carboline®
Coatings - Linings - Fireproofing

VERSION 1.4

Thermo-Sorb HB

IINTUMESCENT COATING BID SUBMITTAL

Prepared by:
Michael Hollman

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Thermo-Sorb® HB

PRODUCT DATA SHEET

SELECTION & SPECIFICATION DATA

Generic Type	A patented high-solids, elastomeric, solvent-based hybrid intumescent fire-resistive material for the fire protection of interior and exterior structural steel.
Description	Thermo-Sorb HB is a high-build, thin-film intumescent fire-resistive material that provides up to 3.5 hours of fire protection for steelwork. With superior flexibility and excellent weather resistance, it's ideal for demanding field applications.
Features	• UL/ULC Listed (ANSI/UL 263, CAN/ULC-S101): Fire-rated designs for a wide range of steel sections—up to 3.5 hours for interior and exterior use. • Contains Optifire®+ unique traceability identifier. • Most rating thicknesses in a single coat. • Early moisture resistance. • Cold temperature resistance. • Decorative finish – provides a slightly textured, decorative finish. • Easy to apply through standard easily available spray equipment. • Developed for both on-site and off-site or shop application conditions. • VOC compliant (to SCAQMD Rule 1113). • Contributes to LEED credits. • Suitable for clean room applications. • Environmental Product Declaration - The International EPD System - registration number S-P-13792.
Color	Off White
Finish	Matte Smooth to slight orange peel
Primer	Apply over approved primer when specified. For pre-primed steel or primer compatibility, consult Carboline Technical Service. Not for use over single-pack primers.
Service Temperature	-4-+176°F (-20-+80°C)
Recommended Thickness	Thickness varies based on required fire rating per listing. Limit each coat to 200 mils (5.08 mm) for best aesthetic results, however higher thicknesses are possible.
Solids Content	By Volume 85% +/- 3%
Practical Yield	6.7 ft² at 200 mil (0.64 m² at 5.08 mm) Allow for loss in mixing and application.
VOC Value(s)	Per EPA Method: 1.19 lb/gal (143 g/L) Check local regulations regarding product usage.
Limitations	Moisture sensitive. Ensure hoses and pumps are dry before use.
Topcoats	Product must be applied to the specified DFT and be dry before applying a topcoat. Thermo-Sorb HB is not suitable for use with single pack or epoxy topcoats. Contact Carboline Technical Service for a complete list of approved topcoats.

SUBSTRATES & SURFACE PREPARATION

General

All surfaces must be primed with compatible primer and be clean, dry and free of oil, grease, loose mill scale, dirt, dust or other materials which would impair the bond of the product to the substrate. Surface preparation must meet the requirements of the primer being used. The general requirement for interior steel is SSPC-SP2 or SP3. Contact Carboline Technical Service for recommendations and specific primer requirements.

Painted/Primed Structural Steel

Existing primers must attain a minimum 3A rating in accordance with ASTM D3359 Method A, X cut adhesion test. If below 3A, the coating must be removed and areas re-primed with a compatible primer. If an existing compatible primer is beyond the recoat window, clean and lightly abrade in accordance with SSPC-SP2 or SP3 to roughen and de-gloss the surface. Contact Carboline Technical Service for a list of approved tie-coat primers and specific primer requirements.

Primer recoat intervals may vary from the published product datasheet when using under intumescent fireproofing products. Consult Carboline Technical Service for recommended cure times before applying Carboline intumescent products.

PERFORMANCE DATA

All test data was generated under laboratory conditions. Field testing results may vary.

Test Method	Results
ASTM 695 Compressive Load/Compressive Stress	120 lb/500 psi
ASTM D2240 Hardness (Type A)	82
ASTM D2240 Hardness (Type DO)	67
ASTM D2794 Impact Resistance (4lb weight)	>160 in-lbs.
ASTM D4060 Tabor Abrasion (CS-17 wheels, 1000g load)	0.881g/1000 cycles
ASTM D638 Tensile Strength/Elongation at Yield/Modulus of Elasticity (-25°C/-13°F)	290 psi/9%/5300psi
ASTM D638 Tensile Strength/Elongation at Yield/Modulus of Elasticity (ambient)	240 psi/12%/3575 psi
ASTM D790-17 Flexural Stress/ Flexural Load/Modulus (-25°C/-13°F)	520 psi/1.4 lb/26100 psi
ASTM D790-17 Flexural Stress/Flexural Load/Modulus (ambient)	300 psi/0.9 lb/8300psi
ASTM E84/UL723 Surface Burning Characteristics	Class A

MIXING & THINNING

Mixing

Always mix complete kits to ensure proper ratio. Pre-mix Part A using a 1/2" (12.7 mm) electric or air driven drill with a slotted paddle or Jiffy mixer blade (300 RPM under load). Shake Part B container thoroughly, then add to Part A. Mix for a minimum of 2 minutes until a uniform color is obtained.

Thinning

This product is designed to be applied without thinning. If necessary, this product may be thinned up to 2% with Thinner 10 or Xylene. Excessive thinning may lead to longer drying times, potential solvent entrapment or soft coatings, and may lead to defects such as blisters, sagging, or runs. Any thinner that contains water will cause the mixed material to react much more quickly, resulting in a reduced pot life.

Pot Life

60 minutes at 68°F (20°C)

APPLICATION EQUIPMENT GUIDELINES

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

Airless Spray	Use minimum 1.35 gal. (5.1 L) per minute electric airless (minimum) to provide an operating pressure of 3,000 psi (204 bar). Remove rock catcher from siphon tube.
Spray Gun	WIWA W500 PFP/Graco XHF PFP application gun (3/8 inch in-let) (with filters removed) or equivalent.
Spray Tips	0.023-0.027" (Use Graco heavy duty RAC non diffuser tips and housing)
Hose Length	Maximum 100' (30 m) Smaller pumps may require shorter hoses to achieve desired spray pattern
Material Hose	1/2" (12.7mm) I.D.
Whip Hose	3/8" (9.5 mm) I.D.

APPLICATION PROCEDURES

General	Spray application is recommended for the optimum production, coverage and finish. Brush, roller or spatula may be used for small areas such as touch up or repairs, work from a small container and mix material frequently. The original pail should be kept tightly closed.
Airless Spray	A single coat built up with a number of quick passes allows greater control over quantities, thickness and finish.

APPLICATION CONDITIONS

Condition	Ambient	Humidity
Minimum	5°F (-15°C)	15%
Maximum	125°F (52°C)	95%

Refer to Thermo-Sorb HB Application Manual for details. Steel surface temperature should be a minimum of 5°F (3°C) above the dew point. Heavy rain or water running over the surface of recently applied material can cause surface patterning if the material has not formed a skin.

CURING SCHEDULE

Surface Temp.	Dry to Handle	Dry to Recoat	Dry to Touch
70°F (21°C)	24 Hours	4 Hours	60 Minutes

Dry times above are for 50% RH. Drying time will vary with temperature and humidity conditions. This product reacts with moisture in the air to cure. Air movement and thinner coats will assist drying. Higher film thicknesses will require longer drying times for topcoating.
Thermo-Sorb HB can be topcoated 24 hours after application at relative humidities of 20-95% regardless of temperature when applied at ≤120 mils (3mm) WFT, and 48 hours after application when applied >120 mils (3mm) WFT.
Consult Carboline Technical Service for specific details.

TESTING / CERTIFICATION / LISTING

Underwriters Laboratories, Inc.	Thermo-Sorb HB has been tested in accordance with ASTM E-119 (UL 263) and CAN/ULC-S101 at Underwriter's Laboratories, Inc. Thermo-Sorb HB is listed by UL and ULC for the following designs: **Wide Flange Columns:** Y677 **Tube Columns:** Y678 **Pipe Columns:** Y678 **Restrained and Unrestrained Beams:** N663 The product should be applied in accordance with the appropriate design.

CLEANUP & SAFETY

Cleanup	Cleaning process is different to conventional intumescent coatings, consult Application Manual for details. Uncured paint can be removed using Thinner 10 or Xylene. Dried on paint may be removed using a paint scraper. Spray equipment must only be cleaned using Thinner 10 or xylene, or solvents with minimum 80% xylene, and water or alcohol content must be <0.2%. Higher water contents will lead to gelling in the equipment. Cleaning of all spray equipment should be done on the same level.
Safety	Read and follow all caution statements on this product data sheet and on the SDS for this product. Employ normal workmanlike safety precautions. Use adequate ventilation. Keep container closed when not in use.
Overspray	All adjacent and finished surfaces shall be protected from damage and overspray.
Ventilation	When used in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to insure all personnel are below guidelines. If not sure or if not able to monitor levels, use MSHA/NIOSH approved respirator.

MAINTENANCE

General	If coating becomes damaged, rebuild required thickness by spray or trowel. When dry, smooth and finish with approved topcoat to match. Damaged areas must be abraded back to a firm edge by sanding or scraping. The topcoat should be abraded back by 1" (25.4 mm) from the damaged area. The surface must be clean and dry before re-applying product. The coating shall then be built back to the original thickness, allowed to dry, then over-coated with the specified topcoat or system.

PACKAGING, HANDLING & STORAGE

Packaging	Full Kits: 4.7 gallons (17.8 L) Part A: 3.98 gallons (15.1 L) Part B: 0.73 gallons (2.7 L)
Shelf Life	12 months (when kept at recommended storage conditions and in original unopened containers).
Storage	Store indoors in a dry environment between 32-100°F (0-38°C). Excursions down to 0°F (-18°C) are acceptable during material transportation.
Shipping Weight (Approximate)	Part A: 51 lbs Part B: 6 lbs
Flash Point (Setaflash)	45°F (7°C)

WARRANTY

To the best of our knowledge the technical data contained herein is true and accurate on the date of publication and is subject to change without prior notice. User must contact Carboline to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. Carboline warrants our products to be free of manufacturing defects in accord with applicable Carboline quality control procedures. THIS WARRANTY IS NOT VALID WHEN THE PRODUCT IS NOT: (1) APPLIED IN ACCORDANCE WITH CARBOLINE'S SPECIFICATIONS, AND/OR (2) PROPERLY STORED, CURED, AND USED UNDER NORMAL OPERATING CONDITIONS. Carboline assumes no responsibility for coverage, performance, injuries, or damages resulting from use of the product. If this product is found not to perform as specified upon inspection by a Carboline representative during the warranty period, Carboline's sole obligation, if any, is to replace the Carboline product(s) proven to be defective or refund the purchase price thereof, at Carboline's sole option. Carboline shall not be liable for any other losses or damages. This warranty excludes (1) labor and costs of labor for the application or removal of any product, and (2) any incidental or consequential damages, whether based on breach of express or implied warranty, negligence, strict liability or any other legal theory. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. All of the trademarks referenced above are the property of Carboline International Corporation unless otherwise indicated. The whole text of this Product Data Sheet, as well as the documents derived from it, have been written in English, and for legal purposes the English version shall prevail.

Safety Data Sheet

Prepared in Accordance with HCS 29 C.F.R. 1910.1200

1. Identification of the Substance/Mixture and the Company/Undertaking

1.1 Product Identifier NC31A1NL

Product Name: THERMO-SORB HB PART A

Revision Date: 10/06/2025

Supercedes Date: New SDS

1.2 Relevant identified uses of the substance or mixture and uses advised against Component of multicomponent industrial coatings - Industrial use.

1.3 Details of the supplier of the safety data sheet

Manufacturer:

Carboline Global Inc.
2150 Schuetz Road
St. Louis, MO USA 63146

Regulatory / Technical Information:
Contact Carboline Technical Services at
1-800-848-4645

Datasheet Produced by: Schlereth, Ken - regulatory@carboline.com

1.4 Emergency telephone number:

CHEMTREC 1-800-424-9300 (Inside US)
CHEMTREC +1 703 5273887 (Outside US)
HEALTH - Pittsburgh Poison Control 1-412-681-6669

2. Hazard Identification

2.1 Classification of the substance or mixture

Carcinogenicity, category 2
Flammable Liquid, category 3
Reproductive Toxicity, category 2
STOT, repeated exposure, category 2

2.2 Label elements

Symbol(s) of Product

Signal Word

Warning

Named Chemicals on Label

ETHYL BENZENE, MELAMINE

HAZARD STATEMENTS

Flammable Liquid, category 3	H226	Flammable liquid and vapour.
Carcinogenicity, category 2	H351	Suspected of causing cancer.
Reproductive Toxicity, category 2	H361	Suspected of damaging fertility or the unborn child.
STOT, repeated exposure, category 2	H373	May cause damage to organs through prolonged or repeated exposure.

PRECAUTION PHRASES

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P284	Wear respiratory protection.
P308+313	IF exposed or concerned: Get medical advice/attention.
P314	Get medical advice/attention if you feel unwell.
P403+233	Store in a well-ventilated place. Keep container tightly closed.

ADDITIONAL INFORMATION

Note_P 64741-65-7	Note P : The classification as a carcinogen or mutagen need not apply; the substance, CAS 64741-65-7, contains less than 0,1 % w/w benzene

2.3 Other hazards

No Information

Results of PBT and vPvB assessment:

The product does not meet the criteria for PBT/VPvB in accordance with Annex XIII.

3. Composition/Information On Ingredients

3.2 Mixtures

Hazardous ingredients

Name According to EEC	EINEC No.	CAS-No.	%	Classifications	
TITANIUM DIOXIDE	236-675-5	13463-67-7	10 - <30		
MELAMINE	203-615-4	108-78-1	10 - <30	H351-361-373	Carc. 2, Repr. 2, STOT RE 2
DIISONONYL PHTHALATE	249-079-5	28553-12-0	1.0 - <5.0	H331	Acute Tox. 3 Inhalation
ETHYL BENZENE	202-849-4	100-41-4	1.0 - <5.0	H225-304-332-373-412	Acute Tox. 4 Inhalation, Aquatic Chronic 3, Asp. Tox. 1, Flam. Liq. 2, STOT RE 2

META-XYLENE	203-576-3	108-38-3	1.0 - <5.0	H226-312-315-332	Acute Tox. 4 Dermal, Acute Tox. 4 Inhalation, Flam. Liq. 3, Skin Irrit. 2
ODORLESS MINERAL SPIRITS	265-067-2	64741-65-7	0.1 - <1.0	H304	Asp. Tox. 1

CAS-No. **M-Factors**

13463-67-7
108-78-1
28553-12-0
100-41-4
108-38-3
64741-65-7

Remarks: CAS No 13463-67-7: Note 10
CAS No. 64741-65-7: Note P

Additional Information: The text for GHS Hazard Statements shown above (if any) is given in Section 16.

4. First-aid Measures

4.1 Description of First Aid Measures

AFTER INHALATION: Give oxygen or artificial respiration if needed. Remove person to fresh air. If signs/symptoms continue, get medical attention.
AFTER SKIN CONTACT: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If skin irritation persists, call a physician.
AFTER EYE CONTACT: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
AFTER INGESTION: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. If swallowed, call a poison control centre or doctor immediately.

4.2 Most important symptoms and effects, both acute and delayed

Harmful if swallowed. Irritating to eyes and skin. Risk of serious damage to the lungs (by aspiration). Vapours may cause drowsiness and dizziness.

4.3 Indication of any immediate medical attention and special treatment needed

No information available on clinical testing and medical monitoring. Specific toxicological information on substances, if available, can be found in section 11.
When symptoms persist or in all cases of doubt seek medical advice.

5. Fire-fighting Measures

5.1 Extinguishing Media:

Carbon Dioxide, Dry Chemical, Foam, Water Fog

UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable liquid. Vapours are heavier than air and may spread along floors. Vapours may form explosive mixtures with air. Vapors may travel to areas away from work site before igniting/flashing back to vapor source. Provide adequate ventilation. Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Electrical installations / working materials must comply with the technological safety standards. Wear shoes with conductive soles.

FOR SAFETY REASONS NOT TO BE USED: Do not use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture

No Information

5.3 Advice for firefighters

SPECIAL FIREFIGHTING PROCEDURES: In the event of fire, wear self-contained breathing apparatus. Cool containers / tanks with water spray. Flammable.

SPECIAL FIREFIGHTING PROTECTION EQUIPMENT: No Information

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation. Evacuate personnel to safe areas. Remove all sources of ignition. To avoid ignition of vapours by static electricity discharge, all metal parts of the equipment must be grounded. Wear personal protective equipment. For personal protection see section 8.

6.2 Environmental precautions

Do not allow material to contaminate ground water system. Prevent product from entering drains.

6.3 Methods and material for containment and cleaning up

Prevent further leakage or spillage if safe to do so. Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections

No Information

7. Handling and Storage

7.1 Precautions for safe handling

INSTRUCTIONS FOR SAFE HANDLING : Keep containers dry and tightly closed to avoid moisture absorption and contamination. Prepare the working solution as given on the label(s) and/or the user instructions. Do not breathe vapours or spray mist. Ensure all equipment is electrically grounded before beginning transfer operations. Do not use sparking tools. Do not get in eyes, on skin, or on clothing. Use only with adequate ventilation/personal protection. Wash thoroughly after handling.
PROTECTION AND HYGIENE MEASURES : Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. When using, do not eat, drink or smoke.

7.2 Conditions for safe storage, including any incompatibilities

CONDITIONS TO AVOID: Heat, flames and sparks.
STORAGE CONDITIONS: Keep container closed when not in use. Store in a dry, well ventilated place away from sources of heat, ignition and direct sunlight.

7.3 Specific end use(s)

The mixing and application to be in accordance with the technical data sheets.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Ingredients with Occupational Exposure Limits
(US)

Name	CAS-No.	ACGIH TWA	ACGIH STEL	ACGIH Ceiling
TITANIUM DIOXIDE	13463-67-7	10 mg/m3	N/E	N/E
MELAMINE	108-78-1	N/E	N/E	N/E
DIISONONYL PHTHALATE	28553-12-0	N/E	N/E	N/E
ETHYL BENZENE	100-41-4	20 PPM	125 ppm	
META-XYLENE	108-38-3	100 PPM	150 PPM	N/E
ODORLESS MINERAL SPIRITS	64741-65-7	N/E	N/E	N/E

Name	CAS-No.	OSHA PEL	OSHA STEL
TITANIUM DIOXIDE	13463-67-7	15 MGM3	N/E
MELAMINE	108-78-1	N/E	N/E

DIISONONYL PHTHALATE	28553-12-0	N/E	N/E
ETHYL BENZENE	100-41-4	435 MGM3, 100 PPM	545 MGM3, 125 PPM
META-XYLENE	108-38-3	100.00 PPM	N/E
ODORLESS MINERAL SPIRITS	64741-65-7	N/E	N/E

FURTHER ADVICE: Refer to the regulatory exposure limits for the workforce enforced in each country. Some components may not have been classified under the EU CLP Regulation.

8.2 Exposure controls

Personal Protection

RESPIRATORY PROTECTION: In order to avoid inhalation of spray-mist and sanding dust, all spraying and sanding must be done wearing adequate respirator. Use only with ventilation to keep levels below exposure guidelines reported in this document. User should test and monitor exposure levels to ensure all personnel are below guidelines. If not sure, or not able to monitor, use State or federally approved supplied air respirator. For silica containing coatings in a liquid state, and/or if no exposure limits are established above, air-supplied respirators are generally not required.

EYE PROTECTION: Ensure that eyewash stations and safety showers are close to the workstation location. Safety glasses with side-shields.

HAND PROTECTION: Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough. Impervious gloves. Request information on glove permeation properties from the glove supplier.

BODY PROTECTION: Lightweight protective clothing

OTHER PROTECTIVE EQUIPMENT: No Information

ENGINEERING CONTROLS: Avoid contact with skin, eyes and clothing. Ensure adequate ventilation, especially in confined areas.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance:	Viscous White Liquid
Physical State	Liquid
Odor	Characteristic
Odor threshold	Not Determined
pH	Not Determined
Melting point / freezing point (°C)	Not Determined
Boiling point/range (°C)	176 F (80 C) - 595 F (313 C)
Flash Point (°C)	102F (39C)
Evaporation rate	Slower Than Ether
Flammability (solid, gas)	Not Determined
Upper/lower flammability or explosive limits	1.0 - 7.1
Vapour Pressure, mmHg	Not Determined
Vapour density	Heavier than Air
Relative density	Not Determined
Solubility in / Miscibility with water	Not Determined
Partition coefficient: n-octanol/water	Not Determined
Auto-ignition temperature (°C)	Not Determined
Decomposition temperature (°C)	Not Determined

Viscosity	Not Determined
Explosive properties	Not Determined
Oxidising properties	Not Determined

9.2 Other information

VOC Content g/l:	143
Specific Gravity (g/cm3)	1.48

10. Stability and Reactivity

10.1 Reactivity
No reactivity hazards known under normal storage and use conditions.

10.2 Chemical stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions
Hazardous polymerisation does not occur.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents.

10.6 Hazardous decomposition products
Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke.

11. Toxicological Information

11.1 Information on toxicological effects

Acute Toxicity:

Oral LD50: No information available on the product itself as the product is not tested.

Inhalation LC50: No information available on the product itself as the product is not tested.

Irritation: Unknown

Corrosivity: Unknown

Sensitization: Unknown

Repeated dose toxicity: Unknown

Carcinogenicity: Carcinogenicity, category 2

Mutagenicity: Unknown

Toxicity for reproduction: Reproductive Toxicity, category 2

STOT-single exposure: Unknown

STOT-repeated exposure: STOT, repeated exposure, category 2

Aspiration hazard: Unknown

If no information is available above under Acute Toxicity then the acute effects of this product have not been tested. Data on individual components are tabulated below:

CAS-No.	Chemical Name	Oral LD50	Dermal LD50	Vapor LC50	Gas LC50	Dust/Mist LC50
13463-67-7	TITANIUM DIOXIDE	25000 mg/kg, oral (rat)	No Information	No Information	No Information	No Information
108-78-1	MELAMINE	3161 mg/kg, oral, rat	Not Available	3248 mg/m3 8 Hr, Inh, Rat	0.000	0.000
28553-12-0	DIISONONYL PHTHALATE	9750 mg/kg, oral, rat		9.4 mg/l / 4h, rat inh	0.000	0.000
100-41-4	ETHYL BENZENE	3500 mg/kg rat, oral	>5000 mg/l, dermal rabbit	17.2 mg/L Inh, Rat, 4Hr	No Information	No Information
108-38-3	META-XYLENE	No Information	No Information	No Information	No Information	No Information
64741-65-7	ODORLESS MINERAL SPIRITS	8000 mg/kg, oral, rat			0.000	0.000

Additional Information:

This product may contain Ethyl Benzene, which is listed by IARC as possibly carcinogenic to humans (Group 2B). This listing is based on inadequate evidence of carcinogenicity in humans and sufficient evidence in experimental animals.

12. Ecological Information

12.1 Toxicity:

EC50 48hr (Daphnia):	No information available.
IC50 72hr (Algae):	No information available.
LC50 96hr (fish):	No information available.

12.2 Persistence and degradability: No information available.

12.3 Bioaccumulative potential: No information available.

12.4 Mobility in soil: No information available.

12.5 Results of PBT and vPvB assessment: The product does not meet the criteria for PBT/VPvB in accordance with Annex XIII.

12.6 Other adverse effects: No information available.

CAS-No.	Chemical Name	EC50 48hr	IC50 72hr	LC50 96hr
13463-67-7	TITANIUM DIOXIDE	No information	No information	No information
108-78-1	MELAMINE	No information	No information	No information
28553-12-0	DIISONONYL PHTHALATE	No information	No information	No information
100-41-4	ETHYL BENZENE	1.8 mg/l (Daphnia Magna)	4.6 mg/l (Green Algae)	4.2 mg/l (Rainbow Trout)
108-38-3	META-XYLENE	No information	No information	No information
64741-65-7	ODORLESS MINERAL SPIRITS	No information	No information	No information

13. Disposal Considerations

13.1 WASTE TREATMENT METHODS: Do not burn, or use a cutting torch on, the empty drum. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of in accordance with local regulations. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport Information

14.1 UN number	None*
14.2 UN proper shipping name	Not Regulated*
Technical name	N/A
14.3 Transport hazard class(es)	None*
Subsidiary shipping hazard	No Information
14.4 Packing group	N/A
14.5 Environmental hazards	No information available.
14.6 Special precautions for user	No information available.
EmS-No.:	Unknown
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code	No information available.
Additional Notes:	*This product does NOT meet the definition of a flammable material under CFR49, 173.120 (3); IATA 3.3.1.3; IMDG 2.3.1.3 or ADR 2.2.3.1.1 (note 1).

15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation for the substance or mixture:

CERCLA - Sara Hazard Category

This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

CERCLA - Sara Hazard Category

Flammable (gases, aerosols, liquids, or solids), Carcinogenicity, Reproductive toxicity, Specific target organ toxicity (single or repeated exposure)

Sara Section 313:

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR part 372:

DIISONONYL PHTHALATE	28553-12-0	3.77
ETHYL BENZENE	100-41-4	2.3
META-XYLENE	108-38-3	1.74

Toxic Substances Control Act:

All components of this product are either listed on the TSCA Inventory or are exempt.

This product contains the following chemical substances subject to the reporting requirements of TSCA 12(B) if exported from the United States:

No TSCA 12(b) components exist in this product.

U.S. State Regulations: As follows -

New Jersey Right-to-Know:

The following materials are non-hazardous, but are among the top five components in this product.

Chemical Name	CAS-No.
AMMONIUM POLYPHOSPHATE	68333-79-9
PENTAERYTHRITOL	115-77-5
CASTOR OIL	8001-79-4

Pennsylvania Right-To-Know

The following non-hazardous ingredients are present in the product at greater than 3%.

Chemical Name	CAS-No.
AMMONIUM POLYPHOSPHATE	68333-79-9
PENTAERYTHRITOL	115-77-5
CASTOR OIL	8001-79-4
BIS(2-ETHYLHEXYL) ADIPATE	103-23-1
ISODECYLDIPHENYL ESTER	29761-21-5

CALIFORNIA PROPOSITION 65

WARNING: Cancer and Reproductive Harm -- www.P65Warnings.ca.gov

International Regulations: As follows -

* Canadian DSL:

No Information

15.2 Chemical Safety Assessment:

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

16. Other Information

Text for GHS Hazard Statements shown in Section 3 describing each ingredient:

H225	Highly flammable liquid and vapour.
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.
H315	Causes skin irritation.
H331	Toxic if inhaled.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H412	Harmful to aquatic life with long lasting effects.

Reasons for revision

No Information

The information contained herein is, to the best of our knowledge and belief accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. It is the responsibility of the user to comply with all applicable federal, state, and local laws and regulations.

Safety Data Sheet

Prepared in Accordance with HCS 29 C.F.R. 1910.1200

1. Identification of the Substance/Mixture and the Company/Undertaking

1.1 Product Identifier NC31B1NL

Product Name: THERMO-SORB HB PART B

Revision Date: 10/06/2025

Supercedes Date: New SDS

1.2 Relevant identified uses of the substance or mixture and uses advised against Component of multicomponent industrial coatings - Industrial use.

1.3 Details of the supplier of the safety data sheet

Manufacturer:

Carboline Global Inc.
2150 Schuetz Road
St. Louis, MO USA 63146

Regulatory / Technical Information:
Contact Carboline Technical Services at
1-800-848-4645

Datasheet Produced by: Schlereth, Ken - regulatory@carboline.com

1.4 Emergency telephone number:

CHEMTREC 1-800-424-9300 (Inside US)
CHEMTREC +1 703 5273887 (Outside US)
HEALTH - Pittsburgh Poison Control 1-412-681-6669

2. Hazard Identification

2.1 Classification of the substance or mixture

Serious Eye Damage, category 1
Flammable Liquid, category 3
Skin Irritation, category 2

2.2 Label elements

Symbol(s) of Product

Signal Word

Danger

Named Chemicals on Label

3-(TRIMETHOXYSILYL)PROPYLAMINE

HAZARD STATEMENTS

Flammable Liquid, category 3	H226	Flammable liquid and vapour.
Skin Irritation, category 2	H315	Causes skin irritation.
Serious Eye Damage, category 1	H318	Causes serious eye damage.

PRECAUTION PHRASES

P210	Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
P280	Wear protective gloves/protective clothing/eye protection/ face protection.
P301+310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.
P332+313	If skin irritation occurs: Get medical advice/attention.
P403+233	Store in a well-ventilated place. Keep container tightly closed.

2.3 Other hazards

No Information

Results of PBT and vPvB assessment:

The product does not meet the criteria for PBT/VPvB in accordance with Annex XIII.

3. Composition/Information On Ingredients

3.2 Mixtures

Hazardous ingredients

Name According to EEC	EINEC No.	CAS-No.	%	Classifications	
3-(TRIMETHOXYSILYL) PROPYLAMINE	237-511-5	13822-56-5	5.0 - <10	H315-318	
META-XYLENE	203-576-3	108-38-3	1.0 - <5.0	H226-312-315-332	Acute Tox. 4 Dermal, Acute Tox. 4 Inhalation, Flam. Liq. 3, Skin Irrit. 2
ETHYL BENZENE	202-849-4	100-41-4	1.0 - <5.0	H225-304-332-373-412	Acute Tox. 4 Inhalation, Aquatic Chronic 3, Asp. Tox. 1, Flam. Liq. 2, STOT RE 2

PARA-XYLENE	203-396-5	106-42-3	1.0 - <5.0	H226-312-315-332	Acute Tox. 4 Dermal, Acute Tox. 4 Inhalation, Flam. Liq. 3, Skin Irrit. 2
ORTHO-XYLENE	202-422-2	95-47-6	1.0 - <5.0	H226-312-315-332	Acute Tox. 4 Dermal, Acute Tox. 4 Inhalation, Flam. Liq. 3, Skin Irrit. 2

CAS-No.	M-Factors
13822-56-5	
108-38-3	
100-41-4	
106-42-3	
95-47-6	

Additional Information: The text for GHS Hazard Statements shown above (if any) is given in Section 16.

4. First-aid Measures

4.1 Description of First Aid Measures

AFTER INHALATION: Give oxygen or artificial respiration if needed. Remove person to fresh air. If signs/symptoms continue, get medical attention.
AFTER SKIN CONTACT: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If skin irritation persists, call a physician.
AFTER EYE CONTACT: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
AFTER INGESTION: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. If swallowed, call a poison control centre or doctor immediately.

4.2 Most important symptoms and effects, both acute and delayed

Harmful if swallowed. Irritating to eyes and skin. Risk of serious damage to the lungs (by aspiration). Vapours may cause drowsiness and dizziness.

4.3 Indication of any immediate medical attention and special treatment needed

No information available on clinical testing and medical monitoring. Specific toxicological information on substances, if available, can be found in section 11.
When symptoms persist or in all cases of doubt seek medical advice.

5. Fire-fighting Measures

5.1 Extinguishing Media:

Carbon Dioxide, Dry Chemical, Foam, Water Fog

UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable liquid. Vapours are heavier than air and may spread along floors. Vapours may form explosive mixtures with air. Vapors may travel to areas away from work site before igniting/flashing back to vapor source. Provide adequate ventilation. Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Electrical installations / working materials must comply with the technological safety standards. Wear shoes with conductive soles.

FOR SAFETY REASONS NOT TO BE USED: Do not use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture

No Information

5.3 Advice for firefighters

SPECIAL FIREFIGHTING PROCEDURES: In the event of fire, wear self-contained breathing apparatus. Cool containers / tanks with water spray. Flammable.

SPECIAL FIREFIGHTING PROTECTION EQUIPMENT: No Information

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation. Evacuate personnel to safe areas. Remove all sources of ignition. To avoid ignition of vapours by static electricity discharge, all metal parts of the equipment must be grounded. Wear personal protective equipment. For personal protection see section 8.

6.2 Environmental precautions

Do not allow material to contaminate ground water system. Prevent product from entering drains.

6.3 Methods and material for containment and cleaning up

Prevent further leakage or spillage if safe to do so. Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections

No Information

7. Handling and Storage

7.1 Precautions for safe handling

INSTRUCTIONS FOR SAFE HANDLING : Keep containers dry and tightly closed to avoid moisture absorption and contamination. Prepare the working solution as given on the label(s) and/or the user instructions. Do not breathe vapours or spray mist. Ensure all equipment is electrically grounded before beginning transfer operations. Do not use sparking tools. Do not get in eyes, on skin, or on clothing. Use only with adequate ventilation/personal protection. Wash thoroughly after handling.
PROTECTION AND HYGIENE MEASURES : Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. When using, do not eat, drink or smoke.

7.2 Conditions for safe storage, including any incompatibilities

CONDITIONS TO AVOID: Heat, flames and sparks.
STORAGE CONDITIONS: Keep container closed when not in use. Store in a dry, well ventilated place away from sources of heat, ignition and direct sunlight.

7.3 Specific end use(s)

The mixing and application to be in accordance with the technical data sheets.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Ingredients with Occupational Exposure Limits
(US)

Name	CAS-No.	ACGIH TWA	ACGIH STEL	ACGIH Ceiling
3-(TRIMETHOXYSILYL)PROPYLAMINE	13822-56-5	N/E	N/E	N/E
META-XYLENE	108-38-3	100 PPM	150 PPM	N/E
ETHYL BENZENE	100-41-4	20 PPM	125 ppm	
PARA-XYLENE	106-42-3	100 PPM	150 PPM	N/E
ORTHO-XYLENE	95-47-6	100 PPM	150 PPM	N/E

Name	CAS-No.	OSHA PEL	OSHA STEL
3-(TRIMETHOXYSILYL)PROPYLAMINE	13822-56-5	N/E	N/E
META-XYLENE	108-38-3	100.00 PPM	N/E

ETHYL BENZENE	100-41-4	435 MGM3, 100 PPM	545 MGM3, 125 PPM
PARA-XYLENE	106-42-3	100.00 PPM	N/E
ORTHO-XYLENE	95-47-6	100.00 PPM	N/E

FURTHER ADVICE: Refer to the regulatory exposure limits for the workforce enforced in each country. Some components may not have been classified under the EU CLP Regulation.

8.2 Exposure controls

Personal Protection

RESPIRATORY PROTECTION: In order to avoid inhalation of spray-mist and sanding dust, all spraying and sanding must be done wearing adequate respirator. Use only with ventilation to keep levels below exposure guidelines reported in this document. User should test and monitor exposure levels to ensure all personnel are below guidelines. If not sure, or not able to monitor, use State or federally approved supplied air respirator. For silica containing coatings in a liquid state, and/or if no exposure limits are established above, air-supplied respirators are generally not required.

EYE PROTECTION: Ensure that eyewash stations and safety showers are close to the workstation location. Safety glasses with side-shields.

HAND PROTECTION: Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough. Impervious gloves. Request information on glove permeation properties from the glove supplier.

BODY PROTECTION: Lightweight protective clothing

OTHER PROTECTIVE EQUIPMENT: No Information

ENGINEERING CONTROLS: Avoid contact with skin, eyes and clothing. Ensure adequate ventilation, especially in confined areas.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance:	Viscous Greyish Liquid
Physical State	Liquid
Odor	Characteristic
Odor threshold	Not Determined
pH	Not Determined
Melting point / freezing point (°C)	Not Determined
Boiling point/range (°C)	149 F (65 C) - 654 F (346 C)
Flash Point (°C)	116F (47C)
Evaporation rate	Slower Than Ether
Flammability (solid, gas)	Not Determined
Upper/lower flammability or explosive limits	1.0 - 36.0
Vapour Pressure, mmHg	Not Determined
Vapour density	Heavier than Air
Relative density	Not Determined
Solubility in / Miscibility with water	Not Determined
Partition coefficient: n-octanol/water	Not Determined
Auto-ignition temperature (°C)	Not Determined
Decomposition temperature (°C)	Not Determined
Viscosity	Not Determined
Explosive properties	

	Not Determined
Oxidising properties	Not Determined

9.2 Other information

VOC Content g/l:	143
Specific Gravity (g/cm3)	0.98

10. Stability and Reactivity

10.1 Reactivity
No reactivity hazards known under normal storage and use conditions.

10.2 Chemical stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions
Hazardous polymerisation does not occur.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents.

10.6 Hazardous decomposition products
Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke.

11. Toxicological Information

11.1 Information on toxicological effects

Acute Toxicity:

Oral LD50: No information available on the product itself as the product is not tested.

Inhalation LC50: No information available on the product itself as the product is not tested.

Irritation: Skin Irritation, category 2

Corrosivity: Serious Eye Damage, category 1

Sensitization: Unknown

Repeated dose toxicity: Unknown

Carcinogenicity: Unknown

Mutagenicity: Unknown

Toxicity for reproduction: Unknown

STOT-single exposure: Unknown

STOT-repeated exposure: Unknown

Aspiration hazard: Unknown

If no information is available above under Acute Toxicity then the acute effects of this product have not been tested. Data on individual components are tabulated below:

CAS-No.	Chemical Name	Oral LD50	Dermal LD50	Vapor LC50	Gas LC50	Dust/Mist LC50
108-38-3	META-XYLENE	No Information	No Information	No Information	No Information	No Information
100-41-4	ETHYL BENZENE	3500 mg/kg rat, oral	>5000 mg/l, dermal rabbit	17.2 mg/L Inh, Rat, 4Hr	No Information	No Information
106-42-3	PARA-XYLENE	No Information	No Information	No Information	No Information	No Information
95-47-6	ORTHO-XYLENE	No Information	No Information	No Information	No Information	No Information

Additional Information:

This product may contain Ethyl Benzene, which is listed by IARC as possibly carcinogenic to humans (Group 2B). This listing is based on inadequate evidence of carcinogenicity in humans and sufficient evidence in experimental animals.

12. Ecological Information

12.1 Toxicity:

EC50 48hr (Daphnia): No information available.

IC50 72hr (Algae): No information available.

LC50 96hr (fish): No information available.

12.2 Persistence and degradability: No information available.

12.3 Bioaccumulative potential: No information available.

12.4 Mobility in soil: No information available.

12.5 Results of PBT and vPvB assessment: The product does not meet the criteria for PBT/VPvB in accordance with Annex XIII.

12.6 Other adverse effects: No information available.

CAS-No.	Chemical Name	EC50 48hr	IC50 72hr	LC50 96hr
13822-56-5	3-(TRIMETHOXYSILYL)PROPYLAMINE	No information	No information	No information
108-38-3	META-XYLENE	No information	No information	No information
100-41-4	ETHYL BENZENE	1.8 mg/l (Daphnia Magna)	4.6 mg/l (Green Algae)	4.2 mg/l (Rainbow Trout)
106-42-3	PARA-XYLENE	No information	No information	No information
95-47-6	ORTHO-XYLENE	No information	No information	No information

13. Disposal Considerations

13.1 WASTE TREATMENT METHODS: Do not burn, or use a cutting torch on, the empty drum. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of in accordance with local regulations. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport Information

14.1 UN number None*

14.2 UN proper shipping name Not Regulated*

Technical name N/A

14.3 Transport hazard class(es) None*

Subsidiary shipping hazard No Information

14.4 Packing group N/A

14.5 Environmental hazards No information available.

14.6 Special precautions for user No information available.

EmS-No.: Unknown

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code No information available.

Additional Notes: *This product does NOT meet the definition of a flammable material under CFR49, 173.120 (3); IATA 3.3.1.3; IMDG 2.3.1.3 or ADR 2.2.3.1.1 (note 1).

15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation for the substance or mixture:

CERCLA - Sara Hazard Category

This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

CERCLA - Sara Hazard Category

Flammable (gases, aerosols, liquids, or solids), Skin Corrosion or Irritation, Serious eye damage or eye irritation

Sara Section 313:

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR part 372:

META-XYLENE	108-38-3	4.34
ETHYL BENZENE	100-41-4	3.45
PARA-XYLENE	106-42-3	1.89
ORTHO-XYLENE	95-47-6	1.37

Toxic Substances Control Act:

All components of this product are either listed on the TSCA Inventory or are exempt.

This product contains the following chemical substances subject to the reporting requirements of TSCA 12(B) if exported from the United States:

No TSCA 12(b) components exist in this product.

U.S. State Regulations: As follows -

New Jersey Right-to-Know:

The following materials are non-hazardous, but are among the top five components in this product.

Chemical Name	CAS-No.
SILANE TERMINATED POLYETHER	611222-18-5

Pennsylvania Right-To-Know

The following non-hazardous ingredients are present in the product at greater than 3%.

Chemical Name	CAS-No.
SILANE TERMINATED POLYETHER	611222-18-5

CALIFORNIA PROPOSITION 65

WARNING: Cancer and Reproductive Harm -- www.P65Warnings.ca.gov

International Regulations: As follows -

* Canadian DSL:

No Information

15.2 Chemical Safety Assessment:

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

16. Other Information

Text for GHS Hazard Statements shown in Section 3 describing each ingredient:

H225	Highly flammable liquid and vapour.
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H332	Harmful if inhaled.
H373	May cause damage to organs through prolonged or repeated exposure.
H412	Harmful to aquatic life with long lasting effects.

Reasons for revision

No Information

The information contained herein is, to the best of our knowledge and belief accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. It is the responsibility of the user to comply with all applicable federal, state, and local laws and regulations.

APPLICATION MANUAL AND RECOMMENDATIONS FOR
THERMO-SORB HB

DOCUMENT No.: 070725-IFRM-TSS-A
DATE: July, 2025

DOCUMENT CONTENTS

SECTION A. REVISION SUMMARY

Revision	Date	Amendments
A	07.07.2025	First revision
B	10.10.2025	Changes to application equipment and temperature

SECTION B. INTRODUCTION

Audience

We assume that applicators of CARBOLINE products understand the terminology associated with our products and the various pieces of spray equipment and application techniques.

The installation of the THERMO-SORB HB Intumescent Fire Resistive Materials shall be performed only by contractor personnel trained or qualified by CARBOLINE in the installation of the materials.

Locating Information

This guide incorporates a number of aids to help you locate information easily.

- Table of Contents
- Figure and Table Listings
- Page Headers and Footers
- Frequent Section, Subsection, and Topic Headings

Numbering System

To avoid a cumbersome numbering system, only chapters, sections, and subsections have a numerical designation. For example, “2.3.1” represents Chapter 2, Section 3, Subsection 1.

Illustrations and drawings generally appear at the end of this document.

Breakdown of Information

Frequent section and subject headings highlight other significant information within a chapter. Heading type style and indentations indicate the level of importance for the topics.

Related Publications and Documents

This document occasionally refers to other Guides, data sheets, or specifications that may be helpful. Copies are available from CARBOLINE. Related information can be accessed at www.Carboline.com.

Other documents that may be helpful, include:

- OSHA - Occupational Safety and Health Administration Safety Rules
- National Spray Equipment Manufacturer’s Association Precautions for Spraying
- Power tools, hand tools or other mechanical equipment operating procedures.

SECTION C. SAFETY PRECAUTIONS

THERMO-SORB HB materials weigh approximately 11 – 12 pounds per gallon. Caution should be taken when lifting and moving the material to prevent injury.

Observe the National Spray Equipment Manufacturers Association precautions for spraying.

DO NOT point spray gun at any part of the human body.

Notes on Installation

Basis for Installation Procedures in This Guide

The installation steps and procedures in this guide were prepared with the best available data. All of the steps and procedures presented in this guide are based upon tests. As additional test and installation data becomes available, including revised installation procedures, CARBOLINE may update and modify this guide.

Note: This is a general Application Manual and cannot cover all possible situations which may arise in the field. For technical assistance, contact CARBOLINE's Fireproofing Technical Service Group at: 1-800-848-4645.

SECTION 1: GENERAL CONDITIONS

1.1 SCOPE

This Application Manual describes the requirements for the application of the THERMO-SORB HB Intumescent Fire Resistive Materials to interior and exterior steel surfaces for the commercial and light industrial market, based on the cellulosic requirements of ASTM E 119, UL 263 and/or CAN/ULC-S101. For the application to any other substrates, markets or specifications, contact CARBOLINE Technical Service or your local CARBOLINE Sales Representative.

1.2 QUALITY CONTROL MANUAL

1.2.1 QUALIFICATIONS OF APPLICATORS/RESPONSIBILITIES OF PERSONNEL

The application shall be performed by a Qualified Applicator having CARBOLINE training with proper equipment and experience.

1.2.2 REQUIREMENTS

In order to qualify, an Applicator shall:

1. Undergo specific training by CARBOLINE
2. Be experienced in the application of thin film Intumescent coatings.
3. Have the necessary approved spray application equipment and recommended quality control instrumentation.
4. Have in place an acceptable QA/QC system and be prepared to permit CARBOLINE audits.
5. Understand and recognize their statutory obligations with regard to health and Safety.

1.3 SAFETY PRECAUTIONS

The Applicator shall follow standard industrial hygiene practices for the handling of chemical coatings and shall conform to applicable codes of practice, regulations, and Owner Safety rules in all respects. Reference THERMO-SORB HB SDS for additional information and instruction.

Where power tools hand tools, spray equipment or other mechanical equipment are being used, the proper operating procedures for each tool or piece of equipment, as well as eye, hearing and respiratory protection should be followed. Equipment used to apply THERMO-SORB HB is under high pressure. Any injury caused by high pressure liquids can be serious and immediate medical attention should be sought.

1.4 DELIVERY

Material shall be delivered to the site in original, unopened containers, bearing clearly visible product names, batch number, name of manufacturer, expiration date, certification mark, and storage instructions.

1.5 STORAGE

Material not in immediate use shall be stored off the ground in a covered area assigned for that purpose. The materials in storage shall be protected from temperatures above 100˚F (38˚C) and below 32˚F (0˚C).

Prior to use with airless spray equipment, THERMO-SORB HB shall be pre-heated to a minimum of 70˚F (21˚C) and a maximum of 100˚F (38˚C).

1.6 PROTECTION OF ADJACENT SURFACES

The applicator shall mask off all adjacent areas and equipment from material overspray during the application. Overspray shall be removed promptly before material has cured. When applying these coating in windy conditions, additional precautions to control overspray should be undertaken.

SECTION 2: MATERIALS

The THERMO-SORB HB Intumescent Fire Resistive Materials systems consist of:

2.1 PRIMERS

All primer systems must be accepted by CARBOLINE prior to use under THERMO-SORB HB. The acceptable primer system shall be applied to properly prepared surfaces in accordance with the manufacturer's and project specifications.

The general requirement for steel preparation before the application of an approved primer should meet SSPC-SP2 or SP3. Contact Carboline Technical Service for surface preparation recommendations and specific primer requirements.

Existing coatings must attain a minimum 3A rating in accordance with ASTM D3359 Method A, X cut adhesion test. If acceptable, clean and lightly abrade in accordance with SSPC-SP2 or SP3 to roughen and de-gloss the surface. If not acceptable, the coating must be removed and areas re-primed with a compatible primer. Contact Carboline Technical Service for a list of approved tie-coat primers and specific primer requirements.

Primer recoat intervals may vary from the published product datasheet when using under intumescent fireproofing products. Consult Carboline Technical Service for recommended cure times before applying Carboline intumescent products.

2.2 THERMO-SORB HB

THERMO-SORB HB is a solvent based intumescent fire resistive materials designed for the fire protection of interior structural steel. THERMO-SORB HB are supplied in full pails of 3.98 gallons (15.1 L) for Part A and 0.73 gallons (2.7 L) for Part B.

2.3 TOPCOATS

All topcoat systems must be approved by Carboline prior to use over THERMO-SORB HB. Contact Carboline Technical Service for topcoat recommendations for interior general purpose and/or interior conditioned space environments.

SECTION 3: PUMP REQUIREMENTS

3.1 APPROVED ELECTRIC AIRLESS PUMPS FOR THERMO-SORB HB

The minimum recommended pump for the application of THERMO-SORB HB is a Graco Mark V, or equivalent, with an output of 1.35 gpm (5.1 L) minimum to provide an operating pressure of 3,000 psi (204 bar). Inline filters should be removed. Remove rock catcher from siphon tube. It is recommended to use a dedicated hose when spraying THERMO-SORB products.

3.2 APPROVED PNEUMATIC AIRLESS PUMPS FOR THERMO-SORB HB

The minimum recommended pump for the application of THERMO-SORB HB is a Graco King, or equivalent, with an output to provide an operating pressure of 3,000 psi (204 bar). Inline filters should be removed. Remove rock catcher from siphon tube. It is recommended to use a dedicated hose when spraying THERMO-SORB products.

SECTION 4: SURFACE PREPARATION AND PRIMING

4.1 DEGREASING, SURFACE PREPERATION AND PRIMING

4.1.1 DEGREASING

All surfaces shall be cleaned and degreased prior to preparing the steel substrate per SSPC SP1. When selecting a cleaning method, the primer manufacturer's and project recommendations must be adhered to.

When it is necessary to clean the surface of THERMO-SORB HB before applying a further coat or top coating, solvent wiping with toluene, Thinner #19 is recommended.

4.1.2 CARBON STEEL SURFACE PREPARATION

The general requirement for steel preparation before the application of an approved primer shall meet SSPC SP2 or SP3. Refer to specific primer's product datasheet for specific requirements.

4.1.3 GALVANIZED SURFACE PREPARATION

Remove any contaminants per SSPC SP1; ensure there are no chemical treatments that may interfere with adhesion; and abrade the surface to establish a suitable roughness per SSPC-SP7. Prime with an approved primer.

4.1.4 STAINLESS STEEL SURFACE PREPARATION

All steel surfaces shall be prepared per SSPC-SP7. Prime with an approved primer.

4.1.5 PRIMING

Only primer systems acceptable by CARBOLINE shall be used under THERMO-SORB HB. The primer shall be applied in accordance with the manufacturer's and project's specification.

4.1.5.1 PRIMER THICKNESS

As previously stated, controlling the thickness of applied primers is very important. The following method will be the only one accepted by CARBOLINE:

1. Use a flat polished steel plate to calibrate the measuring device to zero.
2. Calibrate equipment device to a known thickness using manufacturers supplied shims.
3. Use the measuring device to measure individual primer coats and multi-coat thicknesses.
4. Record measurements at the rate specified by the project.
5. Thickness of primer must be sufficient to fully cover blast profile.

4.1.5.2 PRIMER REACTIVATION

If multiple primer coats are required, care must be taken to ensure that the manufacturers recommended maximum recoat time has not been exceeded. If the recoat window has been exceeded refer to the specific primer manufacturers recommendations.

4.1.5.3 PRIMER ADHESION

The coating inspector for the project must be satisfied that the adhesion values of the primer system meet the project specification.

For field applications, existing coatings must attain a minimum 3A rating in accordance with ASTM D3359 Method A, X cut adhesion test. If acceptable, clean and lightly abrade in accordance with SSPC-SP2 or SP3 to roughen and de-gloss the surface. If not acceptable, the coating must be removed and areas re-primed with a compatible primer. Contact Carboline Technical Service for a list of approved primers and specific primer requirements

SECTION 5: MATERIAL PREPARATION & GENERAL CONSIDERATIONS

5.1 MATERIAL PRE-HEATING

Prior to use the material shall be pre-heated to a minimum of 70˚F (21˚C) for 24 hours prior to application. Material can be heated using heated storage units or hot rooms. These are normally constructed from storage containers that are insulated to maintain desired temperature and fitted with a suitable temperature controllable heater. Smaller custom-made hot boxes can be used for small projects to heat enough pails to maintain daily production. In hot climates the material may have to be maintained at a cooler temperature to stay within application range. Material temperature can be measured using a probe thermometer or IR gun.

Do not use electric jacket heaters that wrap around the outside of the pails. These can overheat the outside perimeter of the pails and “cook” the material around the inside making the material unusable.

5.2 MIXING

Thoroughly mix prior to use. Use 1/2" electric or air driven drill with a slotted paddle mixer. Must be 300 rpm under load (minimum).

Prior to mixing the THERMO-SORB HB, ensure the application equipment has been thoroughly flushed with a xylene thinner, such as Thinners FC150. Any alternatives must ensure that the water content is below 0.05%

1. Mix THERMO-SORB HB Part A component until homogenous, when this has been achieved, add Part B and mix until homogenous.
2. THERMO-SORB HB has a pot life of up to 60 minutes. However, it is recommended that the mixed material be used as soon as possible as the viscosity will increase during the pot life
3. Do not mix part units. Mixing part units may result in coating defects, insufficient curing, reduced performance and delamination.

5.3 MOCK-UP INSTALLATION

Prior to actual production work, a representative sample shall be prepared following all specified procedures and approved thickness / finish / surface quality. This sample must then be approved by representatives of the owner, applicator, architect and any others having a vested interest in the installation. The actual production work must follow, and conform to, the standards and approved finish / surface quality of the site sample.

The site sample is a mandatory requirement and shall be made available to all parties throughout the completion of the project.

5.4 RECORD KEEPING

The maintaining of proper records is an essential requirement for all THERMO-SORB HB projects. The minimum requirements will be established by the project specification.

5.5 WELD CUT BACK AND SERVICE ATTACHMENTS

As heat is generated during the welding process, either during a preheating stage and/or during the welding itself, it is important that a suitable distance is left around the weld area to prevent damage to the adjacent THERMO-SORB HB.

For small weld attachments such as the addition of clips and hangers, a cutback distance of 2” (50mm) on each side of the weld areas should be sufficient. When carrying out welding close to THERMO-SORB HB, discoloration may be noted.

This discoloration denotes that the THERMO-SORB HB has received too much heat and the bond to the steel is likely to have been affected. When this happens, the discolored THERMO-SORB HB must be removed as described in Removal and Repair Procedures. For larger welds, i.e. full girth, a cutback of 12” (300 mm) each side of the weld area may be sufficient.

SECTION 6: THERMO-SORB HB APPLICATION PROCEDURES

6.1 Surface Preparation

1. Surface must be clean, dry and free of any dirt, oil, grease or other contamination prior to surface preparation.
2. Clean surface to specified standard, typically SSPC-SP1.
3. The general requirement for steel preparation before the application of an approved primer should meet SSPC-SP2 or SP3. Contact Carboline Technical Service for recommendations and specific primer requirements.

6.2 Primer Application

1. All surfaces must be clean, dry and properly prepared as stated above prior to primer application.
2. All primers must be approved by Carboline prior to use and applied within manufacturers’ and projects’ stated specifications. If an unknown primer has been applied, contact your Carboline Fireproofing representative for recommendations.

6.3 THERMO-SORB HB Equipment Requirements

Electric Airless:	Graco Mark V with an output of 1.35 gpm (5.1 L) minimum to provide an operating pressure of 3,000 psi (204 bar). Must have 30 mesh inline filter installed. Remove rock catcher from siphon tube.
Gun:	WIWA W500 PFP/Graco XHF PFP application gun (3/8 inch in-let) (with filters removed) or Carboline approved equivalent.
Tip Size:	0.023" - 0.027" Graco XHD Heavy duty RAC non-diffuser tips
Hose:	1/2” (150’ maximum)
Whip Hose:	3/8”

6.4 THERMO-SORB HB Application

(Environmental)

1. Before applying THERMO-SORB HB, confirm that proper environmental conditions are met. Minimum ambient temperature: 5˚F (-15˚C) and rising, maximum relative humidity 95%, steel surface temperature must be 5˚F (3˚C) above the dew point.
2. Confirm that the surface has been prepared to specification.

3. Verify that a Carboline approved primer has been correctly installed to correct thickness and is properly cured. Ensure that the application is within the primer's recoat window.
4. Confirm that adjacent areas are properly masked off.
5. Protect from heavy rain or running water over the surface of THERMO-SORB HB.

(Material)

1. Material shall be pre-heated to a minimum of 70˚F (21˚C) and maximum 100°F (38°C) prior to introduction to the pumping units.
2. Thoroughly mix prior to use. Use 1/2" electric or air driven drill with a slotted paddle mixer. Must be 300 rpm under load (minimum).

(Equipment Setup)

1. The pump and all lines shall be clean and free from any contamination. It is recommended to have a dedicated hose for use with THERMO-SORB HB.
2. Prior to equipment startup, ensure all pressure is removed from lines.
3. Remove rock catcher from siphon tube.

(Application)

1. Adjust to lowest pressure required to achieve the desired fan pattern.
2. Care shall be taken to keep the fan pattern at an angle of 90 degrees to the surface and at 12" (305mm) to 18" (457mm) away from the surface.
3. Material can be re-coated after 4 hours at 70°F (21°C), maximum 2 coats per day.
4. Continue building material in as many coats as required, observing the minimum recoat windows as described in the technical datasheet.
5. Special care should be taken when spraying flange edges on structural steel members to ensure complete coverage and a consistent thickness. The normal spray pattern on the outside and the inside surfaces of the flanges should cause the material to flow and wrap around the edge of the flange. If the coating on the flange edge is uneven after application, the edge shall abraded after curing in order to provide an even surface.
6. The Applicator shall take frequent WFT measurements during application, using a penetrating measuring device to ensure that the coating is uniformly applied at the required film thickness. The thickness checks shall be made as required by the project based on AWCI Technical Manual 12-B.
7. The final thickness shall be specified in project drawings and owner specifications. Thicknesses for THERMO-SORB HB are outlined in published fire test designs. If no standard or guidance exists in project specification, Technical Manual 12-B and/or SSPC PA2 can be used for reference. All matters relating to thickness shall be decided between the owner and the applicator prior to the startup of the job.

6.5 Topcoat Application

1. Confirm that THERMO-SORB HB has been applied to the specified dry film thickness by using an electronic or magnetic dry film thickness gauge.
2. Carboline approved topcoats or topcoat systems can be used to meet project specifications for color, finish, service requirements and UV protection.
3. The THERMO-SORB HB must be sufficiently cured and be clean, dry and free of any contamination prior to topcoat application.
4. All topcoats must be approved by Carboline prior to use.
5. Ensure topcoat is applied within manufacturers' and projects' stated ambient conditions, temperature and relative humidity specifications.
6. The topcoat shall be applied in accordance with the manufacturer and project specification. Refer to the THERMO-SORB HB design for topcoat requirements.
7. When the THERMO-SORB HB specified DFT is achieved, if a topcoat is required, it is recommended to follow the guidelines below:

THERMO-SORB HB topcoat recommendation		
Intumescent DFT	<3mm	24 hours
	3mm+	48 hours

3mm = 118mils

6.6 Safety

1. Only trained and qualified applicators should install THERMO-SORB HB.
2. Follow all safety precautions on the THERMO-SORB HB SDS when applying this material.
3. Always use appropriate personal protective equipment.
4. Ensure proper maintenance and cleaning of the equipment.

SECTION 7: CLEAN-UP PROCEDURES

7.1 General Procedures

The application area shall be maintained in a clean and orderly condition. Following the application, all overspray, debris, and equipment shall be removed and the area left in a condition acceptable to the Owner and General Contractor.

1. If spray application has to stop for more than 15 minutes, the spray equipment must be cleaned.
2. Spray equipment is recommended to be cleaned after the application of every 6-8 kits.
3. Both of these helps to prevent damage to the application equipment from reacted intumescents in areas of low movement such as dead spots or cavitations.
4. At the end of use, care should be taken that the equipment is fully cleaned with no dirty solvent left in the equipment. Any dirty solvent with only a small amount of residual THERMO-SORB HB series intumescent may still react to form a gel overnight.

7.2 Equipment

1. Xylene solvent/thinners
2. Bottle wash brush
3. Cleaning cloths/rags
4. Waste containers/buckets
5. Paint brushes

7.3 ELECTRIC SPRAY EQUIPMENT

1. Finish spraying and run material from pump so the application unit double strokes.
2. Remove wet end cover (cling film) if used.
3. Remove spray tip and diffuser from spray gun.
4. Place clean container under application and pour in solvent/thinners.
5. Hold spray gun over a suitable waste container and then increase pressure on spray unit. When all unwanted material has been discharged and solvent/thinners is present release pressure.
6. Clean filter housing with bottle scrub of all residual unwanted material, then re-connect top.
7. Hold sieve over container under spray unit, then hold spray gun over sieve and increase pressure and sieve solvent/thinners.
8. Continue to sieve solvent/thinners until all residual/unwanted fibres have been collected in the sieve, then release pressure.
9. Dispose of unwanted fibres in to a suitable separate waste container.

10. Hold spray gun over separate waste container, increase pressure and empty container under spray unit of dirty solvent/thinners, then release pressure.
11. When dirty solvent has been used, clean container, then add clean solvent/thinners.
12. Recirculate through purge/dump valve back into container.
13. Continue to flush application equipment until solvent/thinners has removed any residual Intumescent from the application unit/paint line, then release pressure.
14. Re-connect diffuser, increase pressure and clean spray tips.
15. When spray tips/fluid lines are thoroughly cleaned, release pressure. Insure there is no pressure in the application unit, then remove filter housing, inspect and clean if necessary.

7.4 PNEUMETIC SPRAY EQUIPMENT (INCLUDING WITH HOPPER)

1. Finish spraying and run material from pump so the application unit double strokes.
2. Release pressure from application unit.
3. Remove spray tip and diffuser from spray gun.
4. Pour xylene solvent/thinners into hopper and clean inside of hopper.
5. Remove wet end cover (cling film) if used where the uptake leg is inserted directly into the material container.
6. Hold spray gun over a suitable waste container and then increase pressure on spray unit. When all unwanted material has been discharged and solvent/thinners is present release pressure.
7. Hold sieve over hopper, then hold spray gun over sieve and increase pressure passing the solvent through the sieve, back into the hopper.
8. Continue to sieve solvent/thinners until all residual/unwanted fibres have been collected in the sieve, then release pressure.
9. Dispose of unwanted fibres in to a suitable separate waste container. Repeat steps 6-7 to ensure that there are no residual fibres in the system.
10. Hold spray gun over waste container, increase pressure and empty hopper of dirty solvent, then release pressure.
11. Pour clean solvent into hopper, increase pressure and continue to flush application equipment until solvent/thinners runs clear, then release pressure.
12. Re-connect diffuser, increase pressure and clean spray tips.
13. When spray tips/hopper/fluid lines are thoroughly cleaned, release pressure and disconnect airline. Insure there is no pressure in the application unit, then remove filter housing/hopper, inspect and clean if necessary.

SECTION 8: REPAIR PROCEDURES

8.1 PATCHING SMALL DAMAGED AREA

The procedure for damage repair will depend on the extent of the damage. For large areas, such as full structural elements, it may require return to the original application process.
For smaller areas, the following procedure may be used:

8.2 TOPCOAT ONLY DAMAGE

1. Remove all loose or unsound coating to a firm edge and chamfer the edges using abrasive paper.
2. All surfaces should be clean, dry and free from contamination.
3. The original topcoat should be reinstated in compliance with the original specification.

8.3 INTUMESCENT (AND TOPCOAT) ONLY – PRIMER IS INTACT

1. Remove all loose or unsound coating to a firm edge and chamfer the edges using a sharp knife, making sure not to damage the primer, or abrasive paper.
2. The primer surface must be lightly abraded.
3. All surfaces should be clean, dry and free from contamination.
4. The original specification should be reinstated in compliance with the recommended DFT's and overcoating windows.

8.4 DAMAGE TO THE SUBSTRATE – PRIMER IS DAMAGED

1. Remove all loose or unsound coating to a firm edge and chamfer the edges using a sharp knife
2. Any and all corrosion products must be removed.
3. Prepare the substrate to an appropriate level, ensuring that the surface is not polished if hand tools are used.
4. For C1-C2 the THERMO-SORB HB can be applied to the freshly prepared steel. Agreement from the responsible project owner should be sought if this deviates from the original specification.
5. For C3, C4, C5 you must reinstate the primer to the original specification ensuring that there is no overcoating of any adjacent intact intumescent coating.
6. Continue to reinstate the original specification in compliance with the recommended DFT's and overcoating windows.

SECTION 9: CONNECTIONS AFTER APPLICATION

9.1 CLAMP ON CONNECTIONS INSTALLED AFTER APPLICATION OF THERMO-SORB

Examples of clamp on connections include pipe, sprinkler pipe and utilities support brackets. Small to medium size clamps and clips are usually left unprotected. Large clamps and clip supports are usually protected with the same thickness as the structural member, due to the possibility of heat transfer. These connection details are not usually addressed in the fire test design information. It is recommended that the Authorities Having Jurisdiction be consulted for approval.

Where support clamps are required to be protected, the coating should be applied where the clamps are in contact with the structural member, and for four inches beyond the structural member. Refer to the Thermo-Sorb application instructions above for information including product limitations, required surface preparation, humidity, temperature, application rates, cure times, and topcoat application.

If Thermo-Sorb is damaged when the clamped connections are removed, the affected area should be touched up in accordance with "PATCHING SMALL DAMAGED AREAS" above.

9.2 WELDED CONNECTIONS INSTALLED AFTER APPLICATION OF THERMO-SORB HB

Welded items such as plates and wide bracket supports are usually protected with the same THERMO-SORB HB thickness as the supporting member due to the possibility of heat transfer. These details are usually not addressed in the fire test design information. We recommend the Authorities Having Jurisdiction be consulted for approval and confirmation of their requirements.

Prior to welding connections, remove the THERMO-SORB HB to a minimum of three inches beyond the area to be welded by using a grinder, utility knife, chisel or sandblasting. Remove an additional ¼ inch of topcoat by using a medium grit sandpaper. After welding is complete, clean the steel surface to remove all dust, grease, dirt, etc…that would affect

the bond, and reapply the specified primer. Apply the Thermo-Sorb to the areas in need of repair and to the connecting items if required.

9.3 BOLTED STEEL CONNECTIONS INSTALLED AFTER THE APPLICATION OF THERMO-SORB HB

Bolts of threaded rods of ¾ inch diameter or less are usually left unprotected. Bolts or threaded rods greater than ¾ inch diameter are usually protected with the same thickness of THERMO-SORB HB as the supporting member, due to the possibility of heat transfer. These connection details are usually not addressed in the fire test design information. We recommend the Authorities Having Jurisdiction be consulted for approval and confirmation of their requirements. If drill oil is used, oil should be cleaned as soon as possible.

If THERMO-SORB HB is damaged after drilling, the damaged area should be touched up in accordance with “PATCHING SMALL DAMAGED AREAS” above. If there is no damage to the THERMO-SORB HB system after drilling, no additional treatment is required.

SECTION 10: TRANSPORT AND STORAGE OF APPLIED STEELWORK

1. Once the required THERMO-SORB HB thickness has been achieved, the protected steelwork may be stored internally, protected from weathering until transport is required.
2. If storage is to be external, the full coating system must be fully dried and cured.
3. Storage should be done in a way that minimises damage to the coating system. This can be achieved by the use of wooden batons between pieces rather than face to face contact and storing on the flange tips to minimise the surface area of any potential damage.
4. Lifting should be done using lifting points, D shackles and lifting eyes wherever possible. Lifting chains should be avoided, and slings used preferentially.
5. Any damage sustained in storage or transport should be corrected as soon as possible, reinstating the original specification.

SECTION 11: SITE WORK

If THERMO-SORB HB is exposed to sulphur oxides or nitrogen oxides, such as present in diesel exhaust fumes, immediately after application and during the curing process then discolouration may occur. A slight pink or brown hue may be visible. This is cosmetic only and there is no impact or effect on the fire performance of the intumescent.

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

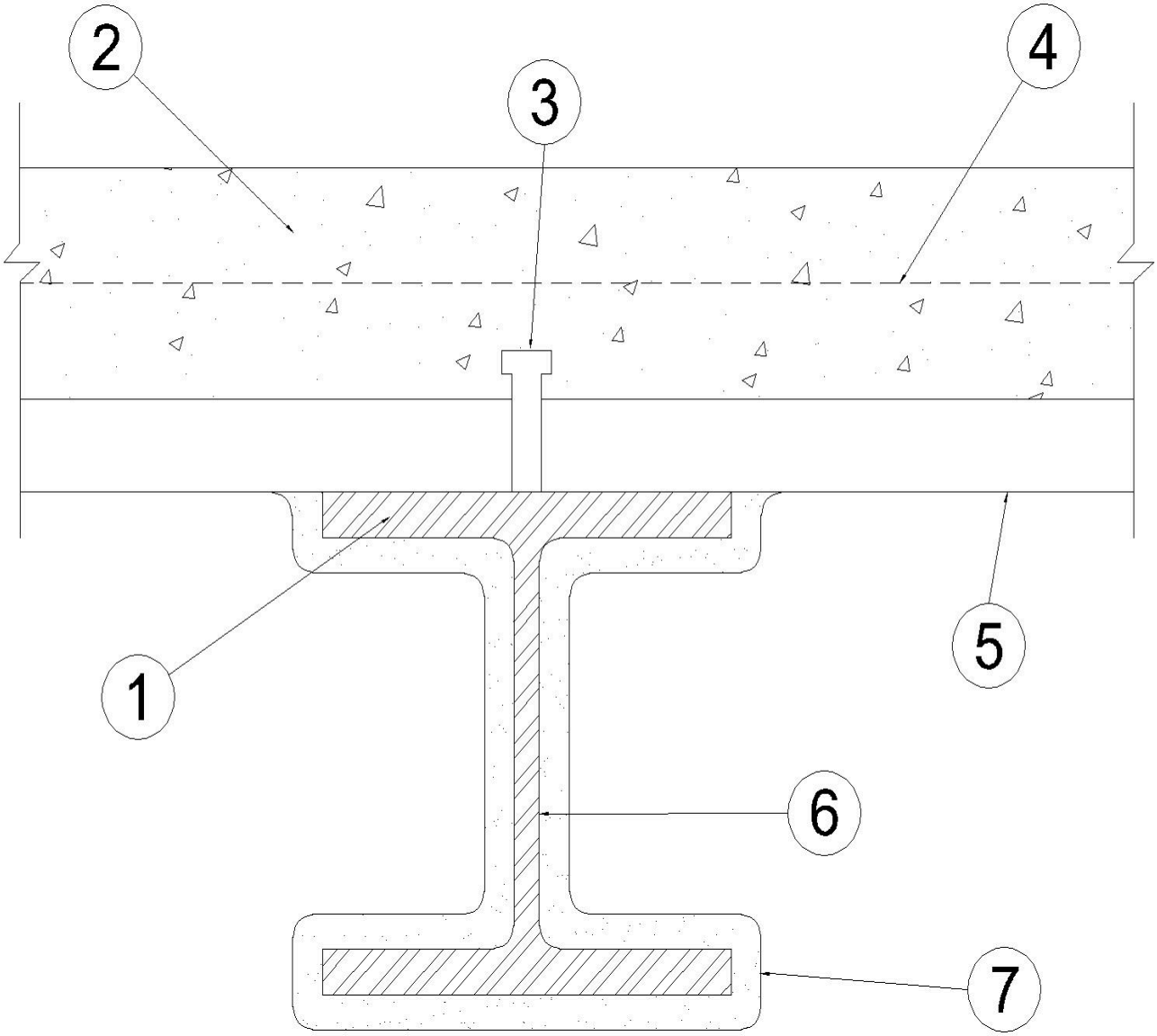
See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

Design No. N663

August 22, 2025

Restrained Beam Rating — 1 and 2 Hr (See Item 7)
Unrestrained Beam Rating — 1 and 2 Hr (See Item 7)
Loading Determined by Allowable Stress Design Method or Load and Resistance Factor Design Method published by the American Institute of Steel Construction, or in accordance with the relevant Limit State Design provisions of Part 4 of the National Building Code of Canada

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Steel Beam —** Min size as shown in the table below (See Item 7). Maximum allowable yield stress of 50 ksi.

2. **Normal Weight or Lightweight Concrete —** Compressive strength 3500 psi. For normal weight concrete either carbonate or siliceous aggregate may be used. Unit weight 148 lbs/cu ft (+/- 3 pcf) for normal weight concrete and 110 lbs/cu ft (+/- 3 pcf) for lightweight concrete. Concrete thickness shall be 2-1/2 in minimum.

3. **Shear Connectors —** (Optional) Studs, headed type or equivalent per AISC specifications welded to the top flange of beam through the steel floor units.

4. **Welded Wire Fabric —** 6x6 SWG.

5. **Steel Floor Units —** 1-1/2, 2 or 3 in. deep galvanized composite fluted units, welded to beam.

6. **Primer Coating —** Beams shall be primed with a nominal 50 micron (2 mil) thickness of an epoxy primer.

7. **Mastic and Intumescent Coating* —** Coating spray or brush applied in accordance with the manufacturer's instructions at the minimum average dry thickness shown in the table below. Flutes above beam to be inserted with Hilti CP 777, 2" Speed Plugs. Any gaps around speed plugs to be filled with the same material. The thickness shown in the table is intumescent only.

UNRESTRAINED BEAM RATINGS

Hp/A	1 Hr., MM	1-1/2 Hr., MM	2 Hr., MM	2-1/2 Hr., MM	3 Hr., MM
253	1.51	3.24	4.96	6.69	8.41

250	1.50	3.21	4.92	6.64	8.41
245	1.47	3.16	4.87	6.58	8.41
240	1.45	3.12	4.79	6.49	8.41
235	1.43	3.08	4.73	6.39	8.41
230	1.40	3.01	4.66	6.31	8.41
225	1.38	2.97	4.60	6.22	8.41
220	1.36	2.92	4.53	6.14	8.41
215	1.33	2.85	4.43	6.02	8.41
210	1.30	2.78	4.34	5.90	8.41
205	1.27	2.71	4.25	5.78	8.41
200	1.24	2.64	4.15	5.66	8.41
195	1.20	2.56	4.04	5.52	8.41
190	1.16	2.49	3.95	5.40	8.41
185	1.13	2.41	3.83	5.25	8.41
180	1.10	2.32	3.73	5.12	8.41
175	1.04	2.24	3.61	4.98	8.41
170	1.00	2.16	3.50	4.84	8.41
165	0.96	2.06	3.36	4.67	8.41
160	0.94	2.06	3.36	4.67	8.41
155	0.93	2.06	3.36	4.67	8.41
150	0.91	2.06	3.36	4.67	8.41
145	0.89	2.06	3.36	4.67	8.41
140	0.87	2.06	3.36	4.67	8.41
135	0.85	2.06	3.36	4.67	8.41
130	0.83	2.06	3.36	4.67	8.41
125	0.81	2.06	3.36	4.67	8.41
120	0.78	2.06	3.36	4.67	8.41
115	0.76	2.06	3.36	4.67	8.41
110	0.73	2.06	3.36	4.67	8.41
105	0.69	2.06	3.36	4.67	8.41
100	0.66	2.06	3.36	4.67	8.41
95	0.62	2.06	3.36	4.67	8.41
90	0.57	2.06	3.36	4.67	8.41
85	0.53	2.06	3.36	4.67	8.41
81	0.48	2.06	3.36	4.67	8.41

Beam	W/D	1 Hr., IN	1-1/2 Hr., IN	2 Hr., IN	2-1/2 Hr., IN	3 Hr., IN
W6x12	0.53	0.060	0.128	0.195	0.263	0.331
W14x22	0.53	0.059	0.127	0.195	0.262	0.331
W12x19	0.54	0.059	0.126	0.193	0.261	0.331
W10x17	0.54	0.059	0.125	0.192	0.260	0.331
W8x15	0.55	0.058	0.124	0.191	0.257	0.331
W16x26	0.56	0.057	0.123	0.189	0.255	0.331
W8x18	0.58	0.055	0.119	0.183	0.248	0.331
W10x22	0.61	0.054	0.115	0.178	0.242	0.331
W10x19	0.61	0.054	0.115	0.178	0.241	0.331
W12x26	0.61	0.053	0.114	0.177	0.240	0.331
W12x22	0.62	0.052	0.112	0.174	0.237	0.331
W14x26	0.63	0.052	0.111	0.173	0.235	0.331
W14x30	0.64	0.051	0.109	0.170	0.231	0.331
W16x31	0.66	0.049	0.106	0.166	0.226	0.331
W5x16	0.66	0.049	0.105	0.165	0.225	0.331
W4x13	0.67	0.049	0.104	0.164	0.223	0.331
W18x35	0.67	0.049	0.104	0.163	0.223	0.331
W8x21	0.68	0.048	0.103	0.163	0.222	0.331
W6x20	0.68	0.048	0.103	0.162	0.221	0.331
W6X16	0.68	0.048	0.102	0.161	0.219	0.331
W12x30	0.70	0.046	0.099	0.157	0.215	0.331
W16x36	0.70	0.046	0.099	0.157	0.214	0.331
W8x24	0.70	0.046	0.099	0.156	0.214	0.331
W10x26	0.71	0.046	0.098	0.155	0.213	0.331
W14x34	0.73	0.044	0.095	0.151	0.208	0.331
W21x44	0.75	0.043	0.092	0.147	0.202	0.331
W21x48	0.75	0.042	0.091	0.146	0.201	0.331
W18x40	0.77	0.041	0.088	0.142	0.196	0.331
W5x19	0.78	0.040	0.087	0.140	0.193	0.331
W16x40	0.78	0.040	0.086	0.139	0.192	0.331
W10x33	0.79	0.040	0.085	0.138	0.190	0.331
W8x31	0.80	0.038	0.082	0.134	0.186	0.331

W10x30	0.81	0.038	0.081	0.132	0.184	0.331
W14x38	0.81	0.038	0.081	0.132	0.184	0.331
W12x35	0.81	0.038	0.081	0.132	0.184	0.331
W8x28	0.82	0.038	0.081	0.132	0.184	0.331
W24x55	0.83	0.037	0.081	0.132	0.184	0.331
W21x50	0.84	0.037	0.081	0.132	0.184	0.331
W6x25	0.84	0.037	0.081	0.132	0.184	0.331
W21x55	0.85	0.037	0.081	0.132	0.184	0.331
W12x40	0.86	0.037	0.081	0.132	0.184	0.331
W16x45	0.87	0.036	0.081	0.132	0.184	0.331
W14x43	0.87	0.036	0.081	0.132	0.184	0.331
W18x46	0.88	0.036	0.081	0.132	0.184	0.331
W18x50	0.88	0.036	0.081	0.132	0.184	0.331
W8x35	0.91	0.036	0.081	0.132	0.184	0.331
W10x39	0.93	0.035	0.081	0.132	0.184	0.331
W24x62	0.93	0.035	0.081	0.132	0.184	0.331
W24x68	0.94	0.035	0.081	0.132	0.184	0.331
W21x57	0.95	0.035	0.081	0.132	0.184	0.331
W21x62	0.95	0.035	0.081	0.132	0.184	0.331
W16x50	0.96	0.034	0.081	0.132	0.184	0.331
W18x55	0.96	0.034	0.081	0.132	0.184	0.331
W14x48	0.97	0.034	0.081	0.132	0.184	0.331
W12x45	0.97	0.034	0.081	0.132	0.184	0.331
W10x49	1.01	0.033	0.081	0.132	0.184	0.331
W12x53	1.02	0.033	0.081	0.132	0.184	0.331
W30x90	1.02	0.033	0.081	0.132	0.184	0.331
W8x40	1.03	0.033	0.081	0.132	0.184	0.331
W27x84	1.03	0.033	0.081	0.132	0.184	0.331
W18x60	1.04	0.033	0.081	0.132	0.184	0.331
W21x68	1.04	0.033	0.081	0.132	0.184	0.331
W24x76	1.05	0.032	0.081	0.132	0.184	0.331
W10x45	1.06	0.032	0.081	0.132	0.184	0.331
W12x50	1.06	0.032	0.081	0.132	0.184	0.331
W14x53	1.06	0.032	0.081	0.132	0.184	0.331
W16x57	1.09	0.031	0.081	0.132	0.184	0.331

W16x67	1.09	0.031	0.081	0.132	0.184	0.331
W12x58	1.10	0.031	0.081	0.132	0.184	0.331
W14x61	1.10	0.031	0.081	0.132	0.184	0.331
W10x54	1.11	0.031	0.081	0.132	0.184	0.331
W12x65	1.11	0.031	0.081	0.132	0.184	0.331
W21x73	1.11	0.031	0.081	0.132	0.184	0.331
W30x99	1.12	0.031	0.081	0.132	0.184	0.331
W18x65	1.13	0.031	0.081	0.132	0.184	0.331
W18x76	1.13	0.031	0.081	0.132	0.184	0.331
W24x84	1.15	0.030	0.081	0.132	0.184	0.331
W27x94	1.15	0.030	0.081	0.132	0.184	0.331
W8x48	1.21	0.029	0.081	0.132	0.184	0.331
W30x108	1.21	0.029	0.081	0.132	0.184	0.331
W33x118	1.21	0.029	0.081	0.132	0.184	0.331
W10x60	1.22	0.029	0.081	0.132	0.184	0.331
W14x68	1.22	0.029	0.081	0.132	0.184	0.331
W18x71	1.22	0.029	0.081	0.132	0.184	0.331
W12x72	1.23	0.028	0.081	0.132	0.184	0.331
W24x104	1.24	0.028	0.081	0.132	0.184	0.331
W27x102	1.24	0.028	0.081	0.132	0.184	0.331
W16x77	1.25	0.028	0.081	0.132	0.184	0.331
W21x83	1.26	0.028	0.081	0.132	0.184	0.331
W18x86	1.27	0.027	0.081	0.132	0.184	0.331
W24x94	1.28	0.027	0.081	0.132	0.184	0.331
W36x135	1.29	0.027	0.081	0.132	0.184	0.331
W21x101	1.30	0.027	0.081	0.132	0.184	0.331
W30x116	1.30	0.027	0.081	0.132	0.184	0.331
W14x90	1.31	0.027	0.081	0.132	0.184	0.331
W14x74	1.32	0.026	0.081	0.132	0.184	0.331
W33x130	1.32	0.026	0.081	0.132	0.184	0.331
W12x79	1.34	0.026	0.081	0.132	0.184	0.331
W10x68	1.38	0.025	0.081	0.132	0.184	0.331
W24x117	1.38	0.025	0.081	0.132	0.184	0.331
W27x114	1.39	0.025	0.081	0.132	0.184	0.331
W30X124	1.39	0.025	0.081	0.132	0.184	0.331

W21x93	1.40	0.025	0.081	0.132	0.184	0.331
W24x103	1.40	0.025	0.081	0.132	0.184	0.331
W18x97	1.42	0.024	0.081	0.132	0.184	0.331
W14x99	1.43	0.024	0.081	0.132	0.184	0.331
W16x89	1.43	0.024	0.081	0.132	0.184	0.331
W21x111	1.43	0.024	0.081	0.132	0.184	0.331
W33x141	1.43	0.024	0.081	0.132	0.184	0.331
W36x150	1.43	0.024	0.081	0.132	0.184	0.331
W8x58	1.44	0.024	0.081	0.132	0.184	0.331
W14x82	1.45	0.023	0.081	0.132	0.184	0.331
W12x87	1.47	0.023	0.081	0.132	0.184	0.331
W30x132	1.47	0.023	0.081	0.132	0.184	0.331
W36x160	1.51	0.022	0.081	0.132	0.184	0.331
W33x152	1.53	0.022	0.081	0.132	0.184	0.331
W10x77	1.54	0.021	0.081	0.132	0.184	0.331
W24x131	1.54	0.021	0.081	0.132	0.184	0.331
W18x106	1.55	0.021	0.081	0.132	0.184	0.331
W27x146	1.55	0.021	0.081	0.132	0.184	0.331
W27x129	1.56	0.021	0.081	0.132	0.184	0.331
W14x109	1.57	0.021	0.081	0.132	0.184	0.331
W21x122	1.57	0.021	0.081	0.132	0.184	0.331
W16x100	1.59	0.020	0.081	0.132	0.184	0.331
W36x170	1.60	0.020	0.081	0.132	0.184	0.331
W12x96	1.61	0.020	0.081	0.132	0.184	0.331
W30x148	1.64	0.019	0.081	0.132	0.184	0.331
W8x67	1.65	0.019	0.081	0.132	0.184	0.331

RESTRAINED BEAM RATINGS

Hp/A	1 Hr., MM	1-1/2 Hr., MM	2 Hr., MM	2-1/2 Hr., MM	3 Hr., MM
253	1.51	2.63	4.33	6.02	7.71
250	1.50	2.61	4.30	5.97	7.65
245	1.47	2.57	4.23	5.88	7.54
240	1.45	2.53	4.17	5.80	7.43

235	1.43	2.49	4.10	5.71	7.32
230	1.40	2.45	4.04	5.62	7.21
225	1.38	2.41	3.97	5.54	7.09
220	1.36	2.37	3.91	5.45	6.99
215	1.33	2.32	3.83	5.34	6.85
210	1.30	2.27	3.75	5.23	6.71
205	1.27	2.21	3.66	5.11	6.56
200	1.24	2.16	3.58	5.00	6.42
195	1.20	2.10	3.48	4.86	6.25
190	1.16	2.03	3.39	4.74	6.09
185	1.13	1.97	3.28	4.59	5.90
180	1.10	1.90	3.17	4.45	5.72
175	1.04	1.84	3.07	4.31	5.55
170	1.00	1.77	2.97	4.17	5.37
165	0.96	1.70	2.85	4.01	5.17
160	0.94	1.70	2.85	4.01	5.17
155	0.93	1.70	2.85	4.01	5.17
150	0.91	1.70	2.85	4.01	5.17
145	0.89	1.70	2.85	4.01	5.17
140	0.87	1.70	2.85	4.01	5.17
135	0.85	1.70	2.85	4.01	5.17
130	0.83	1.70	2.85	4.01	5.17
125	0.81	1.70	2.85	4.01	5.17
120	0.78	1.70	2.85	4.01	5.17
115	0.76	1.70	2.85	4.01	5.17
110	0.73	1.70	2.85	4.01	5.17
105	0.69	1.70	2.85	4.01	5.17
100	0.66	1.70	2.85	4.01	5.17
95	0.62	1.70	2.85	4.01	5.17
90	0.57	1.70	2.85	4.01	5.17
85	0.53	1.70	2.85	4.01	5.17
81	0.48	1.70	2.85	4.01	5.17

Beam	W/D	1 Hr., IN	1-1/2 Hr., IN	2 Hr., IN	2-1/2 Hr., IN	3 Hr., IN
W6x12	0.53	0.060	0.104	0.170	0.237	0.304
W14x22	0.53	0.059	0.103	0.169	0.235	0.301
W12x19	0.54	0.059	0.102	0.167	0.233	0.299
W10x17	0.54	0.059	0.101	0.167	0.232	0.298
W8x15	0.55	0.058	0.100	0.165	0.230	0.295
W16x26	0.56	0.057	0.100	0.164	0.228	0.292
W8x18	0.58	0.055	0.096	0.159	0.221	0.284
W10x22	0.61	0.054	0.093	0.154	0.215	0.275
W10x19	0.61	0.054	0.093	0.154	0.214	0.275
W12x26	0.61	0.053	0.092	0.153	0.213	0.273
W12x22	0.62	0.052	0.091	0.150	0.210	0.269
W14x26	0.63	0.052	0.090	0.149	0.208	0.268
W14x30	0.64	0.051	0.088	0.146	0.204	0.262
W16x31	0.66	0.049	0.086	0.143	0.199	0.256
W5x16	0.66	0.049	0.086	0.142	0.198	0.255
W4x13	0.67	0.049	0.085	0.141	0.197	0.253
W18x35	0.67	0.049	0.085	0.140	0.196	0.252
W8x21	0.68	0.048	0.084	0.140	0.195	0.251
W6x20	0.68	0.048	0.084	0.139	0.195	0.250
W6X16	0.68	0.048	0.083	0.138	0.193	0.248
W12x30	0.70	0.046	0.081	0.135	0.189	0.242
W16x36	0.70	0.046	0.081	0.134	0.188	0.241
W8x24	0.70	0.046	0.080	0.134	0.187	0.241
W10x26	0.71	0.046	0.080	0.133	0.186	0.239
W14x34	0.73	0.044	0.078	0.130	0.181	0.233
W21x44	0.75	0.043	0.075	0.125	0.175	0.226
W21x48	0.75	0.042	0.074	0.124	0.174	0.224
W18x40	0.77	0.041	0.072	0.121	0.169	0.218
W5x19	0.78	0.040	0.071	0.119	0.167	0.215
W16x40	0.78	0.040	0.071	0.118	0.166	0.214
W10x33	0.79	0.040	0.070	0.117	0.164	0.212
W8x31	0.80	0.038	0.068	0.114	0.160	0.206
W10x30	0.81	0.038	0.067	0.112	0.158	0.203
W14x38	0.81	0.038	0.067	0.112	0.158	0.203

W12x35	0.81	0.038	0.067	0.112	0.158	0.203
W8x28	0.82	0.038	0.067	0.112	0.158	0.203
W24x55	0.83	0.037	0.067	0.112	0.158	0.203
W21x50	0.84	0.037	0.067	0.112	0.158	0.203
W6x25	0.84	0.037	0.067	0.112	0.158	0.203
W21x55	0.85	0.037	0.067	0.112	0.158	0.203
W12x40	0.86	0.037	0.067	0.112	0.158	0.203
W16x45	0.87	0.036	0.067	0.112	0.158	0.203
W14x43	0.87	0.036	0.067	0.112	0.158	0.203
W18x46	0.88	0.036	0.067	0.112	0.158	0.203
W18x50	0.88	0.036	0.067	0.112	0.158	0.203
W8x35	0.91	0.036	0.067	0.112	0.158	0.203
W10x39	0.93	0.035	0.067	0.112	0.158	0.203
W24x62	0.93	0.035	0.067	0.112	0.158	0.203
W24x68	0.94	0.035	0.067	0.112	0.158	0.203
W21x57	0.95	0.035	0.067	0.112	0.158	0.203
W21x62	0.95	0.035	0.067	0.112	0.158	0.203
W16x50	0.96	0.034	0.067	0.112	0.158	0.203
W18x55	0.96	0.034	0.067	0.112	0.158	0.203
W14x48	0.97	0.034	0.067	0.112	0.158	0.203
W12x45	0.97	0.034	0.067	0.112	0.158	0.203
W10x49	1.01	0.033	0.067	0.112	0.158	0.203
W12x53	1.02	0.033	0.067	0.112	0.158	0.203
W30x90	1.02	0.033	0.067	0.112	0.158	0.203
W8x40	1.03	0.033	0.067	0.112	0.158	0.203
W27x84	1.03	0.033	0.067	0.112	0.158	0.203
W18x60	1.04	0.033	0.067	0.112	0.158	0.203
W21x68	1.04	0.033	0.067	0.112	0.158	0.203
W24x76	1.05	0.032	0.067	0.112	0.158	0.203
W10x45	1.06	0.032	0.067	0.112	0.158	0.203
W12x50	1.06	0.032	0.067	0.112	0.158	0.203
W14x53	1.06	0.032	0.067	0.112	0.158	0.203
W16x57	1.09	0.031	0.067	0.112	0.158	0.203
W16x67	1.09	0.031	0.067	0.112	0.158	0.203
W12x58	1.10	0.031	0.067	0.112	0.158	0.203

W14x61	1.10	0.031	0.067	0.112	0.158	0.203
W10x54	1.11	0.031	0.067	0.112	0.158	0.203
W12x65	1.11	0.031	0.067	0.112	0.158	0.203
W21x73	1.11	0.031	0.067	0.112	0.158	0.203
W30x99	1.12	0.031	0.067	0.112	0.158	0.203
W18x65	1.13	0.031	0.067	0.112	0.158	0.203
W18x76	1.13	0.031	0.067	0.112	0.158	0.203
W24x84	1.15	0.030	0.067	0.112	0.158	0.203
W27x94	1.15	0.030	0.067	0.112	0.158	0.203
W8x48	1.21	0.029	0.067	0.112	0.158	0.203
W30x108	1.21	0.029	0.067	0.112	0.158	0.203
W33x118	1.21	0.029	0.067	0.112	0.158	0.203
W10x60	1.22	0.029	0.067	0.112	0.158	0.203
W14x68	1.22	0.029	0.067	0.112	0.158	0.203
W18x71	1.22	0.029	0.067	0.112	0.158	0.203
W12x72	1.23	0.028	0.067	0.112	0.158	0.203
W24x104	1.24	0.028	0.067	0.112	0.158	0.203
W27x102	1.24	0.028	0.067	0.112	0.158	0.203
W16x77	1.25	0.028	0.067	0.112	0.158	0.203
W21x83	1.26	0.028	0.067	0.112	0.158	0.203
W18x86	1.27	0.027	0.067	0.112	0.158	0.203
W24x94	1.28	0.027	0.067	0.112	0.158	0.203
W36x135	1.29	0.027	0.067	0.112	0.158	0.203
W21x101	1.30	0.027	0.067	0.112	0.158	0.203
W30x116	1.30	0.027	0.067	0.112	0.158	0.203
W14x90	1.31	0.027	0.067	0.112	0.158	0.203
W14x74	1.32	0.026	0.067	0.112	0.158	0.203
W33x130	1.32	0.026	0.067	0.112	0.158	0.203
W12x79	1.34	0.026	0.067	0.112	0.158	0.203
W10x68	1.38	0.025	0.067	0.112	0.158	0.203
W24x117	1.38	0.025	0.067	0.112	0.158	0.203
W27x114	1.39	0.025	0.067	0.112	0.158	0.203
W30X124	1.39	0.025	0.067	0.112	0.158	0.203
W21x93	1.40	0.025	0.067	0.112	0.158	0.203
W24x103	1.40	0.025	0.067	0.112	0.158	0.203

W18x97	1.42	0.024	0.067	0.112	0.158	0.203
W14x99	1.43	0.024	0.067	0.112	0.158	0.203
W16x89	1.43	0.024	0.067	0.112	0.158	0.203
W21x111	1.43	0.024	0.067	0.112	0.158	0.203
W33x141	1.43	0.024	0.067	0.112	0.158	0.203
W36x150	1.43	0.024	0.067	0.112	0.158	0.203
W8x58	1.44	0.024	0.067	0.112	0.158	0.203
W14x82	1.45	0.023	0.067	0.112	0.158	0.203
W12x87	1.47	0.023	0.067	0.112	0.158	0.203
W30x132	1.47	0.023	0.067	0.112	0.158	0.203
W36x160	1.51	0.022	0.067	0.112	0.158	0.203
W33x152	1.53	0.022	0.067	0.112	0.158	0.203
W10x77	1.54	0.021	0.067	0.112	0.158	0.203
W24x131	1.54	0.021	0.067	0.112	0.158	0.203
W18x106	1.55	0.021	0.067	0.112	0.158	0.203
W27x146	1.55	0.021	0.067	0.112	0.158	0.203
W27x129	1.56	0.021	0.067	0.112	0.158	0.203
W14x109	1.57	0.021	0.067	0.112	0.158	0.203
W21x122	1.57	0.021	0.067	0.112	0.158	0.203
W16x100	1.59	0.020	0.067	0.112	0.158	0.203
W36x170	1.60	0.020	0.067	0.112	0.158	0.203
W12x96	1.61	0.020	0.067	0.112	0.158	0.203
W30x148	1.64	0.019	0.067	0.112	0.158	0.203
W8x67	1.65	0.019	0.067	0.112	0.158	0.203

CARBOLINE GLOBAL INC — Thermo-Sorb HB, INVESTIGATED FOR INTERIOR GENERAL PURPOSE, INTERIOR CONDITIONED SPACE and EXTERIOR ENVIRONMENTAL

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-08-22

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

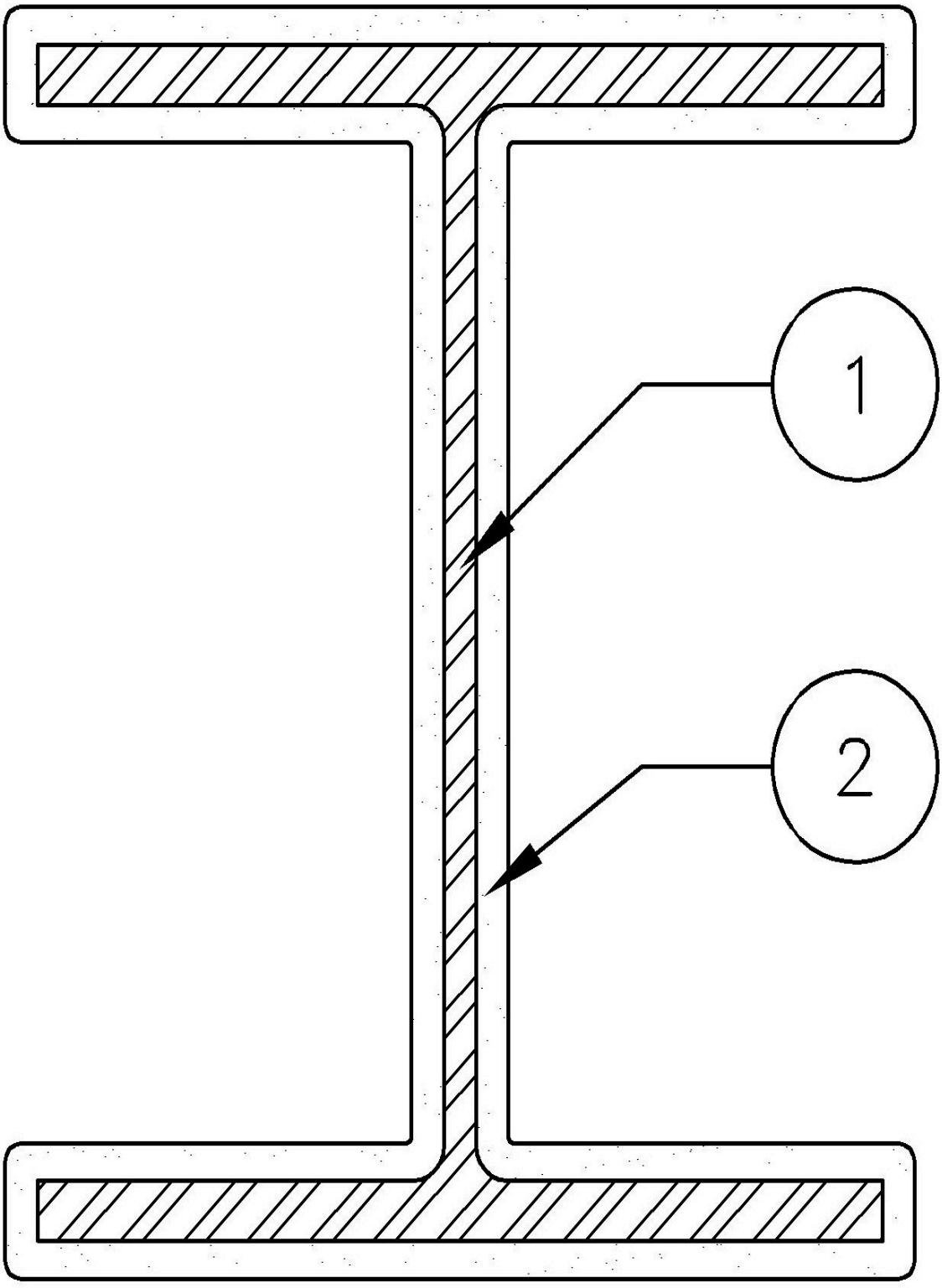
See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

Design No. Y677

August 22, 2025

Ratings - 1/2, 3/4, 1, 1-1/2, 2, 2-1/2, 3 and 3-1/2 Hr. (See Item 2)

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Steel Column —** Wide flange steel columns with the minimum sizes shown in the tables below.

2. **Mastic & Intumescent Coating* —** Coating spray or brush applied in accordance with the manufacturer's instructions at the minimum average dry thickness shown in the table below.

As an alternate to the table below, the required thickness of coating (in mm) to be applied to surfaces of Wide-Flange columns may be determined from the equations listed below. The equations may only be used for the indicated hourly rating, and for the corresponding listed ranges of thickness and Hp/A.

Hourly Rating	Thickness Equation (mm)	Thickness Range (mm)	Hp/A Section Factor Range
1	T =((0.0008*Hp/A) + 3.5825)	3.92 - 3.83	406 - 298
1	T =((0.0142*Hp/A) - 0.4131)	3.83 - 1.86	298 - 160
1	T =((0.0131*Hp/A) - 0.225)	1.86 - 0.47	160 - 53
2	T =((0.0283*Hp/A) + 0.5201	8.94 - 2.02	298 - 53

Size	W/D	Required Thickness (inches)							
		Rating Period (hr)							
		1/2	3/4	1	1-1/2	2	2-1/2	3	3-1/2
W8x10	0.33	0.063	0.109	0.154	N/A	N/A	N/A	N/A	N/A
W6x9	0.34	0.061	0.107	0.153	N/A	N/A	N/A	N/A	N/A
W10x12	0.35	0.059	0.106	0.153	N/A	N/A	N/A	N/A	N/A
W12x14	0.36	0.058	0.106	0.153	N/A	N/A	N/A	N/A	N/A
W12x16	0.41	0.053	0.102	0.151	N/A	N/A	N/A	N/A	N/A
W8x13	0.42	0.052	0.102	0.151	N/A	N/A	N/A	N/A	N/A
W10x15	0.43	0.051	0.101	0.151	N/A	N/A	N/A	N/A	N/A
W6x15	0.43	0.051	0.101	0.151	N/A	N/A	N/A	N/A	N/A
W6x12	0.45	0.05	0.1	0.151	0.251	0.352	N/A	N/A	N/A
W10x17	0.48	0.049	0.092	0.140	0.235	0.332	N/A	N/A	N/A
W14x22	0.48	0.049	0.092	0.140	0.235	0.332	N/A	N/A	N/A
W8x15	0.48	0.049	0.092	0.140	0.235	0.332	N/A	N/A	N/A
W12x19	0.49	0.049	0.09	0.137	0.230	0.325	N/A	N/A	N/A
W16x26	0.5	0.049	0.088	0.134	0.226	0.319	N/A	N/A	N/A
W8x18	0.5	0.049	0.088	0.134	0.226	0.319	N/A	N/A	N/A
W10x22	0.52	0.048	0.084	0.128	0.217	0.308	N/A	N/A	N/A
W12x26	0.53	0.048	0.082	0.125	0.213	0.302	N/A	N/A	N/A
W10x19	0.54	0.048	0.08	0.122	0.209	0.297	N/A	N/A	N/A
W5x16	0.55	0.048	0.078	0.120	0.205	0.292	N/A	N/A	N/A
W12x22	0.56	0.048	0.076	0.118	0.201	0.287	N/A	N/A	N/A
W14X26	0.56	0.048	0.076	0.118	0.201	0.287	N/A	N/A	N/A
W14x30	0.56	0.048	0.076	0.118	0.201	0.287	N/A	N/A	N/A
W4x13	0.56	0.048	0.076	0.118	0.201	0.287	N/A	N/A	N/A
W6x20	0.56	0.048	0.076	0.118	0.201	0.287	N/A	N/A	N/A

W6x16	0.58	0.047	0.073	0.113	0.194	0.278	N/A	N/A	N/A
W8x21	0.58	0.047	0.073	0.113	0.194	0.278	N/A	N/A	N/A
W16x31	0.59	0.047	0.071	0.111	0.191	0.274	N/A	N/A	N/A
W8x24	0.59	0.047	0.071	0.111	0.191	0.274	N/A	N/A	N/A
W18x35	0.6	0.047	0.07	0.109	0.188	0.269	N/A	N/A	N/A
W10x26	0.61	0.047	0.068	0.107	0.184	0.265	N/A	N/A	N/A
W12x30	0.61	0.047	0.068	0.107	0.184	0.265	N/A	N/A	N/A
W16x36	0.62	0.047	0.067	0.105	0.181	0.261	N/A	N/A	N/A
W14x34	0.63	0.046	0.065	0.103	0.179	0.257	N/A	N/A	N/A
W5x19	0.64	0.046	0.064	0.101	0.176	0.254	N/A	N/A	N/A
W10x33	0.66	0.046	0.061	0.097	0.170	0.247	N/A	N/A	N/A
W21x44	0.67	0.046	0.06	0.096	0.168	0.243	N/A	N/A	N/A
W8x31	0.67	0.046	0.06	0.096	0.168	0.243	N/A	N/A	N/A
W16x40	0.69	0.046	0.058	0.092	0.163	0.237	N/A	N/A	N/A
W18x40	0.69	0.046	0.058	0.092	0.163	0.237	N/A	N/A	N/A
W8x28	0.69	0.046	0.058	0.092	0.163	0.237	N/A	N/A	N/A
W10x30	0.7	0.046	0.057	0.091	0.160	0.234	N/A	N/A	N/A
W12x35	0.7	0.046	0.057	0.091	0.160	0.234	N/A	N/A	N/A
W6x25	0.7	0.046	0.057	0.091	0.160	0.234	N/A	N/A	N/A
W14x38	0.71	0.045	0.056	0.089	0.158	0.231	N/A	N/A	N/A
W12x40	0.73	0.045	0.054	0.086	0.154	0.225	N/A	N/A	N/A
W14x43	0.75	0.045	0.052	0.084	0.149	0.220	N/A	N/A	N/A
W21x50	0.75	0.045	0.052	0.084	0.149	0.220	N/A	N/A	N/A
W24x55	0.75	0.045	0.052	0.084	0.149	0.220	N/A	N/A	N/A
W8x35	0.75	0.045	0.052	0.084	0.149	0.220	N/A	N/A	N/A
W16x45	0.77	0.045	0.05	0.081	0.145	0.214	N/A	N/A	N/A
W10x39	0.78	0.045	0.049	0.080	0.144	0.212	N/A	N/A	N/A
W18x50	0.78	0.045	0.049	0.080	0.144	0.212	N/A	N/A	N/A
W18x46	0.79	0.045	0.048	0.079	0.142	0.209	N/A	N/A	N/A
W12x45	0.83	0.044	0.045	0.074	0.135	0.200	N/A	N/A	N/A
W10x49	0.84	0.044	0.044	0.073	0.133	0.198	N/A	N/A	N/A
W14x48	0.84	0.044	0.044	0.073	0.133	0.198	N/A	N/A	N/A
W24x62	0.84	0.044	0.044	0.073	0.133	0.198	N/A	N/A	N/A
W24x68	0.84	0.044	0.044	0.073	0.133	0.198	N/A	N/A	N/A
W16x50	0.85	0.044	0.044	0.072	0.132	0.196	N/A	N/A	N/A

W18x55	0.85	0.044	0.044	0.072	0.132	0.196	N/A	N/A	N/A
W21x62	0.85	0.044	0.044	0.072	0.132	0.196	N/A	N/A	N/A
W8x40	0.85	0.044	0.044	0.072	0.132	0.196	N/A	N/A	N/A
W12x53	0.86	0.043	0.043	0.072	0.130	0.194	N/A	N/A	N/A
W21x57	0.86	0.043	0.043	0.072	0.130	0.194	N/A	N/A	N/A
W10x45	0.89	0.042	0.042	0.069	0.126	0.188	N/A	N/A	N/A
W12x50	0.91	0.041	0.041	0.067	0.123	0.185	N/A	N/A	N/A
W10x54	0.92	0.041	0.041	0.066	0.122	0.183	N/A	N/A	N/A
W14x53	0.92	0.041	0.041	0.066	0.122	0.183	N/A	N/A	N/A
W18x60	0.92	0.041	0.041	0.066	0.122	0.183	N/A	N/A	N/A
W27x84	0.92	0.041	0.041	0.066	0.122	0.183	N/A	N/A	N/A
W12x58	0.93	0.04	0.04	0.065	0.121	0.181	N/A	N/A	N/A
W12x65	0.93	0.04	0.04	0.065	0.121	0.181	N/A	N/A	N/A
W14x61	0.93	0.04	0.04	0.065	0.121	0.181	N/A	N/A	N/A
W21x68	0.93	0.04	0.04	0.065	0.121	0.181	N/A	N/A	N/A
W24x76	0.93	0.04	0.04	0.065	0.121	0.181	N/A	N/A	N/A
W16x67	0.94	0.04	0.04	0.065	0.119	0.179	N/A	N/A	N/A
W16x57	0.96	0.039	0.039	0.063	0.117	0.176	N/A	N/A	N/A
W18x76	0.97	0.039	0.039	0.062	0.116	0.174	N/A	N/A	N/A
W21x73	0.99	0.038	0.038	0.061	0.114	0.171	N/A	N/A	N/A
W18x65	1	0.038	0.038	0.060	0.113	0.170	N/A	N/A	N/A
W30x99	1	0.038	0.038	0.060	0.113	0.170	N/A	N/A	N/A
W8x48	1	0.038	0.038	0.060	0.113	0.170	N/A	N/A	N/A
W10x60	1.01	0.038	0.038	0.060	0.112	0.168	N/A	N/A	N/A
W12x72	1.02	0.037	0.037	0.059	0.111	0.167	N/A	N/A	N/A
W24x84	1.02	0.037	0.037	0.059	0.111	0.167	N/A	N/A	N/A
W27x94	1.03	0.037	0.037	0.058	0.109	0.165	N/A	N/A	N/A
W14x68	1.04	0.037	0.037	0.058	0.108	0.164	N/A	N/A	N/A
W16x77	1.07	0.036	0.036	0.056	0.106	0.160	N/A	N/A	N/A
W24x104	1.07	0.036	0.036	0.056	0.106	0.160	N/A	N/A	N/A
W14x90	1.08	0.036	0.036	0.055	0.105	0.159	N/A	N/A	N/A
W18x71	1.08	0.036	0.036	0.055	0.105	0.159	N/A	N/A	N/A
W33x118	1.08	0.036	0.036	0.055	0.105	0.159	N/A	N/A	N/A
W18x86	1.09	0.035	0.035	0.055	0.104	0.157	N/A	N/A	N/A
W30x108	1.09	0.035	0.035	0.055	0.104	0.157	N/A	N/A	N/A

W12x79	1.11	0.035	0.035	0.053	0.102	0.155	N/A	N/A	N/A
W27x102	1.11	0.035	0.035	0.053	0.102	0.155	N/A	N/A	N/A
W14x74	1.12	0.034	0.034	0.053	0.101	0.154	N/A	N/A	N/A
W21x83	1.12	0.034	0.034	0.053	0.101	0.154	N/A	N/A	N/A
W21x101	1.13	0.034	0.034	0.052	0.100	0.153	N/A	N/A	N/A
W24x94	1.14	0.034	0.034	0.052	0.099	0.151	N/A	N/A	N/A
W10x68	1.15	0.034	0.034	0.051	0.099	0.150	N/A	N/A	N/A
W36x135	1.15	0.034	0.034	0.051	0.099	0.150	N/A	N/A	N/A
W30x116	1.16	0.033	0.033	0.051	0.098	0.149	N/A	N/A	N/A
W14x99	1.18	0.033	0.033	0.050	0.096	0.147	N/A	N/A	N/A
W33x130	1.18	0.033	0.033	0.050	0.096	0.147	N/A	N/A	N/A
W24x117	1.2	0.033	0.033	0.049	0.095	0.145	N/A	N/A	N/A
W8x58	1.2	0.033	0.033	0.049	0.095	0.145	N/A	N/A	N/A
W12x87	1.22	0.032	0.032	0.048	0.093	0.143	N/A	N/A	N/A
W16x89	1.22	0.032	0.032	0.048	0.093	0.143	N/A	N/A	N/A
W18x97	1.22	0.032	0.032	0.048	0.093	0.143	N/A	N/A	N/A
W14x82	1.23	0.032	0.032	0.047	0.093	0.142	N/A	N/A	N/A
W27x114	1.23	0.032	0.032	0.047	0.093	0.142	N/A	N/A	N/A
W21x111	1.24	0.032	0.032	0.047	0.092	0.141	N/A	N/A	N/A
W21x93	1.24	0.032	0.032	0.047	0.092	0.141	N/A	N/A	N/A
W30x124	1.24	0.032	0.032	0.047	0.092	0.141	N/A	N/A	N/A
W10x77	1.28	0.031	0.031	0.045	0.089	0.137	N/A	N/A	N/A
W33x141	1.28	0.031	0.031	0.045	0.089	0.137	N/A	N/A	N/A
W36x150	1.28	0.031	0.031	0.045	0.089	0.137	N/A	N/A	N/A
W14x109	1.29	0.031	0.031	0.045	0.089	0.136	N/A	N/A	N/A
W30x132	1.32	0.03	0.03	0.043	0.087	0.134	N/A	N/A	N/A
W18x106	1.33	0.03	0.03	0.043	0.086	0.133	N/A	N/A	N/A
W24x131	1.33	0.03	0.03	0.043	0.086	0.133	N/A	N/A	N/A
W12x96	1.34	0.03	0.03	0.043	0.085	0.132	N/A	N/A	N/A
W21x122	1.35	0.03	0.03	0.042	0.085	0.131	N/A	N/A	N/A
W27x146	1.35	0.03	0.03	0.042	0.085	0.131	N/A	N/A	N/A
W36x160	1.36	0.029	0.029	0.042	0.084	0.130	N/A	N/A	N/A
W16x100	1.37	0.029	0.029	0.042	0.084	0.129	N/A	N/A	N/A
W33x152	1.37	0.029	0.029	0.042	0.084	0.129	N/A	N/A	N/A
W8x67	1.37	0.029	0.029	0.042	0.084	0.129	N/A	N/A	N/A

W14x120	1.42	0.028	0.028	0.040	0.081	0.126	N/A	N/A	N/A
W36x170	1.44	0.028	0.028	0.039	0.080	0.124	N/A	N/A	N/A
W10x88	1.45	0.028	0.028	0.039	0.079	0.123	N/A	N/A	N/A
W21x132	1.45	0.028	0.028	0.039	0.079	0.123	N/A	N/A	N/A
W30x173	1.45	0.028	0.028	0.039	0.079	0.123	N/A	N/A	N/A
W12x106	1.47	0.028	0.028	0.038	0.078	0.122	N/A	N/A	N/A
W18x119	1.48	0.027	0.027	0.038	0.078	0.121	N/A	N/A	N/A
W24x146	1.48	0.027	0.027	0.038	0.078	0.121	N/A	N/A	N/A
W27x161	1.48	0.027	0.027	0.038	0.078	0.121	N/A	N/A	N/A
W36x182	1.53	0.027	0.027	0.036	0.076	0.118	N/A	N/A	N/A
W14x132	1.56	0.026	0.026	0.035	0.074	0.116	N/A	N/A	N/A
W33x201	1.58	0.026	0.026	0.035	0.073	0.115	N/A	N/A	N/A
W21x147	1.61	0.026	0.026	0.034	0.072	0.113	N/A	N/A	N/A
W30x191	1.62	0.026	0.026	0.034	0.072	0.113	N/A	N/A	N/A
W24x162	1.63	0.025	0.025	0.034	0.071	0.112	N/A	N/A	N/A
W27x178	1.63	0.025	0.025	0.034	0.071	0.112	N/A	N/A	N/A
W36x194	1.63	0.025	0.025	0.034	0.071	0.112	N/A	N/A	N/A
W10x100	1.64	0.025	0.025	0.033	0.071	0.112	N/A	N/A	N/A
W14x145	1.64	0.025	0.025	0.033	0.071	0.112	N/A	N/A	N/A
W12x120	1.65	0.025	0.025	0.033	0.070	0.111	N/A	N/A	N/A
W36x230	1.72	0.024	0.024	0.031	0.068	0.107	N/A	N/A	N/A
W33x221	1.73	0.024	0.024	0.031	0.067	0.107	N/A	N/A	N/A
W30x211	1.76	0.024	0.024	0.030	0.066	0.105	N/A	N/A	N/A
W36x210	1.76	0.024	0.024	0.030	0.066	0.105	N/A	N/A	N/A
W14x159	1.78	0.024	0.024	0.030	0.066	0.104	N/A	N/A	N/A
W10x112	1.81	0.023	0.023	0.029	0.065	0.103	N/A	N/A	N/A
W36x245	1.81	0.023	0.023	0.029	0.065	0.103	N/A	N/A	N/A
W12x136	1.86	0.023	0.023	0.028	0.063	0.101	N/A	N/A	N/A
W33x241	1.87	0.023	0.023	0.028	0.063	0.100	N/A	N/A	N/A
W36x260	1.93	0.022	0.022	0.027	0.061	0.098	N/A	N/A	N/A
W14x176	1.96	0.022	0.022	0.026	0.060	0.097	N/A	N/A	N/A
W12x152	2.04	0.021	0.021	0.025	0.058	0.094	N/A	N/A	N/A
W36x280	2.06	0.021	0.021	0.025	0.057	0.093	N/A	N/A	N/A
W14x193	2.14	0.021	0.021	0.023	0.056	0.090	N/A	N/A	N/A
W36x300	2.21	0.02	0.02	0.022	0.054	0.088	N/A	N/A	N/A

W12x170	2.26	0.02	0.02	0.022	0.053	0.087	N/A	N/A	N/A
W14x211	2.32	0.02	0.02	0.021	0.052	0.085	N/A	N/A	N/A
W12x190	2.5	0.019	0.019	0.019	0.048	0.080	N/A	N/A	N/A
W14x233	2.55	0.018	0.018	0.019	0.048	0.080	0.111	0.143	0.175

Hp/A	**Required Thickness (mm)**							
	Rating Period (hr)							
	1/2	**3/4**	**1**	**1-1/2**	**2**	**2-1/2**	**3**	**3-1/2**
406	1.6	2.76	3.92	N/A	N/A	N/A	N/A	N/A
400	1.56	2.73	3.9	N/A	N/A	N/A	N/A	N/A
395	1.55	2.72	3.9	N/A	N/A	N/A	N/A	N/A
390	1.53	2.71	3.89	N/A	N/A	N/A	N/A	N/A
385	1.52	2.7	3.89	N/A	N/A	N/A	N/A	N/A
380	1.5	2.69	3.89	N/A	N/A	N/A	N/A	N/A
375	1.49	2.69	3.88	N/A	N/A	N/A	N/A	N/A
370	1.47	2.68	3.88	N/A	N/A	N/A	N/A	N/A
365	1.46	2.67	3.87	N/A	N/A	N/A	N/A	N/A
360	1.44	2.66	3.87	N/A	N/A	N/A	N/A	N/A
355	1.43	2.65	3.87	N/A	N/A	N/A	N/A	N/A
350	1.41	2.64	3.86	N/A	N/A	N/A	N/A	N/A
345	1.4	2.63	3.86	N/A	N/A	N/A	N/A	N/A
340	1.38	2.62	3.85	N/A	N/A	N/A	N/A	N/A
335	1.37	2.61	3.85	N/A	N/A	N/A	N/A	N/A
330	1.35	2.6	3.85	N/A	N/A	N/A	N/A	N/A
325	1.34	2.59	3.84	N/A	N/A	N/A	N/A	N/A
320	1.32	2.58	3.84	N/A	N/A	N/A	N/A	N/A
315	1.31	2.57	3.83	N/A	N/A	N/A	N/A	N/A
310	1.29	2.56	3.83	N/A	N/A	N/A	N/A	N/A
305	1.28	2.55	3.83	N/A	N/A	N/A	N/A	N/A
300	1.28	2.55	3.82	N/A	N/A	N/A	N/A	N/A
295	1.27	2.51	3.78	6.32	8.87	N/A	N/A	N/A
290	1.27	2.46	3.7	6.21	8.73	N/A	N/A	N/A
285	1.26	2.41	3.63	6.10	8.59	N/A	N/A	N/A

280	1.25	2.35	3.56	5.99	8.44	N/A	N/A	N/A
275	1.25	2.3	3.49	5.89	8.30	N/A	N/A	N/A
270	1.24	2.25	3.42	5.78	8.16	N/A	N/A	N/A
265	1.24	2.2	3.35	5.67	8.02	N/A	N/A	N/A
260	1.23	2.15	3.28	5.56	7.88	N/A	N/A	N/A
255	1.23	2.1	3.21	5.45	7.74	N/A	N/A	N/A
250	1.22	2.05	3.14	5.34	7.60	N/A	N/A	N/A
245	1.22	1.99	3.07	5.24	7.45	N/A	N/A	N/A
240	1.21	1.94	2.99	5.13	7.31	N/A	N/A	N/A
235	1.21	1.89	2.92	5.02	7.17	N/A	N/A	N/A
230	1.2	1.84	2.85	4.91	7.03	N/A	N/A	N/A
225	1.19	1.79	2.78	4.80	6.89	N/A	N/A	N/A
220	1.19	1.74	2.71	4.69	6.75	N/A	N/A	N/A
215	1.18	1.68	2.64	4.58	6.60	N/A	N/A	N/A
210	1.18	1.63	2.57	4.48	6.46	N/A	N/A	N/A
205	1.17	1.58	2.5	4.37	6.32	N/A	N/A	N/A
200	1.17	1.53	2.43	4.26	6.18	N/A	N/A	N/A
195	1.16	1.48	2.36	4.15	6.04	N/A	N/A	N/A
190	1.16	1.43	2.28	4.04	5.90	N/A	N/A	N/A
185	1.15	1.38	2.21	3.93	5.76	N/A	N/A	N/A
180	1.14	1.32	2.14	3.82	5.61	N/A	N/A	N/A
175	1.14	1.27	2.07	3.72	5.47	N/A	N/A	N/A
170	1.13	1.22	2	3.61	5.33	N/A	N/A	N/A
165	1.13	1.17	1.93	3.50	5.19	N/A	N/A	N/A
160	1.12	1.12	1.86	3.38	5.04	N/A	N/A	N/A
155	1.09	1.09	1.81	3.29	4.91	N/A	N/A	N/A
150	1.06	1.06	1.74	3.19	4.77	N/A	N/A	N/A
145	1.03	1.03	1.67	3.08	4.62	N/A	N/A	N/A
140	1	1	1.61	2.98	4.48	N/A	N/A	N/A
135	0.97	0.97	1.54	2.88	4.34	N/A	N/A	N/A
130	0.94	0.94	1.48	2.78	4.20	N/A	N/A	N/A
125	0.91	0.91	1.41	2.68	4.06	N/A	N/A	N/A
120	0.88	0.88	1.35	2.58	3.92	N/A	N/A	N/A
115	0.85	0.85	1.28	2.47	3.77	N/A	N/A	N/A
110	0.82	0.82	1.22	2.37	3.63	N/A	N/A	N/A

105	0.79	0.79	1.15	2.27	3.49	N/A	N/A	N/A
100	0.76	0.76	1.09	2.17	3.35	N/A	N/A	N/A
95	0.72	0.72	1.02	2.07	3.21	N/A	N/A	N/A
90	0.69	0.69	0.95	1.97	3.07	N/A	N/A	N/A
85	0.66	0.66	0.89	1.87	2.93	N/A	N/A	N/A
80	0.63	0.63	0.82	1.76	2.78	N/A	N/A	N/A
75	0.6	0.6	0.76	1.66	2.64	N/A	N/A	N/A
70	0.57	0.57	0.69	1.56	2.50	N/A	N/A	N/A
65	0.54	0.54	0.63	1.46	2.36	N/A	N/A	N/A
60	0.51	0.51	0.56	1.36	2.22	N/A	N/A	N/A
55	0.48	0.48	0.5	1.26	2.08	N/A	N/A	N/A
53	0.47	0.47	0.47	1.22	2.02	2.83	3.63	4.44

CARBOLINE GLOBAL INC — Thermo-Sorb HB, INVESTIGATED FOR INTERIOR GENERAL PURPOSE, INTERIOR CONDITIONED SPACE and EXTERIOR ENVIRONMENTAL

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-08-22

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

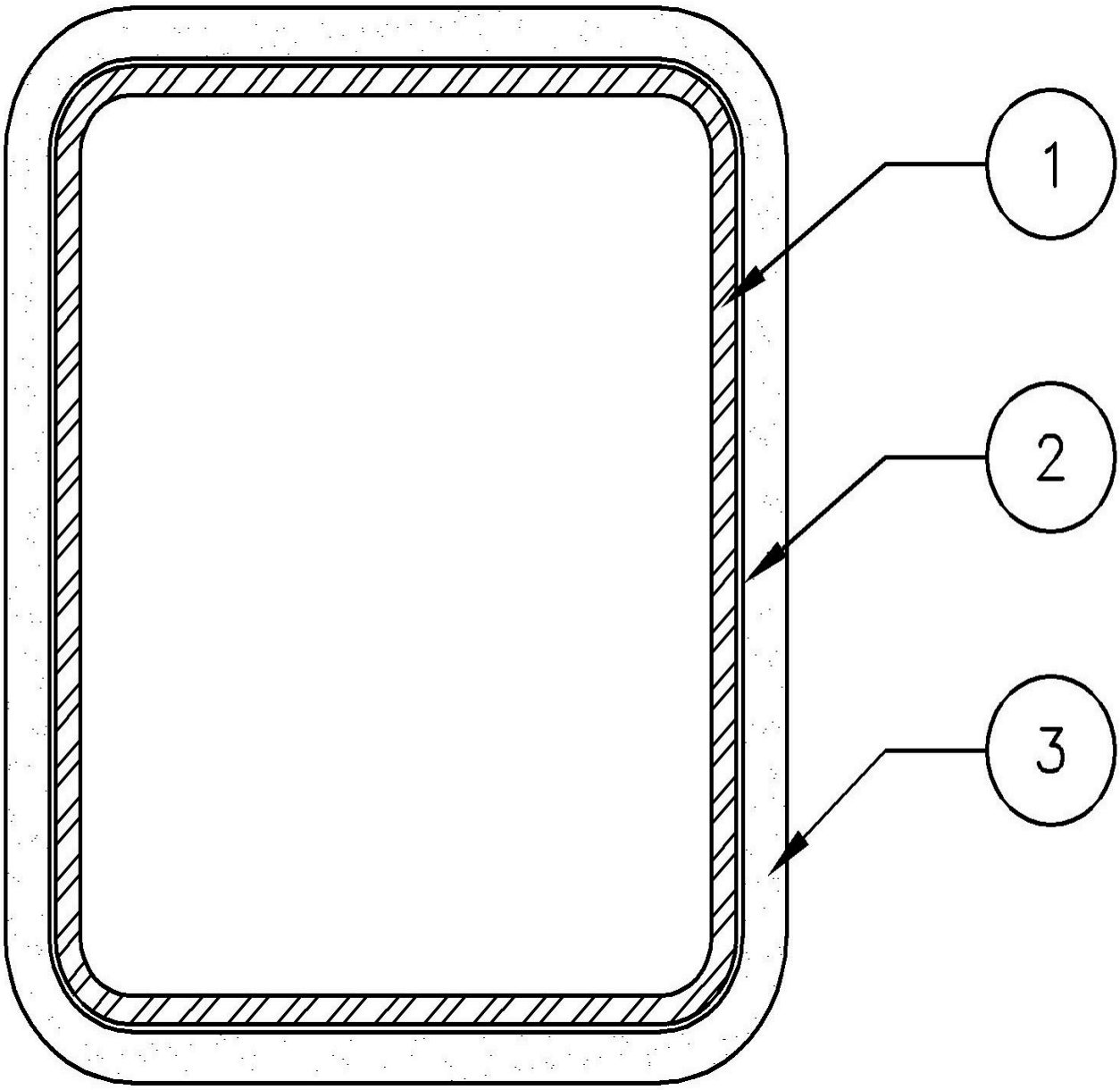
See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

Design No. Y678

August 22, 2025

Ratings - 1/2, 3/4, 1, 1-1/2 2, 2-1/2 and 3 Hr. (See Item 3)

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Steel Tube Column —** Steel rectangular tube (ST) or pipe (SP) columns with the minimum sizes shown in the tables below.

2. **Primer Coating —** No primer required.

3. **Mastic & Intumescent Coating* —** Coating spray or brush applied in accordance with the manufacturer's instructions at the minimum average dry thickness shown in the thickness below. The thickness shown does not include primer thickness.

As an alternate to the table below, the required thickness of coating (in mm) to be applied to surfaces of Wide-Flange columns may be determined from the equations listed below. The equations may only be used for the indicated hourly rating, and for the corresponding listed ranges of thickness and Hp/A.

Hourly Rating	Thickness Equation (mm)	Thickness Range (mm)	Hp/A Section Factor Range
1	T =((0.0077*Hp/A) + 3.5962)	5.22 - 4.86	212- 165
1	T =((0.037*Hp/A) - 1.245)	4.86 - 1.16	165 - 65
2	T =((0.0576*Hp/A) + 0.466	9.97 - 4.21	165 - 65

	Minimum Required Thickness (mm) for Rating Period						
Hp/A	**30 min**	**45 min**	**60 min**	**90 min**	**120 min**	**150 min**	**180 min**
212	1.29	3.26	5.22	9.15	N/A	N/A	N/A
210	1.28	3.24	5.21	9.08	N/A	N/A	N/A
205	1.27	3.19	5.17	8.92	N/A	N/A	N/A
200	1.25	3.14	5.14	8.75	N/A	N/A	N/A
195	1.23	3.09	5.1	8.59	N/A	N/A	N/A
190	1.21	3.04	5.06	8.43	N/A	N/A	N/A
185	1.2	2.99	5.02	8.27	N/A	N/A	N/A
180	1.18	2.94	4.98	8.11	N/A	N/A	N/A
175	1.16	2.89	4.94	7.95	N/A	N/A	N/A
170	1.15	2.84	4.91	7.78	N/A	N/A	N/A
165	1.13	2.79	4.86	7.63	9.97	N/A	N/A
160	1.1	2.67	4.68	7.38	9.68	N/A	N/A
155	1.06	2.56	4.49	7.14	9.39	N/A	N/A
150	1.03	2.44	4.31	6.89	9.11	N/A	N/A
145	0.99	2.32	4.12	6.64	8.82	N/A	N/A
140	0.96	2.21	3.94	6.39	8.53	N/A	N/A
135	0.93	2.09	3.75	6.15	8.24	N/A	N/A
130	0.89	1.97	3.57	5.90	7.95	N/A	N/A
125	0.86	1.85	3.38	5.65	7.67	N/A	N/A
120	0.82	1.74	3.2	5.40	7.38	N/A	N/A
115	0.79	1.62	3.01	5.16	7.09	N/A	N/A
110	0.76	1.5	2.83	4.91	6.80	N/A	N/A
105	0.72	1.39	2.64	4.66	6.51	N/A	N/A
100	0.69	1.27	2.46	4.41	6.23	N/A	N/A
95	0.65	1.15	2.27	4.17	5.94	N/A	N/A
90	0.62	1.04	2.09	3.92	5.65	N/A	N/A
85	0.59	0.92	1.9	3.67	5.36	N/A	N/A
80	0.55	0.8	1.72	3.42	5.07	N/A	N/A
75	0.52	0.68	1.53	3.18	4.79	N/A	N/A
70	0.48	0.57	1.35	2.93	4.50	N/A	N/A
65	0.45	0.45	1.16	2.68	4.21	5.73	7.26

		Minimum Required Thickness (in) for Rating Period						
HSS Tube Size	**A/P**	**30 min**	**45 min**	**60 min**	**90 min**	**120 min**	**150 min**	**180 min**
8x8x3/16	0.17	0.051	0.128	0.206	0.360	N/A	N/A	N/A
10x10x3/16	0.17	0.051	0.128	0.206	0.360	N/A	N/A	N/A
7x4x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
7x7x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
8x3x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
8x4x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
8x6x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
8x8x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
10x2x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
10x4x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
10x6x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
10x10x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
12x2x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
12x4x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
12x6x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
12x8x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
12x12x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
14x4x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
14x6x1/4	0.23	0.045	0.112	0.193	0.306	0.393	N/A	N/A
3x3x5/16	0.27	0.039	0.091	0.162	0.261	0.347	N/A	N/A
3.5x3.5x5/16	0.27	0.039	0.091	0.162	0.261	0.347	N/A	N/A
4x2x5/16	0.27	0.039	0.091	0.162	0.261	0.347	N/A	N/A
4x3x5/16	0.27	0.039	0.091	0.162	0.261	0.347	N/A	N/A
5x2x5/16	0.27	0.039	0.091	0.162	0.261	0.347	N/A	N/A
4x4x5/16	0.27	0.039	0.091	0.162	0.261	0.347	N/A	N/A
5x3x5/16	0.27	0.039	0.091	0.162	0.261	0.347	N/A	N/A
6x2x5/16	0.27	0.039	0.091	0.162	0.261	0.347	N/A	N/A
5x4x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
5x5x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
6x3x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A

6x4x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
7x3x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
7x4x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
8x2x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
8x3x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
6x6x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
7x5x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
7x7x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
8x4x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
8x6x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
8x8x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
10x2x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
10x4x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
10x6x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
10x10x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
12x4x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
12x6x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
12x8x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
14x4x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
14x6x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
16x4x5/16	0.28	0.038	0.087	0.155	0.252	0.336	N/A	N/A
12x12x5/16	0.29	0.036	0.082	0.148	0.242	0.324	N/A	N/A
14x10x5/16	0.29	0.036	0.082	0.148	0.242	0.324	N/A	N/A
16x8x5/16	0.29	0.036	0.082	0.148	0.242	0.324	N/A	N/A
18x6x5/16	0.29	0.036	0.082	0.148	0.242	0.324	N/A	N/A
20x4x5/16	0.29	0.036	0.082	0.148	0.242	0.324	N/A	N/A
14x14x5/16	0.29	0.036	0.082	0.148	0.242	0.324	N/A	N/A
16x12x5/16	0.29	0.036	0.082	0.148	0.242	0.324	N/A	N/A
16x16x5/16	0.29	0.036	0.082	0.148	0.242	0.324	N/A	N/A
20x8x5/16	0.29	0.036	0.082	0.148	0.242	0.324	N/A	N/A
4x4x3/8	0.32	0.033	0.072	0.132	0.220	0.298	N/A	N/A
5x3x3/8	0.32	0.033	0.072	0.132	0.220	0.298	N/A	N/A
6x2x3/8	0.32	0.033	0.072	0.132	0.220	0.298	N/A	N/A
5x4x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
6x3x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A

5x5x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
6x4x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
6x6x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
7x3x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
7x4x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
7x5x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
8x2x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
8x3x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
8x4x3/8	0.33	0.032	0.068	0.126	0.213	0.290	N/A	N/A
7x7x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
8x6x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
10x4x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
8x8x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
10x6x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
10x10x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
12x4x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
12x6x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
12x8x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
12x12x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
14x4x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
12x6x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
12x8x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
14x4x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
14x6x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
14x10x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
14x14x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
16x4x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
16x8x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
16x12x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
18x6x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
20x4x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
20x8x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
16x16x3/8	0.34	0.031	0.064	0.119	0.203	0.279	N/A	N/A
4x4x1/2	0.42	0.026	0.045	0.089	0.164	0.234	N/A	N/A
5x3x1/2	0.42	0.026	0.045	0.089	0.164	0.234	N/A	N/A

5x5x1/2	0.43	0.025	0.043	0.085	0.159	0.228	N/A	N/A
6x4x1/2	0.43	0.025	0.043	0.085	0.159	0.228	N/A	N/A
6x6x1/2	0.44	0.024	0.041	0.082	0.154	0.222	N/A	N/A
7x5x1/2	0.44	0.024	0.041	0.082	0.154	0.222	N/A	N/A
7x7x1/2	0.44	0.024	0.041	0.082	0.154	0.222	N/A	N/A
8x4x1/2	0.44	0.024	0.041	0.082	0.154	0.222	N/A	N/A
8x6x1/2	0.44	0.024	0.041	0.082	0.154	0.222	N/A	N/A
10x4x1/2	0.44	0.024	0.041	0.082	0.154	0.222	N/A	N/A
8x8x1/2	0.44	0.024	0.041	0.082	0.154	0.222	N/A	N/A
10x6x1/2	0.44	0.024	0.041	0.082	0.154	0.222	N/A	N/A
12x4x1/2	0.44	0.024	0.041	0.082	0.154	0.222	N/A	N/A
12x6x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
14x4x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
10x10x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
12x8x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
12x12x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
14x6x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
14x10x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
14x14x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
16x4x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
16x8x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
16x12x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
16x16x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
18x6x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
20x4x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
20x8x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
20x12x1/2	0.45	0.023	0.036	0.075	0.144	0.211	N/A	N/A
8x8x5/8	0.55	0.018	0.018	0.046	0.106	0.166	0.226	0.286
10x10x5/8	0.55	0.018	0.018	0.046	0.106	0.166	0.226	0.286
12x8x5/8	0.55	0.018	0.018	0.046	0.106	0.166	0.226	0.286

CARBOLINE GLOBAL INC — Thermo-Sorb HB, INVESTIGATED FOR INTERIOR GENERAL PURPOSE, INTERIOR CONDITIONED SPACE and EXTERIOR ENVIRONMENTAL

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

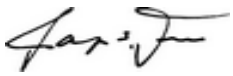
The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

COMPLIANCE TESTED by berkeley analytical

VOC Emission Test Certificate

Product Name: Thermo-Sorb HB

Product Sample Information	
Company:	Carboline Global, Inc.
Company Website:	www.carboline.com
Product Type:	Paints & Coatings - Fireproofing
Date Produced:	June 15, 2025

Certificate Information	
Certificate No:	251008-03
Certified By:	 Raja S. Tannous, Laboratory Director
Date:	October 8, 2025

Reference Standard & Modeling Scenario: California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017 (Emission testing method for CA Specification 01350)

Acceptance Criteria and Results Demonstrating Compliance of Product Sample to Referenced Standard:

Exposure Scenario[1]	Individual VOCs of Concern[2]		Formaldehyde[3]		TVOC[4]
	Criterion	Compliant?	Criterion	Compliant?	Range
School Classroom	≤½ Chronic REL	YES	≤9.0 µg/m³	YES	≤ 0.5 mg/m³
Private Office	≤½ Chronic REL	YES	≤9.0 µg/m³	YES	≤ 0.5 mg/m³

Sample Coverage[5]: 931 g/m²

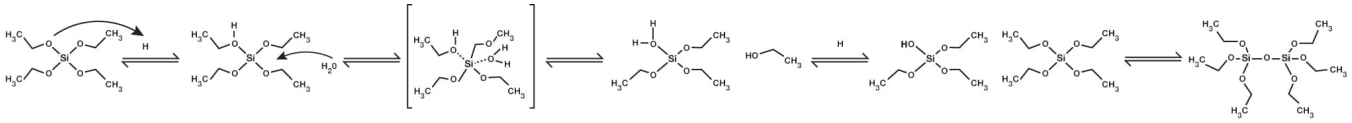
1. Exposure scenarios and product quantities for classroom & office are defined in Tables 4-2 – 4-5 (CDPH Standard Method V1.2-2017)
2. Maximum allowable concentrations of individual target VOCs are specified in Table 4-1 (*ibid*.)
3. Maximum allowable formaldehyde concentration is ≤9 µg/m³, effective January 1, 2012; previous limit was ≤16.5 µg/m³ (*ibid*.)
4. Informative only; predicted TVOC Range in three categories: ≤0.5 mg/m³, >0.5 – 4.9 mg/m³, and ≥5.0 mg/m³
5. Informative and applicable only to tests of wet-applied products; grams of sample applied per square meter of substrate

Standards & Codes Recognizing CDPH Standard Method V1.2 (partial list)

- USGBC LEED Version 4/4.1, BD&C, ID&C, Residential BD&C Multifamily
- The WELL Building Standard, WELL v2, Feature X06
- ANSI/GBI 01-2019 Green Globes Assessment Protocol
- ANSI/ASHRAE/USGBC/IES Standard 189.1

Narrative: Carboline selected a sample representative of its Thermo-Sorb HB intumescent fireproofing product and submitted it on September 17, 2025 for testing. Berkeley Analytical measured and evaluated the emissions of VOCs from this sample following CDPH/EHLB/Standard Method V1.2-2017. The results of the test are presented in Berkeley Analytical report, 904-055-01A-Oct0825.

Berkeley Analytical is an independent testing laboratory specializing in the analysis of organic chemicals emitted by and contained in building products, finishes, furniture, and consumer products. We are an ISO/IEC 17025 accredited laboratory (IAS, TL-383); all standards used in performing this test are in Berkeley Analytical's scope of accreditation.



Carboline Testing Laboratory

350 Hanley Industrial Court St. Louis, MO 63144 • (314) 587-2600 / Fax: (314) 645-2533

Thermo-Sorb HB Physical Performance Testing

October 9, 2025
Testing Project 07217T, Compressive Strength Report
References: Kevin Twyford and Stuart Bradbury
Requested by Michael Hollman

1. System(s) (DFT Range)
One coat Thermo-Sorb HB (60-80 mils)
Note, cure was a minimum of seven days at lab

2. Testing Performed
ASTM D695 Compressive Strength

3. Results

Compressive Load	Compressive Stress
120 lb.	500 psi

Note, results are an average of five trials

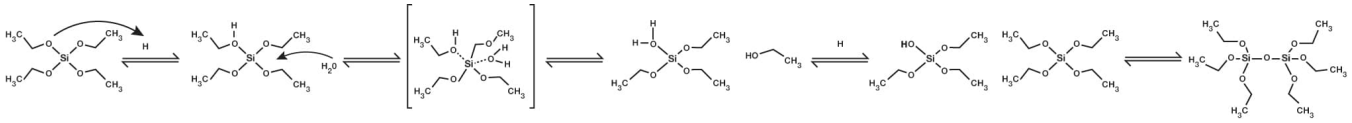
Testing Performed by:

William Brown (Testing Technician II)

Report Reviewed and Approved by:

Robert T Baichly II
Testing and Application Manager

Cc: Ali Shah, John Kloepper, Mary Roley, Paul Atzemis, Justin Manuel, Kevin Twyford, Stuart Bradbury and Michael Hollman



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Thermo-Sorb HB Physical Performance Testing

October 9, 2025
Testing Project 07217T, Abrasion Report
References: Kevin Twyford and Stuart Bradbury
Requested by Michael Hollman

1. System(s) (DFT Range)
One coat Thermo-Sorb HB (60-80 mils)
Notes:

- Coating applied to Q-Lab R-44-T taber abrasion panels, sanded one side with 60 grit sandpaper then MEK wiped and allowed to air dry.
- Final cure was a minimum of seven days at lab ambient

2. Testing Performed
ASTM D4060 Taber Abrasion, using CS-17 wheels with 1000-gram load for 1000 cycles

3. Results
Average weight loss for 1000 cycles was 880 milligrams.

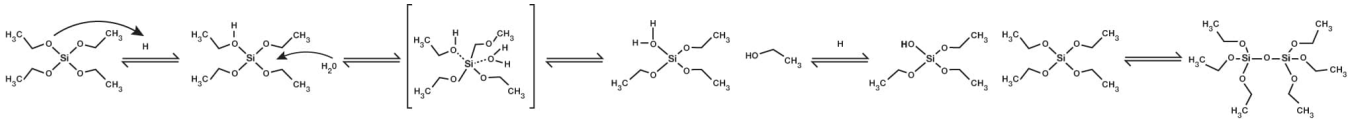
Testing Performed by:

Kristi McCullough (Testing Technician II)

Report Reviewed and Approved by:

Robert T Baichly II
Testing and Application Manager

Cc: Ali Shah, John Kloepper, Mary Roley, Paul Atzemis, Justin Manuel, Kevin Twyford, Stuart Bradbury and Michael Hollman



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Thermo-Sorb HB Physical Performance Testing

October 9, 2025
Testing Project 07217T, Flexural Properties Report
References: Kevin Twyford, Stuart Bradbury and IIA WO# P-1002087
Requested by Michael Hollman

1. System(s) (DFT Range)
One coat Thermo-Sorb HB (60-80 mils)
Note, cure was a minimum of seven days at lab

2. Testing Performed
ASTM D790 Flexural Properties at lab ambient, 0°C and -25°C

3. Results

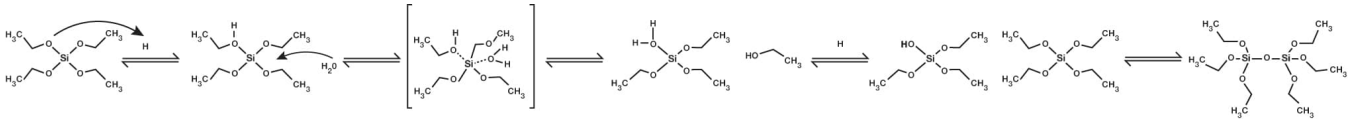
Test Temperature	Flexure Stress	Flexure Load	Modulus
Lab Ambient	300 psi	0.9 lb.	8300 psi
0°C	385 psi	0.8 lb.	12500 psi
-25°C	520 psi	1.4 lb.	26100 psi

Note, results are an average of two trials and testing performed at Industrial Inspection and Analysis

Report Written and Approved by:

Robert T Baichly II
Testing and Application Manager

Cc: Ali Shah, John Kloepper, Mary Roley, Paul Atzemis, Justin Manuel, Kevin Twyford, Stuart Bradbury and Michael Hollman



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Thermo-Sorb HB Physical Performance Testing

October 9, 2025
Testing Project 07217T, Hardness Report
References: Kevin Twyford and Stuart Bradbury
Requested by Michael Hollman

1. System(s) (DFT Range)
One coat Thermo-Sorb HB (60-80 mils)
Note, cure was a minimum of seven days at lab

2. Testing Performed
ASTM D2240 Durometer Hardness

3. Results

Shore D	Shore A
22	68

Note, results are an average of five trials

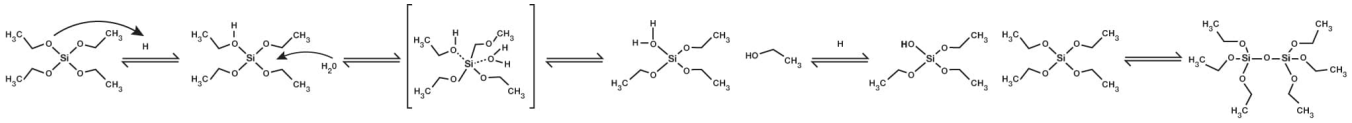
Testing Performed by:

William Brown (Testing Technician II)

Report Reviewed and Approved by:

Robert T Baichly II
Testing and Application Manager

Cc: Ali Shah, John Kloepper, Mary Roley, Paul Atzemis, Justin Manuel, Kevin Twyford, Stuart Bradbury and Michael Hollman



Carboline Testing Laboratory

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Thermo-Sorb HB Physical Performance Testing

October 9, 2025
Testing Project 07217T, Impact Report
References: Kevin Twyford and Stuart Bradbury
Requested by Michael Hollman

1. System(s) (DFT Range)
One coat Thermo-Sorb HB (60-80 mils)
Notes:

- Coating applied to the following substrate:
  - 3”x6”x0.16” carbon steel, SSPC-SP10 or better with a 3+ mil angular anchor profile.
  - Q-Lab S-46-I steel Q-Panel, sanded one side with 60 grit sandpaper then MEK wiped and allowed to air dry.
- Cure was a minimum of seven days at lab ambient conditions.

2. Testing Performed
ASTM D2794 Impact Resistance

3. Results

Substrate	Direct Impact	Indirect Impact
Carbon Steel	> 160 in-lb.	Did not test
Q-Panel	150 in-lb.	> 160 in-lb.

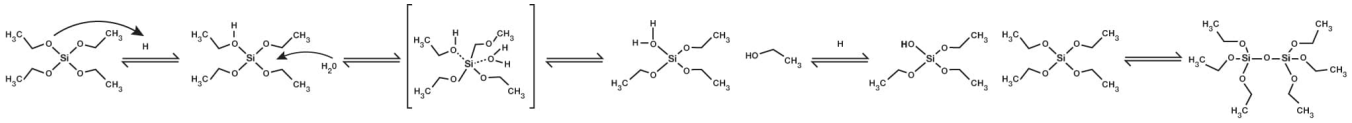
Testing Performed by:

Kristi McCullough (Testing Technician II)

Report Reviewed and Approved by:

Robert T Baichly II
Testing and Application Manager

Cc: Ali Shah, John Kloepper, Mary Roley, Paul Atzemis, Justin Manuel, Kevin Twyford, Stuart Bradbury and Michael Hollman



Carboline Testing Laboratory

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Thermo-Sorb HB Physical Performance Testing

October 9, 2025
Testing Project 07217T, Tensile Properties Report
References: Kevin Twyford and Stuart Bradbury
Requested by Michael Hollman

1. System(s) (DFT Range)
One coat Thermo-Sorb HB (60-80 mils)
Note, cure was a minimum of seven days at lab

2. Testing Performed
ASTM D638 Tensile Properties at lab ambient, 0°C and -25°C

3. Results

Test Temperature	Tensile Strength	Elongation at Yield	Modulus of Elasticity
Lab Ambient	240 psi	12%	3575 psi
0°C	300 psi	11%	4100 psi
-25°C	290 psi	9%	5300 psi

Note, results are an average of five trials

Testing Performed by:

William Brown (Testing Technician II)

Report Reviewed and Approved by:

Robert T Baichly II
Testing and Application Manager

Cc: Ali Shah, John Kloepper, Mary Roley, Paul Atzemis, Justin Manuel, Kevin Twyford, Stuart Bradbury and Michael Hollman

Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021.

EPD of multiple products, based on the average results of the product group, covering the following products:

Nullifire SC901 Intumescent Steel Coating, Fast Track, Off-Site
Nullifire SC902 Intumescent Steel Coating, Fast Track
Nullifire SC904 Intumescent Steel Coating, Fast Track
Carboline Thermo-Sorb HB Steel Coating
from
Tremco CPG UK Ltd.

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-13792
Publication date:	2024-05-16
Valid until:	2029-05-15
Revised Version:	2025-10-02

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): Construction Products – PCR 2019:14 VERSION 1.3.2
PCR review was conducted by: The Technical Committee of the International EPD® System. The review panel may be contacted via info@environdec.com.
Life Cycle Assessment (LCA)
LCA accountability: Nexio Projects NL B.V. Schiekade 10A, 3032 AJ Rotterdam Netherlands info@nexioprojects.com
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: Angela Schindler, Angela Schindler Umweltberatung      Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

Tremco CPG UK Ltd. has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent

data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Tremco CPG UK Ltd.
Contact: Richard Barcock, richard.barcock@tremcocpg.com
Description of the organisation: Tremco CPG UK Ltd (Tremco CPG Europe is a part of RPM International Inc) produces an array of high-performance building products for the increasingly complex demands of the construction industry with brands including Nullifire, Flowcrete, Nudura, DryVit, Vandex, Illbruck, and Tremco.
Product-related or management system-related certifications: ISO 9001, 14001 and 45001
Name and location of production site(s): Tremco CPG UK Ltd, Coupland Road, Hindley Green, Wigan WN2 4HT, United Kingdom

Product information

Product name: SC901, SC902 and SC904/Carboline Thermo-sorb HB.

Product identification:
Nullifire SC901 Intumescent Steel Coating, Fast Track, Off-Site
Nullifire SC902 Intumescent Steel Coating, Fast Track
Nullifire SC904 Intumescent Steel Coating
Carboline Thermo-Sorb HB Steel Coating

Product description:
SC901 Intumescent Steel Coating is a two-component, high solids, high build, fire protection coating for structural steel, based on patented hybrid technology. Due to the unique elastomeric properties of SC901, excellent damage resistance is achieved. SC901 is designed to provide up to 120 minutes fire resistance to 'I' section beams and columns, hollow columns, cellular beams, concrete-filled hollow columns and solid steel tension rods. SC901 can be used on steel, cast iron and galvanised steel.

SC902 Intumescent Steel Coating is a two-component, high solids, high build, fire protection coating for structural steel, based on patented hybrid technology. Due to the unique elastomeric properties of SC902, excellent damage resistance is achieved. SC902 is designed to provide up to 120 minutes fire resistance to 'I' section beams and columns, hollow columns, cellular beams, concrete-filled hollow columns and solid steel tension rods. SC902 can be used on steel, cast iron and galvanised steel.

SC904 Intumescent Steel Coating is a fast-curing fire protection coating and is designed to provide up to 120+ minutes of fire resistance to structural steel. SC904 composition is identical to Thermo-Sorb HB but is the brand name outside of the North American market. SC904 can be used on steel, cast iron and galvanised steel.

Thermo-Sorb HB Steel Coating is a fast-curing fire protection coating and is designed to provide up to 120+ minutes of fire resistance to structural steel. Thermo-Sorb HB composition is identical to SC904 but is the brand name for the North American market. Thermo-Sorb HB can be used on steel, cast iron and galvanised steel.

UN CPC code: N/A

Other codes for product classification:
UFI: M7J4-S061-T00N-YV78 (for SC901 A)
UFI: 5111-P03D-800J-41UJ (for SC901 B)
UFI: 3XVA-A0GH-H00E-FY82 (for SC902 A)
UFI: 9E00-E039-J00E-QEDT (for SC902 B)
Product Code: 502958 (for SC904 Part B)
Product Code: 502957 (for SC904 Part B)
Product Code: NC310700AJ9D (for Thermo-Sorb HB Part A)

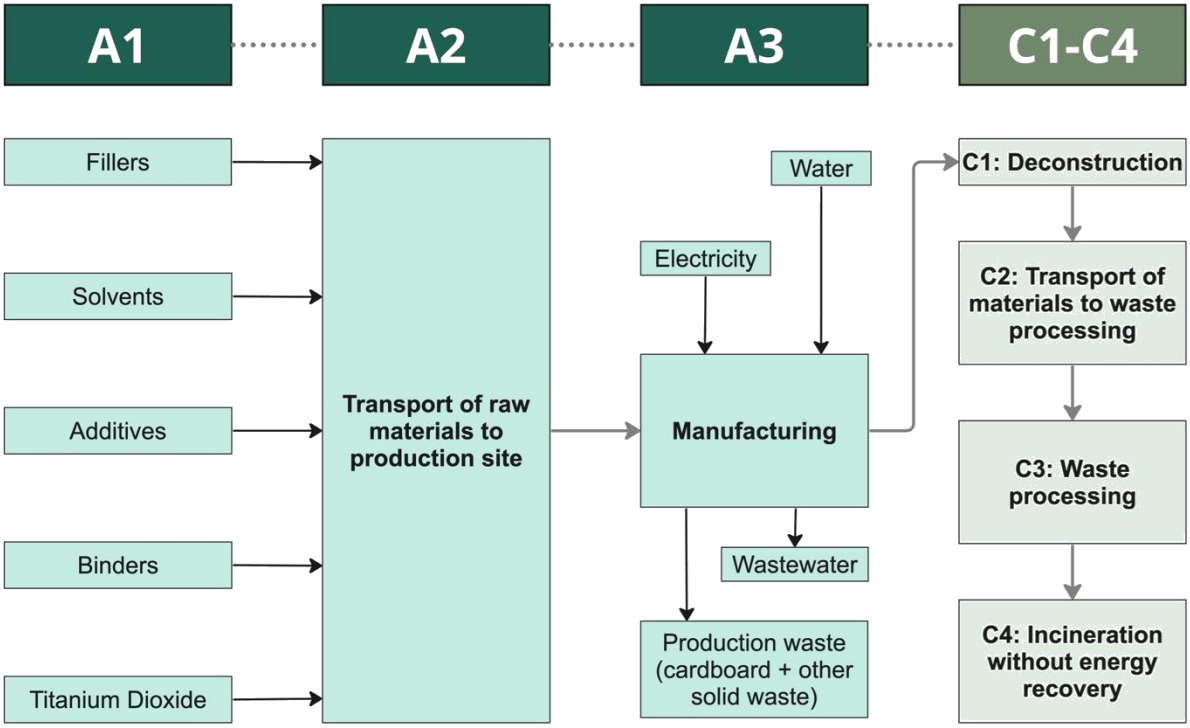
Product Code: NC310908BDSD (for Thermo-Sorb HB Part B)

Geographical scope:
Modules A1 (raw material supply) and A2 (transport) have been modelled for a global use case, A3 (manufacturing) to represent the United Kingdom market, and modules C1-C4 (end-of-life stage) and D (resource recovery stage) were modelled for the European market.

LCA information

Declared unit: 1kg of SC901,of SC902, SC904/Carboline Thermo-sorb HB.
Time representativeness: The activity data used for the LCA calculation covers the year 2022.
Database(s) and LCA software used: Ecoinvent 3.8 and Ecochain Helix 3.2.12
Electricity usage in A3: Electricity, low voltage, residual mix {GB} | electricity, low voltage | Ecoinvent 3.9 Cut-off; Climate impact: 0.45 kgCO2eq/kWh (GWP-GHG)
System boundaries: Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D)

System diagram:



Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results)

(ND - Not Declared, RER – Europe, GLO – Global, UK – United Kingdom)

	Product stage			Construction process stage	Use stage	End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport and construction installation	Use, maintenance, repair, replacement, refurbishment, operational energy and water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4 – A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	ND	X	X	X	X	X
Geography	GLO	GLO	UK	ND	ND	RER	RER	RER	RER	RER
Specific data used	> 90%			-	-	-	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-
Variation – sites	Not relevant			-	-	-	-	-	-	-

A3

The manufacturing process for coatings primarily involves the mixing and dispersing of raw materials into a homogeneous mixture. Raw materials, such as fillers, binders, additives, solvents and water, are first weighed out before they are added to the mixing vessel. After the mixing and dispersion of the materials, the coating is filled into the final packaging.

The mixing of the raw materials as well as the filling line consume electricity. In addition, the production system also uses water which is all turned into wastewater. Lastly, the production process also generates both cardboard and other general waste. Electricity and water consumption as well as waste generation were included in the model.

C1-C4

C1: The de-construction/demolition stage was included in the system boundaries of this assessment. However, due to the nature of the coating, the environmental impact of this lifecycle stage was considered immaterial and is hence declared as “0”. This is because the coating, after its application, is physically integrated with other materials and cannot be physically separated from these at the end of its life.

C2: Due to a lack of solid estimates on average transport distances, the default transport distances to the waste disposal site of the dataset used to model C4, namely *market for hazardous waste, for incineration | hazardous waste, for incineration | Europe without Switzerland - Ecoinvent v3.8 Cut-off*”, were used for C2.

C3: No waste processing options are considered.

C4: It is assumed that 100% of the coating will be incinerated without energy recovery along with the steel structure. The “market for hazardous waste, for incineration | hazardous waste, for incineration | Europe without Switzerland - Ecoinvent v3.8 Cut-off” dataset was considered to be the most representative scenario for this.

D

No benefits and loads beyond the product system boundary were declared since no reuse or recovery occurs for steel coatings in general. In addition, since incineration without energy recovery is assumed to be the waste disposal option in module C4, no “useful energy carrier” is considered leaving the product system. Therefore, no benefit is claimed in module D.

Methodology

Foreground Data: Tremco CPG UK Ltd. has supplied primary data for the amount of raw materials purchased (A1), the transport distance between their suppliers and production site (A2) as well as its manufacturing operations (A3) for the year 2022.

Background Data: Background data (e.g., for raw material extraction and manufacturing) have predominantly been sourced from the Ecoinvent database (v3.8) using Ecochain Helix software v3.2.12.

Allocation: The key production processes that require allocation are:

- Shared electricity and water consumption, wastewater generation and production waste generation at the Wigan production site were allocated on a mass basis, using the respective production volume of the considered products.

No secondary materials (that would require allocation) are used in the product system.

Cut-off criteria: The environmental impact of the product studied has been assessed by considering all significant processes, materials and emissions. Excluded flows are assumed to have a negligible impact, contributing less than 5% to the cumulative impact assessment categories. The following process is excluded:

- A3: Raw materials and processing for the packaging are excluded from the system as well as the end-of-life of packaging.

Key Assumptions: The key choices and assumptions in the LCA are:

- Proxy impact references were used for raw materials for which no Ecoinvent reference existed.
- Primary energy resources used as raw materials (PERM and PENRM indicators) could not be directly quantified due to a lack of data availability. Hence, it was assumed that the energy embedded in the raw materials the product is composed of was equal to the heating value in the “market for hazardous waste, for incineration | hazardous waste, for incineration | Europe without Switzerland - Ecoinvent v3.8 Cut-off” dataset used to model C4. This corresponds to a value of 17MJ/kg of product. Lack of data availability also meant that this energy could not be distributed among renewable and non-renewable primary energy used as raw materials. A worst-case scenario approach was thus taken, and it was assumed that all energy was non-renewable.

The end-of-life scenarios are based on a set of assumptions that may influence the outcome of the assessment. It is important to understand the scenarios before drawing conclusions based on this EPD. A detailed description of the used assumptions for C1-C4 can be found in the LCA information section.

Calculation of Average Results: This EPD is based on three similar products. As per the PCR, the average results of the included products are reported for each indicator, based on the declared unit of 1kg of product. The averages were calculated by taking each product’s value per indicator and averaging them.

Content information

The indicated information in the table below presents the average content of the SC901, SC902 and SC904/Carboline Thermo-sorb HB products. The range of weight based on which the average weight is calculated is also reported.

Product components	Weight, kg	Average weight, kg	Post-consumer material, weight-%	Biogenic material, average kg C/kg
Fillers	5,40E-01 ~ 5,49E-01	5,45E-01	-	5,04E-04
Additives	1,22E-01 ~ 1,31E-01	1,26E-01	-	2,49E-10
Binders	1,16E-01 ~ 1,18E-01	1,17E-01	-	1,52E-02
Titanium Dioxide	1,16E-01 ~ 1,17E-01	1,16E-01	-	-
Solvents	9,31E-02 ~ 9,65E-02	9,48E-02	-	-
TOTAL	1,00E+00	1,00E+00	0%	1,57E-02

Packaging materials	Weight, kg	Average weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Tin pails	7,16E-02 ~ 1,67E-01	10,34%	0
TOTAL	7,16E-02 ~ 1,67E-01	10,34%	0

Note 1: SC901 is sold in two parts, a 200-litre pail and a 50-litre pail, whereas SC902 is sold in a 20-litre and 2.5-litre pail. This explains the bigger difference in proportional weight. The disclosed weight corresponds to the respective packaging weight for 1kg of product.
Note 2: The environmental impact of packaging was not considered in the calculations and is hence excluded from the results.

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
Melamine	203-615-4	108-78-1	10,38%

Results of the environmental performance indicators

The environmental performance of the assessed products is reported below, using the parameters and units specified in the PCR. Characterisation factors from EN15804 based on EF 3.0 were used. The indicated values correspond to the average between the performance of the declared unit of 1kg of SC901, SC902, and SC904/Carboline Thermo-sorb HB respectively.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Mandatory impact category indicators according to EN 15804

Results per declared unit								
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**	**Variation**
GWP-fossil	kg CO_2 eq.	2,90E+00	0,00E+00	3,34E-05	0,00E+00	2,46E+00	0,00E+00	2%
GWP-biogenic	kg CO_2 eq.	-2,52E-02	0,00E+00	7,00E-08	0,00E+00	4,50E-02	0,00E+00	0%
GWP-luluc	kg CO_2 eq.	2,29E-02	0,00E+00	2,18E-08	0,00E+00	5,76E-04	0,00E+00	3%
GWP-total	kg CO_2 eq.	2,90E+00	0,00E+00	3,35E-05	0,00E+00	2,50E+00	0,00E+00	2%
ODP	kg CFC 11 eq.	3,64E-07	0,00E+00	7,15E-12	0,00E+00	2,94E-07	0,00E+00	3%
AP	mol H^+ eq.	2,03E-02	0,00E+00	2,60E-07	0,00E+00	3,89E-03	0,00E+00	5%
EP-freshwater	kg P eq.	4,99E-04	0,00E+00	4,18E-10	0,00E+00	5,22E-05	0,00E+00	20%
EP-marine	kg N eq.	4,60E-03	0,00E+00	8,63E-08	0,00E+00	7,85E-04	0,00E+00	5%
EP-terrestrial	mol N eq.	5,57E-02	0,00E+00	9,52E-07	0,00E+00	8,74E-03	0,00E+00	5%
POCP	kg NMVOC eq.	1,07E-02	0,00E+00	2,64E-07	0,00E+00	2,39E-03	0,00E+00	6%
ADP-minerals&metals*	kg Sb eq.	3,21E-05	0,00E+00	1,15E-10	0,00E+00	4,95E-06	0,00E+00	3%
ADP-fossil**	MJ	5,37E+01	0,00E+00	5,03E-04	0,00E+00	1,19E+01	0,00E+00	2%
WDP*	m^3	2,21E+00	0,00E+00	2,12E-06	0,00E+00	3,25E-01	0,00E+00	1%
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*
*** Disclaimer: The assessment of this indicator contains some unavoidable inconsistencies, and results should be interpreted with caution.*

Variation is defined as the impact indicator results of the worst-case product divided by the best-case product. Variation has been calculated based on the combined impact of modules A1-A3 and C1-C4 of each indicator.

Additional mandatory and voluntary impact category indicators

Results per declared unit								
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**	**Variation**
GWP-GHG[1]	kg CO_2 eq.	2,92E+00	0,00E+00	3,34E-05	0,00E+00	2,46E+00	0,00E+00	2%
PM	disease incident	1,63E-07	0,00E+00	3,31E-12	0,00E+00	3,72E-08	0,00E+00	2%
IRP	kBq U-235 eq	1,18E-01	0,00E+00	2,29E-06	0,00E+00	5,10E-02	0,00E+00	2%
ETP-freshwater	CTUe	6,09E+01	0,00E+00	4,10E-04	0,00E+00	4,74E+01	0,00E+00	10%
HTP-cancer	CTUh	3,53E-09	0,00E+00	1,96E-14	0,00E+00	1,53E-09	0,00E+00	2%
HTP-non-cancer	CTUh	1,53E-07	0,00E+00	4,40E-13	0,00E+00	1,80E-08	0,00E+00	2%
SQP	Pt	4,31E+01	0,00E+00	3,96E-04	0,00E+00	2,83E+00	0,00E+00	2%
Acronyms	PM = Particulate matter; IRP = Ionising radiation, human health; ETP-freshwater = Ecotoxicity, freshwater; HTP-cancer = Human toxicity, cancer effects; HTP-non-cancer = Human toxicity, non-cancer effects; SQP = Land use related impacts.							

Resource use indicators

Results per declared unit								
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**	**Variation**
PERE	MJ	3,00E+00	0,00E+00	1,29E-05	0,00E+00	4,91E-01	0,00E+00	2%
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%
PERT	MJ	3,00E+00	0,00E+00	1,29E-05	0,00E+00	4,91E-01	0,00E+00	2%
PENRE	MJ	5,79E+01	0,00E+00	5,34E-04	0,00E+00	1,27E+01	0,00E+00	2%
PENRM	MJ	1,70E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%
PENRT	MJ	7,49E+01	0,00E+00	5,34E-04	0,00E+00	1,27E+01	0,00E+00	2%
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%
FW	m^3	5,93E-02	0,00E+00	8,86E-08	0,00E+00	8,60E-03	0,00E+00	1%
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water							

Waste indicators

Results per declared unit								
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**	**Variation**
Hazardous waste disposed	kg	5,29E-05	0,00E+00	1,20E-09	0,00E+00	4,23E-05	0,00E+00	2%
Non-hazardous waste disposed	kg	5,33E-01	0,00E+00	2,72E-05	0,00E+00	4,72E-01	0,00E+00	2%
Radioactive waste disposed	kg	1,15E-04	0,00E+00	3,35E-09	0,00E+00	7,04E-05	0,00E+00	2%

Output flow indicators

Results per declared unit								
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**	**Variation**
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%
Material for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0%

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