

Technical Bulletin:

EverGreen® Cut ‘n Wrap Insulation Kits and ASTM C1695-10

Summary: EverGreen Cut ‘n Wrap Insulation Kits are designed and manufactured to industry standards. The materials from which the insulation blankets are made: fabric, hook and loop fastener tape, and insulating fibrous glass wool all meet the industry requirements for tensile strength, tear strength, pull strength, thermal conductivity, and other performance criteria. These industry standards are embodied in a specification, ASTM C1695-10, titled: *Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service.*

About ASTM C1695-10: This standard specification was most recently revised in 2010, hence the “-10” at the end. It has several sections:

1. Scope
2. Reference Documents
3. Terminology
4. Materials
5. Design and Fabrication
6. Construction
7. Tie Down / Anchor Strap Construction
8. Identification Tags
9. Inspection
10. Rejection
11. Thickness Table
12. Keywords

Further, Sections 6, 7, and 8 each have two subsections: i) Outdoor Applications and ii) Indoor Applications. So, there are different requirements for each application since the former must meet the more severe performance of excluding water from precipitation as well as be resistant to UV light, wind, and low temperature exposure. While the requirements for indoor applications are not as severe as for outdoor applications, the blankets must still meet certain minimum requirements. By having separate requirements, the user of C1695-10 is assured of specifying insulation blankets with high performance and yet not be over-specifying blankets, resulting in unnecessary material and installation costs.

Performance of EverGreen Cut ‘n Wrap Insulation Kits: In terms of performance, EverGreen Cut ‘n Wrap Insulation Kits are designed to provide the following:

- i. Withstand service temperatures up to 500° F without significant release of decomposition gasses and without the hot side fabric melting, becoming brittle, or falling apart;

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- ii. Provide a thermal performance equivalent to a 1 inch thickness of 1 pound per cubic foot density fiberglass insulation (i.e., sufficient to reduce heat loss by at least 85% compared to the same bare surface);
- iii. Be sufficiently durable to withstand a minimum of 5 years of handling;
- iv. Repel water and most common oils;
- v. Have sewn seams that will hold together while keeping the fibrous glass insulation encapsulated within the fabric after at least 25 cycles of removal and reinstallation;
- vi. Have hook and loop fastener tape that secures the insulation blankets around pipe components yet is easy to remove and reattach, at least 25 times;
- vii. Meet the ASTM E84 flame spread / smoke developed indices of 25 / 50;
- viii. Be relatively easy to cut to a shape, and then install, in the field using simple hand held tools;
- ix. Release very little fibrous glass dust when handled.

Meeting ASTM C1695-10 Requirements:

1. ASTM C1695-10 has several specific requirements, for indoor removable / reusable insulation blankets, all of which EverGreen Cut 'n Wrap meets or exceeds. These requirements are as follows:
 - 1.1.1. The fiberglass insulation meets or exceeds the requirements of ASTM C553: "Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications", Type V.
 - 1.2. Maximum thermal conductivity (in units of Btu-in/hr-ft²-°F), per ASTM C177 or C581, of each of the following values at the corresponding value of mean temperature:
 - 1.2.1. @ 75° F mean, k = 0.31
 - 1.2.2. @ 100° F mean, k = 0.33
 - 1.2.3. @ 200° F mean, k = 0.44
 - 1.2.4. @ 300° F mean, k = 0.60
 - 1.2.5. @ 400° F mean, k = 0.89
 - 1.3. Maximum water sorption, per ASTM C1104/1104M, of 5% by weight.
 - 1.4. Maximum flame spread index / smoke developed index, per ASTM E84, of 25 / 50.
 - 1.5. Flexible per ASTM C1101/C1101M.
 - 1.6. Non-corrosive to steel per ASTM C665.
 - 1.7. Odor emission per ASTM C1304.
2. The silicone coated fabric, on both surfaces, which has the following properties:
 - 2.1. Minimum weight of 13.5 ounces per square yard.

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- 2.2. Minimum breaking strength, per ASTM D5034 or D5035, of 125 pounds per inch in the warp direction and 100 pounds per inch in the fill direction.
- 2.3. Minimum tear strength, per ASTM D5587, of 30 pounds in the warp direction and 20 pounds in the fill direction.
- 2.4. Minimum burst strength, per ASTM D3786, of 150 psi.
- 2.5. Abrasion resistance, per ASTM D3389, of a maximum 15% weight loss after exposure to a CS-10 wheel with 500 gram of load and 500 revolutions.
- 2.6. Minimum temperature resistance to 500° F, per ASTM C1263.
- 2.7. A flame resistance, per ASTM D6413, of a maximum 1 inch char length with a maximum 3 second afterglow and a maximum flame out in 1 second.
3. The hook and loop fasteners have a width of ¾ inch and a maximum use temperature rating of 220° F. In addition, these fasteners meet the following performance requirements:
 - 3.1. Minimum shear strength when new, per ASTM D5189, of 8 psi.
 - 3.2. Minimum shear strength after 2000 cycles, per ASTM 5189, of 7 psi.
 - 3.3. Minimum breaking strength, per ASTM D5035, of 150 pounds per inch.
4. The glass fiber sewing thread has a diameter of 0.021 inch and a minimum breaking strength of 20 pounds.
5. Sewn seams use at least 7 stitches per inch and are spaced ½ inch apart.
6. Hook and loop fasteners are attached to the insulation blankets using metal staples.
7. Identification tags are made of a water resistant fabric and are attached by metal staples to each blanket section. These include information on the component type and identity (this information must be written on the tag by the installer).

Conclusions

EverGreen Cut 'n Wrap Insulation Kits meet the requirements of ASTM C1695-10 for indoor applications. Meeting these requirements assures the user that this type of removable / reusable insulation blanket will do the following: thermally insulate surfaces up to 500° F, be flexible, be resistant to water and oil, be durable, and be able to be easily removed and reinstalled many times over its life. In addition, they meet the maximum flame spread / smoke developed indices of 25 / 50, per ASTM E84, a requirement in many building codes. Hence, the user of these insulation kits, to fabricate removable / reusable insulation blankets for pipe components on steam and hot water distribution systems, can be assured of performance, durability, and safety for many years after installing the product.

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