TECHNICAL DATA SHEET - TDS

Dynamo Polyurethane Systems - **TUNDRA/ECO2000** Extreme Cold Spray Foam System

Material Specification Criteria | Project Submittal Data

Code Compliance Research Report: **CCRR - 0491**

DYNAMO TUNDRA

MEDIUM DENSITY • CLOSED CELL FOAM • LBA • TYPE I,II,III, IV and V CONSTRUCTION

Dynamo Tundra is a two component, medium density, one to one by volume spray applied polyurethane foam. To produce Dynamo Tundra requires the use of an "A" component (**Dynamo ISO**) and a blended "B" component (**Dynamo Tundra RESIN**). As a component to proper building envelope construction. ***Dynamo Tundra is designed to work in extreme cold climates.*** Dynamo Tundra's Pass thickness of two and 1/2 inches (2.5") per pass.

Recommended substrate temperatures are equal or greater then 15°F (- 9°C)

Dynamo Tundra contains latest generation of ZERO ozone depleting blowing agents. Dynamo Products are Greenguard Certified.

Recommended Product Applications:

Walls, Ceilings, Vented and Unvented Attics, Vented and Unvented Crawl Spaces, Floors, Ducts, Freezers, Tanks, Piping, Coolers, Foundations, Cold Storage, Concrete Slabs

TYPICAL PHYSICAL PROPERTIES

PROPERTY	DYNAMO Tundra Value	TEST METHOD
R - Value	R-Value at 1 inch: 7.5	ASTM C518
Closed-Cell Content	>97.5%	ASTM D2856
Core Density	2.0 - 2.1 lb/ft^3	ASTM D1622
Air Permeance @75PA	< 0.002 L/s . m^2	ASTM E2178
Tensile Strength	33 psi,pass	ASTM 1623
Water Vapor Transmission	.83 Perms @ 1"	ASTM E96
Water Absorption (% Volume)	0.5%	ASTM D2842
Dimensional Stability	-4.45% @158° F and 97% RH	ASTM D2126
Compression Strength	26.4 PSI	ASTM D1621
Fungi Resistnace	Pass,No Growth	ASTM C1338
Re-Entry (worker)/Re-Occupancy	10 ACH	1 hour / 2 hour

BUILDING CODE CERTIFICATIONS / FIRE TEST DATA

EVALUATION SERVICE REPORT		INTERTEK		Report : CCRR - 0491	
NFPA 286		Pass		Thermal Barrier Compliant IBC / IRC	
FLAME SPREAD	ASTM E84	Class I < 15	SMOKE DEVELOPMENT	ASTM E84	Class I < 300
VOC EMISSIONS		UL Environment (Greenguard Gold)		Meets Criteria	
NFPA 259		2603.5 Potential Heat		1989 Btu/ft^2 per inch	
NFPA 285		PASS - EXTERIOR WALL SYSTEMS			
ASTM D1929		Ignition Properties (spontaneous ignition temperature)		>850° F	
AC377 Appendix X		PASS - Appendix X, for use in attics and crawl spaces without a prescriptive ignition barrier or intumescent coating.			

THERMAL BARRIER: Current International Building Code (IBC) and International Residential Code (IRC) require that spray polyurethane foam be separated from the building interior by a code prescribed 15 minute thermal barrier or a code-approved alternative. Gypsum board at a minimum thickness of 1/2" is a code prescribed 15 minute thermal barrier. The following intumescent coatings when installed per manufacturer specifications are approved as thermal barrier alternatives for Dynamo Tundra:

see Code Compliance Report for detailed information same as Dynamo ECO2000

APPROVED INTUMESCENT COATINGS

Product	Application Rates:
No-Burn Plus ThB	14 Wet Mils
DC315™ 115 SQ FT/GAL	18 - 20 Wet Mils
Flame Control 60/60A	14 Wet Mils
ICP F10E	14 Wet Mils

RECYCLED AND RENEWABLE CONTENT OF DYNAMO ECO 2000 systems

Finished Foam Renewable and Recycled Content	22.7%
Polyol Recycled Content	37.4%
Polyol Renewable Content	8%

VAPOR RETARDER: Dynamo Tundra Closed cell foam insulation qualifies as vapor retarder as defined by the ICC and ASHARE (class II) at a minimum thickness of 1 1/2 inches. Buildings with a persistent high moisture drive may require additional moisture remediation as local building codes will dictate.

APPLICATION GUIDELINES: Polyurethane foam systems should be processed through commercially available spray equipment designed for that purpose by a qualified professional applicator. Consult the current Dynamo Polyurethane Systems application guidelines for Dynamo Tundra prior to installation. **It is the responsibility of the professional applicator to thoroughly understand all equipment technical information and safe operating procedures that pertain to spray polyurethane foam application. Always follow proper PPE guidelines.**

APPLICATION PARAMETERS

Storage Temperature	50°F - 80°F	(10 to 26°C)
Ambient Temperature	> 15°F	(- 9°C)
Equipment Static Pressure Dynamic	1,100-1,400 psi	
Preheat Temperature (A&B/Hose)	105°F-130°F	(40-54°C)
Drum Temperature (prior to use)	65°F-80°F	(18-26°C)
Drum Storage Temperature (warehouse)	50°F-80°F	(10-26°C)

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Material Shelf Life:
Properly stored unopened Dynamo Tundra RESIN drums have a Six (6) month shelf life. Seal drums tightly after every use. Only combine Dynamo Tundra resin with Dynamo Tundra resin. Do not allow product to freeze. Other manufacturer products should not be combined with Dynamo Tundra Resin. Caution when changing from other manufacturer's product to Dynamo Tundra, follow recommended change over procedures.

Safety and Material Handling:
MANDATORY! Respiratory protection. Dynamo Polyurethane Systems requires that supplied air and a full face mask be used during the application of any spray applied foam system. Visit Dynamo Polyurethane System's website or CPI's website (www.polyurethane.org) for a copy of the Model Respiratory Protection Program developed by CPI. Wear a NIOSH approved respirator. The "A" component contains reactive isocyanate groups. Persons with known respiratory allergies should avoid exposure to the A (ISO) component. Applicators should ensure the safety of the job site and construction personnel by posting appropriate signs warning of spray foam work in progress and that all "hot work" such as welding, soldering and cutting with torches should take place no less than 3 - 5 feet from any exposed foam. If "hot work" must be performed all spray polyurethane foam should be covered with an appropriate fire or welder's blanket and a fire watch should be provided. The materials must be handled and used with **adequate ventilation** the vapors must not exceed the TLV (0.02 parts per million) for isocyanate. Avoid breathing vapors. Wear a NIOSH approved respirator. If inhalation of vapors occur, remove victim from contaminated area and administer oxygen if breathing is difficult. Call a physician immediately. Avoid contact with skin, eyes and clothing. Always open containers slowly and carefully, allowing any pressure to be released slowly and safely. Wear appropriate chemical safety goggles and rubber gloves when handling or working with these materials. In case of eye contact, immediately flush with large amounts of water for at least fifteen minutes. Consult a physician immediately. In case of skin contact, wash area with soap and water. Wash clothes before reuse. Consult this product's SDS sheet for further information.

In Case of Spills or Leaks:

- Utilize appropriate personal protective equipment (PPE)
- Ventilate area to remove vapors
- Contain and cover spilled material with a loose, absorbent material such as oil-dry, vermiculite or sawdust.
- Shovel absorbent waste material into proper waste containers
- Wash the contaminated areas thoroughly with hot, soapy water
- Report sizable spills to proper environmental agencies

In Case of Fire: ***It is recommended that a fire extinguisher be located in an easily accessible portion of the work area.***
Extinguishing Media: Dry chemical extinguishers such as monoammonium phosphate, potassium sulfate and potassium chloride. Additionally, carbon dioxide, high expansion (protein) chemical foam or water spray for large fires. Positive pressure ventilation of the work area is recommended to minimize the accumulation of vapors in the work area during application. Improper application techniques for this foam system must be avoided, including: excessive thickness, off ratio material and spraying into rising foam. The potential results of improperly applied materials may include, but not limited to: excessive heat build-up that may result in a fire or offensive odors (which may not dissipate with time) and/or poor product performance due to improper density of the applied material. Large masses of sprayed materials should be avoided. When large masses are generated they should be removed from the area, cut into small pieces and allowed to cool before disposal. Failure to follow these recommendations may result in a fire.

Thermal Barrier:
Building codes IRC and IBC require SPF be separated from the interior of a building by an approved fifteen (15) minute thermal barrier, such as 1/2" gypsum wall board or equivalent, installed per manufacturer's instructions and corresponding code requirements. There are exceptions to the thermal barrier requirement: (1) Code authorities may approve coverings based on fire tests specific to the SPF application. (Example: covering systems that successfully pass large scale tests may be approved by code authorities in lieu of a thermal barrier.) (2) SPF protected by 1" thick masonry does not need a thermal barrier. Certain materials that offer protection from ignition, called "ignition barriers," may not be considered as thermal barrier alternatives unless they comply with NFPA 286 or other similar full scale tests. Applicators should request test data and code body approvals or other written indications of acceptability under the code to be sure the product selected offers code-compliant protections.

Material Change Over / Flushing Procedures:
This procedure must be followed whenever changing from one SPF system to another. Before Dynamo Tundra is introduced into any equipment previous material must be purged. Failure to do so can result in product issues. Care must be taken to not allow any other material into the Dynamo Tundra resin. Shut off all heats and spray machine. Disconnect air to both transfer pumps and remove the resin drum pump. Wipe all areas of pump clean and invert pump over bucket to ensure drum pump housing is emptied. Place pump into new resin drum. Remove spray gun from coupling block. With shut off valves closed connect air to resin transfer pump. Open resin side shut off valve only and allow material to pump into a clean bucket. Purging will take between 2-5 gallons. Re-connect cleaned spray gun and all air to transfer pumps. Turn on spray machine and begin heating procedures.
Technical Assistance: For additional assistance please contact the Dynamo Polyurethane Systems Technical Services Department (469) 799-9991.

2:1 transfer pumps are recommended for material transfer from container to the proportioner.

CAUTION: Extreme care must be taken when removing and reinstalling drum transfer pumps so as NOT to reverse the "A" and "B" components.

DISCLAIMER: *To the best of our knowledge, all technical data contained herein is true and accurate as of the date of issuance and subject to change without prior notice. User must contact Dynamo Polyurethane Systems to verify accuracy before specifying or ordering. We guarantee our products to conform to the quality control standards established by Dynamo Polyurethane Systems. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of the product. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY DYNAMO POLYURETHANE SYSTEMS LLC EXPRESSED OR IMPLIED STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.*

EMERGENCY NOTIFICATIONS:
CHEMTREC : Material Leaks, Spills or Fire (800) 424-9300