



Examination Standard for Profiled Steel Panels for Use as Decking in Class 1 Insulated Roof Construction

Class Number 4451

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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.

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1 INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states testing and certification requirements for profiled steel panels for use as roof decking in Class 1 insulated roof construction.
- 1.1.2 Certification criteria include performance requirements, labeling and marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures, and a surveillance program.

1.2 Scope

- 1.2.1 This standard applies to all profiled steel panels intended for use as roof decking in Class 1 insulated roof construction. This standard also applies to the interaction of accessory components with the steel deck. These accessory components include the products used to secure the deck to the structure, the methods of deck side laps securement and the insulation and fasteners located above the roof deck. Each steel roof deck certification must include a certified above deck roof system qualified in accordance with FM Standards 4454, 4470, 4471, 4475, 4476 or 4477.

1.3 Basis for Requirements

- 1.3.1 The requirements of this standard are based on experience, research and testing. The advice of manufacturers, users, trade associations, jurisdictions and/or loss control specialists was also considered.
- 1.3.2 The requirements of this standard reflect tests and practices used to examine characteristics of profiled steel panels as roof decking for the purpose of obtaining certification.

1.4 Basis for Certification

- 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 for certification;
 - the durability and reliability of the product.
- 1.4.2 An examination of the manufacturing facilities and audit of quality control procedures may be 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. Subsequent surveillance may be required by the certification agency in accordance with the certification scheme to ensure ongoing compliance.

1.5 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.

1.6 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.

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

1.8 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:

AISI S100, North American Specification for the Design of Cold-Formed Steel Structural Members, including Supplement 2

ANSI/FM 4474, Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures

FM 4470, Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction

FM 4880, Class 1 Fire Ratings of Insulated Wall or Roof/Ceiling Panels, Interior Finish Materials or Coatings and Exterior Wall System

NFPA 276, Standard Method of Fire Tests for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-Deck Roofing Components

1.9 Terms and Definitions

For purposes of this standard, the following terms apply:

Arc Spot Weld - A type of securement whereby the steel deck is joined to the supporting steel structural member through heat fusion.

Side Lap Crimping and Interlocking - A mechanical securement achieved by crimping adjacent sheets of steel deck panels along the specially designed side laps.

Crack - During wind uplift testing, when an insulation is stressed to the point that it separates from itself while continuing to maintain the applied uplift pressure without catastrophic failure of the test assembly.

Crease - During wind uplift testing, when insulation is stressed to the point that it bends at a sharp, defined angle, without breaking. Often a crack will form on the opposite face of the insulation board.

Deck - The deck is the structural component of the roof assembly to which the roof system is secured.

Designer - The licensed professional responsible for the content of the drawings and specifications from which the steel deck is to be constructed.

Fasteners - A mechanical securement device used alone or in combination with a stress distributor to secure various components of a roof assembly.

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

Minor delamination – In wind uplift testing, an area approximately 1% of the test sample. For a 12 x 24 ft (3.7 x 7.3 m) test an area of approximately 3 ft² (0.28 m²); for a 5 x 9 ft (1.5 x 2.7 m) test approximately 0.5 ft² (0.05 m²) or less, whereby two adhered components which are intended to be in contact are not in contact.

Owner's Designated Representative for Construction - The owner or the entity that is responsible to the owner for the overall construction of the project, including its planning, quality and completion; usually the general contractor, the construction manager or similar authority at the job site.

Rated Load - The uplift load resulting from a windstorm that a roof assembly must resist. The rated load is equal to two times the service load. The rated load is equal to the rating requested for certification; e.g. the rated load is 90 psf (4.3 kPa) for a Class 1-90 rating.

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

Roof Cover - The exterior surface of a roof assembly.

Roof System - A system of interacting roof components (not including the roof deck) designed to weatherproof and, normally, to insulate a building's top surface.

Span – The distance between deck supports measured center to center.

Steel Roof Deck – Profiled steel panel used as a structural component to support a roof system.

Service Wind Load – The uplift load resulting from a windstorm that a roof assembly must resist. The service load is used for bending stress calculations and is equal to one half of the rated load in psf (kPa).

Structure - The structure is the building framework to which the roof deck is fastened.

Wind Uplift - Wind uplift is the force generated by wind on a roof assembly or components in a roof assembly resulting from wind-induced pressure.

2 GENERAL INFORMATION

2.1 Product Information

Steel roof deck is supplied as sheets or panels. Materials employed in the manufacture of steel roof deck shall consist of cold rolled carbon or stainless-steel panels with a minimum yield point of 33 ksi (230 MPa) and a minimum tensile strength of 45 ksi (310 MPa). The minimum steel design thickness shall be 0.0276 in. (0.70 mm). The uncoated minimum steel thickness delivered to a job site shall not be less than 95% of the steel design thickness at any location (exception: lesser thickness due to cold forming is permitted at bends).

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;
- the wind uplift rating(s) desired, or expected, for example: Class 1-60, 1-75, etc.;
- the type of above deck roof system for use with the deck, for example: fully adhered and/or mechanically fastened roof coverings;
- a set of manufacturing drawings for each gauge and profile, sales brochures/literature, installation instructions and maintenance procedures;
- the number and location of manufacturing facilities; and
- 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 may be required to 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 It is the manufacturer's responsibility to provide any specialized tools or equipment needed to properly evaluate their product for certification.