



Approval Standard for Class 1 Panel Roofs

Class Number 4471

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Foreword

The FM Approvals certification mark is intended to verify that the products and services described will meet stated conditions of performance, safety and quality useful to the ends of property conservation. The purpose of Approval Standards is to present the criteria for FM Approval of various types of products and services, as guidance for FM Approvals personnel, manufacturers, users and authorities having jurisdiction.

Products submitted for certification by FM Approvals shall demonstrate that they meet the intent of the Approval Standard, and that quality control in manufacturing and/or applications shall ensure a consistently uniform and reliable product or service. Approval Standards strive to be performance-oriented and to facilitate technological development.

For examining equipment, materials and services, Approval Standards:

- a) must be useful to the ends of property conservation by preventing, limiting or not causing damage under the conditions stated by the Approval listing; and
- b) must be readily identifiable.

Continuance of Approval and Listing depends on compliance with the Approval Agreement, satisfactory performance in the field, on successful re-examinations of equipment, materials and services as appropriate, and on periodic follow-up audits of the manufacturing facility or service/application.

FM Approvals LLC reserves the right in its sole judgment to change or revise its standards, criteria, methods or procedures.

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1 INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states Approval requirements for Class 1 Panel Roofs. A Class 1 Panel Roof is one which meets the criteria of this standard for fire, wind, foot traffic, and hail damage resistance.
- 1.1.2 Approval criteria may include, but are not limited to, performance requirements, marking requirements, examination of manufacturing facility (ies), audit of quality assurance procedures, and a follow-up program.

1.2 Scope

- 1.2.1 This standard sets performance requirements for panel roofs which include all components necessary for installation of the panel roof assembly. The assembly which exhibits low fire spread below and above the panel, adequate simulated wind uplift resistance, and adequate strength and durability during the Approval examination will qualify as a Class 1 assembly. To be rated as a Class 1 panel roof assembly, only Class 1 Approved components may be used.
- 1.2.2 This standard applies to any component intended for use in assembling a panel roof, including metal and plastic panel roofs.
- 1.2.3 The performance of a panel roof depends in part on all components in its makeup, and on how these components interact. It is therefore necessary to evaluate the roof assembly as a whole when measuring the potential for fire spread on the underside and exterior of the roof, and/or its ability to resist wind forces.

1.3 Basis for Requirements

- 1.3.1 The requirements of this standard are based on experience, research and testing, and/or the standards of other organizations. The advice of manufacturers, users, trade associations, jurisdictions and loss control specialists was also considered.
- 1.3.2 The requirements of this standard reflect tests and practices used to examine characteristics of panel roofs for the purpose of obtaining Approval. Panel roofs having characteristics not anticipated by this standard may be FM Approved if performance equal, or superior, to that required by this standard is demonstrated, or if the intent of the standard is met. Alternatively, panel roofs which meet all of the requirements identified in this Standard may not be FM Approved if other conditions which adversely affect performance exist or if the intent of this standard is not met.

1.4 Basis for Approval

Approval is based upon satisfactory evaluation of the product and the manufacturer in the following major areas:

- 1.4.1 Examination and tests on production samples shall be performed to evaluate
 - the suitability of the product;
 - the performance of the product as specified by the manufacturer and required by FM Approvals; and as far as practical,

- the durability and reliability of the product.
- 1.4.2 An examination of the manufacturing facilities and audit of quality control procedures is made to evaluate the manufacturer's ability to consistently produce the product which is examined and tested, and the marking procedures used to identify the product. These examinations may be repeated as part of FM Approvals' product follow-up program.

1.5 Basis for Continued Approval

Continued Approval is based upon:

- production or availability of the product as currently FM Approved;
- the continued use of acceptable quality assurance procedures;
- satisfactory field experience;
- compliance with the terms stipulated in the Approval report;
- satisfactory re-examination of production samples for continued conformity to requirements; and
- satisfactory Facilities and Procedures Audits (F&PAs) for both factory and field fabricated panel roofs conducted as part of FM Approvals' product follow-up program.

Also, as a condition of retaining Approval, manufacturers may not change a product or service without prior authorization by FM Approvals.

1.6 Effective Date

- 1.6.1 The effective date of an Approval standard mandates that all products tested for Approval after the effective date shall satisfy the requirements of that standard. Products FM Approved under a previous edition shall comply with the new version by the effective date or else forfeit Approval.
- 1.6.2 This standard will be effective immediately upon publication.

1.7 System of Units

Units of measurement used in this Standard are United States (U.S.) customary units. These are followed by their arithmetic equivalents in International System (SI) units, enclosed in parentheses. The first value stated shall be regarded as the requirement. The converted equivalent value may be approximate. Appendix A lists the selected units and conversions to SI units for measures appearing in this standard. Conversion of U.S. customary units is in accordance with BSR/IEEE/ASTM SI 10, *Standard for Use of the International System of Units (SI): The Modern Metric System*.

1.8 Applicable Documents

The following standards, test methods, and practices are referenced in this standard:

FM Approval Standard 4880, Class 1 Fire Rating of Insulated Wall or Wall & Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems;

FM Global Property Loss Prevention Data Sheet 1-28, Wind Design;

FM Global Property Loss Prevention Data Sheet 1-31, Metal Roof Systems;

FM Global Property Loss Prevention Data Sheet 1-34, Hail Damage;

ASTM E 108, Standard Test Methods for Fire Tests of Roof Coverings;

BSR/IEEE/ASTM SI 10, *Standard for Use of the International System of Units (SI): The Modern Metric System*.

FM Approvals 12 x 24 Wind Uplift Tests for Standing Seam, Lap Seam and Composite Panel Roof Coverings

FM Approvals Construction Materials Calorimeter Test Procedures

FM Approvals Test Method for Determining the Susceptibility to Hail Damage of Roof Coverings

FM Approvals 4471 Foot Traffic Resistance Test Procedures

1.9 Definitions

For purposes of this standard, the following terms apply:

Heat Release Rate — The Btu's released by an assembly within specific time frames. The total heat released is added over the length of the FM Approvals calorimeter test (30 minutes). The maximum or peak heat release rate is measured over a shorter period of time (either 3, 5, or 10 minutes) or as the average for the test duration.

Insulation — Is any of a variety of materials designed to reduce the flow of heat, either from, or into, a building.

Metal Panel — (1) A single metal sheet formed into a specified profile. (2) A composite assembly formed to a specified profile and consisting of an insulating core or batt material with an exterior metal skin.

Permanent Deformation—Any displacement of a panel or component that remains after the load has been removed. Panel deflection that can be removed by mechanical means not involving special equipment and without additional displacement shall not be considered permanent deformation.

Plastic Panel — (1) A single plastic sheet formed into a specified profile. (2) A composite assembly formed to a specified profile and consisting of an insulating core or batt material with an exterior plastic skin.

Roof Assembly —A system of interacting roof components (including the roof deck) designed to weatherproof, and normally, to insulate a building's top surface.

Wind Uplift — Wind-induced forces on a roof system or components in a roof system. Wind uplift generally includes a negative pressure component caused by wind being deflected around and across the surfaces of a building and a positive pressure component from air flow beneath the roof deck.