



Type D4a Protectospray Directional Spray Nozzles, Open, Medium Velocity

General Description

The TYCO Type D4a 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 Type D4a Nozzles feature a four arm body design that helps assist against mechanical or physical damage similar to a sprinkler guard used on automatic sprinklers.

The Type D4a 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 D4a Nozzles may also be used for fire control or extinguishment.

The Type D4a Nozzles are available in a wide variety of orifice sizes and spray angles (included angle of discharge) to provide versatility in system design.

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.

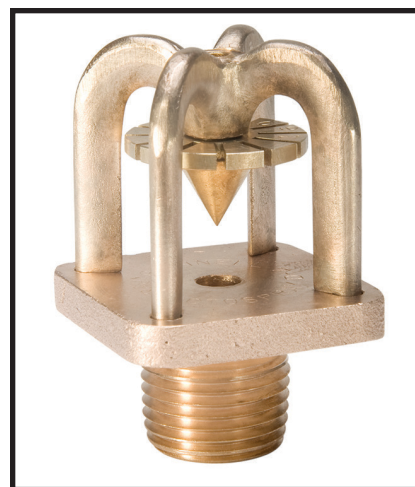
The Type D4a PROTECTOSPRAY Nozzle is a re-designation for the Gem Type D4a Nozzle.

NOTICE

The TYCO Type D4a PROTECTOSPRAY Nozzles described herein must be installed and maintained in compliance with this document and with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), in addition to the standards of any 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.



Technical Data

Approvals

UL and C-UL Listed

The TYCO Type D4a PROTECTOSPRAY Nozzles meet the requirements of MIL-S-901C for lightweight Grade A shock proof equipment.

The bronze Type D4a PROTECTOSPRAY Nozzles with a natural finish and with 80 to 160 degree spray angles meet the requirements of MIL-H-19387A, Type I.

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

Material and Finish

Refer to Table E

Thread Connection

1/2 inch NPT

Physical Characteristics

Frame	Bronze
Deflector	Bronze
Splitter	Bronze
Pin	Bronze

IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

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 sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

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

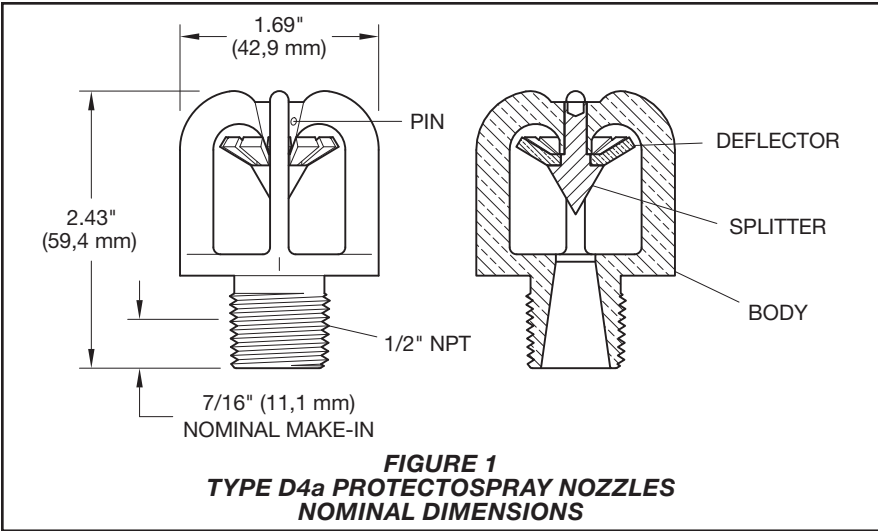
Spray Patterns

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 2 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, that is, No. 16 thru No. 24 (Table A), and for any system where the water is likely to contain obstructive material.



ORIFICE SIZE	MINIMUM DIAMETER	K-FACTOR	
		GPM/psi ^{1/2}	LPM/bar ^{1/2}
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°
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**TABLE B
SELECTION OF SPRAY ANGLES**

Installation

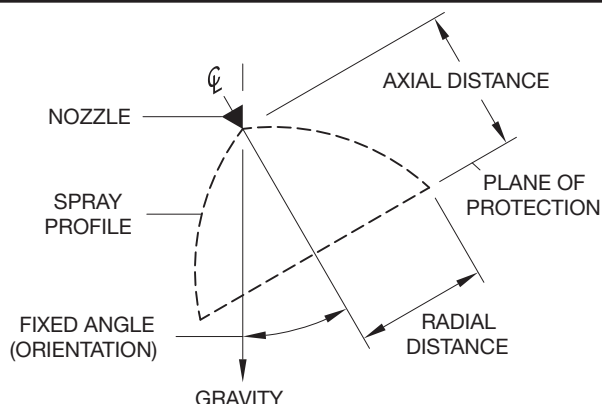
The TYCO Type D4a PROTECTO-SPRAY Nozzles must be installed in accordance with this section.

General Instructions

A leak-tight 1/2 inch NPT sprinkler joint should be obtained by applying a minimum-to- maximum torque of 7 to 14 ft.-lbs. (9,5 to 19,0 Nm). Higher levels of torque can distort the sprinkler Inlet with consequent 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 an adjustable crescent wrench. With reference to Figure 1, the adjustable crescent wrench is to be applied to the wrenching area.



NOTES:

1. Design data obtained from tests in still air.
2. Design data applies to a residual (flowing) pressure range at the nozzle inlet of 20 to 60 psi (1,4 to 4,1 bar). For pressures up to 175 psi (12,1 bar) consult Tyco Fire & Building Products Technical Services.
Refer to the authority having jurisdiction for their minimum required residual pressures.
3. The shapes of the Design Spray Profiles remain essentially unchanged over the maximum Axial Distances shown in Tables C and D.
4. For axial distances of 2 feet (0,6 meters) and less and for nozzle spray angles of 65° to 140°, the Design Spray Profile is the same as the nominal spray angle.
5. The maximum Axial Distances shown in Tables C and D are based on exposure protection.

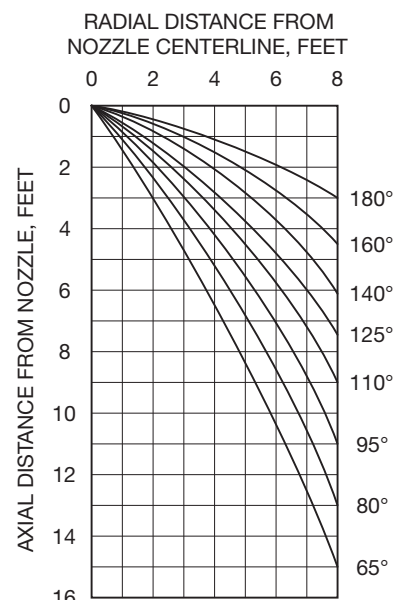


FIGURE 2
WATER DISTRIBUTION DESIGN DATA

Care and Maintenance

The TYCO Type D4a PROTECTO-SPRAY Nozzles must be maintained and serviced in accordance with this section.

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

Type D4a PROTECTOSPRAY Nozzles must never be painted, plated, coated or altered in any way after leaving the factory; otherwise, the spray performance may be impaired.

Exercise care to avoid damage to the nozzles, before, during, and after instal-

lation. Replace nozzles damaged by dropping, striking, wrench twist/slip-page, or the like.

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 to 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, loading/obstructions, or other evidence of impaired protection. The inspections should be scheduled weekly or

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

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 (for example, NFPA 25), in addition to the standards of any authorities having jurisdiction. The installing contractor or sprinkler manufacturer should be contacted relative to any questions.

Water spray fixed systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

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°	5-3	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	2-3	2-6	3-0	3-6
135°	1-3	1-6	1-6	1-6	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
TYPE D4a PROTECTOSPRAY NOZZLE
MAXIMUM AXIAL DISTANCE IN FEET AND INCHES BETWEEN NOZZLE TIP
AND PLANE-OF-PROTECTION FOR EXPOSURE PROTECTION

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 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 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 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 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 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	1,1	1,4	1,6
90°	0,4	0,5	0,9	1,0	0,7	1,1	1,3
120°	0,3	0,4	0,5	0,6	0,5	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	0,5	0,5	0,5

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	1,1	1,1	1,1

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
TYPE D4a PROTECTOSPRAY NOZZLE
MAXIMUM AXIAL DISTANCE IN METERS BETWEEN NOZZLE TIP
AND PLANE-OF-PROTECTION FOR EXPOSURE PROTECTION

P/N 49 – 4XX – X – XXX				SPRAY ANGLE	
ORIFICE SIZE		FINISH & MATERIAL		065	65°
16	No. 16	1	Natural Finish Bronze	080	80°
18	No. 18	4	TEFLON Coated Bronze	095	95°
21	No. 21			110	110°
24	No. 24			125	125°
28	No. 28			140	140°
32	No. 32			160	160°
34	No. 34			180	180°

TABLE E
TYPE D4a PROTECTOSPRAY NOZZLE
PART NUMBER SELECTION

Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product name and part number (P/N).

Type D4a PROTECTOSPRAY

Nozzles

Specify:

- orifice size
- finish/coating and material
- (degree) spray angle
- P/N (from Table E)