Gas Compatibility Data

The compatibility data* shown on the following pages has been compiled to assist in evaluating the appropriate materials to use in handling various gases. It is extremely important that all gas control equipment be compatible with the gas being passed through it. The use of a device that is not compatible with the service gas may damage the unit and cause a leak that could result in property damage or personal injury. To reduce potentially dangerous situations, always check for compatibility of materials before using any gases in your gas control equipment.

Since combinations of gases are virtually unlimited, mixtures (except for Ethylene Oxide/Halocarbon and Ethylene Oxide/CO_2 sterilizing gas mixtures) are not listed in the Compatibility Chart. Before using a gas mixture or any gas not listed in the chart, we strongly urge you to contact your nearest Advanced Representative for information and assistance.

Directions

To use this chart, proceed as follows:

1. Locate the gas you are using in the first column.

2. Compare the materials of construction for the equipment you intend to use with the "materials of construction" shown in the Compatibility Chart. Then use the "Key to Materials Compatibility" to determine compatibility.

Key to Materials Compatibility

S: Satisfactory for use with the intended gas.

U: Unsatisfactory for use with the intended gas.

I: Insufficient data available to determine compatibility with the intended gas.

C1 thru C8: Conditionally acceptable for use with the intended gas as follows:

- **C1**: Satisfactory with brass having a low (65–70% maximum) copper content. Brass with higher copper content is unacceptable.
- **C2**: Satisfactory with acetylene; however, cylinder acetylene is packaged dissolved in a solvent (generally acetone) which may be incompatible with these elastomers.
- **C3**: Compatibility varies depending on specific Kalrez® compound used. Consult E.I. DuPont for information on specific applications.
- **C4**: Satisfactory with brass, except where acetylene or acetylides are present.
- **C5**: Generally unsatisfactory, except where specific use conditions have proven acceptable.
- **C6**: Satisfactory below 1000 psig.
- **C7**: Satisfactory below 1000 psig where gas velocities do not exceed 30 ft./sec.
- **C8**: Material compatibility depends on condition of use.

* This chart has been prepared for use with dry (anhydrous) gases at normal operating temperature of 70°F. Information may vary if different operating conditions exist. Systems and equipment used in oxidizer gas service (e.g., Oxygen or Nitrous Oxide) must be cleaned for oxidizer service.

Important

This information is for experienced operators who know the general principles and the safety precautions to be observed in handling specialty gases and associated equipment. If you are not certain you fully understand these safety precautions, we urge you to obtain and read the applicable Material Safety Data Sheet (MSDS) and Equipment Instruction Booklet.

The information contained in the Compatibility Chart has been compiled by Advanced from what it believes are authoritative sources and it is offered solely as a convenience to its customers. While Advanced believes that this information is accurate and factual as of the date of this publication, this information is intended to be used only as a guide in providing general information with respect to the products mentioned; and, therefore, it is not to be taken as a warranty or representation for which Advanced assumes legal responsibility.

Since the user's product formulation, specific use application, and conditions of use are all outside Advanced's control, Advanced makes no warranty or representation regarding the result which may be obtained by the user. It shall be the responsibility of the user to determine the suitability of the user's gas control equipment for use with the products mentioned.

Gas Compatibility Chart

Common Name	Chemical Formula	Materials of Construction																	
		Metals							Plastics						Elastomers				
		Brass	303 Stainless Steel	316 Stainless Steel	Aluminum	Zinc	Copper	Monel	PCTFE	Teflon	Tefzel	Kynar	PVC	Polycarbonate	Kalrez	Viton	Buna-N	Neoprene	Polyurethane
Acetylene	C_2H_2	C1	S	S	I	U	U	S	S	S	S	S	I	I	S	C2	C2	C2	C2
Air	—	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Allene	C_3H_4	S	S	S	S	I	U	S	S	S	S	S	I	I	S	S	S	S	I
Ammonia	NH_3	U	S	S	S	U	U	S	S	S	S	U	S	U	C3	U	S	S	U
Argon	Ar	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Arsine	AsH_3	S	S	S	C5	I	S	S	S	S	S	S	S	I	S	S	S	S	U
Boron Trichloride	BCl_3	U	S	S	I	I	S	S	S	S	S	I	S	I	C3	I	I	I	I
Boron Trifluoride	BF_3	S	S	S	S	I	S	S	S	S	S	I	S	I	C3	I	I	I	I
1,3-Butadiene	C_4H_6	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	U	S	U
Butane	C_4H_{10}	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
1-Butene	C_4H_8	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Cis-2-Butene	C_4H_8	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Trans-2-Butene	C_4H_8	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Carbon Dioxide	CO_2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Carbon Monoxide	CO	S	S	S	S	S	S	S	S	S	S	S	S	S	S	I	S	S	S
Carbonyl Sulfide	COS	S	S	S	S	I	S	S	S	S	S	S	S	I	I	S	I	I	I
Chlorine	Cl_2	U	S	S	U	U	U	S	S	S	S	S	U	U	S	S	U	U	U
Deuterium	D_2	S	S	S	S	S	S	S	S	S	S	S	S	I	S	S	S	S	S
Diborane	B_2H_6	S	S	S	S	I	S	S	S	S	S	I	I	I	S	I	I	I	I
Dichlorosilane	H_2SiCl_2	I	S	S	I	I	I	S	S	S	S	S	I	I	S	I	I	I	I
Dimethyl Ether	C_2H_6O	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	I
Ethane	C_2H_6	S	S	S	S	S	S	S	S	S	S	S	S	I	S	S	S	S	S
Ethyl Acetylene	C_4H_6	I	S	S	S	I	U	S	S	S	I	S	I	I	S	S	I	S	I
Ethyl Chloride	C_2H_5Cl	S	S	S	U	I	S	S	S	S	S	S	U	U	S	S	S	S	U
Ethylene	C_2H_4	S	S	S	S	S	S	S	S	S	S	S	I	I	S	S	S	S	I
Ethylene Oxide**	C_2H_4O	C4	S	S	C5	I	U	I	S	S	I	I	U	U	C3	U	U	U	U

** Satisfactory for use with EPR (Ethylene Propylene Rubber) and EPDM.

Gas Compatibility Chart (continued)

Common Name	Chemical Formula	Materials of Construction																	
		Metals							Plastics						Elastomers				
		Brass	303 Stainless Steel	316 Stainless Steel	Aluminum	Zinc	Copper	Monel	PCTFE	Teflon	Tefzel	Kynar	PVC	Polycarbonate	Kalrez	Viton	Buna-N	Neoprene	Polyurethane
Ethylene Oxide/Carbon Dioxide Mixtures**		C4	S	S	I	I	U	I	S	S	I	I	U	U	C3	U	U	U	U
Ethylene Oxide/Halocarbon Mixtures**		C4	S	S	I	I	U	I	S	S	I	I	U	U	C3	U	U	U	U
Ethylene Oxide/HCFC-124		C4	S	S	I	I	U	I	S	S	I	I	U	U	C3	U	U	U	U
Halocarbon 11	CCl_3F	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	S	S	U	U
Halocarbon 12	CCl_2F_2	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 13	$CClF_3$	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 13B1	CBF_3	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 14	CF_4	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 21	$CHCl_2F$	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	U	U	S	S
Halocarbon 22	$CHClF_2$	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	U	U	S	U
Halocarbon 23	CHF_3	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	I	I	I	S
Halocarbon 113	CCl_2FCClF_2	S	S	S	C5	U	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 114	$C_2Cl_2F_4$	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 115	C_2ClF_5	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 116	C_2F_6	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	I	I	I	S
Halocarbon 142B	$C_2H_3ClF_2$	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	U	S	S	S
Halocarbon 152A	$C_2H_4F_2$	S	S	S	C5	I	S	S	S	S	S	S	U	U	C3	U	S	S	S
Halocarbon C-318	C_4F_8	S	S	S	C5	I	I	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 502	$CHClF_2/CClF_2$-CF_3	I	S	S	C5	I	I	S	S	S	I	S	U	U	C3	S	S	S	S
Halocarbon 1132A	$C_2H_2F_2$	S	S	S	C5	I	S	S	I	S	S	S	U	U	C3	I	I	I	S
Helium	He	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Hydrogen	H_2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Hydrogen Chloride	HCl	U	S	S	I	U	U	S	S	S	S	S	S	U	S	S	U	U	U
Hydrogen Sulfide	H_2S	U	S	S	S	I	I	S	S	S	S	S	S	S	S	U	S	S	S
Isobutane	C_4H_{10}	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Isobutylene	C_4H_8	S	S	S	S	I	S	S	S	S	S	S	S	I	S	S	S	S	I

** Satisfactory for use with EPR (Ethylene Propylene Rubber) and EPDM.

Gas Compatibility Chart (continued)

		Materials of Construction																
		Metals							Plastics						Elastomers			
Common Name	Chemical Formula	Brass	303 Stainless Steel	316 Stainless Steel	Aluminum	Zinc	Copper	Monel	PCTFE	Teflon	Tefzel	Kynar	PVC	Polycarbonate	Kalrez	Viton	Buna-N	Neoprene	Polyurethane
Isopentane	C_5H_{12}	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Krypton	Kr	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Methane	CH_4	S	S	S	S	S	S	S	S	S	S	S	S	I	S	S	S	S	S
Methyl Chloride	CH_3Cl	S	S	S	U	U	S	S	S	S	S	S	I	I	S	S	U	U	U
Methyl Mercaptan	CH_3SH	S	S	S	U	I	U	U	S	S	S	I	I	I	S	I	I	S	I
Neon	Ne	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Nitric Oxide	NO	U	S	S	S	I	S	S	S	S	S	I	S	I	S	I	I	S	I
Nitrogen	N_2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Nitrogen Dioxide	NO_2	I	S	S	S	I	I	S	S	S	S	I	U	I	S	U	U	U	U
Nitrous Oxide	N_2O	S	C6	C6	C5	S	S	S	S	C5	S	S	S	I	C3	S	S	S	S
Oxygen	O_2	S	C7	C7	C7	S	S	S	S	C5	S	S	S	S	C3	C8	C8	C8	S
Perfluoropropane	C_3F_8	S	S	S	S	I	S	S	S	S	S	I	I	I	I	I	S	S	I
Phosphine	PH_3	I	S	S	S	I	I	S	S	S	S	I	I	I	S	I	I	I	I
Phosphorous Pentafluoride	PF_5	I	S	S	I	I	I	S	S	S	S	I	I	I	I	I	I	I	I
Propane	C_3H_8	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Propylene	C_3H_6	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	U	U	U
Propylene Oxide	C_3H_6O	I	S	S	I	I	I	I	S	S	S	I	U	S	C3	U	U	U	U
Refrigerant Gases	—	See Halocarbons																	
Silane	SiH_4	S	S	S	S	I	S	S	S	S	S	S	S	I	S	S	S	S	S
Silicon Tetrachloride	$SiCl_4$	I	S	S	U	I	I	S	S	S	I	I	U	I	C3	I	I	I	I
Silicon Tetrafluoride	SiF_4	S	S	S	S	I	S	S	S	S	S	S	S	I	C3	S	S	S	S
Sulfur Dioxide	SO_2	U	S	S	S	U	U	S	S	S	S	S	S	U	S	S	U	U	S
Sulfur Hexafluoride	SF_6	S	S	S	S	I	S	S	S	S	S	S	S	I	C3	S	S	S	S
Trichlorosilane	$HSiCl_3$	I	S	S	U	I	I	S	S	S	I	I	U	I	C3	I	I	I	I
Vinyl Methyl Ether	C_3H_6O	S	S	S	S	I	U	S	S	S	S	I	I	U	C3	I	I	I	I
Xenon	Xe	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S