Chlor Alkali Applications

Plastic materials for the use of chlor-alkali Industry

COMPANY PROFILE

Thermoplastic Valves

- PVC, CPVC, PE, PP, PVDF, E-CTFE & PDCPD
- Ball Valves (½” - 6”)
- Butterfly Valves (1 ½” - 48”)
- Diaphragm Valves (1/2” - 10”)
- Check Valves (1/2” - 12”)
- Globe Valves (1/2” - 4”)
- Gate Valves (1/2” - 14”)
- Y strainers (1/2” - 4”)
- Electric & Pneumatic Act.

Thermoplastic Piping Systems

- Polyethylene - PE (1/2” - 98”)
- Polypropylene - PP (1/2” - 38”+)
- PVDF (1/2” - 12”+)
- E-CTFE (1/2” - 4”+)
- PFA (1/2” - 1”)
- Single & Double-Wall
- Leak Detection

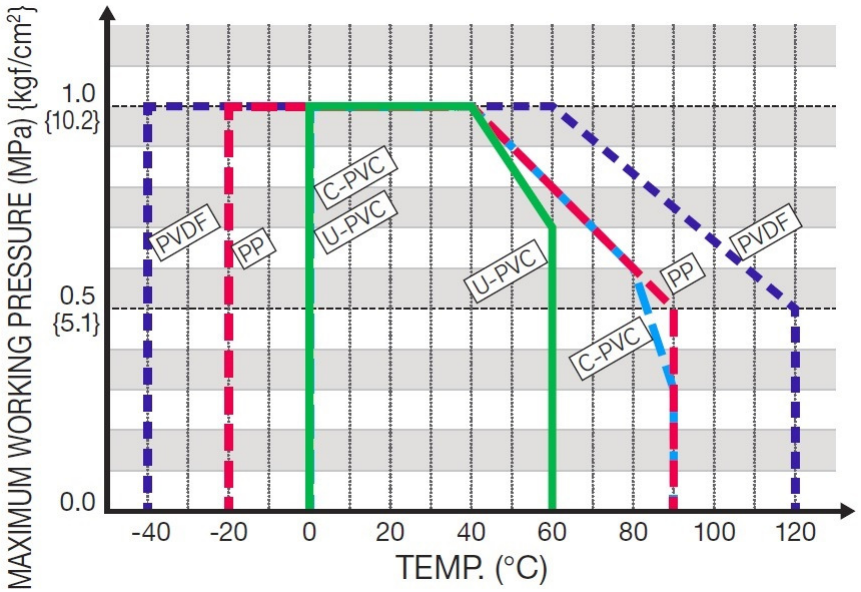
THERMOPLASTIC MATERIALS

- Materials that melts when heat.
- They became processable at certain temperature.
- Mainly 2 different process
  - Injection Molding – Valves
  - Extrusion Process – Pipes
- Thermoplastics advantages
  - Chemically Resistant
  - Better corrosion resistance characteristics
  - Lightweight
  - Lower material and installation cost that metal system (average)
- Thermoplastics restrictions
  - Temperature Range
  - Pressure Rating

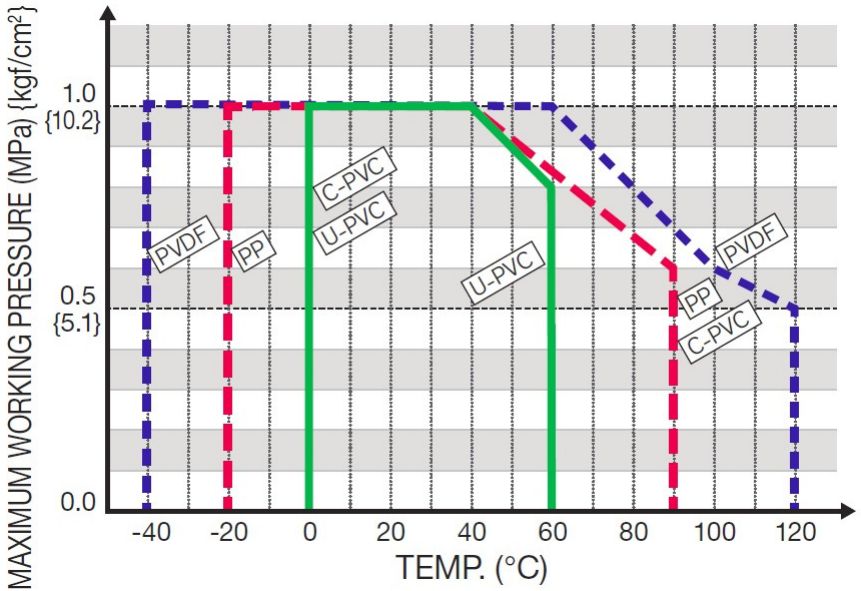
THERMOPLASTIC MATERIALS

Name	Make-up	Temp.	Pressure	Joining	Strength	Weakness
Vinyl:						
PVC	C–HH/C-HCl	140° F / 40° F	150psi?	Solvent	Low Cost	Joints
CPVC	9% > Cl	190° F / 40° F	150psi?	Solvent	Low Cost	Joints
Olefin:						
PE	C- HH/C-HH	140° F / -40° F	230psi	Fusion	Many	Unreinforced
PP	C- HH/C-HH_3	210° F / 15° F	150psi	Fusion	Many	Unreinforced
Fluoropolymer:						
PTFE	C-FFFF	450° F	-	-	Resistance	High Cost
PVDF	C-FFFH	284° F / -40° F	230psi	Fusion	Resistance	High Cost
E-CTFE	PE-Cl-PTFE	334° F / -100° F	150psi	Fusion	Resistance	High Cost
PFA	F_3C-O	450° F	150psi	Fusion	Resistance	High Cost

THERMOPLASTIC MATERIALS



Diaphragm Valve ½ to 2 inch



Diaphragm Valve 2-½ to 4 inch

Chemical Resistance

Type of Service	PE	PP	PVDF	E-CTFE	PFA
Strong Alkalis	+	+	X	+	+
Weak Alkalis	+	+	+	+	+
Strong Acids	+	+	+	+	+
Weak Acids	+	+	+	+	+
Organic Solvents	+	+	+	+	+
Strong Oxidative Agents	X	X	+	+	+
Sodium Hypochlorite	+	X	X	+	+
Sodium Hydroxide	+	+	X	+	+
Hydrochloric Acid	+	+	+	+	+

Advanced PE Piping Systems

Certified to NSF/ANSI 61-G

Advanced PE Piping System

Anti-Leak Technology

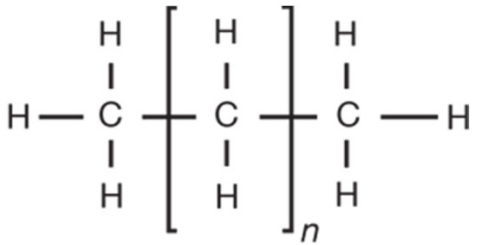
Chem Proline® by Asahi/America

NSF Certified to NSF/ANSI 61-G

Advanced PE (PE100RC)
Cell Classification PE445584C per ASTM D3350
A resin system developed for infrastructure piping applications
that handles difficult chemical applications.

Advanced PE Piping System

Polyethylene PE

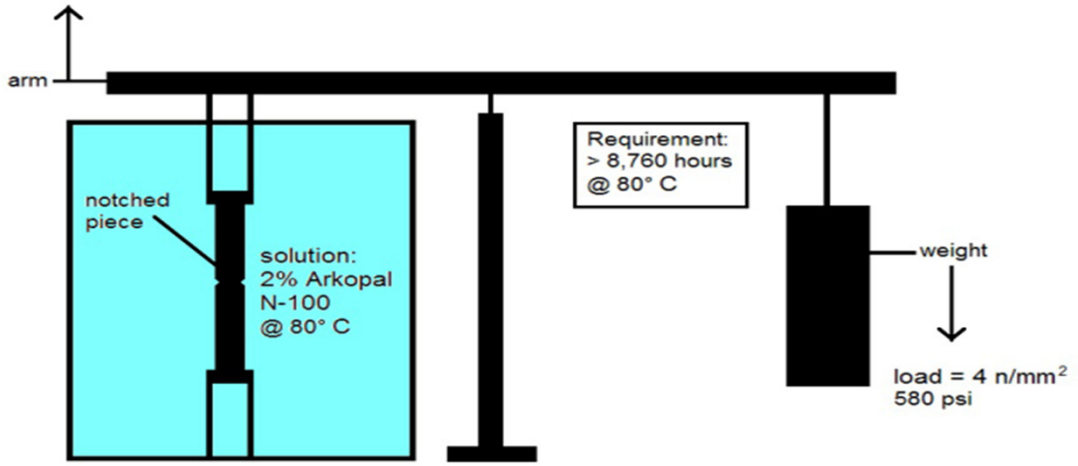


Polyethylene

- Old classifications: LDPE, MDPE, HDPE
- New classification based on ISO - MRS (minimum required strength) standards – long-term loaded pipes at 20 C for 50 years
- First generation: PE 32, 40, 63 (expressed in bar)
- Second generation: PE 80 - PE3408 in the USA
- Third generation: PE 100 – PE4710 in the USA
- Fourth generation: Advanced PE

Advanced PE Piping System

FNCT ISO 16770 - Olefins



Full Notch Creep Test

Advanced PE Piping System

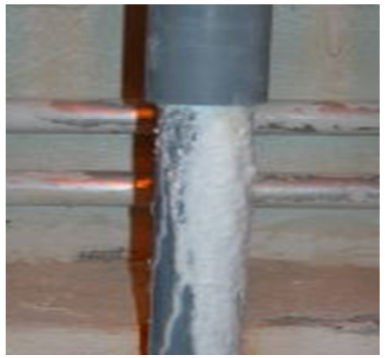
FNCT ISO 16770 - Olefins

Material Class	Minimum Standard	Average Results
PE 63	~ 30 Hours	7.5 Hours (2 samples)
PE 80	100 Hours	114 Hours (3 samples)
PE 100	300 Hours	533 Hours (5 samples)
Advanced PE	8,760 Hours (1 year)	14,648 Hours (2 samples)

Advanced PE Piping System

Glued or threaded systems

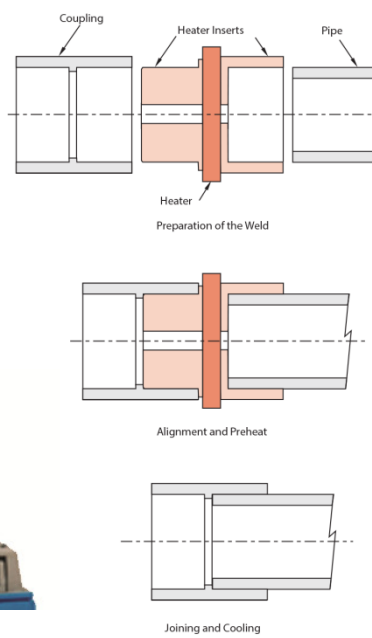
Painted CPVC for visual identification

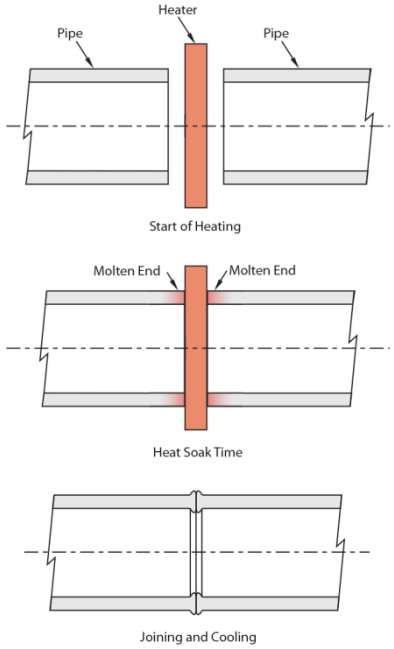


Advanced PE Piping System

Fusion Joining – Highest Integrity

Socket Fusion





Butt Fusion

Advanced PE Piping System

Chem Proline® for Chemical Service

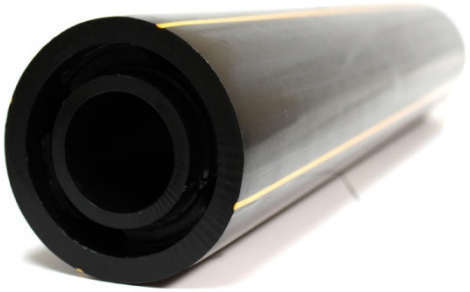
- Single and double wall piping
- Leak detection
- Valves: PVC, CPVC, PP, PVDF & ECTFE
- Socket, butt and electrofusion joining
- NSF/ANSI 61-G
- UV protection

Certified to NSF/ANSI 61-G

Advanced PE Piping System

Advanced PE Double Wall

Chem Prolok® by Asahi/America



Fabricated
Cable or Probe
Leak Detection

Poly-Flo®

Co-Extruded
Probe
Leak Detection

Advanced PE Piping System

Chemical Feed Applications

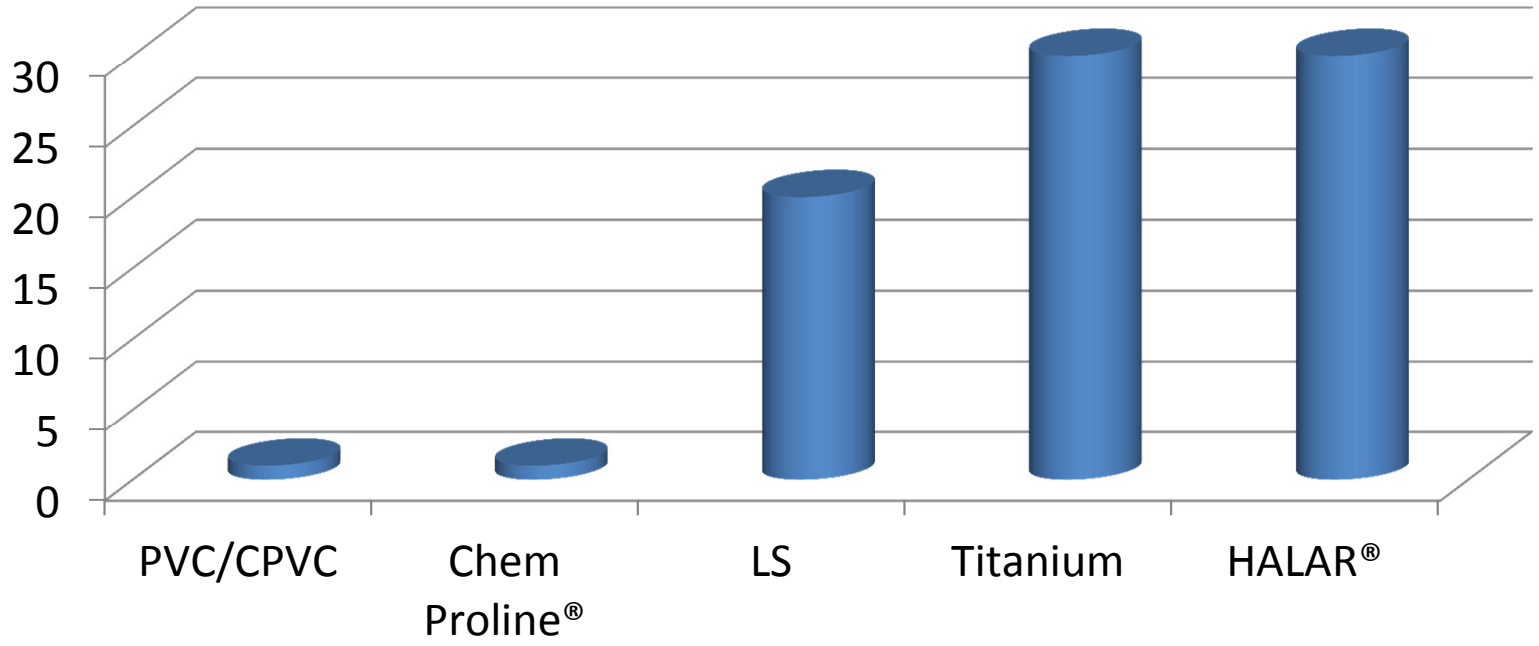
- Many Compatible Chemicals
- pH range from 1 - 14
- Chlorine gas - No
- Ozone - No
- Chlorine dioxide - No
- Sulfuric acid – No
- Resistance Chart
- References

Chem Proline - 25% Sodium Hypochlorite

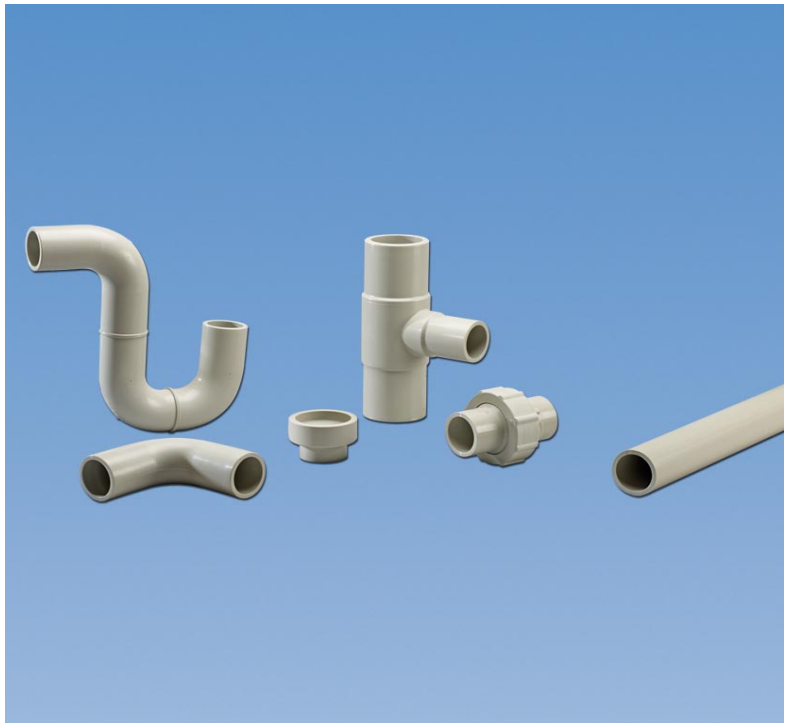
- Chlor-Alkali Plant US
- PVC-FKM Flanged Ball Valves
- Chemproline Pipes

Advanced PE Piping System

Installed Costs

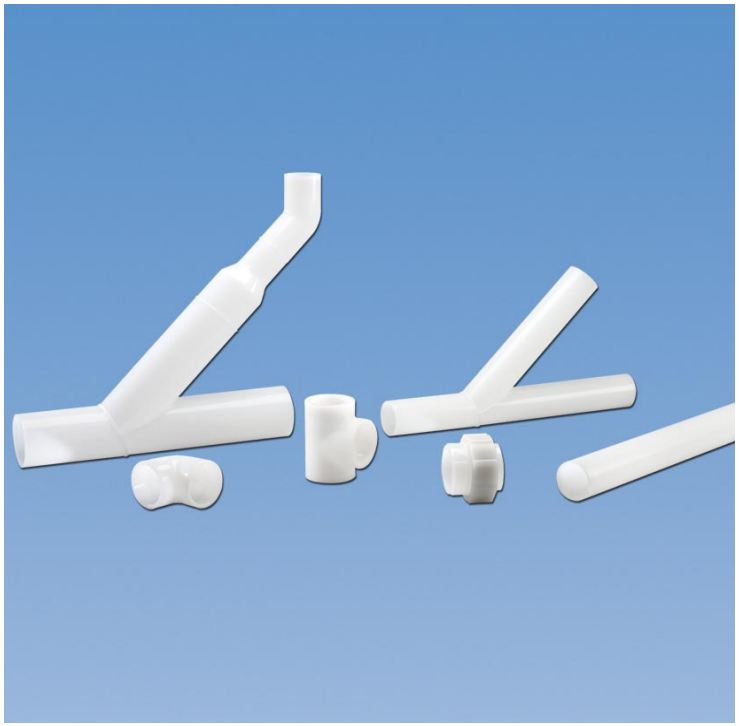


Polypropylene - Pro Line PP-R



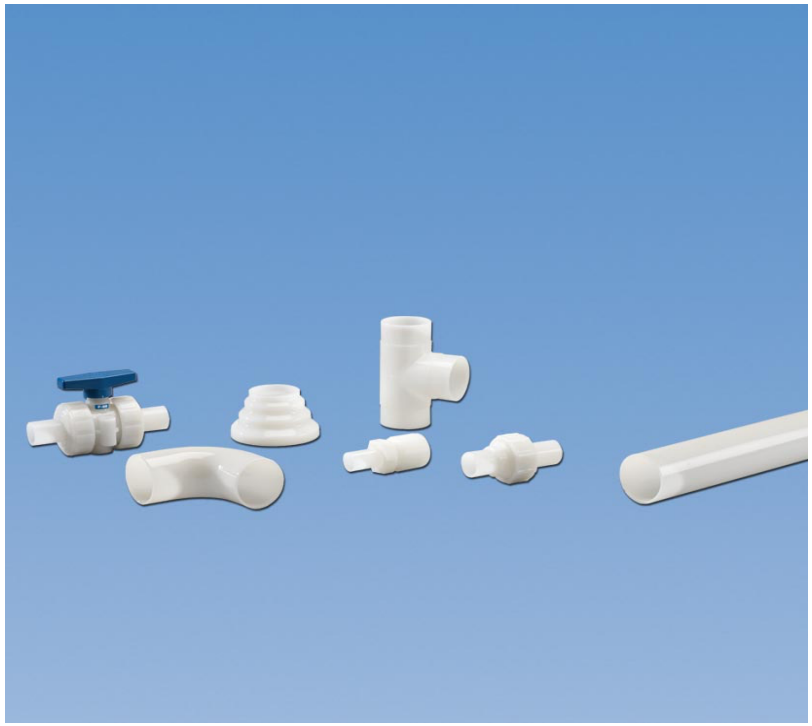
- Pro 150 (150 psi)
- Pro 45 (45psi)
- Pro Vent
- DuoPro, PolyFlo PP D/C
- BV, BFV, Dia. Valves, Check Valves

PVDF - Super Proline



- 230 psi & 150 psi
- Vent Grade
- BV, BFV, Dia. Vlvs., Check Valves
- DuoPro D/C

E-CTFE - Halar Ultra Proline

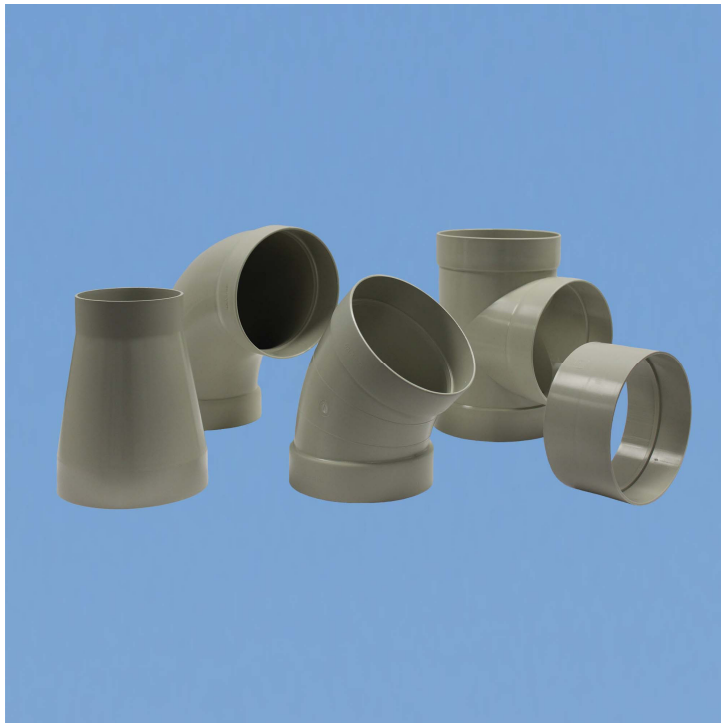


- 150 psi
- Butt Fusion Only
- Ball Valves
- Duo Pro D/C

Air Pro - PE100 Compressed Air/Gas

- 230 psi
- Socket & Butt Fusion
- Ball Valves

Pro Vent - PE, PP, PVDF

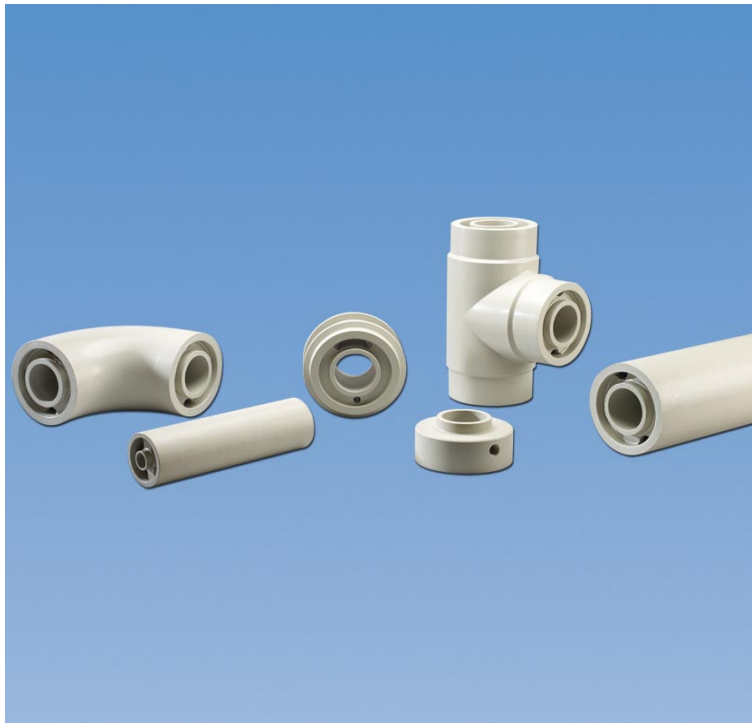


- PE100 - 3” - 48”
- PP-R - 2” - 48”
- PVDF - 2” - 16”
- Damper Valves

PolyFlo - PE & PP Co-Extruded D/C

- 150psi X 100psi
- 1” X 1 ½”, 2” X 3”, 4” X 6”
- Unitary Design

DuoPro - PP, PVDF, E-CTFE D/C



- Many Configurations
- Pressure or Drainage
- Cable or Probe L/D
- Butt Fusion

Ti - Diaphragm Valve

- Specifically designed for processing chlorines and chlorates in chlor-alkali and caustic soda production plants.
- Superior corrosion protection is achieved by offering a palladium-titanium diaphragm insert that connects the diaphragm to the valve compressor via a palladium-titanium stem connection joint.
- Light weight and corrosion resistant titanium bolts, nuts, washers, studs and body inserts sandwich the diaphragm between the body and bonnet creating a reliable seal.

EL-PVDF Material

- To meet the latest customer requirements, Asahi/America has developed a new thermoplastic corrosion resistant valves in EL – PVDF Material
- The purpose of the EL-PVDF material is to prevent the generation of blistering or cracking that can occur in conventional PVDF during electrolysis production.
- EL-PVDF has been designed to achieve 2-5 times the normal life expectancy when compared to conventional PVDF in electrolysis applications.
- Offering
  - Diaphragm Valves - ½" to 4".
  - Swing Check Valves - 2“, 3" & 4".

EL-PVDF Diaphragm Valve

- Diaphragm valve for Aggressive Brine Service Applications.
- Constructed of EL-PVDF and EL-PTFE for the purpose of preventing the generation of blisters and stress cracks.
- . The diaphragm and compressor inserts are made of Palladium Titanium to prevent environmental stress cracks.
- The new valve is designed specifically for Electrolysis plants and brine service applications with high-temp & high-pressure conditions.

EL-PVDF Swing Check Valve

- Swing Check valve for use in electrolysis plants in high temperature sodium hypochlorite, chlorine gas, brine, and hydrofluoric acid applications.
- Valves that are continually exposed to near maximum material working temperature limits for extended periods of time, especially in the production of chlorine, are the intended application target.
- Typical applications include, chlorine manufacturers, steel pickling lines, pulp and paper manufacturing, etc.

EL-PVDF Valves

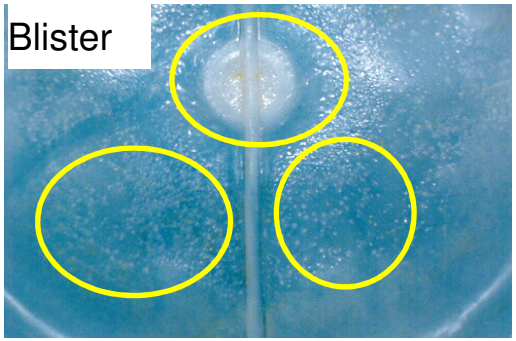
Fail Condition Body

Blister

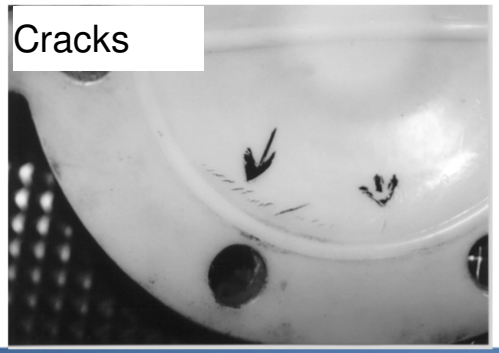
Peeling off

Fail Condition Diaphragm

Blister



Cracks



Field Test EL-PVDF

Thank You