



AUSTRALIAN RAIL TRACK CORPORATION LTD

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Engineering Practices Manual Civil Engineering

Field Loading and Unloading of Welded Rails

RTS 3643

Issue A, Revision 0

March 2006

1. General

This Standard sets out the procedures for loading and unloading welded rails from rail trains. End unloading is described. Side unloading is not approved as a field unloading method.

This procedure covers the technical requirements of the process only. It is assumed the safety requirements are undertaken through pre work safety briefings, safeworking arrangements, and the use of appropriate personal protective equipment.

2. Reason and nature of change

Document reissued as ARTC Engineering Practice Manual.

3. Load Capacities

For end unloading, the maximum load shall consist of the following:

	Length (m)	Capacity				No. of 13.7m rails for a full rail load				
		Tare (t)	Load (t)	Total (t)	Draw Gear	Rail kg/m Size				
						60	53	47	41	31
NDRF Welded Rail	14.6	22	45	67	L	81	92	104	119	157
NDRF Welded Rail (No. 2301 to 2347)	14.7	19	45	64	M1	69	78	88	101	134

These figures are indicative only. Actual capacities are listed on the wagon identification plates.

4. Certification/Safety Requirements

4.1 Personnel

Staff loading/unloading railsets require the following certification:-

- a Workcover crane operators certificate if operating a rail handling crane.
- a Workcover crane chaser/dogman certificate if attaching chains to rails.

4.2 Personal Safety Equipment Required

All workers are required to wear:

- Steel capped safety footwear.
- High visibility orange clothing or vest.
- Hard hats.
- Eye Protection if working on the end unloading wagon.
- Hearing protection if working near plant or the end unloading wagon.
- Gloves.

4.3 Equipment

4.3.1 Wagons

The Plant & Equipment Manager is to arrange for the wagons to be inspected and maintained in accordance with current rollingstock requirements.

The person responsible for releasing the railset for travel is to certify that:

- the wagon loading is secured by straps or chains and cannot move.
- the wagon deck is free of ballast.
- there are no loose straps or chains. Chains are not to be wrapped around wagon stanchions.
- all timbers and pins are secure.

Any wagon damage is to be reported to the Plant & Equipment Manager.

4.3.2 Lifting Equipment

All slings, 'D's', and chains used to unload railsets must be manufactured to approved drawings. All lifting equipment is to have Workcover approved Safety Tags. Any chains or slings used to load/unload railsets are to be inspected visually prior to each use.

Inspection of straps

1. Check for any cuts or abrasion. Any damage over 10% requires replacement.
2. Check for Ultra violet damage. Changes in colour do not indicate U/V damage. Should the strap surface be powdery and rub away replace strap.
3. Check for broken or torn stitching on strap. Any damage over 10% requires replacement.

Polyurethane sleeving

1. Check for Ultra violet damage. Should sleeving be cracked or extremely brittle, replace.
2. Check for cuts that go all the way through sleeve (sleeve can be gouged or have surface cuts that will not effect its performance) if sleeve is cut through entire surface replace it.

Fitting of straps

1. When fitting straps ensure they are straight and have no twists.
2. When fitting sleeving, ensure that it slides over the stitching and is 200mm from the base of the wagon.
3. On the winch side ensure that the sleeving is fitted down to within 200mm of the winch.
4. Ensure that the sleeving is passing through the clamp that fits onto the rails.

4.3.3 Plant

Any plant and equipment used to unload or load railsets is to be inspected to ensure safe and reliable operation.

5. Unloading the train – without using off track plant

5.1 Preparation

The whole of the area over which unloading will take place must be inspected and all signal cables, troughing, impedance bonds etc, noted and packing provided to protect them during unloading. Rail lubricators and take-off's are to be removed or suitably protected.

All straps or chains securing the rail are to be released prior to unloading.

Anchor locations need to be determined by the Team Leader before the train arrives, the bays cleared out and the locations clearly marked outside the four-foot. The sleeper being used to hold the unloading anchor chains must be doubled anchored (i.e. two on each side of the sleeper). Anchor chains are to be placed under the foot of the rail and secured to the cess side of the rail foot, the other end of the anchor chain is to be hooked to the unloading cable.

If two rails are to be unloaded at one time, two cables are to be laid out through the rear end unloading chutes. The cables are to be hooked into the first two rails to be unloaded by means of special 'D' shackles. The rails are to be unloaded in the correct pattern as marked on the rail ends (See Fig 1).

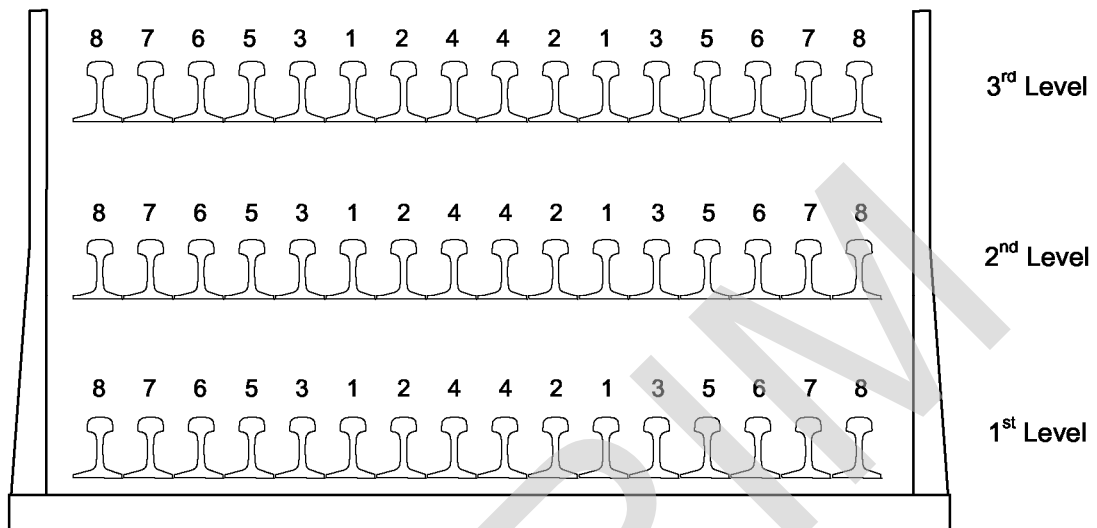


Figure 1 - Unloading sequence -53kg & 60kg rail - Maximum load - 48 rails

5.2 Unloading

After ensuring that the railset and the unloading cables are ready for the work to commence, the Team Leader must be sure that workers are kept at a safe distance (1.5 x the length of the unloading cable) from the unloading cables. Jamming of the rails on the railset or sudden jerks from the locomotive can cause the unloading cables to break and fly back.

Two men are to be placed on the top of the unloading vehicle to apply the chains and 'D' shackles between the rail ends. While the train is moving these men are to stand clear of the moving rails behind the protective screen and should only move around the vehicle deck when coupling up. Rail ends must only be hooked up when the train is stopped.

The Team Leader must ensure that the engine driver is advised of the speed at which the train will be required to work, the method of unloading, and the stops planned and he must be made aware that the emergency stops may be necessary.

The Train Driver must be advised that the initial movement of the locomotive must be a slow and gradual pull taking up the slack to avoid the cables being broken by a sudden jerk.

The first two rails can then be unloaded through the unloading chutes using the locomotive power to pull out the rail.

The rails will generally stay in the "fourfoot" when being unloaded on straight track. On curved track, however, the rails will have a tendency to fall over the running rails as the 110 metre rail length wants to straighten. In this case a rail handling crane (or other suitable plant) must be available to relocate the rail.

As the front end of the rail being unloaded reaches the rear end of the rails still on the train, the end of the next rail to be unloaded is connected to it. This means that for each tier unloaded a gain of approximately 13m (for 14 rails) will be obtained. Consequently, if the first rail is unloaded 6.5m ahead of its position the last rail on the tier will be 6.5m beyond its position.

Where necessary before the second tier is unloaded the train should be set back 13m, so that similar conditions will apply. The same process can be adopted for the third tier.

When the end of the first rail reaches the rear of the last vehicle, the train is stopped to attach the next rail to be unloaded by the chain provided for this purpose and the train is moved forward again.

When attaching chains between rail ends the person in charge of the unloading must ensure that the rail ends are close enough to allow the chain to be placed between the two rails.

This process is repeated until the first tier is fully unloaded.

The train may be then set back 13m and the second tier unloaded similarly. As each layer of rails is unloaded, the baulk timbers are to be removed and stacked on the wagon ends.

If the train is required to be set back while unloading this movement must be done with extreme care as any excess backward movement will cause the rails in the unloading chutes to buckle with consequent extreme danger to staff and damage to rails.

The Team Leader is to select trained personnel to uncouple the rails laying in the "fourfoot". Radio contact should be maintained between the unloading team and the uncoupling team to ensure that the rails are not uncoupled before it is safe to do so. At least three rails, 110 metres long, must be left coupled to the unloading train to ensure that the rail are not dragged along the ground whilst they are being uncoupled.

The unloading procedure should be continued till the railset is completely unloaded.

6. Unloading the train – using off track plant

All straps or chains securing the rail are to be released prior to unloading rail.

A chain or sling with a suitable safe working load is attached to each rail and the machine unloading the rail.

The rail is dragged through the unloading chute and into position. No workers are to stand in the machine slew area or within a distance which is 1.5 x the length of the chain joining the machine and the rail. Workers are not to stand within 10m of any rail which is being moved.

As each layer of rail is unloaded the baulk timbers are to be removed and stacked on the wagon ends.

7. Location of Unloaded Rails

Unloaded rails are normally laid in the cess or six foot and must be clear of the structure gauge. They are preferably to be located below that level of the adjacent tracks.

If the rails are left in the four-foot they must be well clear of the running rails, stood upright on their feet and spiked to sufficient sleepers to ensure they will not move.

If the rails are not to be installed in the running track within four weeks, they must be so located as to permit replacement of rail lubricators and take-offs by the maintenance personnel.

8. Releasing the wagons for traffic

On completion of the unloading, loose baulk timbers are to be placed on the bolsters, ensuring that the timbers key into the bolster pins for security.

If the baulk timbers are damaged or split and cannot be properly held on the bolsters, they must be placed in the nearest suitable rail vehicle with an end wall section to enable the timber to travel with safety, or removed from the wagons. The chains/webbing are to be tightened. The Team must make sure that the chains are suitably tied down and that the railset is safe for traffic.

9. Backloading rails

9.1 Preparation

If loading long lengths of rail (greater than 30m) then two chains/lashings per wagon are required but if loading short lengths of rail four chains/lashings per wagon are to be secured.

Undo and remove two lashing chains or webbing lashings per vehicle. Loose chains or lashings are to be placed on the side of the railset vehicle in a secure position ensuring that they cannot fall off the railset while moving.

Remove all bolster pins on the loading side of the railset, ensuring that pins are placed on the vehicle deck for safety and to remove the risk of the pins falling off the railset. All pins on the opposite side of the railset to be placed in the inner hole of the bolster.

Remove all spare baulk timbers from the bolsters and ensure lower bolster timbers are in the correct position square with the bolster, ready to receive the recovered rails.

Place all spare baulk timbers required for the second or third layers or tiers at the side of the railset vehicle inside the side plate or gunwale on the railset vehicle. The timbers should be stored on the opposite side to the loading operation.

9.2 Mounting 'Geismar' rail loading cranes

Mounting of the two Geismar Loading cranes can now be carried out by one of the following two methods:

1. On NDRF wagons using the mounting brackets on the Geismar cranes which are bolted on to the centre of the railset vehicle using 4 high tensile (8.8S) 15mm diameter 75mm long bolts, washers and nuts

OR

2. Using the special mounting chain and swivel,

Before loading the Geismar rail loading cranes they must be inspected and started up to ensure that they will work when required.

If the Geismar loading cranes are to be travelled on the railset, the jib extension must be folded back in its shortened position so as not to foul the rolling stock gauge.

9.3 Recovering rails

Rails should be stacked 3-10m from the track and placed so they are not interwoven. One end of the stack should be square and positioned so that rail ends sit square, just past the middle bolster of the end unloading wagon to be used during unloading.

Loading of second hand 53kg rail in the field recovery operation is to be generally restricted to twelve (12) rails per tier in all situations. Twelve (12) rails per tier is the maximum number of rails on the second or third tiers. By picking up rails foot first, however, an additional four rails can be loaded (i.e. head down). It is very important that the rails are loaded centrally to ensure stability of load on each wagon.

No loading of 53kg or 60kg rails is to exceed 3 tiers high.

The bolster on the rail wagons have a number of set positions. In establishing the configuration of the load in situations where less than a full loading is required, two considerations need to be met:

1. the bottom layer of rails must be constrained by bolsters on either side. The bolsters must be in the same position on each side (that means the rails must be centrally located on the wagons).
2. It is desirable that second and third layers, if required, are the same width as the first. If, however, they cannot, then the loading must be arranged so that each layer is as even as possible (this will keep the angle of the lashing straps as close to 90° as possible and prevent load movement).

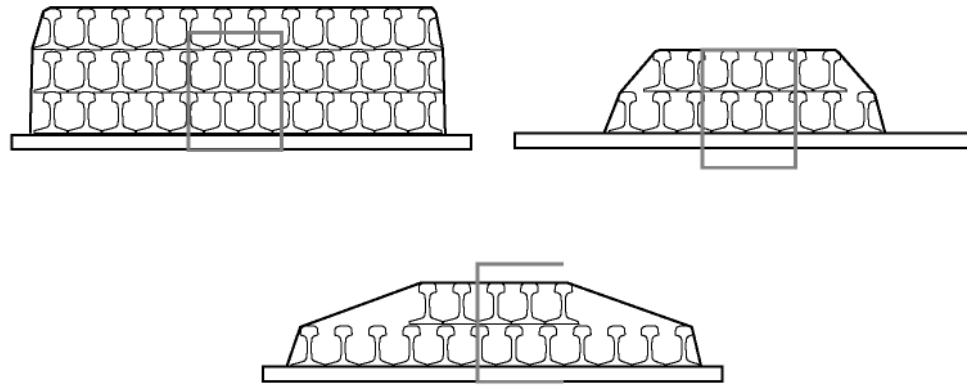


Figure 2 – Examples of good and bad loading arrangements

Between the bottom and second layers of rails, timber baulks are to be used, and the timbers are to be standard as supplied by the Welded Rail Depot.

Baulk timbers will be fitted with a retaining collet centrally fitted to the baulk timber and is to be used as shown in Fig. 3. The steel collet fitted to the centre of the timber is to be placed on the layer of rails with the collet facing down between the rail head. This steel collet will stop the timbers moving sideways and will only allow the timber to move between the head of any two rails in which it is placed.

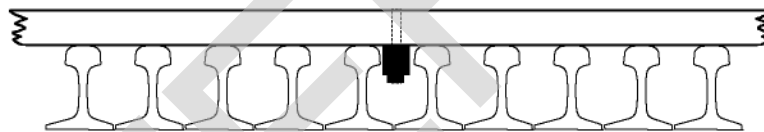


Figure 3 - Timber Baulk with steel collet

It is important that the centralising collet be placed in the centre of the load to stop the timbers fouling the rolling stock gauge.

Once baulk timbers have been placed onto the bottom layer, the second layer of rails can then be loaded to maximum of 12 rails. Then place the final set of baulk timbers between the second and third layers of rails and proceed to load the final layer.

Care must be taken when loading rails to ensure that only 110 metres long rails are placed in the centre of the load so that gaps are not left in the centre allowing the load to move laterally, creating an unstable load and allowing the lashing to become loose. In the case of shorter rails, two short rails should be placed end to end to allow a more stable load to be loaded.

9.4 Releasing the wagons for traffic once loading is complete

When the loading is complete the bolster pins can be replaced to secure the load.

The loaded railset can then be secured with chains or webbing. Where possible the two inner, or centre, chains or lashings are to be used to uniformly hold the load. For rail lengths longer than 1 wagon, 2 chains or lashings per vehicle need to be fastened. For short rails (13.72m) 4 chains or lashings per vehicle should be used to secure the load.

The Team Leader must ensure that the loaded railset is correctly tied down. When webbing straps are used, place “steel cups” on the rail head of the two outer rails and thread the webbing through nylon sleeves. The webbing **MUST NOT** directly contact the rail. See Figures 4 and 5 for examples of the webbing arrangement.



Figure 4 - Webbing, steel cups and nylon sleeves

All chains or straps must be tight **without extreme stress** being placed on the chain links or strap webbing. Use a 450mm bar to hand tighten the straps/chains.

Note: This can be tested for chains by striking the tightened chain lightly with a clawbar. A resulting ring will indicate the chain is tight enough.



Figure 5 - Webbing, steel cups and nylon sleeves

Chains must only secure the load and not be wrapped around the wagon pins.

Removal of the Geismar cranes can then be carried out by one of the following methods:

- a) Field Removal at level crossing or level area. Undo securing chains and swivels and remove cranes with either mobile crane or crane truck.
- b) Bolted cranes can be travelled by rail to nearest yard or siding and be removed without causing delay to traffic. To remove, undo 4 bolts and release securing chains and swivels, remove with mobile crane or crane truck.

9.5 Transporting Geismar rail loading cranes

Weight of crane: 700kg each

Weight of spare gearbox: 60kg each

Total weight of eight (8) cranes and a spare gearbox: 5700kg

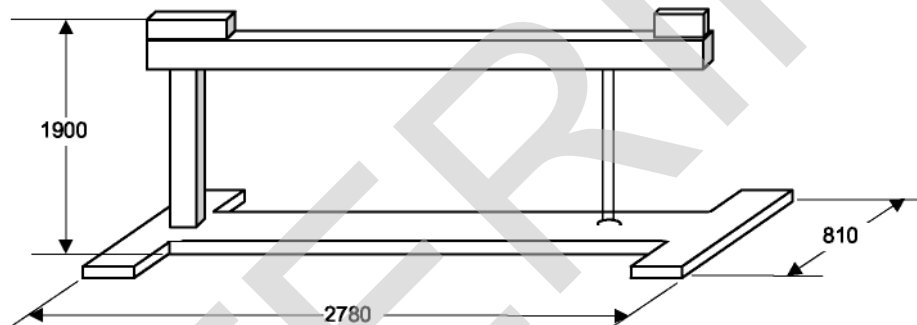


Figure 6 - Dimensions of crane

Loading Instructions:

1. Four timber spacers, around 70mm x 70mm and the width of tray are required. They are placed about 0.4m, 2.4m, 3.3m and 5.2m from the front of the tray, parallel to the front of the tray. They are needed to make the cranes site flat.
2. Before lifting any cranes, the cranes must be prepared for transport. Ensure the chains on the end of the boom are attached to the base and are taut. The engine covers should be on.
3. Place the first crane on (say) the left side of the tray with the motor hard up against the front of the tray, and the side of the crane directly above the side of the tray. This is done by placing the crane using the Hiab and using a jemmy bar to lever the crane to the exact position.
4. The second crane is placed next to the first, hard up against the front of the tray with the end of the boom at the front (engine at the rear). The base is to be slotted into position as shown on the diagram. The jemmy bar may be required to place this crane exactly.
5. The third and fourth cranes are similarly loaded, alternating the direction they are facing. Use the jemmy bar to place each crane exactly.

The rear row is loaded with the same method as the first row.

Unloading Instructions:

1. The cranes are unloaded in the reverse order they were loaded.
2. If the cranes are to be left in the open for a period of time, the engine covers are to be on the engines. If the cranes are to be left in populated areas, it may be practical to remove the engines and store them in a safer place to prevent the engines being stolen or vandalised.

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