thermal·chem®
corporation data sheet

E.V.A. EXPANSION JOINT SYSTEMS

A PERMANENT, WATERTIGHT SYSTEM

INTRODUCTION

Thermal-Chem E.V.A. is an expanded, closed-cell, cross-linked, pre-formed expansion joint system manufactured from ethylene vinyl acetate. This resilient material is both cellular and elastic and will function in both tension and compression without bulging.

USES

Thermal-Chem EVA, when combined with other Thermal-Chem products, provides a simple and easy to install permanent watertight expansion joint. Deteriorated joints are also easily repaired and permanently sealed. EVA Expansion Joint Systems may be used whenever movement takes place between two structures. Typical uses include:

- Floor-to-Wall Joints
- Roof Structures
- Parking Deck Structures
- Floors
- Bridge-to-Highway Joints
- Tunnels
- Swimming Pools
- Sidewalk-to-Curb Joint
- Sidewalk-to-Building Joint
- Reservoirs
- Concrete-to-Concrete Joint
- Concrete-to-Asphalt Joint

Produced in a variety of sizes, this system can accommodate virtually any joint movement. It is adaptable to below-or-above grade installations, skewed joints, curbs, gutters and dividers. The surface resists all forms of heavy traffic wear, including snowplows.

ADVANTAGES

- Will not bulge
- No effect from high-speed traffic
- Accommodates any joint movement:
  - Transverse
  - Longitudinal
  - Vertical
  - Deflection
  - Vibration
  - Shock
  - Braking Forces
- Used Above or Below Grade
- Skewed Joints
- Works in 50% Compression, 25% Tension
- Resistant to Spillage of Petroleum Products
  - De-icing material
  - Aircraft Oil
  - Animal and Vegetable Fatty Acids
  - Most Acids
- Easily Installed
- May be Installed During Winter Months When Most Leaks Occur

EVA Expansion Joint Companion Materials

- Thermal-Chem Bonder (Rapid or Normal Cure), Product 4, has been formulated to act as a lubricant and to bond the EVA to the inner face surfaces of concrete, steel, aluminum and other structural materials normally used in the construction industry. The epoxy adhesive bond is greater than the tensile strength of the EVA, which allows the joint to move while maintaining a watertight seal.
- Thermal-Chem Mortar Resin (Rapid or Normal Cure), Product 3, when blended with a select gradation of dry, clean silica sand is used to repair deteriorated joints. Typical repairs include rebuilding the joint nosing to its original size and shape and to provide the EVA with a straight vertical edge for proper adhesion.

Refer to the individual Product Description Sheets for Bonder, Product 4, and Mortar Resin, Product 3, for complete product descriptions.

TYPICAL PHYSICAL PROPERTIES

Division 9

General: Thermal-Chem EVA is a goamed, closed-cell, cross-linked ethylene vinyl acetate low density polyethylene co-polymer. Being both cellular and elastic, it can operate in tension and compression. Like all polymetric materials, it performs better at low strain and it is recommended for use within the range of 25% tension and 50% compression.

Compression Set British Standard 4443:6
Average figures on samples 24 mm thick
20% compression for 48 hr. at 20°C ½ hr. recovery: 13%
40% compression for 70 hr. at 20°C ½ hr. recovery: 16%
The degree of compression set is dependent on the time under compression, degree of compression, temperature and recovery time. The values quoted apply to the conditions of the test.

Modulus of Elasticity in Compression
British Standard 4443:6

Loading Range	2-8 psi (15-55 kN/m2)	27.5 psi (190 kN/M2)
Loading Ranging	10-20 psi (70-140 kN/m2)	120 psi (825 kN/m2)

Joint Filler Test
U.S.A. Federal Specification HH-F-341a
Type 1 Standard Class A

3.2	Resistance to handling	Excellent
3.3	Recovery to at least 90%	95%+
3.4	Compression: Load to compress 50%	16 psi
3.5	Extrusion: not more than ¼ inc. (6.35 mm)	None
3.8.1	Weathering Freeze-Thaw Cycles	Complies
3.9	Dimensional Tolerance	Complies

COLOR AND SIZES

Color: EVA is only available in Dark Gray.

Size: Available in rolls of 1", 2" of 3" thick by 18" wide and 24" long; 4" thick rolls and specific sizes are available by special order.

CHEMICAL RESISTANCE

EVA has excellent resistance to most acids and alkalis. Oxidizing acids may cause some deterioration. Moderate to excellent results may be expected from lubricating oils. Aromatic, chlorinated and hydrocarbon solvents generally cause swelling. Please consult with your Thermal-Chem representative for actual usage in chemical or corrosive environments.

JOINT DESIGN CONSIDERATIONS

Expansion and contraction joint systems for asphalt and concrete pavements, structures, and buildings are designed to ensure the structural capacity and/or riding quality of the pavement. Joints are capable of controlling the transverse and longitudinal cracks that result from restrained contraction and the combined effects of restrained warping and traffic loads. They accommodate slab or wall panel movements, divide slabs and pavements into practical construction increments, and many times, provide some load transfer between slabs.

To attain adequate workability of the joint system, key factors must be considered in the joint design and spacing. In calculating correct joint dimensions, consider all known factors relating to pavement, slab or column movement, height, panel, size, color and hydrostatic head pressures when below grade. The coefficient of thermal expansion and contraction is the most important factor, because it causes dynamic movements.

The following data is provided as a guide for the size selection of E.V.A. Systems. Every effort is made to assure accuracy, neither Thermal-Chem nor its representative make any warranty of any kind respecting the use of the data for other than information purposes.

The following illustrative examples are intended as a guide only. Other factors not included in the calculations may tend to influence movement or EVA size selection.

CALCULATION EXAMPLE - CONCRETE SLAB ON GRADE

Factors:

Slab Length (L)	50 feet
Slab Depth (D)	12 inches
Temperature Variation (T)	-20 to 120^0 F=140^0 F
Coefficient of Expansion (C)	6.0×10^{-6}

Find:

1. Joint movement
2. Select Thermal-Chem E.V.A. Expansion Joint width
3. Determine joint width
4. Select joint design

Step No. 1: Formula T x C + Factor x (L x D) = Movement in inches

0 x 0.000006 = 0.00084 x 600 = 0.504 inches

Step No. 2: Select the Thermal-Chem E.V.A. Joint with the closest movement rating that is equal or greater from Table No. 1 Selection: ¾ inch width

Step No. 3: Determine the joint width by using the nomograph as a guide. Locate the E.V.A. width and follow the line across the nomograph to the concrete temperature line.

Example: Temperature of concrete at time of installation is 50^0 F (10^0 C). Joint width should be $^7/_{16} \pm {}^1/_{32}$ inch.

Step No. 4: Determine joint design from explanations given in the construction application series.

CALCULATION EXAMPLE - BRIDGE SUPER-STRUCTURE OR EXPOSED PARKING DECK

Factors: Concrete Structure

Slab Length (L)	100 feet
Slab Depth (D)	12 inches
Temperature Variation (T)	0 to 130^0 F = 130^0 F
Coefficient of Expansion (C)	6.0×10^{-6}

Find:

1. Joint movement
2. Select Thermal-Chem E.V.A. Expansion Joint width
3. Determine joint width
4. Select joint design

Step No. 1: Formula T x C = Factor x (L x D) = Movement x 15% = Working Movement

130 x 0.000006 = 0.00078 x 1200 = 0.936 x 1.15 = 1.0764 inches

Step No. 2: Select the Thermal-Chem E.V.A. Joint with the closest movement rating equal or greater from Table No. 1. Selection 1-½ inches (38.1mm) in width.

Step No. 3: Determine the joint width by using the nomograph as a guide. Locate the E.V.A. width and follow the line across the nomograph to the concrete temperature line. Example: Temperature of the concrete at the time of installation is 40^0 F (5^0 C.) Joint width should be approximately $1-{}^1/_{16}$ inches.

Table 1
THERMAL-CHEM E.V.A. OPERATIONAL LIMITS

E.V.A. Width In.(mm)	Working Range Compression %	Tension %	E.V.A. Movement Range Inches (mm)	Total Movement Inches (mm)
3/8 (9.525)	50	25	3/16 to 15/32 (4.7625 to 11.906)	9/32 (7.1438)
½ (12.7)	50	25	¼ to 5/8 (6.35 to 15.875)	3/8 (9.5250)
¾ (19.05)	50	25	3/8 to 15/16 (9.525 to 23.812)	9/16 (14.288)
1 (25.4)	50	25	½ to 1-1/4 (12.7 to 31.75)	¾ (19.05)
1-1/4 (31.75)	50	25	5/8 to 1-9/16 (15.875 to 39.688)	15/16 (23.812)
1-½ (38.1)	50	25	¾ to 1-7/8 (19.05 to 47.825)	1-1/8 (28.575)
2 (50.8)	50	25	1 to 2-½ (25.4 to 63.5)	1-½ (38.1)
2-½ (63.5)	50	25	1-¼ to 3-1/8 (31.75 to 79.375)	1-7/8 (47.625)
3 (76.2)	50	25	1-½ to 3-¾ (38.1 to 95.25)	2-¼ (57.15)
4 (101.6)	50	25	2 to 5 (50/8 to 127)	3 (76.2)

Movements are calculated on the joint being installed in 25% compression at 20^0 F (-7^0 C) or increasec as shown on the nomograph. All information given in the nomograph and Table 1 are based on re therefore, are considered average.

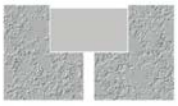
INSTALLATION

The recessed depth of the expansion system exposed to vehicular environments should be $^{1}/_{8}$" (3.175 mm) for E.V.A. widths to 1-¾" (44.45 mm) and ¼" (6.35 mm) in depth for wider applications. Joints in non-vehicular areas may be installed flush with the surface or recessed at the option of the architect or engineer.

The typical joint sizing should be a minimum equal width to depth. However, there are designs requiring more depth (thickness) than width to properly waterproof a given application. All tanks tunnels, swimming pools and reservoirs should be a minimum of 1:2 ratio, width to depth, respectively. There is no harm in filling the balance of the joint with E.V.A. to prevent the buildup of dirt and other debris, which could possibly prevent proper joint movement.

On installation, Thermal-Chem E.V.A. is compressed approximately 25% exertug a force against the inner faces of the joint, to provide an effective, permanent bond and water-tight system.

As decreasing ambient temperatures open the joint to its maximum gap, Thermal-Chem E.V.A. is capable of recovering to its original size, and it will continue to work in tension up to 25% with a designed safety factor of approximately 200%.



As ambient temperatures increase, the joint closes to its minimum gap, further compressing the seal. Thermal-Chem E.V.A. will not take set or bulge when properly designed and installed. Permanent, watertight maintenance-free expansion and contraction joints are the economical answer to pavement and structure requirements.

JOINT NOSING REPAIR

Remove all unsound concrete, and brush the substrate and flush with clean water. Blow away all standing water.
Insert a removal form covered with polyethylene into the joint centerline. When lower joint edges are irregular, a backer-form may be used below the expansion joint form to prevent the loss of epoxy mortar out the bottom of the joint opening.

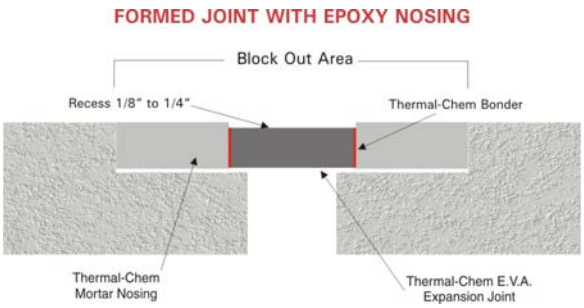
Prime the substrates' horizontal and vertical surfaces with 6 mils of Thermal-Chem Mortar Resin, Product 3.

Place and compact properly graded Thermal-Chem mortar mix in the block-out areas. Compact and strike off and finish surface to established grades.

When the mortar becomes tack-free, remove the form carefully as not to damage the uncured mortar. If spalls occur during removal, patch with Thermal-Chem Mortar or Bonder.

Apply the Bonder and EVA to the newly repaired joint as described above.

Allow the bonder to become tack-free and resume normal traffic over the system.



PRODUCT AVAILABILITY

Products are manufactured and available through the Thermal-Chem Corporation, 2120 Roberts Drive, Broadview, IL 60155 U.S.A.
Tel: 800/635-3773 ▪ 847/288-9090
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Website: www.thermalchem.com

TECHNICAL/SPECIFICATION SERVICES

Additional Product Data, complete Technical Support and Product Specifications are all available through the Thermal-Chem Corporation; or their local representatives.

Every reasonable precaution and effort has been taken in the manufacturer of all Thermal-Chem products to comply with published product data. Actual product performance may vary slightly due to environmental influences and/or conditions.

PRODUCT HANDLING

Read the Material Safety Data Sheet thoroughly before use.

Warning: For professional use only. Avoid contact of uncured material with skin and eyes. Contact with skin may result in irritation. Wash skin with soap and water. If contact with eyes should occur, flush with water for 15 minutes and seek immediate medical attention.

LIMITED WARRANTY

Thermal-Chem Corporation warrants its product to be of good quality and will replace any product proved defective. Satisfactory results depend not only upon quality products but also upon many factors beyond our control. Therefore, except for such replacement, **THERMAL-CHEM CORP. MAKES NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, RESPECTING ITS THERMAL-CHEM CORP. PRODUCTS**, and Thermal-Chem Corporation shall have no other liability with respect thereto, including without limitation, liability for incidental or consequential damages. Any claim regarding product defect must be received in writing within one hundred and eighty (90) days from the date of shipment. No claim will be considered without such written notice or after the specified time interval. The user shall determine the suitability of the products for the intended use and assume all risks and liability in connection therewith.