

INSULATED JOINTS

****From Berlin STP 2935(1)
Berlin NH STP 2938(1)
Berlin NH STP 2947(1)**

- xx. DESCRIPTION. This work shall consist of furnishing and installing conventional and bonded insulated joints at the locations indicated in the Plans and as directed by the Engineer.
- xx. SUBMITTAL REQUIREMENTS. The Contractor shall submit the following to the Engineer for approval:
- (1) Catalog cuts or other manufacturer's descriptive literature on insulated joints and fasteners to be provided.
 - (2) Manufacturer's Field Installation (to include bolt torque) and Test Procedures.
 - (3) Locations where rail cutting and welding is required for bonded insulated joints and conventional insulated joints.
 - (4) Fabrication Drawings, including fabrication details, for bonded insulated joints.
- xx. MATERIALS.
- (a) Insulated Joints.
 - (1) Conventional (Bolted) Insulated Joints. Provide insulated joints consisting of two joint bars of same general configuration as 6-hole standard joint bars conforming to the dimensional requirements of the selected rail section. Provide insulated joint bars of rolled, heat treated steel core surrounded by uniform, single pour, polymeric insulation material and designed for use in installations requiring insulated signal joints.

Provide bar, end post, and bushing insulation material impervious to oil, grease, and water, and with electrical resistance characteristics equal to or greater than fiber insulation meeting the requirements of AREMA Manual, Current Edition: Chapter 4, Section 3.9 Specifications for Non-Bonded Encapsulated Insulated Rail Joints. Provide insulated joints highly resistant to abrading, cracking, cutting, spalling, and fatigue failure under impact loads, which shall exhibit deflection characteristics comparable to standard steel rail joints.

Provide insulated joints complete with bars, 3/16 inch end posts, bushings, and washer plates and high strength bolts.

Provide bolts, nuts, and flat washers conforming to the chemical and mechanical requirements of ASTM A 490, Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints, and having Class 2A and 2B thread fit.

Provide a positive means for maintaining the tension in the bolts through in service vibrations by a prevailing lock nut complying with Industrial Fastener Institute Standard IFI-100 and IFI-101. Locate and size the bolt holes in conformance to drilling for the rail used in the project as specified in the AREMA Manual or as required by the Engineer. Flat washers, if required, shall be hardened ASAT A 325 or A 490 and tempered carbon steel.

Insulated joints shall be suspended. Tie plates for supported insulated joints shall be polymer, insulated steel plates, or approved equal.

- (2) Bonded Insulated Joints. Provide bonded insulated joints, shop fabricated into plug rails, 19 feet-6 inches in length, conforming to the dimensional requirements of the selected rail section, at the locations indicated on the Plans and to the satisfaction of the Engineer.

For specifications of head hardened, bonded insulated joint, plug rails, see CONTINUOUS WELDED RAIL of Section 900.

Joint bars shall be fabricated from quenched carbon steel conforming to the AREMA Manual for Railway Engineering, Chapter 4, Specifications for Quenched Carbon - Steel Joint Bars.

Full face contact joint bars conforming to the configuration of the dimensional requirements of the selected rail section, as required. Joint bars shall be smooth and straight. Furnish inside face of joint bars with pre-bonded insulating material, smooth with no branding or stamping. Furnish end posts and high strength bolts.

a. Fabrication Tolerances.

1. Finishing Height. Within plus or minus 1/64 inch of dimension shown on Fabrication Drawings.
2. Straightness. Portions of joint bars adjacent to rail shall be straight within a tolerance of plus or minus 1/32 inch, measured with a 36 inch straight edge.
3. Length. Within plus or minus 1/8 inch of dimension shown on Fabrication Drawings.

Insulating material shall be of a high pressure, laminated design, impervious to oil, grease, and water, with electrical resistance characteristics equal to or greater than fiber insulation, and meeting the requirements of AREMA Manual, Current Edition: Chapter 4, Section 3.9 Specifications for Non-Bonded Encapsulated Insulated Rail Joints. Furnish end posts that project 1/4 inch plus or minus 1/16 inch below base of rail and 3/16 inch thick.

Cement bonded insulated joints together with adhesive and bolt together with six, high-strength, 1 inch diameter bolts. Furnish bolts, nuts, and flat washers conforming to chemical and mechanical requirements of ASTM A 490, Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints, and having Class 2A and 2B thread fit. Furnish positive means for maintaining tension in bolts through in service vibrations by a prevailing lock nut complying with Industrial Fastener Institute Standard IFI-100. Locate and size bolt holes in conformance to drilling for rail as specified in AREMA Specifications. Flat washers, if required, shall be hardened ASTM A 325 or A 490 and tempered carbon steel.

Bolts shall alternate so that all nutlocks are not on one side of the joint unless specified by the manufacturer.

xx. CONSTRUCTION REQUIREMENTS.

- (a) Quality Control. Inspect insulated joints for conformance to the manufacturer's material Specifications before installation of track. Inspect insulated joints after installation to ensure conformance with the approved manufacturer's field installation and test procedures.
- (b) Installation of Insulated Joints. Install insulated joints in accordance with the track Contractor's special trackwork Fabrication Drawings and with the Plans. Provide location of all joints in a Fabrication Drawing for review and approval by the Engineer.
- (c) Conventional Insulated Joints. Install insulated joints in special trackwork in accordance with the applicable requirements of Association of American Railroads (AAR) Signal Manual Part 8.6.35 and approved installation procedures. Determine final location in the field.
- (d) Bonded Insulated Joints. Install bonded insulated joint plug rails at signal location in track as shown on the Plans, as provided in the Contractor's special trackwork Fabrication Drawings, and to the satisfaction of the Engineer.

Field weld bonded insulated joints into the running rail in accordance with THERMITE WELDING and CONTINUOUS WELDED RAIL of Section 900.

At each location requiring two insulated joints, perform installation in such a manner that insulated joints have a maximum stagger at each signal or cut section location and in accordance with AAR Signal Manual, Part 2.1.20, A through D. The stagger requirements do not apply to insulated joints located in track switches between the frog and switch points.

Install all insulated joints as suspended joints. In ballasted track, re-space existing cross ties to achieve this requirement.

Secure all insulated joints by box anchoring 200 feet of each side of an insulated joint.

(e) Tests. Test insulated joints in accordance with the requirements of AREMA Manual, Current Edition: Chapter 4, Section 3.8 Specifications for Bonded Insulated Rails Joints, 3.8.7. Qualification Testing. Provide copy of test results to the Engineer for review and approval.

Remove and replace insulated joints at the Contractor's expense for those joints that do not meet the testing requirements.

xx. METHOD OF MEASUREMENT. The quantities of Special Provision (Bonded Insulated Joints) and Special Provision (Insulated Joints) to be measured for payment will be the number of joints installed in the complete and accepted work.

xx. BASIS OF PAYMENT. The accepted quantities of Special Provision (Bonded Insulated Joints) and Special Provision (Insulated Joints) will be paid for at the Contract unit price per each. Payment will be full compensation for furnishing, transporting, handling, and placing the materials specified, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Plug rails for bonded insulated joints will not be paid separately but will be considered incidental to Special Provision (Bonded Insulated Joints).

Field welding for the installation of bonded insulated joints will be paid for separately under Special Provision (Thermite Welding).

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Bonded Insulated Joints)	Each
900.620 Special Provision (Insulated Joints)	Each