



Member of the FM Global Group

Examination Standard for Electric Interlocking Fuel Gas and Fuel Oil Cocks

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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	1
1.6 Effective Date.....	2
1.7 System of Units	2
1.8 Normative References.....	2
1.9 Terms and Definitions.....	2
2 GENERAL INFORMATION.....	3
2.1 Product Information.....	3
2.2 Certification Application Requirements.....	3
2.3 Requirements for Samples for Examination.....	3
3 GENERAL REQUIREMENTS.....	4
3.1 Review of Documentation.....	4
3.2 Physical or Structural Features	4
3.3 Markings	5
3.4 Manufacturer’s Installation and Operation Instructions.....	5
3.5 Calibration.....	5
4 PERFORMANCE REQUIREMENTS.....	6
4.1 Electrical	6
4.2 Handle Force	6
4.3 Temperature Ratings.....	6
4.4 Leakage	6
4.5 Components Under Pressure	6
4.6 Endurance Test	6
4.7 Additional Tests.....	6
5 OPERATIONS REQUIREMENTS.....	7
5.1 Demonstrated Quality Control Program.....	7
5.2 Surveillance Audit	8
5.3 Manufacturer's Responsibilities.....	8

1 INTRODUCTION

1.1 Purpose

1.1.1 This standard states testing and certification requirements for electric interlocking cocks (EIC).

1.1.2 Testing and certification criteria may include, but are not limited to, performance requirements, 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 electric interlocking fuel gas and fuel oil cocks.

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 an EIC for the purpose of obtaining certification. An EIC having characteristics not anticipated by this standard may be certified if performance equal, or superior, to that required by this standard is demonstrated.

1.4 Basis for Certification

Certification 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 for certification; 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 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, but is not limited to, 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;
- satisfactory field experience;
- 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 agencies 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.

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

1.9 Terms and Definitions

For purposes of this standard, the following terms apply:

Maximum Ambient Temperature Rating - The specified maximum environmental temperature at which the EIC can operate trouble free when the valve is in normal operation.

Maximum Fluid Temperature Rating - The specified maximum temperature of the applicable EIC fluid at which the EIC can operate trouble free when the valve is in normal operation.

Maximum Rated Pressure – Also referred to as the Maximum Allowable Working Pressure, it is the specified maximum internal pressure at which the weakest point of the EIC can operate trouble free within the operating temperature range when the valve is in normal operation.

2 GENERAL INFORMATION

2.1 Product Information

- 2.1.1** An EIC is a manually operated, quarter-turn plug cock for shutting off the fuel supply to gas or oil-fired burner equipment before closing electric switch contacts which are part of the interlocking cock. The primary purpose of electric interlocking cocks is to minimize the hazard of lighting off manually lighted multiburner equipment by completing a circuit to an electric safety shutoff valve (main valve) only when all the cocks are closed.
- 2.1.2** Certification is limited to the handling of manufactured, natural or LP-Gases, unheated No.4 and lighter or heated No.5 and No.6 fuel oils for which the materials and lubricants are considered suitable.

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, piping and electrical schematics, nameplate format, brochures, sales literature, spec. sheets, installation, operation 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 an certification examination, the manufacturer shall submit samples for examination and testing based on the following:
- Sample requirements to be determined by the certification agency following review of the preliminary information
- 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. Any decision to use data generated using prototypes is at the discretion of the certification agency.
- 2.3.4** It is the manufacturer's responsibility to provide any necessary test fixtures, such as those which may be required to evaluate the EIC.

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 Physical or Structural Features

3.2.1 Basic Function

3.2.1.1 The EIC shall provide a reliable fuel supply shut-off.

3.2.1.2 It shall have switch(es) mounted on the plug cock and arranged so that at least one pair of contacts close only after the fuel port is closed. For general utility, more than one pair of electrically independent contacts are recommended.

3.2.2 Construction

3.2.2.1 The design shall minimize the possibility of unsafe failure, tampering, or of improper reassembly (after being disassembled for maintenance or repair).

3.2.2.2 The materials and lubricant used shall be suitable for the intended application.

3.2.2.3 The EIC shall be capable of withstanding normal conditions of vibration, temperature and atmospheres encountered in industrial applications.

3.2.2.4 The design of the EIC shall be such that it will not necessitate unusual care or strength as regards handling, installation and service. It shall lend itself to conventional fuel piping and electrical wiring methods.

3.2.2.5 The electrical contacts and any other operating components, which would otherwise be damaged or whose efficiency would be affected detrimentally, shall be enclosed in a housing or enclosure which affords adequate protection against dirt or dusty atmospheres.

3.2.2.6 A means shall be furnished to seal the covers of the switch in place with wire and lead seals.

3.2.2.7 The handle shall be attached to the plug so that the handle will be in line with the fuel connections when the fuel port is open and at right angles to them when the port is closed.

3.2.2.8 Rotation of the handle and the plug shall be limited to a quarter-turn by suitable stops.

3.2.2.9 If the handle and plug are not integral, the plug position shall be further identified by an external mark on the top of, or by the distinctive shape of, the external part of the plug. Also, the handle shall be pinned or otherwise attached to the plug so that the handle can be secured in the correct position only, and to minimize the possibility of unauthorized removal.

3.2.2.10 An EIC shall be available as a complete assembly; however, the handle need not necessarily be attached prior to shipment provided the user could not logically attach it incorrectly.

3.3 Markings

- 3.3.1** 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 of the manufacturer or marking traceable to the manufacturer;
 - type or model designation;
 - maximum pressure rating(s);
 - applicable fuel gases and/or oils;
 - maximum ambient temperature ratings;
 - maximum fluid temperature ratings for heated oils (gas and unheated fuel oil would normally be at ambient temperature);
 - electrical load ratings for the switch contacts
- 3.3.2** Lubrication instructions shall be attached to a lubricated EIC. These instructions shall include the recommended lubricant and an indication of the amount and frequency of lubrication.
- 3.3.3** The model or type identification shall correspond with the manufacturer's catalog designation and shall uniquely identify the certification agency's mark of conformity.
- 3.3.4** 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.
- 3.3.5** All markings shall be legible and durable.

3.4 Manufacturer's Installation and Operation Instructions

- 3.4.1** The manufacturer shall provide the end user with:
- instructions for the installation, maintenance, and operation of the product;
 - facilities for repair of the product and supply replacement parts, if applicable; and
 - 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.

3.5 Calibration

- 3.5.1** 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.
- 3.5.2** 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 this equipment.

4 PERFORMANCE REQUIREMENTS

4.1 Electrical

4.1.1 The electrical components (switches, wiring, etc.) shall conform with applicable standards of performance and operate within their ratings. The switch enclosure or housing shall be designed to accommodate wiring in conduit or tubing.

4.1.2 The current capacity of the load carrying contacts shall be consistent with the manufacturer's ratings and practical for industrial service conditions.

4.2 Handle Force

4.2.1 The manual force required to operate the cock under normal conditions should be less than 50 lbs applied at the center point of the normal hand position. An operating force requiring more than 50 lbs will be the subject of special investigation.

4.3 Temperature Ratings

4.3.1 Ambient and fluid temperature ratings shall be consistent with those of the switch components, the materials of the plug cock, the lubrication used and practical industrial application.

4.3.2 The EIC shall be suitable for use in an ambient temperature of at least 105°F.

4.3.3 Even though the EIC may be suitable for higher temperatures, the maximum fluid temperature for which it will be approved is 250°F.

4.4 Leakage

4.4.1 In all positions where the switch contacts indicate the EIC is closed, fuel gas leakage through the valve shall not exceed 1 cfh and fuel oil leakage shall not exceed 1/300 gph under all pressure conditions within the valve rating.

4.4.2 There shall be no measurable fluid leakage to atmosphere at pressures to 150% rating.

4.5 Components Under Pressure

4.5.1 Bodies and other structural parts subject to fuel pressure shall withstand 200% of their maximum rated operating pressure for 10 minutes without damage.

4.6 Endurance Test

4.6.1 If the design is such that there is a reasonable possibility of parts wearing, or there is an apparent need for investigating the lubrication and maintenance procedure, the EIC will be subjected to an endurance test of up to 20,000 operations.

4.7 Additional Tests

4.7.1 Additional tests may be required, at the discretion of the certification agency, depending on design features and results of any foregoing tests.

4.7.2 A re-test following a failure shall be acceptable only at the discretion of the certification agency and with a technical justification of the conditions or reasons for failure.

5 OPERATIONS 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 certifiers 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 insure 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 Manufacturer's Responsibilities

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.