CBS

20 STANWIX STREET, 10TH FLOOR
PITTSBURGH, PENNSYLVANIA 15222

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July 27, 2010

UPS OVERNIGHT MAIL

Mr. Thomas Alcamo
U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Mailstop HSRL-6J
Chicago, IL 60606

RE: ICS Excess Flow Treatment System – Vendor Submittal

Dear Tom,

As discussed on our telephone call on Friday, July 23, enclosed please a copy of the Calgon Carbon submittal for the ICS Excess Flow Treatment System.

Very truly yours,

Dottie Alke

Dorothy M. Alke
BP-10-0047

cc: John Bassett (w/enclosure)
Jessica Fliss (w/enclosure)

CALGON CARBON CORPORATION

500 CALGON CARBON DRIVE ♦ PITTSBURGH, PA 15205 U.S.A.
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www.calgoncarbon.com

TO: CBS Corporation
20 STANWIX ST. – 10TH FLOOR
PNC CENTER
PITTSBURGH, PA 15222

DATE: MAY 7, 2010
CCC PROJECT: LM-10048.CBS1

RECEIVED
MAY 11 2010
CBS - PGH LITIGATION

ATTENTION: MR. RUSS CEPKO

PURCHASE ORDER NUMBER: BL-0397

TELEPHONE: 412-642-2569

FAX:

E-MAIL:

CELL:

REFERENCE: CBS Corp./Clark Dietz – Illinois Central Springs Treatment Facility

WE ARE TRANSMITTING THE FOLLOWING: ☒ Enclosed ☐ Separately ☐ CD

☒ Submittals ☐ Drawings ☐ Operation and Maintenance Manuals
☐ Other ☐ Change Order ☐ Specifications ☐ Preliminary Drawings

COPIES	NUMBER	REVISION	DESCRIPTION
1			Submittal Manual - Model 12 Adsorber Systems

THESE DOCUMENTS ARE TRANSMITTED AS PER THE FOLLOWING:

☒ For Approval ☐ Approved As Submitted ☐ For Your Information ☒ As Requested
☒ For Your Use ☐ Returned For Correction ☐ Released To Fabricate ☐ Released For Construction

Mark Meyers

Mark Meyers, Project Manager

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SENT VIA: FEDEX

☐ Copy to Field Service

CALGON CARBON CORPORATION

Submittal Manual

MODEL 12 GRANULAR CARBON ADSORPTION SYSTEM

FOR

CBS CORPORATION
BLOOMINGTON, IL

PREPARED BY
Calgon Carbon Corporation
PITTSBURGH, PA

CALGON CARBON PROJECT NUMBER:	**LM-10048.CBS1**
CUSTOMER PURCHASE ORDER NUMBER:	**BL-0397**

DATE OF PRINT: MAY, 2010

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CALGON CARBON CORPORATION

SECTION 1

PROCESS DESCRIPTION

SECTION 1 - PROCESS DESCRIPTION

The Model 12 Single Adsorber is a free standing vertical pressure vessel, containing 20,000 pounds of granular activated carbon. The vessel is complete with underdrain. Process piping and carbon transfer piping is shipped loose for installation in the field.

Granular activated carbon is delivered to the site in bulk trailers for unloading directly as a water slurry into the empty adsorber.

The stream to be treated is pumped to the adsorber at a flow rate compatible with the design capacity of the unit. The adsorber is operated in a downflow direction.

In single stage operation, the influent flow is directed to the vessel through the inlet line. Initially, the impurities are adsorbed onto the carbon in the upper portion of the bed. As this top layer of carbon becomes saturated, adsorption takes place lower in the bed. Eventually all the carbon in the adsorber becomes saturated and the contaminant concentration of the effluent from the adsorber increases until it approaches or equals the influent concentration. When contaminant breakthrough is detected from the vessel, flow is stopped and the carbon is replaced.

When the carbon in a vessel is spent, an empty trailer is sent to the site to remove the spent carbon. The spent carbon is transferred from the adsorber to the bulk trailer by first filling the adsorber with water. The adsorber is then pressurized using compressed air as the motive force to facilitate the carbon transfer to the trailer.

Once the spent carbon transfer operation is completed, a charge of fresh carbon can be transferred into the empty adsorber. This is accomplished by filling the bulk trailer with water and placing a water cushion in the adsorber. The bulk trailer is then pressurized with compressed air to facilitate the carbon transfer into the adsorber.

Backwashing/backflushing is usually required when the pressure drop across an adsorber increases by 5 to 10 psi during normal operation.

Model 12 units come equipped with a 30° internal cone. This internal cone offers many advantages, such as ease of carbon removal and good flow distribution through the nozzle underdrain.

To prevent damage to the vessels due to over pressurization, pressure relief devices, graphite rupture disks, are provided in the adsorber vent lines. The rupture disks rated at the design pressure of the vessels.

After start-up, records should be kept of pertinent data such as flow rate, pressure drop across each bed, total dissolved solids, temperature, pH, and/or specific performance requirements such as toxicity, BOD, COD, and TOC organic contaminant levels.

SEQUENCE OF OPERATION

1 PRE-OPERATION CHECK-OUT

All equipment and systems affiliated with the granular carbon adsorption system such as pumps, filters, etc. should be checked out according to the manufacturer's instructions. Specific activities to complete before operating the adsorption equipment should include the following:

1. Check all piping connections for proper installation and tightness.
2. Ensure that all gauges and instruments are functional and installed correctly. Re-zero or re-calibrate if necessary.
3. Close all valves in the adsorber piping system.

For potable water treatment installations, the client will be responsible for cleaning and disinfecting the vessels and piping prior to filling the system with carbon. The procedures to complete this step in the installation process are the responsibility of the client.

2 FILLING AN ADSORBER WITH CARBON

After the system has been checked, the adsorbers are ready to be filled with granular activated carbon. The carbon is transferred to the adsorbers as a water slurry from Calgon Carbon trailers.

3 WETTING (DEAERATING THE CARBON)

In a typical bed of virgin carbon, the pore volume is approximately 40% of the bed volume. Carbon which is shipped dry will contain air in these pores. Therefore, the carbon must be properly wetted prior to being placed on stream. If this is not done, the air within these pores will displace into the void spaces between the carbon particles during operation and cause high pressure drop and channeling in the adsorbers. These problems can cause premature breakthrough of contaminants. Air will not migrate out of the bed during normal downflow operation.

The time required for wetting is a function of liquid temperature and viscosity. Generally, a minimum wetting period of 24 hours is required using water at ambient temperatures, although a period of up to 72 hours is preferred for complete wetting. After wetting, backwashable adsorbers should be backwashed to remove air and segregate the carbon by size.

As an alternative, the Calgon Carbon Service trailer containing fresh carbon may be filled with water and allowed to stand for several hours. When the fresh carbon is transferred to the adsorber, the adsorber should be backwashed to eliminate any remaining air.

After the carbon has been wetted, the adsorber should be drained and then backfilled until water flows out the system vent line. The adsorber should be filled up-flow at 2 gpm/ft^2 maximum. For a Model 12 System this is 220 gpm, maximum.

If the unit must be placed on-stream before the carbon has been wetted, the adsorbers should be drained and backfilled when the pressure drop becomes prohibitive or after two days of operation, whichever occurs first.

4 BACKWASHING AND BACKFLUSHING

4.1 BACKWASH/BACKFLUSH -- GENERAL

Backwashing and backflushing are procedures involving running clean, contaminant-free water upflow through the adsorber. Backwashing or backflushing of a carbon bed can be done after fresh carbon has been transferred into an adsorber and wetted, or during operation to remove sediment from the top of the bed.

If the adsorbers are to be backwashed during operation, they should be backwashed prior to startup. The reasons for backwashing before placing fresh carbon on-line are to:

1. Size segregate the carbon so subsequent backwashing will return the carbon to the same relative position in the bed.
2. Remove any remaining air from the bed.
3. Remove carbon fines which can, in some cases, lead to excessive pressure drop and flow restriction.

Backwashing is done during operation to remove:

1. Sediment from the top of the bed.
2. Carbon fines that may be plugging the underdrain nozzles.
3. Air that is binding the bed. The need to backwash is indicated by an increased bed pressure drop.

Backwashing an adsorber results in expanding the carbon bed, removing air, suspended solids and carbon fines and classifying the carbon particles. The backwash flow rate depends upon the carbon particle mesh size and the water temperature (refer to the bed expansion curve in Section 8). Model 12 units are designed with significant straight side height to permit 30% bed expansion, and the selected backwash rate should limit the bed expansion to a maximum of 25%.

In a system that is not designed for backwashing, an operation termed backflushing can be used to remove fines from the upper portion of the bed. This operation will not remove fines from the lower portion of the bed because it does not expand the bed. Expansion of the bed allows the fines at the bottom of the bed to move to the top. However, fines do not always cause high pressure drop, and their removal is not always necessary.

The backflushing rate is 2 to 3 gpm/ft^2 and this is not significant enough to expand the carbon bed. For the Model 12 adsorber this is a flow rate from 220 gpm to 330 gpm. Flow rates of less than 330 gpm will not expand the bed; therefore, size segregation of the bed will not occur. The time required for backflushing is 30 to 45 minutes.

Normally when backwashing or backflushing, a clean external water source is used. The stream should be compatible with the system and free of suspended solids and organic contaminants which might affect adsorption. If necessary, effluent from the adsorber system may be used as the water source. In this case a tank with storage capacity for 15 minutes of backwash water (20,000 gallons) will be necessary.

When normal downflow operation is started after backwashing, the initial 5 to 15 minutes of effluent flow will be dark due to a small quantity of fines. Under normal operating conditions, this condition will clear up.

4.2 BACKWASHING AN ADSORBER

In this mode, a clean external source is used as the source for the backwash water. Note that the lead adsorber is taken out of service while the backwashing procedure takes place. It is recommended that the entire system be taken off-line to retain all process conditions. However, for continuous flow, the lag adsorber can remain on-line while the lead bed is being backwashed.

For a system operating in parallel, only the vessel needing backwashed should be taken off-line when backwashing is required.

1. Isolate the adsorber to be backwashed.
2. Open the vent valve.
3. Open the backwash water inlet valve and start the backwash pump. Backwash flow should be increased to design flow gradually, avoiding water hammer.

The backwash water enters the vessel through the effluent line and flows up through the underdrain and the carbon bed. The backwash water discharge from the vent line should be observed for clarity to determine the duration of backwashing. Backwashing for high pressure drop should take approximately 10 minutes. If excessive sediment and turbidity exists in the untreated water, the backwashing times may have to be increased to 15 minutes. A fresh carbon fill should be backwashed to classify the carbon. The time required for this step is approximately 15 minutes or until the backwash discharge is free of fines.

4.3 RE-STARTING SYSTEM AFTER BACKWASHING

The valve sequence given below describes the steps taken to bring a system on-line after backwashing.

1. Close the backwash water inlet valve.
2. Close vent valve.
3. Open influent valve.
4. Close influent valve.

5 START-UP

5.1 PARALLEL FLOW

The following sequence of steps should be followed to bring an adsorption system on-line in the parallel mode:

1. Check that all the valves in the adsorption system are closed.
2. Open the valves in the effluent lines from the adsorbers
3. Start the feed pump and open the valve in the pump discharge line.
4. Slowly open the valve in the influent line to one adsorber and allow the pressure to increase to the operating level.
5. Slowly open the valve in the influent line to the other adsorber and allow the pressure to increase to the operating level.

6. Open the 3/4" valve located on the side wall of each vessel to bleed off any air that is trapped underneath the internal cone.

At this point, flow should be established downflow through both vessels and they will be on-line in parallel.

Set the flow rate to the system at the desired value after flow is established to the unit. The flow control meters and control instrumentation will be provided by the client as required for the system.

In order to obtain full utilization of the carbon and prevent air entrapment and channeling in the bed, the water level must remain above the carbon bed. To prevent the bed from draining due to gravity or loss of influent supply, a vacuum break (anti-siphon) loop or backpressure should be included by the client in the effluent piping. This start-up sequence assumes that an anti-siphon loop is present in the effluent piping. If no anti-siphon loop or backpressure is present, start the system by starting the pump and opening the valves in the opposite order of the sequence given previously (i.e., open the influent valves first, followed by the effluent valves).

For parallel operation, flow is established to each vessel by opening the valves as indicated previously. Changing the flow to one vessel may result in a flow change to the other vessel on the skid. This occurs because the vessels share a common influent and effluent line. Flow meters can be installed in the individual influent lines to each vessel to balance the flow to each unit if required.

6 STEADY STATE OPERATION

Once flow is established to both vessels and the flow rate is set, no further adjustments are made during normal operation. The operator should establish a routine to check the adsorbers and to collect operating data. This data can be used to establish a maintenance schedule, to determine when backwashing/backflushing is necessary, or to determine when fresh carbon is needed.

6.1 MONITORING

Sample connections are provided on the influent and effluent lines from each vessel to take periodic samples for analysis.

Pressure gauges are provided to determine the pressure drop across each carbon bed. Taking periodic pressure readings will provide the operator with historic data for troubleshooting purposes. In the event that operating conditions change, the operator has the capability of taking corrective action.

6.2 VALVE OPERATION

All valves should be operated in a slow and even motion. Abrupt opening and closing of the valves can shock the system. Since complete shut-off of flow while a pump is operating could cause damage to the pump, the valves should be operated in the proper sequence in order to always maintain flow through the system.

7 SHUTDOWN

7.1 SHORT TERM SHUTDOWN

For short duration shutdowns lasting less than one or two weeks, little needs to be done. Close all valves in the adsorber piping system, and open the vent line valves on each vessel. The feed pumps should be shut down and the valves closed in the lines to and from the pumps. Any drain valves in the pump casing should be opened for the duration of the shutdown. Freeze protection measures such as draining lines at the low points should be taken when there is a chance of freezing. Freeze protection measures are usually the responsibility of the client.

7.2 EXTENDED SHUTDOWNS

For extended shutdowns, in addition to the steps in Section 7.1, the adsorbers should be drained of all water.

When the adsorbers are started up again, the carbon beds may require disinfection. Once the disinfection is complete, backwashable adsorbers should be backwashed prior to start-up.

After disinfection, bring the adsorber back on-line in the downflow mode, monitor the effluent for coliform count and monitor the pressure drop.

CALGON CARBON CORPORATION

SECTION 2

CARBON

CALGON CARBON CORPORATION

Making Water and Air Safer and Cleaner

DSR-C 8X30

Granular Activated Carbon

Description

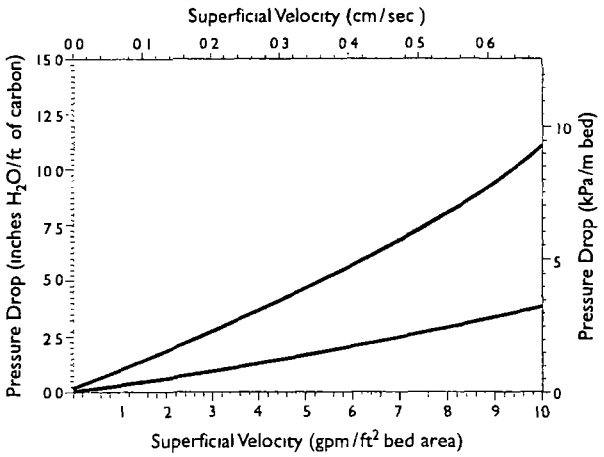
DSR-C is a grade of reactivated carbon designed for the removal of organic contaminants from industrial wastewater or process water. The carbon is manufactured by the reactivation of bituminous coal-based products to produce a high-density, high surface area durable product capable of withstanding repeated cycles of use and reactivation

DSR-C is effective in a wide range of applications and fluctuating flows providing reliable removal of dissolved organic compounds, and is screened prior to packaging to ensure consistent performance and low pressure drop.

Applications

- Point source treatment to remove chemicals
- Pre-treatment to biological waste treatment systems
- Product recovery from wastewater
- Recycling wastewater
- Polishing effluent from biological waste treatment systems
- Providing total wastewater treatment

Pressure Drop Curve



Liquid down-flow through DSR-C 8x30 carbon

Design Considerations

The design of an activated carbon adsorption system is dependent on the adsorbate type, influent concentration, temperature, flow rate, performance objective, and other factors Calgon Carbon has experience designing systems and can help evaluate the suitability of DSR-C to satisfy specific needs and assist in the design of an adsorption system In addition to the supply of activated carbon, Calgon Carbon offers a complete line of standardized, pre-engineered adsorption systems. For additional information on adsorption capacity of organic compounds, please contact the Inside Sales Representative for your area by calling 1-800-4-CARBON.

Specifications

Iodine Number, mg/g (min)	800
Ash, weight % (max)	9
Moisture, weight % (max)	2
Apparent Density, g/cc (max)	0 60
Screen Size, US Sieve Series, weight %	
Smaller than 30 mesh (max)	5

Product Options

In addition to DSR-C, Calgon Carbon offers a variety of products and services to meet your treatment requirements:

Granular Carbon Products

- FILTRASORB® 300 & 400 - virgin liquid phase products
- REACT PH® - for pH sensitive applications.
- React AW - for acid purification.

Equipment Products

- Standardized, pre-engineered adsorption systems capable of treatment flows from 1 gpm to 1400 gpm.
- Custom engineered systems - to meet unique treatment requirements.

Service Products

- Technical services including design assistance, calculations of carbon use rates, laboratory and pilot studies, start-up and operations assistance
- On-site exchange services and reactivation service reduce labor requirements and minimize disposal cost.

DSR-C is not for use in potable water or food grade applications.

DSR-C 8X30

Granular Activated Carbon

Features	Benefits
Raw Material.	
• Metallurgical grade, bituminous coal based	• Produces a strongly adsorbing pore structure for a broad range of contaminants and concentrations
Miscellaneous·	
• Reactivated product	• Economical alternative to virgin carbon • Provides ultimate disposal of pollutants
• Recyclable product	• Eliminates landfill costs and concerns • Propagates the cycle of responsible resource utilization
• High surface area/pore structure	• Efficient in removing a wide range of dissolved organic compounds • Reliable - accommodates variations in flows or concentrations
• Product is screened prior to packaging	• Results in less fines and lower pressure drop • Minimizes backwashing

Packaging

1,000 lb. Super Sacks
Bulk Trucks

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

Limitations of Liability

The Supplier's liability and the Purchaser's exclusive remedy for any cause of action arising out of this transaction, including, but not limited to, breach of warranty, negligence and/or indemnification, is expressly limited to a maximum of the purchase price of spare parts or equipment sold hereunder. All claims of whatsoever nature shall be deemed waived unless made in writing within forty-five (45) days of the occurrence giving rise to the claim In no event shall the Supplier, for any reason or pursuant to any provision of the warranty, be liable for incidental or consequential damages or damages in excess of the purchase price, nor shall the Supplier be liable for loss of profits or fines imposed by governmental agencies.

DSR-C is not for use in potable water or food grade applications.

Visit our website at **www.calgoncarbon.com**

CALGON

CALGON CARBON CORPORATION

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Chemviron Carbon

European Operations of Calgon Carbon Corporation
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Your local office

CPM-LC604-0604

Material Safety Data Sheet

U.S. Department of Labor
Occupational Safety and Health Administration
This form is consistent with ANSI standard for preparation of MSDS's in accordance with OSHA's Hazard Communication Standard, 29 CFR 1910.1200.

Product Type: DSR-C 8X30	
Product Code: 2830	**Profile No:** 1
Effective Date: December 2, 2009	**Supersedes: XXXXX**

SECTION I - PRODUCT AND COMPANY INFORMATION

Company Identification (USA)	**Calgon Carbon Corporation** P.O. Box 717 Pittsburgh, PA 15230-0717	
Telephone Number(s)	Information	412-787-6700
	Emergency	412-787-6700
Company Identification (Europe)	**Chemviron Carbon** Zoning Industriel de Feluy B-7181 Feluy, Belgium	
Telephone Number(s)	Information	32 64 51 18 11
	Emergency	32 64 51 18 11

Date Prepared	Signature of Preparer (optional)	
April 30, 2010		

SECTION II – COMPOSITION /INFORMATION ON INGREDIENTS

Nonhazardous components are listed at 3% or greater; acute hazards are listed when present at 1% or greater and chronic hazards are listed when present at 0.01% or greater. This is not intended to be a complete compositional disclosure.

Ingredient / Component	CAS No	% by Wt
Activated Carbon (Coal based)	7440-44-0	100

SECTION III – HAZARD(S) IDENTIFICATION

Emergency Overview: Black particulate solid, pellet or powder. Contact may cause eye irritation. Dust may be slightly irritating to eyes and respiratory tract. Avoid generation of dust during handling

CAUTION: Wet activated carbon removes oxygen from air causing a severe hazard to workers in enclosed or confined space. 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

OSHA Regulatory Status		Not regulated	
HMIS Ratings	Health	0	4 = Extreme/Severe 3 = High/Serious 2 = Moderate 1 = Slight 0 = Minimum W = Water Reactive OX = Oxidizer
(NFPA)	Flammability	1	
	Reactivity	0	
	Special		
Protective Equipment	Safety glasses with side shields or goggles, gloves, long sleeve shirt or lab coat, long pants recommended.		
Health Effects	See Section IV		
Environmental Effects	See Section XII		

Section IV – First-Aid Measures

Route of exposure	
Eyes	Dust may cause mild irritation, possibly reddening.
Skin	Dust may cause mild irritation, possibly reddening.
Inhalation	Dust may cause mild irritation to the upper respiratory tract.
Ingestion	Dust may cause mild irritation to digestive track resulting in nausea or diarrhea.
Signs/Symptoms of Exposure	Dust may cause irritation and redness of eyes, irritation of skin and respiratory system.
Emergency and First Aid Procedures	For eye contact, immediately flush with copious amounts of water for at least 15 minutes, lifting both the upper and lower lids occasionally; seek medical attention if pail persists. For skin contact, wash with soap and water; seek medical attention if any allergic reaction. For inhalation, Remove to fresh air and rest as needed; seek medical attention for any breathing difficulty. For ingestion, drink plenty of water; seek medical attention.
Medical Conditions Generally Aggravated by Exposure	People with pre-existing skin conditions or eye problems or impaired respiratory function may be more susceptible to the potential effects of the dust.

SECTION V – FIRE FIGHTING MEASURES

Suitable Extinguishing Media	Use an extinguishing media suitable for the surrounding fire.
Unsuitable Extinguishing Media	None known
Specific Hazards	As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source. Activated carbon is difficult to ignite and tends to burn slowly (smolder) without producing smoke or flame. Carbon monoxide and carbon dioxide gas may be generated if combusted. Contact with strong oxidizers such as ozone or liquid oxygen may cause rapid combustion.
Protective Equipment and Procedures	Wear NIOSH approved self-contained breathing apparatus suitable for the surrounding fire.

SECTION VI – ACCIDENTAL RELEASE MEASURES

Personal Precautions	Wear protective equipment, keep unnecessary personnel away, ventilate area of spill.
Environmental Precautions	The material is not soluble but can cause a particulate emission if discharged to waterways; therefore, dike all entrances to sewers and drains to avoid introducing the material into the waterways.
Containment & Clean-up	Dike all entrances to sewers and drains. Vacuum or shovel spilled material and place in closed container for disposal. Remove product to appropriate storage area until it can be properly disposed of in accordance with local, state and federal regulations. Avoid dust formation. See section XIII
Other information	NA

SECTION VII – HANDLING AND STORAGE

Handling	Avoid prolonged contact with eyes and skin. Keep away from ignition sources. Use in well ventilated areas. Protect containers from physical damage. Wash hands after handling.
Storage	Store in cool, dry, ventilated area and in closed containers. Keep away from oxidizers, heat or flames. Store away from ignition sources.

SECTION VIII – EXPOSURE CONTROLS/PERSONAL PROTECTION

Component	OSHA PEL	ACGIH TLV	Other limits
Activated Carbon (dust)	5 mg/M^3 Resp	5 mg/M^3 Resp	

Exposure Guidelines	Wet activated carbon removes oxygen from air posing a hazard to workers in enclosed or confined space. Before entering such an area, sample the air to assure sufficient oxygen supply. Use work procedures for low oxygen levels, observing all local, state and federal regulations.
Engineering Controls	No special ventilation requirements. Good general ventilation should be adequate. Mechanical ventilation is recommended for enclosed or confined spaces
Personal Protective Equipment	Use of NIOSH approved particulate filter is recommended if dust is generated in handling. The usual precautionary measures for handling chemicals should be followed, i.e gloves, safety glasses w/side shields or goggles, long sleeve shirt or lab coat, dust respirator if dusty Other protective clothing/equipment as appropriate.
General Hygiene	The usual precautionary measures for handling chemicals should be followed. i.e. Keep away from food and beverage, remove contaminated clothing immediately; wash hands before breaks or eating; avoid contact with eyes and skin.

SECTION IX – PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point	NA	**Melting Point**	NA
Vapor Pressure (mm Hg.)	0	**Evaporation Rate**	NA
Vapor Density (AIR = 1)	solid	**Flash Point**	NA
Specific Gravity	0.4 to 0.7	**UEL**	NA
		LEL	NA
Flammability Limits	Ignition Temperature > 220° C		
Odor	None		
Solubility in Water	Product is not soluble.		
Appearance	Black granular or powder material		

SECTION X – STABILITY AND REACTIVITY

STABILITY	**UNSTABLE**		**CONDITIONS TO AVOID:** None
	STABLE	**XX**	
HAZARDOUS REACTION	**MAY OCCUR**		**CONDITIONS TO AVOID:** None
	WILL NOT OCCUR	**XX**	
Caution: High concentrations of organics in air will cause temperature rise due to heat of adsorption. At very high concentration levels this may cause a bed fire High concentrations of Ketones and Aldehydes may cause a bed temperature rise due to adsorption and oxidation			
Incompatible Materials			Alkali Metals and Strong Oxidizers such as *ozone, oxygen, permanganate, chlorine.*
Hazardous Decomposition Products			Carbon monoxide and carbon dioxide gas may be generated during combustion of this material.

SECTION XI – Toxicological information

Acute Effects		
Toxicity Studies	Oral LD_{50}	Not Determined on the finished product.
	Dermal LD_{50}	Not Determined on the finished product.
Inhalation	See section IV	
Ingestion	See section IV	
Eye Irritation	See section IV	
Skin Irritation	See section IV	
Sensitization	Not Determined on the finished product.	
Target Organ (s) or System		Eyes, Skin and Upper Respiratory System
Signs and symptoms of Exposure		Irritation and redness of eyes, irritation of skin and respiratory system may result from exposure to carbon dust. See Sections III and IV
Chronic Effects		
Carcinogenicity	Not Determined on the finished product.	
Mutagenicity	Not Determined on the finished product.	
Reproductive Effects	Not Determined on the finished product	
Developmental Factors	Not Determined on the finished product.	

SECTION XII – ECOLOGICAL INFORMATION

Ecotoxicity	Not Determined on the finished product.
Persistence/degradability	Not Determined on the finished product.
Bioaccumulation/Accumulation	Not Determined on the finished product.
Mobility in Environmental Media	Not Determined on the finished product.
Other Adverse Effects	Not Determined on the finished product.

SECTION XIII – DISPOSAL CONSIDERATIONS

Vacuum or shovel material into a closed container. Storage and disposal should be in accordance with applicable local, state and federal laws and regulations. Local regulations may be more stringent than state or federal requirements.

SECTION XIV – TRANSPORT INFORMATION

This information as presented below only applies to the material as shipped. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Land	DOT Regulations	Proper Shipping Description	DSR-C 8X30 (Steam Activated Carbon)
	Canadian WHMIS	Hazard Class	NA See note below
		UN/NA	UN 1362
Water	IMO / IMDG	Proper Shipping Description:	DSR-C 8X30 (Steam Activated Carbon)
		Hazard Class	NA See note below
		UN/NA	UN 1362
Air	IACO / IATA	Proper Shipping Description	DSR-C 8X30 (Steam Activated Carbon)
		Hazard Class	NA See note below
		UN/NA	UN 1362
		Information reported for product/size: 0.5 Kg	

This product has been tested according to the *United Nations Transport of Dangerous Goods* test protocol for a "self-heating substance". It has been specifically determined that this product does not meet the definition of a self heating substance or any other hazard class, and therefore is not a hazardous material. Please note that this information is applicable only for the Activated Carbon Product identified in this document.

SECTION XV – REGULATORY INFORMATION

SARA Title III 302	Product is not subject to SARA Title III, section 302 regulation.	
SARA Title III 313	Product is not subject to SARA Title III, section 313 regulation.	
TSCA	Product is listed	
California Proposition 65	Not listed	
Canadian classification	**WHMIS**	Not listed.
	DSL #	Product is listed.
EEC Council Directives relating to the classification, packaging, and labeling of dangerous substances and preparations.		
Risk and Safety Phrases	R36: Irritating to the eyes, R37: Irritating to the respiratory system, R38: Irritating to the skin,	

SECTION XVI – OTHER INFORMATION

Intended Use	The material is generally used for treatment of gases and liquids
The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to determine the suitability and completeness of this information for their particular use.	
While the information and recommendations set forth herein are believed to be accurate as of the date hereof, Calgon Carbon Corporation makes no warranty with respect to same and disclaims all liability for reliance there on.	

References:

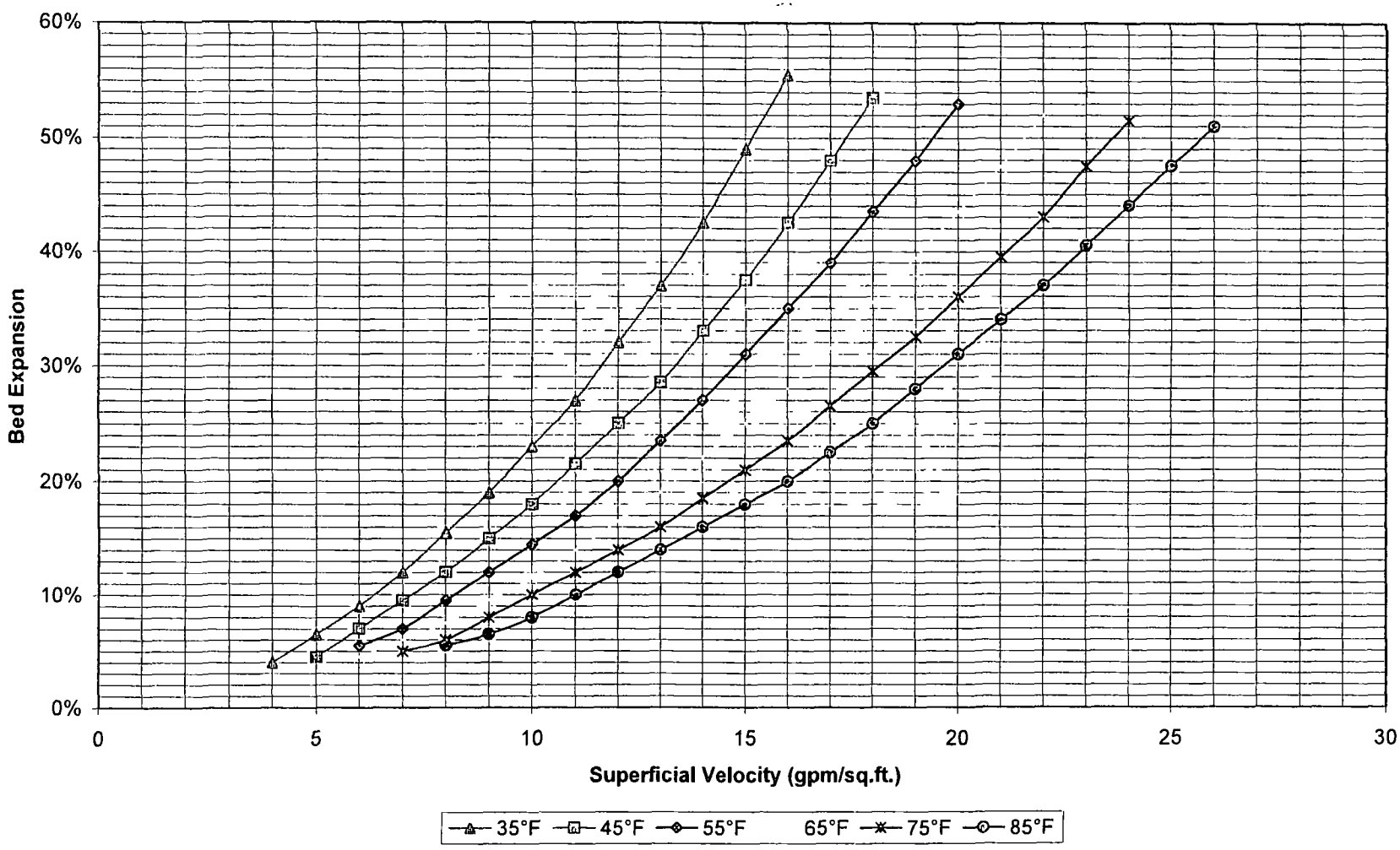
NA not applicable

Legend:

ACGIH	- American Conference of Governmental Industrial Hygienists
ANSI	- American National Standards Institute
ATSDR	- Agency for Toxic Substances and Disease Registry
C	- Ceiling (limit value)
CAS #	- Chemical Abstracts Service Registry Number
CERCLA	- Comprehensive Environmental Response, Compensation, and Liability Act
CEPA	- Canadian Environmental Protection Act
CFR	- Code of Federal Regulations
DOT	- Department of Transportation
DSL	- Domestic Substances List
EINECS	- European Inventory of Existing Commercial Chemical Substances
ERAP	- Emergency Response Assistance Plan
IATA	- International Air Transportation Association
IARC	- International Agency for Research on Cancer
ICAO	- International Civil Aviation Organization
IDLH	- Immediately Dangerous to Life and Health
IMO	- International Maritime Organization
IMDG	- International Maritime Dangerous Goods
LC_{50}	- The concentration of material in air expected to kill 50% of a group of test animals
LD_{50}	- Lethal Dose expected to kill 50% of a group of test animals
NFPA	- National Fire Protection Association
NIOSH	- National Institute for Occupational Safety and Health
NTP	- National Toxicology Program
OSHA	- Occupational Safety and Health Association
PEL	- Permissible Exposure Limit
RCRA	- Resource conservation and Recovery Act
RQ	- Reportable Quantity
SARA	- Superfund Amendments and Reauthorization Act
STEL	- Short Term Exposure Limit
TDG	- Transportation of Dangerous Goods Act/Regulation
TLV	- Threshold Limit Value
TSCA	- Toxic Substances Control Act
TWA	- Time Weighted Average
WHMIS	- Workplace Hazardous Material Information System

* * * END OF MATERIAL SAFETY DATA SHEET * * *

DSR-C (8x30) - Bed Expansion
Backwashed & Segregated



CALGON

CALGON CARBON CORPORATION

SECTION 3

SPECIFICATIONS & CATALOG CUTS

VALVE LIST
FOR
CBS CORPORATION
BLOOMINGTON, IL

Project Number : LM-10048.CBS1

QTY	SIZE	SPEC	MATERIAL	MANUFACTURE	DESCRIPTION
6	1/2"	4.03	Brass	Sıral	Ball Valve, Std Port NPT Thrd Ends
7	3/4"	4.57	SS	Sharpe Valves	Ball Valve, Series 5457, NPT Thrd Ends
4	2"	4.03	Brass	Sıral	Ball Valve, Std Port NPT Thrd Ends
1	3"	3.44	Cast Iron	Flow Line 70/71	Butterfly valve, Wafer Style
2	4"	4.08	SS	Sharpe Valves	Ball Valve, Series 50, 150# Flg

CALGON CARBON CORPORATION	BUTTERFLY VALVES MATERIAL SPECIFICATION	SPEC NO:
	ONE-PIECE CAST IRON BUTTERFLY VALVE	3.44

MATERIAL: One-piece cast iron wafer style body, epdm or buna-n seat material, gasket type seal, torque plug connection, 416 stainless steel stem (or of greater corrosion resistance), bronze or aluminum bronze disc material, bronze upper and lower bushings. Lever operator for valve sizes 2" through 6", weatherproof worm gear wheel operator for sizes 8" through 12" (handwheel diameter shall not exceed 9"). 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.

CONSTRUCTION: Shaft: 1 piece, through shaft construction.

MANUFACTURER: Centerline, Pratt, Xomox, Crane, Apollo, Sure-Seal, Flow Line or equal.

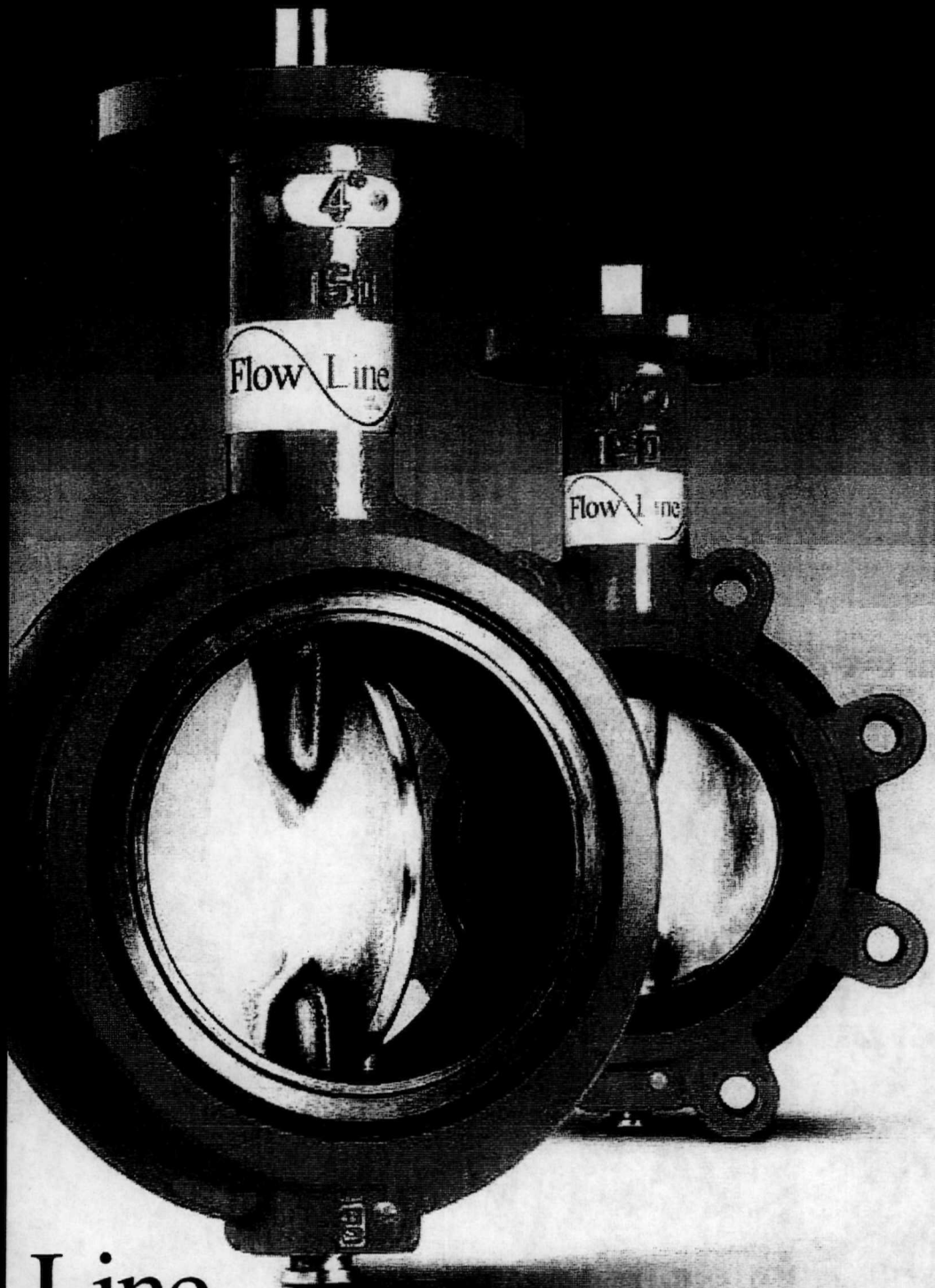
SIZES: 2" through 12"

MODELS: Centerline Series 200, Pratt Series 396, Xomox Series 700, Crane Series 42, Apollo Series 141, Sure-Seal Series 600, Flow Line Series 70 or equal.

Issue Date: 10/29/92 Revision Date 08/13/2009

Approved by Joseph P McMahon on 08/13/2009

SPEC 3.44



Line™
Valve and Controls

Cartridge Seated Butterfly Valves

KEY FEATURES

Body

- One piece ribbed wafer and lugged body is Polyester coated as standard for a superior appearance and excellent resistance to external corrosion.
- Heavy duty ISO 5211 Top plate is slotted for ease of actuation and engineered to accept direct mounting of operators.
- Standard extended neck provides full clearance for 2" of insulation.

Disc

- Streamlined design offers higher Cv and lower pressure drop.

Shaft

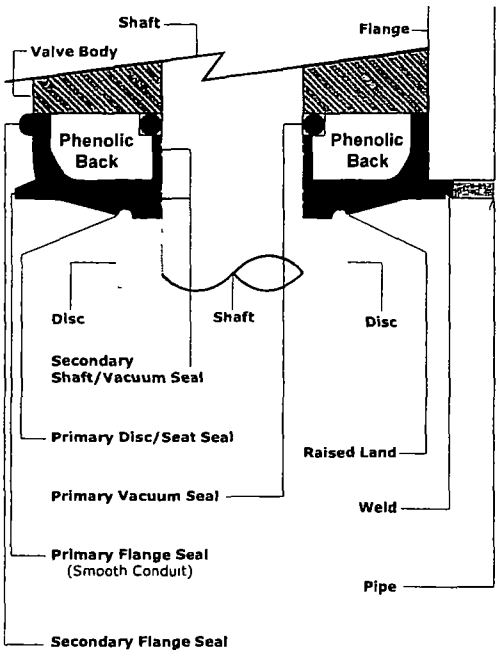
- Triple shaft seals support the primary seal on machined radius of the disc. Our triple shaft seals ensure a dry stem design.
- Two secondary shaft seals are located inside the seat shaft holes and an environmental shaft seal eliminates contaminants from entering the shaft bore.
- Two self lubricated bronze bearings offer consistent torque valves and eliminate side loading.

Seat and Flange Seals

- Field replaceable, phenolic bonded cartridge seat provides no movement of the elastomer which is a common failure point of many resilient flexible seat designs.
- Torque fluctuation is eliminated by our phenolic bonded elastomer seats.
- Our dual purpose primary flange seal is widened offering additional compression of the elastomer against various flanges resulting in a positive seal.
- This resulting primary flange seal provides a smooth flow conduit for media and prevents build up in crevices created by traditional seat designs.
- Molded secondary flange seals assure no leakage when used with weld neck, slip on, and threaded flanges and eliminates the need for gaskets or O-rings.

Disc/Shaft Connection

- A high strength Double D drive ensures a positive shaft to disc connection.
- Disc floats inside the seat for positive sealing and extended seat life.
- No pins or bolts are exposed to flow.
- Offset shaft retainers mechanically retain the shaft in the body ensuring a blow out proof design.



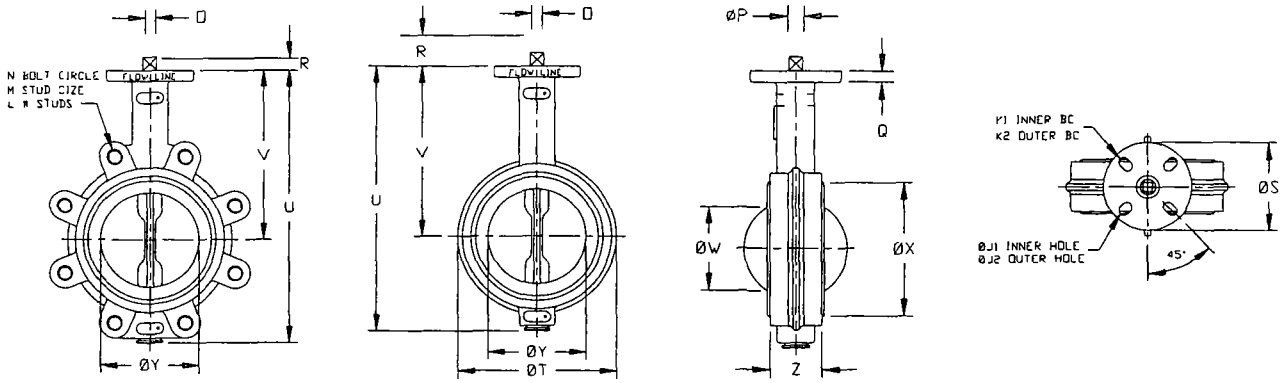
Shaft Sealing Method

- Disc shaft holes surrounded by a 360° machined radius are in constant contact with the flatted area of the seat.
- This design is far superior to resilient flexible seat designs that depend on the "squeeze" effect of the disc and seat interference which allows leakage behind the seat and up the shaft.
- The Flow Line shaft seal is achieved through a continuous pressure exerted from the flatted area of the seat to the machined radius of the disc.
- This sealing mechanism is further enhanced by forces exerted on the seat and shaft providing a secondary seal resulting in media free disc, shaft and seat connection.

Applicable Standards

ANSI B16.1	Conforms to ANSI Class 125 flange drilling.
ANSI B16.5	Conforms to ANSI 150 flange drilling.
ANSI B16.42	Conforms to ANSI Class 150 flange drilling, body wall thickness and pressure-temperature ratings.
ANSI B16.104	Exceeds Class VI shutoff requirements.
API 609	Butterfly Valve Category A.
AWWA C504	Diameter of stainless steel shaft exceeds AWWA Class 75B standard. Body wall thickness exceeds the AWWA Class 150B standard for butterfly valves.
MSS SP-25	Markings and identification conform to the requirements.
MSS SP-67	Butterfly Valves
ISO 5211	Actuator Mounting
USCG	Category "A" Title 46, CFR, Part 56

DIMENSIONS



Valve Size	Z	Y	X	W	V	U	T	S	R	Q	P	O	Lug Drilling N	Lug Drilling M	Lug Drilling L	Top Plate Drilling K1	Top Plate Drilling K2	Top Plate Drilling #holes	Top Plate Drilling J1	Top Plate Drilling J2	Weight (lb)
2	1 74	2 25	2.65	1 46	5 62	8 44	4 12	4 00	0.827	.44	.551	0 551	4.75	5/8-11	4	2.76	3 25	4	39	41	8
2-1/2	1 86	2 81	3 15	2 14	6 12	9 19	4 88	4 00	0 827	44	551	0 551	5 50	5/8-11	4	2 76	3 25	4	39	41	10
→ 3	1 86	3.31	3 78	2 74	6.38	9.69	5.38	4 00	0 827	44	.551	0.551	6.00	5/8-11	4	2.76	3.25	4	.39	.41	11
4	2 11	4 19	4 78	3 60	7 12	11 00	6 88	4 00	0 827	44	551	0 551	7 50	5/8-11	8	2 76	3 25	4	39	41	17
5	2 24	5.06	5.84	4 58	7 75	12.12	7.75	4.00	1 063	44	670	.670	8.50	3/4-10	8	2.76	3 25	4	39	.41	23
6	2 24	6 06	7 03	5 62	8 25	13 25	8 75	4 00	1 063	44	670	670	9 50	3/4-10	8	2 76	3 25	4	39	41	29
8	2.54	7.94	8.96	7.43	9 44	15 56	11 00	6 00	1 063	56	.866	0 866	11 75	3/4-10	8	4.02	5.00	4	53	.53	44
10	2 74	10 00	11 09	9 38	11 25	18 69	13 38	6 00	1 063	56	866	0 866	14 25	7/8-9	12	4 02	5 00	4	53	53	66
12	3 24	11 94	13.09	11 35	12.19	21 69	16.12	6 00	1 063	56	.866	0.866	17 00	7/8-9	12	4.02	5 00	4	.53	.53	99

CLASS II TORQUES (Inch-Pounds)

Shutoff Pressure	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
50 PSI SHUTOFF	66	96	150	225	350	450	750	1325	2250
75 PSI SHUTOFF	98	141	237	261	504	651	1050	1778	2990
100 PSI SHUTOFF	103	148	249	343	531	685	1105	1872	3147
125 PSI SHUTOFF	107	155	260	376	553	714	1151	1950	3279
150 PSI SHUTOFF	110	158	265	384	564	728	1275	1989	3345
175 PSI SHUTOFF	121	175	283	417	632	814	1337	2320	3923
200 PSI SHUTOFF	132	192	300	450	700	900	1500	2650	4500
250 PSI SHUTOFF	145	211	318	486	770	990	1695	2995	5085
285 PSI SHUTOFF	160	232	337	528	847	1089	1915	3384	5746

Cv VALUES

Valve Size	10°	20°	30°	40°	50°	60°	70°	80°	90°
2	2	3.5	8	21	40	87	108	141	170
2-1/2	3	5	11	27	52	121	172	253	332
3	8	16	23	50	92	147	224	420	473
4	17	33	57	110	182	297	462	773	913
5	47	94	143	231	380	578	908	1485	1650
6	91	182	248	396	627	902	1386	2063	2178
8	116	231	330	528	858	1452	2508	4158	4257
10	223	446	633	935	1320	2090	3630	6710	7095
12	303	605	825	1320	2063	3135	5528	10230	10780

Class II

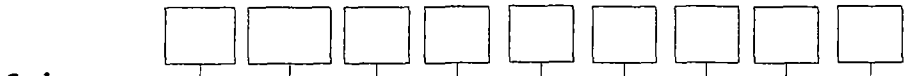
- Valve to be operated a minimum of once a month
- Temperature well within resilient seat limits
- Line media is a self lubricating (Aqueous liquids)
- Minor chemical attacks on seat
- Disc corrosion and media deposits to be mild

Notes

1 This chart to be used as a guide only
2 These torque ratings do not apply to every possible service criteria, which may affect seating and unseating torque
3 Torque values are applicable to Flow Line Series 70/71
4 Do not apply a safety factor to the above torque values when sizing actuators
5 Dynamic Torque should always be a consideration when sizing valves with high differential pressures
6 For 3 way tee assemblies multiply the above torques by 1 5

SPECIFICATIONS

HOW TO ORDER



Series
70 - Wafer
71 - Lug

Size
0200 - 2"
0250 - 2 1/2"
0300 - 3"
0400 - 4"
0500 - 5"
0600 - 6"
0800 - 8"
1000 - 10"
1200 - 12"

Body
1 - Cast Iron
2 - Ductile Iron
3 - Ductile Iron A
4 - 316 Stainless Steel
5 - 216 WBC Carbon Steel
6 - Aluminum
7 - Aluminum Bronze

Disc
D - Electroless Nickel Plated DI
A - Aluminum Bronze
N - Nylon 11 Coated Ductile Iron
S - 316 Stainless Steel
M - Mirror Polished
K - PVDF (Kynar)
H - Haylar

Press
U - 50psi Undercut Disc
F - 200psi Full Cut
M - 285psi Max Cut

Shaft
3 - 316 Stainless Steel
4 - 416 Stainless Steel

Shaft Type
D - Type "D"
B - Type B*
K - Type K*
W - Type W*
I - "ISO" Standard
C - Type "C"

Seat
E - EPDM
B - Buna-N
W - White Buna-N
G - White EPDM
V - FKM / Viton®
S - Silicon
H - Hypalon
R - Red Natural Rubber
X - Special

Oper
O - Bare Shaft
1 - 10 Position Handle
2 - Handwheel Gear Operator
3 - Pneumatic Actuator
4 - Electric Actuator
X - Special

* Designates shaft types sold as automated packages or bare shaft design only

Recommended Specifications

- Polyester coated ribbed wafer or lug bodies to provide extended necks for insulation and be able to install between ANSI 125/150 flanges. Lug design in sizes 2" - 12" to be fully rated for dead end service without any modification.
- Streamlined disc design with no pins or screws in the flow path and designed for high Cv and lower pressure drop.
- Upper and lower shaft design to utilize triple shaft seals as standard.
- Blow out proof design utilizing a Double D drive for a positive disc/shaft connection.
- Pressure responsive 360° sealing design will use constant pressure between machined radius on disc and flatted area of the seat.
- Valve to be Flow Line Series 70 wafer or Flow Line Series 71 lug design.

Components

Qty	Description	Qty	Description
1	Body	2	Shaft Retainers
1	Disc	1	Bearing Retainer
1	Upper Shaft	1	Environmental Shaft Seal
1	Lower Shaft	2	Secondary Shaft Seals
1	Seat	1	Thrust Bearing
		1	Inboard Bearing

Materials of Construction 2" - 12"

Body
- Cast Steel ASTM A-216 WCB
- 316 Stainless Steel ASTM A-351 CF8M
- Cast Iron ASTM A-126 Class B
- Ductile Iron ASTM A-536 (65-45-12)
- Ductile Iron ASTM A-395 (60-40-18)

Disc
- Electroless Nickel Plated Ductile Iron ASTM A-536 (65-45-12)
- Aluminum Bronze ASTM B-148 (954)
- Nylon 11 Coated Ductile Iron ASTM A-536 Grade (65-45-12)
- 316 Stainless Steel ASTM A-351 (CF8M)

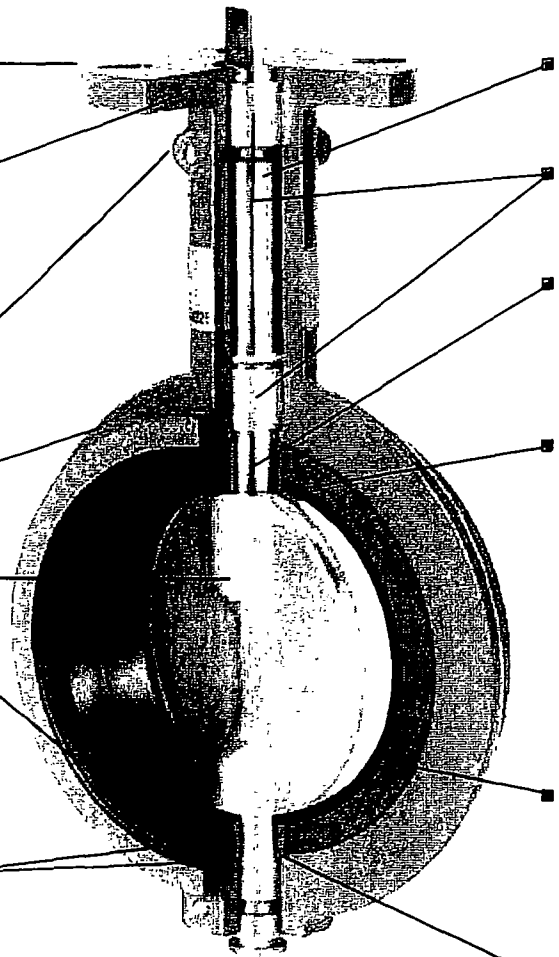
Stem
- 316 Stainless Steel ASTM A-276 Type 316
- 416 Stainless Steel ASTM A-582 Type 416

Seat

EPDM - FDA Food Grade	-30 to + 275
Buna-N - FDA Food Grade	0 to +180
White Buna-N - FDA Food Grade	0 to + 180
Viton® - FDA Food Grade	0 to + 375
Silicon - FDA Food Grade	-80 to + 450
Hypalon	0 to + 180
Red Natural Rubber	0 to + 150

Viton® is a registered trademark of the E.I. DuPont De Nemours Company. FKM is the ASTM D1418 designation for Flournated Hydrocarbon elastomers such as Viton® (DuPont) and Flourel® (3M)

FEATURES



- **Slotted ISO 5211 top plate and shaft for flexibility of direct mounting options**
- **Environmental shaft seal to keep contaminants from entering shaft bore**
- **Offset shaft retainers mechanically retain the shaft ensuring a blow out proof design**
- **One piece ribbed Polyester coated body with extended neck**
- **Streamlined disc with no pins or screws in flow path**
- **Primary seal provides a smooth flow conduit and prevents media buildup in crevices normally found with traditional designs**
- **Independent seals provide full vacuum rating**
- **High strength upper and lower shafts with triple shaft seals**
- **Two self lubricated bronze bearings to eliminate side loading**
- **Double D Drive for a positive disc/shaft connection with no pins or bolts exposed to flow**
- **Proven pressure responsive 360° sealing method uses constant pressure between machined radius on disc and flatted area of the seat that eliminates the "squeeze" of the interference seat design our competition relies on**
- **Phenolic bonded cartridge seat with primary and secondary seals provide no movement of the elastomer**
- **Two secondary shaft seals located inside the seat shaft holes**

The **Series 70 wafer** style and **Series 71 lug** style are heavy duty cartridge seated butterfly valves compatible ANSI 125/150 weld neck, slip on, and threaded flange standards. 2" - 12" valves are fully rated to 200 psi, bi-directional, dead end service. Valves with undercut discs to 50 psi are also available through the size range. Valves with Max cut Disc to 285 psi are also available through size range. All Series 70/71 valves, regardless of the rated working pressure, are vacuum rated to 29.92" of Mercury Gauge (0 Micron).

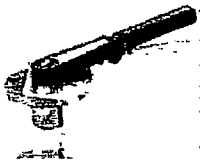
COATINGS

Flow Line Series 70 and 71 butterfly valve bodies are Polyester coated as standard. Polyester is a significant upgrade to paint or two part epoxy coatings. Our standard Polyester coating offers outstanding protection against abrasion and corrosion. The Flow Line Polyester coating is not affected by outdoor exposure and maintains excellent resistance to UV rays.

TEST	RESULT
Salty Fog Test	No change in excess of 2000 hours
Outdoor Weathering (UV Rays)	No noticeable change in excess of 12 months
50% Sulfuric Acid Test	No change for 48 hours

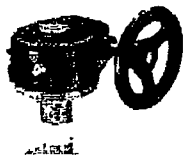
INSTALLATION, MAINTENANCE AND ASSEMBLY

Handle Kit



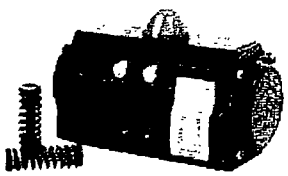
The Flow Line Handle Kit is designed for manual on/off and throttling service for quarter turn, resilient seated butterfly valves ranging from 2" - 12" The Polyester coated ductile iron handle kit includes the handle assembly with a locking lever and bolt on plate notched at 10 degree increments The notched plate also includes on/off stops to prevent over travel of the handle and can be used with a padlock as standard Other available options include an Infinite Throttling Handle Kit, Memory Stop and a 2" Square Nut

Handwheel Gear Operator

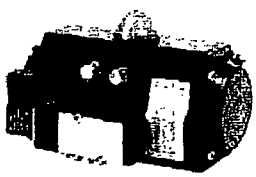


The Flow Line Handwheel Gear Operator is designed for manual on/off and throttling service for quarter turn butterfly valves ranging from 2" - 12" The handwheel gear operator is constructed with a heavy duty, Polyester coated ductile iron housing, is completely self lubricated and weatherproof Along with the gear operator, it also includes a valve position indicator, ductile iron handwheel and mechanical travel stops for field adjustment Other available options include a Chainwheel Kit, Padlock Kit and a 2" Square Nut

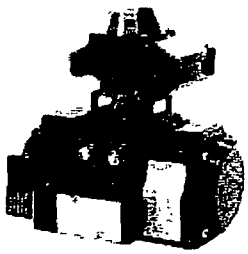
Actuation



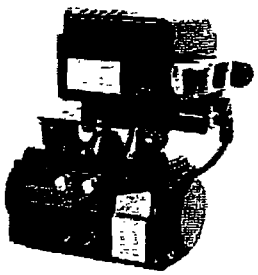
Series 21 spring return actuators are available throughout the size range.



Series 50 solenoid valves are available in 1/8", 1/4", and 1/2"NPT.



Series 52 and 53 limit switches provide local and remote valve position.



Series 55 and 56 positioners are available with either a 3-15 psi or 4-20 MADC signal.

Installation

To install, simply close the valve, position between the flanges and assemble the valve to the flanges with studs or cap screws Do not use flange gaskets Flow Line Series 70 and 71 butterfly valves can be installed with the disc closed Before hand tightening the flange bolts, fully open the disc to ensure disc O D clearance with pipe I D Hand tighten the flange bolts and close the valve to check for valve disc and pipe clearance If contact is made, reposition as necessary and tighten all flange bolts to proper torque specification

Maintenance and Repair

No regular maintenance or lubrication is required Factory assembly procedures provide adequate lubrication for the life of the valve To replace any component, remove valve from the line by fully closing valve disc Spread flanges, remove all bolts then remove valve from line

Testing

All Flow Line Series 70 and 71 butterfly valves are bi-directionally tested to 130 percent of rated working pressure Test certification is available upon request at time of order

Flanges

ANSI 125/150 cast iron, steel, raised face, flat faced weld neck, slip on and threaded flanges are suitable for use with Flow Line butterfly valves. Please contact the factory for proposed installation with plastic flanges

Warranty

All products manufactured by Flow Line Valve and Controls are warranted against defects in material and workmanship for a period of 2 years from date of installation

Flow Line
Valve and Controls

110 Main Project Rd Schriever, LA 70395
Phone (985) 414-6004 Fax (985) 414-6072
Toll 800-815-9226
www.flowlinevalves.com

Doc. No. FLBV1

CALGON CARBON CORPORATION	BALL VALVES MATERIAL SPECIFICATION	SPEC NO:
	FORGED BRONZE, BRASS, OR BARSTOCK BRASS BODY REGULAR PORT BALL VALVE	4.03

MATERIAL: 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, chrome plated bronze or brass ball and stem, PTFE seats and seals (furnish glass fiber reinforced PTFE 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.

MANUFACTURER: DuraValve / Siral or Equal.

SIZES: 1/4" thru 2"

MODELS: VRN5000 or Equal

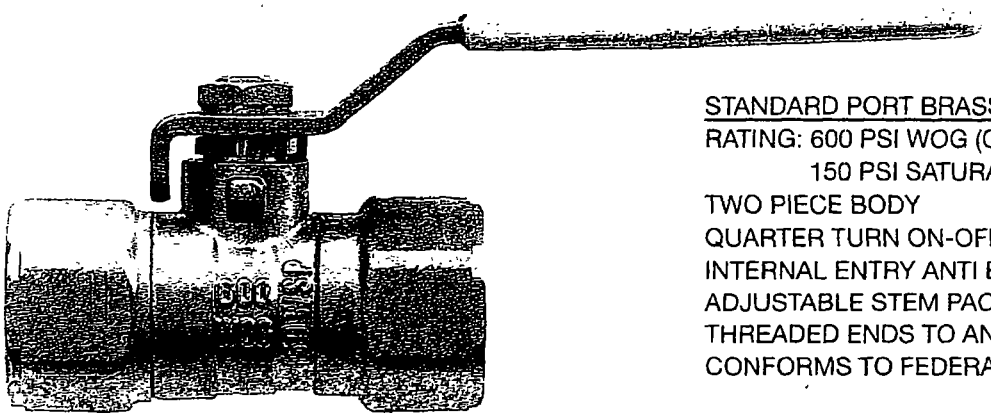
GENERAL REQUIREMENTS:

Issue Date 01/01/89 Revision Date 08/14/2003

Approved by Gerald Kirner on 02/09/2006

FORGED BRASS BALL VALVE MODEL NO VRN 5000
STANDARD PORT THREADED ENDS

CCC SPEC. 4.03



STANDARD PORT BRASS BALL VALVES
RATING: 600 PSI WOG (COLD- NON SHOCK)
150 PSI SATURATED STEAM
TWO PIECE BODY
QUARTER TURN ON-OFF
INTERNAL ENTRY ANTI BLOW-OUT STEM
ADJUSTABLE STEM PACKING GLAND
THREADED ENDS TO ANSI B 2.I
CONFORMS TO FEDERAL SPEC WWV-35B

SIZE	PART NUMBER	A	B	C	D	E	F	CV *	WT LBS
1/4"	50500 A	29	1 74	.87	66	2.62	1.25	7 3	18
3/8"	50500 B	.29	1.80	.95	.82	2.62	1.25	6.9	.22
1/2"	50500 C	.39	2 38	1.19	.98	3 75	1.60	10	.41
3/4"	50500 D	55	2.52	1.26	1 22	3.75	1.62	20	.55
1"	50500 E	75	3.00	1.50	1.53	4.50	2.05	32	1.00
1" 1/4	50500 F	95	3.38	1.69	1 89	4.50	2.16	48	1 84
1" 1/2	50500 G	1 18	3.70	1.85	2.12	6 00	2.87	80	2.07
2"	50500 H	1.50	4.36	2.18	2 63	6.00	2.87	135	3.10

CV *= GALLONS OF WATER PER MINUTE THROUGH THE VALVE WITH A I PSI PRESSURE DROP

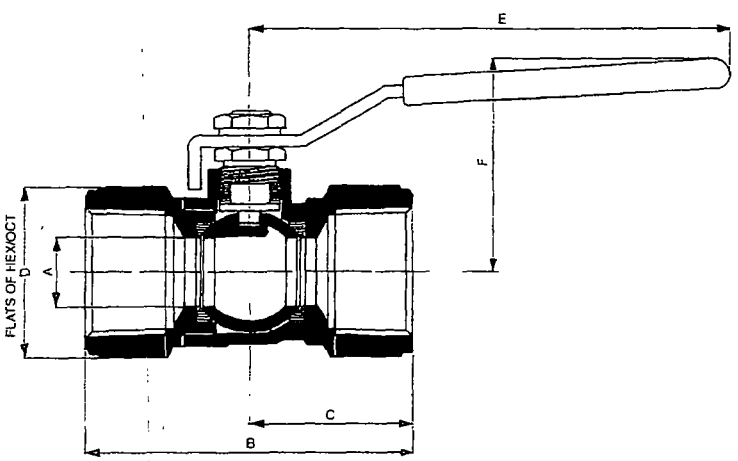
RATING 500WOG

2" 1/2	50500 J	1.85	5.35	2.68	3.38	6 90	3.60	310	6 03
3"	50500 K	2.44	6.14	3 07	3.94	8.50	4 00	420	9.58

RATING 250WOG

4"	50500 L	3 00	7 00	3.50	5.00	9.25	5 00	810	15 60

UL LISTED
1/4" - 2" SIZE



CALGON CARBON CORPORATION	BALL VALVES MATERIAL SPECIFICATION	SPEC NO:
	STAINLESS STEEL AND ENTRY FULL BORE BALL VALVE	4.08

MATERIAL: Stainless steel and entry full bore ball valve 1/2" 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 stainless steel body, ball and stem, TFE seats and seals, wrench operated, 150 lb. ANSI B16 5 flanged ends, raised face, 1/2" thru 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.

MANUFACTURER: Modentic VL-11, Sharpe Valve #50116-R, or equal

SIZES: 1/2" thru 8"

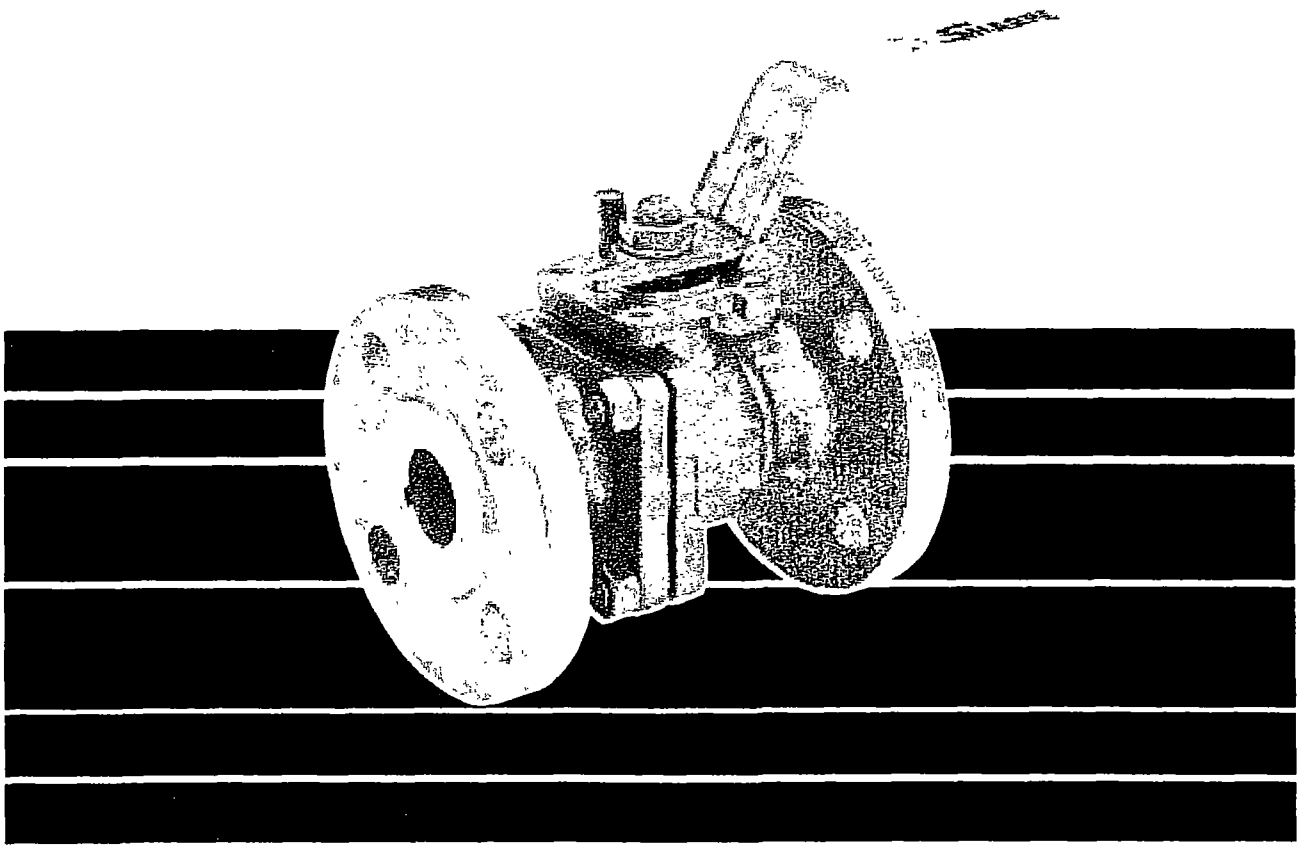
MODELS: Modentic Figure No. VL-11-150 , Figure No. BV-150, or equal.

Issue Date 01/01/89 Revision Date 09/15/99

Approved by Joseph P McMahon on 07/17/2001

CCC SPEC. 4.08

SHARPE® VALVES

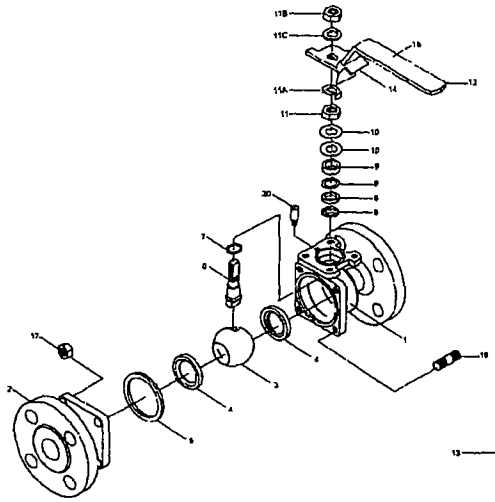


FLANGED FULL PORT BALL VALVE SERIES 50 / CLASS 150

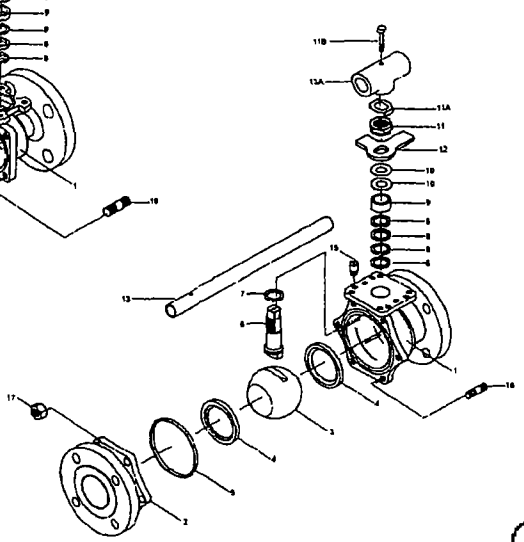
SERIES 50
VALVE PARTS AND IDENTIFICATION

CLASS 150
BLOW OUT PROOF STEM
LOCKING DEVICE

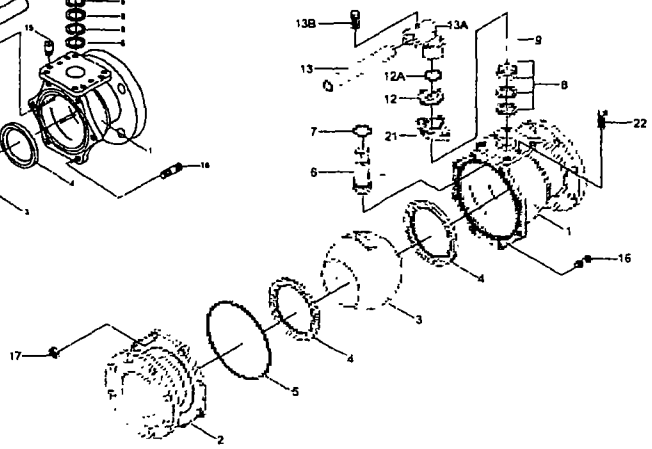
APPLICABLE STANDARDS	
Wall Thickness	ASME B 16 34
Face to Face Dimensions	ASME B 16.10
Flange Dimensions	ASME B 16.5
Pressure Tests	ASME B 16 34 API 598 (Optional)
Basic Design	ASME B16 34



1/2" - 2"



2-1/2" - 4"



6" - 8"

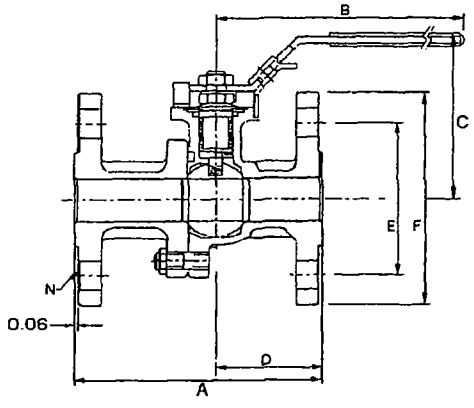
PART NO	PART	QTY	MATERIAL
1	Body	1	316 Stainless Steel ASTM A351 CF8M Alloy 20 ASTM A351 CN7M Carbon Steel ASTM A216 WCB Hastelloy C ASTM A494 GR CW-12MW Monel ASTM A494 GR M35-1
2	End Connector	1	316 Stainless Steel ASTM A351 CF8M Alloy 20 ASTM A351 CN7M Carbon Steel ASTM A216 WCB Hastelloy C ASTM A494 GR CW-12MW Monel ASTM A494 GR M35-1
3	Ball	1	316 Stainless Steel Alloy 20 Hastelloy C
4	Seat	2	TFM (Super TFE) TFE Reinforced TFE NOVA PEEK
5	Body Seal	1	TFE
6	Stem	1	316 Stainless Steel Alloy 20 Hastelloy C 17-4PH (Option)
7	Thrust Bearing	2	Reinforced TFE
8	Stem Packing	3/4	Reinforced TFE
9	Gland Packing	1	304 Stainless Steel
10	Belleville Washer (1/2 -4")	2/4	304 Stainless Steel
11	Packing Nut (1/2' -4")	1	304 Stainless Steel
11A	Lock Tab	1	Stainless Steel
11B	Handle Nut	1	304 Stainless Steel
11C	Lock Washer	1	304 Stainless Steel (1/2"-2")

PART NO	PART	QTY	MATERIAL
12	Stopper	1	304 Stainless Steel
12A	Snap Ring	1	Stainless Steel (6"-8")
13	Handle	1	304 Stainless Steel (1/2"-2") Galvanized Steel (2-1/2"-4") Ductile Iron (6"-8")
13A	Wrench Block	1	Stainless Steel
13B	Hex Head Bolt	1	304 Stainless Steel
14	Locking Device (1/2"-2")	1	304 Stainless Steel
15	Sleeve	1	Vinyl
16	Body Stud	SEE* A193 B8 (SST) N A193 B7 (CS)	
17	Nut	SEE* A194 8 (SST) N A194 2H (CS)	
20	Stop Pin (1/2"-2") (2-1/2"-4")	1 2	304 Stainless Steel 304 Stainless Steel
21	Gland Flange (6"-8")	1	304 Stainless Steel
22	Gland Bolts (6"-8")	2	304 Stainless Steel

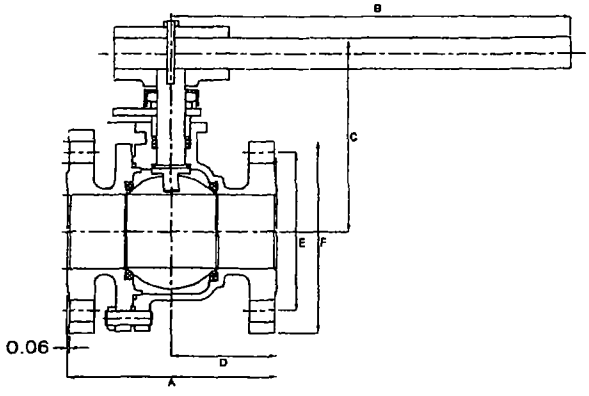
*See Dimensions

SERIES 50
DIMENSIONS

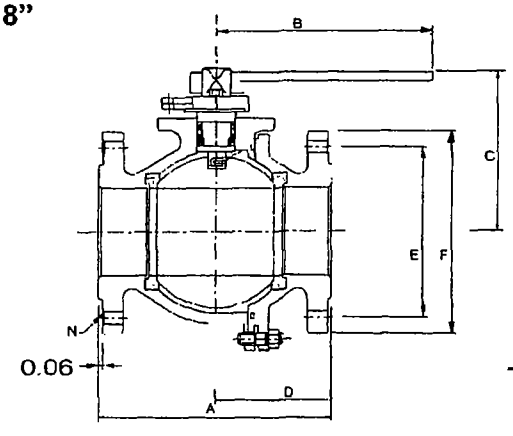
1/2" - 2"



2-1/2" - 4"



6" - 8"



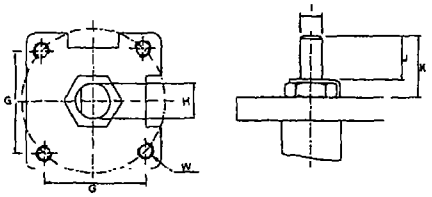
CV DATA	
1/2"	26
3/4"	50
1"	94
1-1/2"	260
2"	480
2-1/2"	750
3"	1300
4"	2300
6"	5400
8"	10000

PORT	
1/2"	0 59
3/4"	0 78
1"	1 00
1-1/2"	1 50
2"	2 00
2-1/2"	2 55
3"	3 00
4"	4 00
6"	6 00
8"	7 88

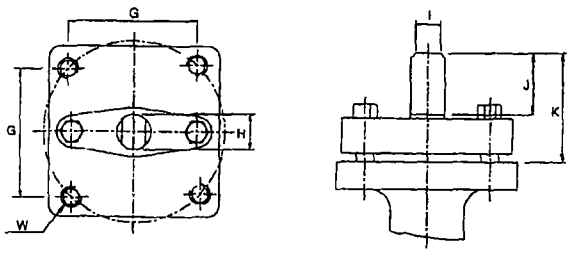
WEIGHT (lbs.)	
1/2"	4
3/4"	6
1"	8
1-1/2"	15
2"	20
2-1/2"	36
3"	45
4"	75
6"	135
8"	290

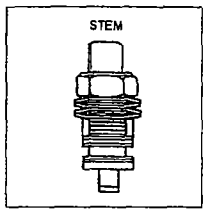
SIZE	A	B	C	D	E	F	N	G	H	I	J	K	W
1/2"	4 25	4.75	3 60	1 80	2 38	3 50	4	1 39	3/8-24 UNF	22	28	63	M5
3/4"	4 62	4 75	3 75	2 00	2 75	3 85	4	1 39	3/8-24 UNF	22	.28	63	M5
1"	5 00	6 22	3 75	2 12	3 13	4 25	4	1 39	7/16-20 UNF	30	30	90	M6
1-1/2"	6.50	9 00	4 50	2 76	3 56	5 00	4	1 94	9/16-18 UNF	35	.42	1 18	M8
2"	7.00	9 00	4 80	3 08	4 75	6 00	4	1 94	9/16-18 UNF	35	42	1 18	M8
2-1/2"	7.50	13 75	6 70	3 09	5.50	7 00	4	2 84	M20	55	55	1 83	M10
3"	8 00	13.75	7 00	3.74	6 00	7 48	4	2 84	1-14 UNS	745	66	1 83	M10
4"	9 00	13 75	7.70	4.46	7 50	9 01	8	2 84	1-14 UNS	.745	66	1 83	M10
6"	15 50	38.97	11 22	7 61	9 50	10 98	8	3 89	1 02	1 64	1 46	3 00	M12
8"	18 00	38 97	11 57	8 34	11 75	13 50	8	4 59	1 02	1.64	1 46	3 00	M12

1/2" - 4"



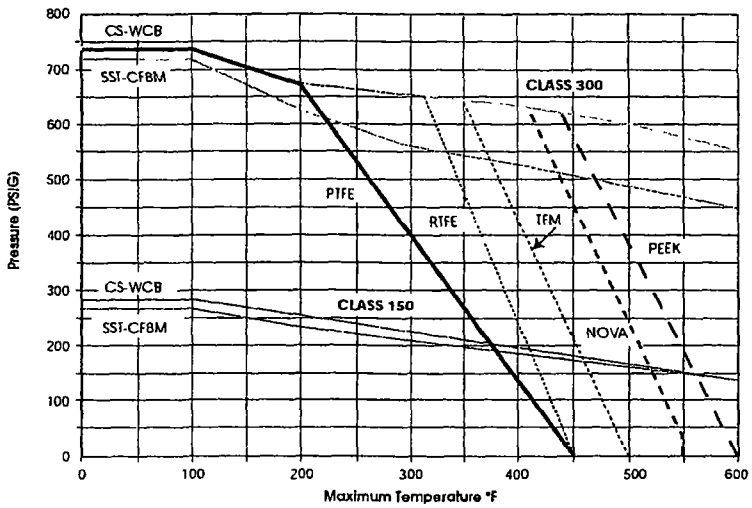
6" - 8"





1/2" - 4"
STEM ARRANGEMENT
FOR ACTUATORS

SEAT PRESSURE/TEMPERATURE RATING SERIES 50



HOW TO ORDER

VALVE SIZE	VALVE SERIES	CLASS	ALLOY	SEATS	OPTIONS
1/2" 3/4" 1" 1-1/2" 2" 2-1/2" 3" 4" 6" 8"	50	150# = 11	2 = Alloy 20 4 = Carbon Steel 6 = Stainless Steel 5 = Hastelloy C 3 = Monel	T = TFE R = RTFE N = NOVA P = Peek M = TFM™	X = Oxygen Service OH = Oval Handle F = Fugitive Emissions Certified ANSI 593 00 01 E = Extended Stem L = Lockable Extended Stem D = Leak detection Stem GO = Gear Operator 7 = 17- 4PH Stem A = Nace

3/4" 50 11 6 T X

SHARPE® VALVES

A DIVISION OF Sharon

Toll-Free 1-877-7SHARPE
E-Mail:sharpediv@aol.com
www.sharpevalves.com

504 West Wrightwood Ave.
Elmhurst , IL 60126

CALGON CARBON CORPORATION	BALL VALVES MATERIAL SPECIFICATION	SPEC NO:
	STAINLESS STEEL END ENTRY REGULAR PORT BALL VALVE	4.57

MATERIAL: Stainless steel end entry regular port ball valve with blowout proof stem and seat retainer design to permit valve to be dead ended in either flow direction. ASTM A-296, Grade CF8M Type 316 stainless steel body, ball and stem, TFE seats and seals, wrench operated, threaded ends. Screwed body inserts or tail pieces not acceptable.

RATING: 80 PSIG @ 400 DEG. F. or 1500 PSIG @ 150 DEG. F.

MANUFACTURER: Modentic, Sharpe Valve #54576, Jamesbury, or equal.

SIZES: 1/4" thru 2"

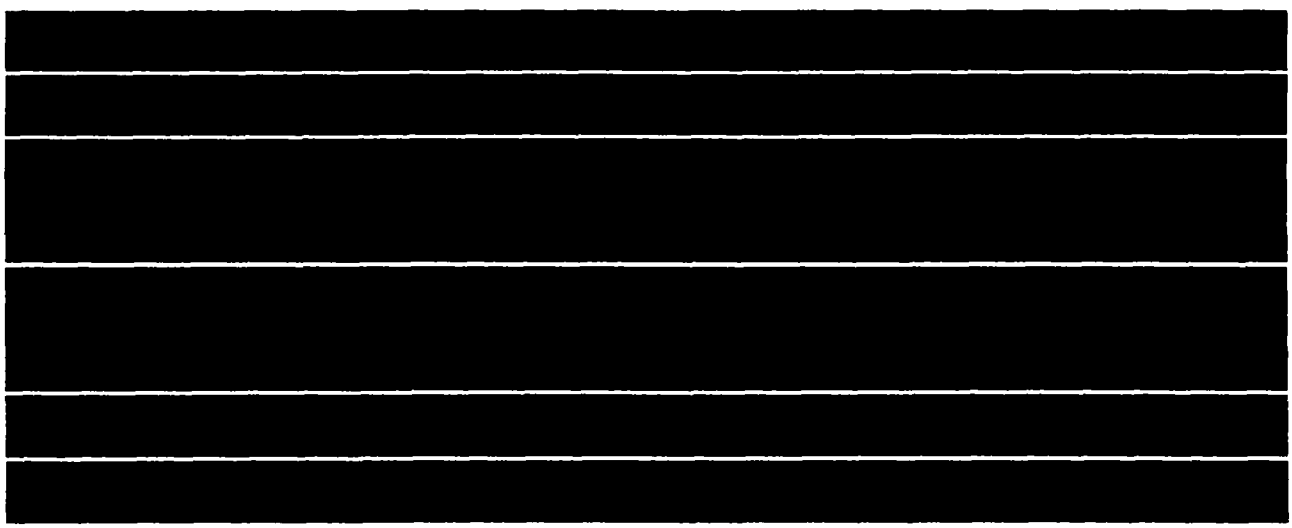
MODELS: Modentic Figure No. V-008, Jamesbury Bulletin 210, Trueline - N600LL, or equal

Issue Date 01/01/89 Revision Date 09/15/99

Approved by Joseph P McMahon on 07/17/2001

CCC SPEC. 4.57

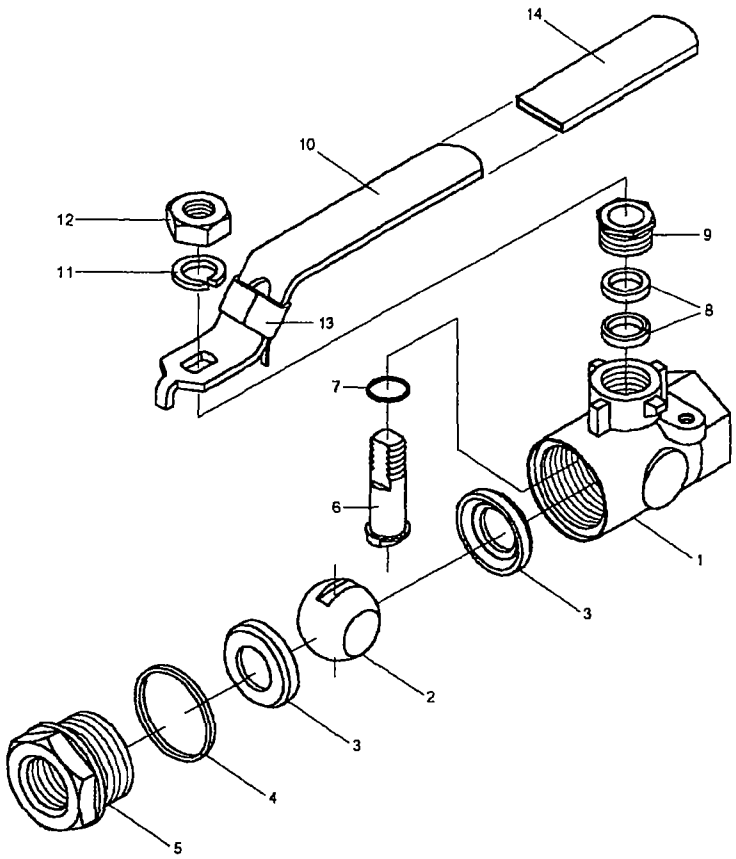
SHARPE® VALVES



SERIES 5457
THREADED STANDARD PORT BALL VALVE

SERIES 5457
VALVE PARTS AND IDENTIFICATION

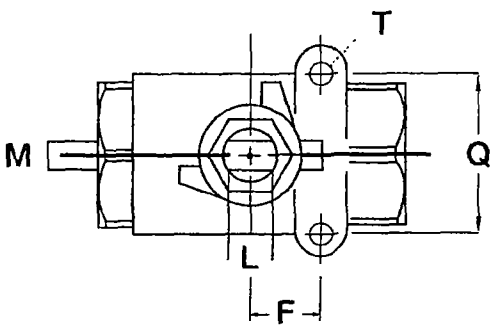
ASTM-A216
ASTM-A351
1/4" - 1" 2000 lb. WOG
1-1/4" - 2" 1500 lb. WOG
LOCKING DEVICE
ACTUATOR MOUNTING PAD
STANDARD PORT
BLOWOUT PROOF STEM
STEAM RATINGS: (SATURATED)
WITH REINFORCED TEFLON
SEATS 150 WSP
WITH NOVA SEATS 250 WSP



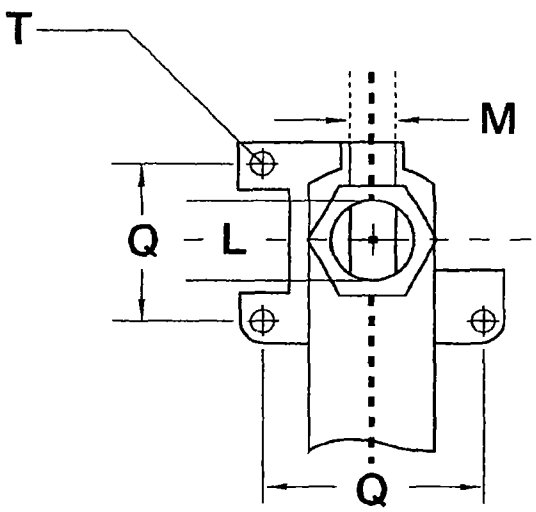
PART NO.	PART	QTY.	MATERIAL
1	Body	1	ASTM-A216 WCB ASTM-A351 CF8M
2	Ball	1	316 Stainless Steel
3	Seat	2	RPTFE / NOVA
4	Body Seal	1	PTFE / Graphite
5	End Plug	1	ASTM-A216 WCB ASTM-A351 CF8M
6	Stem	1	316 Stainless Steel
7	Thrust Washer	1	PTFE
8	Stem Packing	2	PTFE / Grapholl
9	Packing Nut	1	Stainless Steel - 316
10	Handle	1	Stainless Steel - 304
11	Lock Washer	1	Stainless Steel - 304
12	Handle Nut	1	Stainless Steel - 304
13	Locking Device	1	Stainless Steel - 304
14	Handle Sleeve	1	Plastic

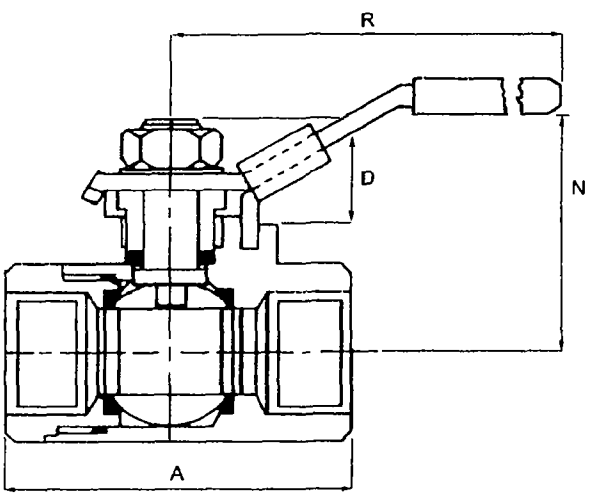
SERIES 5457
VALVE DIMENSIONS

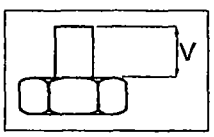
1/4" - 1"



1-1/4" - 2"







1/4" - 2"
STEM ARRANGEMENT
FOR SERIES 5457

SIZE	A	D	N	R	Q	F	M	L	T	V	PORT SIZE	APPROX. WEIGHT
1/4"	2 25	0.95	1.75	4.00	1.10	0 45	0.22	0.30	10 - 24	0 30	0 50	0 60
3/8"	2 25	0 95	1 75	4 00	1 10	0 45	0 22	0 30	10 - 24	0.30	0.50	0.60
1/2"	2 32	1 12	2 00	4 00	1 10	0 45	0 22	0 30	10 - 24	0 32	0.50	0.55
3/4"	3.12	1 20	2 20	5 00	1.35	0 85	0 25	0 42	10 - 24	0.35	0.70	1 10
1"	3.37	1 20	2 45	5 00	1 35	0.85	0 25	0 42	10 - 24	0 35	0.88	1 50
1-1/4"	4 10	1.06	3 40	5 75	1 40*	—	0 37	0.61	1/4 - 20	0.50	1.00	2 75
1-1/2"	4 35	1.10	3.40	5 75	1 40*	—	0.37	0 61	1/4 - 20	0.50	1.25	3.50
2"	5.40	1 10	3 75	5 75	1 40*	—	0.37	0 61	1/4 - 20	0 50	1 50	5 25

CV* DATA

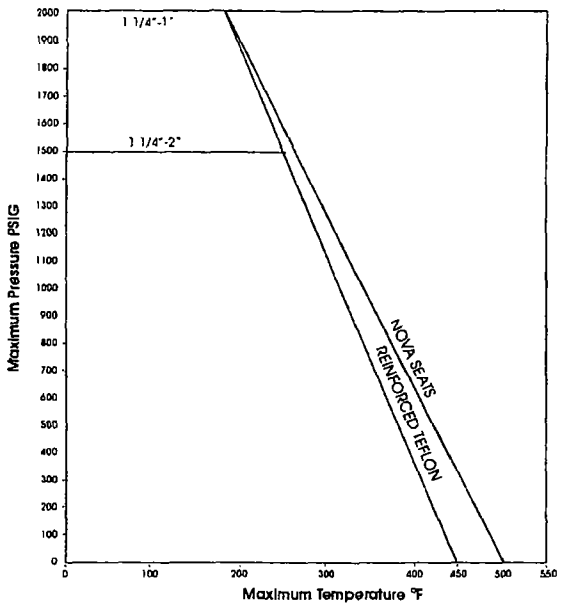
1/4"	6
3/8"	6
1/2"	9
3/4"	24
1"	35
1-1/4"	47
1-1/2"	81
2"	105

*CV: The volume of water in gal /min that will pass through a given valve with a pressure drop of 1 PSI

CCC SPEC. 4.57

SHARPE® VALVES

PRESSURE TEMPERATURE RATINGS



HOW TO ORDER

VALVE SIZE	VALVE SERIES	BODY & ENDS	SEAT & SEAL
1/4" 3/8" 1/2" 3/4" 1" 1-1/4" 1-1/2" 2"	5457	4 = Carbon Steel 6 = Stainless Steel	RT Seats PTFE Seals as Standard N = Nova Seats/ Grapholl Seal

3/4" **5457** **4** **N**

SHARON PIPING & EQPT., INC.

Toll-Free 1-877-7SHARPE
Web Site: www.sharpevalves.com

1260 Garnet Drive
Northlake, Illinois 60164 U.S.A

CALGON CARBON CORPORATION	STEAM TRAPS, DRAINERS, AIR ELIMINATORS MATERIAL SPECIFICATION	SPEC NO:
	AUTOMATIC AIR VENT AND VACUUM BREAKER	21.94

MATERIAL:
Automatic Air Vent and Vacuum Breaker. Cast iron body with stainless steel float, brass and stainless steel trim, female NPT threaded inlet and outlet.

MANUFACTURER:
Multiplex Manufacturing Company, 600 Fowler Ave., Berwick, Pa. 18603, or equal.

SIZES:

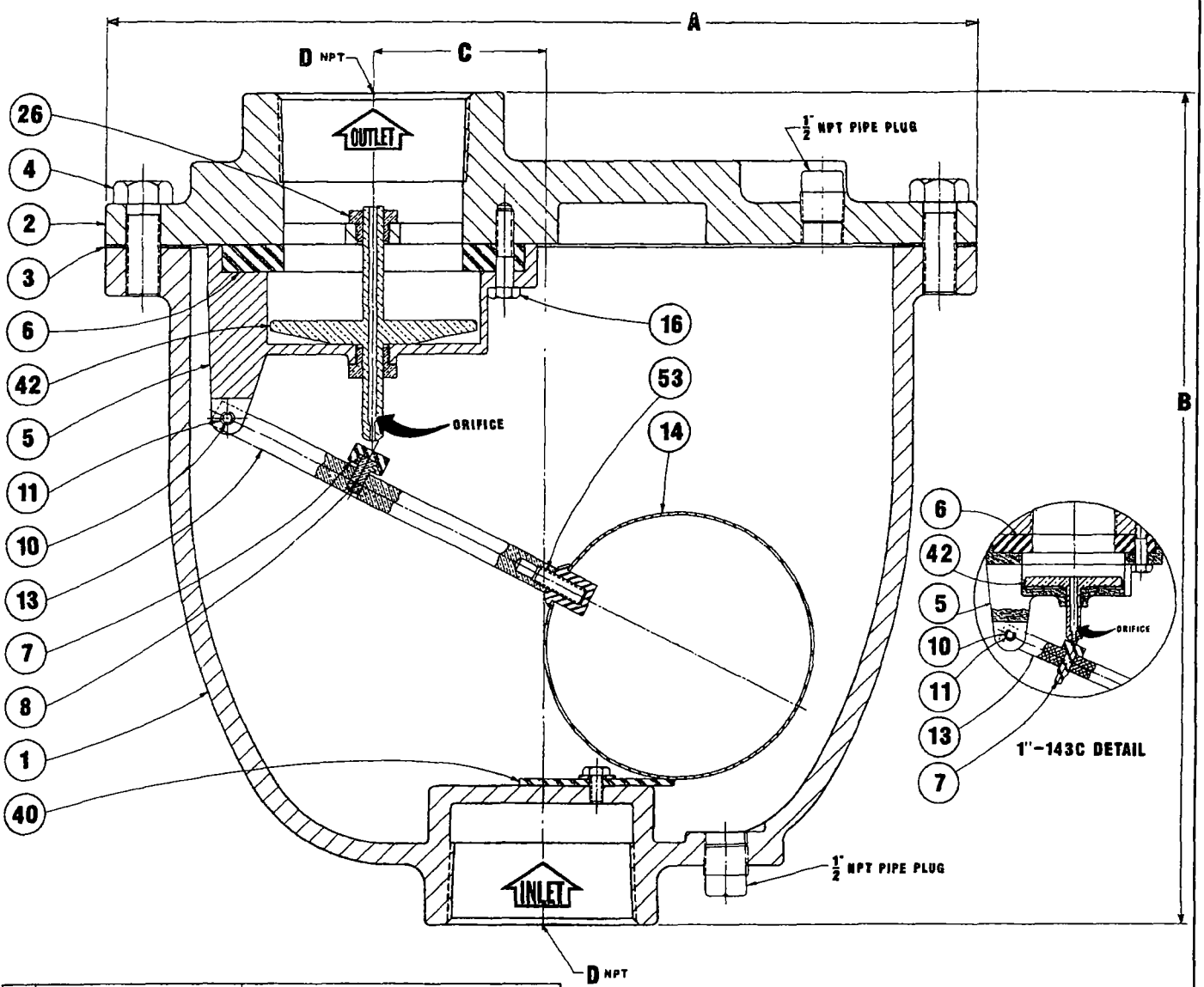
SIZES	MODEL NO.	ORIFICE DIAMETER	WORKING PRESSURE
1"	U-10	3/16"	0-125 PSIG
1"	U-10	5/32"	0-200 PSIG
1"	U-10	1/8"	0-250 PSIG
1"	U-10	3/32"	0-300 PSIG
2"	U-20	1/4"	0-165 PSIG
2"	U-20	3/16"	0-250 PSIG
2"	U-20	1/8"	0-300 PSIG
3"	U-30	1/8"	0-300 PSIG
4"	U-40	1/8"	0-300 PSIG

MODELS: Crispin Universal Air Valve, or equal

Issue Date 01/01/89 Revision Date 06/25/90

Approved by Matthew R McGowan on 07/24/2000

COMBINATION AIR VALVE



DET	DESCRIPTION	MATERIAL
1	BODY	CAST IRON ASTM A126 GR B
2	COVER	CAST IRON ASTM A126 GR B
3	COVER GASKET	LEXIDE (non-asbestos)
4	COVER BOLTS	STEEL ASTM A307 GR. B
5	LEVERAGE FRAME[1]	CAST IRON ASTM A126 GR. B
6	SEAT	BUNA-N
7	NEEDLE	BUNA-N
8	NEEDLE PIN[2]	STAINLESS STEEL ASTM A581 T416 H.T
10	LEVER PIN	STAINLESS STEEL ASTM A581 T303
11	RETAINING RING	STAINLESS STEEL PH15-7Mo
13	FLOAT LEVER	BRASS ASTM B16
14	FLOAT	STAINLESS STEEL ASTM A240 T304
16	LEVERAGE FRAME SCREW	STAINLESS STEEL 18-8
26	GUIDE BUSHING	BRASS ASTM B16
40	BUMPER ASSEMBLY	BUNA-N
42	PLUG	BRASS ASTM B124
53	FLOAT RETAINING SCREW	STAINLESS STEEL 18-8

1 STANDARD MATERIAL ON SIZE 1 AND 2" IS DELRIN ASTM D2133 AND GUIDE BUSHING IS NOT REQUIRED ON THE FRAME
2 NEEDLE PIN IS NOT REQUIRED ON SIZES 1 AND 2

AVAILABLE WITH 125 LB. OR 250 LB. FLANGE INLET
SPECIFY WORKING PRESSURE____PSI
DESIGN FOR 300 PSI MAX NON-SHOCK SERVICE

SIZES	MODEL No	A	B	C	D	WIDTH	LARGE ORIFICE	SMALL ORIFICE	APPROX. WT., LB.
1"	143C	11	10	$2\frac{1}{2}$	1	7	1	$\frac{5}{64}$	35
2"	145C	14	$12\frac{3}{16}$	3	2	8	2	$\frac{3}{32}$	75
3"	147C	16	$15\frac{7}{16}$	$3\frac{1}{8}$	3	10	3	$\frac{3}{32}$	100
4"	149C	18	$17\frac{1}{16}$	$3\frac{3}{4}$	4	11	4	$\frac{3}{32}$	170

CERTIFIED BY: _____

DATE: _____

DATE		DRWG. NO.
09-01-03	APCO Willamette VALVE AND PRIMER CORPORATION	**S-140C**

SPECIFICATIONS OTHER SIDE

September 1, 2003

APCO® SPECIFICATIONS

SERIES 140C COMBINATION AIR VALVES

Combination Air Valve (single body, double orifice) allows large volumes of air to escape out the larger diameter air vacuum orifice when filling a pipeline and closes water tight when the liquid enters the valve. During large orifice closure, the smaller diameter air release orifice will open to allow small pockets of air to escape automatically and independently of the large orifice.

The large air & vacuum orifice shall also allow large volumes of air to enter through the orifice during pipeline drainage to break the vacuum. The body inlet must be baffled to protect the lower float from direct contact of the rushing air and water to prevent premature valve shut-off. The top large orifice plug must be protected in similar manner for the same purpose.

The Buna-N seat must be fastened to the valve cover without distortion, for drop tight shut-off. The float shall be heavy stainless steel, hermetically sealed, designed to withstand a minimum of 1000 psi (static). The top plug shall be center guided thru hex bushings for positive shut-off.

Valve exterior to be painted Universal Primer for high resistance to corrosion.

The cross sectional area of the discharge orifice must be equal to the cross sectional area of the valve inlet size.

All materials of construction shall be certified in writing to conform to A.S.T.M. specifications as follows:

Body & Cover	Cast iron	ASTM A126 Gr.B
Float*	Stainless Steel	ASTM A240 T304
Needle & Seat	Buna-N	
Plug	Brass	ASTM B124
Leverage Frame [1"&2"]	Delrin	ASTM D4181
[3"&4"]	Cast iron	ASTM A126 Gr. B

*** Float design may vary on certain sizes**

Note: Other materials available.

Valve to be APCO Series 140C Combination Air Valve, as maunufactured by Valve & Primer Corporation, Schaumburg, Illinois, U.S.A.

APCO Willamette
VALVE AND PRIMER CORPORATION
1420 S Wright BLVD Schaumburg, IL 60193-4599
847-524-9000 FAX 847-524-9007 800-323-6969
WEBSITE www apcovalves com EMAIL factory@apcovalves.com

CALGON CARBON CORPORATION	STRAINERS MATERIAL SPECIFICATION	SPEC NO:
	SAMPLE PORT SEPTUM, TYPE 316 STAINLESS STEEL	22.27

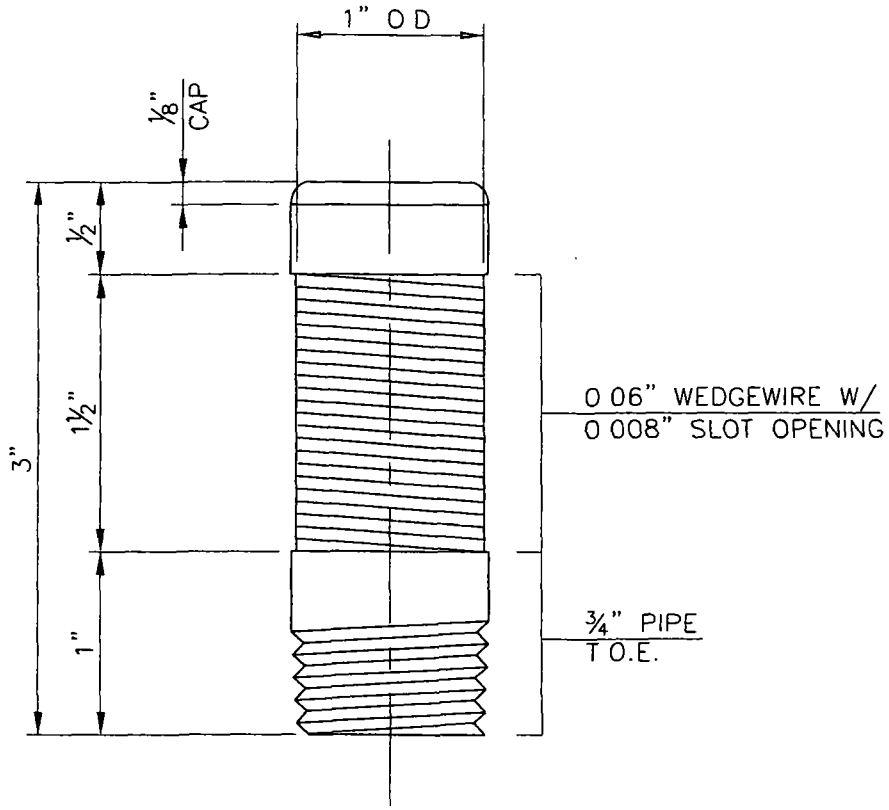
MATERIAL: Sample port septum, Type 316 stainless steel, 0.060" wedge wire with 0.008" slot openings. Septum to be 1".O.D. x 1-1/2" long with 3/4" MNPT end fitting 1" long, TOL 2-3/4".

MANUFACTURER: Johnson Division - UOP Co., Orthos or approved equal.

NOTES: revised to 0.008" slot from 0.012" to account for use of 20x50 mesh carbon

Issue Date 04/06/90 Revision Date 07/14/93

Approved by Joseph P McMahon on 10/04/2002



MATERIAL: 316L STAINLESS STEEL

SAP NUMBER 1001381

	NAME	DATE
DRAFTER	JFS	5-12-05
DESIGNER		
CHECKER		
APPROVAL		
PROJECT No	STANDARD	

REV	DESCRIPTION	APP	DATE
1	REVISED SLOT OPENING & MATL ADDED SAP		8/5/08
0			10-3-07

REVISIONS

CALGON

CALGON CARBON CORPORATION

CLIENT

TITLE
SAMPLE PORT
SEPTA DETAIL
CCC SPEC. 22 27

DWG Size	SHEET No	SCALE
A	1 OF 1	NONE

DWG No 90-07-0014 REV 0

V:\Products\Septa\90070014 Spec 22.27 dwg Aug 05, 2008 - 7.46am

CALGON CARBON CORPORATION	STRAINERS MATERIAL SPECIFICATION	SPEC NO:
	BASKET STRAINER, TYPE 316 STAINLESS STEEL	22.53

MATERIAL: Perforated basket strainer (Carbon Retainer) for 150 lb. Raised Face Flanges, type 316 stainless steel construction. Basket is to be Fabricated from 14 Gage 316 stainless steel with 1/8" holes drilled on 3/16" centers and covered with 40 mesh 316 stainless steel screen, this will then be covered by a 4 mesh 316 stainless steel support screen (0.063" wire diameter).

RATING: Support Screen is to be designed for 125 PSIG if plugged in forward or reverse flow.

MANUFACTURER: Mack Iron Works Company, or equal.

SIZES: 2" thru 12"

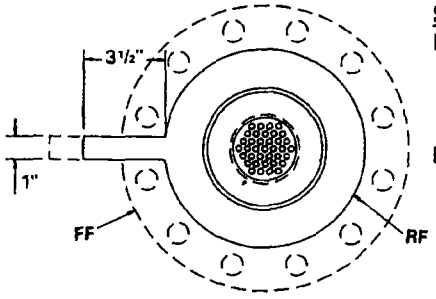
MODELS: Mack Iron Works Company Series PB-R/FF, Style PBL or equal.

Issue Date: 01/01/90 Revision Date 08/23/90

Approved by Matthew R McGowan on 06/16/99

THE MACK IRON WORKS COMPANY
124 WARREN ST. P.O. BOX 5931 SANDUSKY, OHIO 44871-5931
PHONE 419 626-6225 FAX 419 626-3362

PERFORATED BASKET STRAINERS



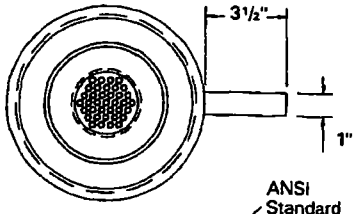
SERIES PB - RF/FF

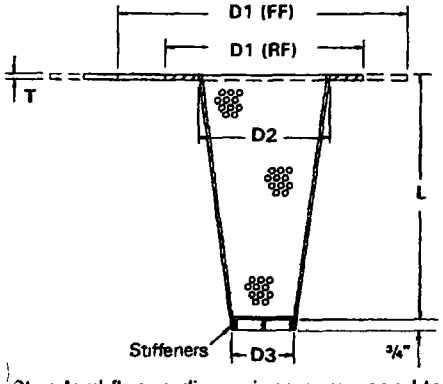
RF - for use with raised face flanges or flat face flanges. Strainer flange fits inside bolt holes.*

FF - for use with flat face flanges. Flange has bolt holes/circle matching mating flanges.*

SERIES PB - RJ

For use with ring joint flanges.

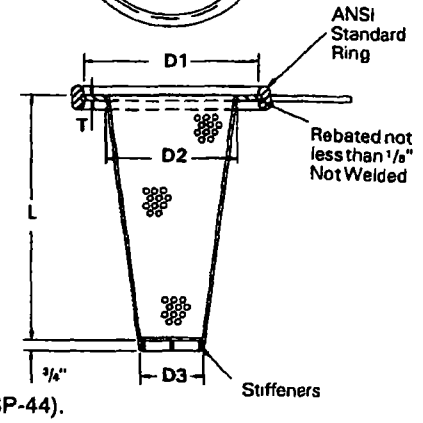




PBS=short pattern, 150% open area relative to flow area of same size std. wt. pipe. Based on 40% perf. plate.

PBL=long pattern, 200% open area relative to flow area of same size std. wt. pipe. Based on 40% perf. plate.

Standard Material:
14 ga. perforated plate
1/8" holes on 3/16" centers
40% open area, 33 holes/sq. in.



Standard flange dimensions correspond to ASME/ANSI B16.5 and B16.47 Series A (MSS SP-44).

Pipe Size	D1 RF 150	D1 RF 300	D1 RF 600	D1 FF 150	D1 FF 300	D1 FF 600	D1 RJ 300 600	D2	D3	L 150% Open Area PBS	L 200% Open Area PBL	T RF FF	T RJ	Approx. Weight PBS	Approx. Weight PBL
¾	2⅛	2½	2½	3⅞	4⅝	4⅝	1⅜	⅝	¾	1½	2	14 GA	14 GA	.5	.5
1	2½	2¾	2¾	4¼	4⅛	4⅞	1 1⁵⁄₁₆	⅞	½	1½	2	"	"	.5	.5
1¼	2⅞	3⅛	3⅛	4⅝	5¼	5¼	2¼₆	1	¾	2	3	"	"	.5	.5
1½	3⅛	3½	3½	5	6⅛	6⅛	2¾	1¼	¾	2½	3½	"	"	.5	.5
2	3⅝	4⅛	4⅛	6	6½	6½	2¹³⁄₁₆	1¾	1¼	2½	3½	"	"	.5	.75
2½	4⅛	4⅞	4⅞	7	7½	7½	3⅜	2¼	1½	3	4	"	"	.75	.75
3	5⅛	5⅝	5⅝	7½	8¼	8¼	4¼₆	2¾	2	3½	4½	"	"	1	1.5
3½	6⅛	6⅛	6⅛	8½	9	9	4¾	3¼	2½	4	5½	"	"	1.5	1.75
4	6¾	6¾	7⅜	9	10	10¾	5⅞₆	3½	2½	4½	6	"	11 GA	1.75	2
5	7½	8¼	9¼	10	11	13	6¹⁵⁄₁₆	4⅝	3½	5½	7½	"	"	3	3.5
6	8½	9⅝	10¼	11	12½	14	7⅛	5½	4	6½	9	"	"	3.5	4
8	10⅝	11⅞	12⅝	13½	15	16½	10⅜₆	7⅛	5⅝	8½	12	"	"	5	6
10	13¼	14	15½	16	17½	20	12⅝₆	9	7¼	10	14	"	"	7	10
12	15⅞	16⅝	17¾	19	20½	22	14⅝₆	10⅞	8⅛	12	16½	"	"	9	12
14	17½	18¾	19¼	21	23	23¾	16⅛₆	12¾	10⅛	13	17	11 GA	"	12	14
16	20	21	22	23½	25½	27	18⅛₆	14½	11¾	14	20	"	"	14	17
18	21⅛	23¼	23⅞	25	28	29¼	20⅝₆	16⅜	13½	16	22	"	"	17	21
20	23¾	25½	26⅛	27½	30½	32	22½	18⅜	15	18	25	"	"	28	30
24	28	30¼	30⅞	32	36	37	26⅝	22¾	18	21	30	"	"	35	40
30	34¼	37⅛	37¾	38¾	43	44½	33	28½	20	30	40	"	"	46	60
36	40¾	43½	44	46	50	51¾	39¾	34½	26	34	46	"	"	78	100

Larger sizes (above 36") and heavier flange ratings available on request.

Dimensions - inches

JUST IN TIME DELIVERY

Dedicated to meeting your timely pipeline strainer needs, ***Mack Iron can ship the following perforated basket strainers to you within 24 hours of your order:***

Carbon Steel PBS - 150# RF and 300# RF - sizes 1-1/2", 2", 3", 4", 6", 8", 10", 12"
304 Stainless Steel PBS - 150# RF - sizes 1-1/2", 2", 3", 4", 6", 8", 10", 12"
Carbon Steel PBL - 150# RF - sizes 1-1/2", 2", 3", 4", 6", 8", 10", 12"

CALGON CARBON CORPORATION	STRAINERS MATERIAL SPECIFICATION	SPEC NO:
	FILTER NOZZLE, POLYPROPYLENE	22.96

MATERIAL: Filter nozzle, 0.012" (0.3mm) slot size, M24 thread x 45mm long stem complete with MUZ slots. Base shoulder is 10 mm in length. Furnish MUZ type nut and washer, and a 2.5"O.D x 1-1/8" I.D. x 1/8" thick white Buna N (FDA approved) gasket. All plastic parts shall be manufactured from virgin polypropylene. All polypropylene parts to be colored green. Calgon Carbon Logo and Spec. Number to be molded on the top.

MANUFACTURER: Orthos, or equal

MODELS: Type C2, or equal.
Kit Number: N11031
Nozzle Part Number: C2.0.3.M24.45.MUZ.PP

Issue Date: 12/01/89 Revision Date: 07/31/2003

Approved by Joseph P McMahon on 08/21/2003

Technical Information

Design

For general purposes the filter nozzles should be placed on 6" centers, with 8" centers being the maximum recommended (subject to the filter media, single or multi-layer, depth of bed, etc) The filter nozzles are available in a wide variety of slot sizes to suit the media, and airtubes and tailpipes for air or water backwash can be provided as required

Consistency of the Material

Filter nozzles made of polypropylene are resistant to many chemicals including the following examples

@ 140°F / 60°C

- ammonia 10%
- formaldehyde 10%
- isopropanol all concentrations
- methanol 50%
- caustic soda solution 50%
- hydrochloric acid 10%
- sulfuric acid 10%
- soda water
- ozone (68°F/20°C, 50 pphm)

In addition to virgin polypropylene (max temperature 140°F), all filter nozzles are also available in glass fiber reinforced polypropylene (max temperature 230°F) and Kynar (max temperature 275°F). Other available materials include stainless steel, alloy 20 and hastelloy

Installation Specifications

Recommended Torque	4 0 ft. lbs
Max RPM	430

In lower temperatures polypropylene becomes more brittle If nozzles are to be installed in cold weather, we recommend that all polypropylene materials are first warmed before installation

When using with hot water (max continuous temperature up to 230°F / 110°C, polypropylene with chemically combined 30% glass fiber is recommended

PVDF is recommended for hot water with a continuous temperature of up to 275°F / 135°C (Conditionally resistant to concentrated caustic solutions)

Color Coded Polypropylene Nozzles

Slot Size	Color
0 2	ivory
0 3	green
0 35	white
0 5	grey
0 7	yellow
0 8	blue
1 0	black
1 5	orange
2.0	green

All specifications are subject to change without notice

Conversion Chart

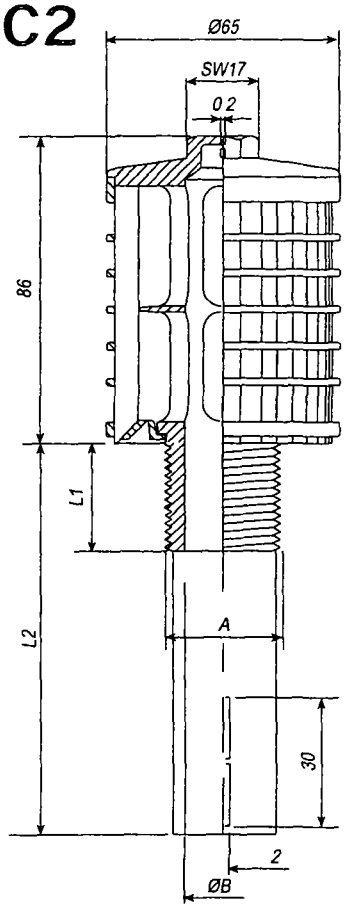
Multiply units in left column by proper factor below

LENGTH	in.	ft.	mm	cm	m
1 inch	1	0.0833	25.4	2 540	0.0254
1 foot	12	1	304.8	30 48	0.3048
1 millimeter	0 0394	0.0033	1	0.100	0.001
1 centimeter	0.3937	0.0328	10	1	0 01
1 meter	39 37	3 281	1000	100	1
AREA	**in.²**	**cm²**			
1 inch²	1	6.452			
1 centimeter²	0.1550	1			
VOLUME	**liter**	**U.S. gal.**			
1 liter	1	0 2642			
1 U S gallon	3.785	1			
VOLUME RATE	**gallon/min.**	**m³/hr.**	**liter/hr.**		
1 gallon/minute	1	0 227	227		
1 m³/hour	4.403	1	1000		
1 liter/hour	0.063	0.001	1		
PRESSURE	**lbs./in.²**	**ft. water at 39.2°F**	**bar**		
1 pound/in ²	1	2 307	0 069		
1 foot water	0 4335	1	0 0299		
1 Bar	14.50	33 45	1		

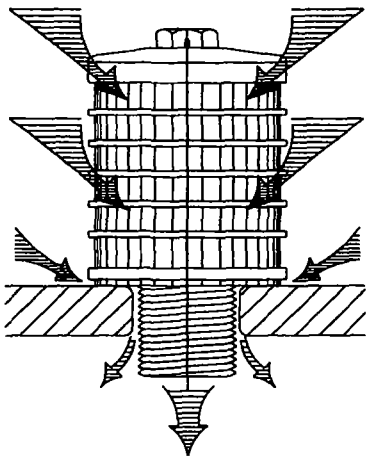
Filter Nozzles

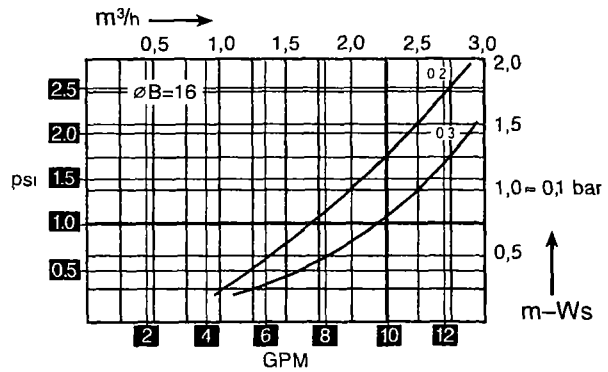
CCC SPEC. 22.96

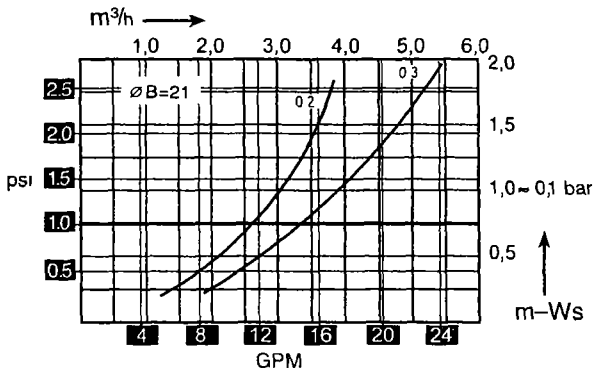
Model C2



All dimensions in mm
unless otherwise noted







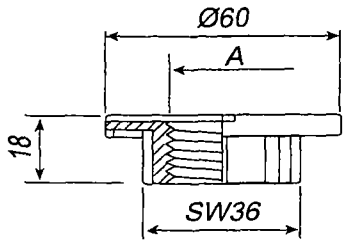
Model C2 Ordering Information

Slots	Thread	ØA	Thread Length — L1	Shaft — L2	ØB
36 x 0 2 = 3.70 cm²	3/4" NPT				16 = 2 00 cm²
→ 36 x 0 3 = 5 50 cm²	1" NPT				21 = 3.40 cm²
	→ M24	24	20, 45, + 5 + 5.	L1, 80, 110, 140, 200, *up to* 400	16 = 2 00 cm²
	1" WW	25 4	45	L1, 80, 110, 140, 200, *up to* 400	16 = 2 00 cm²
	1-1/4" WW	32	20, 30, 45,	L1, 80, 110, 140, 200, *up to* 400	21 = 3 40 cm²
	G3/4"	26 5	20, 45, + 5 + 5	L1, 80, 110, 140, 200, *up to* 400	16 = 2 00 cm²

Nuts / Washers / Expanding Rings

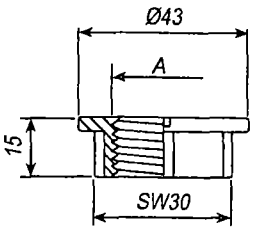
CCC SPEC. 22.96

Model MU60

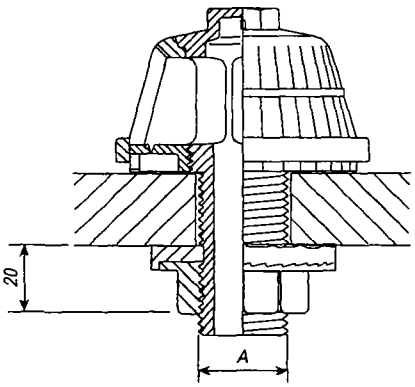


All dimensions in mm unless otherwise noted

Model MU43



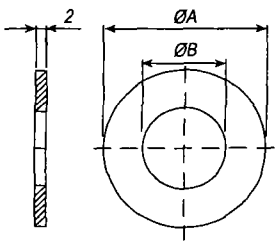
Model MUZ



Ordering Information (Nuts)

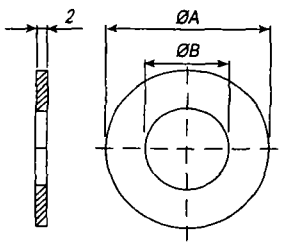
Model #	Thread (A)
MU60	1-1/4" WW, 1" WW, M24
MU43	1" WW, M24, M20
MUZ	M24

Model DP



All dimensions in mm unless otherwise noted

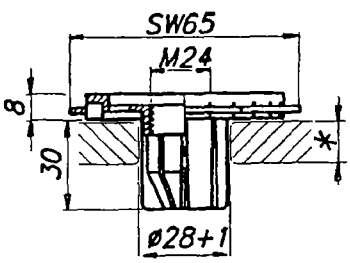
Model DG

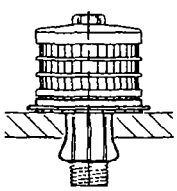


Ordering Information (Washers)

Model #	ØA	ØB	Material
DP	50	32	PP
	70	30	
		27	
		25	
		21	
DG	50	32	Rubber
	70	27	
		25	
		21	

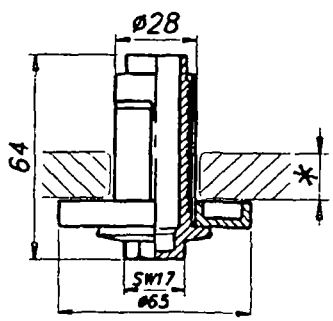
Model DB65

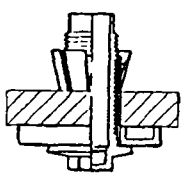




All dimensions in mm unless otherwise noted

Model KSPB





Ordering Information (Expanding Rings)

Model #	Plate Thickness
DB65	8 - 12
	12 - 17
	17 - 22

Model #	Plate Thickness
KSPB	8 - 28
	25 - 45

CALGON CARBON CORPORATION	HOSE FITTINGS MATERIAL SPECIFICATION	SPEC NO:
	QUICK DISCONNECT MALE ADAPTER - ALUMINUM	32.60

MATERIAL: Quick disconnect male adapter, Aluminum, male NPT on one end with other end for connecting to quick disconnect female coupler.

RATING: 150 psig @ 100 DEG. F.

MANUFACTURER: Dixon, Ever-Tite

SIZES: 1/2" thru 4"

MODELS: Dixon "Andrews" line, type F, Ever-Tite Part F, or equal.

Issue Date. 04/16/90 Revision Date 09/15/99

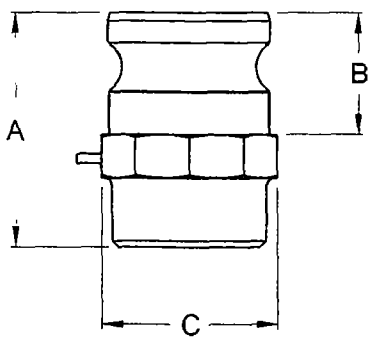
Approved by Matthew R McGowan on 09/27/99

6 Dixon "Andrews" / "Boss-Lock" Type F Adapters

Male Adapter x Male NPT

Size	Aluminum Part #	Aluminum Hard Coat Part #	Brass Part #	Unplated Malleable Iron Part #	Plated Malleable Iron Part #	Stainless Steel Part #
1/2"	50-F-AL	—	50-F-BR	—	—	50-F-SS
3/4" x 1/2"	7550-F-AL	—	7550-F-BR	—	—	7550-F-SS
3/4"	75-F-AL	—	75-F-BR	—	75-F-PM	75-F-SS
1"	100-F-AL	—	100-F-BR	—	100-F-PM	100-F-SS
1 1/4"	125-F-AL	—	125-F-BR	—	—	125-F-SS
1 1/2"	150-F-AL	150-F-ALH	150-F-BR	150-F-MI	150-F-PM	150-F-SS
2"	200-F-AL	200-F-ALH	200-F-BR	200-F-MI	200-F-PM	200-F-SS
2 1/2"	250-F-AL	—	250-F-BR	—	250-F-PM	250-F-SS
3"	300-F-AL	300-F-ALH	300-F-BR	300-F-MI	300-F-PM	300-F-SS
4"	400-F-AL	400-F-ALH	400-F-BR	400-F-MI	400-F-PM	400-F-SS
5"	500-F-AL	—	—	—	—	—
6"	600-F-AL	600-F-ALH	600-F-BR	—	600-F-PM	600-F-SS
8" AND*	800-F-AL	—	—	—	—	—
8" BL*	801-F-AL	—	—	—	—	—

* "Andrews" and "Boss-Lock" Cam and Groove Couplings **DO NOT INTERCHANGE IN THE 8" SIZE.** SAFETY ALERT
- The 8" "Boss-Lock" were designed to interchange with 8" Cam & Groove Couplings manufactured by P T. Coupling.



ALUMINUM, BRASS and MALLEABLE IRON DIMENSIONS

Size	1/2"	3/4 x 1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8" AND	8" BL
A Overall Length	2 1/8	2 7/16	2 1/16	2 3/8	2 15/16	3 5/32	3 17/32	4 3/8	4 15/32	4 21/32	4 1/2	5 17/32	6 15/16	6 3/8
B Adapter Length	1	1	1	1 5/16	1 9/16	1 5/8	1 7/8	1 15/16	2	2 1/16	2 5/16	2 1/4	3 9/16	3 1/16
C Distance Across Flats	1	1 5/16	1 3/8	1 1/2	1 7/8	2 1/4	2 11/16	3 1/4	3 3/4	5	6 1/2*	8 1/32*	10 5/8*	10 5/8*

STAINLESS STEEL DIMENSIONS

Size	1/2"	3/4 x 1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8" AND	8" BL
A Overall Length	2 1/8	2 1/4	2 1/16	2 23/32	2 15/16	3 1/8	3 21/32	4 5/16	4 17/32	4 59/64	------	4 15/16	------	------
B Adapter Length	1	1	1	1 5/16	1 9/16	1 5/8	1 7/8	1 15/16	2	2 1/16	------	2 1/4	------	------
C Distance Across Flats	1	1 5/16	1 5/16	1 1/2	1 7/8	2 1/4	2 11/16	3 1/4	3 3/4	5	------	7 3/4*	------	------

* Distance Over Lugs

CALGON CARBON CORPORATION	HOSE FITTINGS MATERIAL SPECIFICATION	SPEC NO:
	QUICK DISCONNECT ADAPTER - NYLON	32.45

MATERIAL: Quick Disconnect Adapter, nylon, male NPT on one end with other end for connecting to quick disconnect coupler.

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

MANUFACTURER: Dixon, NY-Last

SIZES: 1/2" thru 2"

MODELS: Dixon "Andrews" line - type F, NY-Last Style F, or equal

NOTES: Original Spec - Matt R. McGowan

Issue Date: 01/01/89 Revision Date 09/15/99

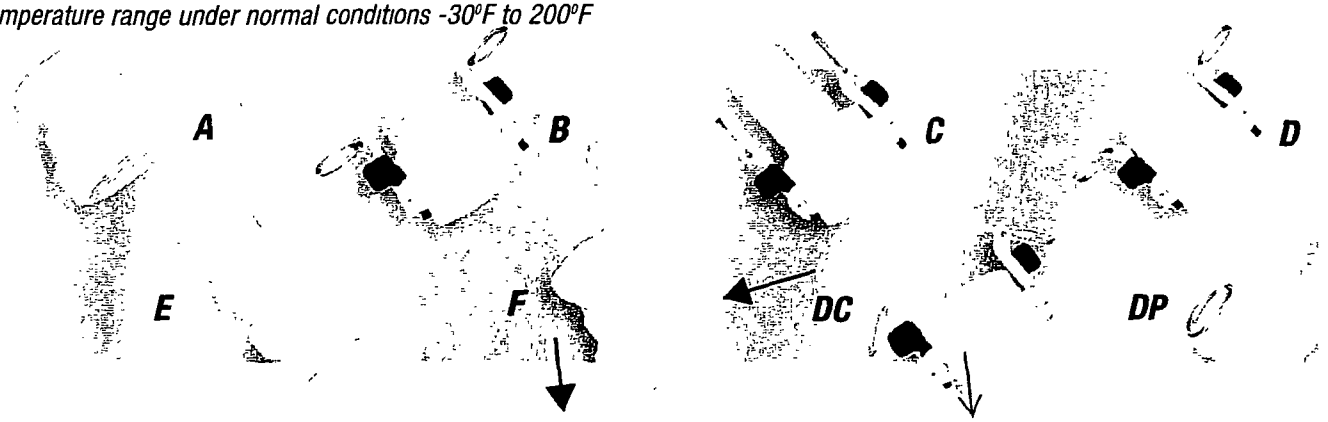
Approved by Gerald Kirner on 01/26/2006

COUPLERS & ADAPTERS

Nylon, Glass-Filled

FEATURES

- *Safety latches available on all couplers ranging in size from 1-1/4" to 4"*
- *Lightweight-1/2 the weight of aluminum*
- *Strong–resists cross threading, thread seizure and "out-of-round" condition*
- *Chemical resistant to most acids (Refer to chemical resistance table for specific recommendation)*
- *Non-conducting*
- *All couplers feature stainless steel handles & pins, blue nylon handles available*
- *Interchangeable with other couplers and adapters – manufactured to MIL-spec*
- *EPDM gaskets furnished standard. Buna-N, Viton and Neoprene also available*
- *Temperature range under normal conditions -30°F to 200°F*



ITEM	DESCRIPTION	1/4"	3/8"	1/2"	5/8"	3/4"	1"	1-1/4"	1-1/2"	2"	3"	4"	3"x 4"
A	Male Adapter/Female Thread	025 A-N	037 A-N	050 A-N		075 A-N	100 A-N	125 A-N	150 A-N	200 A-N	300 A-N	400 A-N	
	Std. Package — Qty	125	125	125		125	80	50	50	80	44	18	
	Std. Package — Wt.	7#	7#	7#		7#	7#	11#	9#	22#	18#	18#	
B	Female Coupler/Male Thread			050 B-N		075 B-N	100 B-N	125 B-N	150 B-N	200 B-N	300 B-N*	400 B-N	
	Std. Package — Qty.			100		100	80	60	60	50	25	20	
	Std Package —Wt.			14#		15#	14#	27#	27#	26#	25#	28#	
C	Female Coupler/Hose Shank			050 C-N	062 C-N	075 C-N	100 C-N	125 C-N	150 C-N	200 C-N	300 C-N	400 C-N	430 C-N
	Std Package — Qty.			100		90	60	65	65	44	18	12	—
	Std Package — Wt.			15#		14#	11#	33#	32#	27#	22#	21#	—
D	Female Coupler/Female Thread	025 D-N	037 D-N	050 D-N		075 D-N	100 D-N	125 D-N	150 D-N	200 D-N	300 D-N*	400 D-N	
	Std. Package — Qty.	100	100	100		100	60	70	70	50	25	16	
	Std. Package — Wt.	16#	16#	16#		16#	11#	37#	35#	29#	21#	24#	
E	Male Adapter/Hose Shank			050 E-N	062 E-N	075 E-N	100 E-N	125 E-N	150 E-N	200 E-N	300 E-N	400 E-N	
	Std Package — Qty.			125		75	45	50	45	30	32	16	
	Std. Package — Wt.			5#		5#	5#	9#	8#	9#	18#	18#	
F	Male Adapter/Male Thread			050 F-N		075 F-N	100 F-N	125 F-N	150 F-N	200 F-N	300 F-N	400 F-N	
	Std Package — Qty			90		90	100	120	120	75	33	12	
	Std. Package — Wt.			5#		5#	10#	23#	23#	22#	20#	11#	
DC	Female Coupler Cap					075 DC-N	100 DC-N		150 DC-N	200 DC-N	300 DC-N	400 DC-N	
	Std Package — Qty.					125	80		80	70	30	20	
	Std. Package — Wt.					18#	13#		37#	35#	28#	22	
DP	Male Adapter Plug					075 DP-N	100 DP-N		150 DP-N	200 DP-N	300 DP-N	400 DP-N	
	Std. Package — Qty.					150	100		45	25	25	36	
	Std. Package — Wt.					8#	7#		6#	6#	10#	23#	

* Coupler supplied with rings only

Size	*Operating Pressure*
1/4"-1"	*175 psi max @ 70° F*
11/4"-2"	*150 psi max @ 70° F*
3"	*100 psi max @ 70° F*
1"	*50 psi max @ 70° F*

- On 1/4", 3/8" & 1/2" sizes the coupler and adapter portion is to 3/4" standard
- On 1-1/4" size the coupler and adapter is to 1-1/2" standard.
- British thread also available.

WARNING: *Do not operate couplings under pressure or with liquid in the lines To prevent accidental opening fully engage and secure handles prior to pressurizing*

BEE VALVE INC.

CALGON CARBON CORPORATION	HOSE FITTINGS MATERIAL SPECIFICATION	SPEC NO:
	UNIVERSAL HOSE COUPLING - STAINLESS STEEL	32.68

MATERIAL: Universal Hose Coupling, Stainless Steel, male pipe thread on one end with other end for connecting to universal coupling.

RATING: 90 psig @ 140 DEG. F.

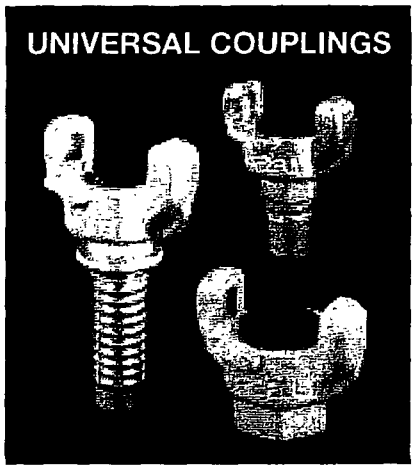
MANUFACTURER: Air King, or equal.

SIZES:
3/8" - RAMB
1/2" - RAM2
3/4" - RAM7
1" - RAM12

NOTE: Above model number includes one standard type rubber gasket No. AWR4 for air service. For water service use neoprene gasket AWS6.

Issue Date: Revision Date 03/19/2007

Approved by Joseph P McMahon on 03/20/2007



HOSE END

Ductile Iron (machined serrations)

hose size	part number	list each
3/8	UH-38	8 37
1/2	UH-2	5.23
5/8	UH-58	7 98
3/4	UH-3	5 40
1	UH-4	7 22

Brass (machined serrations)

3/8	UHB-38	–
1/2	UHB-2	13 60
5/8	UHB-58	–
3/4	UHB-3	15 35
1	UHB-4	20.00

316 Stainless (machined serrations)

1/2	UHSS-2	48 74
3/4	UHSS-3	41 17
1	UHSS-4	45.50

FEMALE NPT

Ductile Iron

npt size	part number	list each
3/8	UF-38	7 22
1/2	UF-2	6 62
3/4	UF-3	6 23
1	UF-4	8 11

Brass

3/8	UFB-38	–
1/2	UFB-2	–
3/4	UFB-3	–
1	UFB-4	–

316 Stainless

1/2	UFSS-2	50 14
3/4	UFSS-3	43 46
1	UFSS-4	46.80

MALE NPT

Ductile Iron

npt size	part number	list each
3/8	UM-38	7 22
1/2	UM-2	6 01
3/4	UM-3	6 39
1	UM-4	7 17

Brass

3/8	UMB-38	–
1/2	UMB-2	–
3/4	UMB-3	–
1	UMB-4	–

316 Stainless

1/2	UMSS-2	50 14
3/4	UMSS-3	43 46
1	UMSS-4	46 80

BLANK END

Ductile Iron

size	part number	list each
All	UB	10 15

Brass

All	UBB	–

THREE WAY

Ductile Iron

size	part number	list each
All	UTW	18 75

Brass

All	UTWB	–

UNIVERSAL WASHER

Nitrile

size	part number	list each
All	UG	0.58

Never use Universal Washers in UniversaLock Couplings

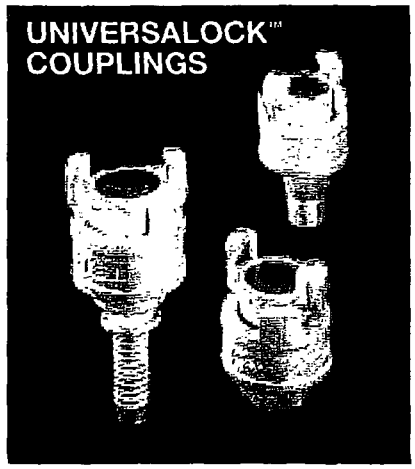
SAFETY CLIP

size	part number	list each
All	SC	0 26

TWO-BOLT UNIVERSAL CLAMP

Ductile Iron

hose o.d. min to max	part no.	list each
3/4 to 15/16	UC-2	5 78
1 to 1-1/4	UC-3	5 83
1-1/4 to 1-17/32	UC-4	10 08



DISTRIBUTOR AUTHORIZATION

Safety is of paramount concern to everyone. Due to the volatile nature of compressed air, and in accordance with our ISO 9000 quality system, we reserve the right to restrict sales of our UniversaLock® Couplings to only those distributors authorized by Campbell Fittings.

Please contact our customer service department for more information.

HOSE END

Ductile Iron (machined serrations)

hose size	part number	list each
1/2	ULH-2	19 90
3/4	ULH-3	19 90
1	ULH-4	19 90

MALE END

Ductile Iron

npt size	part number	list each
1/2	ULM-2	19 90
3/4	ULM-3	19 90
1	ULM-4	19 90

FEMALE END

Ductile Iron

npt size	part number	list each
1/2	ULF-2	19 90
3/4	ULF-3	19 90

UNIVERSALOCK WASHER

Nitrile

size	part number	list each
All	ULW	2 22

Never use UniversaLock Washers in standard Universal Couplings

CALGON CARBON CORPORATION	CARBON STEEL PIPE MATERIAL SPECIFICATION	SPEC NO:
	CARBON STEEL PIPE WITH STEEL FITTINGS	C02

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:
3000 lb 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:
3000 lb forged steel, ASTM A105, Grade 2, integral steel seat, ground joint, threaded ends.

FLANGES:
150 lb ANSI B16.5, ASTM A105 forged carbon steel, slip-on, weld neck, or MSS lap joint/stub end for 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.

Issue Date: 12/01/89 Revision Date 03/25/2008

Approved by Joseph P McMahon on 03/25/2008

CALGON CARBON CORPORATION	CARBON STEEL PIPE MATERIAL SPECIFICATION	SPEC NO:
	GALVANIZED CARBON STEEL PIPE	C13

MATERIAL: Galvanized carbon steel pipe with galvanized iron or steel fittings.

RATING: 275 PSIG @ -20 to 150 DEG. F
215 PSIG @ 350 DEG. F Includes corrosion allowance of 0.050" minimum.

CONSTRUCTION: Screwed 3" and smaller
No bending permitted

PIPE: Galvanized carbon steel, ASTM A53.
Threaded, schedule 40, butt welded seam 2" and smaller.
Threaded schedule 40, butt welded seam or seamless, 2 1/2" and 3".

FITTINGS: 150 lb., ANSI B16.3, ASTM A197, galvanized malleable iron, banded, threaded ends.

UNIONS: 150 LB., ASTM A197, galvanized malleable iron, integral iron seat, ground joint, threaded ends.

FLANGES: 150 lb., ANSI B16 5, ASTM A105, Grade 1, galvanized forged carbon steel, threaded.

Where bolting to flat face cast iron flanges, steel flanges shall be furnished with a flat face. Others shall be raised face

ORIFICE FLANGES: Instrument item.

BOLTING: See attached Fastener Specification F03.

GASKETS: See attached Gasket Specification G02.

Issue Date 12/01/89 Revision Date 04/10/92

Approved by Gerald Kirner on 11/09/2005

CALGON CARBON CORPORATION	FASTENER MATERIAL SPECIFICATION	SPEC NO:
		F03

MATERIAL:
Hex Bolt, low or medium carbon steel, ASTM A307 Grade B.
1/4" through 4" Proof load 55,000 psi.
1/4" through 4" Tensile strength: 60,000 psi minimum, 100,000 psi maximum
Zinc plated.
Threads to be UNC unless specified UNF bolts to include (1) heavy hex nut, ASTM A563, Grade A.

Issue Date 01/01/89 Revision Date 07/16/2001

Approved by Matthew R. McGowan on 07/16/2001

CALGON CARBON CORPORATION	FASTENER MATERIAL SPECIFICATION	SPEC NO:
		F14

MATERIAL: Hex Bolt, type 18-8 stainless steel.
1/4" through 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.

Issue Date 03/27/90 Revision Date 07/27/90

Approved by Joseph P McMahon on 07/24/98

CALGON CARBON CORPORATION	GASKET MATERIAL SPECIFICATION	SPEC NO:
	1/8" EPDM RUBBER	G-45

MATERIAL:	EPDM, Color. Black, 1/8" thick.
RATING:	Durometer (Shore A +/- 5): 60
MANUFACTURER:	Garlock or equal.
SIZES:	Pipe gasket flange dimension per ANSI B16.21
MODELS:	Garlock- 8314 or equal.

SERVICE CONDITIONS:
Temperature: -40 thru 300 degrees F. Pressure: 250 psig

Issue Date 03/12/2008 Revision Date 03/12/2008

Approved by Joseph P McMahon on 03/12/2008

CALGON CARBON CORPORATION	PRESSURE INDICATING GAGES MATERIAL SPECIFICATION	SPEC NO:
	PI-213 TO PI-218; PI-448 TO PI-560	IS008

MATERIAL: As listed below:

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 figures.
Pointer:	Balanced micrometer.
Bourdon Tube:	Stainless steel.
Movement:	Stainless steel and Delrin.
Accuracy:	1% of full range.
Liquid Fill:	None

RATING: Temperature range of -4 DEG. F. to +150 DEG. F.

MANUFACTURER: Ashcroft, WIKA

MODELS: Ashcroft "Duragauge" - 1279, WIKA 232.34

NOTES: As listed below:

1. Spec. IS008 replaces Spec. No. 7209A-CS263
2. This specification replaces the Specs. listed below.

RANGE: As listed below.

ITEM NO.	SCALE RANGE	REPLACES THESE ITEMS	
PI-213	0-15 PSIG	PI-101,7	SPEC. No. 7209A-CS161,2 (IS001,2)
PI-214	0-30 PSIG	PI-102,8	SPEC. No. 7209A-CS161,2 (IS001,2)
PI-215	0-60 PSIG	PI-103,9	SPEC. No. 7209A-CS161,2 (IS001,2)
PI-216	0-100 PSIG	PI-104,10	SPEC. No. 7209A-CS161,2 (IS001,2)
→ PI-217	0-160 PSIG	PI-105,11	SPEC. No. 7209A-CS161,2 (IS001,2)
PI-218	0-200 PSIG	PI-106,12	SPEC. No. 7209A-CS161,2 (IS001,2)
PI-448	0-300 PSIG		
PI-557	0-300 PSIG *		
PI-449	0-400 PSIG		
PI-556	0-400 PSIG *		
PI-450	0-800 PSIG		
PI-558	0-800 PSIG *		
PI-559	0-1500 PSIG		
PI-560	0-1500 PSIG *		*With Steam Coil Siphon

GENERAL REQUIREMENTS:
Tag each assembly with Item No. and Service.

Issue Date 01/01/89 Revision Date 12/16/2005

Approved by Gerald Kirner on 03/21/2006

Bourdon Tube Pressure Gauges
Solid-Front Process Gauge - 1019 Steel Socket
Type 222.34 - Dry Case
Type 223.34 - Liquid-filled Case

CCC SPEC PI-217

WIKA Datasheet 22X.34

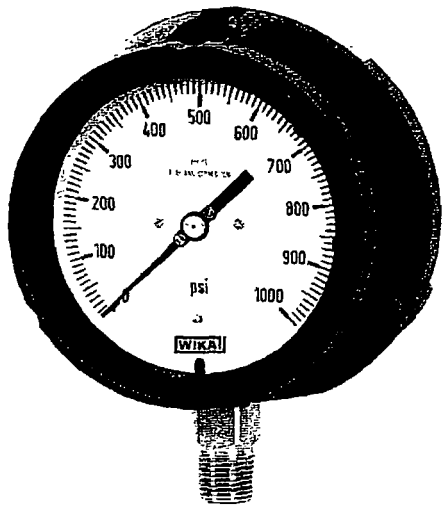
Applications

- For applications with high dynamic pressure pulsations or vibration a liquid filled case and socket restrictor are available
- Suitable for corrosive environments and gaseous or liquid media that will not obstruct the pressure system
- Process industry. chemical/petrochemical, power stations, mining, on and offshore, environmental technology, mechanical engineering and plant construction

Special features

- Excellent load-cycle stability and shock resistance
- Solid front thermoplastic case
- 1019 steel socket and stainless steel tube
- Liquid filled gauges are factory equipped with a restrictor
- All lower mount connection gauges are factory prepared for liquid filling

(LBM· must install membrane prior to field filling)



Bourdon Tube Pressure Gauge Model 222.34

Standard Features

Design
ASME B40.100

Sizes
4½" (115 mm) dial size

Accuracy class
± 0.5% of span (ASME B40.100 Grade 2A)

Ranges
Vacuum / Compound to 200 psi
Pressure from 15 psi to 15,000 psi
or other equivalent units of pressure or vacuum

Working pressure

Steady:	full scale value
Fluctuating·	0.9 x full scale value
Short time·	1 5 x full scale value

Operating temperature
Ambient: -40°F to +150°F (-40°C to +65°C) - dry
-4°F to +150°F (-20°C to +65°C) - glycerine filled
-40°F to +150°F (-40°C to +65°C) - silicone filled
Medium: max +212°F (+100°C) (See Note 1 on reverse)

Temperature error
Additional error when temperature changes from reference temperature of 68°F (20°C) ±0.4% for every 18°F (10°C) rising or falling. Percentage of span

Weather protection
Weather resistant (NEMA 3 / IP54) - without membrane
Weather tight (NEMA 4X / IP65) - dry case or filled case with membrane installed

Pressure connection
Material. 1019 steel
Lower mount (LM) or lower back mount (LBM)
1/4" or 1/2" NPT with M4 internal tap

Bourdon tube
Material 316L stainless steel
≤ 1,000 PSI: C-type
≥ 1,500 PSI· helical type

Movement
Stainless steel. Internal stop pin at 1.3 x full scale
Overload and underload stops - standard
Dampened movement - optional

Dial
White aluminum with black lettering, stop pin at 6 o'clock

Pointer
Black aluminum, adjustable

Case
Black fiberglass-reinforced thermoplastic (POCAN)
Solid front, blowout back
Turret-style case with built in rear flange lugs

Window
Clear acrylic with Buna-N gasket

Case filling
Glycerine 99.7% - Type 223.34

Cycle testing
400,000 - 2,000,000' cycles, depending upon pressure range
Liquid filled

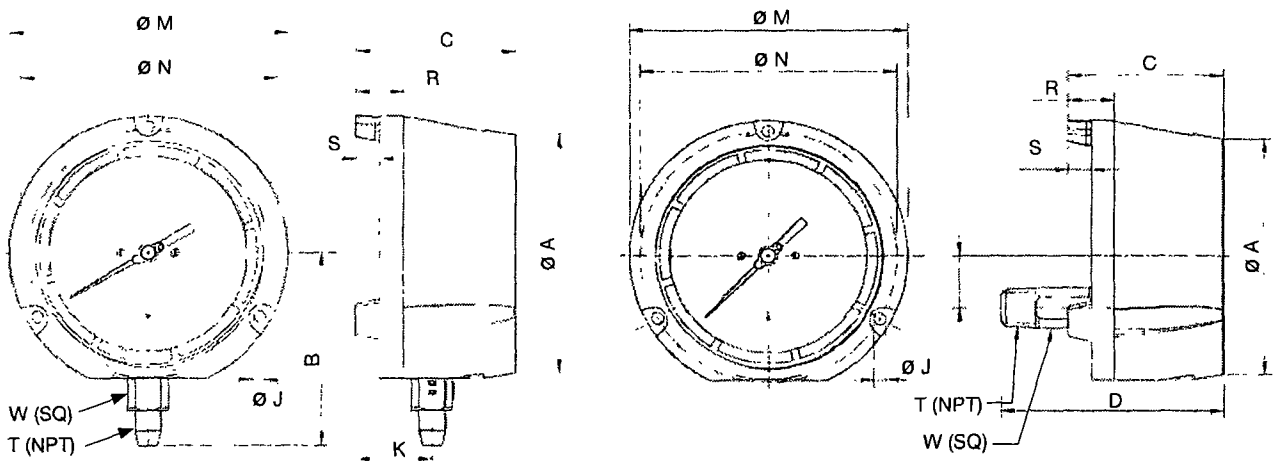
Note 1 Maximum continuous media temperature of 212°F is recommended However, higher temperatures can be maintained safely for short term exposure per table to the right The user should consider temperature error and gauge component degradation when exposing gauge to any media or ambient temperature above 212°F For continuous use in either ambient or media temperatures above 212°F, a diaphragm seal or other heat dissipating means is recommended Consult factory for technical inquiries and application assistance.

Optional extras

- Threaded restrictor (standard on factory filled gauges)
- Silicone dampened movement
- Panel mounting adaptor kit (field assembled)
- Silicone case filling
- Halocarbon case filling
- Cleaned for oxygen service
- Instrument glass or safety glass window
- Alarm contacts switches (magnetic or inductive)
- Special process connections
- Custom dial layout
- External zero adjustment

Short term, intermittent maximum media temperature limits
(Optional glass window required for all these temperatures)
500°F (260 °C) - Dry Gauge
250°F (130°C) - Liquid filled gauge

Dimensions



Size		A	B	C	D	J	K	L	M	N	R	S	T	W	Weight[1]	
4.5"	mm	128	103	84	120.3	6 3	40	28.5	148	136 5	25	12 5		22	2 0 lb	dry
	in	5	4.06	3.31	4.74	0.248	1.57	1.12	5.83	53.7	0.99	0.49	1/2"	0.87	3 0 lb	filled

[1] Weight without optional accessories

Ordering information
Pressure gauge model / Nominal size / Scale range / Size of connection / Optional extras required
Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing
Modifications may take place and materials specified may be replaced by others without prior notice

WIKA Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, GA 30045
Tel (770) 513-8200 Toll-free 1-888-WIKA-USA
Fax (770) 338-5118
E-Mail info@wika com
www.wika com

CALGON CARBON CORPORATION	PRESSURE SWITCH MATERIAL SPECIFICATION	SPEC NO:
	PDS-294	IS052

MATERIAL:
Dual indicating differential pressure switch with center zero indicating gage.

MATERIALS:
Case: Cast aluminum.
Diaphragm: Buna-n or Silicone
Springs: 302 or 316 stainless steel
Magnet: Ceramic coated (Orange, Inc.) or Samarium Cobalt (Dwyer, Inc.)

CASE:
Type Enclosure: NEMA 4 (Orange, Inc) or 4X (Dwyer, Inc.)
Pressure Connections: 1/4" FNPT.
Electrical Connections: 1/2" FNPT.
Style: Panel Mount

MEASURING ELEMENT:
Type: Diaphragm-Magnet (Orange, Inc.) or Magnehelic Linkage (Dwyer, Inc.)
Maximum Line Pressure: 500 PSIG
Maximum Range: 20-0-20 PSID.
Dial: 4" diameter (minimum), calibrated.

SWITCH:
Type: Two SPST (Orange, Inc.) or two DPDT (Dwyer, Inc.)
Rating: 0.7 amp @ 125 VAC (Orange, Inc.), 10 amp @ 120 VAC (Dwyer, Inc.)
Adjustment: External over range shown on the nameplate.
Accuracy: +/-3% (1.2 PSI)
Set Point: Factory set, +/- 18 PSIG differential pressure, switches to be wired.

MANUFACTURER: Orange Research Inc., Dwyer Instruments, Inc.

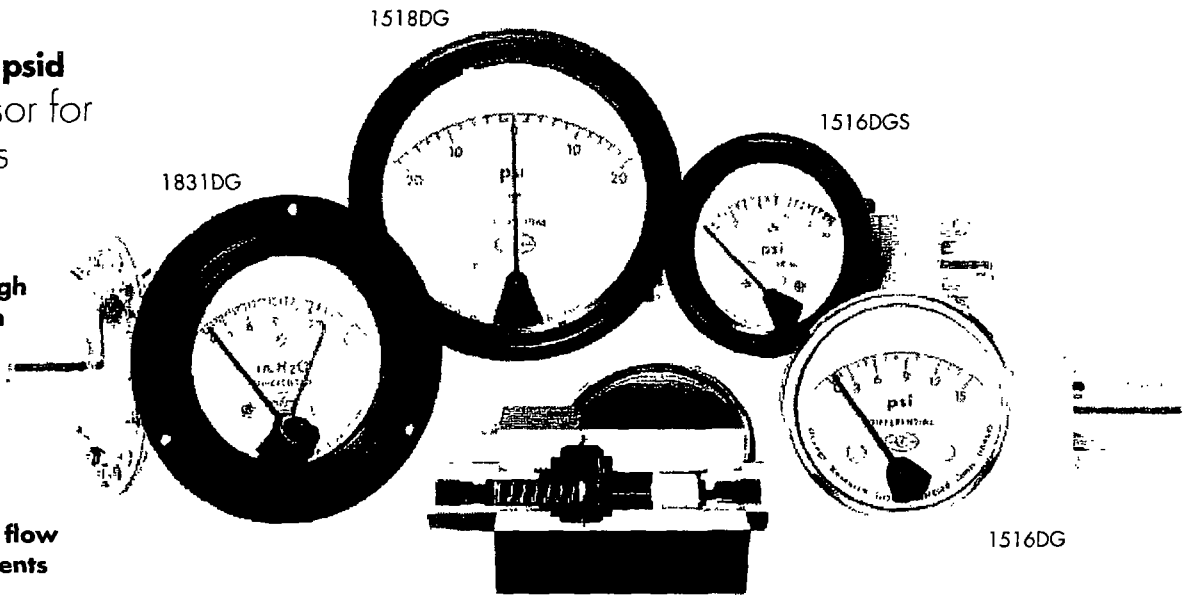
MODELS:
Orange model # 1518 DGS 1A-4.5F-A-A, Dwyer Special Series 43000 Capu-Photohelic, or equal

NOTES: 1 - Tag with item number.

Issue Date 12/01/89 Revision Date 09/15/99

Approved by Matthew R McGowan on 03/20/2000

0-5" H_2O to 0-50 psid
Diaphragm Sensor for Liquids or Gases



Features

- **Low DP ranges at high line pressures, down to 0-5 inches H_2O**
- **Rugged, weather-poof design**
- **Gauge, switch and transmitter versions**
- **Popular in filtration, flow and level measurements**

Select these diaphragm sensor models where low differential pressures exist. The popular 1516 model measures from 0-1 psid up to 0-50 psid. Our 1800 series models include our most sensitive diaphragm which can measure from 0-5"H_2O to 0-8 psid. We also offer compound range models with a zero center.

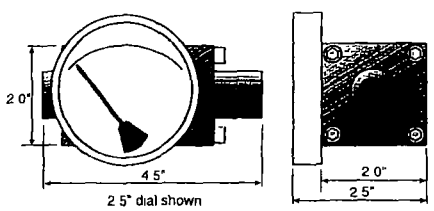
The diaphragm sensor separates the high and low-pressure ports making them popular for gases as well as liquids. There is no bypass between these ports as with our piston models.

As differential pressure changes the diaphragm sensor magnet moves proportionally. This movement is tracked by a pointer magnet, which rotates, relaying the reading onto an easy-to-read 2.5 to 6 inch dial.

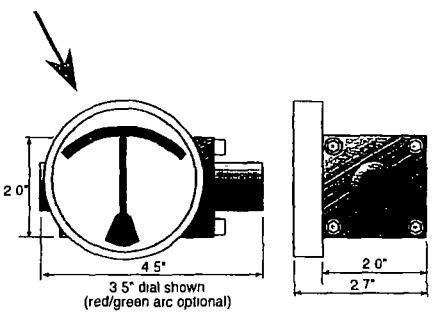
Select from a variety of options such as follower pointers, red arcs and mounting brackets along with switch, relay or transmitter outputs. More details on these models can be found on our DP introduction pages 2-5. Electrical details are on pages 26-27.

Dimensions

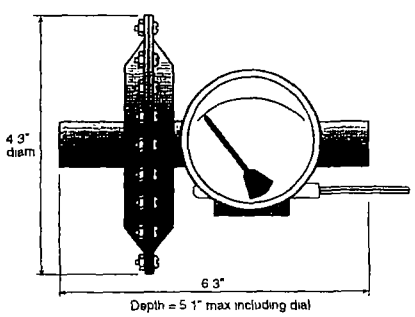
Detailed drawings on website.



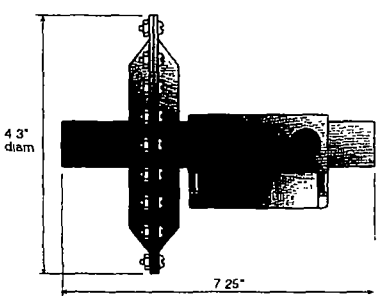
1516DG



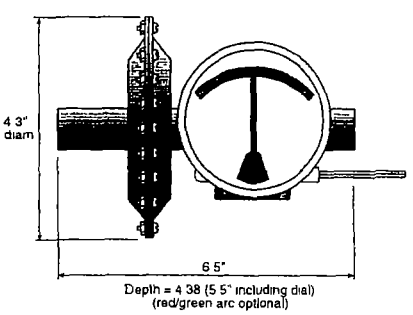
1518DG



1831DGS



1833DS



1835DGS

Specifications (Detailed Specification Sheets on Website)

Model	Differential pressure range	Maximum line pressure/temperature	Accuracy (F.S.) (Ascending)	Porting (Many porting types available)	Electrical Available*
1516DG/DGS/DS	0-1 to 0-50 psid (0-0.07 to 0-3.3 bar)	1500 psig (100 bar)/200°F (93°C)	2%	¼" NPT	1 or 2 switches Class 1 Div 2
1518DG/DGS	10-0-10 to 50-0-50 psid (0.5-0-0.5 to 3.3-0-3 3 bar)	1500 psig (100 bar)/200°F (93°C)	2%	¼" NPT	1 or 2 switches Class 1 Div. 2
1831DG/DGS	0-5" H_2O to 0-8 psid (0-125 mm H_2O to 0-0.5 bar)	Aluminum body 100 psig (7 bar)/200°F (93°C) Stainless steel body 150 psig (10 bar)/200°F (93°C)	2%	¼" NPT	1 or 2 switches No enclosure
1833DGS/DS/DGT/DT	0-5" H_2O to 0-8 psid (0-125 mm H_2O to 0-0.5 bar)	Aluminum body 100 psig (7 bar)/200°F (93°C) Stainless steel body 150 psig (10 bar)/200°F (93°C)	2%	¼" NPT	1 or 2 switches 1 relay transmitter Class 1 Div.
1835DG/DGS/DS	5-0-5" H_2O to 8-0-8 psid (125 mm-0-125 mm H_2O to 0 5-0-0.5 bar)	Aluminum body 100 psig (7 bar)/200°F (93°C) Stainless steel body 150 psig (10 bar)/200°F (93°C)	2%	¼" NPT	1 or 2 switches No enclosure

D=Diaphragm G=Gauge S=Switch T=Transmitter

*NEMA 4X switch models have a 1/2 inch NPT conduit port as standard A DIN 43650A-PG11 with mating connector is optional, rated IP65 & NEMA 4X

How to Order

Select from each of the applicable categories to construct a model number. Use the model number when ordering or obtaining additional information and pricing from Orange Research or your local distributor.
Reordering? You must supply the Part Number from your instrument label.

Sample Model Number

1516DGS – 1A – 2.5B – A 0-1 psid, 1, 3, E

1516DGS	–	1A	–	2.5B	–	A	0-1 psid	,	1, 3, E
Model		**Pressure Body**		**Dial Case**		**Electrical**	**Range**		**Options (more on pg. 5)**
1516DG 1516DGS 1516DS 1518DG 1518DGS 1831DG 1831DGS 1833DGS 1833DS 1835DG 1835DGS 1835DS ***More models above***		***In-line ports:*** 1A = aluminum 1C = 316 stainless steel 1E = brass ***Change "1" above to "4" for back ports; to "5" for bottom ports*** ***1518 & 1800 series in-line only; 1835 SS only***		2.5B = 2.5" basic 3.5B = 3.5" basic 4.5B = 4.5" basic 6B = 6.0" basic ***Change "B" to "F" above for flanged dial case***		A = SPST, N.O. B = SPST, N.C. C = SPDT A-A = 2 ea. - A B-B = 2 ea. - B C-C = 2 ea. - C R2 = relay T1 = transmitter	**Model 1516:** 0-1, 0-2, 0-3, 0-5, 0-8, 0-10, 0-15, 0-20, 0-25, 0-30, 0-35, 0-40, 0-50 psid **Models 1831 & 1833:** 0-5", 0-10", 0-15", 0-20", 0-25", 0-30", 0-40", 0-50", 0-60", 0-80", 0-100", 0-150", 0-200" H_2O; 0-8 psid ***For compound ranges, see p 5***		1 = ½" NPT 2 = plastic lens 3 = liquid filled (glycerine) 4 = follower pointer 5 = Teflon coated magnet/spring 6 = red arc (specify range) 7 = dual scale (specify both) 8 = high temperature Special Diaphragm & Seals (Buna-N standard)* E = EPDM F = Fluorosilicone V = Viton T = Teflon (o-ring seals only)

Orange Research

Differential Pressure Instruments Installation and Operating Instructions

Caution

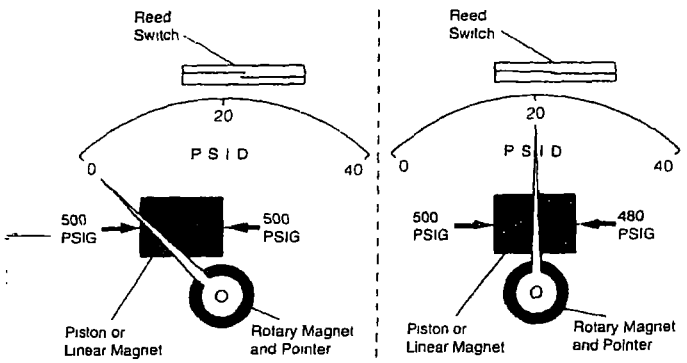
These instructions do not cover all applications. The user should become familiar with Orange Research product catalogs and ANSI B40 (American National Standards Institute) as well as recognized industry codes and safety practices. This should be done to avoid the possibility of misuse or misapplication which could result in explosion or personal injury.

How they work

Differential pressure instruments operate on the difference between two pressures (delta-P). Pressures monitored at two different points in a system act on opposite sides of a piston or diaphragm sensor. Changes in the pressure difference will cause the sensor and an attached magnet to move in proportion to the change.

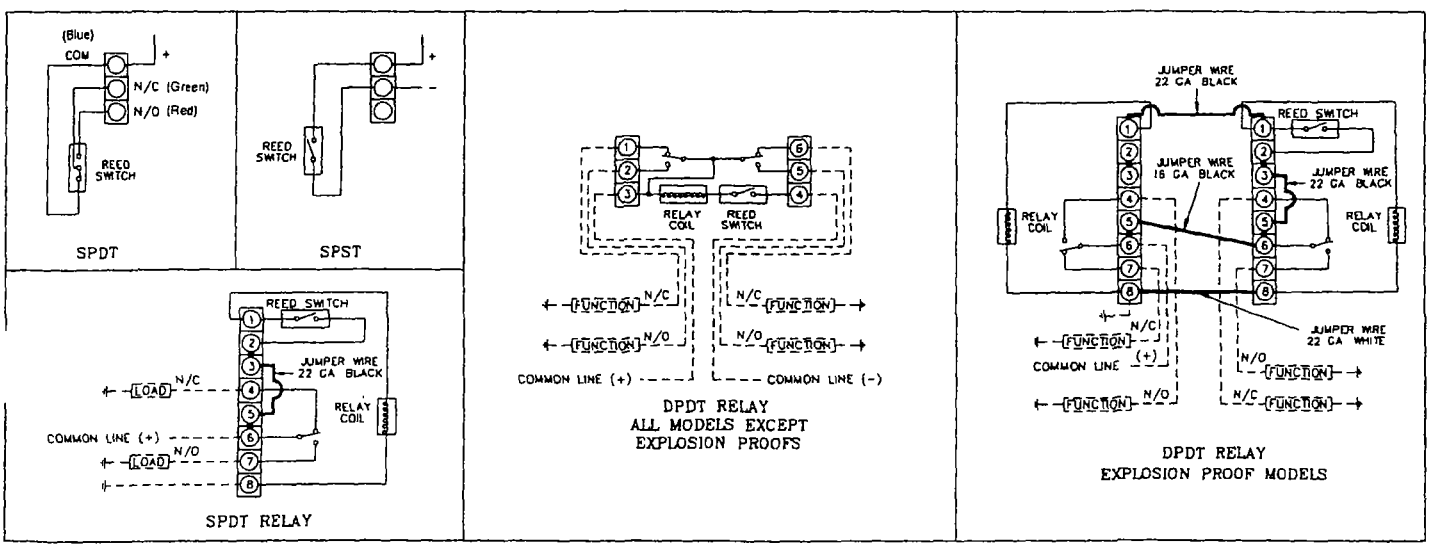
A rotary magnet, located in a separate body cavity and isolated from the acting pressures, is rotated by magnetic coupling to linear movement of the sensor magnet. A pointer attached to the rotary magnet indicates differential pressure on an easy-to-read dial scale.

On switch models, reed switches are located adjacent to the pressure chamber. The switches are activated when the field of the sensor magnet interacts with the reed switch elements causing the contacts to open or close. Reed switch actuation points are field adjustable over the upper 80% of the range in most models.



Typical wiring diagrams

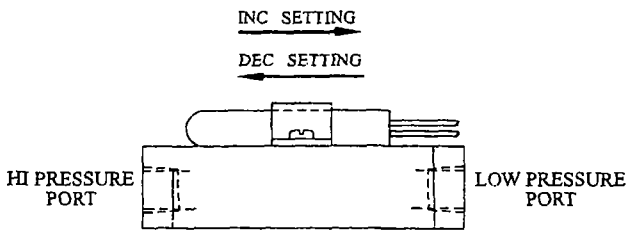
The wiring diagrams shown include schematics for reed switches, which are used on all models, including explosion-proof units, and switches with one or two relays that are available for use only with explosion-proof differential pressure instruments. Relays are supplied with 115 VAC coils as standard. Contacts and coils are wired for common input. Jumper wires shown in the wiring diagrams may be removed to separate coil and contact circuits for different inputs. All relays are controlled by a SPST reed switch wired in series with the relay coil.



Switch adjustment

In general, switch set points are field adjustable within the lower 80% of the differential pressure range for all models, except compound instruments which are field adjustable within the upper 60% of each side. For all units with two switches, each switch is adjusted independently of the other.

To change the reed switch setting, first loosen the screw holding the switch in place. To increase the set point, slide



Typical switch layout

the switch toward the LO port. To decrease the set point, slide the switch tube toward the HI port. Then re-tighten the screw holding the switch in place. CAUTION: Do not over-tighten the switch holding screw; this may damage the reed switch element inside the switch tube.

In some cases, it might be necessary to reverse the switch tube position in order to reach the desired set point.

Accuracy

Most instruments will provide ±2% full scale accuracy over the top 90% of the range on ascending readings. Orange Research "miniature" differential pressure instruments are accurate to ±5% full scale. Special calibration service is available on request. NOTE: Pressure gauges should not be used to measure pressures less than 10% of span. Gauges should not be used for the purpose of indicating that the pressure in a tank or system has been completely exhausted to atmospheric pressure. It is possible that hazardous pressure may remain in the tank or system even though the gauge indicates zero pressure.

Installation

Before installing the differential pressure instrument, examine it for possible shipping damage and check calibration against an accurate pressure standard.

Identify HI and LO markings. HI identifies the high pressure port and LO identifies the low pressure port. If the instrument is installed backwards it will not operate.

Standard port size is 1/4" N.P.T. unless otherwise specified. Alternate port sizes are available. Apply thread sealant to the pressure connection and make up the joint by using a 1-inch spanner wrench in holes provided. Do not tighten gauge into place by means of the case as damage may result.

IMPORTANT: Because of the magnetic movement, the instrument should *never* be mounted in direct contact with a steel surface. Otherwise a calibration shift will occur. Mount the instrument so that the pressure body is at least 1 inch away from metal surfaces using non-magnetic spacers or an aluminum mounting bracket, if necessary. Two-inch and 2-1/2" gauges flush mounted on a steel panel may require resetting of the pointer to zero. (This should be done at the time of manufacture but can be reset in the field with a small loss of accuracy.)

Unless otherwise specified at the time of order, instruments are calibrated in the horizontal position. Instruments should always be mounted in the same position as they were calibrated to eliminate positional errors.

Recalibration

Where the pressure measurement is critical and gauge failure or gross inaccuracy will result in hazard to personnel or property, the instrument should be checked for accuracy on a periodic basis.

Recalibration procedures vary depending upon model but usually can be accomplished by removing the low pressure endcap and adjusting the stacking spacers inside the unit.

Orange Research Inc. offers a recertification service or you may contact the factory for details on how to recalibrate your particular instrument.

Use with oxygen

Instruments used for measurement of oxygen pressure must be free of contamination within the pressure containing portion. Orange Research offers an oxygen cleaning service upon request. Do not use a gauge which has not been cleaned on oxygen service.

Liquid filled gauges

Performance of pressure gauges used in severe vibration or pulsation service can be improved by filling the dial case with a viscous fluid. The standard liquid filling is a mixture of glycerin and water.

NOTE: Glycerin can combine with strong oxidizing agents including (but not limited to) chlorine, nitric acid, oxygen, and hydrogen peroxide resulting in a chemical reaction or explosion. Completely fluorinated or chlorinated fluids may be more suitable for dial case filling in such applications.

For more information, contact Orange Research Incorporated
140 Cascade Blvd., Milford CT 06460
Tel: 203 877-5657, Fax: 203 783-9546

Orange Research

CALGON CARBON CORPORATION	STAINLESS STEEL PIPE MATERIAL SPECIFICATION	SPEC NO:
	INSTRUMENT PIPING, HEAT TRACING, ETC.	S06

MATERIAL: Stainless steel tubing and flareless compression fittings, and stainless steel pipe and fittings.

RATING: 150 PSIG @ 365 DEG. F
300 PSIG @ 100 DEG. F.

CONSTRUCTION: For tubing systems 1" and smaller. Pipe and screwed pipe fittings to be used for take-off connections on larger pipe, manifolding, connections to screwed instruments, equipment, etc. Tubing to be used for all other piping in the system.

PIPE NIPPLES: ASTM A312, Type 316, seamless, Schedule 80S, ANSI B36.19, annealed and pickled.

PIPE FITTINGS: Type 316 stainless steel screwed fittings, dimensions per ANSI B16.3, forged, wrought or cast material rated 150 lb. Camco Fittings Co., or equal.

TUBING: Type 316 stainless steel seamless tubing, 0.035" wall thickness, annealed and pickled, hardness 70-74 Rockwell "B", 1/4 O.D.

TUBE FITTINGS: Type 316 stainless steel, flareless compression fittings, Crawford Fitting Company "Swagelok", or equal.

Issue Date 01/01/89 Revision Date

Approved by Joseph P McMahon on 07/24/98

CALGON CARBON CORPORATION	RUPTURE DISKS MATERIAL SPECIFICATION	SPEC NO:
	PSE-155 TO PSE-157;PSE-252;PSE-301 TO PSE-306;PSE-577;PSE-580	IS015

MATERIAL: Impervious graphite.

Type: Standard.
Vacuum Support: Furnish for disks with bursting pressure of 15 psig or less.

FLANGES: 150 # ANSI RF or FF companion flanges (furnished by others)

MANUFACTURER: Zook, or equal.

SIZES: As listed below:

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-170	2"	125 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%
PSE-307	3"	100 PSIG +/- 5%
PSE-577	3"	125 PSIG +/- 5%
PSE-580	4"	125 PSIG +/- 5%

SPECIFICATIONS: ASME UD stamp required.

NOTES: As listed below:

1 - Tag with Item No. and Service.
2 - IS015 replaces Spec. No. 7209a-CS172

SERVICE CONDITIONS:
As listed below:

Fluid Under Disks:	Water
Pressure Fluctuation:	Back Pressure:
Temperature:	40 to 150 degrees F.
Operating Pressure:	80% of bursting pressure.
Back Pressure:	Atmospheric

GENERAL REQUIREMENTS:
As listed Below:

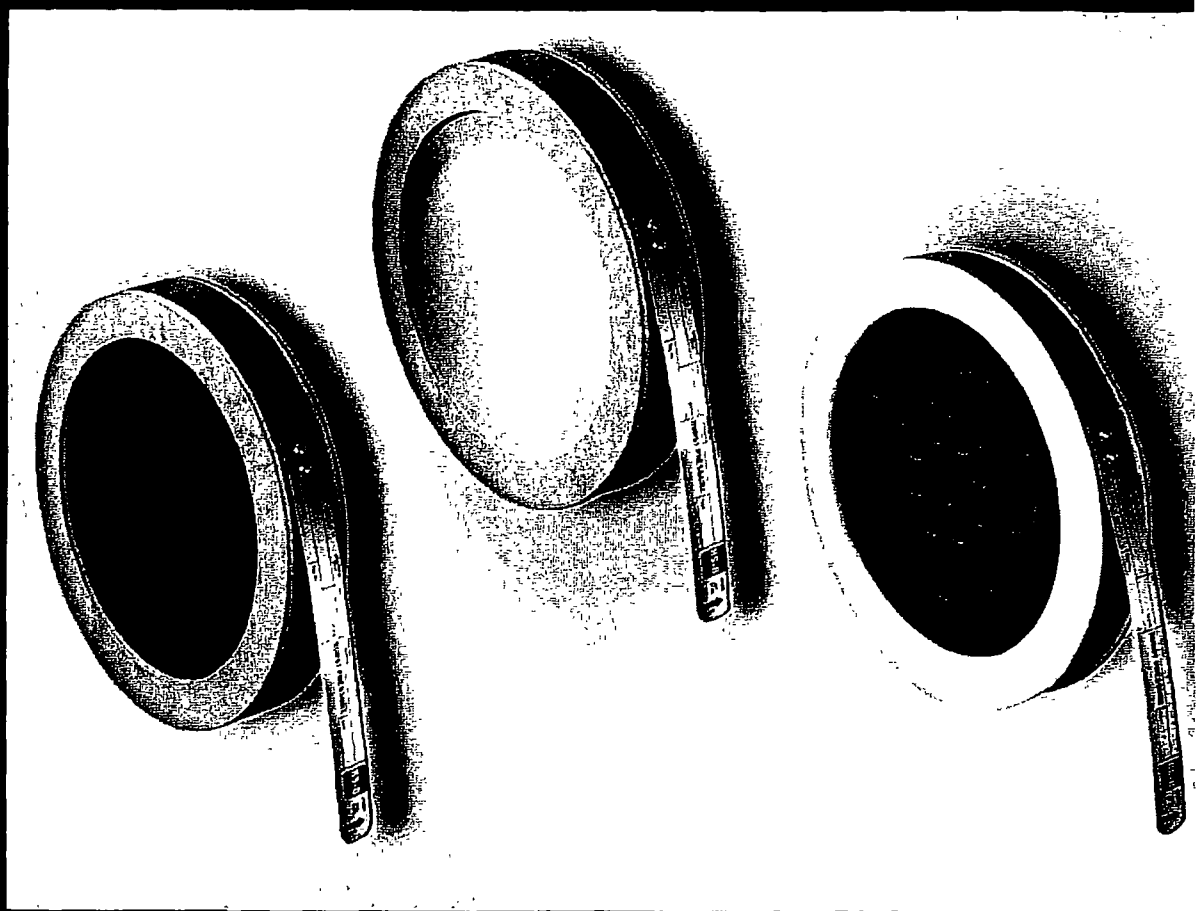
Bursting Pressure:	See table above
Coincident Temperature:	150 degrees F.
Relieving Capacity:	In accordance with ASME

Issue Date 04/06/90 Revision Date. 09/10/2007

Approved by Joseph P. McMahon on 09/10/2007

BS&B SAFETY SYSTEMS, L.L.C.
BS&B SAFETY SYSTEMS LTD

SAF-T-GRAF



Saf-T-Graf graphite disks are impermeable to process gases and fluids

SAF-T-GRAF® FEATURES

Offers superior sealing characteristics to process gases and fluids

Corrosion resistant (except free fluorine)

Burst pressures from 0.02 bar (0.25 psig) to 69 bar (1000 psig)

Higher operating temperature than other impregnated graphite disks up to 205°C (400°F)

Full bore opening

Sizes from 15 to 600 mm (0.5" to 24" and larger)

Extended service life for operating pressures up to 80% of the disk marked pressure in a static environment - Lower operating ratios can be expected in a cyclic environment

Suitable for gas service and liquid service

Supplied with gaskets attached for immediate installation.

Resists full vacuum (vacuum support required below 1.52 bar (22 psig) burst pressure)

Optional PTFE coating to reduce product build-up

Graphite impregnation is environmentally safe

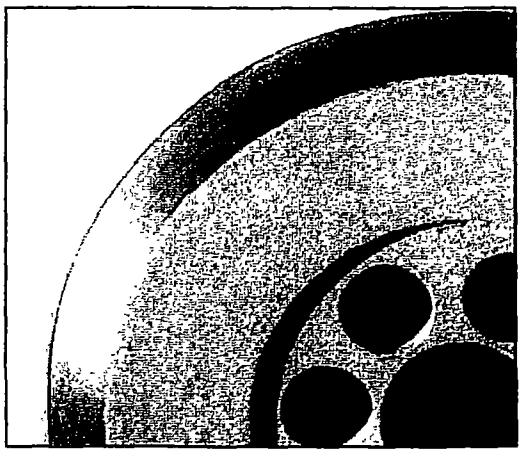
Patent pending

ASME code, UD stamp above 15 psig (1.03barg) available

SAF-T-GRAF® System

Armor

Armor is recommended for all graphite disks for added safety, easier installation and elimination of breakage during installation Armor reduces the possibility of a premature burst due to uneven or excessive torqueing of the flange studs



Armor is standard on disks with burst pressures in excess of 150 psig or to fit ANSI Class 300/600 flanges Carbon steel armor is standard with 304/316 Stainless Steel as an option.

Saf-T-Graf monobloc impregnated graphite disks Vacuum supports are designed utilizing the latest computer software to maximize venting capacities while maintaining structural strength Armor ring around disk's circumference shown left

Disks for Immediate Shipment

In order to provide the best possible service, BS&B stocks monobloc disks in the following sizes 25, 40, 50, 80, 100, 150 and 200 mm (1", 1 5", 2", 3", 4", 6", 8")
Stocked Burst Pressures.
10-15-20-25-30-40-50-75-100-125-150 psig
All disks must be for 150 ANSI flange ratings

Flange Ratings

Saf-T-Graf disks can be supplied to fit flange ratings ANSI, DIN, JIS, BS, AFNOR etc
Please specify flange rating when ordering

Gaskets

BS&B Safety Systems, L.L.C. stocks gaskets in the materials below:

- Garlock® or Klinger®-Sil (standard)

Optional Materials:

- GRAFOIL®
- Neoprene
- PTFE solid

Please specify your gasket material when ordering

Sensors

A GAS™ (Graphite Alert Sensor) is available to provide warning of a burst graphite disk

Installations

The Saf-T-Graf disk is designed to permit direct installation between ANSI, DIN, JIS, BS, AFNOR pipe flanges and to locate between the flange bolts

Operating Ratio

Up to 80% operating pressure to burst pressure ratio in a static environment Lower operating ratios can be expected in a cyclic environment

Klinger®-Sil is a registered trade mark of Klinger (Holdings) Ltd
Garlock® is a registered trade mark of Coltec Industries
GRAFOIL® is a registered trade mark of UCAR Carbon Company, Inc

Monobloc

Model MBV (with bar) and MB

Model MB™

Monobloc disks fit most applications where a graphite disk is needed

When using a monobloc disk in application

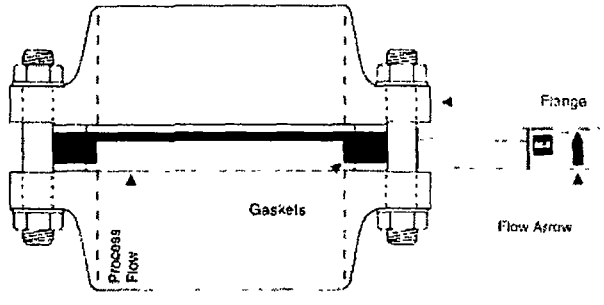
- Vacuum supports are needed for disks rated below 1 52 bar (22 psig) and where a vacuum condition exists. Model MBVTM.
- Vacuum supports are not needed for sizes 15 and 20 mm (0 5", .75")
- Temperature ranges -730 C to 205°C (-100°F to 400°F)
- Armoring is recommended for all graphite disks for added safety, easier installation and elimination of breakage during installation
- Armor reduces the possibility of a premature burst due to uneven or excessive torqueing of the flange studs

MB™ Specifications

Nominal Size		Burst Ratings Barg		PSIG		Internal Diameter		Disk Thickness	
mm	in	Min	Max	Min	Max	mm	in	mm	in
15	0.5	1.73	10 3	25	150	15.9	0.625	16	0.625
20	0.75	1.73	10.3	25	150	21	0.825	16	0.625
25	1	0.69	10.3	10	150	27 2	1.07	22	0 875
40	1.5	0.49	10.3	7	150	41.1	1.62	22	0.875
50	2	0.14	10.3	2	150	52.6	2.07	22	0.875
80	3	0 069	10.3	1	150	78 0	3.07	22	0.875
100	4	0.069	10.3	1	150	103.4	4.07	22	0.875
150	6	0.069	10 3	1	150	154 2	6.07	22	0.875
200	8	0 035	10.3	0.5	150	205 0	8.07	29	1.125
250	10	0.0173	8.6	0.25	125	255.8	10.07	38	1.50
300	12	0.0173	8.6	0.25	125	306.6	12.07	51	2.00
350	14	0.0173	6.89	0.25	100	336.5	13.25	57	2.25
400	16	0.0173	6.89	0.25	100	387.4	15.25	64	2.50
450	18	0.0173	6.89	0.25	100	438 2	17.25	70	2.75
500	20	0.0173	3.4	0.25	50	489 0	19.25	76	3.00
600	24	0.0173	3.4	0.25	50	590.6	23.25	76	3.00

For other disk thickness, contact BS&B Safety Systems, L.L.C. or BS&B Safety Systems LTD

MB



MB monobloc disks are available in size from 15mm to 600 mm (0.5" to 24") with a temperature range to 205° C (400°F).

(For Venting Capacities Chart please refer to page 5)

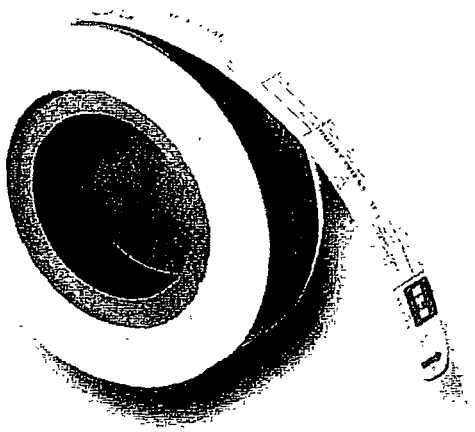
Ordering Specifications

Disk Types	Model
Monobloc	MB™
Monobloc with vacuum support	MBV™
Armored Monobloc	AMB™
Armored Monobloc with vacuum support	AMBV™
Inverted Monobloc	IMB™
Armored Inverted Monobloc	AIMB™
Inverted Monobloc with liner	IMBL™
Armored Inverted Monobloc with liner	AIMBL™
Armored Monobloc with High Temperature Assembly	AMB-HTA™
Armored Inverted Monobloc with High Temperature Assembly	AIMB-HTA™

1/2 to 24 inches, (15mm to 600) larger sizes available upon request

Burst Pressures

- 0.017 bar (0 25 psig) to 69 bar (1000 psig)
- Burst pressures vary depending on disk style and size Please consult MB, IMB, and IMBL specification charts
  For burst pressures outside the standard range consult BS&B Safety Systems, L L.C or BS&B Safety Systems LTD



Vacuum Support

Vacuum support is required on pressures less than 1.52 bar (22 psig) and where a vacuum condition exists, available on Model MBV or AMBV Vacuum supports are not required on 15mm and 20mm (0 5" and 75") monobloc disks

Corrosion Resistance

The Saf-T-Graf® line offers excellent corrosion resistance (except free fluorine) The IMBL has a PTFE liner fitted to the process side of the disk for extra protection against corrosion and prevention of product build-up

Gaskets

- Rupture disks are supplied with gaskets, in materials, Klinger®-Sil (standard), Garlock®, GRAFOIL®
- Optional materials include PTFE, Neoprene

Flange Rating

Graphite monobloc disks are available to fit all standard international flanges ANSI, DIN, BS, AFNOR, JIS etc

Armor

- Carbon steel or 304/316 Stainless Steel (option)
- Armor is recommended for added safety, easier installation and elimination of breakage during installation Armor reduces the possibility of a premature burst due to uneven or excessive torqueing of the flange studs.
- Armor is highly recommended in sizes and with burst pressures in excess of the following:

SIZE	BURST PRESSURE	
0.5" (15mm) -3" (80mm)	10.341 barg	150 psig
4" (100mm)	6 894 barg	100 psig
6" (150mm) - 10" (250mm)	5 17 barg	75 psig
12" (300mm) - 24" (600mm)	3 447 barg	50 psig

- Armoring minimizes the possiblity of lateral bursts inherent in standard monobloc graphite disks

Temperature

- -100°F (-73°C) to 400°F (205°C) Higher temperatures to 800°F (427°C) are accommodated using a High Temperature Assembly used with armored disks (The High Temperature Assemblies are not to be used with model AMBV disk (disks with vacuum support)

Consult BS&B Safety Systems, L.L C. or BS&B Safety Systems LTD

- If a disk is ordered with a burst temperature within 40°F (4.5°C) to 100°F (38°C), it will be burst tested and rated at 72° F (22°C)
- If the requested burst temperature is outside of 40°F (4 5°C) to 100°F (38°C) burst tests will be carried out at the actual burst temperature (at no additional charge) and not estimated using a correction coefficient

(ASME or other international standards certification at additional cost)

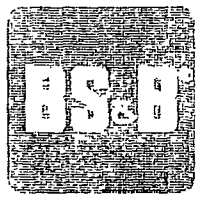
Burst Tolerance

The burst tolerance is the maximum variation from the marked burst pressure

MARKED BURST PRESSURE	TOLERANCE
*less than 0.07 bar (1 psig)	-0/+0 052 bar (0 75 psig)
0 07 bar (1 psig) - 1.03 bar (15 psig)	+/-0.052 bar (0 75 psig)
above 1 03 bar (15 psig)	+/-5%

Example, if a Saf-T-Graf MB type disk is ordered with a 2 bar (29 psig) burst pressure, it will burst between 1 9 bar (27 5 psig) and 2 1 bar (30.5 psig)

** For reduced tolerances contact BS&B Safety Systems, L L.C or BS&B Safety Systems LTD*



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E-mail sales@bsb-systems co uk

CALGON CARBON CORPORATION	STAINLESS STEEL PIPE MATERIAL SPECIFICATION	SPEC NO:
	TYPE 316 STAINLESS STEEL PIPE AND FITTINGS	S15

MATERIAL: Type 316 stainless steel pipe and fittings.

RATING: 150 PSIG @ 365 DEG. F.
300 PSIG @ 100 DEG.F.

CONSTRUCTION: Screwed for 3" and smaller

PIPE: Threaded, Schedule 40S, ASTM A312, Type316, welded, ANSI B36.19, annealed and pickled.

FITTINGS: Type 316 stainless steel screwed fittings, general dimensions to conform to ANSI B16.3 for malleable iron screwed fittings. Forged, wrought or cast material rated 150 Lb. @ 365 DEG.F , Camco Fittings Co., or equal.

FLANGES. Type 316 stainless steel, threaded, MSS-SP-51, 150 Lb. flat face, serrated finish.

ORIFICE FLANGES: Instrument Item.

BOLTING: See attached Fastener Specification F03.

GASKETS: See attached Gasket Specification G02.

Issue Date: 12/01/89 Revision Date 06/20/2001

Approved by Gerald Kirner on 06/21/2001

CALGON CARBON CORPORATION	STAINLESS STEEL PIPE MATERIAL SPECIFICATION	SPEC NO:
	TYPE 304L STAINLESS STEEL	S27

MATERIAL: Type 304L stainless steel

RATING. 150 PSIG @ 500 DEG. F

CONSTRUCTION: Socket weld for 2" and smaller.
Flanged and welded for 2 1/2" and larger

PIPE. Plain end, stainless steel pipe, ASTM A312, Type 304L, welded, schedule 40S, ANSI B36.19, annealed and pickled. Threaded ends permitted for valve, instrument, etc. connections.

FITTINGS: 1 1/2" and smaller: stainless steel fittings, ASTM A182, Grade F304L, socket weld, ANSI B16.11 to match schedule 40. ANSI B36.19, rated 150# WOG.

2" and larger: stainless steel fittings, ASTM A403, Grade WP304L, butt weld, ANSI B16.9, schedule 40S, ANSI B36.19.

UNIONS: 1 1/2" and smaller: forged stainless steel union, ASTM A182, Grade 304L, socket weld, 3000#, integral seats, ground joint.

FLANGES: 1/2" and larger: forged stainless steel flange, ASTM A182, Grade 304L, slip-on type, 150# ANSI B16 5.

ORIFICE FLANGES· Instrument Item

BOLTING: See attached Fastener Specification F16.

GASKETS: See attached Gasket Specification G08

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Approved by Joseph P McMahon on 07/24/98

CALGON

CALGON CARBON CORPORATION

SECTION 4

VESSEL LINING

SECTION 4

SPECIFICATION NUMBER 7209A-VS7 FOR

VINYL ESTER VESSEL LINING (4110)

1.0 SCOPE OF WORK

1.1 This specification covers materials, surface preparation, application and testing of protective coatings for internal lining of carbon steel vessels.

1.2 The scope of work includes all labor, materials, equipment and services required for lining and testing the vessels indicated on the drawings and/or other applicable documents.

1.3 The entire internal surface of the designated vessels including all nozzles and manways shall be lined.

1.4 The lining must satisfactorily protect the internal metal surfaces from corrosion and erosion by the contained carbon slurry.

1.5 The Contractor shall guarantee that all materials and workmanship shall be free of defects and that they will conform to standards set forth for first-class workmanship and quality. In the event of failure of the lining to withstand the service conditions set forth in Article 3.0, the Contractor shall, at his expense, replace the defective materials and workmanship to the Buyer's satisfaction.

2.0 REFERENCE DOCUMENTS

2.1 Steel Structures Painting Council Surface Preparation Specification No. 1, "Solvent Cleaning" (SSPC-SPI-85).

2.2 Steel Structures Painting Council Surface Preparation Specification No. 2, "Hand Tool Cleaning" (SSPC-SP2-85).

2.3 Steel Structures Painting Council Surface Preparation Specification No. 3, "Power Tool Cleaning" (SSPC-SP3-85).

2.4 Steel Structures Painting Council Surface Preparation Specification No. 5, "White Metal Blast Cleaning" (SSPC-SP5-85).

2.5 Steel Structures Painting Council Paint Application Specification No. 1, "Shop, Field and Maintenance Painting" (SSPC-PA1-82).

2.6 Steel Structures Painting Council, "Method for Measurement of Dry Film Paint Thickness with Magnetic Gages" (SSPC-PA2-82).

2.7 Plasite 4110 Technical Bulletin, most current version.

3.0 SERVICE CONDITIONS

3.1 The lining will be exposed to static and moving water slurries of granular activated carbon.

3.2 The characteristics of the slurries will be as follows:

3.2.1			Carbon Slurry in Water
3.2.2	Temperature	-	35 -- 100°F
3.2.3	pH	-	5.0 to 9.0
3.2.4	Density	-	26 Lbs. / Cu. Ft., Dry
3.2.5	Abrasive	-	Yes

4.0 MATERIALS

4.1 The lining shall be a heavy-duty, thick film, high-resistant vinyl ester resin material with special abrasion resistant qualities. The lining material shall be suitable for spray application to a nominal 35 to 45 mil dry film thickness on a steel surface.

4.2 The lining shall be Plasite No. 4110 coating material as supplied by Wisconsin Protective Coating Corporation, Green Bay, Wisconsin. Products from other suppliers or manufacturers are not approved.

5.0 DELIVERY, STORAGE AND HANDLING

5.1 Product Delivery: Materials shall be delivered to the site in sealed, original, labeled containers with the Plasite name, product number, batch number, color designation, and instructions for mixing and thinning.

5.2 Storage: Contractor shall be responsible for the proper storage of all coating materials. Damaged, leaking, or unlabeled containers shall be disposed of daily.

5.3 Storage Location: Materials shall be stored in a place specifically assigned for that purpose which is dry and out of direct sunlight. Materials shall be stored in a manner so as not to exceed the manufacturer's temperature limitations. In all cases, the storage and handling of materials shall conform to the requirements of the manufacturer and the applicable safety regulatory agencies.

5.4 Fire Prevention: All precautions to prevent fire shall be taken. Containers of flammable materials shall be opened only when needed. Rubbing cloths and oil rags shall be kept in tightly-closed containers and removed from the site daily. Fire or other damage due to spontaneous combustion or other means shall be the Contractor's responsibility.

6.0 APPLICATION

6.1 SURFACE PREPARATION

6.1.1 The Contractor shall install and maintain protective coverings on any surface not to be painted to protect the surface during surface preparation and paint application.

6.1.2 Grease, Oil and Interference Material: Surface contamination on bare steel such as grease, oil, tape tags, markings, etc. shall be removed by the contractor by solvent cleaning per SSPC-SPI prior to blast cleaning.

6.1.3 Surface Irregularities: Prior to blast cleaning, all surfaces shall be inspected for weld spatter, weld flux, or any other surface irregularities. When discovered, they will be removed by the Contractor.

6.1.4 Edges: All sharp edges will be ground to a smooth radius. Areas inside the vessel that are not expected to be in direct contact with activated carbon are not required to be chamfered unless noted on the specific detail. (A specific example: the holes in the internal cone design. They do not require a radius or chamfer on their edge since filter nozzles must fit snugly into these holes for proper service.)

6.1.5 Ambient Conditions: Final blast cleaning shall not be performed when the surface temperature is less than 5^0F greater than the dewpoint temperature of the surrounding air, nor when the relative humidity is greater than 90%.

6.1.6 Compressed Air Cleanliness: The air supply used for blast cleaning shall be free from moisture and oil contamination. The air cleanliness shall be verified at least once per shift for each compressor used. The test involves directing the air stream onto a piece of white paper held not more than 18-inches away from the air outlet. The test shall be run downstream of moisture and oil separators for a period of not less than two-minutes. Sufficient freedom from oil and water is confirmed if no soiling or discoloration is visible on the paper. If air contamination is evidenced, the filters shall be changed or cleaned, traps emptied, after-coolers, moisture separators or filters added, the equipment maintained, or such adjustments made as may be otherwise required to achieve clean, dry air for all blast cleaning, coating application, blow-down, or any other quality operations involving compressed air.

6.1.7 Abrasive/Profile: The abrasive selected shall be identified by the Contractor prior to use. The abrasive shall have a sharp, hard cutting surface and shall be dry and free of oil or soluble salt contaminants. Copper slag shall not be used. The abrasive shall provide an anchor pattern of at least 4.0 mils in depth. The surface profile shall be measured using the WPCC 4000 Series Anchor Profile Comparator.

6.1.8 Abrasive Blasting of Carbon Steel: The preparation of all carbon steel shall be by abrasive blast cleaning to remove all mill scale, rust and coatings.

6.1.9 Dry abrasive blast clean all interior steel surfaces in accordance with SSPC-SP5, "White Metal Blast Cleaning."

6.2 COATING APPLICATION

6.2.1 Surface Cleanliness: The surface of the prepared steel shall be blown down (clean, dry, compressed air), brushed and/or vacuumed prior to coating application to remove spent abrasive, dust and other interference material. If grease or oil have become deposited on the surface, they shall be removed by solvent cleaning (SSPC-SP1) prior to coating application. Any rust which has formed shall be removed to the specified degree of cleanliness prior to painting.

6.2.2 Ambient Conditions: Coatings shall be applied only when the interior surface and air temperatures are between 60^0F and 100^0F, the relative humidity in the tank is less than 90%, and the temperature of the surface to be painted is at least 5^0F above the dewpoint temperature of the air in the tank.

6.2.3 Mixing: Paint to be mixed shall have been delivered to the jobsite and stored in accordance with Section 5 and shall not have exceeded its shelf life. Mixing shall conform to the requirements of the coating manufacturer.

6.2.4 Mix Part II into Part I using a high-speed mechanical agitator with mixing blades fitting close to sides of container, making sure all of Part II is completely mixed with Part I. Mix well until obtaining a smooth liquid free of any unmixed particles of pigment. Add Part III and mix well. Part I is the liquid resin, Part II is the pigment, and Part III is the small portion of catalyst. Splitting of kits is not recommended. If necessary, mix Part I and Part II thoroughly and proportion mixture accurately with Part III. Continuous mixing during use is required. Operator should wear a face mask during high-speed mixing of the coating components. Avoid breathing dust.

6.2.5 Only complete kits shall be mixed. Paint which has skinned, gelled, separated, or otherwise deteriorated during storage to the extent that it cannot be remixed to a homogeneous film of the intended viscosity, uniformity and consistency shall not be used. Mixed coatings shall not be used beyond their pot life.

6.2.6 Thinning: Only Plasite 20 Thinner shall be used for thinning. The amount of thinning will be limited 10% (except for stripe coat). If NSF 61 criteria is specified, follow Plasite requirements for Thinner content.

6.2.7 Methods: Coatings shall be applied by conventional spray. Coating applications shall be in accordance with the requirements of SSPC-PA1 and the Plasite 4110 Technical Bulletin. In the event of a conflict, the requirements of this specification, manufacturer's instructions and PAI shall prevail in that order. If NSF 61 is specified on drawing or purchase order, follow plasite instructions for compliance to this standard.

6.2.8 Stripe Coat: A stripe coat of Plasite 4110 thinned 50% with Plasite Thinner 20 shall be applied to all edges, corners, welds, crevices and irregularities prior to each full coat application. Such striping shall extend a minimum of 3-inches beyond the edge or irregularity.

6.2.9 Brush Application: Brush application is not allowed except for touch-up repairs, inaccessible areas and stripe coating. Those areas for which the contractor desires to use brush application shall be carefully defined prior to the start of all work.

6.2.10 Agitation: Paint must be kept agitated in spray pots or containers during paint application.

6.2.11 Coating Thickness: The coating shall be applied in a minimum of two coats. Each coat shall have a dry film thickness of between 17 and 23 mils, with a total system thickness of between 35 and 45 mils.

6.2.12 Coating Continuity: All coats shall have smooth, streamline surfaces relatively free of dryspray, overspray, orange peel, fish eyes, craters, bubbles and other significant defects. Shadow-through, skips and misses are not acceptable. Runs or sags can be brushed out while the material remains wet. Areas where blast products or other debris have become embedded in the paint film shall be prepared by removing these products and touching up the area. In addition, the final coat shall be tested for discontinuities by performing high-voltage holiday testing at 3,500 volts to obtain a pinhole-free film. Holiday testing shall be performed only after a minimum cure time of 48-hours at 70^0F with ventilation has elapsed after application of the final coat.

6.2.13 Re-coat Time and Cleanliness: Subsequent coats shall be applied only after the previously-applied coat has been allowed to dry as required by the Plasite 4110 Technical Bulletin, but as soon as possible in order to minimize exposure to intercoat contamination. Any such surface contamination which is present shall be removed prior to the application of subsequent coats.

6.3 SAFETY

6.3.1 The coating system may be handled safely by trained personnel following normal laboratory and plant standards for good 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 shall be performed in well-ventilated areas away from an open flame. When in enclosed areas; although ventilated, fresh air masks should be provided.

6.3.2 The catalyst or curing agent is relatively stable at room temperature but must be protected from contamination, heat and fire and is classified by the Interstate Commerce Commission as an "oxidizing material" and 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 this 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.

7.0 INSPECTION AND TESTING

7.1 INSPECTION

7.1.1 Contractor Inspection: The Contractor shall responsible for inspecting all phases of the surface preparation and paint application in accordance with the Inspection Procedure.

7.1.2 Owner Inspection: Calgon Carbon reserves the right to inspect all phases of the coating operation to assure compliance with specification requirements. The Contractor shall repair/correct any and all deficiencies at his own expense. The Contractor shall provide accessibility and lighting for any inspections. It is not intended, however, that the presence or activity of such inspection shall in any way whatsoever relieve the Contractor of his obligation to provide inspection of his own to assure compliance with this specification. In all cases, Calgon Carbon or its approved agent will perform final inspection before acceptance.

7.1.3 Work Stoppage: Calgon Carbon reserves the right to stop any and all work at any time for non-compliance with the requirements of this specification.

7.2 TESTING

7.2.1 Check dry film thickness of coating by means of a General Electric Model Type B, or equal, dry film gage. Make at least one measurement for each 50 sq.ft. of surface. All areas with less than 30 mil DFT must have additional lining sprayed on before spark test. Run thickness test prior to spark test.

7.2.2 Spark test for pinholes with a 4500 VDC detector on all coated surfaces. A Tinker and Rasor Model AP-W, or equivalent device, is required for this operation; 3500-volt maximum, minimum 48-hours at 70^0F cure before spark test is run.

8.0 INSPECTION PROCEDURE

8.1 SURFACE PREPARATION

8.1.1 Verify prior to blast cleaning that sharp edges, weld spatter, slivers, laminations, scabs or any other surface irregularities have been adequately removed to provide a surface suitable for coating application.

8.1.2 Verify prior to blast cleaning that heavy deposits of oil and/or grease have been adequately removed in accordance with "Solvent Cleaning" (SSPC-SPI).

8.1.3 Prior to blast cleaning operations, perform compressed air cleanliness test at least once per eight-hour shift. Insert a clean, white blotter or clean, white paper into the air stream no more than 18-inches from air source downstream of moisture and oil separators for approximately two minutes. Examine the blotter or paper for signs of moisture and/or oil contamination. Blast cleaning should not begin unless air is free of detrimental amounts of oil and/or water.

8.1.4 Verify that only clean and dry abrasives will be used. If bulk abrasive is to be used, verify that the abrasive is properly protected from rain, moisture and oil.

8.1.5 If abrasives are recycled, test for the presence of abrasive contamination. Add approximately one ounce of recycled abrasive to several ounces of clean water. Shake contents vigorously and visually examine the water level for signs of oil contamination.

8.1.6 Angular abrasive that will provide an anchor profile depth minimum equal to the SPCC 4000 Series Blast Comparator will be used.

8.1.7 Verify that required protective coverings are intact to assure that previously-coated surfaces will not be damaged during blast cleaning operations.

8.1.8 Monitor and record ambient conditions and surface temperatures during blast cleaning operations using a psychrometer, surface temperature thermometer and U.S. Weather Bureau Tables.

8.1.9 "Final blast cleaning" shall not be performed unless the surface temperature is at least 5^0F higher than the dew point. "Rough blasting" may be performed regardless of ambient conditions, but must be "final blast cleaned" when conditions become favorable.

8.1.10 Verify that blast cleaned surfaces have been prepared in accordance with SSPC-SP5, "White Metal Blast Cleaning". SSPC-VIS-1 may be used as a visual reference. Mark all non-conforming areas with chalk or spray paint for rework.

8.1.11 Verify the profile (4 mils minimum) has been achieved using the WPCC 4000 Series Blast Comparator.

8.1.12 Using a dry film thickness gage, determine the magnetic base reading and record.

8.2 COATING PREPARATION

8.2.1 Verify that all containers are sealed, intact and properly labeled.

8.2.2 Verify that all coating material temperatures are at least 60^0F before mixing by the use of a stem thermometer.

8.2.3 Verify type of coating mixed, batch numbers of all components, type of thinner and batch number, thinning ratios, time of mix, maximum pot life, etc.

8.2.4 Verify that all three components are combined and thoroughly mixed in the proper proportions to obtain a uniform color, free of lumps.

8.2.5 Verify that only the recommended thinner is used.

8.2.6 Verify that the pot life is observed.

8.3 APPLICATION OF ALL COATINGS

8.3.1 Monitor and record ambient conditions and surface temperatures every three to four hours during coating application using a psychrometer, surface temperature thermometer and U.S. Weather Bureau Tables. Coating application shall not be permitted when the surface temperature is less than 5^0F above the dew point. No coatings shall be applied when the surface and/or material temperatures are less than 70^0F. No coating shall be applied when the surface temperature is expected to drop below 60^0F before it has dried. Coating application shall not be permitted when the relative humidity is greater than 90%.

8.3.2 Verify compressed air cleanliness and test for conventional spray application and blowdown operations (see Section 8.1.3). Plasite 4110 must be applied using an agitated conventional pressure pot using continuous agitation during application.

8.3.3 Verify that protective coverings previously established are intact.

8.3.4 Verify that surrounding air is free of airborne contaminants prior to the application of coatings.

8.3.5 Verify intercoat cleanliness and that blast-cleaned surfaces have been cleaned to assure that coatings will not be applied over oil, grease, dirt, dust, spent abrasive, etc.

8.4 APPLICATION OF FIRST COAT

8.4.1 Verify that Plasite 4110 has been applied to all surfaces prepared that day before visual oxidation takes place. Any surfaces not primed the same day shall be reblasted prior to primer application.

8.4.2 Verify that weld seams have been brush-coated at least 3-inches on each side of seam prior to spray application.

8.4.3 Verify that the first coat has been applied to a dry film thickness of 17-23 mils. Perform dry film thickness tests in accordance with SSPC-PA2. (Deduct magnetic base reading.)

8.5 APPLICATION OF FINAL COAT

8.5.1 Verify that previously-coated surfaces have dried at least eight hours at 70^0F with ventilation prior to application of second coat.

8.5.2 Verify that the final coat has been applied to a dry film thickness of 17-23 mils. Perform dry film thickness test in accordance with SSPC-PA2. (Deduct primer thickness.)

8.6 FINAL INSPECTION OF COATED SURFACES

8.6.1 Verify that all surfaces have a smooth and uniform appearance free of any irregularities.

8.6.2 Verify that the total dry film thickness (minimum two coats) is 35-45 mils. Perform dry film thickness test in accordance with SSPC-PA2.

8.6.3 Allow 48-hours cure at 70^0F before holiday testing. Verify that a void-free, continuous film has been achieved by performing high-voltage holiday detection on 100% of the coated surfaces. The voltage shall be set at 3,500-volts. Mark all discovered holidays and re-test all repairs.

8.6.4 All repairs shall be made in strict accordance with this specification.

9.0 SPECIAL REQUIREMENTS FOR NSF-61 (WHEN SPECIFIED)

9.1 When the end-use application requires compliance with NSF-61, Plasite must be applied in accordance with specific instructions found in the product bulletin. Applicator must follow these specific instructions.

9.2 CCC will notify applicator that this section (9.0) applies by signifying such in the purchase order and/or drawings and specifications.

9.3 Force curing may follow the date of application but must be completed prior to the disinfection of the vessel at customer site.

9.4 The NSF criteria specified by Plasite cannot be altered. Any deviation must be in writing to CCC for interpretation and decision making.

9.5 Force curing must be conducted in a controlled manner. Heat rise shall be not greater than 1 degree per minute, up to the maximum temperature needed to achieve a 200°F minimal surface temperature. This is critical to avoid blistering or post-cure holidays.

9.6 Heat should be applied at top or bottom head to allow equal flow of hot air. If heating in the shell, there should be an internal attachment to allow heat to distribute equally so there is not a section of lining that heats faster than the rest. See appendix for recommended flow distribution according to Plasite's guide.

9.7 A strip recorder with multiple thermocouples (or other similar device) shall be used to record the temperature during the force cure process. Records shall be forwarded to CCC for retention.

4110

Meets FDA Requirements
Vinyl Ester Coating
NSF Certified

NSF

PLASITE **PRODUCT DATA**

TYPE

PLASITE 4110 is a vinyl ester resin combined with special curing system and inert flake pigment to provide outstanding chemical and physical properties superior to polyester glass systems specially formulated for excellent abrasion resistance. PLASITE 4110 meets the FDA requirements for 21 CFR, 175.300 and 177.2420.

INTENDED USE

As a high chemical abrasion-resistant thick film for tank lining service and as a maintenance coating for severe exposure. **FOR INDUSTRIAL USE ONLY!**

NSF REQUIREMENTS

PLASITE 4110 is 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 maximum of 5% by volume, must be used for thinning purposes.
- The coating must be applied in 2 to 3 coats for a maximum thickness of 44 dry mils.
- Prior to placing the lining in service, it must be force cured at 200°F metal temperature for 4 hours.

TEMPERATURE RESISTANCE

Dry tests — 350°F continuous, occasional short excursions to 450°F acceptable. Wet temperature resistance depends upon concentration and reagent exposure.

COLOR

Charcoal gray.

FILM THICKNESS

2 to 3 multi-pass spray coats will produce the 35 to 45 mil dry film thickness recommended for immersion service. Consult Plasite Technical Service Department for any deviation to this film thickness. Refer to APPLICATION section.

VOC CONTENT

	Coating as Supplied (Recommended Thickness)		Thinned 5% by Volume with PLASITE 20 Thinner (Recommended Thickness)	
Color	Lbs./Gal.	g/L	Lbs./Gal.	g/L
Charcoal Gray	9.3 ± 2%	90 ± 2%	7.9 ± 2%	95 ± 2%

PHYSICAL SPECIFICATIONS

Pigments: Inert fillers and flake.

Pot Life: 1 1/2 to 3 hours in one gallon cans and 1 1/2 to 2 hours in five gallon cans at 70 to 90°F MATERIAL temperature. MATERIAL temperatures in excess of 90°F will significantly reduce pot life. CAUTION! Do not attempt to extend pot life by mixing newly catalyzed coating into coating near the end of its pot life.

Shelf Life: Approximately 4 months at 75°F. Cooler storage temperatures will increase shelf life. Storage at higher temperatures can result in substantially shorter shelf life.

Film Density: 79.1 lbs./ft³ 0.26384 lbs./ft² at 40 mils.

Elongation: 1.7% using Method ASTM D638.

Shipping Weight: 12 lbs. per gallon kit.

Abrasion Resistance: 11 milligrams average loss per 1000 cycles Taber CS-17 Wheel, 1000 gram weight.

Surface Hardness: Konig Pendulum Hardness of 134 seconds (Glass Standard = 250 seconds), ASTM Method D4366-84.

Thermal Shock: Unaffected by minus 70°F to plus 200°F in 5 cycles, or 40 to 380°F in 10 cycles.

CHEMICAL RESISTANCE

Superior chemical resistance to organic and inorganic acids, oxidizing agents and salts. Provides better alkali resistance than polyester glass flake coatings. For more detailed information see TD-3 Chemical Resistance Data.

COVERAGE

48 ft²/gal/20 mils DFT. 24 ft²/gal/40 mils DFT. This is a coverage obtained from field use on small jobs and includes loss in can, spray loss, small amount of scrink ngs, etc. Application by conventional spray equipment may affect coverage.

RECOATING TIME

May be recoated after initial hardening which will occur normally in 3 to 10 hours depending upon the surface temperature. 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: Freshly applied coating exposed to an accumulation of 24 hours of sunlight or surface temperatures in excess of 140°F may result in internal distortion. An applied coating film should be topcoated before an accumulation of 24 hours exposure has occurred or special procedures (such as etching with brush) should be used.

THINNERS

Use PLASITE 20 Thinner. 2 to 5% thinning may be needed to adjust coating for higher temperatures and various application conditions. Topcoating of previously coated films with long term cure will require the addition of 2 to 5% thinner. Consult Plasite laboratory for unusual thinning requirements. *See RECOATING TIME SECTION*

PRIMERS

For steel surfaces, coating is considered to be a "self-priming" system. Do not apply PLASITE 4110 directly to concrete. See reference to fillers and sealers in CONCRETE section.

CURING

Curing Time: 10 days at 70°F or 7 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 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. 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	4 1/2 Hours
120°F	36 Hours	170°F	3 1/2 Hours
130°F	18 Hours	180°F	2 1/2 Hours
140°F	10 Hours	190°F	2 Hours
150°F	6 Hours	200°F	1 3/4 Hours

PACKAGING

1-gallon kits consist of two 1-gallon cans, Part I and Part II, and a small container of catalyst, Part III (a total of 1 gallon).

5-gallon kits consist of two 5-gallon cans, Part I and Part II, and a small container of catalyst, Part III (a total of 5 gallons).

SURFACE PREPARATION

Steel

High Temperature & Immersion

All sharp edges shall be ground to produce a radius and all imperfections, such as, skip welds, delaminations, scabs, slivers and slag shall be corrected prior to abrasive blasting. Skip welds should be welded solid.

Degrease surface prior to sandblasting. Organic solvents, alkaline solutions, steam, hot water with detergents or other systems that will completely remove dirt, oil, grease, etc. shall be used. Used tanks may require additional decontamination.

The surface shall be blasted to NACE No. 1 or SSPC-SP5 white metal using a Venturi blast nozzle with 100 psi air and 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 Plasite 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 Plasite Technical Service Department or your local sales representative.

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.

The surface temperature shall be maintained at a minimum of 5°F 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.

Severe Corrosive Environments – Splash & Fume

Surface preparation is the same in the foregoing with the exception that NACE No. 2 or SSPC-SP10 near white metal blast may be used providing the anchor pattern as described above is achieved.

Concrete

All concrete requires whip blasting to remove laitance and to provide a hard, firm, clean and neutral body-toned concrete surface for coating. All concrete surfaces are required to be filled and sealed prior to application of PLASITE 4110 in accordance with one of the following.

For immersion service, all concrete surfaces must be filled and sealed with 2 coats either 9028M1 or 9028M2 applied in accordance with the PLASITE 9028 product data sheet instructions. All surface imperfections, "bug holes," etc. must be completely repaired before application of PLASITE 4110.

For non-immersion surfaces having no visible voids, approximately 3 mils of PLASITE 7133 diluted with equal parts of PLASITE 8 Thinner may be brushed or sprayed on the surface, reference PLASITE 7133 product data sheet. The Plasite sealer coat shall be tack-free prior to application of PLASITE 4110.

Note: For food immersion service, use PLASITE 9123 Corrosion Liner Sealer

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

APPLICATION

Mixing

Mix Part II into Part I using a mechanical high speed agitator, making sure all of Part II is completely mixed with Part I. Maintain a good vortex while mixing until a smooth blend, free of any unmixed particles of pigment is obtained (approximately 15 to 30 minutes). Allow to cook if material temperature increases then add Part III and necessary amount of PLASITE 20 Thinner. Mix an additional three to five minutes. Continuous mixing during use is required. Part I and Part II may be premixed up to 72 hours prior to adding Part III. Operator should wear face mask during high speed mixing of the coating components. Avoid breathing dust. WARNING: **DO NOT SPLIT KITS!** Part I contains various pigments and catalysts. Splitting of this component will alter the manufacturer's formulation which will seriously affect its application, curing and chemical resistance properties. If splitting of the kit is necessary, contact Plasite Technical Service Department for instructions.

Atomizing Spray Equipment: Conventional atomizing spray system shall be equal to: Binks Model 2001 Gun with 59ASS Fluid Nozzle, 25I A - Cap, 55SS Needle. Heavy-duty trigger spring recommended. Pot pressure of approximately 50 psi. Atomizing pressure of approximately 60 psi. (Use standard production type pressure pot with air motor drive agitator.)

Airless Spray Equipment: Airless spray is not recommended.

Note: Brush application is not recommended but may be used for minor touch up. Continuous mixing during use is required.

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 be inhibited. Succeeding coats cannot be applied without damaging the system until the surface temperature rises sufficiently to obtain partial polymerization. This will require raising to the minimum surface temperature of 70°F within 12 hours of application. Refer to CURING section. When surface temperatures are over 100°F, consult Plasite Technical Service Department for special thinner and blending 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, and approximately 14" from surface. Refer to THINNERS section.

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. Refer to RECOATING TIME section.

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 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 Steams Model 14/20 or equivalent is required on final film. Use 3000 to 3500 volts. 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. The dry film thickness shall be a nominal 40 mils with acceptable minimum at 35 mils and maximum at 45 mils.

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

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

SAFETY
READ THIS NOTICE
SAFETY AND MISCELLANEOUS EQUIPMENT

For tank lining work and enclosed spaces, 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.

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.

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. In enclosed areas, although ventilated, fresh air masks should be provided.

The catalyst (Part III) is relatively stable at room temperatures but must be protected from contamination, heat, fire and contact with promoter (Part II). The catalyst (Part III) is classified by the Interstate Commerce Commission as an "oxidizing material." 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.

CAUTION : Read and follow all caution statements on this product data sheet, material safety data sheet and container label for this product.

[illegible]

PLASITE
PROTECTIVE COATINGS

614 Elizabeth Street, Green Bay, WI 5430?
920/437-6561 • FAX 920/437-8083

* * 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.

REVISION	DATE	BY	PAGE	REMARKS
A	1/4/1985	DJH	All	Issued for Purchase
B	8/1/1990	FRF	All	Issued for Purchase
C	12/5/1997	RB	All	Issued for Purchase
1	5/01/2000	MRM	3	Revised Paragraph 6.1.4
2	11/3/2004	JMcM	11	Added Section 9.0
3	11/17/2005	GMK	2	Added Correction 3.2.1

ISSUED: JULY, 1993

SECTION 11

SPECIFICATION NUMBER 7209A-VS9 FOR

UNDER CONE VESSEL COATING

1.0 SCOPE OF WORK

1.1 This specification covers materials, surface preparation, application and testing of protective coatings for coating under the cone of the Model 10 Carbon Steel Vessels.

1.2 The scope of work includes all labor, materials, equipment and services required for lining and testing the vessels indicated on the drawing and/or applicable documents.

1.3 The entire internal surface under the cone of the designated vessels shall be lined.

1.4 The coating must satisfactorily protect the internal metal surfaces from corrosion and erosion by the treated water.

1.5 The Contractor shall guarantee that all materials and workmanship shall be free of defects and that they will conform to standards set forth for first-class workmanship and quality. In the event of failure of the coating to withstand the service conditions set forth in Article 3.0, the Contractor shall, at his expense, replace the defective materials and workmanship to the Buyer's satisfaction.

2.0 REFERENCE DOCUMENTS

2.1 Steel Structures Painting Council Surface Preparation Specification No. 1, "Solvent Cleaning" (SSPC-SP1-85).

2.2 Steel Structures Painting Council Surface Preparation Specification No. 2, "Hand Tool Cleaning" (SSPC-SP2-85).

2.3 Steel Structures Painting Council Surface Preparation Specification No. 3, "Power Tool Cleaning" (SSPC-SP3-85).

2.4 Steel Structures Painting Council Surface Preparation Specification No. 5, "White Metal Blast Cleaning" (SSPC-SP5-85).

2.5 NACE 6F-166 "Recommended Practices for Inspections of Linings on Steel and Concrete".

2.6 Plasite 4100 (4110) Technical Bulletin.

2.7 Plasite Caulking Materials Compound 941B Technical Bulletin.

3.0 SERVICE CONDITIONS

3.1 The coating will be exposed to static and turbulent water flow.

3.2 The characteristics of the slurries will be as follows:

3.2.1	Treated Wastewater or Groundwater		
3.2.2	Temperature	-	35 -100°F
3.2.3	PH	-	5.0 to 9.0
3.2.4	Density		Water
3.2.5	Abrasive	-	Minimal

4.0 MATERIALS

4.1 The coating shall be a heavy-duty, thick film, high-resistant vinyl ester resin material with abrasion resistant qualities. The 4100 (4110) lining material shall be suitable for spray application to a nominal 10 to 12 mil dry film thickness on a steel surface. The 941B caulking material shall be heavy bodied brushable type.

4.2 The coating shall be Plasite No. 4100 (4110) coating material and 941B caulking material as supplied by Wisconsin Protective Coating Corporation, Green Bay Wisconsin. Products from other suppliers or manufacturers are not approved.

5.0 DELIVERY, STORAGE AND HANDLING

5.1 Product Delivery: Materials shall be delivered to the site in sealed, original, labeled containers with the Plasite name, product number, batch number, color designation, and instructions for mixing and thinning.

5.2 Storage: Contractor shall be responsible for the proper storage of all coating materials. Damaged, leaking, or unlabeled containers shall be disposed of daily.

5.3 Storage Location: Materials shall be stored in a place specifically assigned for that purpose which is dry and out of direct sunlight. Materials shall be stored in a manner so as not to exceed the manufacturer's temperature limitations. In all cases, the storage and handling of materials shall conform to the requirements of the manufacturer and the applicable safety regulatory agencies.

5.4 Fire Prevention: All precautions to prevent fire shall be taken. Containers of flammable materials shall be opened only when needed. Rubbing cloths and oil rags shall be kept in tightly closed containers and removed from the site daily. Fire or other damage due to spontaneous combustion or other names shall be the Contractor's responsibility.

6.0 APPLICATION

6.1 UNDER THE CONE SURFACE PREPARATION

6.1.1 The Contractor shall install and maintain protective coverings on any surface not to be coated to protect the surface during surface preparation and coating application.

6.1.2 Grease, Oil, and Interference Material: Surface contamination on bare steel such as grease, oil, tape tags, markings, etc. shall be removed by the Contractor by solvent cleaning per SSPC-SP1 prior to blast cleaning.

6.1.3 Surface Irregularities: Prior to blast cleaning, all surfaces shall be inspected for weld spatter, weld flux, or any other surface irregularities. When discovered, they will be removed by the Contractor.

6.1.4 Edges: All sharp edges will be ground to a smooth radius. Areas inside the vessel that are not expected to be in direct contact with activated carbon are not required to be chamfered unless noted on the specific detail. (A specific example: the holes in the internal cone design. They do not require a radius or chamfer on their edge since filter nozzles must fit snugly into these holes for proper service.)

6.1.5 Ambient Conditions: Final blast cleaning shall not be performed when the surface temperature is less than 5°F greater than the dew point temperature of the surrounding air, nor when the relative humidity is greater than 90%.

6.1.6 Compress Air Cleanliness: The air supply used for blast cleaning shall be free from moisture and oil contamination. The air cleanliness shall be verified at least once per shift for each compressor used. The test involves directing the air stream onto a piece of white paper held not more than 18" away from the air outlet. The test shall be run downstream of moisture and oil separators for a period of not less than two minutes. Sufficient freedom from oil and water is confirmed if no soiling or discoloration is visible on the paper. If air contamination is evidence, the filters shall be changed or cleaned, traps emptied, after coolers, moisture separators or filters added, the equipment maintained, or such adjustments made as may be otherwise required to achieve clean, dry air for all blast cleaning, coating application, blow-down, or any other quality operations involving compressed air.

6.1.7 Abrasive/Profile: The abrasive selected shall be identified by the Contractor prior to use. The abrasive shall have a sharp, hard cutting surface and shall be dry and free of oil or soluble salt contaminants. Copper slag shall not be used. The abrasive shall provide an anchor pattern of at least 2.0 mils in depth. The surface profile shall be measured using Testex Press-O-Film replica tape and a spring micrometer.

6.1.8 Abrasive Blasting --
Abrasive Blasting of Carbon Steel: The preparation of all carbon steel shall be by abrasive blast cleaning to remove all mill scale, rust, and coatings.

6.19. Dry abrasive blast clean all interior steel surfaces in accordance with S SPC-SP5, "White Metal Blast Cleaning".

6.2 COATING APPLICATION

6.2.1 Surface Cleanliness: The surface of the prepared steel shall be blown down (clean, dry, compressed air), brushed and/or vacuumed prior to coating application to remove spent abrasive, dust, and other interference material. If grease or oil have become deposited on the surface, they shall be removed by solvent cleaning (SSPC-SP1) prior to coating application. Work schedule shall be such that a minimal amount of time is allowed between surface preparation and coating application. Any rust, which has formed, shall be removed to the specified degree of cleanliness prior to coating.

6.2.2 Ambient Conditions: Coatings shall be applied only when the interior surface and air temperatures are between 60° F and 100°F, the relative humidity in the tank is less than 90%, and the temperature of the surface to be painted is at least 5°F above the dew point temperature of the air in the tank.

6.2.3 Mixing: Materials to be mixed shall have been delivered to the jobsite and stored in accordance with Section 5 and shall not have exceeded its shelf life. Mixing shall conform to the requirements of the coating manufacturer.

6.2.4 For 4100 (4110), mix Part II into Part I using a high-speed mechanical agitator with mixing blades fitting close to sides of container, making sure all of Part II is completely mixed with Part I. Mix well until obtaining a smooth liquid free of any unmixed particles of pigment. Add Part III and mix well. Part I is the liquid resin, Part II is the pigment, and Part III is the small portion of catalyst. Splitting of kits is not recommended. If necessary, mix Part I and Part II thoroughly and proportion mixture accurately with Part III. Continuous mixing during use is required. Operator should wear a facemask during high-speed mixing of the coating components. Avoid breathing dust. For 941B, the vinyl ester and MEK shall be mixed per the manufacturer's instructions.

6.2.5 Only complete kits shall be mixed. Paint which has skinned, gelled, separated, or otherwise deteriorated during storage to the extent that it cannot be remixed to a homogeneous film of the intended viscosity, uniformity and consistency shall not be used. Mixed coatings shall not be used beyond their pot life.

6.2.6 Thinning: Only Plasite 20 thinner shall be used for thinning Plasite 4100 (4110) and the amount of thinning will be limited to about 10%. The Plasite 941B caulking material will not require thinning.

6.2.7 Methods: 4100 (4110) coatings shall be applied by conventional spray. Coating applications shall be in accordance with the requirements of SSPC-PA1 and the Plasite 4100 (4110) Technical Bulletin. In the event of a conflict, the requirements of this specification, manufacturer's instructions and PA1 shall prevail in that order.

6.2.8. Methods: 941B coating shall be brush applied to the joint between the cone and the vessel shell and to all other crevices and irregularities after the full coat of Plasite 4100 (4110) has been applied.

6.2.9 Agitation: Plasite 4100 (4110) material must be kept agitated in spray pots or containers during application.

6.2.10 Coating Thickness: Plastic 4100 (4110) shall be applied in one coat to a dry film thickness of between 10 and 12 mils. Plasite 941B caulking material shall be applied to a sufficient thickness to fill in all crevices and irregularities.

6.2.11 Coating Continuity: Coating shall have smooth, streamline surfaces relatively free of dry spray, over spray, orange peel, fish eyes, craters, bubbles, and other significant defects. Shadow-through, skips and misses are not acceptable. Runs or sags can be brushed out while the material remains wet. Areas where blast products or other debris have become embedded in the paint film shall be repaired by removing these products and touching up the area. Coatings shall be commercially continuous as defined by NACE Publication 6F-166; Calgon Carbon Corporation reserves the right to verify coating continuity.

6.2.12 Re-Coat Time and Cleanliness: Any required subsequent coats shall be applied only after the previously applied coat has been allowed to dry as required by the Plasite 4100 (4110) and 941B Technical Bulletins, but as soon as possible in order to minimize exposure to intercoat contamination. Any such surface contamination, which is present, shall be removed prior to the application of subsequent coats.

6.3 SAFETY

6.3.1 The coating system may be handled safety by trained personnel following normal laboratory and plant standards for good 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 shall be performed in well-ventilated areas away from an open flame. When in enclosed areas, although ventilated, fresh air masks should be provided.

6.3.2 The catalyst or curing agent is relatively stable at room temperature but must be protected from contamination, heat and fire and is classified by the Interstate Commerce Commission as an "oxidizing material" and 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 this 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.

7.0 INSPECTION AND TESTING

7.1 INSPECTION

7.1.1 Contractor Inspection: The Contractor shall be responsible for inspection of all phases of the surface preparation and coating application in accordance with the Inspection Procedure.

7.1.2 Owner Inspection: Calgon Carbon reserves the right to inspect all phases of the coating operation to assure compliance with specification requirements. The Contractor shall repair/correct any and all deficiencies at his own expense. The Contractor shall provide accessibility and lighting for any inspections. It is not intended, however, that the presence or activity of such inspection shall, in any way whatsoever, relieve the Contractor of his obligation to provide inspection of his own to assure compliance with this specification. In all cases, Calgon Carbon or its approved agent will perform final inspection before acceptance.

7.1.3 Work Stoppage: Calgon Carbon reserves the right to stop any and all work at any time for non-compliance with the requirements of this specification.

7.2 TESTING

7.2.1 Check 10-12 mil dry film thickness of coating by means of a fixed probe or magnetic pull-off type gage. Make at least one measurement for each 50 square feet of surface. All areas with less than 8 mil DFT must have additional coating applied.

8.0 INSPECTION PROCEDURE

8.1 SURFACE PREPARATION

8.1.1 The applicator is required to fill out an EAP-2A form (supplied by Calgon Carbon Corporation) and have the form available for the Calgon Carbon Corporation inspector at the time of his inspection.

8.1.2 Verify prior to blast cleaning that sharp edges, weld splatter, slivers, laminations, scabs or any other surface irregularities have been adequately removed to provide a surface suitable for coating application.

8.1.3 Verify prior to blast cleaning that heavy deposits of oil and/or grease have been adequately removed in accordance with "Solvent Cleaning" (SSPC-SP1).

8.1.4 Prior to blast cleaning operations, perform compressed air cleanliness test at least once per eight-hour shift. Insert a clean, white blotter or clean, white paper into the air stream no more than 18 inches from air source downstream of moisture and oil separators for approximately two minutes. Examine the blotter or paper for signs of moisture and/or oil contamination. Blast cleaning should not begin unless air is free of detrimental amounts of oil and/or water.

8.1.5 Verify that only clean and dry abrasives will be used. If bulk abrasive is to be used, verify that the abrasive is properly protected from rain, moisture, and oil.

8.1.6 If abrasives are recycled, test for the presence of abrasive contamination. Add approximately one ounce of recycled abrasive to several ounces of clean water. Shake contents vigorously and visually examine the water level for signs of oil contamination.

8.1.7 Angular abrasive that will provide an anchor profile depth minimum equal to two mils as measured by Testex Press-O-Film replica tape.

8.1.8 Verify that required protective coverings are intact to assure that previously coated surfaces will not be damaged during blast cleaning operations.

8.1.9 Monitor and record ambient conditions and surface temperatures during blast cleaning operations using a psychrometer, surface temperature thermometer and U.S. Weather Bureau Tables and record on the EAP-2A form.

8.1.10 "Final blast cleaning" shall not be performed unless the surface temperature is at least 5°F higher than the dew point. "Rough blasting" may be performed regardless of ambient conditions, but must be "final blast cleaned" when conditions become favorable.

8.1.11 Verify that blast cleaned surfaces have been prepared in accordance with SSPC-SP5, "White metal blast cleaning". SSPC-VIS-1 may be used as a visual reference. Mark all non-conforming areas with chalk or spray paint for rework.

8.1.12 Verify the profile (two mils minimum) has been achieved using the Testex Press-O-Film replica tape.

8.1.13 Using a dry film thickness gage, determine the magnetic base reading and record.

8.2 COATING PREPARATION

8.2.1 Verify that all containers are sealed, intact and properly labeled.

8.2.2 Verify that all coating material temperatures are at least 60°F before mixing by the use of a stem thermometer.

8.2.3 Verify type of coating mixed, batch numbers of all components, type of thinner and batch number, thinning ratios, time of mix, maximum pot life, etc. and record batch numbers on the EAP-2A form.

8.2.4 Verify that all components are combined and thoroughly mixed in the proper proportions to obtain a uniform color, free of lumps.

8.2.5 Verify that only the recommended thinner is used.

8.2.6 Verify that the pot life is observed.

8.3 APPLICATION OF ALL COATINGS

8.3.1 Monitor and record ambient conditions on the EAP-2A form and surface temperatures every three to four hours during coating application using a psychrometer, surface temperature thermometer and U.S. Weather Bureau Tables. Coating application shall not be permitted when the surface temperature is less than 5°F above the dew point. No coatings shall be applied when the surface and/or material temperatures are less then 70°F. No coatings shall be applied when the surface temperature is expected to drop below 60° F before it has dried. Coating application shall not be permitted when the relative humidity is greater than 90%.

8.3.2 Verify compressed air cleanliness and test for conventional spray application and blowdown operations (see Section 8.1.3). Plasite 4100 (4110) must be applied using an agitated conventional pressure pot using continuous agitation during application.

8.3.3 Verify that protective coverings previously established are intact.

8.3.4 Verify that surrounding air is free of airborne contaminates prior to the application of coatings.

8.3.5 Verify intercoat cleanliness and that blast-cleaned surfaces have been cleaned to assure that coatings will not be applied over oil, grease, dirt, dust, spent abrasive, etc.

8.4 APPLICATION OF FIRST COAT

8.4.1 Verify that Plasite 4100 (4110) has been applied to all surfaces prepared that day before visual oxidation takes place. Any surfaces not coated the same day shall be reblasted prior to coating application.

8.4.2 Verify that weld seams, crevices and irregularities have been brush coated and filled in with Plasite 941B vinyl ester caulk after the spray application of Plasite 4100 (4110).

8.4.3 Verify that the first coat has been applied to a dry film thickness of 10-12 mils. Perform dry film thickness tests in accordance with SSPC-PA2. (Deduct magnetic base reading).

8.5 FINAL INSPECTION OF COATED SURFACES

8.5.1 Verify that all surfaces have a smooth and uniform appearance free of any irregularities.

8.5.2 Verify that the total dry film thickness (minimum two coats) is 10-12 mils. Perform dry film thickness tests.

8.5.3 All repairs shall be made in strict accordance with this specification. If repairs are required, the EAP-2 inspection form shall be completed as directed by the Calgon Carbon Corporation inspector.

* * *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.

REVISION	DATE	BY	PAGE	REMARKS
A	11/15/1993	JMcM	All	Issued For Comment
1	6/18/1992	FRF	All	Issued For Construction
2	5/10/2000	MRM		Revised Paragraph 6.1.4

ISSUED: JUNE, 1992

CALGON

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SECTION 5

PAINT SPECIFICATION

SPECIFICATION NUMBER: RS17 FOR EPOXY PAINTING

1.0 SCOPE

1.1 This specification covers the minimum procedures required for the surface prep aration and coating of equipm ent that has not been previ ously painted. It also covers equipment that has been previously painted.

1.2 The work to be perform ed under this specification consists of painting all metal materials including vessels, supports, base plates, skids, pipe, pipe supports, brackets, hanger rods, pipe clamps, and all other metal surfaces, not mentioned in Section 5.0, that are part of the system.

1.3 The "applicator" referred to in this specification could be Calgon Carbon Corporation or a sub-contractor.

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

1.5 The applicator will familiarize himself with rules and regulations as set forth by the Safety Department of the facility where painting is to be conducted and com ply with these regulations.

2.0 SURFACE PREPARATION OF PAINTED SURFACES

2.1 ***Previously coated surfaces that are in good condition:***
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 s anding. Remove all sanding dust.

It is recommended that water blasting be used (NAC E 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 applicator 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 applicator 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 not in good condition:***
The applicator 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 applicator shall accomplish this by hand chipping, scraping, sanding, and wire brushing. The applicator 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, rust-proofing, 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 applicator shall use remove all loose rust and mill scale to the degree specified by SSPC-SP3-63 by power-tool chipping, de-scaling, sanding, wire brushing, grinding, or media blasting as a minimum. SSPC-SP7 Brush-off Blast cleaning is preferred.

4.0 PAINT APPLICATION

4.1 The coating shall be applied in accordance with the manufacturer's instructions.

4.2 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).

4.3 All paint shall be within its expiration date and furnished in unopened containers.

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

4.5 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.

4.6 Any surface that develops rust prior to painting shall be re-prepared per Sections 2.0 or 3.0 above.

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, plastic or S/S 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 Macropoxy HS B58 Series (two-part) Epoxy Coating System, or equal. The manufacturer's specifications are attached and shall be followed along with any recommendations and precautions stated on the paint can label.

Accepted substitutes are:

International Protective Coatings -- Interseal 670
ICI Devoe Coatings -- Devran 224 HS

Other manufacturers may be proposed, but are subject to Calgon Carbon approval prior to use.

6.2 The color shall match Sherwin-Williams MC-71 "Slate Gray" or as specified on the project drawings.

* * *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.

REVISION	DATE	BY	PAGE	REMARKS
0	9/8/1989	FRF	All	Issued for Construction
1	1/30/1996	JPM	All	All New Pages; Revised Paragraph 4.1
2	4/15/1996	JPM	1-2-3	Revised Paragraphs 1.3, 2.2, 3.2, 4.1 ,5.3, 6.1 and 6.2
3	6/4/2002	JPM	All	Revised 1.2,1.5,3.2,5.3,6.1,6.2
4	6/08/2007	TAB	3	Revised 6.1 and 6.2
5	4/22/2008	RES	All	General Revision

ISSUED: SEPTEMBER 8, 1989

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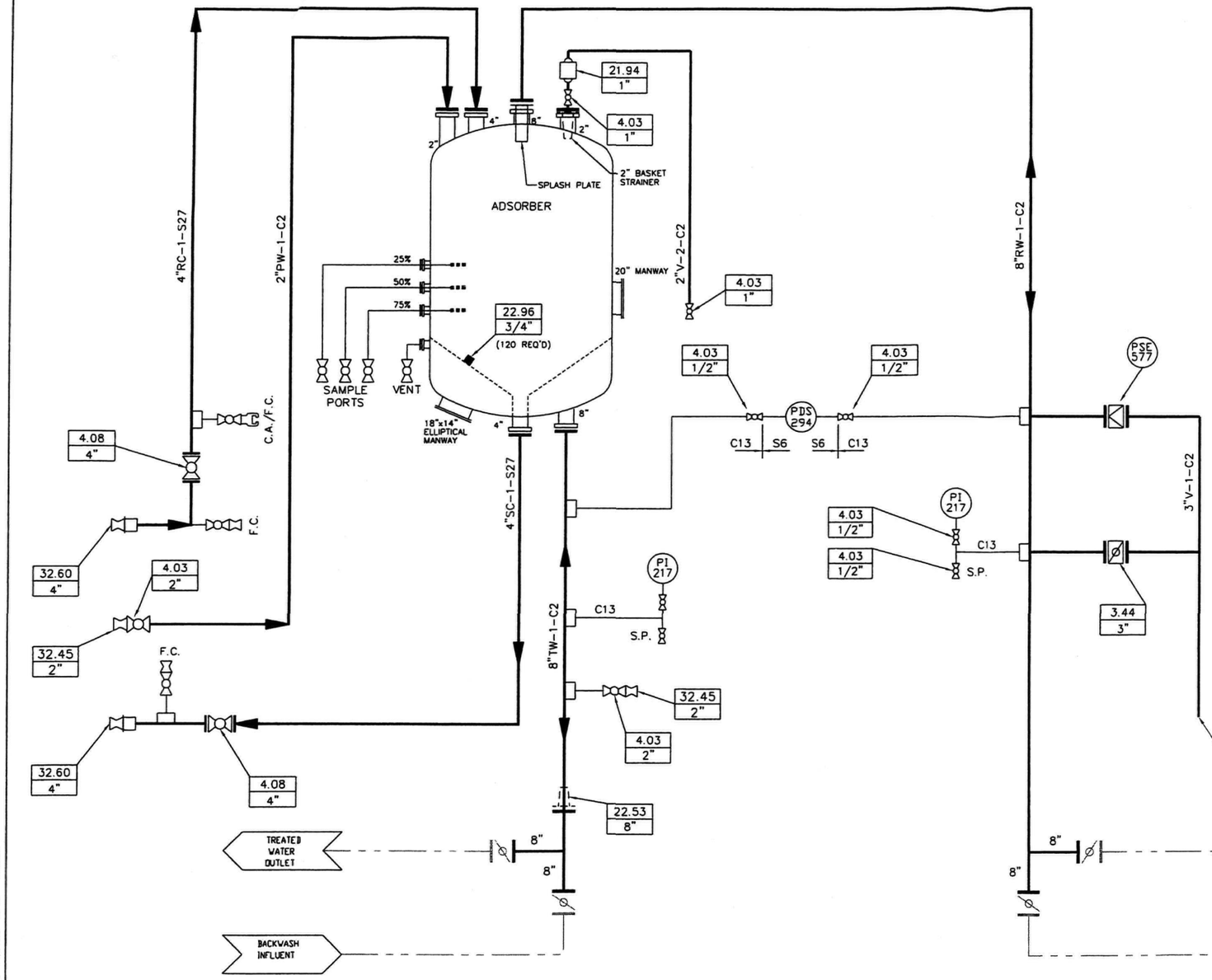
SECTION 6

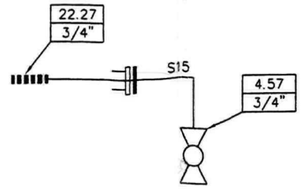
DRAWINGS

SECTION 6

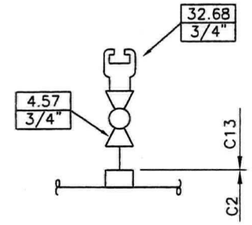
DRAWING INDEX

DRAWING NUMBER	REVISION	TITLE
91106128	A	Modular Adsorber System, 12' Dia., Single, Flow Diagram
91106129	A	Modular Adsorber System, 12' Dia., Single, General Arrangement
91106130	A	Modular Adsorber System, 12' Dia., Internal Cone, Vessel Arrangement

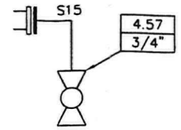




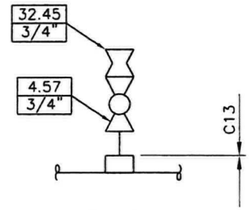
SAMPLE PORT
(3) REQ'D



COMP. AIR/FLUSH CONNECTION



VENT



FLUSH CONNECTION
(2) REQ'D

NOTES:
1.) (1) SYSTEM SHOWN, (8) SYSTEMS REQUIRED.

MEDIA	INSTRUMENTATION	DESIGN CONDITIONS	LEGEND	ADSORBERS	UTILITY REQUIREMENTS
MEDIA: DSR-C QUANTITY PER VESSEL: 20,000 LBS. SERVICE: NON-POTABLE	PS 217 - CCC SPEC IS008 PSE 577 - CCC SPEC IS015 PDS 294 - CCC SPEC IS052	FLOW RATE - 625 GPM INFLUENT PRESSURE - 125 PSIG MAX. INFLUENT TEMP. - 140°F MAX. BACKWASH RATE - 1100 GPM MAX. ELECTRIC POWER - 120V, 60 Hz, 15A	BW - BACKWASH WATER FC - FLUSH CONNECTION RC - REACT.(OR VIRGIN) CARBON RW - RAW WATER SC - SPENT CARBON SLURRY SP - SAMPLE PORT TW - TREATED WATER V - VENT CA - COMPRESSED AIR	12'-0" O.D. x 7'-9" S.S. ASME 2:1 ELLIPTICAL TOP AND BOTTOM HEADS. CARBON STEEL CONSTRUCTION. ASME SECT. VIII, DIV. 1 W/ PLASITE 4110 LINING 125 PSIG @ 140°F DESIGN.	AIR, CARBON TRANSFER - 100 SCFM @ 30 PSIG MIN. PLANT WATER - 100 GPM @ 30 PSIG MIN. WIRING - N/A

	NAME	DATE
DRAFTER	EPG	04/26/10
DESIGNER		
CHECKER		
APPROVAL		
PROJECT No.	LM-10048.CBS1	

REV	DESCRIPTION	APP	DATE
C			
B			
A	ISSUED FOR SUBMITTAL		

REVISIONS

TOLERANCES (unless otherwise specified)

ANGULAR	±0°30'	DECIMAL (2 PLACES)	±.010
FRACTIONAL	±1/16"	DECIMAL (3 PLACES)	±.005
DECIMAL (1 PLACE)	±.015	DECIMAL (4 PLACES)	±.0005

CALGON

CALGON CARBON CORPORATION

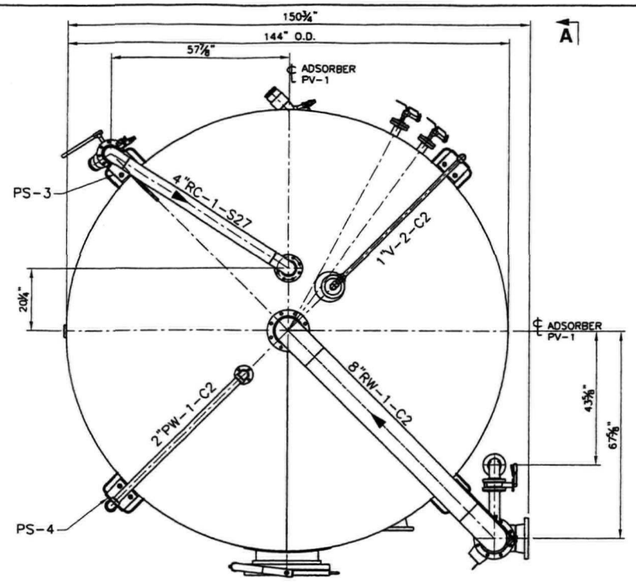
CLIENT: CBS CORPORATION
BLOOMINGTON, IL

TITLE: MODULAR ADSORBER SYSTEM
12' DIA., SINGLE
FLOW DIAGRAM

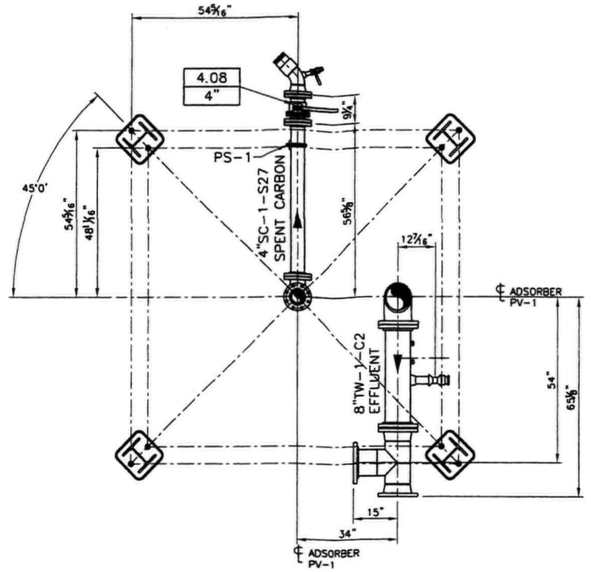
DWG. Size	SHEET No.	SCALE
D	1 OF 1	NONE

DWG. No. 91106128 REV. A

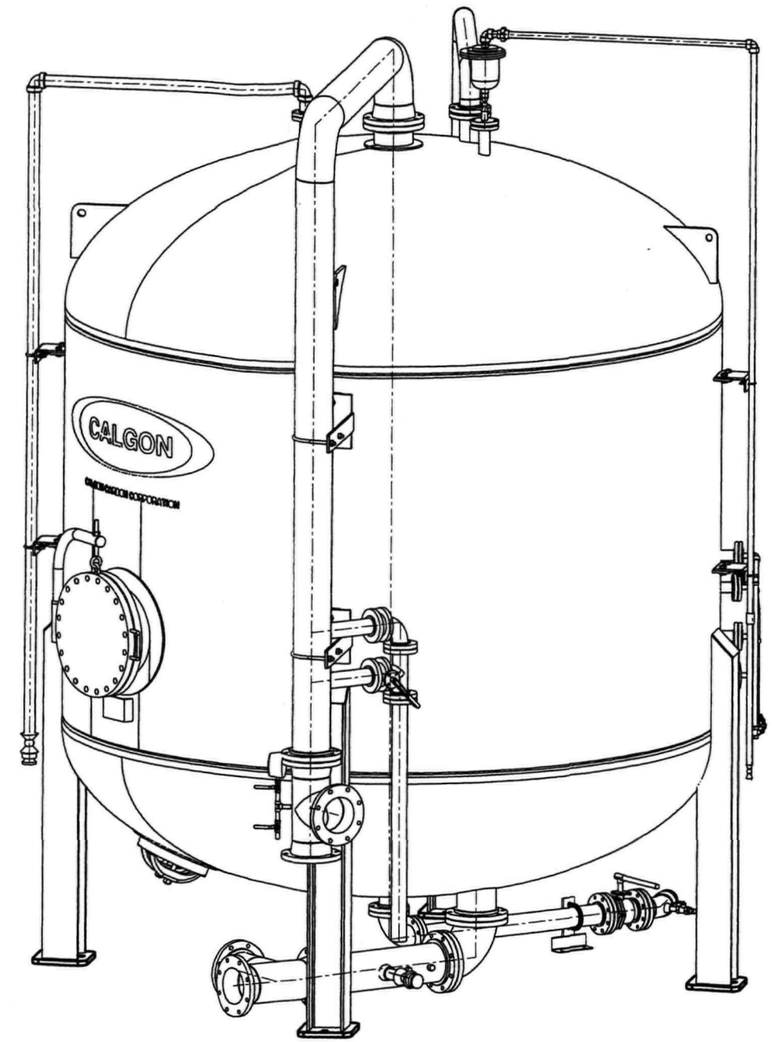
V:\2010\LM-10048.CBS1\Drawings\Process\91106128_PID.dwg May 06, 2010 - 1:51pm



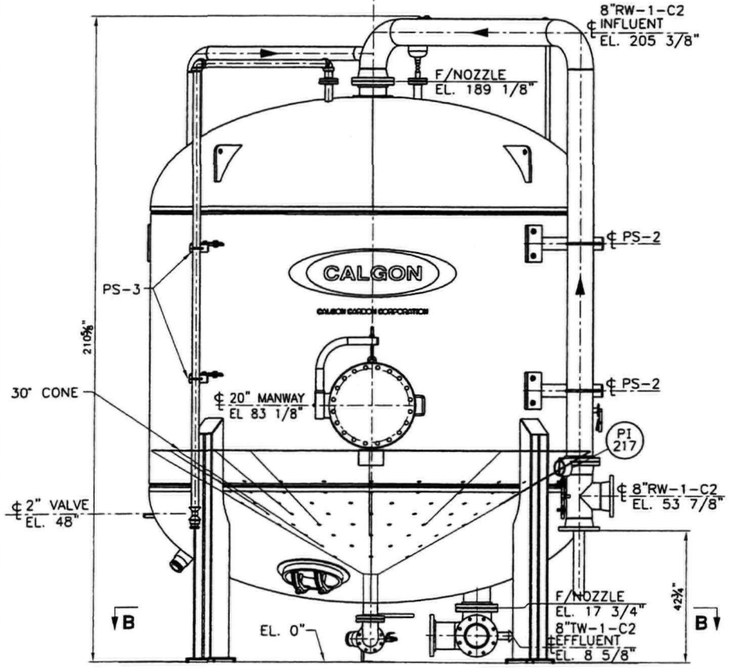
PLAN
(SCALE: 1/2"=1'-0")



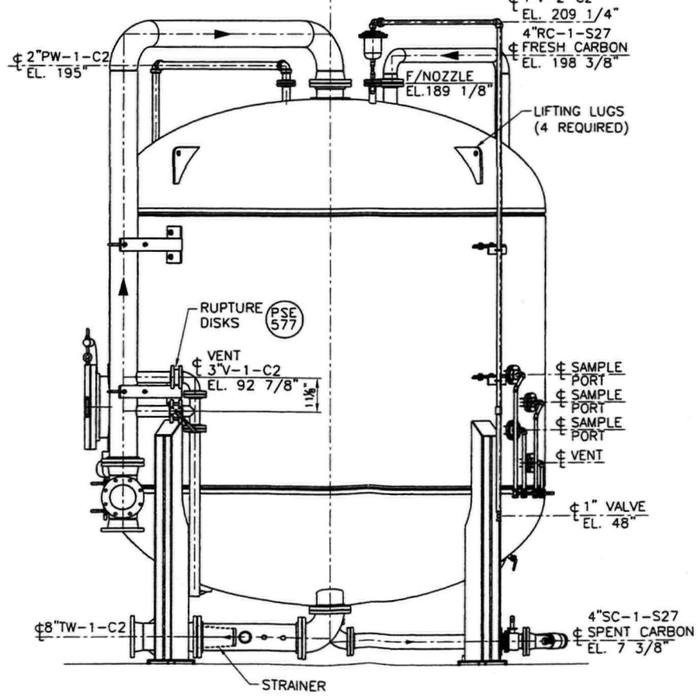
SECTION B-B
(SCALE: 1/2"=1'-0")



ISOMETRIC
(SCALE: N.T.S.)



ELEVATION
(SCALE: 1/2"=1'-0")



VIEW A-A
(SCALE: 1/2"=1'-0")

PIPING PAINTING NOTES:

1. EXTERIOR SURFACES OF PIPE SHALL BE PAINTED PRIOR TO ASSEMBLY TO MINIMIZE OXIDATION AT FLANGED CONNECTIONS.
2. THE FINISHED SURFACE COLOR SHALL MATCH THE COLOR OF THE EXISTING CARBON VESSELS.
3. PRIME COAT: AN EPOXY PRIMER, SUCH AS CARBOLINE 888 OR EQUAL.
4. FINISH COAT: A FINISH COAT OR EITHER POLYURETHANE OR HIGH SOLIDS EPOXY (5-7 MILS DFT, PER CCC SPEC. RS-17. SLATE GREY).

REV	DESCRIPTION	APP	DATE
C			
B			
A	ISSUED FOR SUBMITTAL	EPG	

REVISIONS

TOLERANCES (unless otherwise specified)

ANGULAR	±0°30'	DECIMAL (2 PLACES)	±.010
FRACTIONAL	±1/16"	DECIMAL (3 PLACES)	±.005
DECIMAL (1 PLACE)	±.015	DECIMAL (4 PLACES)	±.0005

	NAME	DATE
DRAFTER	EPG	04/26/10
DESIGNER		
CHECKER		
APPROVAL		
PROJECT No.	LM-10048.CBS1	

CALGON
CALGON CARBON CORPORATION

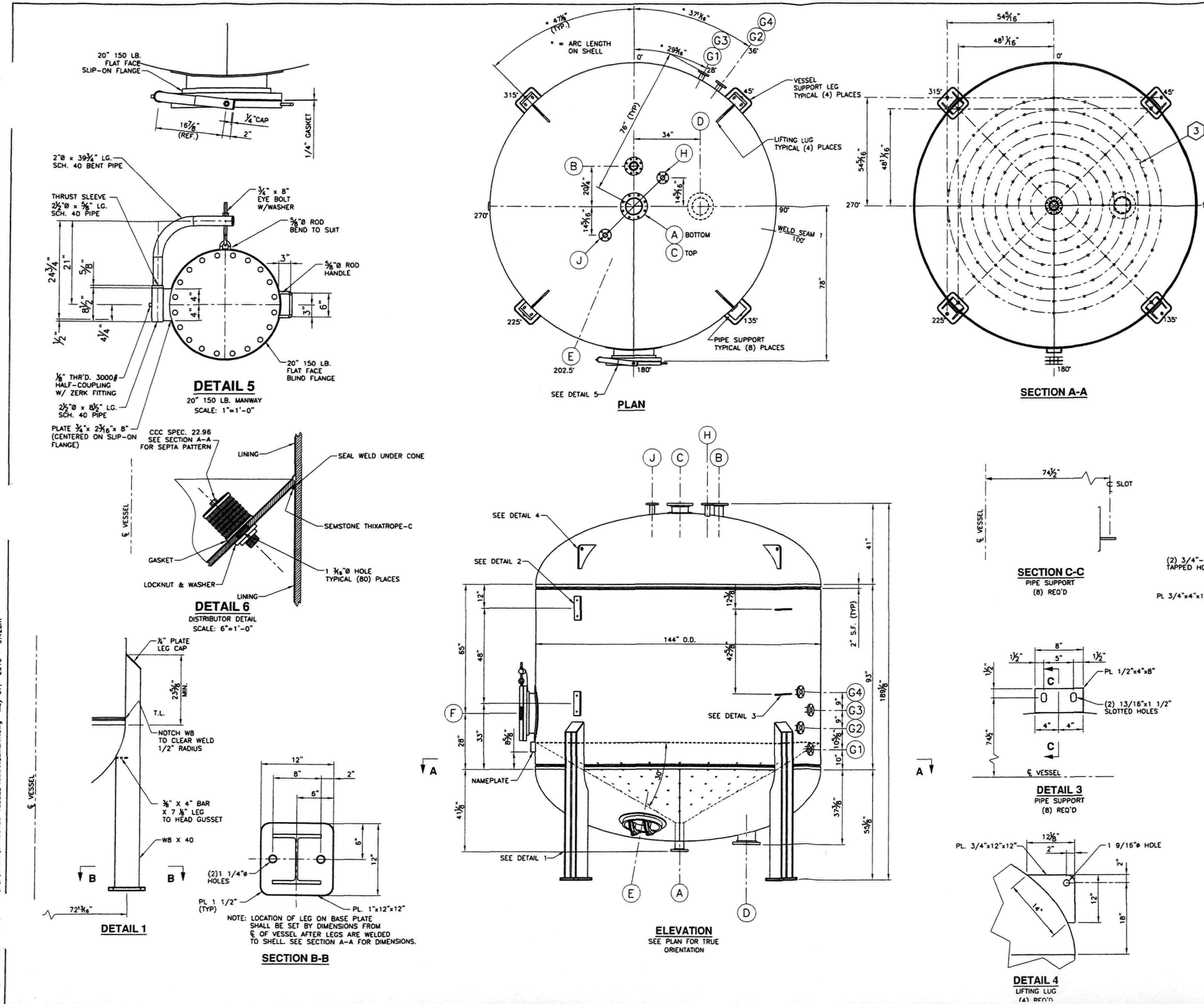
CLIENT: CBS CORPORATION BLOOMINGTON, IL

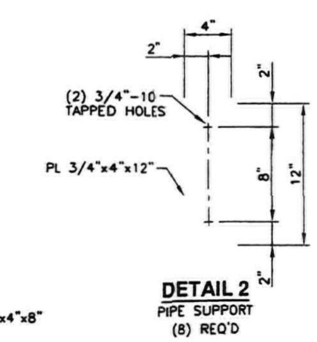
TITLE: MODEL 12 SINGLE 12' DIA., 8" PIPING GENERAL ARRANGEMENT

DWG. Size	SHEET No.	SCALE
D	1 OF 1	NONE

DWG. No. 91106129 REV. A

V:\2010\LM-10048. \Drawings\General Arrangements\91106128_General Arrangement.dwg May 06, 2010 - 1:50pm





VESSEL DESCRIPTION	ADSORBER PV-1	
REFERENCES	VESSEL SPECIFICATION VS1	
DESIGN CONDITIONS	125 PSIG @ 150° F	
OPERATING CONDITIONS	100 PSIG @ 140° F	
PROCESS FLUID	WATER, S.G. = 1.0	
WALL THICKNESS	PER CODE REQUIREMENTS	
MATERIALS OF CONSTRUCTION	SHELL	SA-516 GRADE 70
	TOP HEAD	SA-516 GRADE 70
	BOT. HEAD	SA-516 GRADE 70
	NOZZLES	SA-106 GRADE B
	FLANGES	SA-105 (U.N.O.)
	LINING ABOVE CONE	PLASITE 4110 35-45 MIL NOMINAL DFT, PIN HOLE FREE FOR IMMERSION SERVICE, CCC SPEC VS7
	LINING BELOW CONE	PLASITE 4110 10-15 MIL NOMINAL DFT, CCC SPEC VS9
	SEALANT	SEMSTONE THIXATROPE-C
	SUPPORTS	A-992
	BOLTING	SA-325-1 W/HVY HX NUTS
	GASKETS	1/8" EPDM (MANWAY 1/4" EPDM)
TYPE CONSTRUCTION	FUSION WELDED	
CORROS. ALLOW	NONE	
CODE	ASME SECTION VIII, DIVISION I, LATEST EDITION	
INSPECTION	BY CALGON & AUTHORIZED INSPECTOR	
STAMPING	ASME " U ", NBR	
TESTING	HYDROSTATIC : PER CODE	
STRESS RELIEF	PER CODE	
RADIOGRAPH	PER CODE & CALGON CALCULATIONS	
NAMEPLATE	ASME	
STENCILS	LINED TANK - DO NOT WELD OR BURN	
SEISMIC LOAD	IBC 2006, Ss = 1.65, SITE CLASS D, I = 1.25	
INSULATION	NONE	
SURFACE PREP	BRUSH BLAST PER SSPC-SPC7	
PAINTING	PRIME COAT: AN EPOXY PRIMER, SUCH AS CARBOLINE 888 OR EQUAL. FINISH COAT: A FINISH COAT OR EITHER POLYURETHANE OR HIGH SOLIDS EPOXY (5-7 MILS DFT, PER CCC SPEC. RS-17, SLATE GREY).	
LOCATION		
CAPACITIES	FULL	9,755 GAL 1,304 FT^3
	OPERATING	9,755 GAL AT 100 % FILL
	MEDIA	20,000 LBS.
WEIGHTS	EMPTY	19,200 LBS.
	FULL H_2O	100,600 LBS.
	FULL PRODUCT	39,200 LBS. (DRY CARBON)
	OPERATING	111,400 LBS.

NOZZLE SCHEDULE

MARK	REQ'D	SIZE	DRILLING	FACING	DESCRIPTION
A	1	4"	150#	F.F.	CARBON OUTLET (SCH. 160)
B	1	4"	150#	F.F.	CARBON INLET/VENT
C	1	8"	150#	F.F.	INFLUENT
D	1	8"	150#	F.F.	EFFLUENT
E	1	14"x18"	ELLIP.	F.F.	MANWAY, W/ 1/4" TK. GASKET
F	1	20"	150#	F.F.	MANWAY (BLIND FLANGE GSKT.)
G	4	2"	150#	F.F.	SAMPLE POINT & VENT
H	1	2"	150#	F.F.	AIR VENT
J	1	2"	150#	F.F.	POTABLE WATER INLET

NOTES:
1. ALL INTERIOR WELDS & EDGES TO BE GROUND TO 1/8" MIN.
2. ALL NOZZLES MUST BE FLUSH ON INSIDE OF SHELL, U.O.N
3. ALL NUTS & BOLTS TO BE ZINC PLATED.
4. 20" MANWAY FLG. TO BE SECURED WITH (2) BOLTS. REMAINDER OF BOLTS & NUTS TO BE PACKAGED AND SHIPPED IN THE CRATE.
5. REMOVE ALL WATER & DIRT AFTER HYDROTEST.
6. REMOVE ALL WELD SPATTER.
7. NOZZ. G2, G3, G4 & (1) NOZZ. D TO INCLUDE ASTM A105, 150 LB. BLIND FLANGE, BOLTS, NUTS AND BLIND FLANGE GASKET INSTALLED. TOTAL (5) EPDM BLIND GASKETS REQ'D INCLUDING MANWAY GASKET.
8. CONTACT CCC FOR HEAT TRACE REQUIREMENTS.
9. ALL FLANGE BOLT HOLES TO STRADDLE CENTERLINES.

REVISIONS

REV	DESCRIPTION	APP	DATE
C			
B			
A	ISSUE FOR SUBMITTAL		

TOLERANCES (unless otherwise specified)

ANGULAR	±0°30'	DECIMAL (2 PLACES)	±.010
FRACTIONAL	±1/16"	DECIMAL (3 PLACES)	±.005
DECIMAL (1 PLACE)	±.015	DECIMAL (4 PLACES)	±.0005

	NAME	DATE
DRAFTER	EPG	04/26/10
DESIGNER		
CHECKER		
APPROVAL		

CALGON

CALGON CARBON CORPORATION

CLIENT: CBS CORPORATION BLOOMINGTON, IL

TITLE: MODULAR ADSORBER 12 FT DIA., INTERNAL CONE VESSEL ARRANGEMENT

DWG. Size D | SHEET No. 1 OF 1 | SCALE NONE