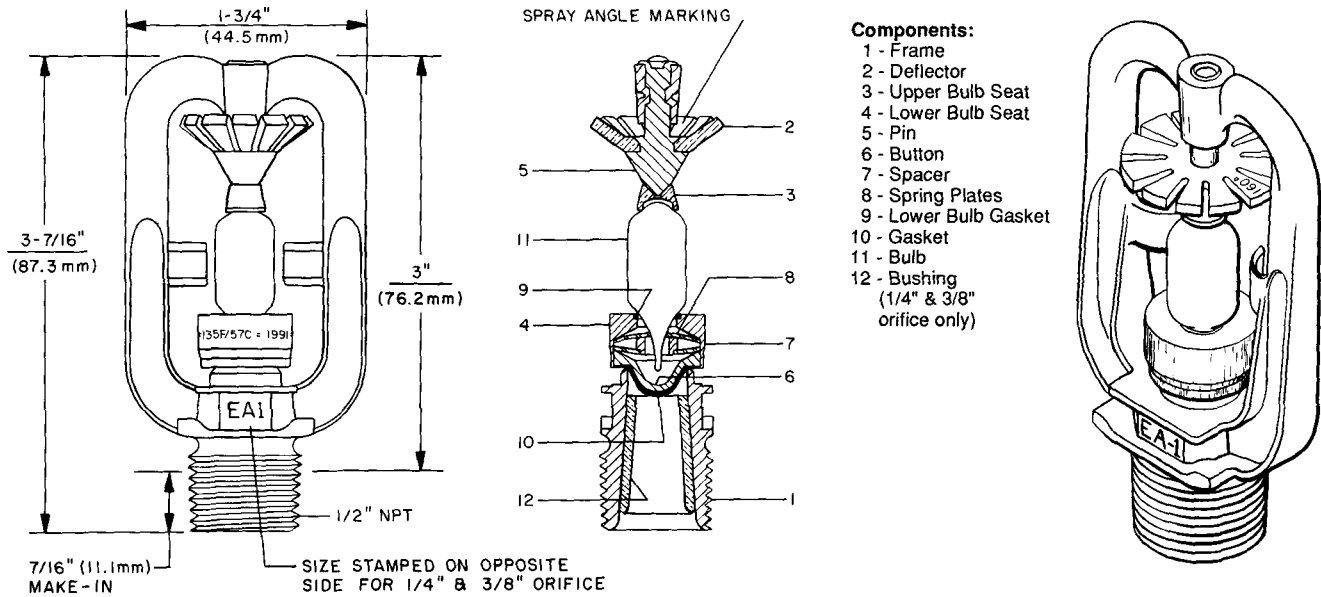




# DIRECTIONAL SPRAY NOZZLES, AUTOMATIC

## TYPE EA-1 PROTECTOSPRAY® — 1/2" NPT



**FIGURE A**  
**TYPE EA-1 PROTECTOSPRAY NOZZLES**

### GENERAL DESCRIPTION

The Type EA-1 Protectospray Nozzles are automatic (frangible bulb) directional spray nozzles and they are designed for use in water spray fixed systems for fire protection applications. The 1/2 inch NPT Type EA-1 Nozzles are external deflector type nozzles that discharge a uniformly filled cone of medium velocity water droplets.

They are especially 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 to prevent possible structural damage or spread of fire to the protected equipment; however, use of an automatic nozzle requires consideration of the response time of the thermal element.

The EA-1 Nozzles are also especially effective for area coverage and are sometimes used in lieu of standard sprinklers where directional spray is considered more appropriate. In some applications, depending on water design density requirements, the Type EA-1 Protectospray Nozzles are also used for fire control or extinguishment.

The Type EA-1 Nozzles are available in three orifice sizes and in a wide variety of spray angles (included angles of discharge), as well as temperature ratings, to provide versatility in system design.

Refer to Technical Data Sheet TD725 for information on using the 1/4 inch orifice, 160 degree spray angle, Type EA-1 Protectospray Nozzles for protection of deep fat fryer commercial cooking equipment.

Refer to Technical Data Sheets TD620A and TD620B for information on Type D3 open (non-automatic) Protectospray Nozzles and TD620C for information on Type D3S open Protectospray Nozzles with individual strainers.

### APPROVALS AND STANDARDS

The Type EA-1 Protectospray Nozzles are listed by Underwriters Laboratories Inc. and Underwriters Laboratories of Canada, as well as approved by the Factory Mutual Research Corporation. The laboratory listings and approvals only apply to the temperature rating and finish combinations stated in Table D.

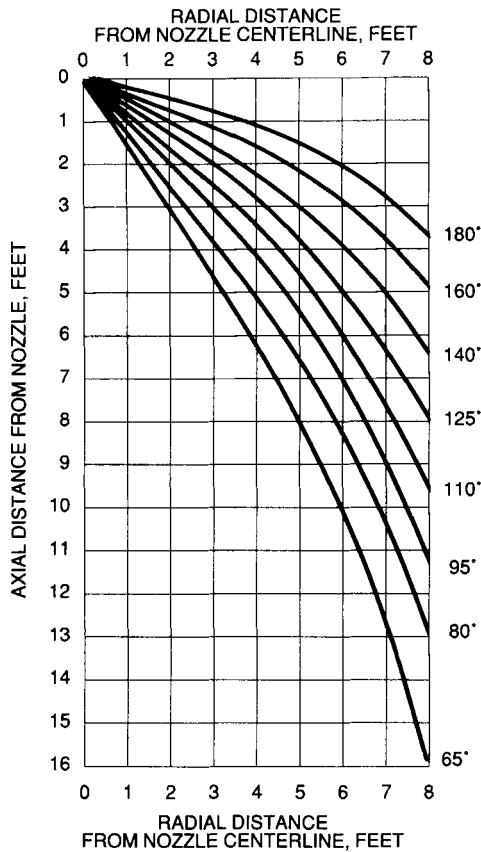
The natural finish and chrome plated Type EA-1 Protectospray Nozzles are approved by the Scientific Services Laboratory (Australia).

The Type EA-1 Protectospray Nozzles are also approved by the New York City Board of Standards and Appeals under Calendar Number 334-79-SA.

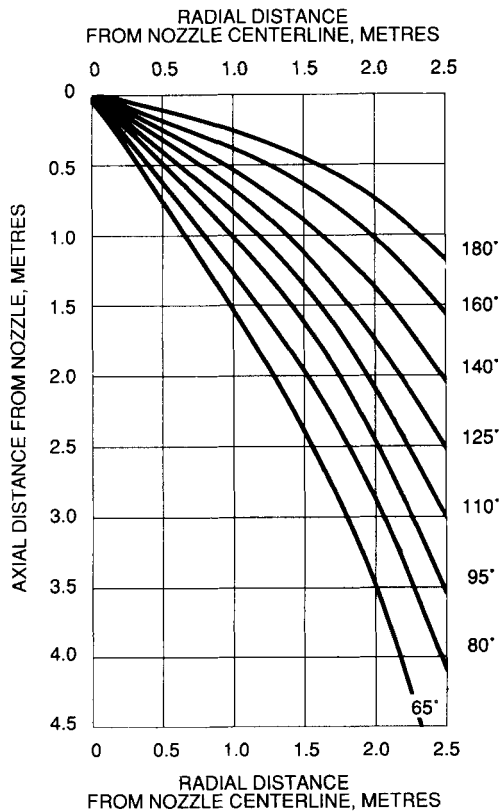
### WARNINGS

*The Type EA-1 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 integrity of these devices.*

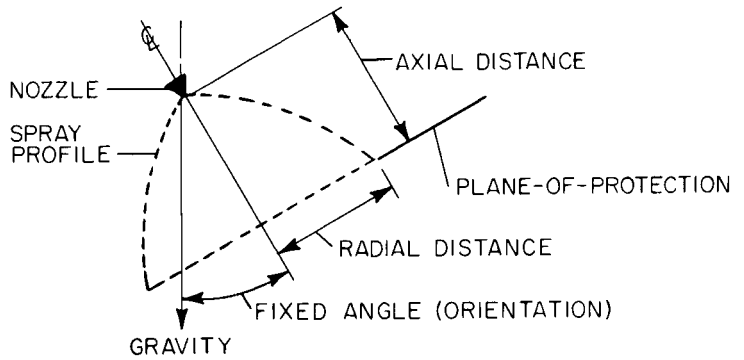
*The design of individual water spray fixed systems can vary considerably, depending on the characteristics and nature of the hazard, the basic purpose of the spraying system, the configuration of the hazard, and wind/draft conditions. Because of these variations as well as the wide range of available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



**Design Spray Profiles**  
—Feet and Inches—



**Design Spray Profiles**  
—Metres—



**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 the Technical Data Department.  
  
Refer to the authority having jurisdiction for their minimum required residual pressure.
3. The shapes of the Design Spray Profiles remain essentially unchanged over the maximum Axial Distances shown on Pages 3 and 4.
4. For axial distances of 2 feet (0.6 metres) 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 on Pages 3 and 4 are based on exposure protection.

**FIGURE B**  
**WATER DISTRIBUTION DESIGN DATA**

Nominal Orifice Size	Minimum Diameter	K-factor	
		NFPA (GPM + $\sqrt{psi}$ )	ISO/SI (LPM + $\sqrt{bar}$ )
1/4"	0.220" (5.59mm)	1.4	20.2
3/8"	0.312" (7.92mm)	2.8	40.3
1/2"	0.435" (11.05mm)	5.6	80.6

**TABLE A**  
**SELECTION OF ORIFICE SIZES**

65°	125°
80°	140°
95°	160°
110°	180°

**TABLE B**  
**SELECTION OF SPRAY ANGLES**

MAX. AXIAL DISTANCE FOR 65° SPRAY ANGLE IN FEET AND INCHES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	11-9	14-0	15-0
30°	10-0	12-3	13-0
45°	9-0	11-3	12-3
60°	8-6	10-6	11-9
90°	7-6	10-0	10-9
120°	6-3	7-6	8-9
135°	5-9	6-3	7-9
150°	5-3	5-6	7-0
180°	4-9	5-0	6-3

MAX. AXIAL DISTANCE FOR 80° SPRAY ANGLE IN FEET AND INCHES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	10-0	13-0	14-0
30°	8-3	11-3	11-6
45°	7-3	10-6	10-9
60°	6-9	9-9	10-3
90°	6-0	8-9	9-6
120°	5-3	6-3	7-6
135°	4-9	5-3	6-6
150°	4-3	4-6	5-6
180°	3-9	4-3	5-0

MAX. AXIAL DISTANCE FOR 95° SPRAY ANGLE IN FEET AND INCHES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	7-0	10-9	12-3
30°	6-3	10-0	10-6
45°	6-0	9-6	9-6
60°	5-9	9-0	9-0
90°	5-0	7-9	8-6
120°	4-0	5-3	6-3
135°	3-6	4-3	5-3
150°	3-3	3-9	4-6
180°	3-0	3-3	4-0

MAX. AXIAL DISTANCE FOR 110° SPRAY ANGLE IN FEET AND INCHES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	6-0	10-0	11-0
30°	5-6	8-9	9-9
45°	5-3	8-3	8-9
60°	5-0	7-6	8-3
90°	4-6	6-6	7-9
120°	3-6	4-3	5-6
135°	3-0	3-6	4-6
150°	2-9	3-0	3-9
180°	2-6	2-9	3-6

MAX. AXIAL DISTANCE FOR 125° SPRAY ANGLE IN FEET AND INCHES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	4-6	7-3	10-0
30°	4-3	6-9	8-3
45°	3-9	6-3	7-3
60°	3-3	5-6	6-6
90°	2-6	5-0	5-9
120°	2-3	3-3	4-0
135°	2-0	2-6	3-6
150°	1-9	2-0	3-0
180°	1-9	1-9	2-6

MAX. AXIAL DISTANCE FOR 140° SPRAY ANGLE IN FEET AND INCHES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	4-0	6-0	9-3
30°	3-6	5-9	7-0
45°	3-3	5-3	6-3
60°	2-9	4-9	5-6
90°	2-0	4-0	4-9
120°	1-9	2-3	3-3
135°	1-6	1-6	2-6
150°	1-6	1-3	2-3
180°	1-3	1-3	1-9

MAX. AXIAL DISTANCE FOR 160° SPRAY ANGLE IN FEET AND INCHES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	3-6	5-0	7-0
30°	3-3	4-9	5-6
45°	2-9	4-3	4-9
60°	1-9	3-9	4-6
90°	1-6	3-3	3-6
120°	1-3	1-9	3-0
135°	1-0	1-3	2-6
150°	1-0	1-0	1-6
180°	1-0	0-9	1-3

MAX. AXIAL DISTANCE FOR 180° SPRAY ANGLE IN FEET AND INCHES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	3-0	3-9	6-0
30°	2-9	3-6	5-0
45°	2-6	3-0	4-3
60°	2-3	2-9	3-9
90°	1-3	1-9	3-0
120°	0-9	1-0	2-6
135°	0-6	0-9	2-3
150°	0-6	0-6	1-0
180°	0-6	0-6	0-9

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

Temperature Rating	Frame Color Code	Bulb Liquid Color Code
135°F/57°C	Unpainted	Orange
175°F/79°C	White	Yellow
250°F/121°C	Blue	Blue
325°F/163°C	Red	Mauve
400°F/204°C	Green	Black
500°F/343°C	Orange	Black

**TABLE C**  
**SELECTION OF**  
**TEMPERATURE RATINGS**

Finish and Material	Temperature Ratings
Natural Finish Bronze	All Ratings
Chrome Plated Bronze	All Ratings
Lead Coated Bronze	135°F & 175°F
Corroproof Wax Coated Bronze	135°F & 175°F

**TABLE D**  
**SELECTION OF**  
**FINISH AND MATERIAL**

*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 manufacturer should be contacted relative to any questions.*

**TECHNICAL DATA**

The Type EA-1 Protectospray Nozzles are rated for use at a maximum service pressure of 175 psi (12.1 bar).

The Frame is bronze per ASTM B62 (C83600), and the Bushing required for 1/4 and 3/8 inch orifice sizes is brass per ASTM B140 (C32000). The Gasket and the Lower Gasket are copper per ASTM B152 (C11000). The De-

MAX. AXIAL DISTANCE FOR 65° SPRAY ANGLE IN METRES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	3.6	4.3	4.6
30°	3.0	3.7	4.0
45°	2.7	3.4	3.7
60°	2.6	3.2	3.6
90°	2.3	3.0	3.3
120°	1.9	2.3	2.7
135°	1.8	1.9	2.4
150°	1.6	1.7	2.1
180°	1.4	1.5	1.9

MAX. AXIAL DISTANCE FOR 80° SPRAY ANGLE IN METRES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	3.0	4.0	4.3
30°	2.5	3.4	3.5
45°	2.2	3.2	3.3
60°	2.1	3.0	3.1
90°	1.8	2.7	2.9
120°	1.6	1.9	2.3
135°	1.4	1.6	2.0
150°	1.3	1.4	1.7
180°	1.1	1.3	1.5

MAX. AXIAL DISTANCE FOR 95° SPRAY ANGLE IN METRES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	2.7	3.3	3.7
30°	1.9	3.0	3.2
45°	1.8	2.9	2.9
60°	1.8	2.7	2.7
90°	1.5	2.4	2.6
120°	1.2	1.6	1.9
135°	1.1	1.3	1.6
150°	1.0	1.1	1.4
180°	0.9	1.0	1.2

MAX. AXIAL DISTANCE FOR 110° SPRAY ANGLE IN METRES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	1.8	3.0	3.4
30°	1.7	2.7	3.0
45°	1.6	2.5	2.7
60°	1.5	2.3	2.5
90°	1.4	2.0	2.4
120°	1.1	1.3	1.7
135°	0.9	1.1	1.4
150°	0.8	0.9	1.1
180°	0.8	0.8	1.1

MAX. AXIAL DISTANCE FOR 125° SPRAY ANGLE IN METRES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	1.4	2.2	3.0
30°	1.3	2.1	2.5
45°	1.1	1.9	2.2
60°	1.0	1.7	2.0
90°	0.8	1.5	1.8
120°	0.7	1.0	1.2
135°	0.6	0.8	1.1
150°	0.5	0.6	0.9
180°	0.5	0.5	0.8

MAX. AXIAL DISTANCE FOR 140° SPRAY ANGLE IN METRES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	1.2	1.8	2.8
30°	1.1	1.8	2.1
45°	1.0	1.6	1.9
60°	0.8	1.4	1.7
90°	0.6	1.2	1.4
120°	0.5	0.7	1.0
135°	0.5	0.5	0.8
150°	0.5	0.4	0.7
180°	0.4	0.4	0.5

MAX. AXIAL DISTANCE FOR 160° SPRAY ANGLE IN METRES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	1.1	1.5	2.1
30°	1.0	1.4	1.7
45°	0.8	1.3	1.4
60°	0.5	1.1	1.4
90°	0.5	1.0	1.1
120°	0.4	0.5	0.9
135°	0.3	0.4	0.8
150°	0.3	0.3	0.5
180°	0.2	0.3	0.4

MAX. AXIAL DISTANCE FOR 180° SPRAY ANGLE IN METRES			
FIXED ANGLE	ORIFICE SIZE		
	1/4	3/8	1/2
0°	0.9	1.1	1.8
30°	0.8	1.1	1.5
45°	0.8	0.9	1.3
60°	0.7	0.8	1.1
90°	0.4	0.5	0.9
120°	0.2	0.3	0.8
135°	0.2	0.2	0.7
150°	0.2	0.2	0.3
180°	0.2	0.2	0.2

**TABLE F**  
**MAXIMUM AXIAL DISTANCE BETWEEN**  
**NOZZLE TIP AND PLANE-OF-PROTECTION FOR EXPOSURE PROTECTION**  
**—METRES—**

flector is bronze per ASTM B96 (C65500), and the Pin is brass per ASTM B140 (C31400, C31600, C32000) or ASTM B16 (C36000). The Upper Bulb Seat is bronze per ASTM B139 (C51000), the Lower Bulb Seat, Spacer, and Button are bronze per ASTM B140 (C31400, C31600, or C32000), and the Spring Plates are Inconel per ASTM B168.

**Orifice Sizes.** The available orifice sizes and associated nominal diameters are shown in Table A, and the nominal discharge curves are given in Figure C.

**Spray Angles.** The nominal spray angles (included angles of discharge) are available as shown in Table B.

**Temperature Ratings.** The available temperature ratings and associated color codes are given in Table C.

**Finish and Material.** The available combinations of finish, material, and temperature rating are given in Table D.

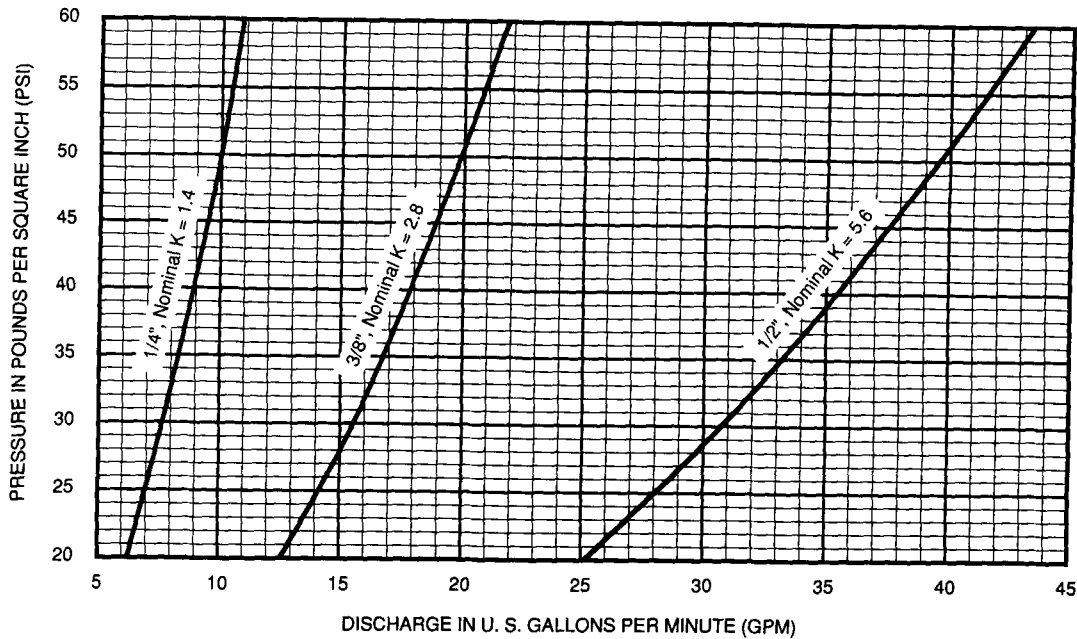
**Nozzle Placement.** Where direct impingement of water spray onto all of the protected surface is required by the authority having jurisdiction, the nozzles are to be spaced and directed so that their spray patterns will completely cover the plane-of-protection with the minimum required average density; however, it is recommended that indoor nozzle spacings be 12 feet (3.7 metres) or less and that outdoor nozzle spacings be 10 feet (3.0 metres) 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

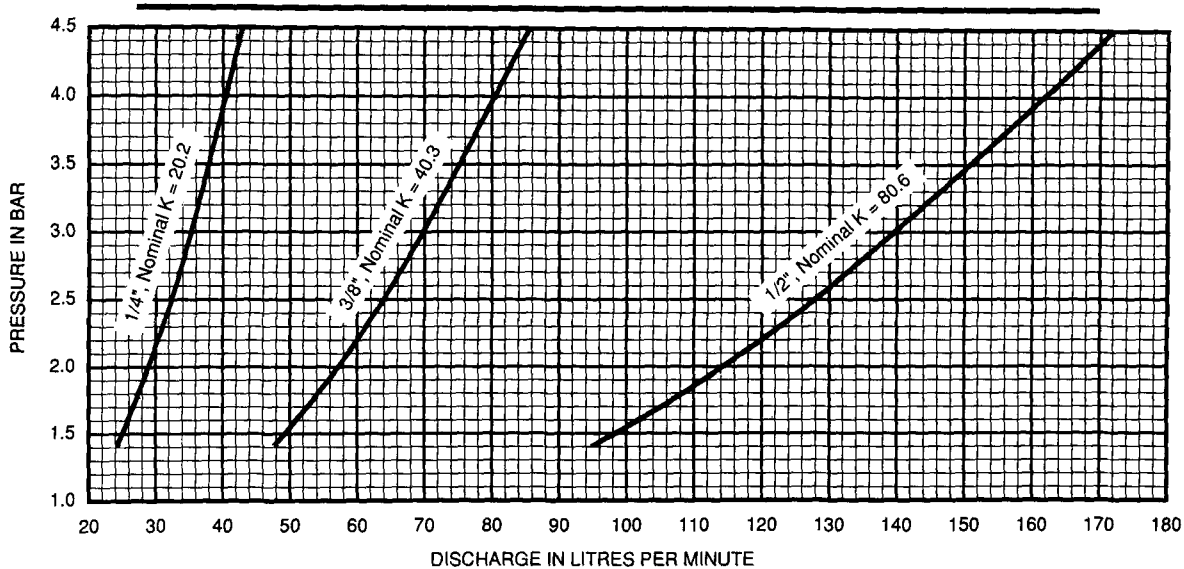
are positioned normal to and approximately 2 feet (0.6 metres) from the surface. This approach, in conjunction with a properly selected spray angle, will tend to make more effective use of the spray as well as help minimize the disturbance effects of wind/draft conditions on the water spray pattern.

**Spray Patterns.** The Design Spray Profiles for the nozzle spray angles of 65° to 180° are as shown in Figure B 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 Data Department.

The maximum axial distances between the nozzle tip and plane-of-protection, for exposure protection, are



**NOTE:**  $Q = K\sqrt{p}$ ; where "Q" = flow in U.S. gallons per minute, "p" = pressure in pounds per square inch, and "K" is the nominal discharge coefficient.



**NOTE:**  $Q = K\sqrt{p}$ ; where "Q" = flow in litres per minute, "p" = pressure in bar, and "K" is the nominal discharge coefficient.

**FIGURE C**  
**NOMINAL DISCHARGE CURVES**  
(Refer to the authority having jurisdiction for their minimum required residual pressure.)

given in Tables E and F. When the axial distance from the nozzle tip to the plane-of-protection is 2 feet (0.6 meters) or less, the Design Spray Profile is the same as the nominal spray angle for spray angles of 65° through 140°.

**NOTES**

Refer to the Warning Section for an important notice concerning the design of individual water spray fixed systems.

Inquiries concerning nozzle installation and usage criteria, not covered by these instructions, should be mailed to the attention of the Technical Data

Department. Include sketches and technical details, as appropriate.

**Heat Sensitivity.** Since the Type EA-1 Protectospray Nozzles are automatic nozzles, they must be located with consideration of their ability to detect abnormal temperature increases due to fire. Therefore, it is recommended that NFPA 13 be reviewed with respect to the rules that define the permitted distance below ceilings and the spacing limitations for automatic sprinklers.

**Main Pipeline Strainers.** Main pipeline strainers are required for systems utilizing nozzles with nominal diame-

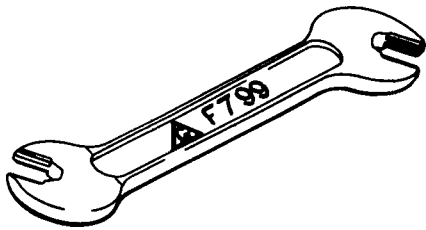
ters less than 3/8 inch (9.5 mm), i.e. 1/4 and 3/8 inch orifice sizes (Ref. Table A), and for any system where the water is likely to contain obstructive material.

**INSTALLATION**

The Type EA-1 Protectospray Nozzles must be installed using the Model F799 Offset Sprinkler Wrench shown in Figure D.

**NOTE**

Do not install any bulb type nozzle if the bulb is cracked or there is a loss of



**FIGURE D  
OFFSET SPRINKLER WRENCH**

liquid from the bulb. With the nozzle held horizontal, a small air bubble should be present. The diameter of the bubble varies from approximately 3/32" (2.4mm) for the 135 F/57 C rating to 1/4" (6.4mm) for the 500 F/204 C rating.

**CARE AND MAINTENANCE**

Automatic nozzles must never be shipped or stored where their temperatures will exceed 100°F/38°C and they must never be painted, plated, coated or otherwise altered after leaving the factory. Modified nozzles must be replaced. Nozzles that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the nozzle with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the nozzles - both before and after installation. Nozzles damaged by dropping, striking, wrench twist/slip-page, or the like, must be replaced. Also, replace any nozzle that has a cracked bulb or that has lost liquid from its bulb (Ref. Installation Section).

Water spray fixed systems for fire protection service require regularly scheduled care and maintenance by trained personnel. It is recommended that the Protectospray Nozzles be periodically inspected for loading/obstructions, or other evidence of impaired protection. The inspections should be scheduled weekly or as frequently as may be necessary and, corrective action taken to ensure that the nozzles will perform as intended in the event of a fire.

**NOTE**

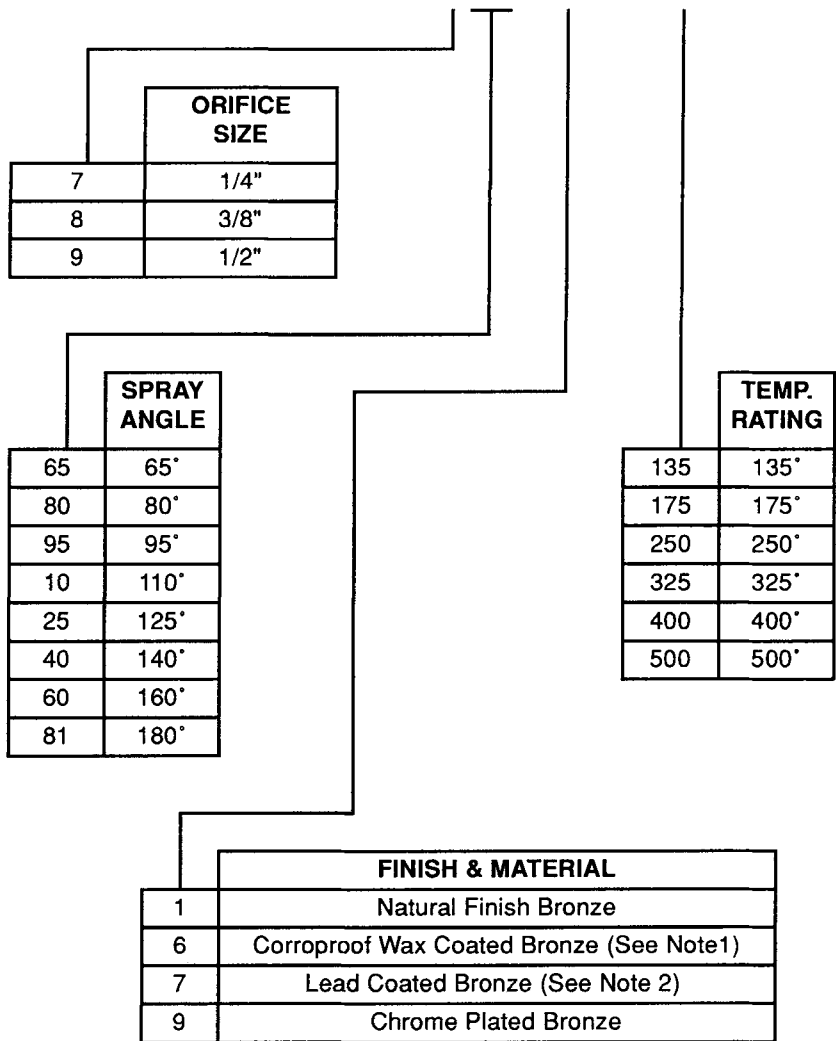
Before closing a fire protection system main control valve for maintenance work on the fire protection system which it controls, permission to shut down the affected fire protection system must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

**WARRANTY**

Seller warrants for a period of one year from the date of shipment (warranty period) that the products furnished hereunder will be free from defects in material and workmanship.

For further details on Warranty, see Price List.

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**Notes:**

1. Corroproof wax available for 135°F and 175°F only.
2. Lead coated available for 135°F and 175°F only.

**TABLE G  
PRODUCT SYMBOL NUMBER SELECTION**

It is recommended that water spray fixed systems for fire protection be inspected by a qualified Inspection Service.

**ORDERING PROCEDURE**

**Protectospray Nozzles:**

Specify: (specify size) orifice, (specify temperature rating), Type EA-1 Protectospray Nozzle in (specify finish/coating and material) with (specify number) degree spray angle, PSN (specify from Table G).

Contact your local distributor for availability.

**Order Separately:**

Specify: Model F799 Offset Sprinkler Wrench, PSN 56-452-1-001.