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Study Guide

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CHAPTER 1

Chapter 1 — Getting Your Driver's Licence: Licensing Process

1.1 Knowledge Tests Requirements

You must take knowledge tests whenever you apply for a new licence. All tests are conducted only in English, must be completed without assistance, and are multiple choice. One test is a traffic signs test. Answers to all knowledge test questions are found in the study guide.

- ✓ All knowledge tests are conducted only in English and must be completed without assistance
- ✓ Knowledge tests are all multiple choice
- ✓ A traffic signs test is one of the required knowledge tests

1.2 Medical Examination Requirements for Commercial Licence

After passing your licensing tests, you'll receive a Driver's Medical Examination Report form. Take it to a B.C.-licensed physician who knows your medical history. The doctor completes and sends it to RoadSafetyBC, which determines fitness to drive commercial vehicles. Your photo licence arrives by mail once medical fitness is confirmed.

- ✓ The medical form must be completed by a B.C.-licensed physician familiar with your medical history
- ✓ RoadSafetyBC determines whether you are fit to drive commercial vehicles
- ✓ The doctor's fee for the routine medical form is not covered by MSP, ICBC, or RoadSafetyBC

CHAPTER 2

Chapter 3 — Fire Prevention and Firefighting

2.1 Vehicles required to carry fire extinguishers

Certain commercial vehicles are legally required to carry firefighting equipment.

- ✓ One fire extinguisher must be carried on limited passenger vehicles with authorized seating capacity of more than 10, all public passenger vehicles, and all school buses
- ✓ School bus fire extinguishers must meet Canadian Standards Association (CSA) Standard D250
- ✓ Vehicles transporting explosives must carry two fire extinguishers

2.2 Fire prevention practices for commercial vehicles

Fires can start from smoking, tire heat, and dragging brakes. Drivers must take proactive steps to prevent vehicle fires.

- ✓ Don't smoke in garages or near fuelling areas, and never throw cigarette butts out cab windows as they could blow back into tarps or loads
- ✓ Check tire pressure often — soft tires build heat and can cause fire; if a tire was soft or flat, ensure it is cool before moving again
- ✓ Ensure all brakes including the parking brake are fully released when moving, as dragging brakes generate heat that can ignite grease in the hubs
- ✓ A peace officer may order your vehicle out of service until a fuel leak is repaired

2.3 Firefighting procedures and safety

Fighting a fire requires quick thinking and fast action. Check firefighting equipment daily and know how to use it.

- ✓ Don't risk your own life — fuel fires can spread quickly or explode; tell the first spectator to call the fire department
- ✓ If a fire is on a combination unit, disconnect the tractor from the trailer only if it doesn't put you in danger
- ✓ Fight fires with the wind at your back to reduce chances of being asphyxiated
- ✓ If a fire starts under the hood, direct the extinguisher from underneath or through the radiator — don't open the hood
- ✓ Don't use water on gasoline or oil fires — it spreads them; use an appropriate extinguisher, sand or dirt

2.4 Types of fire extinguishers

There are two main categories: multi-purpose dry chemical extinguishers and carbon dioxide (CO_2) extinguishers.

- ✓ A BC-marked dry chemical extinguisher puts out grease, oil, gasoline and electrical fires; an ABC-marked one also puts out Class A fires like paper and cloth
- ✓ CO_2 extinguishers are extremely effective but must never be used in an enclosed space as you could smother yourself or blister your skin
- ✓ Keep some extinguishing fuel in reserve in case of flare-ups

CHAPTER 3

Chapter 5 — Coupling Pintle Hitch Units

3.1 Pre-Coupling Inspection of Pintle Hitch

Before coupling a truck and trailer with a pintle hitch, set truck parking brakes, exit the cab and inspect key components. Check the pintle hook and latch for cracks and wear, verify spring brakes have applied (if equipped), block trailer wheels, secure cargo, and check the pintle eye for cracks or excessive wear.

- ✓ Set truck parking brakes and exit cab before inspecting the pintle hitch
- ✓ Check pintle hook and latch for cracks and wear, and check pintle eye for cracks or excessive wear
- ✓ Block trailer wheels and ensure spring brakes have applied before coupling

3.2 Aligning Truck to Trailer for Coupling

Position the truck directly in line with the trailer, not on an angle. Use outside mirrors to check alignment — if lined up, you should see an equal portion of each side of the trailer in each mirror. Back up slowly using four-way flashers and horn, stopping just before the pintle hook touches the pintle eye. Place a wood block or marker beside a truck tire visible in your mirrors to gauge accuracy.

- ✓ Turn on four-way flashers and sound horn before backing up
- ✓ When lined up, you should see an equal portion of each side of the trailer in each mirror
- ✓ Back slowly and stop just before the pintle hook touches the trailer pintle eye

3.3 Applying Trailer Brakes Before Coupling

Apply the trailer brakes before coupling. For trailers with spring brakes, ensure they have applied. For trailers without spring brakes, connect the air lines, charge the trailer air system, then apply the trailer brakes before connecting.

- ✓ Apply trailer brakes before coupling to the trailer
- ✓ For trailers without spring brakes, connect air lines and charge the system before applying brakes

3.4 Completing the Pintle Hitch Connection

Set truck parking brakes, turn on lights, exit cab. Lower the pintle eye onto the pintle hook and close the safety latch. Attach safety cables and/or chains, raise the drawbar support leg, connect air lines, electrical cable and hydraulic lines, and remove wheel blocks. Verify the eye is secured, latch locked, cables in place, support leg retracted, and all lines securely connected.

- ✓ Close the pintle hook safety latch and attach safety cables/chains between truck and trailer
- ✓ Adjust drawbar height so pintle eye is slightly higher than pintle hook before connecting
- ✓ Verify trailer lights (tail, brake, licence plate, clearance) to confirm electrical connection is secure

3.5 Pull-Away Check and Trip Inspection

Before pulling away, charge the trailer braking system, raise trailer air suspension if lowered, pressurize the ram if equipped, and check for air leakage. Confirm truck and trailer are lined up and ground is level. Release brakes, pull away slowly, and apply the trailer hand valve at low speed to test service brake operation and connection security. A trip inspection report is required for every new trailer picked up each day.

- ✓ Check for air leakage in the air brake system before pulling away
- ✓ At slow speed apply the trailer hand valve to test service brakes and connection security
- ✓ A trip inspection report is required for every new trailer picked up each day
- ✓ Crossed air lines are indicated if trailer brakes don't release when charging the system

3.6 Uncoupling Pintle Hitch Units

Position the truck directly in line with the trailer. Set truck and trailer brakes, release ram pressure, exit cab and block trailer wheels. Disconnect air/electrical/hydraulic lines, safety cables/chains and safety pin, release the pintle hook latch, lower the drawbar landing leg, and raise the drawbar so the pintle eye clears the hook. Ensure trailer is level and supported, then pull away slowly until completely clear.

- ✓ Set truck and trailer brakes and block trailer wheels before uncoupling
- ✓ Fasten disconnected air lines to dead-end (dummy) connectors to prevent dirt and chafing
- ✓ Ensure trailer is level and support the drawbar after uncoupling if needed
- ✓ Confirm in mirrors that the pintle connection is disconnected before pulling away

CHAPTER 4

Chapter 5 — Skills for Driving Trucks and Trailers: Dangerous Goods

4.1 Nine Classes of Dangerous Goods

Dangerous goods are divided into nine classes: explosives (Class 1), gases (Class 2 including flammable, compressed and toxic gas), flammable liquids (Class 3), flammable solids (Class 4 including spontaneous combustion and dangerous when wet), oxidizing substances and organic peroxides (Class 5), poisonous and infectious substances (Class 6), radioactive materials (Class 7), corrosive substances (Class 8), and miscellaneous products or substances (Class 9). Placards appear on both sides and both ends of transport trucks.

- ✓ There are nine classes of dangerous goods
- ✓ Placards must appear on both sides and both ends of transport trucks
- ✓ Class 4.3 designates goods that are dangerous when wet; Class 4.2 designates spontaneous combustion

4.2 Training and Certification for Dangerous Goods

If you work with dangerous goods, your current employer must certify that you've had appropriate training. You must always carry your training certificate with you when transporting dangerous goods.

- ✓ Your current employer must certify you have appropriate training
- ✓ Always carry your training certificate when transporting dangerous goods

4.3 Reporting Dangerous Goods Incidents

Report immediately any incident involving dangerous goods such as spills, leaks, fires, explosions or damaged containers to the nearest police agency or the Provincial Emergency Program. Rapid action may prevent an incident from becoming serious. In B.C. call local police or the Provincial Emergency Program at 1-800-663-3456.

- ✓ Report any dangerous goods incident immediately to police or the Provincial Emergency Program
- ✓ In B.C. call 1-800-663-3456 for dangerous goods incidents

4.4 Designated Dangerous Goods Routes

Signs designate roads where vehicles transporting dangerous goods may or may not travel. Obey these signs when carrying dangerous goods.

- ✓ Some signs designate roads where dangerous goods vehicles may travel
- ✓ Other signs designate roads where dangerous goods vehicles cannot travel

CHAPTER 5

Chapter 7 — Hours of Service Requirements

5.1 National Safety Code Purpose and Application

The National Safety Code (NSC) sets minimum safety standards for commercial vehicles, drivers and carriers operating in Canada. Carriers must ensure their drivers and vehicles meet these standards. NSC applies to anyone driving a motor vehicle used to transport people or freight for a business purpose. In B.C., these rules are found in Division 37 of the Motor Vehicle Act Regulations.

- ✓ NSC applies to commercial vehicles licensed with a GVW more than 5,000 kg
- ✓ NSC applies to vehicles operating under the Passenger Transportation Act (taxis, buses, limousines)
- ✓ NSC applies to commercial vehicles with a seating capacity of 10 or more passengers plus the driver

5.2 On-Duty Time Definition and Examples

On-duty time begins when you start work or when a carrier requires you to be ready to start work, and ends when you stop work. You are on duty when driving or performing related activities.

- ✓ On-duty time includes inspecting, servicing, repairing, conditioning or starting a commercial vehicle
- ✓ On-duty time includes loading/unloading, inspecting the load, and waiting at customs, weigh scales or for a peace officer
- ✓ Travelling as a passenger to a driving destination is on-duty if the carrier requests the trip AND you did not have 8 consecutive hours off-duty immediately before
- ✓ Ferry time is not on-duty unless you are working (e.g., a bus driver selling tickets)

5.3 Off-Duty Time Requirements

Off-duty time is any time you are not on duty, including time spent in a sleeper berth. Off-duty regulations protect you and everyone sharing the road. Drivers must take mandatory daily and periodic off-duty time.

- ✓ All drivers must take a minimum of 10 hours off duty every day
- ✓ Off-duty time beyond the mandatory 8 consecutive hours may be split into blocks of 30 minutes or more
- ✓ Daily off-duty time must include at least 2 hours that are not part of an 8 consecutive hour off-duty period
- ✓ All drivers must take 24 consecutive hours off duty every 14 days

5.4 Daily Limits and the Day Concept

A 'day' is a 24-hour period beginning at the hour designated by the carrier. Each day is independent with its own limits. A simple three-point check for daily compliance is: off duty over 10, driving under 13, no driving after 14 hours on duty.

- ✓ A minimum of 10 hours off-duty must be taken every day
- ✓ You may drive a maximum of 13 hours in a day
- ✓ You are not allowed to drive after 14 hours on duty in a day

5.5 Work Shift and 16-Hour Rule

A work shift is the elapsed time between two off-duty periods of at least eight consecutive hours. You cannot drive after 16 hours of elapsed time until you take at least 8 consecutive hours off-duty. Every off-duty period of 8 consecutive hours or more resets the work shift.

- ✓ You cannot drive after 16 hours of elapsed time in a work shift
- ✓ At least 8 consecutive hours off-duty resets the work shift
- ✓ You can put in 14 hours of on-duty time without doing any driving

5.6 Cycle 1 and Cycle 2 On-Duty Limits

Drivers must track time using one of two cycles, each with a maximum number of on-duty hours. The start time remains the same throughout a cycle and must be 'reset' to change.

- ✓ Cycle 1: must not drive after completing 70 on-duty hours in 7 days
- ✓ Cycle 2: must not drive after 120 on-duty hours in 14 days, and must take 24 consecutive hours off duty prior to accumulating 70 on-duty hours
- ✓ The start time remains the same throughout each cycle unless the cycle is reset

5.7 National Safety Code and Its Application

The National Safety Code (NSC) sets out minimum safety standards for commercial vehicles, drivers and carriers operating in Canada. Carriers are responsible for ensuring their drivers and vehicles meet these standards. In B.C., the NSC is applied through Division 37 of the Motor Vehicle Act Regulations.

- ✓ NSC applies if you drive a motor vehicle used to transport people or freight for any business purpose
- ✓ NSC includes commercial vehicles licensed with GVW over 5,000 kg
- ✓ NSC includes vehicles under the Passenger Transportation Act (taxis, buses, limousines)
- ✓ NSC includes commercial vehicles with a seating capacity of 10 or more passengers plus driver

5.8 Daily Driving and On-Duty Limits

A 'day' is a 24-hour period that begins at the hour designated by the carrier. Each day has specific on-duty, off-duty and driving limits that must be observed.

- ✓ A minimum of 10 hours off-duty time must be taken every day
- ✓ You may drive a maximum of 13 hours in a day
- ✓ You may not drive after 14 hours on duty in a day
- ✓ You can put in 14 hours of on-duty time without doing any driving

5.9 Work Shift Rules

A work shift is the elapsed time between two off-duty periods of at least eight consecutive hours. Every off-duty period of 8 consecutive hours or more resets the work shift.

- ✓ You may not drive after 16 hours of elapsed time until you take at least 8 consecutive hours off duty
- ✓ Every off-duty period of 8 consecutive hours or more resets the work shift

5.10 Daily Cycles (Cycle 1 and Cycle 2)

You must track your time using one of two cycles, each with a maximum number of on-duty hours. The start time remains the same throughout each cycle and you must reset the cycle to change the start time.

- ✓ Cycle 1: must not drive after completing 70 on-duty hours in 7 days
- ✓ Cycle 2: must not drive after completing 120 hours in 14 days, and must take at least 24 consecutive hours off duty before accumulating 70 on-duty hours
- ✓ The start time remains the same throughout each cycle unless you reset

5.11 Cycle Reset Provision

You can reset a cycle at any time by taking a required amount of consecutive off-duty time, which allows you to change your start time and restart your on-duty hour accumulation.

- ✓ Take 36 consecutive hours off duty to reset Cycle 1
- ✓ Take 72 consecutive hours off duty to reset Cycle 2

5.12 RODS Retention and Submission

You must keep your RODS current and carry copies for a set period, and submit them to your carrier within a required timeframe. Peace officers may request to see them.

- ✓ Keep RODS updated to your last change in duty status
- ✓ Carry copies of RODS for the present day and previous 14 days (24 days for oilwell service vehicle hours)
- ✓ Submit your RODS and all supporting records to your carrier within 20 days
- ✓ Present RODS and supporting records (bills of lading, shipping documents, fuel/accommodation receipts) when asked by a peace officer

5.13 Purpose of Hours of Service Regulations

Hours of service regulations are designed to limit the time a driver can spend driving because statistics show that fatigued drivers are more likely to be in a crash. These rules have been in effect since the 1980s and were revised to reduce fatigue-related crashes by giving drivers more opportunity for additional rest.

- ✓ Hours of service rules limit driving time to reduce driver fatigue
- ✓ Fatigued drivers are statistically more likely to be involved in a crash

5.14 Deferring Off-Duty Time

You may reduce your 10-hour daily off-duty requirement by up to two hours under specific conditions. This is called deferring off-duty time and must be clearly documented.

- ✓ The 2 deferred hours must not be part of your 8 consecutive off-duty hours
- ✓ The 2 deferred hours must be added to the 8 consecutive off-duty hours taken the next day
- ✓ You must clearly indicate deferral 'Day 1' and 'Day 2' on your RODS
- ✓ On Day 2 you must still have the 2 off-duty hours that are not part of the mandatory 8-hour block

5.15 Cycle Reset Provisions

You can reset a cycle at any time by taking a required number of consecutive off-duty hours. Resetting changes the cycle start time and clears accumulated hours.

- ✓ Take 36 consecutive hours off duty to reset Cycle 1
- ✓ Take 72 consecutive hours off duty to reset Cycle 2

5.16 Sleeper Berth Off-Duty Splitting

The same driving and on-duty rules apply to sleeper berth drivers, but off-duty time may be split. A sleeper berth does not include the back seat of a bus or a reclining seat, so napping in a reclining seat cannot be recorded as sleeper berth time.

- ✓ Single drivers may split off-duty into two periods if neither is less than 2 hours and total is at least 10 hours
- ✓ Team drivers may split off-duty into two periods if neither is less than 4 hours, the two total at least 8 hours, and total off-duty is at least 10 hours
- ✓ A sleeper berth does not include the back seat of a bus or a reclining seat

5.17 Personal Use Exemption

Driving a commercial vehicle for personal use is not on-duty time if strict conditions are met, allowing limited personal travel without counting toward hours of service.

- ✓ Vehicle must not be used in the carrier's business, must be unloaded and not towing a trailer
- ✓ Vehicle may be driven a maximum of 75 km per day for personal use
- ✓ Odometer readings must be recorded in RODS and you must not be under an out-of-service declaration

5.18 Electronic Logging Devices (ELDs)

As of August 1, 2023, ELDs are required. An ELD automatically records driving time (which may not be shortened), facilitates recording the record of duty status, and must be certified and comply with the Technical Standard. Carriers must ensure ELDs are installed, mounted visibly, and in good working order.

- ✓ ELDs are required as of August 1, 2023 unless otherwise exempted
- ✓ A driver must not use more than one ELD at the same time for the same period
- ✓ The ELD must be mounted in a fixed position visible to the driver in the normal driving position
- ✓ If an ELD malfunctions, the driver must notify the carrier as soon as the vehicle is parked and may use an alternate RODS; the carrier must repair or replace it within 14 days

5.19 Record of Duty Status (RODS) Content

RODS record hours of on-duty, driving and off-duty time. They must contain complete identifying and timing information, and totals for each duty status must equal 24 hours.

- ✓ RODS must include date, start time, driver name and signature, odometer readings, distance driven, and plate/unit number
- ✓ Total hours in each duty status (on-duty, off-duty, driving, sleeper berth) must equal 24 hours
- ✓ Deferral of off-duty time must be declared in the Remarks section indicating 'Day 1' or 'Day 2'

5.20 RODS Possession and Submission

Drivers must keep current and recent RODS in their possession and submit them to the carrier within a set time. Peace officers may inspect RODS and supporting records.

- ✓ Keep RODS updated to your last change in duty status and copies for the present day plus previous 14 days (24 days for oilwell service vehicle hours)
- ✓ Submit RODS and all supporting records to your carrier within 20 days
- ✓ Present RODS and supporting records (bills of lading, shipping documents, fuel and accommodation receipts) to a peace officer when asked

5.21 Out-of-Service for Exceeding Hours

A peace officer can order you out of service if you drive after reaching the maximum on-duty hours for your cycle. Only you, not the vehicle, are placed out of service.

- ✓ A peace officer can declare you out of service for exceeding maximum on-duty hours
- ✓ When declared out of service, only the driver is out of service, not the vehicle

5.22 160 km Home Terminal Exemption

Drivers operating within 160 km of the home terminal may be exempt from keeping RODS and using an ELD if they meet conditions, but the carrier must maintain daily records.

- ✓ Driver must operate within a 160 km radius of the home terminal and take 10 hours off-duty in a day
- ✓ Driver must return to the home terminal each day to begin at least 10 consecutive hours off-duty, and off-duty cannot be deferred
- ✓ The carrier must keep records of report time, release time, total on-duty hours and cycle for a minimum of 6 months

5.23 Sleeper Berth Rules

The same hours of service regulations for driving and on-duty time apply to drivers using sleeper berths. A sleeper berth does not include the back seat of a bus or a reclining seat. Single and team drivers may split off-duty time under specific conditions.

- ✓ Single drivers may split off-duty time into two periods if neither is less than 2 hours and total is at least 10 hours
- ✓ Team drivers may split off-duty time if neither period is less than 4 hours, the two total at least 8 hours, and total off-duty is at least 10 hours
- ✓ A sleeper berth does not include the back seat of a bus or a reclining seat
- ✓ No driving after the 16th hour since the last sleeper period

5.24 Hours of Service North of the 60th Parallel

Different hours apply when operating commercial vehicles in the Yukon, Northwest Territories or Nunavut, allowing longer driving and on-duty times.

- ✓ You may drive a maximum of 15 hours and may not drive after 18 hours on duty
- ✓ You must take at least 8 consecutive hours off after 15 hours driving or 18 hours on duty
- ✓ Cycle 1 is 80 on-duty hours in 7 days; Cycle 2 is 120 on-duty hours in 14 days with 24 consecutive hours off before 80 on-duty hours

5.25 Driving Into the U.S.

Canadian drivers must obey all U.S. regulations while operating there, which differ from Canadian rules. Certain medical conditions disqualify B.C. drivers from operating in the U.S.

- ✓ You may drive 11 hours after 10 hours off-duty and may not drive beyond the 14th hour after coming on duty
- ✓ U.S. limits are 60 on-duty hours in 7 days or 70 in 8 days; the cycle may restart after at least 34 consecutive hours off duty
- ✓ You must participate in a drug and alcohol testing program administered by your employer
- ✓ You may not operate in the U.S. with a history of epilepsy, insulin-controlled diabetes, or if you fail U.S. hearing standards

5.26 Driving North of the 60th Parallel

Different hours of service rules apply when operating commercial vehicles in the Yukon, Northwest Territories or Nunavut, allowing longer driving and on-duty limits.

- ✓ May drive a maximum of 15 hours and may not drive after 18 hours on duty
- ✓ Must take at least 8 consecutive hours off duty after driving 15 hours or 18 on-duty hours
- ✓ Cycle 1: 80 on-duty hours in 7 days; Cycle 2: 120 on-duty hours in 14 days with 24 consecutive hours off before accumulating 80 on-duty hours

CHAPTER 6

Components of a Dual Air Brake System

6.1 Reservoir Pressure Gauges

All air brake-equipped vehicles have at least one air pressure gauge on the instrument panel to indicate service reservoir pressure. Many vehicles use a single gauge with two needles showing primary and secondary reservoir pressures. Gauges must be monitored while driving and during pre-trip inspection.

- ✓ All air brake-equipped vehicles must have at least one air pressure gauge on the instrument panel
- ✓ Check gauges frequently to ensure enough air pressure to apply the brakes
- ✓ A dual-needle gauge shows both primary and secondary reservoir pressures

6.2 Low-Air Warning Device

All air brake-equipped vehicles must have a low-air warning device that activates when air pressure drops to a dangerous level. This must come on when pressure drops below 60 p.s.i. (414 kPa). Warning may be a dashboard light, buzzer, or wig-wag. When it activates, stop and find the cause of the air loss.

- ✓ The low-air warning device must activate when air pressure drops below 60 p.s.i. (414 kPa)
- ✓ If the low-air warning comes on, pull over and stop and do not proceed until the cause is found and the system is deemed safe
- ✓ Approximately 60 p.s.i. remaining is enough to stop the vehicle if you act promptly

6.3 Supply, Primary and Secondary Reservoirs

Compressed air from the compressor contains contaminants including water vapour, oil mist and carbon particles. Most contaminants settle in the supply reservoir. Primary and secondary reservoirs supply cleaner air to all air brake components except the governor valve.

- ✓ Most contaminants (water, oil mist, carbon) settle in the supply reservoir
- ✓ All air brake components except the governor valve are supplied with cleaner air from the primary and secondary reservoirs
- ✓ Some reservoirs have more than one compartment and more than one drain cock

6.4 One-Way Check Valve Function

One-way check valves allow air to flow from the supply reservoir to the primary and secondary reservoirs in one direction only. This prevents air in the primary and secondary reservoirs from flowing backward and being lost if there is a failure in the compressor, discharge line, or supply reservoir.

- ✓ One-way check valves allow air to flow in only one direction
- ✓ They protect the primary and secondary reservoir air supply if there is a failure upstream in the supply system

6.5 Quick Release Valve

A quick release valve allows brakes to release quickly and fully by exhausting pressurized air near the brake chambers instead of routing it all the way back to the foot valve exhaust port. This reduces brake release lag time. They may be found on front brakes, rear brakes, spring parking brakes and other locations.

- ✓ Quick release valves reduce lag time by exhausting air near the brake chambers
- ✓ When brakes release, only the air between the foot valve and quick release valve vents at the foot valve; the larger air volume vents at the quick release valve

6.6 Relay Valve

A relay valve reduces lag time when brakes are applied and released. It is a remote-controlled air valve mounted near the air chambers, supplied directly by primary or secondary reservoirs through a large diameter line. The pressure delivered equals the foot valve control pressure. Primarily used on rear axle brakes.

- ✓ Relay valves reduce brake apply and release lag time and are usually mounted near the air chambers
- ✓ The pressure delivered to the chambers equals the control pressure from the foot valve (e.g., a 20 p.s.i. application delivers approximately 20 p.s.i.)
- ✓ Relay valves are primarily found on rear axle brakes

6.7 Wig-Wag Warning Device

Some older vehicles have a wig-wag warning device near the top of the windshield that drops into the driver's view when pressure drops below approximately 60 p.s.i. Some retract automatically when pressure rises; others must be manually pushed to the out-of-view position.

- ✓ A wig-wag drops into the driver's view when air pressure drops below approximately 60 p.s.i.
- ✓ Some wig-wags retract automatically; others must be manually reset once pressure rises

CHAPTER 7

Chapter 1 — Getting Your Driver's Licence

7.1 Commercial Driver Medical Examination Requirements

Commercial drivers must complete medical exams on a regular schedule and take the Driver's Medical Examination Report form to a B.C.-licensed physician who knows their medical history. The doctor completes and sends the form to RoadSafetyBC, which determines fitness to drive commercial vehicles. The doctor's fee is not covered by MSP, ICBC or RoadSafetyBC.

- ✓ A B.C.-licensed physician who knows your medical history must complete the Driver's Medical Examination Report form
- ✓ RoadSafetyBC determines whether you're fit to drive commercial vehicles
- ✓ The doctor's fee for the routine medical report is not covered by MSP, ICBC or RoadSafetyBC
- ✓ Your driver's licence may be cancelled if you don't submit the medical form

7.2 Road Test Components and Requirements

All road tests consist of a pre-trip inspection, an air brake pre-trip inspection (if equipped with air brakes), and a road test. You must demonstrate pre-trip inspection including written report, basic vehicle control skills, and handling in traffic. A Class 1 road test takes about two hours; Class 2, 3, 4 and heavy trailer endorsement tests take less than two hours. Arrive at least 15 minutes early.

- ✓ All road tests include a pre-trip inspection and a road test
- ✓ Air brake pre-trip inspection required if vehicle is equipped with air brakes
- ✓ A Class 1 road test takes about two hours
- ✓ Arrive at least 15 minutes early for your road test
- ✓ A fee applies if you don't provide 48 hours notice or valid reason for missing a road test

7.3 Pre-Trip Inspection Test Requirements

The National Safety Code requires most commercial drivers to complete trip inspections. Class 1, 2, 3, 4 licences, heavy trailer, house trailer or air brake endorsements require a pre-trip inspection. Class 1, 2, 3 or 4 unrestricted licences also require a written trip inspection report. Pre-trip inspections must always be done before the first run of the day.

- ✓ Pre-trip inspections must always be done before the first run of the day
- ✓ Class 1, 2, 3, 4 unrestricted licences require a written trip inspection report
- ✓ Vehicles with manual slack adjusters require a brake adjustment as part of the test
- ✓ Tell the examiner what you're checking for and how you know each part is in good working order

7.4 Road Test Vehicle Requirements by Class

You must provide an appropriate vehicle representative of the licence class. Class 4 restricted: any car/pickup. Class 4 unrestricted: van/small school bus seating 11+ adults. Class 3: large tandem/tridem rear axle truck. Class 2: bus seating 36+ adults. Class 1: loaded tandem/tridem tractor-trailer with air brakes, on-road loaded weight at least 28,000 kg, semi-trailer at least 13 metres (7.5m if pintle hitch).

- ✓ Class 1 requires loaded tractor-trailer with air brakes, on-road weight at least 28,000 kg
- ✓ Class 1 semi-trailer must be at least 13 metres (7.5 metres if pintle hitch trailer)
- ✓ Class 2 requires a bus seating at least 36 adults
- ✓ Class 4 unrestricted requires van/small school bus seating at least 11 adults
- ✓ Heavy trailer endorsement (code 20) requires truck and trailer without air brakes weighing at least 4,600 kg

7.5 Air Brake Courses and Endorsement

An air brake course is highly recommended. A certified course includes 7 hours classroom theory plus 4 hours practical training on air brake pre-trip inspection; passing the provider's assessment may exempt you from the ICBC pre-trip inspection test. A non-certified course includes 7 hours classroom theory only. Even if exempt from the course, you must pass the air brake knowledge test and pre-trip inspection test.

- ✓ A certified air brake course includes 7 hours classroom theory and 4 hours practical training
- ✓ A non-certified course includes 7 hours classroom theory only
- ✓ You must pass the air brake knowledge test and pre-trip inspection test even if exempt from the course
- ✓ To take a road test in an air-brake vehicle, you need the endorsement or an approved course with passed knowledge test

7.6 Medical Report Schedule by Age

The National Safety Code requires all Class 1, 2, 3 and 4 drivers and those with code 18/19 industrial air brake or code 20 heavy trailer endorsements to submit medical reports regularly. Reports are required at ages 25, 30, 35, 40, 45, then 48, 51, 54, 57, 60, 63, and every year upon reaching age 66.

- ✓ Medical reports required at ages 25, 30, 35, 40 and 45
- ✓ Medical reports required at ages 48, 51, 54, 57, 60 and 63
- ✓ Medical reports required every year upon reaching age 66
- ✓ Applies to Class 1, 2, 3, 4 drivers and code 18, 19, 20 endorsement holders

7.7 Knowledge Tests Requirements

Knowledge tests must be taken whenever applying for a new licence. All tests are conducted only in English, are multiple choice, and must be completed without assistance. One test is a traffic signs test. Answers to all knowledge test questions are found in the study guide.

- ✓ All knowledge tests are conducted only in English
- ✓ Tests must be completed without assistance
- ✓ All knowledge tests are multiple choice
- ✓ A traffic signs test is one of the knowledge tests

7.8 Road Test Skills to Demonstrate

During your road test you must competently demonstrate: starting and stopping, shifting gears, turning, steering, backing up, parking, merging with highway traffic, exiting highways, and driving in traffic. For Class 1 or heavy trailer endorsement (code 20), you must also demonstrate coupling and uncoupling a tractor from a trailer.

- ✓ Must demonstrate starting, stopping, shifting, turning, steering, backing and parking
- ✓ Must demonstrate merging with and exiting from highway traffic
- ✓ Coupling and uncoupling required for Class 1 or code 20 heavy trailer endorsement
- ✓ Concentrate on traffic, not on what the examiner is recording

7.9 Prohibited Loads for Road Test Vehicles

Commercial vehicles used for road tests may not contain dangerous goods or explosives, unbaffled liquids or dry bulk, livestock, or oversized loads. Any load must be properly secured and must not exceed the vehicle's GVWR or licensed GVW. Class 1 and heavy trailer endorsement tests must meet minimum weight and load requirements.

- ✓ Road test vehicles may not contain dangerous goods, explosives, unbaffled liquids or livestock
- ✓ No oversized loads permitted on road test vehicles
- ✓ Load must not exceed GVWR or licensed GVW
- ✓ Loads must be properly secured so they won't escape, shift or sway

7.10 Reasons a Road Test May Be Cancelled

A road test may be cancelled and rescheduled if the vehicle is unsafe. Common reasons include: non-working or obscured lights, air brakes out of adjustment, cracked windshield or illegally tinted windows, insecure load, improper licensing/insurance, faulty seatbelts, unsafe tires, doors/windows not operating, faulty exhaust, and no wheel blocks. No aftermarket tinting is allowed on windshield or front side windows.

- ✓ Air brakes out of adjustment will cause road test cancellation
- ✓ No aftermarket tinting allowed on windshield or front side windows
- ✓ Temporary spare tires may not be used on a road test
- ✓ Wheel blocks are required to safely secure large commercial vehicles for inspection
- ✓ Both driver and passenger doors and seatbelts must work properly

7.11 Road Test Tools and Equipment

Bring tools and equipment to conduct the pre-trip inspection: wrenches, a pry bar, chalk or marker, and a watch/timer to check air brakes. Wear sturdy clothing, hard hat, eye protection, boots, and a safety vest. Ensure the vehicle is clean inside with loose objects removed or stored.

- ✓ Bring wrenches, pry bar, chalk/marker, and a watch/timer for air brake checks
- ✓ Wear a hard hat, eye protection, boots, and safety vest
- ✓ For air-brake vehicles with manual slack adjusters, bring tools to perform brake adjustment
- ✓ Loose objects inside must be removed or stored

7.12 Automatic Transmission Restriction

If you take your Class 1, 2 or 3 road test using an automatic transmission, your licence will be restricted to automatic transmissions only.

- ✓ Taking a Class 1, 2 or 3 road test with automatic transmission restricts the licence to automatic only
- ✓ This restriction applies to Class 1, 2 and 3 licences

7.13 Upgrading and Downgrading Licences

To upgrade a commercial licence class, follow all steps including applying for a learner's licence, and a supervisor with appropriate class must accompany you. To downgrade to a non-commercial or lower commercial class, visit a driver licensing office to apply for a new licence and meet the lower class requirements. Your licence will not be downgraded if you fail to submit a routine medical report.

- ✓ Upgrading requires following all steps including applying for a learner's licence
- ✓ A supervisor with an appropriate class of licence must accompany you while practising
- ✓ Your licence will not be downgraded if you fail to submit a routine medical report
- ✓ Downgrading requires meeting the lower licence classification requirements

7.14 Seasonal Weight Restrictions

The Ministry of Transportation and Infrastructure may post seasonal restrictions limiting axle weight on certain roads. If a restriction is in effect where and when you take your road test, the vehicle weight including load must not exceed the seasonal restriction. Example: if restrictions limit to 50% of legal axle weight, a five-axle combination with 40,500 kg max would be restricted to 20,250 kg.

- ✓ Road test vehicle weight must not exceed any seasonal weight restriction in effect
- ✓ Seasonal restrictions may limit axle weight to a percentage of legal axle weight
- ✓ The Ministry of Transportation and Infrastructure posts seasonal restrictions

CHAPTER 8

Chapter 2 — Heavy Vehicle Braking (continued)

8.1 Anti-lock Braking System (ABS) Facts

ABS does not allow you to drive faster or stop sooner. On some surfaces such as gravel, braking distance with ABS may actually be longer. ABS helps prevent wheel lock-up on slippery surfaces so you can brake hard without skidding and losing steering control, and it may help prevent jackknifing. ABS is only as good as the driver's technique.

- ✓ ABS does not shorten stopping distance and may increase braking distance on gravel
- ✓ ABS prevents wheel lock-up so you can brake hard without losing steering control
- ✓ Read the manufacturer's manual to learn to use ABS properly

8.2 Emergency Stopping Technique with ABS

When making an emergency stop with ABS, apply firm, hard, continuous pressure to the brake pedal until the vehicle stops. Do not pump the brakes, as this turns the system on and off. Brake noise, pedal movement or shudder is normal — keep applying firm pressure. Be extremely cautious when steering around obstacles.

- ✓ Apply firm, hard, continuous brake pressure until stopped — do not pump the brakes
- ✓ Do not be alarmed by brake noise, pedal movement or shudder; keep applying firm pressure
- ✓ Steering and handling are affected by vehicle size, load and any trailer being towed

8.3 Jackknifing Definition and Causes

A full jackknife occurs when a tractor and trailer form an angle of 90 degrees or less relative to one another. This can happen even at very low speeds. Jackknifing is often caused by poor braking techniques, including improper use of retarders.

- ✓ A full jackknife is when the tractor and trailer form an angle of 90 degrees or less
- ✓ Jackknifing can occur even at very low speeds
- ✓ Poor braking technique and improper retarder use cause jackknifing

8.4 ABS in Combination Vehicles

When operating combination vehicles, know which units have ABS. If the tractor and trailers do not all have ABS, apply the brakes as if you were operating a combination without ABS.

- ✓ Determine which units of a combination have ABS before driving
- ✓ If not all units have ABS, brake as if operating without ABS

8.5 Automatic Traction Control (ATC)

ATC is an optional addition to an ABS system that uses the pulsating signal from ABS speed sensors to detect loss of drive wheel traction on slippery surfaces. If a drive wheel spins, ATC applies that brake, transferring power to the opposite side. In extremely slippery conditions ATC reduces engine power to let wheels regain traction. Vehicles with ATC have a dash decal and a dash-mounted warning lamp.

- ✓ ATC uses the same wheel sensors as ABS to detect drive wheel spin
- ✓ ATC applies the spinning wheel's brake to transfer power to the opposite side
- ✓ In extremely slippery conditions ATC reduces engine power to regain traction

CHAPTER 9

Chapter 3 — Fire Safety and Firefighting

9.1 Vehicles Required to Carry Fire Extinguishers

Certain commercial vehicles are legally required to carry firefighting equipment. School bus extinguishers must meet Canadian Standard Association (CSA) Standard D250. You must be properly trained before carrying any dangerous goods.

- ✓ One fire extinguisher must be carried on limited passenger vehicles with an authorized seating capacity of more than 10, all public passenger vehicles, and all school buses
- ✓ School bus fire extinguishers must meet CSA Standard D250
- ✓ Vehicles transporting explosives must carry two fire extinguishers

9.2 Preventing Vehicle Fires

Fire prevention involves careful handling of fuel and cigarettes, monitoring tire pressure, and ensuring brakes are fully released. Soft tires build heat and can cause fires. Diesel fuel is toxic and should never be touched or cleaned with a cloth. A fuel leak can result in a vehicle being ordered out of service by a peace officer until repaired.

- ✓ Never smoke in garages or near fuelling areas, and never throw cigarette butts out of cab windows as they could blow back into tarps or loads
- ✓ Check tire pressure often since soft tires build heat and can cause a fire; if a tire was soft or flat, ensure it is cool and check pressure before moving again
- ✓ Ensure all brakes including the parking brake are fully released when moving, since dragging brakes generate heat that can ignite grease in the hubs
- ✓ A peace officer may order your vehicle out of service until a fuel leak is repaired

9.3 Firefighting Procedures for Vehicle Fires

Fighting a fire requires quick thinking and fast action. Check firefighting equipment daily and know how to use extinguishers and what fires they extinguish. Never risk your own life since fuel fires spread quickly or explode. Have the first spectator call the fire department and warn others of explosion or toxic hazards.

- ✓ If a fire is on a combination unit, disconnect the tractor from the trailer and separate the units, but only if it doesn't put you in danger
- ✓ Fight fires with the wind at your back to reduce chances of being asphyxiated
- ✓ If the fire is in the electrical system, disconnect the battery cables
- ✓ If a fire starts under the hood, direct the extinguisher from underneath or through the radiator and don't open the hood
- ✓ Don't use water on gasoline or oil fires as water will spread them; use an appropriate extinguisher, sand or dirt to smother them

9.4 Types of Fire Extinguishers

There are two main categories of fire extinguishers: multi-purpose dry chemical extinguishers and carbon dioxide (CO2) extinguishers. Dry chemical extinguishers are easier and safer to use, but CO2 extinguishers are more effective. Dry chemical extinguishers come in BC and ABC classes.

- ✓ A cylinder marked BC can put out grease, oil, gasoline and electrical fires; a cylinder marked ABC will also put out Class A fires such as paper and cloth
- ✓ CO2 extinguishers are extremely effective but should never be used in an enclosed space as you could smother yourself or blister your skin
- ✓ Keep some extinguishing agent in reserve in case of flare-ups

CHAPTER 10

Coupling and Uncoupling Pintle Hitch Units

10.1 Inspecting Pintle Hitch Before Coupling

Before coupling a truck and trailer with a pintle hitch, you must set the truck parking brakes, exit the cab, and inspect key components. Check the pintle hook and latch for cracks and wear, verify trailer spring brakes have applied, block the trailer wheels, ensure cargo is secure, and check the pintle eye for cracks or excessive wear. The area around the trailer must be clear.

- ✓ Check pintle hook and latch for cracks and wear before coupling
- ✓ Verify spring brakes have applied and block trailer wheels
- ✓ Check pintle eye for cracks or excessive wear
- ✓ Apply trailer brakes before coupling to the trailer

10.2 Positioning Truck for Pintle Hitch Coupling

Position the truck directly in front of and in line with the trailer, not at an angle. Use outside mirrors to check alignment — if lined up you should see an equal portion of each side of the trailer in each mirror. Turn on four-way flashers and sound the horn before backing. Back up slowly and stop just before the pintle hook touches the trailer pintle eye. Placing a block of wood beside a truck tire visible in mirrors helps gauge positioning accuracy.

- ✓ Truck must be in line with trailer, not on an angle
- ✓ Turn on four-way flashers and sound horn before backing
- ✓ Back up slowly and stop just before pintle hook touches pintle eye
- ✓ Use mirrors — equal portion of each trailer side visible means alignment is correct

10.3 Connecting to the Pintle Hitch Trailer

Adjust drawbar height so the pintle eye is just slightly higher than the pintle hook. Back up so the pintle eye is directly over the pintle hook, then lower the pintle eye onto the hook and close the safety latch. Attach safety cables/chains, raise the drawbar support leg, connect air lines, electrical cable and hydraulic lines, and remove wheel blocks. Verify all connections are secure and check trailer lights.

- ✓ Adjust drawbar so pintle eye is slightly higher than pintle hook
- ✓ Close pintle hook safety latch after lowering eye onto hook
- ✓ Attach safety cables and/or chains and raise drawbar support leg
- ✓ Check trailer lights: tail, brake, licence plate and clearance lights

10.4 Preparing to Pull Away and Final Checks

After coupling, re-enter the cab, charge the trailer braking system, raise trailer air suspension if lowered, and pressurize the air or hydraulic ram if equipped. If trailer brakes don't release when charged, air lines may be crossed. Check for air leakage, confirm pintle eye is securely held, and confirm alignment. At slow speed, apply the trailer hand valve to test service brakes and confirm the connection is secure. A trip inspection report is required for every new trailer picked up each day.

- ✓ If trailer brakes don't release when charged, air lines may be crossed
- ✓ Check for air brake leakage before pulling away
- ✓ Test trailer service brakes at slow speed using the hand valve
- ✓ Complete a trip inspection report for every new trailer picked up daily

10.5 Uncoupling Pintle Hitch Units

To uncouple, position the truck directly in line with the trailer, set both truck and trailer brakes, release ram pressure, and block the trailer wheels. Disconnect air lines, electrical cable and hydraulic lines, then safety cables/chains and safety pin, release the pintle hook safety latch, lower the drawbar landing leg, and raise the drawbar so the pintle eye clears the hook. Ensure the trailer is level and supported. Fasten disconnected lines to dead-end (dummy) connectors to prevent dirt entry and chafing.

- ✓ Set both truck and trailer brakes and block trailer wheels before uncoupling
- ✓ Disconnect lines, then safety cables/chains before releasing the latch
- ✓ Ensure trailer is level and support the drawbar after uncoupling
- ✓ Fasten disconnected air lines to dead-end connectors to prevent debris and chafing

10.6 Trailers Without Spring Brakes

Some trailers don't have spring brakes. With these trailers, before connecting you must connect the air lines to the trailer, charge the trailer air system, and apply the trailer brakes. This ensures the trailer cannot move while you complete the coupling process.

- ✓ For trailers without spring brakes, connect air lines and charge system first
- ✓ Apply trailer brakes before connecting to trailer
- ✓ Always ensure trailer is immobilized before coupling

CHAPTER 11

Dangerous Goods

11.1 Nine Classes of Dangerous Goods

Dangerous goods are divided into nine classes, each identified by placards displayed on the sides and both ends of transport trucks. The classes are: explosives, gases, flammable liquids, flammable solids, oxidizing substances and organic peroxides, poisonous and infectious substances, radioactive materials, corrosive substances and miscellaneous products or substances.

- ✓ There are nine classes of dangerous goods, including explosives (Class 1), gases (Class 2), flammable liquids (Class 3), flammable solids (Class 4), oxidizing substances/organic peroxides (Class 5), toxic/infectious substances (Class 6), radioactive (Class 7), corrosive (Class 8), and miscellaneous (Class 9)
- ✓ Placards may appear on the sides and both ends of transport trucks
- ✓ Class 4.3 indicates goods that are dangerous when wet

11.2 Dangerous Goods Training Certification

Anyone working with dangerous goods must have appropriate training certified by their current employer. The training certificate must be carried with you at all times when transporting dangerous goods.

- ✓ Your current employer must certify that you have had appropriate training to work with dangerous goods
- ✓ Always carry your training certificate with you when transporting dangerous goods

11.3 Reporting Dangerous Goods Incidents

Any incident involving dangerous goods such as spills, leaks, fires, explosions or damaged containers must be reported immediately to the nearest police agency or the Provincial Emergency Program. Rapid action may prevent an incident from becoming serious.

- ✓ Report immediately any incident involving dangerous goods in B.C. by calling local police or the Provincial Emergency Program at 1-800-663-3456
- ✓ Report spills, leaks, fires, explosions or damaged containers to the nearest police agency

11.4 Dangerous Goods Route Signs

Special signs designate which roads vehicles transporting dangerous goods may travel and which roads they may not use. Drivers must obey these route restrictions.

- ✓ One sign designates roads where vehicles transporting dangerous goods may travel
- ✓ Another sign designates roads where these vehicles are not permitted to travel

CHAPTER 12

Chapter 8 — Air Brakes: Components of a Dual Air Brake System

12.1 One-Way Check Valve

One-way check valves allow air to flow from the supply reservoir to the primary and secondary reservoirs in one direction only. This prevents the air supply in the primary and secondary reservoirs from flowing backward and being lost if there is a failure in the air compressor, discharge line, or supply reservoir.

- ✓ Allows air to flow in one direction only
- ✓ Prevents loss of primary/secondary reservoir air if there's a failure in the compressor, discharge line, or supply reservoir

12.2 Low-Air Warning Device

All air brake-equipped vehicles must have a warning device to indicate if pressure drops to a dangerous level. This can occur from an air leak or repeated brake applications used faster than the compressor can replenish. The device is typically a dashboard light and/or buzzer; older vehicles may use a wig-wag that drops into view.

- ✓ The low-air warning device must activate when air pressure drops below 60 p.s.i. (414 kPa)
- ✓ When the warning activates, stop the vehicle and find the cause of the air loss before proceeding

12.3 Supply, Primary and Secondary Reservoirs

Compressed air from the compressor contains contaminants including water vapour, oil mist and carbon particles. Most contaminants settle in the supply reservoir. Primary and secondary reservoirs were added so all air brake components (except the governor valve) receive cleaner air.

- ✓ Most contaminants settle in the supply reservoir
- ✓ All air brake components except the governor valve are supplied with cleaner air from the primary and secondary reservoirs

12.4 Reservoir Pressure Gauges

All air brake-equipped vehicles have at least one air pressure gauge on the instrument panel indicating pressure in the service reservoir system. Many vehicles have a single gauge with two needles showing primary and secondary reservoir pressure. Gauges let you monitor the system while driving and during pre-trip inspection.

- ✓ All air brake-equipped vehicles must have at least one air pressure gauge
- ✓ Check gauges frequently to ensure enough pressure to apply the brakes

12.5 Quick Release Valve

A quick release valve allows brakes to release quickly and fully by allowing pressurized air to exhaust near the brake chambers rather than travelling all the way back to the foot valve. This reduces lag time on release. They may be found on front brakes, rear brakes, spring parking brakes, and anywhere rapid exhaust is needed.

- ✓ Reduces brake release lag time by exhausting air near the brake chambers
- ✓ Air from the foot valve flows through it to the chambers normally when brakes are applied

12.6 Relay Valve

A relay valve reduces lag time on brake application and release. It is a remote-controlled air valve responding to a control signal from the foot valve, mounted near the air chambers and supplied directly from the primary or secondary reservoir via a large diameter line. It delivers reservoir air at the same pressure as the foot valve control signal.

- ✓ Delivers reservoir air at the same pressure as the foot valve control signal (e.g. 20 p.s.i. application = ~20 p.s.i. to chambers)
- ✓ Primarily found on rear axle brakes and designed to handle two or four air chambers

CHAPTER 13

Chapter 9 — Air Brake Adjustment: Misconceptions and Review

13.1 Verify Air Pressure Before Checking Brake Adjustment

Parking brake control valves and trailer supply valves remain open with as little as 20 p.s.i. (138 kPa) system pressure, yet spring brakes may be partially or fully applied. To check brake adjustment accurately, system air pressure must be sufficient and all parking brakes released.

- ✓ Ensure system air pressure is at least 90 to 100 p.s.i. (620 to 690 kPa) before checking brake adjustment
- ✓ Confirm all parking brakes are released before checking brake adjustment
- ✓ Valves may stay open at 20 p.s.i. even though spring brakes are applied

13.2 Automatic vs Manual Slack Adjusters

Automatic slack adjusters compensate for brake wear as the brakes are used, while manual slack adjusters only adjust when done manually. A Transport Canada study found vehicles with manual slack adjusters were placed out-of-service at a rate 150 per cent higher than those with automatic slack adjusters.

- ✓ Automatic slack adjusters automatically adjust for brake wear during use
- ✓ It is illegal in B.C. to retrofit manual slack adjusters on a vehicle manufactured with automatic slack adjusters
- ✓ Manual slack adjuster vehicles are 150% more likely to be put out-of-service

CHAPTER 14

Chapter 10 — Class 3 Pre-Trip Inspection

14.1 Air pressure build-up and warning devices test

During the Class 3 pre-trip inspection, verify that the low-air warning device activates at or above 60 p.s.i. (414 kPa). Pump the air pressure down below 50 p.s.i. (345 kPa), then rebuild pressure to confirm the compressor and governor operate correctly. On some systems, one service reservoir fills first (to about 85-95 p.s.i./586-655 kPa), then the second fills. Regardless of system type, pressure must build from 50 to 90 p.s.i. within three minutes.

- ✓ Low-air warning device must activate at or above 60 p.s.i. (414 kPa)
- ✓ Air pressure must build from 50 to 90 p.s.i. (345 to 620 kPa) within three minutes at fast idle (1,000-1,200 r.p.m.)
- ✓ Pump down below 50 p.s.i. before rebuilding to test the compressor

14.2 Mechanical circle check of truck

Leave the cab and inspect the left, rear, and right sides plus the underside. Check mirrors, steps/hand rails, fuel tanks and caps, exhaust system (no leaks, shields secure), battery compartments (secure, no corrosion or leaks), storage compartments, body and frame for damage, load security devices, suspension, tires/wheels/mud flaps, cab protector, cargo doors/lift/tailgate, foundation brakes, axle assembly, and drive line (u-joints for free play, no leaks). Check for a valid CVIP inspection decal.

- ✓ Inspect brakes, axle assembly, drive line, frame, suspension and tires/wheels on all sides and underside
- ✓ Verify load is secured with adequate, tight load security devices
- ✓ Check exhaust, fuel tanks, batteries and storage compartments are secure with no leaks

14.3 Applied air leakage (brake application) test

After returning to the cab, ensure air pressure is at least 100 p.s.i. (690 kPa) and parking brakes released. Make a full brake application (90 to 100 p.s.i.) and hold for one minute. After the initial pressure drop, air loss must not exceed three p.s.i. (20.7 kPa) per minute and there must be no audible leaks. Check for air leakage with the engine off so you can listen for leaks.

- ✓ Air pressure must be at least 100 p.s.i. (690 kPa) before the test
- ✓ After initial drop, air loss must not exceed 3 p.s.i. (20.7 kPa) per minute with a full application held one minute
- ✓ There must be no audible air leaks

14.4 Brake response, tug and steering slack tests

With the transmission in neutral and engine started, ensure air pressure is in operating range. In low gear, gently tug against the parking brakes — they should prevent movement. Release all brakes, move ahead slowly, and apply the foot brake to check brake response. Move the steering wheel to check for excessive slack or lash. Ensure spring brakes are released before making heavy applications to avoid compounding.

- ✓ Parking brakes must prevent the vehicle from moving during a gentle tug test in low gear
- ✓ Foot brake response must be checked by moving ahead slowly
- ✓ Steering wheel must be checked for excessive slack/lash and spring brakes released before heavy applications

14.5 Circle check for lights procedure

To check lights, turn on the left turn signal, low-beam headlights and clearance lights, then walk counter-clockwise around the vehicle to face traffic. Verify left-turn signal, low-beams, tail lights, licence plate lights and clearance lights work. Then check right-turn signal and high-beams, followed by brake lights. Carry a rag to wipe all lenses. Be cautious when walking with your back to traffic.

- ✓ Walk counter-clockwise around the vehicle to face oncoming traffic
- ✓ Check turn signals, headlights (both beams), tail lights, licence plate lights, clearance lights and brake lights all work
- ✓ Lenses must be clean, not cracked, and the correct colour

14.6 In-cab items to inspect

Check the driver's seat and seatbelt are adjusted and fastening devices work; mirrors are adjusted, clean and crack-free; windows/windshield are clean, crack-free and operable. Ensure all documentation is present, valid and up-to-date including vehicle licence, registration, insurance, logbook (if required), CVIP inspection report and CVIP decal on windshield (if required).

- ✓ Documentation must include vehicle licence, registration, insurance, logbook, CVIP report and decal where required
- ✓ Seat, seatbelt, mirrors and windows must be adjusted, functional and free of cracks

CHAPTER 15

Chapter 12 — Industrial Roads

15.1 Industrial Air Brake Endorsement Types

An industrial (off-highway) air brake endorsement permits operating unlicensed vehicles equipped with air brakes used to transport natural resources on industrial roads. Code 18 covers unlicensed single-unit vehicles; Code 19 covers single-unit or combination vehicles. The endorsement appears in the 'restrictions' section of your licence.

- ✓ Code 18 permits operating an unlicensed single-unit vehicle with air brakes on industrial roads
- ✓ Code 19 permits operating an unlicensed single-unit OR combination vehicle with air brakes on industrial roads
- ✓ You do NOT need an industrial endorsement to operate skidders, loaders, graders or yarders

15.2 Driver's Duty to Inspect Vehicles

You must determine your vehicle is in safe operating condition before driving. Perform a pre-trip inspection daily before placing the vehicle in service and keep an up-to-date maintenance logbook. Report any defects to the proper company authority and never operate an unsafe vehicle.

- ✓ Perform a pre-trip inspection daily before placing the vehicle in service
- ✓ Keep an up-to-date maintenance logbook
- ✓ Report defects to the proper company authority and do not operate an unsafe vehicle

15.3 Brake Testing on Industrial Roads

Industrial roads rarely have runaway lanes, so brakes must be in good condition. Test brakes before transporting any load and make a rolling brake test before descending steep hills. If brakes aren't safe, stop in a safe place, park and secure the vehicle, and don't drive until repaired.

- ✓ Test the brakes before transporting any load
- ✓ Make a rolling brake test before taking a loaded vehicle down steep hills
- ✓ If brakes are not operating safely, stop, park securely and do not drive until repaired

15.4 Right-of-Way on Industrial Roads

Use a turnout on a narrow road to give right-of-way to a loaded truck. Give right-of-way to a loaded truck coming down a steep hill. Drivers generally follow the rules of the road set out in the Motor Vehicle Act, with applicable sections determined by the Industrial Roads Act.

- ✓ Use a turnout to give right-of-way to a loaded truck on a narrow road
- ✓ Give right-of-way to a loaded truck coming down a steep hill
- ✓ Follow the rules of the road in the Motor Vehicle Act as applied by the Industrial Roads Act

15.5 Definition of an Industrial Road

An industrial road exists for transporting natural resources, machinery, materials or personnel, including company bridges, wharves and log dumps. It excludes public highways, forest service roads, development roads, privately owned farm/resident roads, power/telephone/pipeline maintenance roads, manufacturing plant roads and tote/cat/access roads.

- ✓ An industrial road is used for transporting natural resources, machinery, materials or personnel
- ✓ Public highways, forest service roads and development roads are NOT industrial roads
- ✓ Company bridges, wharves and log dumps are included as industrial roads

15.6 Applying for Industrial Air Brake Endorsement

Apply at a driver licensing office. You must submit a medical report from a B.C.-licensed physician and a letter of proficiency from a current/previous employer outlining your experience, vehicle types and total operating time (minimum three months acceptable). An air brake pre-trip test is required.

- ✓ A letter of proficiency requires a minimum of three months of experience
- ✓ A medical report form completed by a B.C.-licensed physician is required
- ✓ An air brake pre-trip test must be completed successfully before receiving the endorsement

15.7 Water Cooled Brakes

Many heavy industrial vehicles use water to prevent brake drum overheating. Turn on the water just after applying brakes when drums are only slightly warm, and turn off the water just before a complete stop so the drums contract evenly. Cooling only one side can crack the drums. Water tanks are pressurized with compressed air at least 15 p.s.i. (103 kPa).

- ✓ Turn on water just after beginning to apply brakes when drums are only slightly warm
- ✓ Turn off water just before a complete stop so brake drums contract evenly
- ✓ Water tank pressure should be at least 15 p.s.i. (103 kPa)

15.8 Parking on Industrial Roads

When leaving a parked vehicle unattended, set the mechanical brake and secure the vehicle so it doesn't need air or fluid pressure to hold it in place. Overheating drums expand away from the shoes, reducing braking efficiency.

- ✓ Set the mechanical brake when leaving a vehicle unattended
- ✓ Secure the vehicle so it does not rely on air or fluid pressure to stay in place

15.9 Warning Signals and Backing Procedures

Signal your intention to turn, stop or change course as on any public road. Before backing any truck or tractor-trailer into a loading area, sound your horn to warn others and have the head loader or responsible person direct you after confirming no one is in your path.

- ✓ Sound your horn to provide a warning before backing into a loading area
- ✓ Have a responsible person direct you into the loading area after checking your path is clear
- ✓ Signal turns, stops and course changes as on any public road

15.10 Railway Crossings on Industrial Roads

When driving crew cars carrying passengers, you must stop before crossing any railway line intersecting a public or private road and confirm no trains are approaching from either direction. Don't shift gears while crossing tracks.

- ✓ Stop before crossing railway lines when driving crew cars with passengers
- ✓ Confirm no trains are coming from either direction before crossing
- ✓ Do not shift gears while crossing railway tracks

15.11 Highway Crossing Permits

You may operate unlicensed vehicles on industrial roads, but if you plan to take an unlicensed vehicle across a public highway on a regular basis you must obtain a Highway Crossing permit through the Commercial Vehicle Safety and Enforcement Branch (1-800-559-9688) or a weigh scale.

- ✓ A highway crossing permit is required to regularly cross a public highway with an unlicensed vehicle
- ✓ Obtain the permit from Commercial Vehicle Safety and Enforcement or a weigh scale

15.12 Safe Driving and Speed on Industrial Roads

Obey all posted speed signs and match your speed to road conditions. Your prime responsibility is the safety of yourself, other road users, your vehicle and load. Generally drive on the right side, and use caution when entering any public road where all rules of the road apply.

- ✓ Obey posted speed signs and match speed to road conditions
- ✓ Drive on the right side of industrial roads as a rule
- ✓ Follow all rules of the road when entering a public highway

CHAPTER 16

Examiners' Tips for Passing the Road Tests

16.1 Pre-Trip Inspection Test Preparation

Candidates must practise the pre-trip inspection thoroughly before their test. Ensure the vehicle can pass a safety inspection with all lights working (particularly trailer brake lights and turn signals) and air brakes in good condition. Bring appropriate tools and be able to locate and explain all inspection items.

- ✓ Verify all lights work, especially trailer brake lights and turn signals
- ✓ Ensure the air brake system is in good condition before the test
- ✓ Bring appropriate tools for the pre-trip inspection
- ✓ Have someone observe your pre-trip to confirm you complete and can explain every item

16.2 Knowing Your Test Vehicle

Be fully familiar with the vehicle used for the road test, including its handling, turning characteristics, and gearshift operation. During the road test you will be assessed on your ability to shift gears smoothly.

- ✓ Practise driving the test vehicle to know its handling and turning characteristics
- ✓ Master smooth gearshift operation as it is assessed during the road test

16.3 Speed and Traffic Lane Discipline

Drive at posted speed limits and do not keep up with speeding traffic. Watch for school zones and playgrounds. Use the correct traffic lane and make proper turns as described in the guide.

- ✓ Drive at posted speed limits and never match speeding traffic
- ✓ Watch for and slow in school zones and playgrounds
- ✓ Use the correct traffic lane and make proper turns

16.4 Stops, Turns and Observation

Make full stops at stop signs in the correct position and pull out slowly while scanning the intersection when safe. Perform a mirror check and, if possible, a shoulder check whenever changing lanes or direction. Scan intersections before proceeding even on a green light and observe carefully when backing up.

- ✓ Make full stops at stop signs and stop in the correct position
- ✓ Mirror check and shoulder check before changing lanes or direction
- ✓ Scan intersections before proceeding even when the light is green
- ✓ Observe carefully when backing up

16.5 Safe Following Distance and Railway Crossings

Maintain a safe distance from other vehicles at all times. Be familiar with commercial vehicle procedures for crossing railway tracks.

- ✓ Keep a safe distance from other vehicles
- ✓ Know commercial vehicle procedures for crossing railway tracks

CHAPTER 17

What to take to the driver licensing office

17.1 Required documents for knowledge and road tests

When attending the driver licensing office, candidates must bring proper identification and applicable fees. For the knowledge test you need primary and secondary identification, your current licence, and fees for the knowledge test plus any outstanding debt. For the road test you additionally need a safe vehicle acceptable for the licence class with registration and insurance papers, plate numbers written down, road test and photo licence fees, and glasses or contacts if required.

- ✓ Bring primary and secondary identification, current licence, and required fees to all tests
- ✓ For the road test, provide a safe, acceptable vehicle with valid registration and insurance for the class applied for
- ✓ Bring glasses or contact lenses if you require them to drive

17.2 Arrival times and appointment rules

Timing matters when attending for tests. Arrive at least one hour before the office closes to take a knowledge test, and at least 15 minutes before your scheduled road test appointment. All road tests are by appointment only and must be booked ahead. If you cannot keep an appointment, you must notify ICBC. A fee is charged if you do not show up and fail to provide either 48 hours notice or a valid reason.

- ✓ Arrive at least one hour before closing for a knowledge test
- ✓ Arrive at least 15 minutes before a road test appointment
- ✓ Provide at least 48 hours notice or a valid reason to avoid a no-show fee

17.3 Identification and fees required for tests

When applying for a commercial driver licence, whether it's your first, transferring from another jurisdiction, or a re-examination, you must bring proper identification and fees. Different requirements apply for knowledge tests versus road tests.

- ✓ Always take primary and secondary identification, plus fees for services or licences requested
- ✓ For knowledge tests bring primary and secondary ID, current licence, and fees for the test plus any outstanding debt
- ✓ For road tests bring ID, current licence, a safe acceptable vehicle with registration and insurance, fees, and glasses/contacts if required

17.4 Arrival times for knowledge and road tests

You must allow enough time before tests. For knowledge tests arrive well before closing; for road tests arrive before your appointment time. All road tests require advance booking.

- ✓ Arrive at least one hour before office closing to take a knowledge test
- ✓ Arrive at least 15 minutes before your road test appointment time
- ✓ All road tests are by appointment only and must be booked ahead

17.5 Required documents for knowledge test

When applying for any commercial licence, applicants must bring proper identification, their current licence and applicable fees. For the knowledge test, primary and secondary identification, current licence, and fees (including outstanding debt) are required.

- ✓ Bring primary and secondary identification plus your current licence for the knowledge test
- ✓ Arrive at least one hour before closing to take a knowledge test
- ✓ Pay knowledge test fees and any outstanding debt

17.6 Required items for road tests

For road tests you must bring primary and secondary ID, your current licence, a safe acceptable vehicle or combination for the licence class with registration and insurance, road test and photo licence fees, and any required glasses or contact lenses.

- ✓ Provide a safe vehicle or combination acceptable for the class of licence you seek, with registration and insurance
- ✓ Write down the vehicle licence plate number(s) to give to staff
- ✓ Bring glasses or contact lenses if required to drive
- ✓ Arrive at least 15 minutes before your road test appointment

17.7 Road test appointments and no-show fees

All road tests are by appointment only and must be booked ahead. If you cannot keep an appointment you must notify ICBC. A fee is charged for no-shows without 48 hours notice or a valid reason.

- ✓ Road tests are by appointment only and must be booked ahead
- ✓ Notify ICBC if you cannot keep your appointment
- ✓ A fee applies if you miss a test without 48 hours notice or a valid reason

17.8 Re-test waiting periods

If you do not pass a knowledge test, pre-trip inspection, or road test, you must wait before attempting again. For knowledge tests and pre-trips, the wait is 7 days for every attempt. For Class 1-4 road tests, the wait is 14 days for the first unsuccessful attempt and 30 days for the second and subsequent attempts. For Endorsement 20 road tests, the wait is 14 days for the first attempt, 30 days for the second, and 60 days for the third and subsequent attempts.

- ✓ Knowledge tests and pre-trips require a 7-day wait after each unsuccessful attempt
- ✓ Class 1-4 road tests: 14 days after first fail, 30 days after second and later fails
- ✓ Endorsement 20 road tests: 14 days, then 30 days, then 60 days for third+ fails

17.9 Road test cancellation and no-show fees

If you cannot keep your road test appointment you must notify ICBC. Failing to attend without proper notice or a valid reason results in a fee.

- ✓ Notify ICBC if you cannot keep your road test appointment
- ✓ A fee is charged for no-shows without 48 hours notice or a valid reason
- ✓ Write down the licence plate number(s) of test vehicle(s) to give to staff

CHAPTER 18

Introduction / Using this guide

18.1 Licence study chart usage

The study chart directs candidates to the chapters needed for their specific licence or endorsement. Class 1 applicants must study all indicated chapters and take a knowledge test covering all air brake material for that class — they do not need the separate single-unit air brake test. Industrial air brake endorsement (Code 18/19) applicants do not take a knowledge test but should study indicated chapters to prepare for the pre-trip inspection test.

- ✓ Class 1 knowledge test includes all air brake knowledge material for that class
- ✓ Industrial air brake Code 18 requires studying the same chapters as single-unit air brake plus chapter 12
- ✓ Industrial air brake endorsement applicants are not required to complete a knowledge test

18.2 Driver error causes most crashes

ICBC, government and industry work together to reduce crashes, but the driver has the most important role since most crashes are caused by driver error and are preventable. A professional attitude is essential to safety.

- ✓ Most commercial vehicle crashes are caused by driver error and are preventable
- ✓ Skill and ability alone are not enough — a professional attitude behind the wheel is required for safety

18.3 Purpose of the commercial driving guide

This guide provides the basic information needed to qualify for a Class 1, 2, 3 or 4 commercial licence, an air brake endorsement, an industrial air brake endorsement or a heavy trailer endorsement (code 20). It is a source text but not a training manual — practical experience and instruction from licensed drivers or professional training facilities are required.

- ✓ Most crashes involving large vehicles are caused by driver error and are preventable
- ✓ A professional attitude, along with skill and knowledge, is required behind the wheel
- ✓ The guide covers fuel-efficient driving habits that reduce fuel consumption and emissions

18.4 Purpose and scope of the guide

The guide provides the basic information needed to apply for a Class 1, 2, 3 or 4 commercial licence, an air brake endorsement, industrial air brake endorsement or heavy trailer endorsement. It is a source text, not a training manual — practical experience and instruction are also required.

- ✓ The guide covers Class 1, 2, 3 and 4 commercial licences plus air brake, industrial air brake, and heavy trailer endorsements
- ✓ Once you have a learner's licence you must gain practical experience operating the type of vehicle you want to be licensed for, with instruction from an appropriately licensed driver or training facility

CHAPTER 19

Shifting Skills

19.1 Progressive Shifting and Shift Timing

Progressive shifting is recommended for many new vehicles with high-torque engines. The r.p.m. at which you shift becomes higher as you select higher gears. A tachometer helps determine when to shift. Smart driving techniques like progressive shifting save fuel.

- ✓ Shift r.p.m. increases as you move into higher gears (e.g. 1,200 r.p.m. first-to-second, 1,350 r.p.m. fifth-to-sixth)
- ✓ Use a tachometer to determine shift points
- ✓ Refer to the vehicle manufacturer's guide for the best shifting method

19.2 Shifting Gasoline (Non-Governed) Engines

For upshifting a gasoline-powered engine: start in low gear using only enough throttle to move; quickly shift to the next gear as the engine accelerates; allow the engine to develop more power before each shift as speed increases; engage the clutch smoothly while engaging throttle to avoid shock on drive train.

- ✓ Start in low gear using only enough throttle to move the vehicle
- ✓ Shift to higher gears as soon as you have the power
- ✓ Engage the clutch smoothly and apply throttle simultaneously to avoid drive train shock

19.3 Shifting Governed Engines

A governor controls fuel to the engine and regulates engine speed, allowing you to start on level ground and grades without using the throttle. Always squeeze the throttle rather than stab at it for smooth acceleration. If you need throttle to move off a loaded vehicle with a diesel engine, you should be in a lower gear.

- ✓ Squeeze the throttle rather than stabbing/jabbing for smooth operation
- ✓ Use only enough power to shift into the next gear
- ✓ If throttle is needed to move a loaded diesel, use a lower gear
- ✓ Engage the clutch smoothly to avoid shocking the drive train, load or passengers

19.4 Entering Curves

Before entering a curve, slow to a safe speed and downshift to a gear that lets you use engine power throughout the curve. This keeps the vehicle stable and provides good acceleration when leaving the curve.

- ✓ Slow to a safe speed before entering a curve
- ✓ Downshift to a gear that provides engine power through the entire curve

CHAPTER 20

Chapter 3 — Basic Driving Skills: Shifting Gears

20.1 Progressive shifting and shift methods

Progressive shifting is recommended for many new vehicles with high-torque engines. The r.p.m. needed to shift increases as you select higher gears (e.g., first-to-second at 1,200 r.p.m., fifth-to-sixth at 1,350 r.p.m.). A tachometer indicates engine speed and helps you decide when to shift. An alternative is the standard r.p.m. split method. Always consult your manufacturer's guide for the best method.

- ✓ Use progressive shifting for new high-torque engines, increasing r.p.m. at higher gears
- ✓ A tachometer helps determine the correct time to shift
- ✓ Consult vehicle manufacturer's guidebook for the best shifting method

20.2 Shifting non-governed gasoline engines

For gasoline-powered engines without governors, start in low gear using only enough throttle to move. Quickly shift to the next gear as the engine accelerates, shifting to higher gears as soon as you have power. Let the engine develop more power before each higher shift. Engage the clutch smoothly and apply throttle at the same time to avoid drive train shock.

- ✓ Start in low gear using only enough throttle to move the vehicle
- ✓ Engage clutch smoothly and apply throttle simultaneously to avoid drive train shock

20.3 Shifting governed engines

A governor controls the amount of fuel and regulates engine speed, letting you start on level ground and grades without using the throttle. Always squeeze the throttle rather than stabbing or jabbing at it for smooth acceleration. Use only enough power to shift into the next gear. You may skip gears on down or level grades depending on weight and gear ratios. If you must apply throttle to move a loaded diesel, you should be in a lower gear.

- ✓ Squeeze the throttle smoothly rather than stabbing or jabbing at it
- ✓ A governor lets you start on level ground and grades without throttle
- ✓ If a loaded diesel needs throttle to move off, use a lower gear

20.4 Entering curves

Before entering a curve, slow to a safe speed and downshift to a gear that lets you use engine power all through the curve. This keeps the vehicle stable and provides good acceleration as you leave the curve.

- ✓ Slow to a safe speed and downshift before entering a curve
- ✓ Choose a gear that provides engine power throughout the curve

CHAPTER 21

Chapter 8 — Air Brakes: Foundation Brake Types

21.1 Wedge Brakes Operation and Adjustment

Wedge brakes use a wedge forced between brake shoes to apply the brakes. Unlike s-cam systems, drivers cannot easily check wedge brake adjustment. When lining thickness reaches a specific limit, automatic adjusters have failed. Only qualified mechanics should adjust or repair wedge brakes.

- ✓ Drivers can't easily check wedge brake adjustment unlike s-cam systems
- ✓ Wedge brakes should only be adjusted or repaired by a qualified mechanic
- ✓ Automatic adjusters have failed when lining reaches inch limit for both linings

21.2 Air Disc Brakes

Air disc brakes use a rotor/disc mounted to the wheel hub that rotates with the wheel. Two brake pads press against either side of the rotor, similar to a large 'C' clamp. Most feature internal automatic adjustment for pad wear. Chamber stroke limits are the same as automatic slack adjusters. Drivers cannot easily check adjustment.

- ✓ Air disc brakes press two pads against a rotor like a C-clamp
- ✓ Chamber stroke limits are the same as for automatic slack adjusters
- ✓ Air disc brakes should only be adjusted or repaired by a qualified mechanic

21.3 Air-Over-Hydraulic Brakes

Air-over-hydraulic brakes are found on middleweight trucks and buses, combining air brake and hydraulic braking features. The system consists of a compressor, governor, air storage tanks, foot valve and two air-over-hydraulic pressure intensifiers. Air pressure actuates the braking action while hydraulic pressure delivers braking force. Standard pressure is around 125 p.s.i. (862 kPa).

- ✓ Air pressure actuates braking but hydraulic pressure delivers braking force to foundation brakes
- ✓ Standard air pressure is around 125 p.s.i. (862 kPa)
- ✓ An air brake-endorsed licence is required unless the system doesn't use an air treadle
- ✓ Drivers must check air pressure gauges frequently as serious leaks stop brakes functioning

21.4 Air-Over-Hydraulic Parking Brakes

Many air-over-hydraulic systems have a parking brake chamber attached to the foundation brake. Applying the dashboard parking brake control valve applies the spring in the chamber, forcing a wedge between brake shoes. Releasing directs air pressure to contract the wedge and spring.

- ✓ Parking brake controlled by same dashboard-mounted parking brake control valve as full air systems
- ✓ Applying the parking brake forces a wedge between the brake shoes to apply brakes
- ✓ Releasing directs air pressure to contract the wedge and spring

CHAPTER 22

Introduction

22.1 Purpose and Scope of the Guide

Operating commercial vehicles or vehicles equipped with air brakes requires special knowledge and skill because crashes involving large vehicles can be catastrophic. Most crashes are caused by driver error and are preventable. This guide provides information to apply for Class 1, 2, 3 or 4 commercial licences, or air brake, industrial air brake and heavy trailer endorsements.

- ✓ Most commercial vehicle crashes are caused by driver error and are preventable
- ✓ A professional attitude, plus knowledge and skill, is required to operate commercial vehicles safely
- ✓ The guide is a source text, not a full training manual—practical experience and instruction are also required

CHAPTER 23

Chapter 1: Getting your driver's licence

23.1 Commercial licence classes and requirements

This chapter covers licence classes, medical fitness, vision standards, and how to apply for Class 1, 2, 3 or 4 licences and endorsements. Different commercial vehicles require different licence classes, and applicants must meet medical fitness and vision standards to qualify. Class 1 drivers must complete Mandatory Entry Level Training (MELT).

- ✓ Class 1, 2, 3 and 4 licences authorize different types of commercial vehicles
- ✓ Applicants must meet medical fitness and vision standards
- ✓ Class 1 applicants must complete Mandatory Entry Level Training (MELT)

23.2 Air brake and heavy trailer endorsements

An air brake endorsement is required to operate vehicles equipped with air brakes. There is also an industrial air brake endorsement and a heavy trailer endorsement. Candidates must apply through ICBC and pass the relevant knowledge and practical requirements to add these endorsements to their licence.

- ✓ An air brake endorsement is required to operate air brake-equipped vehicles
- ✓ A heavy trailer endorsement is required for towing heavy trailers
- ✓ Endorsements require passing applicable knowledge and practical tests

23.3 Class 1 licence scope and minimum age

A Class 1 licence permits operation of semi-trailer trucks and all other motor vehicles or combinations of vehicles except motorcycles. The minimum age is 19. Class 1 covers the broadest range of vehicles.

- ✓ Class 1 allows all motor vehicles and combinations except motorcycles
- ✓ Minimum age for Class 1 is 19
- ✓ You must hold a full-privilege Class 5 or equivalent licence before applying

23.4 Class 2 licence scope

A Class 2 licence permits operation of buses, including school buses, special activity buses and special vehicles. Trailers or towed vehicles may not exceed 4,600 kg — they may exceed 4,600 kg only if the bus and trailers do not have air brakes. Class 2 also covers any Class 4 vehicles. Minimum age is 19.

- ✓ Class 2 covers buses including school and special activity buses
- ✓ Trailers may not exceed 4,600 kg unless neither bus nor trailer has air brakes
- ✓ Minimum age for Class 2 is 19

23.5 Class 3 licence scope

A Class 3 licence permits trucks with more than two axles (dump trucks, large tow trucks) but not buses transporting passengers, a tow car towing a vehicle of any weight, a mobile truck crane, and Class 5 vehicles. Trailers may not exceed 4,600 kg unless neither truck nor trailer has air brakes. Minimum age is 18.

- ✓ Class 3 covers trucks with more than two axles but not passenger buses
- ✓ Trailers may not exceed 4,600 kg unless neither truck nor trailer has air brakes
- ✓ Minimum age for Class 3 is 18

23.6 Class 4 unrestricted and restricted

Class 4 unrestricted permits buses with maximum seating of 25 persons (including driver), taxis, limousines, ride-hailing vehicles and ambulances. Class 4 restricted permits taxis, limousines, ride-hailing (up to 10 persons including driver), ambulances, and special vehicles for people with disabilities (max 10 persons). Minimum age for both is 19.

- ✓ Class 4 unrestricted covers buses up to 25 seats including driver
- ✓ Class 4 restricted covers vehicles up to 10 persons including driver
- ✓ Minimum age for Class 4 is 19

23.7 Air brake endorsement requirement (code 15)

To operate vehicles equipped with air brakes on a highway (except construction vehicles), you must have a B.C. driver's licence with an air brake endorsement (code 15). This is also required for most vehicles with air-over-hydraulic brakes. The endorsement code appears in the restrictions section of the licence.

- ✓ Air brake endorsement (code 15) is required to operate air brake equipped vehicles on highways
- ✓ Air-over-hydraulic braked vehicles also require the air brake endorsement
- ✓ Construction vehicles are exempt from the air brake endorsement requirement

23.8 Commercial licence prerequisites

Before applying, you must hold or have held a full-privilege Class 5 or 6 (or out-of-province equivalent), have an acceptable driving record with fewer than four penalty-point offences in the previous two years and zero motor-vehicle-related Criminal Code convictions in the previous three years, meet minimum age, have no outstanding fines/debts, and meet medical standards.

- ✓ Fewer than four penalty-point offences allowed in the previous two years
- ✓ Zero motor-vehicle-related Criminal Code convictions in the previous three years
- ✓ Must hold/have held a full-privilege Class 5 or 6 licence or out-of-province equivalent

23.9 Learner's licence supervisor requirements

A learner's licence is valid for one year and allows practice with a supervisor. The supervisor must be at least 19 years old and hold the appropriate licence for the vehicle. They must sit beside you or immediately behind and to the right if no seat is beside the driver. When operating a bus, taxi, ride-hailing vehicle or ambulance, no passengers are permitted except the supervisor and other learners of the same class.

- ✓ Learner's licence is valid for one year
- ✓ Supervisor must be at least 19 and hold the appropriate licence class
- ✓ No passengers permitted on bus/taxi/ambulance except supervisor and same-class learners

23.10 Class 1 Mandatory Entry Level Training (MELT)

MELT became a requirement for all new Class 1 applicants on October 18, 2021. It aligns with the national Class 1 entry-level training standard under the National Safety Code and includes theory, practical training, on-highway driving and air brake operation. It is a one-time requirement offered by ICBC-approved driving schools. Applicants must qualify for a Class 1 learner licence before starting MELT.

- ✓ MELT is a legislated one-time requirement for all new Class 1 drivers since October 18, 2021
- ✓ MELT includes air brake operation training
- ✓ Applicants must hold a Class 1 learner licence before starting MELT

23.11 Commercial licence classes

BC issues commercial driver licences in Classes 1, 2, 3 and 4 (restricted or unrestricted). Each class corresponds to different vehicle types and may require specific endorsements such as air brakes, industrial air brakes, or heavy trailer endorsements.

- ✓ Class 1, 2, 3 and 4 licences are commercial classes
- ✓ Class 4 can be restricted or unrestricted
- ✓ Some vehicles require additional endorsements beyond the base licence class

23.12 Air brake endorsement

An air brake endorsement is required to operate vehicles equipped with air brakes. Applicants apply through ICBC and may complete an ICBC-approved air brake course. An industrial air brake endorsement is also available.

- ✓ An air brake endorsement is required to operate air brake-equipped vehicles
- ✓ Air brake endorsements can be obtained through ICBC-approved air brake courses
- ✓ An industrial air brake endorsement option is available

23.13 Knowledge and road testing requirements

Getting a commercial licence requires passing a knowledge test, a pre-trip inspection test, and a road test. Road test vehicles must be appropriate for the class applied for. Retest waiting periods apply after failures.

- ✓ A knowledge test must be passed before road testing
- ✓ A pre-trip inspection test is required for commercial licences
- ✓ The road test vehicle must match the class of licence sought

23.14 Air brake knowledge test rules

An applicant who fails the air brake knowledge test after three attempts must complete or repeat an approved 7-hour air brake training course. Air brake knowledge test results are only valid for one year — if the endorsement is not placed on the licence within one year, the test must be retaken.

- ✓ Three failed air brake knowledge test attempts require completing a 7-hour approved course
- ✓ Air brake knowledge test results are valid for only one year
- ✓ Air brake courses are a minimum of 7 hours in length

23.15 Air brake endorsement application steps

To apply: complete a minimum 7-hour air brake course and obtain proof, study applicable guide sections, apply at a licensing office with primary and secondary ID and proof of air brake experience, pay the fee and take the knowledge test, then take the air brake pre-trip inspection test. A road test is not required but you must bring an air brake equipped vehicle.

- ✓ A road test is not required for the air brake endorsement
- ✓ You must bring an air brake equipped vehicle for the pre-trip inspection test
- ✓ Same type of identification used to apply must be brought to the test

23.16 Medical fitness and vision standards

Commercial drivers must be in good physical condition and meet a higher vision standard than Class 5 drivers. Applicants complete a medical declaration and a Driver's Medical Examination form completed by a doctor and sent to RoadSafetyBC. Vision screening measures visual acuity, peripheral vision, depth perception, double vision (diplopia) and colour perception (red, green, amber).

- ✓ Commercial drivers must meet a higher vision standard than Class 5 drivers
- ✓ Vision screening tests acuity, peripheral vision, depth perception, diplopia and colour perception
- ✓ Applicants needing corrective lenses must wear them during vision screening

23.17 MELT for drivers moving to B.C.

Drivers with a Canadian Class 1 licence and more than 24 consecutive months of experience (not expired over three years) do not need MELT. Those with 12-24 months experience without an accepted MELT course get two road test attempts before being required to take MELT. Those with less than 12 months, or any Class 1 licence issued outside Canada, must take MELT. B.C. accepts MELT from Saskatchewan, Manitoba, Ontario and Alberta.

- ✓ Over 24 consecutive months of Canadian Class 1 experience waives MELT
- ✓ Class 1 licences issued outside Canada always require B.C.'s MELT
- ✓ B.C. accepts MELT from Saskatchewan, Manitoba, Ontario and Alberta

23.18 Heavy trailer endorsement (code 20)

A heavy trailer endorsement for a Class 4 or 5 licence allows towing trailers of any weight provided neither the truck nor trailer has air brakes. Application requires study, a learner's licence with knowledge and road sign tests, vision/medical screening, and a road test including a pre-trip inspection. The supervisor must be at least 19 and hold a Class 1, 2 or 3 licence.

- ✓ Heavy trailer endorsement (code 20) allows towing any weight with no air brakes on truck or trailer
- ✓ Supervisor must hold a Class 1, 2 or 3 driver's licence
- ✓ Road test includes a pre-trip inspection test

23.19 Medical fitness and vision requirements

Commercial drivers must meet medical fitness and vision standards to qualify for and keep their licence. Commercial licensing requires periodic medical examinations, and processing fees apply for commercial driver medical examinations.

- ✓ Commercial drivers must meet medical fitness standards
- ✓ Commercial drivers must meet vision standards
- ✓ A processing fee applies to commercial driver medical examinations

23.20 Heavy trailer endorsement

A heavy trailer endorsement is required for towing certain heavy trailers. Applicants apply through ICBC and must meet endorsement testing requirements.

- ✓ A heavy trailer endorsement is required for certain heavy trailer combinations
- ✓ Apply for the heavy trailer endorsement through ICBC

23.21 Keeping and maintaining your licence

Commercial drivers must maintain medical fitness, and a commercial driver medical examination processing fee applies. Drivers can upgrade to a higher commercial class, downgrade to a non-commercial licence, or downgrade to a lower commercial class as circumstances change.

- ✓ Commercial drivers must undergo periodic medical examinations to keep their licence
- ✓ A commercial driver medical examination processing fee applies
- ✓ Drivers may upgrade or downgrade their commercial licence class

23.22 Keeping, upgrading and downgrading a licence

Commercial licences must be maintained through ongoing medical and fitness requirements. Drivers may upgrade their commercial licence, downgrade to a lower commercial class, or downgrade to a non-commercial licence.

- ✓ Maintaining a commercial licence requires meeting ongoing medical requirements
- ✓ Drivers can upgrade or downgrade their commercial licence class
- ✓ Downgrading options include lower commercial class or non-commercial licence

23.23 Air brake endorsement application

An air brake endorsement is required to operate air brake-equipped vehicles. It can be obtained through knowledge and practical testing or an approved course.

- ✓ An air brake endorsement is needed to drive vehicles equipped with air brakes
- ✓ Endorsements covered include air brake, industrial air brake, and heavy trailer endorsements

CHAPTER 24

Chapter 1 — Road Testing

24.1 Road Test Components and Structure

All road tests consist of a pre-trip inspection, an air brake pre-trip inspection (if equipped with air brakes), and a road test. You must demonstrate a pre-trip inspection (with written report), basic vehicle control skills, and handling in traffic. A Class 1 road test takes about two hours; Class 2, 3, 4 and heavy trailer endorsement tests take less than two hours.

- ✓ All road tests include a pre-trip inspection and an air brake pre-trip inspection if the vehicle is air-brake equipped
- ✓ A Class 1 road test takes about two hours
- ✓ Arrive at least 15 minutes early and provide 48 hours notice or a valid reason to avoid a no-show fee

24.2 Pre-Trip Inspection Test Requirements

The National Safety Code requires most commercial drivers to complete trip inspections. Applicants for Class 1, 2, 3, 4, heavy trailer, house trailer, or air brake endorsement must conduct a pre-trip inspection. Class 1, 2, 3 or 4 unrestricted applicants must also complete a written trip inspection report. Pre-trip inspections must always be done before the first run of the day.

- ✓ Under the NSC, pre-trip inspections must always be done before the first run of the day
- ✓ Class 1, 2, 3 or 4 unrestricted licence applicants must complete and submit a written trip inspection report
- ✓ Vehicles with manual slack adjusters require a brake adjustment as part of the test

24.3 Road Test Skills Demonstration

During your road test you must competently demonstrate: starting and stopping, shifting gears, turning, steering, backing up, parking, merging with highway traffic, exiting highways, driving in traffic, and coupling/uncoupling a tractor from a trailer (Class 1 or heavy trailer endorsement code 20). Concentrate on traffic, not on what the examiner records.

- ✓ Coupling and uncoupling a tractor from a trailer is required for a Class 1 road test or heavy trailer endorsement (code 20)
- ✓ You must demonstrate all basic control skills including backing up, parking, merging, and exiting highways

24.4 Automatic Transmission Restriction

If you take your Class 1, 2 or 3 road test using an automatic transmission, your licence will be restricted to automatic transmissions only. This is an important consideration when selecting your road test vehicle.

- ✓ Taking a Class 1, 2 or 3 road test with an automatic transmission restricts your licence to automatic transmissions only

CHAPTER 25

Chapter 2 — Heavy Vehicle Braking

25.1 Anti-lock Braking System (ABS) Basics

ABS does not allow you to drive faster or stop sooner. On some surfaces such as gravel, braking distance with ABS may actually be longer. ABS helps prevent wheel lock-up on slippery surfaces, allowing you to brake hard without skidding or losing steering control, and may help prevent jackknifing. ABS is only as good as the driver — learn and practise the correct technique.

- ✓ ABS does not let you drive faster or stop sooner; on gravel braking distance may be longer
- ✓ ABS prevents wheel lock-up so you can brake hard without losing steering control
- ✓ Read the vehicle manufacturer's manual to learn to use ABS properly

25.2 Emergency Stopping with ABS

When making an emergency stop with ABS, apply firm, hard continuous pressure to the brake pedal until the vehicle stops. Do not pump the brakes as this turns the system on and off. Brake noise, pedal movement or shudder is normal — keep applying firm pressure. Be extremely cautious steering around obstacles as handling depends on size, load and trailer.

- ✓ Apply firm, hard continuous pressure to the brake pedal until stopped
- ✓ Do not pump the brakes with ABS
- ✓ Do not be alarmed by brake noise, pedal movement or shudder — keep firm pressure applied

25.3 Jackknifing

A full jackknife occurs when a tractor and the trailer form an angle of 90 degrees or less relative to one another. This can happen even at very low speeds. Jackknifing is often caused by poor braking techniques, including improper use of retarders.

- ✓ A full jackknife is when tractor and trailer form an angle of 90 degrees or less
- ✓ Jackknifing can occur even at very low speeds
- ✓ Jackknifing is often caused by poor braking and improper retarder use

25.4 Why Heavy Vehicles Take Longer to Stop

A heavy tractor-trailer can weigh up to 63,500 kg loaded. Stopping a tractor-trailer at 100 km/h in an emergency (about 7 seconds) requires a stopping force of nine times the acceleration force — approximately 4,000 hp. Each brake on an 8-axle 16-brake vehicle provides about 1/16 of the braking force. If brakes are out of adjustment or axles unequally loaded, others work harder, increasing stopping distance and heat buildup.

- ✓ A loaded tractor-trailer combination can weigh up to 63,500 kg
- ✓ Out-of-adjustment brakes force other brakes to do more than their share, increasing stopping distance
- ✓ Unequally loaded axles may cause lighter-loaded wheels to skid
- ✓ Excessive brake use can cause heat buildup exceeding what brakes can dissipate, leading to failure

25.5 Total Stopping Distance and Time

Total stopping is a see-think-do process. It includes perception time (see-think, about 3/4 second), reaction time (do, about 3/4 second), brake lag time, and braking time. Air brakes have a brake lag time of approximately 4/10 of a second between application and function, unlike cars where brakes work almost instantly.

- ✓ Total stopping time = perception time + reaction time + brake lag time + braking time
- ✓ Air brakes have a brake lag time of approximately 4/10 of a second
- ✓ Average driver's perception time is about 3/4 second and reaction time about 3/4 second
- ✓ Stopping time is longer if brakes are incorrectly adjusted or vehicle is on a downgrade

25.6 Following Distance for Heavy Vehicles

Passenger cars use the two-second rule. Drivers of buses, trucks and other large heavy vehicles should never be less than five seconds behind the vehicle ahead at highway speeds. Stay even further back when conditions are less than ideal.

- ✓ Heavy vehicle drivers should never be less than five seconds behind at highway speeds
- ✓ Passenger cars and light trucks use the two-second rule
- ✓ Stay even further back when conditions are less than ideal

25.7 Effects of Speed and Weight on Stopping

Speed and weight affect stopping power required. Doubling vehicle speed requires 4 times the stopping power. Doubling vehicle weight requires 2 times the stopping power. Doubling both speed and weight requires 8 times the stopping power. Road grade also matters — downhill requires longer stopping distance, uphill shorter.

- ✓ 2 x vehicle speed requires 4 x the stopping power
- ✓ 2 x vehicle weight requires 2 x the stopping power
- ✓ 2 x speed and 2 x weight requires 8 x the stopping power
- ✓ Going downhill requires longer stopping distance due to gravity

25.8 Brake Heat Limits and Brake Fade

In normal stopping brake components heat to about 120°C, and can handle up to about 250°C under hard braking. Excessive heat causes drums to expand away from linings, resulting in brake fade, damage or failure. Brake components or tires may catch fire. Brake fade occurs when overheated brakes stop working properly, causing longer or no stopping.

- ✓ Brake components operate best at around 120°C and should not exceed 250°C
- ✓ Too much heat causes brake fade, brake damage or brake failure
- ✓ Brake fade occurs when brakes overheat and stop working properly
- ✓ As brake drums heat up, they expand away from the brake linings

25.9 Descending Downgrades Safely

Most brake failures and runaway crashes are caused by overdriving brakes' ability to handle heat (poor speed control). Descend a hill more slowly than other traffic. Be in a lower gear going down than used to climb. Never shift to a higher gear on a downgrade unless speed can be controlled with a retarder or engine compression. Select a safe speed for weight, length, steepness, weather and conditions.

- ✓ Be in a lower gear to go down a hill than used to climb it
- ✓ Never shift to a higher gear on a downgrade unless speed can be controlled by retarder or engine compression
- ✓ Almost all brake failures and runaway crashes are caused by overdriving brakes (poor speed control)
- ✓ Control speed so you can stop at any time for an emergency while descending

25.10 Downgrade Braking Procedure on Highways

If your chosen safe speed, low gear, and retarding device don't control speed and it increases, apply the brakes hard enough to reduce speed by 10 to 15 km/h while brakes are cold, then downshift to a lower main gear (don't use the splitter valve). Continue using engine compression, gearing and retarder. Repeat if needed. Use four-way flashers and stay in the far right lane.

- ✓ Apply brakes hard enough to reduce speed by 10 to 15 km/h when brakes are cold
- ✓ Downshift to a lower main gear (don't use the splitter valve on a downhill)
- ✓ Use engine compression, transmission gearing and retarding device to control speed
- ✓ Keep your vehicle in gear all the way down the hill
- ✓ Use four-way flashers and stay in the far right lane where possible

25.11 Combination Unit Braking

With air brakes, all brakes apply at the same time and same pressure when you step on the pedal. Applying brake pressure too forcefully or only trailer brakes on slippery roads may cause wheel lockup, skid or jackknife. Use extra caution in curves. Brakes, tires and suspension work best when legally loaded and load properly distributed. Empty cargo without ABS may cause wheel bounce and lockup.

- ✓ With air brakes, all brakes apply at the same time and same pressure
- ✓ Applying trailer brakes only on slippery roads may cause a skid or jackknife
- ✓ Use extra caution when applying brakes in a curve
- ✓ Empty cargo area without ABS may cause wheels to bounce and lock up
- ✓ Towing two trailers requires extra care as they are difficult to stop in a straight line

25.12 Anti-Lock Braking Systems (ABS)

ABS is mandatory in Canada on all trucks and buses over 4,560 kg manufactured since April 1, 2000, and on all commercial trailers equipped with air brakes. ABS is an addition to a normal air brake system that helps prevent wheel lockup or skids caused by overbraking on slippery surfaces.

- ✓ ABS is mandatory on trucks and buses over 4,560 kg manufactured since April 1, 2000
- ✓ ABS is mandatory on all commercial trailers equipped with air brakes
- ✓ ABS is an addition to a normal air brake system
- ✓ ABS helps prevent wheel lockup or skids from overbraking on slippery surfaces

25.13 ABS in Combination Vehicles

When operating combination vehicles, make sure you know which units have ABS. If the tractor and trailers do not all have ABS, apply the brakes as if you were operating a combination without ABS.

- ✓ Know which units of a combination have ABS
- ✓ If not all units have ABS, brake as though operating without ABS

25.14 Automatic Traction Control (ATC)

ATC is an optional addition to an ABS system. It uses the pulsating signal from the ABS wheel speed sensors to detect loss of drive wheel traction on slippery surfaces. If a drive wheel begins to spin, ATC applies that brake, transferring power to the opposite side. In extremely slippery conditions, ATC reduces engine power to let wheels regain traction. Vehicles with ATC have a dash information decal and dash-mounted warning lamp.

- ✓ ATC uses the same wheel sensors as ABS to detect drive wheel spin
- ✓ ATC applies the spinning wheel's brake to transfer power to the opposite side
- ✓ In extremely slippery conditions ATC reduces engine power to restore traction

25.15 Basic Scientific Principles of Braking

A brake is a heat conversion machine that works opposite to an engine. Brakes convert the energy of motion into heat energy through friction between brake drums/rotors and brake linings/pads. The heat is absorbed and dissipated into the atmosphere primarily through the brake drums/rotors. Braking effectiveness depends on the linings/pads producing friction, drums dissipating heat, and tires gripping the road.

- ✓ Brakes convert the energy of motion into heat energy through friction
- ✓ Heat is dissipated primarily through the brake drums/rotors
- ✓ Braking depends on friction between lining/pad and drum/rotor surfaces
- ✓ Bald or defective tires may degrade braking performance

25.16 Retarders and Their Use

Retarders provide auxiliary slowing for controlling speed on long downgrades without the main braking system, saving brakes for emergencies. Four types: engine, exhaust, hydraulic driveline, and electric driveline retarders. An engine retarder is more efficient at higher engine r.p.m. and lower vehicle speed — select the right gear before starting downhill. Be cautious on slippery roads as retarders can lock drive wheels and cause jackknifing.

- ✓ The four types are engine, exhaust, hydraulic driveline and electric driveline retarders
- ✓ Engine retarders are most effective at higher r.p.m. and with transmission in low gear
- ✓ Select your gear before starting down a hill, not on the downgrade
- ✓ Retarders on slippery roads can lock drive wheels and cause loss of control or jackknife
- ✓ Obey signs restricting the use of engine retarders/engine brakes

25.17 Safe Braking Technique

Bring a vehicle to a stop on level roadway by squeezing gradually and firmly on the brake pedal. Just before a full stop, reduce brake pressure to prevent jerking back. To stop safely, ensure brakes are correctly adjusted, load balanced, and tires in good condition and properly inflated. Travel at a speed allowing you to see ahead and maintain safe following distance.

- ✓ Squeeze gradually and firmly on the brake pedal to stop
- ✓ Reduce brake pressure just before a full stop to prevent jerking back
- ✓ Ensure brakes are correctly adjusted, load balanced, and tires in good condition
- ✓ Make stops slowly to give the driver behind plenty of notice

25.18 Braking on Icy Roads

On icy roads use extremely light pressure on the brake to control speed and prevent wheels from locking up. A slowly revolving wheel is more effective than a locked skidding wheel. Vehicles with ABS require a different technique. Use snow tires and/or chains; mount chains in designated chain-up areas before steep hills. Reduce speed when driving with tire chains.

- ✓ Use extremely light brake pressure on icy roads to prevent wheel lockup
- ✓ A slowly revolving wheel is more effective than a locked skidding wheel on ice
- ✓ Mount tire chains in designated chain-up areas before steep hills
- ✓ Don't deflate tires to install tire chains; reduce speed when driving with chains

25.19 Water on Roadways and Brakes

Water can reduce braking efficiency. Avoid driving through large amounts of water when possible. If you must, cover the brake pedal and place a slight constant drag on the brakes while driving through to reduce water entering the drums and shoes. Reduce speed before driving through water. After driving through water, test brakes by applying slight pressure to dry them out.

- ✓ Reduce speed before driving through large pools of water on the roadway
- ✓ Apply a slight constant drag on brakes while driving through water
- ✓ After driving through water, apply slight brake pressure to dry out the brakes
- ✓ Water can reduce braking efficiency

25.20 Runaway Lanes

Runaway lanes are located beside the road on some downhill grades to help slow and stop vehicles whose brakes fail while going downhill. They should be used only to control your speed or stop, not for any other purpose.

- ✓ Runaway lanes help slow and stop vehicles whose brakes fail on downhill grades
- ✓ Runaway lanes should be used only to control your speed or stop
- ✓ Don't use runaway lanes for any other purpose

25.21 Fines for Improper Brake Adjustment

You can be fined as much as $2,000 if operating a vehicle with brakes that are not adjusted correctly or not performing adequately. The most common air brake defect found during inspections is brakes out of adjustment.

- ✓ You can be fined as much as $2,000 for operating with incorrectly adjusted brakes
- ✓ The most common air brake system defect found during inspection is brakes out of adjustment

CHAPTER 26

Chapter 5 — Loading and Weight Distribution

26.1 Effects of Load Distribution on Handling

How cargo weight is distributed affects vehicle handling and the life of tires, frame, springs, axles and bearings. A poorly distributed load can overload an axle or set of tires, stress the frame, cause permanent damage and steering misalignment. Improper loading can also make a load dangerously top-heavy.

- ✓ A poorly distributed load can overload an axle, stress the frame and cause steering misalignment
- ✓ Never place a very concentrated heavy load against the cab as it may bend the frame and overload front tires

26.2 Correct Placement of Concentrated Loads

Place a very concentrated heavy load near the rear, on its long side, partially over or just ahead of the rear axles for proper tire loading. Block the load securely to prevent forward sliding. Load evenly so equal weight is on all rear tires to prevent frame twisting and axle/bearing overload. Never place a load on one side (overloads springs/tires) or on the tailgate (severe strain).

- ✓ Place concentrated heavy loads partially over or just ahead of the rear axles with longest side on the floor
- ✓ Distribute equal weight on all rear tires to prevent frame twisting and axle overloading
- ✓ Never load items on the tailgate as it strains equipment and can cause collisions
- ✓ Securely block loads to prevent them from sliding forward

26.3 Axle Weight Distribution Percentages

Weight distribution requirements vary by vehicle type. Five-ton freight trucks are designed for about 90% of cargo weight on rear axles and 10% on the steering axle. Cement mixers and dump trucks: about 70% rear, 30% steering. Tridem drive trucks must have combined steering axle weight of at least 25% of tridem axle weight (40% for twin steering). Trailers should carry about 45% on trailer axle, 45% on drive axle, 10% on steering axle.

- ✓ Five-ton freight trucks: ~90% rear axle, 10% steering axle
- ✓ Cement mixers/dump trucks: ~70% rear axles, 30% steering axle
- ✓ Trailers: ~45% trailer axle, 45% drive axle, 10% steering axle
- ✓ Tridem drive truck steering axle must be at least 25% of tridem axle weight (40% for twin steering)

CHAPTER 27

Chapter 5 — Vehicle and Load Dimensions

27.1 Commercial Transport Act Dimension Limits

The Commercial Transport Act sets limits for commercial vehicle lengths, widths, heights and weights. You must obey all Ministry of Transportation signs limiting dimensions or weight regardless of the licence or permit you carry. Temporary additional weight restrictions can be posted at certain times of the year.

- ✓ The Commercial Transport Act sets limits for length, width, height and weight
- ✓ Obey all dimension/weight signs regardless of licence or permit held
- ✓ Temporary weight restrictions can be posted seasonally

27.2 Maximum Vehicle Height

Know the height of your vehicle and its load at all times. The maximum allowable height for a commercial vehicle is 4.15 m unless the driver has an oversize load permit. Highway signs before underpasses and tunnels give overhead clearances; overhead check bars may be installed to test clearance.

- ✓ Maximum allowable height for a commercial vehicle is 4.15 m without an oversize permit
- ✓ Know your vehicle and load height at all times
- ✓ Highway signs before underpasses/tunnels give overhead clearance heights

27.3 Maximum Vehicle Width

The maximum legal width of a vehicle and its load is 2.6 m unless the driver has an oversize load permit. Certain items may extend up to 10 cm beyond the sides without counting toward overall width: anti-splash/spray devices, load securement devices, ladders, dangerous goods placards, glad hands and air connectors, electrical/hydraulic connectors, and clearance lights. Side mirrors may extend up to 20 cm; more than 20 cm counts in overall width. Loose hay/straw/fodder may be loaded to a maximum of 3.1 m overall width.

- ✓ Maximum legal width of vehicle and load is 2.6 m without an oversize permit
- ✓ Certain items may extend up to 10 cm beyond sides without counting in width
- ✓ Side mirrors may extend up to 20 cm before counting in overall width
- ✓ Loose hay/straw/fodder may be loaded to a maximum 3.1 m width
- ✓ Side mirrors must always extend beyond your load even when oversize

27.4 Vehicle Weight Terms and GVW

Commercial vehicles are licensed according to gross vehicle weight (GVW). GVW is the combined weight of the vehicle and its load. GVWR (gross vehicle weight rating) is the manufacturer's rating of the vehicle and maximum load it should carry. Licensed GVW is the combined weight of the vehicle and maximum load it's licensed to carry or tow. The minimum licensed GVW of most commercial vehicles is 1.5 times the net weight of the vehicle.

- ✓ GVW is the combined weight of the vehicle and its load
- ✓ GVWR is the manufacturer's rating of vehicle plus maximum load
- ✓ Minimum licensed GVW of most commercial vehicles is 1.5 times the net weight of the vehicle
- ✓ Watch for maximum allowable weight signs when approaching a bridge

27.5 Vehicle Length Awareness

Always be aware of your vehicle's length and the length of your load, especially when negotiating turns on narrow roads and in alleys. Leave enough clearance to avoid striking poles, parked cars and buildings. The overall length for reefer vans or trailers may be extended to include the refrigeration or heating unit.

- ✓ Be aware of vehicle and load length when turning on narrow roads and alleys
- ✓ Reefer van/trailer length may be extended to include the refrigeration or heating unit

CHAPTER 28

Chapter 8 — Air Brakes

28.1 Basic Air Brake Components

The simplest air brake system consists of a compressor with a governor, air lines, a reservoir, a brake pedal (foot valve), and foundation brakes. These components work together to store compressed air and convert it into braking force.

- ✓ A compressor pumps air and a governor controls the compressor
- ✓ A reservoir stores compressed air and the foot valve directs air to the brakes
- ✓ Foundation brakes include brake chambers, slack adjusters, brake linings and drums or rotors

28.2 Air Brake Chamber Operation

The air brake chamber converts the force of compressed air into strong mechanical force through the pushrod and slack adjuster. It consists of a flexible diaphragm clamped between two steel housings, plus a pushrod, plate assembly and return spring. When air is admitted, the diaphragm inflates and pushes the pushrod out.

- ✓ The air brake chamber converts compressed air force into mechanical force via the pushrod and slack adjuster
- ✓ Pushrod force is governed by air pressure and effective diaphragm surface area
- ✓ When the slack adjuster is at about 90 degrees to the pushrod it provides optimal leverage

28.3 S-Cam Foundation Brake Operation

The foundation brake is the assembly at each wheel operated by the air brake system. The most popular type is the s-cam drum brake. Air pressure moves the pushrod, rotating the slack adjuster and s-cam, forcing brake linings against the drum to create friction and stop the wheel.

- ✓ The s-cam drum brake is the most popular foundation brake type
- ✓ Air pressure moves the pushrod, which rotates the slack adjuster and s-cam to press linings against the drum
- ✓ Brake shoe return springs keep the linings away from the drum when air pressure is released

28.4 Governor Operation

The governor stops the compressor from pumping air once a set pressure is reached (unloading stage) and restarts it when pressure drops. This controls system pressure within a working range.

- ✓ Governors typically unload the compressor at about 125 p.s.i. (max varies 105–135 p.s.i.)
- ✓ The cut-in/cut-out range should be approximately 20 p.s.i. (138 kPa)
- ✓ The governor must restart the compressor if pressure drops below 80 p.s.i. (552 kPa)

28.5 Reservoirs and Safety Valve

Steel tanks called reservoirs store compressed air. A safety valve on the first reservoir protects against over-pressurization. The supply reservoir (wet tank) collects water vapour, oil and carbon that form sludge, so drain valves are used to remove it.

- ✓ The safety valve (pop-off valve) is normally set to vent excess pressure at approximately 150 p.s.i. (1,034 kPa)
- ✓ If the safety valve relieves pressure, the governor or compressor needs service by a qualified mechanic
- ✓ Most manufacturers recommend draining reservoirs daily to remove sludge and water
- ✓ Stay out of the direct path of compressed air when draining reservoirs

28.6 Foot Valve (Treadle) Operation

Pressing the brake pedal (foot valve treadle) applies the air brakes. It is a foot-controlled pressure regulator; you press farther, not harder, to apply more braking force. Holding it in position maintains constant pressure and automatically replenishes small leaks. Releasing exhausts application air to the atmosphere.

- ✓ To apply more braking force you press the foot valve farther, not harder
- ✓ Holding the treadle in one position keeps delivered air pressure constant and replenishes small downstream leaks
- ✓ Maximum brake application cannot exceed the pressure in the reservoirs

28.7 How Air Brakes Apply and Release

When the foot valve is depressed, air flows from the reservoir to the air chambers, pressurizing them so linings contact the drums. When released, an exhaust port opens, air escapes, and return springs retract the pushrod, slack adjusters, s-cams and linings.

- ✓ Applying the foot valve directs air to the chambers to contact linings with the drums
- ✓ Releasing the foot valve opens an exhaust port so chamber air escapes to the atmosphere
- ✓ Return springs move the pushrod and s-cam back and brake shoe return springs retract the linings

28.8 Dual Air Brake Systems

Dual air brake systems, used since the mid-1970s, use a dual foot valve that acts as two independent control valves operated by one pedal. This divides the system into primary and secondary sections, each with its own supply, delivery and exhaust, so a controlled stop is possible if one section fails.

- ✓ The dual foot valve has primary and secondary sections; primary is closest to the pedal and often operates drive axle brakes, secondary usually operates steering axle brakes
- ✓ Most dual systems use three reservoirs: a supply reservoir and two service (primary and secondary) reservoirs, each filled through a one-way check valve
- ✓ If one section totally fails, the driver can still make a controlled stop with reduced braking power

28.9 Air Brake Chamber and Force Multiplication

The air brake chamber converts the force of compressed air into strong mechanical force through the pushrod and slack adjuster. The slack adjuster acts as a lever, providing leverage (force multiplication).

- ✓ A type 30 chamber at 100 p.s.i. (690 kPa) develops a pushrod force of 3,000 pounds
- ✓ The slack adjuster acts as a lever to multiply force, and also adjusts for brake wear
- ✓ The air brake chamber consists of a flexible diaphragm clamped between two steel housings, plus pushrod, plate assembly and return spring

28.10 S-Cam Foundation Brakes

The foundation brake is the brake assembly at each wheel. The most popular type is the s-cam drum brake, where air pressure moves the pushrod, rotating the slack adjuster and s-cam to press linings against the drum.

- ✓ Air pressure moves the pushrod, causing the slack adjuster to rotate the s-cam, pressing linings against the drum to create friction
- ✓ The slack adjuster is used to adjust brakes to compensate for brake lining and drum wear
- ✓ Brake shoe return springs keep the linings away from the drum when air pressure is released

28.11 Air Compressor Operation

The compressor takes in atmospheric air and compresses it, pumping it through an air line to a supply reservoir. It runs whenever the engine is running and operates in intake and compression strokes.

- ✓ The compressor runs as long as the engine is running
- ✓ The compressor must build pressure in the reservoirs from 50 to 90 p.s.i. within 3 minutes at fast idle (1,000–1,200 r.p.m.)
- ✓ On the intake stroke air is drawn in; on the compression stroke the inlet valve closes and discharge valve opens to feed compressed air to the reservoir
- ✓ Check the air filter and compressor oil supply regularly; check belt tension

28.12 Governor Function

The governor controls when the compressor pumps air. When enough pressure builds, the governor causes the compressor to unload; when pressure drops, it restarts compression.

- ✓ Governors are usually set to unload the compressor at about 125 p.s.i. (max varies 105–135 p.s.i.)
- ✓ The range between cut-in and cut-out should be approximately 20 p.s.i. (138 kPa)
- ✓ Vehicle safety standards require the governor allow the compressor to resume compressing if pressure drops below 80 p.s.i. (552 kPa)

28.13 Foot Valve Operation

The foot valve (brake pedal treadle) applies the air brakes and acts as a foot-controlled pressure regulator, allowing you to select the application pressure needed for gentle or rapid stops.

- ✓ You don't press harder for more braking force; you press farther to increase application pressure
- ✓ Holding the foot valve in one position keeps the delivered air pressure constant
- ✓ The maximum brake application will not exceed the pressure in the reservoirs
- ✓ Releasing the foot valve exhausts application air through exhaust ports to the atmosphere

28.14 Why Air Brakes Are Used

Air brake systems apply much greater force than hydraulic braking systems, which is needed to cope with the heavy loads of commercial vehicles. They are also more tolerant of small leaks that could cause failure in a hydraulic system, because the compressor generates more compressed air as needed.

- ✓ Air brakes apply greater force than hydraulic brakes to handle heavy commercial loads
- ✓ Air brake systems are more tolerant to small leaks because the compressor replenishes air
- ✓ Air brakes are capable of stopping heavy commercial vehicles safely

28.15 Compressed Air and Pressure

Air can be compressed into a smaller space, increasing its resistance and creating pressure that converts to mechanical force to apply brakes. Pressure is measured as force per unit area, such as pounds per square inch (p.s.i.) or kilopascals (kPa).

- ✓ 10 pounds of force on one square inch equals 10 p.s.i. or 68.9 kPa
- ✓ The greater the air pressure, the greater the force exerted to apply the brakes

28.16 Force Multiplication and the Slack Adjuster

The force at the wheel to stop is much greater than the force applied to the brake pedal. The slack adjuster acts as a lever, providing force multiplication (leverage), and also adjusts for brake wear. Heavier trucks and buses need more mechanical advantage than cars.

- ✓ The slack adjuster acts as a lever to multiply braking force and adjusts for brake wear
- ✓ Leverage is a form of force multiplication needed for heavy vehicles

28.17 Air Chamber Sizes and Force

Air chambers are made in a range of sizes to match axle capacity so no axle is under- or over-braked. A common Type 30 chamber has 30 square inches of effective diaphragm area and produces strong force at system pressure.

- ✓ A Type 30 chamber applied with 100 p.s.i. (690 kPa) develops a pushrod force of 3,000 pounds
- ✓ Air chambers range from Type 9 (9 sq in) to Type 36 (36 sq in) to match axle capacity
- ✓ Normal stops usually use less than 20 p.s.i. (138 kPa) of application pressure

28.18 Long Stroke vs Regular Brake Chambers

Many new air brake systems use long stroke brake chambers, which have a longer pushrod stroke than standard chambers. They can be visually identified by specific markings.

- ✓ Long stroke chambers have a longer pushrod stroke than standard chambers
- ✓ Long stroke chambers can be identified by square-shaped inlet ports and/or trapezoid-shaped name tags on a clamp bolt

28.19 Air Compressor Function

The compressor takes in atmospheric air, compresses it, and pumps it to a supply reservoir. It is mounted on and driven by the engine (gears or a belt) and runs whenever the engine runs. It operates on intake and compression strokes like a car engine.

- ✓ The compressor runs whenever the engine is running
- ✓ All trucks use piston-type air compressors with one, two or four cylinders
- ✓ Air leaves the compressor at over 204°C (400°F) at 120 p.s.i. (827 kPa)
- ✓ The compressor must build pressure from 50 to 90 p.s.i. within three minutes at fast idle (1,000–1,200 r.p.m.)

28.20 Advantages of Air Brake Systems

Air brake systems use greater force than hydraulic systems, are more tolerant to small leaks, and can safely stop heavy commercial vehicles. A compressor generates additional compressed air as needed.

- ✓ Air brakes use much greater force to apply the brakes than hydraulic systems, needed for heavy loads
- ✓ Air brakes are more tolerant to small leaks because the compressor generates more air as needed
- ✓ Air brakes generate more braking force than hydraulic brakes

28.21 Compressed Air and Force

Air can be compressed into a smaller space, increasing its resistance and creating pressure. This pressure is converted into mechanical force to apply the brakes. Pressure is measured in p.s.i. or kPa.

- ✓ 10 p.s.i. equals 68.9 kPa; 100 p.s.i. equals 690 kPa
- ✓ The greater the air pressure, the greater the force exerted on a surface

28.22 Long Stroke vs Regular Stroke Chambers

Many new air brake systems use long stroke brake chambers, which have a longer pushrod stroke than standard chambers and can be identified by their shape.

- ✓ Long stroke chambers have a longer pushrod stroke than standard chambers
- ✓ Long stroke chambers can be identified by square-shaped inlet ports and/or a trapezoid-shaped name tag on a clamp bolt

28.23 Air Chamber Sizes and Pressure

Air chambers come in a range of sizes to match braking force to axle capacity. Even though system pressures are 100 p.s.i. or above, much lower pressure is used for normal stops.

- ✓ Type 30 clamp type chamber has 30 square inches of effective diaphragm area and is most common on drive and trailer axles
- ✓ Chambers range from Type 9 (9 sq in) to Type 36 (36 sq in) to match axle capacity
- ✓ Normal stops usually use less than 20 p.s.i. (138 kPa) of application pressure

28.24 Compressor Cooling, Lubrication and Air Supply

To prevent overheating, compressors are cooled by circulating engine coolant or by air cooling. Oil lubricates and helps cool the moving parts, usually from the engine oil supply. Clean air supplied through an air filter is required for proper operation.

- ✓ Compressors are cooled by circulating engine coolant or by air cooling
- ✓ Check that the compressor has sufficient oil supply for lubrication and cooling
- ✓ The air filter must be checked regularly to ensure it is not clogged
- ✓ Check belt tension: if it presses in more than double the belt width, adjust it

CHAPTER 29

Dual System Failure and Parking Brakes

29.1 Dual System with Primary System Failure

In a worst-case line rupture causing total loss of primary reservoir pressure, the secondary reservoir is protected by the one-way check valve. The low-air warning must activate when any reservoir falls below 60 p.s.i. Only the steering axle brakes apply, stopping distances are longer. If the secondary system fails, only rear axle brakes work.

- ✓ The low-air warning system must activate when pressure in any reservoir falls below 60 p.s.i. (414 kPa)
- ✓ With primary failure, only steering axle brakes apply and stopping distances are longer
- ✓ If the low-air warning activates, stop immediately and do not proceed until repaired

29.2 Parking Brakes Must Be Mechanical

Air pressure is unreliable and illegal for parking because any air leak could cause a rollaway. Regulations require parking force to be maintained by mechanical means and be unaffected by loss of air pressure. The most common is the spring parking brake; the second is the safety actuator.

- ✓ It is illegal to park a vehicle using only air brakes
- ✓ Parking force must be maintained by mechanical means and be unaffected by loss of air pressure
- ✓ The spring parking brake is the most common type; the safety actuator is found on some buses and coaches

29.3 Spring Parking Brakes Operation

Spring parking brakes use a powerful coil spring (1,500 to 2,000 lbs force) in a chamber piggy-backed onto the service brake chamber, mounted on rear axles only. They apply and remain applied by mechanical spring pressure, not air pressure. Air compresses the spring to release; if air is lost, the spring applies the brakes.

- ✓ Spring parking brakes are mounted on rear axles only, not steering axles
- ✓ The coil spring can exert 1,500 to 2,000 pounds of force
- ✓ Spring parking brakes are held off by air pressure and apply when air is lost
- ✓ Spring parking brake assemblies should only be serviced by qualified personnel due to extreme spring pressure

29.4 Applying and Releasing Spring Parking Brakes

Spring brakes are normally applied and released with the parking brake control valve (usually a yellow button) on the dashboard. Pushing in releases them; pulling out applies them. If air pressure falls below approximately 60 p.s.i., they may drag, and at 20 to 45 p.s.i. (138 to 310 kPa) they may automatically fully apply.

- ✓ Spring brakes are controlled by the dashboard parking brake control valve (usually yellow button)
- ✓ At 20 to 45 p.s.i. (138 to 310 kPa) the spring parking brakes may automatically fully apply
- ✓ Below approximately 60 p.s.i. the spring brakes may begin to drag

29.5 Compounding of Brakes

Always release spring parking brakes before making heavy service brake applications. When spring brakes are applied (up to 2,000 lbs), a heavy service brake application adds air force (up to 3,000 lbs more, totaling 5,000 lbs). This compounding can damage slack adjusters, s-cams, mounting bolts, rollers, shoes and drums. Light applications under 30-40 p.s.i. are not harmful.

- ✓ Always release spring parking brakes before making a heavy service brake application
- ✓ Compounding adds spring force and air force, potentially reaching 5,000 lbs and damaging brake components
- ✓ Light applications of less than 30 to 40 p.s.i. (207 to 276 kPa) to prevent rolling are not harmful

29.6 Manual Release (Caging) of Spring Brakes

Most spring parking brake chambers can be manually released (caged) with a release bolt, used only by mechanics during repairs or to tow a vehicle after total air loss. Always block the wheels before caging. Once caged, there is no parking brake force at that wheel. Call a tow truck to move a caged vehicle.

- ✓ Caging spring parking brakes should only be done in an emergency (e.g., to tow after total air loss)
- ✓ Always block the wheels before caging spring parking brakes
- ✓ Once a spring brake chamber is caged, there is no parking brake force at that wheel

29.7 Two-Way Check Valve and Blended Air

In dual systems, a two-way check valve supplies the parking brake control with air from the reservoir with the highest pressure (called blended air). The valve has two inlet ports and one delivery port with a free-floating shuttle. This prevents spring parking brakes from automatically applying if one reservoir loses all pressure.

- ✓ The two-way check valve draws air from the reservoir with the highest pressure (blended air)
- ✓ It ensures spring parking brakes won't automatically apply if there is a total loss of air in either reservoir
- ✓ Can be tested by draining the primary reservoir and checking secondary pressure doesn't bleed back

29.8 Safety Actuator Parking Brakes

Used on many buses and highway coaches, safety actuators use a one-way locking mechanism instead of a coil spring, with two diaphragms (service and parking) and a separate parking reservoir. Pulling the dash control applies air and engages the lock. They cannot be compounded. They only apply automatically if the parking reservoir loses pressure.

- ✓ Safety actuator parking brakes use a locking mechanism, not a coil spring, and cannot be compounded
- ✓ If more than 4 p.s.i. (27.6 kPa) is lost from the parking reservoir, the parking brakes will not release without a heavy service brake application
- ✓ Safety actuator brakes only apply automatically upon loss of parking reservoir pressure, not service reservoir pressure

29.9 Spring Brake Modulator

Some dual air vehicles have an optional spring brake modulator that senses primary system pressure loss and exhausts air from the spring parking brakes in proportion to the service brake application, letting the driver control spring force to help the front brakes make a controlled stop. All vehicles must meet Canadian Motor Vehicle Safety Standards for emergency stopping.

- ✓ A spring brake modulator senses primary system pressure loss and exhausts spring brake air in proportion to the service application
- ✓ All vehicles must have adequate braking force even with a partially failed air system per Canadian Motor Vehicle Safety Standards

CHAPTER 30

Chapter 1: Getting Your Driver's Licence — Licence Classes

30.1 Class 1 Licence Vehicle Types and Age

A Class 1 licence allows operation of semi-trailer trucks and all other motor vehicles or combinations of vehicles except motorcycles. The minimum age is 19. A Class 1 licence covers all lower commercial classes.

- ✓ Class 1 covers semi-trailer trucks and all combinations except motorcycles
- ✓ Minimum age for Class 1 is 19
- ✓ Class 1 knowledge test includes all air brake material for that class

30.2 Class 2 Bus Licence Requirements

A Class 2 licence permits driving buses, including school buses, special activity buses and special vehicles. Trailers or towed vehicles may not exceed 4,600 kg, unless neither the bus nor trailer has air brakes. It also covers any Class 4 vehicle. Minimum age is 19.

- ✓ Class 2 allows buses, school buses, special activity buses and special vehicles
- ✓ Towed vehicles may not exceed 4,600 kg unless bus and trailer have no air brakes
- ✓ Minimum age for Class 2 is 19

30.3 Class 3 Licence Vehicle Types

A Class 3 licence permits trucks with more than two axles such as dump trucks and large tow trucks, but not buses transporting passengers. Trailers may not exceed 4,600 kg unless truck and trailer have no air brakes. Also permits tow cars towing any weight, mobile truck cranes and Class 5 vehicles. Minimum age is 18.

- ✓ Class 3 covers trucks with more than two axles (dump trucks, large tow trucks)
- ✓ Trailers may not exceed 4,600 kg unless truck and trailer have no air brakes
- ✓ Minimum age for Class 3 is 18; does not include a bus transporting passengers

30.4 Class 4 Unrestricted vs Restricted

Class 4 unrestricted permits buses with maximum seating of 25 (including driver), taxis, limousines, ride-hailing vehicles, and ambulances. Class 4 restricted permits taxis, limousines, ride-hailing vehicles (up to 10 including driver), ambulances, and special vehicles seating not more than 10. Both require minimum age 19.

- ✓ Class 4 unrestricted allows buses with seating up to 25 including the driver
- ✓ Class 4 restricted limits taxis/limos/ride-hailing to 10 persons including the driver
- ✓ Minimum age for both Class 4 categories is 19

30.5 Heavy Trailer and House Trailer Endorsements

A heavy trailer endorsement (code 20) for Class 4 or 5 allows towing trailers exceeding 4,600 kg provided neither truck nor trailer has air brakes. A house trailer endorsement (code 07, formerly code 51) allows towing recreational trailers exceeding 4,600 kg provided neither has air brakes. Minimum age for both is 18.

- ✓ Heavy trailer endorsement (code 20) allows towing over 4,600 kg only if neither unit has air brakes
- ✓ House trailer endorsement (code 07) applies to recreational trailers over 4,600 kg with no air brakes
- ✓ Minimum age for both endorsements is 18

30.6 Prerequisite Class 5 Licence

You must hold a full-privilege Class 5 or equivalent licence before applying for a commercial licence, heavy trailer endorsement or house trailer endorsement.

- ✓ A full-privilege Class 5 or equivalent must be held before applying for a commercial licence or trailer endorsement
- ✓ Driving without the correct class of licence may void insurance coverage in a crash

CHAPTER 31

Chapter 1: Getting your driver's licence — Licence classes

31.1 Class 1 licence vehicles and age

A Class 1 licence permits semi-trailer trucks and all other motor vehicles or combinations of vehicles except motorcycles. Minimum age is 19.

- ✓ Class 1 allows semi-trailer trucks and all other motor vehicles/combinations except motorcycles
- ✓ Minimum age for Class 1 is 19

31.2 Class 2 licence vehicles and age

A Class 2 licence permits buses, including school buses, special activity buses and special vehicles. Trailers or towed vehicles may not exceed 4,600 kg — they may exceed 4,600 kg only if bus and trailers do not have air brakes. Includes any Class 4 vehicle. Minimum age 19.

- ✓ Class 2 allows buses including school buses, special activity buses and special vehicles
- ✓ Trailers/towed vehicles may not exceed 4,600 kg unless neither bus nor trailer has air brakes; minimum age 19

31.3 Class 3 licence vehicles and age

A Class 3 licence permits trucks with more than two axles (dump trucks, large tow trucks) but not buses transporting passengers. Trailers may not exceed 4,600 kg unless neither truck nor trailer has air brakes. Includes tow car towing any weight, mobile truck cranes and Class 5 vehicles. Minimum age 18.

- ✓ Class 3 covers trucks with more than two axles such as dump trucks and large tow trucks, but not passenger buses
- ✓ Trailers/towed vehicles may not exceed 4,600 kg unless neither truck nor trailer has air brakes; minimum age 18

31.4 Class 4 unrestricted and restricted

Class 4 (unrestricted) permits buses seating up to 25 persons (including driver), taxis, limousines, ride-hailing vehicles and ambulances. Class 4 (restricted) permits taxis, limousines, ride-hailing (up to 10 persons including driver), ambulances and special vehicles for people with disabilities seating not more than 10. Minimum age 19 for both.

- ✓ Class 4 unrestricted allows buses seating up to 25 persons including the driver
- ✓ Class 4 restricted allows taxis, limousines and ride-hailing vehicles up to 10 persons including the driver; minimum age 19

31.5 Heavy trailer and house trailer endorsements

Heavy trailer endorsement (code 20) on Class 4 or 5 allows towing trailers exceeding 4,600 kg provided neither truck nor trailer has air brakes. House trailer endorsement (code 07) allows recreational trailers exceeding 4,600 kg under the same air brake condition. Minimum age 18.

- ✓ Heavy trailer endorsement (code 20) allows towing trailers over 4,600 kg only if neither truck nor trailer has air brakes
- ✓ House trailer endorsement (code 07) applies to recreational trailers over 4,600 kg under the same no-air-brake condition

31.6 Prerequisite full-privilege licence

You must hold a full-privilege Class 5 or equivalent licence before you can apply for a commercial licence, a heavy trailer endorsement, or a house trailer endorsement.

- ✓ A full-privilege Class 5 or equivalent licence is required before applying for a commercial licence or heavy/house trailer endorsement
- ✓ Class 7 and Class 8 are graduated licensing program licences

CHAPTER 32

Chapter 3 — Basic Driving Skills

32.1 Two-Second and Five-Second Following Rules

Drivers of passenger cars, taxis, limousines, ride-hailing vehicles, ambulances or vans should use the two-second rule: watch the vehicle ahead pass a checkpoint and count 'one thousand and one, one thousand and two.' If you reach the checkpoint before finishing, drop back. Buses, trucks and other heavy vehicles need at least a five-second following distance. Increase seconds when conditions are less than ideal. Leave even more space when following a motorcycle.

- ✓ Use a minimum two-second following distance for cars, taxis, vans and ambulances
- ✓ Use a minimum five-second following distance for buses, trucks and heavy vehicles
- ✓ Leave more space when following a motorcycle because they can stop quickly

32.2 Understanding the Danger Zone

The danger zone is the section of road a vehicle travels through before it can stop, where it is physically impossible to stop in time to avoid a collision. As speed increases, danger zone length increases; poor road conditions (rain, snow, ice, gravel) increase it further. Reduce your danger zone by slowing down and by covering the brake pedal when you see a potential hazard.

- ✓ Danger zone length increases with speed and poor road conditions
- ✓ Reduce your danger zone by slowing down
- ✓ Cover the brake pedal when a potential hazard develops to reduce reaction time

32.3 Turning Radius and Off Track

The inside wheel turns more sharply and has a shorter turning radius than the outside wheel. Off track is the difference between the path of the front wheels and the path of the rear wheels around a curve. Greater distance between front and rear wheels (longer wheelbase) increases off track. Combination vehicles usually have more off track than single-unit vehicles.

- ✓ The wheel on the inside of a turn has a shorter turning radius than the outside wheel
- ✓ Off track is the difference between front and rear wheel paths in a curve
- ✓ Longer wheelbase and combination vehicles produce more off track

32.4 Inertia and Traction in Curves

Inertia is the tendency of a moving vehicle to continue in a straight line; when braking, inertia keeps the vehicle moving, and in a curve it pushes the vehicle away from the curve path. The faster and heavier the vehicle, the more inertia. Traction is the grip of tires on the road. Reduce speed before entering a curve; enter at a speed that requires no braking and allows gradual power application. Braking in a curve can cause skidding, rollover or jackknife.

- ✓ Reduce speed before entering a curve, not while in it
- ✓ Enter curves at a speed allowing gradual power without needing to brake
- ✓ Obey suggested speed signs on curves to avoid tipping over

32.5 Turning Right Safely

When turning right, consider vehicle length including trailers, rear wheel off track, street layout and traffic. If the turning arc is too small, off tracking may cause trailer wheels to scrape the curb, crowd cyclists, or hit poles. Check for smaller vehicles, motorcycles, cyclists and pedestrians on the right. The most dangerous point is when the tractor has turned but the trailer hasn't, making the right mirror nearly useless. Keep the rear close to the curb to prevent passing on the right; if you must turn wide, watch oncoming traffic and do not back up.

- ✓ Check the right side for cyclists, motorcycles and pedestrians before turning right
- ✓ Keep the rear of your vehicle close to the curb to prevent passing on the right
- ✓ Never back up to make room during a turn — you might hit someone behind you

32.6 Dealing with Tailgaters

Large vehicle drivers rely on outside mirrors and may not see tailgaters in the blind spot directly behind. Allow tailgaters to pass. Make gradual stops to lessen impact. Leave at least 60 m (200 ft) between your vehicle and other large commercial vehicles on a highway. Use the right lane when travelling more slowly, and use four-way flashers when driving slowly up or down a hill.

- ✓ Leave at least 60 m (200 ft) between your vehicle and other large commercial vehicles on a highway
- ✓ Allow tailgaters to pass and make gradual stops
- ✓ Use the right lane and four-way flashers when travelling slowly up or down a hill

32.7 Slow Moving Vehicle Sign

Vehicles, machinery or combinations that travel at less than 40 km/h should display a red triangle slow moving vehicle sign. Do not put this sign on any stationary object or on any vehicle travelling faster than 40 km/h.

- ✓ Display a red triangle slow moving vehicle sign on vehicles travelling less than 40 km/h
- ✓ Never place the sign on a stationary object or a vehicle travelling faster than 40 km/h

32.8 Vehicle Configurations and Steering Viewpoint

Steering and handling differ among conventional, cab-over and forward-control designs. In a conventional design the driver's seat is behind the steering axle; in cab-over it is above the steering axle; in forward-control it is in front of the steering axle. The seat position affects your turning viewpoint and where you start your turn. Vehicle length and number of articulation points also affect turn start point.

- ✓ Driver seat position (conventional, cab-over, forward-control) affects the turning start point
- ✓ Vehicle length and articulation points affect where you begin a turn
- ✓ Account for these differences when switching between vehicle types

32.9 Off Track Factors in Combinations

Each unit with more than one set of wheels has its own turning radius and off-track pattern. Off track depends on wheelbase and the location of pivot points (draw bar connection or fifth wheel). The longer the wheelbase, the longer the draw bar, or the farther back the fifth wheel is mounted, the greater the off track.

- ✓ Longer wheelbase, longer draw bar or rearward fifth wheel increase off track
- ✓ Trailer rear wheels track with more off tracking than the tractor wheels

32.10 Positioning Wheels in Curves

When curving right, keep the front wheels close to the centre line so rear wheels don't drop off the pavement or onto the shoulder. When curving left, keep the front wheels close to the right edge of the lane to keep driver's-side rear wheels out of the next lane. For narrow bridges with curved approaches, know your off track and adjust speed and approach.

- ✓ When curving right, keep front wheels near the centre line to keep rear wheels on the pavement
- ✓ When curving left, keep front wheels near the right edge to keep rear wheels in your lane
- ✓ Adjust speed and approach for narrow bridges based on your vehicle's off track

32.11 Turning Left Safely

Ensure the turning arc is large enough to avoid cutting the corner; turning too soon may cause the left side to hit another vehicle or run over a median due to off tracking. On a multi-lane street you may turn into a lane to the right if it is safe. With two turning lanes, turn from the right-hand turn lane to accommodate off tracking. Check for pedestrians and cyclists.

- ✓ Make the turning arc large enough to avoid cutting the corner and running over a median
- ✓ Turn from the right-hand turn lane when two turning lanes exist
- ✓ Check for pedestrians and cyclists when turning left

32.12 Lane Selection for Large Vehicles

Choose the lane that gives best vision, lets you go where you want and blends with traffic. A right-hand lane is best on a multi-lane divided highway, especially when driving slowly. On freeways, drive in the far right or centre lane, leaving the left lane for higher-speed and passing traffic. Fewer lane changes reduce collision risk and fuel use.

- ✓ Use the right-hand lane on multi-lane divided highways, especially when slower than traffic
- ✓ On freeways drive in the far right or centre lane, leaving the left for passing
- ✓ Minimize lane changes to reduce collision risk and fuel consumption

32.13 Manual Transmissions and Double-Clutching

Commercial vehicles may have manual transmissions with 10 or more gears, usually diesel engines with fuel governors. Most heavy manual transmissions lack synchromesh, so you must double-clutch — depressing the clutch pedal twice when changing gears. Upshifting is done to go faster; downshifting to slow down. Be familiar with the shift pattern and shift points before a trip.

- ✓ Double-clutch (depress the clutch twice) to change gears in non-synchromesh transmissions
- ✓ Upshift to go faster and downshift as you slow down
- ✓ Know your vehicle's shift pattern and shift points before starting a trip

32.14 Double-Clutch Upshift and Downshift Steps

To upshift: release accelerator and depress clutch to neutral, release clutch, let engine/gears slow to the r.p.m. for the next higher gear, depress clutch and shift up, then release clutch while depressing accelerator. To downshift: release accelerator and depress clutch to neutral, release clutch, increase engine speed to match the lower gear's r.p.m., depress clutch and shift down, then release clutch keeping constant accelerator pressure. If a shift is difficult after too long in neutral, do not force it — return to neutral, release clutch, match engine to road speed and try again.

- ✓ When upshifting, let engine r.p.m. drop to match the higher gear before shifting
- ✓ When downshifting, increase engine speed to match the lower gear's r.p.m.
- ✓ Do not force a shift; return to neutral, match speed and try again

32.15 Knowing When to Shift — Torque and Horsepower

Torque moves the vehicle; horsepower develops speed. Peak torque occurs at a lower engine speed than peak horsepower. Operate the vehicle between peak torque and peak horsepower — the normal operating r.p.m. range. Shift progressively, using only enough torque to get moving before shifting up. Lugging occurs when the engine operates below peak torque for any length of time.

- ✓ Operate the engine between peak torque and peak horsepower (normal operating range)
- ✓ Shift progressively, using only enough torque to get the vehicle moving
- ✓ Avoid lugging — operating the engine below peak torque for extended periods

32.16 Following Distance Fundamentals

You can establish a safe following distance using different rules depending on the vehicle type. All following distance rules apply to ideal conditions; when conditions are less than ideal, increase your following distance. Driving conditions are affected by road, vehicle, physical/mental, traffic, lighting and weather conditions.

- ✓ Following distance rules assume ideal driving conditions
- ✓ Increase following distance when conditions are less than ideal
- ✓ Conditions affecting driving include road, vehicle, driver, traffic, lighting and weather

32.17 Two-Second and Five-Second Rules

Drivers of passenger cars and light trucks (taxi, limousine, ride-hailing, ambulance, van) should use the two-second rule: watch the vehicle ahead pass a checkpoint and count 'one thousand and one, one thousand and two.' If you reach the checkpoint before finishing, drop back. Buses, trucks and other heavy vehicles need at least a five-second following distance because they need more time and distance to stop. Leave even more space behind motorcycles as they stop quickly.

- ✓ Use a two-second following distance for taxis, limousines, ambulances and vans
- ✓ Keep at least a five-second following distance for buses, trucks and heavy vehicles
- ✓ Increase the number of seconds when conditions are less than ideal
- ✓ Leave extra following distance behind motorcycles

32.18 Danger Zones

The section of road a vehicle travels through before it can stop is called the danger zone, because it is physically impossible to stop in time to avoid a collision with any object in it. As speed increases, the danger zone lengthens; poor road conditions increase it further. Reduce your danger zone by slowing down and by covering the brake pedal when you see a potential hazard, which reduces reaction time.

- ✓ The danger zone is the distance travelled before a vehicle can stop
- ✓ The danger zone increases with speed and poor road conditions
- ✓ Reduce your danger zone by slowing down and covering the brake pedal when hazards appear

32.19 Off Track and Turning Radius

The inside wheel in a turn has a shorter turning radius and pivots more sharply than the outside wheel. Off track is the difference between the path of the front wheels and the path of the rear wheels around a curve. The greater the wheelbase, drawbar length or the farther back the fifth wheel is mounted, the greater the off track. Combination vehicles have more off track than single-unit vehicles and display several sets of off tracking.

- ✓ The wheel on the inside of a turn has a shorter turning radius than the outside wheel
- ✓ Off track is the difference between the front wheels' and rear wheels' paths
- ✓ Longer wheelbase, drawbar or rearward fifth wheel increases off track
- ✓ Combination vehicles have more off track than single-unit vehicles

32.20 Curves — Inertia and Traction

Inertia is the tendency of a moving vehicle to keep going in a straight line; the faster and heavier the vehicle, the more inertia pushes it off the curve path. Traction is the grip tires have on the road and determines control. Entering a curve too fast and braking may cause loss of traction, skidding, rollover or jackknifing. Reduce speed before entering a curve and apply gradual power through it; obey suggested curve speed signs to avoid tipping over.

- ✓ Reduce speed before entering a curve, not during it
- ✓ Enter a curve at a speed that does not require braking and allows gradual power
- ✓ Obey suggested speed signs in curves to avoid tipping over
- ✓ Braking in a curve can cause skidding, rollover or jackknifing

32.21 Turning Right

When turning right, consider vehicle length, off track of rear wheels, street layout and traffic. If the turning arc of the front wheels is too small, off tracking can cause the trailer's rear wheels to scrape the curb or leave the road, crowding cyclists on the right. Check for smaller vehicles, motorcycles, cyclists and pedestrians before turning. The most dangerous point is when the tractor has turned but the trailer hasn't — the right mirror becomes nearly useless. Keep the rear of your vehicle close to the curb to prevent passing on the right; do not back up for oncoming vehicles.

- ✓ Keep the rear of your vehicle close to the curb to prevent passing on the right
- ✓ Check for cyclists, motorcycles and pedestrians on the right before turning
- ✓ The most dangerous point is when the tractor has turned but the trailer has not
- ✓ Do not back up for oncoming vehicles when making a wide right turn

32.22 Backing Up Safely

Backing up must always be done with extreme caution; with few exceptions you are responsible for any crash while backing. Avoid backing when possible; if you must, plan to minimize distance and ensure the area is clear. Use a guide whenever possible, or get out and walk around the vehicle before backing and every vehicle length. Sound your horn at least once every vehicle length. Back out of traffic rather than into traffic, and back into the view side rather than the blind side.

- ✓ You are responsible for most crashes that happen while backing up
- ✓ Avoid backing when possible; use a guide or walk around the vehicle first
- ✓ Sound your horn at least once every vehicle length while backing
- ✓ Back out of traffic and into the view side, not the blind side

32.23 Blind Spots and Seeing/Being Seen

Large vehicles have dangerous blind spots including the area immediately in front (longer with a longer hood), alongside on the passenger side, and immediately behind. Check carefully for vehicles and bicycles in blind spots, especially in slow urban areas. Convex/spot mirrors make objects look smaller and farther away. Never assume another driver has seen you.

- ✓ Large vehicles have blind spots in front, alongside (especially passenger side) and directly behind
- ✓ Convex or spot mirrors make objects look smaller and farther away than they are
- ✓ Never assume another driver has seen you

32.24 Yielding to Emergency Vehicles

Yield to vehicles using flashing red or blue lights and sirens: drive parallel and as close as possible to the nearest edge or curb, stop clear of any intersection, and remain stopped until the emergency vehicle passes. Do not assume there is only one emergency vehicle. On a divided highway with a median, if in the left/fast lane pull off to the left; the nearest edge could be the left shoulder.

- ✓ Pull to the nearest edge or curb, stop clear of intersections, and remain stopped until the emergency vehicle passes
- ✓ Watch and listen for more than one emergency vehicle
- ✓ On a divided highway the nearest edge could be the left shoulder

32.25 Passing Stopped Vehicles with Flashing Lights

Slow down and leave room when passing stopped vehicles displaying flashing yellow, red, white or blue lights (police, tow trucks, maintenance, utility, etc.). Drive no faster than 70 km/h where the speed limit is 80 km/h or more, and no faster than 40 km/h where the limit is less than 80 km/h. Change lanes to provide space if you are in the nearest lane and it is safe. Exception: does not apply on a divided highway approaching from the opposite direction.

- ✓ Slow to no more than 70 km/h where the limit is 80 km/h or more when passing flashing-light vehicles
- ✓ Slow to no more than 40 km/h where the limit is less than 80 km/h
- ✓ Change lanes away from the stopped vehicle if it is safe to do so
- ✓ Failure to slow or change lanes may result in a violation and penalty points

32.26 Matching Traffic Flow

Match your travelling speed with traffic flow while staying within the speed limit. Driving faster than the flow increases crash risk, prevents safe following distance, requires more lane changes and causes fatigue. Driving slower than the flow increases collision risk with vehicles behind or beside you. Large vehicles that cannot keep up with traffic flow must travel in the right lane.

- ✓ Match travelling speed to traffic flow while staying within the speed limit
- ✓ When unable to keep up with traffic flow, travel in the right lane
- ✓ Maintaining a steady speed improves reaction time and saves fuel

32.27 Dealing with Tailgaters and Slow Moving Vehicles

Large vehicle drivers rely on outside mirrors and may not see tailgaters in the blind spot behind them. Allow tailgaters to pass and make stops gradual to reduce impact. On highways leave at least 60 m (200 ft) between your large commercial vehicle and other large commercial vehicles. Use four-way flashers when driving slowly up or down a hill. Vehicles travelling under 40 km/h should display a red triangle slow moving vehicle sign — never on a stationary object or a vehicle travelling faster than 40 km/h.

- ✓ Leave at least 60 m (200 ft) between your large commercial vehicle and other large commercial vehicles on a highway
- ✓ Allow tailgaters to pass and make gradual stops
- ✓ Vehicles travelling under 40 km/h should display a red triangle slow moving vehicle sign
- ✓ Do not place the slow moving vehicle sign on stationary objects or vehicles going over 40 km/h

32.28 Construction Zones

Watch for construction zones ahead and traffic-control people, workers and equipment, day or night. You may need to wait for a pilot car to escort you through. Leave plenty of following distance, avoid changing lanes, and leave space between you, crews and equipment. Check traffic reports and consider an alternate route.

- ✓ Avoid changing lanes in a construction zone
- ✓ Leave plenty of following distance and space around construction crews and equipment
- ✓ Wait for a pilot car to escort you through when required

32.29 Positioning in Curves

When curving right, keep the front wheels close to the centre line so the rear wheels do not drop off the pavement or onto the shoulder. When curving left, keep the front wheels close to the right edge of the lane to keep the driver's-side rear wheels out of the next lane. Negotiating narrow bridges with curved approaches requires knowing your vehicle's off track.

- ✓ When curving right, keep front wheels close to the centre line
- ✓ When curving left, keep front wheels close to the right edge of the lane
- ✓ Adjust speed and approach based on your vehicle's off track on narrow bridges

32.30 Sharp Right Turns and Steering Method

For a sharp right turn (especially with a forward-control vehicle like a bus), position the vehicle one to two metres from the curb on approach, drive straight until the side street curb line is visible, then enter the turn at low speed. Use the hand-over-hand steering method for a lot of turning: pull the right half of the wheel for right turns, left half for left turns. Do not grasp the inside of the wheel and always use both hands.

- ✓ Position one to two metres from the curb approaching a sharp right turn
- ✓ Enter turns at low speed to allow smoother steering
- ✓ Use hand-over-hand steering and always steer with both hands
- ✓ Do not grasp the inside of the steering wheel

32.31 Turning Left

Ensure your turning arc is large enough to avoid cutting the corner; turning too soon may hit another vehicle or run over a median due to off tracking. On multi-lane streets, you may need to turn into a lane to the right rather than the leftmost. If there are two turning lanes, turn from the right-hand turn lane to accommodate off tracking. Check for pedestrians and cyclists.

- ✓ Ensure your turning arc is large enough to avoid cutting the corner
- ✓ Turn from the right-hand turn lane when two left-turn lanes exist to accommodate off tracking
- ✓ Check for pedestrians and cyclists when turning left

32.32 Traffic Circles and Roundabouts

Slow down as you approach, yield to any traffic already in the circle, yield to a vehicle on your right if arriving at the same time, and go around counter-clockwise (turn right to enter and exit). Traffic circles are for residential streets; large trucks/buses may encroach on the median. In multi-lane roundabouts, be in the proper lane before entering; due to off track you may need more than one lane. Signal right in advance of your exit. Large vehicles may use the truck apron around the central island.

- ✓ Yield to traffic already in the circle and to vehicles on your right
- ✓ Travel around the circle to the right (counter-clockwise)
- ✓ Large vehicles may need more than one lane due to off track
- ✓ Signal right in advance of your roundabout exit

32.33 Backing Up With and Without a Guide

Position a guide where they have a clear continuous view of the backing path and where you can see them throughout. Without a guide, step out to check for hazards above, below, sides, rear and front; then sound the horn and back very slowly watching both mirrors; stop and recheck periodically. A series of short backing manoeuvres is safer than one long one.

- ✓ Position the guide where you can see them and they can see the backing path
- ✓ Without a guide, check all clearances before backing and back slowly watching both mirrors
- ✓ A series of short backing manoeuvres is safer than one long one

32.34 Using Mirrors and Looking Ahead

Scan traffic ahead, behind and to the sides constantly. Check mirrors frequently to spot passing drivers and vehicles behind. Watch traffic well ahead for lights, signals, pedestrians and lane changes. A 'stale' light that has been the same colour for a while could change — be prepared to stop. Give all drivers plenty of warning before stopping or changing lanes.

- ✓ Scan ahead, behind and to the sides constantly and check mirrors frequently
- ✓ Treat a 'stale' green light as likely to change and be prepared to stop
- ✓ Give plenty of warning before stopping, turning or changing lanes

32.35 Lane Choice for Large Vehicles

Choose the lane that gives the best vision, lets you go where you want, and blends with traffic. A right-hand lane is best on a multi-lane divided highway, especially when driving slower than others. On freeways drive in the far right or centre lane, leaving the left lane for higher-speed and passing traffic. Fewer lane changes reduce collision risk and fuel use.

- ✓ Use the right-hand lane on multi-lane divided highways, especially when slower than traffic
- ✓ On freeways drive in the far right or centre lane, leaving the left for passing
- ✓ Minimize lane changes to reduce collision risk and fuel consumption

32.36 Shifting Gears and Double-Clutching

Commercial vehicles may have manual transmissions with 10 or more gears and are usually diesel-powered with fuel governors. Most heavy vehicles lack synchromesh gears, so double-clutching (depressing the clutch twice when changing gears) is essential. Upshifting goes to a higher gear to go faster; downshifting goes to a lower gear as you slow. Be familiar with the shift pattern and shift points before a trip.

- ✓ Most heavy manual transmissions have no synchromesh, requiring skilled double-clutching
- ✓ Double-clutching means depressing the clutch pedal twice when changing gears
- ✓ Upshift to go faster; downshift as you slow down
- ✓ Do not force a shift — return to neutral, match engine speed, and try again

32.37 Knowing When to Shift Gears

The engine develops torque (ability to move the vehicle) and horsepower (used to develop speed). Peak torque occurs at a lower engine speed than peak horsepower. Operate between peak torque and peak horsepower — the normal operating r.p.m. range. Shift progressively, using only enough torque to get moving before shifting up. Lugging occurs when the engine runs below peak torque too long.

- ✓ Operate the engine between peak torque and peak horsepower (the normal operating r.p.m. range)
- ✓ Peak torque occurs at a lower engine speed than peak horsepower
- ✓ Shift progressively, using only enough torque to get moving before upshifting
- ✓ Lugging occurs when the engine runs below peak torque too long

CHAPTER 33

Loading — Arranging and Distributing Loads

33.1 Effect of Weight Distribution on Vehicle

How cargo weight is distributed affects vehicle handling and the life of tires, frame, springs, axles and bearings. A poorly distributed load can overload an axle or set of tires, stress the frame, cause permanent damage and steering misalignment. Correct loading is essential for safety.

- ✓ Poor weight distribution can overload axles and tires
- ✓ Improper loading can permanently bend the frame and cause steering misalignment
- ✓ Distribute weight to preserve tires, frame, springs, axles and bearings

33.2 Correct Placement of Concentrated Loads

Do not place a very concentrated heavy load against the cab, as this can permanently bend the frame, overload front tires, make steering difficult and make the load top heavy. Place concentrated heavy loads near the rear, partially over or just ahead of the rear axles, on the longest side, and block them securely to prevent forward sliding. Never load items on the tailgate.

- ✓ Do not place concentrated heavy loads against the cab
- ✓ Place concentrated heavy loads partially over or just ahead of rear axles
- ✓ Position the longest side on the floor and block securely
- ✓ Never load items on the tailgate

33.3 Balancing Load Side-to-Side

Do not place a very heavy load on one side, as this overloads the springs and tires on that side and can cause the under-loaded side's brakes to lock and skid on wet surfaces, plus cause flat spots. Load so an equal amount of weight is on all rear tires to eliminate twisting and stress on the frame and prevent overloading the axle housing and wheel bearing.

- ✓ Do not place a heavy load on only one side
- ✓ Distribute weight equally across all rear tires
- ✓ Uneven side loading can cause wheel lock, skidding and tire flat spots

33.4 Axle Weight Distribution Percentages

The best weight distribution depends on the vehicle configuration. Five-ton freight trucks are designed for approximately 90% of cargo weight on rear axles and 10% on the steering axle. Cement mixers and dump trucks are designed for approximately 70% on rear axles and 30% on steering axles. Trailers should carry approximately 45% on the trailer axle unit, 45% on the drive axle unit, and 10% on the steering axle.

- ✓ Five-ton freight trucks: ~90% rear axle, 10% steering axle
- ✓ Cement mixers/dump trucks: ~70% rear axles, 30% steering axle
- ✓ Trailers: ~45% trailer axle, 45% drive axle, 10% steering axle

33.5 Steering Axle Minimum Weight Requirements

A tridem drive truck or truck tractor when loaded must have a combined steering axle weight of at least 25% of the tridem axle weight, or 40% in the case of twin steering axles. Place trailer cargo midway between the rear axle unit and drive axle unit to distribute weight equally.

- ✓ Tridem drive vehicle: steering axle weight at least 25% of tridem axle weight
- ✓ Twin steering axles: at least 40% of tridem axle weight
- ✓ Place trailer cargo midway between rear axle unit and drive axle unit

33.6 Using the Correct Vehicle for the Load

Always use the correct vehicle for the job. Long, heavy loads require a tractor-trailer combination. On rough roads an improperly loaded vehicle may pivot on its rear wheels, lifting the front wheels off the road. For semi-trailers the load should be centred to distribute weight over the tires; the average semi-trailer has its central weight distribution point at approximately the middle of the trailer.

- ✓ Use a tractor-trailer combination for long, heavy loads
- ✓ Centre semi-trailer loads at approximately the middle of the trailer
- ✓ Improper loading can lift front wheels off the road on rough terrain

CHAPTER 34

Vehicle and Load Dimensions

34.1 Commercial Transport Act Dimension Limits

The Commercial Transport Act sets limits for commercial vehicle lengths, widths, heights and weights. Drivers must obey all Ministry of Transportation signs that limit dimensions or weight, regardless of the licence or permit held. Temporary additional weight restrictions may be posted at certain times of the year.

- ✓ Obey all Ministry of Transportation signs limiting dimensions or weight regardless of the licence or permit you carry
- ✓ Temporary additional weight restrictions can be posted at certain times of the year
- ✓ Signs help avoid damaging your vehicle, its load, the road or other highway users

34.2 Maximum Height Requirements

You must know the height of your vehicle and load at all times. The maximum allowable height for a commercial vehicle is 4.15 m unless you have an oversize load permit. Highway signs before underpasses and tunnels give overhead clearance heights, and check bars/warning devices help test clearance.

- ✓ Maximum allowable height for a commercial vehicle is 4.15 m unless the driver has an oversize load permit
- ✓ Know the height of your vehicle and its load at all times
- ✓ Diamond-shaped signs warn of low clearance ahead; rectangular signs may be mounted on the structure

34.3 Maximum Width Requirements

The maximum legal width of a vehicle and its load is 2.6 m unless you have an oversize load permit. Certain items may extend up to 10 cm beyond the sides without being counted in overall width. Loose hay/straw/fodder loads can be up to 3.1 m wide. Side mirrors must always extend beyond your load.

- ✓ Maximum legal width of a vehicle and its load is 2.6 m unless the driver has an oversize load permit
- ✓ Items like anti-splash devices, load securing devices, ladders, placards, glad hands, connectors and clearance lights may extend up to 10 cm beyond the sides
- ✓ Vehicles transporting loose hay, straw or fodder can be loaded to a maximum of 3.1 m overall width
- ✓ Side mirrors may extend up to 20 cm beyond the side; if more than 20 cm they count in overall width
- ✓ Side mirrors must always extend beyond your load so you can see behind

34.4 Vehicle Weight Definitions

Commercial vehicles are licensed according to their gross vehicle weight (GVW). You must know your vehicle and load weight to avoid exceeding limits. GVW is the combined weight of vehicle and load; GVWR is the manufacturer's rating; Licensed GVW is the maximum weight licensed to carry or tow.

- ✓ GVW (gross vehicle weight) is the combined weight of the vehicle and its load
- ✓ GVWR (gross vehicle weight rating) is a manufacturer's rating defining vehicle weight and maximum load
- ✓ Licensed GVW is the combined weight licensed to carry or tow; minimum licensed GVW of most commercial vehicles is 1.5 times the net weight of the vehicle
- ✓ Watch for maximum allowable weight signs when approaching bridges

34.5 Vehicle Length Awareness

Always be aware of your vehicle's length and load length. Be particularly cautious when negotiating turns on narrow roads and in alleys. Leave enough clearance to avoid striking objects like poles, parked cars and buildings.

- ✓ Be particularly cautious while negotiating turns on narrow roads and in alleys
- ✓ Leave enough clearance to avoid striking objects such as poles, parked cars and buildings
- ✓ Overall length for reefer vans or trailers may be extended to include the refrigeration or heating unit

CHAPTER 35

Chapter 8 — Air Brakes: Dual System Failure

35.1 Dual System with Primary System Failure

If a line rupture causes total loss of primary reservoir pressure, the secondary reservoir is protected by the one-way check valve. Only the steering axle brakes will apply, allowing a controlled stop with longer stopping distances. If the failure were in the secondary system, rear axle braking would be maintained but steering axle brakes would not operate.

- ✓ With primary failure, only steering (front) axle brakes apply and stopping distances increase
- ✓ If the low-air warning activates, stop immediately and do not proceed until repaired

CHAPTER 36

Chapter 8 — Other Air Brake System Components

36.1 Anti-Lock Braking Systems (ABS)

ABS has three sections: speed sensing, decision-making, and brake releasing/modulation. Magnetic pickups sense wheel speed via toothed wheels. When lockup occurs, the ECU signals solenoid valves (modulators) to release air pressure. Systems can cycle up to five times per second. To stop shortest on slippery surfaces, apply firm continuous pressure. ABS prevents lockup, retaining steering control.

- ✓ Apply and maintain firm continuous pressure on the brake pedal to let ABS work
- ✓ ABS can cycle the brakes up to five times per second
- ✓ If the ABS lamp stays on or comes on during operation, only the anti-lock feature is disabled — normal braking still works
- ✓ ABS prevents axle brakes from locking, allowing the driver to retain steering control

36.2 Air Dryers

Air dryers are installed in the compressor discharge line between the compressor and first reservoir. They remove water vapour, oil mist and carbon particles from air. When the reservoir reaches full pressure, a purge port opens to eject contaminants. A reverse flush cleans the filters. In systems with an air dryer, the safety valve is often installed at the dryer. Some have electric heating elements to prevent freezing.

- ✓ Air dryers are installed between the compressor and the first reservoir
- ✓ Air reservoirs should still be drained regularly even with an air dryer
- ✓ More than a few drops of water indicates air dryer or compressor needs servicing
- ✓ In dryer systems, the safety valve is often at the air dryer rather than supply reservoir

36.3 Front Wheel Limiting Systems

These optional systems reduce steering axle brake lockup on slippery surfaces. Automatic systems use a limiting/ratio valve near the steering axle with no dashboard control. Below 40 p.s.i. application, steering axle pressure is approximately 50% of drive axle pressure. Above 40 p.s.i., the percentage rises until at emergency stop pressures (60-70 p.s.i.) both axles receive equal pressure.

- ✓ Below 40 p.s.i. application, steering axle brake pressure is approximately 50% of drive axle pressure
- ✓ At emergency stop pressures (60-70 p.s.i.) steering and drive axles receive equal pressure
- ✓ Automatic systems have no dashboard control; use a limiting/ratio valve near the steering axle

36.4 Manual Front Wheel Limiting Systems

No longer installed on new vehicles, these use a limiting quick-release valve and dash-mounted control valve. 'Dry' position applies equal pressure to steering and drive axles. 'Slippery' position limits steering axle to 50% of drive axle. Under the Motor Vehicle Act, the slippery position may only be used when weather conditions make its use essential for safety.

- ✓ Slippery/reduced position may only be used when weather conditions make it essential for safety
- ✓ Dry position applies full/equal pressure to steering axle brakes
- ✓ Keep the control in the normal Dry Road position for normal braking efficiency

36.5 Pressure-Protection Valves

Installed between service brake reservoirs and non-essential air accessories (air seats, horns, wipers, suspensions, fifth wheel sliders, air shifts). They cut off air supply if a failed accessory drops service reservoir pressure below a preset level, ensuring sufficient pressure for a safe stop. Shutoff pressures vary between 60 and 90 p.s.i.

- ✓ They cut off air to accessories if service reservoir pressure drops below preset level
- ✓ Shutoff pressures vary between 60 and 90 p.s.i. (414 and 620 kPa)
- ✓ They ensure sufficient pressure is maintained for a safe stop

36.6 ABS Warning Lamp Self-Check

Trucks and tractors have a dash-mounted ABS failure warning lamp. On ignition, the system self-checks — the lamp may light, flash briefly then stay lit until 7-11 km/h, or light briefly then turn off. If the lamp doesn't go out or comes on while driving, there is an ABS failure and the vehicle may be driven to a service depot.

- ✓ ABS lamp performs a self-check when ignition is first turned on
- ✓ Lamp may stay lit until vehicle speed reaches 7-11 km/h then turn off
- ✓ If lamp doesn't go out, there is an ABS failure but normal braking still works

36.7 Trailer ABS Systems

Trailer ABS uses similar components as trucks/tractors. The ECU may be powered from the stop lamp circuit or a dedicated source. Trailers have an indicator visible in the tractor mirror if the system malfunctions, mounted on the front or rear left side. Some tractors have a dashboard trailer ABS indicator. Always check if a trailer has ABS when coupling.

- ✓ Trailer ABS warning light is visible in the tractor's side mirror
- ✓ Always check if the trailer is ABS-equipped when coupling
- ✓ Emergency stopping differs between all-ABS combinations and non-ABS combinations

36.8 Integrated Air Dryer System

Modern integrated air dryer systems combine spin-on filter, dryer and governor into one unit with a purge reservoir. The wet/supply reservoir isn't needed. Pressure protection valves protect primary and secondary service reservoirs. One service reservoir fills first; at approximately 100 psi the other begins to fill. Maximum pressure may be up to 135 psi.

- ✓ Pressure protection valves are factory set and shouldn't be adjusted
- ✓ One service reservoir fills first, then at approximately 100 psi the other fills
- ✓ Maximum pressure may be up to 135 psi

36.9 Alcohol Evaporators and Injectors

These optional devices introduce alcohol vapour that combines with moisture, acting as anti-freeze to lower the freezing point. Evaporators connect to the compressor inlet; injectors install in the discharge line using a venturi. Keep the alcohol reservoir topped with methyl hydrate in winter, starting before the first freeze.

- ✓ Air reservoirs must still be drained regularly even with alcohol evaporators/injectors
- ✓ Only use methyl hydrate specifically formulated for use in these systems
- ✓ Begin topping up before the first freeze of the season

36.10 Automatic Drain Valves

Automatic drain valves (spitter valves) intermittently expel collected contamination. Most open briefly each time reservoir pressure lowers two or three p.s.i., but some connect to the governor and open each compressor cycle. Some have electric heating elements. Manual drains should still be opened periodically to check for water.

- ✓ Most open when reservoir pressure lowers two or three p.s.i. (13.8 or 20.7 kPa)
- ✓ Manual drains should be opened periodically to check for water
- ✓ Contaminants or water indicate compressor, air dryer, or drain valve may need servicing

36.11 Spring Parking Brake Emergency Release System

This provides an emergency release tank to release spring parking brakes if main reservoir pressure is lost and a disabled vehicle must be moved. A second dashboard control valve directs air from the emergency tank. Usually a 'dead man' type that must be held while moving. Also called 'California spring parking brake systems.'

- ✓ The control valve is usually a 'dead man' type that must be held while the vehicle moves
- ✓ Releasing hand pressure re-applies the spring parking brakes
- ✓ Used on transit buses, school buses and fire trucks

CHAPTER 37

Chapter 10 — Vehicle and Air Brake Pre-Trip Inspections: Responsibility

37.1 Driver Responsibility for Vehicle Safety

The driver must determine the vehicle is in safe operating condition before driving. The National Safety Code (NSC) requires most commercial vehicles be inspected daily. Both driver and carrier share responsibility for proper inspections.

- ✓ You must determine your vehicle is in safe operating condition before you drive it
- ✓ NSC vehicles must be inspected before use each day (pre-trip) and at the end of the final trip of each day (post-trip)
- ✓ Inspections may be done by you or another person specified by the carrier; driver and carrier share responsibility

37.2 Vehicles Requiring Daily Written Inspection Reports

Certain commercial vehicles require daily written inspection reports based on type and weight, including large passenger vehicles and heavy trucks/truck-tractors.

- ✓ Buses/limousines with seating capacity over 10 including driver require written reports
- ✓ Two-axle truck or truck-tractor with licensed GVW greater than 14,600 kg requires written reports
- ✓ Truck or truck-tractor towing a trailer with licensed GVW greater than 8,200 kg requires written reports

37.3 Cargo Securement Inspection Requirements

Under the NSC, all vehicles transporting cargo on a highway, regardless of GVW, must be inspected for cargo securement. Cargo must be re-inspected at set intervals during the trip.

- ✓ Re-inspect cargo securement within 80 km from the loading point
- ✓ Re-inspect at the earliest of: a change in driver duty status, three hours of driving, or 240 km since last inspection
- ✓ Record cargo securement inspections on your daily logs
- ✓ No inspection needed if cargo is sealed with orders not to inspect, or if cargo is inaccessible

CHAPTER 38

Chapter 10 — Bus Pre-Trip Inspection (Class 2 or Class 4 Unrestricted)

38.1 Engine compartment inspection

Look under the vehicle for leaks as you approach. Check fluid levels and condition (engine oil, coolant, power steering fluid, brake fluid, washer fluid). Inspect belts for tension and cracks, hoses for secure connections and no leaks, and steering components (shaft, box, tie-rods, idler arm) for security and no bends/cracks. Check suspension at all wheels for cracked/missing springs, torsion bars, walking beams, U-bolts and airbags. Check frame for cracks/holes. Inspect tires, wheels and mud flaps.

- ✓ Check all fluid levels and condition, belts, hoses and steering components
- ✓ Inspect suspension for broken/missing springs, U-bolts and air bags; frame for cracks and broken welds
- ✓ Check tires for inflation, bulges, tread depth, wheels for cracks and secure lugs; rust streaks may indicate loose wheel nuts

38.2 Bus pre-trip inspection time limits and setup

A Class 2 pre-trip inspection should be completed in less than 30 minutes; a Class 4 (unrestricted) in less than 20 minutes. If the bus has air brakes, also complete the Class 3 air brake procedures, and you must demonstrate setting up a slack adjuster. Before beginning: set parking brakes, shut off the engine and block the wheels. Remove keys from the ignition when checking underneath.

- ✓ Complete Class 2 inspection in under 30 minutes; Class 4 unrestricted in under 20 minutes
- ✓ Set parking brakes, shut off engine and block wheels before beginning
- ✓ If air-brake equipped, demonstrate setting up a slack adjuster and follow Class 3 air brake procedures

38.3 Instrument panel and gauge checks

Turn ignition on and start engine. Verify gauges/warning lights respond properly: charge rate (voltmeter/ammeter), oil pressure (normal soon after start), coolant temperature (rises to normal, light off after start), and fuel gauge shows sufficient fuel. Check instrument lights, windshield wipers/washers, heater/defroster, interior lights (dome, courtesy, step), horn, four-way flashers and school bus stop sign if equipped.

- ✓ Oil pressure must indicate normal soon after start; coolant temperature light must go off after start
- ✓ Charge rate, fuel gauge, instrument lights, wipers, defroster, horn and flashers must all function
- ✓ School bus stop sign (if equipped) must work and be secure

38.4 Emergency equipment on a bus

Check that emergency equipment is in working condition: warning devices (flags or flares), fire extinguisher with a valid date on the label, and a first aid kit with adequate contents. A peace officer may place a vehicle out of service if drum brake linings are less than 1/4 inch (6.4 mm) thick or air disc brake pads are less than 1/8 inch (3.2 mm) thick.

- ✓ Warning devices, fire extinguisher (valid date) and first aid kit (adequate contents) must be present and functional
- ✓ Drum brake linings under 1/4 inch (6.4 mm) or air disc pads under 1/8 inch (3.2 mm) may result in out-of-service

38.5 Passenger compartment check

Check passenger seats are securely fastened with no broken frames, seatbelts (if equipped), and cleanliness. Ensure passenger doors and entrances open/close properly, step lights work and hand rails are secure. Verify emergency windows are secure and open emergency exits (where feasible) to confirm the emergency alarm sounds.

- ✓ Passenger seats must be secure with no broken frames; doors, step lights and hand rails must function
- ✓ Emergency windows and exits must be secure, and opening emergency exits should trigger the alarm

38.6 Bus brake response and slack tests

With engine started, in low gear gently tug against the parking brakes — they should prevent the bus from moving. Release brakes, move the bus ahead slowly and apply the foot brake to check response. Move the steering wheel to check for excessive slack or lash. Remove wheel blocks with parking brakes set before beginning.

- ✓ Parking brakes must hold the bus during a gentle tug test in low gear
- ✓ Check foot brake response by moving ahead slowly and check steering wheel for excessive slack

CHAPTER 39

Passing and Being Passed

39.1 Air Turbulence Hazards

Large vehicles travelling at high speeds create air turbulence hazardous to smaller vehicles. The larger the vehicle, the more wind turbulence. Road users directly in front of a truck, alongside the cab, at the back of the trailer, or immediately behind the trailer are in areas of air turbulence and may be forced off the road or drawn into the vehicle.

- ✓ Larger vehicles create more wind turbulence
- ✓ If a smaller vehicle rides in your turbulence area, slow down until it's clear
- ✓ Be alert for cyclists who may lose control in your air turbulence

39.2 Passing and Being Passed Safely

Drivers often think big vehicles are going faster than they are. When passing, observe the speed limit and avoid startling nervous drivers. Don't occupy the fast lane unnecessarily when passing another commercial vehicle. When other drivers want to pass, help by reducing speed and giving room, but don't direct them into an unsafe pass.

- ✓ Observe speed limits and avoid startling inexperienced drivers when passing
- ✓ Don't occupy the fast lane when it isn't absolutely necessary
- ✓ Reduce speed and give room to help others pass safely
- ✓ Use four-way flashers to warn drivers if you can't keep up with traffic

CHAPTER 40

Chapter 4 — Fuel-Efficient Driving

40.1 Proper engine starting techniques

Fuel efficiency begins when starting the engine; proper warm-up lubricates components and saves fuel.

- ✓ Use zero throttle when starting — don't pump the throttle as it wastes fuel and isn't effective
- ✓ Let the engine warm up three to five minutes only, or seven to 10 minutes if below 0°C — any longer wastes fuel and can cause damage
- ✓ Use ether sparingly if operating in cold temperatures and only if the owner's manual permits it, as it can damage the engine
- ✓ Check that oil and air pressure rise to their normal operating ranges

40.2 Smart driving and gear techniques

Proper driving keeps you safe and reduces fuel consumption through smooth acceleration and correct gear use.

- ✓ Accelerate slowly keeping engine rpm down; practise progressive gear shifting (shifting before reaching maximum governed rpm)
- ✓ Run the engine in the highest gear range to keep it in a low rpm range and always use the clutch to avoid wearing gear teeth
- ✓ Back off the throttle over the top of a hill and select a lower gear to descend; use the retarder properly and turn it off when not needed
- ✓ Use the see-think-do method to anticipate hazards and maintain constant speed — power not used is fuel not burned

40.3 Reducing idling

Turning the engine off when not driving is more economical than leaving it running. Idling wastes fuel and money.

- ✓ Turn off the engine when stopped for any length of time to save fuel, reduce maintenance, prolong engine life and prevent emissions
- ✓ Idling can burn up to four litres of fuel per hour
- ✓ Many trucks have auxiliary power units to run air conditioning or refrigeration without idling the engine

40.4 Maintenance for fuel efficiency

Regular maintenance keeps the vehicle running well and maintains fuel efficiency.

- ✓ Keep tires inflated to manufacturer recommendations — for every 10 p.s.i. (69 kPa) underinflated, one per cent of fuel is wasted
- ✓ It is the law to do a pre-trip inspection before driving; conduct enroute inspections including tires and cargo at least every three hours
- ✓ Check for air leaks which reduce brake effectiveness and make the compressor run longer, reducing fuel efficiency
- ✓ Low-viscosity lubricants such as synthetic motor oil can improve fuel economy by up to four per cent

40.5 Proper Engine Starting Techniques

Fuel efficiency begins when you start the engine. Proper warm-up lubricates components, reduces wear and leakage and saves fuel. Use zero throttle and don't pump the throttle. Use ether sparingly in cold temperatures as it can damage the engine.

- ✓ Use zero throttle when starting and don't pump the throttle as it wastes fuel
- ✓ Let the engine warm up for three to five minutes only, or seven to 10 minutes if temperature is below 0°C
- ✓ Check that oil and air pressure rise to normal operating ranges before driving
- ✓ If adding ether in cold temperatures, use it sparingly and check the owner's manual to see if it's permitted

40.6 Smart Driving Techniques for Fuel Economy

Proper driving reduces fuel consumption. Accelerate slowly, choose the right gear, use progressive gear shifting, and ease off the throttle. Use the see-think-do method to anticipate hazards and maintain constant speed, preserving momentum.

- ✓ Practise progressive gear shifting (shifting before reaching maximum governed rpm) to reduce wear, decrease noise and save fuel
- ✓ Always use the clutch, since failing to use it wears down transmission gear teeth
- ✓ Back off the throttle going over the top of a hill and select a lower gear to go down
- ✓ Changing gears smoothly can improve operating costs by 30 per cent

40.7 Road, Traffic Conditions and Following Distance

Adjust driving to visibility, keep the seat adjusted, keep eyes moving to check hazards, and maintain a safe following distance. Anticipate stops and traffic lights to avoid unnecessary braking.

- ✓ Drivers of buses, trucks and other large heavy vehicles should never be less than five seconds behind the vehicle ahead at highway speeds
- ✓ It's more fuel efficient to let off the throttle to gradually slow down than to apply the brakes at the last minute
- ✓ Anticipate red lights by gradually slowing down to avoid a complete stop when the light may turn green

40.8 Vehicle Maintenance for Fuel Efficiency

Regular maintenance keeps the vehicle running well and maintains fuel efficiency. Correct tire pressure and fluid levels are critical. Pre-trip, enroute and post-trip inspections help avoid breakdowns and detect problems affecting fuel use.

- ✓ For every 10 p.s.i. (69 kPa) underinflated, one per cent of fuel is wasted
- ✓ It's the law to do a pre-trip inspection before driving
- ✓ Conduct enroute inspections including tires and cargo at least every three hours
- ✓ Check for air leaks which affect air brake effectiveness and make the compressor run longer, reducing fuel efficiency

40.9 Importance of fuel efficiency

Fuel-efficient driving controls costs and reduces environmental impact. Nearly 30 per cent of Canada's greenhouse gas emissions come from motor vehicles.

- ✓ Fuel-efficient driving techniques can improve fuel economy by up to 30 per cent
- ✓ Fuel-efficient driving is also safe driving — looking ahead and keeping good space margins avoids sudden stops and speed changes

40.10 Fuel selection and route planning

Choosing the correct fuel for the season and planning efficient routes reduces fuel consumption.

- ✓ Use the correct fuel for the season — summer fuel improves economy by up to 3 per cent but can cause engine problems in cold weather
- ✓ Plan routes to avoid heavy commuter traffic, busy city driving and hills; flat highway routes are more fuel efficient than mountainous or congested routes
- ✓ Consider biodiesel which provides similar power but contributes less carbon dioxide and sulfur
- ✓ Snow-covered roads can increase fuel consumption by 15 to 20 per cent

40.11 Fuel-efficient vehicle equipment and aerodynamics

Equipment options and aerodynamic features significantly affect fuel consumption, especially at highway speeds.

- ✓ At 90 to 100 km/h, about 50 per cent of fuel consumed overcomes air resistance; aerodynamic features can improve economy by 15 to 20 per cent
- ✓ Rib tread tires are more fuel efficient than lug tread on drive and steering axles; super-single tires offer lower rolling resistance
- ✓ Keep flatbed loads low and covered with a tarpaulin to improve aerodynamics
- ✓ Aerodynamic drag increases if wheels on a tractor-trailer aren't properly aligned and tracking parallel to travel direction

40.12 Fuel Efficiency Priority and Smart Choices

Fuel-efficient driving techniques can improve fuel economy by up to 30 per cent. Nearly 30 per cent of all greenhouse gas emissions in Canada are produced by vehicles. Fuel-efficient driving is also safe driving through looking ahead, keeping good space margins and anticipating hazards.

- ✓ Fuel-efficient driving techniques can improve fuel economy by up to 30 per cent
- ✓ Smart fuel-efficient driving includes trip planning, proper maintenance, proper starting techniques, proper driving techniques and reducing idle time

40.13 Fuel Selection and Route Planning

Use the correct fuel for the season; summer fuel can improve fuel economy by up to three per cent but causes problems in cold weather. Consider biodiesel which produces less carbon dioxide and sulfur. Plan routes to avoid heavy traffic, city driving and hills.

- ✓ Use the correct fuel for the season and location since summer fuel can cause engine problems in cold weather
- ✓ Flat routes are more fuel efficient than mountainous routes, and highway driving is more efficient than congested city streets
- ✓ Driving on snow-covered roads can increase fuel consumption by 15 to 20 per cent

40.14 Reducing Idling

Turning the engine off when not driving is more economical than leaving it running. Idling wastes fuel and money. Many trucks have auxiliary power units to run air conditioning or refrigeration.

- ✓ Turn off the engine when stopped for any length of time to save fuel, reduce maintenance, prolong engine life and prevent emissions
- ✓ Idling can burn up to four litres of fuel per hour

40.15 Aerodynamics and Fuel-Efficient Vehicle Features

At 90 to 100 km/h, about 50 per cent of fuel is used to overcome air resistance. Aerodynamic features like sloped hoods, rounded bumpers, roof fairings, side skirts and rear air dams significantly reduce fuel use. Tire choice and accessories also matter.

- ✓ Aerodynamic features can improve fuel economy by 15 to 20 per cent
- ✓ Keep flatbed loads low and cover with a tarpaulin to improve aerodynamics
- ✓ Rib tread tires are more fuel efficient than lug tread tires on drive and steering axles
- ✓ Aerodynamic drag increases if wheels aren't properly aligned and tracking parallel to the direction of travel

CHAPTER 41

Study + Practice = Success (Re-test waiting periods)

41.1 Re-test waiting periods after failed attempts

If you do not qualify on a knowledge test, pre-trip or road test, you must wait a set period before another attempt. The waiting period increases with repeated unsuccessful attempts and varies by test type.

- ✓ Knowledge tests and pre-trips require a 7-day wait after every unsuccessful attempt
- ✓ Class 1–4 road tests require 14 days after the 1st failure and 30 days after the 2nd and subsequent failures
- ✓ Endorsement 20 road tests require 14 days after 1st, 30 days after 2nd, and 60 days after 3rd or more failures

CHAPTER 42

Chapter 3 — Passing and Being Passed

42.1 Air turbulence around large vehicles

Large vehicles travelling at high speeds create air turbulence hazardous to smaller vehicles; the larger your vehicle, the more turbulence. Cars, bicycles or others in front of the truck, alongside the cab, near the back of the trailer or at the immediate rear are in areas of turbulence and may be forced off the road or drawn into your vehicle. If a smaller vehicle rides in your turbulence area, slow down until it's out.

- ✓ The larger the vehicle, the greater the wind turbulence it creates
- ✓ Slow down until a smaller vehicle riding in your turbulence area is clear

42.2 Passing other vehicles safely

Drivers often think big vehicles are travelling faster than they are. When overtaking passenger vehicles, observe the speed limit and avoid startling inexperienced drivers. Avoid occupying the fast lane unnecessarily when passing another slow truck, which congests traffic. Use four-way flashers to warn drivers if you can't keep up with traffic.

- ✓ Observe the speed limit when passing and avoid startling other drivers
- ✓ Don't occupy the fast lane unnecessarily when passing at similar speeds
- ✓ Use four-way flashers if you can't keep up with traffic

42.3 Being passed by others

When other drivers indicate they want to overtake, help them pass safely by reducing speed and giving room. Don't wave others to pass, as this may encourage a pass they can't complete safely.

- ✓ Reduce speed and give room when another driver wants to pass
- ✓ Don't direct others to pass, as it may encourage an unsafe pass

CHAPTER 43

Chapter 13 — For More Information

43.1 Dangerous Goods Emergency Notification

When in control of dangerous goods during a spill or dangerous occurrence, immediately notify the Provincial Emergency Program (PEP) Coordination Centre (1-800-663-3456) or local police, then also notify your employer, the vehicle owner and the consignor/owner of the goods. For Class 6.2 Infectious Substances or catastrophic cylinder failure, call CANUTEC at 613-996-6666 collect.

- ✓ Immediately notify PEP (1-800-663-3456) or local police for a dangerous goods spill
- ✓ Also notify your employer, the vehicle owner and the consignor/owner of the goods
- ✓ For Class 6.2 Infectious Substances, call CANUTEC at 613-996-6666

43.2 Driver's Responsibility in Dangerous Goods Incidents

It is the driver's responsibility to immediately take all reasonable emergency measures to repair, remedy or reduce any danger to life, health, property or the environment whenever a dangerous goods incident occurs. The PEP Coordination Centre is staffed 24 hours a day, 365 days a year.

- ✓ The driver must immediately take all reasonable emergency measures during a dangerous goods incident
- ✓ PEP Coordination Centre is available 24 hours a day, 365 days a year

43.3 CANUTEC Emergency Support

The Canadian Transport Emergency Centre (CANUTEC) provides technical advice on dangerous goods, answering questions on material properties, storage and cleanup, and referring clean-up companies. 24-hour emergency: 613-996-6666 (collect); cellphone *666; non-emergency 613-992-4624.

- ✓ CANUTEC provides technical advice on dangerous goods properties and cleanup
- ✓ CANUTEC 24-hour emergency line is 613-996-6666 (call collect)

43.4 Metric Conversion (p.s.i. to kPa)

Air brake pressures are expressed in both p.s.i. and kilopascals (kPa). Key conversions include 15 p.s.i. = 103 kPa, 30 p.s.i. = 207 kPa, 60 p.s.i. = 414 kPa and 100 p.s.i. = 689 kPa. Understanding these conversions helps interpret gauge readings and pressure requirements.

- ✓ 15 p.s.i. is approximately equal to 103 kPa
- ✓ 100 p.s.i. is approximately equal to 689 kPa
- ✓ Air brake pressures may be expressed in either p.s.i. or kPa

43.5 Reporting and Licensing Contacts

Report commercial vehicle safety violations 24 hours a day at 1-888-775-8785. Book road tests at icbc.com/roadtest; there is no charge for booking. Commercial vehicle permits are available 24 hours through the Permit Line 1-800-559-9688. RoadSafetyBC assesses driver medical fitness (250-387-7747).

- ✓ Report commercial vehicle safety violations at 1-888-775-8785 (24 hours)
- ✓ Commercial Vehicle Permit Line 1-800-559-9688 provides oversize, overweight and crossing permits
- ✓ There is no charge for booking an ICBC road test

CHAPTER 44

Identification (ID) Requirements

44.1 Primary and Secondary ID Requirements

Every visit to a driver licensing office requires one piece of primary ID and one piece of secondary ID. Driver licences and B.C. Identification cards are issued in legal name only. If your name differs from your primary ID you must provide all name change documents linking back to your primary ID. Photocopies are not accepted unless certified as a true copy by the issuing government agency.

- ✓ Bring one primary and one secondary piece of ID to each licensing office visit
- ✓ Licences are issued in legal name only; provide all name-change documents if names differ
- ✓ Photocopies are not accepted unless certified as true copies by the issuing agency
- ✓ A Combination BCDL/BCSC counts as only one piece of ID

44.2 Re-Test Waiting Periods

If you fail the knowledge test you must wait seven days before another attempt. For road tests, the re-test waiting period is 14 days after a first attempt, 30 days after a second attempt, and 60 days for any subsequent attempts.

- ✓ Knowledge test re-attempt requires a seven-day wait
- ✓ Road test waits are 14 days after first fail, 30 days after second, 60 days for subsequent

44.3 Accepted Primary ID Documents

Acceptable primary ID includes a BC Driver's Licence, BC Identification Card, or BC Services Card with photo (none expired more than 3 years), a valid Canadian Passport, Canadian Birth Certificate, Canadian Citizenship Card/Certificate, Permanent Resident Card, Record of Landing, immigration permits (IMM1442), or Certificate of Indian Status (white laser card).

- ✓ BCDL, BCID and BC Services Card must not be expired more than 3 years
- ✓ Baptismal and Live Birth Certificates are not acceptable as primary ID
- ✓ Permanent Resident Card and immigration permits must not be expired

CHAPTER 45

Chapter 1 — Road Test Vehicles

45.1 Vehicle Requirements by Licence Class

You must provide an appropriate vehicle representative of the licence class. Class 4 restricted: any car/pickup. Class 4 unrestricted: passenger van or small school bus seating at least 11 adults. Class 3: large tandem/tridem rear axle truck. Class 2: bus seating at least 36 adults (or 25-34 with restriction 51). Class 1: loaded tandem/tridem tractor trailer with air brakes, at least 28,000 kg loaded weight, semi-trailer at least 13 metres (7.5 metres if pintle hitch). Heavy trailer endorsement code 20: truck and trailer without air brakes, trailer with load at least 4,600 kg.

- ✓ Class 1 road test requires a loaded tractor-trailer with air brakes weighing at least 28,000 kg with a semi-trailer at least 13 metres long (7.5 metres if pintle hitch)
- ✓ Heavy trailer endorsement (code 20) requires a truck and trailer combination without air brakes with trailer and load weighing at least 4,600 kg
- ✓ Class 2 requires a bus seating at least 36 adults, or 25-34 adults with restriction 51 added

45.2 Reasons a Road Test May Be Cancelled

A road test may be cancelled for unsafe conditions: non-working or obscured brake/signal/head lights, air brakes out of adjustment, cracked windshield or illegal tint, insecure load, improper licensing/insurance, faulty seatbelts, unsafe tires, non-operating doors/windows, faulty exhaust, or no wheel blocks. Conduct a pre-trip inspection beforehand to find and correct defects.

- ✓ Air brakes must be in good working order and properly adjusted or the test may be cancelled
- ✓ Temporary spare tires may not be used on a road test
- ✓ Wheel blocks are required to safely secure large commercial vehicles for a pre-trip inspection
- ✓ No aftermarket tinting is allowed on the windshield or front side windows

45.3 Prohibited Loads and Contents for Road Tests

Commercial vehicles used for road tests may not contain dangerous goods or explosives, unbaffled liquids or dry bulk, livestock, or oversized loads. The load must not exceed the vehicle's GVWR or licensed GVW. Seasonal axle weight restrictions must be observed—the vehicle weight including load must not exceed the seasonal restriction.

- ✓ Road test vehicles may not contain dangerous goods, explosives, unbaffled liquids/dry bulk, livestock, or oversized loads
- ✓ The load must not exceed the vehicle's GVWR or licensed GVW
- ✓ Vehicle weight must not exceed any seasonal weight restriction in effect where and when the test is taken

45.4 Required Tools and Safety Equipment

Bring tools and equipment to conduct the pre-trip inspection including wrenches, a pry bar, chalk or marker, and a watch/timer to check air brakes. Wear sturdy clothing, a hard hat, eye protection, boots, and a safety vest. Keep the vehicle clean and remove or store loose objects that could be dangerous during a sudden stop.

- ✓ Bring wrenches, a pry bar, chalk or marker, and a watch/timer to check air brakes
- ✓ Wear sturdy clothing, hard hat, eye protection, boots, and safety vest for the inspection

CHAPTER 46

Parking

46.1 Preventing a Runaway Vehicle

To keep a parked vehicle in place: set the tractor parking brake; place the transmission in lowest forward gear (uphill) or reverse (downhill), or park for automatics; apply parking brakes on tractor and trailer. Most air-brake trailers have spring brakes; if not, apply trailer brakes and block wheels as air pressure may bleed down and release the brakes.

- ✓ Set the parking brake in the tractor
- ✓ Uphill: lowest forward gear; downhill: reverse gear; automatic: park position
- ✓ If dual transmissions, place both in gear; two-speed axle must be in low range
- ✓ Apply parking brakes on both tractor and trailer
- ✓ Block wheels if trailer has no spring brakes; never use a trailer hand valve to hold an unattended unit

46.2 Turning Wheels When Parking on Grades

Wheel positioning when parking depends on the grade and vehicle type. Block the wheels of any large vehicle parked on even a slight grade. Stop the engine, lock the ignition and remove the key.

- ✓ Single-unit uphill with curb: turn wheels left toward centre of road
- ✓ Single-unit uphill with no curb: turn wheels right toward edge of roadway
- ✓ Tractor-trailer uphill (curb or not): always turn wheels left toward centre of road
- ✓ Any vehicle on a downgrade: turn wheels right toward edge of roadway
- ✓ Block wheels on any grade and remove the ignition key

CHAPTER 47

Chapter 5 — Skills for Driving Trucks and Trailers

47.1 Backing up a tractor with a semi-trailer

Backing up a tractor-trailer is complex due to the articulation point where the units pivot, unlike backing a single-unit vehicle.

- ✓ Turn your steering wheel in the direction opposite to where you want the trailer to go when you start backing up
- ✓ Turn the steering wheel the other way as soon as the trailer begins to turn, matching the tractor's path to the trailer's to avoid jackknifing
- ✓ A tractor-trailer backing into a normal right-angle turn follows an S-shaped curve

47.2 Preventing trailer rollovers

A sudden movement could cause a trailer to roll over, a major cause of death among truck drivers. Loaded vehicles roll over more easily than empty ones.

- ✓ Drive slowly around curves and make turns gradually — rollovers happen when you turn too quickly
- ✓ Keep cargo close to the centre of the rig so it doesn't cause the trailer to lean, and spread it out low on the deck to lower the centre of gravity
- ✓ A vehicle with a higher centre of gravity is more likely to roll over

47.3 Towing double trailers

Towing two trailers increases the chance of jackknife or rollover; the last trailer is most likely to roll over.

- ✓ Drive smoothly — accelerate, brake and steer smoothly, and allow extra following distance and time when accelerating, passing or overtaking
- ✓ Couple the more heavily loaded trailer to the tractor with the lighter trailer behind
- ✓ There is more offtrack with two trailers, so stay centred and remember extra length and articulation may encroach on adjacent lanes
- ✓ Never unlock the pintle hook with the dolly still under the rear trailer as the tow bar may fly up causing injury

47.4 Coupling with a fifth wheel

Coupling requires great care to protect your safety, your load and others. Follow the ordered steps for inspection, positioning, connection and testing.

- ✓ Inspect the fifth wheel for damage/lubrication, ensure it's locked to the frame, tilted downward toward the rear, and coupler jaws are open
- ✓ Block the trailer wheels and ensure spring brakes are applied (or connect air, charge, and apply brakes if no spring brakes) before backing under
- ✓ Back up so the fifth wheel just touches the trailer apron directly above the pivot points; use lowest reverse gear and stop when the kingpin locks in
- ✓ After connecting there must be no space or daylight between the fifth wheel and trailer apron, and the release handle must be locked

47.5 Securing and tug testing the connection

After connecting, secure air/electrical lines and verify the coupling with a visual check and tug test.

- ✓ Use a flashlight to check the locking jaws are securely closed around the kingpin, and remove keys so nobody moves the tractor while underneath
- ✓ Raise landing gear until legs are slightly off the ground, then gently tug against the trailer parking brakes to check the connection holds
- ✓ Check turning clearance between rear of tractor and trailer landing gear, and between the tractor cab and front of the trailer
- ✓ At slow speed apply the trailer hand valve to check trailer service brake operation before pulling away

47.6 Uncoupling a tractor and trailer

Uncoupling requires proper positioning, easing jaw pressure, and safely lowering the landing gear before separating units.

- ✓ Line up the tractor and trailer straight and ensure the ground is level and will support the trailer
- ✓ Ease pressure on the fifth wheel locking jaws by backing up gently, then set the parking brakes while pushing against the trailer
- ✓ Block trailer wheels and lower landing gear until both supports touch the ground and pressure is off the fifth wheel before pulling the release handle
- ✓ Keep clear of the tractor wheels while uncoupling as they may roll slightly when the jaws open; drain air suspension if fitted

47.7 Backing Up a Tractor with Semi-Trailer

Backing up a tractor with a semi-trailer differs from a single unit due to the articulation point where it pivots. The steering must be turned opposite to where you want the trailer to go, then reversed as the trailer begins to turn. A tractor-trailer backing into a right-angle turn follows an S-shaped curve.

- ✓ Turn the steering wheel opposite to where you want the trailer to go when starting to back up
- ✓ Turn the steering wheel the other way as soon as the trailer begins to turn, so you're steering in the same direction the trailer is travelling
- ✓ The tractor must follow a path matching the trailer's path or you risk jackknifing

47.8 Towing Trailers and Preventing Rollovers

Towing requires more skill than a single unit. Sudden movements can cause a trailer to roll over, a major cause of death among truck drivers. A loaded vehicle is more likely to roll over than an empty one. Correct loading and low centre of gravity help prevent rollovers.

- ✓ Drive slowly around curves and make turns gradually as rollovers happen when turning too quickly
- ✓ Keep cargo close to the centre of the rig, spread out, and as close to the trailer deck as possible to lower the centre of gravity
- ✓ A vehicle with a higher centre of gravity is more likely to roll over

47.9 Towing Doubles Safely

Towing two trailers increases chances of jackknife or rollover, with the last trailer most likely to roll. Drive smoothly, allow extra following distance, and remember that a safe speed for a single trailer may be too fast with multiple trailers. Extra offtrack occurs with two trailers.

- ✓ Couple the more heavily loaded trailer to the tractor with the lighter trailer behind
- ✓ When coupling multiple trailers, ensure spring brakes are applied, or block the trailer if it doesn't have spring brakes
- ✓ Never unlock the pintle hook with the dolly still under the rear trailer as the tow bar may fly up causing injury
- ✓ The last trailer in a combination is the most likely to roll over

47.10 Trailer Swerving and Whipping

Whipping or swerving occurs when the trailer moves quickly and independently of the tractor across the roadway. This is extremely dangerous and must be dealt with immediately by slowing down and stopping to check.

- ✓ Whipping and swerving may be caused by driving too fast, sudden steering changes, improper connections, shifting loads, dragging brakes or a flat tire
- ✓ If the trailer whips or swerves, slow down and stop as soon as it's safe, then stop and check the vehicle and load even if swerving stops

47.11 Parking a Trailer

Block the wheels of a parked trailer so it can't roll. Air pressure in the trailer air tank bleeds down over time depending on system leaks. Trailer brake behaviour depends on whether spring brakes are equipped.

- ✓ Block the wheels of a parked trailer so it can't roll
- ✓ If a trailer without spring brakes has its air tank drain, the trailer brakes will release; if equipped with spring brakes, the brakes will remain applied
- ✓ Brakes must be properly adjusted for the spring brakes to remain applied and effective

47.12 Coupling with a Fifth Wheel - Inspection

Coupling must be done with great care. Before coupling, inspect the fifth wheel for damage, lubrication and security, ensure it's tilted downward and coupler jaws are open, and inspect the trailer including kingpin, apron and cargo security.

- ✓ Set tractor parking brakes and inspect the fifth wheel for damage, lubrication and security, ensuring it is tilted downward toward the rear and coupler jaws are open
- ✓ Block the trailer wheels and if equipped with spring brakes make sure they have applied; check the kingpin isn't bent or broken and the apron is flat
- ✓ Ensure air lines and electrical cable are supported and routed so they don't get in the way when backing under the trailer

47.13 Coupling with a Fifth Wheel - Positioning and Connection

Position the tractor directly in front of and in line with the trailer, using mirrors to verify alignment. Back up slowly stopping when the fifth wheel just touches the apron, then check height and alignment before connecting fully.

- ✓ When aligned, you should see an equal portion of each side of the trailer in each mirror
- ✓ Stop when the fifth wheel just touches the trailer apron and don't back up too far or at an angle
- ✓ The trailer apron should touch directly above the fifth wheel pivot points; if touching behind or ahead, adjust trailer height with landing gear or air suspension
- ✓ Use the lowest reverse gear to back up very slowly and stop when the kingpin locks into the fifth wheel jaws

47.14 Coupling - Connection Checks and Securing

After connecting, verify the fifth wheel jaws engaged the kingpin with no space or daylight between fifth wheel and apron, and the release handle is locked. Connect air lines and electrical cable, check trailer lights, and go under to visually confirm the locking jaws are securely closed.

- ✓ Confirm no space or daylight between the fifth wheel and trailer apron and the release handle is in the locked position
- ✓ Use a flashlight to check the locking jaws are securely closed around the kingpin, and remove keys from the ignition before going underneath
- ✓ Check trailer electrical connection by verifying tail lights, brake lights, licence plate light and clearance lights
- ✓ A trip inspection report is required for every new trailer you pick up each day

47.15 Coupling - Tug Test and Pulling Away

After securing, raise the landing gear slightly, release tractor brakes and gently tug against the trailer parking brakes to confirm the connection holds. Check turning clearance, then fully raise landing gear before pulling away. Test the trailer hand valve at slow speed.

- ✓ Perform a tug test by gently pulling against the trailer parking brakes to confirm the kingpin is securely held by the fifth wheel jaws
- ✓ Check clearance between rear of tractor and trailer landing gear, and between rear of cab and front of trailer
- ✓ Raise landing gear completely and ensure the crank handle is locked in gear before pulling away, then check trailer service brakes with the hand valve at slow speed

47.16 Uncoupling a Tractor and Trailer

To uncouple, line up the tractor and trailer, ease pressure on the fifth wheel locking jaws by backing gently, block trailer wheels, lower landing gear until supports touch ground, disconnect lines, pull the release handle, and move the tractor slowly clear.

- ✓ Ensure the tractor and trailer are lined up (not at an angle) and the ground is level and firm to support the trailer
- ✓ Both landing gear supports must touch the ground to support a trailer
- ✓ Keep clear of the tractor wheels during uncoupling as they may roll slightly when the fifth wheel jaws open
- ✓ For trailers with air suspension, drain the suspension air supply before leaving the trailer parked

47.17 Pintle Hitch and Other Coupling Devices

A pintle hitch uses a hook on the front vehicle and an eye on the rear. When using any coupling device other than a fifth wheel, chains or cables are required. A converter dolly with an axle, fifth wheel and hitch is used when towing more than one trailer.

- ✓ When using any coupling device other than a fifth wheel, you must use chains or metal cables equal to the strength of the coupling device
- ✓ The drawbar or connection between the motor vehicle and trailer may not exceed five metres unless towing a pole trailer
- ✓ Use the safety catch to secure the pintle hitch connection along with safety chains and/or cables
- ✓ Coupling devices must be strong enough to hold loaded vehicles together and fastened to a structurally adequate part of each vehicle's frame

47.18 Trailer swerving and whipping

Whipping or swerving occurs when the trailer moves independently of the tractor back and forth across the roadway; it is extremely dangerous.

- ✓ Whipping/swerving may be caused by driving too fast, sudden steering changes, improper connections, shifting loads, dragging brakes or a flat tire
- ✓ If the trailer whips or swerves, slow down and stop as soon as it's safe, then stop and check your vehicle and load even if swerving stopped

47.19 Parking a trailer safely

Trailer air pressure bleeds down over time when parked, affecting brakes depending on whether spring brakes are fitted.

- ✓ Block the wheels of a parked trailer so it can't roll
- ✓ If a trailer without spring brakes drains its air tank, the trailer brakes will release; if equipped with spring brakes they remain applied
- ✓ Brakes must be properly adjusted for spring brakes to remain applied and effective

47.20 Pintle hitch and other connections

A pintle hitch uses a hook on the front vehicle and an eye on the rear vehicle; converter dollies are used when towing multiple trailers.

- ✓ With any coupling device other than a fifth wheel you must also use chains or metal cables equal to the strength of the coupling device
- ✓ The drawbar or connection between motor vehicle and trailer may not exceed five metres unless towing a pole trailer
- ✓ Use the safety catch to secure the pintle hitch connection along with safety chains/cables
- ✓ Coupling devices must be strong enough to hold loaded vehicles and fastened to a structurally adequate part of each frame

CHAPTER 48

Chapter 5 — Securing Cargo (North American Standard / Division 35 MVAR)

48.1 Cargo Securement Legal Framework

Do not operate a vehicle unless cargo is properly secured. Division 35 of the Motor Vehicle Act Regulations covers logs/poles, covers for loose loads, front-end structures and bus luggage. B.C. has adopted the North American Standard on cargo securement, which applies to all cargo with general and specific requirements. Both Division 35 and the Standard apply to all vehicles carrying cargo on highways regardless of gross vehicle weight.

- ✓ Do not operate a vehicle unless its cargo is properly secured
- ✓ Both Division 35 and the North American Standard apply regardless of the vehicle's gross vehicle weight
- ✓ Unless otherwise specified, both general and specific requirements apply

48.2 Securement System Force Requirements

The securement system (vehicle structure, blocking/bracing, tiedowns) must be appropriate for the cargo and withstand 0.8g deceleration forward, 0.5g deceleration rearward, 0.5g acceleration in either sideways direction, and a downward force of at least 20% of cargo weight. Load on each component must not exceed its working load limit, and components must be in good working order.

- ✓ System must withstand 0.8g forward, 0.5g rearward, and 0.5g sideways forces
- ✓ System must withstand a downward force of at least 20% of the cargo weight
- ✓ Load on each component must not exceed its working load limit and components must be undamaged

48.3 General Requirements for Tiedowns

Tiedowns must be able to be tightened by the driver (except steel strapping), remain taut, and not slip, loosen, unfasten, open or release during operation. Use edge protectors where a tiedown could be cut or scraped, and locate tiedowns inboard of rub rails if possible. Rub rails must not be used as anchor points. One long chain can serve as two tiedowns if each has an independent tensioning device.

- ✓ Tiedowns must be tightenable, taut, and must not slip, loosen or release while operating
- ✓ Use edge protectors where tiedowns could be cut or scraped by cargo
- ✓ Rub rails must not be used as anchor points

48.4 Minimum Number of Tiedowns Required

For cargo not prevented from moving forward: 1 tiedown for articles 1.52 m or shorter and 500 kg or lighter; 2 tiedowns if 1.52 m or shorter but over 500 kg; 2 tiedowns for articles over 1.52 m up to 3.04 m; and for articles longer than 3.04 m, 2 plus 1 tiedown for each additional 3.04 m or part thereof. A rough guide is two tiedowns for the first 3.04 m and one for every 3.04 m after. When cargo is prevented from moving forward, use one tiedown for every 3.04 m of length.

- ✓ One tiedown for cargo 1.52 m or shorter and 500 kg or lighter
- ✓ Two tiedowns for cargo over 500 kg (1.52 m or shorter) and for cargo over 1.52 m up to 3.04 m
- ✓ Longer than 3.04 m: two tiedowns plus one for each additional 3.04 m or part thereof
- ✓ If prevented from moving forward, use one tiedown for every 3.04 m of length

48.5 Strength and Working Load Limit of Tiedowns

The aggregate working load limit of tiedowns must be at least 50% of the cargo weight. Example: a 600 kg article requires an aggregate WLL of at least 300 kg; if three tiedowns are used, each must be at least 100 kg. The Standard specifies both minimum number and minimum strength — meet both. The manufacturer marks the WLL on the component; unmarked tiedowns are prohibited (since January 1, 2010). Standard 10 provides default WLLs for chain, webbing, wire rope, manila rope, synthetic fibre rope and steel strapping.

- ✓ Aggregate working load limit of tiedowns must be at least 50% of the cargo weight
- ✓ Meet both the minimum number of tiedowns and the minimum strength requirement
- ✓ Unmarked tiedowns are prohibited as of January 1, 2010

48.6 Damaged Tiedowns That Must Not Be Used

Tiedowns must not be used if a chain has cracked welds, links, or bent/twisted/stretched/collapsed links; links weakened by gouges, nicks or pits; incorrect repairs; obvious wear; knots in chain, wire rope or webbing; spread or disturbed grab hooks; nylon webbing with cuts/nicks/splits; wire cable with missing strands or wraps; or anchor points weakened by cracks, breaks or distortion.

- ✓ Do not use chains with cracked welds, bent/twisted/stretched links, or knots
- ✓ Do not use nylon webbing with cuts, nicks or splits, or wire cable with missing strands
- ✓ Do not use tiedowns with anchor points weakened by cracks, breaks or distortion

48.7 Load Binders, Connector Links and Friction Mats

Chain connector links must be compatible with the chain grade — the chain is only as strong as its weakest link. Quick connectors are unsuitable for heavy-duty operations. Assume tiedown assemblies (including hooks and load binders) are the lowest grade unless marked. Protect all assemblies from abrasion, do not use worn assemblies, and lock every load binder handle with rope, wire, chain or a locking mechanism. An unmarked friction mat is assumed to provide horizontal resistance equal to 50% of the weight of cargo resting on it.

- ✓ Chain connector links must be compatible with the grade of chain used
- ✓ Assume tiedown assemblies are the lowest grade unless clearly marked otherwise
- ✓ Lock every load binder handle to prevent it from unlocking
- ✓ An unmarked friction mat is assumed to resist horizontal movement equal to 50% of cargo weight on it

48.8 Dunnage, Aggregate Loads and Rolling Cargo

Timber used as dunnage, chocks or cradles must be strong enough not to split or crush under cargo or tiedowns. Aggregate loads (sand, gravel, wood chips) that can't be contained with sideboards or tiedowns and are likely to bounce, blow or drop must be covered with a tarp. Side-by-side articles secured by common tiedowns must contact each other or be prevented from moving toward each other. Rolling cargo must be restrained by chocks, wedges or a cradle; load on rollers requires at least one locked roller plus adequate tiedowns.

- ✓ Use a cover or tarp for aggregate loads that may bounce, blow or drop from the vehicle
- ✓ Restrain any cargo that may roll with chocks, wedges or a cradle
- ✓ For loads on rollers, lock at least one roller and use adequate tiedowns
- ✓ Dunnage timber must be strong enough not to split or be crushed by cargo or tiedowns

CHAPTER 49

Chapter 5 — Oversize and Overload Permits

49.1 When Oversize/Overload Permits Are Required

If your load can't be reduced and it's larger or heavier than regulations allow, you may purchase an oversize permit. You can obtain permits for overwidth, overweight, overlength, or overheight loads. Permits are issued under Commercial Transport Regulations. You must have a permit before taking an oversize vehicle on the road. To move oversize/overweight loads on city or municipal roads you may need a permit from local government.

- ✓ You must have a permit before taking an oversize vehicle on the road
- ✓ Permits are available for overwidth, overweight, overlength, or overheight loads
- ✓ Permits for loaded vehicles are only given when the load can't be reduced
- ✓ Municipal permits may be needed for city/municipal roads

49.2 When a Vehicle Is Overloaded

A vehicle or combination is overloaded whenever it exceeds the GVW allowed under Commercial Transport Regulations, weighs more than its licensed GVW, or exceeds the maximum allowable weight on any single or group of axles. Overloading makes steering, braking and speed control more difficult; drive slowly on upgrades and control speed on downhills. Overload permits are issued only when loads can't be reduced or the vehicle isn't licensed up to its allowable weight.

- ✓ Overloaded if vehicle/load exceeds GVW allowed under regulations
- ✓ Overloaded if weight exceeds licensed GVW
- ✓ Overloaded if it exceeds maximum allowable weight on any axle or axle group
- ✓ Overloading makes steering, braking and speed control more difficult

49.3 Oversize Permit and Marking Requirements

If your vehicle is wider, longer or higher than regulations allow, you must have an oversize permit before operating on any highway, whether loaded or not. Permits are not normally given for loads or vehicles wider than 4.4 m. Extremities of all oversize vehicles/loads must be marked with red flags at least 30 cm by 30 cm. For night travel, lights are required on extremities — amber to the front and red to the rear.

- ✓ Oversize permit required before operating on any highway, loaded or not
- ✓ Permits not normally given for loads/vehicles wider than 4.4 m
- ✓ Extremities must be marked with red flags at least 30 cm by 30 cm
- ✓ Night travel requires amber lights to front and red lights to rear on extremities

49.4 Permit Application Requirements

When applying for a permit you must provide registration and insurance papers for both tow vehicle and trailer(s), specifics on the load, details about your planned route and destination, and a planned time to move the load. For overload permits, you must also identify the weight on each axle. Permit conditions may require pilot cars, flags, signs, lights, times/days of travel, and required route.

- ✓ Provide registration and insurance for both tow vehicle and trailer(s)
- ✓ Provide load specifics, route, destination and time of movement
- ✓ For overload permits, identify the weight on each axle
- ✓ Permit conditions may specify pilot cars, flags, signs, lights, times, days and route

49.5 Pilot Cars and Distance Requirements

A pilot car may be required as a condition of an oversize or overload permit to warn other drivers about the larger-than-normal vehicle. More than one pilot car may be required depending on route and load. A pilot car must travel between 100 and 500 m either behind or in front of the oversize vehicle. When required, a D (over dimension) sign must be carried by the pilot car. Pilot car sign regulations are in Division 8 of the Commercial Transport Regulations.

- ✓ A pilot car must travel between 100 and 500 m in front of or behind the oversize vehicle
- ✓ A D (over dimension) sign must be carried by a pilot car when required
- ✓ More than one pilot car may be required depending on route and load

49.6 Displaying Oversize Load Signs

You must display the appropriate signs whenever you transport an oversize load — such as wide load, long load or oversize load signs. These signs warn other drivers of the load being carried.

- ✓ Display appropriate oversize/wide/long load signs when transporting oversize loads
- ✓ Do not display wide load signs when a wide load isn't actually being transported

CHAPTER 50

Tractor-Trailer Air Brake Systems

50.1 Trailer Air System Basics

A trailer system has foundation brakes, air chambers, reservoirs and control valves, but no air compressor. It relies on the tractor for compressed air (via the supply line) and control signals (via the control line). Air lines connect with quick-coupling glad hands, colour-coded blue for control and red for supply.

- ✓ The only major component not found on a trailer air system is an air compressor
- ✓ The supply line (also called emergency line) fills the trailer reservoirs; the control line (also called service line) carries the control signal
- ✓ Glad hands are colour-coded: blue for the control line, red for the supply line

50.2 Trailer Emergency Stopping and Dynamiting

All trailer systems must have an emergency stopping system that fully applies the trailer brakes if the trailer separates. Trailers without spring parking brakes use a relay emergency valve which senses supply line pressure loss and applies full reservoir pressure to the brakes (dynamiting). Spring-brake-equipped trailers use spring force to dynamite.

- ✓ All trailer systems must have an emergency stopping system that fully applies the trailer brakes if the trailer separates from the tractor
- ✓ A relay emergency valve applies full trailer reservoir pressure (dynamites the brakes) if it senses supply line pressure loss
- ✓ Trailers with spring parking brakes use spring force to dynamite the brakes

50.3 Dynamiting and 15-Minute Standard

Trailer brakes are dynamited when the supply line breaks, when glad hands are disconnected, or when the driver closes the trailer supply valve. Motor vehicle safety standards require the dynamited brakes to remain applied for a minimum of 15 minutes. Small leaks in non-spring-brake systems can allow a parked trailer to roll away.

- ✓ Trailer brakes dynamite when the supply line breaks, glad hands disconnect, or the trailer supply valve is closed
- ✓ Dynamited trailer brakes must remain applied for a minimum of 15 minutes per safety standards
- ✓ Always block the wheels of a parked trailer so it cannot roll

50.4 Trailer Spring Brake Valve Systems

Trailers with spring parking brakes use a relay valve for service brakes and a trailer spring brake valve to fill the reservoir and control the spring parking brakes. Two types exist: one fills the reservoir before releasing the spring brakes; the other releases the spring brakes first then fills the reservoir. Always perform a tug test after coupling.

- ✓ The trailer spring brake valve fills the reservoir and controls the spring parking brakes
- ✓ Always perform a tug test after coupling the tractor to the trailer
- ✓ Before a tug test, visually check with a flashlight that the fifth wheel locking jaws are closed and locked

50.5 Tractor Protection System

If the trailer separates, the connecting air lines break and tractor air can be lost. The tractor protection system (a trailer air supply valve in the dash and a tractor protection valve behind the cab) automatically shuts off air loss, preserving pressure for a safe stop. Some shut off immediately, some allow drop to as low as 20 p.s.i.

- ✓ The tractor protection system consists of a trailer air supply valve in the dash and a tractor protection valve behind the cab
- ✓ It automatically shuts off tractor air loss in a breakaway to preserve pressure for a safe stop
- ✓ A peace officer may place a vehicle out of service if the system allows tractor pressure to drop below 20 p.s.i. (138 kPa) without the trailer air supply valve automatically closing

50.6 Trailer Air Supply Valve

The dash-mounted trailer air supply valve (usually an octagon-shaped red button) directs air pressure to the trailer supply line. It senses supply line pressure and closes automatically in a breakaway. When no trailer is connected it stays in the closed position for bobtail driving.

- ✓ The trailer air supply valve is usually an octagon-shaped red button that controls air to the trailer
- ✓ A peace officer may place a trailer out of service if the trailer brakes don't apply when the trailer air supply valve is closed
- ✓ When no trailer is connected, the trailer air supply valve remains closed for bobtail driving

50.7 Hand Valve (Trolley Valve)

The hand valve allows the trailer brakes to be applied independently of the tractor, useful when coupling. It should not be used in normal or emergency service braking; always use the foot valve. Most hand valves are spring-loaded and return to released. Never use the hand valve for parking.

- ✓ The hand valve applies only the trailer brakes independently of the tractor
- ✓ Do not use the hand valve for normal or emergency service braking; always use the foot valve
- ✓ Do not use the hand valve for parking; apply the tractor parking brakes, close the trailer supply valve, and block the trailer wheels

50.8 Dual Air Tractor-Trailer System Components

A dual air tractor towing a trailer adds a trailer air supply valve, tractor protection valve, hand control valve, and a pair of two-way check valves. The two-way check valves send a control signal to the trailer whether the foot valve or hand valve is applied. The parking brake control valve is usually interlocked with the trailer supply valve.

- ✓ Components added to tow a trailer include the trailer air supply valve, tractor protection valve, hand control valve, and two two-way check valves
- ✓ The parking brake control valve (yellow button) is usually interlocked with the trailer supply valve (red button) so both tractor and trailer parking brakes apply together
- ✓ Two-way check valves send a control signal to the trailer whether the foot valve or hand valve is applied

50.9 Dual Tractor-Trailer Primary System Failure

With a primary air system failure on the tractor, the low-air warning alerts the driver. A foot valve application applies the front (secondary) brakes and passes air through both two-way check valves to signal trailer brakes. Automatic shutoff of trailer air supply occurs when the highest-pressure reservoir drops to between 20 and 45 p.s.i.

- ✓ With primary failure, a foot valve application applies the tractor front brakes and signals the trailer brakes
- ✓ Automatic shutoff of trailer air supply occurs when pressure is lowered to between 20 and 45 p.s.i. (138 and 310 kPa)
- ✓ With blended air, shutoff won't occur until the highest-pressure reservoir drops into the 20-45 p.s.i. range
- ✓ The automatic shutoff should be checked during pre-trip; if it fails, the vehicle must be placed out of service

50.10 Trailer Breakaway Protection

In a breakaway, the sudden air loss through the broken supply line causes the trailer air supply valve to shut off automatically. The tractor protection valve closes the passage to the trailer control line so no application air is wasted. If only the control line separates, nothing happens until the trailer brakes are applied, then protection activates.

- ✓ Sudden air loss in a breakaway causes the trailer air supply valve to shut off automatically
- ✓ The tractor protection valve closes the passage to the trailer control line to prevent wasting air
- ✓ If only the control line separates, protection activates when the trailer brakes are applied

50.11 Glad Hand Care

When not in use, glad hands should be fastened to dead-end (dummy) couplers or to each other to prevent dirt and debris from entering the air lines, and secured to prevent chafing or bouncing.

- ✓ When not in use, glad hands should be fastened to dead-end couplers or to each other
- ✓ Secure glad hands to prevent lines from chafing against components or bouncing off the vehicle

50.12 Reversed Supply and Service Line Symptoms

If the supply and service (control) line connections are reversed during coupling, the spring parking brakes won't release even with the dashboard control, and the trailer service brakes won't function. Avoid this by taking care during coupling.

- ✓ Reversed line connections cause spring parking brakes not to release and service brakes not to function
- ✓ Take care when coupling to avoid reversing the supply and service line connections

50.13 Two-Way Check Valve (Trailer Control)

The two-way check valve directs the highest application pressure from either the hand valve or the foot valve to the trailer brakes, allowing independent trailer brake application. It is identical in construction to the one used in spring parking brake installations.

- ✓ The two-way check valve directs the highest application pressure (from hand valve or foot valve) to the trailer brakes
- ✓ It allows the trailer brakes to be applied independently

50.14 Bobtailing and Bobtail Proportioning

Driving a tractor without a trailer is called bobtailing. With little weight over the rear axles, rear brakes lock easily. A bobtail proportioning system reduces drive axle braking pressure by up to 75 per cent when bobtailing while giving full pressure to steering axle brakes, improving control and shortening stopping distance. Higher pedal pressure is required.

- ✓ Driving a tractor without a trailer attached is called bobtailing
- ✓ A bobtail proportioning system reduces drive axle braking pressure by up to 75 per cent when bobtailing
- ✓ Because steering axle brakes do most of the braking when bobtailing, higher than normal pedal pressure is required

CHAPTER 51

Chapter 2: Heavy vehicle braking

51.1 Brake heat limits and brake fade

Brakes convert kinetic energy to heat and can only handle a limited amount of heat before losing effectiveness (brake fade). Overheated brakes can fail, especially on long downgrades.

- ✓ Brakes have a limited capacity to handle heat before fading
- ✓ Excessive braking heat causes brake fade and possible failure
- ✓ Manage heat buildup, especially on downgrades

51.2 Braking on icy roads and water

Braking on icy roads and roads covered with water requires gentle, controlled braking to maintain traction. Water on roadways can cause hydroplaning and reduce braking effectiveness.

- ✓ Brake gently on icy roads to maintain traction
- ✓ Water on roadways reduces braking effectiveness and can cause hydroplaning
- ✓ Reduce speed in wet or icy conditions

51.3 Combination unit braking

Braking a combination unit requires understanding how the tractor and trailer brakes work together to maintain stability and prevent jackknifing or trailer swing.

- ✓ Combination units require coordinated braking of tractor and trailer
- ✓ Improper braking can cause jackknifing or trailer swing

51.4 Power to move and power to stop

Heavy vehicles require far more energy and distance to stop than to start moving. Understanding stopping distance and time is critical for safe operation of loaded commercial vehicles.

- ✓ Stopping distance and stopping time increase dramatically with speed and weight
- ✓ Heavy vehicles need much greater distance to stop than lighter vehicles

51.5 Heat and brake capacity

Brakes convert motion into heat, and there is a limit to how much heat brakes can handle before they fade. Excessive braking on long descents can overheat brakes and cause loss of braking.

- ✓ Brakes have a limit to how much heat they can handle before fading
- ✓ Overusing service brakes on downgrades causes brake fade

51.6 Braking on downgrades

On long downgrades drivers should select an appropriate lower gear and use controlled braking to prevent overheating. Different techniques apply on highways versus in town.

- ✓ Select a lower gear before descending a long downgrade
- ✓ Use controlled/intermittent braking to avoid overheating brakes on downgrades

51.7 Using retarders

Retarders help slow a heavy vehicle without using the service brakes, reducing brake wear and heat buildup. They must be used with caution on slippery surfaces.

- ✓ Retarders reduce reliance on service brakes and help control speed on downgrades
- ✓ Use retarders cautiously on icy or wet roads to avoid loss of traction

51.8 Runaway lanes and icy roads

Runaway lanes provide an escape for vehicles that lose braking on steep grades. On icy roads braking must be gentle to maintain traction.

- ✓ Use a runaway lane if you lose braking control on a steep downgrade
- ✓ Brake gently on icy roads to avoid wheel lockup and skidding

51.9 Anti-lock braking systems (ABS)

ABS prevents wheels from locking during hard braking, allowing the driver to maintain steering control. Automatic traction control helps prevent wheel spin during acceleration.

- ✓ ABS prevents wheel lockup and helps maintain steering control during hard braking
- ✓ Automatic traction control reduces wheel spin during acceleration on slippery surfaces

CHAPTER 52

Chapter 3 — Parking

52.1 Preventing a runaway parked vehicle

To prevent a runaway vehicle: set the parking brake in the tractor; place the transmission in lowest forward gear if facing uphill, reverse gear if facing downhill, or park for automatics. With main and auxiliary transmissions, place both in gear; two-speed axles must be in low range. Apply parking brakes on both tractor and trailer. Stop the engine, lock the ignition and remove the key.

- ✓ Set the parking brake in the tractor and apply parking brakes on both tractor and trailer
- ✓ Place transmission in lowest forward gear facing uphill, reverse facing downhill
- ✓ Two-speed axle must be in low range and both main/auxiliary transmissions in gear
- ✓ Stop engine, lock ignition and remove the key

52.2 Trailer brakes and wheel blocking when parked

Most trailers with air brakes have spring brakes. If your trailer has no spring brakes, apply the trailer brakes and block the wheels because air pressure may bleed down and release the trailer brakes. Never use a trailer hand valve to hold an unattended unit — air may drain and brakes may release. Block wheels of any large vehicle parked on even a slight grade. Spring brakes are effective only when brakes are correctly adjusted.

- ✓ If a trailer has no spring brakes, apply trailer brakes and block the wheels
- ✓ Never use a trailer hand valve to hold an unattended unit
- ✓ Block wheels of any large vehicle parked on even a slight grade
- ✓ Spring brakes are effective only when brakes are correctly adjusted

52.3 Turning wheels when parking on grades

On an uphill with a curb (single-unit), turn wheels left toward the centre of the road. On an uphill with no curb (single-unit), turn wheels right toward the edge. For a tractor-trailer combination uphill (with or without curb), always turn wheels left toward the centre. On any downgrade, always turn wheels right toward the edge of the roadway.

- ✓ Single-unit uphill with curb: turn wheels left toward centre of road
- ✓ Single-unit uphill no curb: turn wheels right toward edge of roadway
- ✓ Tractor-trailer uphill (curb or no curb): always turn wheels left toward centre
- ✓ Any vehicle on downgrade: turn wheels right toward edge of roadway

CHAPTER 53

Securing Cargo — General Requirements

53.1 Legal Basis for Cargo Securement

Division 35 of the Motor Vehicle Act Regulations (MVAR) specifies requirements for transporting logs/poles, covers for loose loads, front-end structures and bus luggage. B.C. has adopted the North American Standard on cargo securement, which applies to all cargo types with specific requirements for certain commodities. Both Division 35 and the Standard apply to all vehicles carrying cargo on highways regardless of gross vehicle weight. Unless the Standard specifies otherwise, general and specific requirements both apply.

- ✓ Division 35 of MVAR and the North American Standard both apply to cargo securement
- ✓ Rules apply to all vehicles carrying cargo regardless of gross vehicle weight
- ✓ General and specific requirements both apply unless otherwise specified
- ✓ Do not operate a vehicle unless cargo is secured properly

53.2 Forces the Securement System Must Withstand

The cargo securement system must suit the cargo's size, shape, strength and characteristics, and may include the vehicle structure, blocking/bracing equipment and securing devices such as tiedowns. The system must withstand 0.8g deceleration forward, 0.5g deceleration rearward, 0.5g acceleration in either sideways direction, and a downward force equal to at least 20% of cargo weight. Load on each component must not exceed its working load limit.

- ✓ Must withstand 0.8g forward deceleration
- ✓ Must withstand 0.5g rearward deceleration and 0.5g sideways in either direction
- ✓ Must withstand downward force of at least 20% of cargo weight
- ✓ Load on each component must not exceed its working load limit

53.3 Condition of Securement Components

Cargo securement system components must be in good working order — not damaged, cracked, cut or weakened — and fit for their intended purpose. Components in poor condition must not be used.

- ✓ Components must not be damaged, cracked, cut or weakened
- ✓ Components must be fit for the purpose for which they are used

CHAPTER 54

Oversize and Overload Permits

54.1 Obtaining Oversize and Overload Permits

If a load can't be reduced and is larger or heavier than regulations allow, you may purchase permits for overwidth, overweight, overlength or overheight loads. Apply through the Commercial Vehicle Permit Line. You must provide registration/insurance papers, load specifics, route/destination details and travel time. Overload permit applicants must identify weight on each axle.

- ✓ You must have a permit before you take an oversize vehicle on the road
- ✓ Provide registration and insurance papers for both tow vehicle and trailer(s), load specifics, route details and travel time
- ✓ For overload permits you must identify the amount of weight on each axle
- ✓ To move oversize/overweight loads on city or municipal roads you may need a permit from local government

54.2 Overload Permit Conditions

Overloading makes steering, braking and speed control more difficult. A vehicle is overloaded when it exceeds GVW allowed under regulations, exceeds its licensed GVW, or exceeds maximum allowable weight on any single or group of axles. Overload permits are only issued when loads can't be reduced or the vehicle isn't licensed to its allowable weight.

- ✓ A vehicle is overloaded when it exceeds regulation GVW, its licensed GVW, or the maximum weight on any single or group of axles
- ✓ Overload permits are issued only when loads can't be reduced or the vehicle isn't licensed to allowable weight
- ✓ Drive slowly on upgrades and be careful not to lose speed control going downhill when overloaded

54.3 Oversize Permit Conditions

If your vehicle is wider, longer or higher than regulations allow, you must have an oversize permit before operating on any highway, whether loaded or not. Permits for loaded vehicles are only given when the load can't be reduced. Permits are not normally given for loads wider than 4.4 m. Oversize extremities must be marked with red flags at least 30 cm by 30 cm, with amber lights front and red rear for night travel.

- ✓ You must have an oversize permit before operating on any highway whether loaded or not
- ✓ Permits are not normally given for loads or vehicles wider than 4.4 m
- ✓ Extremities of oversize vehicles must be marked with red flags at least 30 cm by 30 cm
- ✓ For night travel, amber lights are required to the front and red lights to the rear on extremities

54.4 Permit Requirements and Conditions

When you receive a permit you will be given a list of requirements to fulfill, which may include pilot cars, flags, signs, lights, permitted time of day, days of the week you may travel, and the route you must use.

- ✓ Permit requirements may include pilot cars, flags, signs, lights, restricted times/days and specific routes
- ✓ You must fulfill all listed requirements when operating under a permit

54.5 Pilot Car Requirements

A pilot car may be required as a condition of an oversize or overload permit to warn other drivers about the larger-than-normal vehicle. More than one pilot car may be required depending on route and load. A pilot car must travel between 100 and 500 m either behind or in front of the oversize vehicle. When required, a D (over dimension) sign must be carried by the pilot car.

- ✓ A pilot car warns other drivers about a larger-than-normal vehicle approaching
- ✓ A pilot car must travel between 100 and 500 m either behind or in front of the oversize vehicle
- ✓ When required, a D (for over dimension) sign must be carried by the pilot car
- ✓ More than one pilot car may be required depending on route and load

54.6 Oversize Load Signs

You must display the appropriate signs whenever you transport an oversize load. Different signs warn of wide load, long load or oversize load being carried.

- ✓ Display the appropriate signs whenever transporting an oversize load
- ✓ Signs indicate whether a wide load, long load or oversize load is being carried

CHAPTER 55

Chapter 8 — Air Brakes: Parking Brakes

55.1 Parking Brake Requirements

Air pressure alone is unreliable and illegal for parking because any leak or failure could cause loss of pressure and a rollaway. Regulations require the parking force be maintained by mechanical means, unaffected by loss of air pressure. The two types are spring parking brakes and safety actuators.

- ✓ Parking force must be maintained by mechanical means and be unaffected by loss of air pressure
- ✓ Using only air brakes for parking is illegal and unsafe

55.2 Spring Parking Brakes

Most spring parking brakes consist of an additional chamber attached behind the service brake chamber containing a powerful coil spring (1,500 to 2,000 pounds of force). The spring applies the brakes through the service chamber pushrod. Spring parking brakes are mounted on rear axles only, not steering axles. They are applied and held by mechanical spring pressure, not air.

- ✓ Spring parking brakes are mounted on rear axles only, not on steering axles
- ✓ The coil spring exerts between 1,500 and 2,000 pounds of force and holds brakes applied by mechanical pressure, not air
- ✓ Spring brake assemblies should only be serviced by qualified personnel due to extreme spring pressure

55.3 Applying and Releasing Spring Parking Brakes

Spring brakes are normally applied and released using the parking brake control valve (usually a yellow button) on the dashboard. Pushing in supplies air to release; pulling out exhausts air to apply. If air pressure falls below approximately 60 p.s.i. the springs may drag, and at 20 to 45 p.s.i. (138 to 310 kPa) they may automatically fully apply.

- ✓ Pull the parking brake control valve out to apply (exhaust air), push in to release (supply air)
- ✓ At 20 to 45 p.s.i. (138 to 310 kPa) spring brakes may automatically apply; they may begin dragging below approximately 60 p.s.i.

55.4 Compounding of Brakes

When spring parking brakes are applied (up to 2,000 lbs force) and a heavy service brake application is made, the air force (up to 3,000 lbs) is added to the spring force for a total of up to 5,000 lbs. This compounding can damage slack adjusters, s-cams, mounting bolts, rollers, shoes and drums. Always release spring brakes before heavy service applications.

- ✓ Always release spring parking brakes before making a heavy service brake application
- ✓ Light applications under 30 to 40 p.s.i. (207 to 276 kPa) to hold the vehicle while releasing/applying spring brakes are not harmful

55.5 Manual Release (Caging) of Spring Brakes

Spring parking brake chambers can be manually released or 'caged' using a release bolt, nut and washer. This should only be done by mechanics during repairs or in emergencies (e.g. to tow a vehicle when all air is lost). Once caged, there is no parking brake force at that wheel.

- ✓ Always block the wheels before caging spring parking brakes
- ✓ Once a spring brake chamber is caged, there is no parking brake force at that wheel

55.6 Spring Parking Brakes in Dual Air Systems / Blended Air

A two-way check valve supplies the parking brake dash control with air from the reservoir with the highest pressure — called blended air. It has two inlet ports and one delivery port with a free-floating shuttle that moves away from the higher pressure inlet. This ensures spring brakes won't automatically apply if only one reservoir loses air.

- ✓ The two-way check valve draws air from the reservoir with the highest pressure (blended air)
- ✓ This ensures spring parking brakes will not automatically apply if there is total loss in only one reservoir

55.7 Spring Brake Modulator

An optional spring brake modulator senses loss of pressure in the primary system, and when the driver applies the service brakes, exhausts air from the spring parking brakes in direct proportion to the brake application. This lets the driver control spring force to help the front brakes make a controlled stop.

- ✓ Senses loss of primary system pressure and modulates spring brake application proportional to foot valve application
- ✓ All vehicles must meet Canadian Motor Vehicle Safety Standards for emergency stopping even with a partially failed system

55.8 Safety Actuator Parking Brakes

Used on many buses and highway coaches, safety actuators use a one-way locking mechanism instead of a coil spring. They have two diaphragms (service and parking) and a separate parking air reservoir. Pulling the dash control applies air to the parking diaphragm and engages the locking mechanism, holding the pushrod in the applied position even if all air is lost.

- ✓ Safety actuator parking brakes cannot be compounded because spring force is not used
- ✓ They will not apply automatically even if service reservoir pressure drops to zero — only loss of parking reservoir pressure causes automatic application
- ✓ If more than 4 p.s.i. (27.6 kPa) is lost from the parking reservoir, a heavy service brake application must be made to release them

CHAPTER 56

Chapter 9 — Air Brake Adjustment: The Importance and Law

56.1 Brake Adjustment Importance and Responsibility

Foundation brakes are the most important part of any braking system; if not properly adjusted, even the best system can't stop the vehicle safely. Brake failures and runaways are almost never caused by air system failure — usually lack of maintenance or failure to check brakes daily. The driver is ultimately responsible before the vehicle moves.

- ✓ Daily pre- and post-trip inspections including checking and adjusting brakes are mandatory
- ✓ The driver may be held responsible if brakes are incorrectly adjusted or not working
- ✓ One person is ultimately responsible — that person is the driver

56.2 Brake Adjustment — The Law

Federal and provincial laws require checking manual and automatic slack adjusters daily during pre-trip inspection. Drivers must also check brakes before driving down steep grades posted with regulatory signs. You may be fined as much as $2,000 for operating a vehicle with defective brakes, including excessive brake chamber pushrod stroke.

- ✓ Federal and provincial laws require daily checks of slack adjusters during pre-trip inspection
- ✓ You must check brakes before driving down steep grades posted with regulatory signs
- ✓ You may be fined as much as $2,000 for operating with defective brakes

CHAPTER 57

Chapter 10 — Written Report Requirements

57.1 Contents of a Written Trip Inspection Report

Every written trip inspection report must contain specific required information and be completed and signed before the first trip of the day.

- ✓ Report must include licence plate/unit numbers, all defects (or state no defect found), the date, and a signature
- ✓ Report must be completed prior to the first trip of the day
- ✓ New reports must be completed no later than the first rest stop of every subsequent day for multi-day trips
- ✓ All trip inspection reports must be given to the carrier within 20 days

57.2 Multiple Drivers and Coupled Trailers

When drivers share a vehicle, one signature suffices unless there is disagreement over defects. When coupling to a trailer, the driver must obtain or complete a trip inspection report for that trailer.

- ✓ Only one driver needs to sign if there is no disagreement about defects
- ✓ If there is disagreement, all drivers must sign and indicate the nature of the disagreement
- ✓ When coupling to a trailer, obtain and carry that trailer's trip inspection report or complete one
- ✓ For each defect, state that it has been corrected or that no correction is necessary

57.3 Fines and Out-of-Service Consequences

Failure to carry a trip inspection report or operating an unsafe vehicle can result in fines and having the vehicle placed out of service.

- ✓ You may be fined if you fail to carry a trip inspection report
- ✓ Operating an unsafe vehicle may result in a fine and/or the vehicle being placed out of service
- ✓ A defect not affecting safe operation may have repairs deferred but must be recorded and noted as not requiring immediate repair

CHAPTER 58

Index of Key Vehicle Operation Topics

58.1 Following Distance and Two-Second Rule

Maintain safe following distance using the two-second rule, adjusting for larger vehicles, weather and load. Total stopping distance combines perception, reaction and braking distances. Vans, taxis and buses have specific following distance considerations.

- ✓ Apply the two-second rule to maintain safe following distance
- ✓ Total stopping distance includes perception, reaction and braking distance
- ✓ Increase following distance for heavier loads and poor conditions

58.2 Speed, Weight and Stopping Power

A vehicle's speed and weight directly affect its stopping power and stopping distance. Heavier and faster vehicles require greater distance to stop safely, so braking must be planned well ahead.

- ✓ Greater speed and weight increase stopping distance
- ✓ Adjust braking and speed to maintain adequate stopping power

58.3 Off-Tracking and Turning Radius

Large vehicles off-track, meaning the rear wheels follow a tighter path than the front wheels during turns. Turning radius and wheelbase determine how much space is needed. Drivers must position wheels correctly and allow for off-tracking when turning.

- ✓ Rear wheels off-track inside the front wheels' path during turns
- ✓ Account for turning radius and wheelbase when making turns
- ✓ Position the vehicle to allow room for off-tracking

58.4 Shifting Gears and Avoiding Lugging

Proper gear selection is essential; shift smoothly and avoid lugging the engine (operating at too low an rpm for the load). Understand rpm, retarders and multi-speed rear axles.

- ✓ Avoid lugging by keeping engine rpm in the proper operating range
- ✓ Shift gears smoothly and select the appropriate gear for grade and load
- ✓ Use retarders appropriately to control speed

58.5 Railway Crossings and Roundabouts

Commercial drivers must follow specific procedures at railway crossings and navigate roundabouts/traffic circles safely. Buses and certain vehicles may be required to stop at crossings.

- ✓ Follow commercial vehicle procedures at railway crossings
- ✓ Navigate roundabouts and traffic circles safely with proper lane use

CHAPTER 59

Chapter 1: Getting Your Driver's Licence — Medical and Vision

59.1 Medical Fitness Requirements

Commercial drivers must be in good physical condition. When applying, you must answer questions about medical conditions, complete a declaration form, and have a doctor complete a Driver's Medical Examination form sent to RoadSafetyBC, which determines fitness. The doctor's fee is not covered by MSP, ICBC or RoadSafetyBC.

- ✓ A Driver's Medical Examination form must be completed by a B.C.-licensed physician and sent to RoadSafetyBC
- ✓ Applicants must disclose any known medical conditions for safety reasons
- ✓ The Superintendent reviews the medical form to determine fitness to hold a commercial licence

59.2 Vision Standards for Commercial Drivers

Commercial drivers must meet a higher vision standard than Class 5 drivers. Vision is screened when applying for a learner's licence. Testing measures visual acuity, peripheral vision, depth perception, double vision (diplopia), and colour perception (red, green, amber). Applicants who need corrective lenses must wear them during screening.

- ✓ Commercial drivers must meet a higher vision standard than Class 5 drivers
- ✓ Vision testing covers acuity, peripheral vision, depth perception, diplopia and colour perception
- ✓ Corrective lenses must be worn during the vision screening if needed to meet standards

CHAPTER 60

Chapter 1: Getting your driver's licence — Medical and vision

60.1 Medical fitness requirements

Commercial drivers must be in good physical condition. When applying you must disclose certain medical conditions, complete a declaration form, and have a doctor complete a Driver's Medical Examination form sent to RoadSafetyBC, who determines fitness. The doctor's fee is not covered by MSP, ICBC or RoadSafetyBC.

- ✓ Applicants must disclose known medical conditions and complete a medical declaration form
- ✓ A B.C.-licensed physician must complete the Driver's Medical Examination form and send it to RoadSafetyBC, who determines fitness to hold a commercial licence

60.2 Vision standard for commercial drivers

Commercial drivers must meet a higher vision standard than Class 5 drivers. Vision is screened at the driver licensing office measuring visual acuity, peripheral vision, depth perception, double vision (diplopia), and colour perception (red, green, amber). Corrective lenses must be worn during screening if needed.

- ✓ Commercial drivers must meet a higher vision standard than Class 5 drivers
- ✓ Vision screening tests visual acuity, peripheral vision, depth perception, diplopia and colour perception of red, green and amber; corrective lenses must be used during screening

CHAPTER 61

Chapter 10 — Passenger Vehicle Pre-Trip Inspection (Class 4 Restricted)

61.1 Class 4 restricted inspection overview

The Class 4 (restricted) pre-trip inspection should be completed in less than 15 minutes. Under the hood, look for leaks, check fluid levels and condition (oil, coolant, power steering, brake fluid, washer fluid), belts, hoses, battery (corrosion, secure terminals and mounting, fluid level) and check for fuel/oil/coolant leaks. Close and secure the hood.

- ✓ Complete the Class 4 restricted pre-trip inspection in under 15 minutes
- ✓ Check fluids, belts, hoses, battery and for engine compartment leaks under the hood

61.2 Passenger compartment and instrument checks

Check driver's seat adjustment and that all seatbelts work and are in good condition; mirrors adjusted and crack-free; windows/windshield clean and operable. Ensure documentation is valid and up-to-date. Start engine and verify instrument panel: charge rate, oil pressure (normal soon after start), coolant temperature, fuel gauge and instrument lights. Check wipers/washers, heater/defroster, interior lights, four-way flashers, horn and listen for unusual engine noises.

- ✓ All seatbelts must be in good condition and function; documentation must be valid and up-to-date
- ✓ Instrument panel gauges must respond properly as the engine warms up

61.3 Class 4 restricted circle check and brake test

Turn on left-turn signal and low-beam headlights, walk counter-clockwise from the front to face traffic, and confirm left-turn signal, low-beams, tail lights and licence plate lights work. Check right-turn signal and high-beams. Inspect tires/wheels, licence plate and trunk (spare tire, jack, secure/non-leaking propane tank if present). For the brake test: depress brake pedal, shift to low gear, gently tug against parking brake (it should hold), release, then move ahead and apply foot brake. Have an assistant check brake lights when possible.

- ✓ Parking brake must hold the vehicle during the tug test in low gear
- ✓ Check tires for inflation, bulges, tread depth and secure wheel lugs
- ✓ Have an assistant verify brake lights whenever possible

CHAPTER 62

Statement of Limitation

62.1 Purpose and legal authority of the guide

Driving Commercial Vehicles helps individuals study for Class 1, 2, 3 or 4 licences, air brake endorsements, industrial air brake endorsements, or heavy trailer endorsements. It reflects BC law but the actual acts and regulations take precedence over the guide.

- ✓ The guide assists studying for Class 1, 2, 3 or 4 licences and air brake, industrial air brake, or heavy trailer endorsements
- ✓ In case of a difference between the guide and acts or regulations, the acts or regulations shall apply
- ✓ The guide is not a substitute for professional training and does not guarantee test success

CHAPTER 63

Chapter 1 — Air Brake Courses and Endorsements

63.1 Air Brake Course Types and Requirements

To apply for an air brake endorsement, you need proof of completing an air brake course. A certified course includes 7 hours classroom theory plus 4 hours practical training on air brake pre-trip inspection—passing the provider's assessment may exempt you from the ICBC pre-trip test. A non-certified course includes 7 hours classroom theory only. You may be exempt if you can prove sufficient experience, but you still must pass the air brake knowledge test and pre-trip inspection test.

- ✓ A certified air brake course includes 7 hours classroom theory plus 4 hours practical training
- ✓ A non-certified course includes 7 hours classroom theory only
- ✓ Even if exempt from the course, you must pass the air brake knowledge test and pre-trip inspection test
- ✓ Taking a road test in an air-brake vehicle requires an air brake endorsement or completed approved course with passed knowledge test

CHAPTER 64

Crossings and Intersections

64.1 Intersection Best Practices

Never assume you have the right-of-way, even when controlled by signs or signals. Get in the proper lane and signal well before turning. Look left and right, expect drivers to run signs or lights, watch for stale green lights, and enter limited-view intersections at a speed that lets you stop. Don't use vehicle size to force others to give way.

- ✓ Don't assume you have the right-of-way even with signals/signs
- ✓ Get in proper lane and signal well before the intersection
- ✓ Enter limited-view intersections at a speed that allows you to stop
- ✓ Don't change lanes, pass or overtake when approaching or going through an intersection
- ✓ Give the right-of-way; don't try to take it

64.2 Alleys, Lanes and Side Roads

When driving from an alley, lane or side road onto a highway, you must stop before crossing the sidewalk area and yield to pedestrians and vehicles on the highway. The maximum speed in a lane or alley is 20 km/h unless otherwise posted.

- ✓ Stop before driving across the sidewalk area
- ✓ Yield to pedestrians in the sidewalk area and motor vehicles on the highway
- ✓ Maximum speed in a lane or alley is 20 km/h unless otherwise posted

CHAPTER 65

Chapter 5 — Reporting to Weigh Scales

65.1 Requirement to Report to Weigh Scales

Fixed and portable weigh scales are located throughout B.C. If you drive a commercial vehicle with a licensed GVW of more than 5,500 kg, you must report to a scale whenever directed by a sign, police officer or authorized person. Your vehicle will be weighed and inspected. An inspector may ask you to park and bring in registration and permit papers, log book and trip inspection report.

- ✓ Vehicles with licensed GVW over 5,500 kg must report to weigh scales when directed
- ✓ Report when directed by a sign, police officer, or authorized person
- ✓ Bring registration, permit papers, log book and trip inspection report if requested

65.2 Fixed and Portable Weigh Scales

Fixed weigh scales are permanently located throughout B.C. with highway signs directing drivers. Drive onto the scales when entering the yard; a peace officer checks tires and measures the vehicle and load. Follow the directions on the light board. Portable scales travel throughout B.C. and may be found on any public road — set up on the roadside where you're signalled to stop, or a vehicle with flashing lights may direct you to pull over.

- ✓ At fixed scales, follow the directions on the light board
- ✓ Portable scales may be found on any public road
- ✓ A vehicle with flashing lights may direct you to pull over for a portable scale

CHAPTER 66

Chapter 1: Getting Your Driver's Licence — Air Brake Endorsement

66.1 When an Air Brake Endorsement Is Required

To operate air-brake-equipped vehicles on a highway (other than construction vehicles) you must hold a B.C. driver's licence with an air brake endorsement (code 15). It is also required for most vehicles with air-over-hydraulic brakes. Code 15 appears in the restrictions section of the licence.

- ✓ An air brake endorsement (code 15) is required to operate air-brake-equipped vehicles on highways
- ✓ Air-over-hydraulic brake vehicles also generally require an air brake endorsement
- ✓ Construction vehicles are exempt from the air brake endorsement requirement

66.2 Applying for the Air Brake Endorsement

To apply: complete a minimum 7-hour air brake course, study the guide, apply at a licensing office with primary and secondary ID, provide proof of air brake experience, pay the knowledge test fee, take the air brake knowledge test, then take the air brake pre-trip inspection test. No road test is required, but you must bring an air-brake-equipped vehicle for the pre-trip test.

- ✓ Air brake courses are a minimum of 7 hours in length
- ✓ The air brake endorsement requires passing a knowledge test and a pre-trip inspection test, but no road test
- ✓ You must bring an air-brake-equipped vehicle to the pre-trip inspection test

66.3 Air Brake Knowledge Test Validity and Retakes

An applicant who fails the air brake knowledge test after three attempts must complete or repeat an approved 7-hour air brake training course. Air brake knowledge test results are valid for one year; if the endorsement is not placed on the licence within one year, the test must be re-taken.

- ✓ Failing the air brake knowledge test three times requires completing/repeating a 7-hour course
- ✓ Air brake knowledge test results are valid for only one year

CHAPTER 67

Chapter 3: Basic driving skills

67.1 Off-tracking and turning radius

When a large vehicle turns, the rear wheels follow a shorter path than the front wheels (off-tracking). Drivers must account for the turning radius and off-track to avoid hitting curbs, objects or other vehicles.

- ✓ Rear wheels off-track inside the path of the front wheels during turns
- ✓ Account for off-tracking when making turns to avoid curbs and obstacles
- ✓ Sharp right turns require extra space for off-tracking

67.2 Managing traffic flow and tailgaters

Drivers should match the flow of traffic where safe; driving faster or slower than the flow creates hazards. When tailgated, drivers should increase their own following distance and avoid sudden braking.

- ✓ Avoid driving significantly faster or slower than the flow of traffic
- ✓ When tailgated, increase your following distance ahead
- ✓ Do not brake suddenly when being tailgated

67.3 Emergency and stopped vehicles

Drivers must yield to emergency vehicles and slow down or move over for stopped vehicles displaying flashing lights.

- ✓ Yield to emergency vehicles displaying lights and sirens
- ✓ Slow down and move over for stopped vehicles with flashing lights

67.4 Impairment, fatigue and driving penalties

Impaired driving carries Criminal Code penalties, vehicle impoundment and other costs. Prescription and over-the-counter drugs, fatigue and emotions can also impair driving ability.

- ✓ Impaired driving results in Criminal Code penalties and vehicle impoundment
- ✓ Prescription and over-the-counter drugs can impair driving
- ✓ Fatigue and strong emotions impair safe driving

67.5 Personal safety devices

Seatbelts, airbags and head restraints protect occupants and must be used properly. Carbon monoxide poisoning is a hazard drivers must guard against. Cellphone and device use while driving is restricted.

- ✓ Wear seatbelts and use head restraints correctly
- ✓ Guard against carbon monoxide poisoning in the cab
- ✓ Do not use handheld cellphones or devices while driving

67.6 Traffic circles and roundabouts

Drivers of large vehicles must navigate traffic circles and roundabouts carefully, yielding as required and accounting for the vehicle's size and off-tracking.

- ✓ Yield as required when entering traffic circles and roundabouts
- ✓ Account for vehicle size and off-tracking in roundabouts

67.7 Following distance for heavy vehicles

Heavy vehicles require greater following distances than passenger cars because of longer stopping distances. Different types of vehicles require different minimum following distances.

- ✓ Buses, trucks and heavy vehicles require greater following distances than smaller vehicles
- ✓ Maintain adequate space ahead to allow for the longer stopping distance of heavy vehicles

67.8 Off tracking and turning radius

When a large vehicle or combination turns, the rear wheels follow a tighter path than the front wheels, known as off tracking. Drivers must account for this when turning and negotiating narrow spaces.

- ✓ Rear wheels follow a shorter path than front wheels during turns (off tracking)
- ✓ Account for off tracking when making sharp right turns and negotiating narrow bridges

67.9 Making right and left turns

Large vehicles need extra room to turn. Sharp right turns require special positioning to avoid off tracking over curbs, and drivers must watch for cyclists and pedestrians.

- ✓ Position the vehicle to allow for off tracking on sharp right turns
- ✓ Check mirrors and blind spots for cyclists and pedestrians before turning

67.10 Backing up safely

Backing a large vehicle is dangerous due to limited visibility. Use a guide when possible and otherwise get out and check behind the vehicle before backing.

- ✓ Use a guide (spotter) when backing up whenever possible
- ✓ When backing without a guide, get out and check the area behind the vehicle first

67.11 Seeing and being seen

Proper use of mirrors and looking well ahead helps drivers anticipate hazards. Correct lane use improves visibility and safety.

- ✓ Regularly check mirrors and look well ahead to identify hazards early
- ✓ Choose the appropriate lane for your speed and route

67.12 Emergency and stopped vehicles with flashing lights

Drivers must respond appropriately to emergency vehicles and to stopped vehicles displaying flashing lights, including slowing down and moving over.

- ✓ Yield to emergency vehicles displaying lights and sirens
- ✓ Slow down and move over for stopped vehicles displaying flashing lights

67.13 Shifting gears and double-clutching

Proper gear shifting is essential in commercial vehicles. Double-clutching is used on many manual transmissions, and knowing when to shift matters for governed and non-governed engines.

- ✓ Use double-clutching technique when required for manual transmissions
- ✓ Shift at appropriate points for governed diesel versus non-governed gasoline engines

67.14 Railway crossings in large vehicles

Large and long vehicles need special care at railway crossings to ensure they can clear the tracks completely. Both controlled and uncontrolled crossings require caution.

- ✓ Ensure there is room to fully clear the tracks before starting across a railway crossing
- ✓ Approach both controlled and uncontrolled crossings with caution in a large vehicle

67.15 Tire and wheel safety

Correct tire pressure, checking for wear and condition, and monitoring for disk and cast spoke wheel problems are essential for safe commercial vehicle operation.

- ✓ Maintain correct tire pressure and inspect tires for wear and damage
- ✓ Check disk and cast spoke wheels for cracks, missing parts or other problems

67.16 Impairment and vehicle impoundment

Impaired driving carries Criminal Code penalties, additional costs, and vehicle impoundment. Prescription and over-the-counter drugs, fatigue, and emotions can also impair driving.

- ✓ Impaired driving results in Criminal Code penalties and possible vehicle impoundment
- ✓ Prescription/over-the-counter drugs, fatigue and emotions can impair driving ability

67.17 Fire safety and extinguishers

Drivers must know firefighting basics and how to use fire extinguishers. Certain vehicles are required by law to carry fire extinguishers.

- ✓ Know how to use a fire extinguisher in a vehicle fire
- ✓ Certain commercial vehicles are legally required to carry fire extinguishers

CHAPTER 68

Chapter 1: Getting your driver's licence — Air brake endorsement

68.1 When an air brake endorsement is required

To operate vehicles equipped with air brakes on a highway (other than a construction vehicle), you must have a B.C. driver's licence with an air brake endorsement (code 15). It is also required for most vehicles with air-over-hydraulic brakes. Code 15 appears in the restrictions section of the licence.

- ✓ An air brake endorsement (code 15) is required to operate air-brake-equipped vehicles on a highway, except construction vehicles
- ✓ Most vehicles with air-over-hydraulic brakes also require the air brake endorsement

68.2 Air brake knowledge test rules

Applicants who fail the air brake knowledge test after three attempts must complete or repeat an approved 7-hour air brake training course. Air brake knowledge test results are valid for only one year — if the endorsement is not placed on the licence within one year of passing, the test must be re-taken.

- ✓ Failing the air brake knowledge test three times requires completing/repeating an approved 7-hour air brake course
- ✓ Air brake knowledge test results are valid for only one year

68.3 Applying for the air brake endorsement

Steps: complete a minimum 7-hour air brake course; study the guide; apply at a driver licensing office presenting primary and secondary ID, proof of air brake experience, pay the fee and take the knowledge test; then take the air brake pre-trip inspection test. No road test is required, but you must bring a vehicle equipped with air brakes.

- ✓ The air brake course must be a minimum of 7 hours long
- ✓ The air brake endorsement requires passing a knowledge test and a pre-trip inspection test (no road test), using an air-brake-equipped vehicle

CHAPTER 69

Chapter 3 — Crossings and Intersections

69.1 Intersection best practices

Don't assume you have the right-of-way even when controlled by signs or signals. Get in the proper lane and signal well before turning, reducing speed gradually and turning only when your path is clear. Look left and right and expect someone to run signs or lights. Enter limited-view intersections at a speed allowing you to stop. Watch for stale green lights. Don't change lanes, pass or overtake near or in intersections. Give the right-of-way; don't try to take it using your vehicle's size.

- ✓ Don't assume you have the right-of-way even when signals favour you
- ✓ Get in the proper lane and signal well before the intersection
- ✓ Don't change lanes, pass or overtake approaching or in an intersection
- ✓ Give the right-of-way; never use your vehicle's size to force others

69.2 Alleys, lanes and side roads

When driving from an alley, lane or side road onto a highway, you must stop before crossing the sidewalk area and yield the right-of-way to pedestrians in the sidewalk area and to motor vehicles on the highway. The maximum speed in a lane or alley is 20 km/h unless otherwise posted.

- ✓ Stop before crossing the sidewalk area when exiting an alley, lane or side road
- ✓ Yield to pedestrians in the sidewalk area and to vehicles on the highway
- ✓ Maximum speed in a lane or alley is 20 km/h unless otherwise posted

CHAPTER 70

General Requirements for Tiedowns

70.1 Tiedown Design and Operation Requirements

Tiedowns must be designed, constructed and maintained so a driver can tighten them (except steel strapping). They must be taut and must not slip, loosen, unfasten, open or release while the vehicle is in operation. Use edge protectors where a tiedown could be cut or scraped against cargo, and locate tiedowns inboard of rub rails if possible. One long chain may serve as two tiedowns only if each has an independent tensioning device so one failing doesn't cause the other to fail.

- ✓ Tiedowns must be tightenable by the driver (except steel strapping)
- ✓ Tiedowns must remain taut and not slip, loosen or release in operation
- ✓ Use edge protectors where tiedowns could be cut or scraped
- ✓ A long chain used as two tiedowns needs an independent tensioning device for each

70.2 Defects That Prohibit Tiedown Use

Tiedowns must not be used if a chain has cracked welds, links, or bent/twisted/stretched/collapsed links, links weakened by gouges/nicks/pits, is incorrectly repaired, or shows loss of strength. Also prohibited: knots in chain/wire rope/webbing, spread or disturbed grab hooks, nylon webbing with cuts/nicks/splits, wire cable with missing strands/wraps, or an anchor point weakened by cracks/breaks/distortion.

- ✓ Do not use chains with cracked, bent, twisted, stretched or collapsed links
- ✓ Do not use tiedowns with knots in chain, wire rope or webbing
- ✓ Do not use nylon webbing with cuts, nicks or splits or wire cable with missing strands
- ✓ Do not use tiedowns anchored at weakened or damaged anchor points

70.3 Minimum Number of Tiedowns

When cargo isn't prevented from moving forward: articles 1.52 m or shorter and 500 kg or lighter need 1 tiedown; 1.52 m or shorter and over 500 kg need 2; more than 1.52 m up to 3.04 m need 2; longer than 3.04 m need 2 plus 1 additional tiedown for every additional 3.04 m or part thereof. When cargo is prevented from moving forward, use one tiedown for every 3.04 m of length. A rough guide is two tiedowns for the first 3.04 m and one for each 3.04 m after.

- ✓ Article ⩽1.52 m and ⩽500 kg: 1 tiedown
- ✓ Article ⩽1.52 m and >500 kg, or >1.52 m to 3.04 m: 2 tiedowns
- ✓ Article >3.04 m: 2 tiedowns plus 1 for each additional 3.04 m or part thereof
- ✓ If prevented from moving forward: 1 tiedown per 3.04 m of length

70.4 Strength of Tiedowns

The aggregate working load limit of tiedowns used to secure cargo must be at least 50% of the cargo weight. Example: a 600 kg article requires tiedowns with a total working load limit of at least 300 kg. If the article is 3.65 m and not prevented from moving forward, three tiedowns are required, so each must have a working load limit of at least 100 kg. If only 50 kg tiedowns are available, use six. The Standard specifies both minimum number and minimum strength.

- ✓ Aggregate working load limit must be at least 50% of cargo weight
- ✓ Divide required aggregate WLL by number of tiedowns to find per-tiedown requirement
- ✓ Both minimum number and minimum strength requirements must be met
- ✓ Add more tiedowns if individual capacity is low

70.5 Determining Working Load Limit

The working load limit is marked on the component by the manufacturer. As of January 1, 2010, the Standard prohibits the use of unmarked tiedowns. Standard 10 provides default working load limits for chain, synthetic webbing, wire rope, manila rope, synthetic fiber rope and steel strapping. A chain connector link must be compatible with the grade of chain being used — a chain is only as good as its weakest link.

- ✓ Working load limit must be marked by the manufacturer
- ✓ Unmarked tiedowns are prohibited as of January 1, 2010
- ✓ Chain connector links must match the grade of chain being used
- ✓ Standard 10 provides default working load limits by material type

70.6 Load Binders and Assembly Assumptions

When using load binders you must ensure tiedown assemblies are strong enough — assume they are the lowest grade for their size unless clearly marked otherwise. Protect all assemblies from abrasion, don't use assemblies worn beyond the manufacturer's wear limitation, and lock every load binder handle in place using rope, wire, chain or a locking mechanism (the free end of chain is adequate). Ensure all tiedowns can be tightened unless steel/fiber/synthetic strapping is used, in which case ensure it is taut. An unmarked friction mat is assumed to provide resistance equal to 50% of the cargo weight resting on it. Timber dunnage must not split or crush under load. Rub rails must not be used as anchor points.

- ✓ Assume tiedown assemblies are the lowest grade unless marked otherwise
- ✓ Lock every load binder handle in place to prevent unlocking
- ✓ Protect assemblies from abrasion and do not use worn ones
- ✓ Rub rails must never be used as anchor points

70.7 Aggregate and Rolling Loads

An aggregate load is a collection of small articles like sand, gravel, paper or wood chips. If the load is made of aggregate material and likely to bounce, blow or drop from the moving vehicle, you must use a cover or tarp. Articles placed beside each other and secured by tiedowns passing over two or more must be in direct contact or prevented from moving toward each other. Cargo that may roll must be restrained by chocks, wedges, a cradle or other securing device. Bagged products on pallets require tiedowns and dunnage — interlocking bags and wedging pallets alone is not enough. Loads on rollers require at least one roller locked plus adequate tiedowns.

- ✓ Use a cover or tarp for aggregate loads likely to bounce, blow or drop
- ✓ Articles under shared tiedowns must be in direct contact or prevented from shifting toward each other
- ✓ Restrain rolling cargo with chocks, wedges or a cradle
- ✓ Lock at least one roller when a load is supported on rollers

CHAPTER 71

Reporting to Weigh Scales

71.1 Weigh Scale Reporting Requirements

Fixed and portable weigh scales are found throughout B.C. If you drive a commercial vehicle with a licensed GVW of more than 5,500 kg, you must report to a scale whenever directed by a sign, police officer or authorized person. Your vehicle will be weighed and inspected. You may be asked to bring registration, permit papers, log book and trip inspection report into an office.

- ✓ If your commercial vehicle has a licensed GVW of more than 5,500 kg, you must report to a scale when directed by a sign, police officer or authorized person
- ✓ Your vehicle will be weighed and inspected at the scale
- ✓ Bring all registration and permit papers, log book and trip inspection report if asked to go to the office

71.2 Fixed and Portable Weigh Scales

Fixed weigh scales are permanently located throughout B.C. with highway signs directing drivers. The scale measures weight on axles/axle groups and an officer checks tires and measures the vehicle. Portable weigh scales travel throughout B.C. and may be found on any public road, either set up on the roadside or by a vehicle with flashing lights directing you to pull over.

- ✓ At fixed scales, follow the directions on the light board and drive onto the scales when entering the yard
- ✓ Portable weigh scales may be set up on the side of any public road and you may be signalled to stop
- ✓ A vehicle with flashing lights may direct you to pull over where an inspector may set up a scale

CHAPTER 72

Chapter 8 — Air Brakes: Tractor-Trailer Air Brake Systems

72.1 Trailer Air System Basics

A trailer system has foundation brakes, air chambers, reservoirs and control valves like a truck, but has no air compressor. It relies on the tractor to fill trailer reservoirs and to command brake application/release. Two air line connections link the tractor and trailer: the supply line and the control line.

- ✓ The trailer has no air compressor and relies on the tractor for compressed air and brake commands
- ✓ The supply line (also called emergency line) fills the trailer reservoirs; the control line (also called service line) carries the brake control signal

72.2 Glad Hands and Line Colour Coding

Air lines connecting tractor and trailer use quick coupling devices called glad hands. They are colour-coded: blue indicates the control line, red indicates the supply line. When not in use, glad hands should be fastened to dummy couplers or each other to keep out dirt and debris and prevent chafing.

- ✓ Blue indicates the control (service) line; red indicates the supply (emergency) line
- ✓ When not in use, fasten glad hands to dead-end couplers or to each other to prevent dirt entering the lines

72.3 Emergency Stopping / Dynamiting Trailer Brakes

All trailer systems must have an emergency stopping system that fully applies the trailer brakes if the trailer separates. Trailers without spring parking brakes use a relay emergency valve which senses breakaway and applies the service brakes with full reservoir pressure — called dynamiting. Trailers with spring parking brakes use spring force to dynamite the brakes.

- ✓ All trailer systems must have an emergency stopping system that fully applies the trailer brakes on separation
- ✓ The relay emergency valve dynamites the brakes using full trailer reservoir pressure when it senses loss of supply line pressure

72.4 Relay Emergency Valve Operation

During charging, air passes from the tractor through the supply line to fill the trailer reservoir. During a service application, the control signal reaches the relay emergency valve which delivers reservoir air to the service chambers at about the same pressure as the control signal. When the supply line breaks, the valve delivers full reservoir pressure, dynamiting the brakes.

- ✓ The trailer brakes are dynamited when the supply line breaks, glad hands are disconnected, or the trailer supply valve is closed
- ✓ Motor vehicle safety standards require dynamited systems to remain applied for a minimum of 15 minutes

72.5 Trailer with Spring Parking Brakes

Most current trailers use spring parking brakes for parking and breakaway stopping. A common system uses one reservoir, a relay valve for service brakes, and a trailer spring brake valve that fills the reservoir and controls the spring brakes. Some systems fill the reservoir before releasing spring brakes; others release spring brakes first.

- ✓ Always perform a tug test after coupling the tractor to the trailer
- ✓ If supply and service lines are reversed, the spring brakes won't release and the service brakes won't function

72.6 Tractor Protection System

If the trailer separates and the air lines break, tractor air rushes out through broken lines. The tractor protection system — consisting of a trailer air supply valve in the dash and a tractor protection valve behind the cab — automatically shuts off air loss to preserve enough pressure for a safe stop.

- ✓ The tractor protection system automatically shuts off air loss on breakaway; some allow pressure to drop to as low as 20 p.s.i. (138 kPa) before shutting off
- ✓ A peace officer may place your vehicle out of service if it allows tractor pressure to drop below 20 p.s.i. (138 kPa) without the trailer air supply valve closing

72.7 Trailer Air Supply Valve

The dash-mounted trailer air supply valve directs air pressure to the trailer and senses supply line pressure. Most are an octagon-shaped red button. When no trailer is connected, it stays in the closed position so no air is lost through disconnected glad hands during bobtail driving.

- ✓ The trailer air supply valve is usually an octagon-shaped red button on the dash
- ✓ When bobtailing, the trailer air supply valve must be closed to prevent air loss

72.8 Hand Valve

The hand valve allows the driver to apply the trailer brakes independently of the tractor, useful when coupling. It is spring-loaded and returns to released when let go. The foot valve applies about the same pressure to both tractor and trailer brakes.

- ✓ Never use the hand valve for parking or for normal/emergency service braking — always use the foot valve for service braking
- ✓ To park, apply tractor parking brakes, close the trailer supply valve, and block the trailer wheels

72.9 Dual Air Tractor-Trailer System Operation

A dual air tractor for towing a trailer adds a trailer air supply valve, tractor protection valve, hand control valve, and a pair of two-way check valves. In most systems the parking brake control (yellow button) is interlocked with the trailer supply valve (red button) so applying the parking control applies all tractor and trailer parking brakes.

- ✓ Two-way check valves are installed so whichever brake (foot or hand valve) is applied sends a control signal to the trailer
- ✓ Automatic shutoff of trailer air supply occurs when the highest-pressure reservoir drops to between 20 and 45 p.s.i. (138 and 310 kPa) — check this in pre-trip inspection

72.10 Dual Tractor-Trailer Primary/Secondary Failure

With a dual air system, if the primary system fails the low-air warning alerts the driver and the gauges confirm only one part is lost. A foot valve application applies the front brakes and passes air through both two-way check valves to signal the trailer brakes. If the secondary fails, the rear brakes apply and still signal the trailer.

- ✓ Even with a primary or secondary system failure, the driver can make a controlled stop and still signal the trailer brakes
- ✓ The automatic trailer supply shutoff requirement must be checked during pre-trip; if not functioning the vehicle must be placed out of service

72.11 Two-Way Check Valve (Trailer Control)

A two-way check valve allows either the hand valve or foot valve — whichever has the highest application pressure — to send a control signal to the trailer brakes. It is identical in construction to the one used in spring parking brake installations.

- ✓ Directs the highest application pressure from either the hand valve or foot valve to the trailer brakes
- ✓ Two-way check valves ensure a control signal reaches the trailer whether the foot valve or hand valve is applied

72.12 Bobtail Tractors and Proportioning

Driving a tractor without a trailer is called bobtailing. With little weight over the drive axles, rear brakes lock easily. A bobtail proportioning system reduces drive axle braking pressure by up to 75% when bobtailing while giving full pressure to the steering axle, improving control and stopping distance.

- ✓ When bobtailing, drive axle braking pressure is reduced by as much as 75% to prevent lockup
- ✓ Higher than normal pedal pressure is required when bobtailing because the steering axle brakes do most of the braking

CHAPTER 73

Chapter 9 — S-Cam Brakes and Pushrod Travel

73.1 Brake Adjustment and Heat Effects

When a brake chamber has stroked less than half its maximum, the brake is correctly adjusted. Stroking more than half indicates excessive travel needing adjustment. Cast iron drums expand when heated, causing the chamber to stroke further. On long downgrades, hot drum expansion can cause total loss of braking and a runaway.

- ✓ Stroking less than half of maximum indicates correct adjustment
- ✓ Cast iron brake drums expand when heated, causing further chamber stroke
- ✓ Hot drum expansion on long downgrades can cause total loss of braking and a runaway

73.2 Preparing to Check S-Cam Brakes

Ensure the vehicle is safely parked with wheels blocked, air system at full pressure and spring parking brakes released. Turn the engine off to listen for air leaks. Each brake on an axle should have similar pushrod travel — left should be similar to right.

- ✓ Always block the wheels before checking any brakes
- ✓ Turn the engine off so you can listen for air leaks
- ✓ Each brake on an axle should be adjusted to have similar pushrod travel left and right

73.3 Type 30 Air Brake Chamber and Stroke

The most common air brake chamber is the Type 30, with a maximum available stroke of 2½ inches (65 mm). A long stroke Type 30 is designated Type 30LS with a maximum stroke of three inches. When correctly adjusted, running clearance between lining and drum is only a few thousandths of an inch.

- ✓ The Type 30 chamber has a maximum available stroke of 2½ inches (65 mm)
- ✓ Type 30LS long stroke has a maximum available stroke of three inches
- ✓ When correct, running clearance is only a few thousandths of an inch

CHAPTER 74

Chapter 10 — Conducting a Pre-Trip Inspection: Preparation

74.1 Preparing Safely Before Inspection

Before beginning a pre-trip inspection, park safely, secure the vehicle, and prepare to walk the circle check facing oncoming traffic.

- ✓ Choose a safe location away from traffic and park on level ground if possible
- ✓ Set parking brakes, shut off engine, and block wheels of large commercial vehicles
- ✓ Walk counter-clockwise for the circle check so you face oncoming traffic
- ✓ Remove keys from ignition to prevent anyone moving the vehicle while inspecting underneath

74.2 Inspection Order and Time Limits

Pre-trip inspections may be done in any order but should follow the same routine every time. Class 1 tractor-trailer inspections should take under 45 minutes; Class 3 single-unit truck under 30 minutes.

- ✓ Class 1 tractor-trailer pre-trip inspection should be completed in less than 45 minutes
- ✓ Class 3 single-unit truck pre-trip inspection should be completed in less than 30 minutes
- ✓ Conduct inspection in the same order every time to avoid missing items
- ✓ The final step is to pull ahead slowly to check brake and steering response

74.3 Tools Required for Pre-Trip Inspection

Specific tools are needed to properly conduct a pre-trip inspection, particularly for checking tires, pushrod stroke and air brakes.

- ✓ Carry a flashlight, tire pressure gauge, chalk/marker, ruler, pry tool, wrench, and timing device
- ✓ Wear sturdy clothing, a hard hat and eye protection
- ✓ Timing device is used to check air brake leakage and buildup time

CHAPTER 75

Chapter 10 — Pre-Hill, En Route and Post-Trip Inspections

75.1 Pre-hill inspection requirements

B.C. has many mountainous roads with signs posted before steep or long downgrades. You must stop in the pullout area and inspect the braking system before proceeding, and check load security. Verify the compressor maintains full reservoir pressure, no audible air leaks, glad hands and air lines secure, brake drums and hubs not overheated, and pushrod travel within limits — even with automatic slack adjusters. For hydraulic brakes, check adequate pedal reserve, drums not overheated and no fluid leaks. You may be fined for failing to stop.

- ✓ You must stop in the pullout area and inspect the braking system and load before a steep downgrade
- ✓ Pushrod travel must be checked even on vehicles with automatic slack adjusters
- ✓ Failing to stop for a required brake pre-hill inspection may result in a fine

75.2 En route cargo securement re-inspection

As you drive, vehicle condition can change, so inspect at regular intervals. The NSC requires re-inspecting the cargo securement system within 80 km from the loading point, and regularly during the trip at the earliest of: a change in duty status, three hours of driving, or 240 km of driving since the last inspection. Record cargo securement on your daily log. You need not inspect sealed cargo you're ordered not to inspect, or inaccessible cargo. Check tires/wheels, brakes/hubs, trailer coupling, cargo/dangerous goods signs, suspension and driveline.

- ✓ Re-inspect cargo securement within 80 km of loading
- ✓ Re-inspect at the earliest of a duty status change, three hours of driving, or 240 km since the last inspection
- ✓ Record cargo securement on your daily log

75.3 In-service brake checks while driving

Stay aware of the braking system's condition at all times by checking air pressure gauges frequently, watching the dashboard low-air warning indicator, and feeling the braking response with each application. Do not continue driving if smoke comes from an oil-filled hub or the hub is too hot to touch.

- ✓ Check air pressure gauges and the low-air warning indicator frequently while driving
- ✓ Do not continue driving if a hub is smoking or too hot to touch

75.4 Post-trip inspection and trip inspection report

At the end of the final trip of the day you must inspect the commercial vehicle and complete a trip inspection report noting any defects found. This report may be added to the pre-trip inspection report for the same vehicle completed earlier. Examine lights and reflectors every inspection for proper colour, operation, mounting and visibility, per the Motor Vehicle Act Regulations. Commercial trailers 2.05 m or wider require rear and side reflective markings.

- ✓ A trip inspection report must be completed and must note all defects found
- ✓ Lights and reflectors must be checked for proper colour, operation, mounting and visibility
- ✓ Commercial trailers 2.05 m or wider require reflective markings to the rear and sides

CHAPTER 76

Chapter 5 — Front-End Structures

76.1 Front-End Structure Strength and Dimensions

A front-end structure is a vertical barrier across the front of the deck preventing cargo from moving forward (a cab shield/protector is NOT a front-end structure under Standard 10, though WorkSafe BC requires cab protectors on logging trucks). If under 1.83 m tall, it must withstand a static load of at least 50% of total cargo weight; if 1.83 m or taller, at least 40%. It must be no shorter than 122 cm above the deck and no narrower than the vehicle width, and must resist cargo penetration at 6.1 m/s² deceleration with no gaps allowing cargo through.

- ✓ Front-end structures under 1.83 m must withstand 50% of total cargo weight; 1.83 m or taller must withstand 40%
- ✓ Must be no shorter than 122 cm above the deck and no narrower than the vehicle width
- ✓ Must resist penetration at 6.1 m/s² deceleration with no openings allowing cargo through

76.2 Front-End Structure Marking and Load Width

A front-end structure must be attached per the manufacturer's recommendations and identified either by permanent marking (model/serial number, manufacturer name/address, rated capacity) or by a signed letter from the manufacturer or professional engineer carried in the vehicle. Loads generally can't be wider than 2.6 m; vehicles carrying loose hay or straw can't exceed 3.1 m including load.

- ✓ Loads can't be more than 2.6 m wide (loose hay/straw vehicle and load max 3.1 m)
- ✓ Front-end structure must be permanently marked or accompanied by a signed certification letter in the vehicle

CHAPTER 77

Hours of Service

77.1 Logbooks and On/Off-Duty Time

Commercial drivers must record on-duty and off-duty time in logbooks under the Motor Vehicle Act and National Safety Code. Understanding duty status categories is essential for compliance, and rules may differ for other jurisdictions.

- ✓ Record on-duty and off-duty time accurately in a logbook
- ✓ Comply with hours of service rules under the Motor Vehicle Act and National Safety Code
- ✓ Be aware hours of service rules can differ across jurisdictions

CHAPTER 78

Other Types of Foundation Brakes

78.1 Types of Foundation Brakes

Besides s-cam brakes, three other foundation brake types found on air-braked vehicles are wedge brakes, air disc brakes, and air-over-hydraulic brakes.

- ✓ Other foundation brake types are wedge brakes, air disc brakes, and air-over-hydraulic brakes
- ✓ These are found on air-braked vehicles in addition to standard s-cam brakes

78.2 Wedge Brakes

Wedge brakes use one or two small air chambers with wedge-shaped pushrods, usually found only on steering axles. When applied, air pushes the wedge between two rollers forcing the linings against the drum. Most have internal automatic adjusters. Adjustment is checked through inspection holes; if linings move more than 1/16 inch it needs attention.

- ✓ Wedge brakes are usually found only on steering axles
- ✓ Air pressure pushes the wedge pushrod between two rollers to force the linings against the drum
- ✓ Most wedge brakes have internal automatic adjusters; adjustment is checked through inspection holes in the backing plate

CHAPTER 79

Railway Crossings

79.1 Controlled and Uncontrolled Crossings

All vehicles must stop at controlled crossings when signalled. A controlled crossing has a flag person, stop sign, crossing gate, or electric/mechanical signal. When stopping, stop 5 to 15 m from the crossing, look both ways and listen (open window or bus door), then move forward when safe. Don't shift gears while crossing.

- ✓ Stop 5 to 15 m from the railway crossing
- ✓ Open driver's window or bus door to listen for trains
- ✓ Don't shift gears while crossing the tracks
- ✓ Don't park within 15 m of the nearest rail
- ✓ Never cross if the crossing gate is down

79.2 Vehicles Required to Stop at Uncontrolled Crossings

Certain vehicles must stop at all uncontrolled main railway crossings: school buses carrying children, buses carrying passengers, and vehicles transporting explosive, poisonous, flammable, combustible, corrosive liquids or liquefied petroleum gas (empty or loaded). Uncontrolled main crossings don't include industrial tracks in business/residential districts or spur lines.

- ✓ School buses with children and buses with passengers must stop
- ✓ Vehicles carrying explosives, flammables, corrosives, or LPG must stop (empty or loaded)
- ✓ Uncontrolled main crossings exclude industrial tracks and spur lines

79.3 Crossing in a Large Vehicle

Crossing is especially hazardous in large vehicles: longer trucks need more time to clear, heavier trucks need more room to stop, big vehicles can cause a train to derail in a collision, and low clearances may cause trailers to hang up. Before crossing, ensure the track is clear enough to give at least 10 seconds to cross, and ensure room exists on the other side.

- ✓ Ensure the track is clear enough to give at least 10 seconds to cross (more for longer vehicles/multiple tracks)
- ✓ Be certain there's room for your vehicle on the other side before crossing
- ✓ Never stop on the tracks; do not shift gears while crossing
- ✓ Watch for humpback crossings that may catch low-clearance trailers
- ✓ Don't assume the train you see is the only one when crossing multiple tracks

CHAPTER 80

Chapter 5 — Load Projections

80.1 Front and Rear Load Projection Limits

Follow standard projection limits unless you hold a permit. Front: a load can't extend more than one metre beyond the front wheels or front bumper. Front projections on trailers can't extend more than a two-metre radius beyond the articulation point for TAC (BC) vehicles, or 2.25 m for non-TAC vehicles. Rear (straight truck): can't extend more than four metres beyond the turn centre. If a load projects more than 1.2 m past the rear, attach a red flag/cloth in daylight or a red light at night. Allow extra room for projections when turning.

- ✓ Front load can't extend more than one metre beyond the front wheels or front bumper
- ✓ Rear load on a straight truck can't extend more than four metres beyond the turn centre
- ✓ If a load projects more than 1.2 m beyond the rear, attach a red flag/cloth by day or red light at night

CHAPTER 81

Chapter 1: Getting your driver's licence — Applying for a commercial licence

81.1 Commercial licence prerequisites

Before applying you must: hold or have held a full-privilege Class 5 or 6 (or out-of-province equivalent); have an acceptable driving record (fewer than four penalty-point offences in the previous two years and zero motor-vehicle-related Criminal Code convictions in the previous three years); meet minimum age; have no outstanding fines/debts; and meet medical standards.

- ✓ Acceptable driving record requires fewer than four penalty-point offences in the previous two years
- ✓ Zero motor-vehicle-related Criminal Code convictions in the previous three years are required, with no outstanding fines or debts

81.2 Learner's licence and supervision rules

The learner's licence is valid for one year and allows supervised practice. The supervisor must be at least 19 years old and hold the appropriate licence class for the vehicle. The supervisor must sit beside the driver, or immediately behind and to the right if there is no seat beside the driver.

- ✓ A commercial learner's supervisor must be at least 19 and hold the appropriate class of licence for the vehicle
- ✓ The supervisor must sit beside the driver, or immediately behind and to the right if no seat is beside the driver's seat

81.3 Passenger restrictions with a learner's licence

When operating a bus, taxi, ride-hailing vehicle or ambulance with a learner's licence, no passengers are permitted other than your supervisor and other learners being trained on the same class of vehicle who hold the same class of learner's licence.

- ✓ No passengers are allowed in a bus, taxi, ride-hailing vehicle or ambulance operated on a learner's licence except the supervisor
- ✓ Other learners of the same class being trained may also be present

81.4 Testing conducted in English

The licensing process for a Class 1, 2, 3 or 4 licence, heavy/house trailer endorsement or air brake endorsement is conducted entirely in English. Applicants must communicate in both spoken and written English without assistance.

- ✓ All commercial licensing tests are conducted entirely in English
- ✓ Applicants must communicate in spoken and written English without assistance

81.5 Carrier record checks

Every carrier you work for is required to check your driving record before hiring you and once a year after hiring. You must provide proof of an acceptable driving record before obtaining a commercial licence.

- ✓ Carriers must check a driver's record before hiring and annually thereafter
- ✓ Applicants must provide proof of an acceptable driving record, obtaining an abstract from any out-of-province jurisdiction held in the past three years

CHAPTER 82

Chapter 3 — Railway Crossings

82.1 Stopping at railway crossings

All vehicles must stop at controlled crossings if signalled. A controlled crossing has a flag person, stop sign, crossing gate, or electric/mechanical device. When stopping: stop five to 15 m from the crossing, look both ways and listen (open the window or door), then move forward when safe. Don't shift gears while crossing. Never cross if the gate is down. Don't park within 15 m of the nearest rail.

- ✓ Stop five to 15 m from a railway crossing when required
- ✓ Never cross when a railway crossing gate is down
- ✓ Don't shift gears while crossing the tracks
- ✓ Don't park within 15 m of the nearest rail of a crossing

82.2 Vehicles required to stop at uncontrolled crossings

Vehicles required to stop at all uncontrolled main railway crossings are: school buses carrying children; buses carrying passengers; vehicles transporting explosive, poisonous or flammable substances; and vehicles transporting combustibles, corrosive liquids, or liquefied petroleum gas, whether empty or loaded. Uncontrolled main crossings don't include industrial tracks in business/residential districts or railway spur lines.

- ✓ School buses with children and buses with passengers must stop at uncontrolled main crossings
- ✓ Vehicles carrying explosive, flammable, poisonous, corrosive or LPG cargo must stop, empty or loaded

82.3 Crossing safely in a large vehicle

Crossing in a large vehicle is hazardous: longer trucks take more time to clear, heavier trucks need more stopping room, big vehicles can derail trains in a collision, and low clearances can cause trailers to hang up. Check the track is clear for at least 10 seconds — more if needed or if crossing multiple tracks. Ensure room on the other side; never stop on tracks. Watch for humpback crossings and use extra caution at rural and multi-track crossings.

- ✓ Ensure the track is clear for at least 10 seconds before crossing
- ✓ Confirm there's room for your vehicle on the other side before starting to cross
- ✓ Never stop on the tracks and never shift gears while crossing
- ✓ Watch for humpback crossings that can catch low-clearance trailers

CHAPTER 83

Skills for Driving Buses, Taxis, Limousines and Ride-Hailing Vehicles

83.1 Passenger Safety Priority

The safety of your passengers must be your most important concern, always more important than meeting schedules. Bus passengers are usually injured when the driver stops, starts or turns too quickly, opens/closes doors too quickly, or fails to check on passengers. Prevent injuries with smart, smooth driving and safe following distances.

- ✓ Passenger safety is always more important than meeting schedules
- ✓ Passenger injuries are usually caused by stopping, starting or turning too quickly or opening/closing doors too fast
- ✓ Keep a safe following distance so you won't be forced to stop quickly
- ✓ Ensure passengers are completely on or off the bus before closing the doors

83.2 Taking On and Letting Off Passengers

When taking on or letting off passengers on the highway: signal to warn traffic you're stopping, stop where other drivers can see your vehicle from at least 85 metres front and behind, and leave at least three metres to the left so traffic can pass. Whenever safe, pull off the travel portion of the highway during boarding.

- ✓ Stop in a location where other drivers can see your vehicle from at least 85 metres (285 ft) in front and behind
- ✓ Leave at least three metres (10 ft) to the left of your vehicle so traffic may pass
- ✓ Signal to warn traffic that you are stopping
- ✓ Whenever safe, pull off the travel portion of the highway while passengers board or exit

83.3 Emergency Equipment and Exits

Every commercial passenger vehicle with seating capacity of more than 10 occupants including the driver must have one first-aid kit meeting WorkSafeBC guidelines, one spare tire, and at least one fire extinguisher. The carrier is responsible for ensuring equipment is available and working. Vehicles seating more than 12 including the driver must have an emergency exit door or windows. Vehicles seating more than 10 passengers must carry warning devices such as flags and flares.

- ✓ Commercial passenger vehicles seating more than 10 including the driver must have one first-aid kit, one spare tire, and at least one fire extinguisher
- ✓ The carrier is responsible for ensuring emergency equipment is available and in working order
- ✓ Vehicles seating more than 12 including the driver must have an emergency exit door or emergency windows
- ✓ Vehicles seating more than 10 passengers must carry warning devices such as flags and flares

83.4 Class 2 and Class 4 Vehicle Definitions

Drivers must understand terms defined by the Motor Vehicle Act and Passenger Transportation Act. A bus has seating capacity of more than 10 persons including the driver, operated for hire or public transportation. A taxi/limousine carries not more than 10 persons and is available with driver for hire. A large capacity limousine carries more than 10 and up to 24 persons including the driver.

- ✓ A bus has a seating capacity of more than 10 persons including the driver, operated for hire or public transportation
- ✓ A taxi or limousine is designed to carry not more than 10 persons and is available with its driver for hire
- ✓ A large capacity limousine is capable of carrying more than 10 and up to 24 persons including the driver
- ✓ A special vehicle carries not more than 10 persons and is designed for public transportation of persons with disabilities

83.5 Leaving the Curb

Look in the side mirror and over your shoulder to check traffic is clear before leaving the curb; don't rely on mirrors alone. Ensure passengers aren't moving around, signal, and check over your shoulder again. Be careful the rear of the bus does not swing over the sidewalk and hit pedestrians, cyclists, poles or signposts.

- ✓ Look in the side mirror and over your shoulder before leaving the curb; don't rely on mirrors alone
- ✓ Ensure the back end of the bus does not swing over the sidewalk and hit pedestrians, cyclists, poles or signposts
- ✓ Signal other drivers before moving into the traffic flow

83.6 Bus Right-of-Way

The Motor Vehicle Act gives public transit buses the right-of-way when a bus driver signals to move from the curb lane or bus stop into traffic and displays a yield sign. This applies in areas where the speed limit is less than 60 km/h. The bus driver is still required to ensure it is safe before moving into traffic.

- ✓ Public transit buses have the right-of-way when signalling to move from the curb and displaying a yield sign, in areas where the speed limit is less than 60 km/h
- ✓ The bus driver is still required to ensure it is safe before moving from the side of the road into traffic
- ✓ Other drivers don't have to yield if it's unsafe

83.7 Passing Parked Cars

When driving past parked cars, watch for vehicles pulling into traffic, doors opening on the traffic side, and pedestrians stepping between cars. Clues to a possible hazard include front wheels turned out, a driver behind the wheel, exhaust from the tailpipe, brake/back-up/turn signals, and people or children near the road.

- ✓ Watch for vehicles pulling into traffic, doors opening suddenly and pedestrians stepping out from between cars
- ✓ Warning clues include front wheels turned out, a driver in the seat, exhaust from the tailpipe, and lit brake/back-up/turn signals

83.8 Smoking Restrictions in Passenger Vehicles

It is illegal to smoke in any motor vehicle when there are passengers under 16 years old. Children are especially vulnerable to second-hand smoke in enclosed spaces. Drivers must not smoke if passengers are in the vehicle, whether moving or not, and must not be under the influence of alcohol while on duty.

- ✓ It is illegal to smoke in any motor vehicle when there are passengers under 16 years old
- ✓ Don't smoke if passengers are in your vehicle, whether the vehicle is moving or not
- ✓ Don't be under the influence of alcohol while on duty

83.9 Focus on Driving

Any time the vehicle is moving you must not collect fares, make change, or take on/let off passengers. Save unnecessary conversation until stopped. You must clearly see ahead and to both sides and be able to move your arms and legs and reach emergency equipment. Up to two passengers may sit on your right in a sedan-type vehicle only if there is enough room to operate safely and there are designated seating positions with seatbelts.

- ✓ Do not collect fares, make change, or take on/let off passengers while the vehicle is moving
- ✓ You may have up to two passengers on your right side in a sedan-type vehicle only with room to operate safely and designated seatbelt positions
- ✓ You must be able to move your arms and legs and reach emergency equipment at all times

83.10 Standing Passengers

Passengers may not stand while a vehicle is in motion unless the passenger transportation licence allows standing passengers, which limits the number allowed. The standing passenger capacity must be displayed in an easily seen location. Don't allow passengers to stand where they could block your view or movement.

- ✓ Passengers may not stand while a vehicle is in motion unless the passenger transportation licence allows standing passengers
- ✓ The standing passenger capacity must be displayed in an easily seen location in the vehicle
- ✓ Don't allow any passenger to stand where it could make it difficult for you to see or move

83.11 Refusing to Transport Passengers

You must provide transportation to all paying customers, but may refuse if your vehicle is already carrying the maximum passengers, or if the passenger is smoking, using profane/offensive language, or acting disorderly or offensive to others. If you order a person out, you must ensure they can disembark safely where they can reasonably find alternate transportation.

- ✓ You may refuse to transport a passenger if the vehicle is at maximum capacity or the passenger is smoking, using offensive language, or acting disorderly
- ✓ If you order a person out, ensure they can disembark safely in a location where they can reasonably find alternate transportation

83.12 Transporting People with Disabilities

You cannot refuse to transport someone just because they have a disability. Service animals such as guide dogs must be allowed in your vehicle with their owners. Speak directly to the person, don't assume they need help (always ask), and be patient and flexible. Properly secure wheelchairs, scooters and mobility aids and give service animals safe space.

- ✓ You can't refuse to transport an individual just because that person has a disability
- ✓ You must allow service animals such as guide dogs in your vehicle with their owners
- ✓ Properly secure wheelchairs, scooters and other mobility aids
- ✓ Speak directly to the person with the disability and always ask before giving help

83.13 Inside Lights and Vehicle Requirements

Public passenger vehicles with a seating capacity of more than 12 occupants including the driver must have lights inside that illuminate the passenger aisle behind the driver, kept on between sunset and sunrise. Passenger vehicles must have a light at each entrance that turns on when the door opens. Vehicles must be clean and sanitary, display a valid inspection decal and carry the certificate.

- ✓ Public passenger vehicles seating more than 12 including the driver must have lights illuminating the passenger aisle behind the driver
- ✓ Inside lights must be kept on between the hours of sunset and sunrise
- ✓ Passenger vehicles must have a light at each entrance that turns on when the door is opened
- ✓ A valid commercial vehicle inspection decal must be displayed and the certificate carried in the vehicle

83.14 Defects, Breakdowns and Refuelling

You must end the trip if the vehicle develops a problem endangering passenger safety or comfort, and fix it before continuing. If a crash or breakdown makes continuing impossible, arrange to transport passengers to their destination with minimal delay. Don't refuel with the engine running, radio transmitting, or open flame present; keep the fuel nozzle in contact with the filler pipe to ground the connection.

- ✓ End the trip if the vehicle develops a problem that could endanger passenger safety or comfort, and fix it before continuing
- ✓ Arrange to transport passengers to their destination with minimal delay after a crash or breakdown
- ✓ Don't refuel while the engine is running, radio is transmitting, or an open flame is present
- ✓ Keep the fuel nozzle in contact with the filler pipe at all times to ground the connection

83.15 Baggage Loading on Buses

You are responsible for all baggage passengers bring aboard and must ensure it's loaded safely without interfering with passengers or falling on them. Cargo must be carried in properly designed overhead racks, stowed under seats against a barrier, in an enclosed separate compartment, or on a passenger's lap. Baggage must not block aisles or exits, obscure the driver's view, obstruct emergency equipment, or interfere with driver movement.

- ✓ Cargo must be carried in properly designed overhead racks, stowed under seats against a barrier, in an enclosed compartment, or on a passenger's lap
- ✓ Baggage or cargo must not block or partially block any aisle or exit
- ✓ A bus must not be loaded to obscure the driver's view, obstruct emergency equipment access, or interfere with driver movement

83.16 Reporting Vehicle Defects

You must report any defect or deficiency that could make your vehicle unsafe. This report must be made in writing and given to the carrier you work for at the time you find the defect or by the end of that day.

- ✓ Report any defect or deficiency that could make your vehicle unsafe
- ✓ The report must be made in writing and given to the carrier at the time you find the defect or by the end of that day

CHAPTER 84

Chapter 9 — Measuring Brake Adjustment Methods

84.1 Applied Stroke Method

The applied stroke method is used by roadside inspectors. With brakes released and reservoir at least 100 p.s.i. and engine off, mark the pushrod or measure clevis pin to chamber. Apply and hold 90-100 p.s.i., then re-measure. The difference is the applied stroke (1 to 1½ inches / 25-38 mm is a good range). More than 1¾ inch (45 mm) needs adjustment on manual slack adjusters.

- ✓ Apply and hold a full brake application of 90 to 100 p.s.i. (620-690 kPa)
- ✓ Good applied stroke range is 1 to 1½ inches (25 to 38 mm)
- ✓ Manual slack adjuster needs adjustment if applied stroke exceeds 1¾ inch (45 mm)
- ✓ Requires two people unless you have a device to hold the brakes on

84.2 Pry Method of Free Stroke Measurement

With system pressure over 100 p.s.i. and parking brakes released, push the pushrod fully into the chamber and mark it. Pull the pushrod out using a pry bar and measure the distance to the chamber face. This free stroke (½ to ¾ inch / 12-20 mm is a good range) needs adjustment if it exceeds ¾ inch (20 mm).

- ✓ Good free stroke range is ½ to ¾ inch (12 to 20 mm)
- ✓ Brakes need adjustment if free stroke exceeds ¾ inch (20 mm)
- ✓ Ensure system air pressure is over 100 p.s.i. and parking brakes are released

84.3 Brake Adjustment Indicators

New air brake chamber pushrods have a marking (usually red) that shows when adjustment is needed immediately. If the red marking at the chamber face is visible, the brake is dangerously out of adjustment and needs immediate attention. Don't wait until the red marking is exposed before adjusting.

- ✓ A visible red marking indicates the brake is dangerously out of adjustment
- ✓ Don't wait until the red marking is exposed before adjusting
- ✓ The marking is usually red and shows when pushrod travel is excessive

CHAPTER 85

Chapter 10 — Class 1 Tractor-Trailer Pre-Trip Inspection

85.1 Under Hood and Reservoir Draining

Begin by looking for leaks, draining reservoirs (supply reservoir only for road test), and checking fluids, belts, hoses, compressor, steering and suspension components.

- ✓ All reservoirs should be drained daily; drain the supply reservoir during the road test
- ✓ Check fluid levels/condition: engine oil, coolant, power steering fluid and washer fluid
- ✓ Check belts for tension, cracks, frayed cord or missing teeth
- ✓ Verify steering components are secure with no bends or cracks

85.2 Foundation Brake Inspection

Each foundation brake must be checked including chambers, slack adjusters, hoses, s-cams, drums and linings. Pushrod travel must be within tolerance.

- ✓ Brake chamber mounting and retention clamps must be secure with no cracks, corrosion or holes
- ✓ Pushrod travel must be within tolerance; check slack adjuster, s-cam and bushings for wear
- ✓ Air lines must be secure with no leaks, abrasions, cuts, cracks or kinks
- ✓ A peace officer may place a vehicle out of service if drum brake linings are less than 1/4 inch (6.4 mm) or air disc brake pads less than 1/8 inch (3.2 mm)

85.3 Governor and Compressor Cut-Out Check

During air pressure buildup in the cab, confirm the compressor stops pumping (cut-out) within the correct range and gauges respond properly.

- ✓ Compressor must stop pumping (governor cut-out) between 105 and 135 p.s.i. (724 and 931 kPa)
- ✓ Confirm only the supply reservoir lost air; other reservoirs losing pressure may indicate a faulty one-way check valve
- ✓ Air reservoir pressure must build from 50 to 90 p.s.i. (345 to 620 kPa) within three minutes at fast idle (1,000 to 1,200 r.p.m.)

85.4 Class 1 Air Brake System Test Procedure

A step-by-step air brake system test verifies governor cut-in, low-air warning, trailer supply valve operation, trailer brake application, glad hand integrity and pressure buildup.

- ✓ Governor must cause compressor to cut in before pressure falls below 80 p.s.i. (552 kPa)
- ✓ Low-air warning device(s) must activate at or above 60 p.s.i. (414 kPa)
- ✓ Trailer air supply valve must close when highest reservoir gauge reads between 20 to 45 p.s.i. (138 to 310 kPa)
- ✓ Check no air escapes from glad hands when disconnected, and verify trailer brakes applied

85.5 Air Loss / Applied Leakage Test

With full brake application held for one minute, air loss must remain within allowable limits to confirm the system holds pressure.

- ✓ Make a full brake application (90 to 100 p.s.i., 620 to 690 kPa) and hold for one minute
- ✓ After initial pressure drop, air loss must not exceed 4 p.s.i. (27.6 kPa) per minute (single trailer)
- ✓ Air loss must not exceed 6 p.s.i. (41.4 kPa) per minute with two trailers
- ✓ Verify there are no audible air leaks; listen with engine off

85.6 Fifth Wheel and Trailer Coupling Inspection

The fifth wheel and coupling must be inspected to ensure a secure connection between tractor and trailer.

- ✓ Fifth wheel plate must be flush to the trailer apron with no daylight visible between fifth wheel and apron
- ✓ Slider must be locked and secure with locking jaws closed around the trailer kingpin
- ✓ Pintle or ball hitch must not be worn; locking mechanism closed and secure; chains/cables free of cracks and securely attached
- ✓ Landing gear must be fully raised with crank handle secured

85.7 Brake Response, Tug and Steering Slack Tests

Final tests confirm parking brakes hold, service and trailer brakes respond, and steering has acceptable play.

- ✓ Tug against trailer parking brakes in low gear — brakes must prevent movement
- ✓ Tug against tractor parking brakes in low gear — brakes must prevent movement
- ✓ Move ahead slowly and apply foot brake and hand valve to check response
- ✓ For electric-brake trailers, verify breakaway operation by disconnecting the electrical cable and pulling the breakaway switch pin

85.8 Circle Check for Lights

Walk counter-clockwise checking all exterior lights for operation, clean lenses and correct colour.

- ✓ Check left-turn signals, low-beam headlights, tail lights, licence plate lights and clearance lights
- ✓ Check right-turn signal, high-beam headlights and brake lights
- ✓ Ensure all lenses are clean, not cracked and the correct colour

CHAPTER 86

Chapter 11 — Signs

86.1 Regulatory signs

Regulatory signs tell you about driving laws and regulations; disregarding them is an offence under the B.C. Motor Vehicle Act and may result in penalties. Examples: stop (stop completely, continue only when safe), yield (give right-of-way), speed limit (max legal speed when road is bare, dry and visibility good), do not enter, one way, no passing, keep right unless passing, no right turn on red, winter tires/chains required, and slow vehicle pullout signs.

- ✓ Disregarding regulatory signs is an offence under the B.C. Motor Vehicle Act
- ✓ A posted speed limit is the maximum legal speed when the road is bare, dry and visibility is good
- ✓ Winter tires or chains must be used when the sign is displayed

86.2 School, playground and crosswalk signs

These signs indicate areas requiring extra caution. School zone limits (with a tab) are typically in effect 8 a.m. to 5 p.m. on school days; a 30 km/h tab means 30 km/h during those hours. Playground zone 30 km/h limits are in effect every day dawn to dusk. School crosswalks require yielding to pedestrians and following any crossing guard directions. Pedestrian-activated crosswalks require preparing to stop when the light flashes.

- ✓ School zone speed limits are in effect 8 a.m. to 5 p.m. on school days unless otherwise posted
- ✓ Playground zone 30 km/h limits are in effect every day from dawn to dusk
- ✓ Yield to pedestrians at crosswalks and follow crossing guard directions

86.3 Railway signs

Public railway/highway crossings are marked with signs or pavement markings and may have mechanical or electrical warning devices. You must always yield to trains. At crossings you may need to stop then proceed when safe, and must stay stopped until any gate is fully raised.

- ✓ You must always yield to trains at railway crossings
- ✓ Stay stopped until the crossing gate is fully raised before proceeding

86.4 Reading and classifying signs

There are three ways to read signs: by their shape, colour and printed message. Understanding these helps interpret unfamiliar signs. Sign types include regulatory, school/playground/crosswalk, lane use, turn control, parking, reserved lane, warning, object markers, construction, information/destination and railway signs. School zone signs are fluorescent yellow-green.

- ✓ Signs are read by shape, colour and printed message
- ✓ School and playground signs are fluorescent yellow-green

86.5 Lane use and turn control signs

Lane use signs mounted above or beside a lane before an intersection show which lanes may turn or go straight; in a designated lane you must follow the arrow direction. You may not move into or out of a designated lane while in an intersection. Turn control signs mounted directly above the intersection also require following the arrow direction.

- ✓ In a designated lane, you must follow the direction indicated by the arrows
- ✓ You may not move into or out of a designated lane while in an intersection

86.6 Warning signs

Most warning signs are yellow and diamond-shaped and warn of hazards ahead such as curves, merging traffic, lane ends, two-way traffic, road narrows, slippery road, steep hills, stop signs ahead, railway crossings, roundabouts, pedestrian/school crossings and animal crossings. Recommended exit speed signs advise slower speeds in poor conditions.

- ✓ Warning signs are usually yellow and diamond-shaped
- ✓ Warning signs indicate possible hazards ahead requiring caution or reduced speed

86.7 Object markers and construction signs

Object markers are mounted on obstructions and indicate keep right, keep left, or keep right or left. Construction signs warn of construction/maintenance work; you must obey traffic-control persons, travel within the posted speed, stay well back from equipment and pass only when safe. Speeding fines are increased in work zones.

- ✓ Object markers are mounted on obstructions to direct traffic around them
- ✓ Obey traffic-control persons and posted speeds in construction zones, passing only when safe

CHAPTER 87

Cargo Securement

87.1 Tiedowns and Securing Cargo

Cargo must be secured per the Motor Vehicle Act and TAC standards using appropriate tiedowns, webbing, tarps, and equipment. Inspect loads for wear and secure specific cargo types (side, rear, aggregate, tank loads) correctly.

- ✓ Secure cargo using proper tiedowns and webbing meeting TAC standards
- ✓ Inspect loads and tiedowns for wear before and during transport
- ✓ Secure specific cargo types (rollers, pallets, tank loads) with correct methods

87.2 Overload, Oversize and Weigh Scales

Oversize and overload loads require permits and may require a pilot car and long/wide load signs. Vehicle dimensions must comply with legal limits and drivers must report to weigh scales as required.

- ✓ Obtain permits for oversize and overload loads
- ✓ Use pilot cars and long/wide load signs where required
- ✓ Stop at weigh scales when directed

CHAPTER 88

Chapter 1 — Keeping and Changing Your Licence

88.1 Medical Examination Schedule for Commercial Drivers

RoadSafetyBC requires regular medical exams to hold a commercial licence. The NSC requires all Class 1, 2, 3, 4 drivers and drivers with code 18/19 industrial air brake or code 20 heavy trailer endorsements to submit medical reports regularly. Forms are sent at ages 25, 30, 35, 40, 45, then 48, 51, 54, 57, 60, 63, and every year at age 66+. Failure to submit may result in licence cancellation.

- ✓ Medical reports are required at ages 25, 30, 35, 40, 45, then every 3 years (48-63), then annually at age 66+
- ✓ Your licence may be cancelled if you don't submit the required medical form
- ✓ A re-examination may include vision screening, knowledge test, and road test

88.2 Upgrading and Downgrading Your Licence

To upgrade licence class, follow all steps for the new class including applying for a learner's licence. A supervisor with the appropriate licence class must accompany you when practising. To downgrade to non-commercial or lower commercial class, visit a driver licensing office. Your licence won't be downgraded if you fail to submit a routine medical form—you must visit an office to apply for a new licence instead.

- ✓ Upgrading requires following all steps including applying for a learner's licence
- ✓ A supervisor with the appropriate licence class must accompany you while practising
- ✓ Downgrading requires visiting a driver licensing office to apply for a new licence

CHAPTER 89

Chapter 6 — Skills for Driving Buses, Taxis, Limousines and Ride-Hailing Vehicles: Definitions

89.1 Key Definitions for Class 2 and Class 4 Vehicles

Drivers must understand terms under the Motor Vehicle Act and Passenger Transportation Act. Public transportation is transporting groups of people who aren't your associates or family. A commercial passenger vehicle transports passengers for compensation. Compensation includes money or other reward. A bus has a seating capacity of more than 10 persons including the driver, operated for hire or public transportation. A taxi/limousine carries not more than 10 persons and is available with driver for hire. A large capacity limousine carries more than 10 and up to 24 persons including the driver.

- ✓ A bus has seating capacity of more than 10 persons including the driver
- ✓ A taxi or limousine carries not more than 10 persons
- ✓ A large capacity limousine carries more than 10 and up to 24 persons including the driver
- ✓ A special vehicle carries not more than 10 persons and is designed for transporting persons with disabilities

89.2 National Safety Mark Requirement

As of March 29, 2005, these vehicles may operate in B.C. if they have obtained the National Safety Mark indicating compliance with Canadian Motor Vehicle Safety Standards (CMVSS). Vehicles manufactured before January 1, 2005 that don't comply require contacting Commercial Vehicle Safety and Enforcement.

- ✓ Vehicles must have the National Safety Mark to operate in B.C. (as of March 29, 2005)
- ✓ Non-complying vehicles manufactured before Jan 1, 2005 require contact with Commercial Vehicle Safety and Enforcement

CHAPTER 90

Chapter 1: Getting Your Driver's Licence — Commercial Licence Application

90.1 Prerequisites for a Commercial Licence

Before applying for a Class 1, 2, 3 or 4 licence, you must hold or have held a full-privilege Class 5 or Class 6 (or out-of-province equivalent), have an acceptable driving record with fewer than four penalty-point offences in the previous two years and zero motor-vehicle-related Criminal Code convictions in the previous three years, meet minimum age, have no outstanding fines/debts, and meet medical standards.

- ✓ Fewer than four penalty-point offences allowed in the previous two years
- ✓ Zero motor-vehicle-related Criminal Code convictions allowed in the previous three years
- ✓ No outstanding fines or debts owed to Court, Government or ICBC are permitted

90.2 Learner's Licence and Supervisor Rules

The learner's licence is valid for one year and allows practice with a supervisor. The supervisor must be at least 19 and hold the appropriate licence for the vehicle being practised on, and must sit beside the driver or immediately behind and to the right if there is no adjacent seat. When operating a bus, taxi, ride-hailing vehicle or ambulance with a learner's licence, no passengers are allowed other than the supervisor and other learners of the same class.

- ✓ A learner's licence is valid for one year
- ✓ The supervisor must be at least 19 and hold the appropriate licence for that vehicle
- ✓ No passengers allowed on bus/taxi/ride-hailing/ambulance learner operations except supervisor and same-class learners

90.3 Road Test and Pre-Trip Inspection

The commercial road test includes a pre-trip inspection test and, if the vehicle has air brakes, an air brake pre-trip inspection test. Applicants must bring the same type of ID used for the learner's licence and pay the road test fee. Testing is conducted entirely in English—candidates must communicate in spoken and written English without assistance.

- ✓ The road test includes a pre-trip inspection and an air brake pre-trip test if the vehicle has air brakes
- ✓ The entire licensing process is conducted in English without assistance
- ✓ The same type of ID used for the learner's licence must be brought to the road test

90.4 Class 1 Mandatory Entry Level Training (MELT)

Since October 18, 2021, all new Class 1 applicants must complete MELT, a one-time legislated requirement aligned with the National Safety Code. MELT includes theory, practical driving school training, on-highway driving and air brake operation. It is offered by ICBC-approved driving schools. Applicants must first qualify for a Class 1 learner licence.

- ✓ MELT is a mandatory one-time requirement for all new Class 1 drivers since October 18, 2021
- ✓ MELT includes air brake training, so a separate air brake course is not required for Class 1
- ✓ MELT must be delivered by an ICBC-approved driving school

90.5 Heavy Trailer Endorsement Application

A heavy trailer endorsement (code 20) for Class 4 or 5 allows towing trailers of any weight provided neither truck nor trailer has air brakes. The application requires studying the guide, applying with primary and secondary ID, passing knowledge and road sign tests, vision/medical screening, and a road test with pre-trip inspection. The supervisor must be at least 19 and hold a Class 1, 2 or 3 licence.

- ✓ Heavy trailer endorsement (code 20) allows towing any weight only when neither unit has air brakes
- ✓ The supervisor for heavy trailer practice must hold a Class 1, 2 or 3 licence and be at least 19
- ✓ The road test for a heavy trailer endorsement includes a pre-trip inspection test

90.6 MELT Exemptions for Out-of-Province Drivers

Drivers with a Canadian Class 1 licence and more than 24 consecutive months of experience (not expired over three years) are exempt from MELT. Those with 12-24 months who have not taken an accepted MELT course get two road test attempts before being required to take MELT. Those with under 12 months, or a licence issued outside Canada, must take B.C.'s MELT. B.C. accepts MELT from Saskatchewan, Manitoba, Ontario and Alberta.

- ✓ More than 24 consecutive months of Canadian Class 1 experience exempts a driver from MELT
- ✓ Drivers with 12-24 months experience without accepted MELT get two road test attempts before MELT is required
- ✓ All Class 1 drivers licensed outside Canada must take B.C.'s MELT

CHAPTER 91

Front-End Structures

91.1 Front-End Structure Strength Requirements

A front-end structure is a vertical barrier across the front of a deck that prevents cargo from moving forward. Structures less than 1.83 m high must withstand a static load of at least 50% of total cargo weight uniformly distributed; those 1.83 m or taller must withstand 40% of total cargo weight. A cab shield/protector is not considered a front-end structure under Standard 10, though WorkSafe BC requires cab protectors on logging trucks.

- ✓ Front-end structure under 1.83 m must withstand 50% of total cargo weight
- ✓ Structure 1.83 m or taller must withstand 40% of total cargo weight
- ✓ A cab shield is not a front-end structure under Standard 10
- ✓ WorkSafe BC requires cab protectors on logging trucks

91.2 Front-End Structure Dimensions and Penetration

To protect the operator, a front-end structure must be no shorter than 122 cm above the deck (or the height at which it prevents forward cargo movement), and no narrower than the vehicle width (or the width at which it prevents forward movement). It must resist penetration by cargo when the vehicle decelerates at 6.1 m/s^2 and must have no openings or gaps that allow cargo to pass through.

- ✓ Front-end structure must be at least 122 cm above the deck
- ✓ Must be no narrower than the vehicle width
- ✓ Must resist penetration at a deceleration of 6.1 m/s^2
- ✓ Must have no openings or gaps that allow cargo through

91.3 Front-End Structure Marking and Load Width

A front-end structure must be attached per manufacturer's recommendations and identified either by permanent marking (model/serial number, manufacturer name and address, rated cargo capacity) or by a signed letter from the manufacturer or professional engineer carried in the vehicle. Loads cannot exceed 2.6 m wide; vehicles carrying loose hay or straw cannot exceed 3.1 m wide (vehicle and load).

- ✓ Front-end structure must be marked or certified by letter carried in vehicle
- ✓ Loads cannot exceed 2.6 m in width
- ✓ Loose hay or straw loads (vehicle and load) cannot exceed 3.1 m wide
- ✓ Marking must include rated cargo weight capacity

CHAPTER 92

Chapter 4: Fuel-efficient driving

92.1 Smart driving practices for fuel efficiency

Fuel-efficient driving involves preparation and planning, smooth starting, choosing the right gear, easing off the throttle, and using the see-think-do approach. Reducing idling saves fuel.

- ✓ Start out easy and choose the right gear to save fuel
- ✓ Ease off the throttle and anticipate traffic using see-think-do
- ✓ Reduce unnecessary idling

92.2 Vehicle maintenance and choices for efficiency

Maintaining a vehicle properly and choosing fuel-efficient vehicles with aerodynamic features and appropriate tires improves fuel economy.

- ✓ Proper maintenance improves fuel efficiency
- ✓ Aerodynamic features and correct tire choice reduce fuel consumption

92.3 Smart driving techniques for fuel efficiency

Fuel-efficient driving involves smooth acceleration, choosing the right gear, easing off the throttle, and using the see-think-do method. Reducing idling saves significant fuel.

- ✓ Start out easy, choose the right gear, and ease off the throttle to save fuel
- ✓ Reduce unnecessary idling to conserve fuel

92.4 Vehicle choice and maintenance for efficiency

Choosing an aerodynamic, appropriately-sized truck with efficient tires and proper maintenance improves fuel economy. Planning routes and preparing for weather also help.

- ✓ Maintain the vehicle and choose aerodynamic features and efficient tires
- ✓ Plan routes and prepare for weather to improve fuel efficiency

CHAPTER 93

Chapter 8 — Air Brakes: Other Types of Foundation Brakes

93.1 Wedge Brakes

Wedge brakes use one or two small air chambers with wedge-shaped pushrods, usually found only on steering axles. When applied, air pressure pushes the wedge between two rollers, forcing brake linings out against the drum. Most have internal automatic adjusters requiring inspection hole covers to be removed to check adjustment.

- ✓ Wedge brakes are usually found only on steering axles
- ✓ Adjustment is out of tolerance if linings move more than 1/16 inch each or a total of 1/8 inch

93.2 Other Foundation Brake Types

Besides s-cam brakes, the three other types of foundation brakes on air-braked vehicles are wedge brakes, air disc brakes, and air-over-hydraulic brakes.

- ✓ The three other foundation brake types are wedge brakes, air disc brakes, and air-over-hydraulic brakes
- ✓ Different foundation brake types still operate on the same air brake control principles

CHAPTER 94

Chapter 6 — Passenger Safety and Manoeuvring

94.1 Protecting Passenger Safety

Passenger safety is your most important concern, always more important than meeting schedules. Bus passengers are usually injured because the driver stops too quickly, starts too quickly, turns too abruptly, opens/closes doors too quickly, or fails to check passengers often. Keep a safe following distance, avoid getting blocked in, make smooth starts/turns, and ensure passengers are seated and clear of the doors before moving.

- ✓ Passenger safety is more important than meeting schedules
- ✓ Make smooth starts, stops and turns to prevent passenger injuries
- ✓ Ensure passengers are fully on or off before closing doors
- ✓ Keep a safe following distance to avoid quick stops

94.2 Leaving the Curb Safely

Look in the side mirror and over your shoulder to check traffic is clear before leaving the curb — don't rely on mirrors alone. Ensure passengers aren't moving around. Signal to alert other drivers and check over your shoulder again. Be careful the rear of the bus doesn't swing over the sidewalk and hit pedestrians, cyclists, poles or sign posts.

- ✓ Check the side mirror and look over your shoulder before leaving the curb
- ✓ Don't rely on side mirrors alone
- ✓ Ensure the rear of the bus doesn't swing over the sidewalk and hit pedestrians or objects

94.3 Bus Right-of-Way

The Motor Vehicle Act gives public transit buses the right-of-way when the driver signals to move from the curb lane or bus stop into traffic and the bus displays a yield sign. This applies where the speed limit is less than 60 km/h. However, the driver is still required to ensure it's safe before moving into traffic; don't assume you have right-of-way as others don't have to yield if it's unsafe.

- ✓ Transit buses have right-of-way when signalling from a stop and displaying a yield sign
- ✓ This rule applies where the speed limit is less than 60 km/h
- ✓ The bus driver must still ensure it's safe before moving into traffic

94.4 Passing Parked Cars and Warning Clues

When driving past parked vehicles watch for vehicles pulling into traffic, doors opening suddenly on the traffic side, and pedestrians stepping out. Warning clues include front wheels turned out, a driver behind the wheel, exhaust from the tail pipe, brake/back-up lights or turn signals, and people walking or children playing near the road.

- ✓ Watch for opening doors, pedestrians and vehicles pulling out when passing parked cars
- ✓ Warning clues include turned-out front wheels, exhaust, brake lights and a driver in the seat

CHAPTER 95

Chapter 5: Skills for driving trucks and trailers

95.1 Driving and towing with trailers

Towing trailers, including doubles, requires special skills for backing, swerving and whipping control, and parking. Trailers behave differently than straight trucks and require anticipation.

- ✓ Backing a trailer requires steering opposite to the desired trailer direction
- ✓ Towing doubles requires extra skill to control swerving and whipping
- ✓ Allow extra space when parking a trailer combination

95.2 Uncoupling procedures

Uncoupling units requires securing the trailer, lowering landing gear, disconnecting lines, releasing the fifth wheel lock, and safely pulling the tractor away.

- ✓ Lower the landing gear before releasing the fifth wheel
- ✓ Disconnect air and electrical lines before pulling away
- ✓ Ensure the trailer is stable and supported before uncoupling

95.3 Loading and distributing cargo

Cargo must be arranged and distributed to maintain balance and proper weight distribution over axles. Improper loading affects stability, steering and braking.

- ✓ Distribute loads to maintain proper axle weight and balance
- ✓ Improper load distribution affects vehicle stability and control
- ✓ Keep the load's centre of gravity low and centred

95.4 Cargo securement requirements

Cargo must be secured with adequate tiedowns meeting general requirements for number and strength. The number of tiedowns depends on cargo length and weight, and tiedowns must meet minimum working load limits.

- ✓ Use the required number of tiedowns based on cargo length and weight
- ✓ Tiedowns must meet minimum strength and working load limit requirements
- ✓ Determine working load limits and use appropriate chain connector links

95.5 Working load limit and tiedowns

The aggregate working load limit of tiedowns must be at least half the weight of the cargo. Front-end structures and load projections have specific requirements.

- ✓ Aggregate working load limit must be at least 50% of cargo weight
- ✓ Front-end structures must be able to withstand forward cargo shifts
- ✓ Load projections must be marked and secured per requirements

95.6 Vehicle and load dimensions

Vehicles and loads must comply with legal limits for height, width, length and weight. Exceeding these requires oversize or overload permits.

- ✓ Loads must comply with legal height, width, length and weight limits
- ✓ Oversize or overload permits are required to exceed legal dimensions
- ✓ Height clearance must be checked to avoid overhead obstacles

95.7 Specific cargo type securement

Different cargo types — logs, building products, metal coils, paper rolls, concrete pipe, intermodal containers, vehicles, boulders, livestock, hanging meat and bulk tank loads — have specific securement rules.

- ✓ Logs and metal coils have specific securement rules
- ✓ Intermodal containers must be secured to the vehicle frame
- ✓ Liquid and dry bulk tank loads require attention to load shift and surge

95.8 Oversize and overload permits

Oversize and overload permits allow legal operation of larger or heavier loads. Pilot cars, signs, and required distances from oversize vehicles apply.

- ✓ Overload and oversize loads require appropriate permits
- ✓ Pilot cars and warning signs may be required for oversize loads
- ✓ Maintain the required distance from an oversize vehicle

95.9 Coupling with a fifth wheel

Coupling a tractor to a semi-trailer with a fifth wheel requires a precise, safe procedure to ensure a secure connection. Proper coupling and uncoupling prevents dangerous separations.

- ✓ Follow the correct coupling sequence and confirm the fifth wheel jaws are locked around the kingpin
- ✓ Perform a tug test and visual inspection to verify the connection is secure before driving

95.10 Arranging and distributing loads

Cargo must be properly arranged and distributed to keep the vehicle stable and within axle weight limits. Poor distribution affects handling and braking.

- ✓ Distribute loads to keep weight within axle limits and maintain stability
- ✓ Arrange cargo to keep the centre of gravity low and balanced

95.11 General cargo securement and tiedowns

Cargo must be secured with sufficient tiedowns of adequate strength. The number and strength of tiedowns depends on cargo length, weight, and working load limits.

- ✓ Use enough tiedowns based on cargo length and weight per securement rules
- ✓ The aggregate working load limit of tiedowns must be at least half the weight of the cargo

95.12 Coupling with a pintle hitch

Pintle hitch connections are used for certain trailers and require a specific coupling and uncoupling procedure to ensure a secure attachment.

- ✓ Ensure the pintle hook is fully closed and secured around the trailer's lunette eye
- ✓ Verify safety chains and connections are secure before towing with a pintle hitch

95.13 Towing doubles and swerving/whipping

Towing double trailers requires special skill because trailers can swerve and whip. Sudden steering movements amplify trailer sway.

- ✓ Avoid sudden steering movements that cause trailer swerving and whipping
- ✓ Towing doubles requires extra caution due to increased sway and off tracking

95.14 Working load limit and tiedown strength

The working load limit determines how much a tiedown can safely secure. Chain connector links and hardware must meet strength requirements for the cargo.

- ✓ Determine the working load limit for each tiedown and hardware component
- ✓ Ensure the combined working load limit of tiedowns meets minimum requirements for the load

95.15 Securing specific cargo types

Different cargo types such as logs, metal coils, paper rolls, concrete pipe, and vehicles have specific securement requirements. Livestock, hanging meat and bulk liquids also require special handling.

- ✓ Follow the specific securement rules for logs, metal coils, paper rolls and other special cargo
- ✓ Liquid and dry bulk tank loads shift and require special handling and driving techniques

95.16 Vehicle and load dimensions and permits

Vehicles and loads must stay within legal height, width, length and weight limits. Oversize and overload permits, pilot cars and signs are required when exceeding limits.

- ✓ Loads must stay within legal height, width, length and weight limits without a permit
- ✓ Oversize/overload permits, pilot cars and warning signs are required when exceeding legal dimensions

95.17 Reporting to weigh scales

Commercial drivers must report to open fixed and portable weigh scales as required. This ensures vehicles comply with weight limits.

- ✓ Stop and report to open fixed weigh scales as required
- ✓ Comply with portable weigh scale requirements when directed

95.18 Transporting dangerous goods

Transporting dangerous goods requires proper documentation, placarding, and compliance with regulations. Drivers must be trained and certified for the dangerous goods they carry.

- ✓ Carry proper shipping documents and display required placards for dangerous goods
- ✓ Drivers must be trained and certified to transport dangerous goods

CHAPTER 96

Chapter 1: Getting your driver's licence — MELT

96.1 Mandatory Entry Level Training for Class 1

Since October 18, 2021, MELT is a legislated requirement for all new Class 1 applicants. It aligns with the national Class 1 entry-level training standard, includes theory, practical driving and air brake operation, and is a one-time requirement offered by ICBC-approved schools. You must qualify for a Class 1 learner licence before starting MELT.

- ✓ MELT is required for all new Class 1 applicants and is a one-time requirement
- ✓ MELT includes air brake training, so no separate air brake course is needed for Class 1, but you must study air brakes to pass the knowledge test

96.2 MELT for drivers moving to B.C.

Drivers holding a Canadian Class 1 licence with more than 24 consecutive months of experience (not expired over three years) need not take MELT. Those with 12–24 months without an accepted MELT get two road test attempts before being required to take MELT; those with under 12 months must take MELT. All Class 1 drivers licensed outside Canada must take B.C.'s MELT.

- ✓ Canadian Class 1 holders with over 24 consecutive months of experience are exempt from MELT
- ✓ All Class 1 drivers licensed outside Canada must take B.C.'s MELT

CHAPTER 97

Chapter 3 — Acts of Nature

97.1 Night driving

You can't see as far in the dark; travel at a speed that lets you stop within the distance you can see, even below the posted limit. Headlights illuminate only about 100 m on high beam and less on low. A loaded truck at 80 km/h can take over 100 m to stop — farther than headlights reach. Switch from high to low beam at least 150 m from vehicles you approach or follow. It's illegal to drive at night using only parking lights.

- ✓ Travel at a speed that lets you stop within the distance you can see
- ✓ Switch high to low beam at least 150 m from oncoming or followed vehicles
- ✓ It's illegal to drive at night using only parking lights

97.2 Avoiding animal collisions

Animals are a major hazard in B.C. Watch for animal crossing signs and slow down. Be alert at dusk and dawn and in spring and fall. Watch for reflected headlight spots (eyes) at night. Animals move in herds — if you see one, expect more. If an animal is directly ahead, check your mirror, assess the risk, slow down but don't slam the brakes, and leave a wide margin. If unavoidable with a large animal, brake firmly, steer to strike at an angle and let up on the brake just before impact so the front rises.

- ✓ Slow down at animal crossing signs and be alert at dusk, dawn, spring and fall
- ✓ Don't slam the brakes for an animal — it could send the vehicle out of control
- ✓ If unavoidable with a large animal, let up on the brake just before impact to raise the front

97.3 Driving in ice, sleet or snow

Get the feel of the road at slow speed, testing steering and brakes. Reduce speed to suit conditions and install chains if necessary. Apply light brake pressure and avoid quick or erratic steering. Keep windows and windshields clear inside and out, maintain wipers and lights, and use the defroster to prevent fogging. Ensure good ventilation with no exhaust leaks and stay alert for hazards ahead.

- ✓ Test steering and brakes at slow speed to get the feel of the road
- ✓ Reduce speed for conditions and install chains if necessary
- ✓ Apply light brake pressure and avoid quick or erratic steering

CHAPTER 98

Operating a School Bus

98.1 School Bus Operating Requirements

Requirements for operating a bus also apply to school buses, which must comply with all parts of the MVAR relating to school buses. If an inspector or peace officer finds a school bus unfit, you can't operate it as a school bus until defects are fixed. Rental buses replacing a school bus must comply with all applicable rules, and you must notify Commercial Vehicle Safety and Enforcement of the change.

- ✓ School buses must comply with all parts of the MVAR that relate to school buses
- ✓ You can't operate an unfit school bus until the defects have been fixed
- ✓ Never transport passengers on a school bus that's defective in any way
- ✓ Notify Commercial Vehicle Safety and Enforcement when a rental vehicle temporarily replaces a school bus

98.2 School Bus Brake and Fuel Requirements

Test the brakes on your school bus every day; don't operate any school bus unless the brakes are safe. Ensure all passengers are off the bus and the engine is turned off before you refuel.

- ✓ Test the brakes on your school bus every day
- ✓ Don't operate any school bus unless the brakes are safe
- ✓ Ensure all passengers are off the bus and the engine is turned off before refuelling

98.3 School Bus Loading and Unloading Passengers

Before opening doors, ensure the vehicle has come to a full stop, there are at least three metres of road on the left side, other drivers can see the bus from at least 60 metres in either direction, and passengers enter/leave from the right side only. Use alternating flashing red lights when passengers are crossing. All drivers must stop when a school bus displays flashing red lights. Turn off flashing lights and draw in the stop sign after passengers are safely aboard or across.

- ✓ Before opening doors, ensure a full stop, at least three metres of road on the left, and visibility from at least 60 metres in either direction
- ✓ Passengers must enter or leave a school bus from the right side only
- ✓ Use alternating flashing red lights whenever passengers are crossing the road before entering or after leaving the bus
- ✓ All drivers are required to stop their vehicles when a school bus displays flashing red lights
- ✓ Turn off flashing lights and draw in the stop sign after passengers are safely aboard or across the road

98.4 School Bus Signs and Mirrors

All school buses must display two 'School Bus' signs with letters at least 20 cm high, black on a yellow background, mounted front and rear (rear sign above or below the rear window). Every new school bus must have two sets of rear-view mirrors on each side, a mirror to view the entrance door, and a convex mirror at the front to view the roadway immediately ahead.

- ✓ School buses must display two 'School Bus' signs with letters at least 20 cm high, black on a yellow background, mounted front and rear
- ✓ New school buses must have two sets of rear-view mirrors on each side
- ✓ New school buses must have a convex mirror at the front to view the roadway immediately in front

98.5 School Bus Emergency Equipment and Cleanliness

Every school bus must be equipped with an approved fire extinguisher, an approved first-aid kit, and flares or flags. Buses seating more than 12 including the driver need an emergency exit door or windows; those seating more than 10 passengers must carry warning devices. The floor must be washed with disinfectant at least once a week. Passengers are not allowed to stand and must be seated before moving.

- ✓ Every school bus must have an approved fire extinguisher, an approved first-aid kit, and flares or flags
- ✓ Passengers are not allowed to stand on a school bus; ensure all are seated before moving
- ✓ The floor of a school bus must be washed with disinfectant solution at least once a week

CHAPTER 99

Chapter 9 — Manual Slack Adjuster Adjustment

99.1 Manual Slack Adjuster Adjustment Limits

With a typical Type 30 clamp type chamber, adjust brakes if pushrod travel exceeds ¾ inch (20 mm) using pry/free stroke method, or more than 1¾ inch (45 mm) using applied stroke method. These are maximum measurements — adjust if measurements approach the limits.

- ✓ Adjust if free stroke exceeds ¾ inch (20 mm)
- ✓ Adjust if applied stroke exceeds 1¾ inch (45 mm)
- ✓ These are maximum measurements — adjust as measurements approach limits

99.2 Manual Slack Adjustment Procedure

Press and hold the spring-loaded locking sleeve and turn the adjusting bolt (usually 9/16 inch wrench) while watching the camshaft. Turning correctly rotates the cam as if brakes were applied. If the slack adjuster pulls the pushrod out, you're turning the wrong direction. Turn until solid resistance (lining contacts drum), then back off about 1/3 turn for correct clearance. Ensure the locking sleeve re-engages.

- ✓ The pushrod and slack adjuster arm should never move in or out while turning the adjusting bolt
- ✓ Turn until solid resistance, then back off about 1/3 of a turn
- ✓ Ensure the locking sleeve re-engages so adjustment won't back off
- ✓ On tandem axles, one axle may adjust clockwise while the other requires an opposite turn

CHAPTER 100

Chapter 10 — Class 3 Single Unit Truck Pre-Trip Inspection

100.1 Class 3 Under Hood and In-Cab Checks

The Class 3 single-unit truck pre-trip covers under-hood fluids, belts, hoses, compressor, steering, suspension and frame, followed by in-cab tire, wheel, brake and gauge checks.

- ✓ Drain the supply reservoir during the road test; all reservoirs should be drained daily
- ✓ Check tires for inflation, bulges, sidewall separation, cuts, tread depth and even wear
- ✓ Vehicle may be placed out of service if drum linings are under 1/4 inch (6.4 mm) or disc pads under 1/8 inch (3.2 mm)
- ✓ Should be completed in less than 30 minutes and includes demonstrating slack adjuster setup

100.2 Class 3 Air Brake System Test

The Class 3 air brake system test begins by pumping down pressure to confirm governor cut-in and low-air warning operation.

- ✓ Pump down to approximately 80% of maximum pressure and confirm governor cut-in
- ✓ Governor must cause compressor to cut in before pressure falls below 80 p.s.i. (552 kPa)
- ✓ Compressor must stop pumping between 105 and 135 p.s.i. (724 and 931 kPa)

CHAPTER 101

Chapter 11 — Signals

101.1 Traffic lights and arrows

Red means stop; yellow means caution; green means go if the intersection is clear. After a full stop on a steady red you may turn right, or turn left onto a one-way street, unless a sign forbids it. Flashing red means stop then continue when safe; flashing green is a pedestrian-controlled light (go only if the intersection is clear); flashing yellow means proceed with caution. Green arrows permit turns in the arrow direction; a yellow arrow means the advance left turn is ending. A transit priority steady white rectangular signal permits only buses to go.

- ✓ On a steady red, after a full stop, you may turn right or turn left onto a one-way street unless a sign forbids it
- ✓ Flashing red requires a full stop then proceed when safe; flashing yellow requires proceeding with caution
- ✓ A transit priority white rectangular signal permits only buses to proceed

101.2 Lane control signals

Lane control signals are placed over lanes to indicate which are open for driving. A red X means do not drive in that lane; a green arrow means drive in that lane; and flashing yellow means move out of that lane into a lane with a green arrow. If all lane control signals over the lanes flash yellow, slow down and proceed with caution.

- ✓ A red X over a lane means do not drive in that lane; a green arrow means the lane is open
- ✓ A flashing yellow arrow means move out of that lane; if all flash yellow, slow down and proceed with caution

CHAPTER 102

Air Brake Systems

102.1 Low-Air Warning Devices

Air brake systems include a low-air warning device (wig-wag or buzzer/light) that activates when reservoir pressure falls too low, alerting the driver to stop safely before brakes fail.

- ✓ The low-air warning device must activate before dangerous pressure loss
- ✓ Stop safely when the low-air warning activates
- ✓ Understand the wig-wag mechanical low-air indicator

102.2 Dual Air Brake System Reservoirs

A dual air brake system uses primary and secondary (supply/wet tank) reservoirs to provide redundancy. If the primary air system fails, the secondary system provides braking capacity.

- ✓ Dual systems have separate primary and secondary reservoirs for redundancy
- ✓ The supply reservoir (wet tank) collects moisture and feeds other reservoirs
- ✓ Braking remains available if one circuit fails

102.3 Air Brake Valves and Components

Air brake systems use various valves including the safety (pop-off) valve, quick release valve, relay valve, one-way and two-way check valves, relay emergency valve, parking brake control valve, and pressure protection valves. Each controls air flow for braking and safety.

- ✓ The safety valve releases excess air pressure to protect the system
- ✓ Quick release and relay valves speed brake application and release
- ✓ Check valves prevent air backflow between reservoirs

102.4 Spring and Parking Brakes

Spring parking brakes apply mechanically when air pressure is lost, providing emergency and parking braking. Trailer spring brakes and safety actuator parking brakes are engaged via the parking brake control valve.

- ✓ Spring brakes apply automatically when air pressure drops too low
- ✓ Use the parking brake control valve to set spring parking brakes
- ✓ Trailer spring brakes provide emergency braking on air loss

102.5 S-Cam Drum Brakes and Slack Adjusters

S-cam drum brakes use a slack adjuster to convert air chamber push-rod movement into braking force. Slack adjusters may be manual or automatic and must be kept within free-stroke limits. Free stroke is measured using the pry method.

- ✓ Keep slack adjuster free stroke within manufacturer/legal limits
- ✓ Adjust manual slack adjusters when stroke exceeds limits
- ✓ Measure free stroke using the pry method during inspection

102.6 Tractor-Trailer Air Brake Systems

Combination vehicle air brakes include the supply (emergency) line and control (service) line connecting tractor and trailer. Bobtail proportioning and slippery road valves modulate braking. Understand primary system failure procedures.

- ✓ The supply/emergency line charges trailer reservoirs and applies trailer brakes on disconnection
- ✓ The control/service line delivers braking signal to the trailer
- ✓ Bobtail proportioning limits tractor braking when running without a trailer

102.7 Other Brake Types and Failure Warnings

Besides air brakes, drivers should know vacuum brakes, wedge brakes, water-cooled brakes, and ratchet-and-pawl brakes. Brake failure warning systems alert the driver to problems.

- ✓ Recognize different brake types including wedge and vacuum brakes
- ✓ Respond immediately to brake failure warning systems
- ✓ Use runaway lanes if brakes fail on a descent

CHAPTER 103

Chapter 2 — Heavy Vehicle Braking: Starting and Stopping

103.1 Scientific Principles of Braking

An engine is a heat conversion machine converting heat energy to motion. A brake works oppositely, converting the energy of motion back into heat through friction between brake drums/rotors and linings/pads. Heat is absorbed and dissipated into the atmosphere primarily through brake drums/rotors. Traction between tires and road is the final factor in stopping.

- ✓ Brakes convert the energy of motion into heat energy through friction
- ✓ Heat is dissipated primarily through the brake drums/rotors
- ✓ The final factor in stopping is contact between the vehicle and road through the tires

103.2 Weight and Braking Force Distribution

A heavy tractor-trailer can weigh up to 63,500 kg loaded. Stopping quickly requires a stopping force of nine times the acceleration force (approximately 4,000 hp). With 8 axles and 16 brakes, each provides about 1/16 of braking force. If brakes are out of adjustment, others do more work, resulting in longer stopping distance and possible brake overheating, damage, and failure.

- ✓ A heavy tractor-trailer combination can weigh up to 63,500 kg when loaded
- ✓ If brakes are out of adjustment, other brakes must work harder resulting in longer stopping distances
- ✓ Unequally loaded axles can cause lighter-loaded wheels to skid, increasing stopping distance

CHAPTER 104

Acts of Nature

104.1 Animals on the Road

Animals are a major hazard in B.C. Watch for animal crossing signs and slow down, be alert at dusk and dawn, watch for eye reflections at night, and take extra caution in spring and fall. Animals often move in herds. If an animal is directly ahead, check mirrors, assess risk, slow down without slamming brakes, and leave a wide margin.

- ✓ Slow down at animal crossing signs and when wildlife is near the highway
- ✓ If unavoidable with a large animal, brake firmly, steer to strike at an angle, and let up on brakes just before impact to raise the front end
- ✓ Don't slam on brakes, as this could send the vehicle out of control
- ✓ Expect more animals if you see one, since they move in herds

104.2 Driving in Ice, Sleet or Snow

Get the feel of the road by testing steering and brakes at slow speed. Reduce speed to suit conditions and use chains if necessary. Apply light brake pressure and avoid quick or erratic steering. Keep windows/windshields clear and maintain wipers, lights and defroster. Ensure ventilation is good and exhaust has no leaks.

- ✓ Test steering and brakes at slow speed when starting out
- ✓ Reduce speed for conditions and put on chains if necessary
- ✓ Apply light brake pressure and avoid quick/erratic steering
- ✓ Keep windows clear and don't use air recirculation in cold weather (causes fogging)

104.3 Night Driving

You can't see as far in the dark. Travel at a speed that allows you to stop within the distance you can see. Most headlights illuminate only 100 m on high beam. A loaded truck at 80 km/h can take over 100 m to stop, further than high beams illuminate. Reduce speed after sunset.

- ✓ Travel at a speed that lets you stop within the distance you can see, even below posted limits
- ✓ Switch from high to low beam at least 150 m from oncoming or followed vehicles
- ✓ It's illegal to drive at night using only parking lights
- ✓ Don't flash lights at drivers who forget to dim; slow down and focus on the right road edge

CHAPTER 105

Chapter 5 — Specific Cargo Types

105.1 Transporting Logs and Poles

Vehicles transporting logs or poles must be equipped with bunks, bolsters, stakes or other means of cradling the logs (Standard s.29(1)). Stakes and extensions must form a 90-degree or lesser angle with the bunk cross member (MVAR 35.05). Stakes must be secured by an engineer-approved method, by a pin and closed-loop stake lines of wire rope at least 22 mm diameter, or with properly welded gussets. Before entering a highway from a private road, the driver must inspect the vehicle, logs and securing devices and add devices if required. Short logs loaded crosswise must be secured with a device that maintains tension and takes up slack as logs settle.

- ✓ Vehicles must have bunks, bolsters, stakes or other means of cradling logs
- ✓ Stakes must form a 90-degree or lesser angle with the bunk cross member
- ✓ Closed-loop stake lines must be wire rope at least 22 mm in diameter
- ✓ Inspect vehicle, logs and securing devices before entering a highway from a private road

105.2 Intermodal Containers Securement

Secure cargo within intermodal containers per general or commodity-specific requirements. On a container chassis, use integral locking devices; chain can be an interim measure only if the locking device is damaged/missing. On other vehicles, secure by chains/wire ropes/integral locking devices fixed to all lower corners and/or crossed chains fixed to all upper corners, with an aggregate working load limit of 50% of the container weight. Pass chains around an entire corner link, not just through it.

- ✓ Use integral locking devices to secure containers on a container chassis
- ✓ Aggregate working load limit must be at least 50% of the container weight
- ✓ Chain is only an interim measure when the integral locking device is damaged or missing

105.3 Vehicles as Cargo

Vehicles under 4,500 kg GVW must be secured front and rear with a minimum of two tiedowns (a winch may serve as a front tiedown). Vehicles over 4,500 kg require a minimum of four tiedowns, each with a working load limit of at least 2,268 kg, with additional tiedowns as needed to reach an aggregate WLL of at least 50% of cargo weight. Accessory equipment (e.g., hydraulic shovels) must be lowered and secured. Stacked/flattened/crushed vehicles need containment walls and/or tiedowns (WLL at least 2,268 kg, not synthetic webbing) and equipment to prevent loose parts falling.

- ✓ Vehicles under 4,500 kg: minimum two tiedowns at front and rear
- ✓ Vehicles over 4,500 kg: minimum four tiedowns, each with WLL of at least 2,268 kg
- ✓ Aggregate tiedown WLL must be at least 50% of the cargo weight
- ✓ Accessory equipment such as hydraulic shovels must be lowered and secured

105.4 Unstable and Shifting Loads

Livestock can move in the trailer, making turns difficult and risking collision or injury; use false bulkheads to bunch animals with less than a full load and reduce speed on curves since animals can lean and shift the centre of gravity, causing rollover. Hanging meat sways and has a high centre of gravity — secure to prevent shift/sway and reduce speed on curves and ramps. Liquid or dry bulk tank loads have a high centre of gravity and surge if unbaffled — reduce speed on curves and be careful on stops and starts.

- ✓ Use false bulkheads to bunch livestock when carrying less than a full load
- ✓ Reduce speed on curves for livestock, hanging meat and bulk tank loads due to high or shifting centre of gravity
- ✓ Unbaffled liquid loads surge forward, backward and side to side — take care on stops and starts

105.5 Building Products and Bundles

Bundles of lumber, drywall and plywood (Division 2 of the Standard) placed side by side must contact each other or be prevented from shifting by dunnage/blocking. If blocked laterally by stakes or friction devices, secure with tiedowns over the top layer, minimum two for bundles longer than 1.52 m. If stacked directly, use tiedowns over the top and second layers (or at 1.85 m above the deck, whichever is greater). Tiers over 1.85 m must be secured independently.

- ✓ Side-by-side bundles must contact each other or be prevented from shifting toward each other
- ✓ Minimum two tiedowns for bundles longer than 1.52 m
- ✓ Tiers exceeding 1.85 m in height must be secured independently per general requirements

105.6 Metal Coils and Paper Rolls

Specific requirements apply to metal coils and paper rolls weighing 2,268 kg or more. Coils with eyes vertical must be prevented from tipping forward, rearward and sideways using blocking, bracing, friction mats or tiedowns; coils with eyes crosswise or lengthwise must be secured against rolling and against forward/rearward movement. Paper rolls in sided vehicles need blocking/bracing/friction mats/tiedowns to prevent sliding, tipping or rolling; stacks and flatbed loads need additional securement.

- ✓ Specific coil/paper roll requirements apply when the shipment weighs 2,268 kg or more
- ✓ Vertical-eye coils must be prevented from tipping forward, rearward and sideways
- ✓ Coils with eyes crosswise or lengthwise must be secured against rolling

105.7 Boulders and Roll-On/Roll-Off Containers

Secure boulders over 5,000 kg or greater than two cubic metres (Division 9) on their flattest/largest side on the deck, supported by at least two hardwood blocks or a crib, using at least two chains; unstable-base boulders need additional tiedowns. Roll-on/roll-off and hook-lift containers on vehicles without a functioning integral securement system (Division 8) must be blocked against forward movement, secured to the front against sideways/vertical movement, and secured to the rear with tiedowns, two lengthwise tiedowns, two hooks or equivalent mechanisms.

- ✓ Secure boulders over 5,000 kg or over two cubic metres with at least two chains on their flattest side
- ✓ Support boulders with at least two hardwood blocks or a crib
- ✓ Roll-on/roll-off containers without integral securement must be blocked against forward movement and secured front and rear

CHAPTER 106

Load Projections

106.1 Front Load Projection Limits

Loads projecting beyond the vehicle take up extra road space and may intrude on other lanes, especially when turning. Follow standard limits unless you hold a permit. A front load cannot extend more than one metre beyond the front wheels, or one metre beyond the front bumper if equipped. For TAC (BC) trailers, front projections cannot extend more than a two-metre radius beyond the articulation point; for non-TAC (BC) vehicles the limit is 2.25 m.

- ✓ Front load cannot extend more than 1 m beyond the front wheels or bumper
- ✓ Trailer front projection: max 2 m radius from articulation point (TAC BC)
- ✓ Non-TAC (BC) vehicles: max 2.25 m front projection
- ✓ A permit is required to exceed standard projection limits

106.2 Rear Load Projection and Marking

Loads on a straight truck cannot extend more than four metres beyond the turn centre. If a load projects more than 1.2 m beyond the rear, attach a red flag or cloth to the tip during daylight, or a red light at night. Allow extra room when transporting projecting cargo.

- ✓ Straight truck rear load cannot extend more than 4 m beyond the turn centre
- ✓ Projections over 1.2 m require a red flag/cloth by day
- ✓ Projections over 1.2 m require a red light at night

CHAPTER 107

Chapter 2 — Stopping Distance and Following Distance

107.1 Total Stopping Distance Components

Total stopping distance uses see-think-do: perception time (about 3/4 second) plus reaction time (about 3/4 second), then braking. Air brakes have a brake lag time of approximately 4/10 second between applying the brake and when brakes function—unlike car brakes which work almost instantly. Total stopping time = perception + reaction + brake lag + braking time.

- ✓ Total stopping time includes perception time, reaction time, brake lag time, and braking time
- ✓ Air brake lag time is approximately 4/10 of a second before brakes begin to function
- ✓ Average perception time and reaction time are each about 3/4 of a second

107.2 Safe Following Distance for Heavy Vehicles

Passenger cars and light trucks should use the two-second rule. Drivers of buses, trucks, and other large heavy vehicles should never be less than five seconds behind the vehicle ahead at highway speeds. Stay even further back when conditions are less than ideal.

- ✓ Large heavy vehicle drivers should never follow less than five seconds behind at highway speeds
- ✓ Passenger cars and light trucks should use the two-second rule
- ✓ Increase following distance when conditions are less than ideal

107.3 Effects of Speed and Weight on Stopping Power

Speed and weight affect stopping power required. Doubling vehicle speed requires 4 times the stopping power. Doubling vehicle weight requires 2 times the stopping power. Doubling both speed and weight requires 8 times the stopping power. There's only so much stopping power available, so drive at safe speeds and following distances.

- ✓ 2x vehicle speed requires 4x the stopping power
- ✓ 2x vehicle weight requires 2x the stopping power
- ✓ 2x speed and 2x weight together requires 8x the stopping power

107.4 Effect of Road Grade on Stopping

The slope or grade of the road affects stopping distance. A vehicle travelling downhill needs a longer stopping distance than on level ground because of gravity. A vehicle travelling uphill stops in a shorter distance than on level ground due to the grade.

- ✓ A vehicle travelling downhill needs a longer stopping distance due to gravity
- ✓ A vehicle travelling uphill stops in a shorter distance due to the grade

CHAPTER 108

Vehicle Safety

108.1 Tire Pressure and Heat

Rolling wheels flex tires, creating friction and heat. Correctly sized and inflated tires on a non-overloaded vehicle release heat safely. Underinflation, overloading or excessive speed increase flexing and heat, potentially causing overheating and bursts. Underinflation is a major cause of recap tire failure. Check and adjust pressure when tires are cool.

- ✓ Check and adjust tire pressure only when tires are cool, using a gauge
- ✓ Keep vehicle and load weight below the load rating for each tire/axle
- ✓ Underinflation is a major cause of recap (retread) tire failure
- ✓ Don't reduce a warm tire's pressure, as it upsets the cooling balance

108.2 Defective Tire Standards

Never operate a vehicle with bald or damaged tires. Tires are defective with tread damage (cuts, cracks, snags) longer than 2.5 cm and deep enough to expose ply cords. Minimum tread depths vary by tire position and vehicle weight.

- ✓ Front tire on vehicle GVW 5,500 kg+: minimum 3 mm (1/8 in) tread
- ✓ Rear tire on vehicle GVW 5,500 kg+: minimum 1.6 mm (1/16 in) tread
- ✓ Trailer tire: minimum 1.6 mm (1/16 in) tread
- ✓ Winter tire: minimum 3.5 mm (3/16 in) tread
- ✓ Tread damage over 2.5 cm exposing ply cords makes a tire defective

108.3 Braking Systems and Warning Devices

All vehicles using air or vacuum brakes must have warning devices that alert the driver if the air-pressure or vacuum system fails. Every motor vehicle must have at least two separate braking systems, one of which must be mechanical (e.g. ratchet and pawl or spring brake). If the primary foot brakes fail, use the emergency mechanical brake, which needs more time and distance to stop.

- ✓ Air/vacuum brake vehicles must have a warning device for system failure
- ✓ Every vehicle must have at least two separate braking systems, one mechanical
- ✓ The emergency (mechanical) brake requires more time and distance to stop

108.4 Tire Wear from Improper Inflation

Improper inflation causes faster wear and reduces steering control. Overinflation causes excess wear in the centre tread and less road contact (less traction). Underinflation causes excess wear on outer edges and increases hydroplaning risk in wet conditions.

- ✓ Overinflation causes centre tread wear and reduced traction
- ✓ Underinflation causes outer-edge wear and increases hydroplaning risk
- ✓ Reduced tire-road contact reduces steering control

108.5 Tire Problems and Mixing

Common tire problems include incorrect pressure, tread wear/separation, cuts, sidewall separation, bulges, tires contacting each other or the vehicle, and cracked/leaking valve stems. Radial and bias-ply tires or different sizes can be mixed on the same vehicle but not on the same axle. After changing a tire, recheck wheel nut tightness with a torque wrench.

- ✓ Never mix radial and bias-ply tires or different sizes on the same axle
- ✓ Always use a torque wrench to tighten and check wheel nuts
- ✓ After changing a tire, stop after a short while to recheck wheel nut tightness

108.6 Disk and Cast Spoke Wheel Problems

Check wheels before every trip. Don't drive disk wheels with loose/missing lug nuts, stripped studs, or rim cracks. Don't drive cast spoke wheels with missing/loose nuts or clamps, or cracked rims/hubs. Investigate metal/paint flakes (wheel movement), oil/grease from the hub, rust streaks (loose lug/cracks), and rim wear near clamps.

- ✓ Don't drive disk wheels with loose/missing lug nuts, stripped studs, or rim cracks
- ✓ Don't drive cast spoke wheels with missing/loose nuts, clamps, or cracked rims/hubs
- ✓ Metal/paint flakes around nuts may indicate wheel movement
- ✓ Rust streaks on the rim may indicate a loose lug nut or rim cracks
- ✓ Check the brake drum area if oil or grease leaks from the hub

108.7 Flashing Lights Regulations

Flashing lights are restricted by colour: red only on emergency vehicles, blue only on police vehicles, and amber on construction, towing, snow-removal, sanding, pilot cars, and permitted oversize vehicles. A permit from Commercial Vehicle Safety and Enforcement is required to mount amber flashing lights.

- ✓ Red flashing lights only on emergency vehicles; blue only on police vehicles
- ✓ Amber flashing lights used on construction, tow, snow-removal, sanding, and pilot cars
- ✓ A permit from Commercial Vehicle Safety and Enforcement is required to mount amber flashing lights

108.8 Disabled Vehicles and Warning Devices

Vehicles required to carry warning devices: those seating more than 10 passengers, or with overall width or load width over 2.3 m. When disabled, move as far off the road as possible and place warning devices about 30 m ahead and 30 m behind. In the dark, a minimum of two warning devices is required.

- ✓ Vehicles seating over 10, or over 2.3 m in overall/load width must carry approved warning devices
- ✓ Place warning devices approximately 30 m ahead and 30 m behind a disabled vehicle
- ✓ Daylight: two red flags (min 30 cm x 30 cm) or two approved devices; night: flares, fuses, reflectors, red lanterns
- ✓ At night, disabled vehicles need a minimum of two warning devices

CHAPTER 109

Chapter 5 — Transporting Dangerous Goods

109.1 Dangerous Goods Responsibilities

Dangerous goods present serious hazards to handlers, the public and the environment. Anyone involved with dangerous goods has significant legal responsibilities and must be properly trained and appropriately certified. When transporting these goods, all shipping documents must be complete, correct and readily available in the cab, and must accompany the shipment. Any incident related to the dangerous goods cargo must be reported immediately.

- ✓ Persons handling dangerous goods must be properly trained and appropriately certified
- ✓ Shipping documents must be complete, correct, readily available in the cab and accompany the shipment
- ✓ Report any incident related to the dangerous goods cargo immediately

CHAPTER 110

Chapter 6 — Operating a Passenger Vehicle

110.1 Taking On and Letting Off Passengers on Highways

When taking on or letting off passengers on a highway: signal to warn traffic you're stopping, stop where other drivers can see your vehicle from at least 85 metres (285 ft) in front and behind, and leave at least three metres (10 ft) to the left so traffic can pass. Whenever safe, pull off the travel portion of the highway while passengers get on or off.

- ✓ Stop where drivers can see the vehicle from at least 85 metres front and behind
- ✓ Leave at least three metres (10 ft) to the left for passing traffic
- ✓ Pull off the travel portion of the highway when safe

110.2 Passenger Transportation Licence Requirement

You must have a passenger transportation licence if you're responsible for a vehicle transporting passengers on a for-hire basis, and be familiar with all relevant acts and regulations.

- ✓ A passenger transportation licence is required to transport passengers for hire
- ✓ Drivers must be familiar with all relevant acts and regulations

110.3 Smoking Restrictions

It's illegal to smoke in any motor vehicle when there are passengers under 16 years old. Children are especially vulnerable to second-hand smoke in enclosed spaces. Drivers must not smoke if passengers are in the vehicle, whether moving or not.

- ✓ Illegal to smoke in a vehicle with passengers under 16 years old
- ✓ Drivers must not smoke if passengers are in the vehicle, moving or not

110.4 Focus on Driving

Any time the vehicle is moving you must not collect fares, make change, or take on/let off passengers. Save unnecessary conversation until stopped. You must be able to see clearly ahead, right and left, move your arms and legs, and reach emergency equipment. In a sedan-type vehicle you may have up to two passengers on your right side only if there's room for safe operation and designated seating positions with seatbelts.

- ✓ Do not collect fares, make change, or take on/let off passengers while moving
- ✓ Up to two passengers may sit on the right side of a sedan only with seatbelted designated positions and room for safe operation

110.5 Standing Passengers

Passengers may not stand while a vehicle is in motion unless the passenger transportation licence for that vehicle allows standing passengers, which limits the number allowed. The standing passenger capacity must be displayed in an easily seen location. Don't allow a passenger to stand where it hinders your view or movement.

- ✓ Passengers may not stand while the vehicle is moving unless the licence allows it
- ✓ Standing passenger capacity must be displayed in an easily seen location

110.6 Refusing to Transport Passengers

You must provide transportation to all paying customers, but may refuse if your vehicle is already at maximum capacity or if the passenger is smoking, using profane/offensive language, or acting disorderly. If you order a person out, ensure they can disembark safely where they can reasonably find alternate transportation.

- ✓ May refuse passengers when at maximum capacity or when a passenger is smoking, offensive or disorderly
- ✓ Ordering a person out requires ensuring they can disembark safely and find alternate transportation

110.7 Transporting People with Disabilities

You need special skills and sensitivity, and cannot refuse to transport someone just because they have a disability. Allow service animals (e.g. guide dogs) in your vehicle. Speak directly to the person, don't assume they need help—always ask, remember needs vary, and be patient and flexible. Properly secure wheelchairs, scooters and mobility aids and provide safe space for service animals in case of a collision.

- ✓ You cannot refuse to transport a person just because they have a disability
- ✓ Service animals must be allowed in the vehicle with their owners
- ✓ Properly secure wheelchairs, scooters and mobility aids

110.8 Let-Down or Jump Seats

Under the Passenger Transportation Act, you must have a licence or permit before using a let-down or jump seat. These seats may be used only in the rear of sedans and only if the manufacturer designed the vehicle to carry them.

- ✓ A licence or permit is required before using a let-down or jump seat
- ✓ Jump seats may only be used in the rear of sedans designed to carry them

110.9 Chauffeur's Permit

Some municipalities require all limousine and taxi drivers to have a chauffeur's permit, usually issued by municipal police. You may have to allow a police check and complete a hospitality course (such as the TaxiHost program).

- ✓ Some municipalities require a chauffeur's permit for taxi and limousine drivers
- ✓ A police check and hospitality course may be required for the permit

CHAPTER 111

Chapter 3 — Vehicle Safety: Tires and Wheels

111.1 Tire pressure and heat

Rolling tires flex, creating friction and heat. Improper inflation, overloading or excessive speed increases flexing and heat, which can raise pressure until a tire bursts. Underinflation is a major cause of recap (retread) failure. Check and adjust tire pressure when tires are cool using a gauge. Never reduce pressure of a warm tire — it can upset the cooling balance. Keep vehicle and load weight below the tire's load rating.

- ✓ Check and adjust tire pressure when tires are cool using a gauge
- ✓ Underinflation is a major cause of recapped (retread) tire failure
- ✓ Never reduce a warm tire's pressure as it upsets cooling balance
- ✓ Keep vehicle and load weight below the tire's load rating

111.2 Minimum tread depth and tire defects

Tires are defective if they have tread damage (cuts, cracks, snags) longer than 2.5 cm and deep enough to expose ply cords. Minimum tread: 3 mm on a front tire and 1.6 mm on a rear tire (vehicle GVW 5,500 kg or more); 1.6 mm on a trailer; 3.5 mm for a winter tire. Different sizes or radial and bias-ply tires may be mixed on a vehicle but never on the same axle. After changing a tire, recheck wheel nuts with a torque wrench.

- ✓ Front tire minimum tread is 3 mm and rear tire is 1.6 mm on vehicles with GVW 5,500 kg or more
- ✓ Trailer tire minimum tread is 1.6 mm; winter tire minimum is 3.5 mm
- ✓ Never mix radial and bias-ply or different sizes on the same axle
- ✓ Always use a torque wrench to tighten and recheck wheel nuts

111.3 Tire wear from improper inflation

Overinflation causes excess wear in the centre of the tread and reduces road contact and traction. Underinflation causes excess wear on the outer edges and increases hydroplaning risk in wet conditions. Reduced tire-to-road contact also reduces steering control.

- ✓ Overinflation wears the tread centre and reduces traction
- ✓ Underinflation wears the outer tread edges and increases hydroplaning risk

111.4 Disk and cast spoke wheel problems

Check wheels before every trip. For disk wheels, don't drive with loose/missing lug nuts, stripped studs or rim cracks; investigate paint/metal flakes (wheel movement) and hub oil/grease leaks. For cast spoke wheels, don't drive with missing/loose nuts or rim clamps, or cracks on rims/hubs; investigate mismatched/bent/cracked lock rings, hub leaks, and rim wear near clamps. Rust streaks may indicate a loose lug nut or crack.

- ✓ Don't drive with loose/missing lug nuts, stripped studs or cracked rims
- ✓ Metal/paint flakes around nuts may indicate wheel movement
- ✓ Rust streaks on the rim may indicate a loose lug nut or a crack

CHAPTER 112

Chapter 9 — Automatic Slack Adjusters

112.1 Automatic Slack Adjuster Basics

All commercial trucks and trailers with air brakes have been manufactured with automatic slack adjusters since 1996. They adjust themselves during normal brake applications but must still be checked during pre-trip inspection. Manual adjustment is dangerous — it gives a false sense of security and can cause wear leading to early failure. Excessive stroke usually indicates other brake problems needing a qualified mechanic.

- ✓ Automatic slack adjusters have been standard on air brake vehicles since 1996
- ✓ Automatic slack adjusters must still be checked as part of a pre-trip inspection
- ✓ Manual adjustment of automatic slack adjusters is dangerous and gives a false sense of security
- ✓ Excessive stroke indicates the adjuster failed, was incorrectly installed, or a foundation brake problem

112.2 Automatic Slack Adjuster Maintenance and Limits

Manufacturers recommend automatic slack adjusters be checked by a mechanic at every lubrication interval, every 40,000 km, or every three months, whichever comes first. Pushrod strokes are usually slightly longer than well-adjusted manual adjusters. With a Type 30 chamber, brakes need repair if free stroke exceeds ¾ inch (20 mm) or applied stroke exceeds two inches (50 mm).

- ✓ Check by a mechanic every 40,000 km, every three months, or every lubrication interval, whichever comes first
- ✓ Repair if free stroke exceeds ¾ inch (20 mm)
- ✓ Repair if applied stroke exceeds two inches (50 mm)

112.3 Emergency Automatic Slack Adjustment

Adjustment procedures for automatic slack adjusters are emergency procedures only — repair or replacement must be made as soon as possible. Park safely with wheels blocked, full air pressure, and spring parking brakes released. Record any emergency adjustment on your daily post-trip inspection report and verify clearance by re-measuring free stroke.

- ✓ Automatic slack adjuster adjustment is for emergencies only; repair as soon as possible
- ✓ Record any emergency adjustment on your daily post-trip inspection report
- ✓ Verify sufficient clearance by re-measuring the free stroke after adjusting

112.4 Hexagonal and Square Adjusting Bolts

Hexagonal adjusting bolt: set up by turning clockwise until lining contacts drum, then back off ½ turn (may hear or feel ratcheting, which is normal). Square adjusting bolt: disengage the spring-loaded pawl first (pry button up 1/32 inch or remove hex cap/spring/pawl), set up counter-clockwise until lining contacts drum, then turn ½ turn clockwise to restore clearance.

- ✓ Hexagonal bolt: turn clockwise to set up, back off ½ turn to restore clearance
- ✓ Square bolt: disengage pawl first, set up counter-clockwise, restore clearance with ½ turn clockwise
- ✓ Ratcheting when backing off a hex bolt is normal

CHAPTER 113

Chapter 11 — Road Markings

113.1 Yellow lines

Yellow lines divide traffic moving in opposite directions; traffic on the far side of a yellow line to your left comes toward you. A broken yellow line permits passing when safe; a broken-and-solid line permits passing only when safe and the broken line is on your side; a double solid line means no passing; a single yellow line permits passing with extra caution. A double broken yellow line marks a reversible lane controlled by lane control signals. Two-way left-turn lanes are shared by opposing traffic for left turns.

- ✓ Double solid yellow lines mean no passing is allowed
- ✓ With a broken-and-solid line combination, you may pass only when the broken line is on your side and it is safe
- ✓ Yellow lines separate traffic travelling in opposite directions

113.2 White lines and crosswalks

White lines separate lanes moving in the same direction and mark crosswalks, stop positions and right shoulders. A solid white line means do not change lanes; a broken white line permits lane changes when safe. Stop before the stop line, and stop for pedestrians in marked or pedestrian-activated crosswalks. It is illegal to drive over freshly painted, wet pavement markings.

- ✓ A solid white line means do not change lanes; a broken white line permits changing when safe
- ✓ Stop before the stop line and stop for pedestrians in crosswalks
- ✓ It is illegal to drive over freshly painted, wet pavement markings

113.3 Reserved lane and other markings

Reserved lanes for HOVs, buses and bicycles are marked with thick solid or broken lines and white diamond symbols; additional signs state which vehicles are allowed. Bicycle lanes are for cyclists only, who must travel in the same direction as adjacent traffic. Painted islands must not be driven on or over — keep to the right.

- ✓ Reserved lanes are marked with white diamonds; signs state which vehicles may use them
- ✓ Do not drive on or over painted islands — keep to the right

CHAPTER 114

Pre-Trip and Trip Inspections

114.1 Pre-Trip Inspection by Vehicle Class

Pre-trip inspection requirements differ by licence class: passenger vehicle, Class 1 tractor-trailer, Class 3 single-unit truck, and Class 2/4 buses. Candidates must complete a mechanical circle check and under-hood check and file a pre-trip inspection report for the road test.

- ✓ Complete the correct pre-trip inspection for your licence class
- ✓ Perform the mechanical circle check and under-hood check
- ✓ File a pre-trip inspection report before the road test

114.2 Pre-Hill and Post-Trip Inspections

Drivers must perform pre-hill inspections before descending grades to verify brakes are ready, and post-trip inspections to identify defects. Defects or deficiencies must be reported.

- ✓ Conduct a pre-hill inspection before long or steep descents
- ✓ Perform post-trip inspections and report any defects or deficiencies
- ✓ Do not operate a vehicle with unsafe defects

CHAPTER 115

Chapter 6: Skills for driving buses, taxis, limousines and ride-hailing vehicles

115.1 Operating buses and passenger vehicles

Operators must manage taking on and letting off passengers safely, control standing passengers, avoid distractions, and know rules on smoking, refusing passengers, and transporting people with disabilities. A chauffeur's permit may be required.

- ✓ Take on and let off passengers only in safe locations
- ✓ Focus on driving and manage standing passengers safely
- ✓ A chauffeur's permit is required for certain passenger vehicle operation

115.2 Vehicle inspection and defects

Passenger vehicle operators must inspect vehicles, ensure emergency equipment and exits are functional, and report defects or deficiencies. Unfit vehicles must not be operated.

- ✓ Inspect the vehicle and check emergency equipment and exits before operating
- ✓ Report defects or deficiencies and do not operate unfit vehicles
- ✓ Ensure emergency exits are accessible and functional

115.3 Operating emergency vehicles

Emergency vehicle operators have special responsibilities and privileges but must still operate with due care and follow rules governing emergency operation.

- ✓ Emergency vehicle operators must drive with due care and safety
- ✓ Emergency privileges do not remove responsibility for safe operation

115.4 Passenger safety and manoeuvring

Passenger vehicle drivers must prioritize safety when leaving the curb, passing parked cars, and managing right-of-way. Buses have specific right-of-way privileges when leaving stops.

- ✓ Ensure passenger safety when leaving the curb and passing parked cars
- ✓ Buses have right-of-way when re-entering traffic from a stop where required by law

115.5 Operating a bus, taxi, limousine or ride-hailing vehicle

Drivers must handle passengers safely, focus on driving, follow rules for standing passengers, and know when passengers may be refused. A chauffeur's permit is required.

- ✓ Focus on driving and manage standing passengers safely per regulations
- ✓ A chauffeur's permit is required to operate a bus, taxi, limousine or ride-hailing vehicle

115.6 Operating a school bus

School bus operation has strict rules including vehicle inspection, brake maintenance, mirror use, seating passengers, school bus signs, and emergency equipment.

- ✓ School bus passengers must be seated while the bus is in motion
- ✓ Do not operate an unfit school bus; maintain brakes, mirrors and emergency equipment

115.7 Emergency equipment, exits and defect reporting

Passenger vehicles must carry emergency equipment and have accessible exits. Defects and breakdowns must be reported and unfit vehicles must not be operated.

- ✓ Maintain emergency equipment and keep emergency exits accessible
- ✓ Report defects and deficiencies and do not operate unfit vehicles

115.8 Transporting people with disabilities

Drivers must properly accommodate and safely transport people with disabilities, including assistance and securement where needed.

- ✓ Provide appropriate assistance and securement for passengers with disabilities
- ✓ Follow accessibility requirements when transporting people with disabilities

CHAPTER 116

Chapter 1: Getting your driver's licence — Heavy trailer endorsement

116.1 Applying for a heavy trailer endorsement

A heavy trailer endorsement (code 20) for a Class 4 or 5 licence allows towing trailers of any weight provided neither the truck nor trailer has air brakes. The process requires studying the guide, obtaining a learner's licence, supervised practice, and passing a road test including a pre-trip inspection.

- ✓ Heavy trailer endorsement (code 20) requires that neither truck nor trailer has air brakes
- ✓ The learner supervisor must be at least 19 and hold a Class 1, 2 or 3 licence, seated beside or immediately behind and to the right of the driver

CHAPTER 117

Specific Cargo Types

117.1 Transporting Logs and Poles

Logs/pole vehicles must be equipped with bunks, bolsters, stakes or other means of cradling logs (Standard section 29(1)). Under MVAR 35.05, stakes and extensions must form a 90-degree or lesser angle with the bunk cross member. Stakes must be secured by an engineer-approved method, by a pin and closed-loop stake lines of wire rope at least 22 mm diameter, or with properly welded gussets. Before entering a highway from a private road, the driver must inspect the vehicle, logs and securing devices and add securement if needed. Short logs loaded crosswise must use a device maintaining tension and automatically taking up slack as logs settle.

- ✓ Log vehicles must have bunks, bolsters or stakes to cradle logs
- ✓ Stakes must form a 90-degree or lesser angle with the bunk cross member
- ✓ Stake lines must use wire rope at least 22 mm in diameter
- ✓ Inspect logs and securement before entering a highway from a private road

117.2 Building Products Securement

Bundles of lumber, drywall, plywood and similar products are secured under Division 2 of Part 2 of the Standard. Side-by-side bundles must be in direct contact or prevented from shifting toward each other. Bundles blocked from lateral movement by stakes, blocking or friction devices require a minimum of two tiedowns over the top layer for bundles longer than 1.52 m. Multiple layers use combinations of tiedowns based on the 1.85 m height threshold; tiers over 1.85 m may need independent securement.

- ✓ Side-by-side bundles must be in contact or prevented from shifting toward each other
- ✓ Minimum two tiedowns over the top layer for bundles longer than 1.52 m
- ✓ Layer securement is determined using the 1.85 m height threshold
- ✓ Secure bundles per Division 2 of Part 2 of the Standard

117.3 Metal Coils and Paper Rolls

Metal coils weighing 2,268 kg or more (Division 3) transported eyes-vertical must be prevented from tipping forward, rearward and sideways using blocking, bracing, friction mats or tiedowns; coils with eyes crosswise or lengthwise must be secured against rolling. Paper rolls weighing 2,268 kg or more (Division 4) in sided vehicles use blocking, bracing, friction mats or tiedowns to prevent sliding, tipping or rolling, with additional securement for stacks and flatbed loads.

- ✓ Metal coil rules apply to shipments of 2,268 kg or more
- ✓ Vertical-eye coils must be prevented from tipping forward, rearward and sideways
- ✓ Paper roll rules apply to rolls of 2,268 kg or more
- ✓ Use blocking, bracing, friction mats or tiedowns to prevent sliding, tipping or rolling

117.4 Concrete Pipe and Boulders

Concrete pipe loaded crosswise on a flatbed (Division 5) must be grouped by size and secured separately, with front and rear pipes immobilized by blocking, wedges or vehicle structure, and tiedowns run through front and end pipes to hold inner pipes. Boulders over 5,000 kg or greater than two cubic metres (Division 9) must be placed flattest/largest side down, supported by at least two hardwood blocks or a crib, and secured with at least two chains; unstable-based boulders need additional tiedowns.

- ✓ Group concrete pipes by size and secure separately
- ✓ Immobilize front and rear pipes by blocking, wedges or vehicle structure
- ✓ Boulders over 5,000 kg or over 2 cubic metres follow Division 9 requirements
- ✓ Support boulders on at least two hardwood blocks and secure with at least two chains

117.5 Intermodal Containers

Intermodal containers on a container chassis must be secured with integral locking devices; chain may be used as an interim measure if the locking device is damaged or missing. On other vehicles, containers are secured by chains, wire ropes or integral locking devices fixed to all lower corners and/or crossed chains to all upper corners, with an aggregate working load limit of 50% of the container weight. Hook a chain around an entire corner link, not simply through it.

- ✓ Use integral locking devices for containers on a container chassis
- ✓ Aggregate working load limit of tiedowns must be 50% of container weight
- ✓ Fix devices to all lower corners and/or crossed chains to all upper corners
- ✓ Hook chains around an entire corner link, not just through it

117.6 Vehicles as Cargo

Under Division 7, vehicles under 4,500 kg GVW must be secured front and rear with a minimum of two tiedowns (a winch may serve as a front tiedown). Heavy vehicles over 4,500 kg require a minimum of four tiedowns, each with a working load limit of at least 2,268 kg, and additional tiedowns so the aggregate WLL is at least 50% of cargo weight. Accessory equipment must be lowered and secured. Flattened/crushed vehicles use containment walls and/or tiedowns of at least 2,268 kg WLL (not synthetic webbing), with equipment to prevent loose parts falling.

- ✓ Vehicles under 4,500 kg: minimum two tiedowns front and rear
- ✓ Vehicles over 4,500 kg: minimum four tiedowns each with WLL of at least 2,268 kg
- ✓ Aggregate WLL must be at least 50% of cargo weight
- ✓ Crushed vehicle tiedowns must not be synthetic webbing

117.7 Roll-On/Roll-Off and Hook-Lift Containers

These containers are usually carried on vehicles with integral securement systems. Where a front stop or lifting device is missing, damaged or incompatible, use manually installed tiedowns providing the same level of securement. Without an integral system the container must be blocked against forward movement, secured to the front to prevent sideways/vertical movement, and secured to the rear using a chassis-and-container tiedown, two lengthwise tiedowns, two hooks or equivalent mechanisms.

- ✓ Use integral securement systems where available (Division 8)
- ✓ Manually installed tiedowns must equal the securement of the component they replace
- ✓ Block container against forward movement and secure front and rear
- ✓ Secure rear with a tiedown, two lengthwise tiedowns, two hooks or equivalent

CHAPTER 118

Operating Emergency Vehicles

118.1 Emergency Vehicle Operation

Ambulance drivers use flashing red lights only when responding to an emergency call or transporting a patient. You may exceed posted speed limits and drive through red lights or past stop signs if you give other drivers appropriate warning using both lights and siren. Use caution because other drivers may not see or hear your warning. Consider highway conditions, traffic amount, and emergency seriousness when exceeding limits.

- ✓ Ambulance flashing red lights are used only when responding to an emergency call or transporting a patient
- ✓ You may exceed speed limits and drive through red lights or stop signs only if you give appropriate warning using both lights and siren
- ✓ Use caution at all times because other drivers may not see or hear your warning
- ✓ Consider highway condition and use, traffic amount, and the seriousness of the emergency when exceeding limits

CHAPTER 119

Chapter 2 — Brake Heat and Retarders

119.1 Brake Heat Limits and Brake Fade

In normal stopping, brake components heat to about 120°C, and can handle up to about 250°C under hard braking. Excessive hard braking builds heat beyond the components' ability to dissipate it. As brake drums heat, they expand away from the linings. Too much heat causes brake fade, brake damage, and/or brake failure—components or tires may catch fire.

- ✓ Brake components operate best at around 120°C and should not exceed 250°C
- ✓ Brake fade occurs when overheated brakes stop working properly, requiring longer stopping distance or failing to stop
- ✓ As brake drums heat up, they expand away from the brake linings reducing braking effectiveness

119.2 Retarders and Their Use

Retarders provide auxiliary slowing for controlling speed on long downgrades without the main braking system, saving the brakes for emergencies. The four types are engine, exhaust, hydraulic driveline, and electric driveline retarders. Engine retarders are more efficient at higher rpm and lower speed—select the right gear before starting down a hill. Be cautious on slippery surfaces as some can lock drive wheels, cause loss of control, or jackknife.

- ✓ The four main types of retarders are engine, exhaust, hydraulic driveline, and electric driveline
- ✓ Engine retarders are most effective at higher rpm with the transmission in a low gear
- ✓ Select your gear before starting down a hill, not on the downgrade
- ✓ Use caution with retarders on slippery surfaces as they can cause drive wheel lockup and jackknifing

CHAPTER 120

Chapter 6 — Vehicle Requirements and Emergency Equipment

120.1 Emergency Equipment and Exits

Every commercial passenger vehicle with seating capacity over 10 including the driver must have one first-aid kit (meeting WorkSafe BC guidelines), one spare tire, and at least one fire extinguisher. The carrier is responsible for ensuring this equipment is available and working. Vehicles seating more than 12 including driver must have an emergency exit door or emergency windows. Vehicles seating more than 10 passengers must carry warning devices such as flags and flares.

- ✓ Vehicles seating over 10 including driver need a first-aid kit, spare tire and fire extinguisher
- ✓ The carrier is responsible for ensuring emergency equipment is available and working
- ✓ Vehicles seating more than 12 including driver need an emergency exit door or windows
- ✓ Vehicles seating more than 10 passengers must carry flags and flares

120.2 Inside Lights Requirement

Public passenger vehicles with seating capacity of more than 12 occupants including the driver must have interior lights that illuminate the passenger aisle behind the driver. These lights must be on between sunset and sunrise for safe passenger movement. Passenger vehicles must also have a light at each entrance that turns on when the door opens.

- ✓ Vehicles seating more than 12 including driver need aisle lights behind the driver
- ✓ Inside lights must be on between sunset and sunrise
- ✓ A light at each entrance must turn on when the door opens

120.3 Vehicle Cleanliness and Inspection

Your bus or taxi must be clean and sanitary at all times. If your vehicle is licensed in B.C. with a passenger transportation plate, it must display a valid commercial vehicle inspection decal, and you must carry the certificate in the vehicle.

- ✓ Buses and taxis must be clean and sanitary at all times
- ✓ A vehicle with a passenger transportation plate must display a valid inspection decal and carry the certificate

120.4 Defects, Breakdowns and Reporting

You must end the trip if your vehicle develops a problem that could endanger passenger safety or comfort — fix the problem before continuing. If a crash or breakdown prevents continuing, make immediate arrangements to transport passengers with minimal delay. Report any defect or deficiency that could make the vehicle unsafe in writing to your carrier at the time you find it or by the end of that day.

- ✓ End the trip if a problem could endanger passenger safety or comfort
- ✓ Make immediate arrangements to transport passengers after a breakdown
- ✓ Report any unsafe defect in writing to the carrier by end of that day

120.5 Fuelling Passenger Vehicles

Don't refuel while the engine is running, the on-board radio is transmitting, or when any open flame is present. Keep the fuel nozzle in contact with the filler pipe to ground the connection; if there's a ground strap, connect it to the filler pipe.

- ✓ Don't refuel with the engine running, radio transmitting, or open flame present
- ✓ Keep the nozzle in contact with the filler pipe to ground the connection

120.6 Baggage Loading Requirements

You're responsible for all baggage brought into your vehicle and must load it safely so it doesn't interfere with passengers boarding or fall on any passenger. Cargo in buses must be carried in properly designed overhead racks, stowed under seats against a barrier, in a separate enclosed compartment, or on a passenger's lap. Baggage must not block any aisle or exit, obscure the driver's view, obstruct emergency equipment, or interfere with the driver's movement.

- ✓ The driver is responsible for safe loading of all baggage
- ✓ Baggage/cargo must not block or partially block any aisle or exit
- ✓ Baggage must not obscure the driver's view or obstruct emergency equipment

CHAPTER 121

Chapter 7: Hours of service requirements

121.1 National Safety Code and hours of service

Hours of service rules under the National Safety Code limit driving and on-duty time to reduce fatigue. Drivers must track on-duty time, off-duty time and daily limits.

- ✓ Hours of service are governed by the National Safety Code
- ✓ Drivers must track on-duty and off-duty time
- ✓ Daily driving and on-duty limits must not be exceeded

121.2 Daily limits and compliance check

Compliance is checked using a three-point daily check covering work shift limits, daily driving hours, and cycles. Drivers must ensure they meet all daily limits before and during driving.

- ✓ Use the three-point check for daily hours of service compliance
- ✓ Work shift and daily driving hours have specific limits
- ✓ Daily cycles limit total accumulated on-duty time

121.3 Deferring off-duty time and reset

Drivers may defer up to two hours of off-duty time from one day to the next under specific conditions. A reset provision restarts the cycle after sufficient off-duty time.

- ✓ A maximum of two hours of off-duty time may be deferred to the next day
- ✓ The reset provision requires sufficient consecutive off-duty time
- ✓ Deferral rules must be documented on the record of duty status

121.4 Sleeper berth and personal use

Sleeper berth provisions allow drivers to split required off-duty time. A personal use exemption applies when the vehicle is used for personal reasons under set conditions.

- ✓ Sleeper berth time can be split according to specific rules
- ✓ Personal use of a commercial vehicle is subject to daily distance and condition limits

121.5 Electronic Logging Devices and RODS

Drivers must maintain a Record of Duty Status, typically using Electronic Logging Devices (ELDs), or other permitted forms. Drivers within 160 km of the home terminal may qualify for exemptions.

- ✓ Drivers must maintain an accurate Record of Duty Status
- ✓ ELDs are the standard method for recording duty status
- ✓ Drivers within 160 km of home terminal may be exempt from log requirements

121.6 National Safety Code hours of service

Commercial drivers are governed by National Safety Code hours of service rules that limit driving and on-duty time and require off-duty rest. Understanding on-duty, off-duty and day definitions is essential.

- ✓ Hours of service rules limit daily driving and on-duty time and require off-duty rest
- ✓ On-duty time, off-duty time and 'day' have specific definitions under the National Safety Code

121.7 Daily limits and work shift compliance

There is a simple three-point daily check for compliance covering work shift limits and daily hours within cycles. Drivers must not exceed these limits.

- ✓ Comply with daily driving and on-duty limits and work shift maximums
- ✓ Follow daily hours limits within the applicable cycle

121.8 Deferring off-duty time and reset provision

Drivers may defer a limited amount of off-duty time from one day to the next under specific conditions. A reset provision allows the cycle to restart after sufficient off-duty time.

- ✓ A driver may defer up to two hours of off-duty time from one day to the next under conditions
- ✓ The reset provision requires a minimum off-duty period to restart the cycle

121.9 Sleeper berth and personal use exemption

Drivers using a sleeper berth may split required off-duty time under specific rules. A personal use exemption allows limited personal driving under conditions.

- ✓ Sleeper berth time may be split according to specific hours of service provisions
- ✓ The personal use exemption allows limited personal driving under defined conditions

121.10 Electronic Logging Devices and Records of Duty Status

Drivers must record duty status using an Electronic Logging Device (ELD) or other permitted Record of Duty Status. Drivers within 160 km of home terminal may qualify for exemptions.

- ✓ Maintain a Record of Duty Status using an ELD or other permitted form
- ✓ Drivers operating within 160 km of the home terminal may be exempt from keeping a log

121.11 Driving in other jurisdictions

Different hours of service rules apply when driving north of the 60th parallel or into the United States. Drivers must know which rules apply where.

- ✓ Different hours of service rules apply north of the 60th parallel
- ✓ U.S. hours of service rules apply when driving into the United States

CHAPTER 122

Chapter 3 — Braking Systems and Warning Devices

122.1 Brake failure warning and dual braking systems

All vehicles using air or vacuum brakes must have warning devices that alert the driver if the air-pressure or vacuum system fails. Every motor vehicle must have at least two separate braking systems, one of which must be mechanical (e.g., a ratchet and pawl or spring brake). If the foot (primary) brakes fail, the driver must use the emergency (mechanical) brake, which needs more time and distance to stop.

- ✓ Air or vacuum brake vehicles must have a warning device for system failure
- ✓ Every vehicle must have at least two separate braking systems, one mechanical
- ✓ The emergency (mechanical) brake requires more time and distance to stop

122.2 Disabled vehicle warning devices

Approved warning devices are required for vehicles seating more than 10 passengers, and commercial vehicles with overall or load width over 2.3 m. Move a disabled vehicle as far off the road as possible. Place warning devices about 30 m ahead and 30 m behind. When parked in the dark, at least two warning devices are required. In daylight use two red flags at least 30 cm by 30 cm or two approved daylight devices; at night use flares, fuses, reflectors and red lanterns.

- ✓ Place warning devices about 30 m ahead and 30 m behind a disabled vehicle
- ✓ In daylight use two red flags at least 30 cm by 30 cm or two approved daylight devices
- ✓ At night at least two warning devices such as flares, fuses, reflectors or red lanterns are required

122.3 Flashing lights on motor vehicles

Red flashing lights are used only on emergency vehicles; blue only on police vehicles (a police vehicle has both red and blue); amber flashing lights are used on construction, towing, snow-removal, sanding, pilot cars and permitted oversize vehicles. A permit from Commercial Vehicle Safety and Enforcement is required before mounting amber flashing lights.

- ✓ Red flashing lights are only for emergency vehicles; blue only for police
- ✓ A permit from Commercial Vehicle Safety and Enforcement is required to mount amber flashing lights

CHAPTER 123

Difficult and Special Loads

123.1 Transporting Dangerous Goods

Dangerous goods present serious hazards to handlers, the public and the environment. People handling dangerous goods have significant legal responsibilities and must be properly trained and certified. All shipping documents must be complete, correct and readily available in the cab, accompanying the shipment. Any incident related to a dangerous goods cargo must be reported immediately.

- ✓ Handlers of dangerous goods must be properly trained and certified
- ✓ Shipping documents must be complete, correct and readily available in the cab
- ✓ Documents must accompany the dangerous goods shipment
- ✓ Report any dangerous goods incident immediately

123.2 Transporting Livestock and Hanging Meat

Livestock can move around in a trailer, making turns difficult and risking collisions or animal injury. With less than a full load, use false bulkheads to keep animals bunched. Reduce speed on curves because animals lean, shifting the centre of gravity and risking rollover. Hanging meat sways and has a high centre of gravity — secure suspended items so they cannot shift or sway, reduce speed on sharp curves, and take extra care on on-ramps and off-ramps.

- ✓ Use false bulkheads to bunch livestock when less than a full load
- ✓ Reduce speed on curves — leaning animals shift the centre of gravity
- ✓ Secure hanging meat so it cannot shift or sway
- ✓ Take extra care on ramps with high centre-of-gravity loads

123.3 Liquid and Dry Bulk Tank Loads

Liquid or dry bulk tank loads often have a high centre of gravity, increasing rollover danger. These loads shift, and if not baffled they surge forward, backward and side to side. Reduce speed on curves and sharp turns and be especially careful on stops and starts.

- ✓ Bulk tank loads have a high centre of gravity increasing rollover risk
- ✓ Unbaffled liquid loads surge in all directions
- ✓ Reduce speed on curves and sharp turns
- ✓ Be especially careful on stops and starts

CHAPTER 124

Towing and Combination Vehicles

124.1 Towing, Hitches and Trailer Coupling

Combination vehicles use hitches such as the pintle hitch and equipment like pole trailers. Proper coupling and uncoupling is essential to prevent trailer separation. Understand whipping, rollovers and parking of trailers.

- ✓ Use the correct hitch (e.g., pintle hitch) properly rated for the load
- ✓ Couple and secure trailers correctly to prevent separation
- ✓ Understand whipping and rollover risks when towing

124.2 Trailer Stability and Parking

Trailers can whip and roll over, especially when improperly loaded or driven too fast in turns. Park trailers safely and chock as needed. Recreational and semi-trailers have specific licence requirements.

- ✓ Reduce speed in curves to prevent trailer rollover
- ✓ Load trailers to keep the centre of gravity low and balanced
- ✓ Park and secure trailers safely, using chocks where needed

CHAPTER 125

Personal Safety

125.1 Carbon Monoxide Poisoning

Carbon monoxide is odourless, colourless, tasteless and in every vehicle's exhaust. It can seep into the driving compartment causing dizziness, drowsiness, unconsciousness and death. Check the exhaust system, never run an engine in a closed garage, and don't follow too closely. If you feel dizzy or drowsy, pull over and get fresh air.

- ✓ Carbon monoxide is odourless, colourless and tasteless and present in all exhaust
- ✓ Never run your engine in a closed garage
- ✓ If you feel dizzy or drowsy, pull over, stop, and get fresh air
- ✓ Check the exhaust system to ensure fumes aren't entering the cab

125.2 Seatbelts

Seatbelts save lives and reduce the risk of striking the interior, colliding with passengers, or ejection. Correct use of a lap and shoulder belt reduces the likelihood of death by about 50 per cent. You cannot hold yourself back in a collision. Some drivers who get in and out frequently may be exempt at 40 km/h or less.

- ✓ Place the lap belt low over the pelvis, not the stomach, and keep it snug
- ✓ Ensure the shoulder strap is snug across the chest; never under the arm or behind the back
- ✓ Correct lap-and-shoulder belt use reduces death likelihood by about 50 per cent
- ✓ Some frequent in-and-out drivers may be exempt when driving at 40 km/h or less

125.3 Airbags and Head Restraints

Most large trucks lack airbags and head restraints. Even with airbags you must wear a seatbelt, as airbags can injure unbelted occupants. Keep at least 25 cm between breastbone and the steering wheel airbag. Adjust head restraints so the top is at least as high as the top of your head and less than 10 cm from the back of your head.

- ✓ Wear a seatbelt even if the vehicle has airbags
- ✓ Keep at least 25 cm (10 in) between breastbone and steering wheel airbag
- ✓ Head restraint top should be at least as high as the top of your head and less than 10 cm from the back of your head

125.4 Cellphones and Electronic Devices

All B.C. drivers are prohibited from using hand-held electronic devices while driving, including calls, texting, e-mail, gaming, and manually programming GPS. GLP drivers are also restricted from hands-free devices. Non-GLP (including commercial) drivers may use hands-free devices and single-button-activated devices in a fixed location, plus two-way radios and mobile data terminals. Restrictions don't apply to calling 9-1-1.

- ✓ Hand-held electronic devices are prohibited while driving for all B.C. drivers
- ✓ GLP drivers are also restricted from hands-free devices
- ✓ Non-GLP drivers may use hands-free devices, two-way radios and mobile data terminals
- ✓ Restrictions don't apply when calling 9-1-1 to report an emergency

125.5 Impairment and Penalties

Alcohol, marijuana, illicit drugs and some prescription/stay-awake drugs impair driving. Penalties apply under the Motor Vehicle Act and Criminal Code. You may be prohibited if a police officer considers your ability affected even without BAC over .08 or BDC of 2 nanograms THC. Criminal Code penalties escalate for repeat offences and include lifetime prohibitions and jail. Police can impound vehicles for various offences.

- ✓ Penalties apply for BAC over .08, BDC of 2 nanograms+ THC, or refusing to provide a sample
- ✓ A police officer can prohibit you even without reaching the legal BAC/BDC limits
- ✓ Police can impound a vehicle for seven days (up to 30/60 for repeat offenders) for driving unlicensed, suspended, excessive speeding (40 km/h+ over), or stunt driving
- ✓ Vehicle owners are responsible for ensuring only licensed drivers use their vehicles

125.6 Prescribed Drugs, Fatigue and Emotions

Antihistamines, sedatives, tranquilizers and some cold remedies cause drowsiness; read labels and check with a pharmacist. There's no safe substitute for proper rest; stay-awake tablets don't reduce mental fatigue. Follow National Safety Code hours of service. Emotions like road rage or distraction impair focus.

- ✓ Read medication labels for side effects that impair driving and consult a pharmacist/physician
- ✓ There's no safe substitute for proper rest; pull over and sleep if fatigued
- ✓ Follow National Safety Code hours of service regulations and get enough sleep every 24 hours

125.7 Fire Prevention

To prevent fires: never start a vehicle with a fuel leak (repair and clean up spills properly); shut off engines when refuelling; keep the fuel nozzle in contact with the filler pipe to ground the connection; connect the ground strap if equipped. Recommended safety equipment includes flags/flares, a fire extinguisher, and a first aid kit.

- ✓ Never start a vehicle with a fuel leak; repair it and clean up the spill
- ✓ Shut off engines when refuelling
- ✓ Keep the fuel nozzle in contact with the filler pipe to ground the connection
- ✓ Carry recommended safety equipment: flares, fire extinguisher, and first aid kit

CHAPTER 126

Chapter 9 — Air Brake Adjustment Misconceptions

126.1 Common Brake Adjustment Misconceptions

Several dangerous misconceptions exist. Checking adjustment from the cab via pressure drop doesn't work because modern reservoirs are large and gauges too coarse. A 90-degree slack adjuster angle depends more on pushrod length than adjustment. A clockwise turn doesn't always set up manual slack adjusters — direction depends on orientation and varies between tandem axles. There is no reliable substitute for physically checking brake adjustment.

- ✓ Brake adjustment cannot be reliably checked from the cab by watching for pressure drop
- ✓ A 90-degree slack adjuster angle is not a reliable indicator of correct adjustment
- ✓ Direction to set up a manual slack adjuster can be clockwise or counter-clockwise depending on orientation
- ✓ There's no reliable substitute for physically checking brake adjustment

CHAPTER 127

Chapter 6 — Operating a School Bus

127.1 School Bus Brake and Defect Requirements

Test the brakes on your school bus every day and never operate it unless the brakes are safe. Never transport passengers on a school bus that is defective in any way — keeping passengers safe is your first responsibility. Ensure all passengers are off and the engine is off before refuelling.

- ✓ Test school bus brakes every day
- ✓ Never operate a school bus with unsafe brakes or any defect
- ✓ Ensure all passengers are off and engine is off before refuelling

127.2 School Bus Loading and Flashing Red Lights

Before opening doors, ensure the vehicle is fully stopped, there are at least three metres of road on the left side, other drivers can see the bus from at least 60 metres in both directions, and passengers enter/leave from the right side only. School buses have alternating flashing red lights, swing-out stop signs and may have amber lights. Use flashing red lights whenever passengers are crossing the road. All drivers must stop when a school bus displays flashing red lights. New buses may have a crossing control arm. Turn off flashing lights and draw in the stop sign once passengers are safe.

- ✓ Ensure at least three metres of road on the left before loading/unloading
- ✓ Other drivers must be able to see the bus from at least 60 metres each direction
- ✓ Passengers enter and leave from the right side only
- ✓ All drivers must stop when a school bus displays flashing red lights

127.3 School Bus Compliance and Unfit Vehicles

Requirements for operating a bus also apply to school buses, which must comply with all parts of the MVAR relating to school buses. If a mechanical inspector or peace officer finds a school bus unfit, you cannot operate it as a school bus until the defect is fixed. Rental buses temporarily replacing a school bus must comply with school bus regulations, and you must notify Commercial Vehicle Safety and Enforcement of the change as soon as possible.

- ✓ School buses must comply with all school bus provisions of the MVAR
- ✓ An unfit school bus cannot be operated until defects are fixed
- ✓ Rental replacement buses must comply and CVSE must be notified

127.4 School Bus Signs and Mirrors

All school buses must display two 'School Bus' signs with letters at least 20 cm high, black on a yellow background, mounted at the front and rear (rear sign immediately above or below the rear window). Every new school bus must have two sets of rear-view mirrors on each side, a mirror giving a good view of the entrance door, and a convex front mirror to see the roadway immediately in front. Mirrors must be properly adjusted.

- ✓ Two 'School Bus' signs required, letters at least 20 cm high, black on yellow
- ✓ Signs mounted at front and rear, rear sign above or below the rear window
- ✓ New school buses need side rear-view mirrors, an entrance door mirror and a convex front mirror

127.5 School Bus Passengers Must Be Seated

Passengers are not allowed to stand on a school bus. Ensure all passengers are seated before moving the bus. The floor of a school bus must be washed with a disinfectant solution at least once a week.

- ✓ Passengers may not stand on a school bus
- ✓ Ensure all passengers are seated before moving
- ✓ Wash the school bus floor with disinfectant at least once a week

CHAPTER 128

Chapter 8: Air brakes

128.1 Why air brakes and compressed air

Air brakes use compressed air to apply braking force, offering advantages for heavy vehicles. Compressed air stores energy that is used to actuate the brakes through force-multiplying components.

- ✓ Air brakes use compressed air to actuate braking force
- ✓ Compressed air stores energy released when brakes are applied
- ✓ Air brakes are suited to heavy vehicles due to their force-multiplying capacity

128.2 Air brake chamber and force multipliers

Air brake chambers convert air pressure into mechanical force. Leverage and air pressure multiply braking force. Long stroke and regular stroke chambers differ in adjustment limits.

- ✓ Air brake chambers convert air pressure into mechanical braking force
- ✓ Leverage and air pressure multiply braking force through the slack adjuster
- ✓ Long stroke and regular stroke chambers have different maximum stroke limits

128.3 Compressor and governor

The compressor supplies compressed air to the system through intake and compression strokes. The governor controls when the compressor loads (cut-in) and unloads (cut-out) to maintain system pressure.

- ✓ The compressor supplies compressed air via intake and compression strokes
- ✓ The governor controls compressor cut-in and cut-out pressures
- ✓ The governor maintains reservoir pressure within a set range

128.4 How air brakes apply and release

When brakes are applied, air flows to the brake chambers to apply braking force; when released, air is exhausted from the chambers. Understanding the flow is essential for diagnosing brake operation.

- ✓ Applying the brakes sends air to the chambers to create braking force
- ✓ Releasing the brakes exhausts air from the chambers
- ✓ Air flow direction determines whether brakes apply or release

128.5 Dual air brake systems

Dual air brake systems have separate primary and secondary circuits so a failure in one still allows braking with the other. Components include supply, primary and secondary reservoirs and a one-way check valve.

- ✓ Dual systems have separate primary and secondary circuits for redundancy
- ✓ A one-way check valve protects reservoirs during a leak or failure
- ✓ A failure in one circuit still allows braking with the other circuit

128.6 Low-air warning and gauges

Reservoir pressure gauges display system pressure, and a low-air warning device alerts the driver when pressure falls below a safe level (typically about 55 psi).

- ✓ A low-air warning device activates when pressure drops to about 55 psi
- ✓ Reservoir pressure gauges show primary and secondary system pressure
- ✓ Do not drive if the low-air warning is active

128.7 Compressed air and why air brakes are used

Air brakes use compressed air to multiply the driver's braking effort, allowing heavy vehicles to be stopped effectively. Compressed air is air squeezed into a smaller space, storing energy.

- ✓ Air brakes use compressed air to multiply force and stop heavy vehicles
- ✓ Compressed air stores energy that is used to apply the brakes

128.8 Air brake chamber and force multiplication

The air brake chamber converts air pressure into mechanical force, and leverage through the slack adjuster and cam multiplies that force. Long stroke and regular stroke chambers differ in effective travel.

- ✓ The brake chamber converts air pressure into mechanical force to apply the brakes
- ✓ Long stroke and regular stroke chambers have different maximum allowable pushrod travel

128.9 S-cam foundation brakes

S-cam foundation brakes use the rotation of an S-shaped cam to force the brake shoes against the drum. The slack adjuster transfers chamber force to the cam.

- ✓ The S-cam rotates to push brake shoes against the drum when brakes are applied
- ✓ The slack adjuster connects the chamber pushrod to the S-cam and can adjust brake clearance

128.10 Compressor and governor operation

The compressor builds air pressure through intake and compression strokes, and the governor controls when the compressor loads and unloads to maintain system pressure within a set range.

- ✓ The compressor builds air pressure and the governor controls cut-in and cut-out pressures
- ✓ The governor unloads the compressor at cut-out pressure and loads it at cut-in pressure

128.11 Reservoirs and foot valve

Reservoirs store compressed air for braking, and the foot valve (application valve) controls how much air is delivered to the brakes based on pedal pressure.

- ✓ Reservoirs store compressed air to supply the brake system
- ✓ The foot valve meters air to the brakes in proportion to how far the pedal is pressed

128.12 How air brakes work — applied and released

When the brakes are applied, air flows to the brake chambers to push the shoes against the drums; when released, air is exhausted and springs return the shoes. This is the basic operating cycle.

- ✓ Applying the brakes sends air to the chambers to push shoes against drums
- ✓ Releasing the brakes exhausts air and allows return springs to retract the shoes

128.13 Dual air brake system components

Dual air brake systems have separate primary and secondary circuits fed from a supply reservoir, providing redundancy so braking remains if one circuit fails. A one-way check valve prevents air loss.

- ✓ A dual air brake system has separate primary and secondary circuits for redundancy
- ✓ A one-way check valve prevents loss of air from one circuit if another fails

128.14 Pressure gauges and low-air warning device

Reservoir pressure gauges show system air pressure, and a low-air warning device alerts the driver when pressure drops to an unsafe level. These are essential safety indicators.

- ✓ Reservoir pressure gauges display primary and secondary system pressures
- ✓ The low-air warning device must activate when pressure drops to about 55 psi or below

128.15 Spring parking brakes

Spring parking brakes use powerful springs to apply the brakes when air pressure is released, providing a fail-safe park and emergency braking function.

- ✓ Spring parking brakes apply automatically when air pressure is released or lost
- ✓ Air pressure holds the spring parking brakes off during normal driving

128.16 Tractor-trailer air brake systems

Tractor-trailer air brake systems include relay emergency valves or spring parking brakes on the trailer, and operate in charging, applying and emergency (dynamited) states. Proper charging is required before moving.

- ✓ The trailer must be fully charged with air before the trailer brakes will release
- ✓ If the trailer air supply is lost, the trailer emergency brakes apply (dynamite)

128.17 Tractor protection and trailer air supply valve

The tractor protection system, including the trailer air supply valve and hand valve, protects the tractor's air supply if a trailer breakaway or major air leak occurs.

- ✓ The tractor protection valve protects the tractor air supply during a trailer breakaway or major leak
- ✓ The trailer air supply valve controls air to the trailer and applies trailer brakes when closed

128.18 Quick release and relay valves

The quick release valve speeds up the release of air from the brake chambers, and the relay valve speeds application and release of the rear brakes by using a nearby air source.

- ✓ The quick release valve speeds exhausting of air to release the brakes faster
- ✓ The relay valve speeds up brake application and release on rear axles

128.19 Compounding of brakes

Compounding occurs when the spring parking brake and service brake are applied simultaneously, adding forces that can damage brake components. Drivers must avoid this condition.

- ✓ Avoid applying the service brake while the spring parking brake is applied to prevent compounding
- ✓ Compounding of brake forces can damage the brake components

128.20 Manual release of spring parking brakes

Spring parking brakes can be manually caged (released) using the release bolt when there is no air pressure, allowing the vehicle to be moved for repairs.

- ✓ Spring parking brakes can be manually caged/released using the release bolt
- ✓ Manually releasing spring brakes removes the parking and emergency braking capability

CHAPTER 129

Chapter 3 — Personal Safety

129.1 Cellphones and electronic devices

All B.C. drivers are prohibited from using hand-held electronic devices while driving, including holding phones, texting/emailing, gaming, and manually programming a GPS. GLP drivers are also restricted from hands-free devices. Non-GLP, including commercial drivers, may use hands-free devices and single-button-activated devices in a fixed location, plus pre-programmed/voice GPS, two-way radios and mobile data terminals. Restrictions don't apply to calling 9-1-1.

- ✓ All drivers are prohibited from using hand-held electronic devices while driving
- ✓ Non-GLP commercial drivers may use hands-free and single-button devices in a fixed location
- ✓ Restrictions do not apply when calling 9-1-1 to report an emergency

129.2 Carbon monoxide poisoning

Carbon monoxide is odourless, colourless, tasteless and difficult to detect, and is in every vehicle's exhaust. It can make you dizzy, drowsy or unconscious and can kill. Check the exhaust system so fumes don't enter the cab. Never run an engine in a closed garage. Don't follow too closely and keep a safe distance when stopped. If you feel dizzy or drowsy, pull over, stop, and get fresh air.

- ✓ Never run your engine in a closed garage
- ✓ Check the exhaust system to ensure fumes don't enter the driver's compartment
- ✓ If you feel dizzy or drowsy, pull over, stop and get fresh air

129.3 Seatbelts and correct adjustment

Seatbelts save lives and reduce ejection and injury risk. You cannot hold yourself back in a crash regardless of strength. Some frequent-stop workers may be exempt when driving at 40 km/h or less. Adjust correctly: place the lap belt low over the pelvis (snug, not over the stomach), keep the shoulder strap snug across the chest, never under the arm or behind the back, and remove all slack.

- ✓ Place the lap belt low over the pelvis, snug, not over the stomach
- ✓ Keep the shoulder strap snug across the chest, never under the arm or behind the back
- ✓ Some frequent-stop drivers may be exempt only at 40 km/h or less

129.4 Airbags and head restraints

Most large trucks aren't equipped with airbags and head restraints. Even with airbags, wear your seatbelt, as airbags can injure unbelted occupants. Allow at least 25 cm between your breastbone and the airbag in the steering wheel. Adjust head restraints so the top is at least as high as the top of your head and less than 10 cm from the back of your head to prevent neck injury.

- ✓ Even with airbags, always wear your seatbelt
- ✓ Allow at least 25 cm between your breastbone and the steering wheel airbag
- ✓ Set the head restraint top at least as high as the top of your head and within 10 cm of your head

CHAPTER 130

Chapter 2 — Braking Techniques and Conditions

130.1 Safe Braking Technique

Bring your vehicle to a stop by squeezing gradually and firmly on the brake pedal. Just before a full stop, reduce pressure to prevent jerking back. To stop safely, ensure brakes are correctly adjusted, load is balanced, and tires are in good condition and properly inflated. Travel at a speed allowing you to see a safe distance ahead and maintain safe following distance.

- ✓ Reduce brake pedal pressure just before a full stop to prevent the vehicle jerking back
- ✓ Make gradual stops to give the driver behind notice you're slowing
- ✓ You can be fined as much as $2,000 for operating with brakes not adjusted correctly or not performing adequately

130.2 Braking on Icy Roads

On icy roads, use extremely light brake pressure to control speed and prevent wheel lockup. A slowly revolving wheel is more effective than a locked skidding wheel. ABS-equipped vehicles require a different technique. Use snow tires and/or chains. Mount chains at designated chain-up areas—don't wait until you spin out. Don't deflate tires to install chains, check tightness at first safe opportunity, and reduce speed with chains.

- ✓ Use extremely light brake pressure on icy roads to prevent wheel lockup
- ✓ A slowly revolving wheel is more effective than a locked wheel skidding on ice
- ✓ Mount tire chains at designated chain-up areas before steep hills, not on a hill
- ✓ Do not deflate tires to install chains, and reduce speed when driving with chains

CHAPTER 131

Passenger Vehicle Operation

131.1 Bus, Taxi and Limousine Operation

Drivers of buses, taxis and limousines must follow rules on smoking and alcohol, passenger refusal, transporting disabled passengers, and chauffeur permits. Buses have right-of-way rules and following distance considerations.

- ✓ Smoking and alcohol are prohibited while operating passenger vehicles
- ✓ Accommodate disabled passengers as required
- ✓ Obtain a chauffeur permit where required

131.2 School Bus Operation

School bus operators must follow specific requirements for mirrors, signs, passenger management, and safety equipment. Class 2 or 4 unrestricted licences are required for certain buses.

- ✓ Use and adjust school bus mirrors correctly
- ✓ Follow school bus sign and warning light procedures
- ✓ Manage passenger safety per school bus regulations

131.3 Emergency Vehicle and Special Vehicle Operation

Emergency vehicles may use amber flashing lights (with permit) and have specific operating rules. Special activity buses and special vehicles have distinct definitions and licence requirements.

- ✓ Amber flashing lights require a permit
- ✓ Follow specific rules when operating emergency vehicles
- ✓ Know licence requirements for special activity buses and special vehicles

CHAPTER 132

Chapter 2 — Downgrades and Hills

132.1 Descending Downgrades Safely

Highest brake temperatures occur when braking from highway speeds on long downgrades or from repeated brake use without cooling time. Almost all brake failures and runaway crashes are from overdriving the brakes' ability to handle heat—poor speed control. Be in a lower gear going down than climbing up. Never shift to a higher gear on a downgrade unless speed can be controlled with a retarding device or engine compression.

- ✓ Use a lower gear to descend a hill than you used to climb it
- ✓ Never shift to a higher gear on a downgrade unless speed can be controlled by a retarding device or engine compression
- ✓ Almost all brake failures and runaway crashes are caused by overdriving the brakes' ability to handle heat

132.2 Speed Control on Highway Downgrades

Follow truck advisory speed limits. Use four-way flashers when driving slowly downhill. Stay in the far right lane. Select a safe speed for weight, length, grade steepness, weather, and conditions, use an appropriate low gear, and use the retarding device. If speed increases, apply brakes hard enough to reduce speed 10-15 km/h (cold brakes), downshift to a lower main gear (not the splitter valve), and keep the vehicle in gear all the way down.

- ✓ If speed increases on a downgrade, apply brakes hard enough to reduce speed by 10 to 15 km/h
- ✓ Do not use the splitter valve for shifting on a downhill; downshift to a lower main gear
- ✓ Keep your vehicle in gear all the way down the hill
- ✓ Use four-way flashers and stay in the far right lane when descending slowly

132.3 Water on Roadways and Runaway Lanes

Water reduces braking efficiency. Avoid deep water when possible. If driving through water, cover the brake pedal and apply a slight drag to reduce water entering the brakes. Reduce speed before driving through water pools. After water, dry brakes by applying slight pressure for a short distance. Runaway lanes on downhill grades help slow/stop vehicles with brake failure and should be used only to control speed or stop.

- ✓ Apply a slight drag on the brakes when driving through water to reduce water entering the brake drums and shoes
- ✓ Dry out brakes after water by applying slight pressure for a short distance
- ✓ Runaway lanes should only be used to control speed or stop, not for any other purpose

CHAPTER 133

Chapter 3 — Impairment and Fatigue

133.1 Impaired driving laws and penalties

Alcohol, marijuana, illicit drugs and some prescribed or stay-awake drugs can impair your ability to drive safely. Penalties exist under B.C.'s Motor Vehicle Act and the Criminal Code. Immediate, severe penalties apply if you drive with a certain amount of alcohol/drugs or refuse a breath sample, and repeat offences are worse. A police officer may prohibit you even without a BAC over .08 or 2 ng THC if they consider your ability affected.

- ✓ Penalties apply for BAC over .08, THC of 2 ng or more, or refusing to provide a sample
- ✓ Police can prohibit you even without exceeding legal limits if ability appears impaired
- ✓ Criminal Code convictions can include lifetime prohibitions and jail

133.2 Other costs and vehicle impoundment

Impaired driving convictions can deny insurance claims, raise rates, prevent certain jobs, and cause travel problems to the U.S. and Mexico. Police can impound your vehicle for driving unlicensed, suspended/prohibited, excessive speeding (40 km/h or more over the limit), or street racing/stunt driving — seven days initially, escalating to 30 or 60 days for repeat offenders. Owners are responsible for ensuring only licensed drivers use their vehicles.

- ✓ Vehicles can be impounded for unlicensed, prohibited, excessive speeding or stunt driving
- ✓ Impoundment is seven days initially, up to 30 or 60 days for repeat offenders
- ✓ Owners are responsible for ensuring only licensed drivers use their vehicles

133.3 Fatigue, drugs and emotions

Prescribed and over-the-counter drugs (antihistamines, sedatives, tranquilizers, cold remedies) can cause drowsiness — read labels and check with a pharmacist or physician. Stay-awake tablets don't reduce mental fatigue. There's no safe substitute for rest; pull over and sleep if fatigued and follow National Safety Code hours of service. Emotions like road rage and distractions prevent focus — stay calm and focused.

- ✓ Read medication labels for side effects and consult a pharmacist or physician
- ✓ There's no safe substitute for proper rest — pull over and sleep if fatigued
- ✓ Follow National Safety Code hours of service and get enough sleep every 24 hours

CHAPTER 134

Chapter 6 — Operating Emergency Vehicles

134.1 Operating an Emergency Vehicle

Ambulance drivers use flashing red lights to warn drivers when they need right-of-way, used only when responding to an emergency call or transporting a patient. You may drive faster than posted limits and through red lights or stop signs if you give proper warning using both flashing red lights and siren. Use caution because others may not see or hear your warning. When exceeding limits or driving through signals, consider the condition and use of the highway, the amount of traffic, and the seriousness of the emergency.

- ✓ Ambulance flashing red lights are used only for emergency calls or transporting a patient
- ✓ Emergency vehicles may exceed speed limits and pass red lights/stop signs only with proper warning using both lights and siren
- ✓ Consider highway conditions, traffic and emergency seriousness before exceeding limits

CHAPTER 135

Signs, Signals and Road Markings

135.1 Traffic Signs and Signals

Drivers must recognize regulatory, warning, construction, information/destination, lane use, turn control, parking, reserved lane, railway, and school/playground/crosswalk signs, plus object markers and traffic lights.

- ✓ Obey regulatory signs and respond to warning signs
- ✓ Follow lane use, turn control and reserved lane signs
- ✓ Recognize railway and school/playground/crosswalk signs

135.2 Road Markings and Lines

Yellow lines separate opposing traffic and white lines separate same-direction lanes. Reserved lane markings and other road markings guide safe lane use and passing.

- ✓ Yellow lines separate traffic moving in opposite directions
- ✓ White lines separate lanes travelling in the same direction
- ✓ Do not cross solid lines where passing is prohibited

CHAPTER 136

Chapter 2 — Combination Unit Braking and ABS

136.1 Combination Unit Braking

With air brakes, all brakes apply at the same time and pressure when you step on the pedal. Trailers with electric or vacuum brakes work similarly. Applying brake pressure too forcefully or only applying trailer brakes on slippery roads may cause wheel lockup, skid, or jackknife. Use extra caution braking in a curve. Brakes, tires and suspension work best when legally loaded with proper distribution. Empty cargo areas without ABS may cause wheels to bounce and lock up.

- ✓ With air brakes, all brakes apply at the same time and at the same pressure
- ✓ Applying brakes too forcefully or only trailer brakes on slippery roads may cause skid or jackknife
- ✓ An empty cargo area without ABS can cause wheels to bounce and lock up, increasing stopping distance
- ✓ It is difficult to stop a multiple trailer combination in a straight line in an emergency

136.2 Anti-lock Braking Systems (ABS)

ABS is mandatory in Canada on all trucks and buses over 4,560 kg manufactured since April 1, 2000 and on all commercial trailers equipped with air brakes. ABS is an addition to a normal air brake system that helps prevent wheel lockup or skids caused by overbraking on slippery road surfaces.

- ✓ ABS is mandatory on all trucks and buses over 4,560 kg manufactured since April 1, 2000
- ✓ ABS is mandatory on all commercial trailers equipped with air brakes
- ✓ ABS helps prevent wheel lockup or skids caused by overbraking on slippery surfaces

CHAPTER 137

Chapter 3 — Fire Prevention

137.1 Preventing vehicle and fuel fires

To help prevent fires: never start a vehicle with a fuel leak — repair it and absorb spilled fuel, disposing of material properly. Shut off engines when refuelling. Keep the fuel nozzle in contact with the filler pipe to ground the connection, and connect any ground strap to the filler pipe. Recommended safety equipment includes flags or flares, a fire extinguisher and a first aid kit.

- ✓ Never start a vehicle with a fuel leak; repair it and clean up the spill
- ✓ Shut off the engine when refuelling
- ✓ Keep the fuel nozzle in contact with the filler pipe to ground the connection

CHAPTER 138

Dangerous Goods and Emergencies

138.1 Dangerous Goods Transport and Spills

Transporting dangerous goods requires proper handling and knowledge of spill procedures. The Provincial Emergency Program (PEP) is contacted for dangerous goods incidents and spills.

- ✓ Handle and placard dangerous goods according to regulations
- ✓ Report dangerous goods spills to the Provincial Emergency Program
- ✓ Carry required emergency equipment for dangerous goods

CHAPTER 139

Personal Safety and Conditions

139.1 Driving in Adverse Conditions

Adjust driving for weather conditions and night driving. Use snow tires and maintain traction. Reduce speed and increase following distance in poor visibility or slippery conditions.

- ✓ Reduce speed and increase following distance in poor weather
- ✓ Use snow tires and maintain traction in winter conditions
- ✓ Use lights properly and reduce speed for night driving

139.2 Personal Safety and Road Rage

Drivers must use seatbelts and safety equipment, manage personal safety, and avoid road rage. Stay calm and do not engage aggressive drivers.

- ✓ Wear seatbelts and use required safety equipment
- ✓ Avoid and de-escalate road rage situations
- ✓ Carry emergency equipment and warning devices for disabled vehicles

CHAPTER 140

Medical Fitness and Licensing

140.1 Medical Fitness and Vision Requirements

Commercial drivers must meet medical fitness and vision screening standards, with periodic medical examinations (subject to a processing fee). Out-of-province licence holders must meet BC requirements and may need re-examination.

- ✓ Meet medical fitness and vision screening qualifications
- ✓ Undergo required medical examinations
- ✓ Out-of-province licences must be validated and may require re-examination