



Member of the FM Global Group

Approval Standard for Explosive Driven Fasteners

Class Number 1956

July 1970

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
II GENERAL	1
III PERFORMANCE	2
Fastener-Coupling Combinations	2
Anti-Swaying Feature	2
Fastener	2
Material	2
Coupling	2
Installation Instructions	2
III TESTS	3
Fasteners in Vertical Position	3
Fasteners in Horizontal Position	3
IV MARKINGS	3

I INTRODUCTION

Explosive driven fasteners are used to attach sprinkler pipe hanger rods to structural steel or concrete.

FM Approval is based on examination and test of production samples, inspection of the manufacturing and/or quality control facilities, and continued field experience. Particularly considered are functional suitability, adequacy of design and workmanship, uniformity and dependability of production, and effectiveness of quality control, and assurance of service and replacement parts.

These requirements are guides. Mere conformity does not assure Approval; other considerations may control. Nor is strict conformity necessary; devices having different characteristics may be considered and Approved, if shown to be essentially equivalent or superior in performance.

II GENERAL

Either male or female threaded fasteners are suitable. Male fasteners require couplings for connection to hanger rods. Female fasteners may or may not require couplings. A typical hanger assembly is shown in Fig. 1 (page 4).

A single size hanger rod may be used for a range of pipe sizes:

<i>Hanger Rod - Inches</i>	<i>Pipe Sizes - Inches</i>
$\frac{3}{8}$	$\frac{3}{4}$ - 2
$\frac{1}{2}$	2 $\frac{1}{2}$ - 3 $\frac{1}{2}$
$\frac{5}{8}$	4, 5

The 5 in. pipe size is the largest allowed with explosion driven fasteners.

III PERFORMANCE

Fastener-Coupling Combinations

A single fastener may be used with various couplings to support one or more hanger rod sizes. Couplings will be Approved in combination with specific fasteners. Permissible combinations are:

<i>Fastener</i>	<i>Couplings</i>	
	<i>Straight</i>	<i>Reducing</i>
<i>Thread Size</i>		
1/4 - 20	—	3/8 × 1/4; 1/2 × 1/4
3/8 - 16	3/8 × 3/8	1/2 × 3/8; 5/8 × 3/8
5/16 - 18	—	3/8 × 5/16
1/2 - 13	1/2 × 1/2	5/8 × 1/2

Anti-Swaying Feature

The thread section of fasteners to be installed horizontally, as shown on Fig. 2 (page 4), shall be long enough for one washer and one nut on each side of the eye rod, or equivalent assembly, to prevent lateral sway or draw-out when tightening the outer nut.

Fastener

The unthreaded shank of the fastener shall have a minimum 3/16 in. nominal diameter and the threaded section a minimum of 1/4 - 20 U.S. standard gauge.

Material

Fastener and coupling material shall be suitable for the intended application.

Coupling

Straight couplings shall have a total length equal to at least twice their thread diameter.

Reducer couplings shall be of such length that the connecting members shall enter the coupling a distance at least equal to the thread size of the connecting member.

Installation Instructions

The fastener manufacturer shall furnish adequate instructions for installation. Instructions for the anti-swaying and fastener draw-out prevention for horizontal installation shall be included with each box of fasteners.

III TESTS

Coupling and fastener combinations proposed by the manufacture shall pass the following tests:

Fasteners in Vertical Position

1. *Bending*: The fastener (embedded in concrete or steel), the coupling, and hanger rod shall withstand a load of twenty pounds applied at an angle of 90° to the hanger rod and 15 in. from the concrete or steel. If the assembly is permanently deformed, it may be straightened for the subsequent tensile load test. The fastener shall not break or pull out as a result of this test.
2. *Tension*: Fastener and coupling shall be subjected to these tensile loads:

<i>Fastener Thread Size</i>	<i>Load - Lb</i>
1/4 - 20	1250
3/8 - 16	2000
5/16 - 18	750
1/2 - 13	2000

There shall be no fastener or coupling failure as a result of these tests.

Fasteners will be tested in 10 × 10 × 6 in. reinforced concrete blocks which have been aged for at least 30 days. Blocks will be of approximately 3,000 psi compressive strength having this mixture: one part cement, two parts sand and four parts coarse aggregate (3/8 to 3/4 in. stone).

Fasteners in Horizontal Position

1. *Shear*: The fasteners (embedded in concrete or steel), washers, nuts, and eye rods (plus couplings and hanger rods if used) shall be subjected to these shear loads:

<i>Fastener Thread Size</i>	<i>Load - Lb</i>
1/4 - 20	1250
3/8 - 16	2000
5/16 - 18	750
1/2 - 13	2000

Fasteners shall not pull out as a result of these tests.

IV MARKINGS

Each fastener and coupling shall be marked with the manufacturer's identification.

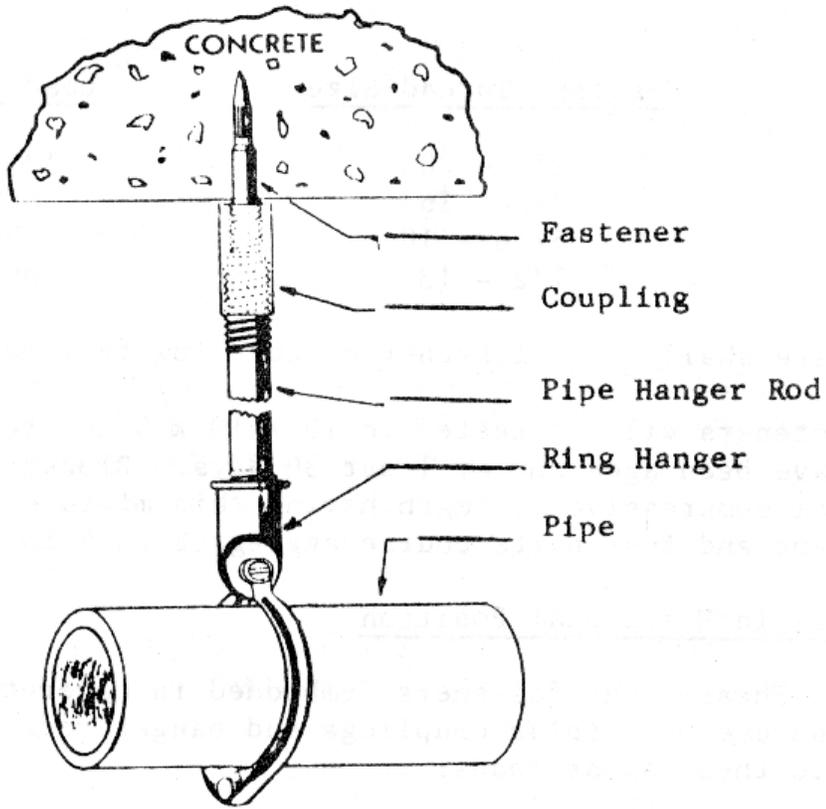


Fig. 1. Typical Hanger Arrangement

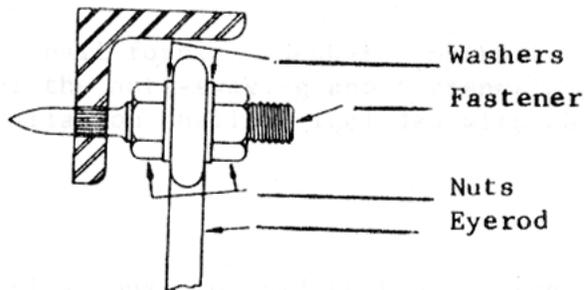


Fig. 2. Anti-Sway Arrangement