

SCHEDULE 2

***RAILWAY FREIGHT AND PASSENGER TRAIN BRAKE
INSPECTION AND SAFETY RULES***

September 29, 2023

Contents

PART I – GENERAL	3
1 Short Title	3
2 Scope	3
3 Definitions	3
4 Certification of Car Inspectors	7
5 Qualified Persons	7
6 Pre-Departure Requirement for Locomotives	7
7 Operating Requirements	7
8 Exceptions	10
9 Corrective Action Reporting	11
10 Train Brake Winter Operating Plan	12
PART II – BRAKE TEST REQUIREMENTS	12
11 General	12
12 No. 1 Brake Test	12
13 No. 1a Brake Test	14
14 Brake Effectiveness Test (BET)	
15 Continuity Test	15
16 Train Information Braking System (Tibs) Test	20
17 Transfer Brake Test	20
18 Push-Pull Operation	20
19 Portable Locomotive Remote Control Device Tilt Test	20
20 Trains Using Back-Up Hose or Valve	21
21 Snow Plow Train Brake Test	21
PART III – EQUIPMENT REQUIREMENTS	21
22 Maintenance	21
23 Brake Cylinder Piston Travel	23
24 Locomotive Feed Valves and Pressure Settings	24
PART IV – FILING REQUIREMENTS	24
25 Filing Requirements with the Department	24

PART I – GENERAL

1. SHORT TITLE

- 1.1 For ease of reference, these rules may be referred to as the "Train Brake Rules".

2. SCOPE

- 2.1 These Rules prescribe the minimum safety standards for the safe operation of train brakes on all freight and passenger trains operated by a company subject to the *Railway Safety Act*.

3. DEFINITIONS

In these Rules:

“bad order” means railway equipment that has been identified with a defect.

“bad order card” means a company form that is affixed to railway equipment to indicate repair or maintenance requirements.

“bad order information system” means any method by which a company can monitor, control and protect the movement of railway equipment identified with defects.

“block of cars” means two (2) or more cars that have previously received a No.1 or No.1A brake test, as a solid coupled block, for which a record is available.

“block swap” means the addition to a train of a maximum of two (2) solid coupled block(s) of cars that have previously received a No.1 brake test.

“brakes” means pneumatic (air) or electronically controlled pneumatic (ECP) brake systems.

“brake effectiveness test” (BET) means an air brake test that uses wheel temperature detectors to identify cars with ineffective brakes.

“brake indicator device” means any device used to indicate the application and release of the brakes when the piston is not visible.

“brake system defect” means a defective or inoperative brake component that prevents the brake system from functioning as intended.

“brake test” means a test performed for the purpose of establishing that the brake system functions as intended, as outlined in Part II of these Rules and company procedures/work instructions.

“cab control car” means a railway vehicle without propelling motors with one or more control stands.

“calibrated” means an indication on the airflow indicator at a position that corresponds to a flow of air into the brake pipe of sixty (60) cubic feet (one point seven (1.7) cubic metres) per minute.

“certified car inspector” means a person who is trained, qualified and certified to inspect and maintain car brake equipment.

“company” is as defined under the Railway Safety Act.

“continuity” means the capability of transmitting a signal between the leading locomotive and the rear of the last piece of equipment of a train.

“conventional train” means a train with the brake pipe air supplied from the controlling locomotive only.

“Department” means the Department of Transport.

“dynamic brake” means a train braking system whereby the kinetic energy of a moving train is used to generate electric current at the locomotive traction motors, which is then dissipated through resistor grids or into the catenary or third rail.

“enhanced air brake test” means a time based air brake test capable of assessing brake cylinder performance of freight cars that can be used in lieu of a brake effectiveness test.

“equipment” or “railway equipment” means railway locomotives, freight cars, passenger cars, cabooses or service equipment operating in a train or transfer.

“heavy grade” means as defined in the *Canadian Rail Operating Rules* (CROR).

“integrity” means having the unimpaired capability to supply air to the rear of the last piece of equipment of a train.

“interchange” means the transfer of railway equipment between companies.

“lift” means the addition to a train of a solid coupled block of cars that have previously received a No.1A brake test at that location.

“locomotive or engine” means a rail vehicle propelled by any energy form, intended for the propulsion and/or control of freight, passenger or service equipment.

“locomotive consist” means a combination of locomotives coupled together and operated from a single control.

“modified tilt test” means a test of the portable locomotive remote control device in which the operator control unit is tilted until an alarm is generated.

“mountain grade” means as defined in the *Canadian Rail Operating Rules* (CROR).

“operative” means a brake that applies and releases and is in a suitable condition to retard and/or stop equipment.

“person in charge” means a person certified in accordance with Section 4 of these Rules, appointed by a company to ensure the safe conduct of a railway operation.

“portable locomotive remote control device” means a device that is a component part of a system for remotely operating a locomotive(s).

“psi” means pressure in pounds per square inch (“kpa” means the equivalent to 1000 newtons per square metre).

“pull-by inspection” means a visual examination, by a stationary qualified person, of a train operating at a speed not exceeding five (5) miles per hour (mph) (eight (8) kilometres per hour (km/h)) to verify that all brakes have released.

“push-pull operation” means a train operation in which the control of the train can be from either end.

“qualified person” means in respect of a specified duty, a person who, because of knowledge, training and experience, is qualified to perform that duty safely and properly.

“railway safety inspector” means a Department of Transport inspector designated pursuant to Section 27 of the *Railway Safety Act*.

“railway schedule” means an electronic or paper record that indicates the type of inspection, brake test and operational activity performed by a railway and the location where the activity is performed.

“running brake test” means a test of brakes performed on a moving train to ascertain that the brakes are operational and to confirm the operation of the dynamic brake prior to operating in territory set out in subsection 7.4 of these Rules.

“safety control” means a device(s) that will cause a brake application to be initiated automatically if the locomotive operator becomes incapacitated.

“safety inspection location” means a location designated by a company where certified car inspectors perform an inspection and testing of train brakes.

“supplemental source of air” means a supply of air to the brake pipe from a location other than the controlling locomotive.

“train information breaking system” (TIBS) means a system with rear and front of train radio communication components capable of:

- a) monitoring and displaying brake pipe pressure on the rear piece of equipment; and
- b) calculating and displaying distance measurement; and
- c) initiating an emergency brake application at the rear of the train from the head end.

“train” means an engine that is intended to operate at speeds greater than fifteen (15) mph (twenty-five (25) km/h):

- a) without cars; or
- b) with cars and equipped with TIBS or a supplemental source of air with TIBS capability at the rear; or
- c) with cars including a caboose occupied by a crew member; or
- d) with cars in passenger service.

“train brake status system” means any method by which a company maintains information on the status of train brake inspections.

“Transfer” means an engine with cars operating on main track at speeds not exceeding fifteen (15) mph (twenty-five 25 km/h) and need not be TIBS equipped.

“train brake test device” means equipment, either fixed or mobile, used to control the supply of compressed air to operate the brakes on railway equipment.

“unit train” means a train having 80 cars or more consisting of a single commodity or car type; shipped from the same origin to the same destination; and operating with 100 tons or more per operative brake.

“valid brake status” means a car has passed a brake effectiveness test (BET) in accordance with these Rules.

“wheel temperature detector” (WTD) means technology that uses heat detection sensors to quantify the temperature of a passing wheel as a direct result of braking force applied on the wheel tread.

4. CERTIFICATION OF CAR INSPECTORS

- 4.1 A company shall ensure that its certified car inspectors are trained and qualified to perform brake tests on freight and/or passenger cars and trains and perform associated repairs in compliance with these Rules and in accordance with company procedures/work instructions, and all amendments, as filed with the Department. Certified car inspectors shall be conversant with these Rules and be able to demonstrate to a company, by means of oral or written examinations and on-the-job performance, a knowledge and ability concerning the performance of brake tests and associated repairs.
- 4.2 A company shall file with the Department a full description of the training program, criteria and all amendments used for certifying car inspectors.
- 4.3 A company shall maintain a record of all certified car inspectors. This record shall be made available to a railway safety inspector upon request.
- 4.4 Certified car inspectors shall be re-certified if they have not been performing the duties prescribed in these Rules within the past three (3) years.

5. QUALIFIED PERSONS

- 5.1 A company shall ensure that its qualified persons are trained and qualified to perform the inspection and testing of brakes, associated control devices and safety controls in compliance with these Rules and in accordance with company procedures/work instructions, and all amendments, as filed with the Department.
- 5.2 A company shall file with the Department a full description of the training program, criteria and all amendments used for qualifying those employees performing brake tests in accordance with these Rules.
- 5.3 A company shall maintain a record of all qualified persons. This record shall be made available to a railway safety inspector upon request.

6. PRE-DEPARTURE REQUIREMENT FOR LOCOMOTIVES

- 6.1 When taking charge of a locomotive(s), except when changing off with another crew, the locomotive engineer or qualified person shall determine that all brakes are functional.
- 6.2 When the brake test is done by other than the locomotive engineer, the results of the test shall be made available to the locomotive engineer and be retained on record for ninety-two (92) days.

7. OPERATING REQUIREMENTS

- 7.1 A freight train shall operate with no less than eighty-five (85) percent of the train brakes operative, except as provided in Subsection 8.5 of these Rules.
- 7.2 A company shall instruct its operating employees of the territory in which pressure-retaining valves and/or dynamic brakes shall be used.
- 7.3 A passenger train shall be operated with no less than eight-five (85) percent of the train brakes operative, including the locomotive(s), unless a reduction in train speed is made, as determined by the locomotive engineer, in accordance with company procedures/work instructions, and all amendments, as filed with the Department.
- 7.4 A running brake test of passenger train brakes shall be performed after leaving any location where the crew is changed in accordance with company procedures/work instructions.
- 7.5 When a train experiences a brake system or a safety control failure or malfunction en route which cannot be readily corrected, the conductor, or in his/her absence, the locomotive engineer, shall report the location, date, time, description of the failure or malfunction and the appropriate action taken by the engineer, in accordance with company procedures/work instructions.
- 7.6 When the safety control on the controlling locomotive becomes inoperative while a train is en route, it may be cut out, and as soon as possible, corrective action shall be taken to either repair the safety control or change the locomotive.
- 7.7 The locomotive engineer and the conductor shall be provided with the initial brake test results and en route updates of the status of the train brakes

Conventional Trains

- 7.8 A freight train having received a No.1 brake test, a No.1A brake test, a brake effectiveness test, an enhanced air brake test or a continuity test may only depart a terminal if:
 - a) the train line brake pipe pressure on the tail end of the train is within fifteen (15) psi (one hundred (100) kpa) of the locomotive brake pipe pressure, and,
 - b) air flow to the brake pipe does not exceed sixty (60) cubic feet (one point seven (1.7) cubic metres) per minute, as indicated by the flow indicator or brake pipe leakage does not exceed five (5) psi (thirty-five (35) kpa) in sixty (60) seconds.
- 7.9 While a train is en route, if the air flow exceeds sixty (60) cubic feet per minute (CFM) or if the pressure gradient exceeds fifteen (15) PSI when the automatic brake handle is in the release position, other than during intended brake application and/or

release activity, and remains consistently above these levels, as determined by the locomotive engineer, the following corrective action(s) must be taken:

- a) the train must be stopped at the next available location where an inspection can be safely performed;
- b) after stopping and prior to resuming movement, if the air flow or pressure gradient does not return to the required levels, the train must be inspected for leaks in the brake system and corrective actions must be implemented as required.

7.10 When the leading locomotive ceases to control a train en route, a continuity test shall be made from the controlling locomotive, and as soon as possible, the controlling locomotive will be placed in the lead position.

Trains with Supplemental Source(s) of Air

7.11 A train having received a No. 1 brake test, a No.1A brake test, a brake effectiveness test, an enhanced air brake test or a continuity test may only depart a terminal if the combined air flow to the brake pipe does not exceed ninety (90) CFM with no individual source of air having a flow greater than sixty (60) CFM, as indicated by the flow indicator.

7.12 While a train is en route, if the combined air flow exceeds ninety (90) CFM or if any individual source of air has a flow that exceeds sixty (60) CFM when the automatic brake handle is in the release position, other than during intended brake application and/or release activity, and remains consistently above these levels, as determined by the locomotive engineer, the following corrective action(s) must be taken:

- a) the train must be stopped at the next available location where an inspection can be safely performed;
- b) after stopping and prior to resuming movement, if the air flow does not return to the required levels, the train must be inspected for leaks in the brake system and corrective actions must be implemented as required.

7.13 When one or more supplemental sources of air are placed in a train or the controlling locomotive and/or supplemental source(s) are changed, communications between the controlling locomotive and supplemental sources of air shall be verified to ensure the equipment is operating as designed.

7.14 A company shall have operating instructions or procedures that address the following:

- a) maximum distance between multiple source(s) of air;
- b) communications loss between multiple sources of air; and

- c) allow the locomotive engineer to determine air flow, brake pipe pressure and status of brake valve from each supplemental source(s) of air.

7.15 When the leading locomotive ceases to control a train en route, a continuity test and a communications test of the supplemental source(s) of air shall be made from the controlling locomotive, and as soon as possible, the controlling locomotive will be placed in the lead position.

7.16 A supplemental source of air being used as the Train Information Braking System, at the rear of the train shall comply with Section 16 of these Rules.

8. EXCEPTIONS

8.1 A car found to be bad order for brakes at a safety inspection location may remain in the train when the car is being routed to a car owner maintenance facility for repair.

Cars with bad order for brakes may be moved in a train in accordance with company procedures/work instructions when authorized by a person in charge if the person in charge ensures that appropriate measures have been taken to move such equipment safely and identify the destination in the direction of travel where the equipment will be repaired and freight trains shall have no less than ninety-five (95) percent of the brakes operative.

8.2 A car found to be bad order for brakes at a safety inspection location and being routed to a car owner maintenance facility for repair as per Subsection 8.1, or while en route in a train, may remain in the train provided that:

- a) where appropriate, the brakes of the car or the affected truck shall be cut out;
- b) there are no more than two (2) consecutive inoperative control valves;
- c) except as provided in Subsections 8.7, 8.9 and 8.10 of these Rules, there shall be a minimum of three (3) cars with operative brakes at the rear of a freight train;
 - i. on cars of articulated or permanently coupled multi-platform design, at least fifty (50) per cent of the control valves must be operational for a car to be considered as having operational brakes.
- d) passenger trains shall have the brakes operational on at least one (1) truck on the last car in the train and no less than eight-five (85) percent of the brakes shall be operative; and
- e) passenger trains having cars with bolted couplers design may depart from other than a safety inspection location, with the brakes cut out on the last car, when:
 - i. appropriate action is taken by the locomotive engineer, in accordance with company procedures/work instructions;
 - ii. the defective car is repaired, set off, or relocated in the consist of the train at the first safety inspection location in the direction of travel; and
 - iii. the Department is advised of each occurrence.

- 8.3 A company shall control and protect the movement of a car with inoperative brakes with a train brake status system in accordance with company procedures/work instructions. This may include the use of a bad order card.
- 8.4 The conductor, or in his or her absence, the locomotive engineer, shall be notified of cars with inoperative brakes in the train, and in turn, is responsible to ensure the train brake status system is updated in accordance with company procedures/work instructions.
- 8.5 Cars or locomotives with inoperative brakes due to damage may be moved in a train when authorized by a person in charge. In accordance with company procedures/work instructions, the person in charge will ensure that appropriate measures have been taken to move such equipment safely and identify the destination in the direction of travel where the equipment will be repaired.
- 8.6 On trains of eighteen (18) cars or less, when it is not possible to comply with Subsection 8.1 and 12.8 of these Rules, a train may proceed with equipment that has inoperative brakes provided that:
- a) the conductor and locomotive engineer are advised of the placement of such equipment in the train;
 - b) the appropriate action, such as the reduction of train speed, is taken so as to ensure safe operation, in accordance with company procedures/work instructions;
 - c) the requirements of Subsection 7.1 of these Rules are not exceeded.
- 8.7 Scale test cars without brakes may be moved in a freight train provided they are placed ahead of the rear car of the train and they are coupled to cars with operative brakes.
- 8.8 Other railway equipment without brakes, because of design, may operate in a freight train provided the equipment is identified to the Department.
- 8.9 A test car with inoperative brakes may be moved at the rear of a freight train in test mode provided it is coupled and secured to a car with operative brakes.
- 8.10 In accordance with company procedures/work instructions, the person in charge may move cars or locomotives with inoperative brakes, due to damage en route, at the rear of the train when no other option exists.

9. CORRECTIVE ACTION REPORTING

- 9.1 A company shall reply in writing or by acceptable electronic means, within fourteen (14) days, to the Department's regional office concerned, on the corrective action taken to correct a non-compliance(s) reported by a railway safety inspector. On defective

equipment, the reply, from a railway officer, shall also include the equipment initials and number and the date and location of the corrective action taken.

10. TRAIN BRAKE WINTER OPERATING PLAN

- 10.1 Each company must develop and adhere to a Train Brake Winter Operating Plan that includes measures for speed restrictions, enhanced train brake inspection and testing requirements, to be taken at specified temperature thresholds to reduce the risk of derailment caused by train brake failure.
- 10.2 The Train Brake Winter Operating Plan must be in effect between November 15 and March 31.
- 10.3 The Train Brake Winter Operating Plan shall be filed with the Department by November 15, 2023. Any subsequent amendments to the Train Brake Winter Operating Plan shall be filed with the Department within 30 days of implementation.

PART II – BRAKE TEST REQUIREMENTS

11. GENERAL

- 11.1 A train shall not depart from any location until a successful brake test(s), as outlined in this Part and in company procedures/work instructions has been performed and all appropriate documentation has been completed.
- 11.2 The enhanced air brake test, No.1 brake test and No.1A brake test shall be performed on every train as specified in these Rules and company procedures/work instructions by:
 - a) the brake pipe leakage method; or
 - b) the air flow method.
- 11.3 The conductor, or in his or her absence, the locomotive engineer, shall be responsible for determining that the prescribed test(s) has been completed prior to departure. When a pull-by inspection for the brake release is performed on freight trains, the conductor or locomotive engineer shall be provided with the results of the release and in turn, will update the train brake status system.
- 11.4 A vehicle assisted No.1 brake test or enhanced air brake test, may be performed by a certified car inspector(s) in accordance with company procedures/work instructions, and shall be made available to a railway safety inspector upon request.

12. NO. 1 BRAKE TEST

- 12.1 Except as permitted by item 12.3, A No.1 brake test shall be performed by a certified car inspector(s) at safety inspection locations on:
- a) trains that are made up at that location;
 - b) cars added to a train at that location;
 - c) cars that are interchanged.
- 12.2 If a train is made up at other than a safety inspection location, a No. 1 brake test will be performed at the safety inspection location designated for that train by the company in the direction of travel.
- 12.3 Exceptions: A No.1 brake test is not required on:
- a) trains operating over main tracks, between yards, up to a maximum of a thirty (30) mile (fifty (50) kilometre) radius. Such trains shall be engaged exclusively in the setting off or lifting of equipment at industry(s), and/or the transfer of equipment between yards, and they shall be filed with the Department.
 - b) a block swap of cars that have been off air for no more than 24 hours or 48 hours after notifying the Department.
 - c) a car that has received a valid brake status in accordance with these Rules.
 - d) a train that received a brake effectiveness test in the previous direction of travel and is transporting cars that have a valid brake status, in accordance with these Rules.
 - e) a train that has received an enhanced air brake test, in the direction of travel, in accordance with these Rules.
- 12.4 A No.1 brake test shall verify:
- a) the integrity and continuity of the brake pipe;
 - b) that the condition of the brake rigging on each car in the train meets the minimum requirement specified in Sections 22, 23 and 24 of these Rules;
 - c) that, once the proper signal has been given to apply or release the brakes, the application and release of the brakes on each car is performed by visible verification of the piston or brake indicator device displacement following a minimum 20 PSI (137 KPA) brake pipe service reduction, which must remain applied until a release of the air brakes is initiated by the controlling locomotive or yard test device; and
 - d) that piston travel on each car is within the specified limits.

- 12.5 A car found with brakes that fail to apply or remain applied may be retested and remain in the train if the retest is conducted at an air pressure that is within 15 psi of the air pressure at which the train will be operated. The retest may be conducted from either the controlling locomotive, the head-end of the consist, or with a suitable test device positioned at one end of the car(s) being retested, and the brakes must remain applied until a release is initiated after a period which is no less than three minutes.
- 12.6 A pull-by inspection by a certified car inspector may be performed to verify the release of the train brakes.
- 12.7 Certified car inspectors shall report, in accordance with company procedures/work instructions, the results of all brake tests performed. Any brake system defect(s) discovered during the brake test and not repaired prior to departure shall be documented as bad order and reported to the conductor, or in his or her absence, the locomotive engineer. The conductor/engineer shall update the train brake status system with the identified defect(s). The results of the tests performed by certified car inspectors shall be retained for ninety-two (92) days.
- 12.8 Except as provided in sections 8.1 and 8.5, after completing a No.1 brake test, a brake effectiveness test, or an enhanced air brake test, a train may only depart from the safety inspection location for that train with one hundred (100) percent of the train brakes operative.
- 12.9 A No. 1 brake test is not required at an interchange point and/or when entering Canada provided the locomotive engineer has access to records that indicate that a No.1 brake test, as per these Rules, or an initial terminal brake test by mechanical personnel in the United States, was performed.

13. NO. 1A BRAKE TEST

- 13.1 No.1A brake test shall be performed by a qualified person(s) on:
- a) trains made up at other than a safety inspection locations;
 - b) cars lifted en route; and/or
 - c) trains operating over main tracks, between yards, up to a maximum of a thirty (30) mile (fifty (50) kilometer) radius. Such trains shall be engaged exclusively in the setting off or lifting of equipment at industry(s), and/or the transfer of equipment between yards and shall be filed with the Department.
- 13.2 A No.1A brake test is not required on blocks of cars lifted en-route that have:
- a) previously received a No.1 brake test for which the brake status information is received; and/or
 - b) previously received a No.1A brake test at that location within twenty-four (24) hours of the lift for which the brake status information is received.

- 13.3 A No.1A brake test shall be performed by a walking inspection of stationary equipment. A pull-by inspection by a qualified person may be performed to verify the release of the train brakes.
- 13.4 A No.1A brake test shall verify:
- a) the integrity and continuity of the brake pipe; and
 - b) the application and release of the brakes on each car.
- 13.5 When applying the brakes on each car, a brake pipe reduction of at least six (6) psi must be indicated on the Sense and Braking Unit (SBU) or air gauge attached to the rear car. When not equipped with an air gauge or SBU, a full service application must be made.
- 13.6 A qualified person(s) shall record and report the test results, and any brake system defect(s) discovered during the brake test, to the train brake status system, in accordance with company procedures/work instruction.
- 13.7 The conductor, or in his or her absence, the locomotive engineer, shall be responsible for determining that the prescribed test(s) has been completed prior to departure.
- 13.8 The results of the No.1A brake tests performed:
- a) by the train crew while enroute shall be recorded and retained until the train reaches its final destination.
 - b) by other than the lifting train crew shall be retained for a period of thirty (30) days.

14. BRAKE EFFECTIVENESS TEST (BET)

- 14.1 A brake effectiveness test (BET) shall be performed, on unit trains on descending mountain grades where the ambient temperature on the mountain grade is at or below -15°C.

When used in lieu of BET, the enhanced air brake test shall be performed on cars that are or will be operating on unit trains, prior to descending the mountain grade.

- 14.1.1 The BET shall be performed in the direction of travel, at a wheel temperature detector inspection location designated by the company as per the procedures and instructions filed under section 14.14.
- 14.1.2 A BET may be used on unit trains descending mountain grades at temperatures above the minimum specified in section 14.1 if addressed by the company in the procedures and instructions filed under 14.14.

- 14.1.3 A BET may be used on unit trains descending heavy grades at all temperatures, if addressed by the company in the procedures and instructions filed under 14.14.
- 14.1.4 Any train undergoing a BET under these Rules must have previously passed a No. 1 brake test or an enhanced air brake test, in the direction of travel.
- 14.2 Any train which fails to qualify for a BET or car that does not have a record of a valid brake status, shall receive a No. 1 brake test as per Section 12 of these Rules.
- 14.3 The BET process shall identify cars with ineffective brakes, by verifying:
- a) the application of the brakes on each car, as per Section 14.4 of these Rules;
 - b) the release of the brakes on each car as per Section 14.5 of these Rules; and
 - c) that each car on a train has a valid brake status as per these Rules.
- 14.4 A company shall use at least one (1) designated wheel temperature detector to verify the application of the brakes. This verification shall confirm:
- a) that the wheel temperature detector's reading is matched to the car and successfully communicated to the company's central system which carries out the algorithm of the BET;
 - b) that the average train braking temperature reaches the minimum qualification temperature in accordance with criteria filed by the company under section 14.14;
 - c) that the wheel temperature detector performs according to the design specifications and that the data produced is consistent with the known conditions; and
 - d) that the matched wheel temperatures on the car reach the minimum car temperature threshold in accordance with criteria filed by the company under section 14.14.
- 14.5 Release of the brakes on each car shall be performed using at least one (1) designated wheel temperature detector to verify that:
- a) the detector's reading is matched to the car and successfully communicated to the company's central system which carries out the algorithm of the BET;
 - b) the average train braking temperature is equal to or below 100°F (38°C); and
 - c) the matched individual wheel temperature on the car is equal to or below 600°F (315°C).
- 14.6 A car which meets the criteria in Sections 14.4 and 14.5 of these Rules shall be assigned a valid brake status that is to be recorded electronically, and is valid for a duration not to exceed 30 calendar days.

- 14.7 A car which does not meet the criteria in Sections 14.4 and 14.5 of these Rules shall:
- a) generate an alert identifying:
 - i. the car number
 - ii. the car sequence
 - iii. the alarm type
 - iv. the time (including time zone) and the date the train passed the wheel temperature detector
 - v. the train symbol and train direction;
 - vi. the lead locomotive;
 - vii. the wheel temperature detector subdivision and mile.
 - b) be bad ordered for brakes; and
 - c) receive an automated single car air brake test, as outlined in the current version of the Standard S-4027 of the Association of American Railroads (AAR), at the designated maintenance facility for repair.
- 14.8 The conductor, or in their absence, the locomotive engineer, of a qualified train that receives an alert for one or more cars as per Section 14.7 shall:
- a) update the train brake status system by documenting test results including any car(s) with ineffective air brakes; and
 - b) verify the following:
 - i. no more than 5% of the cars on the train are without a valid brake status identified by the BET;
 - ii. no more than two (2) consecutive cars are without a valid brake status; and
 - iii. none of the last three (3) cars of the train consist are without a valid brake status.
- 14.9 Any train that does not meet the conditions in item 14.8 (b) shall be addressed in accordance with the company's procedures and instructions specific to its BET process.
- 14.10 Any car with a condition which meets the criteria as outlined in item 14.4 (d) shall be addressed at a location designated in railway schedules.
- 14.11 Any car on a train which fails to qualify for the BET, when required under section 14.1, or if the information is not available, shall receive an enhanced air brake test at a location designated in railway schedules and prior to the next BET.

- 14.12 Wayside wheel temperature detectors utilized for the BET shall be maintained and calibrated, at a minimum, to manufacturer's recommendations. Detector specifications, records of maintenance, and results of calibrations shall be made available to the Department upon request.
- 14.13 Information generated by the wayside temperature detectors shall be retained for ninety-two (92) days.
- 14.14 Companies shall file with the Department, at least 60 days prior to implementation, the procedures, and instructions, specific to its BET process including:
- a) the applicable trains;
 - b) the wheel temperature detector inspection locations;
 - c) alert handling instructions;
 - d) car owner repair validation procedures;
 - e) occurrence reporting instructions used by train crews;
 - f) the BET algorithms, methods and temperature thresholds, used to determine cars with ineffective brakes and train qualification, approved by a professional engineer;
 - g) the BET performance standards and how they will be measured and monitored; and
 - h) the BET procedures, on unit trains, used outside of the required temperatures and grades.
- 14.15 Companies shall keep records of the number of trains and cars subject to BET as per section 14.1, the percentage of qualified trains, and percentage of cars bad ordered for brakes. These records shall be made available to the Department upon request.
- 14.16 Brake cylinders on all equipment requiring a BET as part of these Rules must be verified when sent to a mechanical facility for repair and shall have a maximum brake cylinder life as defined by the manufacture or recondition date (whichever is later). Brake cylinders for this equipment may be replaced or renewed if the manufacture or recondition date (whichever is later) exceeds 13 years and must not exceed 14 years. If over 14 years, the equipment brake cylinder must be replaced or renewed for over age cause.

14.17 ENHANCED AIR BRAKE TEST

14.17.1 The enhanced air brake test shall be performed by a certified car inspector.

14.17.2 The enhanced air brake test shall verify:

- a) the integrity and continuity of the brake pipe;

- b) that the condition of the brake rigging on each car in the train meets the minimum requirement specified in Sections 22, 23 and 24 of these Rules; and
- c) the application of the brakes on each car by visible verification of the piston or brake indicator device displacement after the brake pipe has been vented.

14.17.3 Cars are considered to have passed the enhanced air brake test if they maintain a brake application for a minimum period of:

- a) 30 minutes when required to descend a mountain grade up to 5 miles long; or
- b) 60 minutes when required to descend a mountain grade greater than 5 miles long.

14.17.4 An enhanced air brake test is valid for 15 days or until the unit train has reached its destination, whichever comes first.

15. CONTINUITY TEST

15.1 A continuity test shall be performed by a qualified person(s) when:

- a) a solid block(s) of coupled cars which have received a No.1 or No.1A brake test are added to a train;
- b) the controlling locomotive has been attached to a train having received a No.1 brake test, a No.1A brake test, or an enhanced air brake test;
- c) the locomotive consist has been exchanged or altered;
- d) the locomotive engineer has been changed (unless provisions of 15.3 are met);
- e) the brake pipe has been re-coupled after being uncoupled; and/or
- f) the locomotive is re-coupled to the train after setting off cars.

15.2 The continuity test shall verify the capability to transmit a signal between the leading locomotive and to the rear of the last piece of equipment on the train.

15.3 A continuity test need not be performed when the locomotive engineer has been changed, provided that all of the following provisions are met:

- must be a direct handoff at the crew change location (crew to crew at controlling locomotive). Does not apply to trains left unattended while waiting for the outgoing crew.
- train must not perform any lifts or set-offs at the crew change location. In such case, continuity must be established, unless the lift or setoff has occurred and continuity has been established prior to a direct handoff.

- the controlling locomotive must be equipped with operative dynamic brake (this provision does not supersede the requirements of Item 21.1 of the *Railway Locomotive Inspection and Safety Rules*).

16. TRAIN INFORMATION BRAKING SYSTEM (TIBS) TEST

- 16.1 A TIBS test shall verify that an emergency brake application, initiated from the controlling locomotive or dedicated Input and Display Unit (IDU) through the TIBS system, will cause an emergency brake application on the last piece of equipment on the train.
- 16.2 When the sense and braking component of the TIBS system is first added to a train or when it is suspected that the sense braking component has been stricken or damaged while en route the operation of TIBS will be verified by a qualified person(s) in accordance with company procedures/work instructions.
- 16.3 In the event of a TIBS failure, where the standard locomotive gauges and air flow indicator display no loss of air pressure, the train may proceed at a speed not to exceed twenty-five (25) mph (forty (40) km/h), until the TIBS resumes normal operation.

17. TRANSFER BRAKE TEST

- 17.1 Prior to departure, the locomotive engineer, or the portable locomotive remote control device operator must verify that there is sufficient braking effort to control the transfer. Transfers must have air applied throughout the entire equipment consist and the last three cars must be verified to have operative brakes.

18. PUSH-PULL OPERATION

- 18.1 On a train operated in a push-pull mode, a continuity test must be made from the controlling cab car or locomotive after changing ends.

19. PORTABLE LOCOMOTIVE REMOTE CONTROL DEVICE TILT TEST

- 19.1 A portable locomotive remote control device tilt test shall be performed once every twenty-four (24) hours, and when it is not a direct operator to operator hand off. The test shall be performed in accordance with company procedures/work instructions, and shall verify:
- a) application and release of the train brakes;
 - b) that an emergency brake application is initiated as per its design;
 - c) when tilted, the device will apply the brakes and nullify the transmission of power to the locomotive traction motors.

19.2 A modified tilt test may only be performed on a direct operator to operator hand off, in accordance with company procedures/work instructions.

20. TRAINS USING BACK-UP HOSE OR VALVE

20.1 Before starting a train from any point where the brakes are to be controlled by the use of a back-up hose or valve at the rear of the train, the brakes shall be applied by using the back-up hose or valve.

21. SNOW PLOW TRAIN BRAKE TEST

21.1 Following the appropriate train brake test, as outlined previously in this Part, and before starting a snow plow operation, an emergency application of train brakes shall be obtained from the operator cab of the snow plow.

PART III – EQUIPMENT REQUIREMENTS

22. MAINTENANCE

22.1 All brake equipment shall be maintained in a safe and serviceable condition.

- a) Freight car brakes shall be maintained in accordance with the current AAR requirements and company procedures/work instructions;
- b) Passenger car brakes shall be maintained in accordance with the current American Public Transit Authority (APTA) requirements and company procedures/work instructions. At the end of the Clean Oil Test & Stencil (COT&S) periodic maintenance interval passenger car brake valves shall be maintained:
 - i. To APTA requirements or;
 - ii. A single car air brake test shall be performed every 365 days or less and defective components are to be replaced as required.
- c) Locomotive brakes shall be maintained as a minimum in accordance with manufacturer's recommendations and company procedures/work instructions. In the application of this rule, all systems for the discharge or removal of moisture, such as automatic drain valves and air dryers, shall be maintained to function as intended. Locomotive brake systems shall receive COT&S maintenance as follows:
 - i. At intervals that do not exceed 1,104 days for locomotives equipped with a 26-L or equivalent brake system; or

- ii. At intervals that do not exceed 1,472 days for locomotives equipped with an air dryer and a 26-L or equivalent brake system and for locomotives not equipped with an air compressor and that are semi-permanently coupled and dedicated to locomotives with an air dryer; or
- iii. At intervals that do not exceed 1,840 days for locomotives equipped with an electronic air brake system; except for:
 - a) Locomotives equipped with NYAB CCB-1 air brake systems. This system shall not exceed 2,392 days for COT&S, unless fragmented. For locomotives with fragmented air brake maintenance, the 20 Block shall receive COT&S maintenance that does not exceed 2,392 days. All other components shall receive COT&S maintenance at an interval not exceeding 3,128 days.
 - b) Locomotives equipped with NYAB CCB-2 or CCB-26 air brake systems. This system shall not exceed 2,576 days for COT&S unless equipped with a Brake Pipe Control Portion (BPCP) manufactured or remanufactured after March 1, 2013, or air brake maintenance is fragmented.

If equipped with a Brake Pipe Control Portion (BPCP) manufactured or remanufactured after March 1, 2013 and air brake maintenance is not fragmented, then COT&S maintenance shall be performed at an interval not exceeding 3,312 days.

If the BPCP is manufactured or remanufactured prior to March 1, 2013 and air brake maintenance is fragmented, the BPCP shall receive maintenance at an interval that does not exceed 2,576 days; the 16 Control Portion (16CP) shall receive maintenance at an interval that does not exceed 3,312 days, and all other COT&S components shall receive maintenance not exceeding 3,680 days.

If the BPCP is manufactured or remanufactured after March 1, 2013 and air brake maintenance is fragmented, the 16 Control Portion (16CP) shall receive maintenance at an interval that does not exceed 3,312 days; and each COT&S component shall receive maintenance not exceeding 3,680 days.

- c) Locomotives equipped with Wabtec EPIC-3102D2 or EPIC-2 air brake systems. This system shall not exceed 2,944 days for COT&S.
- d) Locomotives equipped with Wabtec FastBrake air brake systems. This system shall not exceed 3,680 days for COT&S.

- iv. At intervals that do not exceed 736 days for locomotives equipped with a brake system not specifically identified in paragraphs i, ii and iii.
- 22.2 On locomotives or self-propelled equipment, the date of testing or cleaning of brake equipment and the name of the shop or station at which the work was done shall be retained in the cab in a format in accordance with company procedures/work instructions.
- 22.3 Train brake test devices shall be cleaned, repaired and tested every ninety (90) days, to maintain safe and satisfactory operation, in accordance with company procedures/work instructions.
- 22.4 A locomotive that is out service for 30 or more consecutive days may use the time to extend the Clean Oil Test & Stencil maintenance date. An out of service record shall be retained as per company procedures/work instructions. A locomotive can have one or more periods of 30 or more consecutive out of service days. Each period must be recorded as above. Once COT&S air-brake changeout is completed, all credit days revert to zero days.

23. BRAKE CYLINDER PISTON TRAVEL

- 23.1 A car with a body-mounted brake cylinder has piston travel out of adjustment when:
 - a) on a freight car, the piston travel is less than six (6) inches (one hundred fifty (150) mm) or more than nine (9) inches (two hundred thirty (230) mm);
 - b) on a passenger car, the piston travel is less than seven (7) inches (one hundred eighty (180) mm) or more than nine (9) inches (two hundred thirty (230) mm).
- 23.2 A car with truck-mounted brake cylinders shall have piston travel, unless otherwise governed by design, sufficient to provide brake shoe clearance when the brake is released.
 - a) on a freight car, piston travel shall not exceed five (5) inches (one hundred twenty-five (125) mm);
 - b) on a passenger car, piston travel shall not exceed six (6) inches (one hundred fifty (150) mm).
- 23.3 A freight car with a special type of brake equipment, not covered by the above, shall have piston travel adjusted as indicated on the badge plate or stenciling applied in a conspicuous location near the brake cylinder.
- 23.4 A passenger car with a special type of brake equipment, not covered by the above, shall have the brakes maintained in accordance with company procedures/work instructions.

23.5 On a locomotive, the maximum physical limit of brake cylinder piston travel will be indicated in the cab. In operation, piston travel must not come within two (2) inches (fifty (50) mm) of the limit. For example, should the brake cylinder permit an eight (8) inch (two hundred (200) mm) travel, the maximum piston travel shall not exceed six (6) inches (one hundred fifty (150) mm).

24. LOCOMOTIVE FEED VALVES AND PRESSURE SETTINGS

24.1 Air pressure feed valves shall be adjusted to the following pressures in accordance with company procedures/work instructions:

- a) the minimum brake pipe pressure with the automatic brake valve in release position shall be ninety (90) psi (six hundred twenty (620) kpa) for passenger service and eighty (80) psi (five hundred fifty (550) kpa) for freight and remote control locomotive operation;
- b) the minimum differential between the brake pipe and main reservoir air pressures with the brake valve handle in release position shall be fifteen (15) psi (one hundred (100) kpa);
- c) the independent brake cylinder pressure shall be the full application pressure, as posted in cab.

PART IV – FILING REQUIREMENTS

25. FILING REQUIREMENTS WITH THE DEPARTMENT

25.1 A company shall file railway schedules with the Department. Any changes to the railway schedules shall be filed by the company with the Department within thirty (30) days of implementation.

25.2 A company shall file with the Department, procedures/work instructions, and all amendments, for:

- (i) No.1 brake test,
- (ii) Vehicle assisted No. 1 brake tests and enhanced air brake tests,
- (iii) Brake tests of trains having a supplementary source of air supply at a location other than the head end locomotives,
- (iv) Train brake testing device calibration,
- (v) No.1A brake test, including the audit protocol used by the company to ensure compliance,
- (vi) Continuity test,
- (vii) Running brake test,

- (viii) Train information braking system tests,
- (ix) Single car test,
- (x) Locomotive functional brake test,
- (xi) Calibration of locomotive brake pipe flow indicator/metre,
- (xii) Portable locomotive control device tilt test and modified tilt test,
- (xiii) Reporting of brake system failures,
- (xiv) Control and protection of a movement of cars and locomotives with damaged or inoperative brakes due to damage,
- (xv) Control and protection of a movement of cars or locomotives with inoperative brakes at the rear of the train, due to damage en route, when no other option exists,
- (xvi) Movement of 18 cars or less with less than one-hundred (100) percent of operative brakes,
- (xvii) Scale and test car movements,
- (xviii) Repairs to air brake components,
- (xix) Updating of the train brake status system,
- (xx) Air pressure feed valves adjustment,
- (xxi) A brake system or a safety control failure or malfunction en route which cannot be readily corrected,
- (xxii) Procedure to follow when a brake system component found to have been tampered with en route,
- (xxiii) Locomotive out of service record and return to service tests,
- (xxiv) Brake effectiveness test (BET), and
- (xxv) Enhanced air brake test.

25.3 A company may operate trains with advanced technological/operational improvements provided that the testing and operating procedures have been filed with the Department, sixty (60) days prior to testing or placing in service, and the results of the railways risk assessment is provided with the submission.

25.4 Museum train operations shall be filed with the Department thirty (30) days prior to its being placed in service.