Flowmeter SITRANS FM

Siemens Selection Guide – Your best choice

SIEMENS

SITRANS FM Flowmeters
A world of possibilities

Flowmeters from Siemens are designed for individual customer demands, which means they are fully compatible for integration in future system extensions.

SITRANS FM – electromagnetic flowmeters from Siemens

Siemens offers a range of electro-magnetic flowmeters for the measurement of all electrically conductive fluids:

SITRANS FM MAG 1100
SITRANS FM MAG 1100 HT
SITRANS FM MAG 1100 Food
SITRANS FM MAG 3100
SITRANS FM MAG 3100 HT
SITRANS FM MAG 3100 P
SITRANS FM MAG 5100 W, FMS500
SITRANS FM MAG 8000
SITRANS FM MAG 911/E

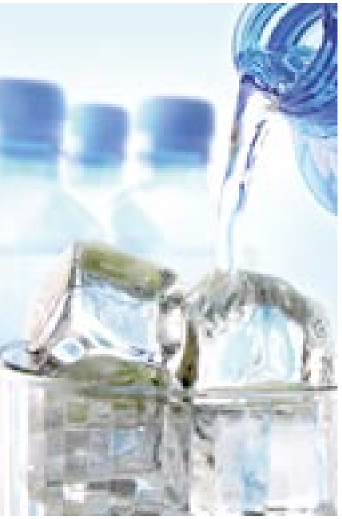
A wide range of transmitters and sensors completes the product range and enables the creation of exactly the flowmeter needed for any purpose and application.

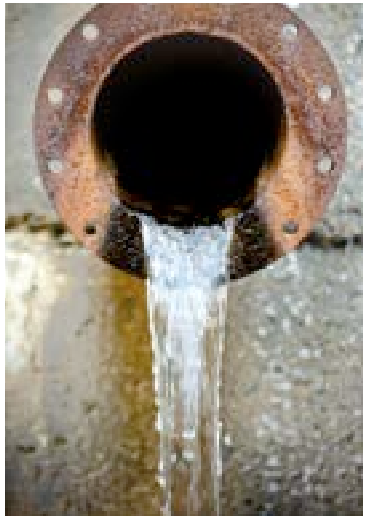
Siemens is your partner for integrating business processes across all levels and helping you create your competitive advantage. Choosing the right flowmeter for the right application is decisive for the productivity and dramatically improves your operations. We develop, manufacture and market all flowmeters worldwide – under the brand SITRANS F. Our range extends from electronic meters based on electromagnetic, coriolis and ultrasonic technologies to more classical mechanical flowmeters. We offer a wide range of electronic flowmeters, all fulfilling the highest demands in terms of accuracy and reliability in industries such as water and wastewater, chemicals, food and beverage, pharmaceutical, mining, pulp and paper, power and utilities.

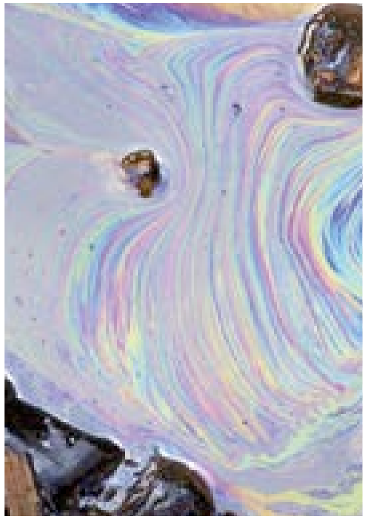
A liner for every purpose

Flowmeter liners. The liners from Siemens are designed for flowmeters covering the following applications:

- Drinking Water
- Wastewater
- Abrasives Liquids
- Chemicals
- Food & Beverage / Pharmaceutical
- Pulp & Paper
- Mining







The flowmeters differ in terms of materials, size, corrosion resistance, pressure and temperature performance.

The right combination depends on the specific application area. Some of the liners are especially suitable for drinking water – such as EPDM – whereas others are designed for use in food and beverage industries – such as PFA or Ceramic.

Several of the liners have obtained international approvals for specific purposes. For instance in drinking water applications, different national authorities dictate a variety of strict limitations and demands.

In any situation, you can find a Siemens flowmeter to suit your requirements exactly.

Use this Selection Guide to see the exact specifications for the various liner types, and get a quick overview of the best liners to use within different application areas.

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SITRANS FM Selection Guide

Liners and Electrodes for every industry

Liners and **Electrodes** for every industry

SITRANS FM
Selection Guide

Liners and Electrodes
for every industry

	PFA	PTFE	Neoprene	EPDM	NBR	Linatex	Ebonite	Ceramic	Novolak
Drinking Water	●	●	●	●̲	●		●		
Wastewater	●	●	●̲	●	●̲		●		
Abrasive Liquids	●	●	●	●	●	●̲	●	●	●
Chemicals	●̲	●̲	●	●	●		●	●	●
Food & Beverage	●̲	●̲		●			●	●̲	
Pulp & Paper	●̲	●̲							●
Overview									

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Liner: **PFA**

PFA, Perfluoroalkoxy

PFA has developed into a high performance liner for chemical and process applications.

The PFA liner from Siemens is the perfect choice for applications within the chemical, food and beverage and pulp and paper thanks to its excellent chemical resistance and temperature resistance.

About PFA

PFA is a perfluoroalkoxy with excellent chemical resistance and high temperature resistance. PFA is moulded directly in the flowmeter tube and is reinforced with a stainless steel tube, resulting in an extremely good mechanical performance during temperatur fluquations and under vacuum pressure conditions.

The robust PFA liner design with stainless steel tube reinforcement withstands high temperatures without deformation.

PFA facts and features

- PFA is highly resistant to chemicals
- The PFA liner tolerates media temperatures of –20 °C to +150 °C (–4 °F to +300 °F)
- Highly stable under vacuum pressure conditions
- Index price higher than PTFE

Application	Capability
Drinking Water	✓
Wastewater	✓
Abrasive Liguids	✓
Chemicals	✓✓✓
Food & Beverage	✓✓✓
Pulp & Papier	✓✓✓

Chemical Resistance*	Capability
Acid, diluted (<10%)	+
Acid, concentrated	+
Diluted alkalis	+
Concentrated alkalis	+
Aromatic hydrocarbons (benzene)	+
Chlorinated hydrocarbons (trichloroethylene)	+
Ozone	+
High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

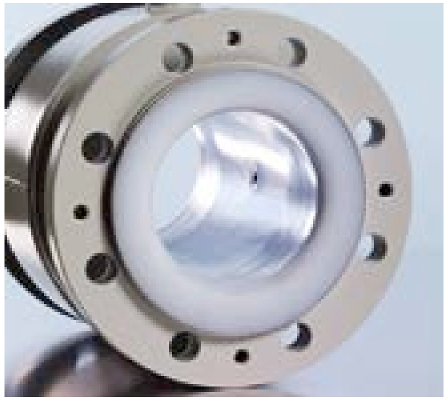
Wear Resistance	Performance
Abrasion	✓

Products	Nominal size	Medium temperature	Operating pressure	Hygienic suitability
MAG 1100	DN 10...DN 100 (⅜"...4")	–30...+130 °C (–20...+270 °F)	0.02–20 bar abs (0.3–290 psia)	
MAG 1100 F	DN 10...DN 100 (⅜ "...4")	–30...+130 °C (–20...+270 °F)**	0.02–20 bar abs (0.3–290 psia)	3A approved
MAG 3100	DN 25...DN 100 (1"...4")	–20...+100 °C (–4...+212 °F)	0.01–50 bar abs (0.15–725 psia)	
MAG 3100 HT	DN 25...DN 100 (1"...4")	–20...+150 °C (–4...+302 °F)	0.01–50 bar abs (0.15–725 psia)	
MAG 3100 P	DN 25...DN 100 (1"...4")	–20...+150 °C (–4...+302 °F)	0.01–50 bar abs (0.15–725 psia)	

**Suitable for steam sterilization at +150 °C (+302 °F)

Liner: **PTFE**

PTFE, Polytetraflouroethylene



PTFE is a commonly used liner for the chemical and general process industries.

PTFE is the most commonly used liner for the chemical and general process industries, where temperature-resistant materials with exceptional chemical properties are required.

About PTFE

PTFE is a polytetraflouroethylene, which is an extruded tube inserted in the flowmeter without bonding. The ends are bevelled and form the flange face.

The PTFE liner can be adversely affected by exposure to vacuum pressure.

PFA facts and features

- Smooth surface
- Small risk of deposits in the liner
- Liner with best chemical resistance
- High and low temperature capability – tolerates media temperatures from −20°C to +180°C (−4°F to +356°F)
- Higher index-priced liner.

Application	Capability
Drinking Water	✓
Wastewater	✓
Abrasive Liguids	✓
Chemicals	✓✓✓
Food & Beverage	✓✓✓
Pulp & Papier	✓✓✓

Chemical Resistance*	Capability
Acid, diluted (<10%)	+
Acid, concentrated	+
Diluted alkalis	+
Concentrated alkalis	+
Aromatic hydrocarbons (benzene)	+
Chlorinated hydrocarbons (trichloroethylene)	+
Ozone	+
High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

Wear Resistance	Performance
Abrasion	✓

Products	Nominal size	Medium temperature	Operating pressure	Hygienic suitability
MAG 3100	DN 15...DN 600 (1/2"...24")	−20...+100°C (−4...+212°F)	DN ≤ 300: 0.3–50 bar abs (–725 psia) 350 ≤ DN ≤ 600: 0.3–40 bar abs (4–580 psia)	
MAG 3100 HT	DN 15...DN 300 (1/2"...12")	−20...+150°C (−4...+302°F) −20...+150°C (−4...+356°F)**	0.3–50 bar abs (4–725 psia)	
MAG 3100 P	DN 15...DN 300 (1/2"...12")	−20...+150°C (−4...+302°F)	0.3–50 bar abs (4–725 psia)	
MAG 911/E	DN 15...DN 600	−20...+150°C (−4...+302°F)	0.3–40 bar abs (4.3–580 psia)	

**Factory mounted grounding rings type E.

Liner: **Neoprene**

Neoprene, Polychloroprene

Neoprene is suitable for water and wastewater applications.

The Neoprene liner from Siemens was formerly the most commonly used liner for water and wastewater applications as well as some chemical applications. In recent years, new materials have emerged for use in these applications.

About Neoprene

Neoprene polychloroprene is a versatile synthetic rubber, originally developed as an oil-resistant substitute for natural rubber. Neoprene possesses a unique combination of properties, which has led to its use in thousands of applications in various water application environments.

The Siemens Neoprene liner is hand lined and bonded to the stainless steel inner tube of the sensor, which supports the liner during use.

Recently, due to new drinking water requirements and the risk of swelling in water, other rubber materials such as NBR, EPDM and Ebonite have replaced Neoprene in many water applications.

Neoprene facts and features

- Performs well in contact with oils, many chemicals and some solvents
- Well-suited to wastewater applications where oil is present
- Good abrasion resistance properties
- Due to compression set the liner tolerates a maximum temperature of +70 °C (+158 °F).

Application	Capability
Drinking Water	✓
Wastewater	✓✓✓
Abrasive Liguids	✓✓
Chemicals	✓
Food & Beverage	
Pulp & Papier	

Chemical Resistance*	Capability
Acid, diluted (<10%)	0
Acid, concentrated	0
Diluted alkalis	+
Concentrated alkalis	+
Aromatic hydrocarbons (benzene)	–
Chlorinated hydrocarbons (trichloroethylene)	–
Ozone	0

High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

Products	Nominal size	Medium temperature	Operating pressure	Hygienic suitability
MAG 3100	DN 25...DN 2000 (1"...78")	0...+70 °C (+32...+158 °F)	0.01–100 bar abs (0.15–1450 psia)	
MAG 911/E	DN 15...DN 600 (½"...24")	0...+70 °C (+32...+158 °F)	0.01–40 bar abs (0.15–580 psia)	

Wear Resistance	Performance
Abrasion	✓✓

Liner: EPDM

EPDM, Ethylene-propylenediene Rubber

EPDM – a perfect choice for drinking water applications.

The EPDM liner from Siemens is the preferred liner for drinking water applications.

About EPDM

EPDM rubber (ethylenepropylenediene rubber) is an elastomer, which is characterized by a wide range of advantages, making it especially suitable for drinking water applications.

EPDM is a hand lined bonded liner with the stainless steel inner tube of the sensor as support.

In the MAG 5100 W / FMS500, DN 15 to DN 300 (½" to 12") flow sensors the liner is moulded, with a stainless steel reinforcement net.

EPDM has excellent properties for drinking water applications.

EBDM facts and features

- Many country specific drinking water approvals
- Can be used for some chemicals, where PTFE or PFA is not required
- Can be used for some food and beverage applications with pipe sizes greater than DN 100/4"
- Not to be used for wastewater applications, where hydrocarbons can be present.
- EPDM has a much better water resistance than PU due to high hydrolysis stability.

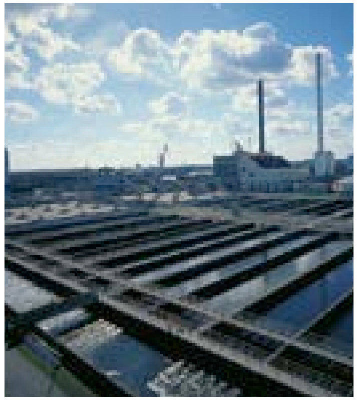
Application	Capability
Drinking Water	✓✓✓
Wastewater	✓
Abrasive Liguids	✓
Chemicals	✓✓
Food & Beverage	✓✓
Pulp & Papier	

Chemical Resistance*	Capability
Acid, diluted (<10%)	+
Acid, concentrated	0
Diluted alkalis	+
Concentrated alkalis	+
Aromatic hydrocarbons (benzene)	–
Chlorinated hydrocarbons (trichloroethylene)	–
Ozone	+
High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

Wear Resistance	Performance
Abrasion	✓✓

Products	Nominal size	Medium temperature	Operating pressure	Hygienic suitability
MAG 3100	DN 25...DN 2000 (1"...78")	−10...+70 °C (+14...+158 °F)	0.01–40 bar abs (0.15–580 psia)	Drinking water approved
MAG 5100 W FMS500	DN 15...DN 2000 (½"...78")	−10...+70 °C (+14...+158 °F)	Coned bore sensor: DN 25...DN 40 (1"...1 ½") 0.01–40 bar abs (0.15–580 psia) Coned bore sensor: DN 50...DN 300 (2"...12") 0.03–20 bar abs (0.44–290 psia) Full bore sensor: DN 350...DN 1200 (14"...48") 0.01–16 bar abs (0.15–232 psia)	Drinking water approved
MAG 8000	DN 25...DN 600 (1"...24")	0...+70 °C (+32...+158 °F)	Coned bore sensor: DN 25... N 40 (1"...1 ½") 0.01–40 bar abs (0.15–580 psia) Coned bore sensor: DN 50...DN 300 (2"...12") 0.03–20 bar abs (0.44–290 psia) Full bore sensor: DN 350...DN 600 (14"...24") 0.01–16 bar abs (0.15–232 psia)	Drinking water approved



The NBR liner is excellent for water and general purpose applications.

Liner: **NBR**

NBR, Nitrile Butadiene Rubber

The NBR liner from Siemens is excellent for water, wastewater and general purpose applications. And it is also suitable for process applications and certain chemical applications, where PTFE or PFA is not needed.

About NBR

NBR is often used in oil and gas industries because the material is highly resistant to hydrocarbons. The performance properties of NBR depend on its acrylonitrite (ACN) and sulphur content. The oil and gasoline resistance increases with ACN rate. The Siemens NBR liner has an ACN rate of about 30 W%, a level which ensures resistance to both water and hydrocarbons.

DN > 300 (12"):
Hand lined and bonded to the stainless steel inner tube of the sensor.

DN 15 to DN 300 (1/2" to 12"):
Moulded liner with reinforcement net

NBR facts and features

- Lowest priced liner
- Some drinking water approvals
- NBR is highly resistant to hydrocarbons
- Suitable for process applications and certain chemical applications, where PTFE or PFA is not required.
- NBR is better suited for waste water than PUR. PUR has good oil, grease, gasoline and aromatic hydrocarbons resistance, but in comparison to NBR it is not recommended for water containing these media due to its low hydrolysis resistance.

Application	Capability
Drinking Water	✓✓
Wastewater	✓✓✓
Abrasive Liguids	✓
Chemicals	✓
Food & Beverage	
Pulp & Papier	

Chemical Resistance*	Capability
Acid, diluted (<10%)	0
Acid, concentrated	–
Diluted alkalis	+
Concentrated alkalis	0
Aromatic hydrocarbons (benzene)	–
Chlorinated hydrocarbons (trichloroethylene)	–
Ozone	–

High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

Wear Resistance	Performance
Abrasion	✓✓

Products	Nominal size	Medium temperature	Operating pressure	Hygienic suitability
MAG 5100 W FMS500	DN 15...DN 2000 (½"...78")	−10...+70° C (+14...+158 °F)	DN 15...DN 40 (½"...1 ½") 0.01–40 bar abs (0.15–580 psia) DN 50...DN 300 (2"...12") 0.03–20 bar abs (0.44–290 psia) DN 350...DN 1200 (14"...48") 0.01–16 bar abs (0.15–232 psia)	

Liner:
NBR

Internal information

NBR performs well in:

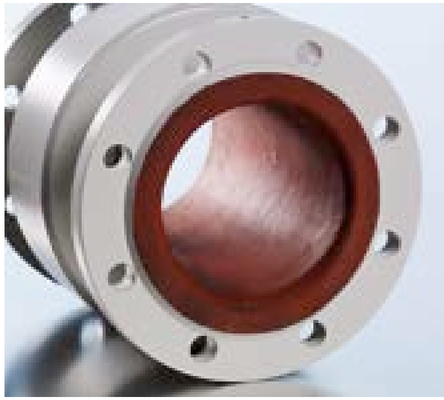
- Petroleum oils & fuels
- Silicone oils & greases
- Ethylene glycol
- Dilute acids
- Water (below 212 °F)

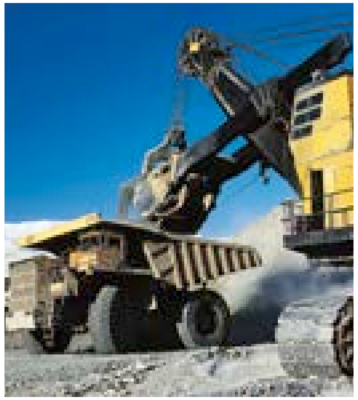
NBR does not perform well in:

- Aromatic hydrocarbons (benzene, toluene, xylene)
- Automotive brake fluid
- Halogen derivatives (carbon tetrachloride, trichloroethylene)
- Ketones (MEK, acetone)
- Phosphate ester hydraulic fluids (Skydrol®, Pydraul®)
- Strong acids

Liner: **Linatex**

Linatex, Natural Soft Rubber





Linatex is made of natural soft rubber and has an excellent performance in abrasive media.

Linatex has an excellent performance in abrasive media. Thanks to its high resistance to wear the Linatex liner is long lasting and economically attractive, especially in heavy slurry applications.

About Linatex

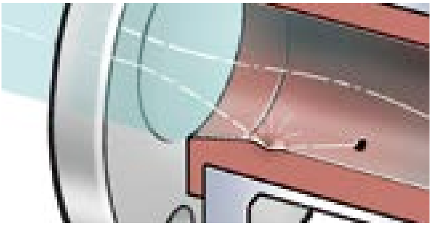
Linatex is based on 95% natural soft rubber. Raw natural rubber, when vulcanized, exhibits an inherent strength, resilience and toughness that combine to provide an excellent abrasion-resistant performance, especially in heavy slurry applications.

Its phenomenal resilience, exceptional tear resistance, all-round toughness and the unique cross-linking of its molecular structure, ensure that Linatex is well accepted worldwide within the mining industry.

The Siemens Linatex liner is a hand lined and bonded liner with a stainless steel inner tube.

Linatex facts and features

- Excellent abrasion resistance particularly to sand, slurries and particles because the particles simply bounce off the soft rubber instead of causing damage
- The only liner which tolerates low temperature applications down to –40 °C (–40 °F)
- Linatex can be adversely affected by oil and solvents.



Linatex protection

Minerals or particles will bounce off the soft rubber liner instead of wearing it down.

Application	Capability
Drinking Water	
Wastewater	
Abrasive Liguids	✓✓✓
Chemicals	
Food & Beverage	
Pulp & Papier	

Chemical Resistance*	Capability
Acid, diluted (<10%)	0
Acid, concentrated	–
Diluted alkalis	+
Concentrated alkalis	+
Aromatic hydrocarbons (benzene)	–
Chlorinated hydrocarbons (trichloroethylene)	–
Ozone	–
High resistance	+
Moderate resistance	0
No resistance	–

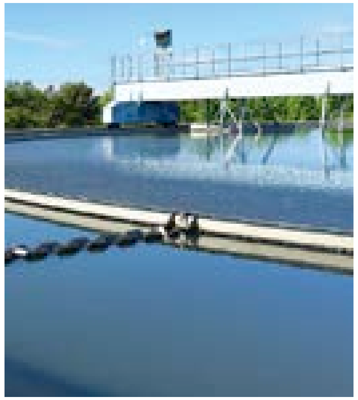
*Please also refer to the chemical resistance chart

Wear Resistance	Performance
Abrasion	✓✓✓

Products	Nominal size	Medium temperature	Operating pressure	Hygienic suitability
MAG 3100	DN 25...DN 600 (1"...24")	–40...+70 °C (–40...+158 °F)	0.01–40 bar abs (0.15–580 psia)	
MAG 911/E	DN 15...DN 1000 (½"...40")	–40...+70 °C (–40...+158 °F)	0.01–40 bar abs (0.15–580 psia)	

Liner: **Ebonite**

Ebonite, Hard Rubber



The Ebonite liner is very suitable for wastewater and several chemical applications.

The Ebonite liner is highly resistant to chemicals, hydrocarbons and other substances, which can be present in untreated water and sewage. The liner is therefore particularly suitable for wastewater applications and certain chemical applications.

About Ebonite

Due to its cross-connected structure the Ebonite liner exhibits an extremely low water absorption and at the same time offers a high level of stability of the measuring tube section during the entire lifetime of the sensor, regardless of pressure and temperature.

The Ebonite liner is hand lined and bonded to the stainless steel inner tube of the sensor, which supports the liner during use.

In general purpose applications Ebonite is typically used for undefined media containing low concentrations of many chemicals – especially for high pressure applications, where temperatures are above +70 °C (+158 °F) – max. +95 °C (+203 °F).

Ebonite facts and features

- Good for use in wastewater applications and certain chemical applications, where PTFE and PFA are not necessary
- Relative good chemical resistance and resistance to hydrocarbons
- Tolerates high pressure and temperatures up to +95 °C (+203 °F)
- Extremely low water absorptionoil and solvents.

Application	Capability
Drinking Water	✓✓
Wastewater	✓✓
Abrasive Liguids	✓
Chemicals	✓
Food & Beverage	✓
Pulp & Papier	

Chemical Resistance*	Capability
Acid, diluted (<10%)	+
Acid, concentrated	0
Diluted alkalis	+
Concentrated alkalis	+
Aromatic hydrocarbons (benzene)	–
Chlorinated hydrocarbons (trichloroethylene)	–
Ozone	0
High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

Products	Nominal size	Medium temperature	Operating pressure	Hygienic suitability
MAG 3100	DN 25...DN 2000 (1"...78")	0...+95 °C (+32...+203 °F)	0.01–100 bar abs (0.15–1450 psia)	

Wear Resistance	Performance
Abrasion	✓

Liner: **Ceramic**

Ceramic, Zirconium Oxide (ZrO_2) – Aluminium Oxide (Al_2O_3)

The two Ceramic liners have excellent properties for use in chemical and food applications.

The two Ceramic liners both have excellent properties for a broad range of process industry applications. They demonstrate a wide range of applicability due to their resistance to high temperatures, low pressures and corrosion. Ceramic is also usable in food and beverage applications, but needs cautions for sudden temperature shocks.

About Ceramic

Ceramic Zirconium Oxide (>96.0% ZrO_2; 3.1–3.3% MgO)

Zirconium Oxide is a versatile advanced ceramic material. It has excellent chemical resistance to acids and alkalis. It has no thermal shock limitations. Ceramic Zirconium Oxide is used for flowmeter sizes DN 2 (1/12”) and DN 3 (1/8”).

Ceramic Aluminium Oxide (Al_2O_3) (99.7% Al_2O_3; 0.3% MgO)

Aluminium Oxide is a high purity aluminium oxide ceramic. It resists both acids and alkalis. For flowmeters sized above DN 50 the liner can be sensitive to sudden thermal shocks. This ceramic is best suited to lining flowmeters of small diameter in high accuracy applications.

Ceramic facts and features

- The liners with the best possible long-term accuracy
- Withstands high temperatures, corrosion and wear
- Chemically inert in the presence of most substances, even at elevated temperatures
- High temperature resistance
- Totally vacuum resistant

Application	Capability
Drinking Water	
Wastewater	
Abrasive Liguids	✓
Chemicals	✓✓
Food & Beverage	✓✓✓
Pulp & Papier	

Chemical Resistance*	Capability
Acid, diluted (<10%)	+
Acid, concentrated	+
Diluted alkalis	+
Concentrated alkalis	0
Aromatic hydrocarbons (benzene)	+
Chlorinated hydrocarbons (trichloroethylene)	+
Ozone	+

High resistance	+
Moderate resistance	0
No resistance	–

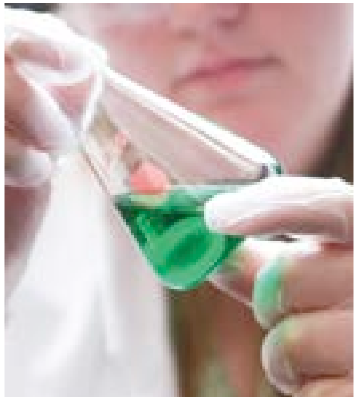
*Please also refer to the chemical resistance chart

Wear Resistance	Performance
Abrasion	✓✓

Products	Nominal size	Medium temperature	Operating pressure	Hygienic suitability
MAG 1100	DN 2...DN 100 (1/12”...4”)	–20...+150 °C (–4...+302 °F)	DN 2...65: 40 bar abs (½”...2 ½”: 580 psia) DN 80: 37.5 bar abs (3”: 540 psia) DN 100: 30 bar abs (4”: 435 psia) Vacuum: 1 x 10–6 bar abs (1.5 x 10–5 psia)	
MAG 1100 HT	DN 15...DN 100 (½”...4”)	–20...+200 °C (–4...+390 °F)	DN 15...50: 40 bar abs (½”...2”: 580 psia) DN 80: 37.5 bar abs (3”: 540 psia) DN 100: 30 bar abs (4”: 435 psia) Vacuum: 1 x 10–6 bar abs (1.5 x 10–5 psia)	
MAG 1100 F	DN 10...DN 100 (⅜”...4”)	–20...+150 °C (–4...+302 °F)	DN 10...65: 40 bar abs (⅜”...2 ½”: 580 psia) DN 80: 37.5 bar abs (3”: 540 psia) DN 100: 30 bar abs (4”: 435 psia) Vacuum: 1 x 10–6 bar abs (1.5 x 10–5 psia)	3A approved

Liner: **Novolak**

Novolak, Epoxy Coating



The Novolak liner can be used for chemical processes, in the pulp and paper industries, and in high temperature applications in general.

The Novolak liner has its strength in high temperature applications as an economic alternative to PTFE liners. The Novolak liner is also used in chemical industries due to its excellent chemical resistance.

About Novolak

The Novolak liner is a spray coating with a smooth, hard and non-porous surface and finish – and is highly resistant to corrosion.

Apart from use in pulp and paper applications, the Novolak liner is also used in chemical industries due to its excellent chemical resistance.

Novolak facts and features

- Robust at high pressures and under vacuum conditions
- Withstands temperatures up to +130 °C (+266 °F)
- Novolak is compatible with chemicals with a pH value between 3 and 13
- Novolak is not suitable for media containing ozone
- Novolak lining is well suited for applications with hot brine in geothermal plants. Geothermal water (hot brine) is a very difficult fluid to measure because of the temperature and the high mineral content (silica, calcite, etc.) which tends to foul the instruments.

Application	Capability
Drinking Water	
Wastewater	
Abrasive Liguids	✓
Chemicals	✓✓
Food & Beverage	
Pulp & Papier	✓✓

Chemical Resistance*	Capability
Acid, diluted (<10%)	+
Acid, concentrated	0
Diluted alkalis	+
Concentrated alkalis	+
Aromatic hydrocarbons (benzene)	+
Chlorinated hydrocarbons (trichloroethylene)	
Ozone	+

High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

Products	Nominal size	Medium temperature	Operating pressure	Hygienic suitability
MAG 911/E	DN 15...DN 600	–20...+130 °C (–4...+266 °F)	0.01–40 bar abs (0.15–580 psia)	

Wear Resistance	Performance
Abrasion	✓

Liners **Overview**

SITRANS FM Liner Survey

The information presented in this chart has been supplied by Siemens or other reputable sources and is to be used only as reference. Please consult the Siemens catalogue FI 01 and chemical compatibility tables for further product/media compatibility and specific product temperature limitations.

Properties	PFA	PTFE	Neoprene	EPDM	NBR	Linatex	Ebonite	Ceramic	Novolak
Other names	Perfluoroalkoxy	Polytetraflouroethylene	Polychloroprene	Ethylenepropylenediene	Nitrile Butadiene Rubber	Natural Soft Rubber	Hard Rubber	Zirconium Oxide (ZRO2) Aluminium Oxide (Al2O3)	Epoxy Coating
General Attributes	Excellent chemical resistance, withstands high temperatures without deformation.	Excellent chemical resistance.	Performs well in contact with oils and many chemicals.	Drinking water and many other media than hydrocarbons (oil, tar, graese).	Excellent for water and general purpose applications.	Excellent abrasion performance.	Suitable for wastewater and several chemical applications. Useable for temperatures up to 95 °C and for applications with high pressure.	Chemically inert in the presence of most substances, even at elevated temperatures. Vacuum resistant.	Chemical process and pulp and paper applications. High-temperature applications.
Wear Resistance	✓	✓	✓✓	✓	✓✓	✓✓✓	✓	✓✓	✓
Applications									
Drinking Water	✓	✓	✓	✓✓✓	✓		✓✓		
Wastewater	✓	✓	✓✓✓	✓	✓✓✓		✓✓		
Abrasive Liquids	✓	✓	✓✓	✓	✓	✓✓✓	✓	✓	✓
Chemicals	✓✓✓	✓✓✓	✓	✓✓	✓		✓	✓✓	✓✓
Food & Beverage	✓✓✓	✓✓✓		✓✓			✓	✓✓✓	
Pulp & Paper	✓✓✓	✓✓✓							✓✓
Chemical Resistance									
Acid, diluted (<10%)	+	+	0	+	0	0	+	+	+
Acid, concentrated	+	+	0	0	–	–	0	+	0
Diluted alkalis	+	+	+	+	+	+	+	+	+
Concentrated alkalis	+	+	+	+	0	+	+	0	+
Aromatic hydrocarbons (benzene)	+	+	–	–	–	–	–	+	+
Chlorinated hydrocarbons (trichloroethylene)	+	+	–	–	–	–	–	+	
Ozone	+	+	0	+	–	–	0	+	+
Temperatures									
Maximum Temperature	300 °F	356 °F	158 °F	158 °F	158 °F	158 °F	203 °F	392 °F	266 °F
	150 °C	180 °C	70 °C	70 °C	70 °C	70 °C	95 °C	200 °C	130 °C
Availability									
MAG 1100	Yes							Yes	
MAG 1100 HT								Yes	
MAG 1100 F	Yes							Yes	
MAG 3100	Yes	Yes	Yes	Yes		Yes	Yes		
MAG 3100 HT	Yes	Yes							
MAG 3100 P	Yes	Yes							
MAG 5100W / FMS500				Yes	Yes				
MAG 8000				Yes					
MAG 911/E		Yes	Yes			Yes			Yes

SITRANS FM **Electrodes**

SITRANS FM **Selection Guide**

Liners and **Electrodes**
for every industry

	Stainless Steel	Hastelloy®	Titanium	Tantalum	Platinum
Drinking Water	●	●			
Wastewater	●	●			
Abrasive Liquids	●	●	●		
Chemicals	●	●	●	●	●
Food & Beverage	●	●			●
Pulp & Paper	●	●		●	
Overview					

Electrode: **Stainless Steel**

The Stainless Steel AISI 316 electrode from Siemens is a general purpose electrode for non-aggressive liquids, such as drinking water, sewage and district heating.

About Stainless Steel (AISI 316)

AISI 316 is an iron-carbon alloy with chromium, nickel and molybdenum being the main alloying elements.

Chromium will form a protective oxide layer when exposed to oxygen and thus the corrosion resistance of Stainless Steel increases compared to plain carbon steel. The general corrosion resistance of AISI 316 is therefore depending on the resistance of the protective oxide layer.

Stainless steel facts and features

- General purpose electrode
- Not suitable for strong acids and alkalis
- Low cost
- Not recommended for salt water and brine

Application	Availability
Drinking Water	✓✓
Wastewater	✓✓
Abrasive Liguids	✓✓
Chemicals	✓
Food & Beverage	✓✓
Pulp & Papier	✓

Chemical Resistance*	Capability
Reducing acids	–
Oxidizing acids	0
Organic acids	+
Alkalis	+
Diluted salts	0
High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

Products	Nominal size	Medium temperature	Liner	Hygienic suitability
MAG 3100	DN 15...DN 2000 (½"...78")	–40...+100 °C (–40...+212 °F)	Neoprene , EPDM, PTFE, Ebonite, Linatex	Drinking water approved
MAG 3100 HT	DN 15...300 (½"...12")	–20...+180 °C (–4...+356 °F)	PTFE	
MAG 911/E	DN 15...600 (½"...24")	–20...+150 °C (–4...+302 °F)	Hard Rubber, PTFE, Novolak	

Electrode: **Hastelloy®**

The Hastelloy® electrode from Siemens is the preferred choice for applications in water and wastewater, chemical, food and beverage, and pharmaceutical industries.

About Hastelloy®

Hastelloy® is a family of nickel alloys with a very wide application area. The Hastelloy® electrode is characterized by having a high-resistance towards localized corrosion which is a great advantage in chloride-containing environments at high temperatures.Furthermore, Hastelloy® has a high level of all-round corrosion resistance which can be attributed to the content of chromium and molybdenum. Chromium increases the resistance to oxidizing conditions and molybdenum increases the resistance to reducing environments. Siemens uses the grades, C22 and C276 as electrode material in its electromagnetic flowmeters, and in a few applications also C4.

Hastelloy® facts and features

- Good all-round corrosion resistance
- High resistance to localized corrosion (superior to Stainless Steel)
- The preferred material within the process and water industry due to cost benefits
- Preferred material for salt water and brine

Application	Availability C22	Availability C276
Drinking Water	✓✓✓	✓✓✓
Wastewater	✓✓✓	✓✓✓
Abrasive Liguids	✓✓✓	✓✓✓
Chemicals	✓✓✓	✓✓✓
Food & Beverage	✓✓✓	✓✓✓
Pulp & Papier	✓✓✓	✓✓

Chemical Resistance*	Capability C22	Capability C276
Reducing acids	0	0
Oxidizing acids	+	0
Organic acids	+	+
Alkalis	+	+
Diluted salts	0	0

High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

MAG 1100	MAG 1100 F	MAG 5100 W	MAG 3100	MAG 8000	MAG 911/E
C22	C22	C276	C276, C22 (only PFA)	C276	C276

Products	Nominal size	Medium temperature	Liner	Hygienic suitability
MAG 1100	DN 2...100 (1/12”...4”)	20...+130 °C (−4...+270 °F)	PFA	
MAG 1100 F	DN 10...100 (1/12”...4”)	20...+130 °C (−4...+270 °F)	PFA	3A approved
MAG 3100	DN 15...DN 2000 (½”...78”)	20...+150 °C (−4...+302 °F)	Neoprene, EPDM, PTFE, Ebonite, Linatex, PFA	Drinking water approved
MAG 3100 HT	DN 15...300 (½”...12”)	−20...+180 °C (−4...+356 °F)	PTFE	
MAG 3100 P	DN 15...300 (½"...12")	−20...+150 °C (−4...+302 °F)	PTFE, PFA	
MAG 5100 W / FMS500	DN 25...1200 (1”...48”)	−10...+70 °C (14...+158 °F)	NBR, EPDM	Drinking water approved
MAG 8000	DN 25...1200 (1”...48”)	0...+70 °C (32...+158 °F)	EPDM	Drinking water approved
MAG 911/E	DN 15...600 (½”...24”)	−20...+150 °C (−4...+302 °F)	Hard Rubber, PTFE, Novolak	

Electrode: **Titanium**

The Titanium electrode from Siemens is a good choice for applications in the process and chemical industry requiring a high corrosion resistance.

About Titanium

The Titanium electrode has an excellent corrosion resistance in many aggressive environments, particularly oxidizing and chloride-containing media. The only corrosion limitation of titanium is applications in reducing acids such as sulphuric and hydrochloric acids. The corrosion resistance of Titanium relies on the formation of a passive surface film composed of Titanium oxide (mainly TiOx2). This passive film is very stable and has a self-healing effect as long as the surrounding environment contains oxygen or other oxidizing agents.

Titanium facts and features

- High corrosion resistance in oxidizing and alkaline media
- Limited resistance in reducing acids
- Good mechanical properties
- Fairly expensive electrode material

Application	Availability
Drinking Water	
Wastewater	
Abrasive Liguids	✓
Chemicals	✓✓
Food & Beverage	
Pulp & Papier	

Chemical Resistance*	Capability
Reducing acids	–
Oxidizing acids	+
Organic acids	0
Alkalis	+
Diluted salts	+
High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

Products	Nominal size	Medium temperature	Liner	Hygienic suitability
MAG 3100	DN 15...600 (½”...24”)	–40...+100 °C (–40...+212 °F)	Neoprene , EPDM, PTFE, Ebonite, Linatex	
MAG 3100 HT	DN 15...300 (½”...12”)	–20...+180 °C (–4...+356 °F)	PTFE	
MAG 911/E	DN 15...600 (½”...24”)	–20...+150 °C (–4...+302 °F)	Hard Rubber, PTFE, Novolak	

Electrode: **Tantalum**

The Tantalum electrode from Siemens is the perfect choice for aggressive media and almost immune to all kinds of chemical attack. This makes it a superior choice for applications in the chemical industry.

About Tantalum

Tantalum is very corrosion-resistant and has a resistance level similar to glass. Once the metal is exposed to air, a thin layer of highly resistant Tantalum oxide is formed, which makes it resistant to almost all kinds of chemicals. Corrosion can only take place in fluor-containing media and unwanted scale formation can occur in alkalis. It is a rather soft metal and thus not very abrasive-resistant.

Tantalum facts and features

- Most common electrode for chemical industry if Hastelloy® is not suitable
- Very corrosion-resistant (more or less similar to glass)
- Recommended for strong acids (except fluoric acids)
- Recommended for diluted salts (except fluor salts)
- The cost for Tantalum is high
- Not very abrasive-resistant

Application	Availability
Drinking Water	
Wastewater	
Abrasive Liguids	
Chemicals	✓✓✓
Food & Beverage	
Pulp & Papier	✓✓ (chemicals)

Chemical Resistance*	Capability
Reducing acids	+ (except flouric acids)
Oxidizing acids	+
Organic acids	+
Alkalis	–
Diluted salts	+ (except flour salts)
High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

Products	Nominal size	Medium temperature	Liner	Hygienic suitability
MAG 3100	DN 15...600 (½"...24")	–40...+100 °C (–40...+212 °F)	Neoprene, EPDM, PTFE, Ebonite, Linatex, PFA	
MAG 3100 HT	DN 15...300 (½"...12")	–20...+180 °C (–4...+356 °F)	PTFE, PFA	
MAG 3100 P	DN 15...300 (½"...12")	–20...+180 °C (–4...+302 °F)	PTFE	
MAG 911/E	DN 15...600 (½"...24")	–20...+150 °C (–4...+302 °F)	Hard Rubber, PTFE, Novolak	

Electrode: **Platinum**

Platinum is the ultimate electrode material for difficult applications with high temperature and corrosive media. Platinum is chosen when tantalum is not sufficiently corrosion-resistant.

About Platinum

Platinum has a very noble and immune character which makes it extremely corrosion-resistant. Corrosive attack of platinum at room temperature will mainly take place in mixtures of strong oxidizing acids. Furthermore, platinum has excellent high-temperature characteristics with stable electrical properties. Different grades of platinum are available as electrode material at Siemens.

Platinum facts and features

- Very high corrosion resistance
- Used in the chemical industry for the most agressive liquids
- Very high cost
- Limited wear resistance

Application	Availability
Drinking Water	
Wastewater	
Abrasive Liguids	
Chemicals	✓✓✓
Food & Beverage	✓✓✓
Pulp & Papier	

Chemical Resistance*	Capability
Reducing acids	+
Oxidizing acids	0
Organic acids	+
Alkalis	+
Diluted salts	0

High resistance	+
Moderate resistance	0
No resistance	–

*Please also refer to the chemical resistance chart

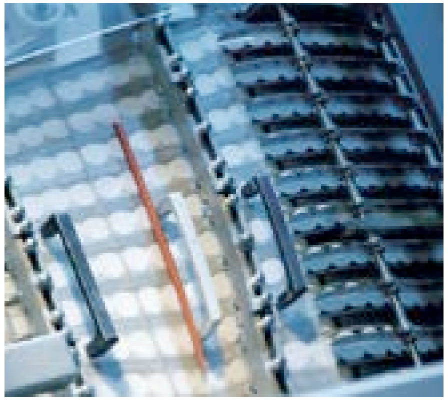
MAG 1100	MAG 1100 F	MAG 3100	MAG 911/E
99.9 wt% platinum electrode sintered or brazed to a ceramic liner.**	99.9 wt% platinum electrode brazed to a ceramic liner.**	90/10 wt% platinum / iridium alloy.	99.9 wt% platinum electrode

**In the brazed version, a thin layer of Titanium oxide is formed between the brazing and the ceramic liner. The general corrosion resistance of Titanium should therefore be taken into account when predicting the overall corrosion resistance.

Products	Nominal size	Medium temperature	Liner	Hygienic suitability
MAG 1100	DN 2...100 (1/12"...4")	20...+150 °C (–4...+300 °F)	Ceramic	
MAG 1100 HT	DN 15...100 (½"...4")	20...+200 °C (–4...+390 °F)	Ceramic	
MAG 1100 F	DN 10...100 (⅜"...4")	20...+150 °C (–4...+302 °F)	Ceramic	3A approved
MAG 3100	DN 15...300 (½"...12")	–40...+100 °C (–40...+212 °F)	Neoprene, EPDM, PTFE, Linatex, PFA	
MAG 3100 HT	DN 15...300 (½"...12")	–20...+180 °C (–4...+356 °F)	PTFE, PFA	
MAG 3100 P	DN 15...300 (½"...12")	–20...+180 °C (–4...+302 °F)	PTFE	
MAG 911/E	DN 15...600 (½"...24")	–20...+150 °C (–4...+302 °F)	Hard Rubber, PTFE, Novolak	

Electrodes **Overview**

SITRANS FM Electrode Survey



	Stainless Steel	Hastelloy C22	Hastelloy C267	Titanium	Tantalum	Platinum
Applications						
Drinking Water	✓✓	✓✓✓	✓✓✓			
Wastewater	✓✓	✓✓✓	✓✓✓			
Abrasive Liquids	✓✓	✓✓✓	✓✓✓	✓		
Chemicals	✓	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓
Food & Beverage	✓✓	✓✓✓	✓✓✓			✓✓✓
Pulp & Paper	✓	✓✓✓	✓✓		✓✓ (chemical)	
Chemical Resistance						
Reducing acids	–	0	0	–	+ (except flouric acids)	+
Oxidizing acids	0	+	0	+	+	0
Organic acids	+	+	+	0	+	+
Alkalis	+	+	+	+	–	+
Diluted salts	0	0	0	+	+ (except fluor salts)	0
Availability						
MAG 1100		Yes	Yes			Yes
MAG 1100 HT						Yes
MAG 1100 F		Yes	Yes			Yes
MAG 3100	Yes	Yes	Yes	Yes	Yes	Yes
MAG 3100 HT	Yes		Yes	Yes	Yes	Yes
MAG 3100 P		Yes	Yes			
MAG 5100 W / FMS500			Yes			
MAG 8000			Yes			
MAG 911/E	Yes			Yes	Yes	Yes

Electrodes **Overview**

Chemical Resistance Chart

Introduction

Corrosion and degradation depend on many parameters:

- Temperature
- Pressure
- Concentration
- Impurities
- pH-value
- Materials and surfaces characteristics
- Joinings (e.g. weldings, soldering)
- Mechanical stress of materials

Due to the many parameters influencing the process the corrosion table can only be used as guidance and does not always apply to the actual process conditions at the end-user. Thus the final responsibility of material selection resides with the user who knows the specific process conditions.

The data presented in this guide is based on published data and field experience.

Disclaimer

Siemens can provide assistance with the selection of sensor parts in contact with the media. However, the full responsibility for the selection rests with the customer and Siemens can take no responsibility for any failure due to material incompatibility.

How to use this guide

Chemical names are listed in alphabetical order. Each chemical may have one or more temperature and concentration combinations.

In the listing the material compatibility to the chemical and the max. temperature limit is given for each material. It can be assumed in general that the resistance will be no worse at lower temperatures.

The following codes define the compatibility to each chemical listed:

A = Excellent

B = Good, minor effect

C = Conditional, not recommended for continuous use

X = Not recommended

– = No data available

For chemicals where the temperature limit is not given, the compatibility information refer to a temperature of 20 °C and a concentration of 100 %.

Chemical Resistance Chart SITRANS FM

A = Excellent
B = Good, minor effect
C = Conditional, not recommended for continuous use
X = Not recommended
– = No data available

Chemicals A – Z				Plastic and rubbers										Ceramics and resins				Metals								
Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Linatex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Acetaldehyde	CH_3CHO	40	TBD	A80	A60 B80	–	B40 C60 X80	–	X	X	A150	A150	X	A23	A23	–	–	A	A	A	A	–	A	–	–	–
Acetaldehyde	CH_3CHO	100	<5	–	A40 B60	C	C40 X60	C23	X	C	A150	A150	X	–	–	–	–	A	A93	A93	A60	A200	A150	B23	–	A23
Acetamide	C_2H_5NO	100	TBD	A23	A93	–	A40	X	A40	A80	A120	A120	A25	–	–	–	–	A	B171	–	B	–	–	–	–	–
Acetic acid	CH_3COOH	5	>100	A23 B100	A93	–	C23	B23	B23	A40	A150	A200	–	A120	A120	–	A93	A	A80	A150	A150	A100	A100	A80	–	–
Acetic acid	CH_3COOH	10	>100	A23	A60	A30	C23 X80	B23	B23	A30	A200	A200	A105	A120	A120	–	A93	A	A200	A150	A150	A100	A100	A120	–	–
Acetic acid	CH3COOH	20	>100	A23	A60	–	C23 X80	B23	C23	A30	A200	A200	A60	–	–	–	A93	A	A200	A150	A150	A100	A100	A120	–	–
Acetic acid	CH_3COOH	30	>100	A23	A23	B30	C	B23	B23	C23	A200	A200	A60	–	–	–	–	A	A93 B150	–	A132	A	A100	A120	–	–
Acetic acid	CH_3COOH	50	>100	A23	A23	A40	C23 X40	X	C23	C23	A200	A200	A38	A120	A120	–	–	A	A23 B100	A100	A80	A100	A127	A120	–	C23
Acetic acid	CH_3COOH	80	>100	A23	A23	–	C23	X	X	C23	A200	A200	A40	A120	A120	–	–	A	B80 C93	A93	A90	A100	A100	A120	–	–
Acetic acid	CH_3COOH	100	<5	B23	X	A23	X	X	X	X	A200	A200	A40	A120	A120	–	–	A	B80 C93	A93	A120	A118	A100	A120	A	C23
Acetic anhydride	$(CH_3CO)_2O$	100	<5	B23	C23	B	X	B23	X	B23	A200	A200	X	A120	A120	–	–	A23	B120	A120	A120	A100	B120	A23	–	A23
Acetone	CH_3CHOCH_3	10 ppm	TBD	–	A60	–	A23	–	–	–	–	–	A60 B120	–	–	–	B93	A	A200	–	–	–	–	–	–	–
Acetone	CH_3CHOCH_3	100	<5	A60	A23 B40	A23	X	B23	X	X	A200	A200	X	A100	A100	–	B93	A	A200	A100	A54 B93	A56	A80	A120	–	A23
Acetonitrile	C_2H_3N	100	>5	B23	A70	–	X	X	X	X	A93	A200	A50 X80	–	–	–	–	A	B60	A	A100	–	A	B23	–	–
Acetyl chloride	CH_3COCl	100	<5	X	X	X	B	X	X	X	A200	A200	A30	–	–	–	–	A	B60	A37	A100	A100	A100	B23	–	–
Acrylic acid	$C_3H_4O_2$	100	TBD	X	X	–	X	X	X	X	A70	A100	A40	–	–	–	–	A	A50	A53	C98	–	–	–	–	–
Acrylonitrile	C_3H_3N	100	TBD	X	X	B30	X	C23	X	A60	A200	A200	A25	–	–	–	–	A	A80	A100	A100	A100	A93	B93	–	A23
Allyl alcohol	C_3H_6O	100	>5	A23	B150	X	A80	A23	A23 B60	A23	A200	A200	A50	–	–	–	–	A	A200	A100	A100	A100	B80	A100	–	A23
Allyl chloride	C_3H_5Cl	100	TBD	X	X	–	B40	X	X	X	A200	A200	A100	–	–	–	–	A	A23 B100	A26	–	A100	A82	A80	–	–
Alum	$K_2Al_2(SO_4)_2$	10	>100	A	A95	A95	–	–	–	A23	A175	A175	–	–	–	–	–	A	A23 B100	–	B80	A80	A100	A80	–	–
Alum	K_2Al2$(SO_4)_2$	sat	>100	A87	A60 B93	A95	A90	A23	A60 B93	A23	A200	A200	A100	–	–	–	–	A	B100	A30	B65	A80	A100	A80	–	–
Aluminium chloride	$AlCl_3$	10	>100	A100	A80	A100	A100	A23	–	A100	A120	A120	–	A100	A100	–	A93	A	C23	A93	A80	A23	A93	A40	–	–
Aluminium chloride	$AlCl_3$	25	>100	A100	A95	A70	A100	A23	–	A60	A175	A175	–	A100	A100	–	A93	A	X	A93	A80	A23	X	A93	–	–
Aluminium chloride	$AlCl_3$	40	>100	–	–	–	–	–	–	–	–	–	A140	–	–	–	A93	A	X	A93	A80	A23	X	A93	–	–
Aluminium chloride	$AlCl_3$	sat	>100	A65	A80	A23	A100	A60	A60	A80	A120	A120	A60	A100	A100	–	A93	A	X	A93	A80	A23	X	C23	–	X
Aluminium fluoride	AlF_3	sat	TBD	A60	A80	A95	A100	A60	A80	A80	A120	A120	A135	–	–	–	–	A	C23	A	X	A100 (20%)	X	X	–	–
Aluminium hydroxide	$Al(OH)_3$	sat	TBD	A30	A60	A100	A80	A23	A60	A80	A120	A120	A120	–	–	–	A93	–	A120	–	B23	A100 (10%)	B87	A23	–	–
Aluminium nitrate	$Al(NO_3)_3$	sat	TBD	A23	A80	A80	A100	A60	A60	A80	A175	A175	A120	A	A	–	A93	C	B80	A	B23	A23	A98	B23	–	–
Aluminium sulfate	$Al_2(SO_4)_3$	20	TBD	A100	–	A70	A100	A60	–	A60	A120	A120	–	A100	A100	–	A93	A	A100	–	A55	–	A93	–	A100 (10%)	–
Aluminium sulfate	$Al_2(SO_4)_3$	sat	<5 (50%)	A87	A60 B123	A60	A100	A23	A60	A70	A175	A175	A135	A120 (57%)	A120 (57%)	–	A93	A	A23	A40	B97	A100	A93	A120	–	–

Chemical Resistance Chart SITRANS FM

A = Excellent
B = Good, minor effect
C = Conditional, not recommended for continuous use
X = Not recommended
– = No data available

Chemicals A – Z				Plastic and rubbers										Ceramics and resins				Metals								
Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Latex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Aluminum Chlorodydrate	AlnCl(3n-m)(OH)m		TBD	–	X	X	–	X	–	X	A175	A175	–	–	–	–	–	–	X	–	B	A	X	A	–	–
Ammonia gas, wet saturated	NH_4	sat	TBD	–	–	A40	–	–	–	A70	–	–	X	–	–	–	–	A	–	–	–	–	–	–	–	–
Ammonium Bicarbonate	NH_4HCO_3	sat	TBD	A70	A60	A60	A60	A23	A60	B93	A200	A200	A100	–	–	–	–	–	A80	–	B26	A100	B93	A120	–	–
Ammonium bifluoride	F_2H_5N	sat	>100	X	A50	A60	A50	X	B30	X	A120	A120	A65	–	–	–	–	A	X	–	B60	A23	X	X	–	–
Ammonium carbonate	$(NH_4)_2CO_3$	sat	TBD	A90	A80	A90	A100	A60	X	A80	A120	A120	A135	A120	A120	–	A93	A	B120	A120	B149	A23	A80	A80	–	B23
Ammonium chloride	NH_4Cl	25	>100	A90	–	A100	A100	–	–	A60	A120	A120	A135	A120	A120	–	A93	A	B100	A80	A80	A100	A100	A100	–	–
Ammonium chloride	NH_4Cl	sat	>100	A100	A80	A100	A100	A60	A80	A80	A120	A120	A120	A120	A120	–	A93	A	X	A23	B120	A100	A100	A120	–	B23
Ammonium fluoride	NH_4F	10	>100	A80	–	A100	A60	B23	A40	A23	A120	A120	–	–	–	–	–	A	B30	–	A80	A23	B31	X	–	–
Ammonium fluoride	NH_4F	20	>100	A80	A60	A100	A60	–	A40	A23	A120	A120	A65	–	–	–	–	A	B23	–	A80	A23	B23	X	–	–
Ammonium hydroxide	NH_4OH	10	>100	A90	A100	A60	B23	X	A23	A93	A200	A200	–	–	–	–	A20	A	A23 B100	A150	A23 B100	A100	A30	A30 X	–	–
Ammonium hydroxide	NH_4OH	25	>100	A60	A75	A40	B23	X	A60	B80	A120	A120	A105	A60	A60	A 23	A20	A	A25 B100	A150	A 23	A 23	A30	A30 X	–	B23
Ammonium hydroxide	NH_4OH	sat	>100	A80	A75	X	B23	X	X	A80	A180	A200	A105	A120	A120	–	A93	A	A100	–	–	A100	–	–	–	B23
Ammonium nitrate	NH_4NO_3	50	>100	A100	–	A80	A80	–	–	A60	A180	A200	–	A120	A120	–	A93	C	A100	A93	–	A100	A93	A93	–	B23
Ammonium nitrate	NH_4NO_3	sat	>100	A80	A80	A60	A80	B23	A80	A80	A180	A200	A135	–	–	–	A93	C	A100	A93	–	A120	B	A80	–	–
Ammonium sulfate	$(NH_4)_2SO_4$	sat	>100	A100	A80	A100	A80	A60	A80	A80	A150	A200	A135	A120	A120	–	A93	A	A100	X	A100	A150	A100	A149	–	B23
Ammonium sulfide	$(NH_4)_2S$	sat	TBD	A23	A60	–	–	A23	A60	A60	A150	A150	A50	–	–	–	–	A	B100	A70	A23 (10%)	–	–	B23	–	–
Ammonium thiocyanate	NH_4SCN	sat	>100	A23	A80	–	–	A23	A60	A80	A120	A120	A135	–	–	-	–	–	B23	A	B97	A100	A100	B23	–	-
Amyl acetate	$C_7H_{14}O_2$	100	TBD	X	B23	–	X	X	X	X	A120	A120	A50	–	–	–	–	A	A120	A	A200	A100	A100	B120	–	A23
Amyl alcohol	$C_5H_{11}OH$	100	TBD	A23	A80	A60	A40	B23	A60	A60	A150	A200	A135	–	–	–	A93	A	A100	A	B93	A100	B100	B120	–	–
Aniline	$C_6H_5NH_2$	100	<5	A60	A23	X	B60	X	X	X	A120	A200	A40	A180	A180	–	–	A	A250	A120	B293	A180	A93	B93	A184	A23
Aqua regia	$HCl:HNO_3$		TBD	C	X	X	B23	X	X	C	A120	A200	A25	A23	A23	–	–	X	X	X	X	X	A23 C60	A60	X	–
Arsenic acid	H_3AsO_3	sat	TBD	A23	A40	A	A60	A60	A40	A60	A120	A200	A135	–	–	–	–	A	B100	X	B93	A93	A23	B93	A23	–
Asphalt		100	TBD	X	X	–	–	X	X	X	A90	A200	A120	–	–	–	–	A	A23	–	–	–	A200	–	–	–
ASTM Oil No. 1			<5	X	X	A60	–	X	A23	X	–	–	–	–	–	–	–	–	–	–	–	–	–	-	–	-
ASTM Oil No. 2			<5	X	X	A60	–	X	A23	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ASTM Oil No. 3			<5	X	X	A60	–	X	A23	X	–	–	zx	–	–	–	–	–	–	–	–	–	–	–	–	–
Barium carbonate	$BaCO_3$	sat	>5	A23	A80	A80	A100	A80	A60	A60	A200	A200	A140	–	–	–	A93	–	B23	A	B293	A23	A23	B23	–	B23
Barium chloride	$BaCl_2$	sat	>100	A80	A80	A90	A100	A23	A60	A80	A120	A200	A140	A	A	–	A93	A	B80	A	A97	A100	A23	A93 (25%)	–	–
Barium hydroxide	$Ba(OH)_2$	sat	>100	A80	A80	A80	A100	A60	A60	A80	A180	A200	A135	A120	A120	–	A93	A	B120	A23	B93	A93	A80	A120	–	B23
Barium sulfate	$BaSO_4$	sat	<5	A23	A80	–	A100	A80	A60	A60	A165	A200	A140	–	–	–	A93	A	B93	A93	B23	A60	A93	B93	–	B23
Beer		100	>100	A30	A80	A23	A80	A23	A23	A23	A120	A200	A110	A	A	–	–	A	A150	A37	A32	A23	B23	A38	–	A23
Benzaldehyde	C_7H_6O	100	<5	A30	B23	X	C	X	X	X	A150	A200	A20	–	–	–	A50	A	B200	A	A93	A100	B23	B93	–	A23
Benzene	C_6H_6	100	<5	X	X	X	A60	X	X	X	A100	A120	A23 B80	A23	A23	–	A93	A	B120	–	B93	A93	A93	A100	A93	A23
Benzene sulfonic acid	$C_6H_5SO_3H$	sat	TBD	–	X	–	A100	X	X	B30	A100	A200	A20	A70	A70	–	–	A	B80	–	B93	A93	X	B93	A93	–
Benzoic acid	C_6H_5COOH	sat	<5	A30	X	–	A80	C30	X	B30	A200	A200	A110	A23	A23	–	–	A	B93	A23	A93	A93	A93	A93	A93	B23

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Chemicals A – Z				Plastic and rubbers										Ceramics and resins				Metals								
Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Linatex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Benzoyl chloride	C_7H_5ClO	100	TBD	–	X	–	A100	X	X	X	A120	A200	A75	–	–	–	–	–	A23	A	B93	A93	–	A93	A93	–
Benzyl alcohol	C_7H_8O	100	<5	B60	B23	X	A60	X	X	X	A150	A200	A120	–	–	–	–	A	A93	A	B93	A93	B93	B93	A93	A23
Benzyl chloride	C_7H_7Cl	100	TBD	X	X	–	A90	X	X	X	A150	A150	A140	–	–	–	–	A	B93	–	A180	A180	–	B100	A180	–
Black liquor		100	>100	A65	A100	A80	A80	A23	A60	A30	A200	A200	A80	–	–	–	–	A	B93	A90	C120	A	X	X	–	–
Bleach, 12,5% active chlorine			TBD	–	–	A65	A100	X	X	B30	A160	A200	A135	–	–	–	–	A	X	–	A52	–	A120	A	–	–
Borax	$Na_2B_4O_7{\cdot}10H_2O$	sat	TBD	A30	A60	A80	A80	B23	B40	B90	A120	A200	A135	–	–	–	A93	A	A120	–	A43 G97	A23	B23	X	–	–
Boric acid	H_3BO_3	sat	TBD	A90	A100	A80	A100	A23	A60	A80	A150	A200	A135	A120	A120	–	A93	A	B120	A23	A120	A150	A80	A120	A150 (10%)	B23
Bromine	Br_2	dry	<5	X	X	–	–	X	X	X	–	–	A60	A120	A120	–	–	X	X	A66	A50	X	X	A	X	–
Bromine solution, aqueous		sat	TBD	X	X	–	A100	X	X	X	A120	A120	A100	–	–	–	–	X	X	–	A97	–	A32	A32	–	–
Butadiene	C_4H_6	100	TBD	B60	X	–	A100	X	B23	A23	A120	A120	A120	–	–	–	–	A	B100	A120	A100	A100	A100	B23	A100	A23
Butyl acetate	$C_6H_{12}O_2$	100	TBD	X	C23	X	X	X	X	X	A120	A120	A25	A23	A23	–	–	A	A120	A120	B150	A93	A93	B23	A93	A23
Butyl alcohol / Butanol	C_4H_9OH	100	<5	A60	B100	A70	A100	A60	B60	A80	A200	A200	A110	A120	A120	–	A93	A	A100	A120	A100	A117	A120	A100	A100	–
Butyric acid	C_3H_7COOH	100	<5	X	B23	X	A40	X	X	X	A200	A200	A110	A160	A160	–	–	A	B93	A23	A93	A93	A93	A23	A93	B23
Calcium bisulfite	$Ca(HSO_3)_2$	sat	TBD	A30	X	A70	A100	C23	B90	A40	A200	A200	A95	A23	A23	–	–	A	B120	–	B23	A150	A93	A23	–	–
Calcium carbonate	$CaCO_3$	sat	>5	A60	A60	A70	A100	A60	A40	A60	A200	A200	A140	–	–	–	A93	–	B97	A	B93	A93	A93	A100	A93	–
Calcium chlorate	$Ca(ClO_3)_2$	sat	TBD	A80	A60	–	A100	A60	A23	A40	A200	A200	A140	–	–	–	–	A60	B60	B	B93	A93	B60	B93	A93	–
Calcium chloride	$CaCl_2$	sat	>100	A80	A80	A70	A100	A60	A40	A60	A200	A200	A140	–	–	–	A93	A	B97	A200	A93	A100	A93	A100	A100	–
Calcium disulfide	CaS_2		TBD	C100	–	–	A100	A23	–	–	–	–	–	A120	A120	–	–	–	–	–	–	–	–	–	–	–
Calcium hydroxide	$Ca(OH)_2$	sat	TBD	A80	A100	A80	A100	A80	A60	A100	A200	A200	A135	A120	A120	–	A93	A	B80	A100	A100 (50%)	A93	A110	A120	A93	B23
Calcium hypochlorite	$Ca(ClO)_2$	sat	TBD	X	B40	B80	A80	C23	C23	A23	A200	A200	A95	A40	A40	–	–	A30 @ 30%	X	A23	A38 B93 (50%)	A93	A100	A93	A93	C23
Calcium nitrate	$Ca(NO_3)_2$	sat	>100	A80	A80	A80	A100	A60	A80	A80	A200	A200	A135	A120	A120	–	A93	X	B120	A23	B93	A100	B97	B23	A100	B23
Calcium phosphate	$Ca_3(PO_4)_2$	sat	TBD	–	A	A	A	A	A	A	A200	A200	A140	A	A	–	–	A	–	A23	A23	A23	A23	A23	–	–
Calcium sulfate	$CaSO_4$	sat	>100	A40	A100	A100	A100	A80	A60	A60	A200	A200	A140	A120	A120	–	A93	A	B97	A23	B120	A93	A93	B97	A93	B23
Carbon monoxide		100	TBD	A80	A60	A80	–	B23	A60	A60	A200	A200	A140	–	–	–	–	A	A250	–	A250	A250	A250	A250	A250	–
Carbon tetrachloride	CCl_4	100	<5	X	X	X	A80	X	X	X	A120	A120	A135	A23	A23	–	A93	A	A93	A60	A60	A76	A93	A120	–	A23
Carbonic acid	H_2CO_3	sat	TBD	A80	A100	A100	A80	A80	A60	A60	A180	A200	A135	A23	A23	–	–	–	B176	A120	A26	A120	A100	B149	–	–
Castor oil		100	<5	B71	B60	A60	A80	A60	A60	A60	A200	A200	A140	–	–	–	–	A	B87	A	A26	–	–	–	–	A23
Chloride, aqueous solution	Cl_2	0,04	>100	C	B23	A90	–	B23	X	A30	A200	A200	–	–	–	–	–	A30	–	–	–	–	–	–	–	–
Chloride, aqueous solution	Cl_2	1	>100	C	–	B	–	B23	X	A30	A200	A200	–	–	–	–	–	A30	–	–	–	–	–	–	–	–
Chloride, aqueous solution		sat	>100	X	B23	A60	A80	X	X	X	A120	A200	A110	–	–	–	–	X	X	–	E93	–	A97	B149	–	–
Chlorine dioxide	ClO_2	15	TBD	X	X	–	A60	X	X	X	A200	A200	A65	A	A	–	–	X	X	–	B23	–	A80	A149	X	–
Chloroacetic acid	$CH_2ClCOOH$	sat	<5	B65	–	–	–	X	X	X	A200	A200	X	A120	A120	–	–	–	X	A	B93	A93	B93	A200	A93	X
Chlorobenzene	C_6H_5Cl	100	TBD	X	X	X	A100	X	X	X	A200	A200	A75	A23	A23	–	–	A	X	–	B93	A93	B80	B120	A93	A23
Chloroform	$CHCl_3$	100	<5	X	X	X	A100	X	X	X	A200	A200	A50	–	–	–	–	A	A23	A21	B93	A93	A93	A93	A93	A23
Chlorosulfonic acid	$SO_2(OH)Cl$	100	TBD	X	X	X	–	X	X	X	A200	A200	X	A150	A150	–	–	A	X	A85	A93	A150	A93	B93	A150	X
Chromic acid	H_2CrO_4	10	>100	A35	A23	C23	A100	X	A60	A23	A200	A200	A80	A120	A120	–	–	X	A38	A	A23	A93	A97	B149	A93	X
Chromic acid	H_2CrO_4	50	>100	X	X	X	A100	X	A60	A23	A200	A200	A50	A120	A120	–	–	X	B71	B	B97	A93	A80	A120	A93	X
Citric acid	$C_6H_8O_{vv}$	sat	>100	A90	A100	A80	A100	A50	A80	A93	A200	A200	A135	A120	A120	–	A93 up to 25%	A	B100	–	A93	A93	A80	A93	A100	C23

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Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Linatex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Copper acetate	$Cu(CH_3COO)_2$	sat	TBD	–	A60	A80	–	A23	A23	B23	A140	A200	A120	–	–	–	–	A	A23	A23	B38	A100	–	A149	A100	–
Copper chloride	$CuCl_2$	sat	>100	A100	A75	A90	A100	A60	A80	A60	A200	A200	A135	A120	A120	–	–	A	X	B23	C23	X	A80	A149	A100	–
Copper cyanide	CuCN	sat	TBD	A	A80	A80	A100	A60	A80	A60	A200	A200	A80	–	–	–	–	A	B97	A100	A65	A23	A23	B149	–	–
Copper difluoride	CuF_2	sat	TBD	–	A60	–	A100	–	A23	A60	A120	A200	A135	–	–	–	–	A	X	–	X	A23	X	X	–	–
Copper nitrate	$Cu(NO_3)_2$	sat	>100	C23	A100	A80	A100	B40	A70	A80	A200	A200	A135	–	–	–	–	A	B93	–	B26	A23	A23	A149	–	X
Copper sulfate	$CuSO_4$	sat	>100	C80	A90	A100	A100	B60	A80	A60	A200	A200	A120	A120	A120	–	A93	A	C23	A100	A93	A150	A100	A120	–	C23
Crude oil		100	<5	X	X	–	A100	X	A80	X	A120	A200	A140	–	–	–	A93	A	A97	A	E32	–	A23	A23	–	B23
Cyclohexane	C_6H_{12}	100	TBD	X	X	–	A80	X	A80	X	A200	A200	A120	–	–	–	A93	A	B93	X	B93	A93	A120	B23	A93	A23
Cyclohexanol	$C_6H_{12}O$	100	TBD	–	X	–	A80	X	X	X	A200	A200	A65	–	–	–	–	A	B93	–	B26	A93	B23	B23	A93	–
Cyclohexanone	$C_6H_{10}O$	100	TBD	X	X	X	–	X	X	X	A200	A200	B80	–	–	A 23	–	A	B82	–	B82	–	B23	B23	–	A23
Detergents			TBD	A23	A100	A90	A100	B23	A80	A70	A200	A200	A120	–	–	–	A93	–	B100	–	A49	–	A60	A75	–	–
Dibutyl Phtalate	$C_{16}H_{22}O_4$	100	TBD	B60	A23	–	X	X	X	X	A200	A200	X	–	–	–	–	A	A93	–	B93	A200	B93	B93	A200	A23
Dichlorobenzene	$C_6H_4Cl_2$	100	TBD	X	X	–	A80	X	X	X	A200	A200	A60	–	–	–	–	–	B42	A	A93	A93	X	A93	A93	–
Dichloroethane	$C_2H_4Cl_2$		TBD	X	X	X	A100	X	X	X	A200	A200	–	A50	A50	–	–	A	B200	–	B110	A100	B80	A93	–	–
Dichloroethylene	$C_2H_2Cl_2$	100	TBD	–	X	X	A100	X	X	X	A200	A200	A100	A60	A60	–	–	–	B93	–	B93	A93	B80	B93	A93	–
Diesel fuel		100	TBD	–	X	–	A100	X	A40	A23	A200	A120	A140	–	–	–	A93	A	A23	A120	B93	–	B80	A120	–	–
Diethyl ether	$(C_2H_5)_2O$	100	TBD	X	X	–	X	X	B23	X	A200	A200	A30	–	–	–	–	A	B97	–	B93	A93	A93	A93	A93	–
Diethylamine	$C_4H_{11}N$	sat	<5	A100	A23	–	X	A23	X	A23	A120	A120	A25	–	–	–	–	A	A93	–	A40	A93	A93	A93	A93	–
Dimethyl phtalate	$C_{10}H_{10}O_4$	100	TBD	B23	B23	–	B100	X	X	X	A200	A200	A25	–	–	–	–	A	A38	–	–	–	–	–	–	–
Dioctyl phtalate	$C_{24}H_{38}O_4$	100	TBD	A30	A23	–	A30	X	X	X	A200	A200	A25	–	–	–	–	A	B38	–	–	A93	A93	A93	A93	–
Dioxane	$O_2(CH_2)_4$	100	TBD	B23	B70	–	X	X	X	X	A200	A200	X	A	A	–	–	A	B97	A	B93	A93	B93	B93	A93	A23
Epichlorhydrin	C_3H_5ClO	100	<5	X	X	–	X	X	X	X	A200	A200	A40	–	–	–	–	A	B93	A60	A23	A93	A60	B23	A93	–
Ether	$(C_6H_5)_2O$		TBD	X	X	–	X	X	X	X	A180	A200	–	A23	A23	–	–	A	A93	X	B80	A35	B23	B93	A35	A23
Ethyl acrylate	$C_5H_8O_2$	100	TBD	X	A30	–	X	X	X	X	A180	A200	A25	–	–	–	–	A	B82	–	A82	A93	B23	B23	A93	–
Ethylacetate	$CH_3COOC_2H_5$	100	<5	A38	A23	A23	X	X	X	X	A180	A200	X	A23	A23	–	-	A	A149	A65	B149	A200	A93	B93	A200	A23
Ethylalcohol, Ethanol	C_2H_5OH	100	<5	A90	A100	A70	A80	A23	A80	A70	A200	A200	A140	A120	A120	–	A93	A	A93	B97	A93	A93	A93	A93	A93	–
Ethylchloride	C_2H_5Cl	100	<5	X	A60	X	A60	X	A93	X	A200	A200	A140	A23	A23	–	–	A	A93	–	B97	A120	A93	A93	–	C23
Ethylene glycol	$C_2H_6O_2$	100	TBD	A85	A120	A70	A100	A60	A93	A60	A200	A200	A140	–	–	–	A93	A	A93	A200	A200	A93	A93	A32	A93	A23
Ethylene oxide	C_2H_4O	100	TBD	X	X	–	X	X	X	X	A200	A200	A95	–	–	–	–	A	A40 B150	A31	A23	A93	A31	A32	A93	–
Ethylenediamine	$C_2H_8N_2$	100	TBD	A23	B120	–	A65	A26	A26	B30	A120	A120	A105	–	–	–	–	A	A93	X	X	A93	A40	B23	A93	–
Fatty acids		100	TBD	C23	X	A30	A80	X	A80	23	A200	A200	A140	–	–	–	–	A	A200	A200	A200	A120	A80	A200	A200	B23
Ferric chloride	$FeCl_3$	sat	>100	A90	A90	A100	A80	A60	A60	A40	A200	A200	A140	A120	A120	–	A93 up to 50%	A	X	X	B38	B23	A93	A93	–	–
Ferric nitrate	$Fe(NO_3)_3$	sat	TBD	A90	A80	A70	A100	A60	A60	A60	A200	A200	A135	A120	A120	–	A93	C	B93 (10%)	A23	B65	A23	A120	A93	–	–
Ferric sulfate	$Fe_2(SO_4)_3$	sat	TBD	A65	A80	A70	A80	A60	A60	A80	A200	A200	A140	A65	A65	–	A93	A	A93 (10%)	–	B23	A23	A100	A80	–	X
Ferrous chloride	$FeCl_2$	sat	TBD	A100	A80	A90	A90	A60	A80	A30	A200	A200	A140	A100	A100	–	–	A	X	X	B138	A100	A100	A93	–	X
Ferrous nitrate	$Fe(NO_3)_2$	sat	TBD	A90	A80	A90	A100	A60	A60	A80	A200	A200	A135	–	–	–	A93	A	B23	–	B23	A23	A23	A23	–	–
Ferrous Sulfate	$FeSO_4.7h_2O$	sat	>100	A90	A80	A70	A80	A60	A60	A70	A200	A200	A140	A120	A120	–	A93	A	B23	A120	B93 (50%)	A23	A32	A71	–	X
Formaldehyde	HCHO	37	>100 @38°C	A60	A80	A40	–	B23	X	A60	A120	A200	A50	A100	A100	–	A93 up to 100%	A	A93	B100	B93	A250	A93	A93	–	C23
Formic acid	HCOOH	conc	>100	A100	A100	B23	B100	X	X	A23	A120	A120	A120	A100	A100	–	A93 up to 10%	A	B93	A23	A93	A93	X	A93	A93	C23
Fruit juice		100	>100	–	A80	–	A100	–	A80	A90	A200	A200	A120	–	–	–	–	A	B150	A23	A82	A	A23	A38	–	A23

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Chemicals A – Z				Plastic and rubbers										Ceramics and resins				Metals								
Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Latex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Fuel oil		100	<5	X	X	–	A23	X	A100	A60	A200	A200	A140	–	–	–	–	–	B71	A80	B93	–	A32	B82	–	–
Furfuryl alcohol	$C_5H_4O_2$	100	TBD	A170	C23	–	X	X	X	X	A120	A120	A40	A170	A170	–	–	–	–	–	–	A93	A93	A93	A93	B23 (25%)
Gasoline – Leaded		100	<5	X	X	X	A80	X	A80	A23	A120	A120	A140	–	–	–	A93	A	B32	A120	A38	–	A23	A38	–	A23
Gasoline – Unleaded		100	<5	X	X	X	A80	X	A90	A23	A120	A120	A140	–	–	–	A93	A	B23	A120	A160	–	B23	A38	–	A23
Glucose		sat	TBD	A80	A120	–	A150	A23	A100	A70	A200	A200	A140	–	–	–	–	A	B176	–	B165	–	A23	A23	–	A23
Glycerine	$C_3H_8O_3$	100	<5	A150	A80	A80	A120	A60	A100	A80	A200	A200	A140	A200	A200	–	A93	A	A97	A100	A250	A250	A80	B23	A250	A23
Glycols			<5	A90	A90	A80	A100	A23	A80	A60	A120	A200	–	–	–	–	–	A	B160	–	A290	–	A97	A32	–	A23
Heptane	C_7H_{16}	100	<5	–	X	–	A150	X	A80	A80	A120	A200	A140	–	–	–	A93	A	A93	A98	A93	A93	B93	B93	A93	A23
Hexafluorosilicic acid	H_2SiF_6	30	TBD	A80	A60	A60	–	A23	A70	A60	A170	A200	–	A30	A30	–	–	–	B23	–	B23	A93	X	X	A93	–
Hexafluorosilicic acid	H_2SiF_6	50	TBD	A80	A60	–	A100	A23	A70	A60	A170	A200	A135	A30	A30	–	–	–	B42	–	B23	A93	X	X	A93	–
Hexane	C_6H_{14}	100	<5	X	X	–	A100	X	A80	A23	A200	A200	A140	–	–	–	A93	A	A93	A	A93	A93	A65	B32	A93	A23
Hydrazine	N_2H_4	100	>100	A23	A23	A50 @15%	X	X	A23	X	A120	A120	A95	–	–	–	–	A	B65	A	A23	A23	A40	A40	A23	–
Hydrobromic acid	HBr	20	>100	A71	A60	–	A90	–	X	X	A120	A120		–	–	–		A	X	–	A32	A93	A93	A120	A93	–
Hydrobromic acid	HBr	up to 50%	>100	A42	A40	A40	A90	A23	X	X	A120	A120	A135	–	–	–	–	A	X	X	–	A93	A80	A120	A93	X
Hydrochloric acid	HCl	10	>100	B50	A60	A70	A50	A60	A23	A50	A120	A120		A120	A120	–		A	X	A45	A45	A93	B23	A70	A120	–
Hydrochloric acid	HCl	37	>100	X	B40	B40	A40	B23	X	X	A93	A120	A140	A120	A120	X	A93 up to 25%	A	X	X	A38	A93	X	A93	A120	–
Hydrochloric acid + Nitric acid	$HCl:HNO_3$	3:1	>100	C23	–	–	B23	C23	–	C23	A120	A120	–	A23	A23	–	–	–	X	–	–	X	–	–	X	–
Hydrochloric acid + Sulfuric acid	$HCl:H_2SO_4$	1:1	>100	–	X	–	X	–	C23	–	A120	A120	A23	–	–	–	–	–	X	–	–	–	–	–	–	–
Hydrocyanic acid	HCN	10	>100	A60	A90	A90	A90	B23	A90	X	A200	A200	A135	A23	A23	–	–	A	A23	A23	B23	A93	–	A93	A93	X
Hydrofluoric acid	HF	40	>100	B23	A40	B23	A90	A23	X	A80	A120	A120	A120	A50	A50	–	A93	A	X	X	B60	A93	X	X	A93	X
Hydrofluoric acid	HF	70	>100		X	C23	A90	X	X	A50	A120	A120	A95	–	–	–	–	A	X	X	B60	A93	X	X	A93	X
Hydrogen bromide	HBr	50	<5	A100	–	–	–	B23	X	X	A120	A120	–	A120	A120	–	–	A	X	X	–	–	–	A23	–	–
Hydrogen peroxide	H_2O_2	30	TBD	X	B70	X	A70	X	X	X	A120	A120	A70	–	–	–	–	A	B93	A90	A23	A93	A80	B120	A93	X
Hydroiodic acid	HI	50	>100	–	A40	B23	A100	–	–	X	A120	A120	–	A23	A23	–	–	–	X	–	B93	–	C32	A60	A23	–
Hydroquinone	$C_6H_6O_2$	sat	TBD	B23	X	–	A90	B23	A23	X	A120	A200	A120	–	–	–	–	–	B93	A	A93	A250	B93	B97	A250	–
Hypochlorous acid	HOCl	100	TBD	X	A40	A65	A50	B23	X	X	A200	A200	A20	–	–	–	–	–	X	A	B23	A93	B23	A93	A93	–
Iodine	I_2		<5	–	B23	A20	A23	X	B23	A23	A200	A200	–	A23	A23	–	–	B23	X	C23	A250	A250	C23	B120	A250	–
Isopropanol (propan–2–ol)	$(CH_3)_2CHOH$	100	<5	A80	A60	A60	A90	A23	A23	A23	A200	A200	A60	–	–	–	A93	A	A93	A	A93	A93	A93	B100	–	A23
Jet Fuels – JP4		100	<5	X	X	–	A150	X	A100	X	A200	A200	A95	–	–	–	–	–	B204	–	A38	–	A30	–	–	A23
Jet Fuels – JP5		100	<5	X	X	–	A150	X	A100	X	A200	A200	A95	–	–	–	–	–	B204	–	A38	–	A30	–	–	A23
Kerosene		100	<5	X	X	X	A150	X	A100	X	A200	A200	A120	A120	A120	–	A93	A	B120	A30	B97	A23	A23	B23	–	–
Lactic acid	$H_6C_3O_3$	80	>5	A65	A65	A60	A80	B23	A23	A23	A200	A200	A65	A120	A120	–	–	A	B93	X	B93	A93	A93	A120	A93	C23
Lead acetate	$Pb(CH_3COO)_2$	sat	TBD	A50	A80	A80	X	A23	A60	A80	A200	A200	A135	A23	A23	–	–	A	B93	A100	B93	A93	A80	B93	A93	–
Lead nitrate	$Pb(NO_3)_2$	sat	>100	A23	A80	–	A100	B23	A80	A80	A200	A200	–	–	–	–	–	A	B23	–	B93	A93	–	A93	A93	–
Linseed oil		100	<5	B65	X	A80	A100	X	A90	A80	A200	A200	A140	–	–	–	A93	–	B97	A23	B32	A93	A23	B93	A93	A23
Magnesium carbonate	$MgCO_3$	sat	>100	–	A80	A80	A100	A80	A60	A80	A200	A200	A140	–	–	–	A93	A	B97	A	–	A23	A23	B93	–	–
Magnesium chloride	$MgCl_2$	sat	>100	A90	A100	A100	A80	A60	A80	A80	A200	A200	A140	A120	A120	–	A93	A	B97	A120	A120	A	A120	A120	A150	–
Magnesium hydroxide	$Mg(OH)_2$	sat	TBD	A90	A80	A80	A100	A80	A80	A80	A200	A200	A135	A120	A120	–	A93	A	A100	A100	A93	A	A32	A32	–	B23
Magnesium nitrate	$Mg(NO_3)_2$	sat	>100	A90	A80	A80	A100	A60	A60	A80	A200	A200	A135	A120	A120	–	A93	–	B149	A93	E23	A	A23	A93	–	B23
Magnesium sulfate	$MgSO_4$	sat	>100	A90	A90	A100	A100	A60	A80	A80	A200	A200	A135	A120	A120	–	A93	A	B120	A93	A93	A100	B80	A60	–	B23

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Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Linatex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Maleic acid	$C_4H_4O_4$	sat	TBD	X	A23	A80	A40	A23	X	X	A120	A200	A135	A100	A100	–	–	A	B204	A80	B93	–	A93	A80	–	C23
Malic acid	$C_4H_6O_5$	sat	TBD	A23	X	A65	A100	A23	A40	A23	A200	A200	A120	A120	A120	–	–	A	A120	A120	B97	–	A80	B80	–	–
Manganese chloride	$MnCl_2$	sat	>100	–	A60	A100	A100	–	A60	A100	A120	A200	A120	A100	A100	–	–	–	B93	–	A93 (40%)	B93	A93	A93	B93	–
Manganese sulfate	$MnSO_4$	sat	>100	A23	A80	A60	A100	B23	A60	A70	A200	A150	A120	A23	A23	–	–	A	A93 (50%)	A63	B65	A93	A63	A93	A93	–
Mercuric chloride	$HgCl_2$	sat	>100 @ 5%	A65	A60	A90	A80	A60	A60	X	A120	A120	A120	–	–	–	A93	A	X	–	–	A100	B80	A100	X	X
Mercuric cyanide	$Hg(CN)_2$	sat	TBD	A65	A23	A90	A23	A60	A60	X	A120	A120	A120	–	–	–	–	A	B23	–	B23	–	A23	A100	–	–
Mercury	Hg	100	>100	A50	A80	–	A90	A60	A40	A80	A120	A120	A140	A150	A150	–	–	A	A200	A	A200	X	X	A23	X	–
Methanol	CH_3OH	100	<5	A65	A40	A60	X	A60	B40	A80	A120	A120	A140	A65	A65	–	A93	A	B100	A100	A121	A65	B80	B120	A65	–
Methyl ethyl ketone	C_4H_8O	100	<5	B40	B90	–	X	X	X	X	A120	A120	X	–	–	–	A93	A	B100	A93	B97	–	B80	B93	–	–
Methyl isobutyl ketone	$C_6H_{12}O$	100	TBD	X	B23	–	X	X	X	X	A120	A120	X	–	–	–	A93	A	B100	–	B100	–	B93	B93	–	–
Methyl methacrylate	$C_5H_8O_2$	100	TBD	X	X	–	X	X	X	X	A120	A120	A50	–	–	–	–	A	B23	A	–	–	–	B23	–	A23
Methylene chloride	CH_2Cl_2	100	TBD	X	X	–	X	X	X	X	A120	A120	A50	–	–	–	–	–	B204	X	A93	A40	A100	X	A300	B23
Milk		100	>100	A40	A120	A	A90	B23	A60	A80	A200	A200	A120	A	A	–	–	A	A120	A80	A38	A100	A32	A149	A100	A23
Molasses		100	>100	A90	A40	A90	A90	A60	A90	A90	A200	A200	A120	–	–	–	A93	A	A176	–	A38	A	A23	A38	–	–
Monochloro acetic acid	CH_2ClCO_2H	100	TBD	A190	C23	–	X	B23	X	X	A190	A190	A80	A190	A190	–	–	A	X	–	B149	A150	A42	A42	–	–
Naphta		100	TBD	X	X	X	A60	X	A60	X	A200	A200	A135	A23	A23	–	A93	A	B97	A	B93	A100	B32	B38	A100	A23
Naphtalene	$C_{10}H_8$	100	<5	X	X	X	A80	X	X	X	A200	A200	A95	–		–	–	A	A200	A120	B93	A200	A100	A120	A200	–
Nickel chloride	$NiCl_2,6H_2O$	sat	TBD	A95 @80%	A80	A95	A100	A60	A80	A80	A200	A200	A120	A95	A95	–	A93	A	B23	A90	A100	A100	A80	A100	A100	X
Nickel nitrate	$Ni(NO_3)_2$	sat	TBD	A65	A100	A90	A120	A60	A80	A80	A200	A200	A140	A	A	–	A93	A	A200	–	B23	A100	A32	B80	A100	–
Nickel sulfate	$NiSO_4$	sat	>100	A90	A80	A90	A80	B23	A80	A80	A200	A200	A140	A80	A80	–	A93	A	A100	–	B93	A100	X	X	A100	X
Nitric acid	HNO_3	10	>100	A23	A23	A20	A80	X	X	X	A200	A200	A80	A120	A120	–	–	A	A100	A52	A80	A	A120	A120	A120	X
Nitric acid	HNO_3	30	>100	X	X	X	A40	X	X	X	A200	A200	A50	A120	A120	–	A93	X	A50	–	A50 B70 C90	–	A120	A187	A120	X
Nitric acid	HNO_3	50	>100	X	X	X	X	X	X	X	A200	A200	A50	A120	A120	–	X	X	A38	–	A50 80 C120	A100	A85	A187	A120	X
Nitric acid	HNO_3	98	>100	X	X	X	X	X	X	X	A120	A120	A50	A100 @70%	A100 @70%	–	A93 up to 30%	X	B23	A23	B23	A100	B97	A150	–	X
Nitric acid + Hydrofluoric acid	HNO_3 / HF (1:1)		>100	X	A23	X	A40	X	X	X	A120	A120	–	B23	X	–	–	X	X	B23	C23	A100	X	A100	X	X
Nitrobenzene	$C_6H_5NO_2$	100	<5	A23	X	–	A23	X	X	X	A200	A200	A25	A120	A120	–	–	A	B176	A	–	A100	A80	B97	A100	A23
Oil, vegetable			<5	X	X	A23	A90	X	A90	A20	A200	A200	–	–	–	–	–	A	B97	A43	A32	–	A40	A93	–	–
Oleic acid		100	<5 @15°C	X	X	A65	A80	X	A23	X	A120	A200	A120	–	–	–	–	A	A149	–	B80	A120	A23	B97	–	C23 (40%)
Oxalic acid	$H_2C_2O_4$	25	>100	A100	A140	A80	A100	–	X	X	A200	A200	A60	A120	A120	–	–	A	X	–	–	–	X	–	–	C23
Oxalic acid	$H_2C_2O_4$	sat	>100	A100	A140	–	–	B23	X	X	A200	A200	A50	A120	A120	–	A93	A	X	–	B80	A150	B23	A93	A100	–
Ozone solution, aqueous	O_3	10 ppm	TBD	–	A40	–	A40	–	–	–	A150	A150	A120	–	–	–	–	A	B176	–	–	–	A	–	–	–
Ozone solution, aqueous	O_3	0,5 mg/L	TBD	–	A40	–	A40	–	–	–	A150	A150		–	–	–	–	A	B176	–	–	–	A	–	–	–
Palmitic acid		sat	TBD	B23	A23	X	A200	X	A100	X	A200	A200	A120	–	–	–	–	A	B200	–	B40	–	–	–	–	C23
Paraffin		100	<5	–	X	A80	A200	X	A60	A60	A200	A200	A135	–	–	–	–	A	A60	A60	B40	–	A	A93	–	A23
Perchloric acid	$HClO_4$	10	TBD	A65	A60	–	A200	A60	X	A23	A200	A200	A95	–	–	–	–	A	X	–	B100	–	X	A150	–	–
Perchloric acid	$HClO_4$	70	TBD	–	A60	–	A200	–	X	X	A200	A200	A50	–	–	–	–	X	X	–	B100	A23	X	A150	–	–

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Perchloroethylene	C_2Cl_4	100	TBD	X	X	–	A200	X	X	X	A120	A200	A135	A120	A120	–	A93	A	A23 B200	–	B97	–	A 100	B93	–	A23
Petroleum oil (crude oil)		100	<5	X	X	–	A80	X	A80	A40	A120	A120	A135	–	–	–	–	A	–	A	–	A23	A	–	–	–
Petroleum oil, refined			<5	X	X	–	A100	X	A80	A40	A120	A120		–	–	–	–	A	B26	–	–	–	–	A150	–	–
Petroleum oil, Sour			<5	X	X	X	A100	X	A80	X	A120	A120		–	–	–	–	A	B26	–	–	–	–	–	–	–
Phenol	C_6H_5OH	5	TBD	–	–	A20	–	–	–	–	–	–	A80	–	–	–	–	A	B93	–	–	–	–	–	–	A23
Phenol	C_6H_5OH	100	<5	X	X	X	A100	X	X	X	A200	A200	A50	A180	A180	–	–	A	A200	A95	A200	A180	A23	A120	A180	–
Phosphoric acid	H_3PO_4	10	>100	A65	A80	A90	A90	B23	A23	–	A200	A200	A135	A120	A120	–	A93 up to 50%	A	A60	A	A40	A100	A23	A175	A100	X
Phosphoric acid	H_3PO_4	50	>100	A65	A80	B90	A90	C23	A23	X	A120	A120	–	A120	A120	–	–	A	A100	A	A40 C93	A100	X	A100	A100	–
Phosphoric acid	H_3PO_4	85	>100	A65	A80	B80	A90	C23	X	X	A120	A120	A105	A60	A60	X	–	A	B23	A110	A93	A100	X	A200	–	X
Phosphoric acid + Hydrofluoric acid	H_3PO_4 / HF (1:1)		>100	–	–	X	–	–	–	–	A	A	A	X	X	–	–	–	X	C23	C23	A23	X	X	–	–
Phosphoric acid + Hydrofluoric acid + Nitric acid	H_3PO_4 / HF / HNO_3 (1:1:1)		>100	–	–	X	–	–	–	–	A	A	A	X	X	–	–	–	X	C23	C23	C23	X	X	–	–
Phosphoric acid + Sulphuric acid	H_3PO_4 / H_2SO_4 (1:1)		>100	–	–	X	–	–	–	–	A	A	A	B23	B23	–	–	–	X	A23	A23	A23	X	A	–	–
Phosphoric acid + Sulphuric acid + Nitric acid	H_3PO_4 / H_2SO_4 / HNO_3 (1:1:1)		>100	–	–	X	–	–	–	–	A	A	A	B23	B23	–	–	–	X	A23	A23	A23	X	A	–	–
Phosphorus trichloride	PCl_3	100	TBD	A	A23	–	A90	X	X	X	A120	A200	A95	–	–	–	A93	A	A32	X	B38	X	A23	A60	–	–
Plating solutions, brass	3% Cu, 1% Zn, 5.6% Rh; 3% cyanide, sodium carbonate	100	TBD	A90	A23	A90	A60	B23	A80	A60	A200	A200	A100	–	–	–	–	–	B149	–	A38	–	A38	–	–	–
Plating solutions, cadmium	3% Cadmium oxyde, 10% sodium cyanide, 1.2% sodium hydroxide	100	TBD	A70	A150	A90	A80	A23	A80	A90	A200	A200	A100	–	–	–	–	–	B176	–	A38	–	A32	–	–	–
Plating solutions, Chrome	25% Cr_2O_3, 12% H_2SO_4, H_2O	100	TBD	X	A100	X	A90	X	X	X	A200	A200	A65	–	–	–	–	X	B176	–	A54	–	X	A150	–	–
Plating solutions, Copper (Cyanide)	10.5% Cu, 14% sodium cyanide, 6% rochelle salts	100	TBD	A80	B150	A90	A90	B23	A80	A70	A200	A200	A105	–	–	–	–	–	A50	–	A49 B97	–	A32	A23	–	–
Plating solutions, Gold	22.8% potassium ferrocyanide, 0.2% potassium gold cyanide, 0.8% sodium cyanide, water	100	TBD	A80	B150	A90	A90	B23	A80	A50	A200	A200	A93	–	–	–	–	–	A38	–	A23	–	A23	A23	–	–
Plating solutions, Lead	8% Pb, 0.8% fluoboric acid, 0.4% boric acid, water	100	TBD	A70	B150	A90	A90	A23	A80	A80	A200	A200	A93	–	–	–	–	–	A32	–	–	–	X	–	–	–

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Chemicals A – Z				Plastic and rubbers										Ceramics and resins				Metals								
Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Linatex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Plating solutions, Nickel	11% nickel sulfate, 2% nickel chloride, 1% boric acid, H_2O	100	TBD	–	B150	A90	A90	B23	A80	A90	A200	A200	A93	–	–	–	–	A	A38 B60	–	A60	–	A60	–	–	–
Plating solutions, Silver	4% silver, 7% potasium cyanide, 5% sodium cyanide, 2% potassium carbonate	100	TBD	A65	B150	A90	A90	B23	A80	A90	A200	A200	A93	–	–	–	–	–	A38	–	A38	–	A38	–	–	–
Plating solutions, Tin	7% Sn, 18% Stannous fluoborate, 9% fluoboric acid, 2% boric acid	100	TBD	A65	A90	A70	A90	–	A80	A90	A200	A200	A93	–	–	–	–	–	C38	–	A42	–	X	–	–	–
Plating solutions, Zinc	9% Zinc cyanide, 9% sodium hydroxide, 4% sodium cyanide	100	TBD	A65	B150	A90	A90	B23	A80	A90	A200	A200	A93	–	–	–	–	–	–	–	A71–B97	–	A60	–	–	–
Potassium aluminium sulfate	$KAl(SO_4)_2$ $12H_2O$	sat	TBD	A	A80	A100	A100	A23	A80	A60	A200	A200	A120	–	–	–	A93	A	B55	–	A23	A23	A100	A80	–	C23
Potassium bicarbonate	$KHCO_3$	sat	>100	A	A90	A100	A100	A23	A80	A70	A200	A200	A95	–	–	–	A93	–	B97	–	B23	–	A100 (30%)	B97 (30%)	–	–
Potassium bromide	KBr	sat	>100	A	A100	A90	A100	A60	A80	A60	A200	A200	A140	–	–	–	–	A	B100 (30%)	X	–	A100	A23	A100 (<50%)	A100	–
Potassium carbonate	K_2CO_3	sat	>100	A80	A80	A70	A90	A60 @50%	A80	A60	A120	A200	A140	–	–	–	A93	A	B100	A	B100	A100	A100	–	A100	–
Potassium chlorate	$KClO_3$	sat	TBD	A	A40	A90	A60	A23	A23	A23	A200	A200	A95	–	–	–	–	X	A100	–	A23 B100 (30%)	A100 (30%)	A100	B23 (30%)	A120	–
Potassium chloride	KCl	sat	>100	A100	A80	A90	A100	A60	A80	A60	A200	A200	A140	A100	A100	–	A93	A	A100 (30%)	A110	A170	A23	A80	A160	–	C23
Potassium chromate	K_2CrO_4	sat	>100	–	A80	–	A100	–	A60	A23	A120	A200	A140	–	–	–	–	X	B100 (<40%)	–	B93 (30%)	–	A 100 (<40%)	B23 (30%)	–	–
Potassium cyanide	KCN	All	>100	A65	A80	A90	A90	A60	A80	A80	A120	A120	A140	A	A	–	–	A	B93	C23	B93 (30%)	B23	X	A32 (30%)	X	X
Potassium dichromate	$K_2Cr_2O_7$	sat	>100	A65	A90	X	A90	X	A70	X	A120	A200	A140	–	–	–	A93 up to 10%	X	A93 (<50%)	–	B93 (<50%)	A93 (<50%)	A32	A120	A120	–
Potassium hydroxide	KOH	20	>100	A120	A120	A90	X	A23	B23	A90	A120	A120	X	A120	A120	–	A93	A	B93	A93	B150	A200	B100	X	–	B23
Potassium hydroxide	KOH	50	>100	A80	A120	A90	X	A23	B23	A80	A120	A120	X	B120	A120	–	A93	A	B60	A93	B150	A200	A23	X	A300	–
Potassium hypochlorite	KOCl	sat	TBD	–	A23	–	A40	X	X	B23	A200	A200	A95	A150	A150	–	–	A	B23	A	–	–	A93 (<40%)	B97	–	–
Potassium nitrate	KNO_3	sat	>100	A120	A80	A80	A100	A60	A60	A60	A200	A200	A140	A120	A120	–	A93	X	B93 (<80%)	A23	B93 (<80%)	A23	A93 (<80%)	B100	A120	–
Potassium perchlorate	$KClO_4$	sat	TBD	–	A60	–	A80	–	X	A23	A120	A120	A95	A25	A25	–	–	–	B93 (20%)	–	A23	–	A93 (20%)	–	–	–
Potassium permanganate	$KMnO_4$	25	>100	A50	A100	X	A70	A23	X	A40	A100	A200	A120	A120	A120	–	–	A23	B93	A100	A32	A100	B23	–	–	–

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Chemicals A – Z				Plastic and rubbers										Ceramics and resins				Metals								
Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Linatex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Potassium sulfate	K_2SO_4	sat	>100	–	A60	A80	A100	A23	A60	A60	A100	A200	A140	A50	A50	–	A93	A	A93 (10%)	A23	B26	A93 (10%)	A32	A23	A120	B23
Propan-1-ol	C_3H_8O	100	<5	A50	A80	A90	A100	A60	A40	A80	A120	A200	A65	–	–	–	–	A	A93	A104	A93	–	A23	B40	–	–
Propylene glycol	$C_3H_8O_2$	100	<5	A23	A100	–	A120	A23	A80	A23	A200	A200	A65	–	–	–	A93	A	B97	A	B32	–	A23	A32	–	A23
Propylene oxide	C_3H_6O	100	TBD	–	B23	–	X	X	X	X	A200	A200	X	–	–	–	–	A	A60	–	–	–	–	B32	–	A23
Pyridine	C_5H_5N	100	<5 @18°C	B23	X	–	X	X	X	X	A120	A200	X	A60	A60	–	–	A	A93	X	A60	A93	B93	B100	A115	B23
Salicylic acid	$C_7H_6O_3$	sat	TBD	A23	A150	–	A150	A23	A23	A23	A200	A200	A95	–	–	–	–	A	A60	A120	A120	A93	A23	B93	A120	C23
Salt water (brine)		sat	>100	A90	A120	A90	A100	A60	A70	A80	A200	A200	A120	A	A	–	–	A	B121	A	A120	–	A23	A38	–	–
Seawater		100	>100	A	A120	A100	A80	A23	A70	A80	A200	A200	A120	–	–	–	A93	A	A23	A	A120	–	A93	A38	–	B23
Silicone oil		100	<5	A23	A60	A80	A100	C23	A60	A20	A200	A200	A120	–	–	–	–	A	B38	A	–	–	A	A	–	–
Soap solution			>100	A65	A150	A80	A100	A60	A110	A80	A200	A200	–	–	–	–	A93	A	B23	A	A23	A93	A32	A23	–	A23
Sodium acetate	$C_2H_3NaO_2$	sat	>100	A	A100	A80	X	C23	X	C23	A120	A200	A140	–	–	–	–	A	A60 B120	A	A93	A200	A93	A23	A120	–
Sodium bicarbonate	$NaHCO_3$	sat	>100	A80	A100	A100	A100	A40	A60	A70	A120	A200	A140	A120	A120	–	A93	–	A65	A65	A65	–	A93 (20%)	A65	–	B23 (50%)
Sodium bisulfate	$NaHSO_4$	sat	TBD	A80	A90	A90	A100	A60	A80	A90	A200	A200	A140	A120	A120	–	A93	–	X	A	B93	A93 (<50%)	A70 (20%)	A23	A300	–
Sodium bisulfite	$NaHSO_3$	sat	TBD	A80	A80	A90	A100	A60	A60	A80	A200	A200	A140	A120	A120	–	–	–	B23	A	B93	A93 (<40%)	B97 (10–40%)	B23	A100	–
Sodium borate	$Na_2B_4O_7 \cdot 10H_2O$	sat	TBD	A80	A80	A90	A100	A23	B100	B100	A200	A200	A100	–	–	–	–	A	A200	A	A38	–	B87	A23	–	–
Sodium carbonate	Na_2CO_3	sat	>100	A100	A80	A70	A100	A80	A90	A60	A200	A200	A140	A120	A120	–	A93	A	B150	A100	B93	A100	A93	A93 (<25%)	A100	B23 (<20%)
Sodium chlorate	$NaClO_3$	sat	TBD	A90	A80	A80	A60	A60	A80	A23	A200	A200	A120	A120	A120	–	A93	A23	X	A150	A93	–	A93	X	–	–
Sodium chloride	NaCl	sat	>100	A80	A60	A90	A100	A23	A80	A70	A200	A200	A120	A120	A120	–	A93	A	X	A60	A120	A93	A93	A120	A100	B23 (30%)
Sodium chlorite	$NaClO_2$	sat	TBD	–	X	A30	B60	X	X	X	A200	A200	A120	A	A	–	–	X	B23 (25%)	–	B23 (10%)	–	–	–	A100	–
Sodium chromate	Na_2CrO_4	sat	TBD	–	A23	A60	A23	–	A23	A23	A120	A120	A95	–	–	–	–	X	A93	–	A93 (80%)	A93 (80%)	A93 (80%)	A93 (80%)	–	B23
Sodium cyanide	NaCN	sat	TBD	A65	A80	A80	A80	A80	A60	A60	A120	A200	A135	–	–	–	–	A100	A23	–	B38	X	A32	A93	X	X
Sodium dichromate	$Na_2Cr_2O_7$	sat	>100	A60	A60	A80	B100	X	A60	X	A120	A200	A100	–	–	–	–	X	B23	–	A32	–	A32	A23	–	–
Sodium hydrogen sulfite	$NaHSO_3$	sat	TBD	–	–	A80	–	–	–	–	–	–	–	–	–	–	–	A	–	–	–	–	–	–	–	–
Sodium hydroxide	NaOH	30	>100	A90	A80	A70	A23	A60	A80	A60	A200	A200	–	A120	A120	–	–	A	A60 X93	A86	B97	A93	A93	X	–	A23
Sodium hydroxide	NaOH	50	>100	A90	A80	A70	X	A60	A65	A60	A200	A200	X	B100	A100	A 23	A93	A	A40–B60–X93	A86	A87–B97	A93	A 23	X	–	C23
Sodium hydroxide	NaOH	70	TBD	A80	A40	A70	X	A23	X	A60	A200	A200		X	B100	–		A	A40	–	A104	–	B93	X	A100	C23
Sodium hypochlorite	NaOCl	5	TBD	B23	B23	A23	A80	C23	X	X	A200	A200	A135	A120	A120	–	–	A	B23	A60	A23	A93	B	A120	–	C23
Sodium hypochlorite	NaOCl	12,5%, 150 g/L Cl2	TBD	X	B23	B30	A80	X	X	X	A200	A200	A95	A120	A120	X	–	A	X	A60	A23	A93	A 23	B120	–	–
Sodium metabisulphite	$Na_2S_2O_5$		TBD		A		A				A	A				–		–	–	A	–	–	–	–	–	–
Sodium nitrate	$NaNO_3$	sat	>100	A100	A100	A70 @25%	A100	B23	A60	A70 @25%	A200	A200	A135	A100	A100	–	A93	A	A93	A	X	A93	A23	B93	A100	C23
Sodium nitrite	$NaNO_2$	sat	TBD	A100	A80	–	A100	–	A60	A60	A120	A200	A135	A100	A100	–	–	A	B23	A	X	–	A97	B93	–	–

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Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Latex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Sodium perborate	$NaBO_3 \cdot nH_2O$	sat	TBD	A23	A60	–	A80	B23	A23	C23	A120	A120	A120	–	–	–	–	A	A40	–	B93 (10%)	A50	–	–	A50	B23 (10%)
Sodium peroxide	Na_2O_2	10	TBD	A80	A150	A90	A80	A60	A90	A80	A120	A200	A95	A120	A120	–	–	X	B93	A100	B93	A93	–	C23	–	B23
Sodium phosphate	Na_3PO_4	sat	>100	A90	A80	A90	A100	A60	A80	A60	A120	A200	A140	–	–	–	–	A	B97	A100	B93	A100	B80	A23	A100	–
Sodium sulfate	Na_2SO_4	sat	>100	A65	A80	A70	A100	A60	A60	A60 @ 25%	A200	A200	A140	A120	A120	–	A93	A	A93	A	A60	–	A93 (10–20%)	A23	A100	B23 (<50%)
Sodium sulfide	Na_2S	50	>100	A65	A60	A80	A80	A60	A60	A80	A200	A200	A120	A120	A120	–	–	A	B80	–	B93	A93	B93	B100 (10%)	A100	B23
Sodium sulfite	Na_2SO_3	sat	TBD	A100	A60	A70	A60	A23	A60	X	A120	A120	A140	A120	A120	–	–	A	A93 (50%)	–	X	A93 (25%)	A	A120	A100	–
Sodium thiosulfate	$Na_4S_2O_3$	sat	>100	A90	A60	A80	A90	A60	A60	A80	A200	A200	A135	–	–	–	A93 up to 50%	A	A93	–	B32	A93	A93 (25%)	A93	–	B23 (25%)
Soybean oil		100	<5	A	X	–	A90	X	A60	A70	A200	A200	A135	–	–	–	–	A	B65	A	A	–	A23	A23	–	A23
Spirit			TBD	–	–	A60	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Starch solution		100	>100	–	A60	A80	A90	B23	A50	A70	A150	A150	A110	–	–	–	–	A	A23	–	–	–	–	A23	–	A23
Steam, high pressure			TBD	X	X	X	X	X	X	X		X	–	–	–	–	–	–	B293	–	B149	–	A293	–	–	–
Steam, low pressure			TBD	X	X	X	X	X	X	X	A90	A200	–	–	–	–	–	–	B293	–	B97	–	B97	B149	–	–
Steam, medium pressure			TBD	X	X	X	X	X	X	X	A90	A200	–	–	–	–	–	–	B293	–	B121	–	A187	–	–	–
Stearic acid	$C_{17}H_{35}COOH$	100	<5	X	X	A80	A40	X	A40	A80	A120	A200	A140	A120	A120	–	–	A	A200	A	A93	A200	A180	B200	A300	C23
Sugar solution		sat	>100	–	A60	A60	A80	A23	A60	B60	A120	A120	A140	A120	A120	–	–	A	A43	A32	A149	–	–	A32	–	A23
Sulfur chloride	S_2Cl_2	sat	TBD	X	X	–	A60	X	X	X	A120	A200	A25	A120	A120	–	–	A	X	A	B97	A150	X	A150	–	–
Sulfur trioxide	SO_3	100	TBD	A	X	A90	B60	X	X	X	A120	A200	X	–	–	–	–	X	B200	A25	B120	X	X	X	–	–
Sulfuric acid	H_2SO_4	10	>100	B23	B80	A80	A120	A60	A60	A50	A200	A200	A120	A120	A120	–	A93	A	A 23	A52	A75	A120	X	A93	A250	C23
Sulfuric acid	H_2SO_4	50	>100	B23	B23	A60	A100	B23	B23	X	A200	A200	A95	A120	A120	X	–	A	X	A24	A23	A120	X	A54	A250	X
Sulfuric acid	H_2SO_4	70	>100	B23	X	B40	A80	X	X	X	A200	A200	–	A120	B120	–	–	A100	X	A24	B80	A120	X	A54	A250	X
Sulfuric acid	H_2SO_4	98	>100	X	X	X	A40	X	X	X	A200	A200	A50	B120	X	–	–	X	A38	A50	A50	A120	X	A54	A250	X
Sulfuric acid + nitric acid	H_2SO_4:HNO_3	50:50	TBD	X	–	B	B35	–	–	X	A200	A200	–	B35	X	–	–	–	–	A23	A23	A23	X	B23	X50	–
Sulfuric acid fuming	H_2SO_4 + SO_3	25	TBD	X	X	–	A100	X	X	X	A200	A200	X	A120	A120	–	–	X	–	–	–	A120	X	X	–	–
Sulfuric dioxide, gaseous, dry and wet	SO_2		<5	–	–	A30	–	–	–	–	–	–	–	–	–	–	–	A	–	–	–	–	–	–	–	–
Sulfurous acid, aqueous solution	H_2SO_3	5	TBD	A65	X	A20	A60	B23	X	X	A200	A200	A120	–	–	–	–	A	B93	–	B93	A93	A60	A150	A100	–
Tall oil		100	<5	X	X	–	A100	X	A100	X	A200	A200	A140	–	–	–	–	A	B93	A	A150	–	–	B149	–	A23
Tannic acid	$C_{76}H_{52}O_{44}$	100	>5 (50%)	A23	A23	A60	A100	A23	A100	A80	A200	A200	A110	A120	A120	–	–	A	B93	–	X	A93	A93	B80	–	–
Tartaric acid	$C_4H_6O_6$	sat	>100	A90	X	A80	A80	A80	A60	A100	A200	A200	A120	A120	A120	–	–	–	A93	–	B93	A93	B93	A93	A120	–
Tin (II) chloride	$SnCl_2$	25	TBD	A	B100	A100	A80	A60	A60	A60	A120	A120	–	A150	A150	–	–	A	A93 (10%)	–	B80	A100	A23	B80	–	–
Tin (IV) chloride	$SnCl_4$	sat	TBD	A150	A	–	–	A60	A23	A80	A120	A120	–	A150	A150	–	–	A	X	C23	–	–	–	B120	–	–
Titanium dioxide		sat	>100	–	–	A80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Titanium tetrachloride	$TiCl_4$	sat	TBD	–	X	–	A70	X	X	X	A200	A200	A65	–	–	–	–	A	B23	A	B23	–	A120	A32	–	–
Toluene	$C_6H_5CH_3$	100	<5	X	X	X	A23	X	X	X	A120	A120	A80	A	A	–	A93	A	A176	A	A93	A93	A93	A93	A111	A23
Tomato juice		100	TBD	–	A90	–	A60	–	A60	A60	A200	A200	A120	–	–	–	–	A	B120	–	B43	–	–	A32	–	–
Transformer oil			<5	X	X	–	A180	X	B	X	A200	A200	–	–	–	–	–	A	B32	–	B32	–	–	–	–	–
Tributyl phospahte	$C_{12}H_{27}O_4P$	100	TBD	X	A23	–	X	X	X	X	A200	A200	A25	–	–	–	–	A	B23	–	B38	–	–	–	–	–

Chemical Resistance Chart SITRANS FM

A = Excellent
B = Good, minor effect
C = Conditional, not recommended for continuous use
X = Not recommended
– = No data available

Chemicals A – Z				Plastic and rubbers										Ceramics and resins				Metals								
Agent	Chemical formula	Concentration (%)	Electrical conductivity (µS/cm) @ 25 °C	Butyl	EPDM	Ebonite	FKM-FPM	Linatex	NBR	Neoprene	PFA	PTFE	PVDF	Aluminium oxide	Zirconium oxide	Ceramic coated	Novolac	Graphite	AISI 316L	Hastelloy C-22	Hastelloy C-276	Platinum	Titanium	Tantalum	Gold	Tungsten carbide
Trichloroacetic acid		50	<5	X	X	–	A80	X	B23	X	A200	A200	A50	–	–	–	–	A	X	A120	A93	–	X	B149	–	X
Trichloroethylene	$CHCl{=}CCl_2$	100	TBD	X	X	X	A100	X	X	X	A120	A120	A140	A23	A23	–	–	A	B120	A	A93	–	A93	B97	–	A23
Triethanolamine	$C_6H_{15}NO_3$	100	TBD	A65	A23	X	X	B23	A23	A60	A200	A200	A50	–	–	–	–	A	B23	A95	A23	A200	A40	B97	–	A23
Trisodium phosphate	Na_3PO_4	sat	TBD	A90	A23	A90	A80	A23	A90	A90	A200	A200	A120	–	–	–	A93	A	E71 (10%)	A200	E49 (10%)	–	–	B26	–	–
Urea		50	>100	A65	A60	A90	A80	A23	A60	A65	A100	A120	A95	–	–	–	A93	A	B97	A90	B23	–	A90	A90	–	A23
Vinegar		100	>100	A65	A60	A65	A100	B23	X	A80	A200	A200	A120	–	–	–	A93	A	B82	A	–	–	A23	A23	–	C23
Vinyl acetate	$C_4H_6O_2$	100	TBD	–	X	–	X	X	X	X	A100	A200	A120	–	–	–	–	–	A40	A	A40	–	–	–	–	–
Waste water		100	>100	–	X	A	A60	A	A60	B	A120	A120	–	A	A	–	–	A	B23	A	A23	A	A23	A23	–	–
Water, demineralized		100	<5	A70	A80	A80	A100	A23	A80	–	A200	A200	–	A100	A100	–	A93	A	B100	A	A200	A	–	A23	–	–
Water, potable		100	>5	A100	A80	A80	A80	A23	A80	B23	A200	A200	A150	A100	A100	A 23	A93	A	B100	A	A 23	A	A23	A 23	–	–
Wine		100	>100	A65	A80	A	A80	A23	A80	A	A200	A200	A120	A100	A100	–	–	A	A23	A	A38	–	A23	A23	–	–
Xylene	$(CH_3)_2C_6H_4$	100	<5	X	X	X	B80	X	X	X	A100	A200	A95	–	–	–	–	A	B93	A120	A150	A100	A93	A93	–	A23
Zinc chloride	$ZnCl_2$	sat	>100	A90	A80	A70	A100	A60	A100	A60	A200	A200	A120	A120	A120	–	A93	A	X	C23	B120	A93	A93 (<70%)	A80	–	X
Zinc sulfate	$ZnSO_4$	sat	>100	A60	A60	A70	A100	A60	A60	A60	A200	A200	A140	–	–	–	A93	A	A97	A100	A100	A100	A93 (<40%)	A32	A100	–

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Overview
Dictionary

SITRANS FM Selection Guide

The following is an explanation of some of the terms used in the Selection Guide.

Alkalis:	Bases with pH greater than 7 common examples within this category are sodium hydroxide and potassium hydroxide.
Concentrated:	The most concentrated solution possible at a given temperature.
Diluted:	A liquid that has been reduced in concentration or purity.
Mineral acids:	Organic acids are in general weak and will not dissociate completely in water (unlike most mineral acids). Common acids within this category include acetic acid, formic acid, citric acid, oxalic acid, and lactic acid.
Organic acids:	A mineral or organic acid with a high redox potential. ommon acids within this category include nitric acid, chromic acid, and hypochlorous acids.
Oxidizing acids:	A mineral or organic acid with a high redox potential. Common acids within this category include nitric acid, chromic acid, and hypochlorous acids.
Reducing acids:	A mineral or organic acid with a low redox potential. Common acids within this category include hydrochloric acid, sulfuric acid, phosphoric acid, and hydrofluoric acid.
Salt solutions:	Salts are ionic compounds composed of positive and negative solvated ions. Salt solutions can be alkaline, acidic or neutral depending on the type of salt.

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