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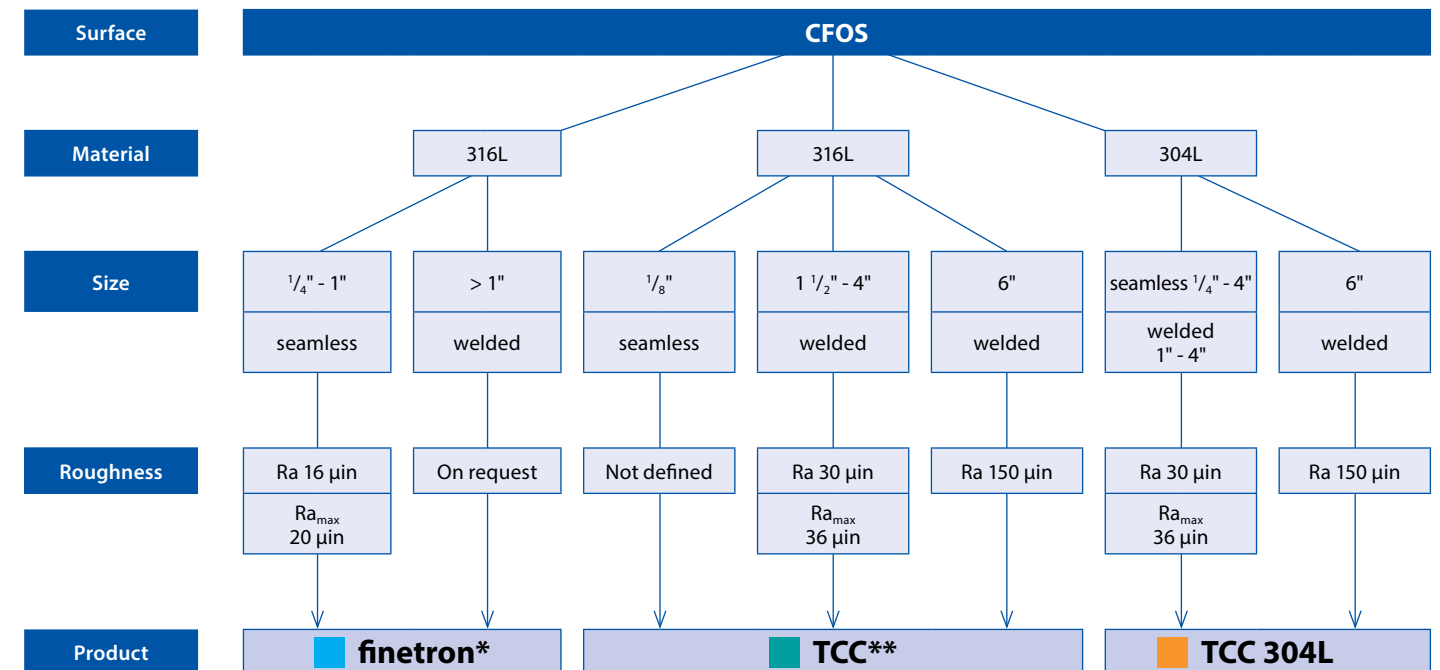
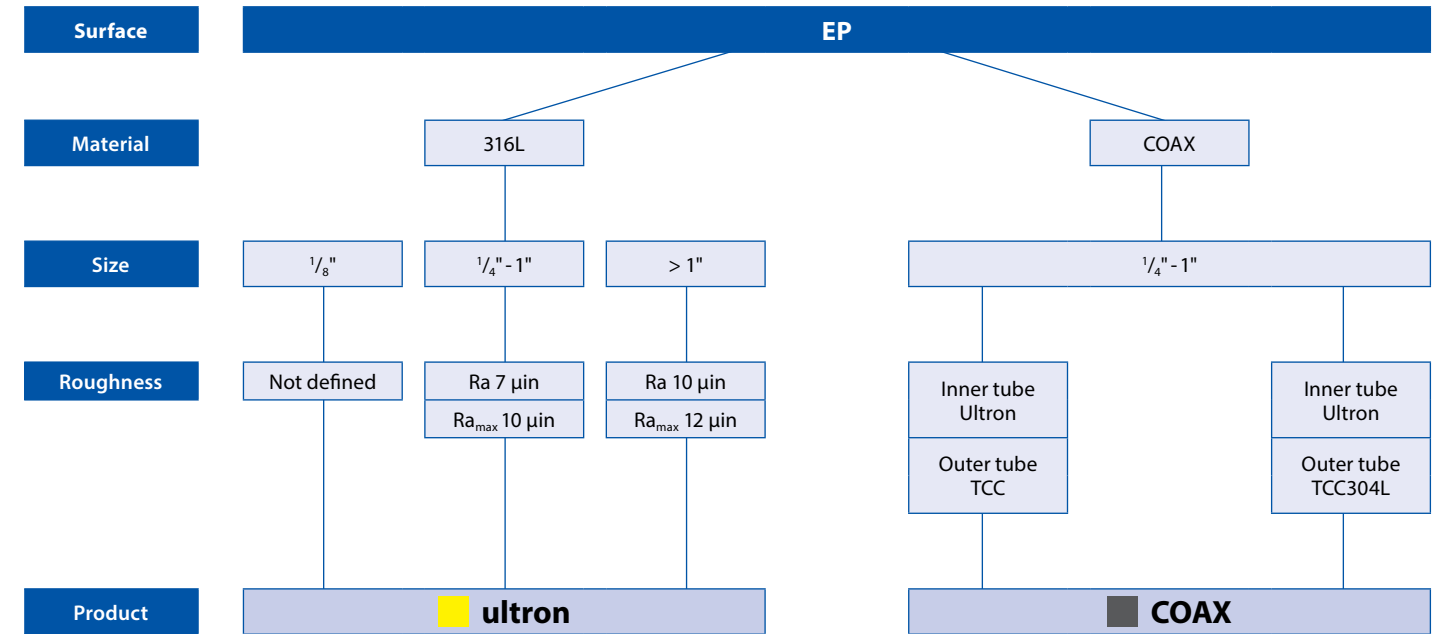
TUBE SYSTEMS IN STAINLESS STEEL



# SEMICONDUCTOR SOLUTIONS

Tube systems in stainless steel:  
complete solutions for the semiconductor industry.

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\* Standard: 1/4" - 3/4" finetron tubes are anodical cleaned and therefore meet passivation requirements. Optional: fittings can be passivated.  
\*\* Optional: 1 1/2" - 6" tubes and fittings can be passivated.

MATERIAL

1		
P/N	Specification	Description
UL	Ultron	316L EP
FT	Finetron	316L CFOS
TC	TCC	316L CFOS
T4	TCC 304L	304L CFOS
CO-UL4	Coaxial	Outer: T4 / Inner: UL
CO-UL6	Coaxial	Outer: TC / Inner: UL

TUBE SIZE

2			
P/N	Size	General Notes	Wall Thickness
02	1/8"		0.022
04	1/4"	<sup>2)</sup>	0.035
06	3/8"	<sup>2)</sup>	0.035
08	1/2"	<sup>2)</sup>	0.049
10	5/8"	<sup>1)</sup>	0.049
12	3/4"	<sup>2)</sup>	0.065
16	1"	<sup>2)</sup>	0.065
24	1 1/2"	<sup>2)</sup>	0.065
32	2"		0.065
40	2 1/2"		0.065
48	3"		0.065
64	4"		0.083
96	6"		0.109
NPS128	8"		0.148
NPS160	10"		0.165
NPS192	12"		0.180
NPS224	14"	Pipe Schedule 10S	0.189
NPS256	16"		0.189
NPS288	18"		0.189
NPS320	20"		0.218

FITTING

2	
P/N	Description
4L	45° Elbow
9L	90° Elbow
TE	Tee Equal
RT	Reducing Tee
CR	Concentric Reducer
FCR	Formed Concentric Reducer
ER	Eccentric Reducer
RWC	Removable Weld Cap (Dockweiler Cap)
WC	Weld Cap
CTE	Coaxial Tee
C4L	Coaxial 45° Elbow
C9L	Coaxial 90° Elbow
CWS	Coaxial Weld Sleeve (Length: 4 inch)
CWS3	Coaxial Weld Sleeve (Length: 3 inch)
CTM	Coaxial Terminator
CPT	Coaxial Purge Tee
CPTM	Coaxial Purge Tee with VCR
CBP	Coaxial Bulkhead Purge Tee
CFG	Coaxial VCR Female Gland
CMG	Coaxial VCR Male Gland
CRT	Coaxial Reducing Tee
CCR	Coaxial Concentric Reducer

FITTING SIZE

3 + 4*			
P/N	Size	General Notes	Wall Thickness
02	1/8"		0.022
04	1/4"		0.035
06	3/8"		0.035
08	1/2"	<sup>2)</sup>	0.049
10	5/8"	<sup>1)</sup>	0.049
12	3/4"	<sup>2)</sup>	0.065
16	1"	<sup>2)</sup>	0.065
24	1 1/2"	<sup>2)</sup>	0.065
32	2"		0.065
40	2 1/2"		0.065
48	3"		0.065
64	4"		0.083
96	6"		0.109
NPS128	8"		0.148
NPS160	10"		0.165
NPS192	12"	Pipe Schedule 10S	0.180
NPS224	14"		0.189
NPS256	16"		0.189
NPS288	18"		0.189
NPS320	20"		0.218

P/N for Tubing **1** - **2**  
e. g. UL - 16  
= ULTRON 1"

GENERAL NOTES:

- Ultron > 1": welded
- Finetron 1/4" - 1": seamless
- TCC > 1": welded
- TCC 304L > 3/4": welded
- <sup>1)</sup> On request, only for outer COAX tubing
- <sup>2)</sup> Coaxial tube represented using inner tube dimensions. Standard is inner tube UL, outer tube TC or T4.
- Further qualities on request.

P/N for Fitting **1** - **2** - **3** - **4\***  
e. g. TC - RT - 16 - 08  
= TCC Reducing Tee 1" x 1/2"

<sup>1)</sup> Only needed for Reducing Tee and Concentric Reducer

## DOCKWEILER SYSTEMS IN STAINLESS STEEL FOR TRANSPORT OF UHP, HP AND CFOS GASES



### DOCKWEILER TUBE SYSTEMS

■ **ultron**
■ **finetron**
■ **finetron.1**
■ **TCC**
■ **TCC 304L**
■ **COAX**

### ADDITIONAL ITEMS TO THE SYSTEM

R4i Laterals, Prefabricated Laterals with different branches, Prefabricated Laterals with ball valves.  
For more information refer to page 47.

### TYPICAL APPLICATIONS

Semiconductor	Process Utilities, Wafer Production, LCD, LED
Photovoltaic and renewable energy	Process Utilities, Slurry, Superheated and Cryogenic Gases
Analytics	Laboratories a. o. High Performance Liquid Chromatography, Gas Chromatography
Automotive	Engine and Chassis Dyno Test Cell Equipment
Pharmaceutical Industry	Process Piping, Water for Injection, Process Utility

# ultron



## APPLICATIONS

Ultron offers optimum safety for the transport of UHP gases in the semiconductor industry and fine chemistry.



SEMICONDUCTOR



FINE CHEMISTRY

## DIMENSIONS

All tubes and fittings are available from stock in the following sizes:

### Imperial (according to ASTM A269 / A632 and DIN 11866 Series C)

1/8" (0.125 inch x 0.022 inch) to 6" (6.000 inch x 0.109 inch)  
3.18 mm x 0.56 mm\* to 152.40 mm x 2.77 mm

### Pipe (according to ASTM A312)

219.08 mm x 3.76 mm to 323.85 mm x 4.75 mm  
NPS 8, 10, 12, Schedule 10S

### Metric (according to DIN 11866 Series A)

3.00 mm x 0.50 mm\* to 35.00 mm x 1.50 mm

### On request

ISO (according to DIN EN ISO 1127 and DIN 11866 Series B)  
13.50 mm x 1.60 mm to 219.10 mm x 2.60 mm

\* For dimensions OD < 5,00 mm roughness is not defined.  
Tube Length will be 2950 ± 50 mm.

## TECHNICAL TERMS OF DELIVERY

Tubes and fittings are prepared for orbital welding according to the following standards:

### Tubes

acc. to ASTM A 269 / A 632 / A 312 (Pipe), DIN EN 10217-7 / 10216-5 with a length of 232.284 - 239.764 inch (max. 10% short lengths of min. 118.110 inch possible)

### Tube components

Prematerial acc. to ASTM A 269 / A 632 / A 312 / A 403 (Pipe),  
DIN EN 10217-7 / 10216-5

### Machined components

Prematerial acc. to ASTM A 479, DIN EN 10088-3, DIN 17440,  
ASTM A 182 (Pipe)

Tubes are permanently marked over the full length.  
Fittings are needle marked.

### Marking always with

DOCKWEILER / DW-Number / Dimension / Material / Heat number

## MATERIALS

Depending on outer diameter welded or seamless austenitic stainless steel tubes and fittings are available in the following materials:

- 1.4404 / UNS S31603 (316L)
- 1.4435 / UNS S31603 (316L) (according to Basler Norm 2 (BN2))
- UNS S31603 (316L)

### The hardness is equivalent to:

max. 180 HV according to DIN EN ISO 6507-1  
max. 90 HRB according to DIN EN ISO 6508-1

## SURFACES

Tubes and fittings are available with the following inner surfaces:

<b>Standard:</b>	Ra ≤ 10 µin (0.25 µm)
<b>On request:</b>	Ra ≤ 5 µin (0.13 µm)
	Ra ≤ 7 µin (0.18 µm)
	Ra ≤ 15 µin (0.38 µm)

<b>Pipes:</b>	Ra ≤ 20 µin (0.51 µm)
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<b>Inner surface :</b>	Ra ≤ 20 µin (0.51 µm)
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The outer surface is not defined.  
End preparation: Pipes and fitting will be supplied with a square cut.

Other specified surfaces or ends are available upon request.

The Ra value in the cold worked area of fittings (inner and outer surface) and on the surface of circumferential welds is not defined.  
Specified roughness of total surface available on request.

For the machining of the inner surfaces following standards apply:

**Free of oil and grease**  
according to ASTM G93 11.4.3.1 - Level A

**Tubes and fittings**  
Electropolishing procedure acc. to Spec. Doc. 7.4-40/3.1/3.3.1

Cleanroom cleaning and packing (Federal Class 4 / ISO Class 6)

## QUALITY AND TEST PROCEDURES

- Verification of basic test certificate
- Visual control
- Endoscopic inspection of bright finished tubes
- Verification of dimensions
- Roughness measurements
- Conductivity test (DI water)
- TOC-measurement of DI water
- Particle measurements
- REM
- XPS / ESCA
- Auger analysis (AES)

## DOCUMENTATION, PACKAGING AND SHIPPING

The documentation result by the Dockweiler Inspection Certificate 3.1 according to DIN EN 10204.

Tubes and fittings filled with N2 (99.9998% incl. inert gas), closed with PA/PE squares and yellow PE caps, sleeved and sealed in PE – imperial dimensions double sleeved and sealed in PE.

The tubes and fittings as well as the batch label on the foil contain the information ultron.

Delivery in tubular container or wooden crate, fittings in strong cardboard box with shock absorbing filler.

# finetron



## APPLICATIONS

Finetron boasts a high quality surface mainly used for the transport of high purity gases for the semiconductor industry as well as in photovoltaics.



PHOTOVOLTAIC



SEMICONDUCTOR

## DIMENSIONS

All tubes and fittings are available from stock in the following sizes:

### Imperial (according to ASTM A269 / A632 and DIN 11866 Series C)

1/4" (0.250 inch x 0.035 inch) to 6" (6.000 inch x 0.109 inch)  
 6.35 mm x 0.89 mm to 152.40 mm x 2.77 mm

### Metric (according to DIN 11866 Series A)

6.00 mm x 1.00 mm to 35.00 mm x 1.50 mm

### On request

ISO (according to DIN EN ISO 1127 and DIN 11866 Series B)  
 13.50 mm x 1.60 mm to 219.10 mm x 2.60 mm

## TECHNICAL TERMS OF DELIVERY

Tubes and fittings are prepared for orbital welding according to the following standards:

### Tubes

acc. to ASTM A 269 / A 632 / A 312 (Pipe), DIN EN 10217-7 / 10216-5 with a length of 232.284 - 239.764 inch (max. 10% short lengths of min. 118.110 inch possible)

### Tube components

Prematerial acc. to ASTM A 269 / A 632 / A 312 / A 403 (Pipe), DIN EN 10217-7 / 10216-5

### Machined components

Prematerial acc. to ASTM A 479, DIN EN 10088-3, DIN 17440, ASTM A 182 (Pipe)

Tubes are permanently marked over the full length.  
 Fittings are needle marked.

### Marking always with

DOCKWEILER / DW-Number / Dimension / Material / Heat number

## MATERIALS

Depending on outer diameter welded or seamless austenitic stainless steel tubes and fittings are available in the following materials:

- 1.4404 / UNS S31603 (316L)
- 1.4435 / UNS S31603 (316L) (according to Basler Norm 2 (BN2))
- UNS S31603 (316L)

### The hardness is equivalent to:

max. 180 HV according to DIN EN ISO 6507-1  
 max. 90 HRB according to DIN EN ISO 6508-1

## SURFACES

Tubes and fittings are available with the following inner surface:

OD ≤ 63.5: Ra ≤ 16 µin (0.40 µm)  
 OD > 63.5: Ra ≤ 24 µin (0.60 µm)

The outer surface has a Ra value ≤ 40 µin (1.00 µm)

Ra value in the cold worked area and on the surface of circumferential welds is not defined. Specified roughness is available on request.

For the machining of the inner surfaces following standards apply:

### Tubes and fittings

Cleaning and test procedure ASTM A 632, S3

## QUALITY AND TEST PROCEDURES

- Verification of basic test certificate
- Visual control
- Endoscopic inspection of bright finished tubes
- Verification of dimensions
- Roughness measurements

## DOCUMENTATION, PACKAGING AND SHIPPING

The documentation result by the Dockweiler Inspection Certificate 3.1 according to DIN EN 10204.

Bright finished tubes and fittings are closed with transparent PE caps and are individually sealed in PE foil.

The tubes and fittings as well as the batch label on the foil contain the information finetron.

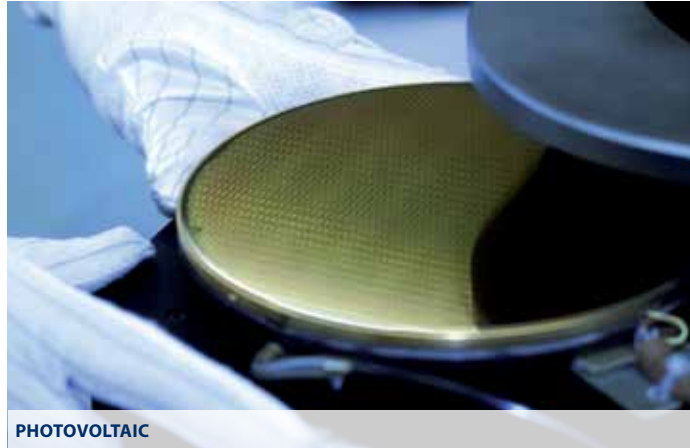
Delivery of tubes in tubular container or wooden crate, fittings in strong cardboard box with shock absorbing filler.

# finetron.1



## APPLICATIONS

Finetron.1 boasts a high quality surface mainly used for the transport of high purity gases for the semiconductor industry as well as in LED, LCD and TFT industry.



PHOTOVOLTAIC



LED-INDUSTRY

## DIMENSIONS

All tubes and fittings are available from stock in the following sizes:

### Imperial (according to ASTM A269 / A632 and DIN 11866 Series C)

1/4" (0.250 inch x 0.035 inch) to 6" (6.000 inch x 0.109 inch)  
6.35 mm x 0.89 mm to 152.40 mm x 2.77 mm

### Metric (according to DIN 11866 Series A)

6.00 mm x 1.00 mm to 35.00 mm x 1.50 mm

### On request

ISO (according to DIN EN ISO 1127 and DIN 11866 Series B)  
13.50 mm x 1.60 mm to 219.10 mm x 2.60 mm

Pipe (acc. to ASTM A312)

## TECHNICAL TERMS OF DELIVERY

Tubes and fittings are prepared for orbital welding according to the following standards:

### Tubes

acc. to ASTM A 269 / A 632 / A 312 (Pipe), DIN EN 10217-7 / 10216-5 with a length of 232.284 - 239.764 inch (max. 10% short lengths of min. 118.110 inch possible)

### Tube components

Prematerial acc. to ASTM A 269 / A 632 / A 312 / A 403 (Pipe),  
DIN EN 10217-7 / 10216-5

### Machined components

Prematerial acc. to ASTM A 479, DIN EN 10088-3, DIN 17440,  
ASTM A 182 (Pipe)

Tubes are permanently marked over the full length.  
Fittings are needle marked.

### Marking always with

- DOCKWEILER / DW-Number / Dimension / Material / Heat number

## MATERIALS

Depending on outer diameter welded or seamless austenitic stainless steel tubes and fittings are available in the following materials:

- 1.4404 / UNS S31603 (316L)
- 1.4435 / UNS S31603 (316L) (acc. to Basler Norm 2 (BN2))
- UNS S31603 (316L)

### The hardness is equivalent to:

max. 180 HV according to DIN EN ISO 6507-1  
max. 90 HRB according to DIN EN ISO 6508-1

## SURFACES

Tubes and fittings are available with the following inner surface:

OD ≤ 63.5: Ra ≤ 16 µin (0.40 µm)  
OD > 63.5: Ra ≤ 24 µin (0.60 µm)

The outer surface has a Ra value ≤ 40 µin (1.00 µm)

Ra value in the cold worked area and on the surface of circumferential welds is not defined. Specified roughness is available on request.

For the machining of the inner surfaces, the following standards apply:

### Free of oil and grease

according to ASTM G93 11.4.3.1 - Level A

### Tubes and fittings

Anodic cleaning procedure acc. to Spec. Doc. 7.4-40/3.2/3.3.2

## QUALITY AND TEST PROCEDURES

- Verification of basic test certificate
- Visual control
- Endoscopic inspection of bright finished tubes
- Verification of dimensions
- Roughness measurements

## DOCUMENTATION, PACKAGING AND SHIPPING

The documentation result by the Dockweiler Inspection Certificate 3.1 according to DIN EN 10204.

Anodic clean tubes and fittings are closed with transparent PE caps, with PE/PA squares and are individually sealed in PE foil. The tubes and fittings as well as the batch label on the foil contain the information finetron.1.

Delivery of tubes in tubular container or wooden crate, fittings in strong cardboard box with shock absorbing filler.

# TCC



## APPLICATIONS

TCC with cleaned surface is widely used in production, process measurement and photovoltaic.



PHOTOVOLTAIC



PROCESS MEASUREMENT AND CONTROL

## DIMENSIONS

All tubes and fittings are available from stock in the following sizes:

### Imperial (according to ASTM A269 / A270 and DIN 11866 Series C)

1/8" (0.125 inch x 0.022 inch) to 6" (6.000 inch x 0.109 inch)  
 3.18 mm x 0.56 mm to 152.40 mm x 2.77 mm

### Pipe (according to ASTM A312/ A999)

219.08 mm x 3.76 mm to 508.00 mm x 5.54 mm  
 NPS 8, 10, 12, 16, 20 Schedule 10S

### Metric (according to DIN 11866 Series A)

3.00 mm x 0.50 mm to 35.00 mm x 1.50 mm

### On request

ISO (according to DIN EN ISO 1127 and DIN 11866 Series B)  
 13.50 mm x 1.60 mm to 219.10 mm x 2.60 mm

## TECHNICAL TERMS OF DELIVERY

Tubes and fittings are prepared for orbital welding according to the following standards:

### Tubes

acc. to ASTM A 269 / A 632 / A 312 (Pipe), DIN EN 10217-7 / 10216-5 with a length of 232.284 - 239.764 inch (max. 10% short lengths of min. 118.110 inch possible)

### Tube components

Prematerial acc. to ASTM A 269 / A 632 / A 312 / A 403 (Pipe),  
 DIN EN 10217-7 / 10216-5

### Machined components

Prematerial acc. to ASTM A 479, DIN EN 10088-3, DIN 17440,  
 ASTM A 182 (Pipe)

Tubes and fittings are permanently marked.

### Marking always with

DOCKWEILER / DW-Number / Dimension / Material / Heat number

## MATERIALS

Depending on outer diameter welded or seamless austenitic stainless steel tubes and fittings are available in the following materials:

- 1.4404 / UNS S31603 (316L)
- 1.4435 / UNS S31603 (316L) (according to Basler Norm 2 (BN2))
- UNS S31603 (316L)

### The hardness is equivalent to:

max. 180 HV according to DIN EN ISO 6507-1  
 max. 90 HRB according to DIN EN ISO 6508-1

## SURFACES

Ra values are not defined for the inner surface.  
 On request with Ra value  $\leq 32 \mu\text{in}$  (0.80  $\mu\text{m}$ ).

The outer surface has a Ra value  $\leq 40 \mu\text{in}$  (1.00  $\mu\text{m}$ )

### Pipes:

The inner surface is not defined.  
 The outer surface is not defined.

### End preparation:

Pipes and fittings will be supplied with a single bevel angle according to ASME B16.25 , 3.2.

Other specified surfaces or ends are available upon request.  
 Ra value in the cold worked area and on the surface of circumferential welds is not defined. Specified roughness is available on request.

For the machining of the inner surfaces, the following standards apply:

### Tubes and fittings

Cleaning and test procedure ASTM A 632, S3

## QUALITY AND TEST PROCEDURES

- Verification of basic test certificate
- Visual control
- Endoscopic inspection of bright finished tubes
- Verification of dimensions
- Roughness measurements

## DOCUMENTATION, PACKAGING AND SHIPPING

The documentation result by the Dockweiler Inspection Certificate 3.1 according to DIN EN 10204.

Bright finished tubes and fittings are closed with transparent PE caps and are individually sealed in PE foil.

The tubes and fittings as well as the batch label on the foil contain the information TCC.

Delivery of tubes in tubular container or wooden crate, fittings in strong cardboard box with shock absorbing filler.



## TCC 304L



### APPLICATIONS

TCC 304L with cleaned surface is widely used in production, process measurement and photovoltaic.



PROCESS MEASUREMENT AND CONTROL



PHOTOVOLTAIC

### DIMENSIONS

All tubes and fittings are available from stock in the following sizes:

#### Imperial (according to ASTM A269 / A632 and DIN 11866 Series C)

1/8" (0.125 inch x 0.022 inch) to 6" (6.000 inch x 0.109 inch)  
 3.18 mm x 0.56 mm to 152.40 mm x 2.77 mm

#### Pipe (according to ASTM A312)

Schedule 5S and 10S

Other dimensions on request.

### TECHNICAL TERMS OF DELIVERY

Tubes and fittings are prepared for orbital welding according to the following standards:

#### Tubes

acc. to ASTM A 269 / A 312 (Pipe), DIN EN 10217-7 / 10216-5 with a length of 232.284 - 239.764 inch (max. 10% short lengths of min. 118.110 inch possible)

#### Tube components

Prematerial acc. to ASTM A 269 / A 312 / A 403 (Pipe), DIN EN 10217-7 / 10216-5

#### Machined components

Prematerial acc. to ASTM A 479, DIN EN 10088-3, DIN 17440, ASTM A182 (Pipe)

Tubes and fittings are permanently marked.

#### Marking always with

- DOCKWEILER
- DW-Number
- Dimension
- Material
- Heat number

### MATERIALS

Depending on outer diameter welded or seamless austenitic stainless steel tubes and fittings are available in the following materials:

- 1.4307
- UNS S30403 (304L)

#### The hardness is equivalent to:

max. 180 HV according to DIN EN ISO 6507-1  
 max. 90 HRB according to DIN EN ISO 6508-1

### SURFACES

Ra values are not defined for the inner surface.  
 On request with Ra value  $\leq 32 \mu\text{m}$  (0,80  $\mu\text{m}$ ).

The outer surface has no defined Ra value.

#### Pipes:

The inner surface is not defined.  
 The outer surface is not defined.

#### End preparation:

Pipes and fitting will be supplied with a single bevel angle as per ASME B16.25 , 3.2.

Other specified surfaces or ends are available upon request.  
 Ra value in the cold worked area and on the surface of circumferential welds is not defined. Specified roughness is available on request.

For the machining of the inner surfaces, the following standards apply:

#### Tubes and fittings

Cleaning and test procedure ASTM A 632, S3

### QUALITY AND TEST PROCEDURES

- Verification of basic test certificate
- Visual control
- Endoscopic inspection of bright finished tubes
- Verification of dimensions
- Roughness measurements

### DOCUMENTATION, PACKAGING AND SHIPPING

The documentation result by the Dockweiler Inspection Certificate 3.1 according to DIN EN 10204.

Bright finished tubes and fittings are closed with transparent PE caps and are individually sealed in PE foil. The tubes and fittings as well as the batch label on the foil contain the information TCC 304L.

Delivery of tubes in tubular container or wooden crate, fittings in strong cardboard box with shock absorbing filler.

# COAX



## APPLICATIONS

COAX is a twin wall tube used for transport of toxic, explosive and corrosive media for the semiconductor and chemical industry.



PROCESS MEASUREMENT AND CONTROL



PHOTOVOLTAIC

## DIMENSIONS

The inner process tube is available from stock in the following sizes:

**Imperial (according to ASTM A269 / A632 and DIN 11866 Series C)**  
1/4" (0.250 inch x 0.035 inch) to 6" (6.000 inch x 0.109 inch)  
6.35 mm x 0.89 mm to 25.40 mm x 1.65 mm

Other dimensions on request.

## TECHNICAL TERMS OF DELIVERY

Tubes and fittings are prepared for orbital welding acc. to the following standards:

**Tubes**  
acc. to ASTM A 269 / A 632, DIN EN 10217-7 / 10216-5 with a length of 232.284 - 239.764 inch (max. 10% short lengths of min. 118.110 inch possible)

**Tube components**  
Prematerial acc. to ASTM A 269 / A 632, DIN EN 10217-7 / 10216-5

**Machined components**  
Prematerial acc. to ASTM A 479, DIN EN 10088-3, DIN 17440, ASTM A 182 (Pipe)

Tubes are permanently marked over the full length.  
Fittings are needle marked.

### Marking always with

- DOCKWEILER
- DW-Number
- Dimension
- Material
- Heat number

## MATERIALS

Welded or seamless austenitic stainless steel tubes (for outer safety tube and inner process tube) are available in the following materials:

- 1.4404 / UNS S31603 (316L)
- 1.4435 / UNS S31603 (316L) (acc. to Basler Norm 2 (BN2))
- UNS S31603 (316L)

**The hardness is equivalent to:**  
max. 180 HV acc. to DIN EN ISO 6507-1  
max. 90 HRB acc. to DIN EN ISO 6508-1

## SURFACES

The Ra value for the inner surface is in accordance to the quality of the process tube:

Ultron\*: Ra ≤ 10 µm (0.25 µm)  
Finetron / Finetron.1\*: Ra ≤ 16 µm (0.40 µm)  
TCC / TCC.1\*: not defined, on request with Ra ≤ 32 µm (0.80 µm)  
\* for further information please see individually specification

Ra value in the cold worked area of fittings (inner and outer surface), on the surface of circumferential welds as well as on the longitudinal weld seam of electropolished tubes and fittings is not defined. Specified roughness of total surface available on request.

## QUALITY AND TEST PROCEDURES

- Verification of basic test certificate
- Visual control
- Endoscopic inspection of bright finished tubes
- Verification of dimensions
- Roughness measurements

## DOCUMENTATION, PACKAGING AND SHIPPING

The documentation result by the Dockweiler Inspection Certificate 3.1 acc. to DIN EN 10204.

For details of packaging please see individually specification.

Delivery of tubes in tubular container or wooden crate, fittings in strong cardboard box with shock absorbing filler.

**Information of the functional principles and installation constructions can be found on page 27**

## DOCKWEILER TUBE SYSTEMS **TUBES AND ORBITAL WELD FITTINGS**



### DOCKWEILER TUBES AND ORBITAL WELD FITTINGS

**ultron** **finetron** **finetron.1** **TCC** **TCC 304L** **COAX**

#### TUBE DIMENSIONS

Imperial Tube, Imperial Pipe (10S)

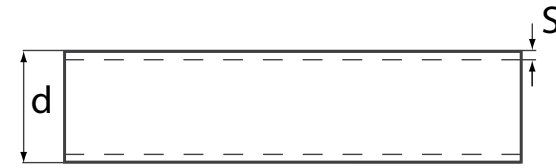
#### FITTING DIMENSIONS

- Elbows 45°
- Elbows 90°
- Tee, equal and reduced
- Concentric and Eccentric Reducer
- Weld Cap
- COAX

Imperial Tube, Imperial Pipe (on request)

## IMPERIAL TUBING

UL, FT, TC, T4



Please add the quality to the Part-No.  
 UL = Ultron  
 FT = Finetron  
 FT.1 = Finetron.1  
 TC = TCC  
 T4 = TCC 304L

Part-No.	Imperial Nominal Size (d)		Tube Wall Thickness (S)		Weight	
	[Inch]	[mm]	[Inch]	[mm]	[lbs/ft]	[kg/m]
XX-02	1/8 <sup>(1)</sup>	3.18	0.022	0.56	0.0247	0.0368
XX-02x0.028	1/8 <sup>(1)</sup>	3.18	0.028	0.71	0.0295	0.0439
XX-04	1/4 <sup>(2)</sup>	6.35	0.035	0.89	0.0833	0.1241
XX-06	3/8 <sup>(2)</sup>	9.53	0.035	0.89	0.1321	0.1966
XX-08	1/2 <sup>(2)</sup>	12.70	0.049	1.24	0.2359	0.3511
XX-12	3/4 <sup>(2)</sup>	19.05	0.065	1.65	0.4836	0.7198
XX-16	1 <sup>(3)</sup>	25.40	0.065	1.65	0.6601	0.9824
XX-24	1 1/2 <sup>(4)</sup>	38.10	0.065	1.65	1.0131	1.5077
XX-32	2 <sup>(4)</sup>	50.80	0.065	1.65	1.3661	2.0331
XX-40	2 1/2 <sup>(4)</sup>	63.50	0.065	1.65	1.7192	2.5585
XX-48	3 <sup>(4)</sup>	76.20	0.065	1.65	2.0722	3.0838
XX-64	4 <sup>(4)</sup>	101.60	0.083	2.11	3.5363	5.2627
XX-96	6 <sup>(4)</sup>	152.40	0.109	2.77	6.9823	10.3909

Further dimensions on request. Subject to alteration.

<sup>1)</sup> 1/8" Ultron and TCC

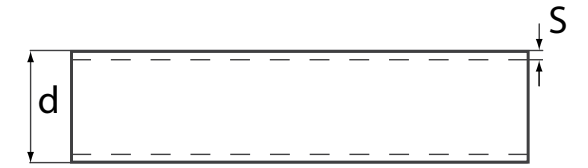
<sup>2)</sup> 1/4" - 3/4" Ultron, FT1, TCC304L

<sup>3)</sup> 1" Ultron, FT or FT1, TCC304L

<sup>4)</sup> > 1" Ultron, TCC, TCC304L

## IMPERIAL PIPE (10S)

UL, FT, TC, T4



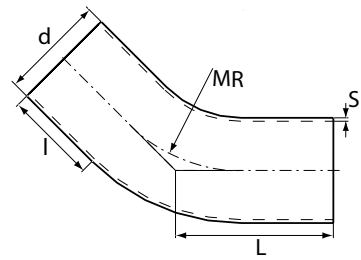
Please add the quality to the Part-No.  
 UL = Ultron  
 FT = Finetron  
 TC = TCC  
 T4 = TCC 304L

Part-No.	Pipe NPS Schedule 10S Nominal Size (d)		Tube Wall Thickness (S)		Weight	
	[Inch]	[mm]	[Inch]	[mm]	[lbs/ft]	[kg/m]
XX-NPS128	8 <sup>(1)</sup>	219.08	0.148	3.76	13.6208	20.2700
XX-NPS160	10 <sup>(1)</sup>	273.05	0.165	4.19	18.9562	28.2100
XX-NPS192	12 <sup>(1)</sup>	323.85	0.180	4.57	24.5537	36.5400
XX-NPS256	16 <sup>(2)</sup>	406.40	0.188	4.78	32.3015	48.0700
XX-NPS320	20 <sup>(2)</sup>	508.00	0.218	5.54	47.0042	69.9500

Further dimensions on request. Subject to alteration.

<sup>1)</sup> 8" - 12" available in Ultron, TCC or TCC304L

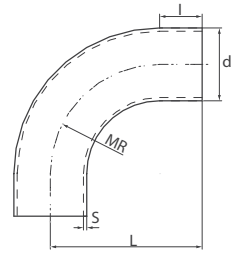
<sup>2)</sup> 16" - 20" only available in TCC and TCC304L



Please add the quality to the Part-No.  
 UL = Ultron  
 FT = Finetron  
 TC = TCC  
 T4 = TCC 304L

Part-No.	Imperial Nominal Size (d)		Wall Thickness (S)		Length (L)		Length (l)		Radius (MR)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
XX-4L-04	1/4"	6.35	0.035	0.89	2.000	50.80	1.7700	44.88	0.563	14.30
XX-4L-06	3/8"	9.53	0.035	0.89	2.000	50.80	1.5350	38.95	1.126	28.60
XX-4L-08	1/2"	12.70	0.049	1.24	2.250	57.20	1.8000	46.02	1.063	27.00
XX-4L-12	3/4"	19.05	0.065	1.65	2.250	57.20	1.7875	45.35	1.126	28.60
XX-4L-16	1"	25.40	0.065	1.65	2.250	57.20	1.6300	41.42	1.500	38.10
XX-4L-24	1 1/2"	38.10	0.065	1.65	2.500	63.50	1.5700	39.81	2.252	57.20
XX-4L-32	2"	50.80	0.065	1.65	3.000	76.20	1.7575	44.64	3.000	76.20
XX-4L-40	2 1/2"	63.50	0.065	1.65	3.374	85.70	1.8200	46.23	3.752	95.30
XX-4L-48	3"	76.20	0.065	1.65	3.626	92.10	1.7625	44.76	4.500	114.30
XX-4L-64	4"	101.60	0.083	2.11	4.500	114.30	2.0150	51.17	6.000	152.40
XX-4L-96	6"	152.40	0.109	2.77	8.750	222.25	5.0225	127.56	9.000	228.60

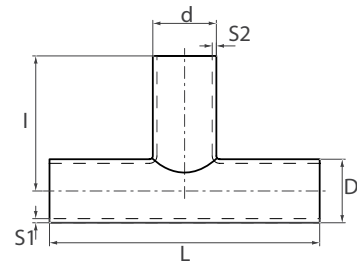
Further dimensions on request. Subject to alteration.



Please add the quality to the Part-No.  
 UL = Ultron  
 FT = Finetron  
 TC = TCC  
 T4 = TCC 304L

Part-No.	Imperial Nominal Size (d)		Wall Thickness (S)		Length (L)		Length (l)		Radius (MR)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
XX-9L-04	1/4"	6.35	0.035	0.89	2.626	66.70	2.063	52.40	0.563	14.30
XX-9L-06	3/8"	9.53	0.035	0.89	2.626	66.70	1.500	38.10	1.126	28.60
XX-9L-08	1/2"	12.70	0.049	1.24	3.000	76.20	1.937	49.20	1.063	27.00
XX-9L-12	3/4"	19.05	0.065	1.65	3.000	76.20	1.874	47.60	1.126	28.60
XX-9L-16	1"	25.40	0.065	1.65	3.000	76.20	1.500	38.10	1.500	38.10
XX-9L-24	1 1/2"	38.10	0.065	1.65	3.752	95.30	1.500	38.10	2.252	57.20
XX-9L-32	2"	50.80	0.065	1.65	4.752	120.70	1.752	44.50	3.000	76.20
XX-9L-40	2 1/2"	63.50	0.065	1.65	5.500	139.70	1.752	44.40	3.752	95.30
XX-9L-48	3"	76.20	0.065	1.65	6.240	158.50	1.752	44.50	4.500	114.30
XX-9L-64	4"	101.60	0.083	2.11	8.000	203.20	2.000	50.80	6.000	152.40
XX-9L-96	6"	152.40	0.109	2.77	14.000	355.60	5.000	127.00	9.000	228.60

Further dimensions on request. Subject to alteration.



Please add the quality to the Part-No.  
UL = Ultron  
FT = Finetron  
TC = TCC  
T4 = TCC 304L

Part-No.	Imperial Nominal Size (D x d)		Wall Thickness (S1 / S2)		Length (L)		Length (l)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
XX-TE-04	1/4" x 1/4"	6.35 x 6.35	0.035 / 0.035	0.89 / 0.89	3.504	89.00	1.752	44.50
XX-RT-06-04	3/8" x 1/4"	9.53 x 6.35	0.035 / 0.035	0.89 / 0.89	3.504	89.00	1.752	44.50
XX-TE-06	3/8" x 3/8"	9.53 x 9.53	0.035 / 0.035	0.89 / 0.89	3.504	89.00	1.752	44.50
XX-RT-08-04	1/2" x 1/4"	12.70 x 6.35	0.049 / 0.035	1.24 / 0.89	3.748	95.20	1.874	47.60
XX-RT-08-06	1/2" x 3/8"	12.70 x 9.53	0.049 / 0.035	1.24 / 0.89	3.748	95.20	1.874	47.60
XX-TE-08	1/2" x 1/2"	12.70 x 12.70	0.049 / 0.049	1.24 / 1.24	3.748	95.20	1.874	47.60
XX-RT-12-04	3/4" x 1/4"	19.05 x 6.35	0.065 / 0.035	1.65 / 0.89	3.976	101.60	2.000	50.80
XX-RT-12-06	3/4" x 3/8"	19.05 x 9.53	0.065 / 0.035	1.65 / 0.89	3.976	101.60	2.000	50.80
XX-RT-12-08	3/4" x 1/2"	19.05 x 12.70	0.065 / 0.049	1.65 / 1.24	3.976	101.60	2.000	50.80
XX-TE-12	3/4" x 3/4"	19.05 x 19.05	0.065 / 0.065	1.65 / 1.65	3.976	101.60	2.000	50.80
XX-RT-16-04	1" x 1/4"	25.40 x 6.35	0.065 / 0.035	1.65 / 0.89	4.252	108.00	2.126	54.00
XX-RT-16-06	1" x 3/8"	25.40 x 9.53	0.065 / 0.035	1.65 / 0.89	4.252	108.00	2.126	54.00
XX-RT-16-08	1" x 1/2"	25.40 x 12.70	0.065 / 0.049	1.65 / 1.24	4.252	108.00	2.126	54.00
XX-RT-16-12	1" x 3/4"	25.40 x 19.05	0.065 / 0.065	1.65 / 1.65	4.252	108.00	2.126	54.00
XX-TE-16	1" x 1"	25.40 x 25.40	0.065 / 0.065	1.65 / 1.65	4.252	108.00	2.126	54.00
XX-RT-24-08	1 1/2" x 1/2"	38.10 x 12.70	0.065 / 0.049	1.65 / 1.24	4.748	120.60	2.374	60.30
XX-RT-24-12	1 1/2" x 3/4"	38.10 x 19.05	0.065 / 0.065	1.65 / 1.65	4.748	120.60	2.374	60.30
XX-RT-24-16	1 1/2" x 1"	38.10 x 25.40	0.065 / 0.065	1.65 / 1.65	4.748	120.60	2.374	60.30
XX-TE-24	1 1/2" x 1 1/2"	38.10 x 38.10	0.065 / 0.065	1.65 / 1.65	4.748	120.60	2.374	60.30

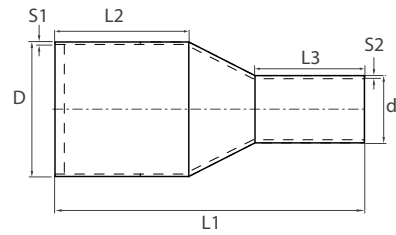
Please add the quality to the Part-No.  
UL = Ultron  
FT = Finetron  
TC = TCC  
T4 = TCC 304L

Part-No.	Imperial Nominal Size (D x d)		Wall Thickness (S1 / S2)		Length (L)		Length (l)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
XX-RT-32-08	2" x 1/2"	50.80 x 12.70	0.065 / 0.049	1.65 / 1.24	5.748	146.00	2.626	66.70
XX-RT-32-12	2" x 3/4"	50.80 x 19.05	0.065 / 0.065	1.65 / 1.65	5.748	146.00	2.626	66.70
XX-RT-32-16	2" x 1"	50.80 x 25.40	0.065 / 0.065	1.65 / 1.65	5.748	146.00	2.626	66.70
XX-RT-32-24	2" x 1 1/2"	50.80 x 50.80	0.065 / 0.065	1.65 / 1.65	5.748	146.00	2.626	66.70
XX-TE-32	2" x 2"	50.80 x 50.80	0.065 / 0.065	1.65 / 1.65	5.748	146.00	2.874	73.00
XX-RT-40-08	2 1/2" x 1/2"	63.50 x 12.70	0.065 / 0.049	1.65 / 1.24	6.252	158.80	2.874	73.00
XX-RT-40-12	2 1/2" x 3/4"	63.50 x 19.05	0.065 / 0.065	1.65 / 1.65	6.252	158.80	2.874	73.00
XX-RT-40-16	2 1/2" x 1"	63.50 x 25.40	0.065 / 0.065	1.65 / 1.65	6.252	158.80	2.874	73.00
XX-RT-40-24	2 1/2" x 1 1/2"	63.50 x 38.10	0.065 / 0.065	1.65 / 1.65	6.252	158.80	2.874	73.00
XX-RT-40-32	2 1/2" x 2"	63.50 x 50.80	0.065 / 0.065	1.65 / 1.65	6.252	158.80	2.874	73.00
XX-TE-40	2 1/2" x 2 1/2"	63.50 x 63.50	0.065 / 0.065	1.65 / 1.65	6.252	158.80	3.126	79.40
XX-RT-48-08	3" x 1/2"	76.20 x 12.70	0.065 / 0.049	1.65 / 1.24	6.752	171.50	3.126	79.40
XX-RT-48-12	3" x 3/4"	76.20 x 19.05	0.065 / 0.065	1.65 / 1.65	6.752	171.50	3.126	79.40
XX-RT-48-16	3" x 1"	76.20 x 25.40	0.065 / 0.065	1.65 / 1.65	6.752	171.50	3.126	79.40
XX-RT-48-24	3" x 1 1/2"	76.20 x 38.10	0.065 / 0.065	1.65 / 1.65	6.752	171.50	3.126	79.40
XX-RT-48-32	3" x 2"	76.20 x 50.80	0.065 / 0.065	1.65 / 1.65	6.752	171.50	3.126	79.40
XX-RT-48-40	3" x 2 1/2"	76.20 x 63.50	0.065 / 0.065	1.65 / 1.65	6.752	171.50	3.126	79.40
XX-TE-48	3" x 3"	76.20 x 76.20	0.065 / 0.065	1.65 / 1.65	6.752	171.50	3.374	85.70
XX-RT-64-08	4" x 1/2"	101.60 x 12.70	0.083 / 0.049	2.11 / 1.24	8.252	209.60	3.626	92.10
XX-RT-64-12	4" x 3/4"	101.60 x 19.05	0.083 / 0.065	2.11 / 1.65	8.252	209.60	3.626	92.10
XX-RT-64-16	4" x 1"	101.60 x 25.40	0.083 / 0.065	2.11 / 1.65	8.252	209.60	3.626	92.10
XX-RT-64-24	4" x 1 1/2"	101.60 x 38.10	0.083 / 0.065	2.11 / 1.65	8.252	209.60	3.626	92.10
XX-RT-64-32	4" x 2"	101.60 x 50.80	0.083 / 0.065	2.11 / 1.65	8.252	209.60	3.874	98.40
XX-RT-64-40	4" x 2 1/2"	101.60 x 63.50	0.083 / 0.065	2.11 / 1.65	8.252	209.60	3.874	98.40
XX-RT-64-48	4" x 3"	101.60 x 76.20	0.083 / 0.065	2.11 / 1.65	8.252	209.60	3.874	98.40
XX-TE-64	4" x 4"	101.60 x 101.60	0.083 / 0.083	2.11 / 2.11	8.252	209.60	4.126	104.80
XX-RT-96-64	6" x 4"	152.40 x 101.60	0.109 / 0.083	2.77 / 2.11	11.252	285.80	5.126	130.20
XX-TE-96	6" x 6"	152.40 x 152.40	0.109 / 0.109	2.77 / 2.77	11.252	285.80	5.626	142.90

Further dimensions on request. Subject to alteration.

# CONCENTRIC REDUCER

CR

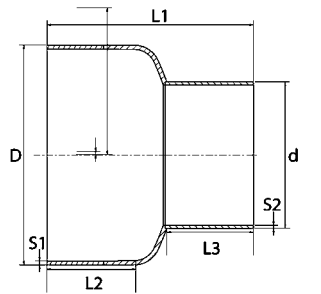


Please add the quality to the Part-No.  
 UL = Ultron  
 FT = Finetron  
 TC = TCC  
 T4 = TCC 304L

Part-No.	Imperial Nominal Size (d)		Wall Thickness (S1/S2)		Length (L1)		Length (L2)		Length (L3)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
XX-CR-06-04	3/8" x 1/4"	9.53 x 6.35	0.035 / 0.035	0.89 / 0.89	1.625	41.28	0.75	19.05	0.75	19.05
XX-CR-08-04	1/2" x 1/4"	12.70 x 6.35	0.049 / 0.035	1.24 / 0.89	1.496	38.00	0.75	19.00	0.75	19.00
XX-CR-08-06	1/2" x 3/8"	12.70 x 9.53	0.049 / 0.035	1.24 / 0.89	1.496	38.00	0.75	19.00	0.75	19.00
XX-CR-12-06	3/4" x 3/8"	19.05 x 9.53	0.065 / 0.035	1.65 / 0.89	2.000	50.80	1.00	25.40	0.75	19.05
XX-CR-12-08	3/4" x 1/2"	19.05 x 12.70	0.065 / 0.049	1.65 / 1.24	2.125	53.98	1.00	25.40	1.00	25.40
XX-CR-16-08	1" x 1/2"	25.40 x 12.70	0.065 / 0.049	1.65 / 1.24	2.500	63.50	1.57	39.80	0.79	20.00
XX-CR-16-12	1" x 3/4"	25.40 x 19.05	0.065 / 0.065	1.65 / 1.65	2.125	53.98	1.00	25.40	1.00	25.40
XX-CR-24-08	1 1/2" x 1/2"	38.10 x 12.70	0.065 / 0.049	1.65 / 1.24	3.150	80.00	1.18	30.00	0.98	25.00
XX-CR-24-12	1 1/2" x 3/4"	38.10 x 19.05	0.065 / 0.065	1.65 / 1.65	3.000	76.20	1.00	25.40	1.00	25.40
XX-CR-24-16	1 1/2" x 1"	38.10 x 25.40	0.065 / 0.065	1.65 / 1.65	2.500	63.50	1.00	25.40	1.00	25.40
XX-CR-32-16	2" x 1"	50.80 x 25.40	0.065 / 0.065	1.65 / 1.65	3.375	85.73	1.00	25.40	1.00	25.40
XX-CR-32-24	2" x 1 1/2"	50.80 x 38.10	0.065 / 0.065	1.65 / 1.65	2.500	63.50	1.00	25.40	1.00	25.40
XX-CR-40-16	2 1/2" x 1"	63.50 x 25.40	0.065 / 0.065	1.65 / 1.65	3.937	100.00	1.18	30.00	0.98	25.00
XX-CR-40-24	2 1/2" x 1 1/2"	63.50 x 38.10	0.065 / 0.065	1.65 / 1.65	3.375	85.73	1.00	25.40	1.00	25.40
XX-CR-40-32	2 1/2" x 2"	63.50 x 50.80	0.065 / 0.065	1.65 / 1.65	2.500	63.50	1.00	25.40	1.00	25.40
XX-CR-48-24	3" x 1 1/2"	76.20 x 38.10	0.065 / 0.065	1.65 / 1.65	4.250	107.95	1.50	38.10	1.00	25.40
XX-CR-48-32	3" x 2"	76.20 x 50.80	0.065 / 0.065	1.65 / 1.65	3.375	85.73	1.50	38.10	1.00	25.40
XX-CR-48-40	3" x 2 1/2"	76.20 x 63.50	0.065 / 0.065	1.65 / 1.65	2.625	66.68	1.50	38.10	1.00	25.40
XX-CR-64-32	4" x 2"	101.60 x 50.80	0.083 / 0.065	2.11 / 1.65	5.125	130.18	1.50	38.10	1.00	25.40
XX-CR-64-40	4" x 2 1/2"	101.60 x 63.50	0.083 / 0.065	2.11 / 1.65	4.250	107.95	1.50	38.10	1.00	25.40
XX-CR-64-48	4" x 3"	101.60 x 76.20	0.083 / 0.065	2.11 / 1.65	3.875	98.43	1.50	38.10	1.50	38.10
XX-CR-96-48	6" x 3"	152.40 x 76.20	0.109 / 0.065	2.77 / 1.65	7.250	184.15	2.00	50.80	1.50	38.10
XX-CR-96-64	6" x 4"	152.40 x 101.60	0.109 / 0.083	2.77 / 2.11	5.625	142.88	2.00	50.80	1.50	38.10

# FORMED CONCENTRIC REDUCER

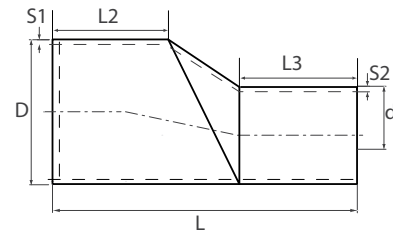
FCR



Please add the quality to the Part-No.  
 UL = Ultron  
 FT = Finetron  
 TC = TCC  
 T4 = TCC 304L

Part-No.	Imperial Nominal Size (d)		Wall Thickness (S1/S2)		Length (L1)		Length (L2)		Length (L3)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
XX-FCR-96-48	6" x 3"	152.40 x 76.20	0.109 / 0.065	2.77 / 1.65	7.250	184.15	3.224	81.90	1.969	50.00
XX-FCR-96-64	6" x 4"	152.40 x 101.60	0.109 / 0.083	2.77 / 2.11	5.622	142.80	2.372	60.25	2.402	60.00

Further dimensions on request. Subject to alteration.



Please add the quality to the Part-No.  
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FT = Finetron  
TC = TCC  
T4 = TCC 304L

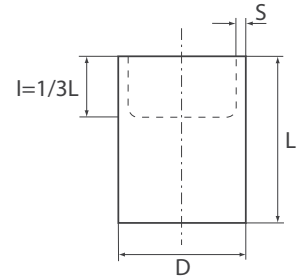
Part-No.	Imperial Nominal Size (d)		Wall Thickness (S1/S2)		Length (L1)		Length (L2)		Length (L3)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
XX-ER-06-04	3/8" x 1/4"	9.53 x 6.35	0.035 / 0.035	0.89 / 0.89	1.625	41.28	0.75	19.05	0.75	19.05
XX-ER-08-04	1/2" x 1/4"	12.70 x 6.35	0.049 / 0.035	1.24 / 0.89	1.496	38.00	0.75	19.00	0.75	19.00
XX-ER-08-06	1/2" x 3/8"	12.70 x 9.53	0.049 / 0.035	1.24 / 0.89	1.496	38.00	0.75	19.00	0.75	19.00
XX-ER-12-06	3/4" x 3/8"	19.05 x 9.53	0.065 / 0.035	1.65 / 0.89	2.000	50.80	1.00	25.40	0.75	19.05
XX-ER-12-08	3/4" x 1/2"	19.05 x 12.70	0.065 / 0.049	1.65 / 1.24	2.125	53.98	1.00	25.40	1.00	25.40
XX-ER-16-08	1" x 1/2"	25.40 x 12.70	0.065 / 0.049	1.65 / 1.24	2.362	60.00	1.00	25.40	1.00	25.40
XX-ER-16-12	1" x 3/4"	25.40 x 19.05	0.065 / 0.065	1.65 / 1.65	2.125	53.98	1.00	25.40	1.00	25.40
XX-ER-24-08	1 1/2" x 1/2"	38.10 x 12.70	0.065 / 0.049	1.65 / 1.24	3.150	80.00	1.18	30.00	0.98	25.00
XX-ER-24-12	1 1/2" x 3/4"	38.10 x 19.05	0.065 / 0.065	1.65 / 1.65	3.000	76.20	1.00	25.40	1.00	25.40
XX-ER-24-16	1 1/2" x 1"	38.10 x 25.40	0.065 / 0.065	1.65 / 1.65	2.500	63.50	1.00	25.40	1.00	25.40
XX-ER-32-16	2" x 1"	50.80 x 25.40	0.065 / 0.065	1.65 / 1.65	3.375	85.73	1.00	25.40	1.00	25.40
XX-ER-32-24	2" x 1 1/2"	50.80 x 38.10	0.065 / 0.065	1.65 / 1.65	2.500	63.50	1.00	25.40	1.00	25.40
XX-ER-40-16	2 1/2" x 1"	63.50 x 25.40	0.065 / 0.065	1.65 / 1.65	3.937	100.00	1.18	30.00	0.98	25.00
XX-ER-40-24	2 1/2" x 1 1/2"	63.50 x 38.10	0.065 / 0.065	1.65 / 1.65	3.375	85.73	1.00	25.40	1.00	25.40
XX-ER-40-32	2 1/2" x 2"	63.50 x 50.80	0.065 / 0.065	1.65 / 1.65	2.500	63.50	1.00	25.40	1.00	25.40

Please add the quality to the Part-No.  
UL = Ultron  
FT = Finetron  
TC = TCC  
T4 = TCC 304L

Part-No.	Imperial Nominal Size (d)		Wall Thickness (S1/S2)		Length (L1)		Length (L2)		Length (L3)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
XX-ER-48-24	3" x 1 1/2"	76.20 x 38.10	0.065 / 0.065	1.65 / 1.65	4.250	107.95	1.50	38.10	1.00	25.40
XX-ER-48-32	3" x 2"	76.20 x 50.80	0.065 / 0.065	1.65 / 1.65	3.375	85.73	1.50	38.10	1.00	25.40
XX-ER-48-40	3" x 2 1/2"	76.20 x 63.50	0.065 / 0.065	1.65 / 1.65	2.625	66.68	1.50	38.10	1.00	25.40
XX-ER-64-32	4" x 2"	101.60 x 50.80	0.083 / 0.065	2.11 / 1.65	5.125	130.18	1.50	38.10	1.00	25.40
XX-ER-64-40	4" x 2 1/2"	101.60 x 63.50	0.083 / 0.065	2.11 / 1.65	4.250	107.95	1.50	38.10	1.00	25.40
XX-ER-64-48	4" x 3"	101.60 x 76.20	0.083 / 0.065	2.11 / 1.65	3.875	98.43	1.50	38.10	1.50	38.10
XX-ER-96-48	6" x 3"	152.40 x 76.20	0.109 / 0.065	2.77 / 1.65	7.250	184.15	2.00	50.80	1.50	38.10
XX-ER-96-64	6" x 4"	152.40 x 101.60	0.109 / 0.083	2.77 / 2.11	5.625	142.88	2.00	50.80	1.50	38.10

Further dimensions on request. Subject to alteration.





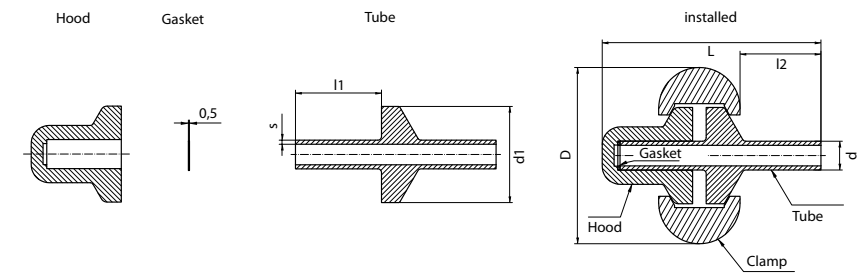
Please add the quality to the Part-No.  
UL = Ultron  
FT = Finetron  
TC = TCC  
T4 = TCC 304L

Part-No.	Imperial Nominal Size (d)		Wall Thickness (S)		Length (L)		Length (l)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
XX-WC-04	1/4"	6.35	0.035	0.89	1.368	34.75	0.197	5.00
XX-WC-06	3/8"	9.53	0.035	0.89	1.750	44.45	0.197	5.00
XX-WC-08	1/2"	12.70	0.049	1.24	1.750	44.45	0.197	5.00
XX-WC-12	3/4"	19.05	0.065	1.65	1.750	44.45	0.394	10.00
XX-WC-16	1"	25.40	0.065	1.65	1.750	44.45	0.394	10.00
XX-WC-24	1 1/2"	38.10	0.065	1.65	2.000	50.80	0.394	10.00
XX-WC-32	2"	50.80	0.065	1.65	2.000	50.80	0.591	15.00
XX-WC-40	2 1/2"	63.50	0.065	1.65	2.000	50.80	0.591	15.00
XX-WC-48	3"	76.20	0.065	1.65	2.000	50.80	0.591	15.00
XX-WC-64	4"	101.60	0.083	2.11	2.500	63.50	0.591	15.00
XX-WC-96	6"	152.40	0.109	2.77	7.874	200.00*	5.827	148.00

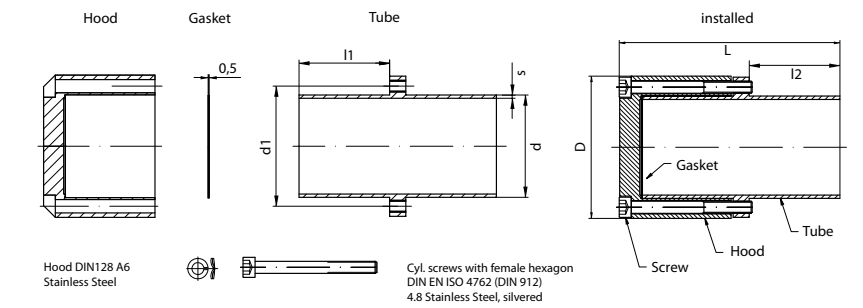
Further dimensions on request. Subject to alteration.

\* Differing design: not machined but dished boiled end welded to tube stub.

TYPE A



TYPE B



Please add the quality to the Part-No.  
UL = Ultron  
TC = TCC

Part-No.	TYPE A							
	Imperial							
	[Inch]	d [Inch]	s [Inch]	L [Inch]	D [Inch]	d1 [Inch]	l1 [Inch]	l2 [Inch]
XX-RWC-04	1/4"	0.250	0.035	1.906	1.535	-	0.750	1.049
TYPE B								
XX-RWC-08-01	1/2"	0.500	0.049	2.533	1.535	-	1.039	1.039
XX-RWC-08-02	1/2"	0.500	0.065	2.533	1.535	-	1.039	1.039
XX-RWC-12-01	3/4"	0.750	0.049	2.650	1.459	1.065	1.039	1.039
XX-RWC-12-02	3/4"	0.750	0.065	2.649	1.459	1.065	1.039	1.039
XX-RWC-16	1"	1.000	0.065	2.689	1.709	1.315	1.039	1.039
XX-RWC-24	1 1/2"	1.500	0.065	3.043	2.280	1.846	1.181	1.181
XX-RWC-32	2"	2.000	0.065	4.303	2.780	2.346	1.772	1.772
XX-RWC-40	2 1/2"	2.500	0.065	4.343	3.280	2.846	1.772	1.772
XX-RWC-48	3"	3.000	0.065	4.382	3.780	3.346	1.772	1.772
XX-RWC-64	4"	4.000	0.083	5.209	4.780	4.346	2.165	2.165
XX-RWC-96	6"	6.000	0.109	5.287	6.780	6.346	2.165	2.165

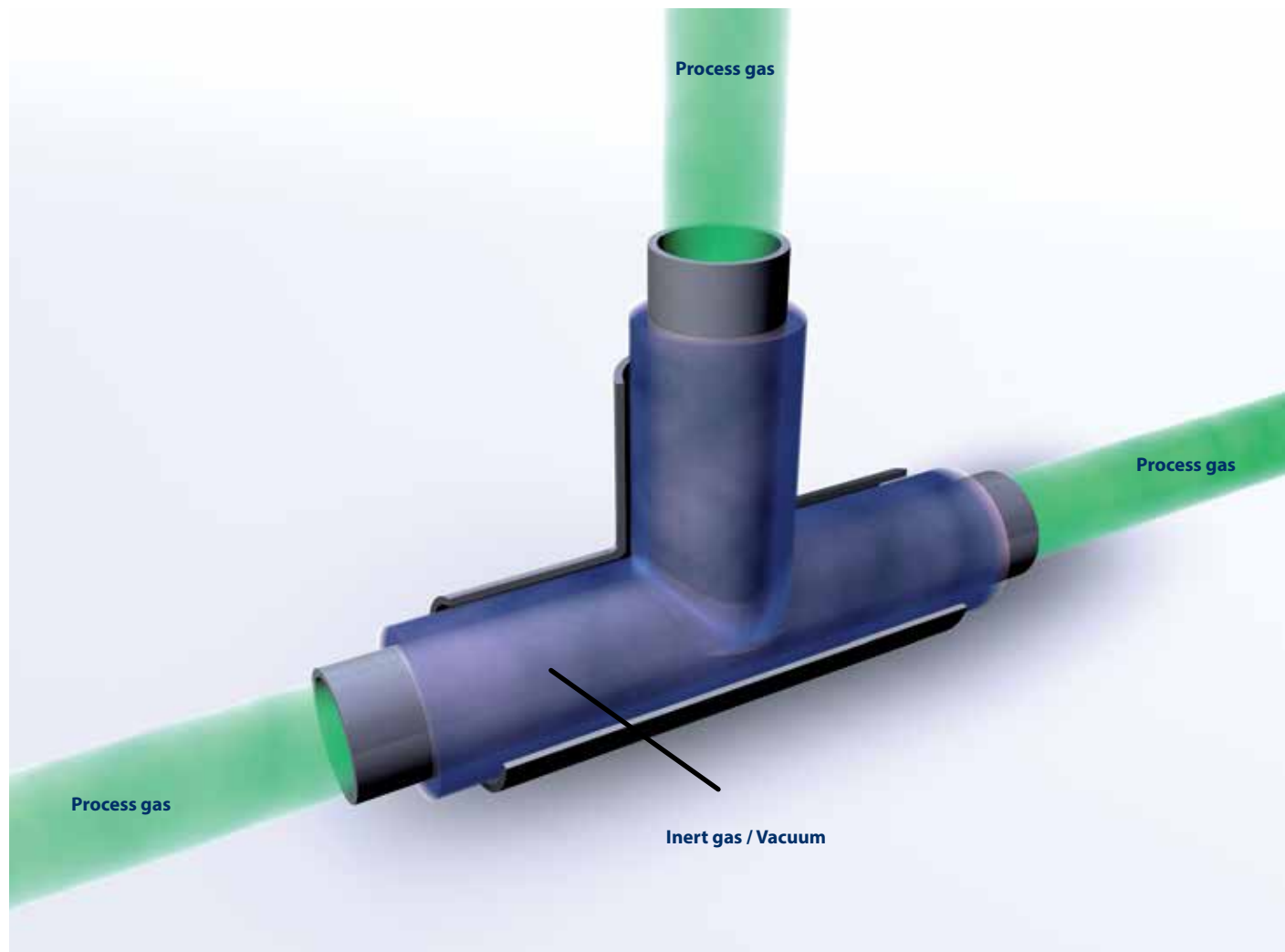
Further dimensions on request. Subject to alteration.

The special twin wall tube system consists of an inner electrochemically polished process tube and an outer safety tube.

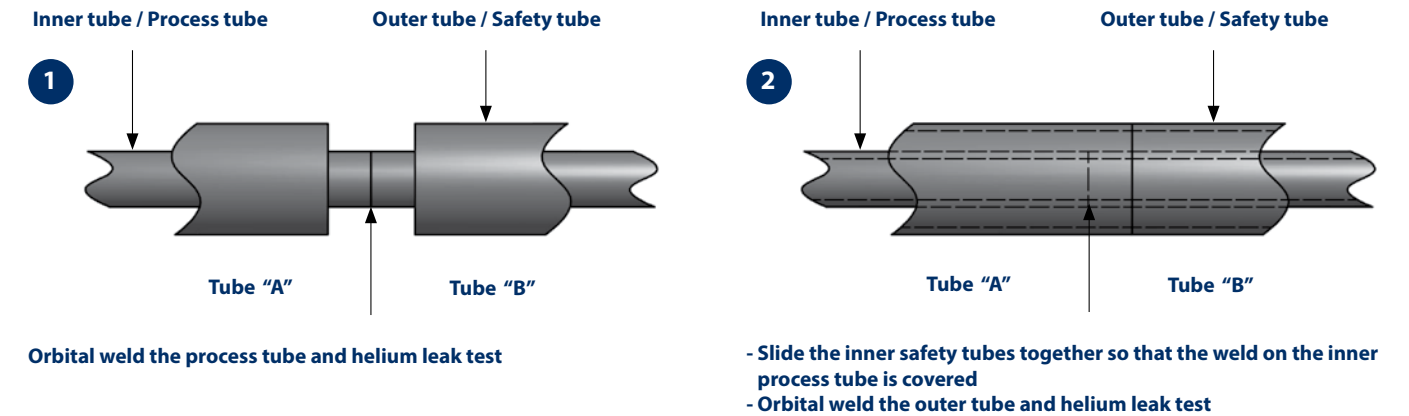
Both are prepared for orbital welding and manufactured from high quality stainless steel AISI 316L or 304L – according to customer specification (the tube is also available in other alloys on demand).

Spacers center the process tube and safeguard the gas, flow between the outer and the inner tube. In case of a leak in the process tube the escaping medium flows into the safety space and can be neutralized and harmlessly discharged from the system.

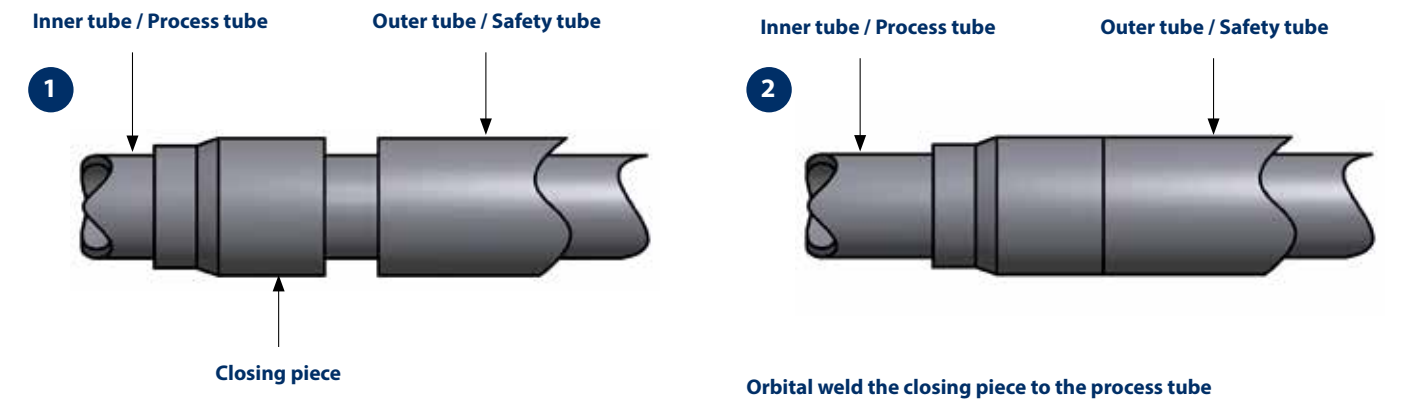
The coaxial tube system is easy to install by orbital welding and can also be integrated into existing systems and plants.



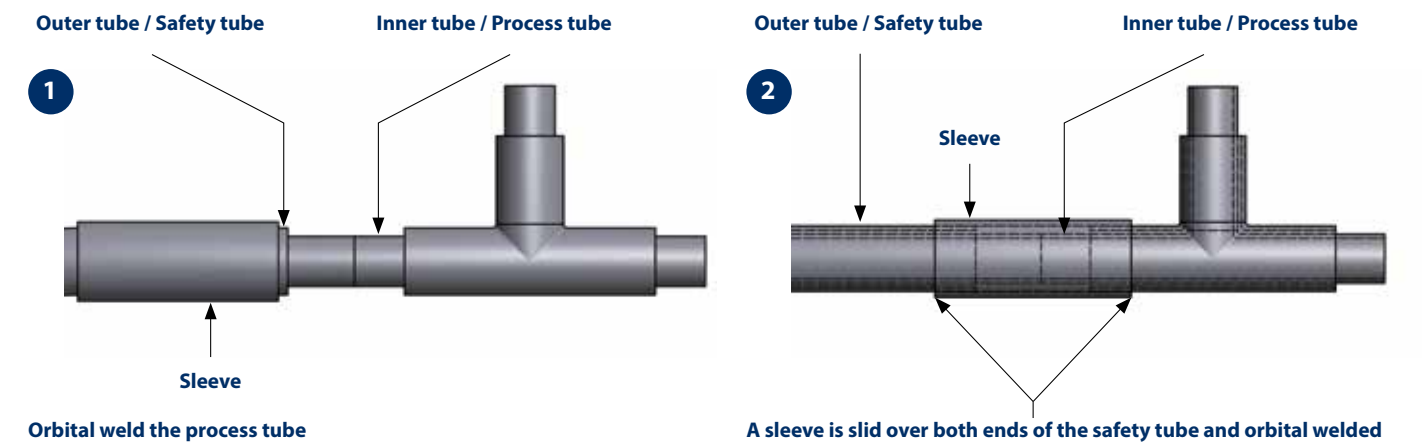
TUBE TO TUBE OR TUBE TO FITTING



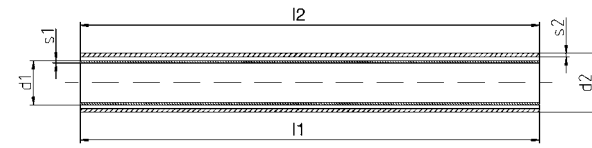
CLOSING THE OUTER SAFETY TUBE



FITTING TO FITTING



■ COAX

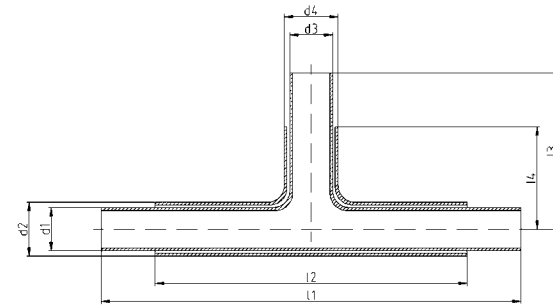


Part-No.		INNER TUBE		OUTER TUBE	
Outer Tubing TCC	Outer Tubing TCC 304L	[Inch]	[mm]	[Inch]	[mm]
CO-UL6-04-T6	CO-UL4-04-T4	1/4"	6.35	1/2"	12.70
CO-UL6-06-T6	CO-UL4-06-T4	3/8"	9.53	5/8"	15.88
CO-UL6-08-T6	CO-UL4-08-T4	1/2"	12.70	3/4"	19.05
CO-UL6-12-T6	CO-UL4-12-T4	3/4"	19.05	1"	25.40
CO-UL6-16-T6	CO-UL4-16-T4	1"	25.40	1 1/2"	38.10

DIMENSIONS INNER TUBE							
Imperial Nominal Size (d1)		Wall Thickness (s1)		Length (l1)		Tolerance (Length)	
[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
1/4"	6.35	0.035	0.89	234.252	5950.00	+/-2	+/-50
3/8"	9.53	0.035	0.89	234.252	5950.00	+/-2	+/-50
1/2"	12.70	0.049	1.24	234.252	5950.00	+/-2	+/-50
3/4"	19.05	0.065	1.65	234.252	5950.00	+/-2	+/-50
1"	25.40	0.065	1.65	234.252	5950.00	+/-2	+/-50

DIMENSIONS OUTER TUBE							
Imperial Nominal Size (d2)		Wall Thickness (s2)		Length (l2)		Tolerance (Length)	
[Inch]	[mm]	Inch	[mm]	Inch	[mm]	Inch	[mm]
1/2"	12.70	0.049	1.24	234.252	5950.00	+/-2	+/-50
5/8"	15.88	0.049	1.24	234.252	5950.00	+/-2	+/-50
3/4"	19.05	0.065	1.65	234.252	5950.00	+/-2	+/-50
1"	25.40	0.065	1.65	234.252	5950.00	+/-2	+/-50
1 1/2"	38.10	0.065	1.65	234.252	5950.00	+/-2	+/-50

COAX



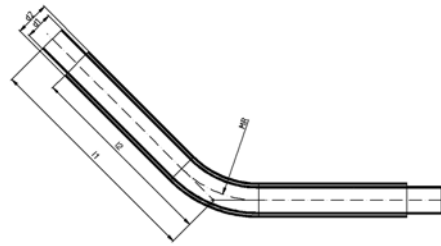
Part-No.	DIMENSIONS INNER TUBE										
	Tube						Branch				
	Nominal Size (d1)		Wall Thickness (s1)		Length (L1)		Nominal Size (d3)	Wall Thickness (s3)		Length (L3)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[mm]	[Inch]	[mm]	[Inch]	[mm]
CO-UL-CTE-04	1/4" x 1/4"	6.35	0.035	0.89	5.000	127.00	6.35	0.035	0.89	2.500	63.50
CO-UL-CRT-06-04	3/8" x 1/4"	9.53	0.035	0.89	5.000	127.00	6.35	0.035	0.89	2.500	63.50
CO-UL-CTE-06	3/8" x 3/8"	9.53	0.035	0.89	5.000	127.00	9.53	0.035	0.89	2.500	63.50
CO-UL-CRT-08-04	1/2" x 1/4"	12.70	0.049	1.24	5.250	133.35	6.35	0.035	0.89	2.625	66.68
CO-UL-CRT-08-06	1/2" x 3/8"	12.70	0.049	1.24	5.250	133.35	9.53	0.035	0.89	2.625	66.68
CO-UL-CTE-08	1/2" x 1/2"	12.70	0.049	1.24	5.250	133.35	12.70	0.049	1.24	2.625	66.68
CO-UL-CRT-12-04	3/4" x 1/4"	19.05	0.065	1.65	5.250	133.35	6.35	0.035	0.89	2.625	66.68
CO-UL-CRT-12-06	3/4" x 3/8"	19.05	0.065	1.65	5.250	133.35	9.53	0.035	0.89	2.625	66.68
CO-UL-CRT-12-08	3/4" x 1/2"	19.05	0.065	1.65	5.250	133.35	12.70	0.049	1.24	2.625	66.68
CO-UL-CTE-12	3/4" x 3/4"	19.05	0.065	1.65	5.250	133.35	19.05	0.065	1.65	2.625	66.68
CO-UL-CRT-16-04	1" x 1/4"	25.40	0.065	1.65	6.250	158.75	6.35	0.035	0.89	3.125	79.38
CO-UL-CRT-16-06	1" x 3/8"	25.40	0.065	1.65	6.250	158.75	9.53	0.035	0.89	3.125	79.38
CO-UL-CRT-16-08	1" x 1/2"	25.40	0.065	1.65	6.250	158.75	12.70	0.049	1.24	3.125	79.38
CO-UL-CRT-16-12	1" x 3/4"	25.40	0.065	1.65	6.250	158.75	19.05	0.065	1.65	3.125	79.38
CO-UL-CTE-16	1" x 1"	25.40	0.065	1.65	6.250	158.75	25.40	0.065	1.65	3.125	79.38

Part-No.	DIMENSIONS OUTER TUBE										
	Tube						Branch				
	Nominal Size (d2)		Wall Thickness (s2)		Length (L2)		Nominal Size (d3)	Wall Thickness (s4)		Length (L4)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[mm]	[Inch]	[mm]	[Inch]	[mm]
CO-UL-CTE-04	1/2" x 1/2"	12.70	0.049	1.24	3.500	88.90	12.70	0.049	1.24	1.750	44.45
CO-UL-CRT-06-04	5/8" x 1/2"	15.88	0.049	1.24	3.500	88.90	12.70	0.049	1.24	1.750	44.45
CO-UL-CTE-06	5/8" x 5/8"	15.88	0.049	1.24	3.500	88.90	15.88	0.049	1.24	1.750	44.45
CO-UL-CRT-08-04	3/4" x 1/2"	19.05	0.065	1.65	3.750	95.25	12.70	0.049	1.24	1.875	47.63
CO-UL-CRT-08-06	3/4" x 5/8"	19.05	0.065	1.65	3.750	95.25	15.88	0.049	1.24	1.875	47.63
CO-UL-CTE-08	3/4" x 3/4"	19.05	0.065	1.65	3.750	95.25	19.05	0.065	1.65	1.875	47.63
CO-UL-CRT-12-04	1" x 1/2"	25.40	0.065	1.65	3.750	95.25	12.70	0.049	1.24	1.875	47.63
CO-UL-CRT-12-06	1" x 5/8"	25.40	0.065	1.65	3.750	95.25	15.88	0.049	1.24	1.875	47.63
CO-UL-CRT-12-08	1" x 3/4"	25.40	0.065	1.65	3.750	95.25	19.05	0.065	1.65	1.875	47.63
CO-UL-CTE-12	1" x 1"	25.40	0.065	1.65	3.750	95.25	25.40	0.065	1.65	1.875	47.63
CO-UL-CRT-16-04	1 1/2" x 1/2"	38.10	0.065	1.65	4.250	107.95	12.70	0.049	1.24	2.125	53.98
CO-UL-CRT-16-06	1 1/2" x 5/8"	38.10	0.065	1.65	4.250	107.95	15.88	0.049	1.24	2.125	53.98
CO-UL-CRT-16-08	1 1/2" x 3/4"	38.10	0.065	1.65	4.250	107.95	19.05	0.065	1.65	2.125	53.98
CO-UL-CRT-16-12	1 1/2" x 1"	38.10	0.065	1.65	4.250	107.95	25.40	0.065	1.65	2.125	53.98
CO-UL-CTE-16	1 1/2" x 1 1/2"	38.10	0.065	1.65	4.250	107.95	38.10	0.065	1.65	2.125	53.98

**COAXIAL 45° ELBOW**

C4L

**COAX**

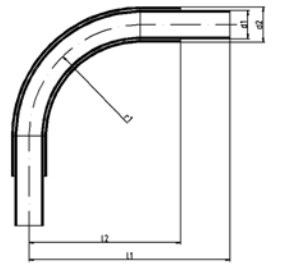


DIMENSIONS										
Part-No.	Inner Tube				Outer Tube					
	Nominal Size (d1)		Length (l1)		Nominal Size (d2)		Length (l2)		Radius (MR)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
CO-UL-C4L-04	1/4"	6.35	3.875	98.45	0.500	12.70	3.125	79.40	1.500	38.10
CO-UL-C4L-06	3/8"	9.53	3.875	98.45	0.625	15.88	3.125	79.40	2.244	57.00
CO-UL-C4L-08	1/2"	12.70	4.302	109.26	0.750	19.05	3.552	90.21	3.346	85.00
CO-UL-C4L-12	3/4"	19.05	5.339	135.61	1.000	25.40	4.339	110.21	3.346	85.00
CO-UL-C4L-16	1"	25.40	3.500	88.90	1.500	38.10	2.500	63.50	2.250	57.20

**COAXIAL 90° ELBOW**

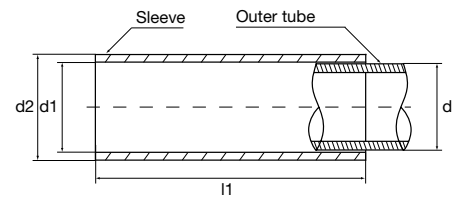
C9L

**COAX**



DIMENSIONS										
Part-No.	Inner Tube				Outer Tube					
	Nominal Size (d1)		Length (l1)		Nominal Size (d2)		Length (l2)		Radius (MR)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
CO-UL-C9L-04	1/4"	6.35	4.752	120.70	0.500	12.70	4.002	101.65	1.500	38.10
CO-UL-C9L-06	3/8"	9.53	5.146	130.70	0.625	15.88	4.396	111.65	2.244	57.00
CO-UL-C9L-08	1/2"	12.70	7.260	184.40	0.750	19.05	6.510	165.35	3.346	85.00
CO-UL-C9L-12	3/4"	19.05	7.510	190.75	1.000	25.40	6.510	165.35	3.346	85.00
CO-UL-C9L-16	1"	25.40	4.250	107.97	1.500	38.10	3.250	82.57	1.500	38.10

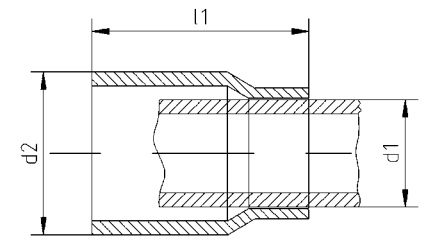
**COAX**



Please add the quality to the Part-No.  
 CWS = Coaxial Weld Sleeve (Length: 4.000 inch / 101.60 mm)  
 CWS3 = Coaxial Weld Sleeve (Length: 3.000 inch / 76.20 mm)

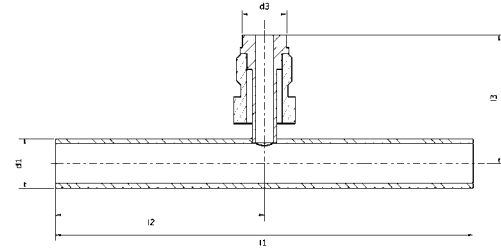
Part-No.	Process Tube		Outer Tube		Sleeve					
	Nominal Size (d)		Nominal Size (d1)		Nominal Size (d2)		Length (l1)			
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
CO-TC-XXX-04	1/4"	6.35	0.500	12.70	0.508	12.90	0.625	15.88	4.000 / 3.000	101.60 / 76.20
CO-TC-XXX-06	3/8"	9.53	0.625	15.88	0.634	16.11	0.750	19.05	4.000 / 3.000	101.60 / 76.20
CO-TC-XXX-08	1/2"	12.70	0.750	19.05	0.760	19.30	0.875	22.23	4.000 / 3.000	101.60 / 76.20
CO-TC-XXX-12	3/4"	19.05	1.000	25.40	1.008	25.60	1.181	30.00	4.000 / 3.000	101.60 / 76.20
CO-TC-XXX-16	1"	25.40	1.500	38.10	1.512	38.40	1.669	42.40	4.000 / 3.000	101.60 / 76.20

**COAX**



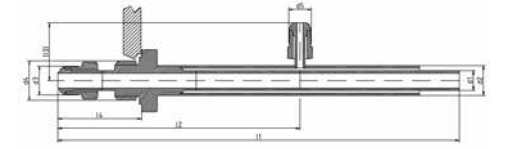
Part-No.	DIMENSIONS					
	Nominal Size (d1)		Nominal Size (d2)		Length (l1)	
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]
CO-TC-CTM-04	1/4"	6.35	0.500	12.70	1.000	24.40
CO-TC-CTM-06	3/8"	9.53	0.625	15.88	1.000	24.40
CO-TC-CTM-08	1/2"	12.70	0.750	19.05	1.000	24.40
CO-TC-CTM-12	3/4"	19.05	1.000	25.40	1.250	31.75
CO-TC-CTM-16	1"	25.40	1.500	38.10	1.250	31.75

**COAX**



DIMENSIONS											
Part-No.	Inner Tube Nominal Size (d1)		Inner Tube Nominal Size (d2)		Length (l1)		Length (l2)		Length (l3)		Size
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	d3
CO-TC-CPT-04	1/4"	6.35	0.500	12.70	5.748	146.00	2.874	73.00	1.311	33.30	1/4" VCR*
CO-TC-CPT-06	3/8"	9.53	0.625	15.88	6.000	152.40	3.000	76.20	1.370	34.80	1/4" V CR*
CO-TC-CPT-08	1/2"	12.70	0.750	19.05	6.000	152.40	3.000	76.20	1.433	36.40	1/4" VCR*
CO-TC-CPT-12	3/4"	19.05	1.000	25.40	6.500	165.10	3.250	82.55	1.559	39.60	1/4" VCR*
CO-TC-CPT-16	1"	25.40	1.500	38.10	6.500	165.10	3.250	82.55	1.805	45.85	1/4" VCR*

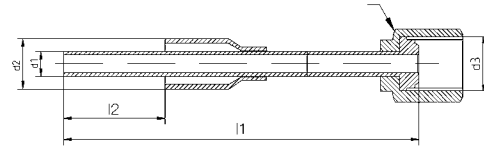
**COAX**



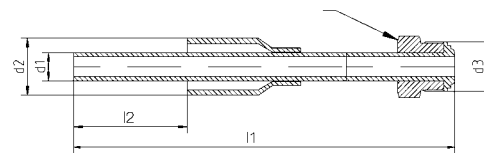
DIMENSIONS															
Part-No.	Nominal Size (d1)		Nominal Size (d2)		Length (l1)		Length (l2)		Length (l3)		Length (l4)		Size		
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	d3	d4	d5
CO-UL-CBP-04	1/4"	6.35	0.500	12.70	9.563	242.90	5.689	144.50	1.305	33.15	2.165	55.00	1/4" VCR*	M20 x 1.5	1/4" VCR*
CO-UL-CBP-06	3/8"	9.53	0.625	15.88	10.086	256.20	6.087	154.60	1.370	34.80	2.102	53.40	3/8" VCR*	M30 x 2.0	1/4" VCR*
CO-UL-CBP-08	1/2"	12.70	0.750	19.05	10.086	256.20	6.087	154.60	1.433	36.40	2.102	53.40	1/2" VCR*	M30 x 2.0	1/4" VCR*

■ COAX

Male



Female



Please add the quality to the Part-No.  
CFG = Coaxial VCR Female Gland  
CMG = Coaxial VCR Male Gland

Part-No.	DIMENSIONS								
	Nominal Size (d1)		Nominal Size (d2)		Length (l1)		Length (l2)		Size
	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	[Inch]	[mm]	d3
CO-UL-XXX-04-08	1/4"	6.35	0.500	12.70	3.500	88.90	0.750	19.05	1/4" VCR*
CO-UL-XXX-06-10	3/8"	9.53	0.625	15.88	3.500	88.90	0.750	19.05	1/4" VCR*
CO-UL-XXX-08-12	1/2"	12.70	0.750	19.05	3.500	88.90	0.750	19.05	1/4" VCR*
CO-UL-XXX-12-16	3/4"	19.05	1.000	25.40	5.500	139.70	1.000	25.40	1/4" VCR*
CO-UL-XXX-16-24	1"	25.40	1.500	38.10	5.500	139.70	1.000	25.40	1/4" VCR*

\*Trademark

## PREFABRICATED LATERAL SYSTEMS FOR GASES CLASSIFICATION UHP, HP, CFOS



### PRODUCT INFORMATION

- Prefabricated Laterals/spools with various branches
- UHP Prefabricated Laterals with diaphragm valves
- Prefabricated Laterals with ball valves
- Prefabricated Laterals according to customer design

### MATERIAL

Tube systems **ultron** **TCC.1** **TCC** **TCC 304L** **TCC.1 304L**  
Surfaces electropolished (cleanroom), anodic clean, bright finish



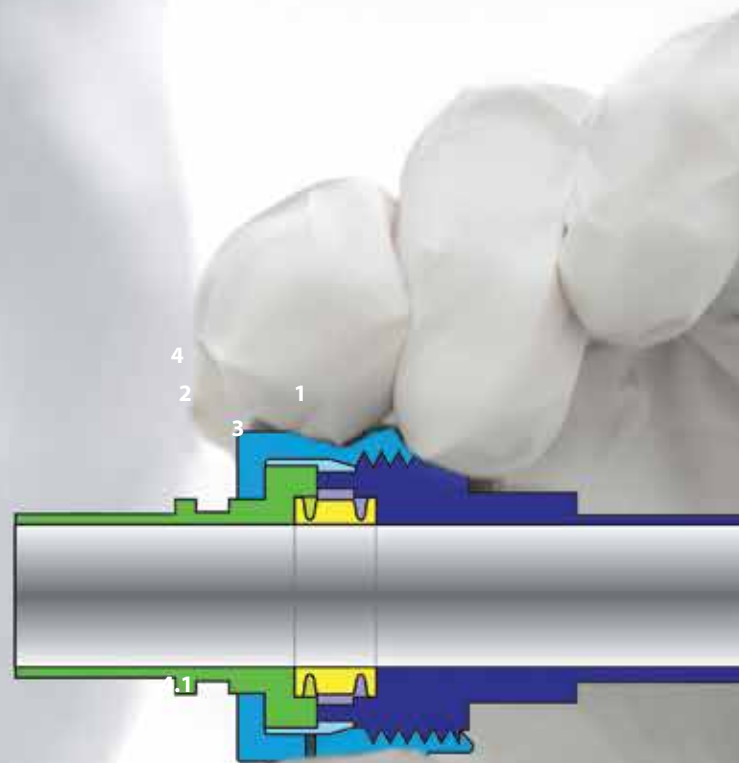
THE NEW CONNECTION SYSTEM FOR THOSE WHO DEMAND THE BEST

ZeroCon® is the new, patented, 100% stainless steel connection system for safe and rapid connection of tube systems.

With ZeroCon® you make zero compromises!

THE ZEROCON® SYSTEM  
COMPRISES 4 COMPONENTS:

- 1 Screw joint
- 2 Force joint
- 3 Seal
- 4 Nut
- 4.1 Leak test port

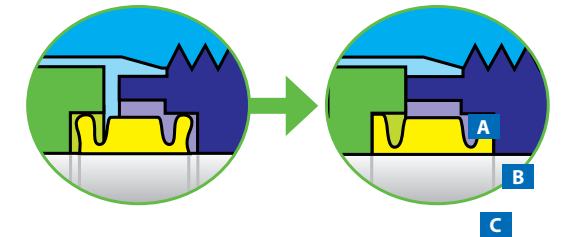


THE ADVANTAGES  
AT A GLANCE:

**Completely leakproof (A)**

Because the same material is used throughout, the connection is as tight as a weld seam (helium leak rate  $\leq 10^{-13}$  mbar l/s)

**No dead space (B) and perfect pharmaceutical barrier (C)**



*The seal ring adapts to fit perfectly when pressed in, ensuring complete sealing and no dead space*

**Robust connection**

Suitable for applications involving high-pressure, critical vacuum and extreme temperature conditions

**Dynamic stress resistance**

Anti-twist locking and outward precision fit prevent negative impact of external forces and torques

**Temperature and pressure stable**

From -459 °F (-273 °C) to +842 °F (+450 °C)  
up to 450 bar (6550 psi)

**No flow disturbances**

**Highest surface quality**

Ra  $\leq 15$  µinch (0.4 µm),  
electropolished  $\leq 10$  µinch (0.25 µm)

**No outgassing of material**

UNS S31603 (316L) / 1.4435

**Easy installation**

Self-centering, end stop and integrated leak test port

**Maintenance-free**

No seal replacement required unlike with soft seals

## THE FLEXIBLE SOLUTION FOR EVERYONE WHO REFUSES TO COMPROMISE ON SAFETY.

ZeroCon® is the simple and efficient solution if you want a new, built-to-last connection. It combines all the advantages of a detachable connection with those of a welded connection. For this reason, ZeroCon® can also be used in all areas of application and industries and is suitable for all applications. Try it for yourself and see.

The modular design of the ZeroCon® connection means that there is nothing to stop you from adding to or adapting the system at a later point. System maintenance, changes of size, and connection with further systems can be carried out rapidly, easily and cost efficiently.

ZeroCon® parts



Advantages of the ZeroCon® connection	Semi-conductor	Pharmaceutical	Fine chemicals
• As tight as a weld seam	■		
• No loss of medium/leakage of toxic media into the environment or contamination of the medium from outside	■		■
• Use in ultra-high vacuum applications	■		
• Meets the highest purity standards	■	■	■
• 100% sterilizable, no deposits, films of bacteria or cultures		■	■
• Brief flushing times	■	■	■
• No cavities for medium to collect in	■	■	■
• External forces and/or torques do not affect the connection	■	■	■
• Self-centering due to interlocking design	■	■	■
• No impairment of flow		■	
• Turbulence-free		■	
• Also suitable for high pressure systems	■		
• No outgassing of material that can contaminate the process medium	■	■	■
• Temperature-stable from -459 °F (- 273 °C) to +842 °F (+450 °C)	■	■	■
• Also sterilizable with superheated steam	■	■	■
• Much more resistant to aggressive media than soft seals media	■	■	■
• Easy to switch to other sizes	■	■	■
• Clearly arranged, simplified product range (seal)	■	■	■
• Quick and easy to install and remove	■	■	■
• No risk of damage from excessive tightening torques	■	■	■
• Easy, rapid leak testing via test port	■		
• Frequent reusability of flange and nut	■	■	■
• No detachment of coatings possible and thus no possibility of contamination of medium	■		■
• Easy, unproblematic connection with further pipelines	■	■	■
• Maintenance-free	■	■	■

## CORRUGATED STAINLESS STEEL HOSES



Flextron corrugated stainless steel hose

The use of flexible tube systems in the semiconductor as well as in parts of the fine chemical industry is becoming increasingly important. Dockweiler, as a leading manufacturer for stainless steel tube systems, has developed a procedure for electropolished corrugated stainless steel hoses. They guarantee a surface quality which meet highest requirements.

### FLEXTRON

Electropolished corrugated stainless steel hoses for the semiconductor industry and fine chemistry.

### ADVANTAGES

Rapid connection of components to existing media supply systems. Furthermore, the optional Dockweiler ZeroCon® connection guarantees a connection to a system with a highest level of safety and absolute leakproofness.

Optimized inner surface quality is achieved by electropolishing in accordance with the high Dockweiler standards.

Clear marking: Needle marking ensures the well-established traceability of the corrugated high-quality hoses.

### DIMENSIONS

**Corrugated hoses**  
DN 6 to DN 20  
Connection: 1/4" to 1"  
(0.250 x 0.065 inch to 1.000 x 0.065 inch)

### OPTIONS

As connection options we offer the corrugated hose with welding ends, VCR or ZeroCon® connection.



Flextron corrugated stainless steel hose with ZeroCon® connection

**SURFACES** Chemically cleaned, electropolished

**MATERIALS** Corrugated hose: UNS S31603 (316L) / 1.4404, Braiding: UNS S30403 (304L) / 1.4301

## PREFABRICATED ASSEMBLIES FOR GASES

- Choice of product quality in accordance with the purity demanded
- Prefabrication of complex components
- The Dockweiler welding process – from inside to out – makes mechanical polishing superfluous and ensures the integrity of the surface
- Optimal branches in locations difficult to access
- Reduction of the number of welds
- Reduction in installation time and therefore cost savings
- Improved surface quality by electropolishing after welding
- Compliance with ultra-high purity specifications as the components are packed under cleanroom conditions
- Simplified documentation

Dockweiler Prefabricated Laterals and headers can be manufactured in any of the products in the Dockweiler range and with a variety of branches such as tees, VCRs (dimensions 1/4" to 1") or simply with pulled stubs – all in accordance with the customer's drawing. The dimensions may be any combination of the sizes in our product range.

## INNOVATIVE MANUFACTURING

The modern production facility in Germany enables Dockweiler to manufacture prefabrications with state-of-the-art welding technology – special lengths – and to electropolish and pack under cleanroom conditions to fulfill ultra-high purity specifications according to requirements. Ask for our complete literature.



## ADVANTAGES

- All welds except tube stub to valve weld are electropolished
- Tube stub to valve weld is cleanroom welded
- Cleanroom packaging
- Lower valve costs
- In compliance with SEMI specifications

## STATE-OF-THE-ART MANUFACTURING TECHNOLOGY

A new production facility with integrated cleanrooms for welding, cleaning and packaging as well as the innovative welding technology enables Dockweiler to manufacture laterals which fulfill the highest demands for purity and cleanliness.

An extensive test program is available on request. We can also provide a cost model calculation.

## OUR PARTNERS:

Evans Components, Inc.  
7606 S.W. Bridgeport Road  
Portland, Oregon 97224, USA  
Phone: +1 971-249-1602  
[www.evanscomponents.com](http://www.evanscomponents.com)

Carten Controls Inc.  
604 West Johnson Avenue  
Cheshire, CT 06410, USA  
Phone: +1 480-239-9010 (cell)  
[www.cartenus.com](http://www.cartenus.com)



Higher cost and time pressure combined with ever increasing demands on quality – especially for the „less“ critical gases call for new ways of cooperation. One possibility could be innovative prefabrication.

One example from the semiconductor industry:

Task: Installation of 3000 ball valves

Time: 4 months from between access to building site and tool hook up.

## TRADITIONAL INSTALLATION

1. Single horizontal crosses: 2 welds per valve
2. T-piece and valve with tube stubs: 3 welds per valve

## PREFABRICATED LATERALS INSTALLATION

2 welds per Prefabricated Lateral (6.00 m) with typically 3 - 5 valves = saving per Prefabricated Lateral of 4 to 8 welds.

Saving through Prefabricated Lateral installation instead of.

1. Single horizontal crosses: 4000 welds
2. T-piece and valve with tube stubs: 7000 welds

## ADVANTAGES OF THE DOCKWEILER PREFABRICATED LATERALS

- Fabrication in accordance with customer drawing
- Anodic cleaning/electropolishing after the final weld
- Short distance tube to valve
- Pressure and Helium leak test on the finished Prefabricated Lateral
- Test documentation as part of the documentation package
- Spool and drawing no. marked on the Prefabricated Lateral
- Reduced number of welds
- Simplified testing on site
- Reduced time of installation on site



The sophisticated Dockweiler welding technology minimizes the dead volume between tube and valve flange. Prefabricated Laterals lengths in accordance with drawings and up to 6 m or longer.

## CONTAINERS AND CUSTOM MADE FITTINGS BUBBLER SYSTEMS AND COMPONENTS



## PRODUCT INFORMATION

- Bubbler HPL, HPS and ECO Series
- Custom made fittings – Elbows and T-pieces

## MATERIAL

Tube systems ■ **ultron** ■ **TCC.1** ■ **TCC**  
Surfaces electropolished (cleanroom), anodic clean, bright finish  
Cleanliness according to Specification

## HPL SERIES

The Dockweiler HPL series stands out from the competition by offering the most efficient utilization of the medium (e.g. trimethylgallium/TMG).

Electropolishable orbital welding seams, optimal vessel size and shape, and the elimination of dead space ensure the highest level of saturation of the carrier gas.

The following versions are available in the HPL Series: Pickled Purity (P), High Purity (HP), and Ultra-High Purity (UHP).



Bubbling System  
**HPL SERIES**

## HPS SERIES

With the patented HPS solids bubbler, Dockweiler has developed a completely new bubbler design.

To ensure continuous saturation of the carrier gas with the filling medium, the HPS bubbler has a patented chamber system through which the flow of carrier gas is channeled.

The following versions are available in the HPS series: Pickled Purity (P) and High Purity (HP).



Bubbling System  
**HPS SERIES**

## ECO SERIES

The Dockweiler ECO series offers a variant of the HPL bubbler designed for the evaporation of liquids.

Dockweiler has systematically standardized the components used to offer an inexpensive alternative to the HPL bubbler.

The ECO series has fewer versions, offering Pickled Purity (P) and High Purity (HP).



Bubbling System  
**ECO SERIES**

## OPTIONS

Dockweiler's HPL and HPS series bubblers can be customized with a wide range of options to create the ideal match for your application.

### Valves

We use Ham-Let 90° monolever rotating diaphragm valves as standard for our bubblers. Valves from the following manufacturers are also optionally available: Swagelok, Carten Controls, Parker and other valves on request.

### Crossover Function

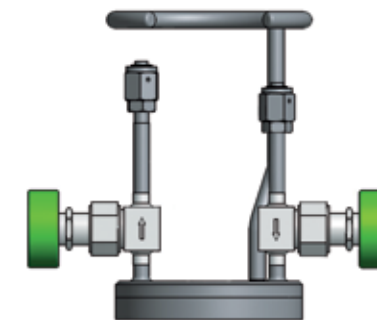
The crossover function is a purging option, with no dead space, for eliminating oxygen from the system (including the inlet and outlet valves) during filling on the chemical manufacturer's premises or while the bubbler is connected to a process. It thus offers a simple, efficient solution for cleaning the gas path.

### Level Sensor

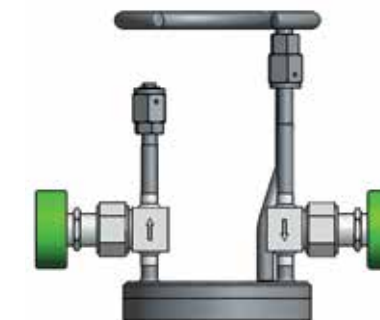
The level sensor is a signal generator that, together with a fill level indicator, reliably displays the residual amount of organometallic compound in the bubbler. Dockweiler offers an ultrasonic sensor for the bubbler, featuring specified switching points (90%, 70%, 30%, 10%) for signaling the fill level.

### Polarized Connectors

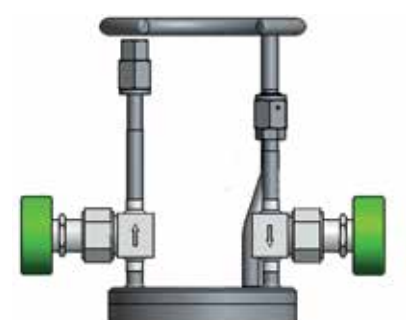
The standard design features male face seal for both connectors. To prevent confusion when connecting, Dockweiler offers male and female connectors in the following configuration:



**Standard Dip Tube**  
Inlet: Male  
**Vapor Space Tube**  
Sampling tube: Male



**PFD Dip Tube**  
Inlet: Polarized Female  
**Vapor Space Tube**  
Sampling tube: Male



**PMD Dip Tube**  
Inlet: Polarized Male  
**Vapor Space Tube**  
Sampling tube: Female

The ZeroCon® connections can also be used optionally instead of the face seal connection, at no charge.

## AUXILIARY EQUIPMENT

### HE8002 temperature control unit

Larger bubblers cannot be used in conventional temperature baths. Dockweiler offers the flexible HE8002 temperature control unit for this. This is connected and supplied via a pump to the supply, temperature, and control unit.

The HE8002 temperature control unit is compatible with the following types of Dockweiler bubbler: HPL2000, HPL4000, HPL8000, HPL22000, HPS3000, HPS6000, and the entire ECO series.

### Supply, temperature, and control unit

In the sensitive production process, keeping the temperature of the medium constant is a must. To ensure a constant process temperature, Dockweiler offers a supply, temperature, and control unit. This ensures a constant and stable flow of gas.



Bubbling System  
**HE8002**  
**TEMPERATURE CONTROL UNIT**

**Completely leak-proof**  
Helium leak rates of  $\leq 4.0 \times 10^{-9}$  mbar l s<sup>-1</sup>.

**No dead space**  
Orbital welding techniques ensure there is virtually no dead space.

**Robust design**  
All types of Dockweiler bubbler have undergone destructive pressure testing and high-altitude drop tests.

**Temperature-stable**  
from -58°F to +212°F

**Optimal dip tube size and shape**  
In collaboration with industry, the course and dimensions of the dip tubes have been optimized for saturation and throughput.

**Highest surface quality**  
Ra  $\leq 16 \mu\text{m}$  and Ra  $\leq 10 \mu\text{m}$  for electropolished version.

**No outgassing of material**  
All wetted components available in stainless steel 1.4404/316L or special material.

**Easy installation**  
Clear labeling and manageability make installation easy.

**Optimum yield**  
The optimized bubbler design ensures a maximum yield of 95% of the organometallic compound in the process.

**Easy integration with auxiliary equipment**  
Easy integration with most existing auxiliary systems and temperature control systems.

**Refillable**  
The high quality materials and production processes used ensure that cleaning, conditioning, and refilling can be carried out with ease.

Series	HPL									HPL		HPS				ECO		
	HPL200	HPL400	HPL600	HPL1000	HPL2000	HPL3000	HPL4000	HPL8000		HPL22000	HPL56000	HPS600	HPS1800	HPS3000	HPS6000	ECO1500	ECO4000	ECO8000
Diameter [inch]	2.500	2.500	4.500	2.500	6.625	6.625	6.625	6.625		6.625	10.750	4.500	4.500	6.625	6.625	6.625	6.625	6.625
Connection height [inch]	9.370	11.693	8.819	11.693	10.197	11.693	14.508	20.756		47.126	47.126	11.496	17.756	14.646	21.508	8.803	13.390	20.201
Volume [ml]	192	356	688	1,363	1,982	2,764	4,000	7,505		21,295	56,294	594	1,795	2,881	5,814	1,586	3,985	7,548
Filling volume (90 %) [ml]	173	320	619	1,227	1,784	1,784	3,600	6,754		19,166	50,665	535	1,615	2,593	5,232	1,428	3,587	6,793
Valve options	■	■	■	■	■	■	■	■		■	■	■	■	■	■			
Crossover	■	■	■	■	■	■	■	■		■	■	■	■	■	■			
DOT	on request	on request	on request	on request	on request	on request	on request	■		■	■	on request	on request	on request	■			■
ADR	on request	on request	on request	on request	on request	on request	on request	■		■	■	on request	on request	on request	■			■
ZeroCon connection	■	■	■	■	■	■	■	■		■	■	■	■	■	■			
PMD/PFD	■	■	■	■	■	■	■	■		■	■	■	■	■	■			
Level sensor			■	■	■	■	■	■		■	■							
Additional connection			■	■	■	■	■	■		■	■	■	■	■	■			
Surface P (Pickled)	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■
Surface HP (EP)	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■
Surface UHP (EP)	■	■	■	■	■	■	■	■		■	■							
Special materials	■	■	■	■	■	■	■	■		■	■	■	■	■	■			
Heat exchanger HE8002					■	■	■	■		■				■	■	■	■	■

■ Available

## SPECIAL TUBE FITTINGS

T-PIECES WITH INCLINED BRANCH AND Y-PIECES

In addition to T-pieces with 90° branch (see dimension tables) Dockweiler also produces T-pieces with differently inclined branches.

Here the manufacture mostly follows customer specifications for the relevant special applications.

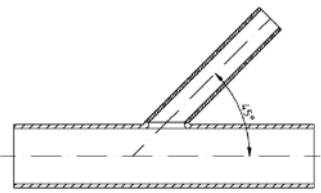
### MATERIAL

Tube components:	Dockweiler stainless steel tube systems ULTRON, finetron/finetron.1, TCC/TCC.1, safetron, weldtron
Prematerial:	1.4404 / 1.4435 / UNS S 31603 (316L), 1.4539 / UNS NO 8904 (904L)
Surfaces:	bright finish, anodic clean, electropolished
Ra-values:	as per customer specification
Dimensions: (tube)	imperial, ISO/DIN 11866, metric/DIN 11866

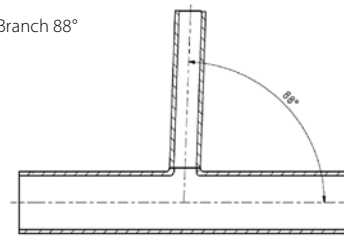


### EXAMPLES

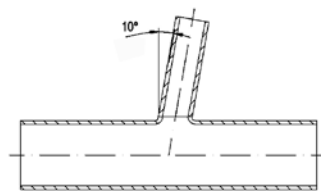
Branch 45°



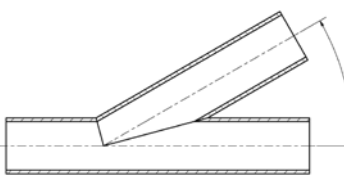
Branch 88°



Branch 10°



Branch 30°



## SPECIAL TUBE FITTINGS

ELBOWS

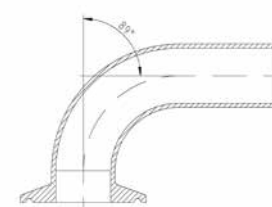
In addition to elbows 45°, 90° and 180° (see dimension tables) Dockweiler also produces elbows with variable angles, in each case following the customer requirements.

### MATERIAL

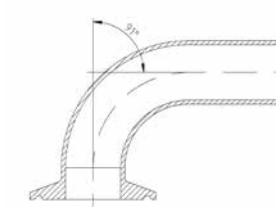
Tube components:	Dockweiler stainless steel tube systems ULTRON, finetron/finetron.1, TCC/TCC.1, safetron, weldtron	Surfaces:	bright finish, anodic clean, electropolished
Prematerial:	1.4404 / 1.4435 / UNS S 31603 (316L) 1.4539 / UNS NO 8904 (904L)	Ra-values:	as per customer specification
		Dimensions: (tube)	Imperial, ISO/DIN 11866, Metric/DIN 11866



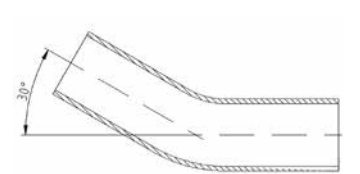
### EXAMPLES



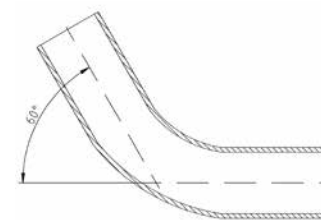
Elbow 89°



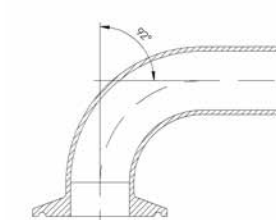
Elbow 91°



Elbow 30°



Elbow 60°



Elbow 92°

## DOCKWEILER TUBE SYSTEMS **TECHNICAL AND GENERAL INFORMATION**



### TECHNICAL INFORMATION

- Certificates
- Melting process and manufacturing of tubing
- Surface treatment of tubing (bright finished and electropolished)
- Glossary semiconductor and stainless steel

### GENERAL INFORMATION

- Dockweiler US distributors
- Dockweiler companies
- Dockweiler international distributors





AD 2000 HPO



DIN EN ISO 9001



DIN EN ISO 14001



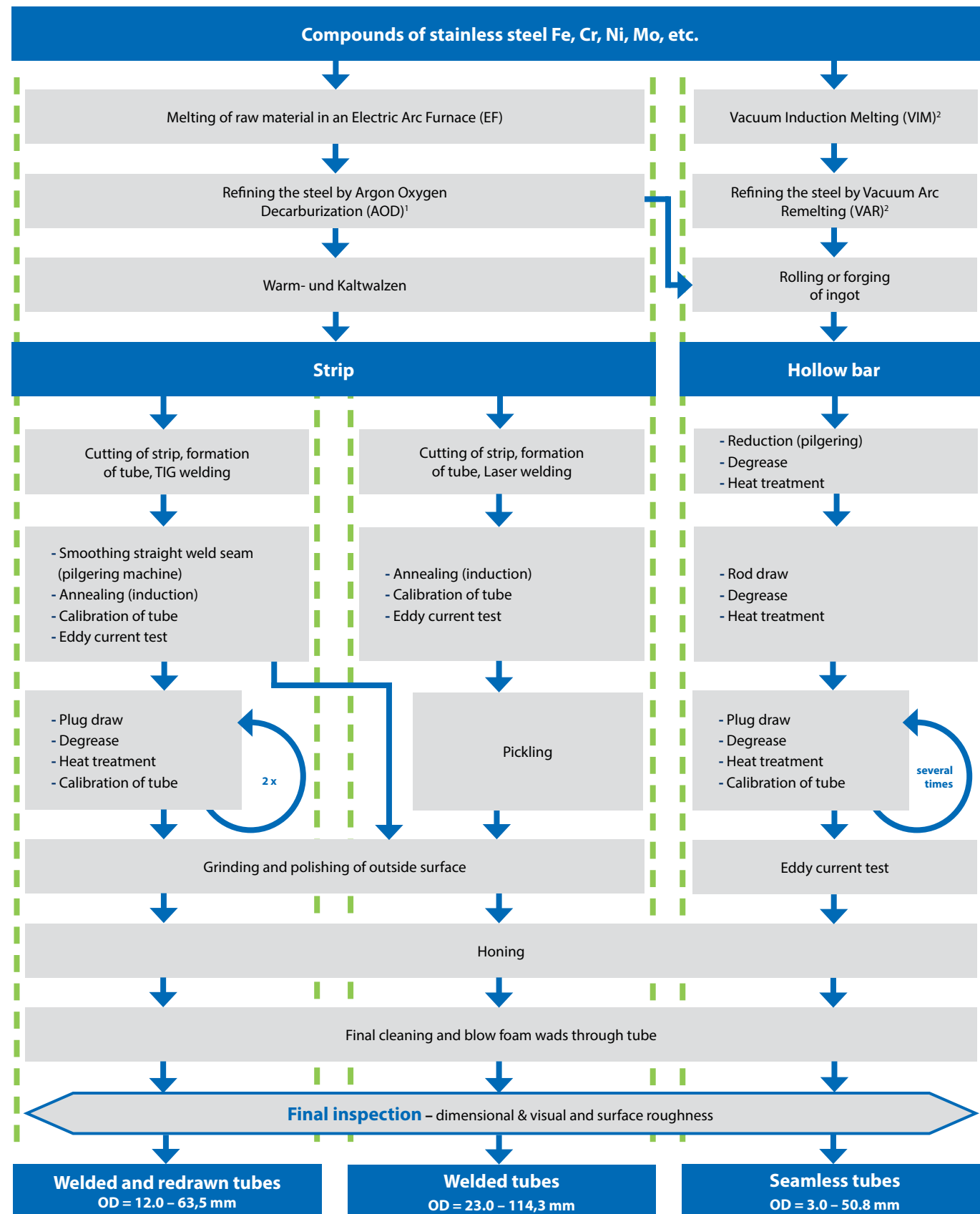
DGRL 97 23 EG and AD 2000 WO

Further certificates are available on our website:

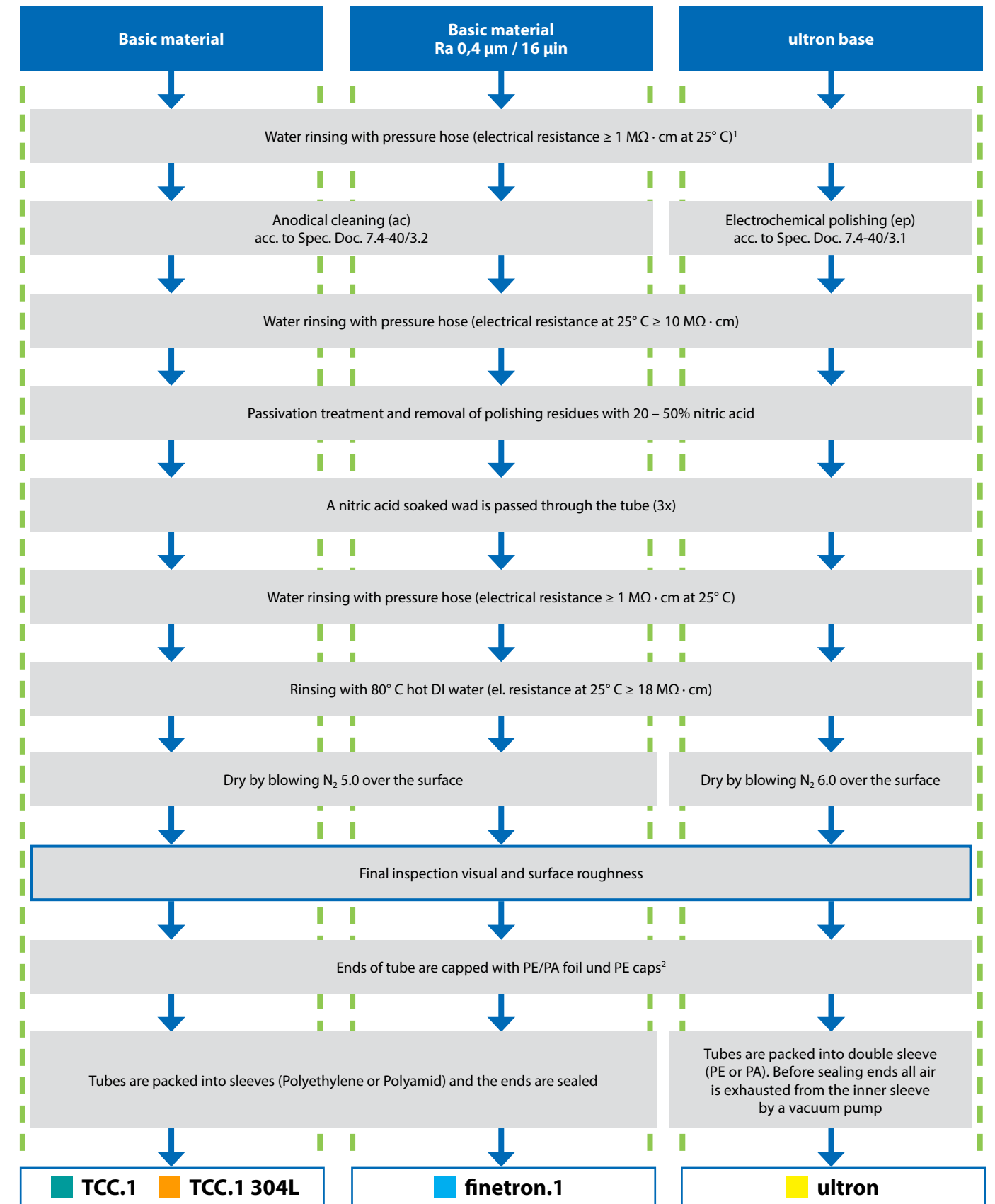
[www.dockweiler.com](http://www.dockweiler.com)

Further certificates are available on our website:

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<sup>1</sup> Alternatively Vacuum Oxygen Decarburization (VOD) is applied for refining instead of AOD <sup>2</sup> Base material for Ultron LM

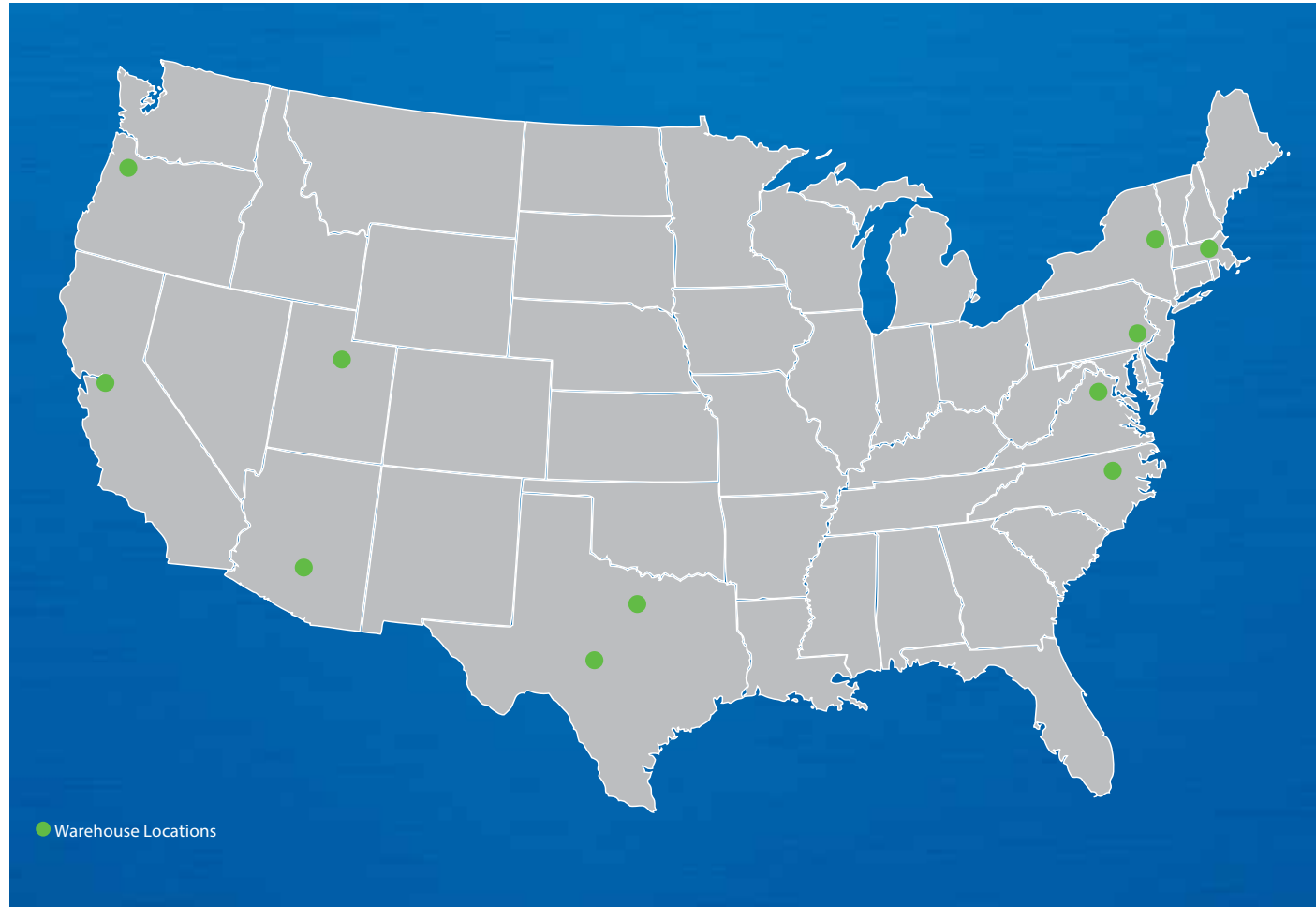


<sup>1</sup> If tubes are contaminated with dirt, dust or oil after mechanical treatment, e.g. honing, they are cleaned with an alkaline or acid detergent before any further treatment. <sup>2</sup> If the marking is hardly legible after the frequent cleaning steps, tubes will be marked again.

Chip .....	Piece of semiconductor wafer containing the entire circuit.
CFOS .....	Cleaned for oxygen systems
Cleanroom .....	Defined in terms of particles 0.5 micrometer and larger per cubic foot of air; e.g. Class 10 = maximum 10 particles 0.5 micron and larger per ft <sup>3</sup> .
DI water, deionized water .....	Ultra-pure water used in semiconductor manufacturing. Produced by removing all ions of dissolved minerals using reverse osmosis and ion-exchange systems. DI water should also be free from particles, bacteria, organics, and dissolved oxygen; purity of deionized water is determined based on its resistivity, target resistivity is 18 megaohm-cm.
Epitaxy .....	Process by which thin layer of single-crystal material is deposited on singlecrystal substrate. Epitaxial growth occurs in such way that the crystallographic structure of the substrate is reproduced in the growing material. Also crystalline defects of the substrate are reproduced in the growing material.
HVAC .....	High VACuum
LCD .....	Liquid Crystal Display. Active matrix LCD uses arrays of thin film transistors (TFT) to control display process.
LEC .....	Liquid Encapsulated Czochralski growth
MEMS .....	Micro Electro Mechanical Systems micromachined in silicon, typically integrated with electronic microcircuits.
MOCVD .....	Metal-Organic Chemical Vapor Deposition: CVD process which uses metal-organic compounds as source materials; metal-organics thermally decompose at temperatures lower than other metal containing compounds. Method often used in epitaxial growth of very thin films of III-V semi-conductors.
Nanotechnology.....	Domain of scientific and technical endeavor in which solid matter is manipulated in the molecular and atomic scale. Processing of functional, information carrying devices in the nanometer length scale ("nano" – 10 <sup>-9</sup> ; nanometer = 0.001 of a micrometer).
OEM .....	Original Equipment Manufacturer
RAM .....	Random Access Memory: memory cell designed to store information (data) temporarily.
Surface mount technology, SMT .....	A method used to connect packaged microchip to printed board, no throughholes in the board are required. Package leads are soldered to the board surface.
UHP .....	Ultra-High Purity
UPS .....	Ultraviolet Electron Spectroscopy: Method of material characterization.
Wafer .....	Thin (thickness depends on wafer diameter, but is less than 1 mm), circular slice of single-crystal semiconductor material used in manufacturing of semiconductor devices and integrated circuits. Depending on material wafer diameter may range from about 25 mm to 300 mm, cut from the ingot of single crystal semiconductor.
Yield .....	In semiconductor industry synonymous with "manufacturing yield", i.e. number defining percentage of operational devices out of all devices manufactured.

You can find more information on the internet: [www.sematech.org](http://www.sematech.org) · [www.semiconductorglossary.com](http://www.semiconductorglossary.com)

AISI .....	American Iron and Steel Institute. An association of North American companies that mine iron ore and produce steel products. There are 31 member companies and 118 associate members, which include both suppliers and customers that distribute, process, or consume steel. The AISI represents the interests of Canada, Mexico, and the United States.
Annealing .....	A heat or thermal treatment process by which a previously cold-rolled steel coil is made more suitable for forming and bending. The steel sheet is heated to a designated temperature for a sufficient amount of time and then cooled.
Autogenous weld .....	A weld made by fusion of the base material without the addition of filler. (See also gas tungsten-arc welding.)
Automatic welding .....	Welding with equipment that performs the welding operation without adjustment of the controls by a welding operator. The equipment may or may not perform the loading and unloading of the work.
Bars .....	Stainless steel formed into long shapes from billets. They can be rounds, squares, hexagons, octagons or flats, either hot or cold finished.
Bright Annealing .....	Annealing in a controlled atmosphere (e.g., cracked ammonia, hydrogen, or vacuum) to prevent formation of oxides and scale. Eliminates the need for acid bath pickling and allows for natural passivation.
Coils .....	Metal sheet that has been wound. The metal, once rolled flat, is more than one-quarter mile long; coils are the most efficient way to store and transport sheet steel.
Corrosion .....	The gradual degradation or alteration of metal caused by atmosphere, moisture, or other agents.
Electropolishing .....	Electropolishing is an electrochemical removal process that selectively removes a thin layer of metal, including surface flaws and imbedded impurities. Electro-polishing is a required surface treatment process for all ultra high-purity components used in the gas distribution systems of semiconductor manufacturers worldwide and many sterile water distribution systems of pharmaceutical and bio-technology companies.
Gas tungsten-arc, welding (GTAW) .....	An arc welding process that produces coalescence of metals by heating them with an arc between a tungsten (nonconsumable) electrode and the work. Shielding is obtained from a gas or gas mixture. (This process is sometimes called TIG welding, a non preferred term.) GTAW may be performed by adding filler material to the weld, or by a fusion process in which no filler is added.
Orbital welding .....	Automatic or machine welding of tubes or pipe in-place with the electrode rotating (or orbiting) around the work. Orbital welding can be done with the addition of filler material or as a fusion process without the addition of filler.
Oxide layer .....	An area usually located in the heat-affected zone of the weldment where an oxidation reaction has taken place.
Passivation .....	A final treatment/cleaning process used to remove free iron or other anodic contaminants from the surface of corrosion-resistant steel parts such that uniform formation of a passive layer is obtained.
Passive layer .....	A passive oxidized film that forms naturally on the stainless steel surface when exposed to air or similar oxidizing environment protecting the underlying base metal from corrosion.
Pickling .....	A process that removes surface scale and oxidation products by immersion in a chemically active solution, such as nitric acid or hydrochloric acid.
Pitting .....	Localized corrosion (in the form of pits) of a metal surface that is confined to a small area.
Slag .....	The impurities in a molten pool of iron. Flux such as limestone may be added to foster the congregation of undesired elements into a slag. Because slag is lighter than iron, it will float on top of the pool, where it can be skimmed off.
Strip .....	Flat steel coil products, with widths of less than 600mm for hot rolled products and less than 500mm for cold rolled products.



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**Silicon Valley**

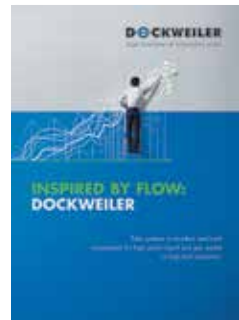
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**Company Profile**



**Products at a Glance**



**SEMI Catalog**



**ASME BPE Catalog**



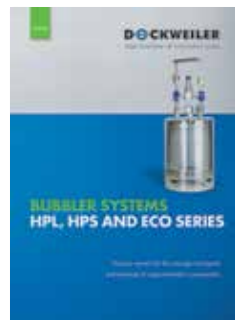
**Tube Connections**



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