

Type D3 Protectospray® Directional Spray Nozzles, Open, Medium Velocity

General Description

The Type D3 Protectospray Nozzles are open (non-automatic) directional spray nozzles and they are designed for use in water spray fixed systems for fire protection applications. They are external deflector type nozzles that discharge a uniformly filled cone of medium velocity water droplets.

The D3 Nozzles are effective in covering exposed vertical, horizontal, curved, and irregular shaped surfaces in a cooling spray to prevent excessive absorption of heat from an external fire and possible structural damage or spread of fire to the protected equipment. In some applications, depending on water design density requirements, the Type D3 Nozzles may also be used for fire control or extinguishment.

The Type D3 Nozzles are available in a wide variety of orifice sizes and spray angles (included angle of discharge) to provide versatility in system design. Refer to Technical Data Sheet TFP890 for information on Blow-Off Plugs that can be used for applications where protection is required against insect infestation or accumulation of debris within the nozzle orifice.

It is recommended that the end user be consulted with respect to the suitability of the materials of construction and

finish for any given corrosive environment. The effects of ambient temperature, concentration of chemicals, and gas/chemical velocity, should be considered, at a minimum, along with the corrosive nature to which the sprinklers may be exposed.

The Type D3 Protectospray Nozzle is a redesignation for the Gem Type D3.

WARNINGS

*The Type D3 Protectospray Nozzles described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. **Failure to do so may impair the performance of these devices.***

The design of individual water spray fixed systems can vary considerably, depending on the characteristics and nature of the hazard, the basic purpose of the spraying system, the configuration of the hazard, and wind/draft conditions. Because of these variations as well as the wide range of available nozzle spray characteristics, the design of water spray fixed systems for fire protection must only be performed by experienced designers who thoroughly understand the limitations as well as capabilities of such systems.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.



IMPORTANT

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the nozzle to fail to operate in a fire situation.

Technical Data

Approvals

The natural finish, chrome plated, and lead coated bronze, as well as stainless steel Type D3 Protectospray Nozzles are UL and C-UL Listed, as well as FM Approved.

Maximum Working Pressure

175 psi (12,1 bar).
Also refer to Figure 2, Note 2.

Discharge Coefficient

Refer to Table A.

Spray Angles

Refer to Table B.

Finish and Material

Refer to Table E.

Thread Connection

1/2 inch NPT.

Physical Characteristics (Bronze)

Frame Bronze
Deflector Bronze
Splitter Bronze
Pin Bronze

Physical Characteristics (Stainless Steel)

Frame ASTM A-296,
Grade CF-8M (equiv. Type 316 S.S.)
Deflector Type 316 S.S.
Splitter Type 316 S.S.
Pin Type 316 S.S.

Design Criteria

Nozzle Placement. Where direct impingement of water spray onto all of the protected surface is required by the Authority having Jurisdiction, the nozzles are to be spaced and directed so that their spray patterns will completely cover the plane-of-protection with the minimum required average density; however, it is recommended that indoor nozzle spacing be 12 feet (3,7 m) or less and that outdoor nozzle spacing be 10 feet (3,0 m) or less. Where rundown or slippage is planned, e.g., exposure protection of vessels per NFPA 15, the above recommended indoor and outdoor spacings also apply.

When used for protecting the surfaces of a vessel, for example, the nozzles are positioned normal to and approximately 2 feet (0,6 m) from the surface. This approach, in conjunction with a properly selected spray angle, will tend to make more effective use of the spray as well as help minimize the

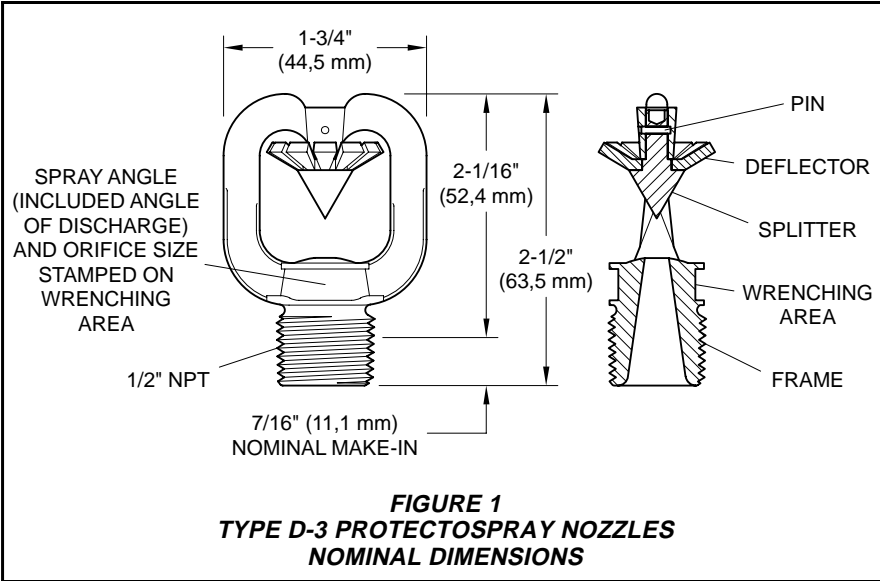


FIGURE 1
TYPE D-3 PROTECTOSPRAY NOZZLES
NOMINAL DIMENSIONS

| ORIFICE SIZE | MINIMUM DIAMETER | K-FACTOR | |
|--------------|-------------------|----------------------|------------------------|
| | | NFPA (GPM ÷ √psi) | ISO/SI (LPM ÷ √bar) |
| NO. 16 | 0.203" (5,16 mm) | 1.2 | 17,3 |
| NO. 18 | 0.250" (6,35 mm) | 1.8 | 25,9 |
| NO. 21 | 0.281" (7,14 mm) | 2.3 | 33,1 |
| NO. 24 | 0.328" (8,33 mm) | 3.0 | 43,2 |
| NO. 28 | 0.375" (9,53 mm) | 4.1 | 59,0 |
| NO. 32 | 0.438" (11,13 mm) | 5.6 | 80,6 |
| NO. 34 | 0.500" (12,70 mm) | 7.2 | 103,7 |

TABLE A
SELECTION OF ORIFICE SIZES

| | |
|------|------|
| 65° | 125° |
| 80° | 140° |
| 95° | 160° |
| 110° | 180° |

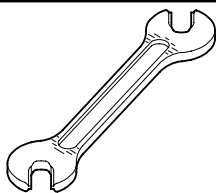
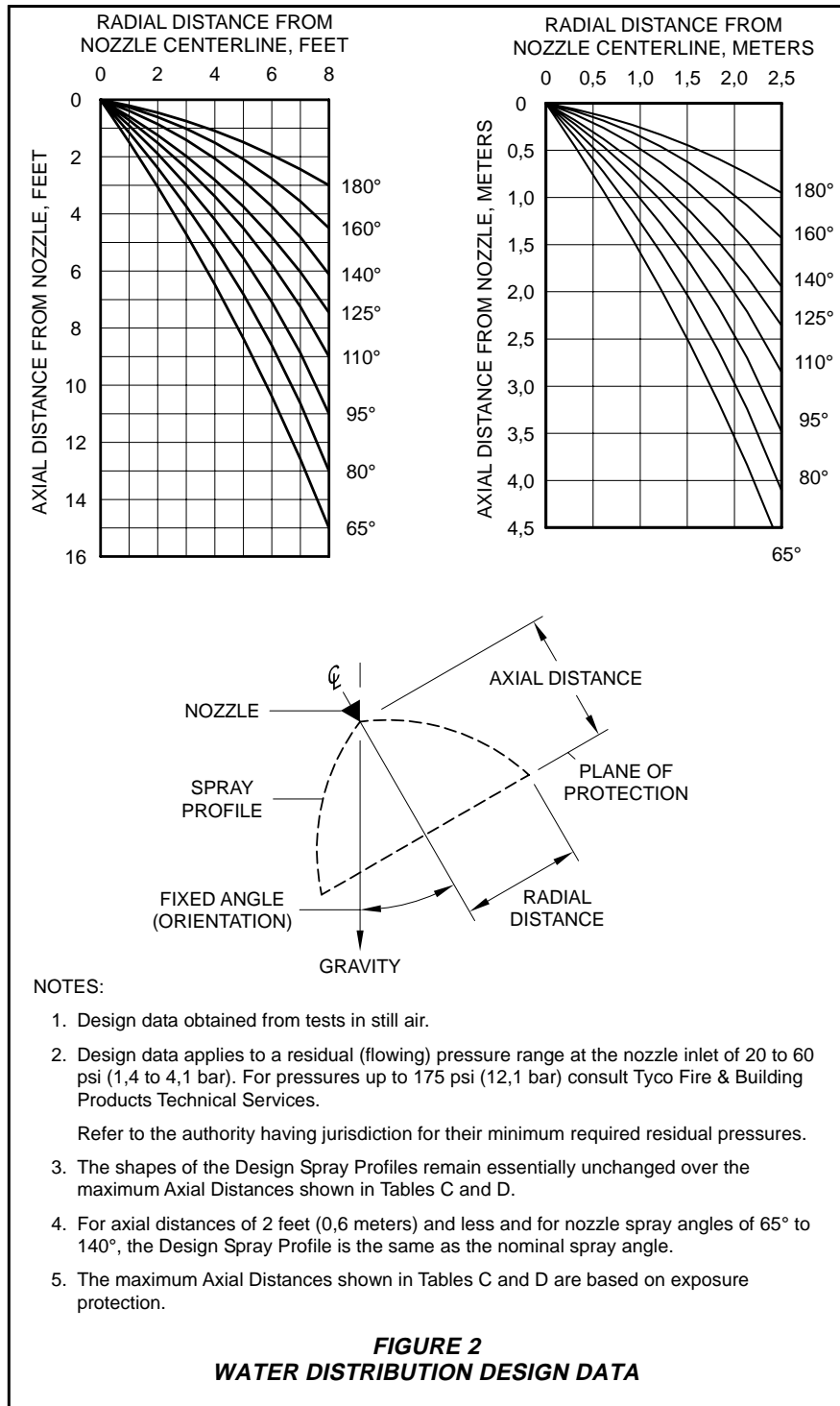
TABLE B
SELECTION OF SPRAY ANGLES

disturbance effects of wind/draft conditions on the water spray patterns.

Spray Patterns. The Design Spray Profiles for the nozzle spray angles of 65 to 180 degrees are shown in Figure 2 and apply to discharge pressures of 20 to 60 psi (1,4 to 4,1 bar). Discharge pressures in excess of 60 psi (4,1 bar) will result in a decrease in coverage area since the spray patterns tend to draw inwards at higher pressures. Refer inquiries on higher discharge pressures to the Technical Services Department. The maximum axial distances between the nozzle tip and

plane-of-protection, for exposure protection, are given in Table C and D. When the axial distance from the nozzle tip to the plane-of-protection is 3 feet (0,6 m) or less, the Design Spray Profile is the same as the nominal spray angles of 65 thru 140 degrees.

Main Pipeline Strainers. Main pipeline strainers per NFPA 15 are required for systems utilizing nozzles with a flow path less than 3/8 inch (9,5 mm) diameter, i.e., No. 16 thru No. 24 (Ref. Table A), and for any system where the water is likely to contain obstructive material.



**FIGURE 3
TYPE W11 SPRINKLER WRENCH**

Installation

Type D3 Protectospray Nozzles must be installed in accordance with the following instructions:

NOTE

A leak tight 1/2 inch NPT nozzle joint should be obtained with a torque of 7 to 14 ft. lbs. (9,5 to 19,0 Nm). A maximum of 21 ft. lbs. (28,5 Nm) of torque

may be used to install nozzles with 1/2 NPT connections. Higher levels of torque may distort the nozzle inlet and cause leakage or impairment of the nozzle.

Step 1. With pipe thread sealant applied to the pipe threads, hand tighten the nozzle into the nozzle fitting.

Step 2. Tighten the nozzle into the nozzle fitting using only the W-Type 11 Sprinkler Wrench (Ref. Figure 3). With reference to Figure 1 the W-Type 11 Sprinkler Wrench is to be applied to the wrenching area.

Care and Maintenance

The Type D3 Protectospray Nozzles must be maintained and serviced in accordance with the following instructions:

NOTE

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, permission to shut down the affected fire protection system must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

Type D3 Protectospray Nozzles must never be painted, plated, coated or altered in any way after leaving the factory; otherwise, the spray performance may be impaired.

Care must be exercised to avoid damage to the nozzles - before, during, and after installation. Nozzles damaged by dropping, striking, wrench twist/slip-page, or the like, must be replaced.

Frequent visual inspections are recommended to be initially performed for nozzles installed in potentially corrosive atmospheres to verify the integrity of the materials of construction and finish as they may be affected by the corrosive conditions present for a given installation. Thereafter, annual inspections per NFPA 25 are required.

Water spray fixed systems for fire protection service require regularly scheduled care and maintenance by trained personnel. In addition to inspecting nozzles for proper spray performance during water flow trip tests of the system, it is recommended that nozzles be periodically inspected for broken or missing parts (including blow-off plugs where applicable), loading/obstructions, or other evidence of impaired protection. The inspections should be scheduled weekly or as frequently as

(Continued on Page 6)

| MAXIMUM AXIAL DISTANCE FOR 65° SPRAY ANGLE IN FEET AND INCHES | | | | | | | |
|--|--------------|------|------|------|------|------|------|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 10-6 | 12-6 | 13-0 | 13-3 | 14-6 | 15-0 | 15-6 |
| 30° | 8-3 | 10-9 | 10-9 | 11-9 | 12-6 | 13-6 | 13-9 |
| 45° | 7-3 | 10-0 | 10-0 | 11-3 | 11-6 | 12-6 | 12-9 |
| 60° | 6-6 | 9-3 | 9-6 | 10-9 | 11-0 | 11-9 | 12-6 |
| 90° | 6-0 | 8-6 | 9-0 | 10-3 | 10-6 | 10-9 | 11-6 |
| 120° | 5-9 | 7-6 | 7-6 | 7-6 | 8-3 | 9-0 | 9-6 |
| 135° | 5-6 | 6-0 | 6-3 | 6-6 | 7-0 | 8-0 | 8-6 |
| 150° | 5-3 | 5-6 | 5-6 | 5-9 | 6-3 | 7-3 | 7-6 |
| 180° | 5-0 | 5-0 | 5-0 | 5-6 | 5-9 | 6-6 | 7-0 |

| MAXIMUM AXIAL DISTANCE FOR 80° SPRAY ANGLE IN FEET AND INCHES | | | | | | | |
|--|--------------|------|------|------|------|------|------|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 9-0 | 10-6 | 11-0 | 12-0 | 13-0 | 14-0 | 14-0 |
| 30° | 7-3 | 8-3 | 8-9 | 10-6 | 11-6 | 12-3 | 12-3 |
| 45° | 6-3 | 7-6 | 8-0 | 10-3 | 10-6 | 11-3 | 11-3 |
| 60° | 5-6 | 7-0 | 7-6 | 10-0 | 10-3 | 10-9 | 10-9 |
| 90° | 5-0 | 6-0 | 7-0 | 9-3 | 9-6 | 9-9 | 10-0 |
| 120° | 4-6 | 4-9 | 5-9 | 6-6 | 7-3 | 7-0 | 8-0 |
| 135° | 4-3 | 4-6 | 5-0 | 5-6 | 6-0 | 6-3 | 6-9 |
| 150° | 4-0 | 4-0 | 4-6 | 5-0 | 5-6 | 5-6 | 6-0 |
| 180° | 3-9 | 3-9 | 4-0 | 4-6 | 4-9 | 5-3 | 5-6 |

| MAXIMUM AXIAL DISTANCE FOR 95° SPRAY ANGLE IN FEET AND INCHES | | | | | | | |
|--|--------------|-----|-----|------|------|------|------|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 7-0 | 7-9 | 9-6 | 10-6 | 11-0 | 12-0 | 12-6 |
| 30° | 5-9 | 6-6 | 7-9 | 9-9 | 10-6 | 10-9 | 11-0 |
| 45° | 5-3 | 6-3 | 7-0 | 9-6 | 9-9 | 10-3 | 10-3 |
| 60° | 4-9 | 6-0 | 6-9 | 9-3 | 9-6 | 9-9 | 9-9 |
| 90° | 4-0 | 5-0 | 6-6 | 8-3 | 8-6 | 8-9 | 8-9 |
| 120° | 3-6 | 3-9 | 5-0 | 5-3 | 6-3 | 6-0 | 6-6 |
| 135° | 3-3 | 3-6 | 4-0 | 4-6 | 5-3 | 5-3 | 5-6 |
| 150° | 3-0 | 3-0 | 3-6 | 4-0 | 4-6 | 4-6 | 4-9 |
| 180° | 3-0 | 3-0 | 3-3 | 3-9 | 4-0 | 4-3 | 4-6 |

| MAXIMUM AXIAL DISTANCE FOR 110° SPRAY ANGLE IN FEET AND INCHES | | | | | | | |
|---|--------------|-----|-----|-----|------|------|------|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 6-0 | 7-0 | 9-0 | 9-6 | 11-0 | 11-3 | 11-6 |
| 30° | 5-3 | 6-3 | 7-3 | 8-9 | 9-6 | 9-9 | 10-0 |
| 45° | 4-9 | 5-9 | 6-6 | 8-6 | 9-0 | 9-0 | 9-3 |
| 60° | 4-3 | 5-6 | 6-3 | 8-3 | 8-6 | 8-6 | 8-9 |
| 90° | 3-6 | 4-6 | 5-9 | 7-6 | 7-6 | 7-6 | 7-9 |
| 120° | 2-9 | 3-3 | 4-6 | 4-6 | 5-6 | 5-6 | 5-6 |
| 135° | 2-6 | 2-9 | 3-6 | 3-6 | 4-6 | 4-6 | 4-9 |
| 150° | 2-3 | 2-6 | 3-0 | 3-3 | 3-6 | 3-9 | 4-3 |
| 180° | 2-3 | 2-3 | 2-9 | 3-0 | 3-3 | 3-6 | 3-9 |

| MAXIMUM AXIAL DISTANCE FOR 125° SPRAY ANGLE IN FEET AND INCHES | | | | | | | |
|---|--------------|-----|-----|-----|------|------|------|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 4-6 | 5-0 | 6-6 | 7-9 | 10-0 | 10-3 | 10-6 |
| 30° | 3-9 | 3-9 | 6-3 | 6-9 | 8-6 | 8-6 | 8-9 |
| 45° | 3-0 | 3-6 | 5-9 | 6-0 | 7-9 | 7-6 | 8-3 |
| 60° | 2-6 | 3-0 | 5-6 | 5-9 | 7-3 | 7-3 | 7-9 |
| 90° | 2-0 | 2-9 | 4-9 | 5-0 | 5-9 | 6-0 | 6-6 |
| 120° | 1-9 | 2-3 | 3-3 | 3-3 | 3-9 | 3-9 | 4-6 |
| 135° | 1-6 | 1-9 | 2-6 | 2-6 | 3-3 | 3-3 | 3-9 |
| 150° | 1-6 | 1-6 | 2-0 | 2-3 | 2-6 | 2-9 | 3-6 |
| 180° | 1-3 | 1-3 | 1-9 | 2-0 | 2-3 | 2-6 | 3-3 |

| MAXIMUM AXIAL DISTANCE FOR 140° SPRAY ANGLE IN FEET AND INCHES | | | | | | | |
|---|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 4-0 | 4-6 | 6-0 | 6-6 | 8-0 | 8-0 | 8-0 |
| 30° | 3-3 | 3-6 | 5-6 | 5-6 | 6-3 | 7-0 | 7-0 |
| 45° | 2-9 | 2-9 | 5-0 | 5-0 | 5-6 | 6-6 | 6-6 |
| 60° | 2-3 | 2-6 | 4-6 | 4-6 | 5-3 | 5-6 | 5-9 |
| 90° | 1-9 | 2-3 | 4-0 | 4-0 | 4-6 | 4-6 | 5-0 |
| 120° | 1-6 | 1-9 | 2-3 | 2-6 | 2-6 | 3-0 | 3-6 |
| 135° | 1-3 | 1-6 | 1-6 | 1-9 | 2-0 | 2-6 | 2-9 |
| 150° | 1-3 | 1-3 | 1-6 | 1-6 | 1-9 | 2-3 | 2-6 |
| 180° | 1-0 | 1-0 | 1-3 | 1-3 | 1-6 | 2-0 | 2-3 |

| MAXIMUM AXIAL DISTANCE FOR 160° SPRAY ANGLE IN FEET AND INCHES | | | | | | | |
|---|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 3-6 | 3-9 | 4-9 | 5-0 | 6-0 | 6-9 | 7-0 |
| 30° | 2-9 | 3-0 | 4-3 | 4-6 | 5-0 | 5-9 | 6-3 |
| 45° | 2-3 | 2-6 | 3-9 | 4-0 | 4-6 | 5-3 | 5-6 |
| 60° | 1-9 | 2-3 | 3-6 | 3-9 | 4-3 | 4-9 | 5-3 |
| 90° | 1-3 | 1-9 | 3-0 | 3-3 | 3-6 | 3-9 | 4-3 |
| 120° | 1-0 | 1-3 | 1-6 | 2-0 | 2-0 | 2-3 | 2-6 |
| 135° | 1-0 | 1-0 | 1-3 | 1-3 | 1-6 | 1-9 | 2-0 |
| 150° | 0-9 | 0-9 | 1-0 | 1-0 | 1-6 | 1-6 | 1-9 |
| 180° | 0-9 | 0-9 | 0-9 | 0-9 | 1-3 | 1-6 | 1-6 |

| MAXIMUM AXIAL DISTANCE FOR 180° SPRAY ANGLE IN FEET AND INCHES | | | | | | | |
|---|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 2-9 | 3-0 | 3-6 | 3-6 | 4-0 | 6-0 | 6-0 |
| 30° | 2-3 | 2-3 | 3-6 | 3-6 | 3-9 | 5-0 | 5-0 |
| 45° | 1-9 | 2-0 | 3-3 | 3-3 | 3-6 | 4-3 | 4-3 |
| 60° | 1-6 | 1-9 | 2-9 | 2-9 | 3-3 | 3-9 | 3-9 |
| 90° | 1-0 | 1-6 | 2-0 | 2-0 | 2-6 | 3-0 | 3-0 |
| 120° | 0-9 | 1-0 | 1-0 | 1-0 | 1-6 | 1-6 | 1-6 |
| 135° | 0-6 | 0-9 | 0-9 | 0-9 | 1-3 | 1-3 | 1-3 |
| 150° | 0-6 | 0-6 | 0-6 | 0-6 | 1-0 | 1-0 | 1-0 |
| 180° | 0-6 | 0-6 | 0-6 | 0-6 | 0-9 | 0-9 | 0-9 |

TABLE C
MAXIMUM AXIAL DISTANCE BETWEEN
NOZZLE TIP AND PLANE-OF-PROTECTION FOR EXPOSURE PROTECTION
— FEET AND INCHES —

| MAXIMUM AXIAL DISTANCE FOR 65° SPRAY ANGLE IN METERS | | | | | | | |
|---|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 3,2 | 3,8 | 4,0 | 4,0 | 4,4 | 4,6 | 4,7 |
| 30° | 2,5 | 3,3 | 3,3 | 3,6 | 3,8 | 4,1 | 4,2 |
| 45° | 2,2 | 3,0 | 3,0 | 3,4 | 3,5 | 3,8 | 3,9 |
| 60° | 2,0 | 2,8 | 2,9 | 3,3 | 3,4 | 3,6 | 3,8 |
| 90° | 1,8 | 2,6 | 2,7 | 3,1 | 3,2 | 3,3 | 3,5 |
| 120° | 1,8 | 2,3 | 2,3 | 2,3 | 2,5 | 2,7 | 2,9 |
| 135° | 1,7 | 1,8 | 1,9 | 2,0 | 2,1 | 2,4 | 2,6 |
| 150° | 1,6 | 1,7 | 1,7 | 1,9 | 1,9 | 2,2 | 2,3 |
| 180° | 1,5 | 1,5 | 1,5 | 1,7 | 1,8 | 2,0 | 2,1 |

| MAXIMUM AXIAL DISTANCE FOR 80° SPRAY ANGLE IN METERS | | | | | | | |
|---|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 2,7 | 3,2 | 3,4 | 3,7 | 4,0 | 4,3 | 4,3 |
| 30° | 2,2 | 2,5 | 2,7 | 3,2 | 3,5 | 3,7 | 3,7 |
| 45° | 1,9 | 2,3 | 2,4 | 3,1 | 3,2 | 3,4 | 3,4 |
| 60° | 1,7 | 2,1 | 2,3 | 3,0 | 3,1 | 3,3 | 3,3 |
| 90° | 1,5 | 1,8 | 2,1 | 2,8 | 2,9 | 3,0 | 3,0 |
| 120° | 1,4 | 1,4 | 1,8 | 2,0 | 2,2 | 2,1 | 2,4 |
| 135° | 1,3 | 1,4 | 1,5 | 1,7 | 1,8 | 1,9 | 2,1 |
| 150° | 1,2 | 1,2 | 1,4 | 1,5 | 1,7 | 1,7 | 1,8 |
| 180° | 1,1 | 1,1 | 1,2 | 1,4 | 1,4 | 1,6 | 1,7 |

| MAXIMUM AXIAL DISTANCE FOR 95° SPRAY ANGLE IN METERS | | | | | | | |
|---|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 2,1 | 2,4 | 2,9 | 3,2 | 3,4 | 3,7 | 3,8 |
| 30° | 1,8 | 2,0 | 2,4 | 3,0 | 3,2 | 3,3 | 3,4 |
| 45° | 1,6 | 1,9 | 2,1 | 2,9 | 3,0 | 3,1 | 3,1 |
| 60° | 1,4 | 1,8 | 2,1 | 2,8 | 2,9 | 3,0 | 3,0 |
| 90° | 1,2 | 1,5 | 2,0 | 2,5 | 2,6 | 2,7 | 2,7 |
| 120° | 1,1 | 1,1 | 1,5 | 1,6 | 1,9 | 1,8 | 2,0 |
| 135° | 1,0 | 1,1 | 1,2 | 1,4 | 1,6 | 1,6 | 1,7 |
| 150° | 0,9 | 0,9 | 1,1 | 1,2 | 1,4 | 1,4 | 1,4 |
| 180° | 0,9 | 0,9 | 1,1 | 1,1 | 1,2 | 1,3 | 1,4 |

| MAXIMUM AXIAL DISTANCE FOR 110° SPRAY ANGLE IN METERS | | | | | | | |
|--|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 1,8 | 2,1 | 2,7 | 2,9 | 3,4 | 3,4 | 3,5 |
| 30° | 1,6 | 1,9 | 2,2 | 2,7 | 2,9 | 3,0 | 3,0 |
| 45° | 1,4 | 1,8 | 2,0 | 2,6 | 2,7 | 2,7 | 2,8 |
| 60° | 1,3 | 1,7 | 1,9 | 2,5 | 2,6 | 2,6 | 2,7 |
| 90° | 1,1 | 1,4 | 1,8 | 2,3 | 2,3 | 2,3 | 2,4 |
| 120° | 0,8 | 1,0 | 1,4 | 1,4 | 1,7 | 1,7 | 1,7 |
| 135° | 0,8 | 0,8 | 1,1 | 1,1 | 1,4 | 1,4 | 1,4 |
| 150° | 0,7 | 0,8 | 0,9 | 1,0 | 1,1 | 1,1 | 1,3 |
| 180° | 0,7 | 0,7 | 0,8 | 0,9 | 1,0 | 1,1 | 1,1 |

| MAXIMUM AXIAL DISTANCE FOR 125° SPRAY ANGLE IN METERS | | | | | | | |
|--|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 1,4 | 1,5 | 2,0 | 2,4 | 3,0 | 3,1 | 3,2 |
| 30° | 1,1 | 1,1 | 1,9 | 2,1 | 2,6 | 2,6 | 2,7 |
| 45° | 0,9 | 1,1 | 1,8 | 1,8 | 2,4 | 2,3 | 2,5 |
| 60° | 0,8 | 0,9 | 1,7 | 1,8 | 2,2 | 2,2 | 2,4 |
| 90° | 0,6 | 0,8 | 1,4 | 1,5 | 1,8 | 1,8 | 2,0 |
| 120° | 0,5 | 0,7 | 1,0 | 1,0 | 1,1 | 1,1 | 1,4 |
| 135° | 0,5 | 0,5 | 0,8 | 0,8 | 1,0 | 1,0 | 1,1 |
| 150° | 0,5 | 0,5 | 0,6 | 0,7 | 0,8 | 0,8 | 1,1 |
| 180° | 0,4 | 0,4 | 0,5 | 0,6 | 0,7 | 0,8 | 1,0 |

| MAXIMUM AXIAL DISTANCE FOR 140° SPRAY ANGLE IN METERS | | | | | | | |
|--|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 1,2 | 1,4 | 1,8 | 2,0 | 2,4 | 2,4 | 2,4 |
| 30° | 1,0 | 1,1 | 1,7 | 1,7 | 1,9 | 2,1 | 2,1 |
| 45° | 0,8 | 0,8 | 1,5 | 1,5 | 1,7 | 2,0 | 2,0 |
| 60° | 0,7 | 0,8 | 1,4 | 1,4 | 1,6 | 1,7 | 1,8 |
| 90° | 0,5 | 0,7 | 1,2 | 1,2 | 1,4 | 1,4 | 1,5 |
| 120° | 0,5 | 0,5 | 0,7 | 0,8 | 0,8 | 0,9 | 1,1 |
| 135° | 0,4 | 0,5 | 0,5 | 0,5 | 0,6 | 0,8 | 0,8 |
| 150° | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,7 | 0,8 |
| 180° | 0,3 | 0,3 | 0,4 | 0,4 | 0,5 | 0,6 | 0,7 |

| MAXIMUM AXIAL DISTANCE FOR 160° SPRAY ANGLE IN METERS | | | | | | | |
|--|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 1,1 | 1,1 | 1,4 | 1,5 | 1,8 | 2,1 | 2,1 |
| 30° | 0,8 | 0,9 | 1,3 | 1,4 | 1,5 | 1,8 | 1,9 |
| 45° | 0,7 | 0,8 | 1,1 | 1,2 | 1,4 | 1,6 | 1,7 |
| 60° | 0,5 | 0,7 | 1,1 | 1,1 | 1,3 | 1,4 | 1,6 |
| 90° | 0,4 | 0,5 | 0,9 | 1,0 | 1,1 | 1,1 | 1,3 |
| 120° | 0,3 | 0,4 | 0,5 | 0,6 | 0,6 | 0,7 | 0,8 |
| 135° | 0,3 | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,6 |
| 150° | 0,2 | 0,2 | 0,3 | 0,3 | 0,5 | 0,5 | 0,5 |
| 180° | 0,2 | 0,2 | 0,2 | 0,2 | 0,4 | 0,5 | 0,5 |

| MAXIMUM AXIAL DISTANCE FOR 180° SPRAY ANGLE IN METERS | | | | | | | |
|--|--------------|-----|-----|-----|-----|-----|-----|
| FIXED ANGLE | ORIFICE SIZE | | | | | | |
| | 16 | 18 | 21 | 24 | 28 | 32 | 34 |
| 0° | 0,8 | 0,9 | 1,1 | 1,1 | 1,2 | 1,8 | 1,8 |
| 30° | 0,7 | 0,7 | 1,1 | 1,1 | 1,1 | 1,5 | 1,5 |
| 45° | 0,5 | 0,6 | 1,0 | 1,0 | 1,1 | 1,3 | 1,3 |
| 60° | 0,5 | 0,5 | 0,8 | 0,8 | 1,0 | 1,1 | 1,1 |
| 90° | 0,3 | 0,5 | 0,6 | 0,6 | 0,8 | 0,9 | 0,9 |
| 120° | 0,2 | 0,3 | 0,3 | 0,3 | 0,5 | 0,5 | 0,5 |
| 135° | 0,2 | 0,2 | 0,2 | 0,2 | 0,4 | 0,4 | 0,4 |
| 150° | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 |
| 180° | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |

TABLE D
MAXIMUM AXIAL DISTANCE BETWEEN
NOZZLE TIP AND PLANE-OF-PROTECTION FOR EXPOSURE PROTECTION
— METERS —

| P/N 49 — 3XX — X — XXX | | | | |
|------------------------|--------|-------------------|--------------------------------|-------------|
| ORIFICE SIZE | | FINISH & MATERIAL | | SPRAY ANGLE |
| 16 | No. 16 | 1 | NATURAL FINISH BRONZE | 065 65° |
| 18 | No. 18 | 4 | TEFLON COATED BRONZE | 080 80° |
| 21 | No. 21 | 7 | LEAD COATED BRONZE | 095 95° |
| 24 | No. 24 | 9 | CHROME PLATED BRONZE | 110 110° |
| 28 | No. 28 | 0 | NATURAL FINISH STAINLESS STEEL | 125 125° |
| 32 | No. 32 | | | 140 140° |
| 34 | No. 34 | | | 160 160° |
| | | | | 180 180° |

TABLE E
PART NUMBER SELECTION

may be necessary, and corrective action must be taken to ensure that the nozzles will perform as intended in the event of a fire.

For installations subject to freezing and where blow-off plugs have been installed, a periodic inspection must be performed for evidence of ice build-up from trapped condensate which could affect the proper release of the blow-off plugs.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any other authorities having jurisdiction. The installing contractor or sprinkler manufacturer should be contacted relative to any questions.

It is recommended that water spray fixed systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Limited Warranty

Products manufactured by Tyco Fire & Building Products (TFBP) are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years

from date of shipment by TFBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by TFBP to be defective shall be either repaired or replaced, at TFBP's sole option. TFBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFBP was informed about the possibility of such damages, and in no event shall TFBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materi-

als or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

Ordering Procedure

When placing an order, indicate the full product name and P/N.

Contact your local distributor for availability.

D3 Protectospray Nozzles:

Specify: No. (specify) orifice, Type D3 Protectospray Nozzle with (specify finish/coating and material) with (specify number) degree spray angle, P/N (specify from table E).

Sprinkler Wrench:

Specify: Type W11 Sprinkler Wrench, P/N 56-452-1-001.

Optional Blow-Off Plugs:

Specify: Blow-Off Plug Style (specify letter), P/N (specify from Figure 1).

- (No. 16) Style A P/N 56-320-1-001
- (No. 18) Style K P/N 56-320-1-009
- (No. 21) Style J P/N 56-320-1-008
- (No. 24) Style I P/N 56-320-1-007
- (No. 28) Style H P/N 56-320-1-006
- (No. 32) Style E P/N 56-320-1-005
- (No. 34) Style D P/N 56-320-1-004