



## Chemical Resistance of Chemical Resistance Screws

### • Chemical Resistance of PFA Coating

Chemical Name	Temperature (°C)	PFA Coating (For SNHS-HTF and SWS-HTF)
10% Hydrochloric Acid	25	○
	50	○
	75	○
10% Nitric Acid	25	○
	70	○
30% Sulfuric Acid	25	○
	70	○
10% Sodium Hydroxide	25	○
	70	○
10% Ammonium Hydroxide	25	○
	70	○
Acetone	25	○
	50	○
Carbon Tetrachloride	25	○
	50	○
95% Ethyl Alcohol	25	○
	50	○
Ethyl Acetate	25	○
	50	○
Toluene	25	○
	50	○
Benzene	78	○

○ : No Corrosion ○ : Slight Corrosion

### • Chemical Resistance of Inconel\*1, Hastelloy\*2, and Nickel

Chemical Name	Temperature	Inconel*1	Hastelloy*2	Nickel
Dilute Sulfuric Acid	Room Temperature	A	AA	A
	Boiling Point	D	A	D
Concentrate Sulfuric Acid	Room Temperature	C	AA	C
	Boiling Point	D	D	D
Dilute Hydrochloric Acid	Room Temperature	B	AA	A
	Boiling Point	D	D	D
Concentrate Hydrochloric Acid	Room Temperature	D	AA	D
	Boiling Point	D	B	D
Dilute Nitric Acid	Room Temperature	D	AA	D
	Boiling Point	-	AA	D
Concentrate Nitric Acid	Room Temperature	A	AA	D
	Boiling Point	-	D	D
Dilute Phosphoric Acid	Room Temperature	AA	AA	AA
	Boiling Point	-	AA	D
Concentrate Phosphoric Acid	Room Temperature	AA	AA	AA
	Boiling Point	-	B	D
Sodium Hydroxide (Diluted)	Room Temperature	AA	-	AA
	Boiling Point	C	-	AA
Sodium Hydroxide (Concentrated)	Room Temperature	AA	-	AA
	Boiling Point	C	-	AA

AA : Excellent  
A : Good  
B : Useable  
C : Useable under certain conditions  
D : Non Useable

### • Chemical Resistance of Titanium

Chemical Name	Composition (%)	Corrosion Resistance	
		Pure Titanium	SUS304
Hydrochloric Acid	10	○	×
	30	×	×
Sulfuric Acid	10	△	-
	50	×	×
Nitric Acid	10	○	○
	50	○	○
Nitrohydrochloric Acid (HCl : HNO <sub>3</sub> )	3:1	○	×
Chromic Acid	5	○	-
Hydrofluoric Acid	5	×	×
	50 (Ventilation)	△	○
Ferric Chloride	10 - 30	○	×
Cupric Chloride	10 - 30	○	×
Sodium Chloride	10 - 40	○	○
Calcium Chloride	50	○	○
Ammonium Chloride	40	○	-
Magnesium Chloride	40	○	○
Ferrous Sulfate	10 - 50	○	○
Ammonia	10 - 30	○	○
Sodium Hydroxide	50	○	○
Sodium Carbonate	10	○	○
Hydrogen Sulfide	Dry Gas	○	△
	Wet Gas	○	○
Hydrogen Sulfide	Dry Gas	×	-
	Wet Gas	○	-
Sulfur Dioxide	Dry Gas	○	-
	Wet Gas	○	-
Seawater	High Speed Stream	○	-
	High Speed Stream	○	-
Formic Acid	10 - 50	○	○
Lactic Acid	50	○	○
Oxalic Acid	20	×	-
Citric Acid	10 - 50	○	○

Testing Temperature : Room Temperature

○ : <0.127 mm/year △ : 0.508 - 1.27 mm/year  
○ : 0.127 - 0.508 mm/year × : >1.27 mm/year

### ⚠ Important Information about Chemical Resistance Data

- A test piece was used to acquire the test data.
- Chemical resistance changes with performance conditions. Always carry out tests under performance conditions similar to actual conditions in advance.

### • Chemical Resistance of Ceramic

Chemical Name	Temperature	Hour	Effect
35% Hydrochloric Acid	Boiling	30 minutes	○
70% Nitric Acid	Boiling	30 minutes	○
98% Sulfuric Acid	Boiling	30 minutes	○
90% Phosphoric Acid	Boiling	30 minutes	○
60% Hydrofluoric Acid	20°C	24 hours	△
10% Potassium Hydroxide	80°C	7 Days	○
Potassium Hydroxide	500°C (Boiling)	24 hours	△
Sodium Hydroxide	500°C (Boiling)	24 hours	○
Sodium Carbonate	900°C (Boiling)	24 hours	○
Sodium Sulfate	1000°C (Boiling)	24 hours	○
Potassium Fluoride	90°C (Boiling)	4 hours	×

○ : No Corrosion ○ : Slight Corrosion △ : Moderate Corrosion × : Heavy Corrosion

### • Chemical Resistance of Plastics

Chemical Name	PTFE	PEEK	VESPEL*3 SP-1	VESPEL*3 SCP-5000	PPS	H-PVC	RENY™*4	PC	PP	PVDF
10% Hydrochloric Acid	○	○	○	○	○	○	×	○	○	○
10% Sulfuric Acid	○	○	○	○	○	○	×	○	○	○
50% Sulfuric Acid	○	×	×	△	×	○	×	△	-	○
10% Nitric Acid	○	○	△	△	○	○	×	○	○	○
50% Nitric Acid	○	×	×	×	×	△	×	△	-	○
10% Hydrofluoric Acid	○	-	△	△	△	△	×	○	○	○
50% Hydrofluoric Acid	○	×	×	×	×	△	×	△	△	△
Phosphoric Acid	○	○	-	-	△	○	×	○	○	○
Formic Acid	○	△	△	△	○	△	×	○	○	○
Phosphoric Acid	○	○	○	○	○	○	×	○	○	○
Citric Acid	○	○	○	○	○	○	△	○	○	○
Chromic Acid	○	○	-	-	△	○	×	○	○	○
Boric Acid	○	○	○	○	○	○	△	○	○	○
Methyl Alcohol	○	○	△	△	○	○	-	△	-	○
Glycol	○	○	○	○	○	-	-	○	-	-
Ammonia	○	○	×	△	○	○	○	×	○	○
10% Sodium Hydroxide	○	○	×	△	○	○	○	-	○	○
10% Potassium Hydroxide	○	○	×	△	△	○	○	×	○	○
Calcium Hydroxide	○	○	-	-	△	○	×	○	○	○
Water	○	○	○	○	○	○	△	○	○	○
Hydrogen Sulfide (Gas)	○	○	-	-	○	-	○	○	○	○
Sulfur Dioxide	○	○	-	-	△	-	○	○	○	-
Ammonium Nitrate	○	○	-	-	○	-	○	○	○	○
Sodium Nitrate	○	○	-	-	○	-	○	×	○	○
Calcium Carbonate	○	○	-	-	○	-	○	×	○	○
Calcium Chloride	○	○	-	-	○	○	○	○	○	○
Magnesium Chloride	○	○	-	-	○	○	○	○	○	○
Magnesium Sulfate	○	○	-	-	○	-	○	○	○	○
Zinc Sulfate	○	○	-	-	○	-	○	○	○	○
Hydrogen Peroxide	○	○	△	△	△	○	△	○	○	○

○ : Usable △ : Usable under certain conditions × : Non-usable

• A test piece was used to acquire the test data at room temperature (23 °C).

\* 1 : Inconel is a registered trademark of Special Metals Corporation.

\* 2 : Hastelloy is a registered trademark of Haynes International, Inc.

\* 3 : VESPEL is a registered trademark of DuPont.

\* 4 : RENY™ is a trademark or registered trademark of Mitsubishi Gas Chemical Company, Inc.