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WELLBEING

RAIL

ELEMENT 17M

20/10/2023

ROLLING STOCK BRAKES

PURPOSE AND SCOPE

The purpose of this Procedure is to advise Laing O'Rourke personnel of the braking standards to be applied and to ensure those people involved in maintaining the braking systems know of the processes to be applied.

This Procedure applies to all items of rolling stock purchased, leased or hired by Select on behalf of Laing O'Rourke for the railway operations they will be engaged in throughout Australia.

All repairs and maintenance of the braking systems will be undertaken in compliance with this Procedure. There may also be issues where specific requirements may be set by the relevant rail infrastructure manager (RIM) for the network on whose railway the rolling stock will operate and these extra issues will be separately addressed in the Maintenance Management System.

1.0 PROCEDURES

All items of rolling stock will be subject to ongoing monitoring to ensure, so far as is reasonably practicable (SFAIRP), that the required standards are maintained for the brakes fitted to the vehicles.

Road rail vehicles shall have at least 2 independent dynamic braking systems when in rail mode which shall include but not be limited to:

Table 1

TYPE	
TYPE 1 VEHICLE – SELF PROPELLED	Hydraulic motor braking (rail wheel), hydraulic disc / tread braking (rail wheel), spring applied park brake (rail wheel).
TYPE 2 VEHICLES – FRICTION DRIVE	Hydraulic disc / tread braking (rail wheel), spring applied park brake (rail wheel).
TYPE 3A – RAIL GUIDANCE	Road wheel hydraulic disc braking (rubber wheel on rail), hydraulic disc / tread braking (rail wheel), spring applied park brake.
TYPE 3B – RAIL GUIDANCE WITH FRONT HI-RAIL BRAKING	Rear road wheel hydraulic disc braking (rubber wheel on rail), hydraulic disc / tread braking (front rail wheel), spring applied park brake.

1.1 SERVICE BRAKES

Service brakes shall stop the vehicle safely without skidding of any wheels (road or rail) when on dry level clean track.

Table 2

RRV CLASSIFICATION	PRIMARY BRAKING METHOD	MEASURED AVERAGE DECELERATION	LOADING CONDITION
TYPE 1	Steel wheel on rail	0.9 m/s ² (minimum)	All
TYPE 2	Steel wheel on rail	0.9 m/s ² (minimum)	All
TYPE 3	Rubber wheel on rail	1.1 m/s ² (minimum)	Tare
TYPE 3A	Rubber wheel on rail	1.0 m/s ² (minimum)	Maximum
TYPE 3B	Rear tyre on rail and front hi-rail	1.0 m/s ² (minimum)	Maximum

The average deceleration values specified in the table above do not include any allowance for braking delay, driver reaction, system response etc.

Type 2 (friction drive) vehicles shall be fitted with service brakes which shall be designed to meet the average deceleration requirements specified in the table above without taking account of any additional braking effort provided by the friction drive through the road wheels.

Tests shall be conducted with the operator applying the service brakes and not releasing them until the vehicle is stationary.

Where variances exist, the vehicle brakes shall be tested at normal operating speed, and also at maximum allowable speed.

1.2 PARK BRAKE PERFORMANCE

A Park Brake shall hold the vehicle stationary on a 1:30 gradient under all conditions of loading. Vehicles with spring applied parking brakes able to be tested for the 1 in 30 criteria by measuring the vehicle deceleration by applying the spring parking brakes from at least 10 km/h. Provided the deceleration exceeds 0.4 m/s² as the vehicle comes to a stand on nominally level track, the park brake will hold the vehicle stationary on a 1 in 30 grade indefinitely.

1.3 AIRBRAKE TEST:

If a fault(s) to the air brake system is identified, the brake system must be isolated following the procedure set out in the manufacturers' manual. The fault(s) must be reported to Select or for external hires to the supplier of the item.

1.4 INSPECTION, REPAIR AND MAINTENANCE OF THE BRAKING SYSTEM

The machine must be isolated and chocked prior to any tests, inspections or repairs are conducted. Work heads / ploughs must be lowered to the ground.

The Fitter / operator will apply the brakes and then have the application checked by the Fitter to see that the shoes have been correctly applied. The brakes will then be released and again the Fitter will conduct an external examination to ensure all brake shoes have released correctly.

The Fitter should familiarise themselves with the standard braking system of the particular machine and refer to the operators manual. Testing and repairs should only be conducted by a competent person. Some track machines are fitted with train brakes e.g. Knorr Bremse type braking system while others are fitted with various automotive type air braking systems.



1.5 OPERATION PRINCIPLES

On certain machines compressed air is admitted by the brake valve on the track machine into the brake pipe, through the open brake pipe end cocks, flexible hoses and brake pipes and through the isolating cock and triple valve into the auxiliary reservoir on the vehicle.

Other items of plant will have an automotive braking system.

Reference should be made to the machine operating manual for the operation of the braking system.

1.6 INSPECTION CRITERIA

- Condition of valves, pipes, hoses, coupling heads, seals, and mountings
- Operation of manually operable valves
- Operation of system
- Air leaks

Examine all valves, pipes, mounting brackets and pipe clips to see that they are in good condition and are secure.

Replace any units showing signs of damage, which may affect their performance. Tighten or replace mounting bolts where necessary.

If the track machine is not part of a train in which air is being supplied to the brake pipe, check that all manually operable valves, such as the end cocks, the isolating cock, the auxiliary reservoir pressure release valve, the grade control valve (if present) and the empty/load changeover valve, are functioning correctly by operating them. If necessary 'work' sticky valves until they operate smoothly.

Ensure that all cocks are returned to their correct position.

1.7 FLEXIBLE BRAKE HOSE

Hose couplings should be replaced if there is:

- Exposed or damaged wire reinforcement
- Loose or defective fittings at either end
- A permanently kinked, crushed, flattened, or twisted hose
- Heat cracking or charring of the hose, or missing hose

If there is any deterioration of the rubber 'O-ring' seal in the coupling head this can be replaced separately without removing the hose.

Minor damage to the outer cover of a hose, with the reinforcement intact, does not necessitate replacement of the hose.

1.8 BRAKE RIGGING

Measurement of the brake cylinder piston stroke during the brake test gives an indication of whether brake-rigging components are excessively worn or damaged.

Inspection Check List:

The Brake Rigging is to be inspected as per the Original Equipment Manufacturers (OEM) recommendations.

Visually examine each pin and bush connection on both the track machine body and on the bogies, for the presence of the pin and the flat cotters or R-clips, for excessive wear in the pin and/or the bush, and for loose bushes.

Worn pins and split pins must be replaced. Loose or excessively worn bushes may be rectified by unit exchange of the components in which they are mounted. R pins are not permitted to be used on the brake rigging below axle level. Split pins shall be utilised.

Visually examine the slack adjuster for signs of malfunction, or damage. Replace if necessary.



If a track machine does not require re-blocking, but the slack adjuster has less than the minimum required adjustment, the slack adjuster must be let out and the brake rigging adjusted.

Visually examine the bogie truss bars (brake beams) for structural cracking, for excessive wear in their support pockets and mating wear surfaces, and for burning brake heads due to wheel contact. Bogies with truss bar defects must have the defective truss bars replaced or changed. In the case of severe structural cracking, this should be done on site if possible.

Check that all brake shoe keys are firmly in position, without bottoming. If a key is loose, but not bottoming, it should be tapped down, until it is firm. If it is bottoming, then the brake shoe and/or the key must be replaced. If the key still bottoms, then this must be due to damage to the brake head, and the truss bar should be examined for possible repair and replacement or the bogie changed.

1.9 BRAKE BLOCKS

Both cast iron and composition brake blocks are in use. Inspect the brake blocks for excessive wear. All measurements of brake block thickness are to be made on the outside (facing) surface at the thinner end of the block, in line with the toe (end) of the brake head. Refer to **Figure 1**.

The minimum permissible brake block thickness for both cast iron and composite brake block is 15mm.

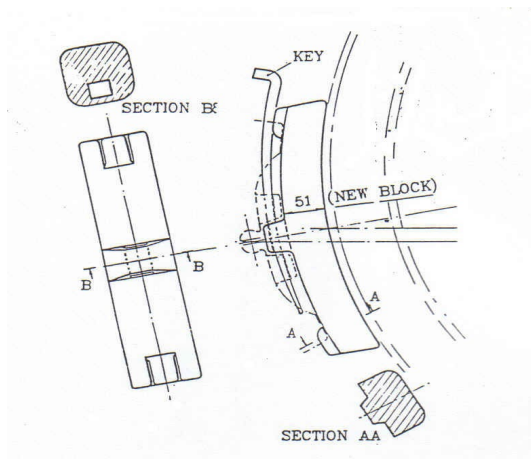


Figure 1 Brake Block (example only)

1.10 REPLACING BRAKE BLOCKS

Refer to the manufacturers specifications.

1.11 PARK-BRAKE

A number of different types of park brakes are in service.

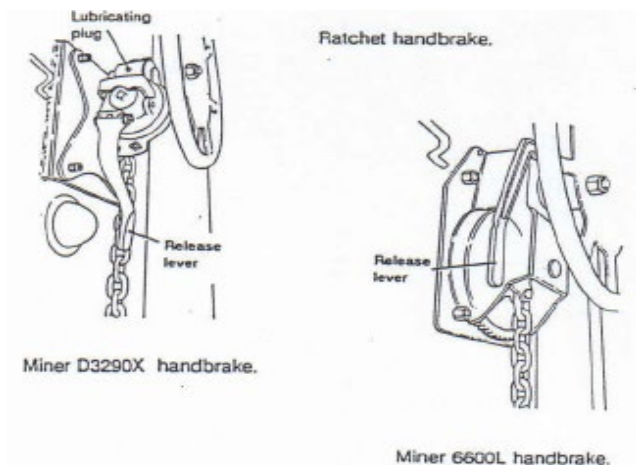


Figure 2 Hand Brake Types (example only)



The braking system on the Plasser 09-32 Tamper is similar to the above diagram, but instead of chains it has a rod connection.

The park brake is applied as per the OEM operating instructions.

Inspection Check List

- Damage and wear of chain, sheave & pull-rod
- Operation of hand brake.

The park brake should be inspected after new brake blocks have been fitted and piston travel correctly adjusted.

Inspect the handbrake unit and chain for damage or excessive wear. Defective units may be replaced on site.

Ensure that the chain passes freely through over the quadrant or sheave and that its connection to the pull-rod is in good condition. Check that the pull-rod is free on its carriers.

1.12 PARK BRAKE TEST

Prior to carrying out this test, wedge the wheels to prevent track machine movement, and ensure that the air is vented from the system to atmosphere.

Apply the park brake by operating the lever or hand wheel. Inspect all of the brake blocks to ensure that they are firmly applied to the wheels.

Release the park brake, using the ratchet pawl or release lever. Inspect all of the brake blocks to ensure that they are no longer applying pressure to the wheels.

Repeat the test, but use the hand wheel to release the brake. If there is any indication that the park brake unit is not functioning correctly, then it may be rectified, or changed-out, on site.

2.0 TESTING OF BRAKE SYSTEMS

OPERATION OF MULTIPLE VEHICLES IN A TRAIN FORMATION

Train / track machines must undergo a Full Train Inspection (FX) or a General Train Inspection (GX) as per the instructions issued by the Rail Infrastructure Manager.

2.1 TAMPER & REGULATORS

Apply the service brake and ensure:

- The brake blocks or pads are firmly against the wheel treads or discs respectively.
- The brake blocks or pads are above the condemning thicknesses.
- The piston strokes are not excessive.

Release the service brake.

- Ensure all brake cylinders retract and the brake blocks are clear of the wheels.

Apply the automatic brake by reducing the brake pipe pressure to zero:

- Ensure the brake blocks or pads are firmly against the wheel treads or discs respectively.

2.2 HI-RAIL (SELF-BRAKING)

Prior to transitioning to rail mode apply the service rail brake checking the following:

- The brake blocks or pads are firmly against the wheel treads or discs respectively.
- The brake blocks or pads are above the condemning thicknesses.
- The piston strokes are not excessive.
- Release the service brake and apply the park brake checking the following:
- Park brake actuated blocks or pads are firmly against the wheel treads or disc respectively.



2.3 HI-RAIL (ROAD WHEEL BRAKING)

No specific test is required as the rail brakes use the same system as the road brakes. When initially moving the vehicle after transitioning to rail mode, operate the brakes to ensure the brake performance is as expected.

2.4 SELF-BRAKING TRAILERS & TROLLEYS

Prior to placing trailer or trolley on rail check that there is no damage to the brake rigging and that the brake blocks or pads can be or are firmly applied to the wheels.

2.5 FREQUENCY OF BRAKE TESTING

2.5.1 BRAKE TESTS

Brake tests are carried out by a fitter prior to a machine entering service or being returned to service or after maintenance of the braking system.

2.5.2 DAILY PRE-OPERATION BRAKE TESTS

The track machine or road rail vehicle operator shall undertake a physical check of the braking systems on the item of rolling stock they are responsible for and record the details in the Daily Pre-start.

2.5.3 PERIODIC BRAKE INSPECTIONS

All vehicles are to undergo periodic brake inspections at intervals specified by the vehicle manufacturer or hi-rail equipment supplier as appropriate.

3.0 LEGISLATION, GUIDES AND STANDARDS

- Rail Safety National Law
- RISSB Standards relevant to the aspect of rolling stock being assessed including AS 7510.4 Infrastructure Maintenance Vehicles Brakes.
- Rail Infrastructure Managers Standards
- Australian Qualification Framework for respective Units of Competency
- Manufacturers Standards
- Operator Manuals
- Legislation relating to Work Health and Safety

4.0 FORMS, TEMPLATES AND REPORTS

- Rail Wheel Inspection Form
- RRV Commissioning and Annual Checklist
- Track Bound Plant Commissioning and Annual Checklist