Aggressive Media Valve
Material Compatibility Guide

Humphrey Product's iDP series aggressive media valves are designed to control difficult liquids and gases by using inert materials through the valve's flow path. Typically, this is the valve's body material and its elastomer material.

This guide describes each material available by valve series to assist you with valve selection and model number creation.

Also listed are common compatible media examples. Not all media possibilities are listed. Media listing is meant to help guide to a best choice. We recommend project-specific compatibility testing to ensure Humphrey materials are a good fit for any proprietary media and application.

Our factory technical representatives can answer questions, assist with compatibility options, and discuss valve selection.
Call 800-477-8709 or email webtech@humphrey-products.com

Aggressive Media Valve Material Compatibility Guide

Applicable Humphrey iDP Valves

The number below each valve is the product's base model number.

101

300

350

351

370

371

S390

S391

SSB250A

SSB250V

SSB250AE1

HKL5

Aggressive Media Valve Material Compatibility Guide

		Valve Model								
		iDP 101	iDP 300	iDP 350/351	iDP 370/371	iDP S390/S391	HKL5	SSB250AE1	SSB250A	SSB250V
Body	Radel®	X		X	X	X				
	SST						X	X	X	X
	PEEK	X	X							
	Thermoset Epoxy						X			
Elastomer	Viton™ GF		X	X	X	X				
	FKM (Viton™)	X					X	X	X	X
	EPDM	X	X	X	X	X	X	X	X	X
	FFKM	X		X	X	X				
	FEPM (Aflas®)							X	X	X

Compatibility Rating

Excellent
Material is recommended for media listed and sterilization method.

Limited
Testing and evaluation of material for your media is required.

Poor
Material is not recommended for media.

Humphrey Inert Materials

Aggressive Media Valve Material Compatibility Guide

Radel® (PPSU) is one of the most chemically resistant and sterilization-stable polymers available, making it highly suitable for repeated exposure to hospital environments, disinfectants and sterilization cycles.

Applicable Valves

1. Excellent Compatibility

A. Sterilization Methods

- Ethylene oxide (EtO)
- Radiation (gamma, e-beam) – better than many other plastics (e.g., polycarbonate).
- Hydrogen peroxide plasma (STERRAD)

101

350, 351

B. Common Disinfectants, Chemicals and Cleaners

- Isopropyl alcohol (IPA)
- Quaternary ammonium compounds (quats)
- Phenolic disinfectants
- Glutaraldehyde (Cidex)
- Peracetic acid
- Bleach (Sodium hypochlorite) – in diluted concentrations
- Enzymatic cleaners

370, 371

2. Limited Compatibility

- Concentrated acids
- Aromatic hydrocarbons
- Ketones and acetone
- Chlorinated solvents: methylene chloride, trichloroethylene
- Long term UV exposure – wavelength and exposure time of UV influence compatibility.

S390, S391

3. Poor Compatibility

- Strong oxidizing agents (e.g., concentrated nitric acid at elevated temps)
- Highly polar solvents: DMF, DMSO

Aggressive Media Valve Material Compatibility Guide

Stainless Steel remains a cornerstone medical material — particularly when strength, durability, and long-term biocompatibility are required — though it's less resistant than polymers or FFKM in highly oxidizing or chloride-rich environments. Stainless Steel is preferred because of its:

- Excellent corrosion resistance due to added molybdenum (2-3%).
- Biocompatibility recognized as biocompatible per ISO 10993 USP Class VI.
- Low carbon (L-grade), which minimizes carbide precipitation during welding.
- Sterilization durability withstands steam autoclaving, EtO, gamma, e-beam, hydrogen peroxide plasma and dry heat.

Applicable Valves

SSB250

1. Excellent Compatibility

A. Sterilization Methods

- Ethylene oxide (EtO)
- Gamma and e-beam radiation
- Dry heat
- Hydrogen peroxide vapor (STERRAD)

HKL5

B. Common Disinfectants, Chemicals and Cleaners

- Water and saline (short-term)
- Alcohols: ethanol, IPA, methanol
- Most hospital disinfectants (quats, phenolics, aldehydes, enzymatic cleaners)
- Peracetic acid
- Hydrogen peroxide (dilute and vapor forms like STERRAD)
- Bleach (low concentrations, short contact times)

SSB250AE1

2. Limited Compatibility

- Chlorides (e.g., concentrated bleach, saline + heat, bodily fluids)
- Strong oxidizers (e.g., nitric acid, chromic acid)
- High-temperature chloride exposure (surgical instruments left wet with saline during autoclaving).

SSB250V

Aggressive Media Valve Material Compatibility Guide

PEEK (Polyether ether ketone) is a high-performance thermoplastic prized in medical, aerospace and industrial applications. PEEK resists most chemicals commonly encountered in medical and pharmaceutical environments.

Applicable Valves

1. Excellent Compatibility

A. Sterilization Methods

- Ethylene oxide (EtO)
- Gamma and e-beam radiation
- Dry heat
- Hydrogen peroxide vapor (STERRAD)

300

B. Compatible Disinfectants, Chemicals and Cleaners

- Acids: sulfuric, nitric, hydrochloric (dilute to moderately concentrated)
- Bases: sodium hydroxide, potassium hydroxide
- Alcohols: ethanol, isopropanol, methanol
- Ketones: acetone, MEK
- Esters, ethers, hydrocarbons
- Oils and greases
- Disinfectants: quats, phenolics, peracetic acid, hydrogen peroxide

101

2. Limited Compatibility

- Concentrated sulfuric acid: One of the few substances that can dissolve PEEK even at room temperature.
- Prolonged exposure to strong oxidizers at elevated temperatures (e.g., concentrated nitric acid + heat) may cause degradation.

Aggressive Media Valve Material Compatibility Guide

Thermoset epoxies are widely used as coatings, adhesives, encapsulants and composites in medical, industrial and chemical-handling applications. Their performance in aggressive media depends heavily on formulation (resin + curing agent + fillers), but in general epoxies are known for:

- Excellent adhesion (to metals, ceramics, composites)
- Good chemical resistance (especially against polar solvents and mild acids/bases)
- High mechanical strength and hardness
- Crosslinked structure → infusible, insoluble once cured.

Applicable Valves

HKL5

1. Excellent Compatibility

A. Sterilization Methods

- Excellent – Ethylene oxide (EtO)
- Good – Dry heat

B. Compatible Disinfectants, Chemicals and Cleaners

- Water (though long-term hot water can cause hydrolysis if not specially formulated.)
- Alcohols: ethanol, IPA, methanol
- Hydrocarbons: aliphatic hydrocarbons (hexane, heptane), fuels
- Dilute acids and bases: hydrochloric acid, sodium hydroxide (low conc.)
- Oils and greases
- Hospital disinfectants: quats, phenolics, aldehydes

2. Limited Compatibility

- Concentrated acids (sulfuric, nitric, hydrochloric)
- Strong bases (NaOH, KOH >10–20%)
- Polar solvents: acetone, MEK, DMF, DMSO
- Bleach (NaOCl) and peroxides

3. Poor Compatibility

- Highly oxidizing acids: concentrated nitric, chromic, perchloric
- Hot concentrated alkalis
- Chlorinated solvents: methylene chloride, chloroform, trichloroethylene

Aggressive Media Valve Material Compatibility Guide

Viton™ GF, a brand name for a type of **FKM** or (fluoroelastomer), is a high-performance rubber known for its excellent chemical resistance, heat stability and durability — especially in harsh chemical environments. In medical or pharmaceutical settings, its use is more limited compared to **EPDM**, but it's chosen when exposure to aggressive chemicals or solvents is a concern.

1. Excellent Compatibility

A. Sterilization Methods

- Ethylene oxide (EtO)
- Chemical sterilization

B. Compatible Disinfectants, Chemicals and Cleaners

- Strong acids (nitric, sulfuric, hydrochloric – even concentrated)
- Oils and greases: mineral oils, silicone oils
- Halogenated solvents: methylene chloride, trichloroethylene
- Alcohols: ethanol, isopropanol, methanol
- Peracetic acid
- Ozone and UV

2. Limited Compatibility

- Hot water
- Ammonia and amines
- Low molecular weight esters and ethers

3. Poor Compatibility

- Ketones in water-rich environments.
- Strong bases (e.g., NaOH, KOH at high concentrations or temperatures)
- Organic acids with water – lactic acid, acetic acid in aqueous solution.
- Long-term exposure to hot steam or superheated water.
- Gamma and e-beam radiation are not recommended.

Applicable Valves

101

300

350, 351

370, 371

S390, S391

Aggressive Media Valve Material Compatibility Guide

FKM (Viton™), or (fluoroelastomer), is a high-performance rubber known for its excellent chemical resistance, heat stability and durability — especially in harsh chemical environments. In medical or pharmaceutical settings, its use is more limited compared to **EPDM**, but it's chosen when exposure to aggressive chemicals or solvents is a concern.

1. Excellent Compatibility

A. Sterilization Methods

- Chemical sterilization
- Ethylene oxide (EtO)

B. Compatible Disinfectants, Chemicals and Cleaners

- Strong acids (nitric, sulfuric, hydrochloric – even concentrated)
- Oils and greases: mineral oils, silicone oils
- Halogenated solvents: trichloroethylene
- Isopropanol alchol
- Ozone and UV

2. Limited Compatibility

- Hot water
- Ammonia and amines
- Low molecular weight esters and ethers

3. Poor Compatibility

- Ketones in water-rich environments.
- Strong bases (e.g., NaOH, KOH at high concentrations or temperatures)
- Organic acids with water – lactic acid, acetic acid in aqueous solution.
- Long-term exposure to hot steam or superheated water.
- Gamma and e-beam radiation are not recommended.

Applicable Valves

SSB250A

HKL5

SSB250AE1

SSB250V

Aggressive Media Valve Material Compatibility Guide

EPDM (**E**thylene **P**ropylene **D**iene **M**onomer rubber) is a widely used elastomer in medical, pharmaceutical and industrial applications due to its excellent resistance.

1. Excellent Compatibility

A. Sterilization Methods

- Ethylene oxide (EtO)
- Gamma radiation (short-term exposure)
- Hydrogen peroxide vapor (e.g., STERRAD)

B. Compatible Disinfectants, Chemicals and Cleaners

- Alcohols: ethanol, IPA
- Dilute acids and bases (e.g., acetic acid, sodium hydroxide)
- Quaternary ammonium compounds (quats)
- Glutaraldehyde (e.g., Cidex)
- Enzymatic cleaners
- Diluted bleach (sodium hypochlorite, ~0.5–1%)
- Peracetic acid

2. Limited Compatibility

- Hydrogen peroxide (>30%)
- Highly concentrated oxidizers
- Peracetic acid at high temp/concentration
- Gamma radiation (repeated cycles)

3. Poor Compatibility

- Oils and greases (mineral, silicone, or synthetic oils)
- Hydrocarbons: toluene, xylene, hexane, gasoline
- Solvents: acetone, MEK, ethers, chlorinated solvents
- Strong acids/bases at high concentration/temperature.

Applicable Valves


101


300


350, 351


370, 371


S390, S391


HKL5


SSB250AE1

Aggressive Media Valve Material Compatibility Guide

FFKM (Perfluoroelastomer) is the highest-performance class of fluoroelastomers, offering unmatched chemical and thermal resistance. It is often used in the most demanding environments, including semiconductor, aerospace and high-purity pharmaceutical and medical applications.

1. Excellent Compatibility

A. Sterilization Methods

- Ethylene oxide (EtO)
- Gamma and electron beam radiation
- Dry heat sterilization
- Hydrogen peroxide vapor (STERRAD)
- Peracetic acid

B. Compatible Disinfectants, Chemicals and Cleaners

- Strong acids: nitric, sulfuric, hydrochloric (even fuming or concentrated)
- Base acids: nitric, sulfuric, hydrochloric (even fuming or concentrated)
- Strong bases: NaOH (sodium hydroxide) and KOH (potassium hydroxide)
- Organic solvents: acetone, MEK, ethers, esters, toluene, chloroform
- Oxidizers: hydrogen peroxide, ozone, peracetic acid
- Alcohols, halogenated solvents
- Hot water, oil, fuel, plasma gases

2. Limited Compatibility

- Fluorinated chemicals such as Freon-type compounds.
- Low-temperature flexibility

Applicable Valves

101

350, 351

370, 371

S390, S391

Aggressive Media Valve Material Compatibility Guide

FEPM (commonly known by trade names like **Aflas®**, a copolymer of tetrafluoroethylene and propylene) is a fluoroelastomer known for exceptional resistance to heat, steam, chemicals and biofluids — making it useful in medical seals, O-rings and valve components exposed to aggressive sterilization or fluids. **FEPM** is one of the most chemically resistant elastomers available for medical and pharmaceutical service, especially where steam, caustics and aggressive cleaners are used. It outperforms **Viton™ (FKM)** in sterilization durability and chemical resistance.

1. Excellent Compatibility

A. Sterilization Methods

- Gamma and electron beam radiation
- Dry heat sterilization
- Hydrogen peroxide vapor (STERRAD)
- Peracetic acid

B. Compatible Disinfectants, Chemicals and Cleaners

- Alcohols: ethanol, IPA
- Dilute acids and bases (e.g., acetic acid, sodium hydroxide)
- Quaternary ammonium compounds (quats)
- Glutaraldehyde (e.g., Cidex)
- Enzymatic cleaners
- Diluted bleach (Sodium hypochlorite, ~0.5–1%)
- Peracetic acid

2. Limited Compatibility

- Not as flexible at low temperatures.
- Not suitable for continuous contact with strong chlorinated hydrocarbons.

3. Poor Compatibility

- Aromatic hydrocarbons (fuels/solvents)
- Ketones
- Chlorinated solvents and some solvent-based mixtures (like lacquer solvents).

Applicable Valves

SSB250A

SSB250AE1

SSB250V

Customer Service | 1.800.477.8707
webcust@humphrey-products.com

Technical Services | 1.800.477.8709
webtech@humphrey-products.com

Business Hours | Monday-Friday, 8:00 am to 4:30 pm EST

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Humphrey Products Company
5070 East N Avenue
Kalamazoo, MI 49048 USA
P: 269.381.5500 | F: 269.381.4113