

2021 Virginia Construction Code

CHAPTER 7 FIRE AND SMOKE PROTECTION FEATURES

SECTION 703 FIRE-RESISTANCE RATINGS AND FIRE TESTS

703.1 Scope.

Materials prescribed herein for *fire resistance* shall conform to the requirements of this chapter.

703.2 Fire resistance.

The *fire-resistance rating* of *building elements*, components or assemblies shall be determined in accordance with [Section 703.2.1](#) or [703.2.2](#) without the use of *automatic sprinklers* or any other fire suppression system being incorporated, or in accordance with [Section 703.2.3](#).

703.2.1 Tested assemblies.

A *fire-resistance rating* of *building elements*, components or assemblies shall be determined by the test procedures set forth in [ASTM E119](#) or [UL 263](#). The *fire-resistance rating* of penetrations and *fire-resistant joint* systems shall be determined in accordance with [Sections 714](#) and [715](#), respectively.

703.2.1.1 Nonsymmetrical wall construction.

Interior walls and partitions of nonsymmetrical construction shall be tested with both faces exposed to the furnace, and the assigned *fire-resistance rating* shall be the shortest duration obtained from the two tests conducted in compliance with [ASTM E119](#) or [UL 263](#). Where evidence is furnished to show that the wall was tested with the least fire-resistant side exposed to the furnace, subject to acceptance of the *building official*, the wall need not be subjected to tests from the opposite side (see [Section 705.5](#) for *exterior walls*).

703.2.1.2 Combustible components.

Combustible aggregates are permitted in gypsum and Portland cement concrete mixtures for fire-resistance-rated construction. Any component material or admixture is permitted in assemblies if the resulting tested assembly meets the *fire-resistance* test requirements of this code.

703.2.1.3 Restrained classification.

Fire-resistance-rated assemblies tested under [ASTM E119](#) or [UL 263](#) shall not be considered to be restrained unless evidence satisfactory to the *building official* is furnished by the *registered design professional* showing that the construction qualifies for a restrained classification in accordance with [ASTM E119](#) or [UL 263](#). Restrained construction shall be identified on the *construction documents*.

703.2.1.4 Supplemental features.

Where materials, systems or devices that have not been tested as part of a fire-resistance-rated assembly are incorporated into the *building element*, component or assembly, sufficient data shall be made available to the *building official* to show that the required *fire-resistance rating* is not reduced.

703.2.1.5 Exterior bearing walls.

In determining the *fire-resistance rating* of exterior bearing walls, compliance with the [ASTM E119](#) or [UL 263](#) criteria for unexposed surface temperature rise and ignition of cotton waste due to passage of flame or gases is required only for a period of time corresponding to the required *fire-resistance rating* of an exterior nonbearing wall with the same *fire separation distance*, and in a building of the same group. Where the *fire-resistance rating* determined in accordance with this exception exceeds the *fire-resistance rating* determined in accordance with [ASTM E119](#) or [UL 263](#), the fire exposure time period, water pressure and application duration criteria for the hose stream test of [ASTM E119](#) or [UL 263](#) shall be based on the *fire-resistance rating* determined in accordance with this section.

703.2.2 Analytical methods.

The *fire resistance* of *building elements*, components or assemblies established by an analytical method shall be by any of the methods listed in this section, based on the fire exposure and acceptance criteria specified in [ASTM E119](#) or [UL 263](#).

1. *Fire-resistance* designs documented in approved sources.
2. Prescriptive designs of fire-resistance-rated *building elements*, components or assemblies as prescribed in [Section 721](#).
3. Calculations in accordance with [Section 722](#).
4. Engineering analysis based on a comparison of *building element*, component or assemblies designs having *fire-resistance ratings* as determined by the test procedures set forth in [ASTM E119](#) or [UL 263](#).
5. Alternative protection methods as allowed by [Section 112.2](#).

703.2.3 Approved alternate method.

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The *fire resistance* of building elements, components or assemblies not complying with Section 703.2.1 or 703.2.2 shall be permitted to be established by an alternative protection method in accordance with Section 112.2.

703.3 Noncombustibility tests.

The tests indicated in Section 703.3.1 shall serve as criteria for acceptance of building materials as set forth in Sections 602.2, 602.3 and 602.4 in Types I, II, III and IV construction. The term “noncombustible” does not apply to the *flame spread* characteristics of *interior finish* or *trim* materials. A material shall not be classified as a noncombustible building construction material if it is subject to an increase in combustibility or *flame spread* beyond the limitations herein established through the effects of age, moisture or other atmospheric conditions.

703.3.1 Noncombustible materials.

Materials required to be noncombustible shall be tested in accordance with ASTM E136. Alternately, materials required to be noncombustible shall be tested in accordance with ASTM E2652 using the acceptance criteria prescribed by ASTM E136.

Exception: Materials having a structural base of noncombustible material as determined in accordance with ASTM E136, or with ASTM E2652 using the acceptance criteria prescribed by ASTM E136, with a surfacing of not more than 0.125 inch (3.18 mm) in thickness having a *flame spread index* not greater than 50 when tested in accordance with ASTM E84 or UL 723 shall be acceptable as noncombustible.

703.4 Fire-resistance-rated glazing.

Fire-resistance-rated glazing, when tested in accordance with ASTM E119 or UL 263 and complying with the requirements of Section 707, shall be permitted. Fire-resistance-rated glazing shall bear a label marked in accordance with Table 716.1(1) issued by an agency and shall be permanently identified on the glazing.

703.5 Fire-resistance assembly marking.

Where there is a concealed floor, floor-ceiling, or attic space, the fire walls, fire barriers, fire partitions, smoke barriers, or any other wall required to have protected openings or penetrations shall be designated above ceilings and on the inside of all ceiling access doors that provide access to such fire-rated assemblies by signage having letters no smaller than 1 inch (25.4 mm) in height. Such signage shall indicate the fire-resistance rating of the assembly and the type of assembly and be provided at horizontal intervals of no more than 8 feet (2438 mm).

Note: An example of suggested formatting for the signage would be “1-HOUR FIRE PARTITION.”

703.6 Determination of noncombustible protection time contribution.

The time, in minutes, contributed to the *fire-resistance rating* by the *noncombustible protection* of mass timber building elements, components, or assemblies, shall be established through a comparison of assemblies tested using procedures set forth in ASTM E119 or UL 263. The test assemblies shall be identical in construction, loading and materials, other than the *noncombustible protection*. The two test assemblies shall be tested to the same criteria of structural failure with the following conditions:

1. Test Assembly 1 shall be without protection.
2. Test Assembly 2 shall include the representative *noncombustible protection*. The protection shall be fully defined in terms of configuration details, attachment details, joint sealing details, accessories and all other relevant details.

The *noncombustible protection* time contribution shall be determined by subtracting the *fire-resistance* time, in minutes, of Test Assembly 1 from the *fire-resistance* time, in minutes, of Test Assembly 2.

703.7 Sealing of adjacent mass timber elements.

In buildings of Types IV-A, IV-B and IV-C construction, sealant or adhesive shall be provided to resist the passage of air in the following locations:

1. At abutting edges and intersections of mass timber building elements required to be fire-resistance rated.
2. At abutting intersections of mass timber building elements and building elements of other materials where both are required to be fire-resistance rated.

Sealants shall meet the requirements of ASTM C920. Adhesives shall meet the requirements of ASTM D3498.

Exception: Sealants or adhesives need not be provided where they are not a required component of a tested fire-resistance-rated assembly.