

## EnerShield™- PSF Low Emissivity Ceiling System Specifications

### PART 1 GENERAL

#### 1.1 Scope

- a) The contractor shall furnish and install a complete overhead suspended EnerShield low emissivity ceiling curtain system with the appropriate coverage as called for in the associated project drawings and specifications. The **EnerShield** low emissivity ceiling curtain system is provided by Energy Ice Inc. – Burlington, Canada, (905) 632-0423.
- b) The contractor shall also include in their bid, a installation reference list with a minimum of 10 previous **EnerShield** installations which have been installed by this contractor. Included in this list must be the facility name, facility location, contact name, and contact phone number.

#### 1.2 Submittals

- a) Shop Drawings: The manufacturer (Energy Ice) shall upon receipt of contract from the owner or his representative, prepare submittals of materials as well as construction detail for installation. Manufacturer will provide submittals to owner and/or his representative for any changes in print dimensions for approval before fabrication of materials.
- b) Warranty: Entire ceiling system shall be warranted against defects in material and workmanship for a period of three (3) years from the date of installation.

#### 1.3 Qualifications

- a) All materials will be per plans and specifications of Energy Ice and constructed, manufactured and installed per project plans and specifications. All equipment and materials supplied under these specifications shall be new and of the best grade material and construction.

#### 1.4 Delivery

- a) To be arranged with owner and/or his representative to coincide with timely completion of entire project.

### PART 2 PRODUCT

#### 2.0 General

The system specified is based solely upon the characteristics and standards listed herein. The listed criteria has been established as the minimum acceptable values for any low emissivity ceiling system to be offered on this project. As all aspects and equipment within the ice rink have been designed to utilize the low emissivity ceiling principle, products not meeting the minimum requirements listed will not be accepted as they could adversely affect the performance of the rink.

Only those materials or exceeding the following ASTM values and surface burning characteristics shall be acceptable.

## 2.1 Materials

Low Emissivity material shall be **EnerShield™-PSF** by Energy Ice. It shall have an emissivity of 0.03 and a bursting strength of 130 beach units. Low emissivity ceiling material shall be composed of 0.0003” polished aluminum foil laminated to a 0.0015” polypropylene backing with flame resistant adhesive and a 4”x4” fiberglass reinforcing scrim. It shall have the physical properties as listed below.

### ENERSHIELD™ – PSF POLYPROPYLENE/SCRIM/FOIL

**Meets ASTM C1136, TYPE II**

<b>FACING COMPOSITION VALUES (METRIC)</b>	<b>DESCRIPTION</b>	<b>VALUES (ENGLISH)</b>	
White Film	Polypropylene	0.0015 inch	38.1 micron
Adhesive	Flame Resustant		
Reinforcing	Bi-directional	4/inch (MD)	16/100mm (MD)
	Fiberglass	4/inch (XD)	16/100mm(XD)
Foil	Aluminum	0.0003inch	7.6 micron

<b>PHYSICAL PROPERTIES</b>	<b>TEST METHOD</b>	<b>VALUES (ENGLISH)</b>	<b>VALUES(METRIC)</b>
Basis Weight	Scale	19 lbs/100 ft	93 gm/m
Permeance (WVTR)	ASTM E96 Procedure A	0.02 perm (grains/hrft <sup>2</sup> in HG)	1.15 ng/N s
Bursting Strength	ASTM D774	90 psi	6.3 kg/cm
Puncture Resistance	ASTM C1136	130 beach units	3.9 Joules
Tensile Strength	ASTM C1136	45 lbs/inch width (MD) 45lbs/inch width (XD)	739 kn/m (XD) 7.9 kn/m(XD)
Caliper/Thickness	Micrometer	0.008 inch	203 micron
Accelerated Aging	30 Days @ 95% RH, 120°F(49°C)	No Corrosion No Delamination	No Corrosion No Delamination
Low temperature Resistance	ASTM D1790 -40°F(-40°C)	Remains Flexible No Delamination	Remains Flexible No Delamination
High Temperature Resistance	4 hours@ 240°F (116°C)	Remains Flexible No Delamination	Remains Flexible No Delamination
Water Immersion	24 hours@73°F(23° C)	No Delamination	No Delamination
Mold Resistance	ASTM C665	No Growth	No Growth
Dimensional Stability	ASTM D1204	0.25%	0.25%
Emissivity (Foil)	ASTM E408	0.03	0.03
Light Reflectance(Film)	ASTM C523	85%	85%

<b>FIRE TESTING</b>	UL-723	
	Flame Spread	Smoke Developed
<b>Film Exposed</b>	10	20
<b>Foil Exposed</b>	5	10

**Physical Properties based upon statistical averages, Weight Thickness+/- 10%**

## 2.2 Suspension System

Individual ceiling sections shall be supported by a suspension system consisting of PVC coated aircraft cables running the length of the ice rink at approximately 6' centers or less. Cables shall be galvanized 3/32" in diameter – PVC coated to a diameter of 3/16". Cables shall have a minimum breaking strength of 920 lbs tension. Cables shall be secured at each end to structural building members and vertically with intermediate supports at a maximum spacing of 30' c/c.

All cables shall be connected using a minimum of one 6" hook and eye turnbuckle. Each connection shall be made with a minimum of two micro press aluminum crimping sleeves. Side cables shall be tensioned with a minimum of two (2) – 6" turnbuckles. All cable connections, supports and terminations shall be as specified in the project drawings.

## 2.3 Clamping System

Each individual low emissivity ceiling section shall be terminated at each side by clamping to a 3/16" OD aircraft side cable using the Energy Ice extruded snap clip. Side termination cables shall be 3/16", 7x19 strand, plain galvanized steel aircraft cable. Clamps shall be designed to tightly hold low emissivity material in place at adequate tension to prevent sags or gaps in low emissivity ceiling material. Clamps shall be removable to permit roof & beam inspections or other low emissivity ceiling adjustments. Permanent or non-removable fastening systems will not be accepted.

## 2.4 Installation

EnerShield low emissivity ceiling shall be installed from side wall to side wall and end wall to end wall in the rink with a coverage of approximately \_\_\_\_\_' x \_\_\_\_\_'.

Low emissivity ceiling panels shall be suspended side by side above the cables with a minimum 6" overlap between panels. Panels shall be tensioned above cables to create a smooth finished surface and prevent any unevenness or gaps in the overlapping edges.

Small cuts or slits may be made in each panel to accommodate obstructions such as lights, fans, heaters, knee braces etc. All edge cuts shall be supported by the adjacent panel and shall be reinforced with EnerShield edge tape suitable for low emissivity ceiling applications.

## 2.5 Protective Netting (AS REQUIRED BELOW 30' HEIGHT)

For some installations where the low emissivity ceiling is installed at a height of 30' or less, **EverSafe** protective nylon netting should be horizontally installed to cover the low emissivity ceiling. Netting shall be **EverSafe** by Energy Ice Inc composed of 1.5" x 1.5" Dupont white mesh. This netting should be installed to cover a minimum of 50 feet at each end of the ice rink to protect the ceiling from wrinkling or damage caused by puck impact. The netting should be located and tensioned to create a space of at least 4" between the netting and the low emissivity ceiling.

## 2.6 Manlift Equipment

The installation contractor will provide articulating or boom manlift equipment required for the installation. Manlift shall be required for a minimum 2 week time period. It shall be propane powered and suitable for reaching to all surfaces at the existing rink interior roof deck.

Should you require further information please contact:

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