SUBMITTAL MANUAL
FOR
CARBON ADSORPTION SYSTEM

ARMONK
PRIVATE WELLS PROJECT
ARMONK, NY

ENVIROTRAC ENVIRONMENTAL SERVICES
DEER PARK, NY

CALGON CARBON CORPORATION
PITTSBURGH, PA

SUBMITTED: OCTOBER 1997
P.O. NO: L.O.I
PROJECT: ARMONK

CALGON CARBON CORPORATION P.O. BOX 717 PITTSBURGH, PA 15230-0717 (412) 787-6700

October 1, 1997

EnviroTrac Environmental Services
561 P Acorn St.
Deer park, NY 11729

SUBJECT: Clarifications

To Reviewer of Submittal;

The carbon adsorption equipment that is being proposed for the Armonk Private Wells Project, is based on our standard Mobile 6 carbon adsorption system. This system has been modified to the fullest extent possible to meet the project specifications. Even though this system has been modified, there are several standard features of the standard system that should be incorporated. Please consider these modifications during the review of this submittal.

2.04 D The carbon discharge piping is fabricated using 304 L stainless steel, in place of the PPL lined piping required in the specifications. This is necessary as a result of the fabrication process.

2.04 E Our standard exterior paint system is applied to a total dry film thickness of 5-7 mil. Additional thickness is not recommended by the manufacturer, and may result in premature paint failure.

2.05 A Our standard process valves are ductile iron butterfly valves, not ball valves, as required by the specification.

Other issues that need to be addressed are listed below;

1.04A1 "...structural design computations for the system support structures..." has interpreted to mean the concrete foundation for the system, and not the adsorption system proper The carbon adsorbtion system is designed for seismic zone 4.

1.04A3 Carbon Usage Rate - Based on the influent concentration, the predicted carbon use rate is 0.53 lbs/1000 gallons or about 17,000 lbs per year of carbon based on 60 gpm, 24 hours per day, 365 days per year. This carbon use rate is based on the Trichloroethylene carbon burn rate for complete removal of the TCE in the effluent stream. Additional information from our modeling program is included in the submittal.

Your consideration of these clarification will be appreciated.

Respectfully,

W. Lage

William Lage
Senior Project Manager
Remediation Services

PRODUCT BULLETIN

CALGON CARBON CORPORATION

FILTRASORB® 300 & 400

GRANULAR ACTIVATED CARBONS FOR WASTEWATER

DESCRIPTION

Filtrasorb 300 and 400 are two grades of granular activated carbon manufactured by Calgon Carbon Corporation for removal of organic pollutants from municipal or industrial wastewaters. These carbons are manufactured from select grades of bituminous coal to produce a high density, high surface area, durable granular product capable of withstanding the abrasion and dynamics associated with repeated reactivation, hydraulic transport, backwashing and mechanical handling.

APPLICATIONS

- Applying point source treatment to remove organics
- Pre-treatment to biological waste treatment systems
- Polishing effluent from biological waste treatment systems
- Recycling the treated water for replacement of groundwater or for other suitable recycling applications
- Providing total wastewater treatment

REACTIVATION

Numerous installations have demonstrated the feasibility and economy of thermal reactivation.

Exhausted granular carbon can be reactivated on your plant site in a high-temperature furnace, or it can be done by Calgon Carbon Corporation under a service agreement.

PACKAGING

55 Pound (25 kg) 5 Ply Bag
1,000 Pound (453.7 kg)Super Sack
Bulk Trucks

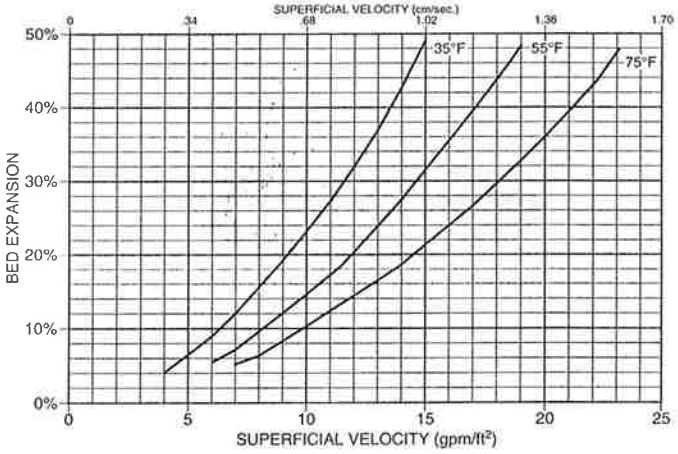
MANUFACTURING

Catlettsburg, KY
Pearlington, MS

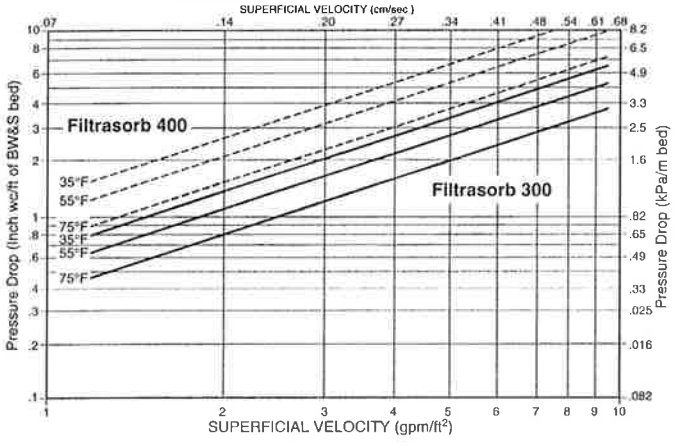
SPECIFICATIONS

	F300	F400
Iodine Number, mg/g (Min.)	900	1000
Moisture, weight % (Max. %)	2	2
Abrasion Number (Min.)	75	75
Effective Size, mm	0.8-1.0	0.55-0.75
Uniformity Coefficient (Max.)	2.1	1.9
Sieve Size, U.S. Sieve Series, weight %		
Larger than No. 8 (Max.)	15	-
Smaller than No. 30 (Max.)	4	-
Larger than No. 12 (Max.)	-	5
Smaller than No. 40 (Max.)	-	4

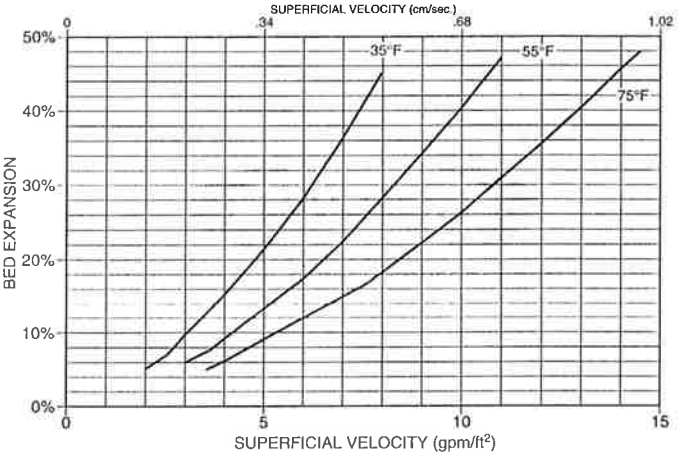
FILTRASORB 300 - BED EXPANSION
BACKWASHED & SEGREGATED BED



FILTRASORB DOWNFLOW PRESSURE DROP
BACKWASHED & SEGREGATED BED



FILTRASORB 400 - BED EXPANSION
BACKWASHED & SEGREGATED BED



LC-249/209/w-08/96

FEATURES	BENEFITS
• High surface area	• Filtrasorb carbons can be reactivated repeatedly and returned to service to provide maximum economy. • Systems using Filtrasorb carbons can accommodate changes in flow rates and increases in concentration of pollutants whether caused by spills, peak loads, pretreatment upsets or other variations in the wastewater effluent.
• Abrasion resistance	• Because of its high surface area and abrasion resistance, Filtrasorb carbons can be reactivated repeatedly and returned to service to provide maximum economy.
• High density	• Filtrasorb carbons are of high density, wet readily, and do not float, thus minimizing loss during backwash operations.
• Optimum pore size	• These carbons are produced with an exceptionally high internal surface area of optimum pore size for adsorption of both high and low molecular weight pollutants.

SAFETY MESSAGE

Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing carbon, appropriate sampling and work procedures for potentially low oxygen spaces should be followed, including all applicable federal and state requirements.

1-800-4-CARBON

Domestic Sales Offices

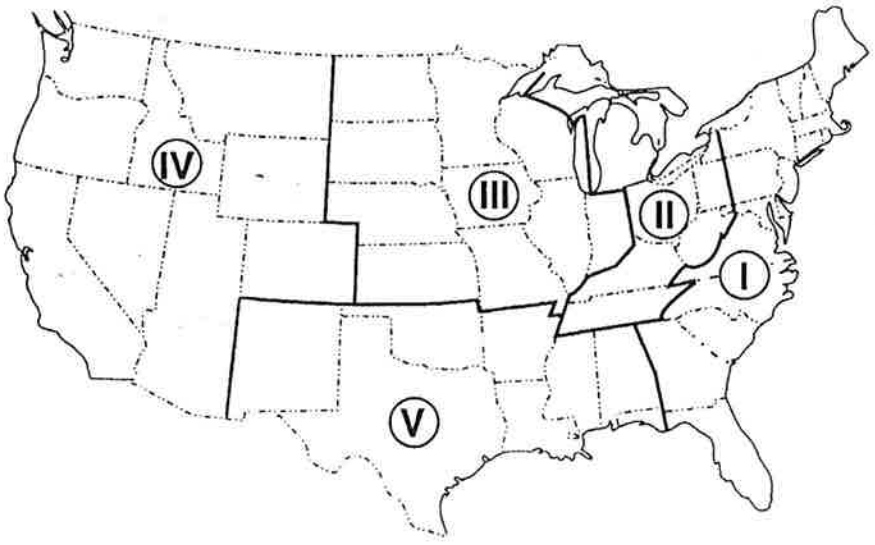
Region I
Bridgewater, NJ
Tel (908) 526-4646
Fax (908) 526-2467

Region II
Pittsburgh, PA
Tel (412) 787-6700
1-800-4-CARBON
Fax (412) 787-6676

Region III
Lisle, IL
Tel (708) 505-1919
Fax (708) 505-1936

Region IV
Burlingame, CA
Tel (415) 548-2040
Fax (415) 344-2029

Region V
Houston, TX
Tel (713) 690-2000
Fax (713) 690-7909



International Sales Offices

Canada
Calgon Carbon Canada, Inc.
Mississauga, Ontario
Tel (905) 673-7137
Fax (905) 673-8883

Latin America/Australasia/ Philippines
Pittsburgh, PA
Tel (412) 787-4519
Fax (412) 787-4523

Singapore/Asia Pacific
Calgon Carbon Corp.
Tel (65) 221-3500
Fax (65) 221-3554

Europe
Chemviron Carbon
B-1200 Brussels, Belgium
Tel 32 2 773 02 11
Fax 32 2 770 93 94

If at any time our products or services do not meet your requirements or expectations, or if you would like to suggest any ideas for improvement, please call us at 1-800-548-1999. From out side the U.S. please call +1-412-787-6700.

CALGON

CALGON CARBON CORPORATION

MATERIAL SAFETY DATA SHEET

DATE: September 22, 1997

Product ID #	Identity (As used in label and list)
19	F300 BULK
Customer Name	Invoice Number

SECTION I - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Manufacturer's Name:	Emergency Phone Number:
CALGON CARBON CORPORATION	(412) 787-6700
Address: P.O. BOX 717, PITTSBURGH, PA 15230-0717	
Chemical Name and Synonyms: CARBON	Formula: C
Proper Shipping Name: NOT REGULATED	
DOT Hazard Class: N/A	
DOT Identification Number: N/A	
Packing Group: N/A	
NON-HAZARDOUS per 49CFR Part 173.124(b)(2): Calgon Carbon's Research Department performed the tests required by 49CFR Part 173 Appendix E which define a spontaneously combustible solid. The test results prove our products are NOT spontaneously combustible.	
Date Prepared: 8/31/97	Prepared by: S. L. Liller

SECTION II - COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	%(BY WEIGHT)	CAS#	Exposure Guidelines: OSHA PEL *	ACGIH TLV *
CARBON	100	7440-44-0	5mg/M3 (Resp.)	10 mg/M3 (Total)

[* PELs and TLVs are 8-hour TWAs unless otherwise noted.]

CONTINUED ON NEXT PAGE

SECTION III - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
BLACK PARTICULATE SOLID, PELLET OR POWDER. CONTACT MAY CAUSE EYE IRRITATION. DUST MAY BE SLIGHTLY IRRITATING TO EYES AND RESPIRATORY TRACT.

CAUTION!!
WET ACTIVATED CARBON REMOVES OXYGEN FROM AIR CAUSING A SEVERE HAZARD TO WORKERS INSIDE CARBON VESSELS AND ENCLOSED OR CONFINED SPACES. BEFORE ENTERING SUCH AN AREA, SAMPLING AND WORK PROCEDURES FOR LOW OXYGEN LEVELS SHOULD BE TAKEN TO ENSURE AMPLE OXYGEN AVAILABILITY, OBSERVING ALL LOCAL, STATE AND FEDERAL REGULATIONS.

POTENTIAL HEALTH EFFECTS

Effects and Hazards of Eye Contact:
THE PHYSICAL NATURE OF THE PRODUCT MAY PRODUCE EYE IRRITATION

Effects and Hazards of Skin Contact:
THE PRODUCT IS NOT A PRIMARY SKIN IRRITANT. THE PRIMARY SKIN IRRITATION INDEX (RABBIT) IS 0.

Effects and Hazards of Inhalation (Breathing):

THE PRODUCT IS PRACTICALLY NON-TOXIC THROUGH INHALATION. THE ACUTE INHALATION LC50 (RAT) IS >64.4 mg/l (NOMINAL CONCENTRATION) FOR ACTIVATED CARBON.

Effects and Hazards of Ingestion (Swallowing):
THE PRODUCT IS NON-TOXIC THROUGH INGESTION. THE ACUTE ORAL LD50 (RAT) IS >10g/kg.

Primary Routes of Entry:

INHALATION, INGESTION, SKIN CONTACT, EYE CONTACT.

Chronic Effects:

CARCINOGENICITY: NTP: N/A IARC: N/A OSHA REGULATED: NO

SECTION IV - FIRST AID MEASURES

Treatment For Eye Contact:
FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

Treatment for Skin Contact: WASH WITH SOAP AND WATER

Treatment for Inhalation (Breathing): N/A

Treatment for Ingestion (Swallowing): N/A

SECTION IV - CONTINUED ON NEXT PAGE

Subchronic, Chronic, Other:
THE EFFECTS OF LONG-TERM, LOW-LEVEL EXPOSURES TO THIS PRODUCT HAVE NOT BEEN DETERMINED. SAFE HANDLING OF THIS MATERIAL ON A LONG-TERM BASIS SHOULD EMPHASIZE THE AVOIDANCE OF ALL EFFECTS FROM REPETITIVE ACUTE EXPOSURES.

SECTION V - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A	Limits: Lel: N/A	Uel: N/A

Extinguishing Media:
FLOOD WITH PLENTY OF WATER.

Special Firefighting Procedures: NONE

Unusual Fire and Explosion Hazards:
CONTACT WITH STRONG OXIDIZERS SUCH AS OZONE, LIQUID OXYGEN,CHLORINE, PERMANGANATE, ETC. MAY RESULT IN FIRE.

NFPA RATING: HEALTH = 0 REACTIVITY = 0 FLAMMABILITY = 0

VI - PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken In Case Material is Released or Spilled:
SWEEP UP UNUSED CARBON AND DISCARD IN REFUSE CONTAINER OR REPACKAGE

Waste Disposal Method: DISPOSE OF UNUSED CARBON IN REFUSE CONTAINER. DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

Precautions for Handling and Storage: CAUTION!!
ACTIVATED CARBON REMOVES OXYGEN FROM AIR CAUSING A SEVERE HAZARD TO WORKERS INSIDE CARBON VESSELS AND ENCLOSED OR CONFINED SPACES. BEFORE ENTERING SUCH AN AREA, SAMPLING AND WORK PROCEDURES FOR LOW OXYGEN LEVELS SHOULD BE TAKEN TO ENSURE AMPLE OXYGEN AVAILABILITY, OBSERVING ALL LOCAL, STATE AND FEDERAL REGULATIONS.

Other Precautions: WASH THOROUGHLY AFTER HANDLING. EXERCISE CAUTION IN THE STORAGE AND HANDLING OF ALL CHEMICAL SUBSTANCES.

SECTION VII - CONTROL MEASURES

Respiratory Protection:
A NIOSH APPROVED PARTICULATE FILTER RESPIRATOR IS RECOMMENDED IF EXCESSIVE DUST IS GENERATED.

Ventilation:
LOCAL EXHAUST VENTILATION: RECOMMENDED

Mechanical Ventilation: RECOMMENDED

Protective Gloves:	Eye Protection:	Other Protective Equipment:
RUBBER GLOVES RECOMMENDED	SAFETY GLASSES OR GOGGLES RECOMMENDED	NOT REQUIRED

CONTINUED ON NEXT PAGE

SECTION VIII - PHYSICAL/CHEMICAL CHARACTERISTICS	
Boiling Point: N/A	Specific Gravity: 2.3g/cc real density
apor Pressure: N/A	Melting Point: N/A
Vapor Density: N/A	Evaporation Rate: N/A
Solubility in Water: NEGLIGIBLE	Packing Density: 0.4 to 0.7g/cc
Appearance and Odor: BLACK PARTICULATE SOLID, PELLET OR POWDER	

SECTION IX - REACTIVITY DATA	
Stability: STABLE	Conditions to avoid : NONE
Incompatability (Materials to avoid): STRONG OXIDIZERS SUCH AS OZONE, LIQUID OXYGEN, CHLORINE, PERMANGANATE, ETC.	
Hazardous Decomposition Products: CARBON MONOXIDE MAY BE GENERATED IN THE EVENT OF A FIRE.	
Hazardous Polymerization: UNSPECIFIED	
Polymerizing Conditions to Avoid: NONE	

SECTION X - REGULATORY INFORMATION
SARA TITLE III: N/A
TSCA: THE INGREDIENTS OF THIS PRODUCT ARE ON THE TSCA INVENTORY LIST.
OSHA: NONHAZARDOUS ACCORDING TO DEFINITIONS OF HEALTH HAZARD AND PHYSICAL HAZARD PROVIDED IN THE HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200)
CANADA WHMIS CLASSIFICATION: NOT CLASSIFIED DSL #: 6798

While this information and recommendations set forth herein are believed to be accurate as of the date hereof, CALGON CARBON CORPORATION MAKES NO WARRANTY WITH RESPECT HERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

END OF MATERIAL SAFETY DATA SHEET

End of Material Safety Data Sheet
Printed on September 22, 1997 at 10:27:46 hours

WATERADS RELEASE 4

EQUILIBRIUM MODEL OF FORMATION OF ADSORPTION BANDS IN COLUMNS
BASED ON MULTICOMPONENT ADSORPTION CALCULATIONS USING

ACTUAL CARBON NAME IS FILTRASORB 300 (1991 PRODUCTION)

14-Jan-97
01:54 PM

Stream Description :N
Customer Name :N
Customer Location :N
Program Run By :GPK

RESULTS FOR ADSORPTION OF THE LIQUID PHASE MIXTURE ON THE COLUMN
OF FILTRASORB 300 (1991 PRODUCTION) CARBON

LIQUID COMPONENT	Concentration (mg/L)
VINYLCL	0.0500
TCE	0.5000
C12DCE	0.0500
PERC	5.0000

THE ADSORBATE DESIGNATIONS ARE AS FOLLOWS;
SOURCE OF V*/V AND 1/GAMMA FOR VINYLCL
1.
ESTIMATED FROM 11DCE - REVISED 7/3/91

THE SOURCE OF V*/V AND 1/GAMMA FOR TCE
IS
MCNAMARA ISOTHERM & 9/7/89 ISOTHERM (8-PTS. TOTAL) - REVISED 2/22/91

THE SOURCE OF V*/V AND 1/GAMMA FOR C12DCE
IS
BELLISSIMO 5/1/84 4-PT. ISOTHERM - REVISED 7/3/91

THE SOURCE OF V*/V AND 1/GAMMA FOR PERC
IS
BELLISSIMO 5/1/84 5-PT. ISOTHERM - REVISED 7/3/91

THE MISCIBLE MODEL WAS USED-ASSUMES NO BULK MISCIBILITY
LIMITS IN PORE SPACE
V* - TYPE COMPETITION WAS USED IN THE CALCULATION

USE RATE MULTIPLIED BY DESIGN FACTOR
The following tables are only valid for a gpm flow rate of 60

USE RATE (LB./1000 GAL.) SERIES

LIQUID COMPONENT	MODEL 10 & DUAL	MOBILE	MODEL 7.5	MODEL 4 & CYCLESORB	350 GAL DISPOSORB	55 GAL DISPOSORB
VINYLCL	3.164	3.164	3.586	3.797	3.797	3.797
TCE	0.435	0.435	0.493	0.522	0.522	0.522
C12DCE	0.401	0.401	0.455	0.481	0.481	0.481
PERC	0.252	0.252	0.285	0.302	0.302	0.302

USE RATE (LB./1000 GAL.) PARALLEL

LIQUID COMPONENT	MODEL 10 & DUAL	MOBILE	MODEL 7.5	MODEL 4 & CYCLESORB	350 GAL DISPOSORB	55 GAL DISPOSORB
VINYLCL	4.219	4.219	4.641	4.641	4.641	5.274
TCE	0.580	0.580	0.638	0.638	0.638	0.725
C12DCE	0.535	0.535	0.588	0.588	0.588	0.668
PERC	0.336	0.336	0.369	0.369	0.369	0.420

TABLE OF EMPTY BED CONTACT TIMES
The following Table is only valid for a gpm flow rate of 60

Equipment Supplied	Series Empty Bed Contact time (minutes/bed)	Parallel Empty Bed Contact time (minutes/bed)
MODEL 10	87.5	175.0
MOBILE	70.0	140.0
MODEL 7.5	43.7	87.5
MODEL 4	8.8	17.5
CYCLESORB	8.8	17.5
350 GAL DISPOSORB	5.8	11.7
55 GAL DISPOSORB	0.9	1.8

For estimates only no guarantees. Source WGS memo 3/13/88
THIS PROGRAM IS THEORETICAL AND IS FROM DR. GREENBANKS THESIS
THIS PROGRAM HAS NOT BEEN APPROVED BY RESEARCH AND HAS NOT BEEN FORMALLY RELEASED OR DOCUMENTED. USE THIS PROGRAM AT YOUR OWN RISK.

Calgon Carbon Corporation WaterAds Report

Temperature (C): 25.0 Flow Rate (gal/min): 60 10/1/97

Pressure (atm): 1.0

bate (Listed In Order of Elution)	Concentration (ppm)	Adsorbent Use Rate (lbs/day) FS300				
TRICHLOROETHYLENE	0.5	31.51				
1,1-DICHLOROETHYLENE	0.05	24.65				
TETRACHLOROETHYLENE	5	17.14				
Totals:	5.55E0					

Note: This information has been generated using Calgon Carbon's proprietary predictive model. No safety factors have been incorporated into these results. Appropriate safety factors should be applied as necessary. There is no expressed or implied warranty regarding the suitability or applicability of results.

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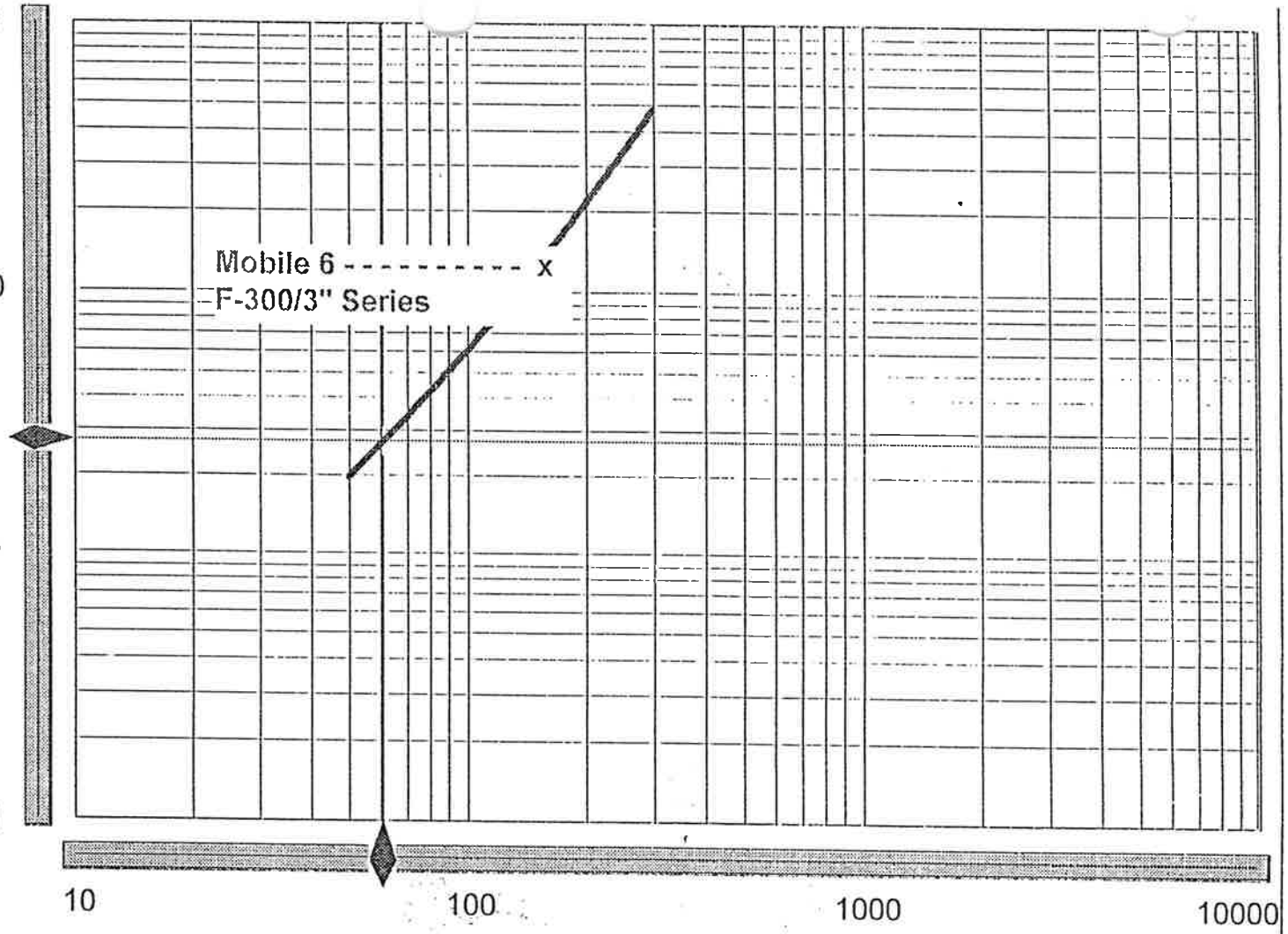
CALGON CARBON CORPORATION

Note: Position flow rate & pressure drop crosshairs before printing.



Pressure Drop 2.7 PSI

Total Flow to System: 60.5 GPM

(Water @ 55° F)

Lined pipe - Multiply by 1.2

PVC Sch.80 pipe - Multiply by 1.1

ISSUED 12-1-89; REV. 5-6-92

PIPING MATERIAL SPECIFICATION C2

MATERIAL	Carbon steel pipe with steel fittings
RATING	125 PSIG @ 350 DEG. F 200 PSIG @ 150 DEG. F Includes corrosion allowance of 0.050" min.
CONSTRUCTION	Screwed for 1 1/2" and smaller. Welded and/or flanged for 2" and larger
PIPE	Carbon steel, ASTM A53, Grade B: Threaded, schedule 80, seamless, 1 1/2" and smaller. Plain end, schedule 40, seamless, 2" to 10" Plain end, 3/8" wall, seamless, 12" and above
FITTINGS	3000lb., ANSI B16.11, forged steel, threaded ends, 1 1/2" and smaller. Schedule 40, ANSI B16.9, ASTM A234, Grade WPB, carbon steel, butt welding ends, 2"-12". 3/8" wall, ANSI B16.9, ASTM A234, Grade WPB, carbon steel, butt welding ends, 14" to 24", or 125# flanged cast iron elbows and tees, ASTM A126, Class B with 125# ANSI B16.1 drilling with dimensions per ANSI A21.10 (AWWA C110). Location of tapped holes for drains shall be in accordance with ANSI B16.1. Use thread-o-lets on branch connections 1-1/2" and smaller, use stub-in or reducing tee connections for 2" and above.
UNIONS	3000LB., forged steel, ASTM A105, Grade 2, integral steel seat, ground joint, threaded ends.
FLANGES	150LB., ANSI B16.5, ASTM A105 forged carbon steel, slip-on or weld neck type 2" and larger, threaded 1 1/2" and smaller. Where bolting to flat face cast iron flanges, flanges shall be furnished with a flat face. Others shall be raised face.
ORIFICE FLANGES	Instrument item.
BOLTING	See attached Fastener Specification F3.
GASKETS	See attached Gasket Specification G2.

ISSUED 03-19-90 REV.10-4-90

PIPING MATERIAL SPECIFICATION S8

MATERIAL	Type 304L stainless steel.
RATING	150 PSIG @ 500 DEG. F.
CONSTRUCTION	Flanged and welded for 1" and larger.
PIPE	Plain end, stainless steel pipe ASTM A-312, Grade TP 304L, welded, annealed and pickled. Pipe dimensions to conform with Schedule 40S, ANSI B36.19.
FITTINGS	ASTM A-403, Grade WP 304L stainless steel, ANSI B16.9 butt weld, Schedule 40S ANSI wall thickness. For 1" dimeter larger, 3000# socket weld for 3/4" and smaller.
FLANGES	ASTM A-182 Grade F304 forged stainless steel, 150# ANSI B16.5, raised face slip-on or weld neck type. Where bolting to flat face flanges on instruments or equipment, flanges shall be furnished with a flat face.
ORIFICE FLANES	Instrument Item.
BOLTING GASKETS	See attached Fastener Specification F3. See attached Gasket Specification G10 for 1/16", or G11 for 1/8".

GASKET SPECIFICATION G1

~~GAC Red Rubber sheet material, 1/16" thick.~~
~~Durometer hardness 75-85.~~
~~Temperature to 180 DEG. F.~~
~~Pipe gasket flange dimensions per ANSI B16.21.~~
~~Johns-Manville No. 107 or equal.~~

GASKET SPECIFICATION G2

GAA Red Rubber sheet material, 1/8" thick.
Durometer hardness 75-85.
Temperature to 180 DEG. F.
Pipe gasket flange dimensions per ANSI B16.21.
Johns-Manville No. 107 or equal.

GASKET SPECIFICATION G3

~~GAB Neoprene Rubber sheet material, 1/16" thick.~~
Durometer hardness 55-65.
Temperature to 250 DEG. F.
Pipe gasket flange dimensions per ANSI B16.21.
John-Manville No. 104 or equal.

GASKET SPECIFICATION G4

GAD Neoprene Rubber sheet material, 1/8" thick.
Durometer hardness 55-65.
Temperature to 250 DEG. F.
Pipe gasket flange dimensions per ANSI B16.21.
Johns-Manville No. 104 or equal.

GASKET SPECIFICATION G5

GAE Neoprene Rubber sheet material, 1/8" thick.
Durometer hardness 45-55.
Temperature to 250 DEG. F.
Pipe gasket dimensions per ANSI B16.21.
Johns-Manville No. 111 or equal.

GASKET SPECIFICATION G6

GAG Natural Rubber sheet material, 1/8" thick.
Durometer hardness 35-45.
Temperature to 200 DEG. F.
Pipe gasket flange dimensions per ANSI B16.21.
Johns-Manville No. 113 or equal.

GASKET SPECIFICATION G7

GAF White Neoprene Rubber sheet material, 1/16" thick.
Durometer hardness 55-65.
Temperature to 212 DEG. F.
Pipe gasket flange dimensions per ANSI B16.21.
Uniroyal No. W-36008.

GASKET SPECIFICATION G8

GAO White Neoprene Rubber sheet material, 1/8" thick.
Durometer hardness 55-65.
Temperature to 212 DEG. F.
Pipe gasket flange dimensions per ANSI B16.21.
Uniroyal No. W-36008.

GASKET SPECIFICATION G9

GAH Silicone Rubber sheet material, 1/8" thick.
Durometer hardness 50.
Temperature to 500 DEG. F.
Pipe gasket flange dimensions per ANSI B16.21.

GASKET SPECIFICATION G10

GAI Teflon sheet material, 1/16" thick.
Heat distortion temperature 250 DEG. F. at 66 lb. sq.in., 500 DEG. F. max.
Pipe gasket flange dimensions per ANSI B16.21.

GASKET SPECIFICATION G11

GAQ Teflon sheet material, 1/8" thick.
Heat distortion temperature 250 DEG. F. at 66 lb. sq. in., 500 DEG. F. max.
Pipe gasket flange dimensions per ANSI B16.21.

GASKET SPECIFICATION G12

→ GAJ Ethylene Propylene Rubber sheet material, 1/8".
Durometer hardness 50-55.
Pipe gasket flange dimensions per ANSI B16.21.
Goodrich

FASTENER SPECIFICATION F1

FAA Hex Bolt, low or medium carbon steel.
SAE-J429, Grade 1.
1/4" thru 1 1/2" Proof load 33,000 psi.
1/4" thru 1 1/2" Tensile strength min. 60,000 psi.
Zinc or Cadmium plated.
Threads to be UNC unless specified UNF bolts to include
(1) heavy hex nut, ASTM A307, and (2) Flat Washers.

FASTENER SPECIFICATION F2

FAB Hex Bolt, low or medium carbon steel.
ASTM-A307.
1/4" thru 4" No proof load.
1/4" thru 4" Tensile strength min. 60,000 psi.
Zinc or Cadmium plated.
Threads to be UNC unless specified UNF bolts to include
(1) heavy hex nut, ASTM A307, and (2) Flat Washers.

FASTENER SPECIFICATION F3

FAC Hex Bolt, low or medium carbon steel.
SAE-J429, Grade 2.
1/4" thru 3/4" Proof load 55,000 psi.
1/4" thru 3/4" Tensile strength min. 74,000 psi.
Over 3/4" thru 1 1/2" Proof load 33,000 psi.
Over 3/4" thru 1 1/2" Tensile strength min. 60,000 psi.
Zinc or Cadmium plated.
Threads to be UNC unless specified UNF bolts to include
(1) heavy hex nut, ASTM A307, and (2) Flat Washers.

FASTENER SPECIFICATION F4

FAD Hex Bolt, medium carbon steel quenched and tempered.
SAE-J429, Grade 5.
1/4" thru 1" Proof load 85,000 psi.
1/4" thru 1" Tensile strength min. 120,000 psi.
Over 1" thru 1 1/2" Proof load 74,000 psi.
Over 1" thru 1 1/2" Tensile strength min. 105,000 psi.
Zinc or Cadmium plated.
Threads to be UNC unless specified UNF bolts to include
(1) heavy hex nut, ASTM A307, and (2) Flat Washers.

FASTENER SPECIFICATION F13

FAM Hex Bolt, Alloy steel quenched and tempered.
ASTM-A490.
1/2" thru 1 1/2" Proof load 120,000 psi.
1/2" thru 1 1/2" Tensile strength min. 150,000 psi.
Zinc or Cadmium plated.
Threads to be UNC unless specified UNF bolts to include (1) heavy hex nut, ASTM A307, and (2) Flat Washers.

FASTENER SPECIFICATION F14

FAN Hex Bolt, type 18-8 stainless steel.
1/4" thru 1" Tensile strength min. 75,000 psi.
Including 1 type 18-8 stainless steel hex nut and 2 type 18-8 stainless steel flat washers per bolt.

FASTENER SPECIFICATION F15

FAO Hex Bolt, type 316 tainless steel.
1/4" thru 3/4" Tensile strength min. 90,000 psi.
Inculding
1 type 18-8 stainless steel hex nut and 2 type 18-8 stainless steel flat washers per bolt.

FASTENER SPECIFICATION F16

FAP Stud Bolt, type 304 Stainless Steel including 2 type 18-8 Stainless Steel Hex Nuts and 2 type 18-8 Stainless Steel flat washers per Stud.

FASTENER SPECIFICATION F17

FAQ Stud bolts, alloy steel, ANSI B18.2, ASTM A193, Grade B7, with two heavy semi-finished hexagon 2H nuts per bolt.

FASTENER SPECIFICATION F18

FAR Stud Bolts, Tefzel, with two Polypropylene Hex Nuts and two Polypropylene flat washers. Fabricator shall be Microplastics, Miller Plastics or approved equal.

ISSUED 1-1-89; REV.8-23-93

PIPING SPECIALTIES SPECIFICATION

BALL VALVES

4.01 Malleable iron or carbon steel body full bore ball valve, chromium plated steel ball, steel stem, TFE seats and seals wrench operated, threaded ends.

RATING: 400 PSIG @ 300 DEG. F.
SIZES: 1/4" thru 1 1/2", W-K-M Type B138, or equal

4.02 Cast iron body full bore ball valve, chromium plated steel ball, steel stem, TFE seats and seals, wrench operated, 150 lb. ANSI B16.5 flanged ends, flat face. Face-to-face dimensions to conform to ANSI B16.10 for steel gate valves.

Rating: 200 PSIG @ 300 DEG. F.
Sizes: 2" and 3", W-K-M Type B111, or equal
4" and 6", W-K-M Type B112, or equal

4.03 Bronze or forged brass or barstock brass body regular port ball valve, blow-out proof stem, ball and seat retainer design to permit valve to be dead ended in either flow direction, bronze or brass ball and stem, TFE seats and seals (furnish glass fiber reinforced TFE seats and graphited stem seal if required to meet pressure and temperature rating), wrench handle operated, threaded ends.

Rating: 500 PSIG @ 100 DEG. F.
150 PSIG @ 366 DEG. F.
Sizes: 1/4" thru 2"

Models: Powell "CRESCENT" figure 4210R, or equal
Worcester "WOVCO" 600, Figure No. 5811R, or equal
Clayton Mark-Pacific Valve Figure No. BR-880-I-T, or equal
Jamesbury Figure 351, or equal
Consolidated Valve Industries "APOLLO" 70 Series, or equal.
Rockwood Figure 105S, or equal

BALL VALVES CONTINUED

4.08 Stainless steel and entry full bore ball valve thru 4" size (Reduced Port for 6" & 8" Acceptable) with blow-out proof stem and seat retainer design to permit valve to be dead ended in either flow direction. Valve has lockable feature to lock the valve in either the open or shut position. Type 316 stain-less steel body, ball and stem, TFE seats and seals, wrench operated, 150 lb. ANSI B16.5 flanged ends, raised face, thur 4" size Face-to-face dimensions to conform to ANSI B16.10 for steel gate valves. Screwed body inserts not acceptable. Gear Operator for 6" and 8" size valves. No asbestos allowed.

Rating: 275 PSIG @ 100 DEG. F. or 110 PSIG @ 353 DEG. F.

4.09 Malleable iron body angle port 3-way ball valve, 90 DEG. turn, chormium plated steel ball, stainless steel stem, TFE seats and seals, wrench operated, threaded ends.

Rating: 200 PSIG @ 350 DEG. F.
Sizes: 1/2" thru 3"
Pittsburgh Brass Mfg. Co., Series MPD, or equal.

4.10 Malleable iron body angle port 3-way ball valve, 90 DEG. turn, chromium plated steel ball, stainless steel stem, TFE seals, wrench operated, 150 lb. ANSI flanged ends, flat face

Rating: 200 PSIG @ 350 DEG. F.
Sizes: 1-1/2" thru 4"
Pittsburgh Brass Mfg. Co., Series MPD, or equal.

4.11 Bronze body reduced port ball valve, ASTM B-62, chrome finished ball and stem, Buna-N seat and O-rings, threaded ends.

Rating: 150 PSIG WOG @ 180 DEG. F. max.
Sizes: 1/4" thru 2"
Crane Figure 2180, or equal.

BUTTERFLY VALVES CONTINUED

3.32 Butterfly valve, cast iron, one piece wafer type body, buna-N seats and seals, buna-N coated disc and stainless steel shaft. Lever operated for valve sizes 2" thru 6". gear operated for valve sizes 8" and above. Ultraflow Model 390-434570 or equal.

Rating: 150 psig @ 180 DEG. F.
Sizes: 2" thru 12"

3.33 Cast iron, one piece wafer type body, Buna N seats, gasket seal between pipe flanges, bronze or aluminum bronze disc, stainless steel stem with Buna N seals, stainless steel disc pins, plugs, and/or screws. Valve shall have reinforced teflon inboard bearings. Valve's wafer body to mate with 150 Lb. ANSI flanges. Lever operated for valve sizes 2" thru 6" and weatherproof worm gear wheel operated for sizes 8" thru 12". Valves shall comply with Section 5: Inspection, Testing And Rejection of AWWA Specification C-504-87 with one exception; test pressure shall be 200 psig.

Rating: 200 psig @ 180 Deg. F.
Sizes: 2" thru 12"

3.34 Ductile iron, two-piece wafer type body, TFE lined butterfly valve, TFE encapsulated 316 stainless steel disc and stem resilient TFE lined seat, Acetal stem bushing, Buna-N stem Packing, 316 stainless steel body screws, metal notched throttling handle for 2" thru 4" sizes, and handwheel operator for 6" and larger. All sizes to be suitable for mounting between 125lb. or 150lb. ANSI flanges.

RATING: 150 PSIG @ 0 DEG. F. for 2" to 12" sizes
75 PSIG @ 0 DEG. F. to 250 F. for 14" and 16" size
SIZES: 2" thru 16"

3.44 One-piece cast iron wafer style body ,buna-n seat material, gasket type seal,splined disc-to-stem Connection, 416 stainless steel stem,bronze or aluninium bronze disc material,bronze upper and lower bushings. Lever operator for valve sizes 2" thru 6", weatherproof worm gear wheel operator for Sizes 8" thru 12". Valves shall comply with **section 5: Inspection Testing and Rejection of AWWA specification C-504-87** with one exception; test pressure shall be 200 psig.
Grinnell series 1000 butterfly valve

Rating: 200 psig @ 180 Deg. F.
Sizes: 2" thru 12"

3.45 Butterfly valve - waffer type, CPVC body and disc, with viton Seat and seal. Lever operated 3" to 6".All sizes to fit between 125lb. or 150lb. Flanges.
Chemtrol model-B or equal.

Rating: 3"-4" 150psi @ 70 deg.F
6" 115psi @ 70 deg.F

STRAINERS CONTINUED

22.97 Filter Nozzle, Orthos type C2, 0.012" Slot, 1" WW thread x 45 MM long with 3/4" six point nut, polypropylene construction. Expanding ring, 32 MM diameter 1" WW thread for 12-17 MM plate thickness, polypropylene construction. Pipe saddle, FDA approved Rubber to suit a schedule 80 PVC pipe, the pipe size shall be specified by Calgon Carbon Corporation.

~~22.98 Filter Nozzle, Orthos type C2, 0.012" Slot, 1" WW thread x 2" long. Expanding Ring, 28 MM diameter, 1" WW thread for 3/8" plate and 1 3/16" dia. hole. Viton Gasket and all parts shall be manufactured from Kynar.~~

22.99 Filter Nozzle, Orthos Type SE11, 316 stainless steel construction with 0.012" slot openings.
1" WW thread x 2" long nipple. Polypropylene expanding ring, 28 mm dia., 1" WW thread for 3/8" plate and 1 3/16" hole. White (FDA approved) Buna-N gasket.

~~22.100 Filter nozzle, Orthos type C2, 0.012" slot, 1" WW thread x 45mm long stem complete with MUZ slots. Base shoulder is 10 mm in length. Furnish type MUZ washer, and a 3"O.D. x 1-1/8" I.D. x 1/8" thick viton gasket. All plastic parts shall be manufactured from virgin polypropylene. Calgon Carbon Logo is stamped on the end cap~~

EXPANSION JOINTS CONTINUED

24.21 Rubber expansion joint, single arch type, molded neoprene and nylon with bias-ply tire Cord for strength. Joint allows 4-way movement and up to 27.5 degree angular movement based on the maximum tension. Solid plate steel flanges drilled to mate with 150 lb. companion flanges.
Dynex: series 700
Rating: 225 psi @ 240 F on joint sizes 1" I.D. to 12" I.D.
125 psi @ 240 F on joint sizes 14" I.D. to 20" I.D.

24.22 Rubber expansion joint, reducer type, construction is high strength fabric and elastomer reinforced with metal rings.Flanges are integral with the body and utilize metal retaining rings.
Dynex series 500

HOSE FITTINGS CONTINUED

32.44 Quick Disconnect Adaptor, nylon, female NPT on one end with other end for connecting to quick disconnect coupler.
NY-Last Style A, or equal.

Rating: 70 psig to 175 psig @ 0 DEG.F. to 150 DEG. F. depending on size.

Sizes: 1/2" thru 4"

32.45 Quick Disconnect Adaptor, nylon, male NPT on one end with other end for connecting to quick disconnect coupler.
NY-Last Style F, or equal.

Rating: 70 psig to 175 psig @ 0 DEG. F. to 150 DEG. F. depending on size.

Sizes: 1/2" thru 4"

32.46 Quick Disconnect Coupler, nylon, Buna-N gaskets, male NPT on one end with other end for connecting to quick disconnect adaptor.
NY-Last Style B, or equal.
Rating: 70 psig to 175 psig @ 0 DEG. F. to 150 DEG. F. depending on size.
Sizes: 1/2" thru 4"

32.47 Quick Disconnect Coupler, nylon, Buna-N gaskets, female NPT on one end, other end for connecting to quick disconnect adaptor.
NY-Last Style D, or equal.

Rating: 70 psig to 175 psig @ 0 DEG. F. to 150 DEG. F. depending on size.

Sizes: 1/2" thru 4"

32.48 Dust Plug for couplers, Nylon, complete with 12" length of brass or stainless steel chain.
NY-Last Style DP, or equal.

Rating: 70 psig or 175 psig @ 0 DEG. F. to 150 DEG. F. depending on size.

Sizes: 3/4" thru 4"

32.49 Quick Disconnect Coupler, nylon, hose shank on one end with other end for connecting to quick disconnect adaptor.
NY-Last Style C, or equal.

Rating: 70 psig to 175 psig @ 0 DEG. F. to 150 DEG. F. depending on size.

Sizes: 1/2" thru 4"

HOSE FITTINGS CONTINUED

32.56 Quick Disconnect Male Adaptor Aluminum, 150 lb. ANSI Flange on one end, other end for connecting to quick disconnect coupler.
Ever-Tite Part 40 FLA or equal.

Rating: 150 psig @ 100 DEG. F.

Sizes: 1/2" thru 4"

32.57 Quick Disconnect Female Coupler, Aluminum, 150 LB. ANSI Flange on one end, other end for connecting to quick disconnect adaptor.
Ever-Tite Part 40 FLB or equal.

Rating: 150 psig @ 100 DEG.F.

Sizes: 1/2" thru 4"

32.58 Quick disconnect male adaptor, Type 316 stainless steel, 150# ANSI flange on one end, other end for connecting to quick disconnect coupler.
Ever-Tight Part FLA or approved equal.

Rating: 150 psig @ 100 deg. F.

Sizes: 1/2" thru 4"

32.59 Quick disconnect male adaptor, Aluminum, female NPT on one end with other end for connecting to quick disconnect female coupler.
Ever-Tite Part A, or equal.

Rating: 150 psig @ 100 DEG. F.

Sizes: 1/2" thru 4"

32.60 Quick disconnect male adaptor, Aluminum, male NPT on one end with other end for connecting to quick disconnect female coupler.
Ever-Tite Part F, or equal.

Rating: 150 psig @ 100 DEG. F.

Sizes: 1/2" thru 4"

RUPTURE DISKS

RUPTURE DISK :

Type :	Standard
Size :	(See Below)
Material :	Impervious graphite
Vacuum Support :	Furnish for disks with bursting pressure of 15 psig or less.
MANUFACTURER :	Process Equipment Div. Carborundum Co., Zook, Carbone, Metaullics or equal.
DISK HOLDER :	Rupture disk to fit between 150 pound ANSI RF or FF companion flanges furnished by others.

SERVICE CONDITIONS :

Fluid Under Disks :	Wastewater
Pressure Fluctuation :	Steady during normal operation.
Temperature :	40 to 150 degrees F.
Operating Pressure :	80% of bursting pressure
Back Pressure :	Atmospheric

PERFORMANCE REQUIREMENTS :

Bursting Pressure :	75 psig +/- 5%.
Coincident Temperature :	40 to 150 degrees F.
Relieving Capacity :	Must equal line size.
NAME PLATE	In accorance with ASME requirements.
TAGGING :	Tag with ITEM NO. and SERVICE.

ITEM NO.	SIZE	BURSTING PRESSURE
PSE-155	1"	75 PSIG +/- 5%
PSE-156	1 1/2"	75 PSIG +/- 5%
PSE-157	2"	75 PSIG +/- 5%
PSE-252	3"	75 PSIG +/- 5%
PSE-301	3"	35 PSIG +/- 5%
PSE-302	3"	50 PSIG +/- 5%
PSE-303	3"	65 PSIG +/- 5"
PSE-304	3"	87 PSIG +/- 5%
PSE-305	3"	150 PSIG +/- 5%
PSE-306	3"	75 PSIG +/- 5%

NOTE: Operating pressure to be 80% of bursting pressure.

PRESSURE INDICATING GAGES

MODEL: Weksler AA44P-Liquid Fill

GAGE

Case:	4 1/2" size stainless steel, steel, brass, aluminum and phenol
Socket:	1/2" NPT male bottom connection, stainless steel
Dial:	White litho with black figure
Pointer:	Balanced micrometer
Bourdon Tube:	Stainless steel
Movement:	Stainless steel and Delrin
Accuracy:	1% of full range
Range:	Listed below
Liquid Fill:	Glycerin (Temp. range of -36 DEG.F. to + 140 DEG. F.)

TAGGING: Tag each assembly with Item No. and Service.

ITEM NO.	SERVICE	ITEM NO.	SERVICE
~~PI-213~~	~~0-15 PSIG~~	~~PI-448~~	~~0-300 PSIG~~
PI-214	0-30 PSIG	PI-557	0-300 PSIG *
~~PI-215~~	~~0-60 PSIG~~	~~PI-449~~	~~0-400 PSIG~~
PI-216	0-100 PSIG	PI-556	0-400 PSIG *
~~PI-217~~	~~0-160 PSIG~~	~~PI-450~~	~~0-800 PSIG~~
~~PI-218~~	~~0-200 PSIG~~	~~PI-558~~	~~0-800 PSIG~~ *
		PI-559	0-1500 PSIG
		PI-560	0-1500 PSIG *

NOTE: Replaces Items

PI-101	Spec. 7209A-CS161
PI-102	Spec. 7209A-CS161
PI-103	Spec. 7209A-CS161
PI-104	Spec. 7209A-CS161
PI-105	Spec. 7209A-CS161
PI-106	Spec. 7209A-CS161
PI-107	Spec. 7209A-CS162
PI-108	Spec. 7209A-CS162
PI-109	Spec. 7209A-CS162
PI-110	Spec. 7209A-CS162
PI-111	Spec. 7209A-CS162
PI-112	Spec. 7209A-CS162

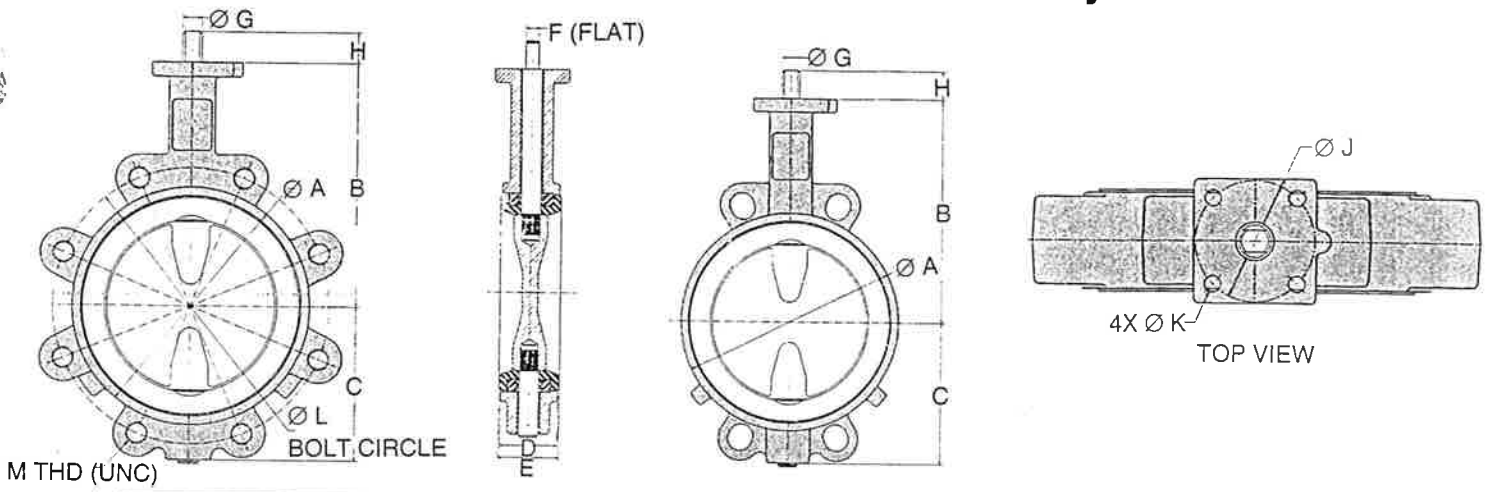
ALTERNATE SOURCES:

MANUFACTURER	MODEL NO.
Ashcroft	
Ametek-U.S. Gauge	
Marshalltown	

* W/STEAM COIL SIPHON

3.44

Dimension 2"-12" Series 1000 Butterfly Valves



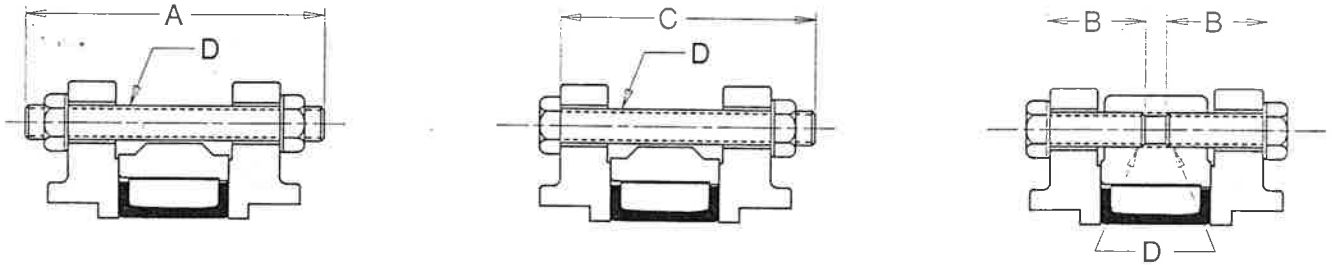
VALVE SIZE	ISO FLANGE SIZE	A	B	C	D	E	F	G	H	J	K	NO. OF LUGS	L
2 (50mm)	FO5	3.66	5.75	2.74	1.67	1.79	.375 (9.5mm)	.562 (14.3mm)	1.060 (26.9mm)	1.969 (50mm)	.277	4	4.75
21/2 (80mm)	FO5	4.23	6.19	2.86	1.79	1.91	.375 (9.5mm)	.562 (14.3mm)	1.060 (26.9mm)	1.969 (50mm)	.277	4	5.50
3 (75mm)	FO5	5.01	6.50	3.83	1.79	1.91	.375 (9.5mm)	.562 (14.3mm)	1.060 (26.9mm)	1.969 (50mm)	.277	4	6.00
4 (100mm)	FO5	6.06	7.25	4.47	2.03	2.15	.375 (9.5mm)	.625 (15.9mm)	1.060 (26.9mm)	1.969 (50mm)	.277	8	7.50
5 (125mm)	FO7	7.24	7.88	4.90	2.18	2.30	.500 (12.7mm)	.750 (19.0mm)	1.060 (26.9mm)	2.756 (70mm)	.358	8	8.50
6 (150mm)	FO7	8.17	8.38	5.30	2.18	2.30	.500 (12.7mm)	.750 (19.0mm)	1.060 (26.9mm)	2.756 (70mm)	.358	8	9.50
8 (200mm)	FO7	10.45	9.62	6.78	2.34	2.52	.625 (15.9mm)	.875 (22.2mm)	1.100 (27.9mm)	2.756 (70mm)	.358	8	11.75
10 (250mm)	F12	12.66	11.00	8.06	2.65	2.83	.750 (19mm)	1.125 (28.6mm)	1.620 (41.1mm)	4.921 (125mm)	.531	12	14.25
12 (300mm)	F12	14.72	12.50	9.25	3.03	3.21	.750 (19mm)	1.125 (28.6mm)	1.620 (41.1mm)	4.921 (125mm)	.531	12	17.00

Material Specifications

Material Specifications – ASTM References

BODY		DISC		STEM	
Material	Spec.	Material	Spec.	Material	Spec.
Cast Iron	A126 CL.B	Ductile Iron	A536, 65-45-12	416 S.S.	A582, Type 416
		Aluminum Bronze	B148; C95400	BUSHINGS	
				Material	Spec.
				Bronze	B584 C93200

Stud and Bolt Specification: Series 1000 Butterfly Valve



DIM.	VALVE SIZE								
	2"	2½"	3"	4"	5"	6"	8"	10"	12"
A	5	5-½	5-½	5-¾	6	6-½	7	7-½	8
B	1-½	1-½	1-½	1-¾	1-¾	2	2	2-¼	2-½
C	4	4-½	4-½	5	5	5	5-½	6	7
D	⅝ -11 UNC	⅝ -11 UNC	⅝ -11 UNC	⅝ -11 UNC	¾ -10 UNC	¾ -10 UNC	¾ -10 UNC	⅞ -9 UNC	⅞ -9 UNC
No. of Bolts (Wafer)	4	4	4	8	8	8	8	12	12
No. of Bolts (Lug)	8	8	8	16	16	16	16	24	24

3.44

GRINNELL SERIES 1000

The Grinnell Series 1000 Butterfly Valves are manufactured at our Statesboro, GA Foundry and Machining Center, an ISO 9002 Facility. The valves are produced on the most advanced machining equipment available, with every valve tested to 110% of full rated pressure prior to shipment.

Designed with the requirements of the commercial and HVAC markets in mind, the Series 1000 meets those normal industry standards including MSS-SP-67.

BODY
One-piece cast bodies are available in both wafer and full tapped lug design. The standard long-neck body provides full clearance for 2 inches of insulation on ANSI 150 pipe flanges.

STEM/DISC
Two-piece design allows for a streamlined disc which minimizes turbulence and improves flow characteristics. A splined disc-to-stem connection eliminates the need for pins or bolts through the disc.

STEM BUSHINGS
Bronze bushings are standard on both the upper and lower shaft to minimize torque and provide maximum stem support.

SEAT
Phenolic reinforced cartridge type resilient seat enables the valve to be used at full pressure, as well as vacuum service. No flange gaskets are required.

DEAD-END SERVICE
A unique patented lip integral to the body prevents the liner from moving downstream, allowing lug valves to be used in dead-end service applications at full rated pressure without the use of a downstream flange.

TESTING
Each valve is individually tested to be bubble-tight at 110% of full rated pressure.

Made in the U.S.A.

Pressure Rating:
200 PSIG WOG (non-shock)
200 PSIG WOG (non-shock) dead-end service
Full Vacuum Service

ORDER BY FIGURE NUMBER

SIZE 2-12" ——— 8" W C - 1 2 8 2 - 3

BODY STYLE
W - Wafer
L - Lug

BODY MATERIAL
C - Cast Iron

SERIES
1 - 1000

SEAT MATERIAL
1 - Buna-N
2 - EPDM

DISC MATERIAL
0 - Nickel-Plated ductile iron
8 - Bronze (Al-Brz)

OPERATOR
1 - 10 Pos.L/Lock
2 - Gear Operator

STEM
3 - 416 S.S. w/bronze bushings

Metaullics®

Serving the CPI Since 1949

PSE-252

Installation of Standard Falls® Rupture Disks

Falls® Impervious Graphite Rupture Disks fit 150# or 300# ANSI flat, or raised-face flanges.

In order to obtain reproducible bursting pressures of Falls® Rupture Disks, the following installation precautions are necessary:

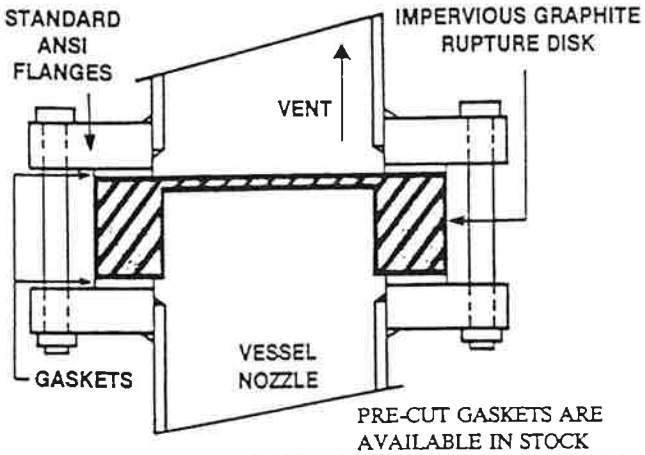
A. The flat side of the disk should always be located toward the vent side of the piping. An arrow on the Rupture Disk label gives the direction of vent flow. Falls® Rupture Disks burst approximately 70% higher when installed in the inverted position.

B. The location of the disk, with respect to the piping center line, is also important. Care should be exercised to insure the centering of the disk in the vent line.

C. The recommended gasket dimensions listed in the chart are to be followed explicitly. The inside diameters conform to ANSI B 16.5 — standards for Group I Gaskets. The outside diameter is identical to that of the disk to insure proper alignment in installation.

D. The bolting torque used to install Falls® Rupture Discs is very critical. The nominal torques given should easily seat most gasket materials. (y factor of 1600 PSI or less.) Use the minimum torque possible to seat the gasket, which should be the softest material available and still be compatible with the service requirements. The maximum torques shown should never be exceeded. Equal torque must be applied to each bolt, and in a diametrically staggered pattern.

Please call if you need assistance or catalog information.



PRE-CUT GASKETS ARE AVAILABLE IN STOCK

NOZZLE SIZE	DISK DIMENSIONS		GASKET DIMENSION		NOMINAL TORQUE	MAXIMUM TORQUE
	I.D.	O.D.	I.D.	O.D.	(FT-#)	(FT-#)
FOR MOUNTING IN 150# ANSI FLANGES (DISKS RATED TO 150 psi.)						
1	1	2½	1 1/16	2½	3	5
1½	1½	3¼	1 23/32	3¼	6	9
2	2	4	2⅛	4	12	17
3	3	5¼	3½	5¼	20	30
4	4	6¾	4½	6¾	14	21
6	6	8⅞	6⅛	8⅞	25	37
8	8	10¾	8⅛	10¾	33	50
10	10	13¼	10¾	13¼	31	47
12	12	16	12¼	16	42	62
14	13¼	17⅞	14	17⅞	53	79
16	15¼	20¼	16	20¼	50	75
FOR MOUNTING IN 300# ANSI FLANGES (DISKS RATED 175psi & above)						
1	1	2¾	1 1/16	2¾	4	6
1½	1½	3⅞	1 23/32	3⅞	8	13
2	2	4¼	2⅛	4¾	6	9
3	3	5¾	3½	5¾	11	17
4	4	7	4½	7	16	23
6	6	9¼	6⅛	9¼	16	25
8	8	12	8⅛	12	26	38

NOTE: Torque loading listed is based upon standard size and number of steel bolts, well lubricated with a heavy graphite and oil mixture. Non-lubricated bolts produce 50% of calculated gasket pressure, and different lubricants produce pressures ranging from 50 - 100% of calculated pressures.

Metaullics Systems Co. L.P.
31935 Aurora Road
Solon, Ohio 44139
Phone 216-349-8800
800-638-2859
Fax 216-248-3432

PSE-252

Typical Operating Characteristics

Corrosion Resistance

Impervious graphite rupture disks are unaffected by practically all corrosives including hydrochloric, sulfuric and phosphoric acids, solvents and halogenated hydrocarbons. Because of this unique corrosion resistance, Falls Impervite rupture disks provide maximum reliability at low pressures where the slightest chemical attack on a thin membrane of other materials might alter the burst rating. In cases where some chemical attack may occur, such as caustic cleaning or where deposits may build up on the disk, TFE coating is recommended on the process side.

Thermal Shock Resistance

Impervious graphite rupture disks are highly resistant to thermal shock because of their extremely low rate of thermal expansion combined with their very high rate of thermal conductivity.

Burst Ratings

At pressure ratings from 15 to 300 psi, Falls Impervite rupture disks are accurate to ±5% of the burst rating stamped on the disk. The stamped rating may vary slightly from the nominal rating shown in the individual charts in this brochure. For pressures below 15 psi, Falls Impervite disks are accurate to ±0.75 psi. Where a given disk diameter is not rated for a low enough pressure, a larger diameter disk may be specified to meet requirements as shown in the minimum burst ratings table.

Temperature Range

Falls Impervite rupture disks are suitable for service in a temperature range from -400°F to 1125°F. For temperatures between 300°F and 650°F a standard high temperature assembly is provided to maintain the temperature of the graphite itself at less than 300°F. For applications involving temperatures above 650°F, contact the Solon, Ohio plant for recommendations.

Minimum Burst Ratings

Nozzle Size (inches)	Minimum Burst Pressure Available (lb./in.²)	Tolerance (lb./in.²)
1	25	±1.25
1½	15	±1.00
2	10	±1.00
3	7	±0.75
4	5	±0.75
6	3	±0.75
8	1	±0.75
10	1	±0.75
12	1	±0.75
14	1	±0.75
16	1	±0.75

Venting Capacity of Impervious Graphite Rupture Disks

PSE-252

Venting capacities are calculated per the latest edition of ASME Code, section 8, division I, paragraph UG-131 using coefficient of discharge of 0.62 as required by paragraph UG-127 (2) (a).

Venting Capacity of Impervious Graphite Rupture Disks

Thousands of cfm air @ standard conditions

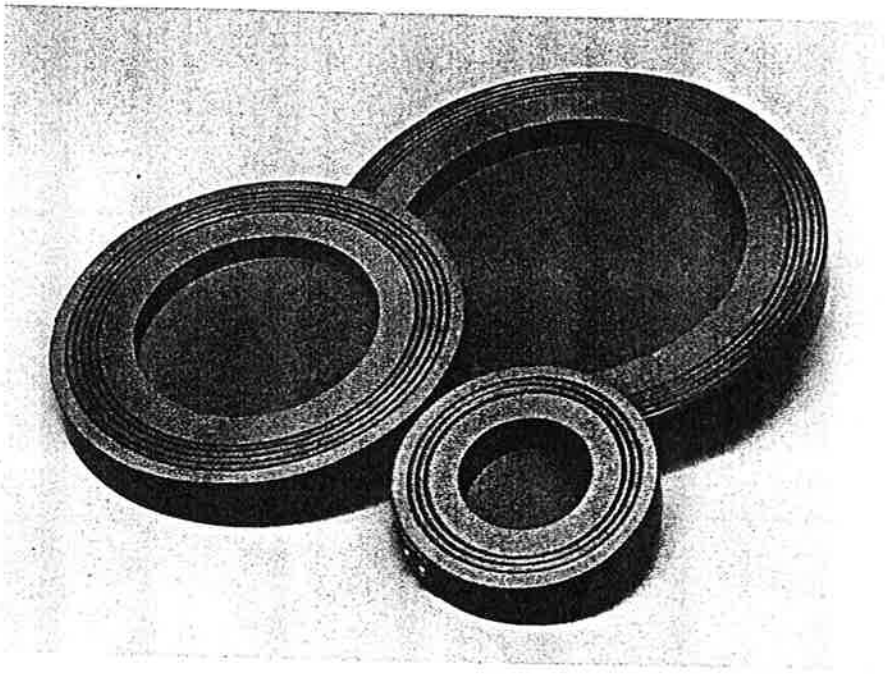
	Disk Burst Rating	Rupture Disk Diameter (inches)										
		1	1½	2	3	4	6	8	10	12	14	16
With Vacuum Supports	10	—	—	.590	1.66	2.90	5.71	12.8	16.1	21.5	33.3	41.9
	15	—	—	.712	1.99	3.48	6.87	15.5	19.4	25.8	40.0	50.4
150 lb. ASA Flanges	10	—	—	.970	2.18	3.88	8.73	15.5	24.2	34.9	42.6	56.4
	15	—	.656	1.17	2.62	4.66	10.5	18.7	29.1	42.0	51.2	67.8
	20	—	.766	1.36	3.06	5.45	12.3	21.8	34.0	49.0	59.8	79.2
	25	.390	.877	1.56	3.51	6.23	14.0	24.9	39.0	56.1	68.4	90.6
	30	.439	.987	1.76	3.95	7.02	15.8	28.1	43.9	63.2	77.0	102
	40	.537	1.21	2.15	4.83	8.59	19.3	34.4	53.7	77.3	94.2	125
	50	.635	1.43	2.54	5.71	10.1	22.9	40.6	63.5	91.4	111	148
	75	.880	1.98	3.52	7.92	14.1	31.7	56.3	88.0	127	155	205
	100	1.13	2.53	4.50	10.1	18.0	40.5	72.0	113	162	198	262
	125	1.37	3.08	5.49	12.3	21.9	49.3	87.7	137	197	241	319
	150	1.62	3.64	6.47	14.5	25.9	58.2	103	162	233	284	376
300 lb. ASA Flanges	175	1.86	4.19	7.45	16.8	29.8	67.0	119	186	268	327	433
	200	2.11	4.74	8.43	19.0	33.7	75.8	135	211	303	370	490
	225	2.35	5.29	9.41	21.2	37.6	84.7	151	235	339	413	547
	250	2.60	5.84	10.4	23.4	41.6	93.5	166	260	374	456	604
	275	2.84	6.40	11.4	25.6	45.5	102	182	284	409	499	661
	300	3.09	6.95	12.4	27.8	49.4	111	198	309	445	542	718

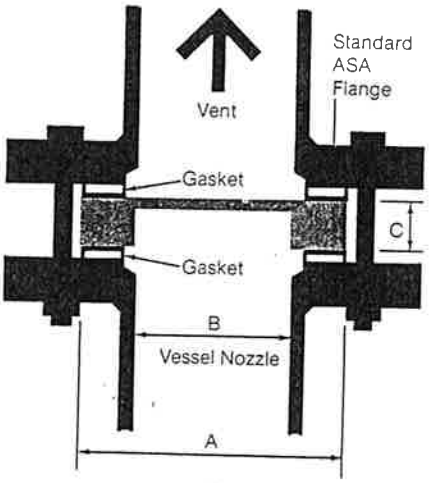
Caution:
Vent lines should be securely anchored and designed to withstand the dynamic forces imposed by the vented liquids or gases. Fragments from graphite disks will discharge at high velocity and suitable shields should be provided.

Standard Disks

PSE-252

Falls Impervite rupture disks are used in a variety of applications including pressure vessel operations in the pharmaceutical and chemical processing industries. Standard disks in the diameters and ratings shown on the accompanying table are available from stock for immediate shipment. Other diameters to 36" can be supplied at any desired burst rating up to 300 psi.





Standard Disks — Maximum operating temperature: 300°F

	Nozzle Size	Disk Dimensions (inches) A	B	C
10-150 lb./in.² Rated Disks	1	2½	1	⅞
	1½	3¾	1½	⅞
Available in the following burst ratings: 10-15-20-25-30-40-50-75-100-150 lb./in.² (All should be mounted in standard 150 lb. ASA flanges)	2	4	2	⅞
	3	5¼	3	⅞
	4	6¼	4	⅞
	6	8⅜	6	⅞
	8	10⅞	8	1⅛
	10	13¼	10	1½
	12	16	12	2
	14	17⅝	13¼	2¼
	16	20⅛	15¼	2½
175-300 lb./in.² Rated Disks	1	2¾	1	1
	1½	3⅝	1½	1
Available in the following burst ratings: 175-200-225-250-275-300 lb./in.² (All should be mounted in standard 300 lb. ASA flanges)	2	4¼	2	1
	3	5¾	3	1¼
	4	7	4	1¼
	6	9¾	6	1¾
	8	12	8	2¼

Bolt Tightening and Gasketing

PSE-252

Equal bolt stress will provide trouble-free operation. The bolt tightening torques in the accompanying table will provide approximately 25% more joint pressure than required to seal the gaskets, based on use of gaskets with minimum design seating stress (y) of 1600 psi per ASME Code, Table 2-5.1. Gaskets can be of any non-metallic material suitable for the application.

The torque loadings indicated are based on new bolts being well lubricated with a heavy graphite and oil mixture.

Bolt Tightening

	Nozzle Size (inches)	Disk Dimensions		Flange Bolts		Maximum Allowable Tightening Torque (Foot-Pounds)	Gasket Dimensions	
		I.D.	O.D.	Number	Size		I.D.	O.D.
150 lb. Flange Mounting	1	1	2 1/2	4	1/2	5	1 5/16	2 1/2
	1 1/2	1 1/2	3 1/4	4	1/2	8 1/2	1 29/32	3 1/4
	2	2	4	4	5/8	15	2 3/8	4
	3	3	5 1/4	4	5/8	22	3 1/2	5 1/4
	4	4	6 1/4	8	5/8	15 1/2	4 5/8	6 3/4
	6	6	8 5/8	8	3/4	24	6 5/8	8 5/8
	8	8	10 7/8	8	3/4	32	8 5/8	10 7/8
	10	10	13 1/4	12	7/8	34	10 3/4	13 1/4
	12	12	16	12	7/8	47	12 3/4	16
	14	13 1/4	17 5/8	12	1	64	14	17 5/8
	16	15 1/4	20 1/8	16	1	60	16	20 1/8
300 lb. Flange Mounting	1	1	2 3/4	4	5/8	6 1/2	1 5/16	2 1/4
	1 1/2	1 1/2	3 5/8	4	3/4	11 1/2	1 29/32	3 5/8
	2	2	4 1/4	8	5/8	5	2 3/8	4 1/4
	3	3	5 3/4	8	3/4	13	3 1/2	5 3/4
	4	4	7	8	3/4	17	4 1/2	7
	6	6	9 3/4	12	3/4	18	6 5/8	9 3/4
	8	8	12	12	7/8	27	8 5/8	12

Caution:
Non-lubricated bolts produce unreliable gasket pressures and care should be taken in evaluating torque readings.

To prevent premature burst, it is essential that the bolt loading values shown in the table not be exceeded. In addition, gaskets must be cut to the dimensions shown in the table to insure proper disk performance.

CRANE

Capri® Ball Valves

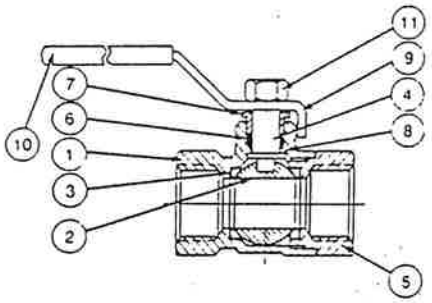
600 CWP/150 SWP (¼"-2")

400 CWP/150 SWP (2½"-3")

Bronze • Regular Port • Blowout-Proof Stem

No. 9302

No. 9302 — Threaded Ends
No. 9302-S — Threaded Ends (Stainless Steel Trim)
No. 9322 — Solder Joint Ends (⅜"-2")



THREADED-END TYPE

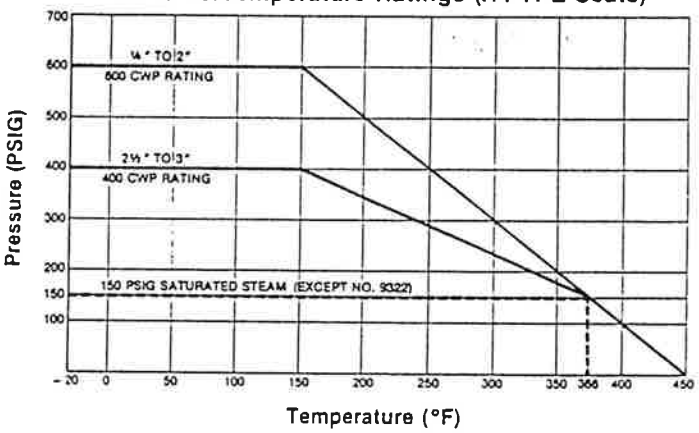
No.	Part	9302/9322	No.	Part	9302-S
1	Body	Bronze ASTM B62 Alloy 836	1	Body	Bronze ASTM B62 Alloy 836
2	Ball ¼"-1"	Brass ASTM B16 Alloy 360*	2	Ball ¼"-1"	Stainless Steel ASTM A276 Type 316
	Ball 1¼"-3"	Brass ASTM B584 Alloy 857*		Ball 1¼"-2"	Stainless Steel ASTM A351 Gr CF8M*
3	Seat Ring	Reinforced PTFE	3	Seat Ring	Reinforced PTFE
4	Stem	Brass ASTM B16 Alloy 360	4	Stem	Stainless Steel ASTM A276 Type 316
5	Retainer	Bronze ASTM B62 Alloy 836	5	Retainer	Bronze ASTM B62 Alloy 836
6	Packing	PTFE	6	Packing	PTFE
7	Packing Nut	Brass ASTM B16 Alloy 360	7	Packing Nut	Brass ASTM B16 Alloy 360
8	Friction Washer	PTFE	8	Friction Washer	PTFE
9	Handle	Steel — Zinc Plated	9	Handle	Steel — Zinc Plated
10	Handle Cover	Vinyl	10	Handle Cover	Vinyl
11	Handle Nut	Steel — Zinc Plated	11	Handle Nut	Steel — Zinc Plated

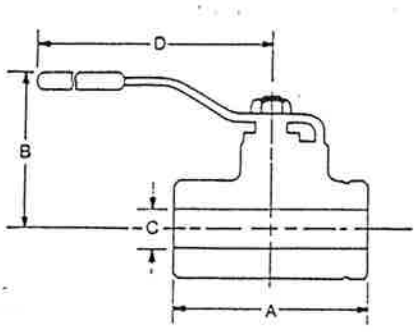
Chrome Plated

Optional Accessories

- Stainless Steel Handle
- Memory Stop
- Tee Handle
- Round Handle
- 2¼" Extension Stem
- Electric Actuator
- Pneumatic Actuator
- Hydraulic Actuator

Pressure/Temperature Ratings (R-PTFE Seats)



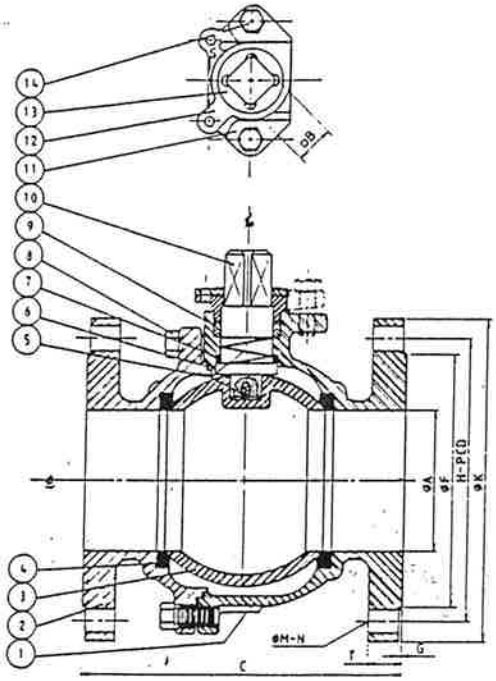


Nom. Pipe Size	Dimensions (inches) A 9302 & 9302-S	A 9322	B	C	D	Weight (lbs.) 9302 & 9302-S	Weight (lbs.) 9322	Cv Factors
¼	1.85	—	1.81	.39	3.27	.40	—	6
⅜	1.85	1.77	1.81	.39	3.27	.40	.40	6
½	2.28	2.28	1.81	.50	3.27	.60	.60	10
¾	2.56	2.91	2.20	.70	4.06	.93	.93	24
1	3.11	3.66	2.36	.88	4.06	1.40	1.40	34
1¼	3.38	4.21	2.72	1.10	6.22	2.00	2.00	57
1½	3.66	4.65	2.91	1.38	6.22	2.50	2.50	80
2	4.45	5.59	3.19	1.77	6.22	4.00	4.00	134
2½*	5.71	—	4.33	2.28	8.19	7.50	—	230
3*	6.30	—	4.64	2.68	8.19	10.80	—	350

*9302-S not available in these sizes

STAINLESS STEEL FLANGE END BALL VALVES
Split Body, Full Bore, ANSI 150 LB, 300 LB

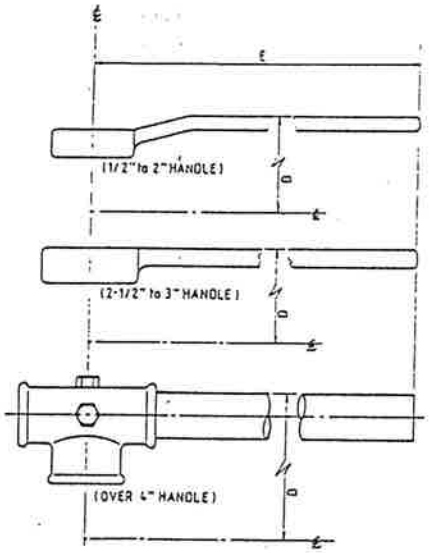
4.08

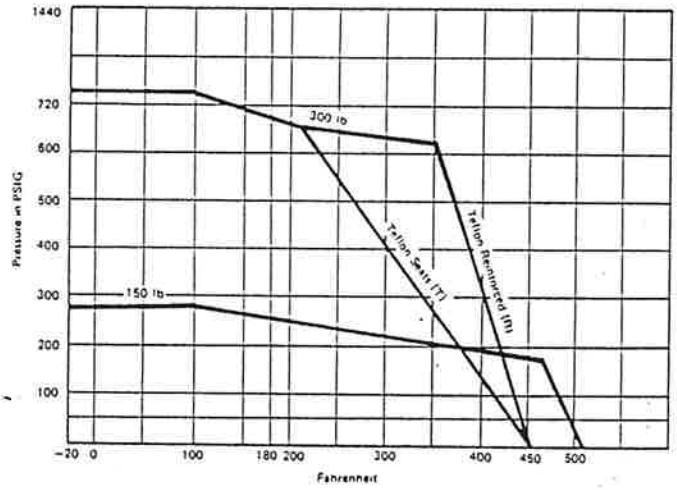


MATERIAL LIST

No.	PARTS NAME	SPECIFICATION	Q'TY
1	BODY	ASTM-A351-GRADE-CF8M	1
2	END CAP	ASTM-A351-GRADE-CF8M	1
3	BALL	ASTM-A351-GRADE-CF8M	1
4	SEAT RING	REINFORCED TFE*	2
5	STATIC DEVICE	SPRING	2
6	JOINT GASKET	ASBESTOS OR GRAPHITE	1
7	THRUST WASHER	REINFORCED TFE*	1
8	BOLT	SS304	4 or 8
9	STEM PACKING	TEFLON	2
10	STEM	SS316	1
11	GLAND	SS304	1
12	TRAVEL STOP	SS304	1
13	SNAP CATCH	SPRING	1
14	GLAND BOLT	SS304	2
	HANDLE	FC20	1

* DuPont Reg. T.M.





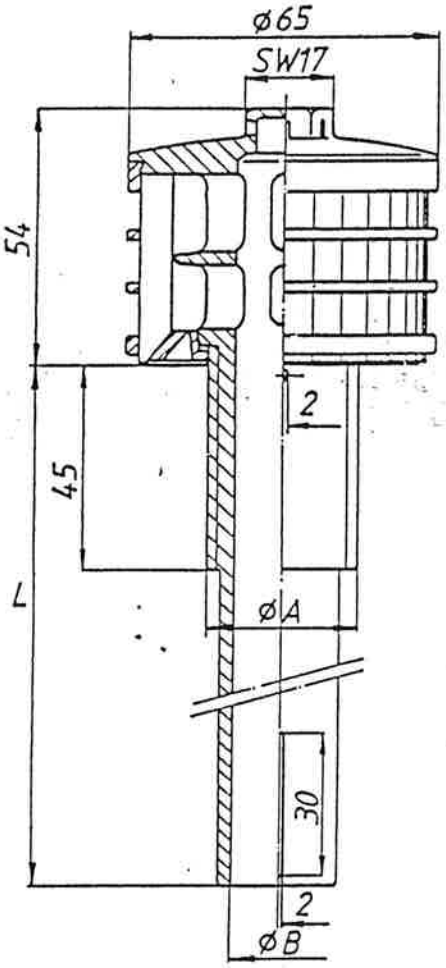
DIMENSIONS (ANSI 150 LBS & 300 LBS) (mm)

SIZE	A	B	C		D	E	F	H		K		T		G	M		N	
INCH			150	300				150	300	150	300	150	300		150	300	150	300
1/2"	.591	.394	4.25	5.51	2.84	4.53	1.38	2.38	2.63	3.50	3.75	.44	.56	.06	.63	.63	.16	.16
3/4"	.787	.394	4.61	5.98	2.95	4.53	1.69	2.76	3.25	3.86	4.61	.50	.63	.06	.63	.75	.16	.16
1"	.984	.472	5.00	6.50	3.66	5.12	2.01	3.13	3.50	4.25	4.88	.56	.69	.06	.63	.75	.16	.16
1¼"	1.260	.472	5.51	7.01	4.13	5.12	2.48	3.50	3.87	4.61	5.24	.63	.75	.06	.63	.75	.16	.16
1½"	1.575	.670	6.50	7.48	4.53	8.58	2.87	3.88	4.50	5.00	6.14	.69	.81	.06	.63	.87	.16	.16
2"	1.969	.670	7.00	8.50	4.72	8.58	3.62	4.74	5.00	5.98	6.50	.75	.87	.06	.75	.75	.16	.31
2½"	2.560	.827	7.48	9.49	5.32	11.61	4.13	5.49	5.87	7.01	7.48	.88	1.00	.06	.75	.87	.16	.31
3"	3.150	.827	7.99	11.14	5.71	11.61	5.00	6.00	6.63	7.48	8.27	.94	1.13	.06	.75	.87	.16	.31
4"	3.937	1.063	9.02	12.01	7.87	15.75	6.18	7.50	7.87	9.02	10.00	.94	1.25	.06	.75	.87	.31	.31
5"	4.921	1.063	14.02	—	8.66	21.65	7.32	8.50	—	10.00	—	.94	—	.06	.87	—	.31	—
6"	5.910	1.063	15.51	15.87	9.45	21.65	8.50	9.51	10.63	10.98	12.52	1.00	1.44	.06	.87	.87	.31	.47
8"	7.874	1.378	17.99	19.76	11.81	39.37	10.63	11.75	13.00	13.50	15.00	1.13	1.63	.06	.87	.98	.31	.47
10"	9.843	1.378	20.98	22.36	13.98	39.31	12.76	14.25	15.25	15.98	17.52	1.19	1.87	.06	.98	1.14	.47	.63

Filterdüsen — Filter-Nozzles — Crépines à filtre — Toberas a filtro

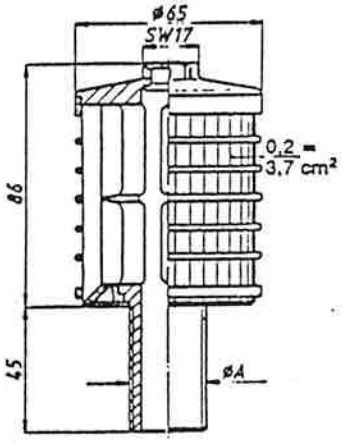
22.40
22.96
22.97

TYP C1



Schlitze Slots Fentes Ranuras	36 x 0,2 mm = 1,95 cm² 36 x 0,3 mm = 2,90 cm² 36 x 0,5 mm = 4,90 cm² 36 x 0,7 mm = 6,80 cm² 36 x 1,0 mm = 9,80 cm²
	oder auf Anfrage or on request ou sur demande o a la demanda

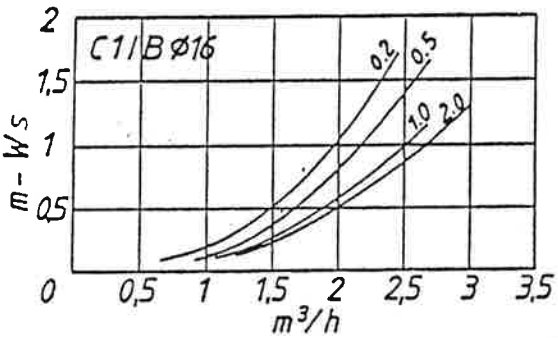
TYP C2

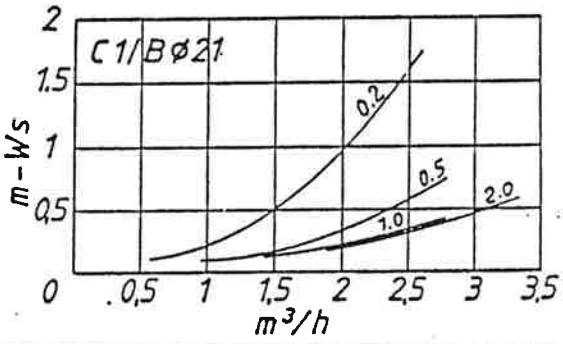


Gewinde: Thread: Filetage: Rosca:	M24	1" WW	R¾"	1¼" WW
A Ø mm B Ø mm	24 16 (2,0 cm²)	25,4 16 (2,0 cm²)	26,4 16 (2,0 cm²)	32 21 (3,4 cm²)

Gewindelänge = Thread length Filetage longueur Largura de la rosca	45 mm (20/60)	oder auf Anfrage or on request ou sur demande o a la demanda

Schaft (L) Shaft (L) Tige (L) Tija (L)	20, 45, 60, 80, 110, 140, 200, 220, 250 mm
	oder auf Anfrage or on request ou sur demande o a la demanda





Bestellbeispiel

Typ	Schlitz-breite	Gewinde	Gewinde-länge	Luft-spülrohr (Schaft)
C1	0,2	M24	45	80

Example for ordering

type	width of slot	thread	thread length	air flush pipe (shaft)
C1	0,2	M24	45	80

Exemple de commande

type	largeur de fente	filetage	filetage longueur	tuyau à air de balayage (tige)
C1	0,2	M24	45	80

Ejemplo de encargo

tipo	ancho de la ranura	rosca	largura de la rosca	conduct de aire de barrido (tija)
C 1	0,2	M24	45	80

Standard Rubber Expansion

The finest Standard Spool Type Expansion Joints on the market today by Dynex!

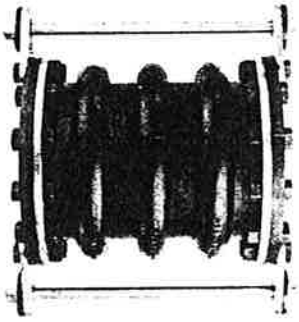
Construction is of a high strength fabric and elastomer reinforced with metal rings. The flanges are integral with the body and utilize metal retaining rings.

Reducer expansion joints are used to connect piping of different diameters. They may be concentric (end flanges with the same axis) or eccentric (end flanges that are parallel but offset axis).

Spool type expansion joints may be supplied with a soft rubber arch filler to prevent the collection of solid materials in the arch, however, this does result in a reduction of normal movement.

Single Arch
Series 201

Triple Arch
Series 202



Reducer
Series 500

24.22

Control Units

Unrestrained, most elastomer joints will extend when pressurized. It is preferable to anchor the system, however, when anchoring is not desirable or practical, control units **must** be used.

Gusset plates are bolted behind the mating flanges and control rods are used between them to limit extension of the joint. The number of rods required depends on the joint size and operating pressure of the system.

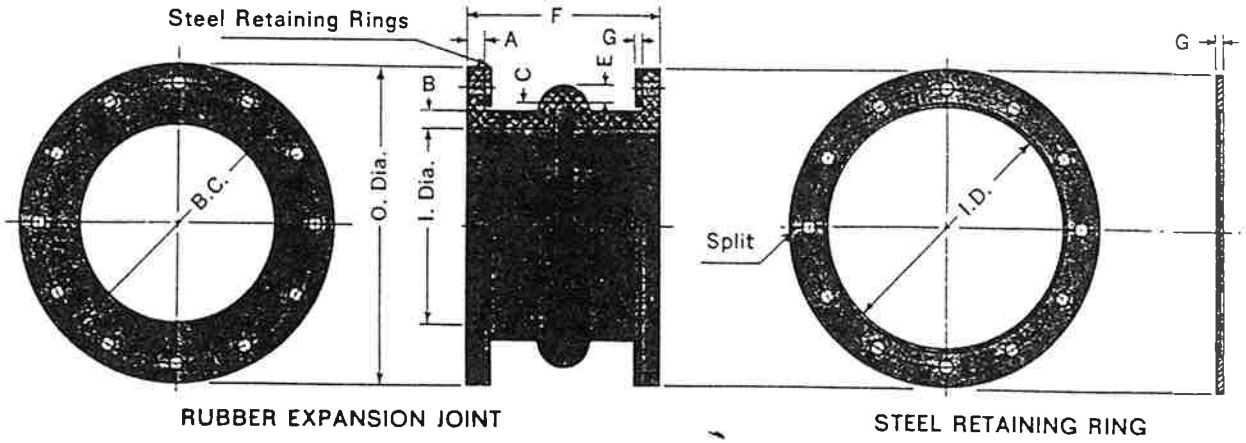
CONTROL UNIT DIMENSIONS AND RATINGS

JOINT SIZE I.D. (In.)	GUSSET PLATE THICKNESS (In.)	ROD DIAMETER (In.)	MAXIMUM PRESSURE (PSI)		JOINT SIZE I.D. (In.)	GUSSET PLATE THICKNESS (In.)	ROD DIAMETER (In.)	MAXIMUM PRESSURE (PSI)	
			2-RODS	3-RODS				2-RODS	3-RODS
2	1/2	5/8	200	—	10	3/4	7/8	140	190
2 ½	1/2	5/8	200	—	12	3/4	1	140	190
3	1/2	5/8	200	—	14	3/4	1	85	190
4	1/2	5/8	200	—	16	3/4	1 1/8	65	110
5	1/2	5/8	200	—	18	3/4	1 1/8	65	110
6	1/2	5/8	140	200	20	3/4	1 1/8	65	110
8	1/2	3/4	140	190	24	1	1 1/4	65	100

TECHNICAL DATA FOR SPOOL - TYPE RUBBER - AND FABR

SIZES • DIMENSIONS • ALLOWABLE MOVEMENTS • FORCES TO COMPRESS

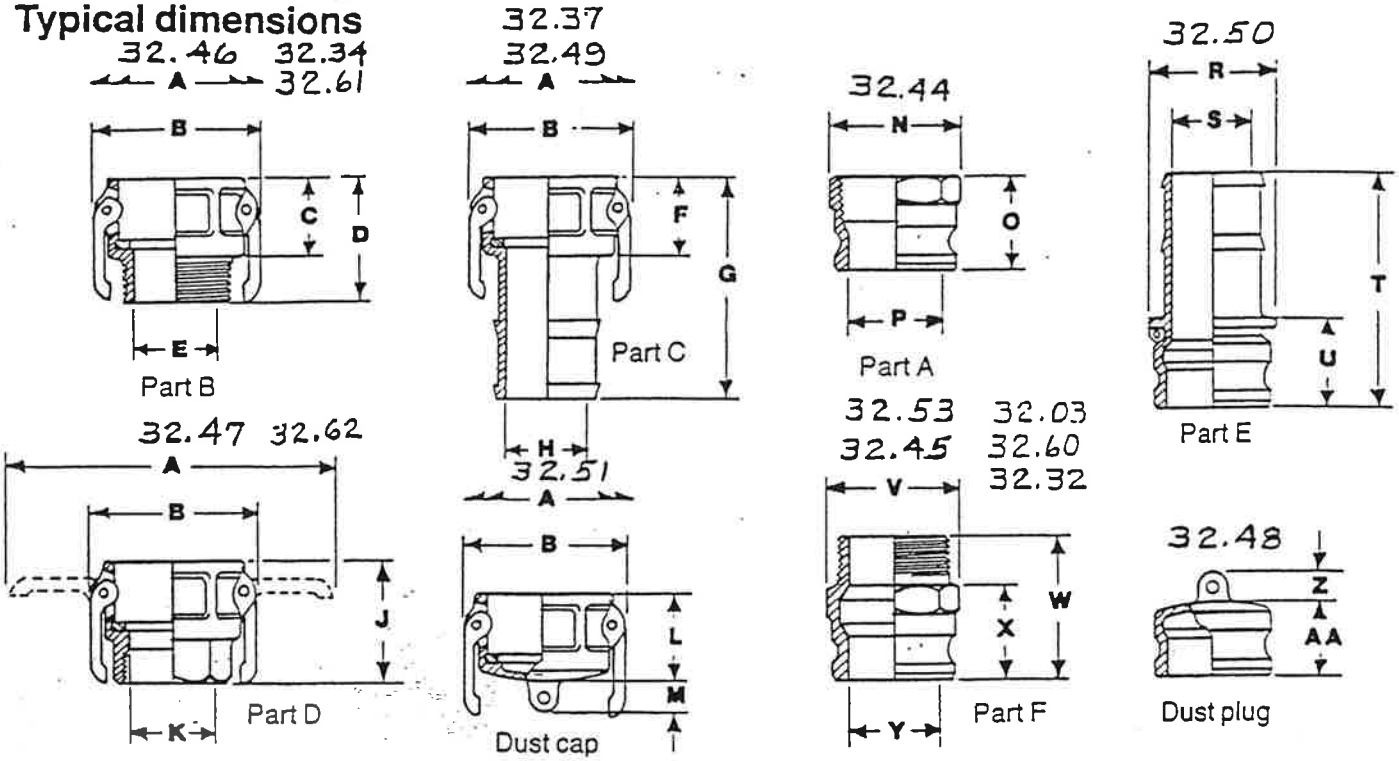
NOMINAL PIPE SIZE EXP. JT. I.D.	"FACE TO FACE" RECOMMENDED LENGTH				MINIMUM "F" TO "F" SINGLE ARCH	FLANGE DIMENSIONS & DRILLING									MOVEM BASED ON	
	SINGLE ARCH	TWO ARCH	THREE ARCH	FOUR ARCH		FLANGE O.D.	BOLT CIRCLE	NO. OF HOLES	DIAMETER OF HOLES	"A"	"B"	"C"	"D"	"E"	"G"	IN. OF AXIAL COMPRESSION	IN. OF AXIAL EXTENSION
1	6	10	12	14	5	4¼	3⅛	4	⅝	9/16	½	1	½	⅜	⅜	½	¼
1¼	6	10	12	14	5	4⅝	3½	4	⅝	9/16	½	1	½	7/16	⅜	½	¼
1½	6	10	12	14	5⅛	5	3⅞	4	⅝	9/16	⅝	1¼	½	7/16	⅜	½	¼
2	6	10	12	14	5¼	6	4¾	4	¾	9/16	¾	1¼	½	½	⅜	½	¼
2½	6	10	12	14	5¼	7	5½	4	¾	9/16	⅞	1¼	½	½	⅜	½	¼
3	6	10	12	14	5¼	7½	6	4	¾	9/16	⅞	1¼	½	½	⅜	½	¼
3½	6	10	12	14	5¼	8½	7	8	¾	9/16	⅞	1¼	½	½	⅜	½	¼
4	6	10	12	14	5¼	9	7½	8	¾	9/16	⅞	1¼	½	½	⅜	½	¼
5	6	10	12	14	5¼	10	8½	8	⅞	⅝	⅞	1¼	½	½	⅜	½	¼
6	6	10	12	16	5½	11	9½	8	⅞	¾	⅞	1¼	½	½	⅜	½	¼
8	6	10	14	16	5¾	13½	11¾	8	⅞	¾	⅞	1½	¾	⅝	⅜	¾	⅜
10	8	12	14	16	6	16	14¼	12	1	¾	1	1½	¾	11/16	⅜	¾	⅜
12	8	12	14	16	6	19	17	12	1	⅞	1 3/16	1½	¾	11/16	⅜	¾	⅜
14	8	12	16	20	7	21	18¾	12	1⅛	⅞	1 3/16	2	¾	¾	⅜	¾	⅜
16	8	12	16	20	7	23½	21¼	16	1⅛	⅞	1 3/16	2	¾	¾	⅜	¾	⅜
18	8	12	16	20	7½	25	22¾	16	1¼	1	1 3/16	2	¾	¾	⅜	¾	⅜
20	8	12	16	20	8	27½	25	20	1¼	1	1¼	2	⅞	25/32	⅜	⅞	7/16
22	10	14	18	22	8	29½	27¼	20	1⅜	1	1¼	2	⅞	25/32	⅜	⅞	7/16
24	10	14	18	22	8	32	29½	20	1⅜	1	1¼	2	⅞	25/32	⅜	⅞	7/16
26	10	14	18	22	8	34¼	31¾	24	1⅜	1	1⅜	2¼	1	13/16	⅜	1	½
28	10	14	18	22	8	36½	34	28	1⅜	1	1⅜	2¼	1	13/16	⅜	1	½
30	10	14	18	22	8	38¾	36	28	1⅜	1	1⅜	2¼	1	13/16	⅜	1	½
32	10	14	18	22	8¼	41¾	38½	28	1⅝	1	1⅜	2¼	1	13/16	⅜	1	½
34	10	14	18	22	8½	43¾	40½	32	1⅝	1 3/16	1⅜	2¼	1	13/16	⅜	1	½
36	10	14	18	22	8½	46	42¾	32	1⅝	1 3/16	1⅜	2¼	1	13/16	⅜	1	½
38	10	14	18	22	8½	48¾	45¼	32	1⅝	1 3/16	1⅜	2¼	1	13/16	⅜	1	½
40	10	14	18	22	8½	50¾	47¼	36	1⅝	1 3/16	1⅜	2¼	1	13/16	⅜	1	½
42	12	14	18	24	8¾	53	49½	36	1⅝	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
44	12	14	18	24	8¾	55¼	51¾	40	1⅝	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
46	12	14	18	24	8¾	57¼	53¾	40	1⅝	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
48	12	14	18	24	8¾	59½	56	44	1⅝	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
50	12	14	18	24	9	61¾	58¼	44	1⅞	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
52	12	14	18	24	9	64	60½	44	1⅞	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
54	12	14	18	24	9	66¼	62¾	44	1⅞	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
56	12	14	18	24	9	68¾	65	48	1⅞	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
58	12	14	18	24	9	71	67¼	48	1⅞	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
60	12	14	18	24	9	73	69¼	52	1⅞	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
66	12	14	18	24	9	80	76	52	1⅞	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
72	12	14	18	24	9	86½	82½	60	1⅞	1 3/16	1½	2½	1⅛	29/32	⅜	1⅛	9/16
78	12	16	18	24	9¼	93	89	64	2⅛	1¼	1 3/16	2½	1⅛	1	⅜	1⅛	9/16
84	12	16	18	24	9¼	99¾	95½	64	2⅛	1¼	1 3/16	2½½	1⅛	1	⅜	1⅛	9/16
90	12	16	18	24	9¼	106½	102	68	2⅜	¼	1 3/16	2½	1⅛	1	⅜	1⅛	9/16
96	12	16	18	24	9¼	113¼	108½	68	2⅜	1¼	1 3/16	2½	1⅛	1	⅜	1⅛	9/16
102	12	16	20	24	11¼	120	114½	72	2⅝	1¼	1 3/16	2½	1⅛	1	⅜	2	1
108	12	16	20	24	11¼	126¾	120¾	72	2⅝	1¼	1 3/16	2½	1⅛	1	⅜	2	1



RUBBER EXPANSION JOINT

STEEL RETAINING RING

Typical dimensions



couplers **adapters**

SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z	AA
½	2 11/16	1 5/8	1 1/8	1 13/16	9/16	1 3/16	2 5/8	7/16	1 7/8	9/16	1 3/16	1/2	1 3/16	1 9/16	9/16	1	7/16	2 7/16	1 1/16	1 1/16	1 7/8	1 5/16	9/16	1/2	1
¾	4 7/16	2 3/16	1 5/16	2 1/16	3/4	1 5/16	3 5/16	1/2	2 1/16	7/8	1 1/4	1/2	1 1/2	1 5/8	3/4	1 1/2	1/2	3 5/8	1 5/8	1 1/2	2 3/16	1 1/2	3/4	1/2	1 1/8
1	5 1/2	2 7/16	1 9/16	2 7/16	1	1 9/16	3 13/16	3/4	2 1/2	1 3/16	1 5/8	5/8	1 3/4	1 15/16	15/16	1 11/16	3/4	4 1/8	1 7/8	1 9/16	2 9/16	1 11/16	1	1/2	1 3/8
1¼	7 1/8	3 3/16	1 15/16	2 7/8	1 1/4	1 15/16	4 1/16	1	2 7/8	1 3/8	2	11/16	2 1/8	2 1/8	1 1/8	2	1	4 7/16	2 3/16	2 1/4	3	2 1/8	1 1/8	5/8	1 1/2
1½	7 7/16	3 7/16	1 7/8	2 3/4	1 9/16	1 13/16	4 3/16	1 1/4	2 3/4	1 5/8	2	3/4	2 1/2	2 3/16	1 3/8	2 1/4	1 1/4	4 5/8	2 1/4	2 7/16	3 1/8	2 3/16	1 3/8	11/16	1 3/4
2	7 7/8	3 13/16	2 3/16	3 1/8	2	2 3/16	5	1 11/16	3 3/8	2	2 1/4	11/16	2 13/16	2 7/16	1 13/16	2 5/8	1 11/16	5 1/8	2 3/8	2 15/16	3 3/8	2 7/16	1 13/16	5/8	1 7/8
2½	8 3/16	4 7/16	2 1/4	3 1/2	2 3/8	2 1/4	5 3/8	2 3/16	3 3/8	2 3/8	1 3/4	3/4	3 11/16	2 3/4	2 3/16	3 5/16	2 3/16	5 3/4	2 5/8	3 5/16	3 13/16	2 5/8	2 1/4	11/16	1 7/8
3	9 7/8	5 1/2	2 3/8	3 9/16	2 7/8	2 5/16	6 5/16	2 11/16	3 1/2	2 7/8	2 1/2	3/4	4 1/4	2 3/4	2 7/8	4	2 5/8	6 5/8	2 5/8	4 1/4	3 15/16	2 3/4	2 7/8	3/4	2
4	11	6 5/8	2 7/16	4	3 15/16	2 7/16	6 11/16	3 5/8	3 15/16	3 3/4	2 5/8	3/4	5 7/16	3 1/16	3 7/8	5 3/16	3 5/8	7	2 3/4	5 5/16	4 1/2	3 1/16	3 7/8	7/8	2 1/8
5	11 7/8	7 9/16	2 1/2	4	4 3/4	2 3/8	7 1/4	4 5/8	4 1/16	4 7/8	2 11/16	7/8	6 1/2	3 5/16	4 7/8	6	4 5/8	7 7/16	2 1/2	6 1/2	4 9/16	3	4 3/4	1	2 1/8
6	16 3/8	9 5/8	2 11/16	4 3/8	5 15/16	2 5/8	8 3/8	5 5/8	4 3/8	5 15/16	2 7/8	1 1/8	7 3/4	3 5/16	5 15/16	7 3/16	5 9/16	8 13/16	3	7 5/8	4 3/4	3	5 15/16	1 1/4	2 9/16
8	20	12 9/16	3 7/8	5 3/4	7 3/4	3 7/8	11 5/16	7 3/4	6	8	4 1/4	1 1/4	10 1/8	5 1/2	7 3/4	9	7 1/4	11 3/8	3 13/16	10 1/8	6 1/4	4 1/2	7 3/4	1 1/4	3 15/16

Special parts In addition to parts described in this catalog, many combinations of adapters, couplers, threads, shanks, flanges and elbows are available. Inquiries about special cam-locking parts are invited.

Non-interchangeable couplings To prevent accidental mixing of dyes, inks, chemicals, etc., specially machined matching parts can be provided to order — so that only one specific adapter will fit into its mating coupler.

process pressure gauges

Spectragage® series 400

PI-215
PI-216
PI-217

Application

To indicate pressure in corrosive applications requiring a stainless steel Bourdon tube and a phenolic case. Maximum resistance to corrosion given by stainless steel socket option, while steel socket choice gives greater economy. Case features a solid front with full pressure relief back to meet safety standards. Liquid fill option provides resistance to severe vibration/pulsation and lubricates the gauge movement for extended operating life. Modular design means easy parts replacement.

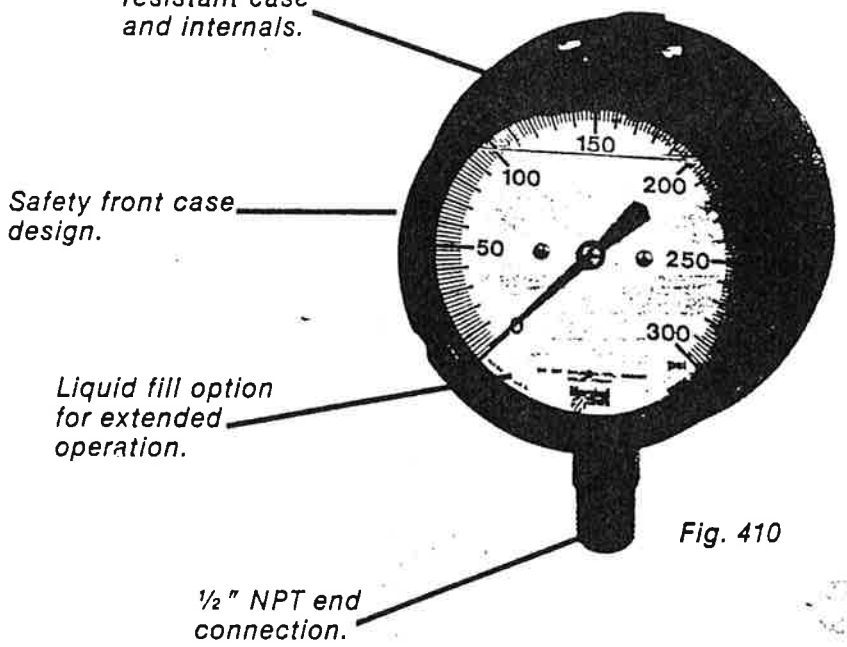


Fig. 410

Operating Specifications

Accuracy—ANSI Grade 2A - ½%.

Ranges—Eighteen ranges from 0-30 in. Hg. VAC to 0-10,000 psi. Also three compound ranges (in. Hg./psi). Refer to part number tables for available ranges.

Temperature Limit—Ambient temperature operating range for the liquid filled gauge option is 0° to 150°F (−15° to 65°C). Operating range for the dry construction is −40° to 160°F (−40° to 71°C).

Design Features

Dial Size—4½".

Bourdon Tube/Socket—316 Stainless steel/316 stainless steel or 316 stainless steel/steel. (403 Stainless steel Bourdon tube for 10,000 psi range.) Bourdon tube is welded to the socket.

Movement—Glass reinforced polyphenylene sulfide plates with stainless steel sector and pinion.

Case—Vented, turret style polypropylene case with solid front construction, full pressure relief back.

Window—Glass.

Ring—Glass-reinforced polypropylene, threaded and designed with grip lugs for ease of removal.

Dial—White coated aluminum with black scales. Corresponding English and metric scales are printed on the dial as standard. Metric pressure scale is expressed in kiloPascal (kPa) units.

Pointer—Fixed type on filled gauges; micrometer type on unfilled gauges.

Case and Dial Screws—Stainless steel.

Pressure Relief Plate—316 Stainless steel.

End Connection—½" NPT.

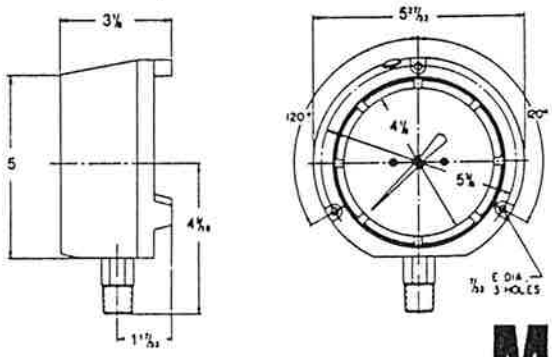
Liquid Fill—Glycerin.

How To Order

To order, simply provide the part number which corresponds to the required gauge construction and pressure range. Note that maximum gauge accuracy and extended gauge life can be gained by selecting a pressure range that is twice the normal operating pressure of the application.

Dimensions

All dimensions shown in inches.



Marshalltown® INSTRUMENTS

Bulletin 28-32

PI-215
PI-216
PI-217

Spectragage Series 400 Identification Chart

Identification Number	Bourdon Material	Socket Material	Liquid Fill
Figure 400	Stainless Steel	Steel	No
Figure 401	Stainless Steel	Stainless Steel	No
Figure 410	Stainless Steel	Steel	Yes
Figure 411	Stainless Steel	Stainless Steel	Yes

Part Numbers

Series 400

Pressure Range		Fig. 400	Fig. 401	Fig. 410	Fig. 411
In. Hg. VAC	kPa				
30	– 100	G26747	G26844	.....	.....
Psi	**kPa**				
15	100	G26672	G26691	.....	G25871
30	200	G26673	G26692	G25851	G25872
60	400	G26675	G26694	G25853	G25874
100	700	G26677	G26696	G25855	G25876
160	1100	G26678	G26697	G25857	G25878
200	1400	G26679	G26698	G25858	G25879
300	2000	G26680	G26699	G25859	G25880
400	3000	G26681	G26700	G25860	G25881
600	4000	G26682	G26701	G25861	G25882
1000	7000	G26684	G26703	G25863	G25884
1500	10,000	G26685	G26704	G25864	G25885
2000	14,000	G26686	G26705	G25865	G25886
3000	21,000	G26687	G26706	G25866	.....
4000	28,000	G26688	G26707	.....	G25888
5000	35,000	G26689	G26708	G2586[illegible]	G25889
10,000	70,000	G26690	G26709	G2586	G25890
In. Hg. VAC x Psi	**kPa**				
30 x 30	– 100 x 200	G26674	G26693	....	.....
30 x 60	– 100 x 400	.....	G26695	....	.....
30 x 100	– 100 x 700	G26749	.....	....	.....

Warning: Glycerin or silicone when combined with strong oxidizing agents, including (but not limited to) chlorine, nitric acid and hydrogen peroxide, can result in a spontaneous chemical reaction, ignition, or explosion which can cause property damage and personal injury. If gauges are to be used in such service, do not use glycerin or silicone filled gauges. Consult factory for proper medium.

WARNING: A failure resulting in injury or damage may be caused by pressure beyond top of scale, excessive vibration or pressure pulsation, excessive instrument temperature, corrosion of the pressure containing parts, or other misuse. For correct use and application of pressure gauges, refer to the ANSI standard B40. 1-1980 entitled "Gauges—Pressure Indicating Dial Type—Elastic Element." This document is available from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th St., New York, NY 10017.

DO NOT USE FOR OXYGEN SERVICE

Marshalltown Instruments, Inc. ☐ P.O. Box 1469 ☐ 108 S. Colorado Avenue ☐ Hastings, Nebraska 68901
Telephone (402) 463-6851

5/87 Revision

PRINTED IN U.S.A.

PLASITE ®

TECHNICAL BULLETIN

4006 (4006HAR)
July 1993

PLASITE 4006 (4006HAR) VINYL ESTER HEAVY DUTY RESISTANT COATING

TYPE: PLASITE 4006: A vinyl ester resin combined with pigments to provide a high build coating with excellent chemical resistance. PLASITE 4006HAR: A high build vinyl ester coating specially formulated for excellent abrasion resistance.

INTENDED USE: As a chemical-resistant coating for tank lining service and as a maintenance coating to protect against corrosive conditions encountered in waste treatment, chemical/food processing and carbon filters. When combined with abrasive conditions, use PLASITE 4006HAR.

FOR INDUSTRIAL USE ONLY!

GOVERNMENT AGENCY ACCEPTANCE: PLASITE 4006 and 4006HAR meet the requirements of the U.S. Food and Drug Administration, 21 CFR 175.300 and 177.2420.

NSF REQUIREMENT GUIDE: PLASITE 4006 (Off White, Gray and Yellow Oxide) and PLASITE 4006HAR (Off White and Gray) are certified by the National Sanitation Foundation (NSF) to Standard 61 for cold potable water when the following requirements are met. The tank is 3,000 gallons or larger. PLASITE 20 Thinner, up to a maximum of 5% by volume, must be used for thinning purposes. The coating must be applied in two to three coats to a maximum thickness of 35 dry mils. Prior to placing the lining in service, it must be force cured at 200°F metal temperature for four hours.

CHEMICAL RESISTANCE: Resistant to chemical effluents, organic and inorganic acids, corrosive liquids, salts, and water. PLASITE 4006HAR also provides protection against abrasion conditions encountered in agitated or flowing solutions.

TEMPERATURE RESISTANCE: Dry film basis is 250°F to 300°F. Immersion temperature or splash and spill limits are determined by chemical exposure — please consult with PLASITE Technical Service Department for further information.

SURFACE PREPARATION: For immersion service, a white metal blast is required as outlined in SSPC-SP5 or NACE No. 1. The profile shall be a minimum of 4 mils. A surface profile comparator is available from Wisconsin Protective Coatings Corp.

APPLICATION: Refer to EQUIPMENT section on page 3.

COLORS: PLASITE 4006: Off White; Gray; Yellow Oxide. PLASITE 4006HAR: Off White; Gray.

FILM THICKNESS PER COAT: One multi-pass spray coat will produce approximately 15 mils DFT. When PLASITE 4006 (4006HAR) is used as an IMMERSION lining in corrosive services (dilute acids, etc.), use of a 30 mil system applied in a minimum of two coats is recommended. CHEMICAL FUMES AND SPILLAGE normally require two coats at 20 to 30 dry mils.

COVERAGE: 28 to 30 ft²/gallon at 30 mils.

RECOATING TIME: May be recoated after initial hardening or set which will normally occur in 3 to 6 hours at 75°F. Following coating must be applied within 30 days. It is recommended each following coat be diluted approximately 2 to 5% with PLASITE 20 Thinner.

NOTE: PREVIOUSLY APPLIED COATING EXPOSED TO AN ACCUMULATION OF 24 HOURS OF SUNLIGHT OR SURFACE TEMPERATURES IN EXCESS OF 130°F MAY RESULT IN INTERCOAT DISBONDMENT. AN APPLIED COATING FILM SHOULD BE TOPCOATED BEFORE AN ACCUMULATION OF 24 HOURS EXPOSURE HAS OCCURRED, OR SPECIAL PROCEDURES (SUCH AS SHADING WITH TARPS) SHOULD BE USED. CARE MUST BE TAKEN TO AVOID CONTAMINATION BETWEEN COATS.

CURING TIME: 7 days at 70°F; 5 days at 90°F.

PHYSICAL SPECIFICATIONS

PIGMENTS: Coloring pigments and inerts (4006HAR - special abrasion resistant pigments).

POT LIFE: *1 to 1½ hours in one-gallon cans. 1 hour in five-gallon cans.

*At 70 to 80°F material temperature.

Material temperature in excess of 80°F will significantly reduce pot life. Careful monitoring is essential.

SHELF LIFE: 60 days at 70°F. Cooler temperatures will increase shelf life. Storage at higher temperatures is not recommended and will result in substantially shorter shelf life.

SHIPPING WEIGHT: Approximately 13 lbs./gallon.

ABRASIVE RESISTANCE: Average loss per 1000 cycles Taber CS-17 Wheel, 1000 gram weight:
PLASITE 4006 - 87.6 mg PLASITE 4006HAR - 37.5 mg

VOLATILE ORGANIC COMPOUNDS CONTENT (4006 AND 4006HAR)
(DETERMINED THEORETICALLY)

	COATING AS SUPPLIED		THINNED 5% BY VOLUME WITH PLASITE 20 THINNER	
COLOR	Lbs./Gal.	Grams/Liter	Lbs./Gal	Grams/Liter
Off White, Gray, Yellow Oxide	.34 ±2%	42 ±2%	.64 ±2%	77 ±2%

WISCONSIN PROTECTIVE COATINGS CORP.
614 Elizabeth Street
P.O. Box 8147
Green Bay, WI 54308-8147
414-437-6561

Represented by:

THINNERS

Use PLASITE 20 Thinner; 2 to 5% thinning may be required to adjust coating for higher temperatures and various application conditions. Topcoating of previously applied films will require the addition of 2 to 5% thinner. Consult Wisconsin Protective Coatings Corp. Laboratory for unusual thinning requirements. See RECOATING TIME section on Page 1.

CURING

CURING TIME: 7 days at 70°F or 5 days at 90°F. Although coating may be applied at substrate temperatures as low as 60°F, the substrate temperature must be raised to at least 70°F within 12 hours and held until coating surface is tack free (approximately 10 hours) to avoid possible loss of cure. A minimum of 70°F surface temperature is required to obtain polymerization of this coating.

FORCE CURING: Listed below are a few curing schedules that may be used for time and work planning. Prior to raising the metal to the force curing temperature, it is necessary that an air dry time of 2 to 5 hours at temperatures from 70°F to 100°F be allowed. After the air dry time has elapsed, the temperature should be raised in increments of approximately 30°F every 30 minutes until the desired force curing metal temperatures are reached. Any moisture from condensation of any source will kill the cure on freshly applied coating before it reaches a "non-tacky" stage. In order to assure removal of solvents and odor, force curing is generally recommended when coating is to be used in potable water and food material service. A force cure at 200°F metal temperature for 4 hours is necessary to comply with NSF standard 61 requirements.

METAL TEMPERATURE	CURING TIME	METAL TEMPERATURE	CURING TIME
110°F	72 Hours	160°F	4½ Hours
120°F	36 Hours	170°F	3½ Hours
130°F	18 Hours	180°F	2½ Hours
140°F	10 Hours	190°F	2 Hours
150°F	6 Hours	200°F	1¾ Hours

SURFACE PREPARATION

STEEL - High Temperature and Immersion Service

1. All sharp edges shall be ground to produce a radius and correct all imperfections such as, skip welds, delaminations, scabs, slivers and slag prior to abrasive blasting. Skip welds should be welded solid.
2. Degrease surface prior to sandblasting. Use organic solvents, alkaline solutions, steam, hot water with detergents or other systems that will completely remove dirt, oil, grease, etc. Used tanks may require additional decontamination.
3. The surface shall be blasted to NACE No. 1 or SSPC-SP5 white metal using a Venturi blast nozzle with 100 psi air. Use a properly graded, clean, sharp angular abrasive, similar to Humble Abrasive Flint S7 (6 to 30 mesh), Steel Grit (HG25), or BLACK BEAUTY® (BB1040) to produce the anchor pattern as required. The degree of profile shall be a minimum of 4 mils as determined by comparing Wisconsin Protective Coatings' blasted panel, using adequate light and magnification as required. Comparator panel is available to inspectors on a job basis. If clarification is required as to how to develop this anchor pattern, consult Wisconsin Protective Coatings Corp. Laboratory or sales representative.
4. Remove all traces of grit and dust, as well as embedded abrasives, with a vacuum cleaner and/or by brushing. Care should be taken to avoid contaminating surface with fingerprints or from detrimental material on the workers' clothes or atmospheric contamination.
5. The surface temperature shall be maintained at a minimum of 5° above the dew point to prevent oxidation of the surface. The coating shall be applied within the same day that the surface has been prepared. Visible oxidation or condensation is not allowed.

STEEL - Service in Severe Corrosive Environments - Splash & Fume

Surface preparation is the same as above except NACE No. 2, or SSPC-SP10 near white metal blast may be used, provided the anchor pattern as described under Paragraph No. 3 above is achieved.

NOTE: The above specification numbers are from Steel Structures Painting Council Surface Preparation Specifications, 4516 Henry Street, Suite 301, Pittsburgh, PA 15213-3728 and National Association of Corrosion Engineers, P.O. Box 218340, Houston, TX 77218.

CONCRETE

All concrete requires whip blasting to remove laitance and to provide a hard, firm, clean and minimum-28-day-cured concrete surface for coating.

For immersion service, all concrete surfaces must be filled and sealed with two coats of either PLASITE 9028M1 or PLASITE 9028M2, applied in accordance with PLASITE Technical Bulletin 9028. If service requires an FDA acceptable coating, use PLASITE 9029 Concrete Filler-Sealer. All surface imperfections, "bug holes," etc. must be COMPLETELY repaired before application of PLASITE 4006 (4006HAR).

For non-immersion surface, degree of service severity will determine the use of fillers and sealers — consult PLASITE Technical Service Department for further information.

OTHER SURFACES

Contact the PLASITE Technical Service Department for surfaces other than steel and concrete.

EQUIPMENT

SPRAY APPLICATION

ATOMIZING SPRAY EQUIPMENT: Conventional atomizing spray system shall be equal to: Binks Model 18 Gun with 59ASS Fluid Nozzle, 251 Air Cap and 59SS Needle. A heavy-duty trigger spring is recommended with a pot pressure of approximately 50 psi and atomizing pressure of approximately 60 psi. Use standard production type pressure pot with air motor drive agitator.

AIRLESS SPRAY EQUIPMENT: Airless spray system requires a large capacity pump with a capacity of 3 g.p.m. similar or equal to Grayco Bulldog with 0.025" or larger fluid nozzle. A 12" minimum spray width is recommended. Use liquid pressure of approximately 1600 to 1800 psi. All screens should be removed from pump and gun. A 3/8" diameter fluid line is recommended. Continuous mixing during use is required. **NOTE:** Airless spray is NOT recommended for PLASITE 4006HAR.

BRUSH APPLICATION

Brush application is not recommended, but may be used for repairs or touch-up. Continuous mixing during use is required.

READ THIS NOTICE!!
SAFETY AND MISCELLANEOUS EQUIPMENT

1. For tank lining work, it is recommended that the operator provide himself with clean coveralls and rubber-soled shoes and observe good personal hygiene. Certain personnel may be sensitive to various types of resins which may cause dermatitis.
2. THE SOLVENT IN THIS COATING IS FLAMMABLE AND CARE AS DEMANDED BY GOOD PRACTICE, OSHA, STATE AND LOCAL SAFETY CODES, ETC. MUST BE FOLLOWED CLOSELY. Keep away from heat, sparks and open flame, and use necessary safety equipment, such as, air mask, explosion-proof electrical equipment, non-sparking tools and ladders, etc. Avoid contact with skin and breathing of vapor or spray mist. When working in tanks, rooms and other enclosed spaces, adequate ventilation must be provided. Refer to PLASITE Bulletin PA-3. Keep out of the reach of children.
3. The coating system may be handled safely by trained personnel following normal laboratory and plant standards for housekeeping and personal hygiene. In the event of skin contact complications, the affected areas should be washed with soap and water. Eye protection is recommended. Work in well ventilated areas away from open flame, and in enclosed areas, although ventilated, fresh air masks should be provided.
4. The catalyst or curing agent is relatively stable at room temperatures but must be protected from contamination, heat and fire and is classified by the Interstate Commerce Commission as an "oxidizing material". Subsequently, all shipping containers bear a yellow caution label. The catalyst is highly irritating if it gets into the eyes. Immediately rinse eyes thoroughly with water and get medical attention. The catalyst also can be a skin irritant and should be removed with large quantities of soap and water. Since this is an oxidizing material, it should not be allowed to accumulate or remain in soaked rags or clothing.
5. **CAUTION** - Read and follow all caution statements on this product technical bulletin, material safety data sheet and container label for this product.

MIXING

The Promotor (Part II) and Catalyst (Part III) are supplied in separate containers and are premeasured for the coating unit supplied. Thoroughly mix the coating (Part I). After the pigments and liquid are thoroughly mixed, add the entire amount of the measured liquid Promotor (Part II). MIX COMPLETELY! NO COLOR STREAKING OR RESIDUE OF PART II SHOULD REMAIN ON CONTAINER SIDEWALLS. Add the Catalyst (Part III) and mix completely with the coating.

WARNING! The Promotor (Part II) and the Catalyst (Part III) must be separately mixed into the coating (Part I). Any contact of unmixed Part II with Part III may lead to a fire or explosion!

PACKAGING

A one-gallon kit consists of:	One 1-gallon can of coating (Part I) One small container of Promotor (Part II) One small container of Catalyst (Part III) Total of One Gallon
A five-gallon kit consists of:	One 5-gallon can of Coating (Part I) One small container of Promotor (Part II) One small container of Catalyst (Part III) Total of Five Gallons

APPLICATION PROCEDURE

A minimum surface temperature of 70°F is required to obtain polymerization of the coating system. Coating can be applied at a surface temperature as low as 60°F but polymerization will not take place. Succeeding coats cannot be applied without damaging the system until the surface temperature rises sufficiently to obtain polymerization. Refer to CURING TIME on Page 2. When surface temperatures are over 100°F, consult the laboratory for special thinner and thinning instructions. The mixed coating shall be applied utilizing a multi-pass spray system. Apply horizontal and vertical passes with 50% overlap. Special precautions are required at overlaps and welds to eliminate excessive film build. Spray gun should be perpendicular to surface at all times, approximately 14" from surface. Refer to THINNERS section on Page 2.

Coating may be overcoated after initial "set" which will occur normally in 3 to 6 hours at 70°F with proper ventilation. Initial "set" time will decrease as surface temperature increases.

WARNING! Refer to RECOATING TIME on Page 1.

When physical contact (foot traffic, scaffolding, etc.) with the previously applied coating is required, a minimum of 10 hours at 70°F substrate and air temperature with ventilation is normally required before proceeding. Previously applied coats must have reached a "non-tacky" state before being exposed to physical contact. This condition will occur in less time as surface temperature increases. Overcoating shall be performed as soon as possible to prevent contamination.

LINING REPAIR

Clean damaged area, removing all contaminants and loose coating.

Abrasive blast substrate to original specification where coating has been exposed to environment and where oxidation is evident. Feather the original coating not less than 2" from damaged area.

If new coating is physically damaged and has not been in service, repair as shown above.

For repairing holidays, sand surface and brush apply proper thickness of coating.

Apply coating by brush or spray. Do not apply by brush on areas larger than 1 square foot.

WARNING: Contamination of previously exposed coating film may be detrimental to adhesion of the repair and may affect service life expectancy.

CLEANING OF FINAL COAT

This coating system, as well as the polyesters, has a minute migration of edible wax to the surface when cured. For immersion temperatures below 110°F, it is not necessary to remove for most products. When removal is required, the wax may be removed by solvent wiping or use of a surfactant such as TRITON X100 (Rohm & Haas).

INSPECTION

Degree of surface preparation shall conform to appropriate specifications as outlined in SURFACE PREPARATION section.

Metal temperature shall be recorded at least every 4 hours and before application of coating. Humidity (wet bulb reading) shall be taken to ensure that metal temperature is at least 5°F higher than wet bulb temperature. Dry bulb temperatures shall be recorded at the same time to ensure curing.

For immersion service, a pinhole-free film is essential and testing with Tinker & Rasor Model AP-W or Stearns Model 14/20 or equivalent is required on final film. Use 3000 volts at the recommended 30 mils dry film thickness. Allow a minimum cure of 48 hours at 70°F or 36 hours at 90°F before holiday testing.

Dry film thickness shall be determined utilizing a non-destructive magnetic type high range gauge. The anticipated film thickness shall be in the middle range of the gauge.

Refer to PLASITE Bulletin PA-3, Section 3, for inspection requirements.

This bulletin provides standard information on the coating and application procedure. Since varying conditions may not be covered, consult your local sales representative or PLASITE Technical Service Department for further information.

CALGON CARBON CORPORATION
PITTSBURGH, PA

SPECIFICATION NO. 7209A-RS17

FOR

EPOXY PAINTING

ISSUED
SEPTEMBER 8, 1989

* * REVISIONS * *

This specification has been revised as indicated below. The new pages added and/or the existing pages revised are attached as replacements for those previously issued.

Revisions	Date	By	Page	Remarks
0	9/08/89	FRF	All	Issued for Construction
1	1/30/96	JPM	All	All New Pages - Revised Paragraph 4.1
2	4/15/96	JPM	1-2-3	Revised Paragraphs 1.3, 2.2, 3.2, 4.1, 5.3, and 6.1

CALGON CARBON CORPORATION
SPECIFICATION NO. 7209A-RS17
ISSUED: SEPTEMBER 8, 1989
REV. 1: JANUARY 30, 1996
REV. 2: APRIL 15, 1996

1.0 SCOPE

1.1 This specification covers the procedures required for the surface preparation and coating of equipment that has been previously painted.

1.2 This specification also covers the procedures required for the surface preparation and painting of unpainted equipment. The work to be performed under this specification consists of painting all unpainted metal materials including vessels, supports, base plates, skids, pipelines, conduit runs, pipe and conduit supports, brackets, hanger rods, pipe clamps, "U" bolts, and all other metal surfaces that are part of the system.

1.3 The Calgon Carbon Corporation equipment shall be painted with an Epoxy Mastic Coating System.

1.4 Unless otherwise specified, the contractor shall furnish all paints and solvents, necessary tools, scaffolds, ladders, compressed air, etc.

1.5 The contractor will familiarize himself with rules and regulations as set forth by the Safety Department.

2.0 SURFACE PREPARATION OF PAINTED SURFACES

2.1 ***Previously coated surfaces that are in good condition:*** DESCRIPTION - Maintenance painting will frequently not permit or require complete removal of all old coatings prior to re-painting. However, all surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold mildew, mortar, efflorescence and sealers must be removed to assure sound bonding to the tightly adhering old paint. In addition, glossy surfaces of old paint films must be clean and dull before re-painting. Thorough washing with an abrasive kitchen cleanser will clean and dull in one operation, or wash thoroughly and dull by sanding. Remove all sanding dust. It is recommended that water blasting be used (NACE Standard RP-01-72) which removes foreign matter by water (with cleanser) at pressures of 2,000-5,000 PSI at a flow of 4-14 gallons per minute. The contractor shall recognize that any surface preparation short of total removal of the

old coatings may compromise the service length of the new coating system. The contractor shall always check for the compatibility of the previously-painted surface with the new coating by applying a test patch of 2-3 square feet. Allow to dry thoroughly, then check adhesion.

2.2 ***Previously coated surfaces that are <u>not</u> in good condition:*** DESCRIPTION - The contractor will hand-tool clean the surfaces to remove loose rust, loose mill scale and loose paint to the degree specified by SSPC-SP2-63. The contractor shall accomplish this by hand chipping, scraping, sanding, and wire brushing. The contractor shall further prepare the hand-tool cleaned surface per Paragraph 2.1 above.

3.0 SURFACE PREPARATION OF UNPAINTED SURFACES

3.1 The metal surface shall be free of dirt, rust, rustproofing, drawing oils and compounds, finger prints, mill scale, and other foreign substances both visible and invisible; thereby improving adhesion and reducing the tendency to blister and corrode on exposure.

3.2 The contractor shall use power-tool cleaning to remove all loose rust and mill scale to the degree specified by SSPC-SP3-63 by power-tool chipping, descaling, sanding, wire brushing, and grinding, as a minimum.

4.0 PAINT APPLICATION

4.1 The coating shall be applied in accordance with the manufacturer's instructions. The system shall consist of at least one (1) coat of epoxy mastic to a total DFT of 6 nominal mils (acceptable range: 5-7 mils).

4.2 All paint shall be furnished in unopened containers.

4.3 Thinners shall be used only with the permission of Calgon Carbon Corporation.

4.4 Painting will not be allowed when the relative humidity is above 85% or the temperature is below 55°F without special permission from Calgon Carbon Corporation.

5.0 AREAS NOT TO BE PAINTED

5.1 Galvanized steel (new) and PVC pipe are not to be painted.

5.2 Inside of pipes shall not be painted.

5.3 Gauge faces, nameplates, fittings, flange faces, etc. shall be taped to protect against overspray and tape shall be removed prior to shipping.

5.4 Inside of vessel shall be lined by others.

6.0 MATERIAL SPECIFICATION

6.1 The paint used shall be Sherwin-Williams B58 Series (two-part W&X) Epoxy Mastic Coating System, or equal. The specifications are attached and shall be followed along with any recommendations and precautions stated on the paint can label. Accepted substitutes are:

- Pittsburgh Paint & Glass - PITT-GUARD 97-Line
- Gulf Coast Paint Mfg., Inc. - Chemical Mastic No. CM-15

6.2 The color shall be Sherwin-Williams MC-71 slate gray.

/ / / /

EPOXY MASTIC COATING

B58 Series (Part W)
B58 Series (Part X)

PRODUCT DESCRIPTION:
Epoxy Mastic Coating is a high solids, polyamine/bisphenol A epoxy coating formulated to provide a high performance system over marginally prepared surfaces.

USES:
- As a primer under high-performance finishes for rusted/pitted steel when sandblasting is not possible.
- As a self-priming finish coat for marginally prepared substrates.
- Where chemical and moisture-resistance is required.

Performance Information:
- Chemical/moisture-resistant
- Compatible with old, intact paint films
- Outstanding adhesion over dry, marginally prepared surfaces

Physical Properties:
- Abrasion Resistance ..... 67 mg
  (ASTM D4060 CS-17 wheel, 1,000 cycles, 1 kg Taber/Abraser)
- Direct Impact Resistance ..... 64 in. lbs
  (ASTM G14)
- Dry Heat Resistance ..... 200°F (Discolors)
  (ASTM D2485)
- Elcometer Adhesion ..... 750 psi
  (ASTM D4541)
- Exterior Durability ..... Excellent
  (with non-progressive chalk face developing in 3-6 months)
- Flexibility ..... Passes
  (ASTM D1737, 180° bend 1" mandrel)
- Moisture Condensation Resistance ..... Excellent
  (ASTM D2247, 100°F, 2500 hours)
- Pencil Hardness 7H
  (ASTM D3363)
- Salt Fog Resistance ..... Excellent
  (ASTM B117, 2500 hours)
- Thermal Shock ..... Passes
  (ASTM D1211, 100 cycles)
- Wet Heat Resistance ..... 120°F (not immersion)

Resistance Guide: (Per ASTM D3912)
- Acid and Alkaline salt solutions: SEVERE
- Aliphatic hydrocarbon solvents: SEVERE
- Alkalies: SEVERE
- Aromatic hydrocarbon solvents: MODERATE
- Chlorinated solvents: MODERATE
- Fresh water & salt water: SEVERE
- Glycol ethers; alcohols, formaldehyde: SEVERE
- Inorganic acids: MODERATE
- Oils (cutting, vegetable, lubricating): SEVERE
- Organic acids: MODERATE
- Oxygenated solvents: MODERATE

CHARACTERISTICS:
- **Color/Finish:** Wide range of color possible/70 ± 10 units @ 60°F. Available in Pure White and Ultradeep Bases
- **Drying Schedule:** (temperature & humidity dependent) @ 77°F and 50% RH @ 7 mils wet:
  To Touch: 8 hours
  Tack Free: Overnight
  To Recoat: Minimum 16 hours, maximum 7 days (with vinyls and chlorinated rubber — 72 hours max.). If maximum recoat time is exceeded, brush blast before recoating.
  To Cure: 10 days
- **Flash Point (catalyzed):** 95°F (Pensky-Martens Closed Cup)
- **Pot Life:** 8 Hours @ 55°F
  2½ hours @ 77°F
  1 hour @ 95°F

product description CONTINUED

LIMITATIONS: Do not apply to large expanses of sheet metal. Do not apply to any surface containing moisture. Moisture condensation on Epoxy Mastic Coating which is not thoroughly dry will adversely affect its cure.

PRECAUTIONS: See notes 2 and 3, page 115.

SURFACE PREPARATION: See pages 5, 6, and 7.
- Aluminum ..... S-W 1
- Concrete Block ..... S-W 3
- Galvanized Metal ..... S-W 10
- Masonry ..... S-W 6 D or A
- Steel ..... S-W 14 (SSPC-SP2)
- Previously Painted Surfaces ..... S-W 12

Recommended Systems:
- **Steel: Light/Moderate Service**
  1 coat Epoxy Mastic, B58 Series/B58 V 1 @ 6 mils DFT
  Total DFT, mils: 6
- **Steel: Severe Service**
  2 coats Epoxy Mastic, B58 Series/B58 V 1 @ 6 mils DFT/coat
  Total DFT, mils: 12
- **Steel: Acrylic Latex Topcoat**
  1 coat Epoxy Mastic Coating, B58 Series/B58 V 1 @ 6 mils DFT
  1-2 coats DTM Acrylic Coating, B66 Series @ 3 mils DFT/coat
  OR
  1-2 coats METALATEX Semi-Gloss Coating, B42 Series @ 1.5 mils DFT/coat
  Total DFT, mils: 9-12
- **Steel: Epoxy Topcoat**
  1 coat Epoxy Mastic, B58 Series/B 58 V 1 @ 6 mils DFT
  1 coat Heavy Duty Epoxy, B67 Series/B60 V 3 @ 6 mils DFT
  Total DFT, mils: 12
- **Steel: Epoxy Topcoat**
  1 coat Epoxy Mastic, B58 Series/B58 V 1 @ 6 mils DFT
  1 coat Tile Clad II Epoxy, B62 Series/B60 V 70 @ 4 mils DFT
  Total DFT, mils: 10
- **Steel: Polyurethane Topcoat**
  1 coat Epoxy Mastic, B58 Series/B58 V 1 @ 6 mils DFT
  1 coat Hi-Bild Aliphatic Polyurethane, B65 Series/B60 V 2 @ 3 mils DFT
  OR
  1 coat Hi-Solids Polyurethane, B65 W 300 Series/B60 V 3 @ 3 mils DFT
  Total DFT, mils: 9
- **Aluminum/Galvanized Metal: Moderate Service**
  1 coat Epoxy Mastic, B58 Series/B58 V 1 @ 6 mils DFT
  Total DFT, mils: 6
- **Concrete Block**
  1 coat Heavy Duty Block Filler, B42 W 46 @ 10 mils DFT
  OR
  1 coat Kem Cati-Coat Epoxy Filler/Sealer, B42WA8/B42WA9 @ 10 mils DFT
  1 coat Epoxy Mastic, B58 Series/B58 V 1 @ 6 mils DFT
  Total DFT, mils: 16
- **Masonry**
  1 or 2 coats Epoxy Mastic, B58 Series/B58 V 1 @ 6 mils DFT/coat
  Total DFT, mils: 6-12

product description CONTINUED

APPLICATION:
To eliminate possible blocking of equipment during spraying, clean the equipment before use and before extended periods of down time with Methyl Ethyl Ketone following supplier's safety cautions. In the early stages of drying Epoxy Mastic is sensitive to rain, dew, high humidity, cool evening temperatures, and moisture condensation. Painting schedules should be planned to avoid these influences during the initial 16 hour drying period.

- **Application Conditions:**
- **Temperature** .....(air, surface, material)
  55°F - 120°F (at least 5°F above the dew point)
- **Relative Humidity** .....85% max
- **Methods** .....Brush, roll, conventional and airless spray

- **Airless Spray:**
  Unit .....2,500 psi pressure
  Hose .....3/8" I.D.
  Tip .....021" minimum
  Filter .....30 mesh
- **Brush/Roller** .....Use nylon, polyester or natural bristle brush, 1/2" lambswool or synthetic roller cover.
- **Conventional Spray:** Binks 62 SS Gun, 68 Fluid Nozzle, 68 PB Air Nozzle, 40 psi atomization pressure, 30 psi fluid pressure, or equivalent equipment.
  Note: Flush equipment with MEK every 3-4 hours to prevent material from "settling" in lines.
- **Mixing Instructions:** Thoroughly mix each separate component (W & X). Then combine equal parts (by volume) of Part W and Hardener Part X, thoroughly agitate. Allow mixture to "sweat-in" for 15 minutes. Complete mixing and proper induction time is essential for Epoxy Mastic Coating to dry.
- **Tinting:** Tint with Nuodex Chroma Chem 844 PM Colorants into Part W only, 150% tint strength. Fifteen-minutes mixing on a mechanical shaker is required for complete mixing of color.
- **Tint Levels:** Pure White, 0-6 oz.; UltraDeep Base, 12-18 oz. For Midtone Base colors, first intermix (by volume) three parts Pure White with one part UltraDeep Base (tint 6-12 oz.). For Deeptone Base colors, first intermix (by volume) equal parts Pure White and UltraDeep Base (tint 12-18 oz.).
- **Reducer:**
  Below 65°F .....Xylene (R2K4)
  Above 65°F R7K58
- **Reduction:***
  Airless Spray .....None
  Brush Roller: Up to 10% per gallon catalyzed material after induction.
  Conventional Spray: Up to 15% per gallon catalyzed material after induction.
- **Reduction Recommendations:** See Note 4, page 70.
  *NOTE: Excess reduction will affect film build, appearance, and may cause lifting of old paint films.
- **Clean-up** .....Use Methyl Ethyl Ketone following supplier's safety cautions.