Designation: ~~C795 – 08 (Reapproved 2013)~~ C795 – 08 (Reapproved 2018)

Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel[1]

This standard is issued under the fixed designation C795; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers non-metallic thermal insulation for use in contact with austenitic stainless steel piping and equipment. In addition to meeting the requirements specified in their individual material specifications, issued under the jurisdiction of ASTM Committee C16, these insulations must pass the preproduction test requirements of Test Method C692, for stress corrosion effects on austenitic stainless steel, and the confirming quality control, chemical requirements, when tested in accordance with the Test Methods C871.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate ~~safety~~ safety, health, and ~~health~~environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C168 Terminology Relating to Thermal Insulation

C390 Practice for Sampling and Acceptance of Thermal Insulation Lots

C692 Test Method for Evaluating the Influence of Thermal Insulations on External Stress Corrosion Cracking Tendency of Austenitic Stainless Steel

C871 Test Methods for Chemical Analysis of Thermal Insulation Materials for Leachable Chloride, Fluoride, Silicate, and Sodium Ions

3. Terminology

3.1 *Definitions*—Terminology C168 applies to the terms used in this specification.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *basic material specification*—any of the material specifications for homogeneous insulation covered in any of the pertinent *Annual Book of ASTM Standards*.

3.2.2 *lot*—a lot shall be defined in accordance with Practice C390 by agreement between the purchaser and the manufacturer.

3.2.3 *stress corrosion cracking (SCC)*—the failure of metal, taking the form of cracks that potentially occur under the combined influence of certain corrosive environments and applied or residual stresses.

3.2.4 *wicking-type insulation*—insulation material that, by virtue of its physical characteristics, permits a wetting liquid to infiltrate it by capillary attraction.

---

[1] This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.20 on Homogeneous Inorganic Thermal Insulations.

Current edition approved ~~May 1, 2013~~Nov. 1, 2018. Published ~~May 2013~~December 2018. Originally approved in 1977. Last previous edition approved in ~~2008~~2013 as ~~C795 – 08.~~C795 – 08 (2013). DOI: ~~10.1520/C0795-08R13.~~10.1520/C0795-08R18.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

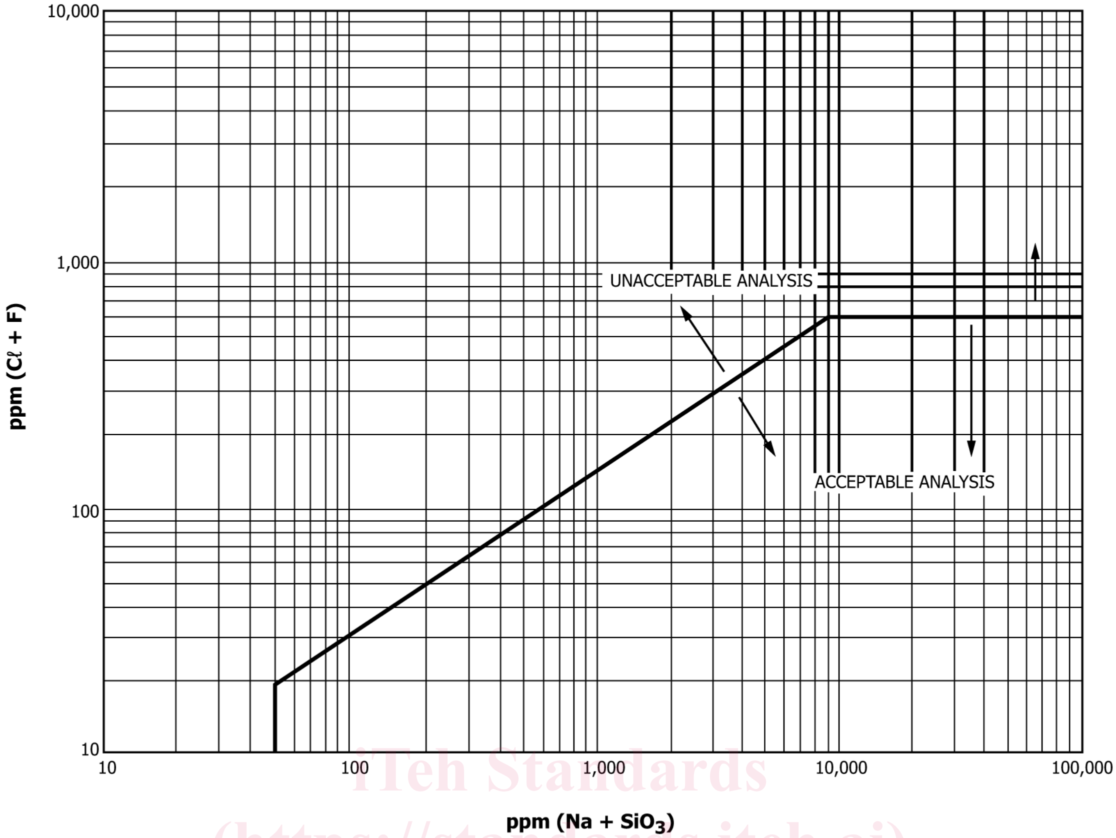

FIG. 1 Acceptability of Insulation Material on the Basis of the Plot Points of the (Cl + F) and the (Na + SiO_3) ~~Analyses.~~ Analyses

4. Significance and Use

4.1 Stress corrosion cracking of austenitic stainless steel is a metallurgical phenomenon. One cause of stress corrosion cracking is the presence of contaminants in water solution, which can be concentrated at the stressed surface by evaporation of the water.

4.2 There is an apparent correlation between stress corrosion cracking of austenitic stainless steel and the use of insulation which either contains water-leachable chloride or, by reason of its water absorptivity, acts as a vehicle through which chlorides from outside the system are concentrated at the surface of the stainless steel.[3,4,5]

4.3 Studies have shown that insulation containing certain water-soluble compounds have the capacity to retard or prevent stress corrosion. Numerous materials thought to inhibit stress corrosion cracking have been tried with varying degrees of success. An inhibiting compound commonly used is sodium silicate. Present knowledge indicates that the sodium silicate dissociates in the presence of water, leaving the silicate ion to form a protective mechanism that inhibits or prevents the chloride ion from attacking the stainless steel. Under adverse environmental conditions, this protective agent will possibly be leached from the product with time and permanent protection is not afforded.

4.4 Test Method C692 contains a procedure for determining whether or not stress corrosion cracking will occur with a given thermal insulation. The procedure is used to evaluate insulation materials have the potential to inhibit, to be passive, or actively contribute to stress corrosion cracking of austenitic stainless steels.

4.5 Research has indicated that in addition to the halide ion chloride, fluoride ions have the potential to induce SCC in the absence of inhibiting ions.[6] Two widely used insulation specifications that are similar to C795 and are specific to SCC allow the use of the same Test Methods C692 and C871 for evaluation of insulation materials. Both specifications require fluoride ions to be included with chloride ions when evaluating the extractable ions and plotting them on the Fig. 1 acceptability graph. Fluoride has been added to chloride in Section 13 and on Fig. 1 to be consistent with the other standards.

[3] Schaffer, L. D., and Klapper, J. A., "Investigation of the Effects of Wet, Chloride-Bearing, Thermal Insulation on Austenitic Stainless Steel," *Report No. ESI-25-(a)-1,* Oak Ridge National Laboratory, and Ebasco Services Inc., November 1, 1961.

[4] Dana, A. W., Jr., "Stress-Corrosion Cracking of Insulated Austenitic Stainless Steel," *ASTM Bulletin*, October 1957.

[5] Louthan, M. R., Jr., "Initial Stages of Stress Corrosion Cracking in Austenitic Stainless Steels," *Corrosion*, NACE, September 1965.

[6] Whorlow, Kenneth M., Woolridge, Edward and Hutto, Francis B., Jr., "Effect of Halogens and Inhibitors on the External Stress Corrosion Cracking of Type 304 Austenitic Stainless Steel"; *STP 1320 Insulation Materials: Testing and Applications*, Third Volume, Ronald S. Graves and Robert R. Zarr, editors, ASTM West Conshohocken, PA, 1997 page 485 .