

Ceva® 300 System Armored Joint System
Expansion Joint System
for Bridge & Parking Garage Applications

A. General

The work shall consist of furnishing and installing a high performance, closed cell, preformed seal with armored angles imbedded in an elastomeric concrete in accordance with the details shown on the plans and the requirements of the specifications.

Manufacturer shall have a minimum ten (10) years experience specializing in the design and manufacture of armored closed cell foam expansion control systems

B. Quality Control

Manufacturer shall be ISO-9001:2000 certified and shall provide written confirmation that a formal Quality management System and Quality Processes have been adopted in the areas of, (but not limited to) Engineering, Manufacturing, Quality Control and Customer Service for all processes, products and their components. Alternate manufacturers will be considered provided they submit written proof that they are ISO 9001:2000 certified prior to the project bid date.

C. Product

Provide a watertight joint sealing system that is capable of accommodating multidirectional movements. The closed cell foam armored sealing system shall consist of a steel angle cast into the structure by means of sinusoidal or stud anchorage and a field mixed elastomeric concrete header. The steel angles shall be designed to accept a continuous preformed closed cell foam seal. Provide seal profile that satisfies project requirements including movement and watertightness. The elastomeric concrete material shall be field mixed and consist of a two component elastomer and pregraded aggregate mix. Install all components utilizing manufacturer's bonding agent and recommended lubricant/adhesive for complete installation:

D. Component and Materials

The Contractor shall furnish a manufacturer's certification that the materials proposed will meet the requirements as set forth in the specification.

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1. Joint Seal Profile

The seals shall be manufactured of impermeable closed-cell, low density, resilient, non-extrudable, ethylene vinyl acetate foam material with a hindered amine light stabilizer providing U.V. stability. Bridge/Parking joint seal shall be held in place by a two component 100% solids epoxy adhesive. The design of the seal shall be capable of accommodating movement and variations in joint widths through compression and tension of its shape. Enhanced Surface Preparation (E.S.P.) shall be grooves 1/8" (3mm) wide by 1/8" deep (3mm) and spaced between 1/4" (6mm) to 1/2" (13mm) apart and run along the entire length of the bond surfaces of the seal to ensure an effective and quality surface for adhesion. Provide seal profile that satisfies project requirements including movement and water tightness, it should also exhibit the physical properties listed in the table below:

PHYSICAL PROPERTIES	TEST METHOD	REQUIREMENT
Elongation at break	ASTM D3575; Suffix: T	225% avg.
Tensile Strength, psi (kPa)	ASTM D3575; Suffix: T	115 psi +/- 20%
Tear Resistance	ASTM D624	10 – 20 lbs/inch
Density	ASTM D3575; Suffix W, Method A	2.7 – 3.4 lbs/ft ³
Water Absorption	ASTM D3575; Suffix L	0.035 lbs/ft ² avg.
Compression Deflection	ASTM D3575	25% 6 psi avg. 50% 16 psi avg.
Weather / Deterioration	ASTM G154	3000 hours No Effect
Compression Set 50% compression for 22 hours @ 73° F (23° C) 2 hr recovery 50% compression for 22 hours @ 73° F (23° C) 24 hour recovery	ASTM D3575; Suffix: B	10% set 9% set
Extrusion (specimen compressed 60% of original thickness with 3 restrained sides)	ASTM D545	Extrusion on free side does not exceed 0.25 inches (6.4mm)
Operating Temperature	In House	160° F (71° C) max.
Movement Range Compression Tension Shear (Horizontal & Vertical)	In House	50% 25% 50%±

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The seals shall be manufactured of impermeable closed-cell, low density, resilient, non-extrudable, ethylene vinyl acetate foam material with carbon black added as a U.V. stabilizer. Bridge/Parking joint seal shall be held in place by a two component 100% solids epoxy adhesive. The design of the seal shall be capable of accommodating movement and variations in joint widths through compression and tension of its shape. Enhanced Surface Preparation (E.S.P.) shall be grooves 1/8" (3mm) wide by 1/8" deep (3mm) and spaced between 1/4" (6mm) to 1/2" (13mm) apart and run along the entire length of the bond surfaces of the seal to ensure an effective and quality surface for adhesion. Provide seal profile that satisfies project requirements including movement and water tightness, it should also exhibit the physical properties listed in the table below:

PHYSICAL PROPERTIES	TEST METHOD	REQUIREMENT
Elongation at break	ASTM D3575; Suffix: T	225% avg.
Tensile Strength, psi (kPa)	ASTM D3575; Suffix: T	115 psi +/- 20%
Tear Resistance	ASTM D624	10 – 20 lbs/inch
Density	ASTM D3575; Suffix W, Method A	2.7 – 3.4 lbs/ft ³
Water Absorption	ASTM D3575; Suffix L	0.035 lbs/ft ² avg.
Compression Deflection	ASTM D3575	25% 6 psi avg. 50% 16 psi avg.
Weather / Deterioration	AASHTO T42 Accelerated Weathering	No deterioration
Compression Set 50% compression for 22 hours @ 73° F (23° C) 2 hr recovery 50% compression for 22 hours @ 73° F (23° C) 24 hour recovery	ASTM D3575; Suffix: B	10% set 9% set
Extrusion (specimen compressed 60% of original thickness with 3 restrained sides)	ASTM D545	Extrusion on free side does not exceed 0.25 inches (6.4mm)
Operating Temperature	In House	160° F (71° C) max.
Movement Range Compression Tension Shear (Horizontal & Vertical)	In House	50% 25% 50%±

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The seals shall be manufactured of impermeable closed-cell, low density, resilient, non-extrudable, polyethylene foam material with carbon black added as a U.V. stabilizer. Bridge/Parking joint seal shall be held in place by a two component 100% solids epoxy adhesive. The design of the seal shall be capable of accommodating movement and variations in joint widths through compression and tension of its shape. Enhanced Surface Preparation (E.S.P.) shall be grooves 1/8" (3mm) wide by 1/8" deep (3mm) and spaced between 1/4" (6mm) to 1/2" (13mm) apart and run along the entire length of the bond surfaces of the seal to ensure an effective and quality surface for adhesion. Provide seal profile that satisfies project requirements including movement and water tightness, it should also exhibit the physical properties listed in the table below:

PHYSICAL PROPERTIES	TEST METHOD	REQUIREMENT
Elongation at break	ASTM D3575; Suffix: T	175% avg.
Tensile Strength, psi (kPa)	ASTM D3575; Suffix: T	101 psi min.
Tear Resistance	ASTM D624	16.0 lbs/inch min
Density	ASTM D3575; Suffix W, Method A	2.12 lbs/ft ³ avg.
Water Absorption	ASTM D3575; Suffix L	0.03 lbs/ft ² avg.
Weather / Deterioration	AASHTO T42 Accelerated Weathering	No deterioration
Compression Set 25% compression for 22 hours @ 73° F (23° C) 1/2 hr recovery 25% compression for 22 hours @ 73° F (23° C) 24 hour recovery	ASTM D3575; Suffix: B	9% set 3.6% set
Extrusion (specimen compressed 60% of original thickness with 3 restrained sides)	ASTM D545	Extrusion on free side does not exceed 0.25 inches (6.4mm)
Operating Temperature	In House	212° F (100° C) max.
Movement Range Compression Tension Shear (Horizontal & Vertical)	In House	50% 25% 50%±

2. Adhesive

The low density closed cell cross linked seal shall be installed utilizing a 100% solids two component moisture insensitive modified epoxy adhesive which meets ASTM C-881 Type I & II Grade 2 Class B & C and the requirements of the properties listed below:

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Properties (uncured):

	Part A	Part B	Mixed
Color (Beige or Gray):	White/White	Carmel/Gray	Beige/Gray
Shelf Life	2 Years	2 Years	
Mixing ratio (By Vol)	3	1	3:1
Specific Gravity	1.47	1.15	
Density (lbs/gal) @ 77 ° F (25 ° C)	12.0 +/-0.5	9.7 +/-0.2	11.6 +/-0.2
Viscosity (cps) @ 77 ° F (25 ° C)	35,000	33,000	26,000
Pot Life (200 gms)			32-36 minutes
Initial Set @ 77 ° F			1 ½ - 2 Hours
Initial Cure			8-12 hours
Full Chemical Cure			7 days

Properties after Cure:

TEST	TEST METHOD	REQUIREMENT
Compressive Strength	ASTM D695	7000 psi
Tensile Strength	ASTM D638	3500 psi
Elongation at Break	ASTM D638	3-5%
Shore D hardness	ASTM D2250	85±5
Water Absorption	ASTM D570	0.25%
Bond Strength	ASTM C-882	430 psi min
Lap Shear		2000 psi min

Ambient temperatures as low as 20F, Eva-Pox Cold Cure Bonder is available and meets ASTM C-881, Type II Grade 2 Class A

3. Elastomeric Concrete

Material shall be an ambient cure, 100% solids, two component polyurethane with pregraded aggregate mix exhibiting the physical properties listed in the tables below. When properly mixed and poured, the elastomeric concrete cures rapidly, flows and fills any voids, spalls or irregularities forming a monolithic unit.

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Elastomeric cured binder shall meet the following physical properties:

<u>PHYSICAL PROPERTIES</u>	<u>TEST METHOD</u>	<u>REQUIREMENT</u>
Tensile strength	ASTM D638	775 avg., psi
Hardness, Durometer D	ASTM D2240	59 avg.
Water Absorption	ASTM D570	<1% avg.
Elongation	ASTM D638	110% min

Elastomeric cured binder and aggregate shall meet the following physical properties:

<u>PHYSICAL PROPERTIES</u>	<u>TEST METHOD</u>	<u>REQUIREMENT</u>
Compressive Strength	ASTM D695	2100-3000 psi
Resilience @ 5% deflection	ASTM D695	90% min
Slant Shear Bond Strength to concrete		250 psi min.
Impact Resistance @ 32°F (0°C)	In House	no cracks
@ -20°F (-29°C)		no cracks
@158°F (70°C)		no cracks

4. Bonding Agent

Provide manufacturers two component, 100% solids epoxy bonding agent. Apply bonding agent to the sides and base of the preformed concrete blockout prior to placement of the elastomeric concrete. Elastomeric concrete shall be placed prior to bonding agent drying/curing. Store, mix and apply in accordance with manufacturer's system data sheet.

Liquid components shall be identified by the following information:

Part A – Resin	Color: White
Part B – Activator	Color: Gray or Carmel
Mixed	Color: Gray or Beige

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5. Steel Angle

Steel angle utilized to produce joint suitable to withstand anticipated traffic loading and volume. Angle shall conform to properties of ASTM A36 or A588. Profile shall have a minimum thickness of 3/8" as measured from the outer edges of one both sides of one leg of the angle. The top surface of the steel shall be capable of accommodating various horizontal conditions and service loads including HS-20 loading.

E. Construction Requirements

The Contractor shall submit product information and necessary shop drawings after the award of the contract. At the discretion of the Engineer, the manufacturer may be required to furnish a representative sample of material to be supplied in accordance with the project specifications. Where indicated and noted on the contract plans, install bridge joint seals in a neat and workmanlike manner. All surfaces to receive bridge deck joint seal shall be free from dirt, water and any other loose foreign debris, which may be detrimental to effective joint sealing.

Armored Closed Cell Foam joint sealing systems shall be set to the proper width for the ambient temperature at the time of installation. Properly align all steel angles prior to welding operations to ensure proper joint performance and watertightness.

The manufacturer instructions for the proper installation of the joint system shall be entered on the shop drawings. Shop drawings, which lack manufacturer installation instruction, may be returned without approval.

Measure the joint opening width. The low density closed cell material should be sized 25% larger than the joint opening at near neutral but never less than 10% oversized or greater than 35% oversized. The seal profile shall be cut to the correct length for installation. Care should be taken to extend the profile to its full length, without exerting any tension or stretching of the seal. The bond at the splice location is achieved by heat welding. Heatwelds and splices and other directional changes should be cut and made a minimum of fifteen (15) minutes prior to seal installation.

Armored Closed Cell Foam joint sealing systems along with the elastomeric concrete shall be installed in strict accordance with the manufacturers written instructions along with the advice of their qualified representative.

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F. Payment

The accepted quantity of bridge joint seal will be paid for at the contract unit price per lineal foot. Measurement of the bridge joint seal will be taken horizontally and vertically along the centerline of the joint system between the outer limits indicated on the contract plans.

Payment will be made under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
Armored Low Density, Closed Cell, Joint Seal	Lineal Foot
Elastomeric Concrete	Cubic Foot

Payment will be full compensation for all work necessary to complete the items including furnishing and installing the bridge joint or parking joint seal, and any miscellaneous patching required.

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