FM Approvals

CLASS NUMBER 4651

Examination Standard for Plastic Suspended Ceiling Panels

March 2025

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Foreword

This standard 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 this standard is to present the criteria for examination of various types of products and services.

Examination in accordance with this standard shall demonstrate compliance and verify that quality control in manufacturing shall ensure a consistent and reliable product.

TABLE OF CONTENTS

1. INTRODUCTION 1

1.1. Purpose 1

1.2. Scope 1

1.3. Basis for Requirements 1

1.4. Basis for Certification 1

1.5. Basis for Continued Certification 2

1.6. Effective Date 2

1.7. System of Units 2

1.8. Normative References 2

2. GENERAL INFORMATION 3

2.1. Product Information 3

2.2. Certification Application Requirements 3

2.3. Requirements for Samples of Examination 3

3. GENERAL REQUIREMENTS 4

3.1. Review of Documentation 4

3.2. Markings 4

3.3. Manufacturer's Installation and Operation Instructions 4

3.4. Calibration 4

4. PERFORMANCE REQUIREMENTS 5

4.1. Fire Tests 5

4.2. Quality Control Tests 6

5. MANUFACTURING REQUIREMENTS 7

5.1. Demonstrated Quality Control Program 7

5.2. Surveilance Audit 7

5.3. Manufacturer's Responsibilities 7

6. BIBLIOGRAPHY 8

1. INTRODUCTION

1.1. PURPOSE

1.1.1. This standard states testing and certification requirements for plastic suspended ceiling panels.

1.1.2. Certification criteria may include performance requirements, marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures and a surveillance audit program.

1.2. SCOPE

1.2.1. This standard applies to any component intended to or for use as a suspended ceiling installed below an automatic sprinkler system. This can impede the operation of automatic sprinkler heads and their water distribution. By acting as an insulator, the suspended ceiling may delay sprinkler head operation. By obstructing sprinkler water flow and distribution, the suspended ceiling panels or tiles may contribute to fire spread at floor level and subsequent building damage).

1.3. BASIS FOR CERTIFICATION

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

1.3.1. 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 for certification,
- the durability and reliability of the product.

1.3.2. An examination of the manufacturing facilities and audit of quality control procedures may be conducted 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. Subsequent surveillance may be required by the certification agency in accordance with the certification scheme to ensure ongoing compliance.

1.4. BASIS FOR CONTINUED CERTIFICATION

The basis for continual certification may include the following based upon the certification scheme and requirements of the certification agency:

- production or availability of the product as currently certified;
- the continued use of acceptable quality assurance procedures;
- compliance with the terms stipulated by the certification;
- satisfactory re-examination of production samples for continued conformity to requirements; and
- satisfactory surveillance audits conducted as part of the certification agency’s product surveillance program.

1.5. EFFECTIVE DATE

The effective date of this certification standard mandates that all products tested for certification after the effective date shall satisfy the requirements of this standard.

The effective date of this standard is eighteen (18) months after the publication date of the standard for compliance with all requirements.

1.6. 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. Conversion of U.S. customary units is in accordance with ANSI/IEEE/ASTM SI 10.

1.7. NORMATIVE REFERENCES

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the cited edition applies.

ANSI/IEEE/ASTM SI 10, *American National Standard for Metric Practice*

ASTM D1622, *Standard Test Method for Apparent Density of Rigid Cellular Plastics*

ASTM D482, *Standard Test Method for Ash from Petroleum Products*

ASTM E1642, *Standard Practice for General Techniques of Gas Chromatography Infrared (GC/IR) Analysis*

ASTM D240, *Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter*

2. GENERAL INFORMATION

2.1. PRODUCT INFORMATION

2.1.1. Suspended ceilings are available in materials which incorporate special features that will minimize the hazards mentioned above. These features include their melt-out properties which enable the ceiling tiles to decompose without flaming when subjected to heat, and/or drop-out properties which enable the panels to shrink when absorbing heat. These properties permit the ceiling panels to fall from their suspension grid allowing prompt and unobstructed sprinkler water flow. The melt-out or drop-out behavior of the panels minimizes the potential propagation of fire across the surface of the entire suspended ceiling. For this reason, no clips which limit drop-out of the ceiling panels shall be used with certified ceiling panels unless they have been incorporated during the fire tests.

2.2. CERTIFICATION APPLICATION REQUIREMENTS

The manufacturer shall provide the following preliminary information with any request for certification consideration:

- a complete list of all models, types, sizes, and options for the products or services being submitted for certification consideration;
- general assembly drawings, complete set of manufacturing drawings, materials list, anticipated marking format, spec. sheets, installation and maintenance procedures; and
- the number and location of manufacturing facilities.

All documents shall identify the manufacturer's name, document number or other form of reference, title, date of last revision, and revision level. All documents shall be provided with English translation.

2.3. REQUIREMENTS FOR SAMPLES FOR EXAMINATION

2.3.1. Following authorization of a certification examination, the manufacturer shall submit samples for examination and testing based on the following:

- Sample requirements to be determined by the certification agency.

2.3.2. Requirements for samples may vary depending on design features, results of prior or similar testing, and results of any foregoing tests.

2.3.3. The manufacturer shall submit samples representative of production.

2.3.4. A representative of the certification agency shall inspect the manufacturing facility for, witness the production of, and place their mark on, each sample used.

3. GENERAL REQUIREMENTS

3.1. REVIEW OF DOCUMENTATION

3.1.1. During the initial investigation and prior to physical testing, the manufacturer's specifications and details shall be reviewed to assess the ease and practicality of installation and use. The certification examination results may further define the limits of the final certification.

3.2. MARKINGS

3.2.1. Marking on the product or, if not possible due to size, on its packaging or label accompanying the product, shall include the following information:

- name and address of the manufacturer or marking traceable to the manufacturer;
- date of manufacture or code traceable to date of manufacture or lot identification;
- model number, model type, and/or product name, as appropriate.

When hazard warnings are needed, the markings shall be universally recognizable and permanent.

3.2.2. The model or type identification shall correspond with the manufacturer's catalog designation and shall uniquely identify the certification agency's mark of conformity.

3.2.3. The manufacturer shall supply a separate certificate with the panel shipment stating the lot or batch number of the panels.

3.2.4. The certification agency's mark of conformity shall be displayed visibly and permanently on the product and/or packaging as appropriate and in accordance with the requirements of the certification agency. The manufacturer shall exercise control of this mark as specified by the certification agency and the certification scheme.

3.2.5. All markings shall be legible and durable.

3.3. MANUFACTURER'S INSTALLATION AND OPERATION INSTRUCTIONS

3.3.1. The manufacturer shall:

- prepare instructions for the installation, maintenance, and operation of the product;
- provide facilities for repair of the product and supply replacement parts, if applicable; and,
- provide services to ensure proper installation, inspection, or maintenance for products of such nature that it would not be reasonable to expect the average user to be able to provide such installation, inspection, or maintenance.

3.4. CALIBRATION

3.4.1. Each piece of equipment used to verify the test parameters shall be calibrated within an interval determined on the basis of stability, purpose, and usage. A copy of the calibration certificate for each piece of test equipment is required. The certificate shall indicate that the calibration was performed against working standards whose calibration is certified and traceable to an acceptable reference standard and certified by an ISO/IEC 17025 accredited calibration laboratory. The test equipment shall be clearly identified by label or sticker showing the last date of the calibration and the next due date. A copy of the service provider's accreditation certificate as an ISO/IEC 17025 accredited calibration laboratory should be available.

3.4.2. When the inspection equipment and/or environment is not suitable for labels or stickers, other methods such as etching of control numbers on the measuring device are allowed, provided documentation is maintained on the calibration status of thus equipment.

4. PERFORMANCE REQUIREMENTS

4.1. FIRE TESTS

Three series of fire tests are performed to evaluate the behavior of the ceiling panels. During tests 1 through 6, a forced draft is created under the simulated ceiling arrangement by a 12 in. (30.5 cm) diameter fan, 1/4 hp, 1000 rpm, to induce surface flame spread, if possible.

4.1.1. Series 1 (Fire Tests 1-3) Melt-Out or Drop-Out Behavior Before Sprinkler Operation

4.1.1.1. Tests 1, 2 and 3 are conducted to determine the effect of heat and flame on the ceiling tiles before sprinkler operation and their ability to melt out quickly. The ceiling panels directly above the fire shall melt out or drop out of the grid system within one minute and 45 sec. and no spreading flame shall be observed on the surfaces of the panels.

4.1.1.2. For each test, a 10 ft × 12 ft (3.05 m ×× 3.66 m) ceiling is assembled horizontally incorporating a suspension frame and centered over a fire exposure derived from a 1 in. (2.54 cm) depth of isopropyl alcohol in a 1 ft^2 (0.093 m^2) pan located 35 in. (88.9 cm) below the panels.

4.1.1.3. The fire source is ignited, and the panels observed for decomposition and the elapsed time required for panels to fall free from the grid is noted. This arrangement is considered to simulate a fire with ceiling temperatures reaching 1000°F (538°C) in about 1 ½ min.

4.1.2. Series 2 (Fire Tests 4-6) Melt-Out or Drop-Out Behavior When Sprinklers are Operating

4.1.2.1. Tests 4, 5 and 6 are conducted to determine if sprinkler water adjacent to a fire area would cool the ceiling panels and significantly delay fallout. The ceiling panels directly above the fire shall drop free of the grid system within one minute and 45 sec. and no spreading flame shall be observed on the surfaces of the panels.

4.1.2.2. The test set-up is essentially the same as described in Paragraph 4.1.1.2, except as follows: One pendant type sprinkler, 1⁄2 in. (12.7 mm) orifice, is centrally mounted 18 in. (45.7 cm) above the 10 ft (3.05 m) × 12 ft (3.66 m) suspended ceiling. A sprinkler flow (10 gpm) is initiated 15 sec. prior to ignition of the fire source and is maintained at the same flow rate throughout each test.

4.1.2.3. The fire source is ignited, and the panels above the fire exposure are timed for melt-out or drop-out performance under the cooling effect of the sprinkler flow.

4.1.3. Series 3 (fire Tests 7-9) Surface Flammability

4.1.3.1. Tests 7, 8 and 9 are performed to determine if the panels would contribute to a spreading fire over their surface. When the fire exposure described below is removed, the flame shall not spread to the top of the panels.

4.1.3.2. For each test, two ceiling panels are held vertically 1⁄2 in.(13 mm) apart and a Bernz-o-matic propane torch is placed between the panels at their base and held for a 15 sec. period.

4.1.3.3. The torch is then removed, and observations are made to determine if the panels support combustion.

4.2. QUALITY CONTROL TESTS

For purposes of acquiring quality control data, original samples will be analyzed by the methods below. The data developed from these small-scale quality control tests shall be maintained on file by the certification agency. Results of these tests will be considered as nominal for the certified product. Should periodic control testing of the certified product at any time yield significantly different results from the original small scale test, re-examination of the certified product may be necessary.

4.2.1. Density

4.2.1.1. The apparent density of the ceiling panel is recorded and kept on file by the certification agency.

4.2.1.2. Standard Test Method for Apparent Density of Rigid Cellular Plastics, ASTM D1622. An average of three density samples will be tested and recorded.

4.2.2. Total Ash

4.2.2.1. The ash content of the ceiling panel is recorded and kept on file by the certification agency.

4.2.2.2. Standard Test Method for Ash from Petroleum Products, ASTM D482

4.2.3. Emerson Oxygen Bomb Calorimeter

4.2.3.1. The heat of combustion of the ceiling panel is recorded and kept on file by the certification agency.

4.2.3.2. Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter, ASTM D240. An average of three heat of combustions will be tested and recorded.

4.2.4. Gas Chromatography

4.2.4.1. The gas chromatography graph of the ceiling panel is recorded and kept on file by the certification agency.

4.2.4.2. Standard Practice for General Techniques of Gas Chromatography Infrared (GC/IR) Analysis, ASTM E1642.

5. MANUFACTURER'S REQUIREMENTS

5.1. DEMONSTRATED QUALITY CONTROL PROGRAM

5.1.1. A quality assurance program is required to assure that subsequent products produced by the manufacturer shall present the same quality and reliability as the specific products examined. Design quality, conformance to design, and performance are the areas of primary concern.

- Design quality is determined during the examination and tests and may be documented in the certification report.
- Continued conformance to this standard is verified by the certifier's surveillance program.
- Quality of performance is determined by field performance and by periodic re-examination and testing.

5.1.2. The manufacturer shall demonstrate a quality assurance program which specifies controls for at least the following areas:

- existence of corporate quality assurance guidelines;
- incoming quality assurance, including testing;
- In-process quality assurance, including testing;
- final inspection and tests;
- equipment calibration;
- drawing and change control;
- packaging and shipping; and
- handling and disposition of non-conforming materials.

5.1.3. Documentation/Manual

There should be an authoritative collection of procedures/policies. It should provide an accurate description of the quality management system while serving as a permanent reference for implementation and maintenance of that system. The system should require that sufficient records are maintained to demonstrate achievement of the required quality and verify operation of the quality system.

5.1.4. Records

To assure adequate traceability of materials and products, the manufacturer shall maintain a record of all quality assurance tests performed, for a minimum period of two years from the date of manufacture.

5.1.5. Drawing and Change Control

- The manufacturer shall establish a system of product configuration control that shall allow no unauthorized changes to the product. Changes to critical documents, identified in the certification report, may be required to be reported to, and authorized by the certification agency prior to implementation for production.
- Records of all revisions to all certified products shall be maintained.

5.2. SURVEILLANCE AUDIT

5.2.1. An audit of the manufacturing facility may be part of the certification agencies surveillance requirements to verify implementation of the quality assurance program. Its purpose is to determine that the manufacturer's equipment, procedures, and quality program are maintained to ensure a uniform product consistent with that which was tested and certified.

5.2.2. Certified products or services shall be produced or provided at, or provided from, location(s) disclosed as part of the certification examination. Manufacture of products bearing a certification mark is not permitted at any other location prior to disclosure to the certification agency.

5.3. PRODUCT MODIFICATIONS

5.3.1. The manufacturer shall notify the certification agency of changes in product construction, components, raw materials, physical characteristics, coatings, component formulation or quality assurance procedures prior to implementation.

6. BIBLIOGRAPHY

ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories