
INSTRUCTIONS FOR HIGH PURITY, SEMI-AUTOMATIC CHANGEOVER MANIFOLD SYSTEMS (AC SERIES)

THIS BOOKLET CONTAINS PROPRIETARY INFORMATION OF ADVANCED SPECIALTY GAS EQUIPMENT CORP. AND IS PROVIDED TO THE PURCHASER SOLELY FOR USE IN CONJUNCTION WITH SEMI-AUTOMATIC CHANGEOVER MANIFOLDS (AC SERIES).

IMPORTANT

These instructions are for experienced operators who know the general principles and safety precautions to be observed in handling specialty gases and operating specialty gas equipment. If you are not certain you fully understand the safety precautions for handling gases, we urge you to obtain and read the Material Safety Data Sheet (MSDS) for each gas being used.

Do not permit untrained persons to install, operate, or maintain this equipment. Do not attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your Advanced Specialty Gas Equipment Distributor.

Be sure this information reaches the operator. Your supplier has extra copies.



SAFETY PRECAUTIONS

Protect yourself and others. Read and understand the following instructions before attempting to use this equipment. Failure to understand and follow these instructions could result in serious personal injury and/or damage to equipment.

- Know and understand the physical and chemical properties of the gas being used.
- Observe general precautions for the use of gases.
- Observe safety precautions for the gas being used.
- Read and follow precautions on cylinder labels.
- Never use this equipment with gases not compatible with the materials of construction. The use of gases not compatible with the materials of construction may cause damage to equipment or injury to personnel.
- If flammable gases are used with this equipment do not locate it near open flames or any other source of ignition.
- If toxic or flammable gases are used with this equipment, emergency equipment applicable to the gases in use should be available in the operating area.
- Many gases can cause asphyxiation by displacing oxygen in the atmosphere. Make certain the area where this equipment is operated is well ventilated. Provide a device to warn personnel of oxygen depletion in the work area.
- Do not release toxic or flammable gases in the vicinity of personnel. Use this equipment only in well ventilated areas. Vent gases to the outside atmosphere, and in an area away from personnel. Be sure that venting and disposal methods are in accordance with Federal, State and local requirements. Locate and construct vent lines to prevent condensation or gas accumulation. Be sure the vent outlet cannot be obstructed by rain, snow, ice, insects, birds, etc. Do not interconnect vent lines; if more than one vent is needed, use separate lines.
- Relief devices should be installed and properly vented in all gas handling systems to protect against regulator failure and overpressurization.
- Never use oil or grease with this equipment. Oil and grease are easily ignited and may combine violently with some gases under pressure.
- Never connect this equipment to a supply source having a pressure greater than the maximum rated pressure. Refer to Product Specifications (page 12) for maximum inlet pressures.

DESCRIPTION

AC Series changeover manifold systems are used to connect two or more cylinders together for uninterrupted gas flow. These semi-automatic wall-mounted manifold systems are made in either Brass or Type 316 Stainless Steel construction and are supplied with the appropriate wall mounting brackets.

The system uses two diffusion resistant regulators (one connected to each bank) which act as a changeover device. Delivery pressure of regulator no. 1 is set 10–15 psi higher than regulator no. 2. This causes regulator no. 1 to flow gas while holding regulator no. 2 closed. When the gas in bank no. 1 is exhausted, regulator no. 2 will begin to flow gas. Inlet pressure gauges on the regulators indicate pressure in each manifold bank. When gas in the first cylinder bank has been exhausted and a changeover has occurred, the empty cylinders are replaced and the delivery pressure settings of the regulators are reversed. This will cause a reverse changeover when bank no. 2 is exhausted.

Because delivery pressure drops slightly when changeover occurs, a line pressure regulator should be installed downstream to eliminate pressure variations.

OPTIONAL EQUIPMENT

Pressure Switches (Models SG6540 & SG6541) – monitor line pressure and can activate an external alarm (not supplied) when a certain predetermined pressure is reached. These switches are generally connected to the ends of the single row manifold headers.

Flashback Arresters (SG6545) for acetylene service only – designed to be used on acetylene cylinders to prevent a flash or flame from entering the cylinder through a cylinder lead.

INSTALLATION

WARNING: Before attempting to install and operate this equipment, read and fully understand the safety precautions on page 2 in this booklet. Failure to follow the safety precautions may result in serious personal injury and/or damage to equipment.

The AC Series Semi-Automatic Changeover Manifold System can be used either with two cylinders by connecting the inlet leads directly to each of the cylinders or with four or more cylinders by connecting the leads to the ends of two single-row manifolds. A typical layout for use with two single-row manifolds is shown in Fig. 1.

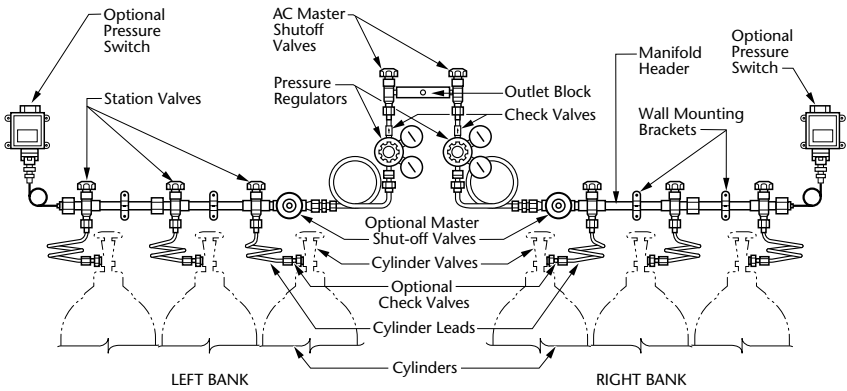


Figure 1 – Typical Installation of Semi-Automatic Changeover with Two Single Row Manifolds, Optional Master Shut-Off Valves and Pressure Switches

1. Securely mount the outlet block of the changeover section on a wall. Mounting dimensions are shown in Fig. 2 (page 6). The changeover mounting brackets for the outlet block should be located approximately 12 to 15 inches above the centerline of the manifolds or cylinder valve outlets. The single row manifold outlets (or cylinder valves if AC-2 is installed) should be located approximately 10 to 12 inches outward from the regulator hand knobs.
2. Connect the process line (downstream piping) to the ½" NPT female port located on the outlet block. Use Teflon® tape on pipe threads to prevent galling.
3. Attach the inlet leads to the regulators by inserting the O-Rings provided in the groove located in the regulator inlet adapters. The inlet leads (rigid pigtails) may be carefully bent to align them with the manifold or cylinder valve fittings. Avoid sharp bends that could kink the tubing.

4. Single-row manifolds are shipped without cylinder leads connected to prevent damage to the leads. Manifolds over four stations long are shipped in sections and require assembly.

To assemble single row manifold sections (if required), align the manifold sections and insert the O-Rings provided in the groove located in the threaded end of the pipe tee. Connect the sections being careful not to chip or dislodge the O-Ring.

To attach cylinder leads to the manifold, insert the small O-Rings in the groove of the station valves. Connect the cylinder leads (pigtails) to the station valves being careful not to chip or dislodge the O-Ring.

5. Securely mount the two manifolds on a wall. Mounting dimensions for single-row manifolds are shown in Figure 3 (page 7).
6. Provide a means of securely supporting the cylinders connected to the system. The clamping brackets, chains, straps, etc. used must be capable of holding the cylinders in place to prevent them from falling.
7. If the system is sized for more than two cylinders, connect the inlet leads of the automatic changeover to the outlets of the two single row manifolds.
8. Close the two shut-off valves located on the changeover outlet block by turning the hand knobs fully clockwise. Close both regulators by turning hand knobs counterclockwise until they reach the stop or until there is no spring resistance.
9. After the manifold system is installed and the downstream piping is connected, the entire system should be leak tested at the maximum working pressure.

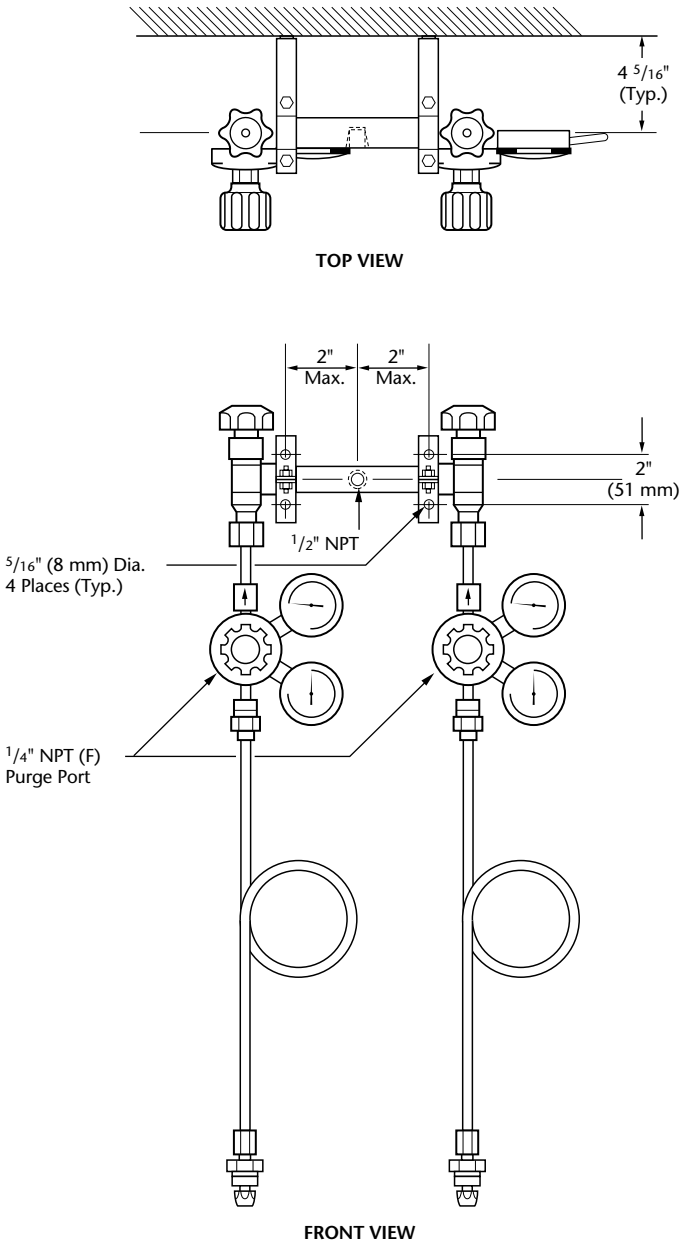


Figure 2 – Mounting Dimensions for Semi-Automatic Main Header Section

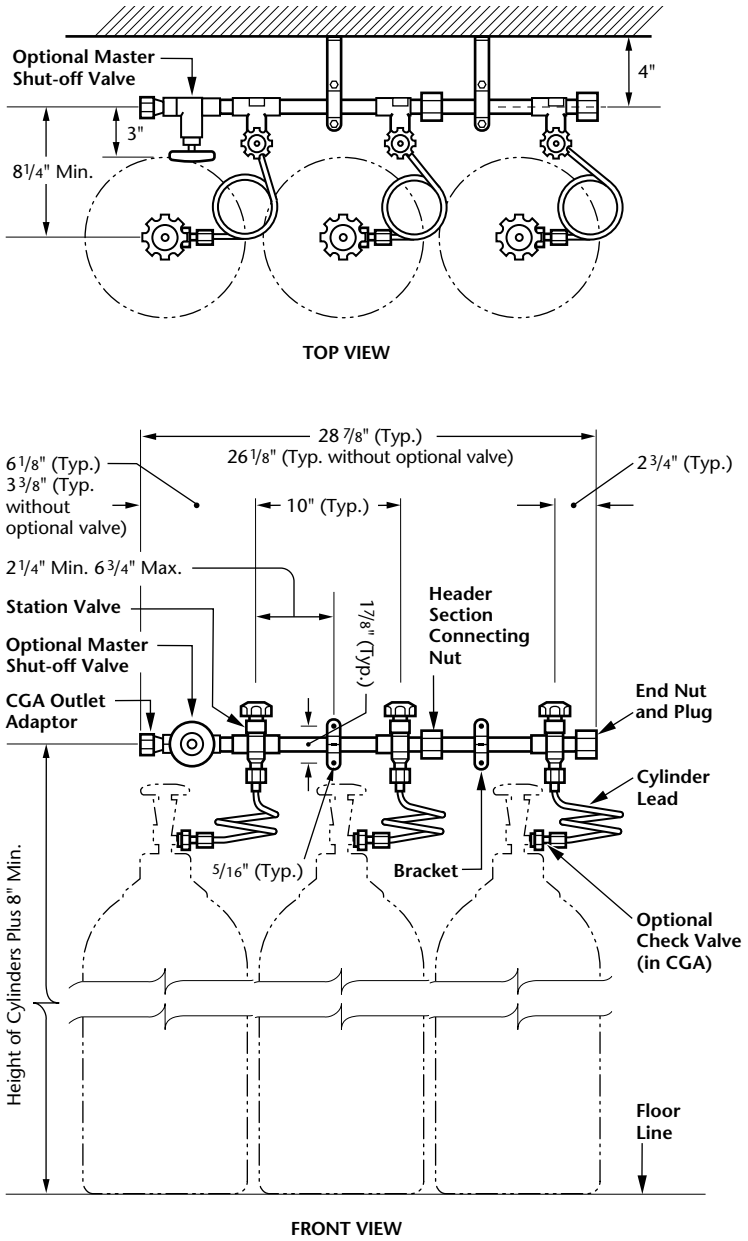


Figure 3 – Typical Installation of Single Row Manifold used on the Right Side of a Semi-Automatic Changeover System

LEAK TESTING AND PURGING

CAUTION: Care should be exercised when bending cylinder leads to connect them to cylinders. Brass is especially subject to work hardening and may fail if continuously re-bent.

1. Connect cylinders to changeover (or manifolds) using the cylinder leads and connectors provided.

CAUTION: Cylinder leads containing check valves can be pressurized with system pressure only up to the check valve seat. The threaded joints on the pigtail, including the CGA connection will not be pressurized with the process gas.

2. If it is nonhazardous, use the process gas from the manifold to leak test and purge the system.
If the process gas is hazardous (flammable, toxic and/or corrosive) or sensitive to atmospheric contaminants, use clean dry nitrogen as a purge gas to leak test and purge the changeover system.
3. Isolate downstream side of changeover system by closing downstream process isolation valve or line pressure regulator.
4. Stand to the side of the regulator and slowly open the purge gas from one side of the changeover. Check inlet gauge for pressure into the regulator. Repeat the same procedure for the other side of the changeover.
5. Open the regulators by turning the pressure adjusting knobs clockwise until the desired pressures are indicated on the outlet gauge. Slowly open the two shut-off valves located on the changeover outlet block by turning the hand knobs counterclockwise.
6. With cylinders connected but with the cylinder valves closed, leak check all connections with either a soap solution, such as Snoop® or a gas leak detector.

If a leak is detected, vent system to atmospheric pressure and repair. Do not repair any leaks while system is under pressure.

Note: The changeover regulators do not vent downstream system pressure when the pressure adjusting knob is turned counterclockwise to reduce delivery pressure. For applications where atmospheric constituents could contaminate your gas system, install a vent valve on the downstream system to vent pressure. Connect outlet of vent valve to a safe disposal area.

7. Purge entire system of air if the process gas is hazardous or sensitive to atmospheric contaminants.
8. Vent system to atmospheric pressure. Close the two shut-off valves located on the changeover outlet block by turning the hand knobs fully clockwise. Close both regulators by turning hand knobs counterclockwise until they reach the stop or until there is no spring resistance.

OPERATION

WARNING: Never operate a gas handling system under any circumstances if it is leaking or otherwise malfunctioning. DO NOT repair any leaks while system is under pressure. Damage to equipment and/or injury to personnel may result.

1. Close the two shut-off valves located on the changeover outlet block by turning the hand knobs fully clockwise. Close both regulators by turning hand knobs counterclockwise until they reach the stop or until there is no spring resistance.
2. Ensure that any purge or system vents are closed.
3. Stand to the side of the regulator and slowly open the cylinder valves (and manifold station valves, if applicable) from one side of the changeover to admit gas to the system. Check inlet gauge for pressure into the regulator. Repeat the same procedure for the other side of the changeover.
4. With the changeover shut-off valves still closed, adjust the right-hand (R.H.) regulator to the desired delivery pressure. Then, adjust the left-hand (L.H.) regulator for a delivery pressure that is 10 to 15 psi below the setting of the R.H. regulator.
5. Open the two shut-off valves located on the changeover outlet block. If the system is equipped with a downstream line pressure regulator, adjust it to produce the desired delivery pressure to the downstream system.

The system is now in operation with gas being supplied from the right-hand source (cylinder or manifold). When that source is exhausted and delivery pressure from the R.H. regulator drops below the setting of the L.H. regulator, changeover will occur and gas will flow from the left-hand source.

CYLINDER REPLACEMENT

1. Close the shut-off valve (located on the changeover outlet block) for the side containing the exhausted cylinders.
2. On the side containing the exhausted cylinders, close all cylinder valves and manifold station valves (if single row manifolds are contained in the system).

WARNING: Hazardous gases must be discharged into a safety vent. Be sure to use a venting procedure that is environmentally acceptable and complies with Federal, State and local requirements.

3. Nonhazardous gases may be vented by carefully loosening the cylinder lead connector.
If a hazardous gas is in use, vent inlet leads through a safety vent. Purge the leads with clean dry nitrogen gas. Continue purging until the hazardous gas level is below the TLV for the gas.
4. Disconnect exhausted cylinder(s) and replace with full cylinder(s).
5. If the gas connected to the manifold is nonhazardous, use it to leak test and purge the cylinder lead. If the process gas is hazardous (flammable, toxic and/or corrosive, or sensitive to atmospheric contaminants), use clean dry nitrogen as a purge gas to leak test and purge the cylinder lead.
6. Slowly open cylinder valve(s) (and manifold station valves, if applicable). This now becomes the reserve cylinder bank.
7. Adjust the reserve cylinder bank regulator to match the delivery pressure of the regulator supplying the process line.
8. Readjust the regulator supplying the process line to a delivery pressure 10 to 15 psig above the setting of the regulator used for the reserve gas.
9. When the supply source is exhausted and changeover to the reserve cylinder bank occurs, replace the empty cylinders by following this same procedure starting from step 1.

SHUTDOWN

WARNING: Hazardous gases must be discharged into a safety vent. Be sure to use a venting procedure that is environmentally acceptable and complies with Federal, State and local requirements.

1. Close the cylinder valves.
2. Vent the system pressure to zero psi. If a hazardous gas was used, purge the entire system with clean dry nitrogen gas. Continue purging until the hazardous gas level in the system is below the TLV for the gas.
3. Close all system valves by turning the hand knobs fully clockwise.
4. Close both regulators by turning hand knobs counterclockwise until they reach the stop or until there is no spring resistance.

REPAIRS

If any part of the changeover leaks or malfunctions, take it out of service immediately. Repairs should be made by Advanced Specialty Gas Equipment Corp. who have the special tools, test equipment and trained personnel required to make a safe repair. Contact your Advanced Specialty Gas Equipment Distributor to arrange for repair.

Warranty Repairs are only available through Advanced Specialty Gas Equipment Corp., and will be performed at no charge for parts and labor. For information on warranty, see the last page of this instruction booklet.

Non-Warranty Repairs are available through your distributor. Upon receipt at the factory, the changeover will be inspected and you will be contacted by your distributor with a repair cost estimate. No item will be repaired until approval is received. There will be an evaluation charge assessed for equipment not repaired.

SPECIFICATIONS

Manifolds

Maximum Inlet Pressure	3000 psig
Flow Coefficient (each station valve)	$C_V = 0.43$
Inlet Connections	CGA connection as specified
Outlet Connection	½ in. NPT female

Regulators

	Brass Systems Model UPD-3-150*	Stn. Stl. Systems Model UPC-3-150*
Maximum Inlet Pressure	3000 psig	3000 psig
Inlet Pressure Gauge	0-4000 psig	0-4000 psig
Delivery Pressure Range	25-150 psig	10-150 psig
Delivery Pressure Gauge	0-200 psig	0-200 psig
Gauge Size	2 in. dial	2 in. dial
Flow Coefficient	$C_V = 0.13$	$C_V = 0.13$

*These are standard regulators used on the changeover manifold systems. Please note; other regulators having lower inlet pressure gauges and delivery ranges are available for low-pressure applications or for use with liquefied gases. Regulators with higher delivery pressures are also available. Contact your Advanced Specialty Gas Equipment Distributor for more information.

MATERIALS OF CONSTRUCTION

Manifolds

	Brass Systems	Stn. Stl. Systems
Metal Parts	Brass	Type 316 Stn. Stl.
Seals	Teflon®	Teflon®
Check Valve Seats	EPDM	Viton®
Station Valve Seats	Kel-F®	Kel-F®
Station Valve Body	Brass	Type 316 Stn. Stl.

Regulators

	Brass Systems Model UPD-3-150	Stn. Stl. Systems Model UPC-3-150
Body	Brass Bar Stock	Type 316L Stn.Stl. Bar Stock
Gauges	Brass	Type 316 Stn.Stl.
Bonnet	Brass	Electroless Nickel-Plated Brass
Internal Metal Parts Exposed to Gas	Brass & Stn. Stl.	Type 316 Stn. Stl.
Seats	Tefzel®	Tefzel®
Diaphragm	Type 316 Stn. Stl. lined w/ Teflon®	Type 316 Stn.Stl. lined w/ Teflon®
Seals	Teflon®	Teflon®

REPLACEMENT PARTS

O-Ring Kits (package of 25 ea.)

For connection between pigtail & station valve	SG6081
For header connection	SG6082

Replacement Pigtails, Rigid Type

Brass without Check Valves	SG6640-(CGA)
Brass with Check Valves	SG6641-(CGA)
Stainless Steel without Check Valves	SG6642-(CGA)
Stainless Steel with Check Valves	SG6643-(CGA)

Replacement Pigtails, Flexible Type

Without Check Valves	SG6638-(CGA)
With Check Valves	SG6639-(CGA)

Replacement Station Valve

Brass	0202-5083
Stainless Steel	not available

Repair Kit for Station Valve

Brass	0202-3079
Stainless Steel	0202-3076

Additional Stations – for adding stations to the following existing manifolds (specify left or right bank when ordering)

Brass System with Rigid Pigtails without Check Valves	SG6660-(CGA)
Brass System with Rigid Pigtails with Check Valves	SG6661-(CGA)
Brass System with Flexible Pigtails without Check Valves	SG6662-(CGA)
Brass System with Flexible Pigtails with Check Valves	SG6663-(CGA)
Stainless Steel System with Rigid Pigtails without Check Valves	SG6664-(CGA)
Stainless Steel System with Rigid Pigtails with Check Valves	SG6665-(CGA)
Stainless Steel System with Flexible Pigtails without Check Valves	SG6666-(CGA)
Stainless Steel System with Flexible Pigtails with Check Valves	SG6667-(CGA)

Note: Insert applicable CGA connection number to complete part number.
Example: SG6667-580.

WARRANTY

Advanced Specialty Gas Equipment Corp., (the Company), warrants to the initial purchaser of each semi-automatic changeover described herein, that such equipment will be free from defects in material and workmanship which result in breakdown or failure under normal use during a period of 12 months from date of shipment by the Company if used and maintained according to Advanced Specialty Gas Equipment written instructions. Purchaser is aware that this equipment is designed for specific applications and that using this equipment with the wrong or improperly purged gas or at the wrong pressure may damage or corrode the unit and cause personal injury. This warranty does not cover damage or malfunction due to corrosion. Purchaser must confirm that this equipment is compatible with the gas being passed through it. If there is any doubt about compatibility, consult your Advanced Specialty Gas Equipment Corp. distributor.

The Company's liability under this warranty shall be limited to the repair, or at its option, replacement or refund of the purchase price, of such equipment which proves to be defective, provided; however, that this warranty shall only apply if the purchaser (1) gives the Company written notice within ten (10) days after discovery of such defect, (2) immediately on discovery of the claimed defect, discontinues all use of such equipment, and (3) returns such equipment freight prepaid to plant of manufacture.

THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE SPECIFIED HEREIN. NO WARRANTIES BY ADVANCED SPECIALTY GAS EQUIPMENT CORP. (OTHER THAN WARRANTY OF TITLE AS PROVIDED IN THE UNIFORM COMMERCIAL CODE) SHALL BE IMPLIED OR OTHERWISE CREATED UNDER ANY APPLICABLE LAW, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY AND WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. No claim against the Company of any kind, whether as to equipment delivery or for nondelivery of equipment and whether or not based on contract, warranty, negligence, strict liability in tort or otherwise, shall be greater in amount than the purchase price of the equipment in respect of which such claim is made. Without limiting the generality of the foregoing, Advanced Specialty Gas Equipment Corp. shall not be liable for any special, indirect, or consequential damage, such as failure of parts resulting from corrosion.

If it is determined by Advanced Specialty Gas Equipment Corp. that the equipment is to be repaired or replaced under the terms of this warranty, the cost of returning said equipment to the initial purchaser will be paid by the Company. If, however, equipment returned to the Company in connection with a claim under this warranty is found by the Company not to be defective hereunder, then such equipment will be returned to the initial purchaser, shipping charges collect, and additionally, a service charge will be paid by the purchaser to the Company to cover the cost of handling and testing such equipment.



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