

Approval Standard

Vacuum and
Pressure Gauges for
Fire Protection Systems

Class Number 2311
April 2008

Approval Standard

For

Vacuum and Pressure Gauges for Fire Protection Systems

Class Number 2311

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Foreword

Approvals are 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 Approval of various types of products and services, as guidance for FM Approvals personnel, manufacturers, users and authorities having jurisdiction.

Products submitted for Approval 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 Master 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.

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1. INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states FM Approvals criteria for water and air vacuum and pressure gauges for use in fire protection systems. Compound pressure gauges may be used in the suction line of fire pump packages. They shall be of the single needle, direct-reading, elastic element style. Positive pressure gauges may be used in sprinkler systems, in a variety of locations.
- 1.1.2 FM Approvals 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 encompasses the design and performance requirements of pressure gauges with nominal case sizes of 3-1/2, 4, or 4-1/2 inch (90, 102, or 115 mm) diameter. The minimum case size shall be 3-1/2 in. (90 mm). Other, larger sizes may be evaluated on a case-by-case basis. In cases where metric sized pressure gauges are to be examined for Approval, test criteria comparable to the United States equivalent size shall be used. Throughout this Standard, the term “pressure gauge” shall mean “vacuum and pressure gauge”. The gauges may be of the vacuum type, positive pressure type, or compound type.
- 1.2.2 Approval Standards are intended to verify that the product described will meet stated conditions of performance, safety and quality useful to the ends of property conservation.

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/or loss control specialists was also considered.
- 1.3.2 The requirements of this standard reflect tests and practices used to examine characteristics of pressure gauges for the purpose of obtaining Approval. Pressure gauges 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, pressure gauges 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 initial facilities and procedures audit shall be conducted to evaluate the manufacturer's ability to consistently produce the product that was examined and tested as part of the Approval project. The audit shall review the facility and in-place quality control procedures used in the manufacturing of the product. Typically, areas of review are incoming inspection, work in progress, production testing, final quality control, marking, calibration of equipment, shipping procedures, and document and drawing control. These examinations are repeated periodically as part of the FM Approvals product follow-up program. (Refer to Section 5.2, Facility and Procedures Audit.)

1.5 Basis for Continued Approval

- 1.5.1 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 Master Agreement;
- Satisfactory re-examination of production samples for continued conformity to requirements; and
- Satisfactory Facilities and Procedures Audits (F&PAs) conducted as part of FM Approvals' Product Follow-up Program.

- 1.5.2 Also, as a condition of retaining Approval, manufacturers may not change an FM Approved product or service without prior written authorization by FM Approvals. (Refer to Section 5.1.3 for further details regarding changes.)

1.6 Effective Date

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 forfeit Approval.

The effective date of this standard is **April 30, 2009** 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. 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 the Institute of Electrical and Electronics Engineers (IEEE)/American Society for Testing Materials (ASTM) SI 10-2002, *"American National 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 or beneficial in understanding this standard.

ANSI/American Society of Mechanical Engineers (ASME) B1.20.1 - 1983 (R2001), *Pipe Threads, General Purpose (Inch)*
ANSI/IEEE/ASTM SI 10, 2002, *American National Standard for Use of the International System of Units (SI): The Modern Metric System*
ASME B40.100 - 2005, *Pressure Gauges and Gauge Attachments*
ASTM B-117 – 2003, *Practice for Operating Salt Spray (Fog) Apparatus*

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