E. 10/12 : INSTALLATION OF INSULATED RAIL JOINTS

CONTENTS

1. SCOPE

This specification covers the work necessary for the installation and replacement of insulated rail joints/block joints in track.

2. INTERPRETATION

2.1 SUPPORTING SPECIFICATIONS

2.1.1 Where this specification is required for a project, the following specifications, shall, inter alia, form part of the contract documents:

a) The E.10 Gen - General.
b) The E.10/1 - Laying of rails.
c) The E.10/2 - Laying of sleepers.
d) The E.10/4 - Ballast and tamping.

2.1.2 In addition the following specifications, inter alia, may be required:

a) The E.10/7 - Field welding of rail joints.
b) The E.10/8 - Field welding and corrective grinding of battered rail joints, skid marks and rail crown damage.
c) The E.10/9 - Slewing and alignment.

2.2 DEFINITIONS

Void.

3. MATERIALS

3.1 Block joints will be either prefabricated, pre-assembled or loose components to be assembled in track as specified in the Project Specification

3.2 Care shall be taken to ensure that all of the correct components are available before installation or rectification is attempted.

3.3 Anti-static paint shall comply to Specification No. CSS 183/19.10/G25.

4. PLANT

4.1 Drill bits shall be diameter 32 mm and sharp.

4.2 When drilling CrMn rails a SOMTA 8% COBALT or similar drill bit shall be used.

5. CONSTRUCTION

5.1 GENERAL

Void.

5.2 SAFETY

Void.

5.3 PROGRAMME AND METHOD STATEMENT

Void.

5.4 METHODS AND PROCEDURES

5.4.1 GENERAL

5.4.1.1 The Engineer will instruct where block joints are to be installed.

5.4.1.2 A minimum distance of 12 mm shall be maintained between any metallic item on a block joint and any sleeper fastening.

5.4.1.3 The track shall be restored to A-standard for at least ten metres on both sides of the joint prior to installing the block joint.

5.4.1.4 Where block joint assemblies are to be inserted in curves of any radius, the whole length of rail on either side of the fishplates shall be jim-crowed to the correct radius. The jim-crow shall not be allowed to span the joint.

5.4.1.5 For installation of block joints on curves with check rails, a gap 25 mm wide shall be left in the check rail opposite a block joint in the low leg running rail. The wearing edge of the check rail shall be chamfered 5 mm over a length of 50 mm on both sides of the gap.

5.4.1.6 On electrified lines, jumper cables shall be applied before breaking the track.

5.4.1.7 Block joints in long welded rails in open lines shall not be loosened outside of temperature range A, Annexure H in specification E.10 Gen. unless otherwise permitted by the Engineer.

5.4.1.8 The rail ends at block joints shall not be flame-cut.

5.4.1.9 Where a block joint is to be inserted in an existing rail, the rail shall be mechanically cut, square and perpendicular in both the horizontal and vertical planes and rough edges removed.

5.4.1.10 The Contractor shall respace sleepers either side of the block joint as indicated in Annexure J Sh. 4 in Specification E.10 Gen.

5.4.2 PRE-ASSEMBLED BLOCK JOINTS

5.4.2.1 Handling of a workshop assembled block joint :

(a) The supplied pre-assembled block joints shall be handled in such a way that bending thereof, especially over the joint area, is prevented.

(b) The block joint shall be handled with the rail profile in the normal position with the crown to above to ensure that the moment of inertia is at its greatest.

(c) A way of handling can be one of the following :

* To stiffen the block joint during handling a support rail can be clamped to it.
* A spreader beam can be used to support the block joint on at least four places.

(d) Care shall be taken during the off-loading of block joints. Under no circumstances shall the block joints be dropped from the delivery vehicles.

5.4.2.2 Stacking and storing of pre-assembled block joints :

(a) If the pre-assembled block joints are not stored under roof, the joints shall be covered with tarpaulins.

(b) The pre-assembled block joints shall be stored on wooden sleepers and layers shall also be separated from one another by means of wooden sleepers.

5.4.2.3 Where pre-assembled block joints are installed to replace existing block joints, lengths of rail as specified in the Project Specification shall be cut out and a new joint thermit welded in.

5.4.3 FIELD ASSEMBLED BLOCK JOINTS

5.4.3.1 The Contractor shall, by sawing or filing, trim the end posts of every block joint to conform to the profile of the rail before the fishplates are fitted.

5.4.3.2 Where the length of batter at the rail ends of the joint is more than 100 mm on either side the dipped joint shall be bent out with a vertical jim-crow.

5.4.3.3 Where a new joint is to be prepared, the rail crown over the proposed joint area shall be ground out to a depth of up to 3 mm and 300 mm in length. This ground out area shall then be welded and finished according to the specification E.10/8.

5.4.3.4 Where it is necessary to drill holes for the fishbolts it shall be done according to Annexure J Sh. 1 in Specification E.10 Gen. and the position of the rail holes shall be marked accurately.

5.4.3.5 When drilling, overheating of the rails shall be prevented to avoid the detremental effect of martensite formation.

5.4.3.6 All holes drilled shall be cylindrical, clear and free of any burr marks and shall be perpendicular to the rail web in both the horizontal and vertical planes.

5.4.3.7 The holes shall be champhered to a depth of 1,5 mm according to Annexure J Sh. 1 in Specification E.10 Gen.

5.4.3.8 The finished surfaces of the rail ends over the whole length of the insulated fishplates shall be cleaned of all grease, dirt, scale and loose rust by means of grinding/sanding, then with Acetone or Xylene.

5.4.3.9 The rail ends shall be cleaned of all loose metal particles.

5.4.3.10 The finishing surfaces of the rail at the rail ends, including the underside of rail crown, web and rail flange, shall be painted with anti-static paint such as "Polyvinyl Chloride Copolymer Highbuild Midgrey", after the rail ends have cooled off.

5.4.3.11 Where assembling the rail joint the contractor shall ensure the following :

(a) That the fishplates to be re-used shall be cleaned properly by a light sanding of the fishing surfaces and removing any grease, dirt, or any other foreign substance with Acetone or Xylene to ensure a good bonding with the epoxy.

(b) That defective components shall be replaced with new ones.

(c) That the gap between the rail ends is 6 mm before the end post is inserted.

(d) That the insulated fishplates are of the correct mass and that the holes in the rail correspond with the holes in the fishplates.

(e) That there is no loose metal particles on the rail surfaces if and when epoxy is being used.

(f) That where epoxy is used it is mixed as per manufacturer's instructions and applied to all the fishing surfaces of the fishplate and in the bolt holes once the rails have cooled enough. Epoxy shall be applied on the bolts as well as the holes in the rails and both sides of the end post. Excess epoxy shall be removed and smoothed down with a spatula to ensure a neat joint and to avoid the ingression of dirt and other foreign matter that could make the joint fail.

(g) That where the fishplates are fitted into the fishing recesses of the rails, it be done in such a way that the fishplates fits into the fishing recesses with the top side uppermost.

(h) That care is taken not to damage the threads on the bolts where inserting it through the fishplates and rails and shall not use a hammer to drive the bolts through.

(i) That the bolts used are those supplied in the components-kit.

(j) That where the gap between the rails is not correct, the rail shall be cut at an existing thermit weld joint or at a suitable place nearby and the gap then closed to the required dimension by pushing the rail.

(k) That the rail shall be destressed for a distance of 80 sleepers on both sides of the joint, according to Specification E.10/5 before the joint shall be fastened.

(l) That the correct procedure is followed when applying torque on the bolts :-

i) Number the bolts in numerical order from one end of the joint to the other.

ii) The torque on each bolt and nut shall be brought on in steps of one quarter of the torque, followed by half the torque, three quarters of the torque and then finally full torque in the following sequence :

4-hole insulated rail joints :- 2, 3, 1, 4

Refer to Annexure J Sh. 2 in Specification E.10 Gen. for an exploded view of the insulated rail joint and numbering of the bolts.

6-hole insulated rail joints :- 3, 4, 2, 5, 1, 6

Refer to Annexure J Sh. 3 in Specification E.10 Gen. for an exploded view of the insulated rail joint and numbering of the bolts.

(m) That care is taken not to over-torque the bolts as a precaution for possible damage to components.

5.4.3.12 Marking of joints

(a) Mark the insulating rail joint with white paint on a black background and seal it with a translucent paint. A stencil (40 mm min.) shall be used to apply the lettering on the web of the rail, within one metre from the joint. The paint shall be of a durable and rust proof quality and applied on a rust and grease free surface.

(b) The marking shall for example be as follows :

KDP / 305 / 15,2 / 6-94 / 48kg

depicting the district, line code, km-distance, date installed and mass of the rails in track.

5.5 STANDARDS

5.5.1 The weld-up area shall be free from corrugations, depressions, grooves and slag inclusions.

5.5.2 The rail ends shall be square and vertical, free from any loose metal particles and debarred before the end post is replaced.

5.6 COMPLETION

5.6.1 Finishing of insulated rail joint

5.6.1.1 Ensure that the end post conform with the rail profile, including that the top of the end post does not protrude above the rail crown.

5.6.1.2 Ensure that the excess epoxy is smoothed into all gaps at the joint and that there is none on the crown of the rail.

6. TOLERANCES

6.1 Tolerance for hole diameters is ± 0,3 mm.

6.2 Tolerance for the pitch of the holes is ± 0,3 mm measured from the centre line of the hole nearest to the end of the rail. Refer to Annexure J Sh. 1 in Specification E.10 Gen.

7. TESTING

7.1 Insulation check

7.1.1 Pre-assembled block joints shall be checked outside the track. With field assembled block joints the contractor shall ensure that the rails are insulated from any supporting structures by means of rubber pads.

7.1.2 Use a 500 volt insulation resistance testing apparatus (1000 mega ohm scale) and measure the resistance between the two rails. It can only be done if the overhead power is turned off.

7.1.3 The resistance shall not be less than 100 mega ohms

7.1.4 The Engineer will certify that the joint is electrically acceptable.

8. MEASUREMENT AND PAYMENT

8.1 SCHEDULED ITEMS

8.1.1 Offload and distribute block joints.....Unit : Each

Each block joint offloaded will be counted.

8.1.1.1 Separate items will be scheduled for the following :

(a) Pre-fabricated block joints.
(b) Assemble in track block joints.
(c) Offloading from wagons and lorries.
(d) Block joints in tunnels and on bridges.

8.1.1.2 The rates tendered shall include for the following :

(a) Offloading and distributing the block joints.

8.1.2 Offload and stack block joints.....Unit : Each

Each block joint offloaded will be counted.

8.1.2.1 Separate items will be scheduled for the following :

(a) Pre-fabricated block joints.
(b) Assemble in track block joints.
(c) Offloading from wagons and lorries.

8.1.2.2 The rates tendered shall include for the following ;

(a) Clearing site of all rubbish and vegetation.
(b) Offloading and stacking of block joints on the ground or on dunnage.
(c) Providing dunnage.

8.1.3 Load from stack, transport and distribute block joints..... Unit : Each.km

Each block joint will be counted.

8.1.3.1 Separate items will be scheduled for the following :

(a) Pre-fabricated block joints.
(b) Assemble in track block joints.
(c) Offloading from wagons and lorries.
(d) Block joints in tunnels and on bridges.

8.1.3.2 The rates tendered shall include for the following :

(a) Loading the block joints.
(b) Transport over free haul distance.
(c) Offloading and distributing the block joints.

8.1.4 Build and install block joints in new track .....Unit: Each

Each block joint built and installed will be counted.

8.1.4.1 Separate items will be scheduled for the following:

(a) Installation of pre-fabricated block joints in track.
(b) Building and installation of block joints in track.
(c) Installation of block joints on curves with check rails.
(d) Installation of block joints on long welded rails.
(e) Installation of block joints opposite each other.

8.1.4.2 The rates tendered shall include for the following:

(a) Building and installation of block joints in track.
(b) Sawing, filing and trimming of the rail ends.
(c) Installation of a reinforcing rail and wood sleepers.
(d) Correcting the spacing of the block joint sleepers.
(e) Chamfering of check rail.
(f) Measuring rail temperature on long welded rails.

8.1.5 Build and install block joints in existing track .....Unit: Each

Each block joint built and installed will be counted.

8.1.5.1 Separate items will be scheduled for the following:

(a) Installation of pre-fabricated block joints in track.
(b) Building and installation of block joints in track.
(c) Installation of block joints on curves with check rails.
(d) Installation of block joints on long welded rails.
(e) Installation of block joints opposite each other.
(f) Installation of block joints for the first time.
(g) Replacing of block joints.

8.1.5.2 The rates tendered shall include for the following:

(a) Removing the existing block joints/rails and concrete sleepers.
(b) Building and installation of block joints in track.
(c) Sawing, filing and trimming of the rail ends.
(d) Installation of a reinforcing rail and wood sleepers.
(e) Correcting the spacing of the block joint sleepers.
(f) Chamfering of check rail.
(g) Measuring rail temperature on long welded rails.

8.1.6 Load released block joints in wagons.....Unit : Each

Each block joint loaded will be counted.

8.1.6.1 Separate items will be scheduled for the following :

(a) Pre-fabricated block joints.
(b) Dismantled block joints.

8.1.6.2 The rates tendered shall include for the following :

(a) Loading the block joints into wagons.

8.1.7 Load, transport by lorry and offload released block joints ..... Unit : Each. km

8.1.7.1 Separate items will be scheduled for the following :

(a) Pre-fabricated block joints.
(b) Dismantled block joints.

8.1.7.2 The rates tendered shall include for the following :

(a) Loading the block joints into lorries.
(b) Transport over free haul distance.
(c) Offloading, sorting and stacking the block joints.