

## **RAVEN™ Institutional — 5.6 K-factor Pendent and Horizontal Sidewall Sprinklers Quick Response, Standard and Extended Coverage**

### **General Description**

The Tyco® RAVEN™ Institutional Pendent and Horizontal Sidewall Sprinklers are quick response spray sprinklers designed for use in areas such as correctional, detention, and mental health care facilities, as well as other commercial buildings. Both the pendent and horizontal sidewall styles are available for standard or extended coverage applications.

#### **Features:**

- The RAVEN assembly increases the difficulty of tampering with the sprinkler that may cause a false activation.
- The tamper resistant nature of the RAVEN helps reduce the opportunity for individuals to injure themselves or others with components of a fire sprinkler.
- The RAVEN optimizes an aesthetically appealing flush design that conceals all of the operating parts.

#### **NOTICE**

The RAVEN Institutional Sprinklers described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association, in addition to the standards of any authorities having ju-

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

isdiction. Failure to do so may impair the performance of these devices.

Tyco Fire Suppression & Building Products specifically disclaims any liability for damages or injury (including death) arising out of or caused by manipulation, dismantling, or misuse of RAVEN Sprinklers or the use or attempted use of the RAVEN Sprinklers or any component thereof as an instrument unrelated to its intended function as a fire protection device.

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

### **Sprinkler Identification Numbers**

SIN	DOT COLOR*	APPLICATION
TY3281	Black	Pendent Standard Coverage
TY3282	Green	Pendent Extended Coverage
TY3381	Red	HSW Standard Coverage
TY3382	Purple	HSW Extended Coverage

\* Refer to Figures 1 through 4 for SIN Color Dot location.

### **Technical Data**

**Approvals:**  
UL and C-UL Listed.  
(Refer to the Design Criteria section.)

**Maximum Working Pressure:**  
175 psi (12,1 bar)

**Inlet Thread Connection:**  
1/2 inch NPT



**Discharge Coefficient:**  
K=5.6 GPM/psi<sup>1/2</sup>  
(80,6 LPM/bar<sup>1/2</sup>)

**Temperature Rating:**  
165°F/74°C

**Finishes:**  
Sprinkler: Chrome or White  
Escutcheon: Chrome or White

**Physical Characteristics:**  
Body ..... Brass  
Deflector Assembly ..... Bronze  
Sealing Assembly .....  
..... Beryllium Nickel w/Teflon\*  
Link Assembly ..... Copper

**Patents:**  
Patent pending

5.6K EC PENDENT (TY3282)						
Response Rating	Coverage Area, Ft. x Ft. (m x m)	Minimum Flow <sup>(1)</sup> , GPM (LPM)	Minimum Pressure <sup>(2)</sup> , PSI (BAR)	Deflector-To-Ceiling Distance, In. (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing, Ft. (m)
Quick	16 x 16 (4,9 x 4,9)	26 (98)	21.6 (1,49)	Flush Mounted	165	8 (2,4)
5.6K EC HSW (TY3382)						
Response Rating	Coverage Area, Ft. x Ft. (m x m)	Minimum Flow <sup>(1)</sup> , GPM (LPM)	Minimum Pressure <sup>(2)</sup> , PSI (BAR)	Deflector-To-Ceiling Distance <sup>(3)</sup> , In. (mm)	Sprinkler Temperature Rating, °F	Lateral Minimum Spacing <sup>(4)</sup> , Ft. (m)
Quick	16 x 16 (4,9 x 4,9)	26 (98)	21.6 (1,49)	4 to 12 (100 to 300)	165	8 (2,4)

**NOTES**

1. Requirement is based on minimum flow in GPM from each sprinkler.
2. The indicated residual pressures are based on the nominal K-factor.
3. The centerline of the sprinkler waterway is located 7/16 inch (11,1 mm) below the deflector (Ref. Figure 7).
4. Minimum spacing is for lateral distance between sprinklers located along a single wall. Otherwise adjacent sprinklers (i.e., sidewall sprinklers on an adjacent wall, on an opposite wall, or pendent sprinklers) must be located outside of the maximum listed protection area of the extended coverage sidewall sprinkler being utilized.

**TABLE A**  
**UL AND C-UL LISTING EXTENDED COVERAGE AND FLOW RATE CRITERIA**

## Design Criteria

### Standard Coverage Criteria:

The RAVEN™, Standard Coverage, Institutional Pendent and Horizontal Sidewall Sprinklers (TY3281 and TY3381) are intended for use with fire protection systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency (e.g., UL Listing is based on NFPA 13 requirements).

The RAVEN Horizontal Sidewall Sprinkler (TY3381) must be installed with a deflector to ceiling distance of 4 to 12 inches (100 to 300 mm). To meet this requirement, the centerline of the sprinkler waterway must be located 4-7/16 to 12-7/16 inches (112,7 to 315,9 mm) below the ceiling (Ref. Figure 7).

### Extended Coverage Criteria:

The RAVEN™, Extended Coverage, Institutional Pendent and Horizontal Sidewall Sprinklers (TY3282 and TY3382) must be installed in accordance with the flow rate criteria provided in Table A and they must be installed and utilized in light hazard occupancies, under smooth, flat, horizontal ceilings as outlined in the applicable installation standard recognized by the Listing or Approval agency (e.g., UL Listing is based on NFPA 13 requirements).

The RAVEN, Extended Coverage, Horizontal Sidewall Sprinkler (TY3382) must be installed with a deflector to ceiling distance of 4 to 12 inches (100 to 300 mm). To meet this requirement, the centerline of the sprinkler waterway must be located 4-7/16 to 12-7/16 inches (112,7 to 315,9 mm) below the ceiling (Ref. Figure 7).

### General Criteria:

Only the Escutcheons shown in Figures 5 and 6 can be utilized with the RAVEN Institutional Sprinklers. A maximum of two Spacers can be used for adjustment of the Escutcheons.

### NOTICE

*Use of more than two Spacers may result in disabling the tamper resistant design of the RAVEN Sprinklers and its principle function of helping to avoid false sprinkler operations and the opportunity for individuals to injure themselves or others with components of the sprinkler.*

*Integrity of the tamper resistant design of the RAVEN Escutcheons is dependent on the piping installation design. When installed properly, the Escutcheon is held fast (i.e., tight with no movement or gap) to the mounting surface (ceiling or wall, as applicable) by the tightening of the sprinkler assembly into the sprinkler fitting. In order to accomplish a proper installation, the sprinkler fitting must be properly located with respect to distance from*

*the face of the sprinkler fitting to the face of the mounting surface (Ref. Figures 5 and 6); the sprinkler fitting being rigidly secured and held immobile; and, the centerline of the sprinkler fitting being perpendicular to the mounting surface to assure that the escutcheon sits squarely against the mounting surface around the entire perimeter of the Institutional Escutcheon.*

*Figure 7 illustrates a technique that can be used to help adjust the location of the sprinkler fitting; to help assure immobility of the sprinkler fitting; and, to help maintain perpendicularity of the sprinkler fitting to the mounting surface. Figure 7 illustrates a horizontal installation; however, it can be applied to a pendent installation as well.*

*When applied, the technique shown in Figure 7 allows the sprinkler/supply pipe to be pulled back into the mounting surface from behind the wall or above the ceiling before tightening the retaining flange set screw, which will help overcome problems with assuring that the escutcheon is held fast (i.e., tight with no movement or gap) to the mounting surface. Also, this method of installation allows for easy removal of the sprinkler/supply pipe for installations where there is access behind the wall or above the ceiling.*

## Operation

In the standby condition, the unique features of the RAVEN provide a tamper resistant sprinkler design that helps reduce the opportunity for individuals to injure themselves or others with components of a fire sprinkler. The RAVEN has been specifically designed to minimize components, as well as holes or shapes that could provide a point for securing an external non-sprinkler associated object. Also, when properly installed, the escutcheon is held fast to the ceiling or wall to deter its removal. The shape of the sprinkler and escutcheon cannot be grasped easily, which further deters tampering.

A link assembly covers the sealing assembly. The link is soldered with an eutectic solder that melts when exposed to heat. When the link reaches its rated temperature, the link separates and releases the sealing assembly, allowing the deflector assembly to extend from the body and water to flow.

## Installation

The Tyco® RAVEN™ Institutional Sprinklers must be installed in accordance with the following instructions:

### NOTICE

Refer to the Design Criteria section for important information regarding the piping installation design and its effect on maintaining the integrity of the tamper resistant design of the Institutional Escutcheons.

A 1/2 inch NPT sprinkler joint should be obtained with a minimum to maximum torque of 7 to 14 ft.lbs. (9,5 to 19,0 Nm). Higher levels of torque may damage the sprinkler with consequent leakage or impairment of the sprinkler.

Do not attempt to compensate for improper location of the sprinkler fitting by under- or over-tightening the sprinkler.

After the installation is complete, make certain that the RAVEN Escutcheon is held fast (i.e., tight with no movement or gap) to the mounting surface and that the Escutcheon sits squarely against the mounting surface around the entire perimeter of the Escutcheon.

### PENDENT SPRINKLERS

**Step 1.** The RAVEN Pendent Sprinkler must be installed pendent and with the centerline of the waterway perpendicular to the ceiling.

**Step 2.** With the Escutcheon in place and with pipe thread sealant applied to the pipe threads, hand tighten the sprinkler into the sprinkler fitting using

the W-type 25 Sprinkler Wrench.

**Note:** The sprinkler has intentionally been designed to be difficult to grasp by hand; therefore, the use of the W-type 25 Sprinkler Wrench for hand tightening will assist in threading the sprinkler. Also use of the W-type 25 Sprinkler Wrench will help avoid damage to the Sprinkler during installation.

**Step 3.** Wrench tighten the Sprinkler using only the W-Type 25 Sprinkler Wrench (Ref. Fig. 3) with the wrench prongs fully engaged with the Sprinkler Wrenching Notches. The wrench prongs are designed to engage with the wrenching notches in the sprinkler body. The wrench prongs are also uniquely spaced to align with the sprinkler wrenching notches in one position.

**Note:** To help prevent slippage of the Sprinkler Wrench and while using a 1/2 inch ratchet drive, place one hand over the Sprinkler Wrench while tightening with the other hand.

**Step 4.** After the installation is complete, make certain that the RAVEN Escutcheon is held fast to the mounting surface and that it sits squarely against the ceiling around its entire perimeter. When using the technique shown in Figure 7, the Escutcheon can be pulled up onto the ceiling by pulling up on the sprinkler/supply pipe and then tighten the Retaining Flange Set Screw. See Figure 3 inset for post installation identification.

**Note:** If the Escutcheon is NOT held fast (i.e., tight with no movement or gap) to the mounting surface and as an option to relocating the sprinkler pipe fitting (i.e., increasing the "face of fitting" to "face of mounting surface" distance) up to two Adjustment Spacer Rings as shown in Figure 3 may be utilized. Each Adjustment Spacer Ring can account for 0.075 inches of gap between the Escutcheon and mounting surface. Therefore, if the gap is greater than 0.150 inches, the sprinkler fitting will need to be relocated to assure proper installation of the RAVEN Sprinkler and Escutcheon.

### HORIZONTAL SIDEWALL SPRINKLERS

**Step 1.** The RAVEN Horizontal Sidewall Sprinkler must be installed with the centerline of their waterway parallel with the ceiling and perpendicular to the back wall.

**Step 2.** With the Escutcheon in place and with pipe thread sealant applied to the pipe threads, hand tighten the sprinkler into the sprinkler fitting using the W-type 25 Sprinkler Wrench.

**Note:** The sprinkler has intentionally been designed to be difficult to

grasp by hand; therefore, the use of the W-type 25 Sprinkler Wrench for hand tightening will assist in threading the sprinkler. Also use of the W-type 25 Sprinkler Wrench will help avoid damage to the Sprinkler during installation.

**Step 3.** Wrench tighten the Sprinkler using only the W-Type 25 Sprinkler Wrench (Ref. Fig. 4) with the wrench prongs fully engaged with the Sprinkler Wrenching Notches. The wrench prongs are designed to engage with the wrenching notches in the sprinkler body. The wrench prongs are also uniquely spaced to align with the sprinkler wrenching notches in one position so as to assure that the sprinkler deflector is properly positioned with respect to the ceiling.

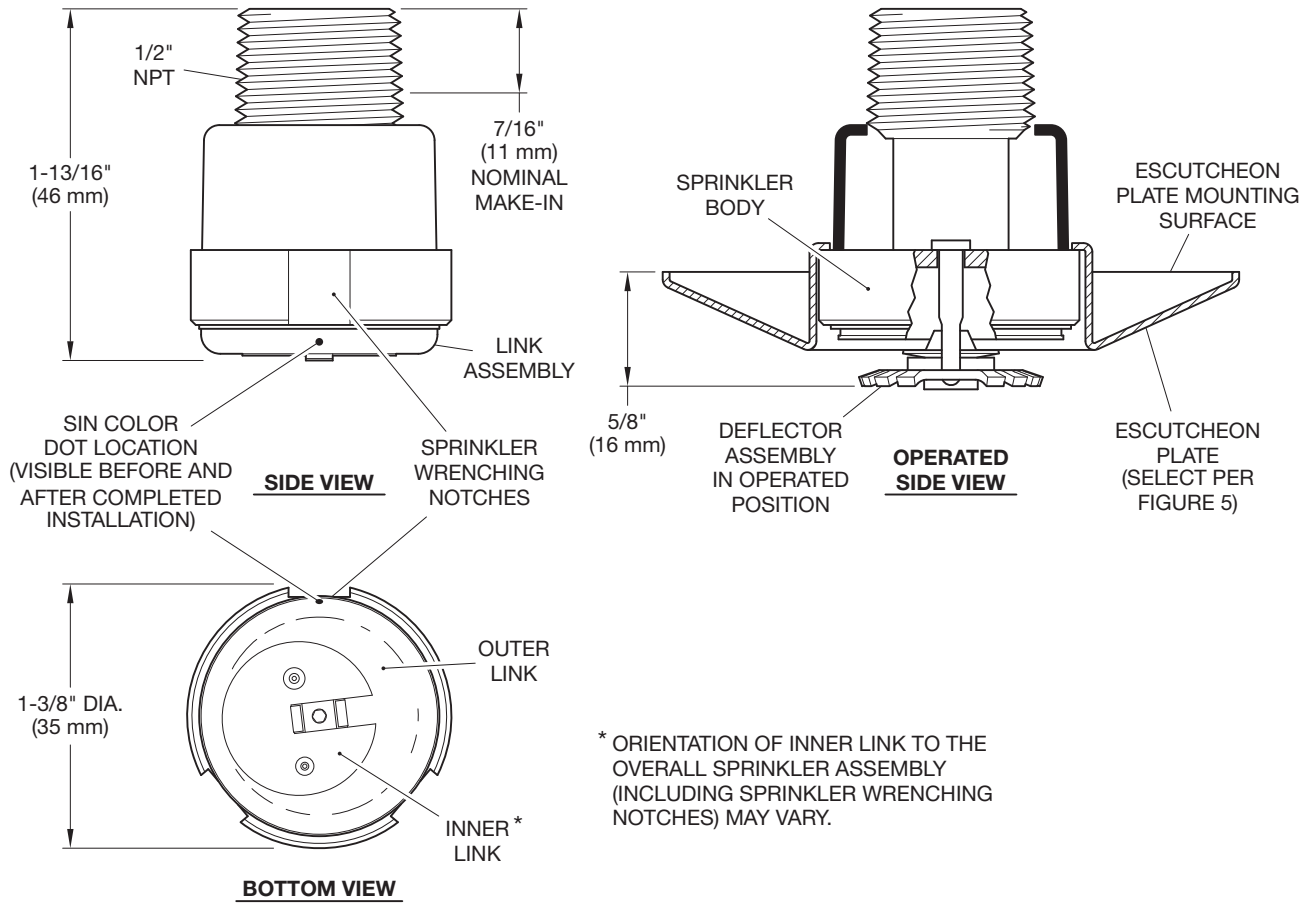
**Note:** To help prevent slippage of the Sprinkler Wrench and while using a 1/2 inch ratchet drive, place one hand over the Sprinkler Wrench while tightening with the other hand.

**Note:** Upon completion of tightening the sprinkler, the word "UP" on the wrench must be positioned towards the ceiling. The use of a level applied the flat of the wrench below the word "UP" is recommended to help assure that the sprinkler deflector is positioned correctly with respect to the ceiling.

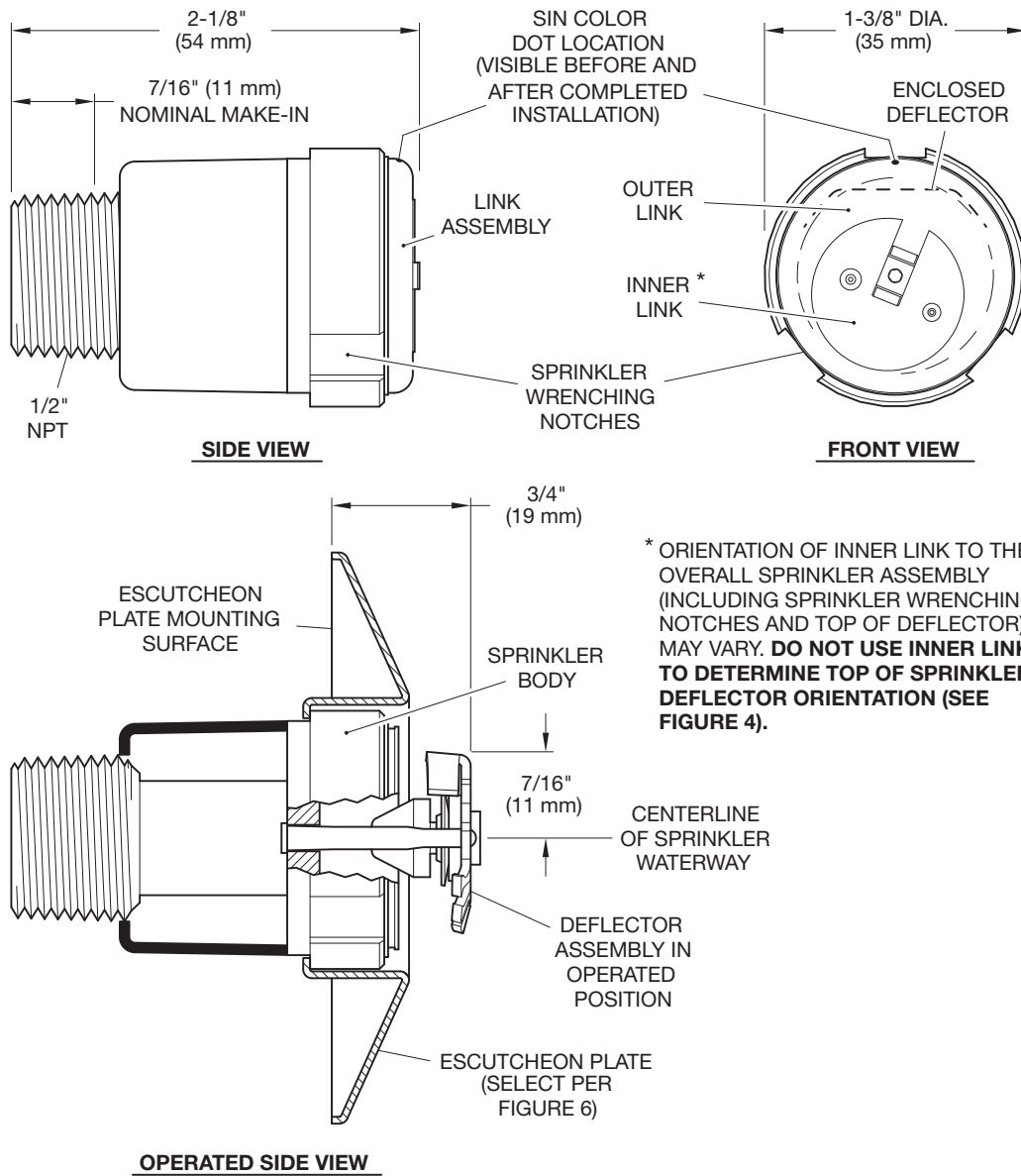
**Step 4.** After the installation is complete, make certain that the Escutcheon is held fast to the mounting surface and that it sits squarely against the wall around its entire perimeter. When using the technique shown in Figure 7, the Escutcheon can be pulled back onto the wall by pulling back on the sprinkler/supply pipe and then tighten the Retaining Flange Set Screw.

**Note:** If the Escutcheon is NOT held fast (i.e., tight with no movement or gap) to the mounting surface and as an option to relocating the sprinkler pipe fitting (i.e., increasing the "face of fitting" to "face of mounting surface" distance) up to two Adjustment Spacer Rings as shown in Figure 4 may be utilized. Each Adjustment Spacer Ring can account for 0.075 inches of gap between the Escutcheon and mounting surface. Therefore, if the gap is greater than 0.150 inches, the sprinkler fitting will need to be relocated to assure proper installation of the RAVEN Sprinkler and Escutcheon.

**Step 5.** After all the horizontal sidewall sprinklers are installed, use the W-type 25 Sprinkler Wrench to verify that the each sprinkler deflector is properly aligned with respect to the ceiling. See Step 3. See Figure 4 inset for post installation identification.

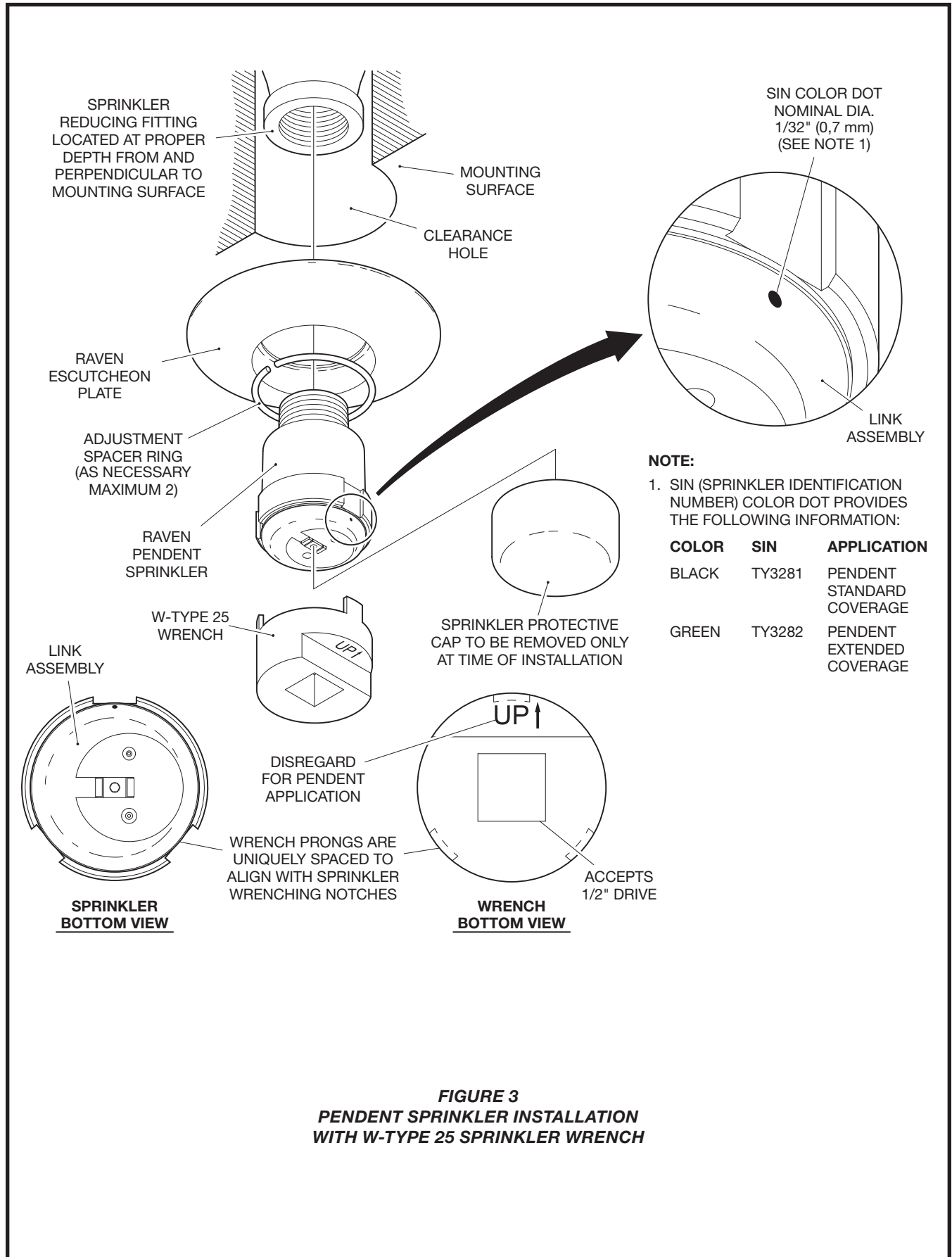


**FIGURE 1**  
**RAVEN INSTITUTIONAL PENDENT SPRINKLERS**  
**NOMINAL INSTALLATION DIMENSIONS**

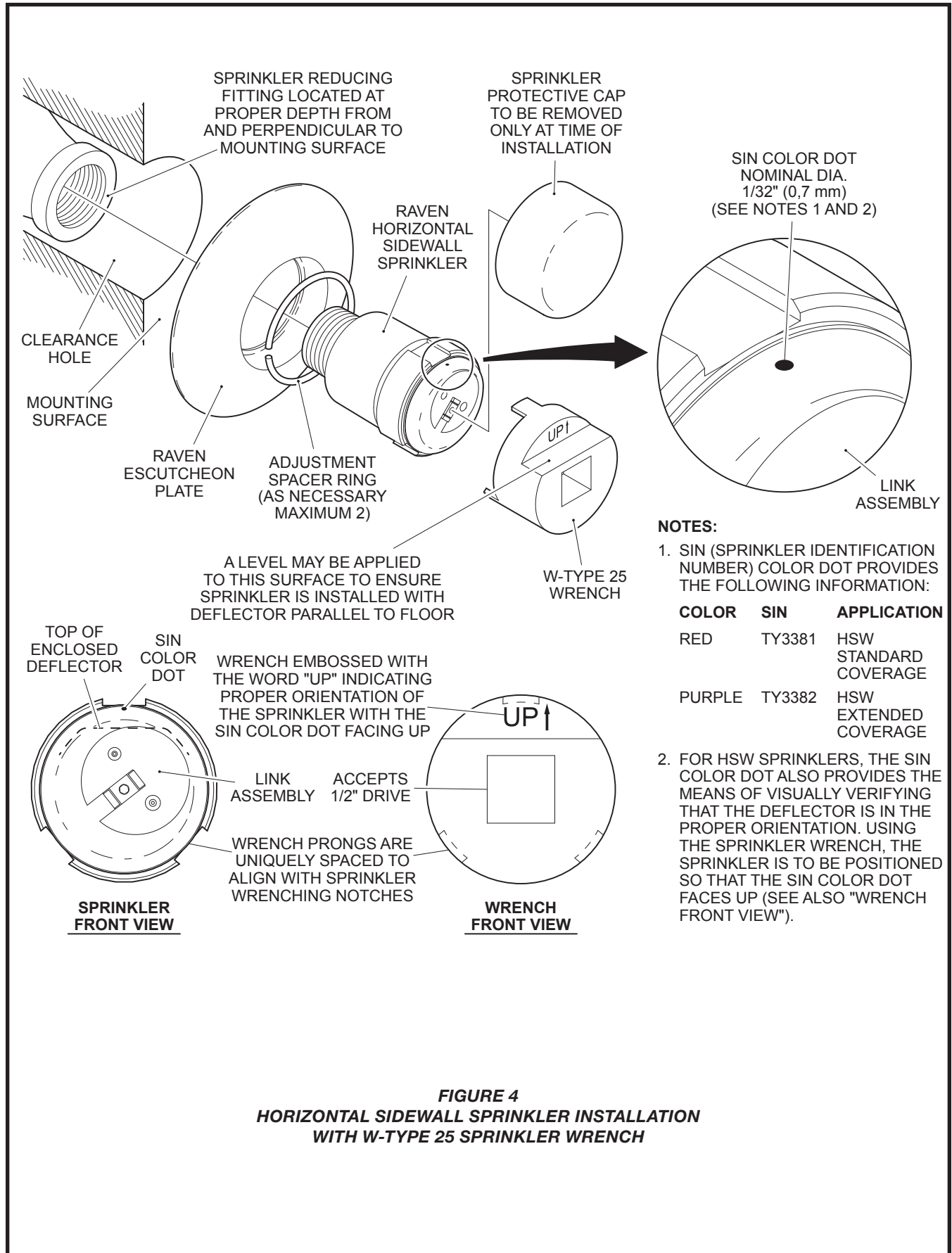


**FIGURE 2**  
**RAVEN INSTITUTIONAL HORIZONTAL SIDEWALL SPRINKLERS**  
**NOMINAL INSTALLATION DIMENSIONS**





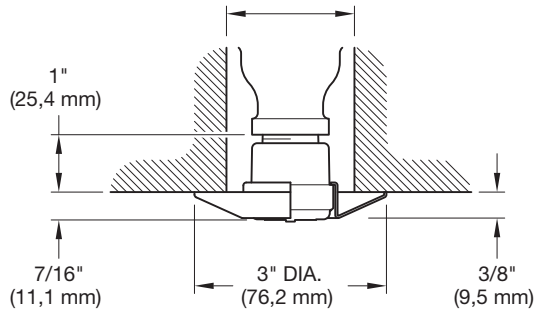
**FIGURE 3**  
**PENDENT SPRINKLER INSTALLATION**  
**WITH W-TYPE 25 SPRINKLER WRENCH**



**FIGURE 4**  
**HORIZONTAL SIDEWALL SPRINKLER INSTALLATION**  
**WITH W-TYPE 25 SPRINKLER WRENCH**

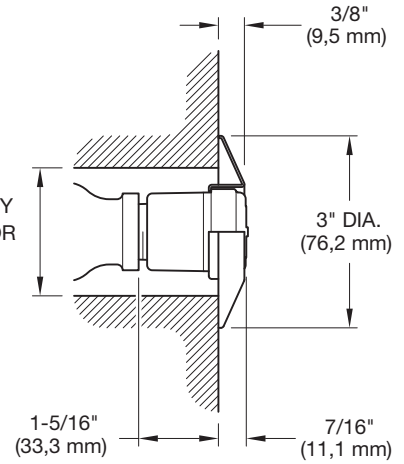
**STYLE F**

DIAMETER DETERMINED BY CLEARANCE FOR REDUCING COUPLING



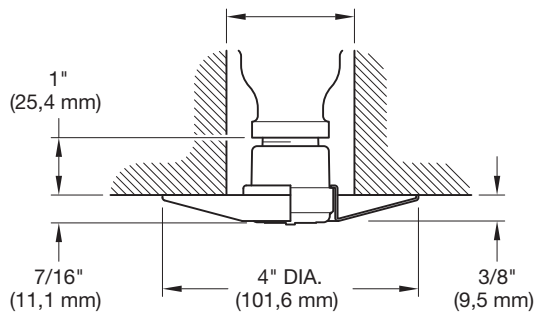
**STYLE F**

DIAMETER DETERMINED BY CLEARANCE FOR REDUCING COUPLING



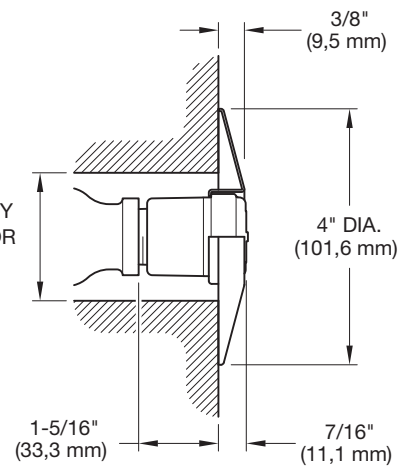
**STYLE G**

DIAMETER DETERMINED BY CLEARANCE FOR REDUCING COUPLING



**STYLE G**

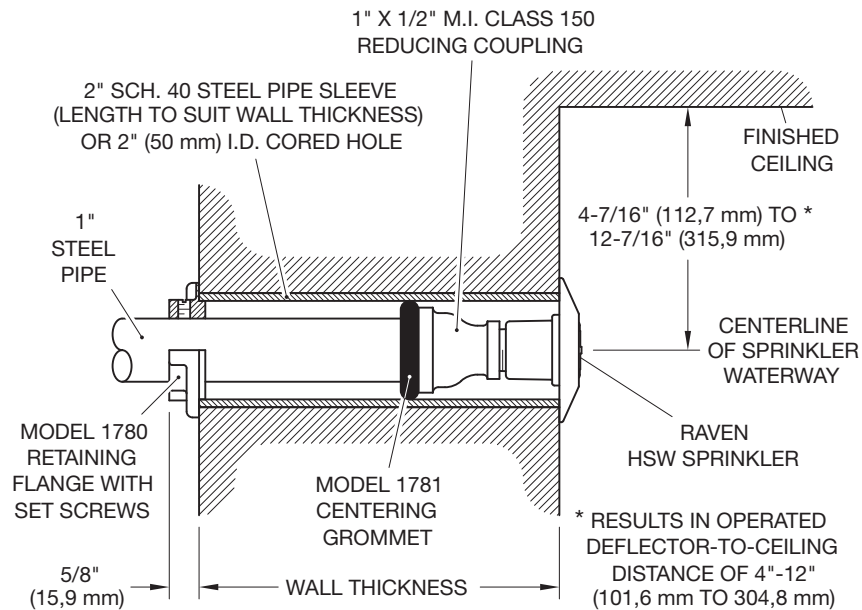
DIAMETER DETERMINED BY CLEARANCE FOR REDUCING COUPLING



**FIGURE 5  
ESCUTCHEON OPTIONS  
FOR USE WITH RAVEN INSTITUTIONAL  
PENDENT SPRINKLERS**

**FIGURE 6  
ESCUTCHEON OPTIONS  
FOR USE WITH RAVEN INSTITUTIONAL  
HORIZONTAL SIDEWALL SPRINKLERS**





**FIGURE 7**  
**OPTIONAL INSTALLATION TECHNIQUE FOR USING**  
**MODEL 1780 RETAINING FLANGE**  
**AND MODEL 1781 CENTERING GROMMET**  
*(Horizontal Installation Shown –*  
*May be Applied to Pendent Installation)*

## Care and Maintenance

The Tyco® RAVEN™ Institutional Sprinklers must be maintained and serviced in accordance with the following instructions:

### NOTICE

*Service inspections should be made on a regular basis to detect possible damage or alterations to the sprinkler and escutcheon. Inspections should include making certain that the Institutional Escutcheon is held fast to the mounting surface. Damaged or altered sprinklers are to be replaced immediately to avoid personal injury and to prevent use for causing personal injury, as well as to maintain the sprinkler system in an operative condition.*

*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 sys-*

*tems must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.*

Sprinklers which are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated, or otherwise altered after leaving the factory. Modified or over-heated sprinklers must be replaced.

Care must be exercised to avoid damage to the sprinklers -before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced.

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.

Automatic sprinkler systems should 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 Suppression & Building Products (TFSBP) 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 TFSBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFSBP or for products and components which have been subject to misuse, improper installation or maintenance, corrosion, or other external sources of damage. Materials found by TFSBP to be defective shall be either repaired or replaced, at TFSBP's sole option. TFSBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFSBP shall not be responsible for system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFSBP 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 TFSBP was informed about the possibility of such damages, and in no event shall TFSBP'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, materials 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.

## Disclaimer

Tyco Fire Suppression & Building Products specifically disclaims any liability for damages or injury (including death) arising out of or caused by manipulation, dismantling, or misuse of RAVEN Sprinklers or the use or attempted use of the RAVEN Sprinklers or any component thereof as an instrument unrelated to its intended function as a fire protection device.

## Ordering Procedure

Contact your local distributor for availability.

### Sprinkler Assemblies:

Specify: RAVEN (specify standard or extended coverage), 165°F, Institutional (specify pendent or horizontal sidewall) Sprinkler with (specify finish), P/N (specify).

### Standard Coverage

#### Pendent (TY3281)

Chrome . . . . . P/N 50-314-9-165  
White Color . . . . . P/N 50-314-4-165

#### HSW (TY3381)

Chrome . . . . . P/N 50-316-9-165  
White Color . . . . . P/N 50-316-4-165

### Extended Coverage

#### Pendent (TY3282)

Chrome . . . . . P/N 50-315-9-165  
White Color . . . . . P/N 50-315-4-165

#### HSW (TY3382)

Chrome . . . . . P/N 50-317-9-165  
White Color . . . . . P/N 50-317-4-165

### Separately Ordered Escutcheons:

Specify: Style (F or G), (specify finish), Escutcheons, P/N (specify).

#### Style F (3" Dia.)

Chrome . . . . . P/N 56-314-9-010  
White Color . . . . . P/N 56-314-4-010

#### Style G (4" Dia.)

Chrome . . . . . P/N 56-312-9-010  
White Color . . . . . P/N 56-312-4-010

### Separately Ordered Wrench:

Specify: W-type 25 Sprinkler Wrench, P/N 56-314-1-001.

### Separately Ordered Adjustment

#### Spacer Ring:

Specify: Adjustment Spacer Ring for use with RAVEN Sprinklers, P/N 56-000-1-755.

### Separately Ordered Parts For Installation In Concrete Walls:

Specify: Model 1781 Centering Grommet for installation in concrete, P/N 56-000-1-781.

Specify: Model 1780 Retaining Flange with Set Screws for installation in concrete, P/N 56-000-1-780.