

**HYDRAULIC CALCULATIONS
SUBMITTAL**

For

Harbor Freight Lake City

Lake City, Florida

WAFS PROJECT NO. 8531



Automatic Fire Sprinklers, Inc.

**CORPORATE OFFICE
222 CAPITOL COURT • OCOEE, FLORIDA 34761-3033
407-656-3030 • FAX: 407-656-8026**

EMERGENCY: 407-656-8946

APPROVED (Subject to Revisions)
Life Safety Services
Columbia County Fire Rescue
Florida State Fire Inspector #146595
By: DB Date: 03/08/14



Automatic Fire Sprinklers, Inc.



Hazard Fire Protection Engineering, Inc.

222 CAPITOL COURT OCDEE, FL 34761

PH: (407) 877-5578 FAX: (407) 858-8028

Certificate of Authorization Number 29038

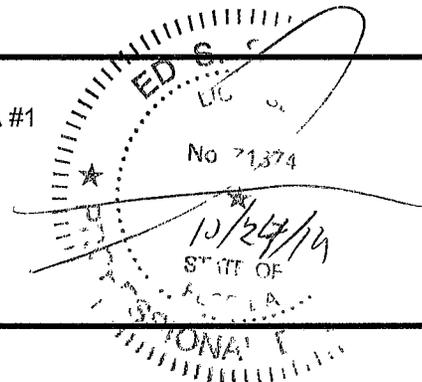
Robert J. Dewar, P.E. FL License No. 70937

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Hydraulic Calculations

Wayne Automatic
Fire Sprinklers, Inc.
11326 Distribution Avenue West
Jacksonville, Fl. 32256-2745
904-268-3030

Job Name : HARBOR FREIGHT LAKE CITY DA #1
Sheet Number : FP 1
Location : 1824 US HIGHWAY 90
Design Area : DA #1
Contract : 8531
Data File : DA 1.WXF

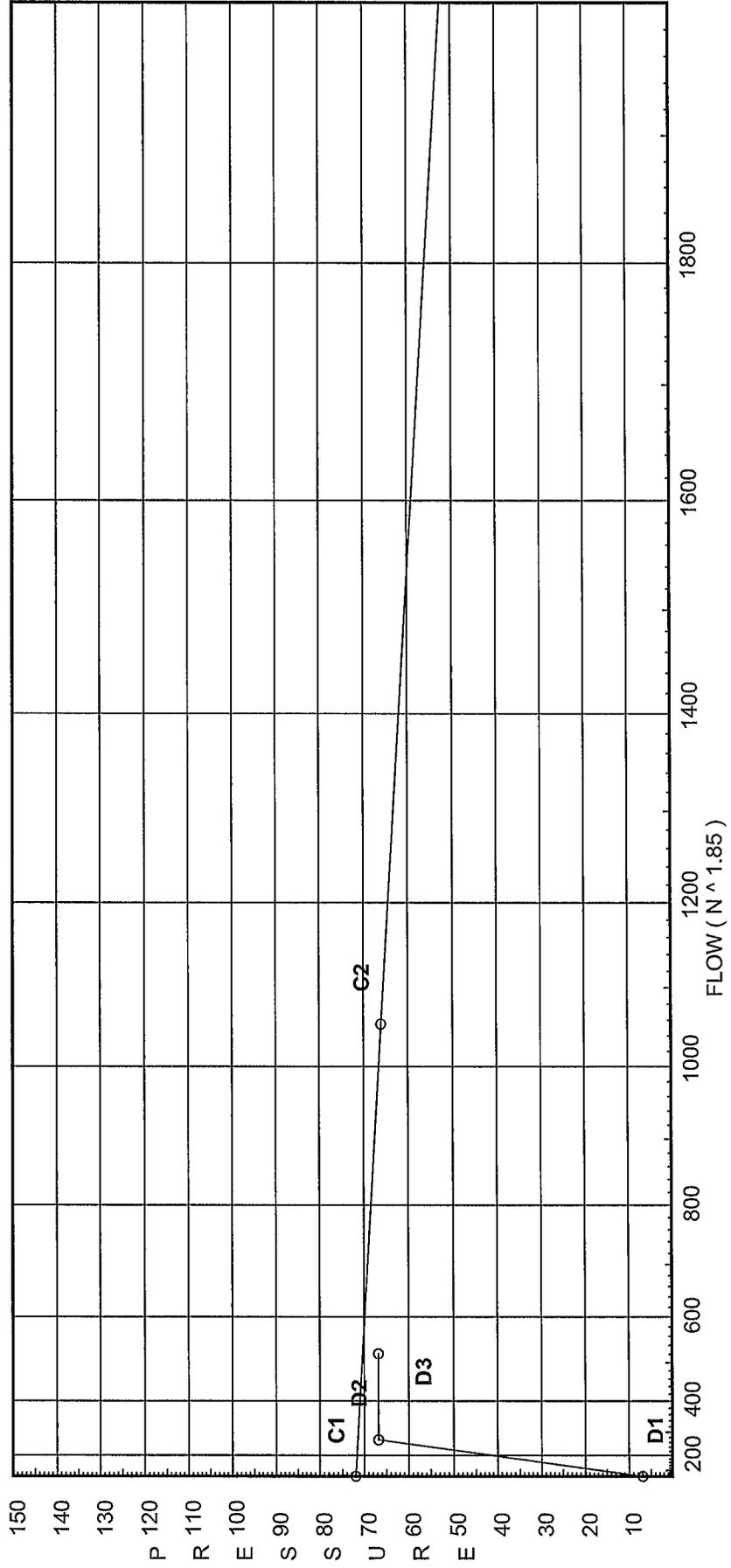


Water Supply Curve C

Wayne Automatic
 HARBOR FREIGHT LAKE CITY DA #1

City Water Supply:
 C1 - Static Pressure : 72
 C2 - Residual Pressure: 66
 C2 - Residual Flow : 1055

Demand:
 D1 - Elevation : 6.930
 D2 - System Flow : 270.825
 D2 - System Pressure : 66.775
 Hose (Demand) : 250
 D3 - System Demand : 520.825
 Safety Margin : 3.599



Pressure / Flow Summary - STANDARD

Wayne Automatic
HARBOR FREIGHT LAKE CITY DA #1

Page 4
Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
S10	18.0	5.6	19.93	na	25.0	0.2	125	7.0
M10	17.833		20.14	na				
S11	17.75	5.6	20.35	na	25.26	0.2	125	7.0
S12	17.583	5.6	21.53	na	25.99	0.2	125	7.0
S13	17.333	5.6	24.06	na	27.47	0.2	125	7.0
RN1	17.0		33.67	na				
S14	18.0	5.6	20.0	na	25.05	0.2	125	7.0
S15	17.75	5.6	20.42	na	25.3	0.2	125	7.0
S16	17.583	5.6	21.61	na	26.03	0.2	125	7.0
S17	17.333	5.6	24.14	na	27.52	0.2	125	7.0
RN2	17.0		33.78	na				
S18	17.583	5.6	31.57	na	31.46	0.2	125	7.0
S19	17.333	5.6	32.14	na	31.75	0.2	125	7.0
RN3	17.0		36.08	na				
RN11	14.667		37.72	na				
RN12	14.667		37.85	na				
RN13	14.667		38.3	na				
M1	14.667		43.42	na				
TOR	14.667		47.1	na				
BOR	1.0		55.36	na				
IBR	-3.0		57.28	na				
UC	-3.0		58.3	na	250.0			
U1	-3.0		58.48	na				
U2	-3.0		58.94	na				
BF1	-3.0		64.5	na				
BF2	-3.0		68.63	na				
U3	-3.0		68.86	na				
TEE	-3.0		68.87	na				
HYD	2.0		66.78	na				

The maximum velocity is 17.99 and it occurs in the pipe between nodes S17 and RN2

Final Calculations - Hazen-Williams

Wayne Automatic
HARBOR FREIGHT LAKE CITY DA #1

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	63.21					36.075			K Factor = 10.52	
RN3 to RN13	63.21	1.536 120.0 0.1709	J	4.8 0.0	2.333 4.800 7.133	36.075 1.010 1.219			Vel = 10.94	
	0.0 63.21					38.304			K Factor = 10.21	
RN11 to RN12	103.71	3.314 120.0 0.0101		0.0 0.0	12.500 0.0 12.500	37.722 0.0 0.126			Vel = 3.86	
RN12 to RN13	103.90	3.314 120.0 0.0365		0.0 0.0	12.500 0.0 12.500	37.848 0.0 0.456			Vel = 7.72	
RN13 to M1	63.21	3.314 120.0 0.0596	J	12.2 0.0	73.667 12.200 85.867	38.304 0.0 5.114			Vel = 10.07	
	0.0 270.82					43.418			K Factor = 41.10	
M1 to TOR	270.82	3.314 120.0 0.0596	J	12.2 0.0	49.667 12.200 61.867	43.418 0.0 3.686			Vel = 10.07	
	0.0 270.82					47.104			K Factor = 39.46	
TOR to BOR	270.82	3.314 120.0 0.0596	B Z	14.559 10.191 0.0	14.542 24.750 39.292	47.104 5.919 2.340			Vel = 10.07	
	0.0 270.82					55.363			K Factor = 36.40	
BOR to IBR	270.82	4.026 120.0 0.0231		0.0 0.0	8.000 0.0 8.000	55.363 1.732 0.185			Vel = 6.83	
IBR to UC	0.0	4.07 150.0 0.0145		0.0 0.0	70.000 0.0 70.000	57.280 0.0 1.015			Vel = 6.68	
UC to U1	250.01	5.86 150.0 0.0082	E	17.893 0.0	4.000 17.893 21.893	58.295 0.0 0.180			Qa = 250 Vel = 6.20	
U1 to U2	0.0	5.86 150.0 0.0082	S	40.899 0.0	15.000 40.899 55.899	58.475 0.0 0.461			Vel = 6.20	
U2 to BF1	0.0	5.86 150.0 0.0082	E 2G	17.893 7.668 0.0	650.000 25.561 675.561	58.936 0.0 5.562			Vel = 6.20	
BF1 to BF2	0.0	6.065 120.0 0.0105	3E Zic	42.0 0.0	14.000 42.000 56.000	64.498 3.543 0.589			** Fixed Loss = 3.543 Vel = 5.78	
BF2 to U3	0.0	5.86 150.0 0.0082	G	3.834 0.0	24.000 3.834 27.834	68.630 0.0 0.229			Vel = 6.20	

**MATERIAL SUBMITTAL
DATA**

For

Harbor Freight Lake City

Lake City, Florida

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Automatic Fire Sprinklers, Inc.

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222 CAPITOL COURT • OCOEE, FLORIDA 34761-3033
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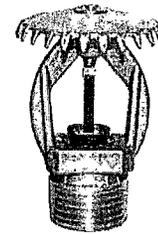


**QUICK RESPONSE
AUTOMATIC SPRINKLERS
GL SERIES
UPRIGHT • PENDENT
VERTICAL SIDEWALL
HORIZONTAL SIDEWALL
CONVENTIONAL (OLD STYLE)**

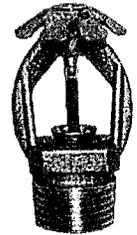
DESCRIPTION AND OPERATION

The Globe Quick Response GL Series Sprinklers are a low profile yet durable design which utilizes a 3mm frangible glass ampule as the thermosensitive element. This provides sprinkler operation approximately six times faster than ordinary sprinklers. While the Quick Response Sprinkler provides an aesthetically pleasing appearance, it can be installed wherever standard spray sprinklers are specified when allowed by the applicable standards. It offers the additional feature of greatly increased safety to life and is available in various styles, orifices, temperature ratings and finishes to meet many varying design requirements. Quick Response Sprinklers should be used advisedly and under the direction of approving authorities having jurisdiction.

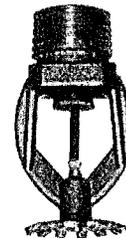
The heart of Globe's GL Series sprinkler proven actuating assembly is a hermetically sealed frangible glass ampule that contains a precisely measured amount of fluid. When heat is absorbed, the liquid within the bulb expands increasing the internal pressure. At the prescribed temperature the internal pressure within the ampule exceeds the strength of the glass causing the glass to shatter. This results in water discharge which is distributed in an approved pattern depending upon the deflector style used.



**QUICK RESPONSE
UPRIGHT**



**QUICK RESPONSE
CONVENTIONAL**



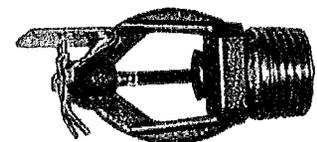
**QUICK RESPONSE
PENDENT**



**QUICK RESPONSE
VERTICAL
SIDEWALL**

TECHNICAL DATA

- See reverse side for Approvals and Specifications.
- Temperature Ratings - 135°F (57°C), 155°F (68°C), 175°F (79°C), 200°F (93°C), 286°F (141°C)
- Water Working Pressure Rating - 175 psi (12 Bars)
- Factory tested hydrostatically to 500 psi (34 Bars)
- Maximum low temperature glass bulb rating is -67°F (-55°C)
- Frame - bronze • Deflector - brass • Screw - brass
- Bulb seat - copper • Spring - nickel alloy • Seal - teflon
- Bulb - glass with alcohol based solution, 3mm size



**QUICK RESPONSE
HORIZONTAL SIDEWALL**

• SPRINKLER TEMPERATURE RATING/CLASSIFICATION and COLOR CODING

CLASSIFICATION	AVAILABLE SPRINKLER TEMPERATURES		BULB COLOR	N.F.P.A. MAXIMUM CEILING TEMPERATURE	
ORDINARY	135°F/155°F	57°C/68°C	ORANGE/RED	100°F	38°C
INTERMEDIATE	175°F/200°F	79°C/93°C	YELLOW/GREEN	150°F	66°C
HIGH	286°F	141°C	BLUE	225°F	107°C

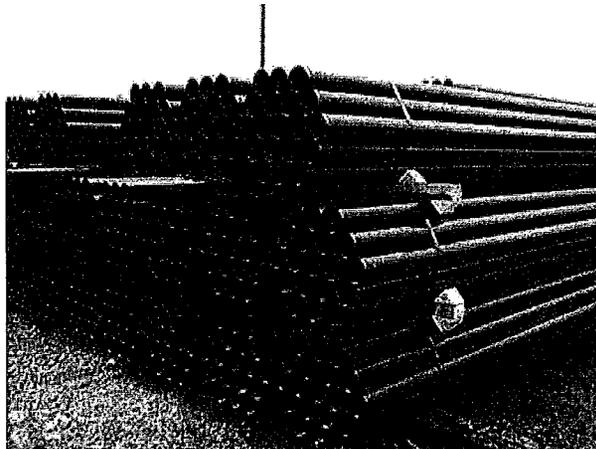


Wayne Automatic Fire Sprinklers (W.A.F.S.) utilizes “Flow” piping for sizes 1-1/4” through 4”. Some refer to it as Schedule 7. Per NFPA 13 section 6.3.6.1 it is permissible to use piping other than that provided in Table 6.3.1.1 provided it is listed. Piping will be sourced from domestic manufacturers. Piping will be manufactured in accordance with the following standard:

- **ASTM A795 - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.**

All piping will be UL listed & FM approved. Pipe will be from one of the following manufacturers:

- **Allied “Dyna-Flow”**
- **Bull moose Tube Company “Eddy Flow”**
- **Northwest Pipe Company “EZ-Flow”**
- **Welded Tube – Berkeley “Steady-Flow”**
- **Wheatland Tube Company “Mega-Flow”**
- **Youngstown Tube “Fire-Flo”**





Worldwide
Contacts

www.tyco-fire.com

GRINNELL G-FIRE Grooved Fittings, Ductile Iron

General Description

GRINNELL G-FIRE Grooved Fittings provide an economical and efficient method of changing direction, adding an outlet, reducing, or capping piping systems. The G-FIRE grooved fittings are available in ductile iron or fabricated steel as indicated.

Note: Figure 510S and 519S fittings are special short radius fittings with smaller center to end dimensions than standard grooved fittings. Depending on the size and coupling used, there may be interferences at the bolt pads that require repositioning of the coupling orientation. The use of flange adapters is not recommended with Figures 510S and 519S fittings. Contact Tyco Fire Protection Products for details.

NOTICE

Never remove any piping component nor correct or modify any piping deficiencies without first de-pressurizing and draining the system. Failure to do so may result in serious personal injury, property damage, and/or impaired device performance.

It is the designer's responsibility to select products suitable for the intended service and to ensure that pressure ratings and performance data are not exceeded. Material and gasket selection should be verified to be compatible for the specific application. Always read and understand the installation instructions.

The GRINNELL G-FIRE Grooved Fittings described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the approval agency, in addition to the standards of any other authorities having jurisdiction. Failure to do so may result in serious personal injury or impair the performance of these devices.

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

Technical Data

Approvals

UL, FM, ULC, VdS, and LPCB.

Material

Cast: Ductile iron conforming to ASTM A536, Grade 65-45-12

Protective Coatings

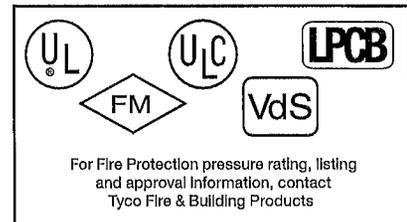
- Non-lead orange paint
- RAL red or non-lead paint
- Hot dipped galvanized conforming to ASTM A153

Care and Maintenance

The following inspection procedure must be performed as indicated, in addition to any specific requirements of the NFPA. Any impairments must be immediately corrected.

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 decision.

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 authority having jurisdiction. The installing contractor or



Full warranty terms
can be found on
www.grinnell.com

product manufacturer should be contacted relative to any questions.

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

After placing a fire protection system in service, notify the proper authorities and advise those responsible for monitoring proprietary and/or central station alarms.

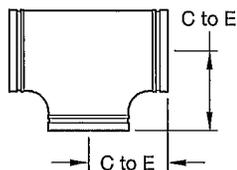


FIGURE 519
CAST TEE

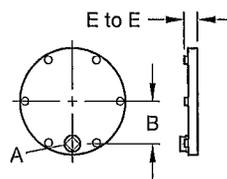


FIGURE 260
CAST END CAP

Nominal Pipe Size		Figure 519			Figure 260‡	
ANSI Inches DN	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight (Domestic) Lbs. (kg)	Approx. Weight (International) Lbs. (kg)	Nominal E to E Inches (mm)	Approx. Weight (Domestic) Lbs. (kg)
1 DN25	1.315 (33,4)	-	-	-	0.88 (22,4)	0.3 (0,1)
1-1/4 DN32	1.660 (42,4)	2.75 (69,9)	2.05 (0,93)	1.66 (0,73)	0.88 (22,4)	0.4 (0,2)
1-1/2 DN40	1.900 (48,3)	2.75 (69,9)	2.25 (1,56)	1.70 (0,77)	0.88 (22,4)	0.6 (0,3)
2 DN50	2.375 (60,3)	3.25 (82,6)	3.40 (1,54)	2.68 (1,22)	0.88 (22,4)	0.9 (0,4)
2-1/2 DN65	2.875 (73,0)	3.75 (95,3)	5.45 (2,47)	4.16 (1,89)	0.88 (22,4)	0.9 (0,4)
- DN65	3.000 (76,1)	3.75 (95,3)	5.55 (2,52)	4.22 (1,91)	0.94 (23,9)	1.1 (0,5)
3 DN80	3.500 (88,9)	4.25 (108,0)	8.00 (3,63)	5.95 (2,70)	0.88 (22,4)	1.1 (0,5)
4 DN100	4.500 (114,3)	5.00 (127,0)	9.32 (4,23)	9.32 (4,23)	1.00 (25,4)	2.6 (1,2)
- DN125	5.500 (139,7)	5.50 (139,7)	16.15 (7,72)	12.18 (5,52)	0.92 (23,4)	4.7 (2,1)
5 DN125	5.563 (141,3)	-	-	-	1.00 (25,4)	5.0 (2,3)
- DN150	6.500 (165,1)	6.50 (165,1)	25.25 (11,45)	12.89 (5,85)	1.00 (25,4)	7.5 (3,4)
6 DN150	6.625 (168,3)	6.50 (165,1)	26.90 (12,20)	19.61 (8,89)	1.00 (25,4)	7.5 (3,4)
8 DN200	8.625 (219,1)	7.75 (196,9)	45.35 (20,57)	30.61 (13,88)	1.19 (30,2)	12.8 (5,8)
10 DN250	10.750 (273,0)	-	-	-	1.25 (31,8)	20.0 (9,1)
12 DN300	12.750 (323,9)	-	-	-	1.25 (31,8)	36.0 (16,3)

‡ - Available with tapped plugs. Contact Tyco Fire Protection Products

FIGURE 2
NOMINAL DIMENSIONS FIGURES 519 AND 260

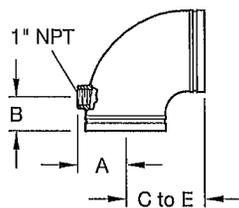


FIGURE 510DE
90° DRAIN ELBOW

Nominal Pipe Size		Figure 510DE 90° Drain Elbow			
ANSI Inches DN	O.D. Inches (mm)	Nominal C to E Inches (mm)	Nominal A Lbs. (kg)	Nominal B Inches (mm)	Approx. Weight Lbs. (kg)
2 DN50	2.375 (60,3)	3.75 (95,3)	2.00 (50,8)	2.75 (69,9)	2.7 (1,2)
2-1/2 DN65	2.875 (73,0)	3.75 (95,3)	2.00 (50,8)	2.75 (69,9)	3.8 (1,7)
3 DN80	3.500 (88,9)	4.25 (108,0)	2.34 (59,4)	2.75 (69,9)	5.8 (1,7)
4 DN100	4.500 (114,3)	5.00 (127,0)	2.85 (72,4)	2.75 (69,9)	8.0 (3,6)
6 DN150	6.625 (168,3)	6.50 (165,1)	3.92 (99,6)	2.75 (69,9)	17.6 (8,0)
8 DN200	8.625 (219,1)	7.75 (196,9)	4.95 (125,7)	2.75 (69,9)	30.4 (13,8)

FIGURE 4
NOMINAL DIMENSIONS FIGURES 510DE

Friction Resistance					
Nominal Pipe Size		Elbows 90° Feet (m)	Elbows 45° Feet (m)	Tee* Branch Feet (m)	Tee Run Feet (m)
ANSI Inches DN	O.D. Inches (mm)				
1-1/4 DN32	1.660 (42,4)	1.9 (0,6)	1.0 (0,3)	4.8 (1,5)	1.9 (0,6)
1-1/2 DN40	1.900 (48,3)	2.3 (0,7)	1.2 (0,4)	5.8 (1,8)	2.3 (0,7)
2 DN50	2.375 (60,3)	3.2 (1,0)	1.6 (0,5)	8.0 (2,5)	3.2 (1,0)
2-1/2 DN65	2.875 (73,0)	3.9 (1,2)	2.0 (0,6)	9.8 (3,0)	3.9 (1,2)
- DN65	3.000 (76,1)	4.1 (1,2)	2.1 (0,6)	10.3 (3,1)	4.1 (1,2)
3 DN80	3.500 (88,9)	4.9 (1,5)	2.4 (0,7)	12.2 (3,7)	4.9 (1,5)
4 DN100	4.500 (114,3)	6.5 (2,0)	3.3 (1,0)	16.3 (5,0)	6.5 (2,0)
- DN125	5.500 (139,7)	8.0 (2,4)	4.1 (1,3)	20.0 (6,1)	8.0 (2,4)
5 DN125	5.563 (141,3)	8.2 (2,5)	4.1 (1,3)	20.5 (6,3)	8.2 (2,5)
- DN150	6.500 (165,1)	9.5 (2,9)	4.8 (1,4)	23.8 (7,2)	9.5 (2,9)
6 DN150	6.625 (168,3)	9.9 (3,0)	5.0 (1,5)	24.8 (7,6)	9.9 (3,0)
8 DN200	8.625 (219,1)	13.1 (4,0)	6.6 (2,0)	32.8 (10,0)	13.1 (4,0)
10 DN250	10.750 (273,0)	16.5 (5,0)	8.3 (2,5)	41.3 (12,6)	16.5 (5,0)
12 DN300	12.750 (323,9)	19.9 (6,1)	9.9 (3,0)	49.7 (15,1)	19.9 (6,1)

*For the reducing tee branches, use the value that is corresponding to the branch size
 Example
 For 8" x 8" x 2" tee, the branch value of 2" is 8.0 feet
 For sizes not listed interpolate from the values shown

TABLE A
FRICITION RESISTANCE FOR
FIGURES 501, 510, 510DE AND 519
(EXPRESSED AS EQUIVALENT STRAIGHT PIPE)

Ordering Procedure

GRINNELL Products are available globally through a network of distribution centers. For the nearest distributor, visit www.grinnell.com. When placing an order, indicate the full product name.

Please specify the quantity, figure number, wall thickness, and size.



THREADED FITTINGS

Wayne Automatic Fire Sprinklers (W.A.F.S.) utilizes black cast iron, ductile iron and/or malleable iron threaded fittings. Fittings are not required to be listed if they conform to NFPA 13 Table 6.4.1 Fittings Materials and Dimensions. Many will be UL Listed or FM Approved. Fittings will be from various manufacturers including but not limited to: Anvil, ProValue, Shurjoint, Sigma, Smith Cooper, Tyco and Ward. Fittings will be manufactured in accordance with the following standards per NFPA 13 Table 6.4.1.

- **ASME B16.3 – Malleable iron threaded fittings, Class 150 and 300 steel.**
- **ASME B16.4 – Cast iron threaded fittings, Class 125 and 250**

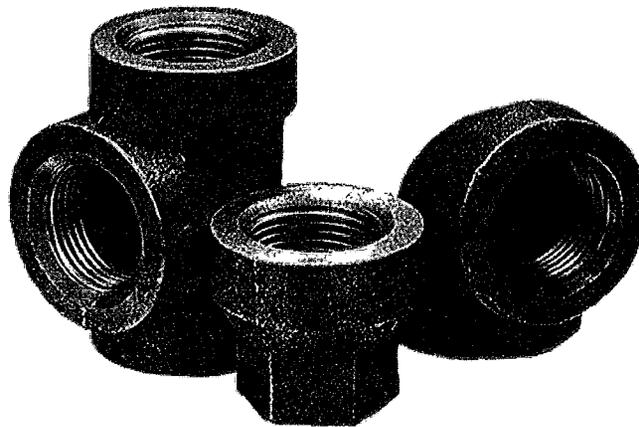


Fig. 142

Coach Screw Rods Machine Threaded on Opposite End

Size Range: 3/8" and 1/2"

Material: Carbon steel

Finish: Plain

Ordering: Specify rod size, figure number, name and rod length

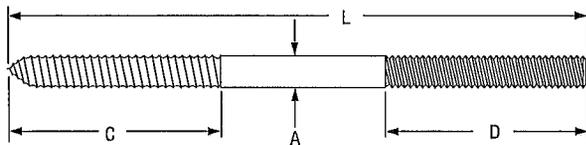


Fig. 142: Standard Thread Lengths(in) • Loads (lbs)

Rod Size A	Standard Length - L	Coach Screw Thread Length - C	Standard Rod Thread Length - D	Max Load
3/8	3 1/2	2	3/4	390
	8		2 1/2	
1/2	3 1/2	2 7/16	3/4	640
	8		2 1/2	

Fig. 146

Continuous Threaded Rod

Size Range: 1/4" through 1 1/2" Stocked in six, ten, and twelve foot lengths. Other even foot lengths can be furnished to order

Material: Carbon steel, rod threaded complete length

Finish: Plain or galvanized

Maximum Temperature: 650° F

Ordering: Specify rod diameter and length, figure number, name and finish.

Note: The acceptability of galvanized coatings at temperatures above 450°F is at the discretion of the end user

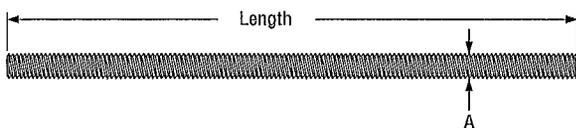
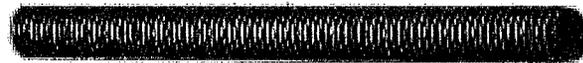


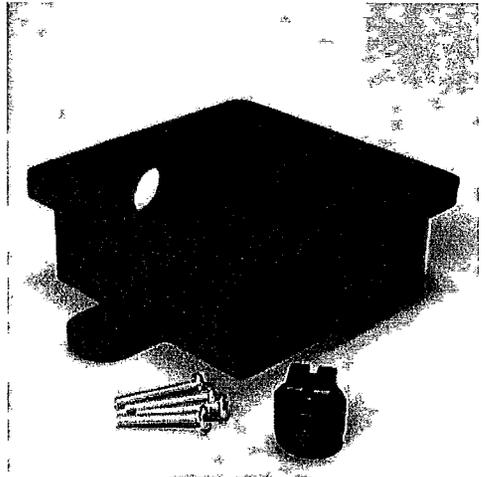
Fig. 146: Loads (lbs) • Weights (lbs) Dimensions (in)

Rod Size A	Threads per Inch	Max Load	Weight per Ft.
		650° F	
1/4	20	240	0 12
3/8	16	730	0 30
1/2	13	1,350	0 53
5/8	11	2,160	0 84
3/4	10	3,230	1 20
7/8	9	4,480	1 70
1	8	5,900	2 30
1 1/4	7	9,500	3 60
1 1/2	6	13,800	5 10

Note: Other rod sizes available upon request.
Class 2 fit is available upon request

Back Box (patent pend)

for Fire Alarm Bell, ABS



Description

FPPI's Back Box for Fire Alarm Bells is made from high impact ABS thermoplastic. ABS is known for its strength and rigidity and has superior electrical insulation properties as compared to PVC, Styrene or other plastics. ABS can also be used in a wide range of temperatures from -13 °F (-25° C) and 140 °F (60°). ABS is resistant to the elements that would normally cause corrosion in a similar back box made from cast aluminum with a painted finish. The back box design includes two tabs for easy surface mounting with two 1/2" NPT threaded inlets/outlets for through wiring. Each back box is supplied with four screws for mounting a compatible bell and an extra 1/2" NPT plug for plugging an unused NPT inlet or outlet

Installation

Install in accordance with usual and customary installation techniques for electrical apparatus. The ABS back box can be attached to most flat even surfaces in either horizontal or vertical positioning. Mounting to an uneven surface may cause the back box to become deformed, compromise weather resistance and prevent proper installation of the alarm bell. In order to maintain its' weather resistant properties install the supplied 1/2" NPT plug when not "through" wiring the bell to another appliance. Prolonged exposure to direct sunlight may cause the surface of the backbox to appear slightly discolored. This appearance does not change the performance characteristics of the product. Do not mount any electrical appliance in areas that are expected to be exposed to direct streams of water or directly exposed to inclement weather. The back box weather resistant prop-

erties are dependent on all installed components (NPT plugs, conduit connections, alarm bells, etc) being installed in a weather resistant fashion and having weather resistant properties of their own. When installed correctly, the final assembly of all components should provide a reasonable amount of resistance to moisture

Maintenance

No regular maintenance is required. As with all fire sprinkler system components, regularly inspect the back box for damage to insure expected performance

Related Products

6" Alarm Bell
10" Alarm Bell
Alarm Bell Cage (Guard)
Alarm Bell Signs

Specifications

Materials

Acrylonitrile butadiene styrene (ABS)

Sizes:

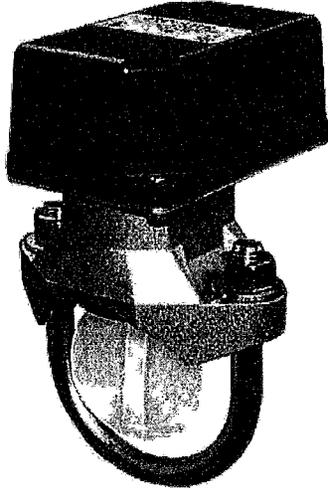
4" Back box with two 1/2" NPT threaded outlets/inlets
Includes for bell mounting screws and one 1/2" NPT plug

Color:

Dark Gray



Fire Protection Products, Inc. 6241 Yarrow Dr , Suite A, Carlsbad, CA 92011-1541
For questions 1 800 344-1822 • 1 800 344-3775 fax • www.fpfi.com



Specifications subject to change without notice.

Ordering Information			
Nominal Pipe Size		Model	Part Number
2"	DN50	VSR-2	1144402
2 1/2"	DN65	VSR-2 1/2	1144425
3"	DN80	VSR-3	1144403
3 1/2"	-	VSR-3 1/2	1144435
4"	DN100	VSR-4	1144404
5"	-	VSR-5	1144405
6"	DN150	VSR-6	1144406
8"	DN200	VSR-8	1144408

Optional Cover Tamper Switch Kit, stock no 0090148

Replaceable Components: Retard/Switch Assembly, stock no 1029030

UL, CUL and CSFM Listed, FM Approved, LPCB Approved, For CE Marked (EN12259-5)/VdS Approved model use VSR-EU

Service Pressure: 450 PSI (31 BAR) - UL

Flow Sensitivity Range for Signal:

4-10 GPM (15-38 LPM) - UL

Maximum Surge: 18 FPS (5.5 m/s)

Contact Ratings: Two sets of SPDT (Form C)

10.0 Amps at 125/250VAC

2.0 Amps at 30VDC Resistive

10 mAmps min. at 24VDC

Conduit Entrances: Two knockouts provided for 1/2" conduit.

Individual switch compartments suitable for dissimilar voltages

Environmental Specifications:

- NEMA 4/IP54 Rated Enclosure suitable for indoor or outdoor use with factory installed gasket and die-cast housing when used with appropriate conduit fitting
- Temperature Range: 40°F - 120°F, (4.5°C - 49°C) - UL
- Non-corrosive sleeve factory installed in saddle

Service Use:

Automatic Sprinkler

NFPA-13

One or two family dwelling

NFPA-13D

Residential occupancy up to four stories

NFPA-13R

National Fire Alarm Code

NFPA-72

WARNING

- Installation must be performed by qualified personnel and in accordance with all national and local codes and ordinances
- Shock hazard. Disconnect power source before servicing. Serious injury or death could result.
- Risk of explosion. Not for use in hazardous locations. Serious injury or death could result.

CAUTION

Waterflow switches that are monitoring wet pipe sprinkler systems shall not be used as the sole initiating device to discharge AFFF, deluge, or chemical suppression systems. Waterflow switches used for this application may result in unintended discharges caused by surges, trapped air, or short retard times

General Information

The Model VSR is a vane type waterflow switch for use on wet sprinkler systems. It is UL Listed and FM Approved for use on steel pipe; schedules 10 through 40, sizes 2" thru 8" (50 mm thru 200 mm) LPC approved sizes are 2" thru 8" (50 mm thru 200 mm) See Ordering Information chart.

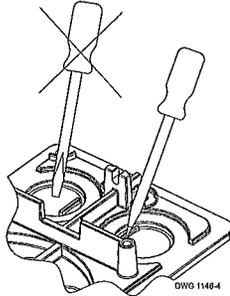
The VSR may also be used as a sectional waterflow detector on large systems. The VSR contains two single pole, double throw, snap action switches and an adjustable, instantly recycling pneumatic retard. The switches are actuated when a flow of 10 GPM (38 LPM) or more occurs downstream of the device. The flow condition must exist for a period of time necessary to overcome the selected retard period.

Enclosure

The VSR switches and retard device are enclosed in a general purpose, die-cast housing. The cover is held in place with two tamper resistant screws which require a special key for removal. A field installable cover tamper switch is available as an option which may be used to indicate unauthorized removal of the cover. See bulletin number 5401103 for installation instructions of this switch.

Fig. 2

To remove knockouts, place screwdriver at inside edge of knockouts, not in the center.



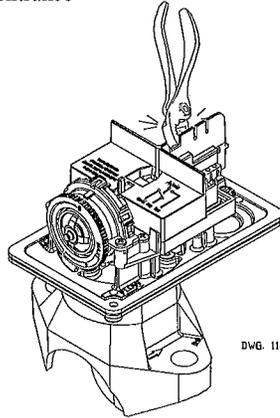
DWG 1146-4

NOTICE

Do not drill into the base as this creates metal shavings which can create electrical hazards and damage the device. Drilling voids the warranty

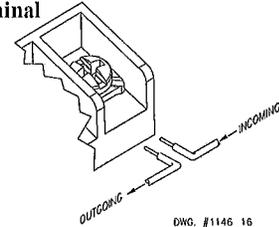
Fig. 3

Break out thin section of cover when wiring both switches from one conduit entrance



DWG 1146-13

Fig. 4 Switch Terminal Connections Clamping Plate Terminal



DWG #1146 16

WARNING

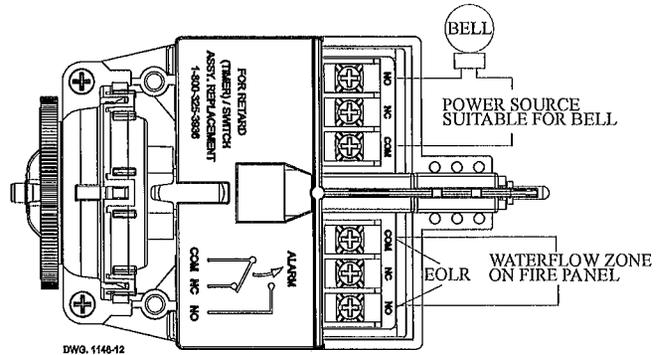
An un-insulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire become dislodged from under the terminal. Failure to sever the wire may render the device inoperable risking severe property damage and loss of life.

Do not strip wire beyond 3/8" of length or expose an un-insulated conductor beyond the edge of the terminal block. When using stranded wire, capture all strands under the clamping plate

Fig. 5 Typical Electrical Connections

Notes:

- 1 The Model VSR has two switches, one can be used to operate a central station, proprietary or remote signaling unit, while the other contact is used to operate a local audible or visual annunciator.
- 2 A condition of LPC Approval of this product is that the electrical entry must be sealed to exclude moisture
- 3 For supervised circuits, see "Switch Terminal Connections" drawing and warning note (Fig. 4).



DWG 1146-12

Testing

The frequency of inspection and testing for the Model VSR and its associated protective monitoring system shall be in accordance with applicable NFPA Codes and Standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently)

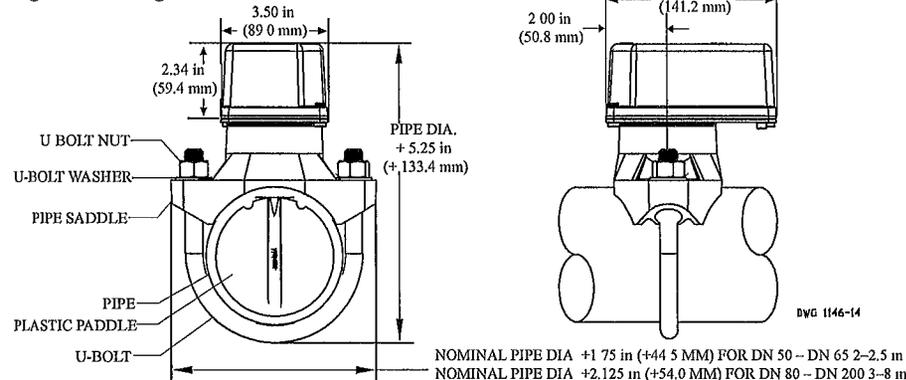
If provided, the inspector's test valve shall always be used for test purposes. If there are no provisions for testing the operation of the flow detection device on the system, application of the VSR is not recommended or advisable.

A minimum flow of 10 GPM (38 LPM) is required to activate this device

NOTICE

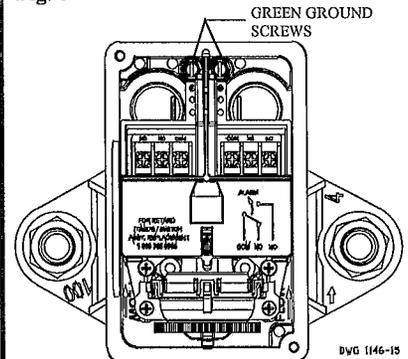
Advise the person responsible for testing of the fire protection system that this system must be tested in accordance with the testing instructions

Fig. 7 Mounting Dimensions



DWG 1146-14

Fig. 8



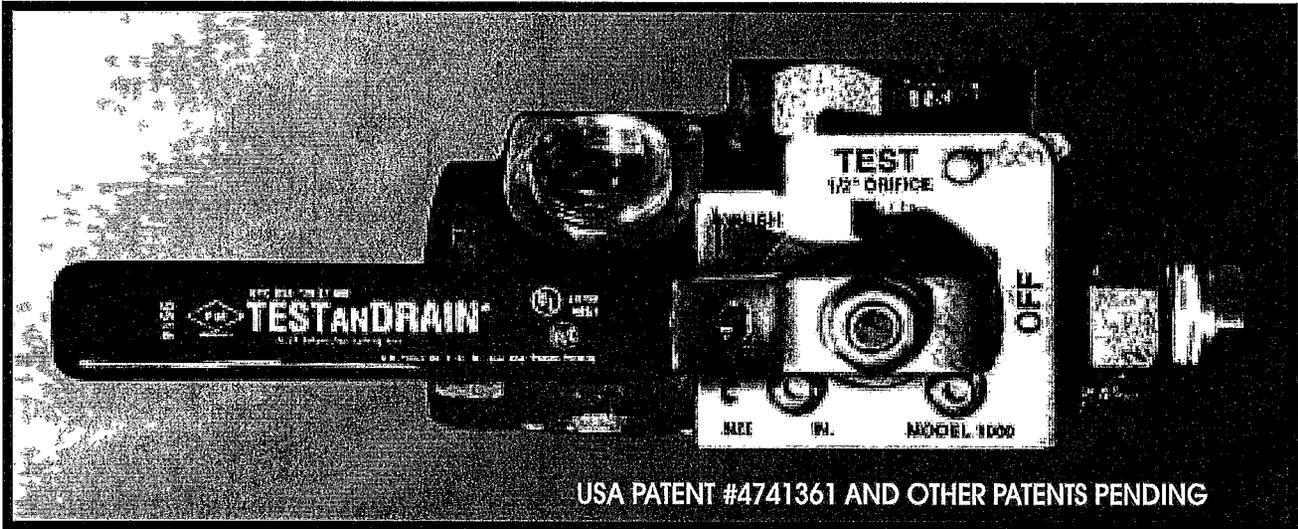
DWG 1146-15



MODEL 1000



3/4" 1" 1 1/4" 1 1/2" 2"



- ❑ The AGF Manufacturing Inc. **Model 1000 TESTANDRAIN** Provides Both The Test Function And The Express Drain Function For A Wet Fire Sprinkler System.
- ❑ The **Model 1000** Complies With All Requirements Of NFPA-13, NFPA-13R, And NFPA-13D.
- ❑ The **Model 1000 TESTANDRAIN** Is A Single Handle Ball Valve That Is Light Weight And Compact, Includes A Tamper Resistant Test Orifice, Integral Tamper Resistant Sight Glasses, And Is 300 PSI Rated.
- ❑ Available In A Full Range Of Sizes From 3/4" To 2" NPT & BSPT, With All Specifiable Orifice Sizes 3/8", 7/16", 1/2", 17/32", 5/8" (ELO), 3/4" (ESFR) and K.25.
- ❑ The Orifice Size Is Noted On The Indicator Plate And The Valve Is Tapped For A Pressure Gauge.
- ❑ The Standard **Model 1000 TESTANDRAIN** Valve Includes A Pressure Gauge Port Tapping And Can Be Ordered With A Relief Valve As A **Model 1011** Or **1011T**
- ❑ Locking Kit Available Which Provides Superior Vandal Resistance And Prevents Unintentional Alarm Activation.

Check Out Our New AutoCAD Site!
Visit us
on the Internet
at

www.testandrain.com

**HYDRAULIC CALCULATIONS
SUBMITTAL**

For

Harbor Freight Lake City

Lake City, Florida

WAFS PROJECT NO. 8531



Automatic Fire Sprinklers, Inc.

**CORPORATE OFFICE
222 CAPITOL COURT • OCOEE, FLORIDA 34761-3033
407-656-3030 • FAX: 407-656-8026**

EMERGENCY: 407-656-8946



Automatic Fire Sprinklers, Inc.



Hazard Fire Protection Engineering, Inc.

222 CAPITOL COURT OCDEE, FL 34761

PH: (407) 877-5578 FAX: (407) 856-8028

Certificate of Authorization Number 28038

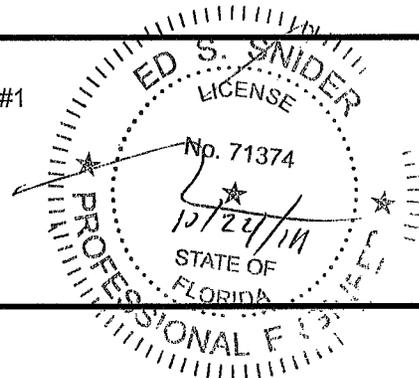
Robert J. Dawar, P.E. FL License No. 70937

Ed S. Snider, P.E. FL License No. 71374

Hydraulic Calculations

Wayne Automatic
Fire Sprinklers, Inc.
11326 Distribution Avenue West
Jacksonville, Fl. 32256-2745
904-268-3030

Job Name : HARBOR FREIGHT LAKE CITY DA #1
Sheet Number : FP 1
Location : 1824 US HIGHWAY 90
Design Area : DA #1
Contract : 8531
Data File : DA 1.WXF



Water Supply Curve C

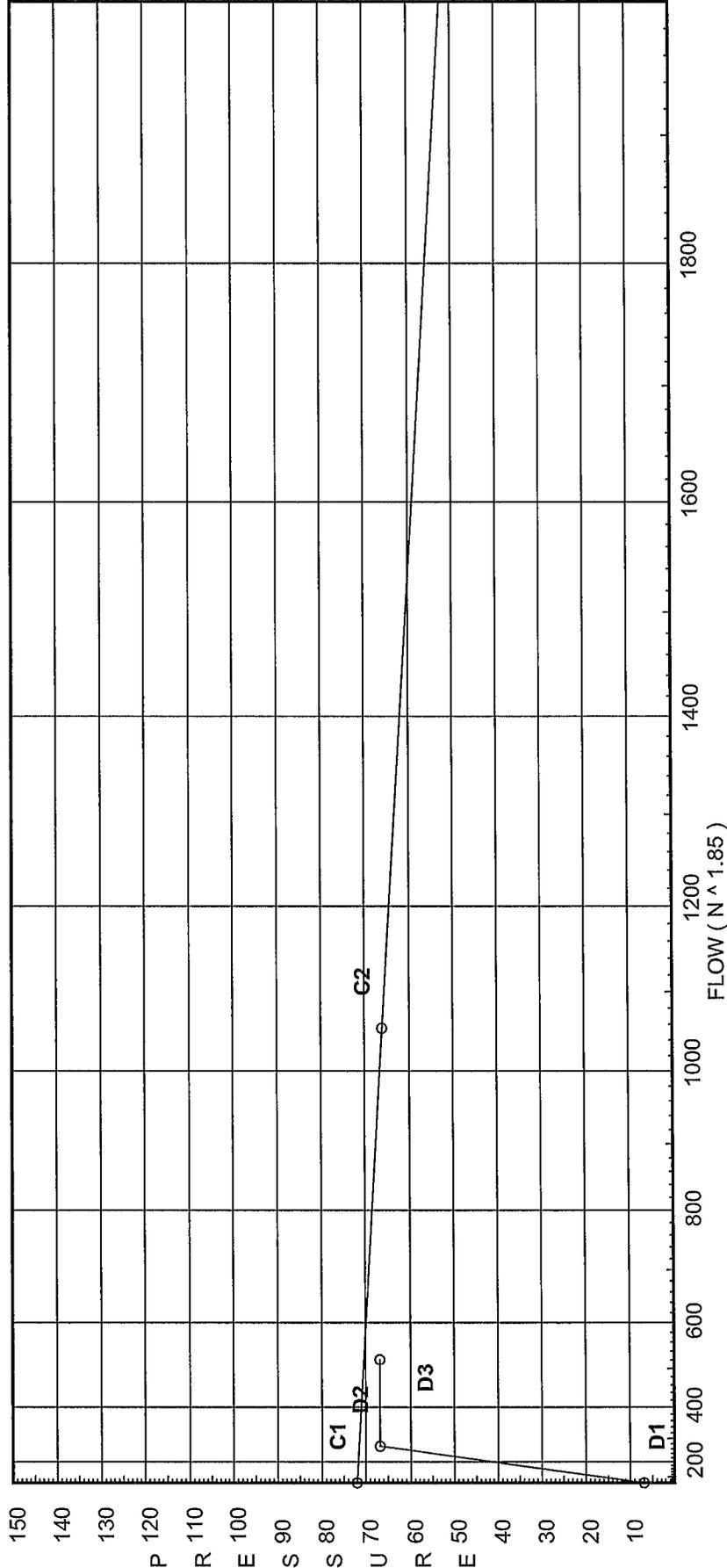
Wayne Automatic
 HARBOR FREIGHT LAKE CITY DA #1

City Water Supply:

C1 - Static Pressure : 72
 C2 - Residual Pressure: 66
 C2 - Residual Flow : 1055

Demand:

D1 - Elevation : 6.930
 D2 - System Flow : 270.825
 D2 - System Pressure : 66.775
 Hose (Demand) : 250
 D3 - System Demand : 520.825
 Safety Margin : 3.599



Pressure / Flow Summary - STANDARD

Wayne Automatic
HARBOR FREIGHT LAKE CITY DA #1

Page 4
Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
S10	18.0	5.6	19.93	na	25.0	0.2	125	7.0
M10	17.833		20.14	na				
S11	17.75	5.6	20.35	na	25.26	0.2	125	7.0
S12	17.583	5.6	21.53	na	25.99	0.2	125	7.0
S13	17.333	5.6	24.06	na	27.47	0.2	125	7.0
RN1	17.0		33.67	na				
S14	18.0	5.6	20.0	na	25.05	0.2	125	7.0
S15	17.75	5.6	20.42	na	25.3	0.2	125	7.0
S16	17.583	5.6	21.61	na	26.03	0.2	125	7.0
S17	17.333	5.6	24.14	na	27.52	0.2	125	7.0
RN2	17.0		33.78	na				
S18	17.583	5.6	31.57	na	31.46	0.2	125	7.0
S19	17.333	5.6	32.14	na	31.75	0.2	125	7.0
RN3	17.0		36.08	na				
RN11	14.667		37.72	na				
RN12	14.667		37.85	na				
RN13	14.667		38.3	na				
M1	14.667		43.42	na				
TOR	14.667		47.1	na				
BOR	1.0		55.36	na				
IBR	-3.0		57.28	na				
UC	-3.0		58.3	na	250.0			
U1	-3.0		58.48	na				
U2	-3.0		58.94	na				
BF1	-3.0		64.5	na				
BF2	-3.0		68.63	na				
U3	-3.0		68.86	na				
TEE	-3.0		68.87	na				
HYD	2.0		66.78	na				

The maximum velocity is 17.99 and it occurs in the pipe between nodes S17 and RN2

Final Calculations - Hazen-Williams

Wayne Automatic
HARBOR FREIGHT LAKE CITY DA #1

Page 6
Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	63.21					36.075			K Factor = 10.52	
RN3 to RN13	63.21	1.536 120.0 0.1709	J	4.8 0.0	2.333 4.800 7.133	36.075 1.010 1.219			Vel = 10.94	
	0.0 63.21					38.304			K Factor = 10.21	
RN11 to RN12	103.71	3.314 120.0 0.0101		0.0 0.0	12.500 0.0 12.500	37.722 0.0 0.126			Vel = 3.86	
RN12 to RN13	103.90	3.314 120.0 0.0365		0.0 0.0	12.500 0.0 12.500	37.848 0.0 0.456			Vel = 7.72	
RN13 to M1	63.21	3.314 120.0 0.0596	J	12.2 0.0	73.667 12.200 85.867	38.304 0.0 5.114			Vel = 10.07	
	0.0 270.82					43.418			K Factor = 41.10	
M1 to TOR	270.82	3.314 120.0 0.0596	J	12.2 0.0	49.667 12.200 61.867	43.418 0.0 3.686			Vel = 10.07	
	0.0 270.82					47.104			K Factor = 39.46	
TOR to BOR	270.82	3.314 120.0 0.0596	B Z	14.559 10.191 0.0	14.542 24.750 39.292	47.104 5.919 2.340			Vel = 10.07	
	0.0 270.82					55.363			K Factor = 36.40	
BOR to IBR	270.82	4.026 120.0 0.0231		0.0 0.0	8.000 0.0 8.000	55.363 1.732 0.185			Vel = 6.83	
IBR to UC	0.0	4.07 150.0 0.0145		0.0 0.0	70.000 0.0 70.000	57.280 0.0 1.015			Vel = 6.68	
UC to U1	250.01	5.86 150.0 0.0082	E	17.893 0.0	4.000 17.893 21.893	58.295 0.0 0.180			Qa = 250 Vel = 6.20	
U1 to U2	0.0	5.86 150.0 0.0082	S	40.899 0.0	15.000 40.899 55.899	58.475 0.0 0.461			Vel = 6.20	
U2 to BF1	0.0	5.86 150.0 0.0082	E 2G	17.893 7.668 0.0	650.000 25.561 675.561	58.936 0.0 5.562			Vel = 6.20	
BF1 to BF2	0.0	6.065 120.0 0.0105	3E Zic	42.0 0.0	14.000 42.000 56.000	64.498 3.543 0.589			** Fixed Loss = 3.543 Vel = 5.78	
BF2 to U3	0.0	5.86 150.0 0.0082	G	3.834 0.0	24.000 3.834 27.834	68.630 0.0 0.229			Vel = 6.20	

**MATERIAL SUBMITTAL
DATA**

For

Harbor Freight Lake City

Lake City, Florida

WAFS PROJECT NO. 8531



Automatic Fire Sprinklers, Inc.

**CORPORATE OFFICE
222 CAPITOL COURT • OCOEE, FLORIDA 34761-3033
407-656-3030 • FAX: 407-656-8026**

EMERGENCY: 407-656-8946

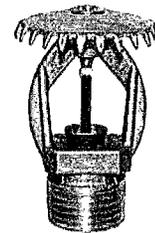


**QUICK RESPONSE
AUTOMATIC SPRINKLERS
GL SERIES
UPRIGHT • PENDENT
VERTICAL SIDEWALL
HORIZONTAL SIDEWALL
CONVENTIONAL (OLD STYLE)**

DESCRIPTION AND OPERATION

The Globe Quick Response GL Series Sprinklers are a low profile yet durable design which utilizes a 3mm frangible glass ampule as the thermosensitive element. This provides sprinkler operation approximately six times faster than ordinary sprinklers. While the Quick Response Sprinkler provides an aesthetically pleasing appearance, it can be installed wherever standard spray sprinklers are specified when allowed by the applicable standards. It offers the additional feature of greatly increased safety to life and is available in various styles, orifices, temperature ratings and finishes to meet many varying design requirements. Quick Response Sprinklers should be used advisedly and under the direction of approving authorities having jurisdiction.

The heart of Globe's GL Series sprinkler proven actuating assembly is a hermetically sealed frangible glass ampule that contains a precisely measured amount of fluid. When heat is absorbed, the liquid within the bulb expands increasing the internal pressure. At the prescribed temperature the internal pressure within the ampule exceeds the strength of the glass causing the glass to shatter. This results in water discharge which is distributed in an approved pattern depending upon the deflector style used.



**QUICK RESPONSE
UPRIGHT**



**QUICK RESPONSE
CONVENTIONAL**



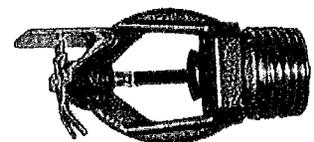
**QUICK RESPONSE
PENDENT**



**QUICK RESPONSE
VERTICAL
SIDEWALL**

TECHNICAL DATA

- See reverse side for Approvals and Specifications.
- Temperature Ratings - 135°F (57°C), 155°F (68°C), 175°F (79°C), 200°F (93°C), 286°F (141°C)
- Water Working Pressure Rating - 175 psi (12 Bars)
- Factory tested hydrostatically to 500 psi (34 Bars)
- Maximum low temperature glass bulb rating is -67°F (-55°C)
- Frame - bronze • Deflector - brass • Screw - brass
- Bulb seat - copper • Spring - nickel alloy • Seal - teflon
- Bulb - glass with alcohol based solution, 3mm size



**QUICK RESPONSE
HORIZONTAL SIDEWALL**

• SPRINKLER TEMPERATURE RATING/CLASSIFICATION and COLOR CODING

CLASSIFICATION	AVAILABLE SPRINKLER TEMPERATURES		BULB COLOR	N.F.P.A. MAXIMUM CEILING TEMPERATURE	
ORDINARY	135°F/57°C	155°F/68°C	ORANGE/RED	100°F/38°C	68°C
INTERMEDIATE	175°F/79°C	200°F/93°C	YELLOW/GREEN	150°F/66°C	66°C
HIGH	286°F/141°C		BLUE	225°F/107°C	107°C

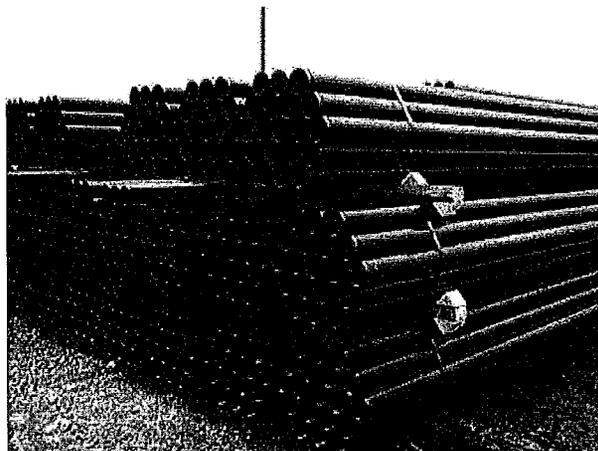


Wayne Automatic Fire Sprinklers (W.A.F.S.) utilizes “Flow” piping for sizes 1-1/4” through 4”. Some refer to it as Schedule 7. Per NFPA 13 section 6.3.6.1 it is permissible to use piping other than that provided in Table 6.3.1.1 provided it is listed. Piping will be sourced from domestic manufacturers. Piping will be manufactured in accordance with the following standard:

- **ASTM A795 - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.**

All piping will be UL listed & FM approved. Pipe will be from one of the following manufacturers:

- **Allied “Dyna-Flow”**
- **Bull moose Tube Company “Eddy Flow”**
- **Northwest Pipe Company “EZ-Flow”**
- **Welded Tube – Berkeley “Steady-Flow”**
- **Wheatland Tube Company “Mega-Flow”**
- **Youngstown Tube “Fire-Flo”**



GRINNELL G-FIRE Grooved Fittings, Ductile Iron

General Description

GRINNELL G-FIRE Grooved Fittings provide an economical and efficient method of changing direction, adding an outlet, reducing, or capping piping systems. The G-FIRE grooved fittings are available in ductile iron or fabricated steel as indicated.

Note: Figure 510S and 519S fittings are special short radius fittings with smaller center to end dimensions than standard grooved fittings. Depending on the size and coupling used, there may be interferences at the bolt pads that require repositioning of the coupling orientation. The use of flange adapters is not recommended with Figures 510S and 519S fittings. Contact Tyco Fire Protection Products for details.

NOTICE

Never remove any piping component nor correct or modify any piping deficiencies without first de-pressurizing and draining the system. Failure to do so may result in serious personal injury, property damage, and/or impaired device performance.

It is the designer's responsibility to select products suitable for the intended service and to ensure that pressure ratings and performance data are not exceeded. Material and gasket selection should be verified to be compatible for the specific application. Always read and understand the installation instructions.

The GRINNELL G-FIRE Grooved Fittings described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the approval agency, in addition to the standards of any other authorities having jurisdiction. Failure to do so may result in serious personal injury or impair the performance of these devices.

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

Technical Data

Approvals

UL, FM, ULC, VdS, and LPCB.

Material

Cast: Ductile iron conforming to ASTM A536, Grade 65-45-12

Protective Coatings

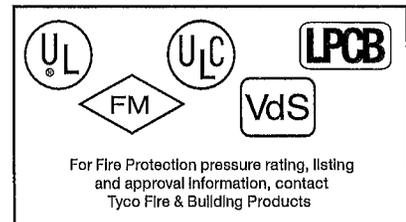
- Non-lead orange paint
- RAL red or non-lead paint
- Hot dipped galvanized conforming to ASTM A153

Care and Maintenance

The following inspection procedure must be performed as indicated, in addition to any specific requirements of the NFPA. Any impairments must be immediately corrected.

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 decision.

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 authority having jurisdiction. The installing contractor or



Full warranty terms
can be found on
www.grinnell.com

product manufacturer should be contacted relative to any questions.

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

After placing a fire protection system in service, notify the proper authorities and advise those responsible for monitoring proprietary and/or central station alarms.

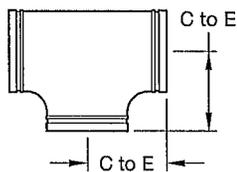


FIGURE 519
CAST TEE

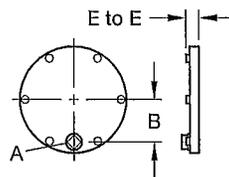


FIGURE 260
CAST END CAP

Nominal Pipe Size		Figure 519			Figure 260‡	
ANSI Inches DN	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight (Domestic) Lbs. (kg)	Approx. Weight (International) Lbs. (kg)	Nominal E to E Inches (mm)	Approx. Weight (Domestic) Lbs. (kg)
1 DN25	1.315 (33,4)	-	-	-	0.88 (22,4)	0.3 (0,1)
1-1/4 DN32	1.660 (42,4)	2.75 (69,9)	2.05 (0,93)	1.66 (0,73)	0.88 (22,4)	0.4 (0,2)
1-1/2 DN40	1.900 (48,3)	2.75 (69,9)	2.25 (1,56)	1.70 (0,77)	0.88 (22,4)	0.6 (0,3)
2 DN50	2.375 (60,3)	3.25 (82,6)	3.40 (1,54)	2.68 (1,22)	0.88 (22,4)	0.9 (0,4)
2-1/2 DN65	2.875 (73,0)	3.75 (95,3)	5.45 (2,47)	4.16 (1,89)	0.88 (22,4)	0.9 (0,4)
- DN65	3.000 (76,1)	3.75 (95,3)	5.55 (2,52)	4.22 (1,91)	0.94 (23,9)	1.1 (0,5)
3 DN80	3.500 (88,9)	4.25 (108,0)	8.00 (3,63)	5.95 (2,70)	0.88 (22,4)	1.1 (0,5)
4 DN100	4.500 (114,3)	5.00 (127,0)	9.32 (4,23)	9.32 (4,23)	1.00 (25,4)	2.6 (1,2)
- DN125	5.500 (139,7)	5.50 (139,7)	16.15 (7,72)	12.18 (5,52)	0.92 (23,4)	4.7 (2,1)
5 DN125	5.563 (141,3)	-	-	-	1.00 (25,4)	5.0 (2,3)
- DN150	6.500 (165,1)	6.50 (165,1)	25.25 (11,45)	12.89 (5,85)	1.00 (25,4)	7.5 (3,4)
6 DN150	6.625 (168,3)	6.50 (165,1)	26.90 (12,20)	19.61 (8,89)	1.00 (25,4)	7.5 (3,4)
8 DN200	8.625 (219,1)	7.75 (196,9)	45.35 (20,57)	30.61 (13.88)	1.19 (30,2)	12.8 (5,8)
10 DN250	10.750 (273,0)	-	-	-	1.25 (31,8)	20.0 (9,1)
12 DN300	12.750 (323,9)	-	-	-	1.25 (31,8)	36.0 (16,3)

‡ - Available with tapped plugs Contact Tyco Fire Protection Products

FIGURE 2
NOMINAL DIMENSIONS FIGURES 519 AND 260

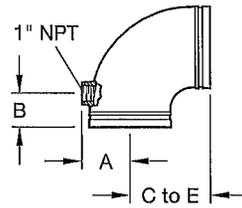


FIGURE 510DE
90° DRAIN ELBOW

Nominal Pipe Size		Figure 510DE 90° Drain Elbow			
ANSI Inches DN	O.D. Inches (mm)	Nominal C to E Inches (mm)	Nominal A Lbs. (kg)	Nominal B Inches (mm)	Approx. Weight Lbs. (kg)
2 DN50	2.375 (60,3)	3.75 (95,3)	2.00 (50,8)	2.75 (69,9)	2.7 (1,2)
2-1/2 DN65	2.875 (73,0)	3.75 (95,3)	2.00 (50,8)	2.75 (69,9)	3.8 (1,7)
3 DN80	3.500 (88,9)	4.25 (108,0)	2.34 (59,4)	2.75 (69,9)	5.8 (1,7)
4 DN100	4.500 (114,3)	5.00 (127,0)	2.85 (72,4)	2.75 (69,9)	8.0 (3,6)
6 DN150	6.625 (168,3)	6.50 (165,1)	3.92 (99,6)	2.75 (69,9)	17.6 (8,0)
8 DN200	8.625 (219,1)	7.75 (196,9)	4.95 (125,7)	2.75 (69,9)	30.4 (13,8)

FIGURE 4
NOMINAL DIMENSIONS FIGURES 510DE

Friction Resistance					
Nominal Pipe Size		Elbows 90° Feet (m)	Elbows 45° Feet (m)	Tee* Branch Feet (m)	Tee Run Feet (m)
ANSI Inches DN	O.D. Inches (mm)				
1-1/4 DN32	1.660 (42,4)	1.9 (0,6)	1.0 (0,3)	4.8 (1,5)	1.9 (0,6)
1-1/2 DN40	1.900 (48,3)	2.3 (0,7)	1.2 (0,4)	5.8 (1,8)	2.3 (0,7)
2 DN50	2.375 (60,3)	3.2 (1,0)	1.6 (0,5)	8.0 (2,5)	3.2 (1,0)
2-1/2 DN65	2.875 (73,0)	3.9 (1,2)	2.0 (0,6)	9.8 (3,0)	3.9 (1,2)
- DN65	3.000 (76,1)	4.1 (1,2)	2.1 (0,6)	10.3 (3,1)	4.1 (1,2)
3 DN80	3.500 (88,9)	4.9 (1,5)	2.4 (0,7)	12.2 (3,7)	4.9 (1,5)
4 DN100	4.500 (114,3)	6.5 (2,0)	3.3 (1,0)	16.3 (5,0)	6.5 (2,0)
- DN125	5.500 (139,7)	8.0 (2,4)	4.1 (1,3)	20.0 (6,1)	8.0 (2,4)
5 DN125	5.563 (141,3)	8.2 (2,5)	4.1 (1,3)	20.5 (6,3)	8.2 (2,5)
- DN150	6.500 (165,1)	9.5 (2,9)	4.8 (1,4)	23.8 (7,2)	9.5 (2,9)
6 DN150	6.625 (168,3)	9.9 (3,0)	5.0 (1,5)	24.8 (7,6)	9.9 (3,0)
8 DN200	8.625 (219,1)	13.1 (4,0)	6.6 (2,0)	32.8 (10,0)	13.1 (4,0)
10 DN250	10.750 (273,0)	16.5 (5,0)	8.3 (2,5)	41.3 (12,6)	16.5 (5,0)
12 DN300	12.750 (323,9)	19.9 (6,1)	9.9 (3,0)	49.7 (15,1)	19.9 (6,1)

*For the reducing tee branches, use the value that is corresponding to the branch size
 Example
 For 8" x 8" x 2" tee, the branch value of 2" is 8.0 feet
 For sizes not listed interpolate from the values shown

TABLE A
FRICION RESISTANCE FOR
FIGURES 501, 510, 510DE AND 519
(EXPRESSED AS EQUIVALENT STRAIGHT PIPE)

Ordering Procedure

GRINNELL Products are available globally through a network of distribution centers. For the nearest distributor, visit www.grinnell.com. When placing an order, indicate the full product name.

Please specify the quantity, figure number, wall thickness, and size.



THREADED FITTINGS

Wayne Automatic Fire Sprinklers (W.A.F.S.) utilizes black cast iron, ductile iron and/or malleable iron threaded fittings. Fittings are not required to be listed if they conform to NFPA 13 Table 6.4.1 Fittings Materials and Dimensions. Many will be UL Listed or FM Approved. Fittings will be from various manufacturers including but not limited to: Anvil, ProValue, Shurjoint, Sigma, Smith Cooper, Tyco and Ward. Fittings will be manufactured in accordance with the following standards per NFPA 13 Table 6.4.1.

- **ASME B16.3 – Malleable iron threaded fittings, Class 150 and 300 steel.**
- **ASME B16.4 – Cast iron threaded fittings, Class 125 and 250**

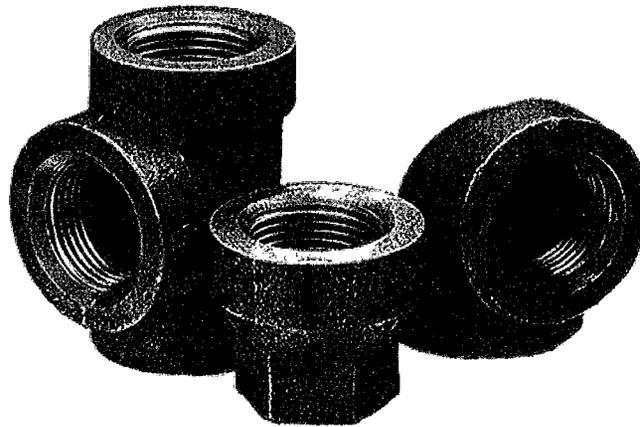


Fig. 142

Coach Screw Rods Machine Threaded on Opposite End

Size Range: 3/8" and 1/2"

Material: Carbon steel

Finish: Plain

Ordering: Specify rod size, figure number, name and rod length.

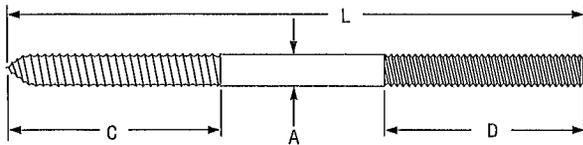


Fig. 142: Standard Thread Lengths(in) • Loads (lbs)

Rod Size A	Standard Length - L	Coach Screw Thread Length - C	Standard Rod Thread Length - D	Max Load
3/8	3 1/2	2	3/4	390
	8		2 1/2	
1/2	3 1/2	2 7/16	3/4	640
	8		2 1/2	

Fig. 146

Continuous Threaded Rod

Size Range: 1/4" through 1 1/2" Stocked in six, ten, and twelve foot lengths Other even foot lengths can be furnished to order

Material: Carbon steel; rod threaded complete length

Finish: Plain or galvanized.

Maximum Temperature: 650° F

Ordering: Specify rod diameter and length, figure number, name and finish

Note: The acceptability of galvanized coatings at temperatures above 450° F is at the discretion of the end user

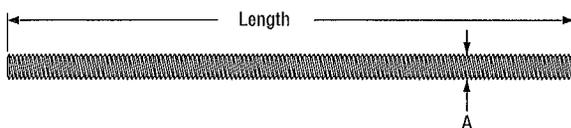
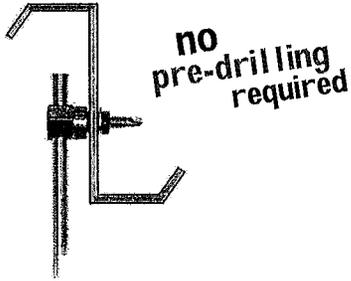


Fig. 146: Loads (lbs) • Weights (lbs) Dimensions (in)

Rod Size A	Threads per Inch	Max Load	Weight per Ft.
		650° F	
1/4	20	240	0.12
3/8	16	730	0.30
1/2	13	1,350	0.53
5/8	11	2,160	0.84
3/4	10	3,230	1.20
7/8	9	4,480	1.70
1	8	5,900	2.30
1 1/4	7	9,500	3.60
1 1/2	6	13,800	5.10

Note Other rod sizes available upon request
Class 2 fit is available upon request

SIDEWINDERS® for Steel Installs HORIZONTALLY into the side of steel structures easily and quickly!



Product Features

- Made with TekS® self-drilling fasteners - no pre-drilling required
- Install into steel range from 22 gauge – 1/2" thicknesses
- Saves time from traditional methods
- Reduces installation cost.
- Quick to install using the Sammy Nut Driver with an 18V cordless drill/driver



#14 SW Red Nut Driver
Part # 8114910

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	FM Test Load (lbs)	Min Thickness	Max Thickness	Box Qty	Case Qty
	1/4"	8047957	SWD 100	1/4-14 x 1" TEKS 3	1477 (16 ga.)			060"-16 ga	3/16"	25	125
	1/4"	8049957	SWDR 100 *	1/4-20 x 1 TEKS 3	1900 (20 ga.)			036"-20 ga	3/16"	25	125
	3/8"	8050957	SWD 10	1/4-14 x 1" TEKS 3	1477 (16 ga.)			060"-16 ga	3/16"	25	125
	3/8"	8080925	SWD 10-SS	1/4-14 x 1 TEKS 3	1477 (16 ga.)			060"-16 ga	3/16"	25	125
	3/8"	8051957	SWD 15	1/4-14 x 1-1/2" TEKS 3	1477 (16 ga.)			060"-16 ga	3/16"	25	125
	3/8"	8081925	SWD 15-SS	1/4-14 x 1-1/2" TEKS 3	1477 (16 ga.)			060"-16 ga	3/16"	25	125
	3/8"	8052957	SWD 20	1/4-14 x 2" TEKS 3	1477 (16 ga.)			060"-16 ga	3/16"	25	125
	3/8"	8053957	SWD 516	5/16-18 x 1-1/4" TEKS 3	2480 (20 ga.)			036"-20 ga	1/8"	25	125
	3/8"	8055957	SWDR 1 *	1/4-20 x 1" TEKS 3	1900 (20 ga.)	1500	1475	036"-20 ga	3/16"	25	125
	3/8"	8054957	SWDR 1-1/2 *	12-24 x 1-1/2" TEKS 5	2375 (3/16")	1500	1475	187"-3/16"	1/2"	25	125
	3/8"	8056957	SWDR 516 *	5/16-18 x 1-1/4" TEKS 3	2480 (20 ga.)	1500	1475	036"-20 ga	1/8"	25	125
	3/8"	8057957	SWT 15	12-24 x 1 1/2" TEKS 5	237 (3/16")			187"-3/16"	1/2"	25	125

*Includes retaining nut

Performance Data - Steel

Sheet Steel Gauges											
Gauge No.	26	24	22	20	18	16	14	12	3/16"	1/4"	
Nominal Decimal Equivalent	018	024	030	036	048	060	075	105	188	250	

Ultimate Pullout Values (avg. lbs. ultimate) - SAMMYS									
Fastener			Steel Gauge (lbs.)						
Model	Dia	Pt.	20	18	16	14	12	3/16	1/4
DST	1/4	#3	446	613	970	1145	1544	3190	
DST 516	5/16	#3	457	568	1209	1712	2422		
TEK 50	#12	#5		487	699	913	1527	3270	3593
DSTR 1-1/2"	#12	#5						3270	3593
DSTR 1"	1/4	#3	1510						
DSTR 516	5/16	#3	2200						

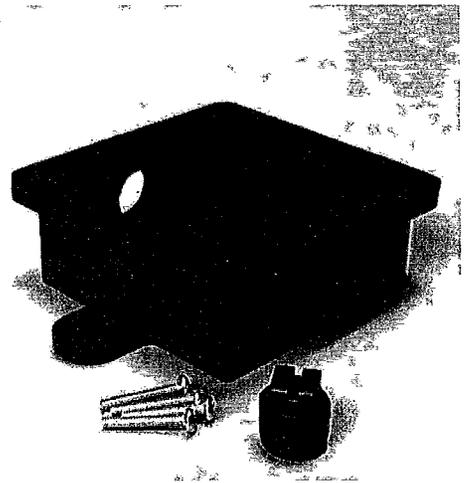
Aluminum Curtain Wall Extrusion						
Ultimate Pullout Values (average lbs. ultimate)						
Fastener			Thickness			
Model	Dia	Pt.	.114	.092	.365	.132
DST 10	1/4	#3	1265		2750	
SWD 10	1/4	#3		1120		1420

Ultimate Pullout Values (avg. lbs. ultimate) - SIDEWINDERS									
Fastener			Steel Gauge (lbs.)						
Model	Dia	Pt.	20	18	16	14	12	3/16	1/4
SWD	1/4	#3			1477				
SWDR 1-1/2"	#12	#5	2375						
SWDR 1"	1/4	#3	1900			1900			
SWDR 516	5/16	#3	2480			2480			

SPECIAL NUT DRIVER SYSTEM. The nut drivers were designed with a unique spin-off feature which provides a fast and safe installation each time. When the face of the driver comes into contact with the material you are installing into continue drilling until nut driver spins free. Installation is then complete. Warranty requires the use of the appropriate nut driver for installations.

SPECIAL STEEL FASTENERS

Back Box (patent pend) for Fire Alarm Bell, ABS



Description

FPPI's Back Box for Fire Alarm Bells is made from high impact ABS thermoplastic. ABS is known for its strength and rigidity and has superior electrical insulation properties as compared to PVC, Styrene or other plastics. ABS can also be used in a wide range of temperatures from -13 °F (-25° C) and 140 °F (60°). ABS is resistant to the elements that would normally cause corrosion in a similar back box made from cast aluminum with a painted finish. The back box design includes two tabs for easy surface mounting with two 1/2" NPT threaded inlets/outlets for through wiring. Each back box is supplied with four screws for mounting a compatible bell and an extra 1/2" NPT plug for plugging an unused NPT inlet or outlet.

Installation

Install in accordance with usual and customary installation techniques for electrical apparatus. The ABS back box can be attached to most flat even surfaces in either horizontal or vertical positioning. Mounting to an uneven surface may cause the back box to become deformed, compromise weather resistance and prevent proper installation of the alarm bell. In order to maintain its' weather resistant properties install the supplied 1/2" NPT plug when not "through" wiring the bell to another appliance. Prolonged exposure to direct sunlight may cause the surface of the backbox to appear slightly discolored. This appearance does not change the performance characteristics of the product. Do not mount any electrical appliance in areas that are expected to be exposed to direct streams of water or directly exposed to inclement weather. The back box weather resistant prop-

erties are dependent on all installed components (NPT plugs, conduit connections, alarm bells, etc) being installed in a weather resistant fashion and having weather resistant properties of their own. When installed correctly, the final assembly of all components should provide a reasonable amount of resistance to moisture.

Maintenance

No regular maintenance is required. As with all fire sprinkler system components, regularly inspect the back box for damage to insure expected performance.

Related Products

- 6" Alarm Bell
- 10" Alarm Bell
- Alarm Bell Cage (Guard)
- Alarm Bell Signs

Specifications

Materials

Acrylonitrile butadiene styrene (ABS)

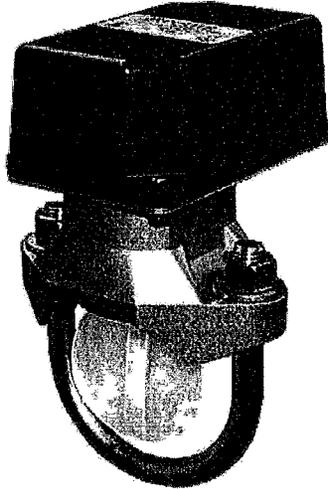
Sizes:

4" Back box with two 1/2" NPT threaded outlets/inlets. Includes for bell mounting screws and one 1/2" NPT plug.

Color:

Dark Gray





Specifications subject to change without notice.

Ordering Information			
Nominal Pipe Size		Model	Part Number
2"	DN50	VSR-2	1144402
2 1/2"	DN65	VSR-2 1/2	1144425
3"	DN80	VSR-3	1144403
3 1/2"	-	VSR-3 1/2	1144435
4"	DN100	VSR-4	1144404
5"	-	VSR-5	1144405
6"	DN150	VSR-6	1144406
8"	DN200	VSR-8	1144408

Optional: Cover Tamper Switch Kit, stock no 0090148

Replaceable Components: Retard/Switch Assembly, stock no 1029030

UL, CUL and CSFM Listed, FM Approved, LPCB Approved, For CE Marked (EN12259-5) / VdS Approved model use VSR-EU

Service Pressure: 450 PSI (31 BAR) - UL

Flow Sensitivity Range for Signal:

4-10 GPM (15-38 LPM) - UL

Maximum Surge: 18 FPS (5.5 m/s)

Contact Ratings: Two sets of SPDT (Form C)

10.0 Amps at 125/250VAC

2.0 Amps at 30VDC Resistive

10 mAmps min. at 24VDC

Conduit Entrances: Two knockouts provided for 1/2" conduit. Individual switch compartments suitable for dissimilar voltages.

Environmental Specifications:

- NEMA 4/IP54 Rated Enclosure suitable for indoor or outdoor use with factory installed gasket and die-cast housing when used with appropriate conduit fitting.
- Temperature Range: 40°F - 120°F, (4.5°C - 49°C) - UL
- Non-corrosive sleeve factory installed in saddle

Service Use:

Automatic Sprinkler

NFPA-13

One or two family dwelling

NFPA-13D

Residential occupancy up to four stories

NFPA-13R

National Fire Alarm Code

NFPA-72

WARNING

- Installation must be performed by qualified personnel and in accordance with all national and local codes and ordinances.
- Shock hazard. Disconnect power source before servicing. Serious injury or death could result.
- Risk of explosion. Not for use in hazardous locations. Serious injury or death could result.

CAUTION

Waterflow switches that are monitoring wet pipe sprinkler systems shall not be used as the sole initiating device to discharge AFFF, deluge, or chemical suppression systems. Waterflow switches used for this application may result in unintended discharges caused by surges, trapped air, or short retard times.

General Information

The Model VSR is a vane type waterflow switch for use on wet sprinkler systems. It is UL Listed and FM Approved for use on steel pipe; schedules 10 through 40, sizes 2" thru 8" (50 mm thru 200 mm). LPC approved sizes are 2" thru 8" (50 mm thru 200 mm). See Ordering Information chart.

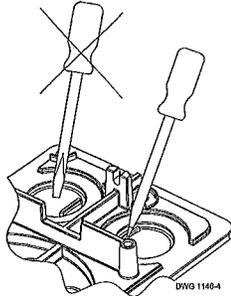
The VSR may also be used as a sectional waterflow detector on large systems. The VSR contains two single pole, double throw, snap action switches and an adjustable, instantly recycling pneumatic retard. The switches are actuated when a flow of 10 GPM (38 LPM) or more occurs downstream of the device. The flow condition must exist for a period of time necessary to overcome the selected retard period.

Enclosure

The VSR switches and retard device are enclosed in a general purpose, die-cast housing. The cover is held in place with two tamper resistant screws which require a special key for removal. A field installable cover tamper switch is available as an option which may be used to indicate unauthorized removal of the cover. See bulletin number 5401103 for installation instructions of this switch.

Fig. 2

To remove knockouts Place screwdriver at inside edge of knockouts, not in the center.



NOTICE

Do not drill into the base as this creates metal shavings which can create electrical hazards and damage the device Drilling voids the warranty

Fig. 3

Break out thin section of cover when wiring both switches from one conduit entrance.

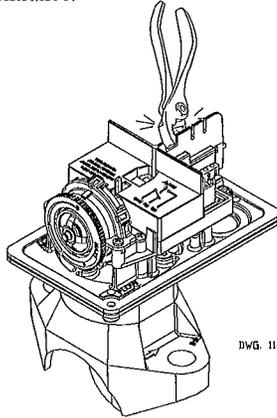
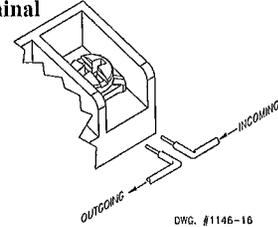


Fig. 4 Switch Terminal Connections Clamping Plate Terminal



WARNING

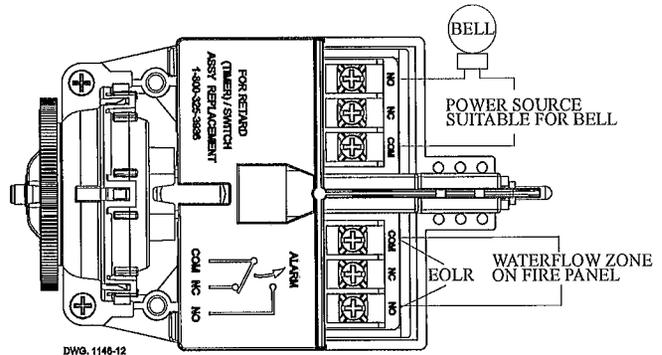
An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections The wire must be severed, thereby providing supervision of the connection in the event that the wire become dislodged from under the terminal Failure to sever the wire may render the device inoperable risking severe property damage and loss of life.

Do not strip wire beyond 3/8" of length or expose an uninsulated conductor beyond the edge of the terminal block When using stranded wire, capture all strands under the clamping plate.

Fig. 5 Typical Electrical Connections

Notes:

- 1 The Model VSR has two switches, one can be used to operate a central station, proprietary or remote signaling unit, while the other contact is used to operate a local audible or visual annunciator
- 2 A condition of LPC Approval of this product is that the electrical entry must be sealed to exclude moisture
- 3 For supervised circuits, see "Switch Terminal Connections" drawing and warning note (Fig 4)



Testing

The frequency of inspection and testing for the Model VSR and its associated protective monitoring system shall be in accordance with applicable NFPA Codes and Standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently)

If provided, the inspector's test valve shall always be used for test purposes If there are no provisions for testing the operation of the flow detection device on the system, application of the VSR is not recommended or advisable

A minimum flow of 10 GPM (38 LPM) is required to activate this device.

NOTICE

Advise the person responsible for testing of the fire protection system that this system must be tested in accordance with the testing instructions.

Fig. 7 Mounting Dimensions

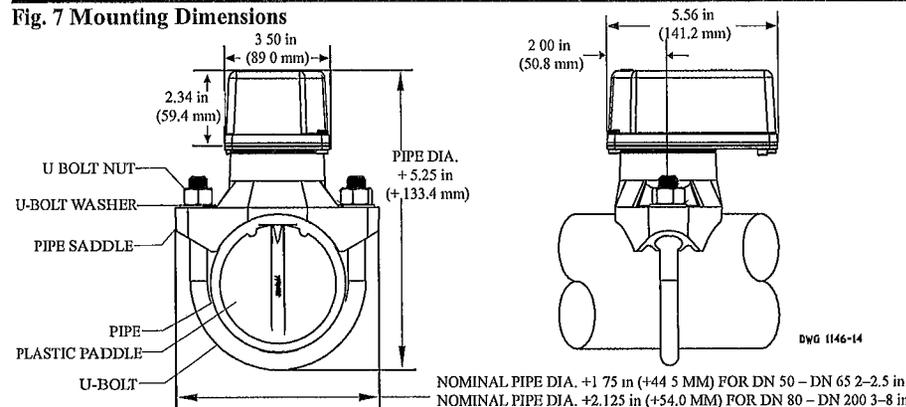
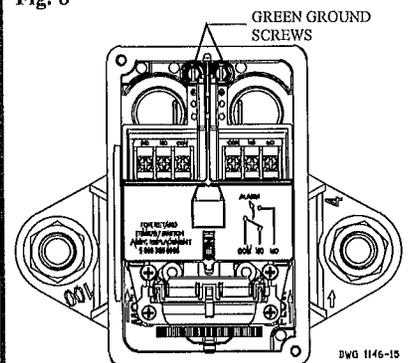


Fig. 8





MODEL 1000

UL
ULC **TESTANDRAIN**® FM

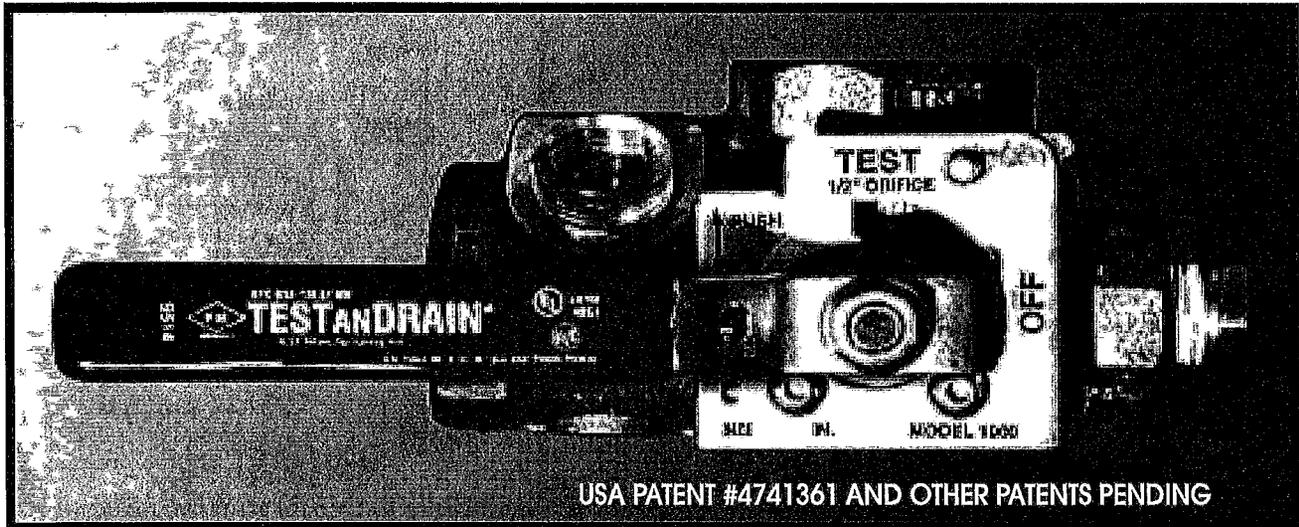
3/4"

1"

1 1/4"

1 1/2"

2"



- ❑ The AGF Manufacturing Inc. **Model 1000 TESTANDRAIN** Provides Both The Test Function And The Express Drain Function For A Wet Fire Sprinkler System.
- ❑ The **Model 1000** Complies With All Requirements Of NFPA-13, NFPA-13R, And NFPA-13D.
- ❑ The **Model 1000 TESTANDRAIN** Is A Single Handle Ball Valve That Is Light Weight And Compact, Includes A Tamper Resistant Test Orifice, Integral Tamper Resistant Sight Glasses, And Is 300 PSI Rated.
- ❑ Available In A Full Range Of Sizes From 3/4" To 2" NPT & BSPT, With All Specifiable Orifice Sizes 3/8", 7/16", 1/2", 17/32", 5/8" (ELO), 3/4" (ESFR) and K.25.
- ❑ The Orifice Size Is Noted On The Indicator Plate And The Valve Is Tapped For A Pressure Gauge.
- ❑ The Standard **Model 1000 TESTANDRAIN** Valve Includes A Pressure Gauge Port Tapping And Can Be Ordered With A Relief Valve As A **Model 1011** Or **1011T**
- ❑ Locking Kit Available Which Provides Superior Vandal Resistance And Prevents Unintentional Alarm Activation.

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