



# OM94002

## Material Trolley Requirements

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Issue 1	A Hunt (P) W Hudson (R) P Morton (R)	<i>A. S. Hunt</i>	23 October 2008

### 1 Scope

This code applies to any unpowered trolley<sup>1</sup> intended to carry materials on the National Rail System that is rated for a gross weight of more than 1500 kg. It does not include bridge span launching trolleys or tower trolleys.

Note: Manual OM94001 (Hi-Rail manual) is the reference document for technical specifications such as: axle load calculations, insulation, braking etc. and should be referred to in the first instance when further information is required.

Note: For trolleys having a gross weight up to 1500 kg refer to the mechanical code and M9458 "Wooden Material Trolleys", or M9459 "Fold Up Material Trolleys".

### 2 Implementation

These requirements will be phased in over a 12 month period for existing equipment. New equipment must comply from the outset.

### 3 Requirements

#### 3.1 Wheel Profiles

Tread profiles must be to drawing 7604. This drawing is included in Appendix A of National Rail System Standard/6. Recommended tread profiles are: E1 on drawing 7604/15 for pressed steel wheels and B2 on drawing 7604/12 for cast wheels. Gauge 50107551 will be used to check the E1 profile (see OM94001, Appendix C).

<sup>1</sup> Includes bundling carts for carrying sleepers.

### **3.2 Rated Load**

In operation the gross weight of the trolley and its load shall not exceed the maximum towing capacity of the towing vehicle.

### **3.3 Maximum Axle Load**

The maximum axle load in kg, must be less than  $20D$ , where  $D$  is the wheel diameter in mm.

### **3.4 Insulation**

All trolleys must be insulated for track circuits. That is there must not be a short-circuit between the rails through any part of the vehicle.

### **3.5 Earth Path**

Any trolley taller than 2.5 m above rail level or fitted with any equipment capable of extending above 2.5 m or to be loaded higher than 2.5 m must be provided with an "earth path" to one rail for working in electrified areas. Alternatively approved spark gap devices fitted to both sides of the trolley will be acceptable.

### **3.6 Brakes**

- 3.6.1 All trolleys must have some form of brake that will automatically apply and remain applied if the trolley is not connected to a towing vehicle, whether loaded or unloaded. The system must be fail safe. A suitable system would typically be air or hydraulic.
- 3.6.2 The brake must operate in such a way as to prevent runaway of the trolley during all stages of on- and off-tracking.
- 3.6.3 The brake must hold the fully loaded trolley on a grade of 1:33 when in the most unfavourable loading condition and vehicle orientation, on greasy rail (rail wheel to rail coefficient of friction 0.12). This can be tested on level track by ensuring that the handbrake will restrain a force equal to: Vehicle weight divided by 30 in either direction. Note: this test includes a 10% allowance for load transfer on a grade.
- 3.6.4 All trolleys must be capable of braking when travelling using a signal from the towing vehicle e.g. like a truck/trailer airbrake system<sup>2</sup>.
- 3.6.5 Brakes must operate on the tread of at least two wheels or on discs on at least one axle. If the trolley has more than two axles then at least 50% of wheels (and axles) must be braked.
- 3.6.6 The brake must remain effective with wear in the interval between maintenance inspections without need for frequent adjustment.
- 3.6.7 All trolleys must stop within the following distances, in any load condition on level, dry track, both alone (as if uncoupled from the towing vehicle) and in combination with the towing vehicle:
- 22 metres from 25 km/h,
  - 50 metres from 50 km/h.

Brake testing of the trolley (and combinations of trolley and towing vehicle) is to be done from 25 km/h with the trolley fully loaded.

### **3.7 Draw Bars and Pins**

- 3.7.1 Drawbar to be designed for tensile and compressive longitudinal loads of at least 1.5 times the rated capacity of the trolley based on the yield stress of the material used (assuming that the drawbar is pinned at both ends and movement is not constrained in any direction when in use).
- 3.7.2 Rated load to be displayed on drawbar<sup>3</sup>.

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<sup>2</sup> For information, a hi-rail vehicle does not have the braking effort to be able to reliably control an unbraked load of any significant weight. ONTRACK's Kershaw bundling carts were retrofitted with a fail safe air brake system after stopping incidents, including a collision. The brakes are of the road "fail safe" air release type fed from a bolt-on air compressor on the excavator.

<sup>3</sup> For information, this is standard practice for truck drawbars.

- 3.7.3 Drawbar pins to be designed for a load of 6.0 times their rated capacity based on the yield stress of the material used. For information this is based on a pin in shear at 33% of yield and a load impact factor of 2.0<sup>4</sup>.
- 3.7.4 Drawbar pins are to be secured by a visible latch that is self latching so that the pin can not work out. For information an example is a simple pendulum that is swung to one side to withdraw the pin.
- 3.7.5 All drawbars and their connections at both ends, and trolley attachments, are to be certified by a Chartered Professional Engineer or other reputable engineer acceptable to ONTRACK. The engineer shall issue a design certificate certifying the design, manufacture and repair (if appropriate). The certificate must be provided to the ONTRACK inspector when the trolley is first presented for use on rail and subsequently if requested.

### **3.8 Lifting Points**

Any trolley not able to be readily lifted by two people must be fitted with a lifting eye or other safe lifting point(s) which can be used to lift the trolley clear of the track by mechanical means.

### **3.9 Marking & Fittings**

All trolleys must display the following:

- Name of owner.
- Tare weight in kg. #
- Maximum rated load in kg. #
- Maximum speed in km/h. #
- Identification number assigned by owner (if applicable).
- Any trolley with ladders, handholds or any other facility allowing access to a standing position higher than 1.8 metres above rail level must be fitted with clearly legible labels or lettering with the wording "Danger Live Wires Above" and carrying the electricity hazard symbol.
- A red reflector facing along the track at each corner of each end.
- Drawbar certification and rated load as specified above.

All lettering is to be clearly visible.

# Items marked # are to be displayed on both sides or both ends.

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<sup>4</sup> For information, loosely based on NZS5446:1987 for truck drawbars.

## 4 Maintenance Inspections

Trolleys must be inspected before their first use on rail and thereafter will be subject to six-monthly inspection to code 155. Trolleys must clearly display a current Loco 155B sticker when on rail.

The following items are to be checked during the six-monthly inspection<sup>5</sup>:

- Markings and fittings as above.
- Rail wheels are not cracked, unduly worn and are to code. On pressed wheels check for wear (minimum 3 mm) and alignment using CCE drawing 95397.
- Lift wheels and check wheel bearings. Bearings to be greased or oiled appropriate to type.
- Wheel insulation is free from earth or other soiling.
- Axles are not cracked and are straight (including stub axles).
- Wheel back – back dimensions are between 996 mm and 998 mm.
- There are no cracks and the trolley is generally in sound condition.
- Draw bar and couplings are in good order.
- Decks are sound and bolts are tight.
- All labels and markings are in place and legible, including drawbar ratings.
- Reflectors are fitted and in good order.
- Test run.
- Brakes operational and in good order. An on/off functional test is required. A full brake test may be conducted at the inspector's discretion.
- All other operating and safety devices must be serviceable.
- Any other requirements on the current 155 inspection sheet.

## 5 New Equipment Approval

ONTRACK may require certification of a trolley before its first use on rail, particularly if it is not of a typical type or has features or equipment that an inspector can not readily assess. Certification will be by a Chartered Professional Engineer (CPEng) or other reputable engineer acceptable to ONTRACK. The engineer shall issue a design certificate certifying the design, manufacture and repair (if appropriate). A copy of the certificate must be provided to the ONTRACK inspector when the trolley is first presented for use on rail and subsequently if requested.

Persons intending to introduce new equipment to the National Rail System are advised to discuss likely requirements with ONTRACK before commencing construction.

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<sup>5</sup> Transferred from M9458, "Wooden Material Trolleys Maintenance Handbook" and M9459, "Fold Up Material Trolleys Maintenance Handbook"