

NEW ZEALAND RAILWAYS	DRAWGEAR ON LOCOMOTIVES AND ROLLING STOCK	CODE No. 45
MECHANICAL BRANCH		Page No. 1 of 5 Issue No 5 Date Issued 1/12/81

(1) APPLICATION:

All drawgear components for locomotives and rolling stock must be manufactured and applied strictly according to drawings, specifications and instructions issued by the Chief Mechanical Engineer.

(2) DRAWGEAR MATERIALS:

Materials for the manufacture of drawgear parts must conform to those quoted on drawings and specifications issued by the Chief Mechanical Engineer or to updated equivalents which generally conform to the following:

Forged buffer heads and drawbars	:	BS 970 - Part 1 - 070M20
Cast drawbars	:	Cast steel to Mechanical Branch Code No. 91
Drawbar hooks	:	BS 970 - Part 1 - 080M46
Drawbar pins	:	BS 970 - Part 2 - 605M36
Drawbar pin tongues	:	BS 4360 - grade 43A
Drawbar keys	:	BS 970 - Part 1 - 080M46
Automatic couplers	:	Cast steel to Mechanical Branch Code No. 91
Automatic coupler knuckle pins	:	BS 970 - Part 2 - 605M36

Japanese drawings of rolling stock built in Japan quote Japanese Industrial Standards of materials. Replacement of drawgear components on such vehicles shall be to British Standards quoted above.

(3) HEAT TREATMENT OF DRAWGEAR COMPONENTS:

- (a) Apart from items specifically mentioned below in this Clause, annealing or heat treatment of drawgear is not necessary except at the time of manufacture, and shall not be carried out. Where, however, dirt, rust or grease is present and the inspection of parts (See Clause 8) will be facilitated, parts may be put through the fire to burn off the surface accumulation.
- (b) Drawbar pins and automatic coupler knuckle pins of manganese molybdenum steel to BS 970 - Part 2 - 605M36 shall be heat treated to condition S in this specification. Should they be subsequently reheated for any reason, they must again be heat treated to condition S. (Tensile strength 772-926 MPa (50-60 tonf/ in²), and Brinell hardness number 223-277).
- (c) Drawbar hooks manufactured from BS 970 - Part 1 - 080M46 steel shall be flame hardened in the gullet and pin hole in accordance with instructions on the relevant drawing.
- (d) New high tensile transition heads manufactured to drawing X28148 of nickel-chromium-molybdenum steel to BSS 3100 - Grade BT2 shall be heat treated as detailed in ~~Code 46 (yet to be published at time of printing)~~ [Code 91 Part B]. Should they be subsequently reheated for any reason they must be heat treated again.

(4) CLASSIFICATION OF DRAWBARS:

Headstocks on all rolling stock must be branded immediately above the drawbar with the appropriate letters denoting the drawbar dimensions. Details of the method of branding and the alphabetical symbols to be used are shown on drawing Y 35353.

(5) JANNEY YOKE DRAWGEAR:

For the list of prints of Janney yoke drawgear for locomotives and rolling stock see drawing X27142. Because of the relatively small tolerances allowed, it is essential when manufacturing or repairing Janney yoke drawgear that keys, drawbar shanks, spring blocks, yokes, draft lugs, and springs be made strictly in accordance with the drawings.

Any slack between the drawbar and yoke assembly on the spring blocks shall be eliminated by packing between the inner spring block and the yoke. Only one packing piece is permitted and the thickness shall be not less than 3 mm or [1.5 mm for workshops] more than 12 mm. Each flange shall be 16 mm in width and fit closely to the yoke. When in position the packing piece shall be secured to the yoke by two welds 25 mm long on each flange.

(6) AUTOMATIC COUPLERS:

The following types of automatic couplers are in use:

- (a) Alliance type to drawing Y/X 26078/2, as fitted to D and DM electric multiple units; 15.2n, 17m and 18.3m (50 ft, 56 ft and 60 ft) cars fitted with Janney Yoke drawgear; UL wagons: steam heating vans.
 - (b) Alliance type to drawing X 27925, as fitted to USL wagons.
 - (c) Alliance type to drawing Y/X 27774/2 as fitted to coal wagons.
 - (d) Alliance type to drawing W 32397, having top and bottom shelves, and fitted to USG and UCG wagons.
 - (e) Alliance type to drawing 11040035, as fitted to AC cars. (See part (h)).
 - (f) Sumitomo type to drawing W 31780, as fitted to Silver Star Cars. [Et & Em]
 - (g) Sumitomo type to drawing X 48031, similar to (f) but of less depth, as fitted to Silver Fern railcars.
 - (h) ¾ size Alliance type 'A' to drawing X 43393, as fitted to AC cars. To be replaced by (e) as time permits.
- Couplers (a), (b), (c), (d) and (e) may be coupled directly together for train running purposes.
Couplers (f) and (g) may be coupled directly together for shunting or emergency towing purposes.

NEW ZEALAND RAILWAYS	DRAWGEAR ON LOCOMOTIVES AND ROLLING STOCK	CODE No. 45
MECHANICAL BRANCH		Page No. 2 of 5 Issue No 5 Date Issued 1/12/81

Couplers (f), (g) and ~~(h)~~ may be coupled directly to (a), (b), (c), (d), or (e) for shunting or emergency towing purposes. The correct method of operating automatic couplers is set out in Instruction Nos. 26 and 27 of the Locomotive Staff Operating Instructions and in Instructions No. 9 part 7(b) of the Train Examiners Manual. Officers in Charge and Supervisory Officers must ensure that staff concerned under their control are fully conversant with the respective instructions.

Vehicles fitted with automatic couplers must have transition heads fitted before they can be coupled to vehicles with standard drawgear. Transition heads are carried on all locomotives, and on AC cars still fitted with obsolete ¾ size Alliance type automatic couplers.

(7) USE OF TRANSITION HEADS:

Transition heads for coupling vehicles with automatic couplers to those with standard drawgear are provided as follows:

Drawing	Type of Transition Head	For Coupling Standard Drawgear to
X28148	Standard transition head	Alliance type coupler
X25578	Standard transition head	Alliance type coupler-now superseded by x 28148
W31781	Transition head	Sumitomo tight lock coupling for use "Silver Star" and "Silver Fern" [Et & Em]
X28448	Transition head	Original W31781 modified for use between locomotive and first vehicle on "Silver Star" train
11040020	Transition head : ¾ size	AC car Alliance type drawgear. Note that this type is to be replaced with transition head to drawing X28148 when ¾ size couplers are replaced.

Some adaptor hooks to drawing W 30645 are still in service. Adaptor hooks are designed for shunting and marshalling purposes, and are **not** to be used for train running:

- (a) If a transition head is available.
- (b) When coupling a locomotive to an automatic coupler at the head of a train.
- (c) When coupling a four-wheeled wagon to an automatic coupler.
- (d) On **any** passenger train.
- (e) Near the front of a heavy train.

IMPORTANT: When it is necessary to couple an Alliance type coupler fitted to a car to a standard drawbar using an adaptor hook, the adaptor hook **must** be manipulated from inside the car. To do this it is necessary to open the car end door and lie on the floor of the vestibule, and insert the coupling pin into the standard drawbar from this position. Under no circumstances must any attempt be made to make such a coupling from a standing position between two vehicles, as there is insufficient clearance. Staff members have been crushed when attempting to make couplings in this way.

Enginedrivers are responsible for ensuring that their Locomotive Assistants adhere rigidly to this instruction.

(8) EXAMINATION, MAINTENANCE AND LIMITS OF WEAR:

All drawgear components, including side chains, must be thoroughly inspected for defects and wear when vehicles are in workshops for overhaul or in workshops or depots for lifting [and that holes and slots for pins and keys are the correct size and shape]. Also, they shall be checked visually when vehicles receive their annual brake overhaul and replacements effected if required. Automatic couplers shall be dismantled and examined for wear at annual brake overhaul periods. Other inspection work shall be carried out as directed by the District Mechanical Engineer.

[Amendment No. 44]

Drawbars

Before new and repaired drawbars are passed into service, they shall be gauged to ensure that the drawbar head throat width and depth and the distance from the buffing face to the drawpin holes are correct. Janney drawbars may be reduced up to 13 mm over the total original length by dumping the shank up to its full section. Alternatively, worn shanks may be built up by welding and machining.

The butt end of Janney drawbars may be built up by electric welding to compensate for wear.

Forged head drawbars are to be fitted with coupling pin retainers to drawing 11140024A.

Cast drawbars are to be fitted with coupling pin retainers to drawing 111240024A.

Drawbars fitted to DH and DX Locomotives, as on drawing X 47680 are to be modified to drawing 12020001A.

Drawbar Coupling Pins

Drawbar coupling pins are to be scrapped when the diameter on any portion is worn to 38 mm or below.

Drawhooks and Bridles

Drawhooks and bridles are to be checked with gauges to drawing W31184 during overhaul or lifting of vehicles to ensure that wear is within acceptable limits.

NEW ZEALAND RAILWAYS	DRAWGEAR ON LOCOMOTIVES AND ROLLING STOCK	CODE No. 45
MECHANICAL BRANCH		Page No. 3 of 5 Issue No 5 Date Issued 1/12/81

Janney Yoke Spring Blocks

Janney yoke spring blocks are to be built up by electric welding when worn by 3 mm or more.

Automatic Couplers

For size and limits of wear on Sumitomo automatic couplers fitted to "Silver Star" stock see Maintenance Instruction, Volume 1, Mechanical Equipment of Sleeping Car Trains, Appendix 1 - 5.

These limits of wear shall also apply to the Sumitomo automatic couplers fitted to the "Silver Fern" railcars.

For other types of automatic couplers, the limit of wear on wearing faces of component parts shall be 3.0 mm.

Clearance of the knuckle hinge pin in the hole is to be restricted to a maximum of 6 mm. On the external pulling face the limit of wear shall be 6 mm.

Alliance coupler maintenance procedures are as follows:

- (a) **Normal Operation:** When the locklifter raises the locking block up to the full height clear of the knuckle tail the block can tilt on the locklifter support and the tail catches and rests on a ledge in the coupler head. This is a design feature.

Testing the coupler: Start with the knuckle open and the locking block resting on top of the knuckle tail. As the knuckle is moved to the closed position the block should be held upright by its guides until it slips off the knuckle tail. It should then drop cleanly to the locked position.

Fault Condition: If, when the knuckle is closed, the **locking block does not easily drop** into a position where the bottom of the locklifter is level with the indicator chain, then a fault exists. This must be rectified. NOTE: the operating lever must **not** be held. Both the operating lever and locklifter must be free to move.

- (b) **Gauging:** Assembled coupler heads and knuckles are to be gauged using coupler contour gauge to drawing H.S. 3153/1. The purpose of this gauge is to ensure that a standard mating coupler and knuckle will fit, to check wear, and to ensure that the gathering horn is not bent.

The knuckle is to be checked separately using the knuckle profile gauge to drawing H.S. 3153. Correct positioning of the pivot pin hole is covered when checked in the coupler using the coupler contour gauge.

- (c) **At workshops overhaul:** All internal parts of the couplers must be stripped out. Locking blocks and locklifters are to be replaced or reconditioned and brought back to new condition so far as alignment (locklifters) or wear at any place is concerned. Coupler heads are to be gauged to ensure that they are satisfactory for use until the next overhaul, knuckles are to be reconditioned as necessary. Knuckles must not drag on the underside as they open or close. Defective coupler heads which cannot be reconditioned are to be scrapped.

In new knuckle castings, or when worn holes in knuckles have been filled by welding, holes are to be jig-drilled. Similarly the hole in the coupler head is to be jig-drilled.

When the external pulling face of the knuckle is built up by welding this is best done between profiled copper formers clamped onto the top and bottom faces. Welding on pulling faces should be hard-surfaced so that wear can be reduced.

The only place where weld reconditioning is permitted to be greater than drawing dimensions is on the wearing face of the knuckle tail which contacts the locking block. The maximum deposit of weld permitted at this point to compensate for worn coupler head and knuckle faces is 6 mm.

On assembly a reconditioned knuckle must be able to be operated in conjunction with a master locking block (similarly with any new locking block ex stores) in the overhauled coupler. The clearance between knuckle tail and locking block is to be approximately 2 mm when in the locked position (block and knuckle tail pushed apart). The overall width dimension is to be within 0.5 mm of the drawing dimension for reconditioned locking blocks. Welding on the block which would make it oversize is not permitted. Locklifter guides and indicator chains are to be correctly installed.

Whenever automatic couplers are in Workshops or Depots for attention the area between the head and shank should be carefully checked for cracking.

- (d) **All parts manufactured in Workshops:** must be fitted into a **master coupler** which is to be set up and maintained for the purpose to ensure standardisation of parts held in stores. A master coupler must be set up and maintained at each Workshops where coupler overhauls are carried out. Gauges provided must also be held at this location. Reconditioned parts should also be checked as necessary for operation with the master coupler and its components. Knuckles with tails built up larger than the drawing dimension can not be tried with a locking block in the master coupler but all other aspects of operation of the knuckle can be tested.
- (e) **Depot Repairs:** Depots must be able to draw fully finished parts from stores. Parts withdrawn from service are to be sent to Workshops for reconditioning or scrapping. Knuckles should be free to move without the tail dragging on the underside. If the locking block does not drop freely a fault exists at the knuckle tail, on the block or locklifter or else the locklifter guide may not be fitted. Defective parts which allow the block to cant or catch should be changed so that the fault is eliminated. Correct operation is important and everything possible must be done to prevent train partings in service.

NEW ZEALAND RAILWAYS	DRAWGEAR ON LOCOMOTIVES AND ROLLING STOCK	CODE No. 45
MECHANICAL BRANCH		Page No. 4 of 5 Issue No 5 Date Issued 1/12/81

[(f) Welding repairs – any welding repairs to Alliance couplers, are to be carried out in accordance with Code 91 clause 5.]

[Chief Mechanical Engineer's 24/563 of 30 March 1982 8(f)]

Transition Heads

Where transition head coupling pin holes have worn to 48 mm diameter, they are to be built up by welding and rebored to 44 mm diameter correctly located. The bearing face may also be built up by electric welding and re-machined. In all cases welding is to be used only for reconditioning worn areas and not for repairing defects. Special conditions apply to the welding of high tensile transition heads. See code 46 (still in preparation at time of printing of this code).

Side Chains

Care shall be taken to ensure that vehicles are fitted with the correct length of side chains according to the relevant drawings.

Special attention must be given to side chain hooks to ensure that stretched hooks are replaced.

All vehicles except locomotives are fitted with two sidechains at each end. Locomotives are fitted with one sidechain per end, on the driver's side at the front and on the Locomotive Assistant's side at the rear. Vehicles with automatic couplers are not fitted with sidechains.

Kidney Links

Kidney links to drawing Z7299 are to be returned to workshops when elongation of the holes exceeds 3 mm from standard, and are to be reformed to size.

This also applies to kidney links to drawing S3490, which are strictly reserved for Cook Strait Ferry use.

(9) DRAWBAR HEIGHTS:

The distance from rail level to the centre line of the drawbar on locomotives and rolling stock shall be maintained as follows:

Locomotives shall be measured in running order and rolling stock in tare condition.

(a) Vehicles Passed Out of Workshops:

Stock	Drawbar Height
New locomotives	750 mm ± 7 mm
Repaired locomotives	750 mm ± 13 mm [+7 -13] [C.M.E.'s 24/563 of 16/5/1986]
Rolling stock	760 mm ± 7 mm for all classes of vehicles except the following: 750 mm ± 7 mm - classes: CP 3, 26, 32, 49; H 13 to 99; J 44, 52, 60; LA 561 to 32540; MC 15 to 919; MCC 137, 401, 795, 876; MCP; NR 81, 98, 109, 144; PK; Q 4821 to 4864, 5502 to 5968, 6036 to 8664; UD; UK; UKA; UKB; UKC; UKP; UKX; W (remainder); YB 1178 to 1823; F (30 ft). 745 mm ± 7 mm - class YB 375 to 1161 and 1846 to 1898. 735 mm ± 7 mm - classes: CP 55; DD; J 28, 36; LA 19 to 555; M; N; NR52; Q (remainder); R; RB 17 to 46; T10 to 37; U; UA; UB (remainder); UBF; UBW; UC 12 to 1149; VB; XB; YB 29 to 369; ZC; F (50 ft) 159, 367 to 465; F (47½ ft); F (30 ft) 13, 22, 32, 41, 308, 419 to 440; EP. 725 mm ± 7 mm - class Q 3653, 3661, 4682 to 4805
Repaired vestibule ended cars "Silver Star"	Maximum = 765 mm Minimum = 750 mm
Other repaired rolling stock	Maximum as per new rolling stock Minimum = maximum less 13 mm

(b) Minimum Drawbar Heights Allowed in Service:

Stock	Drawbar Height
Locomotives	710 mm
Vestibule ended cars and "Silver Star" cars	735 mm
All other rolling stock	710 mm [725 mm] [C.M.E.'s 24/563 of 16/5/1986]

NEW ZEALAND RAILWAYS	DRAWGEAR ON LOCOMOTIVES AND ROLLING STOCK	CODE No. 45
MECHANICAL BRANCH		Page No. 5 of 5 Issue No 5 Date Issued 1/12/81

(10) ADJUSTING DRAWBAR HEIGHTS:

Bogie Vehicles

The drawbar height of bogie vehicles may be adjusted:

- (i) By adjusting the spring hangers (where provided).
- (ii) By packing under spigoted bogie centres. Steel packing plates under top or bottom spigoted bogie centres shall not be less than 6 mm in thickness. Not more than three loose packing plates shall be fitted under any one centre. The total thickness of packing shall be such that the bogie centre spigot engages in the bolster or transom by not less than 13 mm. Float blocks must then be adjusted in accordance with Code 82, Clause 5.
- (iii) By rotating roller bearing axleboxes where this means is provided (i.e. where the distance from the centre to the top and bottom of the axlebox is not the same). Where such axleboxes are rotated, the distance from the axle centre to the top of the axlebox must be the same at each wheel of the bogie.
- (iv) By replacing the bogie centres with ones of greater depth (see relevant drawing for the particular vehicle). Float blocks must then be adjusted in accordance with Code 82, Clause 5. For bogies to drawings X28250, X28020, and X27250, as fitted to prestige passenger services, see the Sleeping Car Maintenance Instruction Volume I (Mechanical equipment).

Four Wheel Vehicles

- (a) The drawbar height of four-wheeled vehicles with auxiliary and main laminated spring suspension may be adjusted as indicated on the appropriate drawings by:
 - (i) Inserting a maximum of 13 mm steel packing to drawing X27029/ 5 between the axlebox and distance piece.
 - (ii) Inserting a maximum of 9 mm steel packing to drawing X27029/ 2 between the main and auxiliary springs at the spring brackets.
 - (iii) By fitting thicker laminated spring distance pieces to the drawing relevant to the particular wagon between the top of the axlebox and the bottom of the spring buckle. **The standard distance pieces are not to be modified for this purpose.**
- (b) The drawbar height of four wheeled vehicles fitted with long link laminated spring suspension, eg. LPX, NH, and NK wagons, may only be adjusted by adding or removing the correct packing piece between the link brackets and the wagon body. Packing must **not** be placed between the axleboxes and the main springs.
- (c) The drawbar height of four wheeled vehicles fitted with pedestal type coil spring suspension, eg NX and KSX wagons, is adjusted by removing packing pieces from below the bearing house and placing them above, or vice versa. There must be a clearance of 6 mm between the bottom of the bearing housing and the top of the packing retaining bolt head, as shown on the relevant drawings.