



# Heritage Railway Operating Guidelines

Rules and safety standards for operating a heritage railway

The logo for the province of Alberta, featuring the word "Alberta" in a stylized, cursive script font, followed by a small square icon.



# Heritage Railway Operating Guidelines

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## 1. General Notice

1.1 Safety and a willingness to obey these terms and conditions are of the utmost importance in the performance of duty. If in doubt, the safe course must be taken.

1.2 A railway operator shall develop and maintain general operating instructions in respect of its railway operations using the terms and conditions of this document as a guideline. General operating instructions must not contain instructions for anything other than a rail operation.

## 2. General Rules

2.1 Every employee in any service connected with the movement of trains or engines shall

- (a) be subject to and conversant with these Rules, special instructions and general operating instructions,
- (b) have a copy of these Rules and the general operating instructions accessible while on duty,
- (c) provide every possible assistance to ensure that every Rule, special instruction and general operating instruction is complied with and shall report promptly to the person in charge of rail operations any violation of these Rules,
- (d) communicate by the quickest available means to the person in charge of rail operations any condition that may affect the safe movement of a train or engine and be alert to the heritage railway operator's interest, and join forces to protect it,
- (e) obtain assistance promptly when required to control a harmful or dangerous condition,
- (f) be conversant with and governed by every safety rule and instruction of the heritage railway operator pertaining to the employee's occupation,
- (g) recertify based on job classification at prescribed intervals, not to exceed 3 years,
- (h) seek clarification from the person in charge of rail operations if in doubt as to the meaning of any rule or instruction, and
- (i) conduct themselves in a courteous and orderly manner.

2.2 Special instructions will be found in general operating instructions, operating bulletins or General Bulletin Orders (GBO). They may be appended to or included within copies of these Rules but do not diminish the intent of the rule unless the Railway Administrator has granted an exemption.

2.3 Employees must

- (a) be vigilant to avoid the risk of injury to themselves or others,
- (b) expect the movement of a train, engine, car or track unit at any time, on any track, in either direction,
- (c) not stand in front of an approaching engine or car for the purpose of boarding such equipment,
- (d) not ride the side or above the roof of a moving engine or car when passing side or overhead restrictions,
- (e) not be on the roof of a moving engine or car, or on the lading of a moving open top car, and
- (f) not be on the end ladder of a car while in motion except for the purpose of operating a handbrake.

2.4 Each employee must be acquainted with, and be on the lookout for, restricted side and overhead clearances. Where standard restricted clearance signs are used, no other advice of restricted clearance will elsewhere or otherwise be given. If such signs are not provided in a yard or terminal, the location of the restricted clearance will be shown in special instructions.

2.5 Side and overhead clearance may be restricted on a track at a main shop, diesel shop or car shop. Where restricted clearance exists on a track, it will not be marked by a standard restricted clearance sign nor will its location be elsewhere or otherwise given. Employees must not ride on top or on the side of equipment when on any main shop, diesel shop or car shop track, whether or not the side or overhead clearance is restricted.

2.6 The use or possession of intoxicants or narcotics by employees on duty or subject to duty is prohibited.

2.7 The use or possession of mood altering agents by employees on duty or subject to duty is prohibited except as prescribed by a doctor.

2.8 The use of drugs, medication or mood altering agents, including those prescribed by a doctor, that in any way will adversely affect an employee's ability to work safely is prohibited.

2.9 Employees must know and understand the possible effects of drugs, medication or mood altering agents, including those prescribed by a doctor, which in any way will adversely affect the employee's ability to work safely.

### 3. Definitions

3.1 In these Rules,

- (a) "crossover" means a track joining adjacent main tracks, or a main track and another track. The switches at both ends of a crossover are normal when set for through movements on the other tracks;
- (b) "daily operating bulletin (DOB)" means instructions regarding track condition restrictions and other information which affect the safety and movement of a train or engine within limits indicated in the timetable or specified in special instructions;
- (c) "engine" means a locomotive, rail car mover, winch or other equipment used to move rail cars;
- (d) "equipment" means one or more engines or rail cars that can be handled on their own wheels in a movement;
- (e) "fixed signal" means a signal or sign at a fixed location indicating a condition affecting the operation of a movement;
- (f) "general operating instructions" means a document prepared by a heritage railway operator containing site-specific descriptive information, approved site-specific procedures and special instructions relating to a rail operation;
- (g) "main track" means a track between stations or platforms, upon which trains or engines travel;
- (h) "reduced speed" means a speed that will permit stopping
  - (i). within 1/2 the range of vision of equipment,
  - (ii). short of a switch not properly lined,
  - (iii). in response to a hand signal,
  - (iv). in response to a red signal as provided for in Rule 18,
  - (v). in response to a derail set in the derail position, and
  - (vi). in response to an unsafe condition, but in no case in excess of 10 mph;
- (i) "route" means the track a train or engine will use in passing from one location to another;

- (j) “schedule” means information pertaining to the movement and times of a passenger train. A schedule does not convey operating authority;
- (k) “semi-automatic switch” means a yard switch equipped with a mechanism that permits an engine to trail through the switch points thus setting the switch for the route being used;
- (l) “siding” means a track auxiliary to the main track for meeting or passing trains, which is so designated by the heritage railway;
- (m) “signal indication” means the information conveyed by a fixed signal or a cab signal;
- (n) “single track” means one main track upon which trains are operated in both directions;
- (o) “station” means a location identified by a station name sign and designated by that name in the timetable;
- (p) “timetable” means the document that contains subdivision information, footnotes and special instructions relating to the movement of trains, engines and track units;
- (q) “train” means an engine or more than one engine coupled, with or without cars, or a track unit so designated by its operating authority, displaying a marker;
- (r) “yard” means a system of tracks, other than main tracks, provided for the making up of trains, storing of rail cars and for other purposes, over which movements may be made, subject to prescribed signals, rules and special instructions.

#### 4. Operating Rules

4.1 Unless otherwise specified, these Rules are applicable without respect to the number of main tracks.

4.2 Rules pertaining to the main track also apply to tracks specified as signalled sidings and other signalled tracks.

4.3 Radio may be used to communicate information or instructions except when its use is restricted by these Rules, special instructions or general operating instructions.

4.4 When the term “in writing” is used in these Rules, special instructions or general operating instructions, if the written permission, authority or instruction referred to is not received personally by the receiving employee, it must be copied by the receiving employee and repeated back to the sender to ensure it was correctly received.

4.5 Wherever the following occupational names or titles appear in these Rules, special instructions or general operating instructions, they apply to the employee who is qualified and responsible for performing the duties of a

- (a) conductor,
- (b) flagman,
- (c) foreman, or
- (d) locomotive engineer.

4.6 In these Rules, special instructions and general operating instructions, the terms

- (a) “engine” also applies to an engine with cars,
- (b) “conductor” also applies to a yard foreman, and
- (c) “trainman” also applies to a yardman.

4.7 In these Rules, the following abbreviations and those authorized by special instructions may be used:

- (a) Cndr    Conductor;
- (b) DOB    Daily Operating Bulletin;



- (c) Eng Engine;
- (d) Engr Locomotive Engineer;
- (e) MPH Miles Per Hour;
- (f) No Number;
- (g) OCS Occupancy Control System;
- (h) Psgr Passenger.

4.8 In these Rules, when the distance prescribed for the placement of signals, signs or flags is not possible due to track configuration, the maximum distance available applies.

4.9 In these Rules, a train must be operated at a reduced speed that will permit safe stopping

- (a) short of any equipment within 1/2 the range of vision of equipment,
- (b) short of a switch not properly lined,
- (c) in response to a hand signal,
- (d) in response to a red signal as provided for in Rule 18,
- (e) in response to a derail set in the derail position, and
- (f) in response to an unsafe condition, but in no case in excess of 16 km/hr.

## 5. Signals - General

5.1 Every employee whose duties may require them to give hand signals must have the proper appliances and keep them in good order and ready for immediate use. Night signals must be used from sunset to sunrise and when day signals cannot be plainly seen.

**Note:** The hand or a flag displayed in the same manner as the lantern, which is illustrated in the following diagrams, gives the same indication.

### Method of Display and Indication

(a)



Swung from side to side at a right angle to the track:





STOP

(b)



Swung in a circle at a right angle to the track at a speed in proportion to the speed required:

MOVE BACKWARD

- (c)  Raised and lowered at a speed in proportion to the speed required: MOVE FORWARD
- (d)  Held horizontally at arm's length:  
REDUCE SPEED
- (e)  Raised and swung horizontally above the head, at right angle to the track when standing:  
APPLY AIR BRAKES
- (f)  Raised and held at arm's length above the head when standing:  
RELEASE AIR BRAKES
- (g) Any object waved violently by anyone on or near the track is a signal to stop.

5.2 A signal given to move forward or move backward must be given in relation to the front of the controlling unit.

5.3 A signal must be given in sufficient time before the required action to permit compliance. It must be given from a point where it can be plainly seen and in such a manner that it cannot be misunderstood. If there is doubt as to the meaning of a signal, or for whom it is intended, it must be regarded as a stop signal.

5.4 When switching is being performed, signals shall be given directly to the locomotive engineer whenever practicable. The conductor is responsible for seeing that trainmen are in the proper position to give or relay signals to the locomotive engineer.

5.5 When moving under the control of hand signals, the disappearance from view of either the crewmember or lights by which signals controlling the movement are being given must be regarded as a stop signal.

5.6 A crewmember, whose train or engine is clear of the main track, must not give an approaching train or engine a hand signal to move forward.

## 6. Radio or hand signals

6.1 Radio will be used to communicate signals or instructions, but, if conditions require, hand signals may be used in lieu of radio. Before changing from radio to hand signals or from hand signals to radio, a definite understanding as to the method of control must be established between crewmembers giving or receiving instructions. In case of an emergency, either method may be used in addition to that previously arranged.

## 7. Switching by radio

7.1 When radio is used to control a switching movement, and after positive identification has been established, the following procedures are required:

- (a) direction in relation to the front of the controlling unit must be given in the initial instruction and from then on whenever the direction of movement is to change;
- (b) distance to travel must be given with each communication;
- (c) when the movement has travelled one-half the distance required by the last instruction and no further communication is received the movement must be stopped at once.

**Note:** Doubt as to the meaning of an instruction or for whom it is intended must be regarded as a stop signal.

## 8. Engine bell

8.1 The engine bell must be rung when

- (a) an engine is about to move,
- (b) passing a train or engine standing on an adjacent track,
- (c) approaching, passing or moving about station facilities or shop track areas, and
- (d) one-quarter of a mile from every public crossing at grade (except within limits as may be prescribed in special instructions) until the crossing is fully occupied by the engine or cars. When the engine whistle signal in sub rule (f) under Rule 10.3 is sounded, the engine bell need not be rung.

## 9. Engine bell failure

9.1 If the engine bell fails on the lead unit, repairs must be made as quickly as possible.

## 10. Engine whistle signals

10.1 Wherever the words “engine whistle” appear in these Rules, they also refer to “engine horn”. Signals prescribed by this Rule are illustrated by “o” for short sounds and “—” for longer sounds.

10.2 Engine whistle signals must be sounded as prescribed by this Rule and should be distinct, with intensity and duration proportionate to the distance the signal is to be conveyed. Unnecessary use of the whistle is prohibited.

10.3 Radio must not be used in lieu of engine whistle signals for indications prefixed by the symbol (#).

SOUND	INDICATION
(a) o	When standing-braking system is equalized, angle cock may be closed.
(b) o o	(i) Answer to a stop signal (except a fixed signal).

(ii) Answer to any signal not otherwise provided for.

**Note:** Subrule (b) is not applicable when switching.

(c) o o o o Call for signals.

(d) o o o o o To notify track forces of fire on or near the right-of-way (to be repeated as often as required).  
o

(e) Succession of short sounds (#) Alarm for persons or animals on or near the track.

(f) \_\_\_ o \_\_\_ (#) (i) At every whistle post.

(#) (ii) At least 0.25 miles from every public crossing at grade (except within limits as may be prescribed in special instructions), to be prolonged or repeated according to the speed of the movement until the crossing is fully occupied by the engine or cars.

(#) (iii) At frequent intervals when view is restricted by weather, curvature or other conditions.

(g) When two or more engines are coupled, the locomotive engineer on the leading engine will sound the signals as prescribed by this Rule.

(h) In case of engine whistle failure, the engine bell must be rung continuously

(i) approaching and moving through curves, and

(ii) approaching and passing station facilities, yards and public crossings at grade.

In addition, the train or engine must not exceed 5 miles per hour when entering each public crossing at grade that is not protected by a watchman, gates or automatic warning devices until such crossing is fully occupied.

## 11. Headlight

11.1 The full power of the headlight in the direction of movement must be illuminated during hours of darkness.

## 12. Headlight failure

12.1 If the headlight on a train or engine fails during hours of darkness, the movement of the train must be stopped and the headlight repaired.

## 13. Markers

13.1 One marker, or two markers when so equipped, lighted or reflectorized, will display red to the rear of every train by day and by night to mark the rear of the train.

## 14. Substitute marker

14.1 A red flag by day or a red light by night will be displayed to mark the rear of a train not equipped to display the markers prescribed by Rule 13.

**Note:** A red reflectorized plaque may be used in lieu of a red flag or light.

## 15. Blue signal protection

15.1 A blue flag by day and, in addition, a blue light by night, or when day signals cannot be plainly seen, displayed at one or both ends of equipment indicates that workmen are in the vicinity of such equipment. On a track that permits entry of a train or engine from one end only, a blue signal displayed between the equipment and the switch permitting entry indicates that workmen are in the vicinity of such equipment. When such signals are displayed, the equipment must not be coupled to or moved. The removal of the signal from one or both ends of the equipment indicates that no workers are in the vicinity of the equipment and such equipment may be coupled to or moved.

15.2 Other equipment must not be placed on the same track that will block a clear view of the blue signals without first notifying the workers. When equipment is placed on the same track, the train or engine placing such equipment must remain on that track until the workers have relocated the blue signals to include the additional equipment.

15.3 Each class of workers must display the blue signals and only that same class of workers is authorized to remove them.

15.4 Special instructions must govern the use of other approved methods of protecting workers performing equipment repairs or inspections.

## 16. Fixed signal recognition and compliance

16.1 The crew on an engine must know the indication of each fixed signal, including switches where practicable, before passing it.

16.2 Crew members within hearing range must communicate to each other, in a clear and audible manner, the indication by name of each fixed signal they are required to identify. Each signal affecting their train or engine must be called out as soon as it is positively identified, but crewmembers must watch for and promptly communicate and act on any change of indication that may occur.

16.3 If prompt action is not taken to comply with the requirements of each signal indication affecting their train or engine, crewmembers must remind one another of such requirements. If no action is then taken, or if the locomotive engineer is observed to be incapacitated, other crewmembers must take immediate action to ensure the safety of the train or engine, including stopping it in an emergency if required.

**Note:** The indication of a switch target or light does not need to be communicated unless it indicates that the switch is not properly lined for the train or engine affected.

## 17. Emergency protection

17.1 Any employee discovering a hazardous condition, which may affect the safe passage of a train or engine, must, by the use of flags, lights, fuses, radio, telephone or other means, make every possible effort to stop or provide necessary instructions to any train or engine that may be affected. Flag protection must be provided on the main track unless or until otherwise relieved of the requirement.

17.2 A flagman must go the required distance from the hazardous condition, and in each direction when possible, to ensure that an approaching train or engine will have sufficient time and distance to be able to stop before the condition. Unless otherwise provided, a flagman must go at least 200 feet from the condition to a location where there will be a clear view of the flagman from an approaching train or engine.

17.3 When a train or engine is observed approaching, the flagman must display a stop signal using a red flag by day or a lighted red fuse by night, or when day signals cannot be plainly seen. The train or engine flagman must continue to display the stop signal until the train or engine being flagged has

- (a) acknowledged the stop signal with an engine whistle signal set out in Rule 10.3(b),
- (b) come to a stop, or
- (c) reached the location of the flagman.

17.4 A train or engine stopped by a flagman must not proceed until so instructed by the flagman.

## **18. Protection of track work**

18.1 Before any track work is started that may make the track unsafe for a train or engine movement, employees will provide protection as follows:

- (a) each switch must be locked with a special lock in the position that will prevent a train or engine from operating on the portion of track where work is to be performed;
- (b) a red flag must be placed by day and, in addition, a red light must be used by night, or when day signals cannot be plainly seen, between the rails in each direction from the working point. Such signals must be placed at least 100 feet from the working point. When there is equipment on the track that prevents a clear view from an approaching train or engine, the red signals must be placed to include such equipment.

18.2 A train or engine approaching a red signal prescribed by Rule 18.1(b) must be stopped before passing it and must not proceed beyond such signal until it has been removed. An employee of the same class who placed the red signal may alone remove it, but only when authorized by the supervisor.

18.3 Equipment must not be placed on the track being protected that will block a clear view of the red signals.

## **Movement of Trains and Engines**

### **19. Operating bulletins**

19.1 Operating bulletins must be issued by the proper authority and in the format of the heritage railway. They will be posted in a book provided for that purpose at stations or other locations designated in the timetable or operating bulletins. Operating bulletins must only contain information or instructions pertaining to the movement of trains and engines. They will be numbered consecutively, beginning on the first day of each year.

19.2 Employees responsible for the placement of operating bulletins must post them in the book provided for that purpose immediately after they are received. They must record on each bulletin the time and date it is posted in the book.

19.3 A monthly operating bulletin, containing the number, date and contents of, or reference to, each operating bulletin remaining in effect, will be issued the first of each month. Operating bulletins of a previous date, which are not included or referred to in the monthly reissue, become void.

19.4 Before commencing work at a station or location where operating bulletins are posted, every yardmaster, locomotive engineer, conductor and trainman must have read, understood and signed the operating bulletins.

### **20. Starting a train or engine**

20.1 A train or engine must not commence movement until the proper signal or instruction is received by the locomotive engineer from a crewmember.

### **21. Protection against extraordinary conditions**

21.1 A train or engine must be fully protected against any known or suspected condition that may interfere with its safe passage.

21.2 A train or engine must stop at once and be fully inspected when it is known or suspected to have struck any object that may interfere with its safe operation and the person in charge of the heritage railway must be notified immediately.

21.3 When a portion of a train is left on the main track, outside yard limits or cautionary limits, precautions must be taken by the crew to protect the remaining portion against the returning movement.

## **22. Public crossings at grade**

22.1 When rail cars not headed by an engine are moving along a public road not protected by a fence or other barrier, a crewmember must be on the leading car or on the ground in a position to warn persons standing on, crossing or about to cross the track.

22.2 When rail cars not headed by an engine, snow plow or other equipment equipped with a whistle and headlight are moving over a public crossing at grade not protected by a watchman or gates, a crew member must provide manual protection of the crossing.

**Exception:** Manual protection of the crossing is not required provided the crossing is equipped with automatic warning devices and a crew member is on the leading car to warn persons standing on, or crossing or about to cross the track. This exception does not modify the application of Rule 23.1.

22.3 No part of a train or engine may be allowed to stand on any part of a public crossing at grade, for a longer period than 5 minutes, when vehicular or pedestrian traffic requires passage. Switching operations at such crossings must not obstruct vehicular or pedestrian traffic for a longer period than 5 minutes at a time. When emergency vehicles require passage, employees must cooperate to clear public crossings at grade and private crossings as quickly as possible.

22.4 Equipment must not be left standing within 100 feet of the travelled portion of a public or private crossing at grade except where it is necessary to leave such equipment for loading or unloading.

22.5 Before making a switching movement over an unprotected public crossing at grade where the locomotive engineer's view of the crossing is obscured, arrangements must be made for a crewmember to be in position to observe the crossing and give signals and instructions to the locomotive engineer as necessary.

22.6 Where special instructions require that train or engine movements over certain public crossings at grade be protected by a crewmember providing manual protection of the crossings, such protection must be provided until the crossings are fully occupied.

22.7 When providing manual protection of a public crossing at grade, a crewmember must be on the ground ahead of the train or engine in a position to stop vehicular and pedestrian traffic before the train or engine enters the crossing. A hand signal by day, and a red light or a lighted red fuse by night, must be used to give a signal to stop the movement of vehicular and pedestrian traffic over such crossing. The train or engine must not enter the crossing until a signal to enter the crossing has been received from the crewmember providing the manual protection.

## **23. Public crossings at grade with warning devices**

23.1 When a train or engine passes over any public crossing at grade equipped with automatic warning devices, it will be necessary, before making a reverse movement over the crossing, for a crewmember to provide manual protection of the crossing.

23.2 Unless otherwise directed by special instructions, a main track train or engine movement over a public crossing at grade equipped with automatic warning devices must not exceed 10 miles per hour from a distance of 300 feet from the crossing until the crossing is fully occupied by the movement that

- (a) has stopped or is switching on the main track in the vicinity of the crossing,
- (b) is entering the main track in the vicinity of the crossing, or
- (c) has been authorized to pass a block or interlocking signal indicating a stop that is located within 300 feet of the crossing.

**Note:** Such movement must not obstruct the crossing until the warning devices have been operating for at least 20 seconds.

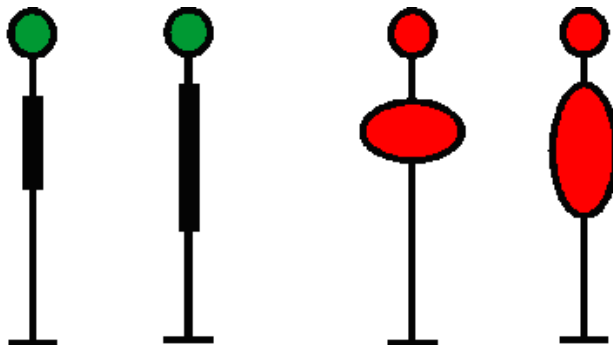
23.3 Unless otherwise directed by special instructions, a train or engine movement on non-main track over a public crossing at grade equipped with automatic warning devices must not exceed 10 miles per hour from a distance of 300 feet until the crossing is fully occupied by the movement.

23.4 At a public crossing at grade where special instructions require that warning devices be operated by pushbutton, or other appliances, or that train or engine movements stop at stop signs, train or engine movements affected must not obstruct the crossing until the warning devices have been operating for at least 20 seconds.

23.5 Equipment must not be allowed to stand so as to cause the unnecessary operation of warning devices.

#### 24. Hand-operated switches

24.1 Unless otherwise specified by special instructions, the normal position for a main track switch is for main track movement. The main track switches must be lined and locked in normal position. A main track hand-operated switch must display a reflectorized target, or light and target, to indicate the following:

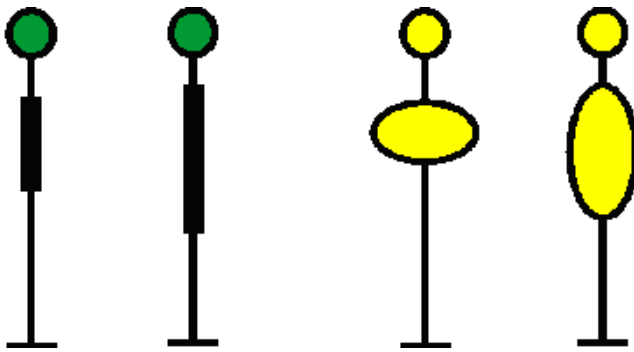


NORMAL POSITION      REVERSED POSITION

**Exception:** A light or reflectorized target need not be maintained on a main track switch in CTC and single track ABS or on a subdivision specified in special instructions.

24.2 Unless otherwise specified by special instructions, switches other than main track switches, when equipped with a lock, must be lined in normal position and locked after having been used. When equipped with a target, light or reflector, it will indicate the following:





NORMAL POSITION      REVERSE POSITION

24.3 Except while being turned, each switch must be secured with an approved device.

24.4 When a switch has been turned, the points must be examined and the target, light or reflector, if any, observed to ensure that the switch is properly lined.

24.5 A switch must not be turned while any part of a rail car or engine is between the switch points and the fouling point of the track to be used, except when making a running switch or in the application of the exception to Rule 24.9.

24.6 Except when switching, when a train is closely approaching or passing over a main track switch, other than a dual control switch, employees must keep at least 20 feet from the switch stand, and must, when practicable, on single track, stand on the opposite side of the track.

24.7 On single track, a crewmember of a train stopped on the main track to meet or to be passed by another train will, when practicable, reverse the switch for the approaching train and protect it unless relieved by a crewmember of the other train.

24.8 If it is known or suspected that either of the points or any part of a switch is damaged or broken, the switch must be protected until it can be made safe for use. A report must be made to the person in charge of the heritage track as quickly as possible.

24.9 A train or engine must not foul a track until the switches connected with the movement are properly lined or, in the case of semi-automatic or spring switches, the conflicting route is seen or known to be clear.

**Exception:** A movement may foul a track connected by a hand-operated switch provided that

- (a) neither the track occupied nor the track to be fouled are main tracks,
- (b) the conflicting route is seen or known to be clear, and
- (c) the switch is properly lined before the movement passes over it.

24.10 Unless otherwise directed by special instructions,

- (a) the normal position for a main track switch at the end of 2 tracks is when such switch is set for a train or engine leaving a single track for 2 tracks to operate to the right, and
- (b) the normal position for a main track junction switch is when such switch is set for a train or engine to operate as a through movement on one subdivision.

24.11 When a train or engine diverges from a main track, the switch used must not be restored to its normal position until the movement has cleared the fouling point.

24.12 When a crossover is to be used, the switch in the track on which the train or engine is standing must be reversed first. Both switches must be reversed before a crossover movement is commenced and the movement must be completed before either switch is restored to normal position.

24.13 Unless or until the switch is seen to be in normal position, trains and engines approaching a main track hand-operated switch in a facing point direction, unless otherwise governed by signal indication, must not exceed the following speed from one-quarter of a mile of the switch:

HERITAGE RAILWAYS 10 mph / 16 km

## **25. Derails**

25.1 The location of each derail must be marked by a sign, unless otherwise directed by special instructions. Employees must be familiar with the location of each derail.

25.2 A train, engine or track unit must stop short of a derail set in the derailing position.

25.3 Each derail must be left in the derailing position. When so authorized by special instructions, a derail on a main track, siding or spur may be left in the non-derailing position only when stored equipment is not present.

25.4 Derails must be left secured with a locking device.

## **26. Crew responsibilities**

26.1 A train must run under the direction of its conductor.

26.2 The locomotive engineer of a train is in charge of and responsible for the operation of the engine of such train.

26.3 When a train is operated without a conductor, the locomotive engineer will perform the duties of the conductor.

26.4 The conductor and locomotive engineer are responsible for the safe operation of the train or equipment in their charge and for the observance of the Rules. Under conditions not provided for by the Rules, they must take every precaution for protection. Other crewmembers are not relieved of their responsibility under the Rules.

## **27. Restrictions at passenger train stops**

27.1 Unless otherwise directed by special instructions, a train or engine must move with extreme care when moving alongside a train carrying passengers that is discharging or receiving traffic. The train or engine must not pass between such train and the station or platform unless the movement is properly protected.

## **28. Train inspection**

28.1 This Rule also applies to an engine.

28.2 The train and engine crew must know that equipment in their train is in good order before starting and inspect it whenever they have an opportunity to do so. Equipment added to a train enroute must be examined with extra care to ensure it is in good order.

28.3 When crewmembers are on the rear of a moving train, they must inspect, at every opportunity, the track to the rear for evidence of dragging or derailed equipment.

28.4 All crewmembers on a moving train must make frequent inspections of both sides of their train to ensure that it is in good order.

28.5 On completion of crew-planned train inspections and at locations where inspection is required by special instructions, crew members must, when possible, voice communicate to each other the results of such inspections.

## **29. Securing equipment**

29.1 Unless otherwise directed by special instructions, a sufficient number of handbrakes must be applied on equipment left at any point to prevent it from moving. If left on a siding, it must be coupled to other equipment, if any, on such track unless it is necessary to separate such equipment at a public crossing at grade or elsewhere.

### **30. Coupling to equipment**

30.1 Before coupling to equipment at any point, care must be taken to ensure that the equipment is properly secured.

30.2 Before coupling to or moving equipment being loaded or unloaded, all persons in or about the equipment must be notified. Vehicles and loading or unloading devices must be clear.

30.3 Before coupling to or moving service equipment, employees occupying the equipment must be notified and attachments secured.

### **31. Fouling other tracks**

31.1 Equipment must not be moved foul of another track unless the movement is properly protected.

31.2 Equipment must not be left foul of a connecting track unless the switch is left lined for the track upon which the equipment is standing.

### **32. Pushing equipment**

32.1 When equipment is pushed by an engine, a crewmember must be on the leading rail car or on the ground in a position to observe the track to be used and to give signals or instructions necessary to control the movement.

32.2 When equipment is pushed by an engine on the main track, unless protected by a crewmember as described in Rule 32.1, the movement must

- (a) not be made while the leading car is within yard limits or cautionary limits,
- (b) not exceed the overall length of the equipment, and
- (c) not exceed 10 mph.

## **Radio**

### **33. Reliability tests**

33.1 The crew of a train or engine when equipped with radios must carry out an intra-crew test of such radios before leaving their initial terminal, change-off or starting point. When a train or engine is equipped with a single radio, it must be voice tested as soon as practicable after the crew commences duty.

### **34. Replacement of defective radios**

34.1 A portable radio that is defective must be turned in for repairs as soon as practicable and exchanged for a working radio as soon as practicable.

34.2 The employee discovering a radio that is defective must attach a tag to it indicating the apparent nature of the defect.

### **35. Radio terms**

35.1 In radio communication, the following terms, when used, will denote the corresponding meaning:

- (a) "STAND BY" - Monitor this channel for my next transmission;
- (b) "OVER" - Transmission is ended and a response is expected;
- (c) "OUT" - Transmission is ended and no response is expected.

### **36. Positive identification**

36.1 The person initiating a radio communication and the responding party must establish positive identification.

36.2 The person initiating the radio communication must end the initial call with the spoken word “OVER”.

36.3 Each party to a radio communication must end their final transmission with the spoken word “OUT”.

### **37. Content of radio communications**

37.1 Radio communications must be brief and to the point and contain only essential instructions or information.

### **38. Avoiding distraction**

38.1 General operating bulletins, authorities or instructions must not be copied by the employee operating moving equipment if it will interfere with the safe operation of the equipment.

### **39. Emergency communication procedures**

39.1 An employee will transmit the word “EMERGENCY” 3 times at the beginning of the transmission to indicate the report of

- (a) an accident involving injury to employees or others,
- (b) a condition which may constitute a hazard to employees or others,
- (c) a condition which may endanger the passage of trains or engines, or
- (d) a derailment which has occurred on, or is fouling, a main track.

39.2 When an emergency communication, which is directed to a specific person or movement, has not been acknowledged, any other employee hearing it will, if practicable, relay the communication by any means available. Other employees must not interfere with such communication.

39.3 An emergency communication has absolute priority over other transmissions.

### **40. Radio special instructions**

40.1 Special instructions necessary to govern the use of radios will be issued. Except as affected by such instructions and Rules 33 to 39, all Operating Rules remain in force.

## **Heritage Railway Locomotive Inspection and Safety Rules**

41.1 In these Rules,

- (a) “break” means a fracture resulting in complete separation into parts. The terms “break” and “broken” are used interchangeably in these Rules;
- (b) “competent locomotive inspector” means a person who is competent to perform safety inspections of locomotives pursuant to Rule 44.1;
- (c) “cracked” means fractured without complete separation into parts;
- (d) “Department” means Alberta Transportation, Dangerous Goods and Rail Safety Branch;
- (e) “fire season” means the period of time from April 1 to October 31;
- (f) “in service” means all locomotives except those that are
  - (i) in a repair shop or on a repair track, or
  - (ii) on a storage track and are dead and drained;

- (g) “locomotive consist” means a combination of locomotives operated from a single control;
- (h) “locomotive or engine” means a rail vehicle propelled by any energy form intended for the propulsion or control of freight, passenger or service equipment. The terms “locomotive” and “engine” are used interchangeably in these Rules;
- (i) “operative” means a component or system that is in a safe condition to perform its intended function;
- (j) “person in charge” means a competent person in accordance with Rule 44.1 and appointed by a heritage railway operator to ensure the safe conduct of an operation or the work of employees;
- (k) “railway safety officer” means a railway safety officer designated pursuant to section 52(1) of the *Railway (Alberta) Act*;
- (l) “safety control” means a device which will cause a brake application to be initiated automatically if the locomotive operator becomes incapacitated;
- (m) “safety defect” means any item or component that is defective on a locomotive as prescribed in Rules 47-59;
- (n) (n) “safety inspection” means an examination of a locomotive for safety defects while stationary by a competent person as defined in section 1 of this Regulation, or a person in charge as defined in sub rule (j), to verify that it may move safely, and to identify those defects listed in Rules 47-59 that may inhibit such movement and require correction. Safety inspections are intended to be of a visual nature;
- (o) “safety inspection location” means a location designated by a heritage railway operator where a competent person performs safety inspections;
- (p) “safety inspection record” means a record in hard copy form or otherwise, including a computer record, that attests that a safety inspection was performed;
- (q) “train” means a locomotive, with or without rail cars, so designated by its operating authority, displaying markers.

## **42. Heritage railway operator responsibility**

42.1 A heritage railway operator is responsible for the inspection and repair of all locomotives to ensure safe operation. All components, appurtenances and control apparatuses of all locomotives must be designed and maintained to perform their intended function.

42.2 A heritage railway operator must reply in writing or by acceptable electronic means, within 30 days, to the Railway Administrator on the corrective action taken to correct a violation or defect reported by a railway safety officer. The reply, from an appropriate railway officer, shall also include the unit initials and number and the date and location of the corrective action taken.

## **43. Application of safety inspections and movement restrictions**

43.1 A heritage railway operator must ensure that locomotives placed or continued in service are free from all safety defects described in Rules 47-59.

43.2 A locomotive identified with safety defects may be moved to a designated location for repair when authorized by a person in charge.

## **44. Competent locomotive inspector**

44.1 A heritage railway operator must ensure that competent locomotive inspectors are trained to perform safety inspections of locomotives in compliance with these Rules. Locomotive inspectors must demonstrate to a

heritage railway operator, by means of oral or written examinations and on-the-job performance, a knowledge and ability concerning safety inspection of railway locomotives.

44.2 A heritage railway operator must maintain a record of competent locomotive inspectors who perform safety inspections. This record shall be made available to a railway safety officer on request.

44.3 Locomotive inspectors must be re-examined if they have not been performing the duties prescribed in these Rules for a period of 3 years or more.

#### **45. Safety inspection locations**

45.1 A Heritage railway site is a safety inspection site for the purposes of this Schedule.

45.2 At safety inspection locations, all locomotives on a train for the purpose of passenger use only when placed in service or laid over for more than 8 hours shall receive a safety inspection.

45.3 A heritage railway operator must maintain a record of all locomotives that receive a safety inspection. This information must be retained for a minimum of 92 days and must be made available to a railway safety officer on request.

45.4 Prior to departure of a train, where a locomotive that has received a safety inspection has been placed in service or placed on a train, the locomotive operator must be notified that a safety inspection has been made.

#### **46. Pre-departure inspection**

46.1 Where a locomotive is placed in service, or where a locomotive layover of more than 8 hours has occurred, the locomotive must, as a minimum requirement, be given a pre-departure inspection by either the locomotive operator or other qualified person for those conditions listed in Appendix 1.

46.2 The locomotive operator is responsible for determining that the prescribed inspection has been completed prior to departure.

### **Locomotive Inspection Requirements**

#### **47. Brake system**

47.1 The brake system and all related components, including the handbrake, must be

- (a) in a safe operative condition, and
- (b) maintained in accordance with the brake manufacturer's requirements.

47.2 The heritage railway operator shall have a locomotive pneumatic brake maintenance plan in place. This plan must be made available to a railway safety officer on request.

#### **48. Trucks**

48.1 A heritage railway operator shall not place or continue in service a locomotive with any of the following truck related defects:

- (a) cracked or broken truck frames, swing hangers, swing hanger pins or equalizers;
- (b) suspension components, such as coil or rubber springs, elliptic springs, snubbers and dampers, must not be missing, cracked, broken or out of place and must be properly secured.

48.2 All components attached to the truck frames must be properly secured.

48.3 The bolster side bearing and pedestal clearances must be maintained within manufacturer's specifications.

48.4 The truck frame, brake rigging and associated components of locomotives must be kept free from accumulation of oil, grease and other combustible materials.

## 49. Wheels and axles

49.1 A heritage railway operator shall not place or continue in service a locomotive with any of the following wheel defects:

- (a) flange thickness of 7/8 inch (22.2 mm) or less;
- (b) vertical flange of 1 inch (25.4 mm) or more;
- (c) a flange height of 1.5 inches (38.1 mm) or more measured from tread to the top of the flange;
- (d) a curved plate wheel with a rim thickness of 1 inch (25.4 mm) or less;
- (e) a straight plate wheel with a rim thickness of 1 inch (25.4 mm) or less;
- (f) a straight or curved plate wheel with a rim thickness of 3/4 inch (19.0 mm) or less on locomotives used in yard services;
- (g) a flat spot of 2.5 inches (63.5 mm) or more in length or, in the case of multiple flat spots, 2 inches (50.8 mm) or more in length;
- (h) a gouge or chip in the flange that is more than 1.5 inches (38.1 mm) in length and 0.5 inch (12.7 mm) in width;
- (i) a shell of 2.5 inches (63.5 mm) or more in length or, in the case of multiple shells, 2 inches (50.8 mm) or more in length;
- (j) a tread worn hollow 5/16 inch (7.9 mm) or more;
- (k) a crack in the rim, plate or hub;
- (l) a loose wheel;
- (m) the variation in the circumference of wheels that exceeds 0.25 inch or 2 tapes on the same axle when applied or threaded.

49.2 A heritage railway operator shall not place or continue in service a locomotive with a traction motor support bearing that shows evidence of any of the following:

- (a) signs of overheating;
- (b) loose or missing bolts;
- (c) oil leaking from the reservoir;
- (d) a missing or defective reservoir filler cup or a drain plug that is not properly secured.

49.3 A heritage railway operator shall not place or continue in service a locomotive with any of the following journal bearing safety defects:

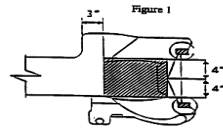
- (a) a loose or damaged seal;
- (b) a loose or missing end cap bolt;
- (c) signs of overheating;
- (d) a missing or defective gasket or a drain plug that is not properly secured.

## 50. Draft couplers

50.1 A heritage railway operator shall not place or continue in service a locomotive with any of the following coupler related defects:

- (a) a coupler shank that is bent out of alignment to the extent that the coupler will not couple automatically;
- (b) a coupler knuckle that is cracked or broken on the inside pulling face of the knuckle, except that shrinkage cracks or hot tears that do not significantly reduce the strength of the knuckle shall not be considered cracked;
- (c) a knuckle pin or thrower that is missing or inoperative;
- (d) a coupler retaining pin lock that is missing or broken;
- (e) a coupler with an inoperative lock lift or a coupler assembly that does not have anti-creep protection to prevent unintentional unlocking of the coupler lock; locomotives in passenger service must be equipped with a device that secures the lock lift assembly to ensure prevention of unintentional uncoupling;
- (f) a coupler lock that is missing, inoperative, bent, cracked or broken;
- (g) a coupler not falling within the following heights above the rails, except those by design and of which specifications will be filed with the Railway Administrator:
  - (i) minimum height: 31.5 inches (800 mm);

- (ii). maximum height: 34.5 inches (876 mm);
- (h) a coupler that has a crack in the area of the shank or head represented by the unshaded portion of Figure 1, except that shrinkage cracks or hot tears that do not significantly reduce the strength of the coupler shall not be considered cracked:



- (i) an inoperative uncoupling device.

50.2 A heritage railway operator shall not place or continue in service a locomotive with a draft arrangement that shows evidence of any of the following:

- (a) a draft gear that is inoperative;
- (b) a cracked or broken yoke;
- (c) a vertical coupler pin retainer that is missing or defective;
- (d) a draft gear carrier plate that is missing or has more than 25% of the fasteners loose or missing;
- (e) a draft stop that is missing or broken to the extent that it no longer performs its design function.

## 51. Fuel tanks

51.1 The exterior of fuel tanks of the locomotive must be kept free from accumulation of oil, grease and other combustible materials.

51.2 Fuel tanks, filling adapters, pumps, piping, valves and connections must be kept free from leaks, properly secured and in operative condition.

51.3 The fuel tank vent must be kept clear of obstructions.

51.4 When originally equipped, the liquid level gauge must be operative and must be free from leaks.

## 52. Internal combustion engines

52.1 The engine and engine room must be kept free from accumulation of oil, grease, fuel oil and other combustible materials. Pollution control tanks must be kept free from leakage or overflow.

52.2 Locomotives operated in service during the fire season must have exhaust passages on the discharge side of spark arresting devices or turbo-chargers and must be kept free of oil accumulation and carbonaceous deposits in excess of 1/8 inch (3 mm) in thickness.

## 53. Rail clearance

53.1 No part or appliance of a locomotive, except wheels and flexible non-metallic sand pipe extension tips, must be less than 2.5 inches (63.5 mm) above the top of the rail.

## 54. Windows

54.1 Windows on controlling locomotives must be kept clean and free from cracks or obstructions. All related components on controlling locomotives such as wipers, sun visors and defrosters must be kept in operative condition.

## 55. Safety control equipment



55.1 Locomotives originally equipped with a safety control device must have an operative reset safety control.

55.2 Locomotives with no reset safety control must have a second competent person present in the cab of the locomotive to remove tractive effort and initiate an application in the event the locomotive engineer becomes inattentive or incapacitated.

55.3 Locomotives with a non-operative reset safety control device may be operated on a temporary basis if a second competent person rides in the cab of the locomotive to remove the tractive effort and initiate an application in the event the locomotive engineer becomes inattentive or incapacitated.

## **56. Safety appliances**

56.1 All safety appliances, as described in General Order No. O-10, *Regulations Respecting Railway Safety Appliance Standards (Canada)*, must be kept in a safe and operative condition.

## **57. Speed indicator**

57.1 Locomotives originally equipped with a speed indicator shall not be placed in service without operative speed indicators.

## **58. Audible signals**

58.1 All audible signal equipment on controlling locomotives must be in operative condition.

## **59. Illuminating devices**

59.1 All illuminating devices must be secured and be in operative condition.

# **Locomotive Filing Requirements**

## **60. Filing requirements with the Department**

60.1 A heritage railway operator, if requested, must file with the Railway Administrator a full description of the training program and criteria used

- (a) to perform safety inspections, and
- (b) to perform pre-departure inspections in accordance with Appendix 1.

# **Steam Locomotives**

## **61. Steam locomotives**

61.1 For the purpose of this Part, a “locomotive or engine” means a self-propelled unit of equipment, powered by steam that is either designed or used for moving other equipment. This includes a self-propelled unit designed or used to carry freight or passenger traffic.

61.2 Steam powered locomotives must be inspected and maintained in accordance with *The Railway Association of Canada (RAC) Circular No. MC 3 Steam Locomotive Inspection, Maintenance and Operating Standards* and the *Alberta Boilers Safety Association (ABSA)* requirements.

61.3 Each heritage railway operator that operates, or intends to operate, steam powered locomotives must

- (a) notify the Railway Administrator at least 30 days in advance of the first date of such operation in a new calendar year,
- (a) notify the Railway Administrator in advance of any periodic inspections, as required in *RAC Circular No. MC 3*, and

- (b) maintain on file all periodic inspections for a minimum of 3 years.

## **62. Pre-departure Inspection by a Locomotive Operator or Other Qualified Person**

62.1 A pre-departure inspection of locomotives must be performed by the locomotive operator or other qualified person for the following:

- (a) brake test, including the operation of the safety control system;
- (b) handbrake;
- (c) headlights and ditch lights;
- (d) trucks and running gear;
- (e) any other apparent safety hazard likely to cause an accident or casualty.

62.2 Exceptions are to be reported for correction.

## **Heritage Railway Rules Respecting Track Safety**

### **63. Definitions**

63.1 In these Rules,

- (a) “heritage railway operator” means a railway operator that is under the jurisdiction of the *Railway (Alberta) Act*;
- (b) “line of track” or “track” means a railway of any length, including yard tracks, sidings, spurs and other tracks auxiliary thereto, and including the right-of-way and the structures supporting or protecting the track or facilitating drainage from the track;
- (c) “main track” means a track extending through yards and between stations, upon which trains or engines are authorized and governed by one or more methods of control;
- (d) “track inspector” means a competent person or company appointed in this capacity;
- (e) “track supervisor” means a competent person or company appointed in this capacity.

### **64. Scope**

64.1 This Part prescribes initial minimum safety requirements for railway track that is part of the general railway system of transportation. The requirements prescribed in this Part apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from the requirements in this Part, may require remedial action to provide for safe operations over that track. Nothing in these Rules prevents a heritage railway operator from prescribing a higher level of maintenance.

### **65. Application**

65.1 These Rules apply to all heritage railways operating on standard gauge track in the province of Alberta.

65.2 The purpose of these Rules is to ensure the safe operation of trains on standard gauge track owned by, operated on or used by a heritage railway operator.

### **66. Responsibility of a heritage railway operator**

66.1 Where a line of track is not in compliance with the requirements of these Rules, the heritage railway operator must immediately

- (a) bring the line of track into compliance, or
- (b) halt operations over that line of track.

66.2 Notwithstanding Rule 66.1, in the case of a line of track that is not in compliance with these Rules, the heritage railway operator may operate on that line of track for not more than 30 days if the heritage railway operator considers it safe to do so.

### **67. Restoration or renewal of track under traffic conditions**

67.1 If, during a period of restoration or renewal, a track is under traffic conditions and does not meet all of the requirements prescribed in this Part, the work on the track must be under the continuous supervision of a person designated under Rule 69. The term “continuous supervision” as used in this section means the physical presence of that person at a job site. However, since the work may be performed over a large area, it is not necessary that each phase of the work be done under the visual supervision of that person.

### **68. Measuring track not under load**

68.1 When un-loaded track is measured to determine compliance with requirements of this Part, the amount of rail movement, if any, that occurs while the track is loaded must be added to the measurements of the un-loaded track.

### **69. Track supervisors**

69.1 Each heritage railway operator must utilize competent persons or competent companies to supervise restorations and renewals of track under traffic conditions. These supervisors must also be qualified to inspect track for defects.

### **70. Track inspectors**

70.1 Each heritage railway operator must use competent persons or utilize a competent company to inspect track for defects.

### **71. Certification**

71.1 No heritage railway operator shall allow an employee of the operator to perform the duties of a track inspector or track supervisor unless the employee has, to the satisfaction of the operator, met the criteria established by the operator.

71.2 A heritage railway operator must maintain a record of all competent employees.

### **72. Track inspection**

72.1 A track inspector or track supervisor shall undertake track inspection at such frequency and by such a method as to ensure that a line of track is safe for operation of a train at the authorized speed.

## **Track Safety Rules – Division 1 – Classes of Track**

### **73. Operating speed limits**

73.1 The following maximum allowable operating speeds apply (in miles per hour):

<b>Over track that meets all of the requirements prescribed in this Part for</b>		<b>The maximum allowable speed for trains is</b>
Heritage track		10mph / 16 km/hr

## Track Safety Rules – Division 2 – Roadbed

### 74. Drainage

74.1 Each drainage or other water-carrying facility under or immediately adjacent to the roadbed must be maintained and kept free of obstruction to accommodate expected water flow for the area concerned.

### 75. Vegetation

75.1 Vegetation on heritage railway property that is on or immediately adjacent to the roadbed must be controlled so that it does not

- (a) become a fire hazard to track-carrying structures,
- (b) obstruct visibility of railway signs and signals,
- (c) interfere with railway employees performing normal track side duties,
- (d) prevent proper functioning of signal and communication lines, or
- (e) prevent railway employees from visually inspecting moving equipment from their normal duty stations.

## Track Safety Rules – Division 3 – Track Geometry

### 76. Scope

76.1 This Division prescribes requirements for the gauge, alignment and surface of track, and the elevation of outer rails and speed limitations for curved track.

### 77. Gauge

77.1 Gauge is measured between the heads of the rails at right angles to the rails in a plane 5/8 of an inch below the top of the rail head.

77.2 Gauge must be within the limits prescribed in the following table:

<b>Class of track</b>	<b>The gauge must be at least</b>	<b>But no more than</b>
Heritage track	4'8" (1/2" N)	4'9 3/4" (1 1/4" W)

**Note:** When gauge is less than the minimum shown in the table above, speed must be reduced. If the change in gauge over 20 feet on either side of the defective location exceeds 7/8 inch, then speeds must be further reduced, according to the following table:

<b>Change in gauge over 20 ft. either side of site of narrow gauge</b>	<b>Maximum permissible speed in mph / km</b>
More than 1 1/8"	10 / 16

## 78. Alignment

78.1 Alignment may not deviate from uniformity more than the amount prescribed in the following table:

<b>Class of Track</b>	<b>Tangent track - the deviation of the mid-offset from 62-foot line<sup>1</sup> may not be more than</b>	<b>Curved track - the deviation of the mid-offset from 62-foot chord<sup>2</sup> may not be more than</b>
Heritage track	1 3/4 inches	1 3/4 inches

<sup>1</sup> The ends of the line must be at points on the gauge side of the line rail, 5/8 of an inch below the top of the rail head. Either rail may be used as the line rail, however, the same rail must be used for the full length of that tangential segment of track.

<sup>2</sup> The ends of the chord must be at points on the gauge side of the outer rail, 5/8 of an inch below the top of the rail head.

## 79. Curves: elevation and speed limitations

79.1 Except as provided in Rule 81, the outside rail of a curve may not be lower than the inside rail or have more than 6 inches of elevation.

79.2 The maximum allowable operating speed for each curve is determined by the following formula:

$$* V_{max} = [(Ea+3) / 0.0007d]^{1/2}$$

where

$V_{max}$  = Maximum allowable operating speed (mph)

$Ea$  = Actual elevation of the outside rail (inches)

$d$  = Degree of curvature (degrees)

\* Does not apply to certain passenger equipment

## 80. Elevation of curved track: runoff

80.1 If a curve is elevated, the full elevation must be provided throughout the curve, unless physical conditions do not permit. If elevation runoff occurs in a curve, the actual minimum elevation must be used in computing the maximum allowable operating speed for that curve under Rule 79.2.

80.2 Elevation runoff must be at a uniform rate, within the limits of track surface deviation prescribed in Rule 81, and it must extend at least the full length of the spirals. If physical conditions do not permit a spiral long enough to accommodate the minimum length of runoff, part of the runoff may be on tangent track.

**81. Track surface**

81.1 Heritage railway track to which this Part applies must maintain the surface of its track within the limits prescribed in the following table:

Track Surface	Maximum Allowable
The runoff in any 31 feet of rail at the end of a raise may not be more than	2 in.
The deviation from uniform profile on rail at the mid-ordinate of a 62-foot chord may not be more than	2 1/4 in.
Deviation from designated elevation on spirals may not be more than	1 1/4 in.
Variation in cross level on spirals in any 31 feet may not be more than	1 1/4 in.
Deviation from zero cross level at any point on tangent or from designated elevation on curves between spirals may not be more than	1 3/4 in.
The difference in cross level between any 2 points less than 62 feet apart on tangents and curves between spirals may not be more than	1 3/4 in.

**Track Safety Rules – Division 4 – Track Structure**

**82. Scope**

82.1 This Division prescribes minimum requirements for ballast, crosstie, track assembly fittings and the physical condition of rails.

**83. Ballast: general**

83.1 Unless it is otherwise structurally supported, all track must be supported by material which will

- (a) transmit and distribute the load of the track and railroad rolling equipment to the subgrade,
- (b) restrain the track laterally, longitudinally and vertically under dynamic loads imposed by railway rolling equipment and thermal stress exerted by the rails,
- (c) provide adequate drainage for the track, and
- (d) maintain proper track cross level, surface and alignment.

## 84. Crossties

84.1 Crossties must be made of a material to which rail can be securely fastened.

84.2 Each 39-foot segment of track must have

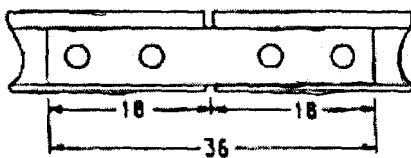
- (a) a sufficient number of crossties which in combination provide effective support that will
  - (i). hold gauge within the limits prescribed in Rule 77,
  - (ii). maintain surface within the limits prescribed in Rule 81, and
  - (iii). maintain alignment within the limits prescribed in Rule 78,
- (b) the minimum number and type of crossties specified in Rule 84.3 effectively distributed to support the entire segment, and
- (c) at least one crosstie of the type specified in Rule 84.3 that is located at a joint location as specified in Rule 84.4.

84.3 Each 39-foot segment of heritage track must have a minimum of 14 crossties which are not

- (a) broken through,
- (b) split or otherwise impaired to the extent the crossties will allow the ballast to work through, or will not hold spikes or rail fasteners,
- (c) so deteriorated that the tie plate or base of rail can move laterally more than 1/2 inch relative to the crossties, or
- (d) cut by the tie plate through more than 40% of a tie's thickness.

84.4 Heritage railway track must have one crosstie whose centre line is within 24 inches of the rail joint location.

84.5 Each rail joint in heritage railway track must be supported by at least one crosstie, specified in Rule 84.3, whose centre line is within the 36 inches, shown below:



## 85. Defective rails

85.1 When a rail in track contains any of the defects listed in the following table, operation over the defective rail is not permitted until

- (a) the rail is replaced, or
- (b) the remedial action prescribed in the following table is initiated.

### 1. Remedial Action

Defect	Length of Defect (inch)		Percent of Rail Head Cross-sectional Area Weakened by Defect		If Defective Rail is not Replaced, Take the Remedial Action Prescribed in the Notes
				less than	
Transverse fissure			20	20	B
			100	100	B A
Compound fissure			20	20	B
			100	100	B A
Detail fracture Engine burn fracture Defective weld			20	20	C D
				100	A or E and H
Horizontal split head	0	2			H and F
Vertical split head	2	4			G
	4				B
	( <sup>1</sup> )	( <sup>1</sup> )			A
Split web	0	1/2			H and F
Piped rail	1/2	3			G
Head web separation	3				B
	( <sup>1</sup> )	( <sup>1</sup> )			A
Bolt hole crack	0	1/2			H and F
	1/2	1 1/2			G
	1 1/2				B
	( <sup>1</sup> )	( <sup>1</sup> )			A
Broken base	0	6			E
					A or E
Ordinary break					A or E
Damaged rail					C

(<sup>1</sup>) Break out in rail head.



**Notes:**

- A) Assigned person to visually supervise each operation over defective rail.
- B) Limit operating speed over defective rail to that as authorized by the Track Supervisor or other supervisory personnel.
- C) Apply joint bars bolted only through the outermost holes to defect within 20 days after it is determined to continue the track in use.
- D) Apply joint bars bolted only through the outermost holes to defect within 10 days after it is determined to continue the track in use.
- E) Apply joint bars to defect and bolt in accordance with Rule 25.4.
- F) Inspect rail 90 days after it is determined to continue the track in use.
- G) Inspect rail 30 days after it is determined to continue the track in use.
- H) Limit operating speed over defective rail to 5 mph.

**85.2 In this Rule,**

- (a) “broken base” means any break in the base of a rail;
- (b) “compound fissure” means a progressive fracture originating in a horizontal split head which turns up or down in the head of the rail as a smooth, bright or dark surface progressing until substantially at a right angle to the length of the rail. Compound fissures require examination of both faces of the fracture to locate the horizontal split head from which they originate;
- (c) “damaged rail” means any rail broken or injured by wrecks, broken, flat or unbalanced wheels, slipping or similar causes;
- (d) “detail fracture” means a progressive fracture originating at or near the surface of the rail head. These fractures should not be confused with transverse fissures, compound fissures or other defects which have internal origins. Detail fractures may arise from shelly spots, head checks or flaking;
- (e) “engine burn fracture” means a progressive fracture originating in spots where driving wheels have slipped on top of the rail head. In developing downward they frequently resemble the compound or even transverse fissures with which they should not be confused or classified;
- (f) “horizontal split head” means a horizontal progressive defect originating inside of the rail head, usually one-quarter inch or more below the running surface and progressing horizontally in all directions, and generally accompanied by a flat spot on the running surface. The defect appears as a crack lengthwise of the rail when it reaches the side of the rail head;
- (g) “ordinary break” means a partial or complete break in which there is no sign of a fissure and in which none of the other defects described in this Rule are found;
- (h) “piped rail” means a vertical split in a rail, usually in the web, due to failure of the shrinkage cavity in the ingot to unite in rolling;
- (i) “split web” means a lengthwise crack along the side of the web and extending into or through it;
- (j) “transverse fissure” means a progressive crosswise fracture starting from a crystalline centre or nucleus inside the head from which it spreads outward as a smooth, bright or dark, round or oval surface substantially at a right angle to the length of the rail. The distinguishing features of a transverse fissure from other types of fractures or defects are the crystalline centre or nucleus and the nearly smooth surface of the development which surrounds it;
- (k) “vertical split head” means a vertical split through or near the middle of the head and extending into or through it. A crack or rust streak may show under the head close to the web or pieces may be split off the side of the head.

## 86. Rail end mismatch

86.1 Any mismatch of rails at joints may not be more than that prescribed by the following table:

Class of Track	On top of the rail ends (inch)	On the gauge side of the rail ends (inch)
Heritage Railway Track	3/16	3/16

## 87. Rail joints

87.1 Each rail joint, insulated joint and compromise joint must be of the proper design and dimensions for the rail on which it is applied.

87.2 If a joint bar is cracked, broken or because of wear allows vertical movement of either rail when all bolts are tight, it must be replaced.

87.3 If a joint bar is cracked or broken between the middle 2 bolt holes, it must be replaced.

87.4 In the case of jointed track, each rail must be bolted with at least one bolt on each side of the joint bar and repaired as soon as possible.

87.5 Each joint bar must be held in position by track bolts tightened to allow the joint bar to firmly support the abutting rail ends and to allow longitudinal movement of the rail in the joint to accommodate expansion and contraction due to temperature variations.

87.6 No rail or joint bar having a torch cut or burned bolt hole may be used.

## 88. Tie plates

88.1 In heritage railway track where timber crossties are in use, there must be tie plates under the running rails on at least 8 of any 10 consecutive ties.

## 89. Rail anchoring

89.1 A sufficient number of anchoring devices must be applied to provide adequate longitudinal restraint. The devices may vary by locations and may not be required on track where there are minimal longitudinal stresses or where there is no historical evidence of pull-a-parts or sun kinks.

## 90. Rail fastenings

90.1 Each 39-foot segment of rail must have a sufficient number of fastenings to effectively maintain gauge within the limits prescribed in Rule 77.

## 91. Rail wear

91.1 Each heritage railway operator must have written requirements establishing maximum rail wear limits. These requirements must be made available on request to the Railway Administrator.

## 92. Turnouts and track crossings generally

92.1 In turnouts and track crossings, the fastenings must be intact and maintained so as to keep the components securely in place. Also, each switch, frog and guard rail must be kept free of obstructions that may interfere with the passage of wheels.

92.2 Heritage track must be equipped with rail anchors through and on each side of track crossings and turnouts to restrain rail movements affecting the position of switch points and frogs.

92.3 Each flangeway at turnouts and track crossings must be at least 1.5 inches wide.

### **93. Switches**

93.1 Each stock rail must be securely seated in switch plates, but care must be used to avoid canting the rail by over tightening the rail braces.

93.2 Each switch point must fit its stock rail properly with the switch stand in either of its closed positions to allow wheels to pass the switch point. Lateral and vertical movement of a stock rail in the switch plates or of a switch plate on a tie must not adversely affect the fit of the switch point to the stock rail.

93.3 Each switch must be maintained so that the outer edge of the wheel tread cannot contact the gauge side of the stock rail.

93.4 The heel of each switch rail must be secure and the bolts in each heel must be kept tight.

93.5 Each switch stand and connecting rod must be securely fastened and operable without excessive lost motion.

93.6 Each throw lever must be maintained so that it cannot be operated with the lock or keeper in place.

93.7 Each switch position indicator must be clearly visible at all times.

93.8 Unusually chipped or worn switch points must be repaired or replaced. Metal flow must be removed to ensure proper closure.

### **94. Frogs**

94.1 The flangeway depth measured from a plane across the wheel bearing area of a frog may not be less than 1.5 inches on a heritage railway track.

94.2 If a frog point is chipped, broken or worn more than 5/8 inch down and 6 inches back, operating speed over the frog may not be more than 10 miles per hour.

94.3 If the tread portion of a frog casting is worn down more than 3/8 inch below the original contour, operating speed over that frog may not be more than 10 miles per hour.

### **95. Self-guarded frogs**

95.1 The raised guard on a self-guarded frog may not be worn more than 3/8 inch.

95.2 If repairs are made to a self-guarded frog without removing it from service, the guarding face must be restored before rebuilding the point.

### **96. Frog guard rails**

96.1 The guard check in frogs must be within the limits prescribed in the following table:

<b>Class of Track</b>	<b>Guard check gauge - the distance between the gauge line of a frog to the guard line<sup>1</sup> of its guard rail or guarding face, measured across the track at right angles to the gauge line<sup>2</sup>, may not be less than</b>
Heritage Railway Track	4 feet 6 3/8 inches

<sup>1</sup>Line along that side of the flangeway which is nearer to the centre of the track and at the same elevation as the gauge line.

<sup>2</sup>Line 5/8 inch below the top of the centre line of the head of the running rail, or corresponding location of the tread portion of the track structure.

## Track Safety Rules – Division 5 – Track Appliances and Track-Related Devices

### 97. Scope

97.1 This Division prescribes minimum requirements for certain track appliances and track-related devices.

### 98. Derails

98.1 Each derail must be clearly visible and painted yellow. When in a locked position, a derail must be free of any lost motion that would allow it to be operated without removing the lock.

98.2 Derails must be installed when there is any possibility of equipment that has been left standing on tracks, other than main tracks or sidings, being moved by gravity so as to obstruct a main track or siding.

98.3 The location of each derail must be marked with a rectangular sign that has a yellow background with the letter “D” or “Derail” printed in black. The sign must be mounted on a post that is adjacent to the derail. The bottom of the sign must be not less than 1.5 metres or more than 2 metres above the ground.

## Track Safety Rules – Division 6 – Inspection

### 99. Scope

99.1 This Division prescribes requirements for the frequency and manner of inspecting track to detect deviations from the standards prescribed in this Part.

### 100. Track inspections

100.1 All tracks must be inspected in accordance with the table prescribed in Rule 101.3.

100.2 Each inspection must be made on foot or by riding over the track in a vehicle at a speed that allows the person making the inspection to visually inspect the track structure for compliance with this Part. However, mechanical, electrical and other track inspection devices may be used to supplement visual inspection. If a vehicle is used for visual inspection, the speed of the vehicle may not be more than 5 miles per hour when passing over track crossings, highway crossings or switches.

100.3 When riding over the track in a vehicle, the track inspectors may inspect up to 2 tracks at one time provided that

- (a) each main track is actually traversed by the vehicle or inspected on foot on alternate inspections at least once every 7 days, and each siding is actually traversed by the vehicle or inspected on foot at least once every month,

- (b) one track inspector cannot inspect more than 2 tracks at one time and cannot inspect any track centred more than 30 feet from the track on which the inspector is riding,
- (c) track inspection records indicate all track included in the inspection and indicate which track was traversed by the vehicle or inspected on foot,
- (d) the track inspector's view of the tracks is unobstructed by tunnels, bridges, differences in ground level or any other circumstances or conditions that would interfere with a clear view of all the tracks being inspected, and
- (e) each track inspection be made in accordance with the following table:

**Heritage Railway Track**

<b>Track Type</b>	<b>Required Frequency</b>
Main Track	As required with a maximum interval of 7 calendar days between inspections and train operations.
Sidings	Monthly with a minimum of 20 calendar days between inspections, or before use if the track is used less than once per month.
All Tracks	All tracks must be inspected prior to seasonal start up if the track has not been used on a monthly basis.

100.4 If the person making the inspection finds a deviation from the requirements of this Part, that person shall immediately initiate remedial action.

100.5 In addition to track inspections, a heritage railway operator shall develop a plan to identify internal track defects.

**101. Switch and track crossing inspections**

101.1 Except as provided in Rule 102.2, each switch and track crossing must be inspected on foot at least monthly.

101.2 In the case of track that is used less than once a month, each switch and track crossing must be inspected on foot before it is used.

**102. Special inspections**

102.1 In the event of fire, flood, severe storm or other occurrences which might have damaged the track structure, a special inspection must be made of the track involved as soon as possible after the occurrence.

**103. Inspection records**

103.1 Each heritage railway operator shall keep a record of each inspection required to be performed on that track under this Division.

103.2 Each record of an inspection under Rules 101 and 102 must be prepared on the day the inspection is made and signed by the person making the inspection. Records must specify the track inspected, date of inspection, location and nature of any deviation from the requirements of this Part, and the remedial action taken

by the person making the inspection. Heritage railway operators shall retain each record at its division headquarters for at least one year after the inspection covered by the record.

103.3 Rail inspection records must specify the date of inspection, the location and nature of any internal rail defects found, and the remedial action taken and the date thereof. Heritage railway operators must retain a rail inspection record for at least 2 years after the inspection and for one year after remedial action is taken.

103.4 All records must be made available on request by a railway safety officer.

## **Heritage Railway Employee Qualification Standards**

### **104. Definitions**

104.1 In these Rules,

- (a) “candidate” means an employee who is required to undergo examination and on-job training in accordance with these Rules in order to be qualified to work in a heritage railway yard;
- (b) “classroom training instructor” means a person qualified under these Rules to give classroom instruction;
- (c) “engine” means a locomotive, rail car mover, winch or other equipment used to move rail cars;
- (d) “examiner” means a person who is qualified under these Rules to examine employees;
- (e) “fireman” means a person who fires a locomotive or assists an engineer in the performance of the engineer’s duties;
- (f) “movement” means the transfer of rail equipment from one location to another;
- (g) “on-job training” means instruction provided to an employee by an on-job training instructor in the work environment appropriate to a heritage railway;
- (h) “on-job training instructor” means a person who is qualified under these Rules to instruct employees during on-job training;
- (i) “rail equipment” means one or more engines or rail cars that can be handled on their own wheels in a movement;
- (j) “required subject” means a subject listed in Appendix 1 that is required in order to qualify for the category.

### **105. Training programs must be established**

105.1 A heritage railway operator shall establish employee training programs for employees directly involved in heritage railway operations.

### **106. Person must be qualified to work in a heritage railway yard**

106.1 Subject to Rule 107.2, no heritage railway company shall permit an employee to work in a heritage railway operation unless the employee is competent to work in a heritage railway yard in accordance with Rule 111.1.

106.2 An employee undergoing on-job training may perform the duties for which the employee is a candidate under the direction of an on-job training instructor for the duration of the employee’s training period.

### **107. Extent of on-job training**

107.1 A heritage railway operator shall provide its heritage railway yard employees with on-job training in respect of the required subjects to enable them to demonstrate to on-job training instructors and examiners that they are competent to perform their required duties.

### **108. Passing mark for on-job training**

108.1 No examiner shall issue a passing mark for on-job training unless the examiner

- (a) is satisfied that the candidate is competent to perform the required duties by assessing the candidate's competency in actual heritage railway operations, and
- (b) has completed, signed and placed on the candidate's personnel file a document indicating that the candidate has received a passing mark for the on-job training.

### **109. Examinations**

109.1 An examiner shall determine the overall mark for a candidate based on written or oral examinations, or both, dealing with the required subjects.

### **110. Qualification standards for candidates**

110.1 The subjects required for an employee to qualify to work in a heritage railway yard are the subjects listed in Appendix 1.

110.2 No heritage railway operator shall qualify an employee to work in a heritage railway yard unless the person obtains a mark of at least 80% in each required subject.

### **111. Qualification standards for on-job training instructors**

111.1 No heritage railway operator shall qualify a person as an on-job training instructor unless the person meets the qualification requirements with a mark of at least 80% in each required subject and demonstrates that the person is competent in the function being instructed.

### **112. Qualification standards for classroom training instructors**

112.1 No heritage railway company shall qualify a person as a classroom training instructor for a required subject unless the person has

- (a) obtained a mark of at least 90% in a written examination on that subject, and
- (b) received training in instructional delivery.

### **113. Qualification standards for examiners**

113.1 A person who is a classroom training instructor is qualified to act as an examiner on the subjects on which the person is qualified to give instruction.

### **114. Re-examination**

114.1 A heritage railway company shall, at intervals of not more than 3 years, have each employee that is qualified to work in a heritage railway site re-examined on the required subjects.

114.2 A re-examination must consist of

- (a) a review or test, or both, of an employee's knowledge of required subjects, and
- (b) a hands-on competency evaluation of actual job tasks measured against a defined level of performance.

114.3 The passing mark for re-examination is 80% for each subject.

### 115. Copies of examinations must be kept on file

115.1 A heritage railway company shall retain on file a copy of each type of classroom examination and a copy of a detailed description of each method of assessing on-job competence used by the heritage railway company.

### 116. Examination records must be kept on file

116.1 During the period of employment of each employee examined in accordance with these Rules, a heritage railway operator shall maintain an examination record for the employee.

### 117. Record of training programs must be kept on file

117.1 A heritage railway operator must retain on file a full description of its employee training programs related to heritage railway yard operations.

117.2 A heritage railway operator must maintain for each calendar year a comprehensive record of its employee training programs, including recurrent training.

117.3 A record under Rule 118.2 must specify

- (a) the total number of employees involved with heritage railway yard operations,
- (b) the total number of employees and the names of the employees who received training for heritage railway yard operations, and
- (c) the number of employees who received training and met the training requirements for heritage railway yard operations.

## Appendix 1

### Required Subjects

The following tables outline the subject-matter that must be included as a minimum in training programs for employees directly involved in heritage railway yard operations. It is the responsibility of each heritage railway operator to identify the specific content that is applicable to their respective operations.

**Table A**  
**Training Requirements**

1. Persons in a safety critical position require the training noted in Items 1, 2, 3, 4, 5, 6, and 7.
2. A person in a steam locomotive in a fireman position requires the training noted in Items 2, 3, 6, 7 and 8.
3. Persons directly involved in the movement of trains require the training noted in Items 1, 2, 3, 4, and 5.
4. Persons not directly involved in the movement of trains but who work on or around trains require the training noted in Items 1, 3, and 5.

Item	Description
1. Heritage Railway Operating Rules (HROR), including Railway Radio Communication Rules	Applicable operating rules as per guidelines
2. Car Air Brake Systems	Identify and explain the purpose of each major component of a freight car air brake system and how they operate.



Item	Description
3. Car Securement	Identify and apply the rules that apply to the use and testing of handbrakes in securing equipment.
4. Equipment Handling and Switching Strategies	Identify the operating conditions that will affect the selection of the safest and most effective equipment handling and switching strategies, and apply these strategies safely.
5. Core Safety Rules	<p>Explain and apply basic safety rules for working in and around rail equipment, including but not limited to the following:</p> <ul style="list-style-type: none"> <li>● on or about tracks</li> <li>● 3-point protection</li> <li>● entraining/detraining/crossing over/riding equipment</li> <li>● hand-operated switches (throwing, cleaning)</li> <li>● operating derails</li> <li>● coupling/adjusting misaligned coupler</li> </ul>
6. Engine operation	<p>Identify and apply the rules and procedures for:</p> <ul style="list-style-type: none"> <li>● safely starting the equipment</li> <li>● the considerations and steps for initiating movement</li> <li>● the considerations to be made while operating</li> <li>● engine brakes</li> <li>● safety control systems</li> </ul>
7. Engine inspection	<ul style="list-style-type: none"> <li>● Identify and apply the steps to be taken in inspecting the equipment</li> <li>● Develop and implement a plan for equipment inspection appropriate for the equipment being used</li> </ul>

Item	Description
8. Boiler operations and controls	Identify and operate or maintain the following: <ul style="list-style-type: none"> <li>● water gauge</li> <li>● water level</li> <li>● water injector</li> <li>● firing controls</li> <li>● steam pressure</li> <li>● fire in the fire box</li> <li>● ability to start up and shut down the fire</li> <li>● basic steam locomotive operation</li> <li>● emergency procedures</li> <li>● train movement</li> </ul>

## Heritage Railway Safety Critical Positions Rules

### 118. Interpretation

118.1 In these Rules, “safety critical position” means a railway position directly involved in the operation of a locomotive.

118.2 Any person performing any of the duties normally performed by a person holding a safety critical position is deemed to be holding a safety critical position while performing those duties.

### 119. Records to be kept

119.1 A heritage railway operator shall

- (a) maintain a list of all qualified locomotive engineers, and
- (b) make the lists referred to in clause (a) available for inspection by a railway safety officer on request.

## Heritage Railway Medical Rules for Positions Critical to Safe Heritage Railway Operations

### 120. Definitions

120.1 In these Rules,

- (a) “medical practitioner” means a medical doctor or a registered nurse employed by a heritage railway operator;
- (b) “person” means a person in a safety critical position;
- (c) “safety critical position” means a railway position directly involved in the operation of a locomotive.

## **121. Frequency of medical assessments**

121.1 An employee must undergo a medical fitness for duty assessment

- (a) prior to commencement of employment in a safety critical position,
- (b) on promotion or transfer to a safety critical position, and
- (c) every 5 years until the age of 40, and every 3 years after that date until the employee retires or no longer occupies a safety critical position.

121.2 The medical practitioner may require an employee to undergo additional medical fitness for duty assessments if the employee

- (a) has or may have a medical condition that requires frequent monitoring, or
- (b) is returning to work in a safety critical position after a medical leave of absence.

## **122. Medical fitness for duty assessment**

122.1 The assessment must be conducted by a medical practitioner using the Alberta Transportation drivers licence medical examination.

## **123. Medical restrictions**

123.1 If, in making an individual assessment of an employee's medical fitness for duty, the medical practitioner is of the opinion that there exists a threat to safe heritage railway operations, the medical practitioner may

- (a) prohibit the employee from occupying a safety critical position,
- (b) restrict the use of corrective devices or other medical aids, or
- (c) otherwise restrict the employee's ability to work or perform certain tasks in a safety critical position.

123.2 On completion of a medical fitness for duty assessment, the medical practitioner shall advise the employee who is the subject of the assessment and the employee's supervisor of

- (a) the employee's medical fitness for duty, and
- (b) any restrictions or requirements imposed by the chief medical examiner under Rule

## **124. Records**

124.1 The medical practitioner shall maintain a record of each employee's medical fitness for duty assessments and any restrictions imposed under Rule 124.1.

124.2 The heritage railway operator shall maintain copies of all medical policies, guidelines and medical fitness certificates used by the heritage railway operator in respect of medical fitness for duty assessments.

124.3 The heritage railway operator shall make records, medical certificates of fitness records, policies and guidelines required to be maintained under this Rule available to a railway safety officer on request.

## **125. Exception**

125.1 These Rules do not apply to a heritage railway operator if that operator establishes and complies with appropriate alternative medical requirements suitable to the operator's particular operation.

125.2 In developing alternative medical requirements, the heritage railway operator must

- (a) use these Rules as a guide to ensure that the alternative medical requirements achieve an equivalent level of safety,

- (b) establish appropriate rules suitable for the operator's operation in respect of its employees in safety critical positions,
- (c) maintain fitness records for each employee and make them available to a railway safety officer upon reasonable request, and
- (d) maintain a copy of the alternative medical requirements.

125.3 The Railway Administrator may reject a heritage railway operator's alternative medical requirements if, in the Railway Administrator's opinion, an equivalent level of safety is not achieved.