ISO-C1® /6.0 Polyisocyanurate Insulation

6.0 lb/ft³ (96.1 kg/m³) Density Foam

ISO-C1® /6.0

Meets ASTM C591-17

ISO-C1/6.0 is Dyplast Products' 6.0 lb/ft³ polyisocyanurate rigid, closed cell, foam insulation. ISO-C1/6.0 physical properties is certified by independent laboratories. ISO-C1/6.0 is ideally suited for low temperature piping and refrigeration applications where added compressive, shear, flexural, or tensile strength beyond that available in 4.0 lb/ft³ polyiso is appropriate. ISO-C1/6.0, for example, is well suited for pipe saddle applications where superior insulating properties combine with excellent compressive strength.

Dyplast Products offers ISO-C1/6.0 as variable-sized bunstock or as sheets and blocks with tolerances to 1/32 inch. Our extensive network of fabricators can provide special shapes for pipe, fittings, vessels, or other mechanical applications.

Polyisocyanurate exhibits the highest R-factor (insulating value) to thickness ratio of commercially available insulation, and our ISO-C1 product line provides higher R-factors and reduced thermal aging at lower temperatures. Ideal for low-temperature and cryogenic applications, ISO-C1 offers superior performance when compared to polystyrene, polyurethane, phenolic, fiberglass, and cellular glass alternatives. Our ISO-C1 product line is also available in 2, 2.5, 3, and 4 lb/ft³ densities, which each provide successively improved strength and other attributes for physically demanding applications.

Dyplast Products offers mechanical insulation solutions for an array of low temperature applications such as LNG insulation, cryogenic insulation, chilled water pipe insulation, refrigeration insulation, and low temperature steam insulation - - and in industries ranging from building construction, roofing, refrigeration, transportation, petrochemical, pharmaceutical, marine, and more.

APPLICATIONS

ISO-C1/6.0 is designed for use where temperatures range from -297F to +300F, making ideal for refrigeration and freezers, commercial HVAC and chill water systems, cryogenic processes such as LNG (liquid natural gas) and LOX (liquid oxygen), panel insulation for transportation containers, duct and air plenum insulation, and core material for architectural and panel construction.

NOTE TO ENGINEERS AND CONTRACTORS

Visit www.dyplast.com for easily accessible infor- mation on specifications as well as installation, MSDS, and more. Relevant documents are retrievable within two clicks from our home page.

WATER ABSORPTION (WA)

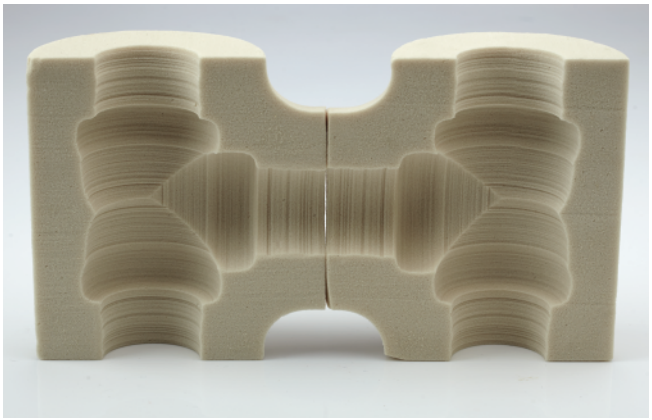
Water absorption by insulation can degrade thermal insulating performance, although the correlation between WA and loss of thermal efficiency varies considerably between insulants. ISO-C1/6.0's extraodinary resistance to water absorption (0.6%) helps ensure long-term thermal performance, and remains superior to polystyrenes, phenolic foams, and fiberglass. Proper installation of vapor barriers can further improve performance of the complete ISO-C1/6.0 insulating system.

THERMAL EFFICIENCY

With its high R-factor, ISO-C1/6.0 can achieve the same insulating value with as little as half the thickness required by alternative insulating materials. Less insulation leads to thinner walls, more space, and fewer and tighter energy-losing seams - - further enhanced by the availability of larger pieces (for example, 24-foot lengths). Less insulation in mechanical applications also equates to reduced quantities of expensive vapor retarders, jackets, and mastics. The lighter weight of ISO-C1/6.0 compared to cellular glass reduces structural support requirements.

R-FACTOR

High thermal insulation efficiency is achieved by infusing cells with gases having low thermal conductivity. All such rigid foam insulation (including polyurethane, extruded polystyrene, and polyisocyanurate) thus lose a small amount of their insulating value over time as air displaces insulating gases. ISO-C1/6.0's smaller, stronger cell structure and our proprietary cell-gas formulation work together to impede gas transfer across cell boundaries, thus reducing loss of thermal efficiency. It is important to note that ISO-C1/6.0's service temperatures is normally well below 75F, and that thermal aging is reduced considerably at lower operating temperatures. Thicker insulation, vapor barriers, and metal constraints also limit gas diffusion.



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REV. ISOC1/6.0 0318

ISO-C1®/6.0 Polyisocyanurate Foam Comparison versus ASTM C591-17

GENERAL PHYSICAL PROPERTIES [1,2,3]	ISO-C1/6.0	ASTM C591 Max or Min
Service Temperature (Maximum)[4], °F (°C)	300 (149)	300 (149)
(Minimum)	-297 (-183)	-297 (-183)
12.1[5] Nominal Density, D1622, lb/ft^3 (kg/m^3)	6 (96)	≥6 (96)
12.2 Compressive Resistance (Strength), D1621, psi (kPa)		
Parallel	150 (1032)	≥125 (862)
12.3 Apparent Thermal Conductivity, C177 [6] (aged 6 months @ 73 ± 4°F), Btu·in/hr·ft^2·°F (W/m ·°K)		
Mean temp of measure -200°F (-129°C)	0.13 (0.018)	≤0.15 (0.022)
Mean temp of measure -150°F (-101°C)	0.15 (0.021)	≤0.17 (0.025)
Mean temp of measure -100°F (-73°C)	0.17 (0.025)	≤0.19 (0.027)
Mean temp of measure -50°F (-45°C)	0.18 (0.026)	≤0.21 (0.030)
Mean temp of measure -0°F (-17°C)	0.17 (0.025)	≤0.22 (0.032)
Mean temp of measure +50°F (+10°C)	0.18 (0.026)	≤0.21 (0.030)
Mean temp of measure +75°F (+24°C)	0.19 (0.027)	≤0.22 (0.032)
Mean temp of measure +150°F (+66°C)	0.22 (0.032)	≤0.26 (0.037)
Mean temp of measure +200°F (+93°C)	0.23 (0.033)	≤0.30 (0.043)
Apparent Thermal Conductivity, C518[9], aged +75F (+24C)	0.22 (0.032)	≤0.22 (0.032)
Average +75F (+24C) Mean Temperature Value	0.22 (0.032)	Not Specified
12.4 Hot-Surface Performance, C411, at 300°F (149°C) Deflection inches (mm)	Pass @ 0.06 (1.5)	≤0.25 (6)
12.5 Water Absorption, C272, % by volume	0.6	≤0.8
12.6 Water Vapor Permability (Transmission), E96, Perm-in (ng/Pa·s·m)	1.6 (2.3)	≤2.0 (2.9)
12.7 Dimensional Stability [7], D2126, % linear change		
-40°F, 14 days	0.5	≤1
158°F, 97% RH, 14 days	-1.2	≤4
212°F, 14 days	0.6	≤2
12.8 Closed Cell Content, D6226, %	95	≥90
ASTM C591-17 COMPLIANCE	YES	YES

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ISO-C1® /6.0 POLYISOCYANURATE INSULATION (nominal 6 lb density)

12.9 Surface Burning Characteristics[8] (if required), E84		
	Flame Spread (@ 4 inch thickness)	<25
	Smoke Density (@ 4 inch thickness)	<100
12.10 Leachable Chloride, C871, ppm		39
The following properties are not Numerically Specified in ASTM C591 yet often reported		
Shear Strength, C273, psi (kPa)	Parallel	76 (525)
	Perpendicular	84 (575)
Shear Modulus, C273, psi (kPa)	Parallel	800 (5515)
	Perpendicular	840 (5800)
Tensile Strength, D1623, psi (kPa)	Parallel	131 (900)
	Perpendicular	114 (790)
Tensile Modulus, D1623, psi (kPa)	Parallel	4420 (30500)
	Perpendicular	3670 (25300)
Flexural Strength, C203, psi (kPa)	Parallel	221 (1520)
	Perpendicular	230 (1590)
Flexural Modulus, C203, psi (kPa)	Parallel	4610 (31800)
	Perpendicular	5620 (38700)
Color		Tan

1. All properties were measured at temperatures at or near 75°F unless otherwise indicated, and all test values were obtained from independent certified testing laboratories.
2. These are nominal values obtained from representative product samples, and are subject to normal manufacturing variances.
3. Average value through the foam cross section of tested sample.
4. Above 300°F, discoloration and charring will occur, resulting in an increased k-factor in the discolored area.
5. Table 1 includes the paragraph numbering system utilized within Section 12 of ASTM C591.
6. Thermal Conductivities (k-factors) at Low Temperatures: ASTM C591 is the Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal, and is arguably the key Standard used by insulation system end-users and engineer/specifiers to guide decision-making. Compliance with ASTM C591 is often a prerequisite within an insulation Request for Proposal. The latest version of the Standard, ASTM C591-17, imposes some additional requirements such as revised limits on thermal conductivities (k-factors) measured across a temperature range from +200°F to -200°F. Dyplast has traditionally offered this information to its clients; our k-factor results are compliant.
7. Frequent and severe thermal cycling can produce dimensional changes significantly greater than those listed here. Special design considerations must be made in systems subject to severe cycling.
8. This numerical flame spread data is not intended to reflect hazards presented by this or any other material under actual fire conditions.
9. Quote from ASTM C177: "5.9 The results of comparative test methods such as Test Method C518 depend on the quality of the heat flux reference standards. The apparatus in this test method is one of the absolute methods used for generation of the reference standards. The accuracy of any comparative method can be no better than that of the referenced procedure. While it is possible that the precision of a comparative method such as Test Method C518 will be comparable with that of this test method, Test Method C518 cannot be more accurate. In cases of dispute, this test method is the recommended procedure."

CONDENSATION

For optimum performance and longevity, insulation systems for low temperature applications must be designed to control condensation. One primary design strategy is to specify high insulation efficiency since if the surface temperature of the insulation system can be maintained above the dewpoint, condensation will not occur. Since a minimal amount of condensation may be acceptable (or unavoidable) in humid environments, a secondary design strategy is to also demand insulation with low water vapor transmission. In this regard, no other insulation alternative offers ISO-C1/6.0's combination of superior R-factor and low water vapor permeance of 1.6 perm-inch.

FEATURES AND BENEFITS

- Fabrication available to virtually any shape/size
- Variable bunstock sizing in 3 dimensions
- Environmentally friendly (Zero-ODP)
- Sheets can be cut to 1/32" tolerance
- Easy to handle, shape in the field
- Excellent Moisture Resistance
- Superior insulating value
- High flexural strength
- Dimensionally stable
- Chemically resistant
- Low life-cycle cost
- Light-weight

THERMAL EFFICIENCY

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DISCLAIMER OF WARRANTIES AND LIABILITIES

Dyplast Products, LLC ("Dyplast") warrants that all products manufactured and sold by us are free from defects in material and workmanship at the time of shipment. Dyplast shall be notified promptly of any material claimed defective and such materials shall be subject to inspection by Dyplast. With respect to material proven to be defective, Dyplast will replace any material; replacement will be CIF to the buyer's location. This warranty is given in lieu of all other warranties expressed or implied, including without limitation any warranty of merchantability or fitness for a particular purpose and all other such warranties are expressly disclaimed. In no event shall Dyplast be liable, under this warranty for special, incidental, punitive or inconsequential damages of any kind whatsoever arising from the use or installation of the materials sold hereunder, and Dyplast's liability under the above warranty shall be expressly limited to the cost of those materials proven to be defective. In no event, whether as a result of breach of contract, warranty or alleged negligence shall Dyplast be liable for damages for lost profits or revenue, claims of Dyplast's customer's or their customer's inability to operate their facilities, or any other item of special incidental, punitive or consequential damages.

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