Up Your...GAME!

Building a Better Insulation Blanket through ASTM C1695-19 Standard Specification for Fabrication of Flexible and Removable Reusable Blanket Insulation for Hot Service



Overview

- Brief intro about Insulation Blankets
- Why we cared about getting into specification development
- Existing spec examples
- Suncor case study
 - About the ASTM standards process
- **Overview of C1695**
 - How C1695 makes Insulation Blanket Fabricators better
 - How ASTM can make your company better

About Insulation Blankets

K-EM-203

Heat Conservation

Personnel Protection

Process Stabilization

Freeze Protection



Hands Up...











Recent End User Specification Development

MEG Energy

North West Redwater Partnership

NOVA Chemicals



CNRL

Enbridge

Statoil (Equinor)

lssues Persist

- Incomplete specifications
 - Antiquated materials and design
 - Poor quality and damaged reputations

Solution Available

Industry-Wide Specification Development

C1695-19 – Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service

Incomplete Insulation **Specification** Example #1

4.5 All Flanges, Valves, Equipment, and Instrumentation

All flanges, valves, equipment, and instrumentation requiring insulation shall be insulated with prefabricated insulated fabric covers that can be entirely removed for maintenance. Valve stems shall remain exposed. The removable blankets shall incorporate draw cords or other Owner approved means of securing the blankets to the item being insulated.

Incomplete Insulation Specification **Example #2**

2.6 Insulation Blanket

- 2.6.1. Insulation blanket shall be in accordance with manufacturer's standard.
- 2.6.2. Insulation blanket must be suitable for maximum operating temperature of piping and equipment. Insulation blanket must be chemical resistant, suitable for outdoor applications and manufactured from non-flammable materials.
- 2.6.3. Insulation blanket fasteners should be Metal D-ring with Velcro tab. For steam service, snaps or tie up blankets shall be used. Other fastener designs may be used subject to suitability with piping and equipment operating conditions.
- 2.6.4. Insulation blankets for valves shall be a two piece design with a separate body and bonnet. The Metal D-ring with Velcro tab is to be on the bonnet to fasten to main body blanket.
- 2.6.5. To accommodate a leak and detect its origin, insulation blankets shall have a low point stainless steel drain grommet.
- 2.6.6. For identification and location, a stainless steel or aluminum ID tag must be riveted to each insulation blanket. 3.2mm (1/8 in.) embossed lettering should show line number or equipment tag, size, pressure rating (where applicable) and manufacturer name.
- 2.6.7. Insulation blanket thicknesses for heat conservation and personnel protection shall be in accordance with Table 15.

Expectation vs Reality?





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Case Study: Suncor

- 4.5.5 Removable and reusable insulation covers
 - 4.5.5.1 Removable and reusable insulation covers are fabricated insulation products that can be removed for inspection and maintenance of the insulated surface. Removable and reusable insulation covers shall conform to ASTM C1695.
 - 4.5.5.2 Removable and reusable insulation covers shall only be applied in hot service insulation for service up to 1000°F (538°C).
- 4.6.4 With the aid of Engineering, Operations and Maintenance, identify flanges, manways, exchanger heads, pressure relief valves (PSVs), etc. which require removable flexible insulation covers or insulation boxes. Removable flexible insulation covers and insulating boxes shall have insulation properties equal to the insulation on the line or equipment of which they are a part.

ASTM Standards





How ASTM Standards Work

Need Identified	Draft	Balloting	Balloting	Approval	Reviewed
ASTM Technical Committee	Prepared by Task Group E-mails Conferencing	Subcommittee Review	Society & Main Committee Review	Publishing in ASTM Standards Collection	5 year cycle Withdrawn if not revised or reissued within
Other Interested Party	Online Document Editing				8 years

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C168	C892	C1676	D3776/ D3776M	D5035	D6413	A			Mine	eral Fibe	r Pipe Insi	Pipe Insulation		
C553	C1129	C1728	D3786/ D3786M	D5189	D6413M	B		C:	167	C302	C390	C585	C795	C1058/ C1058M
C1263	C1	086	D3389	D5034	D5587			С	168	C335/ C335M	C411	E84	C921	C1104/ C1104M
	C167	C518		P		-	1	C	177	C356	C447	C680	C1045	C1335
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	C335	D123		·T'-	J.		C533-17 Standard	Specifica	ation for	Calcium	- NILLAND		- 182	
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	C4	11			C1695	C203	C411	C518	C1045	C1058	C1617	C1114		
				-	C168	C302	C421	C303	C795	E136	C335	E84		
					C177	C390	C446	C585	C870	C1616	C356			

Evolution of ASTM & Insulation Blankets

ASTM C1094-88 Standard Guide for Flexible Removable Insulation Covers

ASTM C1094-88(1993)

STM C1094-01

STM C1094-01 (withdrawn in 2006)

Replaced by:

ASTM C1695-09

Standard Guide for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service

ASTM C1695

ASTM C1695-10 (2015)

ASTM C1695-18

→ ASTM C1695-18a

ASTM C1695-19 (current version)



This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

DESIGNATION: C1695 - 19 🚯

Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service¹

Active Standard ASTM C1695

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ADD/EDIT ANNOTATION

This standard is issued under the fixed designation C1695; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

In this standard:

Section 1 Scope

Section 2 Referenced Documents

Section 3 Terminology

Section 4 Materials

Section 5 Design and Fabrication

Section 6 Construction

Section 7 Tie-Down/Anchor Strap Construction

Section 8 Identification Tags

Section 9 Inspection

Section 10 Rejection

Section 11 Thickness Determination and Energy Savings

Section 12 Keywords

Footnotes





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PDF Pages: 5

Level of Detail / Completeness

3.2.6 removable and reusable blanket insulation, n—An insulation blanket, encased in woven fabric and/or woven wire mesh, that has attachment mechanisms designed to allow the assembly to be installed, then later removed and reinstalled, without using any new insulation or fabric materials.

4. Materials

Abrasion Resistance

per Test Method D3389

INSULATION

4.1 Insulation shall be of a flexible fibrous material acceptable for the maximum temperature of the application. Acceptable materials must be one of the following:

4.1.1 High Temperature Fiber Blanket per Specification C892, any Type or Grade.

4.1.2 Needled Glass Fiber Mechanically Bonded Felt per Specification C1086.

4.1.3 Mineral Fiber Blanket, per Specification C553, of the Type suitable for the application.

4.1.4 Microporous Thermal Insulation, per Specification C1676, of the Type and Grade suitable for the application.

See^A

4.3.2 For surfaces from 501° F (261°C) to 1000° F (538°C) where leaks of process fluids are expected, such as flange pairs and valves, the inner layer and gussets shall be as specified in 4.3.1 and 4.3.1.1 above but also with Type 304 stainless steel foil that has a minimum thickness of 0.001 in. (0.025 mm). This foil shall be placed between the insulation material and the outer fabric or wire mesh.

4.4 All hardware such as D-rings, buckles, tags, quilting pins, lacing hooks and insulation anchors, etc. shall be made of Type 304 stainless steel. Where lacing hooks and lacing anchors are used, they shall be 12 or 14 Gauge.

4.5 Tie-Down Straps:

CS-10 Wheel, 500 g loads

500 revs, 15 % weight loss

max

4.5.1 Outdoor Applications—These tie-down straps shall be constructed of one of the following three types of material: (1) the same material as the outer jacket, (2) a woven glass fiber fabric, or (3) a tape of suitable thickness with the same coating as the outer jacket material. If the same material as the outer

CS-10 Wheel, 500 g loads

500 revs, 15 % weight loss max

FABRICS

HARDWARE

Plain, heat cleaned Glass fiber fabric Glass fiber fabric Fiber fabric coated PHYSICAL & PERFORMANCE glass fiber fabric^A coated with Silicone, for coated with Silicone. with Fluorocarbon REQUIREMENTS exterior applications for interior applications only Weight (minimum) 17.7 (602) 15 (510) 16.5 (561) 13.5 (455) oz/sq. vd (a/m²) per Test Methods D3776/ D3776M **Breaking Strength** Warp 200 (35.7) Warp 225 (40.19) Warp 125 (22.4) Warp 225 (40.19) lb/inch (kg/cm) per Fill 100 (17.9) Fill 175 (31.26) Fill 100 (17.9) Fill 175 (31.26) Test Methods D5034 or D5035 See^A Warp 40 (18.14) Warp 30 (13.6) Warp 40 (18.14) Tear Strength lb (kg) per Test Method D5587 Fill 25 (11.33) Fill 20 (9.1) Fill 25 (11.33) Burst Strength psi (kg/cm²) per Test Method D3786/ 200 (14) 150 (9.77) 200 (14) Not Applicable D3786M

TABLE 1 Physical and Performance Requirements for Fabrics

CS-10 Wheel, 500 g loads

500 revs, 15 % weight loss

max

C1695-19 Highlights



- Fabrics
- Insulations
- Fasteners
- Stitching

Progressive

• Legitimate fluid barrier on liner >260°C in process fluid services

Commercial application

• "inside" vs "outside" categorization

Design

- Cones or reducing end caps
- Thickness by engineer / end user

C1695-19 Makes Blanket Fabricators

Better



- Progressive
 - Investment in machinery to comply with specifications

Quality Management

• Material compliance with standards

Solutions Provider

• Reference C1695 when advising engineers & end users



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Non-Members

Summary

- Existing standards are lacking
- Thorough standards are needed
- ASTM can help
- C1695-19 can benefit all



Thank You!

