Materials of Construction and Chemical Compatibility for Sensing and Control Products

INTRODUCTION

Entegris Sensing and Control products are designed for use in highly corrosive processes and high-purity applications primarily in the semiconductor industry. This guide will help you choose the right materials for your application.

CHEMICAL COMPATIBILITY

The following pages provide a chemical compatibility chart for the wetted and nonwetted materials in Entegris InVue® and NT™ products: pressure transducers, flowmeters, proportional control valves and integrated flow controllers. This information is presented to provide basic chemical compatibility information for some of the most common chemicals used in the semiconductor industry. The chart information is a compilation from many sources and is intended to be only a general guideline for materials selection and is not all-inclusive.

Please use this chart to determine whether the parts found in Entegris products will be suitable for use in your application. Contact Entegris for further chemical compatibility support.

WETTED PART MATERIALS OF CONSTRUCTION

Sensing and control products are manufactured with high-purity and inert materials of construction. Flowmeters and pressure transducers have three wetted parts that contact the process fluid which are the body, sensor interface and primary seal. Integrated flow controllers have an additional wetted part which is the valve diaphragm. The wetted parts for the proportional control valve are the body and valve diaphragm. For model-specific wetted materials, visit *entegris.com* and search sensing and control products.

NONWETTED PART MATERIALS OF CONSTRUCTION

Each application has different material specifications. Use this guide to select materials to withstand mild to harsh environments, with particular attention to chemical attacks from splashes, spraydown and corrosive vapors. The internal electronics are fully encapsulated for additional protection against corrosive fumes.

ENTEGRIS CHEMICAL COMPATIBILITY CHART FOR SENSING AND CONTROL PRODUCTS

Wetted parts

A: Preferred, suitable for all high-purity applications.
B: May not be suitable for wetted parts in high-purity applications.
C: Not recommended for wetted parts in high-purity applications.
D: Information not available.

Sensor interface material code guide:
*P1 Aqueous acids and bases up to 40°C (104°F) maximum Dilute HF 1% and below**
P2/P8 Solvents, slurry, aqueous acids and bases above 40°C (104°F)
P5 HF only
P7 Aqueous acids and bases up to 40°C (104°F) maximum including 49% HF and below
**Contact Entegris for long-term product performance in dilute HF.*

		WETTED SURFACES										
		SENSOR INTERFACE					BODY		PRIMARY SEAL			
		CTFE**	PFA**	CTFE**	CTFE (HF compatible) (Legacy)	Sapphire	PTFE/ PTFM	PFA	Kalrez® 4079 (Legacy)	Kalrez 1050LF (Legacy)	Kalrez 6375 UP (Legacy)	Perfrez PXC Ultra
Chemical type	**Chemical**	**Code -P1**	**Code -P2/-P8**	**Code -P7**	**Code -P5**				**Code -U1 or -S1**	**Code -U2 or -S2**	**Code -U3 or -S3**	**Code -U3*** or -S3**
Acids	Acetic	A/B	B	A/B	D	A	A	A	A	C	A	A
	HFN	A	B	A	D	A	A	A	A/B	B/C	A/B	A
	Hydrochloric (HCl)	A	B	A	D	A	A	A	A	A	A	A
	Hydrofluoric (HF)	B	C	A	A	A	A	A	A	B	A	A
	Nitric (HNO_3)	A	B	A	D	A	A	A	A/B	B/C	A	A
	Phosphoric (H_3PO_4)	A	A	A	D	A	A	A	A	A	A	A
	Sulfuric (H_2SO_4)	A	A	A	D	A	A	A	A	A	A	A
Bases	Ammonium fluoride (NH_4F)	A	A	A	D	A	A	A	B	A/B	A	A
	Ammonium hydroxide (NH_4OH)	A	B	A	D	A	A	A	B	A/B	A	A
	Potassium hydroxide (KOH)	A	A	A	D	A	A	A	A	A	A	A
Oxidants	Hydrogen peroxide (H_2O_2)	A	A	A	D	A	A	A	A	A	A	A
	Dissolved ozone	A	A	A	D	A	A	A	B	B	A/B	A
	Dissolved chlorine	B	A	B	D	A	A	A	B	B/C	B	A

Wetted parts (continued)

A: Preferred, suitable for all high-purity applications.
B: May not be suitable for wetted parts in high-purity applications.
C: Not recommended for wetted parts in high-purity applications.
D: Information not available.

		WETTED SURFACES										
		SENSOR INTERFACE					BODY		PRIMARY SEAL			
		CTFE**	PFA**	CTFE**	CTFE (HF compatible) (Legacy)	Sapphire	PTFE/ PTFM	PFA	Kalrez® 4079 (Legacy)	Kalrez 1050LF (Legacy)	Kalrez 6375 UP (Legacy)	Perfrez PXC Ultra
Chemical type	**Chemical**	Code -P1	Code -P2/-P8	Code -P7	Code -P5				Code -U1 or -S1	Code -U2 or -S2	Code -U3 or -S3	Code -U3*** or -S3
Organic solvents	Acetone	B	A	B	D	A	A	A	A	A	A	A
	n-Butyl acetate	B	A	B	D	A	A	A	A	A	A	A
	Ethylene glycol	A	A	A	D	A	A	A	A	A	A	A
	Isopropyl alcohol	A	A	A	D	A	A	A	A	A	A	A
	Methanol	A	A	A	D	A	A	A	A	A	A	A
	Methyl ethyl ketone (MEK)	C	A	C	D	A	A	A	A	A	A	A
	n-methyl pyrrolidone (NMP)	B	A	B	D	A	A	A	A	A	A	A
	Tetramethyl-ammonium hydroxide (TMAH)	A	B	A	D	A	A	A	B	A	A	A
Organic solvents categories	Acetates	B	A	B	D	A	A	A	A	A	A	A
	Alcohols	A	A	A	D	A	A	A	A	A	A	A
	Amines	B	A	B	D	A	A	A	C	A	A	A
	Hydrocarbons, aromatic	B	A	B	D	A	A	A	A	A	A	A
	Hydrocarbons, alkane	A/B	A	A/B	D	A	A	A	A	A	A	A
	Ketones	B	A	B	D	A	A	A	A	A	A	A
Media temperature	High temperature (>40°C [104°F])	B	A	B	C	C	A	A	A/B	A	A	A

***The suitability of CTFE and PFA is based on both chemical resistance and permeability.*

****Recommended for new application.*

Notes: The compatibility chart is compiled from information published by Entegris, DuPont Dow Elastomers, Welch Fluorocarbon, Little Giant Pump Company, the PDL Handbook and Compass Corrosion Guide.

Entegris neither represents nor warrants the accuracy or sufficiency of the information set forth in this chart for specific end-user applications. Ultimate responsibility for material selection remains with the end user. Nothing in this chart constitutes change to the terms and conditions under which the Entegris product was sold.

Nonwetted parts

A: Preferred, suitable for all high-purity applications.
B: Acceptable, suitable for nonwetted parts in most applications.
C: May be suitable for nonwetted parts in some applications.
D: Information not available.

Chemical type	Chemical	PVDF	PP	PE	Nylon	PVC	FEP	Viton®	Delrin®	PUR	Poly-ester
Acids	Acetic	B	B	B	C	C	A	B	B	C	B
	HFN	B	C	B	D	D	D	D	D	D	D
	Hydrochloric (HCl)	A, B	B	B	C	C	A	D	C	C	C
	Hydrofluoric (HF)	A	B	B	C	C	A	C	C	C	C
	Nitric (HNO_3)	B	C	B	C	C	A	B	C	C	C
	Phosphoric (H_3PO_4)	A	B	B	C	A	A	A	C	C	C
	Sulfuric (H_2SO_4)	B	C	B	C	B	A	A	C	C	C
Bases	Ammonium fluoride (NH_4F)	A	A	B	A, B	A, B	A	A	D	D	D
	Ammonium hydroxide (NH_4OH)	A	A	B	B	A	A	C	C	C	C
	Potassium hydroxide (KOH)	A	A	B	B	A	A	C	B	C	C
Oxidants	Hydrogen peroxide (H_2O_2)	A	B	B	C	A, B	A	A	C	A, B	C
	Dissolved ozone	A	C	C	C	A	A	A	C	A	C
	Dissolved chlorine	A	C	B	C	D	A	B	C	C	C

Nonwetted parts (continued)

A: Preferred, suitable for all high-purity applications.
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D: Information not available.

Chemical type	Chemical	PVDF	PP	PE	Nylon	PVC	FEP	Viton	Delrin	PUR	Poly-ester
Organic solvents	Acetone	C	A	B	A	C	A	C	B	C	A, B
	n-Butyl acetate	B	C	C	A	A, B	A	C	B	C	A
	Ethylene glycol	B	A	B	A	A	A	A	A, B	A, B	A, B
	Isopropyl alcohol	A	A	B	A, B	A	A	A	A	C	A
	Methanol	A	A	B	C	A	A	C	A	C	A
	Methyl ethyl ketone (MEK)	C	B	C	A	C	A	C	A, B	C	A
	n-methyl pyrrolidone (NMP)	C	B	B	C	D	D	D	D	D	D
	Tetramethyl-ammonium hydroxide (TMAH)	A	A	D	D	D	A	D	D	D	D
Organic solvents categories	Acetates	B	B	C	A	C	A	D	A	C	D
	Alcohols	A	A	B	A, B	A	A	D	A	C	D
	Amines	C	B	C	D	C	A	C	A	D	D
	Hydrocarbons, aromatic	B	C	C	A	C	A	B	A, B	C	C
	Hydrocarbons, alkane	B	C	B	D	D	D	D	D	D	D
	Ketones	B	B	C	A	C	A	D	A, B	C	C
Media temperature	High temperature (>40°C [104°F])	A	B	A	D	D	D	D	D	D	D

Notes: The compatibility chart is compiled from information published by Entegris, DuPont Dow Elastomers, Welch Fluorocarbon, Little Giant Pump Company, the PDL Handbook and Compass Corrosion Guide.

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FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit entegris.com and select the Contact Us link to find the customer service center nearest you.

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