Ultrapure Water

→ High purity system solutions for high end water applications

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GEORG FISCHER
PIPING SYSTEMS

Ultrapure Water (UPW) and Hot Ultrapure Water (HUPW) in SYGEF® Plus

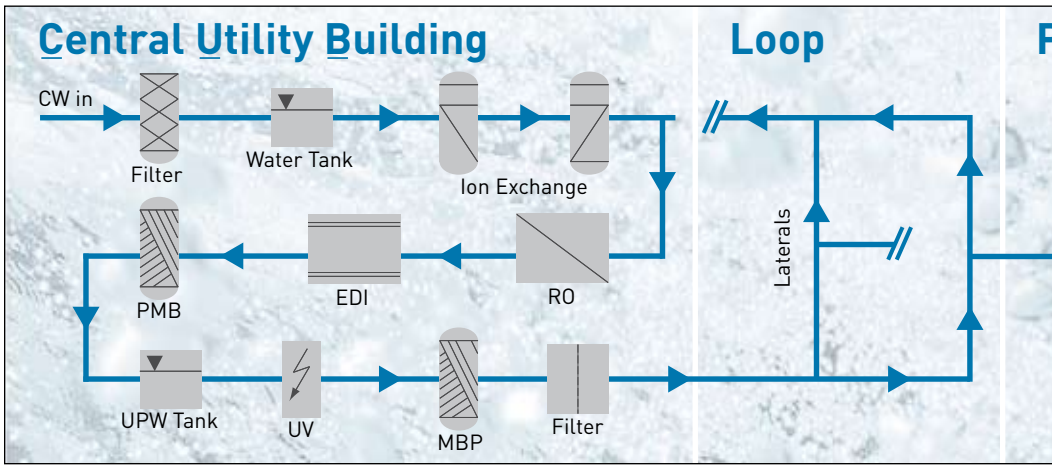
The Specifiables

In close relationship to the endcustomers and based on their needs GF Piping Systems introduced the SYGEF® and PROGEF® product lines for various applications within the microelectronic world.
In order to best meet these needs, the SYGEF® and PROGEF® pipes, fittings, valves and the related fusion technologies are compatible to each other in order to guaranty maximum safety and performance.

They are a SYSTEM

SYGEF® and PROGEF® are strictly fulfilling the internal specifications to ensure the customer expected performance.

They are SPECIFIED products



P & ID.
GF Piping Systems is providing the veins for high tech factories.

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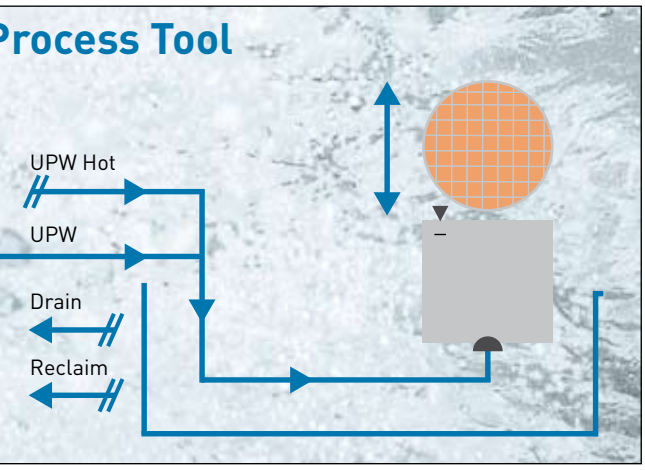
→ You want to know what to expect
→ Completely controlled process

Water distribution. From the Central Utility Building (CUB) there is a interconnect line to the loop system which is followed by submains or laterals ending up via hook-up systems at the process tools.

Process tools. Typically, UPW contacts the wafer in at least 20% of the manufacturing process steps. More than 50% of the used fluids in wet process tools is UPW.



SYGEF® Plus piping systems in PVDF-HP. Water purification is an increasingly demanding process. Technology that was «leading edge» only a few years ago may now be obsolete. The end user requires systems and components that meet or exceed expectations during every moment of operation. To keep pace, high purity products and suppliers must continually improve to meet these rigorous demands. In accepting this challenge, Georg Fischer takes every possible measure to make the SYGEF® Plus product line the cleanest and most reliable piping system available.

Production parameters which we specify and monitor during the manufacturing, cleaning and packaging stages have one thing in common: They are all «data driven», which means with these measurable facts and data we can ensure that our customers receive the highest quality products to give consistent and dependable service in their application. This process is applied to our existing lines of products as well as to every innovation that takes place in all facets of our business. Simply stated, our mission is to supply the best quality to our customers.

Each chain is only as strong as it's weakest link

Therefore GF Piping Systems ensures:

- completely controlled processes
- optimized packaging and logistic concepts
- documented manufacturing process steps
- ISO certified factories
- unsurpassed BCF® and IR Plus® welding technology
- field proven industrial benchmark technology with more than 8 million IR welds in the field
- 100 % repeatability
- 100 % traceability
- worldwide certification training program for installation
- worldwide support

The raw material used for Pipes and Fittings is Kynar which exceeds the highest requirements and standards of the market regarding purity.

Completely controlled manufacturing process.
Fully automated injection moulding of fittings.

During the whole process the inner surface is contacting air class 100 or better.

SYGEF® Plus products are 100 % visually inspected to guarantee strict compliance to ISO 10931.

Living the high purity chain with GF Piping Systems

An optimized one hour, four step process: washing, rinsing (two times) and drying is performed for all moulded SYGEF® Plus components.

SYGEF® Plus products are double bagged with specified bags in class 100 or better.

What does it take to be a supplier of high purity products?

High Purity products are specialty products by definition. Procedures and protocols to manufacture and deliver such product must reflect these circumstances. Ultimately the overall ultra-pure water (UPW) system integrity is assured from source to point of use by the complete integration of SYGEF® Plus PVDF products and associated jointing technologies. When SYGEF® Plus PVDF products are matched with Georg Fischer's state-of-the-art welding technologies, system reliability, purity, safety and longevity are assured.

Georg Fischer is the only supplier of high purity PVDF products that can make such a claim. Adhering strongly to accepted standards such as SEMI, SEMATECH, ISO and DIN, we control the entire process from the injection moulding of the fittings and valves, to the extrusion of the pipe as well as the design and construction of the fusion equipment. A complete set of courses in welder training and joint inspection rounds out our offering to the customer.

Particle Control:
World`s largest cleanroom dedicated to Fluoropolymer Manufacturing
Over 5500 m² high tech manufacturing floor
4000 m² < class 10000
100 m² < class 100
Completely controlled processes

GF Piping Systems played a major role to establishing the relevant standards SEMI F40, F48, F57 for polymer component testing.
Due to our long experience and continous improvements we are exceeding these requirements to increase our customer's yield.
SYGEF® Plus products are strictly fulfilling the strong requirements of the ITRS roadmap in order to be prepared also for upcoming, even more demanding processes in the future.

System Impurities	SYGEF® Plus (Average) µg/m²	SEMI F57 Requirement µg/m²
Total Metals (w/o Ca)	11.17	≤ 110
Calcium	1.30	≤ 30
Fluoride	11160	≤ 60000
remaining Anions	266	≤ 3900
TOC	9319	≤ 60000

What a Georg Fischer piping system does to keep your high tech factories running 24/7

Quality control:

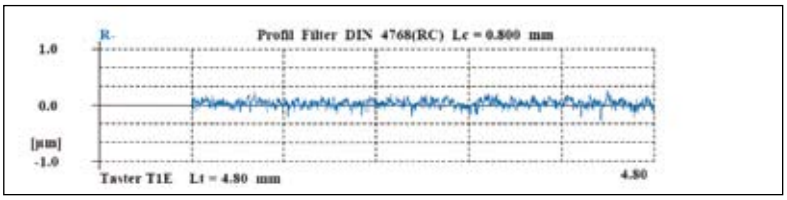
Criteria	Test standard	Test interval Pipe	Fitting
Dimension:	ISO 10931	every 2 hours	every 4 hours
Inner Surface:	visual	every 2 hours	every 4 hours
Delivery conditions:	visual	100% control	100% control
Color:	visual	every 2 hours	every 4 hours
Marking:	visual	every 2 hours	every 4 hours
Surface roughness:	DIN EN ISO 4287 DIN EN ISO 4288	1 x Production	1 x Production
Micropores:	Microscope	will be done by +GF+	
MFI-raw material:	ISO 1133	1 x Charge	1 x Charge
MFI-Pipe:	ISO 1133	1 x per week/plant	
Internal pressure	Test: EN 921	1 x per week/plant	1 x per week/plant
Impact test:	DIN EN ISO179 (replaces DIN 53479)	only at change of specified and continously controlled raw material	
Density raw material:	ISO R 1183 D	from ATO 3.1.B	from ATO 3.1.B
Surface prop:	SEMASPEC	on demand	on demand
Heat reversion:	ISO 10931	1 x production	

Parameter compare:

Parameter	GF SYGEF® Plus Advertised Value	GF SYGEFâ Plus Measured (Typical values)	Competitor Advertised Value	Competitor Measured Value	Comments
Surface Finish Pipe ≤ 225mm (Axial)	≤ 0.20um	≤ 0.14um	≤ 0.25um		
Surface Finish Pipe > 225mm (Axial)	≤ 0.30um	≤ 0.27um	≤ 0.50um		
Ovality	≤ 1.10mm	≤ 0.60mm	Not Specified	≤ 1.30mm	Specified by ISO 10931 as <=1.10mm for d 90 example
Stress, Longitudinal	≤ 0.35%, ISO states ≤ 2%	≤ 0.16%	Not Specified	0.17%	d 225 example
Stress, Diagonal	≤ 0.35%	≤ 0.10%	Not Specified	0.27%	d 225 example
Warpage	≤ 25mm per 5 meters	3mm per 5 meters	Not Specified	61mm per 5 meters	d 110 example

Safe and reliable system

Quality Control is an integral part of every step in manufacturing of our products so that we meet the market requirements in the best possible manner.
All mechanical testing takes place in our Swiss federally accredited lab facility.
Together with our unsurpassed installation equipment GF Piping Systems is superior regarding ovality, stress and warpage, the key factors to influence weld strenghth.



Surface quality

Smooth surfaces are achieved by means of a good tool design, selection of proper tooling materials, mirror finish surface of inner cores and a preventive and predictive maintenance schedule.
We even exceed our guaranteed surface finish of <= 0.2 µm

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GF Piping Systems → worldwide at home

Our sales companies and representatives
ensure local customer support in over 100 countries.

www.piping.georgfischer.com

The technical data is not binding. They neither constitute expressly warranted characteristics nor guaranteed properties nor a guaranteed durability. They are subject to modification. Our General Terms of Sale apply.

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