

settled density determined according to paragraph 8 of ASTM C 739–91, commonly referred to as the “Blower Cyclone Shaker” (“BCS”) test.⁴⁷ Because a consensus-based test procedure had not been adopted for determining the long-term, settled density of dry-applied loose-fill mineral-fiber insulation for this type of application, the Rule only requires that R-values be based on long-term thickness and density after settling, and does not specify how to determine a specimen’s density.⁴⁸

Since the Commission promulgated the Rule, new forms of loose-fill home insulation products have been introduced for use in attic applications, including “stabilized” cellulose. “Stabilized” cellulose refers to a form of loose-fill cellulose insulation that contains a glue binder and is applied on attic floors with a small amount of liquid. Application of the insulation with the glue binder and liquid purportedly results in lower-density cellulose insulations that do not settle like dry-applied loose-fill cellulose insulations. The Rule does not currently specify a procedure for determining the long-term, settled density of stabilized cellulose insulation. In addition, questions have been raised regarding the settling of loose-fill insulations in the walls of site-built housing and in both the attics and walls of manufactured housing. 64 FR 48032.

i. Dry-applied Loose-fill Cellulose in Site-Built⁴⁹ Attics.

Comments on Dry-applied, Loose-fill Cellulose Insulations for Use in Site-Built Home Attics

Two commenters addressed the issue of dry-applied loose-fill cellulose in attics. NAIMA supported the current design density test (ASTM C 739–91) (“Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal

Insulation”) required by the Rule for loose-fill cellulose. NAIMA urged the Commission to revise the Rule to require use of sample preparation techniques, stabilization times, and guidance on gauging the specimen’s density in the test area according to ASTM C 687 for *all types* of loose-fill insulations, pointing out that ASTM C 739 already requires cellulose insulation manufacturers to conduct testing as prescribed in C 687. NAIMA also recommended that the Commission require, on dry-applied loose-fill cellulose bags, an installed thickness column that reflects the magnitude of settling and loss of thickness that can be expected.⁵⁰ It cited a Swedish long-term study that showed average settling of 16% to 21% of loose-fill insulation in attics in two test houses studied for up to seven years.⁵¹ The study documented that certain variations in cellulose material directly affect settling. The study suggested that cardboard based cellulose seems to settle more than newsprint and that the degree of grinding also affects settling. The study also suggested that humidity variations, density, and vibration affected settling.

CIMA contended that the BCS test was promulgated about 20 years ago and is probably no longer appropriate for determining the settled density of dry-applied loose-fill insulation. CIMA stated that current studies of actual installations indicate that settlement of loose-fill cellulose insulation is typically between 12% and 20% in residential applications, while the BCS test results suggest a settlement of 30% or more. By specifying a test that significantly overstates cellulose settlement, the Rule, in CIMA’s view, places dry-applied loose-fill cellulose insulation at a competitive disadvantage (compared to fiberglass) that may result in an annual loss of 50 million dollars in revenues to cellulose insulation manufacturers.⁵²

Discussion of Dry Applied Loose Cellulose in Site-Built Attics

In the absence of an accepted alternative to the test procedures in ASTM C 739, the Commission is reluctant to amend the Rule to eliminate the established BCS test. Moreover, the Commission does not believe that further prescriptive requirements, as suggested by NAIMA, are warranted and is thus not proposing the use of sample preparation techniques, stabilization times, and guidance on gauging the specimen’s density in the test area

according to ASTM C 687 for *all types* of loose-fill insulations. This standard practice is already required for loose-fill cellulose insulation through the requirements in ASTM C 739 (currently required by the Rule). It is unclear whether the application of this technique would significantly improve the accuracy of R-value claims for other loose-fill materials. The Commission does propose, however, to update the current reference to the ASTM C 739 in section 460.5(a)(2) to reflect the most current version (1997). The Commission also proposes to address the issue of installed thickness as suggested by NAIMA (*see* § V.E.1.c.ii. of this document).

Although the Rule requires manufacturers of dry-applied loose-fill cellulose to determine the R-value and coverage at the settled density determined according to the BCS procedure, manufacturers who can demonstrate that the BCS procedure is inappropriate for their products can petition the Commission for an exemption that would allow them to determine the settled density of their products according to a more appropriate method. *See* 64 FR 48033.

ii. Dry-Applied Loose-Fill Mineral Fiber in Site-Built Attics

Section 460.5(a)(2) of the Rule specifies the procedures to be used in determining the settled density only for cellulosic, and not mineral fiber, insulation products. When the Commission promulgated the Rule in 1979, it expected that GSA soon would adopt a specific test procedure for determining the settled density of dry-applied loose-fill mineral fiber insulation products. 44 FR at 50228, 50239 n.239. GSA did not do so, and now accepts the use of ASTM standards, which do not specify procedures for determining the settled density of dry-applied loose-fill mineral fiber insulations. Reports of studies conducted by Oak Ridge National Laboratory during the 1980s demonstrate that certain loose-fill mineral fiber insulation products can settle following installation, resulting in a reduction of R-value. The results differed in the amount of settling and the effect of settling on the R-values of the specific insulation products studied, depending on the type of mineral fiber insulations studied (fiberglass versus rock wool products) due to differences in density. 64 FR at 48033.

The Commission indicated in the ANPR that it would be preferable to specify a uniform procedure for determining the long-term, settled density of dry-applied loose-fill mineral

⁴⁷ Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation (“ASTM C 739–91”).

⁴⁸ When the Commission promulgated the Rule, GSA had proposed adopting a settled density test procedure for loose-fill mineral fiber insulation products similar to the one it had adopted for loose-fill cellulose insulation products. Mineral fiber manufacturers contended, however, that they took settling into account in their coverage charts, and that if their insulations were installed according to their coverage charts, consumers would receive the R-values they claimed. The Commission imposed a general requirement that R-values of dry-applied loose-fill mineral fiber insulations be based on tests that take the adverse effects of settling into account, but did not specify how the settled density was to be determined. 44 FR at 50228. GSA never adopted a procedure for determining the settled density of mineral fiber insulations. *See* 64 FR 48032, n.46 (1999).

⁴⁹ The term “site-built” differentiates attics in manufactured housing.

⁵⁰ NAIMA (9), pp. 12–13.

⁵¹ *Id.*, Appendix 17.

⁵² CIMA (4), p. 3.