Approval Standard for Post-Indicator-Valve-Assembly

Class Number 1111

March 1973

Foreword

The FM Approvals certification mark is intended to verify that the products and services described will meet FM Approvals' 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 shall ensure a consistently uniform and reliable product. Approval Standards strive to be performance-oriented. They are intended 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.

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

TABLE OF CONTENTS

I INTRODUCTION

1.1 A Post-Indicator-Valve-Assembly is used for the control of water flow to a fire protection system. The assembly consists of an underground valve with an above grade operator-indicator. This standard is intended for complete valve/post-indicator assemblies and does not apply to gate valves.

1.2 FM Approval is based on examination and tests of production samples, inspection of the manufacturing and quality control facilities, and satisfactory field experience. The following items are carefully evaluated in the course of an examination: functional suitability, operational reliability, adequacy of design and workmanship, uniformity and dependability of production, effectiveness of quality control and availability of replacement parts and service.

1.3 The requirements of the standard are intended as guidelines reflecting current FM Approval tests and practices. Items which do not precisely conform to these requirements may be Approved if shown to perform as well as or superior to Approved items and the intent of this standard. In the same way items that do conform to each of these written requirements may not be approved if other considerations seriously affect the performance of the product.

II GENERAL REQUIREMENTS

2.1 Glossary

A Post-Indicator-Valve-Assembly consists of a valve, a post, an indicator, a power train, a power-transmission and an operator. The valve is the direct flow controller. The post is the housing for the power train and the support for the indicator and the power transmission. The indicator is the visual display of the valve position. The power train is the linkage between the valve and the power transmission. The power transmission controls the speed at which the valve is opened and closed and the ease of manipulation. The operator is the connection between the motivating power and power transmission; this is the part handled by the person manipulating the valve.

2.2 Instructional Manual

An instruction manual shall accompany each assembly. It shall include a caution notice: ‘‘All replacement parts must be obtained from manufacturer to assure correct orientation between indicator and valve.’’

2.3 Marketing

Post-Indicator-Valve-Assembly shall be marketed as a complete packaged unit.

2.4 Markings

A corrosion-resistant nameplate permanently fastened to the assembly abovegrade shall indicate the manufacturer’s name or trademark, rated working pressure, valve size, type or model number, and year of manufacture. All or part of this marking may be cast in raised letters on the assembly (above grade).

2.5 Sizes

Standard sizes are: 4, 5, 6, 8, 10, 12, 14, 16, 18, 20 and 24 in. NPS. Other sizes may be approved if there is a demonstrated need for them and they meet the requirements stated herein.

2.6 Rated Working Pressure

Post-Indicator-Valve-Assemblies shall have a minimum rated working pressure of 175 psig.

2.7 Factory Tests

All valves shall be tested before leaving the factory to at least 110% of rated working pressure for seat and body leakage. The pressure shall be held for at least one minute and no noticeable seat and body leakage shall occur.

III DESIGN

3.1 Waterway

When in the wide open position, the valve may provide either a single or multiple waterway. The total area of the waterway shall be not less than 60% of the nominal pipe area.

3.2 Orientation

All parts concerned with orientation shall go together in a unique manner to maintain a single correct orientation between valve and indicator.

A readily available section of weakness shall be provided at the beginning of the power transmission or power train. A second, but stronger, section of weakness shall be concealed within the assembly. Both shall fracture upon application of a force less than that required to deform the power train permanently. These fractures shall leave the true indication unaffected, and make it obvious that something is wrong and needs attention.

3.3 Visibility

The indicator shall be of such size and shape that an informed observer when standing at either of two points 90° apart and 300 ft. away will be able to tell whether the valve is open. The indicator shall not depend on lettering to show the observer that the valve is open.

An arrow showing direction to open plus the word ‘‘OPEN’’ shall be provided on the assembly and be readily visible to a person operating the valve. The arrow and letters shall be large enough for easy reading by a person with normal vision standing 3 ft. from valve.

3.4 Design Factors of Safety

The stresses applied to any part under normal conditions, except sections of intentional weakness, shall not exceed 20% of the ultimate strength of the material in tension, compression, or shear.

3.5 Water Hammer

When the valve is closed as rapidly as possible, no water hammer shall occur. (See 4.3)

3.6 Operation

If rotary motion is employed to operate the valve, the direction to open shall be counter-clockwise. The operator shall be removable.

3.7 Ease of Operation

The valve shall be designed to operate easily by hand without tools after standing idle for five years. The operating torque or leverage resulting from a force of 60 lb. applied at the normal operating point shall be ample to operate the valve but less than that required to shear the first weakness section in the power train.

The length of the post shall be such that the operator is at a reasonable height above grade after the valve is installed.

3.8 Serviceability

The arrangement of parts shall make it difficult for unauthorized personnel to tamper with the unit. Replacement of parts by qualified personnel shall be easy.

3.9 Impact Resistance (Shock Loading)

Exposed parts shall have sufficient strength to resist the normal abuse expected in service.

Impacts sufficiently hard to do serious damage shall result in a fracture above grade before any other part fails and the valve shall remain intact.

3.10 Friction Loss

The loss in pressure through the valve shall not exceed 5.0 psig at flows that will produce a velocity of 20 ft. per sec. in the pipe of the nominal diameter of the valve.

3.11 Locking

Suitable means shall be provided for locking the valve in the wide open position. It shall be designed so that the lock must be removed to close the valve or to remove any indicator parts.

3.12 Seat Leakage

Valves shall give a tight shut off at water pressures up to the rated working pressure.

3.13 Materials

All materials used in the construction of the assembly shall be suitable for the intended application.

Materials used in the construction of parts above grade shall have good resistance to weathering. Valve parts exposed to water shall have good resistance to corrosion.

3.14 Post Design

The post shall be designed so that ground frost will not lift the post and separate the power train from the valve.

Means shall be provided to drain water which may enter the post.

IV TESTS

4.1 General

Conformance with these requirements may be determined by tests, calculations or both at the discretion of FM Approvals.

4.2 Visibility

A new production assembly will be observed outdoors with the target placed in a favorable position against a contrasting background. Observation will be made during daylight hours by an observer having previous knowledge of the correct relationship between indicator and valve position. Valve position shall be obvious to the observer(s).

4.3 Water Hammer

Water hammer is a series of pressure pulsations caused by rapidly stopping a flow of liquid in a pipe. The severity of this condition depends on several factors including how quickly the flow is stopped. To ensure that no water hammer occurs, the valve will be rapidly closed from the fully open position. This operation must take at least 5.0 sec. under a no-flow condition. For valves manipulated with a rotating operator, rapid operation will be defined as two revolutions per second. For valves using other actuation methods, similar requirements shall apply.

4.4 Loss of Power Transmission Control

One or more strategic parts will be removed from the power train to be sure that the valve stays in position or moves to the wide open position.

4.5 Hydrostatic Test

The valve body shall be hydrostatically tested for five minutes at 700 psig or 400% rated working pressure, whichever is greater. There shall be no deformation, rupture or cracking as a result of this test.

4.6 Seat Leakage

The valve shall be tested for seat leakage at the rated working pressure. Leakage shall not exceed a rate of 1 ft. oz. per hour, regardless of size. At 110% of rated working pressure leakage shall not exceed 1 ft. oz. per hour per inch of nominal valve size.

4.5 Impact Resistance

With the Post-Indicator-Valve-Assembly held rigidly, a horizontal load will be applied to the post until it fractures. The load may be applied at any suitable distance above the intended section of weakness. As a result of this test, other assembly members may be ruptured or permanently deformed, but no permanent deformation or rupture shall occur in the valve which would allow serious water leakage or impairment of sprinkler protection.

The indicator will be tested by dropping a 5 lb., 2 in. diameter, cylindrical steel weight from a height of 10 ft. onto the indicator. The indicator will be placed in the most unfavorable position with respect to the weight. No fracture or breakage shall occur.

4.8 Durability

Post-Indicator-Valve-Assembly will be opened and closed at least 1000 times under representative pressures and flows. It shall operate properly in all respects following this test.

4.9 Friction Loss

A representative sample of each valve size shall be flow-tested with the valve in the wide open position to measure friction loss. If friction loss data is available from the manufacturer, it may not be necessary to test each valve size. Results shall be within the limits stated in Para. 3.10.

4.10 Stem Seal

A representative sample will be pressurized to the rated working pressure for five minutes with the valve partially open. No leakage shall occur past the stem seal as a result of this test.

The stem seal assembly shall be subjected to a temperature of 120°F for seventy-two hours and then pressurized to the rated working pressure for five minutes. No leakage shall occur past the stem seal as a result of this test.

4.11 Other

Other tests may be necessary at the discretion of FM Approvals.