



M&EE Networking Group

Document revision history

Issue	Date	Reason for change
1	Mar 06	First issue (Now withdrawn)
2	Apr 08	Re-ordered and new section for Other Equipment added. Revised brake torque figures added for Rotamag trolleys. (Now withdrawn)
3	Apr 10	Wolfe trolleys added. Brake test procedure added. Clarification added that the requirement for load carrying trolleys is to be applied retrospectively for anything used on Network Rail managed infrastructure.

Background

A sub-group of the M & EE Networking Group has considered the arrangements for the use of rail mounted manually propelled equipment and recommend the following as good practice for the Industry.

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Sign off

The M & EE Networking Group agreed and signed off this Code of Practice on 27 January 2010 and published on 3 April 2010.

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Purpose

This Code of Practice details the use and some aspects of the design and maintenance of rail mounted manually propelled equipment to prevent uncontrolled movements.

Scope

This Code of Practice concerns all in service and new rail mounted manually propelled equipment used on Network Rail managed infrastructure.

Principally, rail mounted manually propelled equipment can be divided in two main groups, those that can carry loads and those that cannot. Equipment which is not load carrying are normally items of plant and equipment with more than 2 rail wheels, for example:

- ❑ sleeper drills,
- ❑ coach screwing equipment,
- ❑ rail grinders,
- ❑ track geometry measurement equipment
- ❑ rail clipping equipment.

(this list is not exhaustive)

1 General Requirements

1.1 Design

- 1.1.1 All manually propelled equipment should be certificated to be used on Network Rail managed infrastructure. Any equipment that does not have product acceptance from Network Rail for the design should not be used.
- 1.1.2 All manually propelled equipment should be subject to maintenance, which in addition to the manufacturers' recommendations and company instructions should also achieve the requirements contained in this document.
- 1.1.3 All manually propelled equipment used on Network Rail infrastructure should be fitted with fail safe operational brakes
- 1.1.4 All manually propelled equipment that is to be used on Network Rail managed infrastructure should meet the stopping distances stated in BS EN 13977:2005 (section 5.4). These results should be submitted to Network Rail Acceptance Services as part of the application for acceptance, contact Tel 0207 557 8063 or product.acceptance@networkrail.co.uk. A suggested test method for the brakes is shown in Appendix B.

1.2 Pre use checks

- 1.2.1 Check that each part of the manually propelled equipment is labelled with unique identification, owners name and contact details, where applicable the maximum uniformly distributed load (UDL) and that the maintenance brake test has not expired. If not compliant then do not use.
- 1.2.2 Each item of manually propelled equipment is to be assembled in accordance with the manufacturer's instructions (including braking lever, and where applicable push bars and side and end boards). This should be carried out by a person who has had suitable training and instruction, who should ensure that it is in good working order.
- 1.2.3 The user should ensure that the brakes are in full working order during each pre use check prior to start of shift. This should be done on the assembled item of manually propelled equipment as follows:

- a) for items with braked wheels: by gaining access to the wheels and turning the braked wheels using one hand, see figure 1, the wheels must resist movement. The wearing of gloves for this task is strongly recommended.
- b) for items where the design should prevent unaccompanied movement (eg where a tool has to be supported in raised position to allow movement): ensure that the mechanism operates correctly.

If in doubt, the item of manually propelled equipment is not to be used until it is checked by a competent maintainer.

- 1.2.4 Any item of manually propelled equipment that fails the pre use check should be withdrawn immediately from service and clearly labelled "do not use" and placed in quarantine.



Fig 1 Pre use brake test should only be undertaken with one hand

1.3 Placing onto the track

- 1.3.1 Protection of the line should be carried out in accordance with the Rule Book before placing the item of manually propelled equipment on the track.
- 1.3.2 Ensure sufficient resources are available to lift the item of manually propelled equipment onto the track
- 1.3.3 The item of manually propelled equipment should be put onto the track and the brake system immediately tested:
- a) for items with braked wheels: a push test conducted to ensure that the braked wheels do not rotate when pushed without activating the brake lever (the lever must be in place when this test is completed).
 - b) for items where the design should prevent unaccompanied movement (eg where a tool has to be supported in raised position to allow movement): ensure that the tool/restraining device drops to the ballast when released under all circumstances and load.
- 1.3.4 If any of the braked wheels rotate or the tool/restraining device fails to drop under gravity, then the item of manually propelled equipment should be immediately removed from the track and clearly labelled "do not use" and placed in quarantine.

1.4 Use

- 1.4.1 The item of manually propelled equipment should be used in accordance with the Rule Book and manufacturers instructions. Any limitations of use should be adhered to at all times.
- 1.4.2 It is essential that manually propelled equipment should not be moved faster than walking pace i.e. 3mph or 5km/hr
- 1.4.3 The method statement should consider, when using the equipment on gradients, the manpower required to push the item of manually propelled equipment (including its intended load where applicable) uphill.

Table 1 shows recommended number of persons required to push the item of manually propelled equipment up a gradient. These should be taken into consideration when planning work

but they are indicative values only. Manpower numbers are based on testing with a limited number of trolleys and assuming the average man can push with both hands on firm footing a value of 30 kg to overcome the initial start and then continue to push 20 kg whilst the item of manually propelled equipment is moving. These figures have been used to produce the table below, but may not always be valid due to condition of site, state of trolley and ability of individuals. It is recommended that no more than three persons simultaneously push an item of manually propelled equipment, except as shown in 1.4.8 and 1.4.9.

Load Gradient	2000 kg	1500 kg	1000 kg	500 kg
Up to 1 in 250	(3)	(3)	2	1
1 in 250 to 1 in 150	(4)	(3)	2	1
1 in 150 to 1 in 70	(5)	(4)	3	1
1 in 70 to 1 in 50	(6)	(5)	(4)	2
1 in 50 to 1 in 30*	(6)	(5)	(4)	2

* Where authorised by local instructions
() Theoretical figures, not recommended to use

Table 1 Estimation of manpower requirement

- 1.4.4 Personnel should not interfere with the braking mechanism. Only authorised maintenance staff are permitted to maintain or adjust the braking mechanism.
- 1.4.5 Only the correct brake handle should be used to operate the equipment.
- 1.4.6 Persons should not ride on any part of an item of manually propelled equipment.
- 1.4.7 The total weight of the uniformly distributed load of any trolley should not exceed 1000 kg.
- 1.4.8 Manually propelled equipment specifically for moving lengths of rail (commonly known as "Ironmen") are convenient to have greater number of personnel to move the item along the track because they are designed to be used in multiple and can comfortably have personnel distributed around each of them,

therefore it is permitted to have greater loads on these items only.

- 1.4.9 Table 2 shows recommended number of persons required to push items of manually propelled equipment specifically for moving lengths of rail up a gradient. These should be taken into consideration when planning work but they are indicative values only. Manpower requirements assume the average man can push with both hands on firm footing whilst the item of manually propelled equipment specifically for moving lengths of rail is moving, these figures have been used to produce the table below. This may not always be valid due to condition of site, state of equipment and ability of individuals.

Load Gradient	4000 kg	3000 kg	2000 kg	1000 kg	500 kg
Up to 1 in 250	#	5	3	2	1
1 in 250 to 1 in 150	#	5	4	2	1
1 in 150 to 1 in 70	#	6	5	3	1
1 in 70 to 1 in 50	#	7	6	4	2
1 in 50 to 1 in 30*	#	(10)	6	4	2

* Where authorised by local instructions
 # The ability to move more than three 60 ft lengths of rail, or longer lengths than 60 ft, is very dependent on site conditions and must be specifically risk assessed for each location
 () Theoretical figures, not recommended to use

Table 2 Estimation of manpower requirement to move manually propelled rail movement equipment

1.5 Maintenance

- 1.5.1 All items of manually propelled equipment should be subject to maintenance, which should as a minimum meet the manufacturer's recommendations

1.6 Labelling

- 1.6.1 In addition to the requirements of BS EN 13977, all items of manually propelled equipment should be marked with the

following information. This should be visible externally when the item of rail mounted manually propelled equipment is in use.

- Unique identification number (NB this could be different from the serial number referred to in BS EN 13977)
- Date of next Maintenance brake test (or the equivalent maintenance examination for equipment that does not require brakes as shown in 1.3.3.b)
- Owner name and contact details

2 Requirements for load carrying rail mounted manually propelled equipment - trolley

2.1 Use including loading

- 2.1.1 Loading should be uniformly distributed and not interfere with the brake handle. No load should overhang the sides of a trolley unless a risk assessment has been completed and any necessary protection of the adjacent line has been arranged.
- 2.1.2 Ensure that the UDL (carrying capacity as marked on the trolley) is not exceeded.
- 2.1.3 If two trolleys with unlinked brakes are used to move a load then a risk assessment and documented method statement that considers all risks should be produced.
- 2.1.4 No load should be carried that overhangs a single trolley by more than 50% of the trolley's deck length if overhanging at one end, and by not more than 100% of the trolley's deck length if the overhang is equal at both ends of the trolley. If loads longer than this are required to be carried the load should be carried between two trolleys.

2.2 Maintenance

- 2.2.1 A maintenance brake test should be completed that equates to the following:
- Remove the brake shoes and check for wear and contamination, change the brake shoe if the thickness is below the manufacturer's recommendation. If the brake shoes are contaminated, clean or replace as necessary.
 - Turn the wheel using a suitable torque measuring device (that may be supplied by the manufacturer) to ascertain a dynamic figure of the torque required to turn the wheel with the brake applied. Testing should be done with dry wheels and shoes. These figures allow for wet running conditions to meet the braking distances stated in BS EN 13977:2005
 - The requirements of b) are best achieved by making each braked wheel turn and taking the torque reading required to continue the movement. Readings should be taken in both directions and in all 4 quadrants around the wheel (8 readings per wheel). The average figure should not be below the minimum figures stated in the table.

d) After testing ensure that the brakes can be released.

Equipment type	Minimum average torque figure Nm	Minimum average torque figure Ft lbs	Note
Harsco/Permaquip type A/B	80	60	If torque is not reached then change brake components until minimum torque is reached
Harsco/Permaquip Link trolley	45	33	If torque is not reached then adjust to meet the figure shown in the table
Rotamag split trolley ^A	135 ^A	100 ^A	If torque is not reached then adjust to meet the figure shown in the table
Rotamag Link ^B	60 ^B	45 ^B	If torque is not reached then adjust to meet the figure shown in the table
Wolfe 'trakrat' trolley LT1000, LT1250 and LT1500	90	65	If torque is not reached then adjust spring to meet the figure shown in the table
Harsco scaffold trolley	25	18	If torque is not reached then change brake components until minimum torque is reached
Harsco scaffold plus	18 (25 maximum)	13 (18 maximum)	If torque is not reached then change brake components until minimum torque is reached
Harsco Ironman	40	30	If torque is not reached then change brake components until minimum torque is reached

^A Rotamag split trolley modified to service bulletin number SPLITS35-iss2 ,fitted with modified brake linings (lime green painted) and longer actuator arms, is permitted to have a minimum torque figure of 80 Nm (60 ft lbs)

^B Rotamag link trolley modified to service bulletin number LINKS35-iss1 ,fitted with modified brake linings (lime green painted) and new springs (yellow painted), is permitted to have a minimum torque figure of 45 Nm (33 ft lbs)

Important note: that both the above exceptions ^A and ^B require that the trolleys are fully modified. If in any doubt, or the trolley is only partially modified the figures shown in the main table should be used

Table 3 Torque requirements for specific equipment

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- 2.2.2 The equipment shown in Table 3 have been certificated to run on Network Rail managed infrastructure. Any other trolleys used on Network Rail managed infrastructure should meet the stopping distances stated in BS EN 13977:2005 (section 5.4) These results should be submitted to Network Rail Acceptance Services as part of the application for acceptance, contact Tel 0207 557 8063 or product.acceptance@networkrail.co.uk
- 2.2.3 The maintenance brake test should be completed at a periodicity of no greater than 3 months. The date of the next maintenance brake test should be marked in a suitable, easily seen position, on all trolleys. On rail mounted manually propelled equipment which is in sections, the date of next brake test should be displayed on all braked portions only.
- 2.2.4 A record of the maintenance brake test should be kept and an example is given in appendix A

3 Requirements for rail mounted manually propelled equipment other than load carrying

3.1 Other manually propelled equipment should meet the braking requirements of BS EN13977 and also have product acceptance from Network Rail. During the product acceptance stage it should be ensured that:

- Relevant brake tests for both maintenance and pre-use checks are documented in the maintenance and operating instructions as appropriate.
- The design is such that the manually propelled equipment cannot be placed in an un-braked condition during set-up or use.
- Where the design of brake relies on a pin to lock the wheel there should be proof that the equipment can be stopped during runaway and that the maintenance frequency is sufficient to cover potential use of the brake.

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Appendix A

Maintenance Brake test Record Sheet

Trolley Maintenance Brake Test		
Trolley Number / Owners Name		
Trolley Type		
Number of Braked wheels		NB All braked wheels must be torque tested
	Torque figures	
	Braked wheel No 1	Braked wheel No 2
Quadrant 1 forward		
Quadrant 2 forward		
Quadrant 3 forward		
Quadrant 4 forward		
Quadrant 1 reverse		
Quadrant 2 reverse		
Quadrant 3 reverse		
Quadrant 4 reverse		
Average Torque figure		
NB there should not be a significant difference between forward and reverse figures		
Name of Tester		
Signature of Tester		
Date of Test		
Location of Test		

Appendix B

Trolley & Ironmen brake testing schedule

Schedule to be used for assessing first of type braking performance of manually propelled rail mounted trolleys for conformance with the requirements of the following standards and acceptance by the M&EE Networking Group

- BS EN 13977:2005 Railway applications-track-safety requirements for portable machines and trolleys for construction and maintenance
- M&EE code of practice 0018 issue 3 Apr 2010 Rail mounted manually propelled equipment
- RIS-1701-PLT Rail Industry Standard for Portable and Transportable Plant Used for Infrastructure Work

Pre-requisites

Site	Must have a gradient of 1 in 27 and as a minimum 50m in length
Speed	Equipment must be provided to record speed of trolley prior to brake application (Possibly a GPS device)
Load	Load should be a uniformly distributed (UDL) and be tested at twice the maximum permitted load (This would be 2 tonnes for a hand trolley)
Distance	Equipment must be provided to accurately measure braking distance

Test method

The tests shown in Table 4 for trolleys or Table 5 for ironmen should be carried out.

The trolley should be manually propelled down the gradient with sufficient approach distance to ensure that the desired speed is achieved prior to brake application point. The brake handle should remain in place at all times.

For the 'simulated wet rail conditions' equipment must be provided to simulate extreme weather conditions i.e. torrential rain fall. This is for example a large garden spray mounted onto the trolley that will apply a continuous flow of water min 1 litre/min onto the rail wheel during testing. The wheel and brake pad area should be pre-sprayed before the test run.

Repeat each test 3 times and take averages.

Ironmen are to be tested in pairs.

Record the results on the appropriate test record sheet shown.

Test	Description of testing element	Pass/fail criteria
1	Propel trolley at 10 km/h with no load	Trolley stops within 10m
2	Propel trolley at 10 km/h with maximum payload	Trolley stops within 10m
3	Propel trolley at 5 km/h with twice payload	Trolley stops within 10m
4	Propel trolley at 5 km/h with twice payload and simulated wet rail conditions	Trolley stops within 14m
5	Propel trolley at 10 km/h with maximum payload and simulated wet rail conditions	Trolley stops within 14m

Table 4 Tests required for trolleys

Test	Description of testing element (Ironmen usually tested in pairs)	Pass/fail criteria
1	Propel Ironmen at 10 km/h with maximum payload	stops within 10m
2	Propel Ironmen at 5 km/h with half braking capacity	stops within 10m
3	Propel Ironmen at 10 km/h with maximum payload and simulated wet conditions	stops within 14m
4	Propel Ironmen at 5 km/h with half braking capacity and simulated wet conditions	stops within 14m
5	Propel Ironmen at 10 km/h with maximum payload and half braking capacity	Stop in a controlled manner within 20m
6	Propel Ironmen at 10 km/h with maximum payload and half braking capacity and simulated wet conditions	Stop in a controlled manner within 28m

Table 5 Tests required for Ironmen

Test Record for Trolleys

Date:
 Time:

Trolley Brake testing Record						
Trolley Type						
Serial number(s)						
Bearing type						
Ave Initial torque setting of braked wheels			Braked wheel No1		Braked wheel No2	
Ave Torque setting of braked wheels following completion of testing			Braked wheel No1		Braked wheel No2	
Test No	Result 1	Result 2	Result 3			Average
1						
2						
3						
4						
5						

Comments:

Photos and other relevant documents/ contributory factors

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Test Record for Ironmen

Date:
 Time:

Ironmen Brake testing Record						
Ironmen Type						
Serial number(s)						
Bearing type						
Ave Initial torque setting of braked wheels			Ironman 1		Ironman 2	
			Braked wheel No1		Braked wheel No1	
			Braked wheel No2		Braked wheel No2	
Ave Torque setting of braked wheels following completion of testing			Braked wheel No1		Braked wheel No1	
			Braked wheel No2		Braked wheel No2	
Test No	Result 1	Result 2	Result 3			Average
1						
2						
3						
4						
5						
6						

Comments:

Photos and other relevant documents/ contributory factors

References

Document	Title
GE/RT8000	Rule Book
RIS-1701-PLT	Rail Industry Standard for Portable and Transportable Plant Used for Infrastructure Work
BS EN 13977	Railway applications - Track - Safety requirements for portable machines and trolleys for construction and maintenance