City of Aurora
Building Codes Division
15151 E Alameda Pkwy
Aurora, CO 80012
(303) 739-7420

Notice

This material is subject to copyright protection pursuant to Federal Law: 17 United States Code Section 106.

Building Permit Application

Permit Center - 15151 E Alameda Pkwy ❖ Ste 2400 ❖ Aurora, CO 80012 ❖ (303)739-7420
Email buildingplans@auroragov.org

Project Address: 1444 SOUTH POTOMAC STREET Unit # 110 Zip code: 80012
Project Name: MEDICAL CENTER OF AURORA - IMAGING CENTER
Contractor Company Name: FRONTIER FIRE PROTECTION Phone: 303-629-0221 Fax: 303-623-7830
Contact Person: TRACY SKINNER Phone: 303-629-0221
Email: TSKINNER@FRONTIERFIREPROTECTION.COM Fax: 303-623-7830
Architect and/or Engineer Contact information for correction items:
Architect or Engineer Name: TRACY SKINNER Email: TSKINNER@FRONTIERFIREPROTECTION.COM
Phone #: 303-629-0221 Fax #: 303-623-7830
Owner:(Required for Certificate of Occupancy) only:
Owner address:
Email:
Valuation / FDA$ $ 5,389 ⁰⁰ **Materials cost $** $ 986 ⁰⁰

FDA = Fee Determination Assessment. (Also known as the value of project. The Fee Determination Assessment, FDA has no relationship to the construction costs for the building which can vary greatly. Rather, the Assessment is used only to determine the appropriate level of fees to fund our code compliance activities.

Describe the work you will be doing: Imaging Center
ADD PENDENT FIRE SPRINKLER HEADS OFF EXISTING SYSTEM
CONVERT UPRIGHTS TO PEND FOR TENANT FINISH

I declare under penalty that this application has been examined by me; and that the statements made herein are made in good faith pursuant to City of Aurora tax and licensing regulations; and to the best of my knowledge and belief are true, correct and complete.

Print Name: TRACY SKINNER **Signature:** [signature] **Date:** 3-6-13

BOARD OF APPEALS - Contractor's Appeals and Standards Board. Applicants have the right to have the board hear appeals of orders, decisions or determinations made by the building official relative to the application and interpretation of the building code. Any application for appeal to the board shall be based on a claim that the true intent of the code or the rules legally adopted there under have been incorrectly interpreted, the provisions of the building code do not fully apply or an equally good or better form of construction is proposed.

Sprinkler & Alarm permits are separate submittals, and the value is NOT included on main permit.

◆◆◆◆ **THIS SPACE FOR OFFICE USE ONLY** ◆◆◆◆

Change of occupancy/use: ☐ Yes ☐ No

FDA: 5389

Reviews		Inspections	
☐	Structural	☐	Structural
☐	Mechanical	☐	Mechanical
☐	Plumbing	☐	Plumbing
☐	Electrical	☐	Electrical
☒	Fire Life Safety	☒	Life Safety
☐	Bldg Life Safety	☐	Gate/Haz.

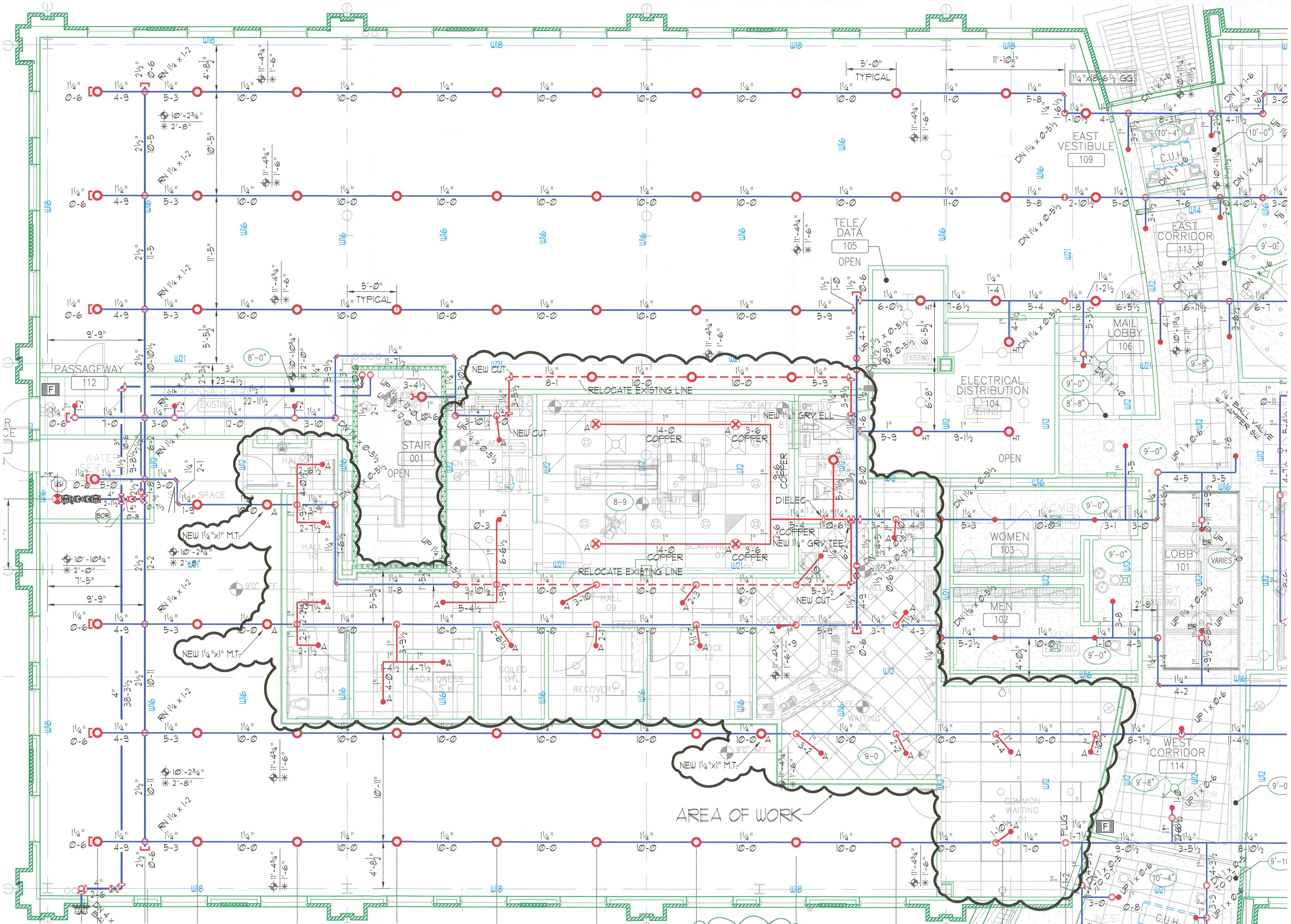
Intake Date: 3/6/13 PE Initial JM

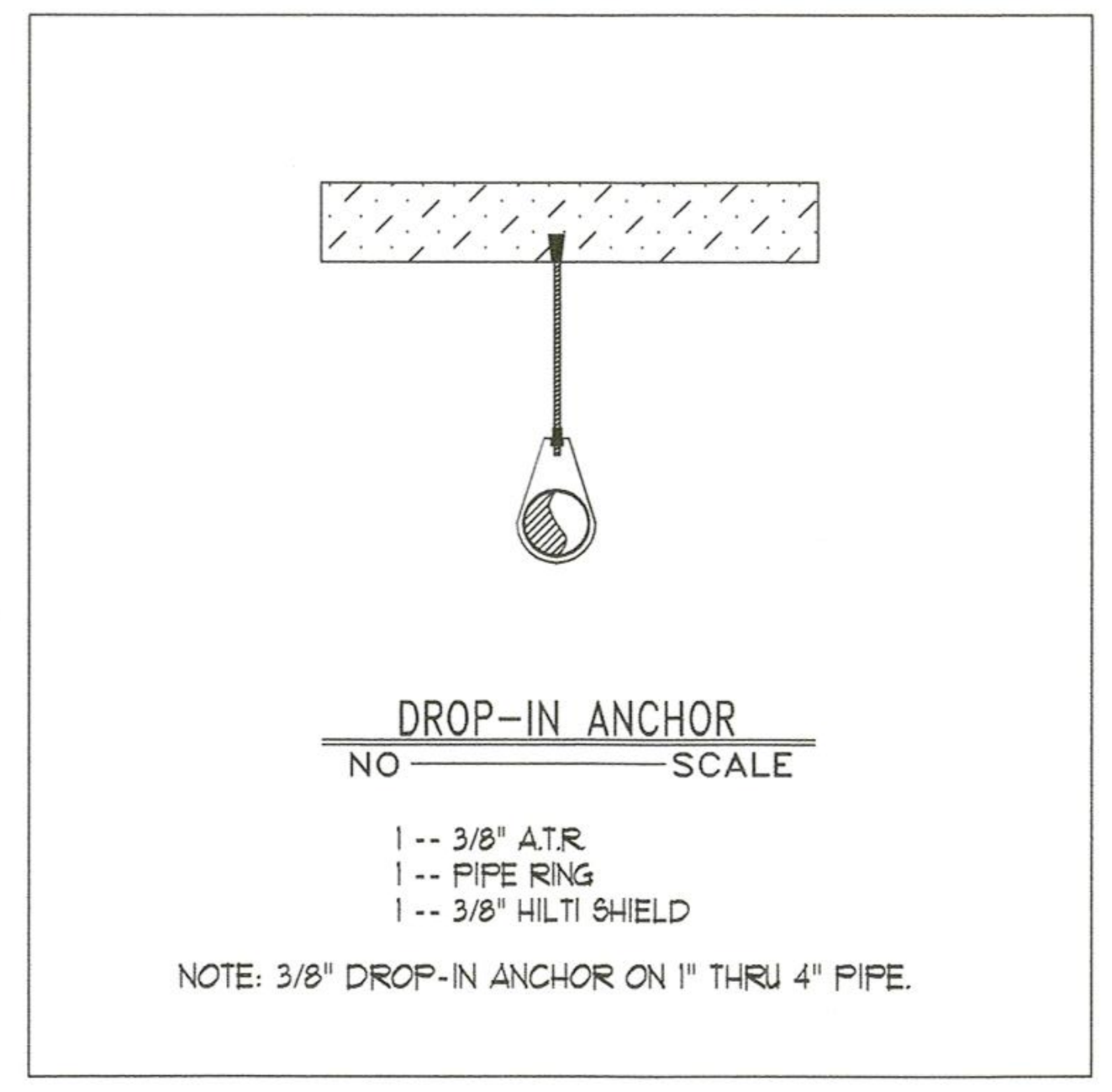
Balance Due: $

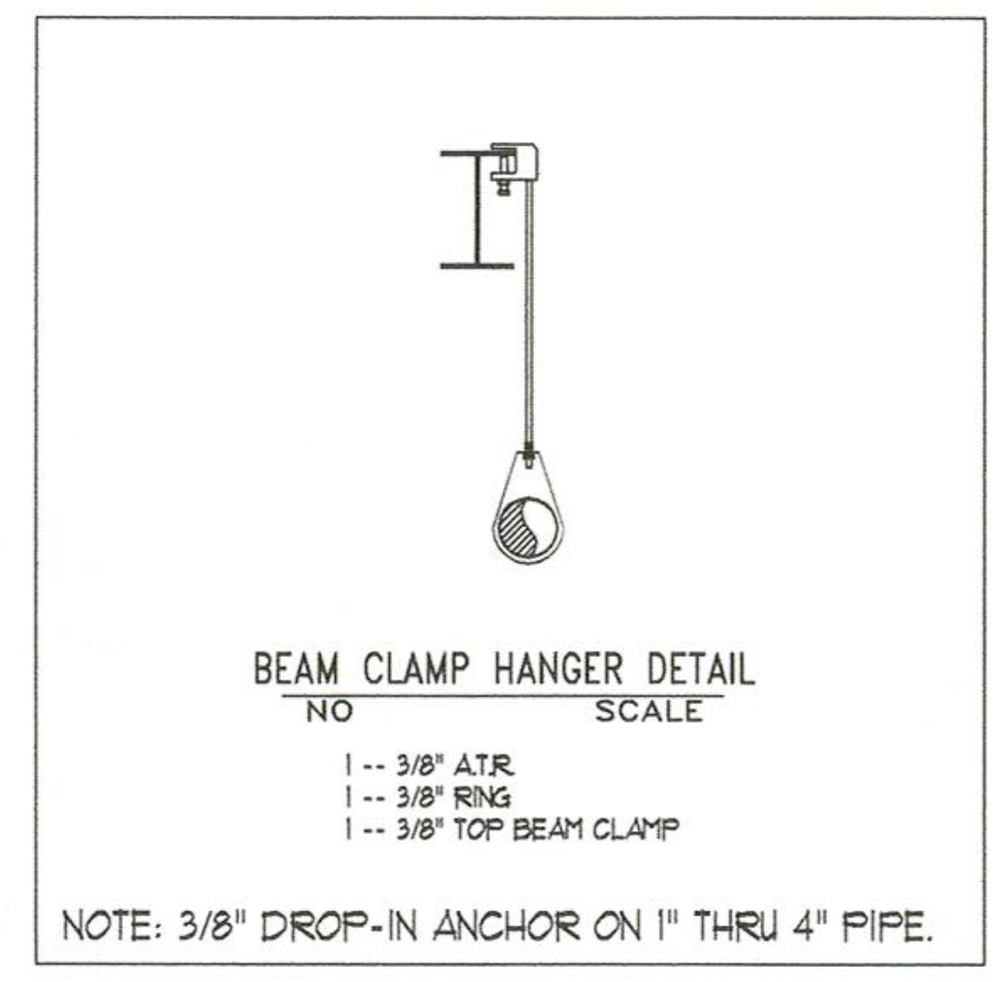
Pre-approval(s): Zoning: ☒ Initials CT
Water: ☐
Exterior changes? ☐ Yes ☒ No CT
Homeowner Verified ☐ Yes N/A
Permit Type LT
Mid roof /Avg. bldg height N/A
Parent Permit RSN 686483
Plans Examiner JM
Sub Type 4X Fire Sprinkler
RSN: 2013-647594 703956

Plans Picked up by
Company Nam
Phone #

See reverse side for Fence/sign/Public Improvements application







GENERAL NOTES

1. SCOPE OF WORK:
   MODIFY EXISTING SYSTEM FOR NEW TENANT.
   REMOVE STEEL PIPE WITHIN NEW MRI CHAMBER AND PROVIDE NON-FERROUS MATERIALS.
2. EXISTING SPRINKLER SYSTEM DESIGN, PER 2002 NFPA 13:
   - LIGHT HAZARD - OFFICE, CORRIDOR, RESTROOMS, PATIENT ROOMS AND SIMILAR
   - ORDINARY HAZARD GROUP 1 - JANITORIAL, ELECTRICAL, STORAGE AND SIMILAR MAXIMUM STORAGE HEIGHT IS 8'-0"
   - SMALL ROOM RULE HAS BEEN UTILIZED PER 2010 NFPA 13-3.3.17
   - REMOTE AREA REDUCTION HAS BEEN UTILIZED PER NFPA 13
3. WET SYSTEM THREADED PIPING, SIZES 1" - 1¼":
   SCH 40 BLACK PIPE WITH BLACK D.I. FITTINGS.
4. WET SYSTEM WELDED PIPING, SIZES 1¼":
   SCH 10 BLACK PIPE WITH WELDED OUTLETS AND/OR MECHANICAL TEES WITH FACTORY PAINTED GROOVED FITTINGS.
5. PIPE HANGERS PER 2010 NFPA 13 - WATER PRESSURE DOES NOT EXCEED 100 PSI.
6. SEAL PIPE PENETRATIONS THROUGH FIRE RATED WALLS WITH HILTI FS-ONE FIRE STOP.
7. CENTER PENDENT HEADS AT QUARTER POINT OF CEILING TILE.
8. CDPHE DISCHARGE PERMIT #COG604165.
9. EXISTING PIPE / NEW PIPE / RELOCATED PIPE

City of Aurora Building Division
Project: IMAGING CENTER
Address: 1444 S POTOMAC UNIT 110
Occupancy Group: B
Construction Type: IIB SPK
RSN: 703956
Permit: 13 647594

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: Jean Pardue
Date: Mar 25, 2013
2009 INTERNATIONAL CODES & 2011 NEC

PARTIAL 1ST FLOOR FIRE SPRINKLER PLAN
1/4"=1'-0"

N

Code violations found in the field will be required to be corrected

Changes to the underlying Tenant plans that cause changes to the sprinkler design will require Revised plan to be submitted for Review

CITY OF AURORA
BUILDING DIVISION
APPROVED AS NOTED *JMP*
DATE *3/25/13*
NFPA 13('07)

PERMIT # *13 647594*
RSN # *703956*
OCCUPANCY TYPE *B*
CONST. TYPE *IIB SPK*
SQUARE FOOT
CODES REV'D *NFPA 13('07) IFC 2009*

TRACY ALLEN SKINNER
CERTIFIED ENGINEERING TECHNICIAN
WATER-BASED FIRE PROTECTION SYSTEMS LAYOUT
NICET #37029 - LEVEL III
3-6-13

PARTIAL 1ST FLOOR FIRE SPRINKLER PLAN

FIRE PROTECTION ENGINEERS AND CONTRACTORS
PHONE: (303) 629-0221 FAX: (303) 623-7830
2617 West Holden Place, Denver, Colorado 80204
FRONTIER FIRE PROTECTION, INC.
STATE REGISTRATION NO. 006

Fire Sprinkler Plan Symbols	
Symbol	Description
○	Hydraulic Reference Points
✳ X-X	Elev. Below Top of Steel
⊕ X-X	Elev. Above Finished Floor
(TOS 20-10)	Elev. of Top of Steel
(8-6)	Ceiling Height
—/—	Denotes Hanger Location
O RN 1"x 6-0	Rise up or down
— —o— —	Existing pipe and outlet
— —o'R— —	New Head Location

Number of Sprinklers — Total This Sheet 31 — Total This Job 31

Symbol	Degree	Description	K-Fact.	Thread	Quantity
●	165	VIKING MODEL B-2 QR CONC. PEND. w/ OFF-WHITE PLATE	5.6	½"	EXIST
○	155	GLOBE MODEL GLQR BRASS UPRIGHT (w/o SPRIG-UP)	5.6	½"	EXIST
⭘	155	GLOBE MODEL GLQR BRASS UPRIGHT (ON 1" SPRIG-UP)	5.6	½"	EXIST
⭘ HT	286	GLOBE MODEL GLQR BRASS UPRIGHT (ON 1" SPRIG-UP)	5.6	½"	EXIST
◁	286	VIKING MODEL M-5 SR BRASS SIDEWALL	5.6	½"	EXIST
● BR	165	VIKING MODEL B-2 QR CONC. PEND. w/ BRASS PLATE	5.6	½"	EXIST
● A	155	NEW VIKING QR CONC PEND WITH WHITE PLATE - VK462	5.6	½"	23
⊗ A	155	NEW VIKING QR CONC PEND WITH MRI PLATE - VK462	5.6	½"	4
⭘ A	5	NEW VIKING QR UPRIGHT BRASS - VK300	5.6	½"	4

Drawing Title	PARTIAL 1ST FLOOR FIRE SPRINKLER PLAN
Contract No.	203279
File Name:	203279
Drawn By	TRACY SKINNER
Scale	AS NOTED
Date	3-6-13
Approval By	AURORA FIRE DEPT.

Revisions: | By: | Date:

Job: MEDICAL CENTER OF AURORA - IMAGING CENTER SUITE 110
1444 SOUTH POTOMAC STREET
AURORA, COLORADO 80012

Contractor: FRONTIER FIRE PROTECTION INC.
2617 W. HOLDEN PLACE
DENVER, CO 80204

FP 1 OF 1

PLOT DATE 3-6-13

PHONE: (303) 629-0221
FAX: (303) 623-7830

2617 West Holden Place, Denver, Colorado • 80204

FRONTIER FIRE PROTECTION INC.

FIRE PROTECTION ENGINEERS AND CONTRACTORS

AUTOMATIC FIRE SPRINKLER SYSTEM

EQUIPMENT SUBMITTAL

FOR

MEDICAL CENTER OF AURORA

IMAGING CENTER SUITE 110

1444 POTOMAC STREET

AURORA, COLORADO 80012

rsn 703956
PERMIT 13647594

TABLE OF CONTENTS

Bookmark/Section	Description
0	Cover sheet and Table of Contents
1	Fire stop caulking
2	Hangers
3	Pipe
4	Fittings
5	Not used
6	Not used
7	Not used
8	Sprinkler heads

rsn 703956
PERMIT 13647594

FS-ONE
High Performance
Intumescent Firestop Sealant

Product description

- Intumescent (expands when exposed to fire) firestop sealant that helps protect combustible and non-combustible penetrations for up to 4 hours fire rating

Areas of application

- Steel, copper and EMT pipes
- Insulated steel and copper pipes
- Cable bundles
- Closed or vented plastic pipes
- HVAC penetrations

For use with

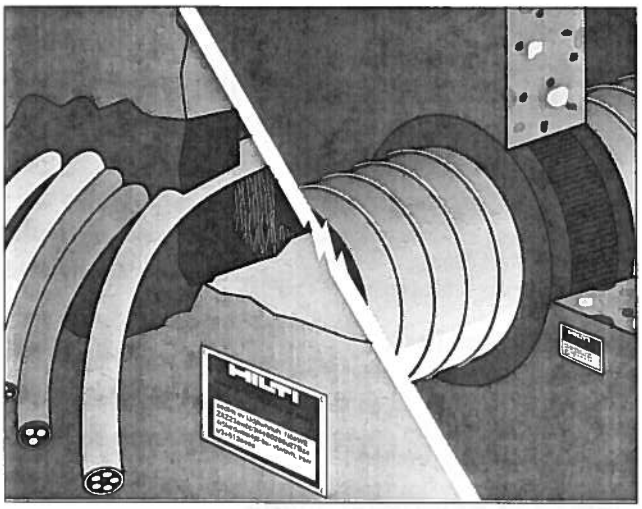
- Concrete, masonry, drywall and wood floor assemblies
- Wall and floor assemblies rated up to 4 hours

Examples

- Sealing around plastic pipe penetrations in fire rated construction
- Sealing around combustible and non-combustible penetrations in fire rated construction

System advantage/Customer benefits

- Protects most typical firestop penetration applications
- Easy to work with and fast cleanup
- Can be repenetrated when laying new cables
- Can be painted



Internationally tested and approved

CLASSIFIED UL — FILL, VOID OR CAVITY MATERIALS CLASSIFIED BY UNDERWRITERS LABORATORIES, INC. FOR USE IN TROUGH-PENETRATION FIRESTOP SYSTEMS SEE UL FIRE RESISTANCE DIRECTORY 66Y7

FM APPROVED
For Penetration Fire Stops.
Consult the Factory Mutual Research Corporation Approval Guide

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FS-ONE
Intumescent Firestop Sealant

Ordering Description	Color	Package contents	Volume	Item No.
FS-ONE, tube	**red**	**10.1 oz. (300 ml)**	**18 in³**	**00259579**
FS-ONE, foil	**red**	**(Qty 20) 20.2 oz. (600 ml)**	**36 in³**	**00311387**
FS-ONE, pail	**red**	**5 Gallons (19 liter)**	**1155 in³**	**00259578**
CB 200 PI-300/310 ml Dispenser				**00055205**
600 ml Foil Dispenser				**00024669**



rsn 703956
PERMIT 13647594

FS-ONE
High Performance Intumescent Firestop Sealant

Product description

- Intumescent (expands when exposed to fire) firestop sealant that helps protect combustible and non-combustible penetrations for up to 4 hours fire rating

Product features

- Smoke, gas and water resistant
- Contains no halogen, solvents or asbestos
- High fire rating properties
- Water based, easy to clean

Tested in accordance with

- UL 1479
- ASTM E 814
- ASTM E 84

Technical Data

FS-ONE Intumescent Firestop

(at 73°F (23°C) and 50% relative humidity)

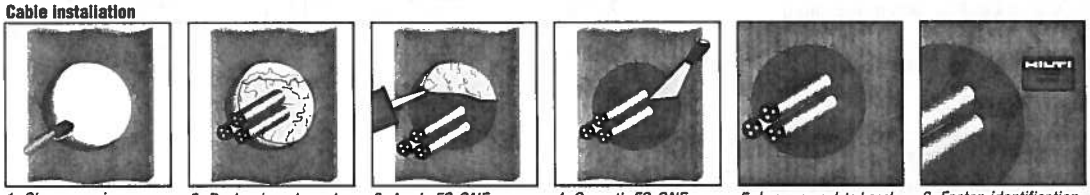
Chemical basis:	Water-based intumescent acrylic dispersion
Density:	Approx. 1.5 g/cm³
Color:	Red
Working time:	Approx. 20-30 min
Curing time:	Approx. 14-21 days
Shore A Hardness:	Approx. 35
Movement capability:	Approx. 5%
Intumescent Activation:	Approx 250°F (121°C)
Expansion rate (unrestricted):	Up to 3-5 times original volume
Temperature resistance (cured):	-40°F (-40°C) to 212°F (100°C)
Application temperature:	35°F (2°C) to 100°F (38°C)
Surface burning characteristics:	Flame Spread: 0
(ASTM E 84-96)	Smoke Development: 5
Sound transmission classification:	50
ASTM E 90-97	

Approvals

ICBO Evaluation Service, Inc.	Report No. 5071
California State Fire Marshal	Listing No. 1200:108
City of New York	MEA 326-96-M Vol. II

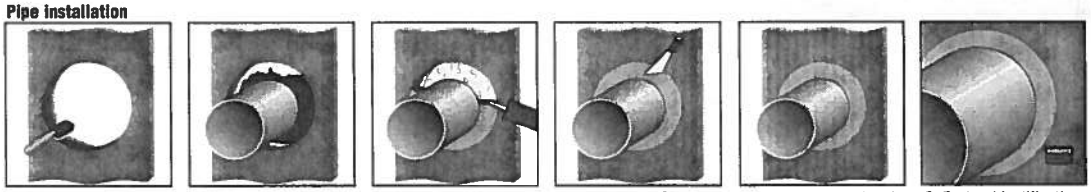
Installation instructions for FS-ONE

Cable installation



1. Clean opening. *2. Pack mineral wool. (If required)* *3. Apply FS-ONE.* *4. Smooth FS-ONE.* *5. Leave completed seal undisturbed for 48 hours.* *6. Fasten identification plate (if required).*

Pipe installation



1. Clean opening. *2. Pack mineral wool. (If required)* *3. Apply FS-ONE.* *4. Smooth FS-ONE.* *5. Leave completed seal undisturbed for 48 hours.* *6. Fasten identification plate (if required).*

Opening

1. Clean the opening. Surfaces to which FS-ONE will be applied should be cleaned of loose debris, dirt, oil, moisture, frost and wax. Structures supporting penetrating items must be installed in compliance with local building and electrical standards.

Application of firestop sealant

2. Install the prescribed backfilling material type and depth to obtain the desired rating (if required). Leave sufficient depth for applying FS-ONE.
3. Application of firestop sealant: Apply FS-ONE to the required depth in order to obtain the desired fire rating. Make sure FS-ONE contacts all surfaces to provide maximum adhesion. For application of FS-ONE use a standard caulking gun, foil pack gun, bulk loader and bulk gun. With FS-ONE buckets, Graco type sealant pumps may be used. (Contact pump manufacturer for proper selection).
4. Smoothing of firestop sealant: To complete the seal, tool immediately to give a smooth appearance. Excess sealant, prior to curing, can be cleaned away from adjacent surfaces and tools with water.
5. Leave completed seal undisturbed for 48 hours.
6. For maintenance reasons, a penetration seal could be permanently marked with an identification plate. In such a case, mark the identification plate and fasten it in a visible position next to the seal.

Notice about approvals

- Check that the penetration has been sealed according to the specified drawing in the UL Fire Resistance Directory or Hilti Firestop Manual. For further advice, please contact Hilti customer service. Refer to Hilti product literature and UL fire resistance directory for specific application details.

Not for use...

- High movement expansion joints
- Underwater
- On materials where oil, plasticizers or solvents may bleed i.e. impregnated wood, oil based seals, green or partially vulcanized rubber
- In any penetration other than those specifically described in this manual or the test reports

Safety precautions

- Before handling, read the product and Material Safety Data Sheet for detailed use and health information
- Keep out of reach of children
- Wear suitable gloves and eye protection

Storage

- Store only in the original packaging in a location protected from moisture at temperatures between 40°F (5°C) and 86°F (30°C)
- Observe expiration date on the packaging

rsn 703956
PERMIT 13647594

Material Safety Data Sheet

HILTI, INC.: P.O. Box 21148, Tulsa, OK 74121; Ph: 1 800 879 6000; Emergency No.: 1 800 879 4444

PRODUCT NAME: FS-ONE High Performance Intumescent Firestop Sealant

DESCRIPTION: One-part acrylic-based sealant

MSDS No.: 259
Revision No.: 008
Date: 05/19/99

INGREDIENTS AND EXPOSURE LIMITS

Ingredients:	*CAS Number:*	*PEL:*	*TLV:*	*TEL:*
Calcium carbonate	01317-65-3	5 mg/m³ (T)	10 mg/m³ (T)	NE
Ammonium polyphosphate	68333-79-9	NE	NE	NE
Boron trioxide	01303-86-2	15 mg/m³ (R)	10 mg/m³	NE
Alkylphenolethersulfate, sodium salt	69011-84-3	NE	NE	NE
Talc	14807-96-6	20 mppcf	2 mg/m³	NE
Zinc oxide	01314-13-2	5 mg/m³ (T)	10 mg/m³	NE
Expandable graphite	12777-87-6	5 mg/m³ (T)	2 mg/m³ (T)	NE
Ethylene glycol	00107-21-1	NE	C:100 mg/m³ (A)	NE
Polybutene	09003-29-6	NE	NE	NE
Iron oxide	01309-37-1	10 mg/m³	5 mg/m³	NE
Glass filament	65997-17-3	NE	5 mg/m³ (T)	NE
Silicon dioxide	14808-60-7	0.05 mg/m³ (T)	0.1 mg/m³ (T)	NE

Abbreviations: PEL = OSHA Permissible Exposure Limit. TLV = ACGIH Threshold Limit Value. C = Ceiling. STEL = Short Term Exposure Limit. NE = None Established. NA = Not Applicable. (T) indicates "as total dust". (R) indicates "as respirable fraction". (A) indicates "as an aerosol". mppcf = million particles per cubic foot.

PHYSICAL DATA

Appearance:	Red paste.	Odor:	Odorless.
Vapor Density: (air = 1)	Not determined.	Vapor Pressure:	23mbar @ 20C / 68F
Boiling Point:	Not applicable.	VOC Content:	None.
Evaporation Rate:	Not applicable.	Solubility in Water:	Soluble.
Specific Gravity:	1.5	pH:	Notdetermined.

FIRE AND EXPLOSION HAZARD DATA

Flash Point:	Non-flammable.
Flammable Limits:	Not applicable.
Extinguishing Media:	Not applicable. Use extinguishing media as appropriate for surrounding fire.
Special Fire Fighting Procedures:	None known. Use a self-contained breathing apparatus when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None known. Thermal decomposition products can be formed.

REACTIVITY DATA

Stability:	Stable.
Hazardous Polymerization:	Will not occur.
Incompatibility:	Strong acids, peroxides, and oxidizing agents.
Decomposition Products:	Thermal decomposition can yield CO and CO2.
Conditions to Avoid:	None known.

HEALTH HAZARD DATA

Known Hazards:	None known.
Carcinogenicity:	IARC classifies crystalline silica (quartz sand) as Gp I based upon evidence among workers in industries where there has been long-term and chronic exposure (via inhalation) to silica dust; e.g. mining, quarry, stone crushing, refractory brick and pottery workers. This product does not pose a dust hazard; therefore, this classification is not relevant. Based upon the nature and intended use of this product, it does not pose an increased cancer risk to workers.

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Signs and Symptoms of Exposure:	Possibly irritating upon contact with the eyes or upon repeated contact with the skin.
Routes of Exposure:	Dermal.
Medical Conditions Aggravated by Exposure:	Eye and skin conditions.

EMERGENCY AND FIRST AID PROCEDURES

Eyes:	Immediately flush with plenty of water. Call a physician if symptoms occur.
Skin:	Immediately wipe off material and wash with soap and water. Material can adhere to the skin. If material has adhered to the skin, use an abrasive containing hand cleaner. If material does not come off, buff with a pumice stone.
Inhalation:	Move victim to fresh air if discomfort develops. Call a physician if symptoms persist.
Ingestion:	Seek medical attention. Do not induce vomiting unless directed by a physician. Never give anything by mouth to an unconscious person.
Other:	Referral to a physician is recommended if there is any question about the seriousness of the injury/exposure.

CONTROL MEASURES AND PERSONAL PROTECTIVE EQUIPMENT

Ventilation:	General (natural or mechanically induced fresh air movements).
Eye Protection:	Not required, however, safety glasses should be worn in most industrial settings.
Skin Protection:	Avoid skin contact. Cloth gloves are suitable for hand protection.
Respiratory Protection:	None normally required. Where ventilation is inadequate to control vapors, use a NIOSH-approved respirator with organic vapor cartridges. Never enter a confined space without an appropriate air-supplied respirator.

PRECAUTIONS FOR SAFE HANDLING AND USE

Handling and Storing Precautions:	Store in a cool, dry area preferably between 50° and 100° F. Keep from freezing. Do not store in direct sunlight. Avoid contact with the eyes or skin. Practice good hygiene; i.e. always wash thoroughly after handling and before eating or smoking. For industrial use only. Keep out of reach of children. Follow label/use instructions.
Spill Procedures:	Immediately wipe away spilled material before it hardens. Place in a container for proper disposal in accordance with all applicable local, state, or federal requirements.

REGULATORY INFORMATION

Hazard Communication:	This MSDS has been prepared in accordance with the federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
HMIS Codes:	Health 1, Flammability 0, Reactivity 0, PPE B
DOT Shipping Name:	Not regulated.
TSCA Inventory Status:	Chemical components listed on TSCA inventory.
SARA Title III, Section 313:	This product contains 1-5% ethylene glycol (CAS 107-21-1) and 1-5% zinc oxide (re: zinc compounds) which are subject to reporting under Section 313 of SARA Title III (40 CFR Part 372).
EPA Waste Code(s):	Not regulated by EPA as a hazardous waste.
Waste Disposal Methods:	Consult with regulatory agencies or your corporate personnel for disposal methods that comply with local, state, and federal safety, health and environmental regulations.

CONTACTS

Customer Service:	1 800 879 8000
Technical Service:	1 800 879 8000
Emergency:	1 800 879 4444
Health / Safety:	1 800 879 6000 Steve Gerrard (x6309) Jerry Metcalf (x6704)

The information and recommendations contained herein are based upon data believed to be correct; however, no guarantee or warranty of any kind expressed or implied is made with respect to the information provided.

rsn 703956
PERMIT 13647594

Underwriters Laboratories Inc.®

Northbrook, Illinois • (708) 272-8800
Melville, New York • (516) 271-6200
Santa Clara, California • (408) 985-2400
Research Triangle Park,
North Carolina • (919) 549-1400

CERTIFICATE OF COMPLIANCE

CERTIFICATE NUMBER: 211097 - R13240A
ISSUE DATE: October 21, 1997

Issued to: Hilti Construction Chemicals Inc.
5400 S. 122nd East Avenue
Tulsa, OK 74146 USA

Report Reference: R13240, February 14, 1997

This is to Certify that representative samples of: Fill, Void or Cavity Materials, one part Sealant designated as FS One (also identified as CP 612)

Have been investigated by Underwriters Laboratories Inc. in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1479, Fire Tests of Through-Penetration Firestops;

UL 2079, Tests for Fire Resistance of Building Joint Systems.

Additional Information:

This material is a one part intumescent firestop sealant for use in through-penetration firestop systems. These sealants are Classified as "Fill, Void or Cavity Materials" for use in various Through-Penetration Firestop Systems as specified in Volume 2 of UL's Fire Resistance Directory.

Only those products bearing the UL Classification Marking should be considered as being covered by UL's Classification and Follow-Up Service.

The UL Classification Marking includes: the name "Underwriters Laboratories Inc."; the word "Classified"; a control number (may be alphanumeric) assigned by UL; a statement to indicate the extent of UL's evaluation of the product; and, the product category name (product identity) as indicated in the appropriate UL Directory.

LOOK FOR THE UL CLASSIFICATION MARKING ON THE PRODUCT

Engineer: Underwriters Laboratories Inc.
Nikola Momcilovic

Review Engineer: Underwriters Laboratories Inc.
A. M. Ramirez

2000-44C (6/92)

rsn 703956
PERMIT 13647594

Fig. 200 - "Trimline" Adjustable Band Hanger

Size Range — 1/2" thru 8" pipe

Material — Carbon Steel, Mil. Galvanized to G90 specifications

Function — For fire sprinkler and other general piping purposes. Knurled swivel nut design permits hanger adjustment after installation.

Features —

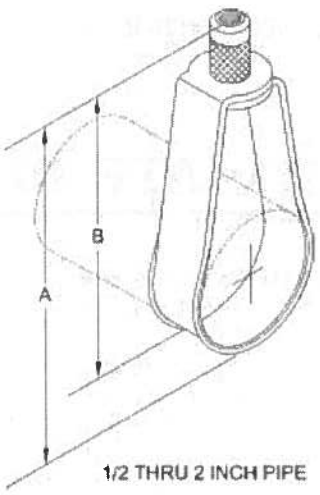
- (1/2" thru 2") Flared edges ease installation for all pipe types and protect CPVC plastic pipe from abrasion. Captured design keeps adjusting nut from separating with hanger. Hanger is easily installed around pipe.
- (2½" thru 8" Spring tension on nut holds it securely in hanger before installation. Adjusting nut is easily removed.

Approvals — Underwriters' Laboratories listed (1/2" thru 8") in the USA **(UL)** and Canada **(cUL)** for steel and CPVC plastic pipe and Factory Mutual Engineering Approved (3/4" thru 8"). Conforms to Federal Specifications WW-H-171E, Type 10 and Manufacturers Standardization Society SP-69, Type 10.

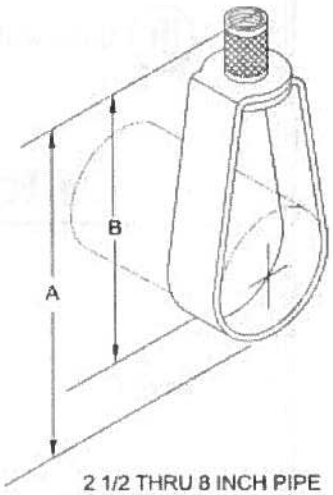
Maximum Temperature — 650°F

Finish — Mil. Galvanized. For Stainless Steel materials, order TOLCO™ Fig. 200WON.

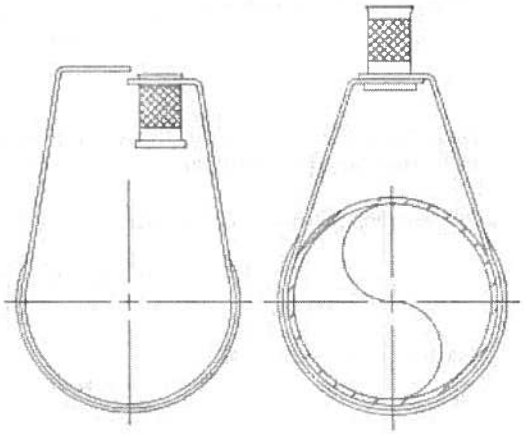
Order By — Figure number and pipe size



1/2 THRU 2 INCH PIPE



2 1/2 THRU 8 INCH PIPE



Dimensions • Weights

Pipe Size	Rod Size Inch	Rod Size Metric	A	B	Max. Rec. Load Lbs.	Approx. Length
1/2	3/8	8mm or 10mm	3 1/8	2 5/8	400	11
3/4	3/8	8mm or 10mm	3 1/8	2 1/2	400	11
1	3/8	8mm or 10mm	3 3/8	2 5/8	400	12
1 1/4	3/8	8mm or 10mm	3 3/4	2 7/8	400	13
1 1/2	3/8	8mm or 10mm	3 7/8	2 7/8	400	14
2	3/8	8mm or 10mm	4 1/2	3	400	15
2 1/2	3/8	10mm	5 5/8	4 1/8	600	27
3	3/8	10mm	5 7/8	4	600	29
3 1/2	3/8	10mm	7 3/8	5 1/4	600	34
4	3/8	10mm	7 3/8	5	1000	35
5	1/2	12mm	9 1/8	6 1/4	1250	66
6	1/2	12mm	10 1/8	6 3/4	1250	73
8	1/2	12mm	13 1/8	8 3/4	1250	136

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Fig. 65 and Fig. 66
Reversible C-Type Beam Clamps 3/4" and 1¼" Throat Openings

Component of State of California OSHPD Approved Seismic Restraints System

Size Range — (Fig. 65 and Fig. 66) 3/8", 1/2" and 5/8" rod

Material — Carbon Steel with hardened cup point set screw and jam nut

Function — Recommended for hanging from steel beam where flange thickness does not exceed 3/4" (Fig. 65) or 1¼" (Fig. 66).

Features — All steel construction eliminates structural deficiencies associated with casting type beam clamps. May be used on top or bottom flange of the beam. (Beveled lip allows hanging from top flange where clearance is limited.) May be installed with set screw in up or down position. Offset design permits unlimited rod adjustment by allowing the rod to be threaded completely through the clamp. Open design permits inspection of thread engagement.

Approvals — Underwriters' Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Factory Mutual Engineering approved. Conforms to Federal Specification WW-H-171E, Type 23 and Manufacturers Standardization Society SP-69, Type 19. Exceeds requirements of the National Fire Protection Association (NFPA), Pamphlet 13, 3/8" rod will support 1/2" thru 4" pipe, 1/2" rod will support 1/2" thru 8" pipe. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development (OSHPD). For additional load, spacing and placement relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines.

Finish — Plain

Note — Available in Electro-Galvanized and HDG finish.

Order By — Figure number, rod size and finish

Fig. 65 Patent #4,570,885

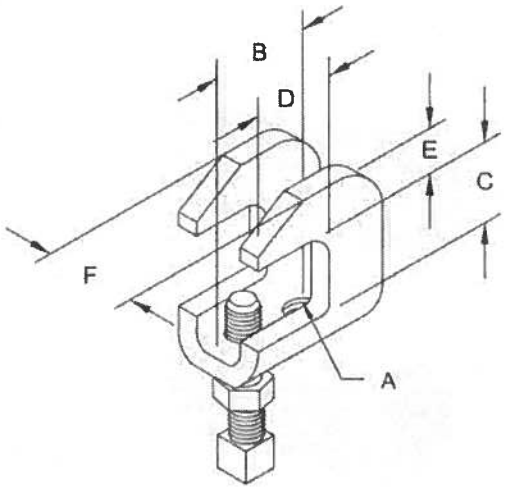


Fig. 65

Dimensions • Weights

Rod Size A	B	C	D	E	F	Max. Rec. Load Lbs.*	Approx. Wt./100
3/8	1 3/16	3/4	1	7/16	1	610	28
1/2	1 1/2	3/4	1	9/16	1 1/4	1130	55
5/8	1 1/2	3/4	1	9/16	1 1/4	1130	55

* Max. loads for clamp with set screw in up or down position.

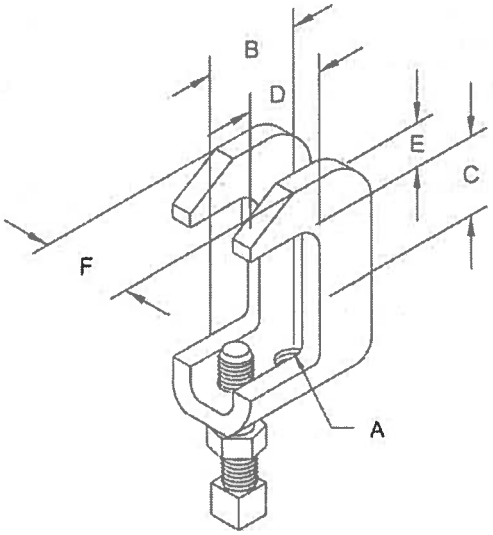


Fig. 66

Dimensions • Weights

Rod Size A	B	C	D	E	F	Max. Rec. Load Lbs.*	Approx. Wt./100
3/8	1 3/16	1 1/4	1	7/16	1	610	28
1/2	1 1/2	1 1/4	1	9/16	1 1/4	1130	55
5/8	1 1/2	1 1/4	1	9/16	1 1/4	1130	55

* Max. loads for clamp with set screw in up or down position.

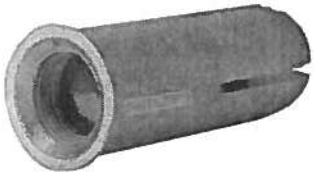
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4.3.8 HDI & HDI-L Drop-In Anchor

4.3.8.1 Product Description
4.3.8.2 Material Specifications
4.3.8.3 Technical Data
4.3.8.4 Installation Instructions
4.3.8.5 Ordering Information





Listings/Approvals

ICC-ES (International Code Council)
ER-2895 (HDI Only)

COLA (City of Los Angeles)
Research Report No. 23709 (HDI Only)

FM (Factory Mutual)
Pipe Hanger Components for Automatic Sprinkler Systems (3/8" - 3/4")
(HDI and HDI-L)

UL (Underwriters Laboratories)
UL 203 Pipe Hanger Equipment for Fire Protection Services (3/8" - 3/4")

4.3.8.1 Product Description

The Hilti HDI/HDI-L Drop-In anchor is an internally threaded, flush mounted expansion anchor for use in concrete.

Product Features

HDI

- Anchor, setting tool and Hilti drill bit form a matched tolerance system to provide reliable fastenings
- Below surface setting for easy patchwork
- Allows shallow embedment without sacrificing performance
- Lip provides flush installation, consistent anchor depth, and easy rod alignment (HDI-L)
- Lip allows accurate flush surface setting, independent of hole depth (HDI-L)
- Ideal for repetitive fastenings with threaded rods of equal length
- Intelligent expansion section adapts to the base material and reduces number of hammer blows up to 50% (HDI-L)

Guide Specifications

Expansion Anchor Expansion anchors shall be flush or shell type and zinc plated in accordance with ASTM B 633, SC 1, Type III. Anchors shall be Hilti HDI/HDI-L anchors as supplied by Hilti.

Installation Install shell or flush type anchors in holes drilled with Hilti carbide tipped drill bits. Install anchors as per manufacturer's recommendations.

4.3.8.2 Material Specifications

HDI/HDI-L, 1/4", 3/8", 1/2", and HDI 5/8" and 3/4" are manufactured from mild carbon steel which is plated with a zinc finish for corrosion protection in accordance with ASTM B 633, SC 1, Type III

HDI Stainless Steel material meets the requirements of AISI 303

4.3.8.3 Technical Data

HDI/HDI-L Specification Table

Details		Anchor Size	in. (mm)	HDI/HDI-L 1/4 (6.4)	HDI/HDI-L 3/8 (9.5)	HDI/HDI-L 1/2 (12.7)	HDI 5/8 (15.9)	HDI 3/4 (19.1)
d_{bit}	Bit diameter[1]		in.	3/8	1/2	5/8	27/32	1
h_{nom} ℓ h_1	Std. depth of embed. Anchor length Hole depth		in. (mm)	1 (25)	1-9/16 (40)	2 (51)	2-9/16 (65)	3-3/16 (81)
ℓ_{th}	Useable thread length		in. (mm)	7/16 (11)	5/8 (15)	11/16 (17)	7/8 (22)	1-3/8 (34)
	Threads per Inch			20	16	13	11	10
h	min. base material thickness		in. (mm)	3 (76)	3-1/8 (79)	4 (102)	5-1/8 (130)	6-3/8 (162)
T_{max}	max. tightening torque		ft-lb (Nm)	4 (5.4)	11 (14.9)	22 (29.8)	37 (50.2)	80 (108.5)

1 For Hilti matched tolerance carbide tipped drill bits, see section 8.4.1.

Combined Shear and Tension Loading

$$\left(\frac{N_d}{N_{rec}}\right)^{5/3} + \left(\frac{V_d}{V_{rec}}\right)^{5/3} \leq 1.0 \text{ (Ref. Section 4.1.2.7)}$$

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HDI & HDI-L Drop-In Anchor 4.3.8

Carbon Steel HDI Allowable Loads in Concrete

Anchor size in. (mm)	2000 psi (13.8 MPa)				4000 psi (27.6 MPa)				6000 psi (41.4 MPa)			
	Tension	lb (kN)	Shear	lb (kN)	Tension	lb (kN)	Shear	lb (kN)	Tension	lb (kN)	Shear	lb (kN)
	HDI	HDI-L	HDI	HDI-L	HDI	HDI-L	HDI	HDI-L	HDI	HDI-L	HDI	HDI-L
1/4 (6.4)	500 (2.2)	500 (2.2)	450 (8.0)	450 (8.0)	570 (2.5)	570 (2.5)	625 (2.8)	625 (2.8)	790 (3.5)	790 (3.5)	700 (3.1)	700 (3.1)
→ 3/8 (9.5)	890 (4.0)	890 (4.0)	965 (4.3)	965 (4.3)	1115 (5.0)	1115 (5.0)	1250 (5.6)	1250 (5.6)	1360 (6.0)	1360 (6.0)	1500 (6.7)	1500 (6.7)
1/2 (12.7)	1120 (5.0)	1120 (5.0)	1500 (6.7)	1500 (6.7)	1785 (7.9)	1785 (7.9)	2125 (9.5)	1940 (8.6)	2345 (10.4)	2345 (10.4)	2500 (11.1)	2500 (11.1)
5/8 (15.9)	1875 (8.3)	–	2500 (11.1)	–	2920 (13.0)	–	3250 (14.5)	–	3715 (16.5)	–	3750 (16.7)	–
3/4 (19.1)	2500 (11.1)	–	3875 (17.2)	–	4065 (18.1)	–	5000 (22.2)	–	5565 (24.8)	–	5500 (24.5)	–

Note: The ultimate shear and allowable shear values are based on the use of SAE Grade 5 bolts, (f_y = 85 ksi, F_{ult} = 120 ksi) with the exception of the 1/4" HDI/HDI-L in f'_c = 6000 psi concrete which is based upon the use of a SAE Grade 8 bolt (f_y = 120 ksi, F_{ult} = 150 ksi).

Carbon Steel HDI Ultimate Loads in Concrete

Anchor size in. (mm)	2000 psi (13.8 MPa)				4000 psi (27.6 MPa)				6000 psi (41.4 MPa)			
	Tension	lb (kN)	Shear	lb (kN)	Tension	lb (kN)	Shear	lb (kN)	Tension	lb (kN)	Shear	lb (kN)
	HDI	HDI-L	HDI	HDI-L	HDI	HDI-L	HDI	HDI-L	HDI	HDI-L	HDI	HDI-L
1/4 (6.4)	1995 (8.9)	1995 (8.9)	1800 (8.0)	1800 (8.0)	2270 (10.1)	2270 (10.1)	2500 (11.1)	2500 (11.1)	3150 (14.0)	3150 (14.0)	2800 (12.5)	2800 (12.5)
→ 3/8 (9.5)	3555 (15.8)	3555 (15.8)	3850 (17.1)	3850 (17.1)	4460 (19.8)	4460 (19.8)	5000 (22.2)	5000 (22.2)	5430 (24.2)	5430 (24.2)	6000 (26.7)	6000 (26.7)
1/2 (12.7)	4470 (19.9)	4470 (19.9)	6000 (26.7)	6000 (26.7)	7140 (31.8)	7140 (31.8)	8500 (37.8)	7750 (34.4)	9375 (41.7)	9375 (41.7)	10000 (44.5)	10000 (44.5)
5/8 (15.9)	7500 (33.4)	–	10000 (44.5)	–	11685 (52.0)	–	13000 (57.8)	–	14865 (66.1)	–	15000 (66.7)	–
3/4 (19.1)	10000 (44.5)	–	15500 (69.0)	–	16260 (72.3)	–	20000 (89.0)	–	22250 (99.0)	–	22000 (97.9)	–

Carbon Steel HDI Allowable Loads in Lightweight Concrete and Lightweight Concrete over Metal Deck[1, 2]

Anchor Size in. (mm)	Anchor Installed in 3000 psi (20.7 MPa) Lt. Wt. Concrete[3]		Anchor Installed Through Steel Deck Upper Flute Into 3000 psi (20.7 MPa) Lt. Wt. Concrete[4]		Anchor Installed Through Steel Deck Lower Flute Into 3000 psi (20.7 MPa) Lt. Wt. Concrete[4]	
	Tension, lb (kN)	Shear, lb (kN)	Tension, lb (kN)	Shear, lb (kN)	Tension, lb (kN)	Shear, lb (kN)
1/4 (6.4)	465 (2.1)	340 (1.5)	530 (2.4)	335 (1.5)	375 (1.7)	250 (1.1)
→ 3/8 (9.5)	755 (3.4)	940 (4.2)	880 (3.9)	1010 (4.5)	500 (2.2)	500 (2.2)
1/2 (12.7)	1135 (5.0)	1700 (7.6)	1105 (4.9)	1755 (7.8)	625 (2.8)	750 (3.3)
5/8 (15.9)	1465 (6.5)	2835 (12.6)	–	–	875 (3.9)	875 (3.9)
3/4 (19.1)	2075 (9.2)	3680 (16.4)	–	–	1250 (5.5)	1000 (4.4)

1 The allowable values are based on the use of SAE Grade 2 bolts installed in the anchors.

2 Based on using a safety factor of 4.0.

3 The tabulated shear and tensile values are for anchors installed in structural lightweight concrete having the designated ultimate compressive strength at the time of installation. The concrete must comply with ASTM C 330-77.

4 The tabulated shear and tensile values are for anchors installed through 20 gauge intermediate decking into structural lightweight concrete having the designated ultimate strength at the time of installation. The concrete must comply with ASTM C 330-77.

Stainless Steel HDI Allowable Loads in Concrete

Anchor size in. (mm)	4000 psi (27.6 MPa)		6000 psi (41.4 MPa)	
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
SS HDI – 1/4 (6.4)	480 (2.1)	600 (2.7)	740 (3.3)	600 (2.7)
SS HDI – 3/8 (9.5)	1040 (4.6)	1230 (5.5)	1460 (6.5)	1230 (5.5)
SS HDI – 1/2 (12.7)	1840 (8.2)	2760 (12.4)	2410 (10.7)	2760 (12.3)
SS HDI – 5/8 (15.9)	2630 (11.7)	4510 (20.1)	3770 (16.8)	4510 (20.1)
SS HDI – 3/4 (19.1)	3830 (17.0)	5580 (24.8)	5030 (22.4)	5580 (24.8)

Note: The ultimate and allowable shear values are based on the use of Type 18-8 bolts.

Stainless Steel HDI Ultimate Loads in Concrete

Anchor size in. (mm)	4000 psi (27.6 MPa)		6000 psi (41.4 MPa)	
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
SS HDI – 1/4 (6.4)	1930 (8.6)	2400 (10.7)	2950 (13.1)	2400 (10.7)
SS HDI – 3/8 (9.5)	4170 (18.5)	4920 (21.9)	5850 (26.0)	4920 (21.9)
SS HDI – 1/2 (12.7)	7350 (32.7)	11040 (49.1)	9630 (42.8)	11040 (49.1)
SS HDI – 5/8 (15.9)	10540 (46.9)	18040 (80.2)	15100 (67.2)	18040 (80.2)
SS HDI – 3/4 (19.1)	15340 (68.2)	22320 (99.3)	20130 (89.5)	22320 (99.3)

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4.3.8 HDI & HDI-L Drop-In Anchor

Anchor Spacing and Edge Distance Guidelines (See Anchoring Technology Section 4.1.3)

Anchor Spacing Adjustment Factors

s = Actual Spacing

s_{min} = 2.0 h_{nom}

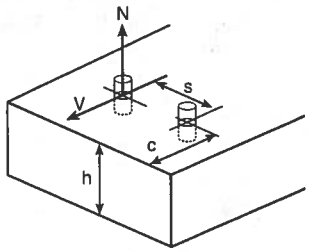
s_{cr} = 3.5 h_{nom}

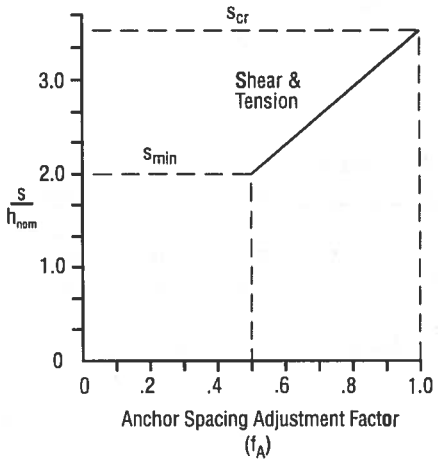
Edge Distance Adjustment Factors

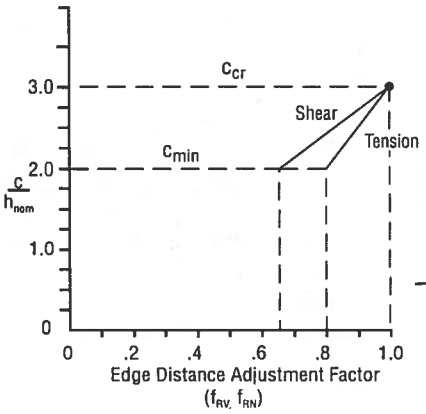
c = Actual edge distance

c_{min} = 2.0 h_{nom}

c_{cr} = 3.0 h_{nom}







Influence of Anchor Spacing & Edge Distance f_A, f_R

Anchor Size in. (mm)	h_{nom} in. (mm)
1/4 (6.4)	1 (25)
3/8 (9.5)	1-9/16 (40)
1/2 (12.7)	**2** (51)
5/8 (15.8)	**2-9/16** (65)
3/4 (19.1)	**3-3/16** (81)

h_{nom} = standard embedment depth

Load Adjustment Factors (Anchor Spacing) f_A						Load Adjustment Factors (Edge Distance) f_R										
Tension/Shear Loads						Tension, f_{RN}						Shear, f_{RV}				
Spacing s in. (mm)	Anchor Diameter					Edge Distance c in. (mm)	Anchor Diameter					Anchor Diameter				
	1/4	3/8	1/2	5/8	3/4		1/4	3/8	1/2	5/8	3/4	1/4	3/8	1/2	5/8	3/4
2 (51)	.50					**2** (51)	.80					.65				
2-1/2 (64)	.67					**2-1/2** (64)	.90					.83				
3 (76)	.83	.50				**3** (76)	1.0	.80				1.0	.65			
3-1/2 (89)	1.0	.58				**3-1/2** (89)		.85					.73			
4 (102)		.69	.50			**4** (102)		.91	.80				.85	.65		
4-1/2 (114)		.79	.58			**4-1/2** (114)		.98	.85				.96	.74		
5 (127)		.90	.67	.50		**5** (127)		1.0	.90	.80			1.0	.83	.65	
5-1/2 (140)		1.0	.75	.55		**5-1/2** (140)			.95	.83				.91	.70	
6 (152)			.83	.61	.50	**6** (152)			1.0	.87				1.0	.77	
7 (178)			1.0	.74	.57	**6-1/2** (165)				.91	.80				.84	.65
8 (203)				.87	.67	**7** (178)				.95	.84				.91	.72
9 (229)				1.0	.77	**8** (203)				1.0	.90				1.0	.83
10 (254)					.88	**9** (229)					.96					.94
11 (279)					.98	**10** (254)					1.0					1.0
12 (305)					1.0											
s_{min} = 2.0 h_{nom}, s_{cr} = 3.5 h_{nom} $f_A = 0.33 \frac{s}{h_{nom}} - 0.17$ for $s_{cr} > s > s_{min}$						c_{min} = 2.0 h_{nom}, c_{cr} = 3.0 h_{nom} $f_{RN} = 0.2 \frac{c}{h_{nom}} + 0.4$ for $c_{cr} > c > c_{min}$						c_{min} = 2.0 h_{nom}, c_{cr} = 3.0 h_{nom} $f_{RV} = 0.35 \frac{c}{h_{nom}} - 0.05$ for $c_{cr} > c > c_{min}$				

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Youngstown Tube

"Quality by the Foot"

Schedule 40 Sprinkler Pipe

Youngstown Tube manufactures Schedule 40 pipe in sizes 1" thru 2" using only high quality **domestic** steel coils. This ensures a uniform superior product for threading, roll grooving, welding or plain end uses. Youngstown Tube's schedule 40 pipe is produced under ASTM A135/A795 Type E, Grade A, NH standards. Every piece is Eddy-Current tested and conforms to internal SPC testing and recording.

Youngstown Tube Schedule 40 steel sprinkler pipe is coated with a waterbased black enamel coating, YTC Guard® antimicrobial coating and a continuous color coded ***red*** stencil, and **stored indoors** ready for immediate shipment.

Approvals: UL Listed, CUL Listed, FM Approved

Youngstown Tube schedule 40 pipe meets the rigorous testing and certification processes of Underwriters Laboratory and Factory Mutual for steel sprinkler pipe with working pressures of 300 psi or less. It also meets the requirements of NFPA 13 and can be used in wet, dry, deluge and preaction systems.

Schedule 40

Pipe Size	Pipe OD	Pipe ID	Nominal Wall	Weight per Foot	Standard Length	Pieces per Bundle	Feet per Bundle	Weight per Bundle	UL Threaded CRR
1	1.315	1.049	.133	1.68	21	61	1,281	2,152	1.00
1 ¼	1.660	1.380	.140	2.27	21	61	1,281	2,907	1.00
1 ½	1.900	1.610	.145	2.72	21	44	924	2,511	1.00
2	2.375	2.067	.154	3.65	21	37	777	2,836	1.00

Youngstown Tube Company
401 Andrews Avenue
Youngstown, Ohio 44505
1-866-The-Tube
www.youngstowntube.com

Project: Contractor:

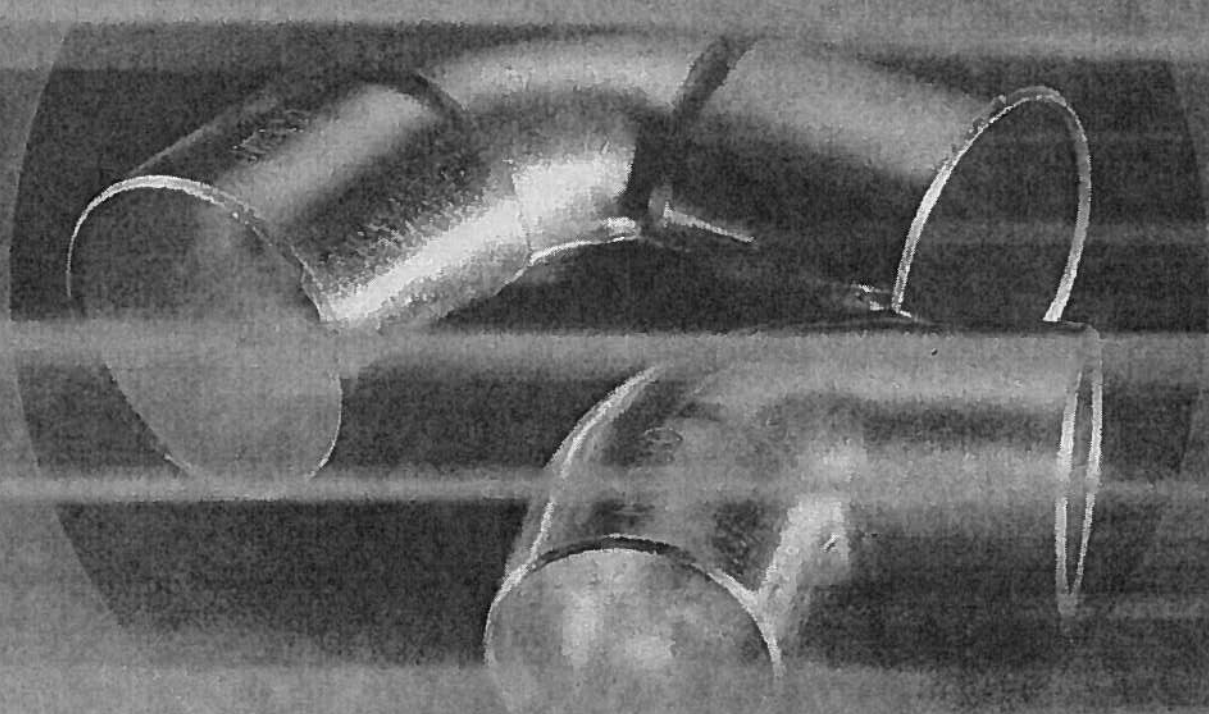
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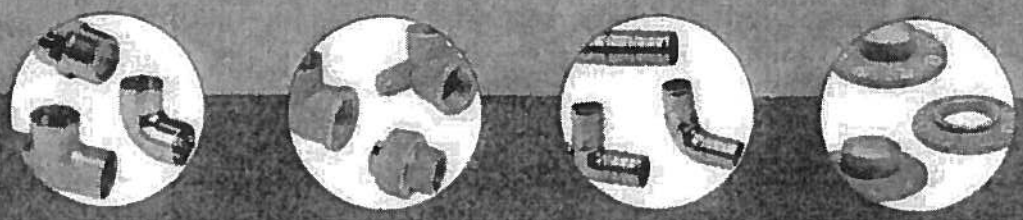
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CATALOG C-CF-0410

NIBCO®

AHEAD OF THE FLOW®





Copper Fittings

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Specifications

All of the advantages found in copper as a metal have been capitalized to the utmost in the manufacture of NIBCO® Fittings. Because of the accuracy of construction and design, copper plumbing is more efficient and less expensive.

NIBCO manufactures nine general types of fittings: Wrot Pressure; Cast Pressure; Wrot Drainage; Cast Drainage; Flanges; Flared Tube; Threaded Bronze; Insert Fittings for PEX; Barbed Insert Fittings for Polybutylene. Each has its particular place and use and each offers its own advantages when used for the proper service requirement.

Material & Construction — NIBCO® Fittings are made from the highest quality raw materials — Cast Fittings are offered in traditional copper alloys C83600, and C84400 and high quality lead-free* dezincification-resistant (DZR) silicon brass alloy C87850 per ASTM Specification B584. Wrot Copper Fittings are made from commercially pure copper mill products already meeting current lead-free* requirements per ASTM Specifications B75 Alloy C12200.

*Lead Free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content 0.25%. Source: California Health & Safety Code (116875); Vermont Act 193.

NIBCO Fittings are produced to meet the requirements of applicable standards.

The majority of NIBCO® brand wrot and cast fittings are manufactured in the U.S.A. and Mexico*. The manufacturing plants at Stuarts Draft, VA, Nacogdoches, TX and Reynosa, Mexico are registered to ISO 9001 quality standards.

Following is suggested phrasing to be incorporated in your specifications or bills of material for Copper Tube Fittings.

WROT SOLDER JOINT FITTINGS — "Solder Joint Fittings shall be produced to one of the following specifications:

1. "Material and workmanship shall be in accordance with ASME/ANSI B16.22; Wrought Copper and Copper Alloy Solder Joint Pressure Fittings."
2. "The dimensional, material and workmanship shall meet the requirements of MSS SP-104; Wrought Copper Solder Joint Pressure Fittings."
3. "The dimensional, material and workmanship of 5"–12" copper fittings shall meet the requirements of MSS SP-109 "Welded Fabricated Copper Solder Joint Pressure Fittings."
4. "Third party certified to NSF/ANSI61."
5. "Lead-free* fittings are certified by NSF/ANSI 61, Annex G and are in compliance with Section 116875 of the California Health & Safety Code and Vermont Act 193."

CAST COPPER ALLOY SOLDER JOINT FITTINGS — "Cast Copper Alloy Solder Joint Fittings shall be in accordance with ASME B16.18."

WROT DRAINAGE FITTINGS — "Wrot Drainage Fittings shall be in accordance with ASME B16.29."

CAST COPPER ALLOY SOLDER JOINT DRAINAGE FITTINGS — "Cast Copper Alloy Solder Joint Drainage Fittings shall be in accordance with ASME B16.23."

CAST COPPER ALLOY FLARED TUBE FITTINGS — "Cast Copper Alloy Flared Tube Fittings shall be in accordance with ASME B16.26."

CAST COPPER ALLOY FLANGES AND FLANGED FITTINGS —

CLASS 150 — "Cast Copper Alloy Flanges and Flanged Fittings shall meet the requirements of MSS SP-106" and/or "the workmanship and dimensions of Federal Specifications WW-F-406 or ASME Std. B16.24."

"CLASS 125 — Material, workmanship and dimensions of flanges shall be in accordance with MSS SP-106."

CAST BRONZE THREADED FITTINGS — "Cast Bronze Threaded Fittings shall be in accordance with ANSI/ASME B16.15."

POLYBUTYLENE COPPER INSERT TYPE VALVES AND FITTINGS — "Wrot Copper Insert Fittings shall be manufactured per MSS SP-103."

NIBCO® Copper Tube Fittings are all produced to above Standards. To simplify, write your specifications to read: "Copper Tube Fittings to be in accordance with specifications as outlined in NIBCO Catalog C-CF-0602."

WROT COPPER MEDICAL GAS SYSTEM COMPONENTS — "Wrot copper fittings that are to be installed in medical gas applications shall be prepared in accordance with NFPA 99, Health Care Facilities Gas and Vacuum Systems and the Compressed Gas Association, Pamphlet G4.1. Packaging shall be adequately protective and include labeling that identifies the preparer and states that the product has been cleaned and bagged for oxygen or med gas service."

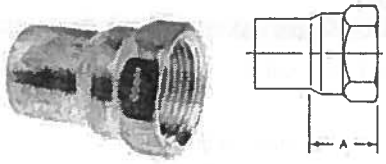
For technical information and dimensions refer to the engineering section contained in this catalog.

* NIBCO, may, from time to time, source and/or supplement a wrot or cast fitting product from suppliers outside of the U.S.A. and/or Mexico.

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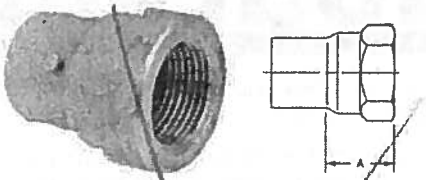
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ADAPTERS



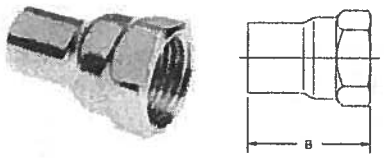
603
Adapter C x F – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES
1/8	0.03	13/32
1/8 x 1/4	0.03	1/2
1/4	0.03	5/8
1/4 x 3/8	0.05	21/32
3/8	0.04	11/16
3/8 x 1/2	0.09	29/32
3/8 x 1/4	0.03	9/16
1/2	0.09	27/32
1/2 x 3/4	0.14	1
1/2 x 3/8	0.04	17/32
1/2 x 1/4	0.05	1/2
5/8 x 3/4	0.12	29/32
5/8 x 1/2	0.11	3/4
3/4	0.15	29/32
3/4 x 1	0.21	1 1/8
3/4 x 1/2	0.10	5/8
1	0.24	31/32
1 x 1 1/4	0.28	1 7/32
1 x 3/4	0.19	25/32
1 x 1/2	0.24	5/8
1 1/4	0.33	1 3/32
1 1/4 x 1 1/2	0.40	1 1/4
1 1/4 x 1	0.27	31/32
1 1/2	0.44	1 1/8
1 1/2 x 2	0.50	1 1/32
2	0.63	1 3/32
2 x 1 1/2	0.74	1 3/16
2 1/2	1.22	–
3	1.83	–
4	3.00	–



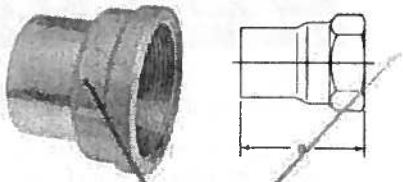
703
Adapter C x F – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES
1/4 x 1/2	0.18	27/32
1/2 x 1	0.30	1
3/4 x 1 1/4	0.55	1 1/8
3/4 x 3/8	0.17	3/4
1 x 1 1/2	0.68	13/32
1 1/4 x 1	0.27	31/32
1 1/4 x 3/4	0.29	3/4
1 1/2 x 2	0.78	1 1/2
1 1/2 x 1	0.37	25/32
1 1/2 x 1 1/4	0.47	1 1/4
2 x 1 1/4	0.76	27/32
2 1/2	1.62	1 3/8
3	2.34	1 1/2
4	4.05	1 9/16



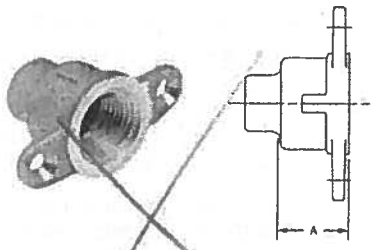
603-2
Fitting Adapter Ftg x F – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES
1/4	0.03	1 3/32
3/8	0.06	1 3/16
1/2	0.09	1 7/16
1/2 x 3/8	0.05	1 1/4
3/4	0.13	1 11/16
1	0.27	2 1/32
1 1/4	0.31	2 1/8
1 1/2	0.43	2 5/16
2	0.61	2 17/32



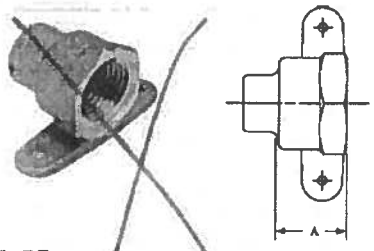
703-2
Fitting Adapter Ftg x F – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES
1/2 x 1/4	0.11	1 7/32
3/4 x 1/2	0.12	1 9/16
1 x 3/4	0.38	1 31/32
1 x 1/2	0.15	1 7/16
2 1/2	1.65	2 15/16
3	2.47	3 1/4



703-5 Special
Drop Adapter C x F – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES
1/2	0.16	3/4
3/4	0.24	31/32



703-5B
Drop Adapter C x F – Cast

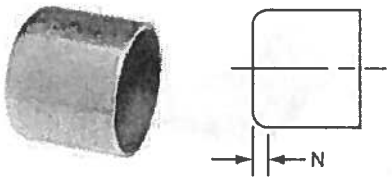
NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES
1/2	0.15	3/4

Consult price sheet for Made to Order items and for minimum order quantities.

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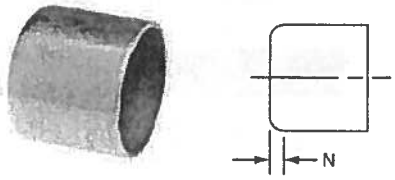
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CAPS



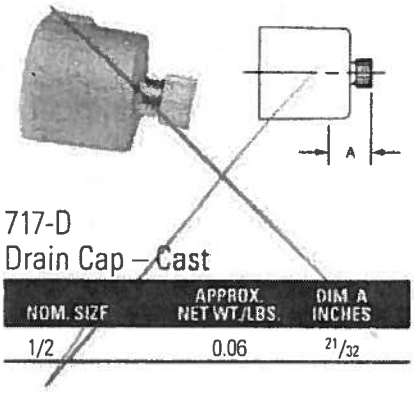
617
Tube Cap C – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. N INCHES
1/8	0.01	1/32
1/4	0.01	3/32
3/8	0.01	3/32
1/2	0.02	3/32
5/8	0.03	1/8
3/4	0.04	1/8
1	0.07	5/32
1 1/4	0.10	3/32
1 1/2	0.16	1/8
2	0.27	5/32
2 1/2	0.50	7/32
3	0.78	7/32
4	1.66	1/4



717
Tube Cap C – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. N INCHES
5	5.48	7/16
6	9.07	17/32

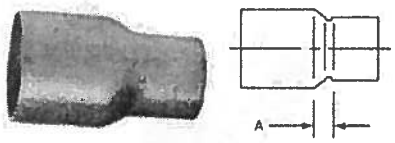


717-D
Drain Cap – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES
1/2	0.06	21/32

Consult price sheet for Made to Order items and for minimum order quantities.

COUPLINGS

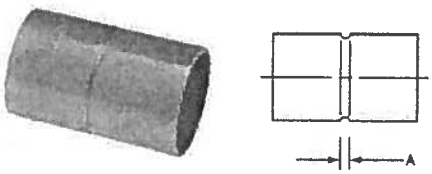


600
Reducing Coupling C x C – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES
1/8 x 3/16 O.D.	0.01	5/32
5/16 O.D. x 1/8	0.01	3/16
1/4 x 5/16 O.D.	0.01	3/16
1/4 x 1/8	0.01	3/16
3/8 x 1/4	0.02	3/16
3/8 x 5/16 O.D.	0.01	1/4
3/8 x 1/8	0.01	1/4
1/2 x 3/8	0.03	3/16
1/2 x 1/4	0.02	1/4
1/2 x 1/8	0.03	11/32
5/8 x 1/2	0.05	3/16
5/8 x 3/8	0.04	11/32
5/8 x 1/4	0.03	13/32
3/4 x 5/8	0.07	3/16
3/4 x 1/2	0.06	9/32
3/4 x 3/8	0.06	3/8
3/4 x 1/4	0.05	11/32
1 x 3/4	0.11	11/32
1 x 5/8	0.09	3/8
1 x 1/2	0.10	11/32
1 x 3/8	0.10	13/32
1 1/4 x 1	0.16	5/16
1 1/4 x 3/4	0.18	17/32
1 1/4 x 5/8	0.18	5/8
1 1/4 x 1/2	0.14	7/16
1 1/2 x 1 1/4	0.23	5/16
1 1/2 x 1	0.22	9/16
1 1/2 x 3/4	0.20	3/8
1 1/2 x 1/2	0.19	1/2
2 x 1 1/2	0.41	9/16
2 x 1 1/4	0.35	11/16
2 x 1	0.37	7/16
2 x 3/4	0.34	17/32
2 x 1/2	0.35	23/32
2 1/2 x 2	0.59	9/16
2 1/2 x 1 1/2	0.65	11/16
2 1/2 x 1 1/4	0.65	13/16
2 1/2 x 1	0.73	29/32

Continues...

NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES
3 x 2 1/2	0.98	1/2
3 x 2	1.06	15/16
3 x 1 1/2	0.92	1 1/32
3 1/2 x 3	1.52	1/2
4 x 3 1/2	2.12	19/32
4 x 3	1.92	27/32
4 x 2 1/2	1.77	1
4 x 2	1.92	1 1/4
5 x 4	3.50	3 31/32
5 x 3	3.18	1 15/32
5 x 2 1/2	3.50	13/16
5 x 2	3.09	2 1/32
6 x 5	5.70	1 1/8
6 x 4	5.24	1 1/2
6 x 3	5.04	2
6 x 2 1/2	5.13	2 1/4
6 x 2	4.89	2 1/2
8 x 6	13.06	1 19/32
8 x 4	12.22	2 19/32
8 x 3	11.79	3 3/32
8 x 2 1/2	12.64	3 3/8

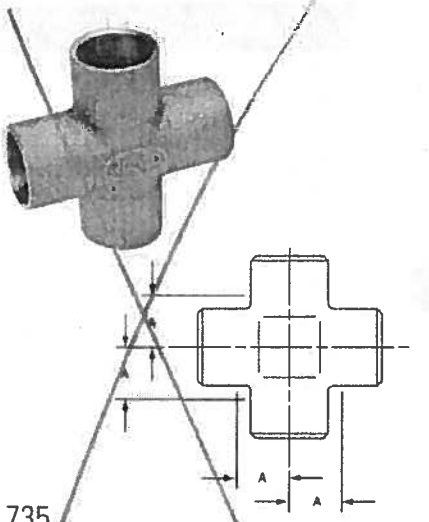


600-RS
Coupling with Rolled Tube Stop C x C – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES
1/8 O.D.	0.01	1/16
3/16 O.D.	0.01	3/32
1/8	0.01	1/16
5/16 O.D.	0.01	3/32
1/4	0.01	1/16
3/8	0.01	3/32
1/2	0.03	3/32
5/8	0.04	3/32
3/4	0.06	3/32
7/8	0.09	3/32
1	0.11	3/32
1 1/4	0.16	1/8
1 1/2	0.23	1/8
2	0.41	1/8
2 1/2	0.65	1/8
3	0.93	1/8
3 1/2	1.45	5/32
4	1.93	7/32

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CROSSES

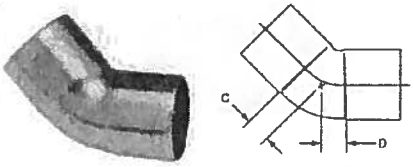


735
Cross C x C x C x C – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES
3/8	0.09	3/8
1/2	0.15	7/16
3/4	0.30	9/16
1	0.54	23/32
1 1/4	0.78	7/8
1 1/2	1.05	1
2	2.00	1 1/4
2 1/2	2.96	1 1/2

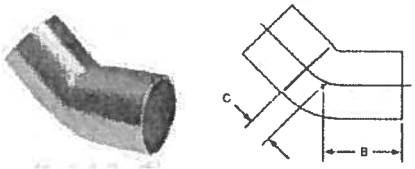
Consult price sheet for Made to Order items and for minimum order quantities.

ELBOWS



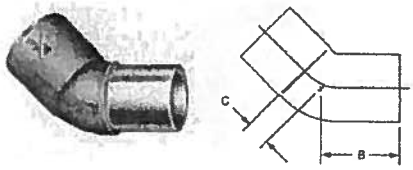
606
45° Elbow C x C – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. C INCHES	DIM. D INCHES
1/8	0.01	1/4	1/4
1/4	0.02	9/32	9/32
3/8	0.03	3/16	3/16
1/2	0.04	9/32	9/32
5/8	0.09	15/32	15/32
3/4	0.10	11/32	11/32
7/8	0.20	11/16	11/16
1	0.16	3/8	3/8
1 1/4	0.25	17/32	17/32
1 1/2	0.35	19/32	19/32
2	0.65	25/32	25/32
2 1/2	1.07	29/32	29/32
3	1.58	1 1/8	1 1/8
4	3.35	1 7/16	1 7/16
5	11.05	1 9/16	1 9/16
6	16.95	2	2
8	23.00	2 9/32	2 9/32



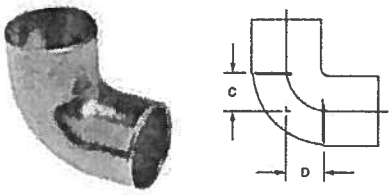
606-2
45° Fitting Elbow Ftg x C – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES	DIM. C INCHES
1/4	0.02	9/16	1/4
1/2	0.04	3/4	7/32
5/8	0.08	1 1/8	13/32
3/4	0.10	1 1/16	5/16
1	0.16	1 7/32	15/32
1 1/4	0.25	1 19/32	17/32
1 1/2	0.35	1 25/32	19/32
2	0.65	2 3/16	25/32
2 1/2	1.07	2 3/16	29/32
3	1.55	2 19/32	1 5/32



706-2
45° Fitting Elbow Ftg x C – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES	DIM. C INCHES
4	4.31	3 11/32	15/16

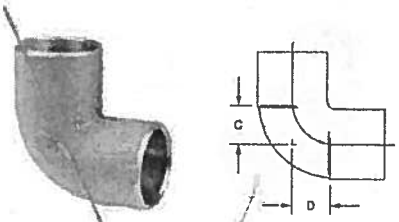


607
90° Elbow – Close Rough
C x C – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. C INCHES	DIM. D INCHES
1/8	0.01	13/32	13/32
1/4	0.02	9/32	9/32
3/8	0.03	1/2	1/2
1/2	0.04	3/8	3/8
1/2 x 3/8	0.04	9/16	21/32
3/4	0.10	1/2	1/2
3/4 x 5/8	0.12	29/32	7/8
3/4 x 1/2	0.10	17/32	3/4
7/8	0.20	29/32	29/32
1	0.21	23/32	23/32
1 x 3/4	0.16	23/32	5/8
1 1/4	0.31	1 1/32	1 1/32
1 1/4 x 1	0.31	1 5/8	1 15/32
1 1/2	0.46	1 7/32	1 7/32
1 1/2 x 1 1/4	0.35	1 5/32	1 3/32
2	0.84	1 1/2	1 1/2
2 x 1 1/2	0.58	1 7/16	1 1/4
2 1/2	1.41	1 27/32	1 27/32
3	2.07	2 3/32	2 3/32
3 1/2	2.94	2 3/8	2 3/8
4	4.23	2 25/32	2 25/32
5	7.74	2 7/8	2 7/8
6	10.95	3 7/16	3 7/16
8	29.50	4 23/32	4 23/32

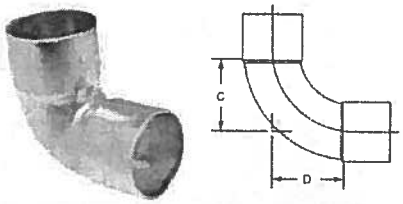
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ELBOWS *continued*



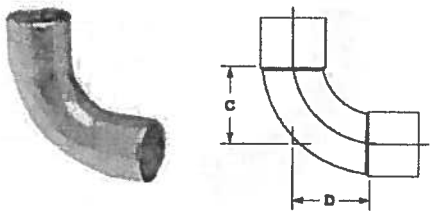
707
90° Elbow – Close Rough
C x C – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. C INCHES	DIM. D INCHES
1 1/4 x 1	0.42	1 5/8	1 15/32
1 1/4 x 3/4	0.34	9/16	13/16
1 1/4 x 1/2	0.28	15/32	27/32
1 1/2 x 1	0.54	11/16	1
1 1/2 x 3/4	0.42	19/32	31/32
1 1/2 x 1/2	0.40	5/8	29/32
2 x 1 1/4	0.86	7/8	1 1/4
2 x 1	0.78	3/4	1 1/4
2 x 3/4	0.69	5/8	1 1/4
2 1/2 x 2	2.16	1 3/16	19/32
3 x 2 1/2	2.26	1 11/16	1 1/2
3 x 2	2.68	1 3/8	1 9/16
4 x 3	5.18	1 29/32	2 15/32



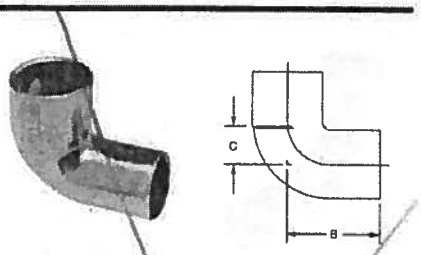
607-I
90° Elbow –
Intermediate Radius C x C
– Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. C INCHES	DIM. D INCHES
1/2	0.06	19/32	19/32
5/8	0.09	7/8	7/8
3/4	0.14	13/16	3/16
1	0.24	1 1/16	1 1/16



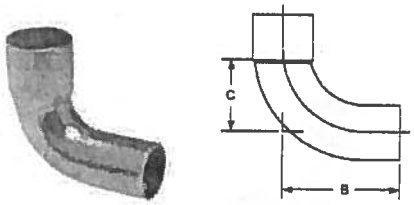
607-LT
90° Elbow – Long Radius
C x C – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. C INCHES	DIM. D INCHES
3/16 O.D.	0.01	13/32	13/32
1/8	0.01	13/32	13/32
5/16 O.D.	0.02	9/16	9/16
1/4	0.02	17/32	17/32
1/4 x 1/8	0.01	19/32	1/2
3/8	0.04	23/32	23/32
1/2	0.08	7/8	7/8
1/2 x 3/8	0.06	13/16	13/16
1/2 x 1/4	0.03	25/32	21/32
5/8	0.10	1 3/32	1 3/32
5/8 x 1/2	0.09	1 1/16	1 1/16
3/4	0.16	1 1/8	1 1/8
3/4 x 5/8	0.13	1 1/4	1 3/32
3/4 x 1/2	0.10	1 1/8	1 1/16
7/8	0.28	1 19/32	1 19/32
1	0.28	1 7/16	1 7/16
1 x 3/4	0.20	1 1/4	1 1/8
1 x 5/8	0.15	1 13/32	1 3/32
1 1/4	0.42	1 7/8	1 7/8
1 1/4 x 1	0.33	1 25/32	1 1/2
1 1/2	0.66	2 1/4	2 1/4
2	1.23	2 15/16	2 15/16
2 1/2	1.96	3 11/16	3 11/16
3	2.93	4 1/32	4 1/32
4	5.95	5 1/4	5 1/4



607-2
90° Fitting Elbow – Close Rough
Ftg x C – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES	DIM. C INCHES
1/4	0.02	3/4	3/8
3/8	0.03	15/16	1/2
1/2	0.04	1 1/32	3/8
5/8	0.07	1 7/32	17/32
3/4	0.10	1 11/32	17/32
1	0.20	1 3/4	27/32
1 1/4	0.33	2 1/8	1 1/32
1 1/2	0.46	2 13/32	1 7/32
2	0.84	2 27/32	1 1/2
2 1/2	1.39	3 15/32	1 29/32
3	2.10	3 13/16	2 3/32
4	4.00	4 3/4	2 25/32



607-2-I
90° Fitting Elbow –
Intermediate Radius
Ftg x C – Wrot

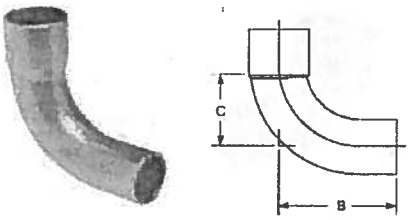
NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES	DIM. C INCHES
1/2	0.06	1 5/32	19/32
5/8	0.09	1 9/16	7/8
3/4	0.14	1 5/8	13/16
1	0.24	2 1/32	1 1/16

Consult price sheet for Made to Order items and for minimum order quantities.

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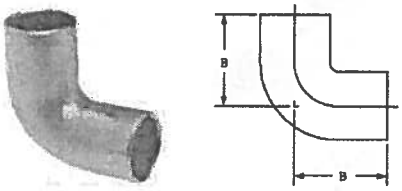
rsn 703956
PERMIT 13647594

ELBOWS *continued*



607-2-LT
90° Fitting Elbow – Long Radius
Ftg x C – Wrot

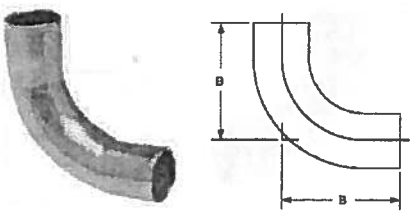
NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES	DIM. C INCHES
1/8	0.01	13/32	1/2
1/4	0.02	1 1/8	3/4
3/8	0.05	1 1/8	7/8
1/2	0.08	1 9/16	1 3/32
1/2 x 3/8	0.06	1 5/16	13/16
1/2 x 1/4	0.03	1 1/4	5/8
5/8	0.10	1 25/32	1 3/32
3/4	0.16	1 15/16	1 1/8
1	0.31	2 1/2	1 21/32
1 1/4	0.43	2 29/32	1 7/8
1 1/2	0.66	2 13/32	2 1/4
1 1/2 x 1 1/4	0.50	3 3/8	2 3/32
2	1.27	4 11/32	2 31/32
2 1/2	2.16	5 7/32	3 11/16
3	3.10	5 3/4	4 1/32



607-2-2
90° Fitting Elbow – Close Rough
Ftg x Ftg – Wrot

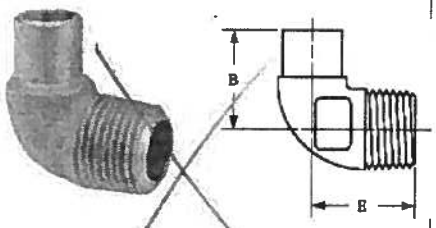
NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES
1/2	0.04	1 1/16
3/4	0.12	1 15/32
1	0.20	1 23/32
1 1/4	0.33	2 1/8
1 1/2	0.46	2 13/32
2	0.82	2 27/32
3	2.12	3 7/8

Consult price sheet for Made to Order items and for minimum order quantities.



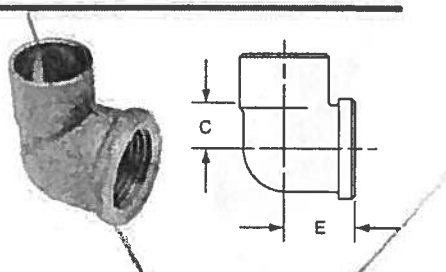
607-2-2-LT
90° Fitting Elbow – Long Radius
Ftg x Ftg – Wrot

NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES
1/4	0.02	27/32
3/8	0.04	1 1/8
1/2	0.08	1 19/32
5/8	0.10	1 11/16
3/4	0.16	1 15/16
1	0.31	2 1/2
1 1/4	0.43	2 29/32
1 1/2	0.65	3 7/16
2	1.25	4 11/32



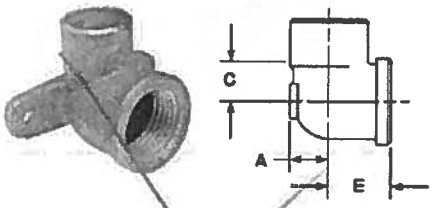
707-2-4
90° Fitting Elbow
Ftg x M – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. B INCHES	DIM. E INCHES
1/2	0.12	7/8	25/32



707-3
90° Elbow C x F – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. C INCHES	DIM. E INCHES
1/4	0.06	13/32	9/16
3/8	0.09	7/16	11/16
3/8 x 1/2	0.13	7/16	13/16
1/2	0.12	7/16	13/16
1/2 x 3/4	0.18	11/16	15/16
1/2 x 3/8	0.09	1/2	13/16
1/2 x 1/4	0.10	3/8	23/32
3/4	0.18	21/32	15/16
3/4 x 1	0.35	13/16	1 1/8
3/4 x 1/2	0.20	9/16	15/16
1	0.43	25/32	1 1/4
1 x 3/4	0.35	11/16	1 3/16
1 x 1/2	0.26	9/16	1 1/8
1 1/4	0.67	1	1 1/2
1 1/4 x 3/4	0.47	9/16	1 11/16
1 1/2	0.89	1 1/8	1 5/8
2	1.46	1 3/8	1 15/16

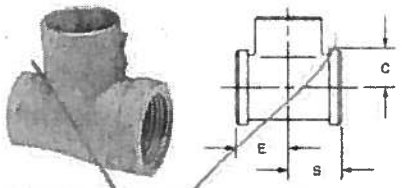


707-3-5
90° Drop Elbow C x F – Cast

NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES	DIM. C INCHES	DIM. E INCHES
3/8	0.12	11/32	7/16	11/16
3/8 x 1/2	0.18	11/32	9/16	13/16
1/2	0.15	13/32	9/16	7/8
1/2 x 3/8	0.17	3/8	1/2	13/16
3/4	0.28	17/32	21/32	15/16
3/4 x 1/2	0.24	17/32	9/16	15/16
1	0.49	5/8	25/32	1 1/4

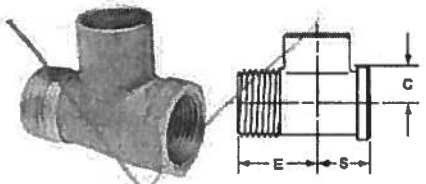
rsn 703956
PERMIT 13647594

TEES *continued*



710-3
Tee F x F x C – Cast

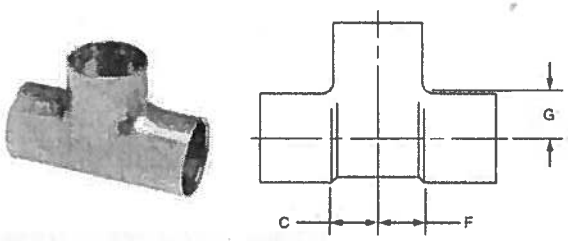
NOM. SIZE	APPROX. NET WT. LBS.	DIMENSIONS INCHES C	E	S
1/2	0.20	9/16	7/8	7/8
3/4	0.37	11/16	1	1
3/4 x 3/4 x 1/2	0.31	11/16	31/32	31/32
3/4 x 1/2 x 3/4	0.29	11/16	1	15/16
3/4 x 1/2 x 1/2	0.27	11/16	31/32	7/8



710-3-4
Tee M x F x C – Cast

NOM. SIZE	APPROX. NET WT. LBS.	DIMENSIONS INCHES C	E	S
3/4	0.34	11/16	1 11/32	1
3/4 x 3/4 x 1/2	0.33	11/16	1 7/32	31/32

Consult price sheet for Made to Order items and for minimum order quantities.



611
Tee C x C x C – Wrot

NOM. SIZE	APPROX. NET WT. LBS.	DIMENSIONS INCHES C	F	G
3/16 o.d.	0.01	7/32	7/32	7/32
1/8	0.02	1/4	1/4	7/32
1/8 x 1/8 x 1/4	0.02	13/32	13/32	1/4
1/8 x 1/8 x 3/16 o.d.	0.01	1/4	1/4	5/16
1/8 x 3/16 o.d. x 1/8	0.01	1/4	11/32	7/32
5/16 o.d.	0.02	3/8	3/8	5/16
5/16 o.d. x 5/16 o.d. x 1/4	0.02	3/8	3/8	1/4
5/16 o.d. x 5/16 o.d. x 1/8	0.02	3/8	3/8	13/32
5/16 o.d. x 1/8 x 5/16 o.d.	0.02	3/8	13/32	5/16
5/16 o.d. x 1/8 x 1/8	0.02	3/8	13/32	13/32
1/4	0.02	5/16	5/16	1/4
1/4 x 1/4 x 1/2	0.06	19/32	19/32	3/8
1/4 x 1/4 x 3/8	0.04	17/32	17/32	11/32
1/4 x 1/4 x 5/16 o.d.	0.02	5/16	5/16	5/16
1/4 x 1/4 x 1/8	0.02	5/16	5/16	13/32
1/4 x 1/4 x 3/16 o.d.	0.02	5/16	5/16	7/16
1/4 x 5/16 o.d. x 1/4	0.02	5/16	3/8	1/4
1/4 x 1/8 x 1/4	0.02	5/16	13/32	1/4
1/4 x 1/8 x 1/8	0.02	5/16	13/32	3/8
3/8	0.04	11/32	11/32	11/32
3/8 x 3/8 x 1/2	0.07	17/32	17/32	3/8
3/8 x 3/8 x 1/4	0.04	11/32	11/32	15/32
3/8 x 3/8 x 5/16 o.d.	0.04	11/32	11/32	11/32
3/8 x 3/8 x 1/8	0.04	11/32	11/32	11/32
3/8 x 1/4 x 3/8	0.04	11/32	17/32	11/32
3/8 x 1/4 x 1/4	0.04	11/32	17/32	15/32
3/8 x 1/4 x 1/8	0.04	11/32	17/32	9/16
3/8 x 1/8 x 3/8	0.04	11/32	19/32	11/32
3/8 x 1/8 x 1/8	0.04	11/32	19/32	19/32
1/2	0.06	11/32	11/32	11/32
1/2 x 1/2 x 1	0.29	1	1	21/32
1/2 x 1/2 x 3/4	0.12	17/32	17/32	11/32
1/2 x 1/2 x 5/8	0.11	5/8	5/8	7/16
1/2 x 1/2 x 3/8	0.07	5/16	5/16	13/32
1/2 x 1/2 x 1/4	0.06	5/16	5/16	9/16
1/2 x 3/8 x 1/2	0.07	7/16	17/32	3/8
1/2 x 3/8 x 3/8	0.06	5/16	17/32	13/32
1/2 x 3/8 x 1/4	0.06	5/16	17/32	17/32
1/2 x 1/4 x 3/8	0.06	5/16	5/8	9/16

Continues

NOTE: Tee sizes are read Run x Run x Outlet.

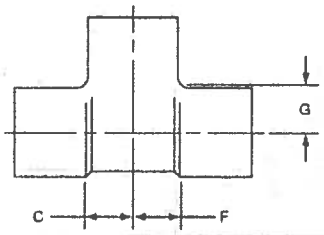
NOM. SIZE	APPROX. NET WT. LBS.	DIMENSIONS INCHES C	F	G
5/8	0.12	7/16	7/16	7/16
5/8 x 5/8 x 3/4	0.15	23/32	23/32	1/2
5/8 x 5/8 x 1/2	0.11	7/16	7/16	13/32
5/8 x 5/8 x 3/8	0.09	7/16	7/16	5/8
5/8 x 5/8 x 1/4	0.09	7/16	7/16	3/4
5/8 x 1/2 x 5/8	0.10	7/16	5/8	7/16
5/8 x 1/2 x 1/2	0.09	7/16	19/32	13/32
5/8 x 3/8 x 5/8	0.10	7/16	3/4	7/16
5/8 x 3/8 x 3/8	0.09	7/16	3/4	5/8
3/4	0.15	1/2	1/2	1/2
3/4 x 3/4 x 1	0.22	23/32	23/32	1/2
3/4 x 3/4 x 5/8	0.16	17/32	17/32	11/16
3/4 x 3/4 x 1/2	0.12	7/16	7/16	17/32
3/4 x 3/4 x 3/8	0.12	7/16	7/16	21/32
3/4 x 3/4 x 1/4	0.12	13/32	13/32	23/32
3/4 x 3/4 x 1/8	0.12	7/16	7/16	13/16
3/4 x 5/8 x 3/4	0.15	17/32	11/16	1/2
3/4 x 5/8 x 5/8	0.15	17/32	23/32	11/16
3/4 x 1/2 x 3/4	0.15	17/32	25/32	1/2
3/4 x 1/2 x 1/2	0.12	13/32	19/32	1/2
3/4 x 1/2 x 3/8	0.12	7/16	21/32	21/32
3/4 x 3/8 x 3/4	0.15	17/32	17/32	1/2
3/4 x 3/8 x 1/2	0.12	7/16	23/32	17/32
3/4 x 3/8 x 3/8	0.12	7/16	23/32	21/32
7/8	0.31	23/32	23/32	23/32
1	0.30	11/16	11/16	21/32
1 x 1 x 1 1/2	0.60	1 11/32	1 11/32	31/32
1 x 1 x 1 1/4	0.42	1	1	29/32
1 x 1 x 3/4	0.27	9/16	9/16	21/32
1 x 1 x 5/8	0.26	9/16	9/16	7/8
1 x 1 x 1/2	0.23	15/32	15/32	23/32
1 x 1 x 3/8	0.23	15/32	15/32	29/32
1 x 1 x 1/4	0.23	15/32	15/32	1
1 x 3/4 x 1	0.29	11/16	7/8	21/32
1 x 3/4 x 3/4	0.26	9/16	23/32	3/4
1 x 3/4 x 1/2	0.22	15/32	21/32	23/32

Continues

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TEES *continued*





611
Tee C x C x C – Wrot continued

NOM. SIZE	APPROX. NET WT. LBS.	DIMENSIONS INCHES C	F	G
1 x 1/2 x 1	0.29	11/16	1	21/32
1 x 1/2 x 3/4	0.27	9/16	13/16	3/4
1 x 1/2 x 1/2	0.22	15/32	25/32	23/32
1 1/4	0.43	13/16	3/16	13/16
1 1/4 x 1 1/4 x 2	1.13	1 30/32	1 30/32	1 3/32
1 1/4 x 1 1/4 x 1 1/2	0.60	1 3/16	1 3/16	29/32
1 1/4 x 1 1/4 x 1	0.45	25/32	25/32	29/32
1 1/4 x 1 1/4 x 3/4	0.37	21/32	21/32	3/4
1 1/4 x 1 1/4 x 1/2	0.30	1/2	1/2	25/32
1 1/4 x 1 1/4 x 3/8	0.34	23/32	23/32	29/32
1 1/4 x 1 x 1 1/4	0.43	13/16	1 1/32	13/16
1 1/4 x 1 x 1	0.47	25/32	7/8	29/32
1 1/4 x 1 x 3/4	0.35	21/32	25/32	7/8
1 1/4 x 1 x 1/2	0.30	1/2	5/8	29/32
1 1/4 x 3/4 x 1 1/4	0.42	13/16	1 1/8	13/16
1 1/4 x 3/4 x 1	0.45	25/32	1 1/32	29/32
1 1/4 x 3/4 x 3/4	0.37	21/32	15/16	7/8
1 1/4 x 3/4 x 1/2	0.30	1/2	3/4	29/32
1 1/4 x 1/2 x 1 1/4	0.41	13/16	1 7/32	13/16
1 1/2	0.61	31/32	31/32	29/32
1 1/2 x 1 1/2 x 2	1.11	1 25/32	1 25/32	1 3/32
1 1/2 x 1 1/2 x 1 1/4	0.62	29/32	29/32	1 1/16
1 1/2 x 1 1/2 x 1	0.55	11/16	11/16	7/8
1 1/2 x 1 1/2 x 3/4	0.45	11/16	11/16	1 1/32
1 1/2 x 1 1/2 x 1/2	0.40	1/2	1/2	1 1/32
1 1/2 x 1 1/4 x 1 1/2	0.62	1 1/32	1 3/16	29/32
1 1/2 x 1 1/4 x 1 1/4	0.62	31/32	1 3/32	31/32
1 1/2 x 1 1/4 x 1	0.51	25/32	1	1 1/32
1 1/2 x 1 1/4 x 3/4	0.49	11/16	13/16	1 1/32
1 1/2 x 1 1/4 x 1/2	0.41	1/2	25/32	1 1/32
1 1/2 x 1 x 1 1/2	0.59	1 1/32	1 11/32	29/32
1 1/2 x 1 x 1 1/4	0.63	29/32	1 1/8	1 1/16
1 1/2 x 1 x 1	0.54	25/32	1 1/16	1 1/32
1 1/2 x 1 x 3/4	0.44	11/16	31/32	15/16
1 1/2 x 1 x 1/2	0.39	1/2	25/32	1 1/32
1 1/2 x 3/4 x 1 1/2	0.62	1 1/32	1 7/16	1 1/16
1 1/2 x 3/4 x 1 1/4	0.58	29/32	1 11/32	1 1/16
1 1/2 x 3/4 x 1	0.54	25/32	1 1/4	1 1/32
1 1/2 x 3/4 x 3/4	0.47	11/16	1 3/32	29/32
1 1/2 x 3/4 x 1/2	0.39	1/2	29/32	31/32
1 1/2 x 1/2 x 1 1/2	0.62	1 1/32	1 13/32	31/32

Continues

NOM. SIZE	APPROX. NET WT. LBS.	DIMENSIONS INCHES C	F	G
2	1.30	1 9/32	1 9/32	1 1/32
2 x 2 x 2 1/2	2.34	2	2	1 21/32
2 x 2 x 1 1/2	1.17	1 1/4	1 1/4	1 23/32
2 x 2 x 1 1/4	1.12	9/32	9/32	1 7/8
2 x 2 x 1	0.91	27/32	27/32	1 1/4
2 x 2 x 3/4	0.88	19/32	19/32	1 1/4
2 x 2 x 1/2	1.17	1 1/4	1 1/4	2 1/4
2 x 1 1/2 x 2	1.16	1 9/32	1 7/8	1 11/32
2 x 1 1/2 x 1 1/2	1.15	1 1/4	1 3/4	1 23/32
2 x 1 1/2 x 1 1/4	1.15	7/32	1 3/4	1 11/32
2 x 1 1/2 x 3/4	0.83	21/32	15/16	1 7/32
2 x 1 1/2 x 1/2	1.12	1 1/4	1 25/32	2 1/4
2 x 1 1/4 x 2	1.58	1 9/32	1 15/32	1 9/32
2 x 1 1/4 x 1 1/2	1.16	1 1/4	1 31/32	1 23/32
2 x 1 1/4 x 1 1/4	1.19	15/16	1 11/32	1 11/32
2 x 1 1/4 x 1	0.90	27/32	1 9/32	1 11/32
2 x 1 1/4 x 3/4	0.85	21/32	1	1 8/27
2 x 1 x 2	1.11	1 1/8	1 25/32	1 1/4
2 x 1 x 1	0.89	27/32	1 9/32	1 11/32
2 x 3/4 x 2	1.15	1 9/32	2 3/16	1 1/4
2 x 1/2 x 2	1.15	1 9/32	2 3/8	1 1/4
2 1/2	2.40	1 5/8	1 5/8	1 5/8
2 1/2 x 2 1/2 x 2	1.97	1 5/16	1 5/16	1 21/32
2 1/2 x 2 1/2 x 1 1/2	1.53	1 3/32	1 3/32	1 21/32
2 1/2 x 2 1/2 x 1 1/4	1.72	1 3/32	1 3/32	1 27/32
2 1/2 x 2 1/2 x 1	1.34	25/32	25/32	1 11/16
2 1/2 x 2 1/2 x 3/4	1.34	25/32	25/32	1 13/16
2 1/2 x 2 1/2 x 1/2	1.34	25/32	25/32	2 1/8
2 1/2 x 2 x 2 1/2	1.99	1 21/32	2 3/32	1 21/32
2 1/2 x 2 x 2	1.95	1 11/32	1 5/8	1 23/32
2 1/2 x 2 x 1 1/2	1.57	1 3/32	2 13/32	1 21/32
2 1/2 x 2 x 1 1/4	1.57	1 3/32	1 19/32	1 27/32
2 1/2 x 2 x 1	1.40	25/32	1 9/32	1 3/4
2 1/2 x 2 x 3/4	1.35	25/32	1 9/32	1 27/32
2 1/2 x 1 1/2 x 1 1/2	1.76	1 3/32	1 13/32	1 3/8
2 1/2 x 1 1/4 x 2 1/2	2.40	1 21/32	2 7/16	1 21/32
2 1/2 x 1 x 2 1/2	2.04	1 21/32	2 23/32	1 21/32
2 1/2 x 3/4 x 2 1/2	2.00	1 21/32	2 11/16	1 21/32

Continues

NOTE: Tee sizes are read Run x Run x Outlet.

NOM. SIZE	APPROX. NET WT. LBS.	DIMENSIONS INCHES C	F	G
3	3.15	1 7/8	1 7/8	2 1/32
3 x 3 x 2 1/2	3.55	1 29/32	1 29/32	2 3/8
3 x 3 x 2	3.19	1 15/32	1 15/32	1 31/32
3 x 3 x 1 1/2	3.08	1 15/32	1 15/32	2 9/32
3 x 3 x 1 1/4	3.10	1 15/32	1 15/32	2 7/16
3 x 3 x 1	2.12	27/32	27/32	1 31/32
3 x 3 x 3/4	2.39	27/32	27/32	2 3/16
3 x 3 x 1/2	1.82	27/32	27/32	2 3/8
3 x 2 1/2 x 3	3.08	1 7/8	2 3/8	1 31/32
3 x 2 1/2 x 2 1/2	3.12	1 29/32	2 11/32	2 5/32
3 x 2 1/2 x 2	2.28	1 15/32	1 27/32	1 31/32
3 x 2 x 3	3.62	1 29/32	2 17/32	1 15/16
3 x 2 x 2 1/2	3.56	1 29/32	2 9/16	2 5/16
3 x 2 x 2	3.22	1 15/32	1 31/32	1 31/32
3 x 1 1/2 x 3	3.13	1 29/32	2 25/32	2 3/32
3 x 1 1/4 x 3	3.63	1 29/32	2 25/32	1 15/16
3 x 1 x 3	3.20	1 31/32	2 19/32	2 3/16
3 x 3/4 x 3	3.55	1 31/32	2 29/32	2 3/16
3 1/2	5.20	2 17/32	2 17/32	2 17/32
4	8.12	2 13/32	2 13/32	2 17/32
4 x 4 x 3	6.70	2 1/32	2 1/32	2 21/32
4 x 4 x 2 1/2	6.65	2 1/32	2 1/32	3 5/32
4 x 4 x 2	5.82	1 15/32	1 15/32	2 7/16
4 x 4 x 1/2	4.42	1	1	2 9/32
4 x 4 x 1 1/2	3.94	1 11/32	1 11/32	2 17/32
4 x 4 x 1 1/4	4.04	1 11/32	1 11/32	2 29/32
4 x 4 x 1	3.72	1	1	2 9/16
4 x 4 x 3/4	3.70	1	1	2 11/16
4 x 3 x 4	7.05	2 25/32	3 7/32	2 17/32
4 x 3 x 3	5.03	2 1/32	2 15/32	2 15/32
4 x 3 x 2 1/2	5.04	2 1/32	2 15/32	2 29/32
4 x 3 x 2	5.87	1 15/32	1 31/32	2 7/16
4 x 2 1/2 x 4	7.19	2 25/32	3 15/32	2 27/32
4 x 2 x 4	7.08	2 25/32	3 19/32	2 27/32

Continued on next page

Consult price sheet for Made to Order items and for minimum order quantities.

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Copper Tube Fittings

TYPES OF JOINTS

Flared Joint — The principle of the flared joint was first developed for copper tube plumbing in 1928 by NIBCO. The flared type joint is wholly a mechanical means of joining copper tubes. The tube nut is placed over the end of the copper tube to be joined; the tube end then is flared out at an approximate 45 degree angle by a flaring tool. The flared end is then drawn up by the tube nut so the inside surface is tightly secured against the ball seat of the fitting. This joint can be readily dismantled at any time and is, in effect, a type of union connection. Its use is generally restricted to soft (annealed) copper tubes since hard drawn tubes would be subject to splitting when flared (if the ends were not previously annealed). The flared ends of NIBCO® Flared Fittings are produced to the requirements of ASME B16.26, "Cast Copper Alloy Fittings for Flared Copper Tube."

Solder Joint — NIBCO pioneered the development of the solder joint and its application to the field of copper tube piping. Today the solder joint is widely adopted, as evidenced by the majority of cities and states that have written codes to include copper tube and solder joints as desirable for general plumbing, water lines, vent, stack, waste and drain lines, as well as other uses in industry. Testing has shown that often the solder joint has greater strength than the tubes being joined, depending upon the soldering alloy selected. While the method of preparing a solder joint is an exacting art to insure a full strength joint, it can be readily mastered by skilled tradesmen. It is for this reason — to insure the public of the protection afforded by properly prepared joints — that NIBCO products are marketed through the reputable sources of supply to the piping trades. Important procedures for preparing a solder joint are graphically illustrated in this catalog on page 48.

Brazed Joint — This type of joint has long been used wherever and whenever critical situations have been encountered in copper piping. The joint itself is completed much in the same manner as the solder joint; however, considerably more heat and several refinements of technique require separate procedures that are described further in this catalog on pages 49-50.

Threaded Ends — To adapt copper tube to equipment having National Standard Pipe Taper (NPT) threads or to add copper tube to existing iron pipe installations or other threaded connections, NIBCO provides fittings having both external and internal NPT threads. These threaded ends are produced to the requirements of ASME B1.20.1, "Pipe Threads, General Purpose (Inch)."

Flanges — To adapt copper tube to equipment having flanged connections, or to add copper tube to flanged pipe installations or other purposes, NIBCO provides flanges. The flanges are produced in two standard types widely used in this field where copper tube can serve — Class 150, comply with ASME B16.24, "Cast Copper Alloy Pipe Flanges and Flanged Fittings Class 150, 300, 400, 600, 900, 1500 and 2500"; and Class 125, which conform to MSS SP-106, "Cast Copper Alloy Flanges and Flanged Fittings Class 125, 150 and 300."

Barbed Insert Fittings for Polybutylene (PB) — NIBCO offers a complete line of copper barbed insert fittings for joining PB tube. The insert fittings are produced to the requirements of ASTM F 1380. Along with the insert fittings are copper crimp rings, which, when properly installed, provide a leak-tight mechanical joint. Transition fittings are available for adapting to new or existing threaded or solder joint ends.

Fitting Terms and Abbreviations

C	Female solder cup
Ftg	Male solder end
F	Female NPT thread
M	Male NPT thread
Hose	Standard hose thread
Hub	Female end for soil pipe
Spigot	Male end for soil pipe
No Hub	Used with mechanical coupling
O.D. Tube	Actual tube outside diameter
S	Straight thread
SJ	Slip joint
FL	Flared

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Copper Tube Fittings continued

SOLDER JOINT SPECIFICATION

1. **Soldering Clearance** (between the outside of the tube and the inside diameter of the solder cup) **and the Depth of the Solder Cup** (into which the tube is inserted).

Chart 1 – Soldering Clearance and Solder Cup Depth

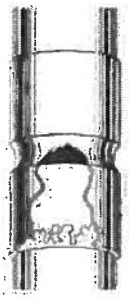
Nominal Size of Fitting (Inches)	Maximum I.D. of Fitting Inch	(mm)	Minimum O.D. of Tube Inch	(mm)	Maximum Clearance for Soldering Inch	(mm)	Depth of Solder Cup Inch	(mm)
1/4	0.381	(9.66)	0.374	(9.50)	0.007	(0.18)	0.31	(7.9)
3/8	0.506	(12.85)	0.499	(12.67)	0.007	(0.18)	0.38	(9.7)
1/2	0.631	(16.03)	0.622	(15.80)	0.009	(0.23)	0.50	(12.7)
5/8	0.756	(19.20)	0.749	(19.02)	0.007	(0.18)	0.62	(15.7)
3/4	0.881	(22.38)	0.872	(22.20)	0.009	(0.23)	0.75	(19.1)
1	1.132	(28.75)	1.123	(28.54)	0.009	(0.23)	0.91	(23.1)
1 1/4	1.382	(35.10)	1.373	(34.88)	0.009	(0.23)	0.97	(24.6)
1 1/2	1.633	(41.48)	1.623	(41.22)	0.010	(0.25)	1.09	(27.7)
2	2.133	(54.18)	2.123	(53.92)	0.010	(0.25)	1.34	(34.0)
2 1/2	2.633	(66.88)	2.623	(66.62)	0.010	(0.25)	1.47	(37.3)
3	3.133	(79.58)	3.123	(79.32)	0.010	(0.25)	1.66	(42.2)
3 1/2	3.633	(92.28)	3.623	(92.02)	0.010	(0.25)	1.91	(48.5)
4	4.133	(104.98)	4.123	(104.72)	0.010	(0.25)	2.16	(54.9)
5	5.133	(130.38)	5.123	(130.12)	0.010	(0.25)	2.66	(67.6)
6	6.133	(155.78)	6.123	(155.52)	0.010	(0.25)	3.09	(78.5)

The National Bureau of Standards Report BMS58, "Strength of Soft-Soldered Joints in Copper Tubing," reporting on tests conducted with 3/4-inch tubing and fitting, says "When the clearance is greater than 0.010 inch (0.25 mm), there is difficulty in filling the joint properly."

2. **Depth of Solder Penetration** drastically affects the breaking load of the joint. When there is too great a soldering clearance, there is no capillary flow to assure complete solder penetration. As shown in the chart below, the holding power of the 3/4-inch joint is directly proportional to the depth of solder penetration.

   For example: If you get only one-third penetration, you get approximately one-third the strength needed to assure complete satisfaction.

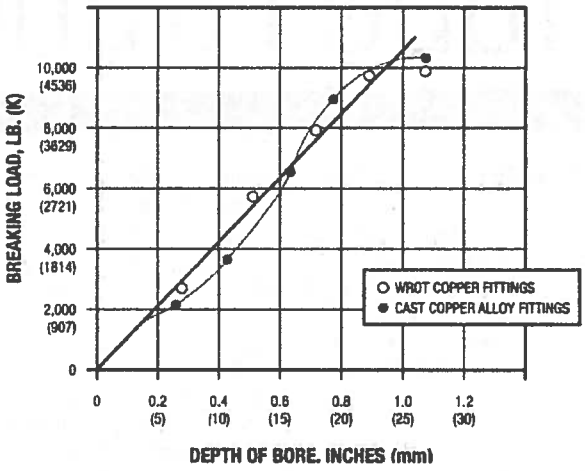
Chart 2 – Type K 3/4" Tubing



Solder penetration of one-third the cup depth — breaking load, approximately 2,100 lb. (955 kg)



Solder penetration of the entire cup depth — breaking load approximately 7,000 lb. (3175 kg)



HOW TO BE SURE OF PROPER TOLERANCES

It is apparent that all of the scientific apparatus used to test tube and fittings, according to the dimensions indicated in Chart 1, would be impractical to use on the job. It is therefore essential that you install tube and fittings manufactured by companies known to be dedicated to the highest quality control standards. Should you encounter a condition where there is difficulty in filling the joint properly, NIBCO will analyze the trouble without charge. Just send six inches of the tube, along with the fitting and our technicians will provide you with an authoritative report.

U.S. customary units in this document are the standard, the metric units are provided for reference only. The values stated in each system are not exact equivalents.

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BRAZING INFORMATION

Copper Water Tube Size (In Inches)	Brazing[A] Filler Required Inches	(mm)	Torch Tip Drill Size No.	For Estimating Purposes Acetylene Consumption C.F.H.	(C.M.H.)	Oxygen Pressure (Approx.) PSI	(kPa)	Acetylene Pressure (Approx.) PSI	(kPa)
1/4	0.25[B]	(6.4)	54	15.9	(0.5)	4	(27)	4	(27)
3/8	0.38[B]	(9.7)	54	15.9	(0.5)	4	(27)	4	(27)
1/2	0.50	(12.7)	51	24.8	(0.7)	5	(34)	5	(34)
5/8	0.62	(15.7)	51	24.8	(0.7)	5	(34)	5	(34)
3/4	1.00	(25.0)	51	24.8	(0.7)	5	(34)	5	(34)
1	1.60	(41.0)	48	31.6	(0.9)	6	(41)	6	(41)
1 1/4	2.00	(51.0)	48	31.6	(0.9)	6	(41)	6	(41)
1 1/2	2.60	(66.0)	44	38.7	(1.1)	7	(48)	7	(48)
2	4.40	(112.0)	40	60.0	(1.7)	7	(48)	7	(48)
2 1/2	5.90	(150.0)	40	60.0	(1.7)	7	(48)	7	(48)
3	7.90	(200.0)	35	70.0	(2.0)	7 1/2	(52)	7 1/2	(52)
3 1/2	10.50	(207.0)	35	70.0	(2.0)	7 1/2	(52)	7 1/2	(52)
4	13.50	(343.0)	30	88.5	(2.5)	9	(62)	9	(62)
5	20.50	(521.0)	30	88.5	(2.5)	9	(62)	9	(62)
6	28.50	(724.0)	30	88.5	(2.5)	9	(62)	9	(62)

[A] Approximate consumption when brazing one cup of the fitting. Actual consumption depends on workmanship.
For filler sizes shown, one pound of filler alloy provides 1,068 inches (27.13 mm) of 1/16-inch wire or 475 inches (12,065 mm) of 3/32-inch wire.

[B] 1/16-inch (1.59 mm) diameter wire; all other is 3/32-inch (2.38 mm) diameter.

SOLDER AND FLUX REQUIREMENTS

Nom. Size Joint (In Inches)	Solder Required, LB (kg) General Use	Drainage Use	
1/4	0.097	–	
3/8	0.159	–	
1/2	0.261	–	
5/8	0.389	–	
3/4	0.548	–	
1	0.856	–	
1 1/4	1.115	1.2	(0.5)
1 1/2	1.480	1.4	(0.6)
2	2.380	1.5	(0.7)
2 1/2	3.225	–	
3	4.335	2.8	(1.3)
3 1/2	5.786	–	
4	7.446	4.2	(1.9)
5	11.392	–	
6	15.815	–	
8	26.955	–	

Solder requirements in this table are based on estimate of weight of solder used to prepare 100 solder joints of sizes shown.

Two (2) ounces (0.06 kg) of solder flux will be required for each pound (0.45 kg) of solder.

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Copper Tube Fittings continued

RATED INTERNAL WORKING PRESSURES OF JOINTS MADE WITH COPPER WATER TUBE AND SOLDER TYPE FITTINGS, PSI (BAR)

Joining Material	Working Temperature °F	°C	Maximum Gauge Working Pressure for Standard Water Tube Sizes (Note (1)) 1/8" though 1" PSI	BAR	1 1/4" through 2" PSI	BAR	2 1/2" through 4" PSI	BAR	5" through 8" PSI	BAR	10" to 12" PSI	BAR	Saturated Steam LB (kg) All Sizes
Alloy Sn50 50-50 Tin-Lead solder [Notes (2), (3)]	100	38	200	(14)	175	(12)	150	(10)	135	(9)	100	(6)	15
	150	66	150	(10)	125	(9)	100	(7)	90	(6)	70	(5)	
	200	93	100	(7)	90	(6)	75	(5)	70	(5)	50	(3)	
	250	121	85	(6)	75	(5)	50	(3)	45	(3)	40	(3)	
Alloy Sb5 95-5 Tin-Antimony solder [Note (4)]	100	38	1090[8]	(75)	850[8]	(59)	705[8]	(49)	660[8]	(46)	340	(23)	15
	150	66	625[10]	(43)	485[10]	(34)	405[10]	(28)	375[10]	(26)	280	(19)	
	200	93	505[10]	(35)	395[10]	(27)	325[10]	(32)	305[10]	(21)	230	(16)	
	250	121	270	(19)	210	(15)	175	(12)	165	(11)	120	(8)	
Alloy E	100	38	710[10]	(49)	555[10]	(38)	460[10]	(32)	430[10]	(30)	320	(22)	15
	150	66	475[11]	(33)	370[10]	(26)	305[10]	(21)	285[11]	(20)	215	(15)	
	200	93	375	(26)	290	(20)	240[11]	(17)	225[11]	(16)	170	(12)	
	250	121	320	(22)	250	(17)	205	(14)	195	(13)	145	(9)	
Alloy HB [Note (6)]	100	38	1035[9]	(71)	805[8]	(56)	670[8]	(46)	625[9]	(43)	340	(23)	15
	150	66	710[10]	(49)	555[10]	(38)	460[10]	(32)	430[10]	(30)	320	(22)	
	200	93	440[11]	(30)	345[11]	(24)	285[11]	(20)	265[11]	(18)	200	(14)	
	250	121	430[11]	(30)	335[11]	(23)	275[11]	(19)	260[11]	(18)	195	(13)	
Joining materials at or above 593°C [Note (7)]	Pressure-temperature ratings consistent with the materials and procedures employed.												

GENERAL NOTE:

For extremely low working temperatures in the 0°F to 200°F range, it is recommended that a joint material melting at or above 1000°F be employed (see Note (5)).

NOTES:

(1) Standard water tube sizes per ASTM B 88
(2) ASTM B 32 Alloy Grade Sn50
(3) The Safe Drinking Water Act Amendment of 1986 prohibits the use of any solder having a lead content in excess of 0.2% in potable water systems.
(4) ASTM B 32 Alloy Grade Sb5
(5) ASTM B 32 Alloy Grade E
(6) ASTM B 32 Alloy Grade HB
(7) These joining materials are defined as *brazing alloys* by the American Welding Society.
(8) The solder joint exceeds the strength of Types K, L & M tube in drawn and annealed tempers.
(9) The solder joint exceeds the strength of Types L & M tube in drawn temper and Type K tube in annealed temper.
(10) The solder joint exceeds the strength of Type M tube in drawn temper and Types L & K in annealed temper.
(11) The solder joint exceeds the strength of Type L tube in annealed temper.

RATED INTERNAL WORKING PRESSURES OF JOINTS MADE WITH FLARED FITTINGS AND COPPER WATER TUBE

Nominal Size Joint (In Inches)	Temperature, °F (°C)[A]	Pressure, PSI (BAR)[A]
3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, 2	100 (38)	175 (12)

[A] ASME B16.26

RATED INTERNAL WORKING PRESSURES OF POLYBUTYLENE TUBE AND COPPER BARBED INSERT FITTINGS

Nominal Size Joint (In Inches)	Temperature, °F (°C)	Pressure, PSI (BAR)
3/8, 1/2, 3/4, 1	73 (23)	200 (14)
	140 (60)	160 (11)
	180 (82)	100 (7)
	200 (93)	80 (5)

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RATED INTERNAL WORKING PRESSURE[1] FOR COPPER FITTINGS, PSI (BAR)

Nominal Water Tube Size (In Inches)	Water Temperature Range						
	-20° to 100°F (-29° to 38°C)	150°F (66°C)	200°F (95°C)	250°F (120°C)	300°F (149°C)	350°F (177°C)	400°F (204°C)
1/4	912 (62)	775 (53)	729 (50)	729 (50)	714 (49)	608 (42)	456 (31)
3/8	779 (54)	662 (46)	623 (43)	623 (43)	610 (42)	519 (36)	389 (27)
1/2	722 (50)	613 (42)	577 (40)	577 (40)	565 (39)	481 (33)	361 (25)
5/8	631 (43)	537 (37)	505 (35)	505 (35)	495 (34)	421 (29)	316 (21)
3/4	582 (40)	495 (34)	466 (32)	466 (32)	456 (31)	388 (27)	291 (20)
1	494 (34)	420 (29)	395 (27)	395 (27)	387 (26)	330 (23)	247 (17)
1 1/4	439 (30)	373 (26)	351 (24)	351 (24)	344 (23)	293 (20)	219 (15)
1 1/2	408 (28)	347 (24)	327 (23)	327 (23)	320 (22)	272 (19)	204 (14)
2	364 (25)	309 (21)	291 (20)	291 (20)	285 (20)	242 (17)	182 (13)
2 1/2	336 (23)	285 (20)	269 (19)	269 (19)	263 (18)	224 (15)	168 (12)
3	317 (22)	270 (19)	254 (17)	254 (17)	248 (17)	211 (15)	159 (11)
3 1/2	304 (21)	258 (18)	243 (17)	243 (17)	238 (16)	202 (14)	152 (10)
4	293 (20)	249 (17)	235 (16)	235 (16)	230 (16)	196 (13)	147 (10)
5	269 (19)	229 (16)	215 (15)	215 (15)	211 (15)	179 (12)	135 (9)
6	251 (17)	213 (15)	201 (14)	201 (14)	196 (14)	167 (12)	125 (8)
8	270 (19)	230 (16)	216 (15)	216 (15)	212 (15)	180 (12)	135 (9)

[1] The fitting pressure rating applies to the largest opening of the fitting.

RATED INTERNAL WORKING PRESSURES OF CAST COPPER ALLOY FLANGES AND FLANGED FITTINGS

Nominal Size Joint (In Inches)	Temperature °F (°C)[A]	Pressure (PSI) Class 125[A,B]	Class 150[B]	Class 150[A,C]
1/2, 3/4, 1, 1 1/4, 1 1/2, 2, 2 1/2, 3, 4, 5, 6, 8 (also 10" for Class 125)	0 – 150 (0 – 66)	105 (7)	210 (14)	225 (15)
	175 (79)	100 (7)	205 (14)	220 (15)
	200 (93)	95 (7)	195 (13)	210 (15)
	225 (107)	90 (6)	190 (13)	205 (14)
	250 (121)	90 (6)	180 (12)	195 (13)
	275 (135)	85 (6)	175 (12)	190 (13)
	300 (149)	85 (6)	170 (12)	180 (12)
	350 (177)	75 (5)	150 (10)	165 (11)
	406 (208)	70 (5)	140 (9)	150 (10)

[A] MSS SP-106

[B] ASTM B584, UNS C83800 and UNS C84400

[C] ASTM B62, UNS C83600 and ASTM B584, UNS C83600

U.S. customary units in this document are the standard; the metric units are provided for reference only. The values stated in each system are not exact equivalents.

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rsn 703956
PERMIT 13647594

Copper Fittings Dimensional Data

The mechanics of making both the solder joint and the brazing joint are comparatively similar. Complete instructions on proper techniques of both of these joining methods are outlined in this catalog on pages 48-50.

A very important consideration in Copper Piping is the selection of the proper bonding medium. As a general rule, the working temperature of the installation is a more important consideration than the working pressures. If the working temperature is not over 250°F (121°C), either 50-50%* or 95-5% solder can be used successfully. However, if the temperature exceeds 250°F (121°C), a low temperature brazing alloy should be used, with a melting temperature somewhat in excess of 1000°F (538°C).

According to BMS report No. 58, joints made with tin or tin-alloy solders should not be subject continuously to temperatures above 250°F (121°C). A number of brazing alloys are available and a careful study should be made in every case to determine the proper alloy for the particular application.

*The Safe Drinking Water Act Amendment of 1986 prohibits the use in potable water systems of any solder having a lead content in excess of 0.2%.

DIMENSIONAL DATA – SOLDER JOINT FITTING ENDS

Nominal Water Tube Size (In Inches)	Solder Joint Fittings – Tolerances: Male End (Fitting Connector) Diameter Min. Inch	Min. (mm)	Male End Max. Inch	Max. (mm)	Female End (Solder Cup) Diameter Min. Inch	Min. (mm)	Female End Max. Inch	Max. (mm)	Solder Joint Fittings Copper Alloy – Pressure [1,2]: Fitting End Length Min. Inch	(mm)	Solder Cup Length Min. Inch	(mm)	Solder Joint Fittings Copper Alloy – Drainage [3,4]: Fitting End Length Min. Inch	(mm)	Solder Cup Length Min. Inch	(mm)
1/8	0.248	(6.30)	0.251	(6.38)	0.252	(6.40)	0.256	(6.50)	0.31	(7.9)	0.25	(6.4)	N/A	N/A	N/A	N/A
1/4	0.373	(9.47)	0.376	(9.55)	0.377	(9.58)	0.381	(9.68)	0.38	(9.7)	0.31	(7.9)	N/A	N/A	N/A	N/A
3/8	0.497	(12.62)	0.501	(12.73)	0.502	(12.75)	0.506	(12.85)	0.44	(11.2)	0.38	(9.7)	N/A	N/A	N/A	N/A
1/2	0.622	(15.80)	0.626	(15.90)	0.627	(15.93)	0.631	(16.03)	0.56	(14.2)	0.50	(12.7)	N/A	N/A	N/A	N/A
5/8	0.747	(18.97)	0.751	(19.08)	0.752	(19.10)	0.756	(19.20)	0.69	(17.5)	0.62	(15.7)	N/A	N/A	N/A	N/A
3/4	0.872	(22.15)	0.876	(22.25)	0.877	(22.28)	0.881	(22.38)	0.81	(20.6)	0.75	(19.1)	N/A	N/A	N/A	N/A
1	1.122	(28.50)	1.127	(28.63)	1.128	(28.65)	1.132	(28.75)	0.97	(24.6)	0.91	(23.1)	N/A	N/A	N/A	N/A
1 1/4	1.372	(34.85)	1.377	(34.98)	1.378	(35.00)	1.382	(35.10)	1.03	(26.2)	0.97	(24.6)	0.56	(14.2)	0.50	(12.7)
1 1/2	1.621	(41.17)	1.627	(41.33)	1.628	(41.35)	1.633	(41.48)	1.16	(29.5)	1.09	(27.7)	0.62	(15.7)	0.56	(14.2)
2	2.121	(53.87)	2.127	(54.03)	2.128	(54.05)	2.133	(54.18)	1.41	(35.8)	1.34	(34.0)	0.69	(17.5)	0.62	(15.7)
2 1/2	2.621	(66.57)	2.627	(66.73)	2.628	(66.75)	2.633	(66.88)	1.53	(38.9)	1.47	(37.3)	N/A	N/A	N/A	N/A
3	3.121	(79.27)	3.127	(79.43)	3.128	(79.45)	3.133	(79.58)	1.72	(43.7)	1.66	(42.2)	0.81	(20.6)	0.75	(19.1)
3 1/2	3.621	(91.97)	3.627	(92.13)	3.628	(92.15)	3.633	(92.28)	1.97	(50.0)	1.91	(48.5)	N/A	N/A	N/A	N/A
4	4.121	(104.67)	4.127	(104.83)	4.128	(104.85)	4.133	(104.98)	2.22	(56.4)	2.16	(54.9)	1.06	(26.9)	1.00	(25.4)
5	5.121	(130.07)	5.127	(130.23)	5.128	(130.25)	5.133	(130.38)	2.72	(69.1)	2.66	(67.6)	1.31	(33.3)	1.25	(31.8)
6	6.121	(155.47)	6.127	(155.63)	6.128	(155.65)	3.133	(79.58)	3.22	(81.8)	3.09	(78.5)	1.62	(41.1)	1.50	(38.1)
8	8.119	(206.22)	8.127	(206.43)	8.128	(206.45)	8.133	(206.58)	4.09	(103.9)	3.97	(100.8)	2.12	(53.8)	2.00	(50.8)
10	10.119	(257.02)	10.127	(257.23)	10.128	(257.25)	10.133	(257.38)	4.12	(104.6)	4.00	(101.6)	N/A	N/A	N/A	N/A
12	12.119	(307.82)	12.127	(308.03)	12.128	(308.05)	12.133	(308.18)	4.62	(117.3)	4.50	(114.3)	N/A	N/A	N/A	N/A

[1] As shown Standard ASME B16.18
[2] As shown Standard ASME B16.22
[3] As shown Standard ASME B16.23
[4] As shown Standard ASME B16.29

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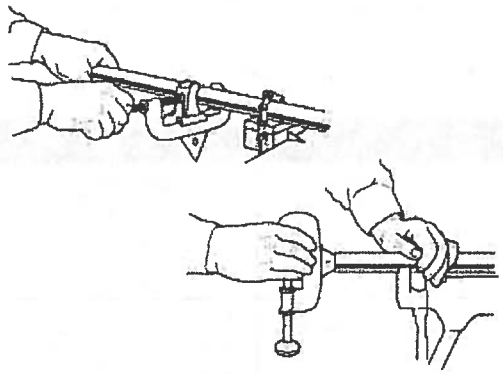
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The Fine Art of Soldering

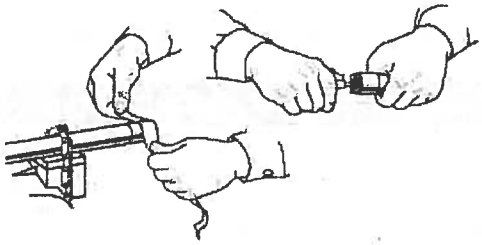
When adjoining surfaces of copper and copper alloys meet under proper conditions of cleanliness and temperature, solder will make a perfect adhesion. The strength of joint is equal to or even greater than the strength of tube alone. Surface tension seals the joint. Capillary attraction draws solder into, around, and all about the joint. It's easy to learn to make a perfect solder joint when you use NIBCO® Fittings.

WITH 95-5 SOLDER AND INTERMEDIATELY CORROSIVE FLUX

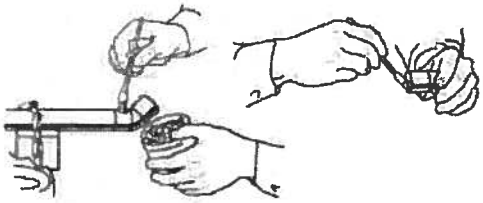
1. Cut tube end square, ream, burr and size.



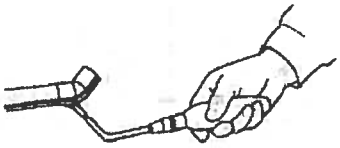
2. Use sand cloth or steel wire brush to clean tube and cup to a bright metal finish.



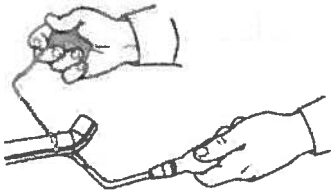
3. Apply solder flux to outside of tube and inside of cup of fitting carefully so that surfaces to be joined are completely covered. **Use flux sparingly.**



4. Apply flame to the fitting to heat tube and solder cup of fitting until solder melts when placed at joint of tube and fitting.



5. Remove flame and feed solder into the joint at one or two points until a ring of solder appears at the end of the fitting. The correct amount of solder is approximately equal to 1 1/2 the diameter of the fitting... 3/4" (20mm) solder for 1/2" fitting, etc.



6. Remove excess solder with a small brush or wiping cloth while the solder is plastic.



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rsn 703956
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Copper Water Tube

The mechanics of making both the solder joint and the brazing joint are comparatively similar. Complete instructions on proper techniques of both of these joining methods are outlined in this catalog on pages 85-97.

A very important consideration in Copper Piping is the selection of the proper bonding medium. As a general rule, the working temperature of the installation is a more important consideration than the working pressures. If the working temperature is not over 250°F (121°C), either 50-50%* or 95-5% solder can be used successfully. However, if the temperature exceeds 250°F (121°C), a low temperature brazing alloy should be used, with a melting temperature somewhat in excess of 1000°F (538°C).

According to BMS report No. 58, joints made with tin or tin-alloy solders should not be subject continuously to temperatures above 250°F (121°C). A number of brazing alloys are available and a careful study should be made in every case to determine the proper alloy for the particular application.

*The Safe Drinking Water Act Amendment of 1986 prohibits the use in potable water systems of any solder having a lead content in excess of 0.2%.

DIMENSIONAL DATA – SOLDER JOINT FITTING ENDS

Nominal Water Tube Size (In Inches)	Solder Joint Fittings – Tolerances: Male End (Fitting Connector) Diameter Min. Inch	(mm)	Male End (Fitting Connector) Diameter Max. Inch	(mm)	Female End (Solder Cup) Diameter Min. Inch	(mm)	Female End (Solder Cup) Diameter Max. Inch	(mm)	Solder Joint Fittings Copper Alloy – Pressure [1,2] Fitting End Length Min. Inch	(mm)	Solder Cup Length Min. Inch	(mm)	Solder Joint Fittings Copper Alloy – Drainage [3,4] Fitting End Length Min. Inch	(mm)	Solder Cup Length Min. Inch	(mm)
1/8	0.248	(6.30)	0.251	(6.38)	0.252	(6.40)	0.256	(6.50)	0.31	(7.9)	0.25	(6.4)	N/A	N/A	N/A	N/A
1/4	0.373	(9.47)	0.376	(9.55)	0.377	(9.58)	0.381	(9.68)	0.38	(9.7)	0.31	(7.9)	N/A	N/A	N/A	N/A
3/8	0.497	(12.62)	0.501	(12.73)	0.502	(12.75)	0.506	(12.85)	0.44	(11.2)	0.38	(9.7)	N/A	N/A	N/A	N/A
1/2	0.622	(15.80)	0.626	(15.90)	0.627	(15.93)	0.631	(16.03)	0.56	(14.2)	0.50	(12.7)	N/A	N/A	N/A	N/A
5/8	0.747	(18.97)	0.751	(19.08)	0.752	(19.10)	0.756	(19.20)	0.69	(17.5)	0.62	(15.7)	N/A	N/A	N/A	N/A
3/4	0.872	(22.15)	0.876	(22.25)	0.877	(22.28)	0.881	(22.38)	0.81	(20.6)	0.75	(19.1)	N/A	N/A	N/A	N/A
1	1.122	(28.50)	1.127	(28.63)	1.128	(28.65)	1.132	(28.75)	0.97	(24.6)	0.91	(23.1)	N/A	N/A	N/A	N/A
1 1/4	1.372	(34.85)	1.377	(34.98)	1.378	(35.00)	1.382	(35.10)	1.03	(26.2)	0.97	(24.6)	0.56	(14.2)	0.50	(12.7)
1 1/2	1.621	(41.17)	1.627	(41.33)	1.628	(41.35)	1.633	(41.48)	1.16	(29.5)	1.09	(27.7)	0.62	(15.7)	0.56	(14.2)
2	2.121	(53.87)	2.127	(54.03)	2.128	(54.05)	2.133	(54.18)	1.41	(35.8)	1.34	(34.0)	0.69	(17.5)	0.62	(15.7)
2 1/2	2.621	(66.57)	2.627	(66.73)	2.628	(66.75)	2.633	(66.88)	1.53	(38.9)	1.47	(37.3)	N/A	N/A	N/A	N/A
3	3.121	(79.27)	3.127	(79.43)	3.128	(79.45)	3.133	(79.58)	1.72	(43.7)	1.66	(42.2)	0.81	(20.6)	0.75	(19.1)
3 1/2	3.621	(91.97)	3.627	(92.13)	3.628	(92.15)	3.633	(92.28)	1.97	(50.0)	1.91	(48.5)	N/A	N/A	N/A	N/A
4	4.121	(104.67)	4.127	(104.83)	4.128	(104.85)	4.133	(104.98)	2.22	(56.4)	2.16	(54.9)	1.06	(26.9)	1.00	(25.4)
5	5.121	(130.07)	5.127	(130.23)	5.128	(130.25)	5.133	(130.38)	2.72	(69.1)	2.66	(67.6)	1.31	(33.3)	1.25	(31.8)
6	6.121	(155.47)	6.127	(155.63)	6.128	(155.65)	3.133	(79.58)	3.22	(81.8)	3.09	(78.5)	1.62	(41.1)	1.50	(38.1)
8	8.119	(206.22)	8.127	(206.43)	8.128	(206.45)	8.133	(206.58)	4.09	(103.9)	3.97	(100.8)	2.12	(53.8)	2.00	(50.8)
10	10.119	(257.02)	10.127	(257.23)	10.128	(257.25)	10.133	(257.38)	4.12	(104.6)	4.00	(101.6)	N/A	N/A	N/A	N/A
12	12.119	(307.82)	12.127	(308.03)	12.128	(308.05)	12.133	(308.18)	4.62	(117.3)	4.50	(114.3)	N/A	N/A	N/A	N/A

[1] As shown Standard ASME B16.18
[2] As shown Standard ASME B16.22
[3] As shown Standard ASME B16.23
[4] As shown Standard ASME B16.29

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rsn 703956
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DIMENSIONAL DATA – COPPER WATER TUBE – TYPE "L"

TYPE "L" Hard Drawn: 20-ft. (6.1m) Straight Lengths
Soft Annealed: 20-ft. (6.1m) Straight Lengths, or 40-ft. (12.2m) and 60-ft. (18.3m) Length Coils (to and including size 1 1/2)

Usage: For general purpose plumbing and heating conditions.

Nominal Water Tube Size (In Inches)	Outside Diameter		Tolerances (Hard Drawn Only) Tubing OD Min.		Tolerances (Hard Drawn Only) Tubing OD Max.		Nominal Wall Thickness		Weight Per Foot		Hard Drawn Bursting Pressure[A]		Hard Drawn Safe Working Pressure[B]		Soft Annealed Bursting Pressure[A]		Soft Annealed Safe Working Pressure[C]	
	Inch	(mm)	Inch	(mm)	Inch	(mm)	Inch	(mm)	Lb	(kg)	psi	(bars)	psi	(bars)	psi	(bars)	psi	(bars)
1/4	0.375	(9.53)	0.373	(9.47)	0.376	(9.55)	0.030	(0.76)	0.126	(0.06)	N/A	N/A	1367	(94)	N/A	N/A	775	(53)
3/8	0.500	(12.70)	0.497	(12.62)	0.501	(12.72)	0.035	(0.89)	0.198	(0.09)	N/A	N/A	1168	(81)	N/A	N/A	662	(46)
1/2	0.625	(15.88)	0.622	(15.80)	0.626	(15.90)	0.040	(1.02)	0.285	(0.13)	7765	(535)	1082	(75)	3885	(268)	613	(42)
5/8	0.750	(19.05)	0.747	(18.97)	0.751	(19.08)	0.042	(1.07)	0.362	(0.16)	N/A	N/A	947	(65)	N/A	N/A	537	(37)
3/4	0.875	(22.23)	0.872	(22.15)	0.876	(22.25)	0.045	(1.14)	0.455	(0.21)	5900	(407)	873	(60)	2935	(202)	495	(34)
1	1.125	(28.58)	1.122	(28.50)	1.127	(28.63)	0.050	(1.27)	0.655	(0.30)	5115	(353)	741	(51)	2650	(183)	428	(29)
1 1/4	1.375	(34.93)	1.372	(34.85)	1.377	(34.98)	0.055	(1.40)	0.884	(0.40)	4550	(314)	658	(45)	2400	(165)	373	(26)
1 1/2	1.625	(41.28)	1.621	(41.17)	1.627	(41.33)	0.060	(1.52)	1.140	(0.52)	4100	(283)	613	(42)	2200	(152)	347	(24)
2	2.125	(53.98)	2.121	(53.87)	2.127	(54.03)	0.070	(1.78)	1.750	(0.79)	3365	(232)	545	(38)	1910	(132)	309	(21)
2 1/2	2.625	(66.68)	2.621	(66.57)	2.627	(66.73)	0.080	(2.03)	2.480	(1.12)	3215	(222)	504	(35)	N/A	N/A	285	(20)
3	3.125	(79.38)	3.121	(79.27)	3.127	(79.43)	0.090	(2.29)	3.330	(1.51)	2865	(198)	476	(33)	N/A	N/A	270	(19)
3 1/2	3.625	(92.08)	3.621	(91.97)	3.627	(92.13)	0.100	(2.54)	4.290	(1.95)	N/A	N/A	455	(31)	N/A	N/A	258	(18)
4	4.125	(104.78)	4.121	(104.67)	4.127	(104.83)	0.110	(2.79)	5.380	(2.44)	2865	(198)	440	(30)	N/A	N/A	249	(17)
5	5.125	(130.18)	5.121	(130.07)	5.127	(130.23)	0.125	(3.18)	7.610	(3.45)	2985	(206)	404	(28)	N/A	N/A	229	(16)
6	6.125	(155.58)	6.121	(155.47)	6.127	(155.63)	0.140	(3.56)	10.200	(4.63)	2690	(185)	376	(26)	N/A	N/A	213	(15)
8	8.125	(206.38)	8.118	(206.22)	8.127	(206.43)	0.200	(5.08)	19.290	(8.75)	2650	(183)	406	(28)	N/A	N/A	230	(16)
10	10.125	(257.18)	10.119	(257.02)	10.127	(257.23)	0.250	(6.35)	30.100	(13.65)	N/A	N/A	407	(28)	N/A	N/A	231	(16)
12	12.125	(307.98)	12.119	(307.82)	12.127	(308.03)	0.280	(7.11)	40.400	(18.33)	N/A	N/A	380	(26)	N/A	N/A	215	(15)

Note: Information and data contained in these charts, as taken from ASTM Specifications B 88. Rated internal pressure for copper water tube based on the strength of the tube alone and applicable to systems using suitable mechanical joints.

[A] Based on actual laboratory test data provided by Copper Development Association, Inc.

[B] Based upon 150°F (65.6°C) with an allowable stress of 9500 psi (668 kPa).

[C] Based upon 150°F (65.6°C) with an allowable stress of 5100 psi (359 kPa).

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Copper Water Tube continued

SELECTION OF TUBE SIZES

The smooth interior of copper tube, and the design of both solder joint and flared-tube-type fittings, which have no shoulders projecting into the flow of water, decrease friction loss. With the use of copper tube, no allowance is necessary for the accumulation of rust deposits in supply and service lines. Consequently, copper tube lines are usually figured one size smaller than iron pipe for the same service. This rule does not apply to lines from a well to a pump where the nominal diameters specified by the pump manufacturer must be adhered to strictly.

Water passing through any pipe line encounters resistance by friction. The resistance is increased by bends and turns in the line, which should be taken into account in complex piping systems. For example, a one-inch 90° elbow will cause friction loss equivalent to that of one foot (0.305m) of straight one-inch tube. (See below for allowance to be made for fittings and valves in equivalent lengths of tube.) Friction loss in terms of head loss must be taken into consideration in calculating tube sizes to be used for various types of installations.

For most average-size-house installations with water pressures 40 PSI (275.8kPa) and higher, 3/4" copper tube will be ample for main supply lines, and 1/2" copper tube can be used for risers and branches to all fixtures. The smaller 3/8" tube is adequate to supply branches, but with pressures at 40 PSI (275.8kPa) and higher, water hammer becomes a concern when the flow is suddenly stopped.

APPROXIMATE FRICTION LOSS ALLOWANCES FOR FITTINGS AND VALVES IN FEET OF STRAIGHT TUBE

	Wrought-Copper Fittings						Cast Copper Alloy Fittings and Valves						
Nominal Tube Size (In Inches)	90° Elbow Feet (m)	45° Elbow Feet (m)	Tee Run Feet (m)	Tee Side Outlet Feet (m)	90° Bend Feet (m)	180° Bend Feet (m)	90° Elbow Feet (m)	45° Elbow Feet (m)	Tee Run Feet (m)	Tee Side Outlet Feet (m)	Comp. Stop Feet (m)	Globe Valve Feet (m)	Gate Valve Feet (m)
3/8	0.5 (0.15)	0.5 (0.15)	0.5 (0.15)	1 (0.31)	0.5 (0.15)	0.5 (0.15)	1 (0.31)	0.5 (0.15)	0.5 (0.15)	2 (0.61)	9 (2.75)	– –	– –
1/2	0.5 (0.15)	0.5 (0.15)	0.5 (0.15)	1 (0.31)	0.5 (0.15)	1 (0.31)	1 (0.31)	0.5 (0.15)	0.5 (0.15)	2 (0.61)	13 (3.97)	– –	– –
5/8	0.5 (0.15)	0.5 (0.15)	0.5 (0.15)	2 (0.61)	1 (0.31)	1 (0.31)	2 (0.61)	1 (0.31)	0.5 (0.15)	3 (0.92)	17 (5.19)	– –	– –
3/4	1 (0.31)	0.5 (0.15)	0.5 (0.15)	2 (0.61)	1 (0.31)	2 (0.61)	2 (0.61)	1 (0.31)	0.5 (0.15)	3 (0.92)	21 (6.41)	– –	– –
1	1 (0.31)	1 (0.31)	0.5 (0.15)	3 (0.92)	2 (0.61)	2 (0.61)	4 (1.22)	2 (0.61)	0.5 (0.15)	5 (1.53)	30 (9.15)	– –	1 (0.31)
1 1/4	2 (0.61)	1 (0.31)	0.5 (0.15)	4 (1.22)	2 (0.61)	3 (0.92)	5 (1.53)	2 (0.61)	1 (0.31)	7 (2.14)	– –	53 (16.17)	1 (0.31)
1 1/2	2 (0.61)	2 (0.61)	1 (0.31)	5 (1.53)	2 (0.61)	4 (1.22)	8 (2.44)	3 (0.92)	1 (0.31)	9 (2.75)	– –	66 (20.13)	2 (0.61)
2	2 (0.61)	2 (0.61)	1 (0.31)	7 (2.14)	3 (0.92)	8 (2.44)	11 (3.36)	5 (1.53)	2 (0.61)	12 (3.66)	– –	90 (27.45)	2 (0.61)
2 1/2	2 (0.61)	3 (0.92)	2 (0.61)	9 (2.75)	4 (1.22)	16 (4.88)	14 (4.27)	8 (2.44)	2 (0.61)	16 (4.88)	– –	– –	2 (0.61)
3	3 (0.92)	4 (1.22)	– –	– –	5 (1.53)	20 (6.10)	18 (5.49)	11 (3.36)	2 (0.61)	20 (6.10)	– –	– –	2 (0.61)
3 1/2	4 (1.22)	– –	– –	– –	7 (2.14)	24 (7.32)	24 (7.32)	14 (4.27)	2 (0.61)	31 (9.46)	– –	– –	2 (0.61)
4	– –	– –	– –	– –	8 (2.44)	28 (8.54)	28 (8.54)	17 (5.19)	2 (0.61)	37 (11.29)	– –	– –	2 (0.61)
5	– –	– –	– –	– –	10 (3.05)	37 (11.29)	41 (12.51)	22 (6.71)	2 (0.61)	48 (14.64)	– –	– –	– –
6	– –	– –	– –	– –	13 (3.97)	47 (14.34)	52 (15.86)	28 (8.54)	2 (0.61)	61 (18.61)	– –	– –	– –

Notes: This table is based on tests conducted at Harvard University (1948).
If the type of fitting is not known – i.e., whether wrought copper or cast alloy – use cast copper alloy values for design.

U.S. customary units in this document are the standard; the metric units are provided for reference only. The values stated in each system are not exact equivalents.

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COPPER WATER TUBE – INTERNAL WORKING PRESSURES*

Nominal Tube Size (In Inches)	Service Temperature °F (°C) 100°F (37.8°C) S = 6000psi (414 bars) Type K	Type L	Type M	200°F (93.3°C) S = 4800psi (331 bars) Type K	Type L	Type M	300°F (148.9°C) S=4700 psi (324 bars) Type K	Type L	400°F (204.4°C) S=3000 psi (207 bars) Type K	Type L
1/4	1210 (83.43)	1025 (70.67)	– –	850 (58.61)	700 (48.27)	– –	830 (57.23)	690 (47.58)	530 (36.54)	450 (31.03)
3/8	1275 (87.91)	890 (61.37)	625 (43.09)	930 (64.12)	630 (43.44)	460 (31.72)	910 (62.74)	610 (42.06)	590 (40.68)	400 (27.58)
1/2	1005 (69.29)	810 (55.85)	560 (38.61)	730 (50.33)	580 (39.99)	415 (28.61)	720 (49.64)	570 (39.30)	460 (31.72)	370 (25.51)
5/8	830 (57.23)	705 (48.61)	– –	600 (41.37)	500 (34.48)	– –	580 (39.99)	500 (34.48)	380 (26.20)	330 (22.75)
3/4	950 (65.50)	645 (44.47)	450 (31.03)	700 (48.27)	470 (32.41)	325 (22.41)	690 (47.58)	460 (31.72)	440 (30.34)	300 (20.69)
1	725 (49.99)	550 (37.92)	380 (26.20)	540 (37.23)	400 (27.58)	270 (18.62)	530 (36.54)	400 (27.58)	340 (23.44)	260 (17.93)
1 1/4	590 (40.68)	495 (34.13)	375 (25.86)	440 (30.34)	370 (25.51)	270 (18.62)	430 (29.65)	360 (24.82)	280 (19.31)	230 (15.86)
1 1/2	550 (37.92)	455 (31.37)	370 (25.51)	410 (28.27)	340 (23.44)	270 (18.62)	400 (27.58)	330 (22.75)	260 (17.93)	220 (15.17)
2	485 (33.44)	405 (27.92)	335 (23.10)	350 (24.13)	310 (21.37)	240 (16.55)	345 (23.79)	305 (21.03)	230 (15.86)	190 (13.10)
2 1/2	450 (31.03)	375 (25.86)	305 (21.03)	330 (22.75)	275 (18.96)	220 (15.17)	320 (22.06)	270 (18.62)	210 (14.48)	180 (12.41)
3	430 (29.65)	355 (24.48)	280 (19.31)	320 (22.06)	260 (17.93)	205 (14.13)	315 (21.72)	255 (17.58)	210 (14.48)	170 (11.72)
3 1/2	410 (28.27)	340 (23.44)	280 (19.31)	300 (20.69)	250 (17.24)	200 (13.79)	300 (20.69)	245 (16.89)	190 (13.10)	160 (11.03)
4	400 (27.58)	325 (22.41)	280 (19.31)	295 (20.34)	240 (16.55)	200 (13.79)	290 (20.00)	235 (16.20)	190 (13.10)	150 (10.34)
5	385 (26.55)	300 (20.69)	260 (17.93)	290 (20.00)	220 (15.17)	190 (13.10)	280 (19.31)	215 (14.82)	180 (12.41)	140 (9.65)
6	385 (26.55)	280 (19.31)	240 (16.55)	280 (19.31)	205 (14.13)	180 (12.41)	280 (19.31)	200 (13.79)	190 (13.10)	130 (8.96)
8	410 (28.27)	300 (20.69)	255 (17.58)	300 (20.69)	220 (15.17)	190 (13.10)	300 (20.69)	215 (14.82)	200 (13.79)	140 (9.65)
10	410 (28.27)	300 (20.69)	255 (17.58)	310 (21.37)	225 (15.51)	190 (13.10)	305 (21.03)	220 (15.17)	200 (13.79)	150 (10.34)
12	410 (28.27)	280 (19.31)	225 (15.51)	310 (21.37)	210 (14.48)	190 (13.10)	305 (21.03)	205 (14.13)	200 (13.79)	140 (9.65)

Formulas

$$tm = \frac{PD}{2S + 0.8P} + C$$

or

$$P = \frac{2\ S\ tm}{D - 0.8\ tm} \quad \text{when C is 0}$$

- tm Minimum tube wall thickness
- P Maximum rated internal working pressure
- D Outside diameter of tube
- S Allowable stress in material due to internal pressure at operating temperature
- C Allowance for threading, mechanical strength and/or corrosion

*Rated internal pressures for Copper Water Tube based on the strength of the tube alone and applicable to systems using suitable mechanical joints.

The values are based on the formula in the American Standard Code, Power Piping ANSI/ASME B31.1 1992.

U.S. customary units in this document are the standard; the metric units are provided for reference only. The values stated in each system are not exact equivalents.

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Copper Water Tube continued

COPPER TUBE – TYPES, STANDARDS, APPLICATIONS, TEMPERS AND LENGTHS

Tube Type	Color Code	Standard	Application	Commercially Available Lengths: Nominal or Standard Sizes		Drawn	Annealed
Type K	Green	ASTM B 88	Domestic Water Service Distribution Fire Protection Solar Fuel/Fuel Oil HVAC Snow Melting	Straight Lengths:	1/4-inch to 8-inch	20 ft. (6.1m)	20 ft. (6.1m)
					10-inch	18 ft. (5.5m)	18 ft. (5.5m)
					12-inch	12 ft. (3.7m)	12 ft. (3.7m)
				Coils:	1/4-inch to 1-inch	–	60 ft. (18.3m)
						–	100 ft. (30.5m)
					1 1/4-inch & 1 1/2-inch		60 ft. (18.3m)
					2-inch	–	40 ft. (12.2m)
						–	45 ft. (13.7m)
Type L	Blue	ASTM B 88	Domestic Water Service Distribution Fire Protection Solar Fuel/Fuel Oil Natural Gas Liquified Petroleum (LP) Gas HVAC Snow Melting	Straight Lengths:	1/4-inch to 10-inch	20 ft. (6.1m)	20 ft. (6.1m)
					12-inch	18 ft. (5.5m)	18 ft. (5.5m)
				Coils:	1/4-inch to 1-inch	–	60 ft. (18.3m)
						–	100 ft. (30.5m)
					1 1/4-inch & 1 1/2-inch	–	60 ft. (18.3m)
					2-inch	–	40 ft. (12.2m)
						–	45 ft. (13.7m)
Type M	Red	ASTM B 88	Domestic Water Service Distribution Fire Protection Solar Fuel/Fuel Oil HVAC Snow Melting	Straight Lengths:	1/4-inch to 12-inch	20 ft. (6.1m)	N/A
DWV	Yellow	ASTM B 306	Drain Waste Vent HVAC Solar	Straight Lengths:	1 1/4-inch to 8-inch	20 ft. (6.1m)	N/A
ACR	Blue	ASTM B 280	Air Conditioning Refrigeration Natural Gas Liquified Petroleum (LP) Gas	Straight Lengths:	1/4-inch to 4 1/8-inch	20 ft. (6.1m)	20 ft. (6.1m)[1]
				Coils:	1/8-inch to 1 5/8-inch	–	50 ft. (15.3m)[1]
OXY MED OXY/MED OXY/ACR ACR/MED	Type K Green Type L Blue	ASTM B 819	Medical Gas	Straight Lengths:	1/4-inch to 8-inch	20 ft. (6.1m)	N/A
Type G	Yellow	ASTM B 837	Natural Gas Liquified Petroleum (LP) Gas	Straight Lengths:	3/8-inch to 1 1/8-inch	12 ft. (3.7m)	12 ft. (3.7m)[1]
						20 ft. (6.1m)	20 ft. (6.1m)[1]
				Coils:	3/8-inch to 7/8-inch	–	60 ft. (18.3m)[1]
						–	100 ft. (30.5m)[1]

[1] Available as special order only

U.S. customary units in this document are the standard; the metric units are provided for reference only. The values stated in each system are not exact equivalents.

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c UL us LISTED

SCI COOPLOK GROOVED

FM APPROVED

QUALITY

- Manufacturing facility is ISO 9001:2000
- Quality management inspections both at the overseas factory and our US warehouses

RELIABILITY

- Ductile Iron Housings conform to ASTM A-536
- Electroplated Track Bolts conform to ASTM A-183
- UL listed and FM approved

TRACEABILITY

- For your protection, the SCI logo is on all fittings, couplings, bolts, and gaskets

AVAILABILITY

- Coatings available in Orange Paint or Hot Dipped Galvanized
- SCI Fittings stocked throughout the USA
- Stocked in sizes 1-1/4" to 8"
- Gaskets are Grade E EPDM (green stripe) – Grade T Nitrile (orange stripe) Available

PROTECTION

- USA engineering staff available at your request
- $7,000,000 product liability insurance
- SCI trademark logo on each fitting
- SCI 5/50 guarantee

CUSTOMER SERVICE

- Pro Pak Packaging System makes products easier to handle and warehouse
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500 Series Flexible Couplings



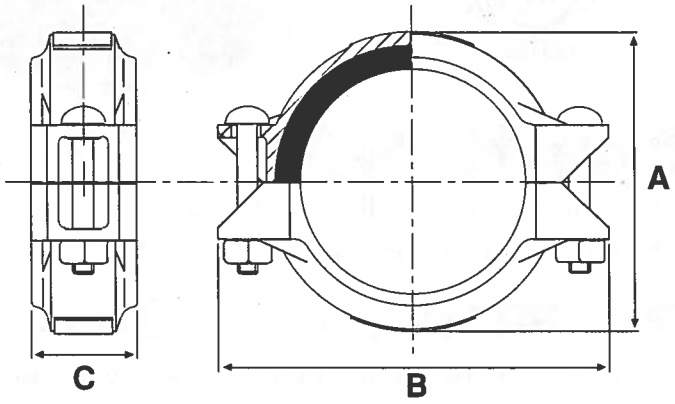


Fig. 65LF – Lightweight Flexible Couplings

Part Number	Pipe Size IN / *mm*	Pipe OD IN / *mm*	Max Pipe End Gap IN / *mm*	Max Working Pressure PSI / *bar*	Dimensions A IN / *mm*	Dimensions B IN / *mm*	Dimensions C IN / *mm*	Bolt Size IN / *mm*	Deflection Degrees	Weight LB / *KG*	Packaging Master	Packaging Bulk
65LF3012	1-1/4 *32*	1.660 *42.2*	1/8 *3.2*	500 *35*	2.58 *65.5*	4.09 *104.0*	1.85 *47.0*	3/8 x 2 *M10 x 51*	2.1°	1.19 *0.54*	36	–
65LF3014	1-1/2 *40*	1.900 *48.3*	1/8 *3.2*	500 *35*	2.85 *72.4*	4.37 *111.0*	1.85 *47.0*	3/8 x 2 *M10 x 51*	1.9°	1.32 *0.60*	36	–
65LF3020	2 *50*	2.375 *60.3*	1/8 *3.2*	500 *35*	3.37 *85.6*	4.80 *122.0*	1.85 *47.0*	3/8 x 2-1/4 *M10 x 57*	2.0°	1.67 *0.76*	30	–
65LF3024	2-1/2 *65*	2.875 *73.0*	1/8 *3.2*	500 *35*	3.88 *98.6*	5.28 *134.0*	1.85 *47.0*	3/8 x 2-1/2 *M10 x 64*	2.3°	1.89 *0.86*	24	–
65LF3030	3 *80*	3.500 *88.9*	1/8 *3.2*	500 *35*	4.40 *113.5*	5.91 *150.0*	1.85 *47.0*	3/8 x 2-1/2 *M10 x 64*	2.0°	2.15 *0.98*	20	–
65LF3040	4 *100*	4.500 *114.3*	1/4 *6.4*	500 *35*	5.75 *146.1*	7.44 *189.0*	2.01 *51.0*	3/8 x 2-1/2 *M10 x 64*	2.2°	3.59 *1.63*	18	275
65LF3050	5 *125*	5.563 *141.3*	1/4 *6.4*	500 *35*	6.79 *172.5*	9.13 *231.9*	2.01 *51.0*	1/2 x 3 *M12 x 76*	1.8°	5.13 *2.33*	12	–
65LF3060	6 *150*	6.625 *168.3*	1/4 *6.4*	500 *35*	7.95 *201.9*	10.31 *261.9*	2.01 *51.0*	1/2 x 3 *M12 x 76*	1.6°	5.98 *2.72*	10	175
65LF3080	8 *200*	8.625 *219.1*	1/4 *6.4*	500 *35*	10.80 *256.0*	13.07 *332.0*	2.52 *64.0*	5/8 x 4 *M16 x 102*	1.4°	10.63 *4.84*	–	80

NOTES:

1. All bolts and gaskets identified by SCI logo.

2. 100% Magnetic particle inspection of each bolt. Each bolt has a minimum tensile strength of 110,000 psi.

3. Gaskets are pre-lubricated.

4. Gasket Grade E EPDM (green stripe):
- *Temperature range: -30°F (-34°C) to +230°F (+110°C).*

5. Gasket Grade T Nitrile (orange stripe) available:
- *Temperature range: -20°F (-29°C) to +180°F (+82°C).*

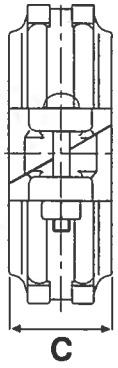
6. See Installation Instructions on Page 17.

7. Smith Cooper Warranty (see page 16) only applies to assemblies made up using gaskets, housings, and bolts with the SCI logo.

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500 Series Rigid Couplings





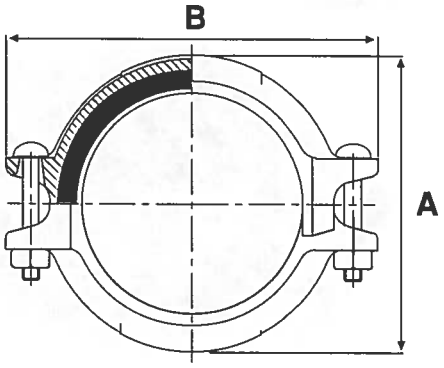


Fig. 65LR – Lightweight Rigid Couplings

Part Number	Pipe Size IN / *mm*	Pipe OD IN / *mm*	Max Pipe End Gap IN / *mm*	Max Working Pressure PSI / *bar*	Dimensions A IN / *mm*	Dimensions B IN / *mm*	Dimensions C IN / *mm*	Bolt Size IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65LR3012	1-1/4 *32*	1.660 *42.2*	1/8 *3.2*	500 *35*	2.66 *67.5*	4.09 *104.0*	1.85 *47.0*	3/8 x 2 *M10 x 51*	1.25 *0.57*	36	–
65LR3014	1-1/2 *40*	1.900 *48.3*	1/8 *3.2*	500 *35*	2.93 *74.5*	4.37 *111.0*	1.85 *47.0*	3/8 x 2 *M10 x 51*	1.36 *0.62*	36	–
65LR3020	2 *50*	2.375 *60.3*	1/8 *3.2*	500 *35*	3.44 *87.5*	4.80 *122.0*	1.85 *47.0*	3/8 x 2-1/4 *M10 x 57*	1.74 *0.79*	30	800
65LR3024	2-1/2 *65*	2.875 *73.0*	1/8 *3.2*	500 *35*	3.96 *100.5*	5.28 *134.0*	1.85 *47.0*	3/8 x 2-1/2 *M10 x 64*	2.01 *0.91*	24	640
65LR3030	3 *80*	3.500 *88.9*	1/8 *3.2*	500 *35*	4.55 *115.5*	5.91 *150.0*	1.85 *47.0*	3/8 x 2-1/2 *M10 x 64*	2.22 *1.01*	20	500
65LR3040	4 *100*	4.500 *114.3*	1/4 *6.4*	500 *35*	5.83 *148.0*	7.28 *185.0*	2.01 *51.0*	3/8 x 2-1/2 *M10 x 64*	3.38 *1.54*	18	275
65LR3050	5 *125*	5.563 *141.3*	1/4 *6.4*	500 *35*	6.87 *174.5*	8.62 *219.0*	2.01 *51.0*	1/2 x 3 *M12 x 76*	4.36 *1.98*	12	–
65LR3060	6 *150*	6.625 *168.3*	1/4 *6.4*	500 *35*	8.03 *204.0*	9.76 *248.0*	2.01 *51.0*	1/2 x 3 *M12 x 76*	5.39 *2.45*	10	175
65LR3080	8 *200*	8.625 *219.1*	1/4 *6.4*	500 *35*	10.16 *258.0*	12.52 *318.0*	2.52 *64.0*	5/8 x 4 *M16 x 102*	10.50 *4.77*	–	80

NOTES:

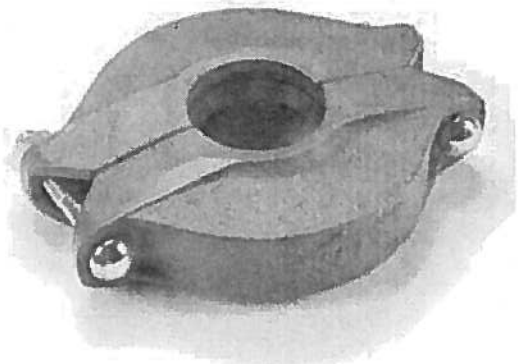
1. All bolts and gaskets identified by SCI logo.
2. 100% Magnetic particle inspection of each bolt. Each bolt has a minimum tensile strength of 110,000 psi.
3. Gaskets are pre-lubricated.
4. Gasket Grade E EPDM (green stripe):
- *Temperature range: -30°F (-34°C) to +230°F (+110°C).*

5. Gasket Grade T Nitrile (orange stripe) available:
- *Temperature range: -20°F (-29°C) to +180°F (+82°C).*

6. See Installation Instructions on Page 17.
7. Smith Cooper Warranty (see page 16) only applies to assemblies made up using gaskets, housings, and bolts with the SCI logo.

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500 Series Reducing Couplings



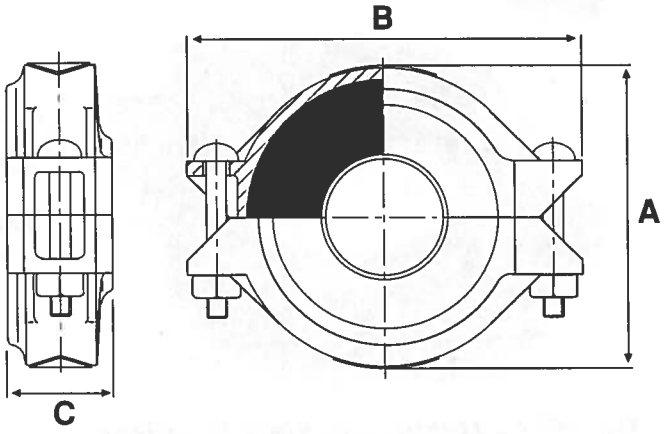


Fig. 65RC – Reducing Couplings

Part Number	Pipe Size IN / *mm*	Max Pipe End Gap N / *mm*	Max Working Pressure PSI / *bar*	Dimensions A IN / *mm*	Dimensions B IN / *mm*	Dimensions C IN / *mm*	Bolt Size IN / *mm*	Deflection Degrees	Weight LB / *KG*	Packaging Master	Packaging Bulk
65RC3020014	2 x 1-1/2 *50 x 40*	1/8 *3.2*	300 *20.7*	3.43 *87.0*	4.88 *124.0*	1.85 *47.0*	3/8 x 2-1/4 *M10 x 57*	2.0°	1.88 *0.85*	26	–
65RC3024020	2-1/2 x 2 *65 x 50*	1/8 *3.2*	300 *20.7*	3.98 *101.0*	5.35 *136.0*	1.85 *47.0*	3/8 x 2-1/2 *M10 x 64*	1.5°	2.27 *1.03*	22	–
65RC3030020	3 x 2 *80 x 50*	1/8 *3.2*	300 *20.7*	4.59 *116.5*	6.34 *161.0*	1.85 *47.0*	3/8 x 2-1/2 *M10 x 64*	1.8°	3.08 *1.40*	20	–
65RC3030024	3 x 2-1/2 *80 x 65*	1/8 *3.2*	300 *20.7*	4.51 *114.5*	6.34 *161.0*	1.85 *47.0*	3/8 x 2-1/2 *M10 x 64*	1.8°	2.95 *1.34*	20	–
65RC3040020	4 x 2 *100 x 50*	1/4 *6.4*	300 *20.7*	5.83 *148.0*	7.52 *191.0*	2.01 *51.0*	1/2 x 3 *M12 x 76*	1.2°	4.82 *2.19*	10	–
65RC3040024	4 x 2-1/2 *100 x 65*	1/4 *6.4*	300 *20.7*	5.83 *148.0*	7.52 *191.0*	2.01 *51.0*	1/2 x 3 *M12 x 76*	1.2°	4.81 *2.18*	10	–
65RC3040030	4 x 3 *100 x 80*	1/4 *6.4*	300 *20.7*	5.83 *148.0*	7.52 *191.0*	2.01 *51.0*	1/2 x 3 *M12 x 76*	1.2°	4.42 *2.01*	10	–
65RC3060040	6 x 4 *150 x 100*	1/4 *6.4*	300 *20.7*	7.99 *203.0*	10.35 *263.0*	2.01 *51.0*	5/8 x 3-3/4 *M16 x 95*	0.9°	9.02 *4.09*	–	120
65RC3080060	8 x 6 *200 x 100*	1/4 *6.4*	300 *20.7*	10.12 *257.0*	13.15 *334.0*	2.48 *63.0*	5/8 x 3-3/4 *M19 x 108*	0.8°	14.59 *6.62*	–	60

NOTES:

1. *All bolts and gaskets identified by SCI logo.*
2. *100% Magnetic particle inspection of each bolt. Each bolt has a minimum tensile strength of 110,000 psi.*
3. *Gaskets are pre-lubricated.*
4. *Gasket Grade E EPDM (green stripe):*
   - *Temperature range: -30˚F (-34˚C) to +230˚F (+110˚C).*
5. *Gasket Grade T Nitrile (orange stripe) available:*
   - *Temperature range: -20˚F (-29˚C) to +180˚F (+82˚C).*
6. *See Installation Instructions on Page 17.*
7. *Smith Cooper Warranty (see page 16) only applies to assemblies made up using gaskets, housings, and bolts with the SCI logo.*

rsn 703956
PERMIT 13647594

500 Series Hinged Flange Adapter



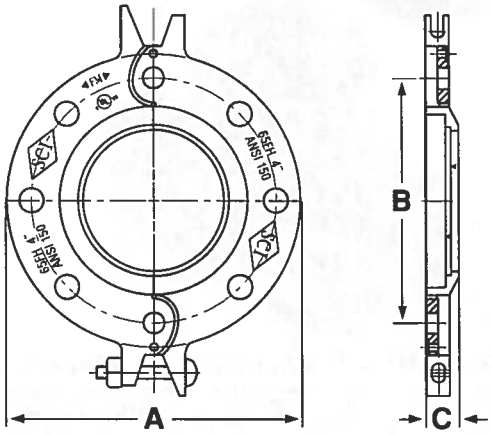


Fig. 65FH – Hinged Flange Adapter

Part Number	Pipe Size IN / *mm*	Pipe OD IN / *mm*	Max Working Pressure PSI / *bar*	Dimensions A IN / *mm*	B IN / *mm*	C IN / *mm*	Bolt Size IN / *mm*	Number of Bolts	Weight LB / *KG*	Packaging Master	Bulk
65FH3020	2 *50*	2.375 *60.3*	300 *20.7*	6.00 *152.4*	4.75 *120.7*	0.75 *19.1*	5/8 x 3 *M16 x 76*	4	3.59 *1.63*	10	–
65FH3024	2-1/2 *65*	2.875 *73.0*	300 *20.7*	7.00 *177.8*	5.50 *139.7*	0.88 *22.4*	5/8 x 3 *M16 x 76*	4	3.60 *1.63*	10	–
65FH3030	3 *80*	3.500 *88.9*	300 *20.7*	7.50 *190.5*	6.00 *152.4*	0.94 *23.9*	5/8 x3 *M16 x 76*	4	4.79 *2.17*	10	–
65FH3040	4 *100*	4.500 *114.3*	300 *20.7*	9.00 *228.6*	7.50 *190.5*	0.94 *23.9*	5/8 x 3 *M16 x 76*	8	6.58 *2.99*	10	–
65FH3060	6 *150*	6.625 *168.3*	300 *20.7*	11.0 *279.4*	9.50 *241.3*	1.00 *25.4*	3/4 x 3-1/2 *M19 x 89*	8	8.40 *3.81*	–	175
65FH3080	8 *200*	8.625 *219.1*	300 *20.7*	13.50 *342.9*	11.75 *298.5*	1.12 *28.4*	3/4 x 3-1/2 *M19 x 89*	8	14.28 *6.48*	–	100

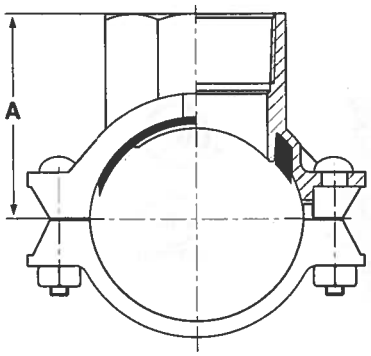
NOTES:

1. *All bolts and gaskets identified by SCI logo.*
2. *100% Magnetic particle inspection of each bolt. Each bolt has a minimum tensile strength of 110,000 psi.*
3. *Gaskets are pre-lubricated.*
4. *Gasket Grade E EPDM (green stripe):*
   - *Temperature range: -30˚F (-34˚C) to +230˚F (+110˚C).*
5. *Gasket Grade T Nitrile (orange stripe) available:*
   - *Temperature range: -20˚F (-29˚C) to +180˚F (+82˚C).*
6. *Matches class 125/150 flange dimensions.*
7. *See Installation Instructions on Page 17.*
8. *Smith Cooper Warranty (see page 16) only applies to assemblies made up using gaskets, housings, and bolts with the SCI logo.*

rsn 703956
PERMIT 13647594

500 Series Mechanical Tee, Threaded





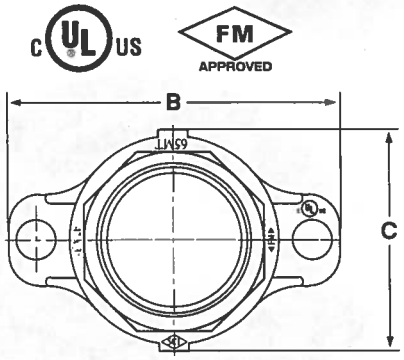


Fig. 65MT – Mechanical Tee, Threaded

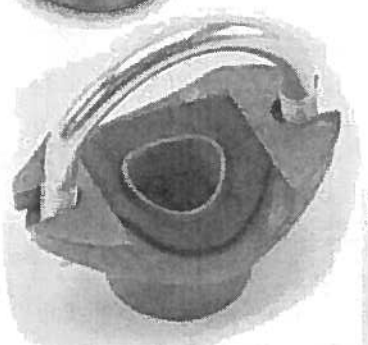
Part Number	Size Run x Branch IN / *mm*	Hole Diameter +1/8, -0 / *+3.2, -0* IN / *mm*	Max Working Pressure PSI / *bar*	Dimensions A IN / *mm*	 B IN / *mm*	 C IN / *mm*	Weight LB / *KG*	Packaging Master	 Bulk
65MT3020004	2 x 1/2 *50 x 15*	1-1/2 *38*	500 *35*	2.52 *64.0*	4.96 *126.0*	2.80 *71.0*	3.1 *1.4*	21	–
65MT3020006	2 x 3/4 *50 x 20*	1-1/2 *38*	500 *35*	2.52 *64.0*	4.96 *126.0*	2.80 *71.0*	3.1 *1.4*	21	–
65MT3020010	2 x 1 *50 x 25*	1-1/2 *38*	500 *35*	2.52 *64.0*	4.96 *126.0*	2.80 *71.0*	3.0 *1.4*	21	–
65MT3020012	2 x 1-1/4 50 x *32*	1-3/4 *45*	500 *35*	2.76 *70.0*	4.96 *126.0*	2.80 *71.0*	3.5 *1.6*	18	–
65MT3020014	2 x 1-1/2 *50 x 40*	1-3/4 *45*	500 *35*	2.76 *70.0*	4.96 *126.0*	2.87 *73.0*	3.6 *1.6*	18	–
65MT3024004	2-1/2 x 1/2 *65 x 15*	1-1/2 *38*	500 *35*	2.76 *70.0*	5.20 *132.0*	2.80 *71.0*	3.0 *1.4*	18	–
65MT3024006	2-1/2 x 3/4 *65 x 20*	1-1/2 *38*	500 *35*	2.76 *70.0*	5.20 *132.0*	2.80 *71.0*	3.0 *1.4*	18	–
65MT3024010	2-1/2 x 1 *65 x 25*	1-1/2 *38*	500 *35*	2.76 *70.0*	5.20 *132.0*	2.80 *71.0*	3.0 *1.4*	18	–
65MT3024012	2-1/2 x 1-1/4 *65 x 32*	1-3/4 *45*	500 *35*	2.99 *76.0*	5.20 *132.0*	3.03 *77.0*	3.5 *1.6*	16	–
65MT3024014	2-1/2 x 1-1/2 *65 x 40*	2 *51*	500 *35*	2.99 *76.0*	5.20 *132.0*	3.27 *83.0*	3.6 *1.6*	16	–
65MT3030010	3 x 1 *80 x 25*	1-1/2 *38*	500 *35*	3.07 *78.0*	5.91 *150.0*	2.80 *71.0*	3.3 *1.5*	14	–
65MT3030012	3 x 1-1/4 *80 x 32*	1-3/4 *45*	500 *35*	3.27 *83.0*	5.91 *150.0*	3.03 *77.0*	3.8 *1.7*	14	–
65MT3030014	3 x 1-1/2 *80 x 40*	2 *51*	500 *35*	3.50 *89.0*	5.91 *150.0*	3.27 *83.0*	4.1 *1.9*	14	–
65MT3030020	3 x 2 *80 x 50*	2-1/2 *64*	500 *35*	3.50 *89.0*	5.91 *150.0*	3.78 *96.0*	4.9 *2.2*	10	–
65MT3040010	4 x 1 *100 x 25*	1-1/2 *38*	500 *35*	3.54 *90.0*	7.09 *180.0*	2.80 *71.0*	3.6 *1.6*	22	–
65MT3040012	4 x 1-1/4 *100 x 32*	1-3/4 *45*	500 *35*	3.78 *96.0*	7.09 *180.0*	3.03 *77.0*	4.0 *1.8*	22	–
65MT3040014	4 x 1-1/2 *100 x 40*	2 *51*	500 *35*	4.02 *102.0*	7.09 *180.0*	3.27 *83.0*	4.2 *1.9*	22	–

NOTES:

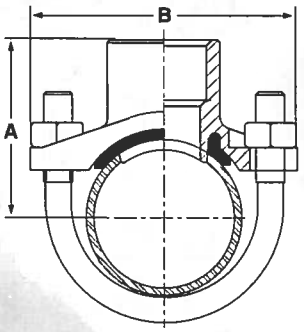
1. *All bolts and gaskets identified by SCI logo.*
2. *100% Magnetic particle inspection of each bolt. Each bolt has a minimum tensile strength of 110,000 psi.*
3. *Gaskets are pre-lubricated.*
4. *Gasket Grade E EPDM (green stripe):*
   - *Temperature range: -30˚F (-34˚C) to +230˚F (+110˚C).*
5. *Gasket Grade T Nitrile (orange stripe) available:*
   - *Temperature range: -20˚F (-29˚C) to +180˚F (+82˚C).*
6. *See Installation Instructions on Page 17.*
7. *Smith Cooper Warranty (see page 16) only applies to assemblies made up using gaskets, housings, and bolts with the SCI logo.*

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500 Series Threaded Strap Tee







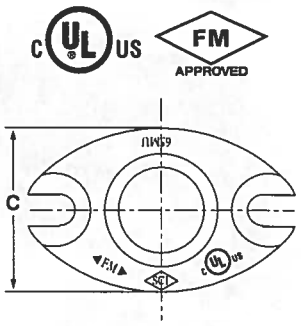


Fig. 65MU – Strap Tee, Threaded

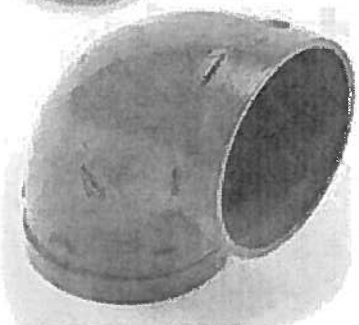
Part Number	Size Run x Branch IN / *mm*	Hole Diameter +1/8, -0 / *+3.2, -0* IN / *mm*	Max Working Pressure PSI / *bar*	Dimensions A IN / *mm*	Dimensions B IN / *mm*	Dimensions C IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65MU3012004	1-1/4 x 1/2 *32 x 15*	1-1/4 *32*	300 *20.7*	1.65 *42.0*	3.54 *90.0*	2.28 *58.0*	3.1 *1.4*	50	–
65MU3012006	1-1/4 x 3/4 *32 x 20*	1-1/4 *32*	300 *20.7*	1.85 *47.0*	3.54 *90.0*	2.28 *58.0*	3.1 *1.4*	50	–
65MU3012010	1-1/4 x 1 *32 x 25*	1-1/4 *32*	300 *20.7*	2.13 *54.0*	3.54 *90.0*	2.28 *58.0*	3.0 *1.4*	50	–
65MU3014004	1-1/2 x 1/2 *40 x 15*	1-1/4 *32*	300 *20.7*	1.77 *45.0*	3.54 *90.0*	2.28 *58.0*	3.1 *1.4*	48	–
65MU3014006	1-1/2 x 3/4 *40 x 20*	1-1/4 *32*	300 *20.7*	1.97 *50.0*	3.54 *90.0*	2.28 *58.0*	3.1 *1.4*	48	–
65MU3014010	1-1/2 x 1 *40 x 25*	1-1/4 *32*	300 *20.7*	2.24 *57.0*	3.54 *90.0*	2.28 *58.0*	3.0 *1.4*	48	–
65MU3020004	2 x 1/2 *50 x 15*	1-1/4 *32*	300 *20.7*	2.01 *51.0*	3.74 *95.0*	2.28 *58.0*	3.1 *1.4*	45	–
65MU3020006	2 x 3/4 *50 x 20*	1-1/4 *32*	300 *20.7*	2.20 *56.0*	3.74 *95.0*	2.28 *58.0*	3.1 *1.4*	45	–
65MU3020010	2 x 1 *50 x 25*	1-1/4 *32*	300 *20.7*	2.48 *63.0*	3.74 *95.0*	2.28 *58.0*	3.0 *1.4*	45	–
65MU3024004	2-1/2 x 1/2 *65 x 15*	1-1/4 *32*	300 *20.7*	2.26 *57.5*	4.29 *109.0*	2.28 *58.0*	3.0 *1.4*	36	–
65MU3024006	2-1/2 x 3/4 *65 x 20*	1-1/4 *32*	300 *20.7*	2.46 *62.5*	4.29 *109.0*	2.28 *58.0*	3.0 *1.4*	36	–
65MU3024010	2-1/2 x 1 *65 x 25*	1-1/4 *32*	300 *20.7*	2.74 *69.5*	4.29 *109.0*	2.28 *58.0*	3.0 *1.4*	36	–

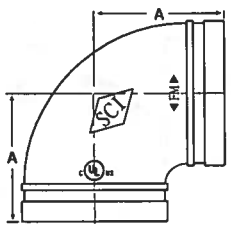
NOTES:

1. *All bolts and gaskets identified by SCI logo.*
2. *100% Magnetic particle inspection of each bolt. Each bolt has a minimum tensile strength of 110,000 psi.*
3. *Gaskets are pre-lubricated.*
4. *Gasket Grade E EPDM (green stripe):*
   - *Temperature range: -30°F (-34°C) to +230°F (+110°C).*
5. *Gasket Grade T Nitrile (orange stripe) available:*
   - *Temperature range: -20°F (-29°C) to +180°F (+82°C).*
6. *See Installation Instructions on Page 17.*
7. *Smith Cooper Warranty (see page 16) only applies to assemblies made up using gaskets, housings, and bolts with the SCI logo.*

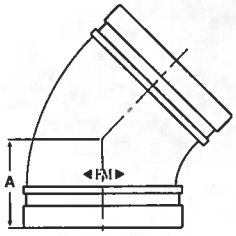
rsn 703956
PERMIT 13647594

500 Series Short Radius Grooved Fittings

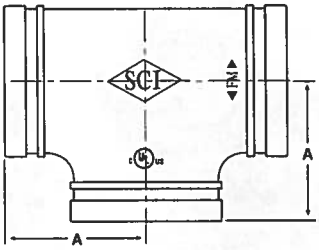




90° Elbow



45° Elbow



Tee



Cap

Fig. 65ES – 90° Elbow, Short Radius

Part No.	Nominal Pipe Size IN / *mm*	Actual Pipe OD IN / *mm*	A IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65ES3012	1-1/4 *32*	1.660 *42.2*	2.75 *69.85*	0.97 *0.44*	–	–
65ES3014	1-1/2 *40*	1.900 *48.3*	2.75 *69.85*	1.14 *0.52*	–	–
65ES3020	2 *50*	2.375 *60.3*	2.75 *69.85*	1.70 *0.77*	–	–
65ES3024	2-1/2 *65*	2.875 *73.0*	3.00 *76.20*	3.10 *1.41*	–	–
65ES3030	3 *80*	3.500 *88.9*	3.38 *85.85*	4.00 *1.81*	–	–
65ES3040	4 *100*	4.500 *114.3*	4.00 *101.60*	6.47 *2.93*	–	–
65ES3050	5 *125*	5.563 *141.3*	4.88 *123.95*	12.60 *5.72*	–	–
65ES3060	6 *150*	6.625 *168.3*	5.50 *139.70*	18.30 *8.30*	–	–
65ES3080	8 *200*	8.625 *219.1*	6.81 *172.97*	25.50 *11.57*	–	–

Fig. 65FS – 45° Elbow, Short Radius

Part No.	Nominal Pipe Size IN / *mm*	Actual Pipe OD IN / *mm*	A IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65FS3012	1-1/4 *32*	1.660 *42.2*	1.75 *44.45*	0.68 *0.31*	–	–
65FS3014	1-1/2 *40*	1.900 *48.3*	1.75 *44.45*	0.79 *0.36*	–	–
65FS3020	2 *50*	2.375 *60.3*	2.00 *50.80*	1.47 *0.67*	–	–
65FS3024	2-1/2 *65*	2.875 *73.0*	2.25 *57.15*	2.00 *0.91*	–	–
65FS3030	3 *80*	3.500 *88.9*	2.50 *63.50*	2.77 *1.26*	–	–
65FS3040	4 *100*	4.500 *114.3*	3.00 *76.20*	4.73 *2.15*	–	–
65FS3050	5 *125*	5.563 *141.3*	3.25 *82.55*	7.44 *3.37*	–	–
65FS3060	6 *150*	6.625 *168.3*	3.50 *88.90*	9.81 *4.45*	–	–
65FS3080	8 *200*	8.625 *219.1*	4.25 *107.95*	19.47 *8.83*	–	–

Fig. 65TS – Tee, Short Radius

Part No.	Nominal Pipe Size IN / *mm*	Actual Pipe OD IN / *mm*	A IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65TS3012	1-1/4 *32*	1.660 *42.2*	2.75 *69.85*	1.45 *0.66*	–	–
65TS3014	1-1/2 *40*	1.900 *48.3*	2.75 *69.85*	1.72 *0.78*	–	–
65TS3020	2 *50*	2.375 *60.3*	2.75 *69.85*	2.40 *1.09*	–	–
65TS3024	2-1/2 *65*	2.875 *73.0*	3.00 *76.20*	3.60 *1.63*	–	–
65TS3030	3 *80*	3.500 *88.9*	3.38 *85.85*	5.30 *2.40*	–	–
65TS3040	4 *100*	4.500 *114.3*	4.00 *101.60*	8.70 *3.95*	–	–
65TS3050	5 *125*	5.563 *141.3*	4.88 *123.95*	15.70 *7.12*	–	–
65TS3060	6 *150*	6.625 *168.3*	5.50 *139.70*	22.70 *10.30*	–	–
65TS3080	8 *200*	8.625 *219.1*	6.94 *176.28*	38.70 *17.55*	–	–

Fig. 65C – Cap

Part No.	Nominal Pipe Size IN / *mm*	Actual Pipe OD IN / *mm*	Thickness IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65C3012	1-1/4 *32*	1.660 *42.2*	0.88 *22.35*	0.30 *0.14*	200	–
65C3014	1-1/2 *40*	1.900 *48.3*	0.88 *22.35*	0.50 *0.23*	140	–
65C3020	2 *50*	2.375 *60.3*	0.88 *22.35*	0.60 *0.27*	80	–
65C3024	2-1/2 *65*	2.875 *73.0*	0.88 *22.35*	1.00 *0.45*	60	–
65C3030	3 *80*	3.500 *88.9*	0.88 *22.35*	1.20 *0.54*	40	–
65C3040	4 *100*	4.500 *114.3*	1.00 *25.40*	2.50 *1.13*	24	–
65C3050	5 *125*	5.563 *141.3*	1.00 *25.40*	4.60 *2.09*	12	–
65C3060	6 *150*	6.625 *168.3*	1.00 *0*	6.10 *2.77*	10	–
65C3080	8 *200*	8.625 *219.1*	1.19 *25.40*	13.10 *5.94*	5	–

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VIKING

TECHNICAL DATA

MICROFAST® AND MicrofastHP® QUICK RESPONSE UPRIGHT AND CONVENTIONAL SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Approval Chart 2 (FM)

Microfast® Quick Response Upright Sprinklers
Maximum 175 PSI (12 bar) WWP

KEY
Temperature
Finish
A1X ← Escutcheon (if applicable)

Base Part Number[1]	SIN	Thread Size		Nominal K-Factor		Overall Length		FM Approvals[3] (Refer also to Design Criteria below.)
		NPT	BSP	U.S.	metric[2]	Inches	mm	
Standard Orifice								
06661B	VK300	1/2"	15 mm	5.6	80.6	2-3/16	56	A2
07060	VK345	--	15 mm	5.6	80.6	2-3/16	56	A2
Large Orifice								
06665B	VK350	3/4"	--	8.0	115.2	2-5/16	59	A2
14817	VK350	--	20 mm	8.0	115.2	2-5/16	59	A2
06764B	VK350	1/2"	15 mm	8.0	115.2	2-5/16	59	A2
Small Orifice[4]								
06717B[6]	VK325	1/2"	15 mm	2.8	40.3	2-3/16	56	A1

Approved Temperature Ratings
A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141°C)

Approved Finishes
1 - Brass and Chrome-Enloy®
2 - Brass, Chrome-Enloy®, White Polyester[5], and Black Polyester[5]

Footnotes

[1] Base part number is shown. For complete part number, refer to Viking's current price schedule.

[2] Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

[3] This table shows the FM Approvals available at the time of printing. Check with the manufacturer for any additional approvals.

[4] FM Approved as quick response **Non-Storage** pendent sprinklers. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0).

[5] Other colors are available on request with the same Approvals as the standard colors.

[6] The sprinkler orifice is bushed.

DESIGN CRITERIA - FM

(Also refer to Approval Chart 2 above.)

FM Approval Requirements:

The sprinklers indicated in Approval Chart 2 are FM Approved as quick response **Non-Storage** upright sprinklers as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

NOTE: The FM installation guidelines may differ from cULus and/or NFPA criteria.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to page QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

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VIKING

TECHNICAL DATA

MICROFAST® AND MicrofastHP® QUICK RESPONSE UPRIGHT AND CONVENTIONAL SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

DESIGN CRITERIA - UL

(Also refer to Approval Chart 1 on page 51c)

cULus Listing Requirements:

Microfast® and MicrofastHP® Quick Response Upright and Conventional Sprinklers are cULus Listed as indicated in Approval Chart 1 for installation in accordance with the latest edition of NFPA 13 for standard spray sprinklers, or old style (conventional) sprinklers.

- Designed for use in Light and Ordinary Hazard occupancies *(exception: small orifice sprinklers are limited to Light Hazard where allowed by the installation standards being applied, with hydraulically calculated wet systems only).*
- The sprinkler installation rules contained in NFPA 13 for standard spray upright sprinklers must be followed. For conventional sprinklers, refer to the installation guidelines for old style (conventional) sprinklers.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to page QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

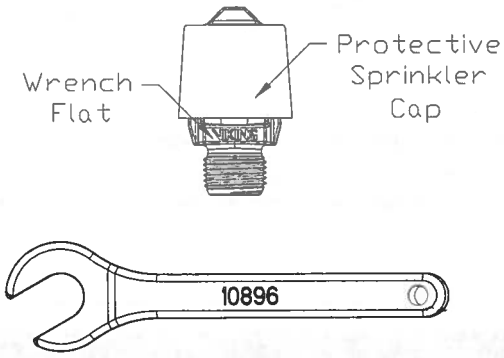


Figure 1:
Standard Sprinkler Wrench 10896W/B

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TECHNICAL DATA

MICROFAST® AND MicrofastHP® QUICK RESPONSE UPRIGHT AND CONVENTIONAL SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Approval Chart 1 (UL)

Microfast® and MicrofastHP® Quick Response
Upright and Conventional Sprinklers
Maximum 175 PSI (12 bar) WWP

KEY
Temperature Rating
A1X = Exception (if applicable)

Base Part Number[1]	SIN	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals[3] (Refer also to Design Criteria on page 51d.)					
		NPT	BSP	U.S.	metric[2]	Inches	mm	cULus[4]	NYC[7]	VdS	LPCB	CE	⎈
Upright-Standard Orifice													
06661B	VK300	1/2"	15 mm	5.6	80.6	2-3/16	56	A1	A1	--	--	--	--
07060	VK345	--	15 mm	5.6	80.6	2-3/16	56	--	--	A2	A2	B2[11]	B2[14]
Conventional-Standard Orifice													
06766B	VK310	1/2"	15 mm	5.6	80.6	2-3/16	56	A2	A2	--	A2	B2[11]	B2[14]
Upright-Large Orifice													
06665B	VK350	3/4"	--	8.0	115.2	2-5/16	59	A1	A1	A2	A2	B2[11]	--
14817	VK350	--	20 mm	8.0	115.2	2-5/16	59	A1	A1	A2	A2	B2[11]	--
06764B	VK350	1/2"	15 mm	8.0	115.2	2-5/16	59	A1	A1	A2	--	A2[12]	--
Conventional-Large Orifice													
06768B	VK354	3/4"	20 mm	8.0	115.2	2-5/16	59	A1	A2	--	A2	B2[11]	--
Upright-Small Orifice[10]													
06717B[10]	VK325	1/2"	15 mm	2.8	40.3	2-3/16	56	A1	A1	--	--	--	--
06719B[10]	VK327	1/2"	15 mm	4.2	57	2-3/16	56	A1	A1	--	--	--	--
06931B[10]	VK327	--	10 mm	4.2	57	2-3/16	56	--	--	A2	--	C3[13]	--

Maximum 250 PSI (17 bar) WWP
Upright-Standard Orifice

Base Part Number[1]	SIN	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals[3] (Refer also to Design Criteria on page 51d.)					
		NPT	BSP	U.S.	metric[2]	Inches	mm	cULus[4]	NYC[8]	VdS	LPCB	CE	⎈
12281	VK315	1/2"	15 mm	5.6	80.6	2-3/16	56	A1	A1	--	--	--	--
Upright-Small Orifice[9]													
12286[10]	VK340	1/2"	15 mm	2.8	40.3	2-3/16	56	A1	A1	--	--	--	--

Approved Temperature Ratings

A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141°C)
B - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141°C)
C - 155 °F (68 °C)

Approved Finishes

1 - Brass, Chrome-Enloy®, White Polyester[5,6], Black Polyester[5,6], and Black Teflon®[5]
2 - Brass, Chrome-Enloy®, White Polyester[5,6], and Black Polyester[5,6]
3 - Brass and Chrome-Enloy®

Footnotes

[1] Base part number is shown. For complete part number, refer to Viking's current price schedule.
[2] Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
[3] This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals.
[4] Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada.
[5] cULus Listed as corrosion resistant.
[6] Other colors are available on request with the same Listings and Approvals as the standard colors.
[7] Accepted for use, City of New York Board of Standards and Appeals, Calendar Number 219-76-SA.
[8] Accepted for use, City of New York Department of Buildings, MEA 89-92-E, Vol. 16.
[9] Listings and Approvals limited to Light Hazard Occupancies where allowed by the installation standards being applied, with hydraulically calculated wet systems only. **Exception:** 4.2K sprinklers may be installed on hydraulically calculated dry pipe systems where piping is corrosion resistant or internally galvanized.
[10] The sprinkler orifice is bushed.
[11] CE Certified, Standard EN 12259-1, EC-certificate of conformity 0832-CPD-2001 and 0832-CPD-2003.
[12] CE Certified, Standard EN 12259-1, EC-certificate of conformity 0786-CPD-40278.
[13] CE Certified, Standard EN 12259-1, EC-certificate of conformity 0786-CPD-40131.
[14] ⎈ MED Certified, Standard EN 12259-1, EC-certificate of conformity 0832-MED-1003 and 0832-MED-1008.

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VIKING TECHNICAL DATA

MICROFAST® AND MicrofastHP® QUICK RESPONSE UPRIGHT AND CONVENTIONAL SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
For Teflon® Coated Sprinklers: Belleville Spring-Exposed, Screw-Nickel Plated, Pip Cap-Teflon® Coated
For Polyester Coated Sprinklers: Belleville Spring-Exposed

Ordering Information: (Also refer to the current Viking price list.)
Order Microfast® and MicrofastHP® Quick Response Upright and Conventional Sprinklers by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, Chrome-Enloy® = F, White Polyester = M-/W, Black Polyester = M-/B, and Black Teflon® = N
Temperature Suffix (°F/°C): 135°/57° = A, 155°/68° = B, 175°/79° = D, 200°/93° = E, and 286°/141° = G
For example, sprinkler VK300 with a 1/2" thread, Brass finish and a 155 °F/68 °C temperature rating = Part No. 06661BAB

Available Finishes And Temperature Ratings: Refer to Table 1.

Accessories: (Also refer to the "Sprinkler Accessories" section of the Viking data book.)

Sprinkler Wrench: Standard Wrench: Part No. 10896W/B (available since 2000)

Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
The Viking Microfast® and MicrofastHP® Quick Response Upright and Conventional Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	135 °F (57 °C)	100 °F (38 °C)	Orange
→ Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Intermediate	200 °F (93 °C)	150 °F (65 °C)	Green
High	286 °F (141 °C)	225 °F (107 °C)	Blue

Sprinkler Finishes: Brass, Chrome-Enloy®, White Polyester, Black Polyester, and Black Teflon®
Corrosion-Resistant Coatings[4]: White Polyester, Black Polyester, and Black Teflon®

Footnotes
[1] The sprinkler temperature rating is stamped on the deflector.
[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
[3] The corrosion-resistant coatings have passed the standard corrosion test required by the approving agencies indicated on pages 51c-e. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester and Teflon® coatings.

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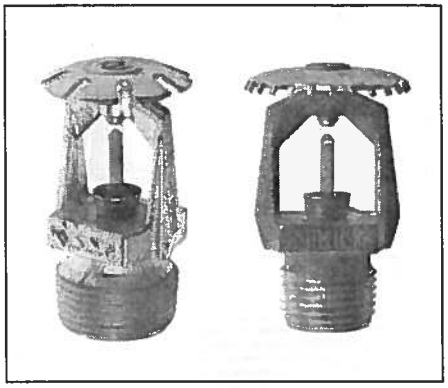
TECHNICAL DATA

MICROFAST® AND MicrofastHP® QUICK RESPONSE UPRIGHT AND CONVENTIONAL SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

Viking Microfast® and MicrofastHP® Quick Response Upright and Conventional (Old Style) Sprinklers are small, thermosensitive, glass-bulb spray sprinklers available in several different finishes, temperature ratings, and K-Factors to meet design requirements. The special Polyester and Teflon® coatings can be used in decorative applications where colors are desired. In addition, these coatings have been investigated for installation in corrosive atmospheres and are cULus listed as corrosion resistant as indicated in Approval Chart 1. (Note: FM Global has no approval classification for Teflon® and Polyester coatings as corrosion resistant.)



2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV
FM Approved: Classes 2002 and 2020
NYC Approved: Calendar Number 219-76-SA and MEA 89-92-E, Volume 16
ABS Certified: Certificate 04-HS407984B-PDA
VdS Approved: Certificates G4060054, G4060056, G4880046, G4930039, and G4980020
LPC Approved: Ref. No. 096e/03, TE30401, and TE30872
CE Certified: Standard EN 12259-1, EC-certificate of conformity 0832-CPD-2001, 0832-CPD-2003, 0786-CPD-40131, 0786-CPD-40171, and 0786-CPD-40278
MED Certified: Standard EN 12259-1, EC-certificate of conformity 0832-MED-1003 and 0832-MED-1008
NOTE: Other International approval certificates are available upon request.

Refer to Approval Chart 1 and Design Criteria on pages 51c-d for cULus Listing requirements, and refer to Approval Chart 2 and Design Criteria on page 51e for FM Approval requirements that must be followed.

3. TECHNICAL DATA

Specifications:

Available since 1987.
Minimum Operating Pressure: 7 psi (0.5 bar)*
Maximum Working Pressure: Sprinklers VK315 and VK340 are rated for use with water working pressures ranging from the minimum 7 psi (0.5 bar) up to 250 psi (17 bar) for high-pressure systems. High-pressure (HP) sprinklers can be identified by locating "250" stamped on the deflector. All other Part Nos. not mentioned above are rated to a maximum 175 psi (12 bar) wwp.
Factory tested hydrostatically to 500 psi (34.5 bar)
Testing: U.S.A. Patent No. 4,831,870
Thread size: Refer to the Approval Charts
Nominal K-Factor: Refer to the Approval Charts
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: Refer to the Approval Charts

Viking Technical Data may be found on The Viking Corporation's Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

*cULus Listing, FM Approval, and NFPA 13 installs require a minimum of 7 psi (0.5 bar). The minimum operating pressure for LPCB and CE Approvals ONLY is 5 psi (0.35 bar).

Material Standards:

Frame Casting: Brass UNS-C84400 or QM Brass for Sprinklers 06661B, 06766B, 07060, and 12281. Brass UNS-C84400 for all other sprinklers.
Deflector: Brass UNS-C23000 or Copper UNS-C19500 for Sprinklers 06661B, 06764B, and 12281. Copper UNS-C19500 for Sprinklers 06665B, 07060, and 14817. Brass UNS-C26000 for all other Sprinklers.
Bushing (for Sprinklers 06719B, 06717B, and 12286): Brass UNS-C36000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape
Screw: Brass UNS-C36000

Form No. F_080488

Replaces page 51a-e, dated December 20, 2010. (Revised deflector material and added CE-certificate of conformity 0786-CPD-40278 for sprinkler 06764B.)

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TECHNICAL DATA

MIRAGE® STANDARD AND QR CONCEALED PENDENT SPRINKLER VK462 AND HP SPRINKLER VK463 (K5.6)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

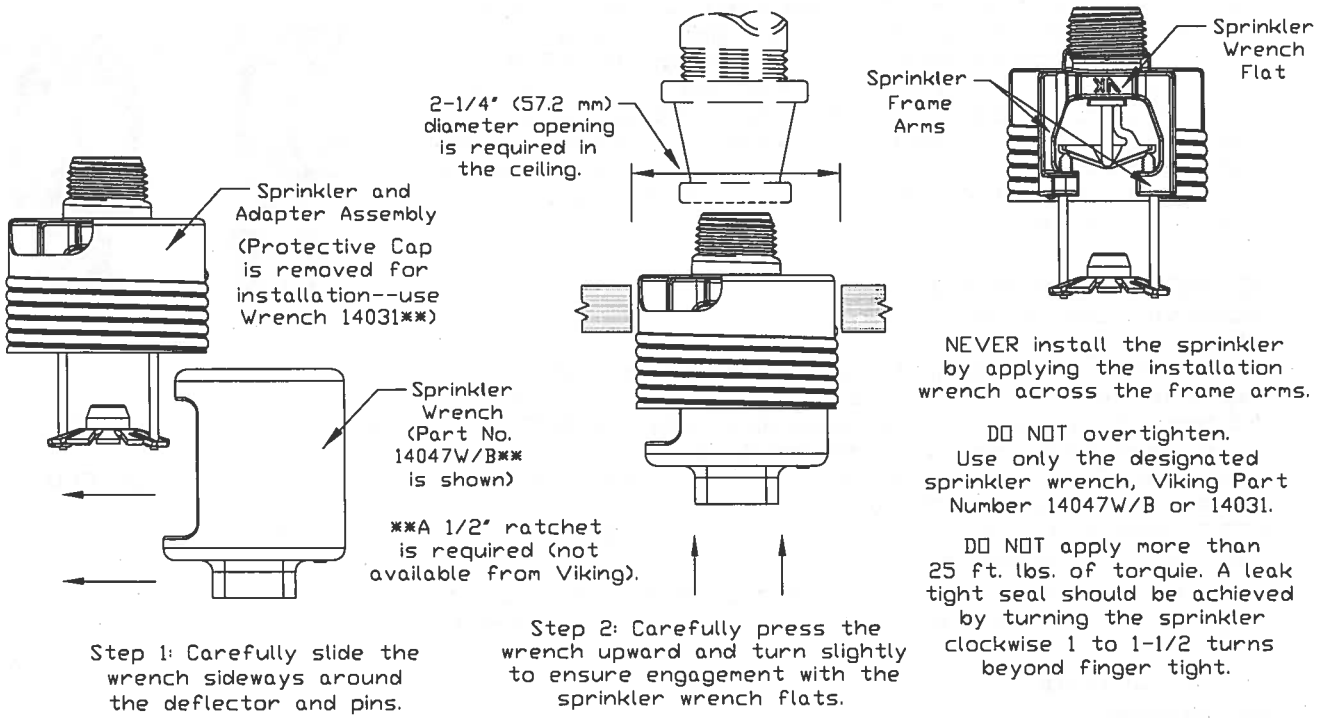


Figure 3: Sprinkler Installation and Correct Use of Wrenches

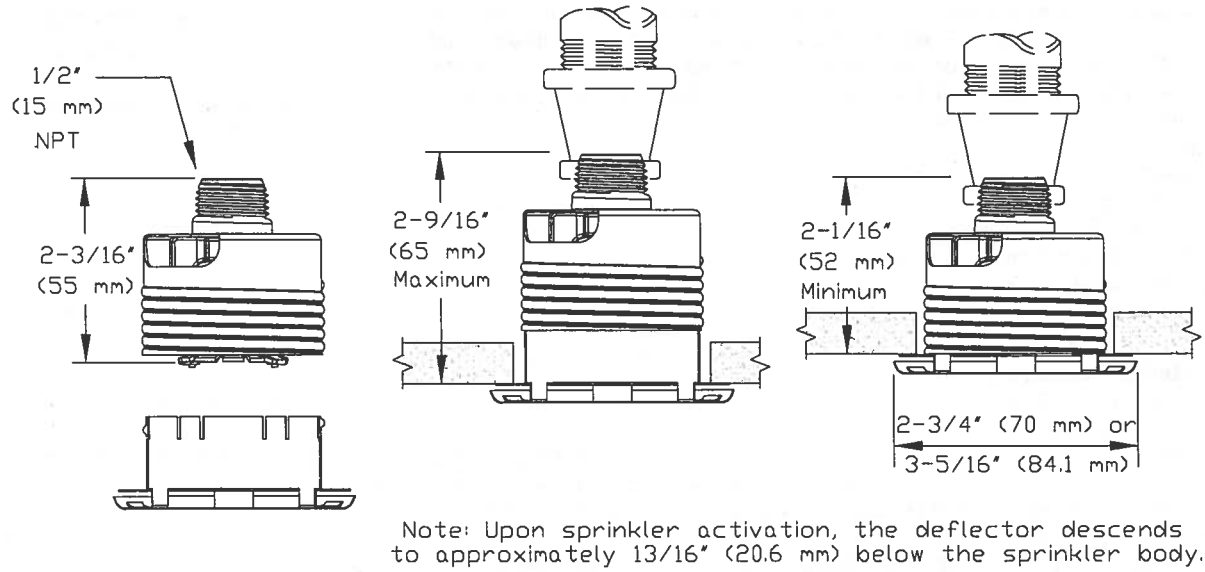


Figure 4: Sprinkler Dimensions and Cover Installation

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MIRAGE® STANDARD AND QR CONCEALED PENDENT SPRINKLER VK462 AND HP SPRINKLER VK463 (K5.6)

TECHNICAL DATA

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

DESIGN CRITERIA

(Also refer to the Approval Chart on page 54c.)

cULus Listing Requirements:

Mirage® Concealed Pendent Sprinklers VK462 and VK463 are cULus Listed as quick response for installation in accordance with the latest edition of NFPA 13 for standard coverage pendent spray sprinklers as indicated below.

- For hazard occupancies up to and including Ordinary Hazard, Group II.
- Protection areas and maximum spacing shall be in accordance with the tables provided in NFPA 13. Maximum spacing allowed is 15 ft. (4.6 m).
- Minimum spacing allowed is 6 ft. (1.8 m) unless baffles are installed in accordance with NFPA 13.
- Minimum distance from walls is 4 in. (102 mm).
- Maximum distance from walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler obstruction rules contained in NFPA 13 for standard coverage pendent spray sprinklers must be followed.

NOTE: Concealed sprinklers must be installed in neutral or negative pressure plenums only.

FM Approval Requirements: Mirage® Concealed Pendent Sprinkler VK462 is FM Approved as a standard response standard spray sprinkler as indicated in the Approval Chart for hazard occupancies up to and including Ordinary Hazard, Group II. For installation in accordance with the latest applicable FM Loss Prevention Data Sheets (including 2-8N) and Technical Advisory Bulletins. FM Global Loss Prevention Data Sheets and Technical Advisory Bulletins contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

NOTE: The FM installation guidelines may differ from cULus and/or NFPA criteria.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to page SR1-3 or QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.



Identification of Custom Paint Color:
All custom color painted cover plates will have an identifying label affixed to the inside of the cover that indicates custom color and will have a representative sample (a paint dot) of the paint on the label.

Figure 1: Identification of Custom Paint Color for Concealed Covers

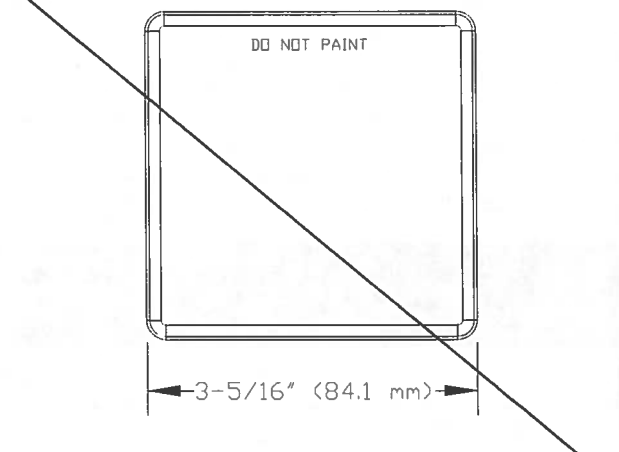


Figure 2: Square Cover Assembly 15394

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MIRAGE® STANDARD AND QR CONCEALED PENDENT SPRINKLER VK462 AND HP SPRINKLER VK463 (K5.6)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Approval Chart
Mirage® Concealed Pendent Sprinklers VK462 and VK463

Sprinkler Temperature Rating / Cover Plate Temperature Rating / AW1◄ Cover Plate Finish — KEY

Sprinkler Base Part No.[1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Listings and Approvals[4] (Refer also to Design Criteria on page 54d.)					
		Inch	mm	U.S.	metric[2]		cULus[5]	FM	NYC[6]	VdS	LPCB	CE
Standard Response Applications												
~~13503A~~	~~VK462~~	~~1/2"~~	~~15~~	~~5.6~~	~~80.6~~	~~175 psi (12 bar)~~	--	AU1, BX1	--	AY1, CZ1	--	--
14697A	VK462	1/2"	15	5.6	80.6	175 psi (12 bar)	--	--	--	--	~~AV2, BW2~~	~~AV2, BW2~~[7]
Quick Response Applications												
13503A	VK462	1/2"	15	5.6	80.6	175 psi (12 bar)	AV1, BX1	--	AV1, BW1	--	--	AY2, CZ2[8]
14697A	VK462	1/2"	15	5.6	80.6	175 psi (12 bar)	AV1, BX1	--	AV1, BW1	--	--	--
13667A	VK463	1/2"	15	5.6	80.6	250 psi (17.2 bar)[3]	AV1, BX1	--	AV1, BW1	--	--	--

Sprinkler Temperature Ratings
A - 155 °F (68 °C)
B - 175 °F (79°C) and 200 °F (93 °C)
C - 200 °F (93 °C)

Cover Plate Assembly Temperature Ratings[9]
U - 135 °F (57 °C) cULus Listed cover 13504[1], 13642[1] (large diameter), or 15394[1] (square cover plate) *FM Approved as 139 °F (59 °C)*
V - 135 °F (57 °C) cULus Listed cover 13504[1] or 13642[1] (large diameter)
W - 165 °F (74 °C) cover 13504[1] or 13642[1] (large diameter)
X - 165 °F (74 °C) cover 13504[1], 13642[1] (large diameter), or 15394[1] (square cover plate)
Y - 135 °F (57 °C) cover 13504[1]
Z - 165 °F (74 °C) cover 13504[1]

Cover Plate Assembly Finishes[10]
1 - Polished Chrome, Brushed Chrome, Bright Brass, Antique Brass, Brushed Brass, Brushed Copper, Painted White, Painted Ivory, or Painted Black
2 - Polished Chrome, Painted White

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.
[2] Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
[3] The Water Working Pressure rating is stamped on the deflector.
[4] This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.
[5] Listed by Underwriter's Laboratories for use in the U.S. and Canada.
[6] Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 32.
[7] CE Certified, Standard EN 12259-1, EC-certificate of conformity 0832-CPD-2032.
[8] CE Certified, Standard EN 12259-1, EC-certificate of conformity 0786-CPD-40249.
[9] The 135/139 °F cover has an orange label. The 165 °F cover has a white label.
[10] Painted finish consists of Polyester Baked Enamel. Other paint colors are available on request with the same listings as the standard paint colors. Listings and approvals apply for any paint manufacturer. Contact Viking for additional information.

NOTE: Custom colors are indicated on a label inside the cover assembly. Refer to Figure 1.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Temperature Rating of Cover Assembly (Required)	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	135 °F (57 °C) cULus 139 °F (59 °C) FM	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	165 °F (74 °C)	Yellow
Intermediate	200 °F (93 °C)	150 °F (65 °C)	165 °F (74 °C)	Green

Cover Plate Finishes: Polished Chrome, Brushed Chrome, Bright Brass, Antique Brass, Brushed Brass, Brushed Copper, Painted White, Painted Ivory, or Painted Black

Footnotes

[1] The sprinkler temperature rating is stamped on the sprinkler deflector.
[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

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VIKING | TECHNICAL DATA | MIRAGE® STANDARD AND QR CONCEALED PENDENT SPRINKLER VK462 AND HP SPRINKLER VK463 (K5.6)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Cover Assembly Materials:
Cover: Copper UNS-C11000
Base: Brass UNS-C26000 or UNS-C26800
Springs: Nickel Alloy
Solder: Eutectic

Ordering Information: (Also refer to the current Viking price list.)
Viking Mirage® Standard and Quick Response Concealed Pendent Sprinklers and Cover Plate Assemblies must be ordered separately:
Sprinkler: Base Part No. 13503A, 14697A, or HP Base Part No. 13667A
Specify sprinkler temperature rating by adding the appropriate suffix for the temperature rating to the base part number:
Temperature Suffix (°F/°C): 155°/68° = B, 175°/79° = D, 200°/93° = E
For example, sprinkler VK463 with a 155 °F/68 °C temperature rating = 13667AB.
Cover Plate Assembly: Base Part No. 13504 (2-3/4" diameter), Base Part No. 13642 (3-5/16" diameter), or Base Part No. 15394 (square cover plate, 3-5/16" diameter)
Specify finish and temperature rating of the cover plate assembly by first adding the appropriate suffix for the finish and then the appropriate suffix for the cover temperature rating to the base part number:
Finish Suffix: Polished Chrome = F, Painted White = M-/SW1004, Painted Ivory = M-/SW1634, Painted Black = M-/SW1007
Temperature Suffix (°F/°C): 135°/57° UL (139°/59° FM) = A, 165°/74° = C
For example, cover 13504 with a Polished Chrome finish and a 165 °F/74 °C temperature rating = 13504FC.
Note: Square cover plate 15394 cULus Listing is for the 135 °F (57 °C) temperature rated cover plate only. Refer to the Approval Chart.

Available Finishes And Temperature Ratings:
Refer to Table 1

Accessories: (Also refer to the "Sprinkler Accessories" section of the Viking data book.)
Sprinkler Wrenches:**
A. Heavy Duty Wrench Part No. 14047W/B (available since 2006), or
B. Head Cabinet Wrench Part No. 14031*** (available since 2006)
C. Optional Concealed Cover Plate Installer Tool Part No. 14412 for cover 13504, or Part No. 14867 for the large diameter cover (available since 2007)
**Requires a ½" ratchet (not available from Viking). ***Optional for removal of the protective cap. Ideal for sprinkler cabinets.
Sprinkler Cabinet: Part No. 01731A, Capacity: five (5) sprinklers (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
During fire conditions, when the temperature around the sprinkler approaches its operating temperature, the cover plate detaches. Continued heating of the exposed sprinkler causes the heat-sensitive liquid in the glass bulb to expand and the bulb to shatter, releasing the yoke, pip-cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
Viking Sprinklers VK462 and VK463 are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

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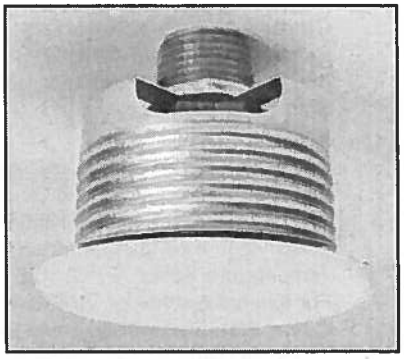
VIKING

TECHNICAL DATA

MIRAGE® STANDARD AND QR CONCEALED PENDENT SPRINKLER VK462 AND HP SPRINKLER VK463 (K5.6)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION



Viking Mirage® Standard and Quick Response Concealed Pendent Sprinkler VK462 and HP Sprinkler VK463 are thermosensitive glass-bulb spray sprinklers designed for installation on concealed pipe systems where the appearance of a smooth ceiling is desired.

The sprinkler is pre-assembled with a threaded adapter for installation with a low-profile cover assembly that provides up to ½" (12.7 mm) of vertical adjustment. The two-piece design allows installation and testing of the sprinkler prior to installation of the cover plate. The "push-on", "thread-off" design of the concealed cover plate assembly allows easy installation of the cover plate after the system has been tested and the ceiling finish has been applied. The cover assembly can be removed and reinstalled, allowing temporary removal of ceiling panels without taking the sprinkler system out of service or removing the sprinkler.

2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV
FM Approval: Class 2015
NYC Approved: MEA 89-92-E, Volume 32
VdS Approved: Certificate G4080021
LPC Approved: Ref. No. 096e/12
CE Certified: Standard EN 12259-1, EC-certificates of conformity 0832-CPD-2032 and 0786-CPD-40249
Refer to the Approval Chart on page 54c and Design Criteria on page 54d for cULus Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:

Available since 2006.
Minimum Operating Pressure: 7 psi (0.5 bar)*
Maximum Working Pressure: Sprinkler VK463 is rated for use with water working pressures ranging from the minimum 7 psi (0.5 bar) up to 250 psi (17.2 bar) for high-pressure systems. High-pressure (HP) sprinklers can be identified by locating "250" stamped on the deflector. Sprinkler VK462 is rated to a maximum 175 psi (12 bar) wwp.
Factory tested hydrostatically to 500 psi (34.5 bar)
Testing: U.S.A. Patent No. 4,831,870
Thread size: 1/2" (15 mm) NPT
Nominal K-Factor: 5.6 U.S. (80.6 metric†)
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Patents Pending

Viking Technical Data may be found on The Viking Corporation's Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

*cULus Listing, FM Approval, and NFPA 13 installs require a minimum of 7 psi (0.5 bar). The minimum operating pressure for LPCB and CE Approvals ONLY is 5 psi (0.35 bar).

†Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Material Standards:

Sprinkler Body: Brass UNS-C84400
Deflector: Copper UNS-C19500 for Sprinkler VK462
Phosphor Bronze UNS-C51000 for Sprinkler VK463
Deflector Pins: Stainless Steel Alloy
Bulb: Glass, nominal 3 mm diameter
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Button: Brass UNS-C36000
Screws: 18-8 Stainless Steel
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape
Yoke: Phosphor Bronze UNS-C51000
Cover Adapter: Cold Rolled Steel UNS-G10080, Finish: Clear Chromate over Zinc Plating

Replaces page 54a-e, dated June 5, 2009. (Revised minimum and maximum dimensions in Figure 4).

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TECHNICAL DATA

MIRAGE® QUICK RESPONSE CONCEALED PENDENT MRI SPRINKLERS (K5.6 & 8.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

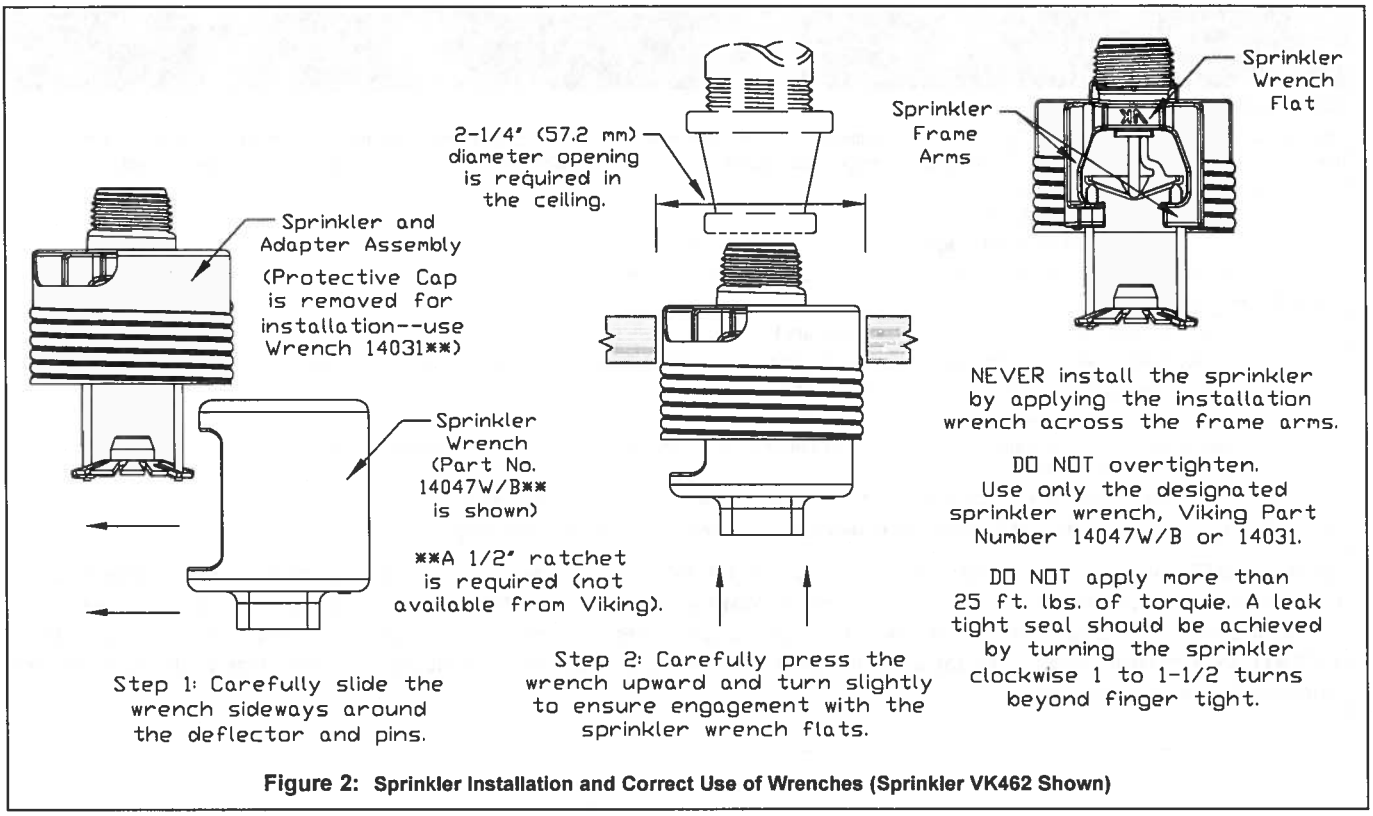


Figure 2: Sprinkler Installation and Correct Use of Wrenches (Sprinkler VK462 Shown)

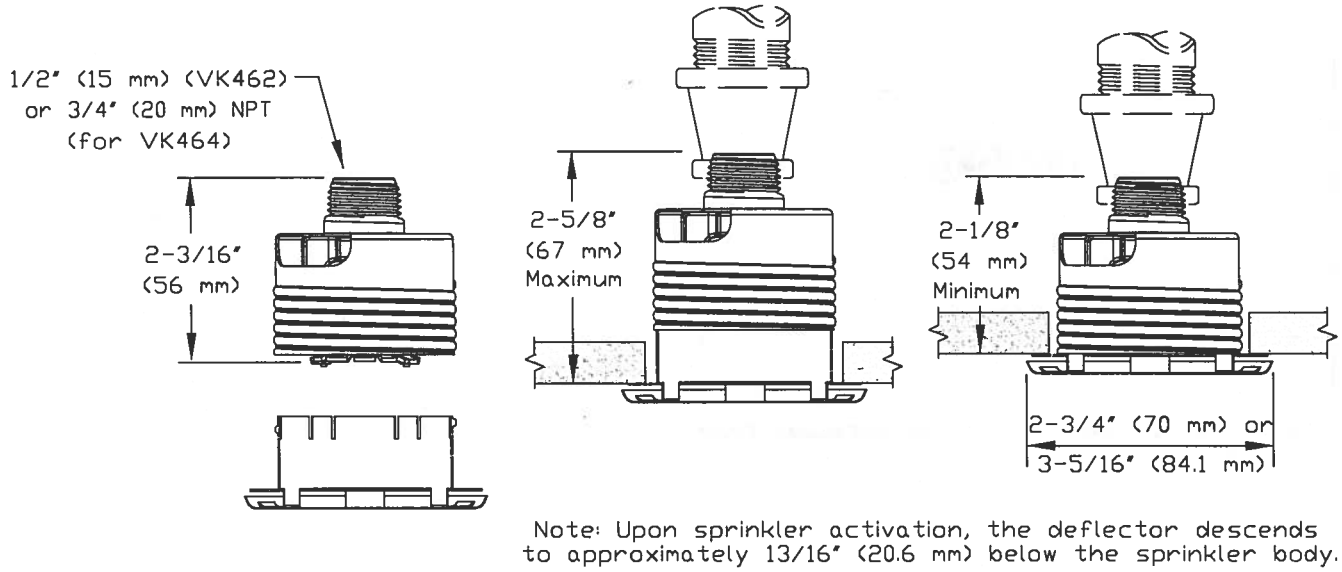


Figure 3: Sprinkler Dimensions and Cover Installation (Sprinkler VK462 Shown)

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VIKING | TECHNICAL DATA | MIRAGE® QUICK RESPONSE CONCEALED PENDENT MRI SPRINKLERS (K5.6 & 8.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

DESIGN CRITERIA

(Also refer to the Approval Chart on page 54r)

cULus Listing Requirements:

Mirage® Concealed Pendent MRI Sprinklers were subjected to magnetic field interaction testing and determined to be MRI conditional according to the terminology specified in ASTM International, Designation F2503-05. These sprinklers are intended for use in a high magnetic field environment according to the following conditions:

1. Static magnetic field of 3-Tesla or less
2. Highest spatial gradient magnetic field of 720-Gauss/cm or less

Sprinklers VK462 and VK464 are cULus Listed for installation in accordance with the latest edition of NFPA 13 for standard coverage pendent spray sprinklers as indicated below.

- For hazard occupancies up to and including Ordinary Hazard, Group II.
- Protection areas and maximum spacing shall be in accordance with the tables provided in NFPA 13. Maximum spacing allowed is 15 ft. (4.6 m).
- Minimum spacing allowed is 6 ft. (1.8 m) unless baffles are installed in accordance with NFPA 13.
- Minimum distance from walls is 4 in. (102 mm).
- Maximum distance from walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler obstruction rules contained in NFPA 13 for standard coverage pendent spray sprinklers must be followed.

NOTE: Concealed sprinklers must be installed in neutral or negative pressure plenums only.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to page QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.



Identification of Custom Paint Color:
All custom color painted cover plates will have an identifying label affixed to the inside of the cover that indicates custom color and will have a representative sample (a paint dot) of the paint on the label.

Figure 1: Identification of Custom Paint Color for Concealed Covers

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TECHNICAL DATA

MIRAGE® QUICK RESPONSE CONCEALED PENDENT MRI SPRINKLERS (K5.6 & 8.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Approval Chart

Mirage® Quick Response Concealed Pendent MRI Sprinklers

AW1 = Sprinkler Temperature Rating / Cover Plate Temperature Rating / Cover Plate Finish — KEY

Sprinkler Base Part Number[1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Listings and Approvals[3] (Refer also to Design Criteria on page 54s.)		
		Inch	mm	U.S.	metric[2]		cULus[4]	FM	NYC
→ 15480A	VK462	1/2"	15	5.6	80.6	175 psi (12 bar)	AW1, BX1	--	--
15481A	VK464	3/4"	20	8.0	115.2	175 psi (12 bar)	AW1, BX1	--	--

Sprinkler Temperature Ratings	Cover Plate Assembly Temperature Ratings[5]	Cover Plate Assembly Finishes[6]
→ A - 155 °F (68 °C) B - 175 °F (79°C) and 200 °F (93 °C)	W - 135 °F (57 °C) cover 13504[1] or 13642[1] (large diameter) X - 165 °F (74 °C) cover 13504[1] or 13642[1] (large diameter)	1 - Polished Chrome, Brushed Chrome, Bright Brass, Antique Brass, Brushed Brass, Brushed Copper, Painted White, Painted Ivory, or Painted Black

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.

[2] Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

[3] This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.

[4] Listed by Underwriter's Laboratories for use in the U.S. and Canada.

[5] The 135 °F cover has an orange label. The 165 °F cover has a white label.

[6] Painted finish consists of Polyester Baked Enamel. Other paint colors are available on request with the same listings as the standard paint colors. Listings and approvals apply for any paint manufacturer. Contact Viking for additional information.

NOTE: Custom colors are indicated on a label inside the cover assembly. Refer to Figure 1.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Temperature Rating of Cover Assembly (Required)	Bulb Color
→ Ordinary	155 °F (68 °C)	100 °F (38 °C)	135 °F (57 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	165 °F (74 °C)	Yellow
Intermediate	200 °F (93 °C)	150 °F (65 °C)	165 °F (74 °C)	Green

Cover Plate Finishes: Polished Chrome, Brushed Chrome, Bright Brass, Antique Brass, Brushed Brass, Brushed Copper, Painted White, Painted Ivory, or Painted Black

Footnotes

[1] The sprinkler temperature rating is stamped on the sprinkler deflector.

[2] Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

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VIKING | TECHNICAL DATA | MIRAGE® QUICK RESPONSE CONCEALED PENDENT MRI SPRINKLERS (K5.6 & 8.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Ordering Information: (Also refer to the current Viking price list.)
Viking Mirage® Quick Response Concealed Pendent MRI Sprinklers and Cover Plate Assemblies must be ordered separately:
Sprinkler: Base Part No. 15480A or 15481A
Specify sprinkler temperature rating by adding the appropriate suffix for the temperature rating to the base part number:
Temperature Suffix (°F/°C): 155°/68° = B, 175°/79° = D, 200°/93° = E
For example, MRI Sprinkler VK462 with a 155 °F/68 °C temperature rating = 15480AB.
Note: When ordering this sprinkler using the SIN, add suffix -MRI. For example, sprinkler VK462 for MRI applications = VK462-MRI.
Cover Plate Assembly: Base Part No. 13504 (2-3/4" diameter) or Base Part No. 13642 (3-5/16" diameter)
Specify finish and temperature rating of the cover plate assembly by first adding the appropriate suffix for the finish and then the appropriate suffix for the cover temperature rating to the base part number:
Finish Suffix: Polished Chrome = F, Painted White = M-/SW1004, Painted Ivory = M-/SW1634, Painted Black = M-/SW1007
Temperature Suffix (°F/°C): 135°/57° = A, 165°/74° = C
For example, cover 13504 with a Polished Chrome finish and a 165 °F/74 °C temperature rating = 13504FC.
Available Finishes And Temperature Ratings:
Refer to Table 1
Accessories: (Also refer to the "Sprinkler Accessories" section of the Viking data book.)
Sprinkler Wrenches:**
A. Heavy Duty Wrench Part No. 14047W/B (available since 2006), or
B. Head Cabinet Wrench Part No. 14031*** (available since 2006)
C. Optional Concealed Cover Plate Installer Tool Part No. 14412 for cover 13504, or Part No. 14867 for the large diameter cover (available since 2007)
**Requires a ½" ratchet (not available from Viking). ***Optional for removal of the protective cap. Ideal for sprinkler cabinets.
Sprinkler Cabinet: Part No. 01731A, Capacity: five (5) sprinklers (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

5. OPERATION
During fire conditions, when the temperature around the sprinkler approaches its operating temperature, the cover plate detaches. Continued heating of the exposed sprinkler causes the heat-sensitive liquid in the glass bulb to expand and the bulb to shatter, releasing the yoke, pip-cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
Viking Sprinklers VK462 and VK464 are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE
For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

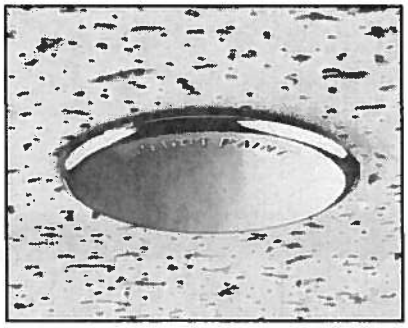
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MIRAGE® QUICK RESPONSE CONCEALED PENDENT MRI SPRINKLERS (K5.6 & 8.0)

TECHNICAL DATA

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION



Viking Mirage® Quick Response Concealed MRI Sprinklers are intended for use inside an MRI environment, such as the MR system room. They are not intended to be used within the bore of the MR scanner itself. This sprinkler is made from non-magnetic materials that are acceptable for use in a high magnetic field environment like those associated with a magnetic resonance system. This sprinkler has been independently tested for use with a 3-Tesla MR system in accordance with ASTM F2503-05 criteria. The results of this test demonstrate that this product is acceptable for use in an environment with a static magnetic field of 3-Tesla or less and the highest spatial gradient magnetic field of 720-Gauss/cm or less.

The sprinkler is pre-assembled with a threaded adapter for installation with a low-profile cover assembly that provides up to ½" (12.7 mm) of vertical adjustment. The two-piece design allows installation and testing of the sprinkler prior to installation of the cover plate. The "push-on", "thread-off" design of the concealed cover plate assembly allows easy installation of the cover plate after the system has been tested and the ceiling finish has been applied. The cover assembly can be removed and reinstalled, allowing temporary removal of ceiling panels without taking the sprinkler system out of service or removing the sprinkler.

2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

Refer to the Approval Chart on page 54r and Design Criteria on page 54s for cULus Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:

Available since 2008.
Minimum Operating Pressure: 7 psi (0.5 bar)
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Testing: U.S.A. Patent No. 4,831,870
Thread size: 1/2" (15 mm) or 3/4" (20 mm) NPT
Nominal K-Factor: 5.6 U.S. (80.6 metric*) or 8.0 U.S. (115.2 metric*)

Viking Technical Data may be found on The Viking Corporation's Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

*Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Patents Pending

Material Standards:

Sprinkler Body: Brass UNS-C84400
Deflector: Phosphor Bronze UNS-C51000
Deflector Pins: Stainless Steel Alloy (non-magnetic)
Bulb: Glass, nominal 3 mm diameter
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400 (non-magnetic)
Button: Brass UNS-C36000
Screws: 18-8 Stainless Steel
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape
Yoke: Phosphor Bronze UNS-C51000
Cover Adapter: Brass UNS-C26800

Cover Assembly Materials:

Cover: Copper UNS-C11000
Base: Brass UNS-C26800
Springs: Nickel Alloy
Solder: Eutectic

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7044 Branch Outlet

ANVILSTAR™
Fire Products Division of Anvil® International

ANVIL INTERNATIONAL

Submittal Sheet

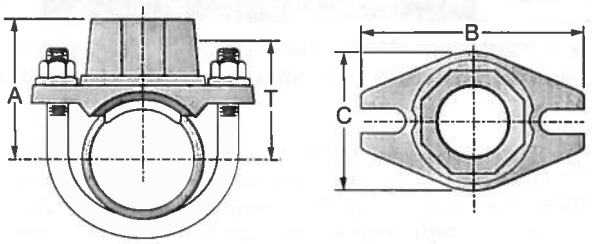


FIGURE 7044 BRANCH OUTLET

Nominal Size	Pipe O.D.	Max. Working Pressure	Hole Diameter		Dimensions				Specified Torque §		Approx. Wt. Ea.
			Min. Dia.	Max. Dia.	A	B	C	Take-out T	Min.	Max.	
In./DN(mm)	In./mm	psi/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Ft.-Lbs./N-M		Lbs./Kg
1¼ x ½	1.660 x 0.840	175	1 3/16	1¼	2 1/16	3½	2 7/32	1 3/8	27	33	0.8
32 x 15	42.4 x 21.3	12.1	30	32	53	89	56	35	-	-	0.4
1¼ x ¾	1.660 x 1.050	175	1 3/16	1¼	2 1/16	3½	2 7/32	1 3/8	27	33	0.8
32 x 20	42.4 x 26.7	12.1	30	32	53	89	56	35	-	-	0.4
1¼ x 1	1.660 x 1.315	175	1 3/16	1¼	2 3/16	3½	2 7/32	1½	27	33	0.9
32 x 25	42.4 x 33.7	12.1	30	32	56	89	56	38	-	-	0.4
1½ x ½	1.900 x 0.840	175	1 3/16	1¼	2 5/32	3½	2 7/32	1 3/8	27	33	0.8
40 x 15	48.3 x 21.3	12.1	30	32	55	89	56	35	-	-	0.4
1½ x ¾	1.900 x 1.050	175	1 3/16	1¼	2 5/32	3½	2 7/32	1 3/8	27	33	0.8
40 x 20	48.3 x 26.7	12.1	30	32	55	89	56	35	-	-	0.4
1½ x 1	1.900 x 1.315	175	1 3/16	1¼	2 9/32	3½	2 7/32	1½	27	33	0.9
40 x 25	48.3 x 33.7	12.1	30	32	58	89	56	38	-	-	0.4
2 x ½	2.375 x 0.840	175	1 3/16	1¼	2½	3 3/8	2 7/32	1 5/8	27	33	0.8
50 x 15	60.3 x 21.3	12.1	30	32	64	98	56	42	-	-	0.4
2 x ¾	2.375 x 1.050	175	1 3/16	1¼	2½	3 3/8	2 7/32	1 5/8	27	33	0.8
50 x 20	60.3 x 26.7	12.1	30	32	64	98	56	42	-	-	0.4
2 x 1	2.375 x 1.315	175	1 3/16	1¼	2 5/8	3 3/8	2 7/32	1¾	27	33	0.9
50 x 25	60.3 x 33.7	12.1	30	32	67	98	56	45	-	-	0.4
2½ x ½	2.875 x 0.840	175	1 3/16	1¼	2 11/16	4 3/8	2 7/32	2	27	33	0.8
65 x 15	73.0 x 21.3	12.1	30	32	69	111	56	51	-	-	0.4
2½ x ¾	2.875 x 1.050	175	1 3/16	1¼	2 11/16	4 3/8	2 7/32	2	27	33	0.9
65 x 20	73.0 x 26.7	12.1	30	32	69	111	56	51	-	-	0.4
2½ x 1	2.875 x 1.315	175	1 3/16	1¼	2 13/16	4 3/8	2 7/32	2 1/8	27	33	1.0
65 x 25	73.0 x 33.7	12.1	30	32	72	111	56	54	-	-	0.5

Not for use in copper systems.

§ – For additional Bolt Torque information, see Technical Data section.

⚠ WARNING

For dry pipe systems and freezer applications lubrication of the gasket is required, Gruvlok® Xtreme™ Lubricant is Required.

For the latest UL/ULC Listed and FM Approved pressure ratings, versus pipe schedule, go to **www.anvilstar.com** or contact your local AnvilStar representative

ANVIL INTERNATIONAL

rsn 703956
PERMIT 13647594

7044 Branch Outlet

ANVILSTAR™
Fire Products Division of Anvil® International

ANVIL INTERNATIONAL

Submittal Sheet

The Gruvlok Fig. 7044 Branch Outlet is for direct connection of sprinkler heads and drop nipples. Just cut a hole, saddle up and fasten it with the U-bolt. The branch outlet provides an economical, quick, and easy outlet at any location along a pipe. Specially engineered to conform to the pipe O.D., the Fig. 7044 provides a leak tight reliable seal in both positive pressure and vacuum conditions. Ductile iron housings with Grade E gasket and carbon steel U-bolt (3/8" dia.) with flanged nuts.

The maximum working pressure for all sizes is 175 PSI (12.1 bar).



UL FM ULC
APPROVED

For Listing/Approval Details and Limitations visit our Web Site *www.anvilintl.com* or contact an Anvil®/AnvilStar™ Sales Representative.

MATERIAL SPECIFICATIONS

HOUSING:
Ductile Iron conforming to ASTM A-536, Grade 65-45-12.

U-BOLT & NUTS:
Plated U-bolt conforming to ASTM A-307 with plated hex nuts conforming to ASTM A-563.

COATINGS:
- ❑ Plain
- ❑ Other (Specify): _____

For other Coating requirements contact an AnvilStar Representative.

LUBRICATION:
- ❑ Standard Gruvlok Gruvlok Xtreme™ (Required for dry pipe systems and freezer applications.)
- ❑ Other (Specify): _____

GASKETS: Materials
Properties as designated in accordance with ASTM D-2000
- ❑ **Grade "E" EPDM** (Green color code)
  -40°F to 150°F (Service Temperature Range) (-40°C to 66°C)
  Recommended for water service, diluted acids, alkalies solutions, salts, oil-free air and many chemical services not involving hydrocarbons, oils or gases.
  NOT FOR USE WITH HYDROCARBONS.
- ❑ Other_____

PROJECT INFORMATION:		APPROVAL STAMP:
Project: undefined		
Date: undefined	**Phone:** undefined	
Architect / Engineer: undefined		
Contractor: undefined		
Address: undefined		
Notes 1: undefined		
Notes 2: undefined		

For the latest UL/ULC Listed and FM Approved pressure ratings, versus pipe schedule, go to **www.anvilstar.com** or contact your local AnvilStar representative

ANVIL INTERNATIONAL

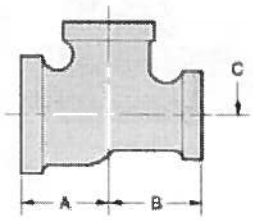
rsn 703956
PERMIT 13647594

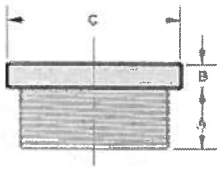
D.I. THREADED FITTINGS

S.P FITTINGS
A Division of Star Pipe Products

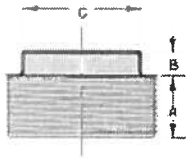
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For fire protection services request submittal GRS 1.3





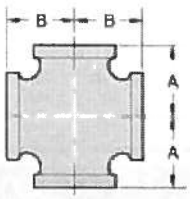
OUTSIDE HEAD



INSIDE HEAD

DUCTILE IRON BUSHINGS

NOMINAL SIZE (INCH)	ITEM CODE #	DIMENSIONS A	B	C	STYLE	WT. EACH
1x1/2	DBUSH31	0.75	0.25	1.42	OUT	0.22
1x3/4	DBUSH32	0.75	0.25	1.42	OUT	0.17
1 1/4x1	DBUSH43	0.80	0.28	1.76	OUT	0.28
1 1/2x1	DBUSH53	0.83	0.31	2.00	OUT	0.44
1 1/2x1 1/4	DBUSH54	0.83	0.31	2.00	OUT	0.30
2x1	DBUSH63	0.88	0.41	1.95	IN	0.66
2x1 1/4	DBUSH64	0.88	0.34	2.48	OUT	0.72
2x1 1/2	DBUSH65	0.88	0.34	2.48	OUT	0.61

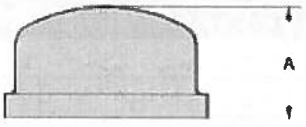


DUCTILE IRON CROSS

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I	DIMENSIONS A	B	WEIGHT EACH PIECE
1	DX033	500	1.50	1.50	0.98
1 1/4	DX044	500	1.75	1.75	1.50
1 1/2	DX055	500	1.94	1.94	1.90
2	DX066	500	2.25	2.25	2.95
1 1/4X1	DX043	500	1.58	1.67	1.27
1 1/2X1	DX053	500	1.65	1.80	1.48
2X1	DX063	500	1.73	2.02	2.10

DUCTILE IRON REDUCING TEE

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	B	C	WEIGHT EACH PIECE
1X1X1/2	DT331	500	1.26	1.26	1.36	0.64
1X1X3/4	DT332	500	1.37	1.37	1.45	0.73
1X1/2X1	DT313	500	1.50	1.36	1.50	0.71
1X3/4X1	DT323	500	1.50	1.45	1.50	0.76
1X1X1 1/4	DT334	500	1.67	1.67	1.58	0.98
1X1X1 1/2	DT335	500	1.80	1.80	1.65	1.16
1 1/4X1X1/2	DT431	500	1.34	1.26	1.53	0.82
1 1/4X1X3/4	DT432	500	1.45	1.37	1.62	0.90
1 1/4X1X1	DT433	500	1.58	1.50	1.67	1.00
1 1/4X1X1 1/4	DT434	500	1.75	1.67	1.75	1.08
1 1/4X1X1 1/2	DT435	500	1.88	1.80	1.82	1.42
1 1/4X1 1/4X1/2	DT441	500	1.34	1.34	1.53	0.86
1 1/4X1 1/4X3/4	DT442	500	1.45	1.45	1.62	0.92
1 1/4X1 1/4X1	DT443	500	1.58	1.58	1.67	0.95
1 1/4X1 1/4X1 1/2	DT445	500	1.88	1.88	1.82	1.45
1 1/4X1 1/4X2	DT446	500	2.10	2.10	1.90	1.75
1 1/2X1X1/2	DT531	500	1.41	1.34	1.66	0.95
1 1/2X1X3/4	DT532	500	1.52	1.37	1.75	1.14
1 1/2X1X1	DT533	500	1.65	1.50	1.80	1.17
1 1/2X1X1 1/4	DT534	500	1.82	1.67	1.88	1.34
1 1/2X1X1 1/2	DT535	500	1.94	1.80	1.94	1.45
1 1/2X1 1/4X1/2	DT541	500	1.41	1.34	1.66	1.05
1 1/2X1 1/4X3/4	DT542	500	1.52	1.45	1.75	1.15
1 1/2X1 1/4X1	DT543	500	1.65	1.58	1.80	1.25
1 1/2X1 1/4X2	DT546	500	2.16	2.10	2.02	1.90
1 1/2X1 1/2X1/2	DT551	500	1.41	1.41	1.16	1.15
1 1/2X1 1/2X3/4	DT552	500	1.52	1.52	1.75	1.24
1 1/2X1 1/2X1	DT553	500	1.65	1.65	1.80	1.30
1 1/2X1 1/2X1 1/4	DT554	500	1.82	1.82	1.88	1.48
1 1/2X1 1/2X2	DT556	500	2.16	2.16	2.02	1.98
2X1X2	DT636	500	2.25	2.02	2.25	2.15
2X1 1/4X2	DT646	500	2.25	2.10	2.25	2.30
2X1 1/2X1/2	DT651	500	1.49	1.41	1.88	1.50
2X1 1/2X3/4	DT652	500	1.60	1.52	1.97	1.62
2X1 1/2X1	DT653	500	1.73	1.65	2.02	1.64
2X1 1/2X1 1/4	DT654	500	1.90	1.82	2.10	1.80
2X1 1/2X1 1/2	DT655	500	2.02	1.94	2.16	2.00
2X1 1/2X2	DT656	500	2.25	2.16	2.25	2.35
2X2X1/2	DT661	500	1.49	1.49	1.88	1.60
2X2X3/4	DT662	500	1.60	1.60	1.97	1.68
2X2X1	DT663	500	1.73	1.73	2.02	1.85
2X2X1 1/4	DT664	500	1.90	1.90	2.10	2.04
2X2X1 1/2	DT665	500	2.02	2.02	2.16	2.18
2X2X2 1/2	DT667	500	2.60	2.60	2.39	3.61
2 1/2X2X3/4	DT762	500	1.74	1.60	2.32	2.28



DUCTILE IRON CAP

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSION A	WEIGHT EACH PIECE
1	DCP003	500	1.16	0.32
1 1/4	DCP004	500	1.28	0.43
1 1/2	DCP005	500	1.33	0.60
2	DCP006	500	1.45	0.91

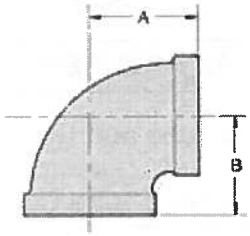
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PERMIT 13647594

D.I. THREADED FITTINGS

S.P. FITTINGS
A Division of Star Pipe Products

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For fire protection services request submittal GRS 1.3

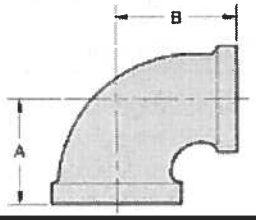


DUCTILE IRON THREADED FITTINGS ARE UL, ULC LISTED AND FACTORY MUTUAL APPROVED FOR 500 PSI SERVICE. DUCTILE IRON PER ASTM A 536 GRADE 65-45-12. DIMENSIONS CONFORM TO ANSI B16.3 CLASS 150. THREADS ARE NPT PER ANSI/ASME B1.20.1

NOTICE: DUCTILE IRON FITTINGS HAVE HIGHER TENSILE STRENGTH THEN THAT OF STEEL PIPE. THEREFORE, OVER TIGHTENING CAN CAUSE DAMAGE TO PIPE THREADS WHICH MAY CAUSE LEAKAGE. DUCTILE IRON FITTINGS SHOULD BE TIGHTENED THREE TURNS BEYOND HAND TIGHT, BUT NO MORE THAN FOUR TURNS.

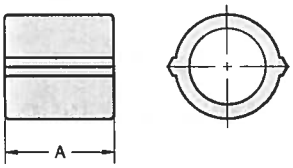
DUCTILE IRON 90 DEG. ELBOW

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	DIMENSIONS B	WEIGHT EACH PIECE
1	DB90033	500	1.50	1.50	0.62
1 1/4	DB90044	500	1.75	1.75	0.90
1 1/2	DB90055	500	1.94	1.94	1.20
2	DB90066	500	2.25	2.25	1.85



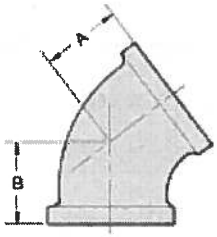
DUCTILE IRON RED.90 DEG. ELBOW

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	DIMENSIONS B	WEIGHT EACH PIECE
1X1/2	DB90031	500	1.26	1.36	0.44
1X3/4	DB90032	500	1.37	1.45	0.52
1 1/4X1/2	DB90041	500	1.34	1.53	0.64
1 1/4X3/4	DB90042	500	1.45	1.62	0.72
1 1/4X1	DB90043	500	1.58	1.67	0.75
1 1/2X1	DB90053	500	1.65	1.80	0.92
1 1/2X1 1/4	DB90054	500	1.82	1.88	1.08
2X1/2	DB90061	500	1.49	1.88	1.08
2X3/4	DB90062	500	1.60	1.97	1.24
2X1	DB90063	500	1.73	2.02	1.40
2X1 1/4	DB90064	500	1.90	2.10	1.52
2X1 1/2	DB90065	500	2.02	2.16	1.65



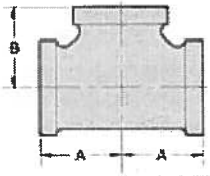
DUCTILE IRON COUPLING

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSION A	WEIGHT EACH PIECE
1	DCL033	500	1.67	0.40
1 1/4	DCL044	500	1.93	0.57
1 1/2	DCL055	500	2.15	0.75
2	DCL066	500	2.53	1.15



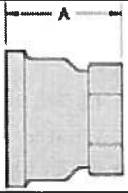
DUCTILE IRON 45 DEG. ELBOW

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	DIMENSIONS B	WEIGHT EACH PIECE
1	DB45033	500	1.12	1.12	0.46
1 1/4	DB45044	500	1.29	1.29	0.73
1 1/2	DB45055	500	1.43	1.43	0.92
2	DB45066	500	1.68	1.68	1.50



DUCTILE IRON STRAIGHT TEE

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	DIMENSIONS B	WEIGHT EACH PIECE
1	DT333	500	1.50	1.50	0.85
1 1/4	DT444	500	1.75	1.75	1.22
1 1/2	DT555	500	1.94	1.94	1.55
2	DT666	500	2.25	2.25	2.45



DUCTILE IRON RED. COUPLING

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSION A	WEIGHT EACH PIECE
1X1/2	DRC031	500	1.69	0.39
1X3/4	DRC032	500	1.69	0.53

rsn 703956
PERMIT 13647594

UL Listed/FM Approved Sprinkler Pipe and Warranty Information

SCI Cooplok™ Grooved Couplings are UL Listed and FM Approved for use on the following types of sprinkler pipe:*

PIPE NAME	MANUFACTURER
Dyna-Thread®, Central-Thread®, XL®, XL-II®, Dyna-Flow®, Super 40®, Super-Flo®, TL®, Central 7®, BLT®,	Allied Tube and Conduit Corp.
Eddylite®, Eddy Flow®, Eddy Thread 40®	Bull Moose Tube Co.
Gal-7®	IDOD Systems Co.
EZ-Flow®	Northwest Pipe & Casing Co.
WLS®, Mega-Flow®, Mega-Thread®, MLT®, GL®	Wheatland Tube Company
Steady Flow®, Steady Thread®	Welded Tube Corp.
Fire-Flo®, EZ-Thread®	Youngstown Tube Co.
Tex-Flow®	Tex-Tube International
SPSF®	Yieh Phui Enterprise Co. Ltd.

***NOTE:** Includes any manufacturer of Schedule 10 or Schedule 40 steel pipe. Check www.SmithCooper.com for updated list of UL Listed/FM Approved sprinkler pipe manufacturers.*

WARRANTY AND LIMITATIONS OF LIABILITY

SMITH-COOPER INTERNATIONAL (SCI) warrants to its initial purchaser only, that its products which are delivered to this initial purchaser will be of the kind described in the order or price list and will be free of defects in workmanship or material for a period of five years from the date of delivery to our initial purchaser.

Should any failure to conform to this warranty appear within five years after the date of the initial delivery to our initial purchaser, SCI will, upon written notification thereof and substantiation that the goods have been stored, installed, maintained and operated in accordance with recognized engineering and piping practices and industry standards, correct such defects by suitable repair or replacement (which alternative shall be at the discretion of SCI) of product at SCI's own expense upon return of the defective part to SCI.

In the event that SCI elects to replace the defective product, SCI shall pay up to $50 per defective product for total cost of replacement. In the event of multiple claims, such payment shall be no greater than $1,000 for each installation project.

This warranty applies only during normal use that meets the above referenced conditions of installation and operation and is absolutely void if the product has been damaged after purchase or if it has been misused, repaired, altered or modified in any manner whatsoever. SCI shall not warranty any of its products if any portion of the product including without limitation, any component, gasket, housing or bolt has been modified, altered, remanufactured or replaced in any manner by any customer, user of the product or third party.

Correction of non-conformities, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of SCI to our initial purchaser, with respect to the goods, whether based on contract, negligence, strict tort, or otherwise. It is the intention of SCI that no warranty of any kind, whether expressed or implied shall pass through our initial purchaser to any other person or corporation.

No returns will be allowed unless prior written permission of SCI is first obtained. Buyers shall be responsible for all costs of transportation as well as a restocking charge.

This warranty is exclusively for the benefit of the initial purchaser of this product from SCI and, except to the extent prohibited by applicable law, the foregoing warranty is in lieu of all other warranties, express or implied, including but not limited to warranties of fitness or merchantability.

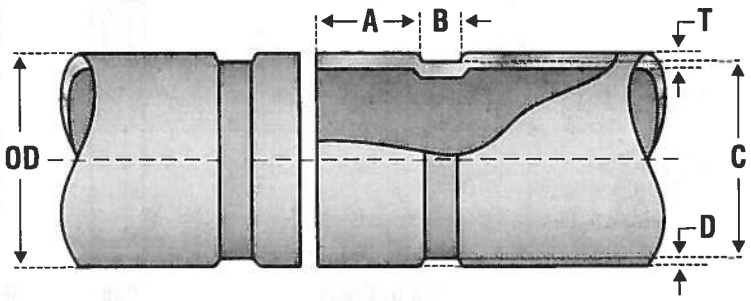
LIMITATIONS OF LIABILITY: SCI shall not under any circumstances be liable for special or consequential damages such as, but not limited to damage to loss of other property or equipment, loss of profits or revenue, cost of capital, cost of purchased or replacement goods, claims of customers of our initial purchaser, any labor cost for repair or replacement of the product or damage caused by the product.

The remedies of our initial purchaser, and all others, set forth herein are exclusive, and the liability of SCI with respect to same shall not, except as expressly provided herein, exceed the price of the SCI products on which such liability is based.

DISCLAIMER: Smith-Cooper International cannot be held responsible for omissions or errors in this catalog. Please refer to *www.smithcooper.com* for current information.

rsn 703956
PERMIT 13647594

Standard Roll Groove Specifications



c UL us

FM APPROVED

Column 1
Nominal IPS pipe size.
Nominal metric pipe size.

Column 2
IPS outside diameter.
Metric outside diameter.

Column 3 & 4
For IPS pipe, the maximum allowable tolerance from square cut ends is 0.030″ for 1 – 3-1/2″, 0.045″ for 4 – 6″ and 0.060″ for sizes 8″ and above, measured from a true square line.
For metric size pipe, the maximum allowable tolerance from square cut ends is 0.75mm for sizes 25 – 80mm, 1.15mm for sizes 100 – 150mm and 1.50mm for sizes 200mm and above, measured from a true square line.

Column 5
The groove must be of uniform depth around the entire pipe circumference (see Column 6).

Column 6
Groove depth: for reference only. Groove must conform to the groove diameter "C" listed in Column 5.

Column 7
Minimum allowable wall thickness which may be roll grooved.

Column 8
Maximum allowable pipe end flare diameter. Measured at the most extreme pipe end diameter of the gasket seat area.

① Nominal IPS Pipe Size IN / *mm*	② Pipe Outside Diameter (OD) Actual IN / *mm*	② Tolerance + IN / *mm*	② Tolerance − IN / *mm*	③ Gasket Seat (A) ±0.030 ±0.770 IN / *mm*	④ Groove Width (B) ±0.030 ±0.770 IN / *mm*	⑤ Groove Diameter (C) Actual IN / *mm*	⑤ Tolerance +0.0000 IN / *mm*	⑥ Groove Depth (D) (Ref.) IN / *mm*	⑦ Min. Allow. Wall Thick. (T) IN / *mm*	⑧ Max. Flare Dia. IN / *mm*
1 *25*	1.315 *33.7*	+0.015 *+0.381*	–0.015 *–0.381*	0.625 *15.875*	0.281 *7.137*	1.190 *30.226*	–0.015 *–0.381*	0.062 *1.575*	0.065 *1.575*	1.360 *34.5*
1-1/4 *32*	1.660 *42.4*	+0.015 *+0.381*	–0.015 *–0.381*	0.625 *15.875*	0.281 *7.137*	1.535 *38.989*	–0.015 *–0.381*	0.062 *1.575*	0.065 *1.575*	1.705 *43.3*
1-1/2 *40*	1.900 *48.3*	+0.015 *+0.381*	–0.015 *–0.381*	0.625 *15.875*	0.281 *7.137*	1.775 *45.085*	–0.015 *–0.381*	0.062 *1.575*	0.065 *1.575*	1.945 *49.4*
2 *50*	2.375 *60.3*	+0.024 *+0.610*	–0.024 *–0.610*	0.625 *15.875*	0.344 *8.738*	2.250 *57.150*	–0.015 *–0.381*	0.062 *1.575*	0.065 *1.575*	2.447 *62.2*
2-1/2 *65*	2.875 *73.0*	+0.029 *+0.737*	–0.029 *–0.737*	0.625 *15.875*	0.344 *8.738*	2.720 *69.088*	–0.018 *–0.457*	0.078 *1.981*	0.083 *2.108*	2.962 *75.2*
3 *80*	3.500 *88.9*	+0.035 *+0.889*	–0.031 *–0.787*	0.625 *15.875*	0.344 *8.738*	3.344 *84.938*	–0.018 *–0.457*	0.078 *1.981*	0.083 *2.108*	3.566 *90.6*
3-1/2 *	4.000 *	+0.040 *+1.016*	–0.031 *–0.787*	0.625 *15.875*	0.344 *8.738*	3.834 *97.384*	–0.020 *–0.508*	0.083 *2.108*	0.083 *2.108*	4.071 *103.4*
4 *100*	4.500 *114.3*	+0.045 *+1.143*	–0.031 *–0.787*	0.625 *15.875*	0.344 *8.738*	4.334 *110.084*	–0.020 *–0.508*	0.083 *2.108*	0.083 *2.108*	4.576 *116.2*
5 *125*	5.563 *141.3*	+0.056 *+1.422*	–0.031 *–0.787*	0.625 *15.875*	0.344 *8.738*	5.395 *137.033*	–0.022 *–0.559*	0.084 *2.134*	0.109 *2.769*	5.650 *143.5*
6 *150*	6.625 *168.3*	+0.063 *+1.600*	–0.031 *–0.787*	0.625 *15.875*	0.344 *8.738*	6.455 *169.957*	–0.022 *–0.559*	0.085 *2.159*	0.109 *2.769*	6.719 *170.7*
8 *200*	8.625 *219.1*	+0.063 *+1.600*	–0.031 *–0.787*	0.750 *19.050*	0.469 *11.913*	8.441 *214.401*	–0.025 *–0.635*	0.092 *2.337*	0.109 *2.769*	8.719 *221.5*
10 *250*	10.750 *273.0*	+0.063 *+1.600*	–0.031 *–0.787*	0.750 *19.050*	0.469 *11.913*	10.562 *268.275*	–0.027 *–0.686*	0.094 *2.388*	0.134 *3.404*	10.844 *275.4*
12 *300*	12.750 *323.9*	+0.063 *+1.600*	–0.031 *–0.787*	0.750 *19.050*	0.469 *11.913*	12.531 *318.287*	–0.030 *–0.762*	0.109 *2.769*	0.156 *3.962*	12.844 *326.2*
14 *350*	14.000 *355.6*	+0.063 *+1.600*	–0.031 *–0.787*	0.938 *23.825*	0.469 *11.913*	13.781 *350.037*	–0.030 *–0.762*	0.109 *2.769*	0.156 *3.962*	14.094 *253.0*
16 *400*	16.000 *406.4*	+0.063 *+1.600*	–0.031 *–0.787*	0.938 *23.825*	0.469 *11.913*	15.781 *400.837*	–0.030 *–0.762*	0.109 *2.769*	0.165 *4.191*	16.094 *408.8*
18 *	18.000 *	+0.063 *+1.600*	–0.031 *–0.787*	1.000 *25.400*	0.469 *11.913*	17.781 *451.637*	–0.030 *–0.762*	0.109 *2.769*	0.165 *4.191*	18.094 *459.6*
20 *500*	20.000 *508.0*	+0.063 *+1.600*	–0.031 *–0.787*	1.000 *25.400*	0.469 *11.913*	19.781 *502.437*	–0.030 *–0.762*	0.109 *2.769*	0.188 *4.775*	20.094 *510.4*
24 *600*	24.000 *609.6*	+0.063 *+1.600*	–0.031 *–0.787*	1.000 *25.400*	0.500 *12.700*	23.656 *600.862*	–0.030 *–0.762*	0.172 *4.369*	0.218 *5.53*	24.100 *612.1*

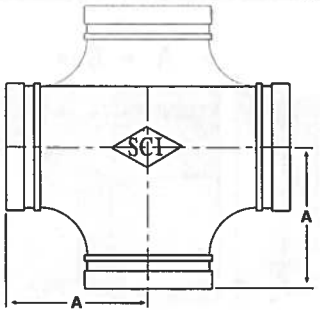
** No equivalent metric pipe size.*

NOTES:
1. Gasket seat and groove must be smooth and free from scores, seams, chips, rust or scale which may interfere with proper coupling assembly.
2. Out of roundness: Difference between maximum OD and minimum OD measured at 90° must not exceed total OD tolerance listed.

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1000 Series Standard Radius Grooved Fittings

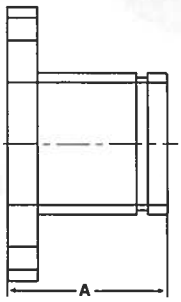




Tee or Cross



Cap



Grooved X Flanged Adapter

Fig. 65T – Tee, Standard Radius

Part No.	Nominal Pipe Size IN / *mm*	Actual Pipe OD IN / *mm*	A IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65T3012	1-1/4 *32*	1.660 *42.2*	2.75 *69.85*	1.45 *0.66*	35	–
65T3014	1-1/2 *40*	1.900 *48.3*	2.75 *69.85*	1.75 *0.78*	24	–
65T3020	2 *50*	2.375 *60.3*	3.25 *82.55*	3.10 *1.41*	15	–
65T3024	2-1/2 *65*	2.875 *73.0*	3.75 *95.25*	4.11 *1.87*	7	–
65T3030	3 *80*	3.500 *88.9*	4.25 *107.95*	5.79 *2.62*	10	–
65T3040	4 *100*	4.500 *114.3*	5.00 *127.00*	10.01 *4.54*	5	–
65T3050	5 *125*	5.563 *141.3*	5.50 *139.70*	14.96 *6.79*	–	100
65T3060	6 *150*	6.625 *168.3*	6.50 *165.10*	22.29 *10.11*	–	65
65T3080	8 *200*	8.625 *219.1*	7.75 *196.85*	40.99 *18.59*	–	36

Fig. 65X – Cross, Standard Radius

Part No.	Nominal Pipe Size IN / *mm*	Actual Pipe OD IN / *mm*	A IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65X3012	1-1/4 *32*	1.660 *42.2*	2.75 *69.85*	2.10 *0.95*	–	–
65X3014	1-1/2 *40*	1.900 *48.3*	2.75 *69.85*	2.50 *1.13*	–	–
65X3020	2 *50*	2.375 *60.3*	3.25 *82.55*	2.90 *1.32*	–	–
65X3024	2-1/2 *65*	2.875 *73.0*	3.75 *95.25*	5.20 *2.36*	–	–
65X3030	3 *80*	3.500 *88.9*	4.25 *107.95*	7.50 *3.40*	–	–
65X3040	4 *100*	4.500 *114.3*	5.00 *127.00*	12.20 *5.53*	–	–
65X3050	5 *125*	5.563 *141.3*	5.50 *139.70*	17.60 *7.98*	–	–
65X3060	6 *150*	6.625 *168.3*	6.50 *165.10*	28.30 *12.84*	–	–
65X3080	8 *200*	8.625 *219.1*	7.75 *196.85*	48.00 *21.77*	–	–

Fig. 65C – Cap

Part No.	Nominal Pipe Size IN / *mm*	Actual Pipe OD IN / *mm*	Thickness IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65C3012	1-1/4 *32*	1.660 *42.2*	0.88 *22.35*	0.30 *0.14*	200	–
65C3014	1-1/2 *40*	1.900 *48.3*	0.88 *22.35*	0.50 *0.23*	140	–
65C3020	2 *50*	2.375 *60.3*	0.88 *22.35*	0.60 *0.27*	80	–
65C3024	2-1/2 *65*	2.875 *73.0*	0.88 *22.35*	1.00 *0.45*	60	–
65C3030	3 *80*	3.500 *88.9*	0.88 *22.35*	1.20 *0.54*	40	–
65C3040	4 *100*	4.500 *114.3*	1.00 *25.40*	2.50 *1.13*	24	–
65C3050	5 *125*	5.563 *141.3*	1.00 *25.40*	4.60 *2.09*	12	–
65C3060	6 *150*	6.625 *168.3*	1.00 *0*	6.10 *2.77*	10	–
65C3080	8 *200*	8.625 *219.1*	1.19 *25.40*	13.10 *5.94*	5	–

Fig. 65FA – Grooved X Flanged Adapter

Part No.	Nominal Pipe Size IN / *mm*	Actual Pipe OD IN / *mm*	A IN / *mm*	Weight LB / *KG*	Packaging Master	Packaging Bulk
65FA3020	2 *50*	2.375 *60.3*	3.00 *7.60*	4.40 *2.00*	–	–
65FA3024	2-1/2 *65*	2.875 *73.0*	3.00 *7.60*	6.60 *3.00*	–	–
65FA3030	3 *80*	3.500 *88.9*	4.00 *10.20*	7.70 *3.50*	–	–
65FA3040	4 *100*	4.500 *114.3*	4.00 *10.20*	9.90 *4.50*	–	–
65FA3060	6 *150*	6.625 *188.3*	4.00 *10.20*	19.80 *9.00*	–	–
65FA3080	8 *200*	8.625 *219.1*	6.00 *15.20*	38.50 *17.50*	–	–

NOTE:

1. Matches class 125/150 flange dimensions.

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