

SPECIFICATION SECTION 07800 – EXPANSION JOINT

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SPECIFICATION SECTION 07800 - EXPANSION JOINT

1. DESCRIPTION

This Specification Section prescribes the requirements for expansion and fixed joints as indicated on the Drawings, including preformed joint filler and joint sealer. The Contractor shall furnish all required materials and install expansion joints, fixed joints, preformed joint filler and joint sealer in accordance with the details indicated on the Drawings and as specified herein. This work shall include the supply and installation or application of all necessary hardware including anchor bolts and studs, sealants, adhesives, epoxies and other accessories.

2. MATERIAL REQUIREMENTS

2.1 Reference Standards

The most recent edition of the following Standards shall be applied to the Works covered by this Specification Section.

AASHTO M297-96	Specification Standard for Bridge Expansion Joint
AASHTO M183-96	
AASHTO M270M (ASTM A709M)	Structural Steel
ASTM A240M	Stainless Steel
ASTM A123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM D395	Rubber Property - Compression Set
ASTM D412	Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomer - Tension
ASTM D471	Rubber Property - Effect of Liquids
ASTM D994	Preformed Expansion Joint Filler for Concrete (Bituminous Type)
ASTM D1149	Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM D2240	Rubber Property - Durometer Hardness
ASTM D6690	Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

- a) The elastomeric constituent of the expansion joints shall be of the compound known as neoprene which shall have the physical properties as determined by the following ASTM requirements as shown on Table 1:

Table 1. Physical Properties of Elastomeric

Standard	Physical Properties	Requirements
ASTM D412	Tensile strength	126kg/cm ² (min.)
ASTM D412	Elongation at break	400%

ASTM D2240	Hardness (Durometer A)	50 ± 5
ASTM D395	Compression set (Method B) 22 hours at 70 °C	20% max.
ASTM D1149	Ozone resistance: Exposure to 100 ppm ozone for 70 hours @ 38 °C sample under 20% strain	No cracks
ASTM D471	Oil deterioration: Volume increase after immersion in ASTM Oil # 3 for 70 hours @ 100 °C	120% max.

- b) The dimensions of the neoprene constituent of the joint shall be correct to zero millimeters under and plus 6mm over in width and length, and from zero millimeters under to plus 3mm in thickness of the exterior dimensions required on the Drawings; measured at 21°C.
- c) The sealant for sealing joints between the expansion joint units, along the edges of the expansion joint and the bolts and plugs shall be a high solid, one part polyurethane based sealant that cures quickly without shrinkage into a rubber with high elongation characteristics and excellent recovery. Sealant shall be capable of bonding to concrete, steel and neoprene without the use of a primer. When cured the sealant shall possess excellent abrasion resistance and shall resist attack by salt, oil and road chemicals. The sealant to be used shall meet the requirements of the manufacturer of the neoprene expansion joint.
- d) When test specimens are cut from the finished product a 10 percent variation in physical properties will be allowed.
- e) The flexible epoxy for filling voids around the nut fasteners shall consist of a black two component flexible epoxy sealant having the following physical properties as shown on Table 2:

Table 2. Physical Properties of Epoxy

Base Material:	Flexibilized Epoxy Resin
Weight/Litter(mixed materials):	1.05 kg/litter
Mixing Time:	2 min. @ 24°C with 50 strokes minimum
Pot Life:	10-15 minutes @ 24°C
Initial Cure:	4 hours @ 24°C
Final Cure:	48 hours @ 24°C
Shelf Life:	12 months minimum (components separate)
Hardness Shore A Durometer:	80 + 10

- f) Flexible epoxy shall be supplied either in cans or preassembled cartridges. Flexible epoxy shall meet the requirements of the manufacturer of the expansion joint. Flexible epoxy shall also be compatible with and have

the physical characteristics when cured, similar to the neoprene of the joint.

- g) The adhesive/sealant bedding epoxy for bonding the expansion joint to concrete or steel shall be supplied in premeasured cartridges or cans and shall consist of a grey two component flexible epoxy having the following physical properties shown in Table 3:

Table 3. Physical Properties of Epoxy

Base Material:	Epoxy Resin
Colour:	Concrete Grey
Weight/Litter (Mixed Materials):	1.44 kg/litter
% Solids Content:	98 % minimum by weight
Mixing Time:	2 min. @ 24 °C with 50 strokes minimum
Pot Life:	25-30 minutes @ 24°C
Initial Cure:	4 hours @ 24 °C
Final Cure:	48 hours @ 24 °C
Shelf Life:	12 months minimum (components separate)
Tensile Strength:	211 kg/cm ²
Elongation:	7% @ 24 °C
Water Absorption:	1.0% maximum
Bond Strength to concrete:	Concrete fails before bond

- (h) Structural steel shall comply with AASHTO M270M or ASTM A709M and hot dip galvanized in accordance with the requirements of ASTM A123.
- (i) Steel anchors shall be hot dip galvanized in accordance with the requirements of ASTM A123.
- (j) Anchor bolts for joint seals shall be hot dip galvanized in accordance with ASTM A153 commercial grade bolts set in epoxy mortar in holes drilled in the deck in accordance with approved shop drawings.
- (k) The surface of holes drilled in the concrete shall be carefully prepared to provide a cleaned textured surface to which the epoxy mortar can successfully bond. Faces shall be mechanically tooled until surface glaze and contamination have been removed; dusted to remove all residues; dried thoroughly and then primed with hydrophobic epoxy resin immediately prior to setting the anchor bolts in epoxy mortar. Bolts shall be degreased with white spirit alcohol and dried thoroughly. Drilling and setting the anchor bolts shall not be done until a minimum of 7 days after concrete is poured.
- (l) Epoxy mortar shall consist of a mixture of aggregate and epoxy binder. Aggregate shall consist of clean, hard quartzite particles with a maximum

size of 2 millimeters. Aggregate shall be dried until the moisture content is less than 0.2 percent by weight and then shall be sealed in plastic containers until required for mixing on Site. Binder for epoxy mortar shall be two part, cold curing, solventless epoxy produced by an approved manufacturer. Primer shall be compatible with the epoxy resin binder and shall be supplied by the same manufacturer. The type of resin selected shall be that recommended by the manufacturer for this application and shall meet the requirements of the supplier of the component on which it is to be used.

- (m) Components of the epoxies shall be proportioned, mixed, applied and cured strictly in accordance with the manufacturer's printed recommendations. Mixing shall be carried out with an efficient mechanical device which ensures that all components are fully dispersed and wetted. The two parts of the epoxy binder for the mortar shall be thoroughly mixed first without frothing and the aggregate added progressively. Mixed epoxy mortar which has begun to cure before it has been placed and compacted will be rejected and a fresh batch shall be mixed.

2.2 Submittals

- a) The Contractor shall submit to the Engineer, for his approval, complete Shop Drawings of all the expansion joints. The Shop Drawings shall include a movement chart showing the total anticipated movement of the structure and the required setting width of the joint assembly at various temperatures. All movements due to shrinkage, creep, mid slab deflection and similar data may not be incorporated into this chart but shall be considered by the Contractor and approved by the Engineer prior to final installation and adjustment.
- b) The Contractor shall provide to the Engineer for review and approval manufacturer's literature verifying that all materials to be supplied conform to the requirements of this Specification Section.
- c) The Engineer may request the Contractor to furnish whatever samples which may be required to perform any of the tests specified as necessary to approve the material. The use of all joints to be used in the work shall be subject to approval of the Engineer.

2.3 Approval of Materials

No materials shall be used or installed until they have been approved by the Engineer.

3. CONSTRUCTION REQUIREMENTS

3.1 Method of Construction and Installation

- a) The Contractor shall obtain installation instructions from the supplier of the expansion joint material and comply with the instructions provided for the installation of the joint. The adequacy of the joint design and installation details shall be subject to the approval of the Engineer. The Contractor shall obtain the technical assistance of a field representative from the manufacturer of the joint during its installation. Proper adjustment shall be made for temperature at the time of installation.
- b) Concrete on which expansion joints are to be set shall be; dry, clean and free from dirt, grease, laitance and contaminants and shall be level and sound with no broken or spilled concrete. No joint shall be placed until the Engineer has inspected and approved the seat conditions.
- c) After coating the seat area with the specified sealant adhesive the joint shall be positioned over the anchor bolts and the nuts securely tightened. All loose or long anchor bolts shall be corrected in a manner approved by the Engineer.
- d) All joints between units around connecting bolts and cavity plugs shall be carefully sealed with sealant in a neat workmanlike manner to keep out water and protect against corrosion. Neoprene surfaces in contact with sealant shall be buffed at the plant or wire brushed prior to installation to provide a bonding surface for the sealant.
- e) Prior to filling the space in the bolt wells, the Engineer shall inspect the anchor bolts and check the tightening of the nuts to the manufacturer's specified torque. Any wells sealed without the Engineer's approval shall be opened and resealed after approval at the Contractor's expense.
- f) The expansion joint shall be installed after completion of the final layer of the pavement to ensure an even joint, true to line and level, between the expansion joint and the pavement.
- g) The finished joint shall present a smooth, neat appearance with no protruding bolts or rough joints. Excess sealant shall be wiped or scraped away before it becomes hard.
- h) The Contractor shall use a non shrink 40 MPa grout conforming with ASTM C1107, Grade A in the transition section between the expansion joint and the pavement; as described in the expansion joint Drawings.

3.2 Preformed Joint Filler

- a) Preformed joint filler shall conform to the requirements of ASTM D994 with a nominal thickness of 20 mm. Joint filler must be compatible with

joint sealant.

- b) The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint. When the use of more than one piece is required for a joint the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening means.

3.3 Joint Sealer

- a) Joint sealer shall be in accordance with ASTM D6690.
- b) Each lot or batch of sealing compound shall be delivered to the Site in the manufacturer's original sealed container. Each container shall be marked with; the manufacturer's name, batch or lot number, and the safe heating temperature and shall be accompanied by the manufacturer's certification stating that the compound meets the requirements of this Specification Section.

4. MEASUREMENT AND PAYMENT

4.1 Method of Measurement

- a) Expansion Joints shall be measured according to the number of linear meters installed and approved by the Engineer.
- b) The Expansion Joint provisions, material requirements and construction requirements identified in this Specification Section shall be measured for payment in pay items 07800-01 and 07800-03.
- c) Any Expansion Joint Works not specifically identified in this Specification Section but which are necessary for the performance of the Works shall be deemed to be included in pay items 07800-01 and 07800-03.
- d) The length of the expansion joint shall be measured along the centre line of the joint according to the Drawings or as shown on the approved shop drawings.

4.2 Basis of Payment

- a) The work under this Specification Section shall be paid for in accordance with the applicable unit prices as indicated in the Bill of Quantities and given below. Payment shall constitute full compensation for performing the requirements of the Contract for the item of work as specified including furnishing all necessary labor, materials, tools, equipment, incidentals and tests.
- b) Preformed joint filler and joint sealer shall not be paid separately. They shall be deemed to be included in the unit price of the expansion joint

along with all materials, labor, tools, equipment and appurtenances and execution of all work and any incidentals required for the complete finishing and installation of preformed joint filler and joint sealer.

<u>Pay Item</u>	<u>Description</u>	<u>Unit</u>
07800	Expansion Joint	
07800-01	Expansion Joint, Comb type (s=60mm) (Steel Finger Joint)	m
07800-03	Expansion Joint, Low-bedding Type (s=80mm)	m