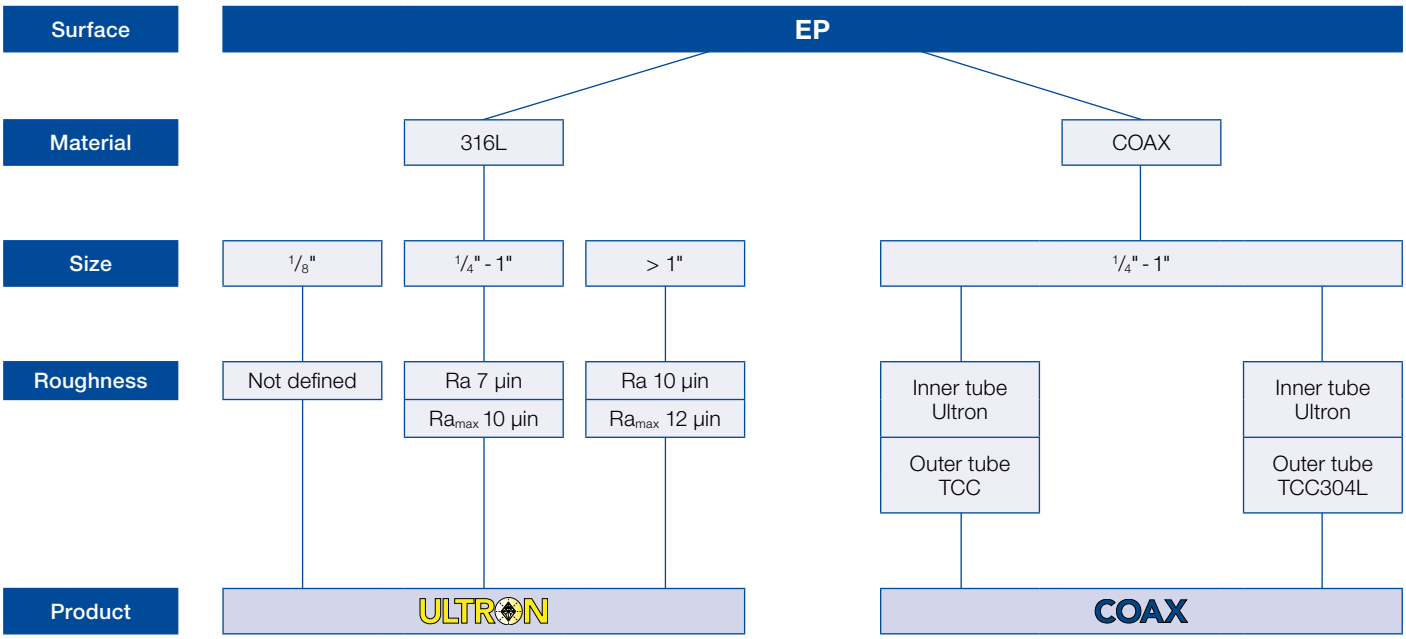
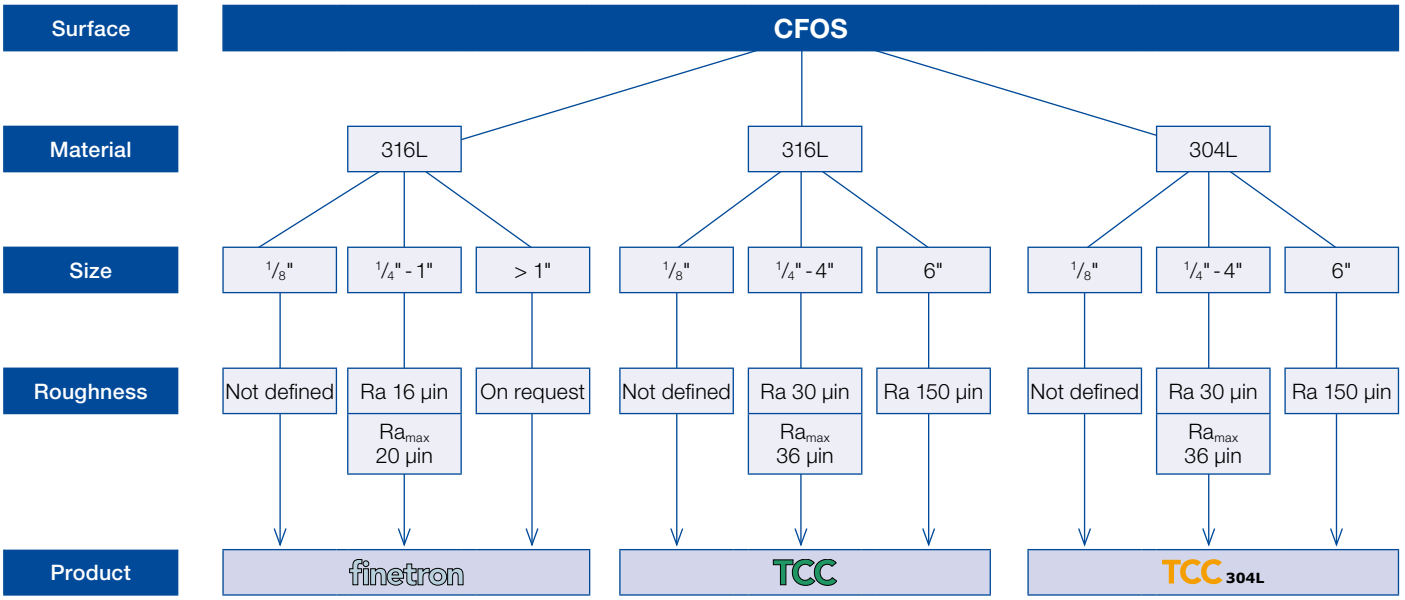
DECKWEILER

TUBE SYSTEMS IN STAINLESS STEEL

A COMPLETE SOLUTION

TUBE SYSTEMS FOR THE SEMICONDUCTOR INDUSTRY


Surface
EP
Material
316L
COAX
Size
1/8"
1/4" - 1"
> 1"
1/4" - 1"
Roughness
Not defined
Ra 7 µin
Ramax 10 µin
Ra 10 µin
Ramax 12 µin
Inner tube Ultron
Outer tube TCC
Inner tube Ultron
Outer tube TCC304L
Product
ULTRON
COAX


Surface
CFOS
Material
316L
316L
304L
Size
1/8"
1/4" - 1"
> 1"
1/8"
1/4" - 4"
6"
1/8"
1/4" - 4"
6"
Roughness
Not defined
Ra 16 µin
Ramax 20 µin
On request
Not defined
Ra 30 µin
Ramax 36 µin
Ra 150 µin
Not defined
Ra 30 µin
Ramax 36 µin
Ra 150 µin
Product
finetron
TCC
TCC 304L

PART NUMBER GENERATOR

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"		0.035
06	3/8"		0.035
08	1/2"	2)	0.049
10	5/8"	1)	0.065
12	3/4"	2)	0.065
16	1"	2)	0.065
24	1 1/2"	2)	0.065
32	2"		0.065
40	2 1/2"		0.065
48	3"		0.065
64	4"		0.083
96	6"		0.109
128	8"	Pipe Schedule 10S	0.148
160	10"		0.165
192	12"		0.180
224	14"		0.189
256	16"		0.189
288	18"		0.189
320	20"		0.218

P/N for Tubing 1 – 2

e. g. UL – 16

= ULTRON 1"

GENERAL NOTES:

Ultron > 1" is welded, TCC 1" is welded or seamless

1) On request, only for outer COAX tubing

2) Coaxial tube represented using inner tube dimensions. Standard is inner tube UL, outer tube TC or T4. Further qualities on request.

FITTING

2	
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"	2)	0.049
10	5/8"	1)	0.065
12	3/4"	2)	0.065
16	1"	2)	0.065
24	1 1/2"	2)	0.065
32	2"		0.065
40	2 1/2"		0.065
48	3"		0.065
64	4"		0.083
96	6"		0.109
128	8"	Pipe Schedule 10S	0.148
160	10"		0.165
192	12"		0.180
224	14"		0.189
256	16"		0.189
288	18"		0.189
320	20"		0.218

P/N for Fitting 1 – 2 – 3 – 4*

e. g. TC – RT – 16 – 08

= TCC Reducing Tee 1" x 1/2"

*) 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 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 35

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 Equipmentent
Pharmaceutical Industry	Process Piping, Water for Injection, Process Utility

Material	Seamless or welded stainless steel tube, depending on outer diameter (see dimensions). 1.4404 / 1.4435 / UNS S31603 (316L)
Dimensions	Stock dimensions: Imperial: $^1/_8$" (0.125 x 0.0222 Inch; 3.18 x 0.56 mm)*) to 6" (6.000 x 0.109 Inch; 152.40 x 2.77 mm) Pipe: NPS 8, 10, 12 Schedule 10S acc. to ASTM A 312 (219.08 x 3.76 mm to 323.85 x 4.57 mm) Further dimensions on demand: Metric: 3.00 x 0.50 mm*) to 35.00 x 1.50 mm
Technical terms of delivery Pressure ratings	see page 50
Tubing Length Fittings Tube components Machined components Tolerances Weld ends	Acc. to ASTM A 269 / A 632 / A 312 / A 403 (Pipe), DIN EN 10217-7 / 10216-5 19.357 ft - 19.980 ft (5900 - 6090 mm), max. 10% short lengths possible Prematerial acc. to ASTM A 269 / A 632 / A 312 (Pipe), DIN EN 10217-7 / 10216-5 Prematerial acc. to ASTM A 479, DIN EN 10088-3, DIN 17440 Pipe dimensions acc. to ASTM A 182 According to ASTM A 269 / A 632 or DIN EN ISO 1127 - D4/T3 Tubes and fittings are prepared for orbital welding
Surface options Tubing and Fittings Fittings Pipes	Inner surface: $^1/_8$" Ra not defined $^1/_4$" - 1" Ra 7 µin Ra_{max} 10 µin > 1" Ra 10 µin Ra_{max} 12 µin Outer surface: Ra ≤ 40 µin (1.00 µm) Inner and outer surface roughness of the cold worked area is not defined Specified roughness of total surface available on request, Ra ≤ 20 µin (0.51 µm)
Inner surface treatment Tubing Fittings	Electropolishing procedure Spec. HE 175 8VN Electropolishing procedure Spec. HE 111 8VN Cleanroom cleaning and packing
Hardness	Max. 180 HV / 90 HRB
Test procedures	• Verification of basic test certificate • Verification of dimensions • Visual inspection • Roughness measurements • Conductivity test (DI water) • Endoscopic inspection of bright finishedTubing before electropolishing • TOC-measurement of DI water • Particle measurements • REM • XPS/ESCA • Auger analysis (AES)
Marking Tubing and Fittings	Needle marking
Information	• DOCKWEILER • DW number • Dimensions • Material • Heat number
Documentation	Inspection certificate 3.1 according to DIN EN 10204 for the prematerial
Packing and delivery	Tubing and fittings filled with N2 (99.9998% incl. inert gas), closed with PA/PE squares and yellow PE caps, sleeved and sealed in PE with a yellow sticker reading „Ultron" – imperial dimensions double sleeved and sealed in PE. Delivery in tubular container or wooden crate, fittings in strong cardboard box with shock absorbing filler.

*) For dimensions OD < 0.197 in (5.00 mm) roughness is not defined. Length: 116.142 in (2950 mm) ± 1.969 in (50 mm).

Material	Seamless or welded stainless steel tube, depending on outer diameter (see dimensions). 1.4404 / 1.4435 / UNS S31603 (316L)
Dimensions	Stock dimensions: Imperial: $^1/_8$" (0.125 x 0.0222 Inch; 3.18 x 0.56 mm)*) to 6" (6.000 x 0.109 Inch; 152.40 x 2.77 mm) Pipe: see section dimensions (tubes) Metric: 6.00 x 1.00 mm to 35.00 x 1.50 mm Further dimensions on demand: ISO, metric
Technical terms of delivery Pressure ratings	 see page 50
Tubing Length Fittings Tube components Machined components: Tolerances Ends	Acc. to ASTM A 269 / A 632 / A 312 (Pipe), DIN EN 10217-7 / 10216-5 5900 - 6090 mm (max. 10% short lengths possible) Prematerial acc. to ASTM A 269 / A 632 / A 312 / A 403 (Pipe), DIN EN 10217-7 / 10216-5 Prematerial according to ASTM A 479, DIN EN 10088-3, DIN 17440 Pipe dimensions acc. to ASTM A 182 According to ASTM A 269 / A 632 or DIN EN ISO 1127 - D4/T3 Tubes and fittings are prepared for orbital welding
Surface options Tubing and Fittings Fittings Pipes	Inner surface: $^1/_8$" Ra not defined $^1/_4$" - 1" Ra 16 µin Ra_{max} 20 µin > 1" Ra 30 µin Ra_{max} 36 µin Outer surface: Ra ≤ 1.00 µm (40 µin) Surface roughness of the cold worked area is not defined Specified roughness of total surface available on request Inner and outer surface an request
Inner surface treatment Tubing Fittings	 finetron: Cleaning and test procedure ASTM A 632, S3 finetron: Cleaning and test procedure ASTM A 632, S3
Hardness	Max. 180 HV / 90 HRB
Test procedures	• Verification of basic test certificate • Verification of dimensions • Visual inspection • Roughness measurements • Endoscopic inspection of bright finished tubes
Marking Tubing Fittings	 Permanently marked Needle marking
Information	• DOCKWEILER • DW number • Dimensions • Material • Heat number
Documentation	Inspection certificate 3.1 according to DIN EN 10204 for prematerial
Packing and delivery	Bright finished tubing and fittings closed with transparent PE caps (anodic clean tubes and fittings with PE/PA squares), sleeved and sealed in PE and marked with blue sticker “finetron”. Delivery of tubes in tubular container or wooden crate, fittings in strong cardboard box with shock-absorbing filler.

*) For dimensions OD < 0.197 in (5.00 mm) roughness is not defined. Length: 116.142 in (2950 mm) ± 1.969 in (50 mm).

Material	Seamless or welded stainless steel tube, depending on outer diameter (see dimensions). 1.4404 / 1.4435 / UNS S31603 (316L)
Dimensions	Stock dimensions: Imperial: $^1/_8$" (0.125 x 0.0222 Inch; 3.18 x 0.56 mm)*) to 6" (6.000 x 0.109 Inch; 152.40 x 2.77 mm) Pipe: NPS 8, 10, 12, 16, 20 Schedule 10S acc. to ASTM A 312 (219.08 x 3.76 mm to 508.00 x 5.54 mm) Further dimensions on demand: Metric: 3.00 x 0.50 mm*) to 35.00 x 1.50 mm
Technical terms of delivery Pressure ratings	see page 50
Tubing Length Fittings Tube components Machined components: Tolerances Ends	Acc. to ASTM A 269 / A 632 / A 312 (Pipe), DIN EN 10217-7 / 10216-5 19.357 ft - 19.980 ft (5900 mm - 6090 mm), max. 10% short lengths possible Prematerial acc. to ASTM A 269 / A 632 / A 312 / A 403 (Pipe), DIN EN 10217-7 / 10216-5 Prematerial according to ASTM A 479, DIN EN 10088-3, DIN 17440 Pipe dimensions acc. to ASTM A 182 Acc. to ASTM A 269 / A 632 (only tubes Ra ≤ 0,80 µm) or DIN EN ISO 1127 - D4/T3 Tubes and fittings are prepared for orbital welding
Surface options Tubing and Pipes Fittings	Inner surface: Ra not defined, on request: Ra ≤ 30 µin (0.76 µm) < 6" Ra 30 µin Ra_{max} 36 µin 6" Ra 150 µin Outer surface: 40 µin (1.00 µm). Pipe sizes according to customer specifications Surface roughness of the cold worked area is not defined Specified roughness of total surface available on request
Inner surface treatment Tubing Fittings	 TCC: Cleaning and test procedure ASTM A 632, S3 TCC: Cleaning and test procedure ASTM A 632, S3
Hardness	Max. 180 HV / 90 HRB
Test procedures	• Verification of basic test certificate • Verification of dimensions • Visual inspection • Roughness measurements • Endoscopic inspection of bright finished tubing
Marking Tubing Fittings	Permanently marked Needle marking
Information	• DOCKWEILER • DW number • Dimensions • Material • Heat number
Documentation	Inspection certificate 3.1 according to DIN EN 10204 for the prematerial
Packing and delivery	Bright finished tubings and closed with transparent PE caps (anodic clean tubings and fittings with PE/PA squares), sleeved and sealed in PE and marked with green sticker “TCC”. Delivery of tubes in tubular container or wooden crate, fittings in strong cardboard box with shock-absorbing filler.

*) For dimensions OD < 0.197 in (5.00 mm) roughness is not defined. Length: 116.142 in (2950 mm) ± 1.969 in (50 mm).

SPECIFICATION

TCC 304L

Material	Seamless or welded stainless steel tube, depending on outer diameter (see dimensions). 1.4307 / 1.4306 / UNS S30403 (304L) Fittings*: 1.4404 / UNS S31603 (316L)
Dimensions	Stock dimensions: Imperial: $^1/_4$" (0.250 x 0.035 Inch; 6.35 x 0.89 mm) to 6" (6.000 x 0.109 Inch; 152.40 x 2.77 mm) Pipe: NPS 8, 10, 12, 16, 20 Schedule 10S acc. to ASTM A 312 (219.08 x 3.76 mm to 508.00 x 5.54 mm) Further dimensions on request.
Technical terms of delivery Pressure ratings	 see page 50
Tubing Length Fittings Tube components Machined components Tolerances Ends	Acc. to ASTM A 269 / A 312 (Pipe), DIN EN 10217-7 / 10216-5 19.357 ft - 19.980 ft (5900 mm - 6090 mm), max. 10% short lengths possible Prematerial acc. to ASTM A 269 / A 312 / A 403 (Pipe), DIN EN 10217-7 / 10216-5 Prematerial acc. to ASTM A 479, DIN EN 10088-3, DIN 17440 Pipe dimensions acc. to ASTM A 403 According to AS TM A 269 Tubes and fittings are prepared for orbital welding
Surface options Tubing and Pipes Fittings	Inner surface: Ra not defined, on request: Ra ≤ 30 µin (0.76 µm) < 6" Ra 30 µin Ra_{max} 36 µin 6" Ra 150 µin Outer surface: Ra not defined. Pipe sizes according to customer specifications Surface roughness of the cold worked area is not defined Specified roughness of total surface available on request
Inner surface treatment Tubing Fittings*	 TCC 304L: Cleaning and test procedure ASTM A 632, S3 TCC 304L: Cleaning and test procedure ASTM A 632, S3
Test procedures	• Verification of basic test certificate • Verification of dimensions • Visual inspection • Endoscopic inspection of bright finished tubing
Hardness	Max. 180 HV / 90 HRB
Information	• DOCKWEILER • DW number • Dimensions • Material • Heat number
Documentation	Inspection certificate 3.1 according to DIN EN 10204 for the prematerial
Packing and delivery	Tubing and fittings closed with red PE caps sleeved and sealed in PE and marked with orange coloured sticker “TCC 304L”. Delivery of tubing in tubular container or wooden crate, fittings in strong cardboard box with shock-absorbing filler.

*) Tube fittings in 316L, Pipe fittings in 316L or 304L

SPECIFICATION
COAX

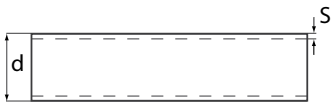
Material	Inner and outer tube, seamless or welded from the DOCKWEILER programme. 1.4404 / 1.4435 / UNS S31603 (316L) Other material on demand Tubing only: Outer Tube can be either TCC or TCC304L (see specification) Fittings: Outer tube only TCC
Dimensions	Stock dimensions: process tube from 1/4" (0.25 x 0.035 Inch; 6.35 x 0.89 mm) to 1" (1 x 0.065 Inch; 25.4 x 1.65 mm) Further dimensions on demand
Technical terms of delivery Pressure ratings	 see page 50
Tubing Length Fittings Tube components Machined components Tolerances Welds Ends	According to ASTM A 269 / A 632, DIN EN 10217-7 / 10216-5 19.357 ft - 19.980 ft (5900 mm - 6090 mm) Prematerial acc. to ASTM A 269 / A 632, DIN EN 10217-7 / 10216-5 Prematerial acc. to ASTM A 479, DIN EN 10088-3, DIN 17440 According to ASTM A 269 / A 632 Tubes and fittings are prepared for orbital welding
Surface options Tubing and Fittings Fittings	 Depending on product specification of the inner tube ULTRON, TCC Inner and outer surface roughness of the cold worked area is not defined Specified roughness of total surface available on request
Test procedures	Acc. to product specification of the inner tube
Hardness	Max. 180 HV / 90 HRB
Marking Tubing Fittings	 Permanently marked Needle marking
Information	• DOCKWEILER • DW number • Dimensions • Material • Heat number
Documentation	Inspection certificate 3.1 according to DIN EN 10204 for the prematerial
Packing and delivery	Tube ends and fitting ends closed with PA/PE squares and PE caps (colour acc. to specification of the inner tube), sleeved and sealed in PE with coloured labels. Delivery in tubular container or wooden crate, fittings in strong card-board box with shock-absorbing filler (look at specification for the inner tube).

DIMENSIONS

DOCKWEILER TUBE SYSTEMS
ULTRON finetron TCC TCC 304L COAX

DIMENSIONS
Imperial Tube, Imperial Pipe (10S)

UL, FT, TC, T4
TUBING



Please add the quality to the Part-No.
UL = Ultron
FT = Finetron
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"	3.18	0.022	0.56	0.02247	0.0368
XX-04	1/4"	6.35	0.035	0.89	0.08333	0.1241
XX-06	3/8"	9.53	0.035	0.89	0.1321	0.1966
XX-08	1/2"	12.70	0.049	1.24	0.2359	0.3511
XX-12	3/4"	19.05	0.065	1.65	0.4836	0.7198
XX-16	1"	25.40	0.065	1.65	0.6601	0.9824
XX-24	1 1/2"	38.10	0.065	1.65	1.0131	1.5077
XX-32	2"	50.80	0.065	1.65	1.3661	2.0331
XX-40	2 1/2"	63.50	0.065	1.65	1.7192	2.5585
XX-48	3"	76.20	0.065	1.65	2.0722	3.0838
XX-64	4"	101.60	0.083	2.11	3.5363	5.2627
XX-96	6"	152.40	0.109	2.77	6.9823	10.3909

Part-No.	Pipe NPS Schedule 10S Nominal Size (d)		Tube Wall Thickness (S)		Weight	
	Inch	mm	Inch	mm	lbs/ft	kg/m
XX-128	8"[1)]	219.08	0.148	3.76	13.6208	20.2700
XX-160	10"[1)]	273.05	0.165	4.19	18.9562	28.2100
XX-192	12"[1)]	323.85	0.180	4.57	24.5537	36.5400
XX-256	16"[2)]	406.40	0.188	4.78	32.3015	48.0700
XX-320	20"[2)]	508.00	0.218	5.54	47.0042	69.9500

Further dimensions on request. Subject to alteration.
[1)] 8" - 2" available in Ultron, TCC or TCC304L
[2)] 16" - 20" only available in TCC and TCC304L

DIMENSIONS

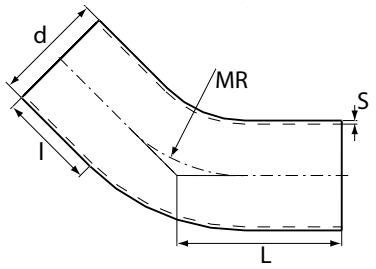
DOCKWEILER ORBITAL WELD FITTINGS

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

DIMENSIONS

Imperial Tube, Imperial Pipe (on request)

4L
ELBOWS 45°

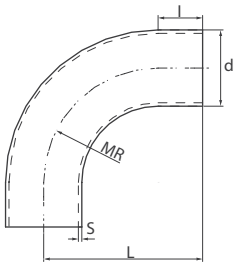


Please add the quality to the Part-No.
UL = Ultron
FT = Finetron
TC = TCC
T4 = TCC 304L

Part-No.	Imperial Nominal Size (d)		Wall Thickness (S)		Length (L)		Radius (MR)	
	Inch	mm	Inch	mm	Inch	mm	Inch	mm
XX-4L-04	1/4"	6.35	0.035	0.89	2.000	50.80	0.563	14.30
XX-4L-06	3/8"	9.53	0.035	0.89	2.000	50.80	1.126	28.60
XX-4L-08	1/2"	12.70	0.049	1.24	2.250	57.20	1.063	27.00
XX-4L-12	3/4"	19.05	0.065	1.65	2.250	57.20	1.126	28.60
XX-4L-16	1"	25.40	0.065	1.65	2.250	57.20	1.500	38.10
XX-4L-24	1 1/2"	38.10	0.065	1.65	2.500	63.50	2.252	57.20
XX-4L-32	2"	50.80	0.065	1.65	3.000	76.20	3.000	76.20
XX-4L-40	2 1/2"	63.50	0.065	1.65	3.374	85.70	3.752	95.30
XX-4L-48	3"	76.20	0.065	1.65	3.626	92.10	4.500	114.30
XX-4L-64	4"	101.60	0.083	2.11	4.500	114.30	6.000	152.40
XX-4L-96	6"	152.40	0.109	2.77	8.750	222.25	9.000	228.60

Further dimensions on request. Subject to alteration.

9L
ELBOWS 90°

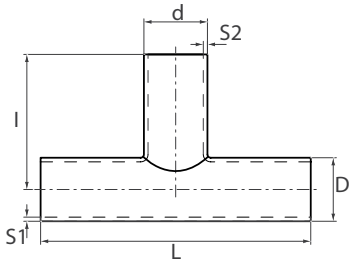


Please add the quality to the Part-No.
UL = Ultron
FT = Finetron
TC = TCC
T4 = TCC 304L

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.

TE, RT
TEE, EQUAL AND REDUCED



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

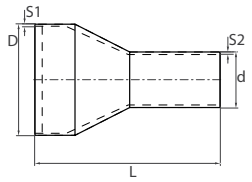
Part-No.	Imperial Nominal Size (D x d)		Wall Thickness (S1 / S2)		Length (L)		Length (l)	
	Inch	mm	Inch	mm	Inch	mm	Inch	mm
XX-TE-04	1/4" x 1/4"	6.35 x 6.35	0.035 / 0.035	0.89 / 0.89	3.504	89.00	1.752	44.50
XX-RT-06-04	3/8" x 1/4"	9.53 x 6.35	0.035 / 0.035	0.89 / 0.89	3.504	89.00	1.752	44.50
XX-TE-06	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-08-06	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-TE-08	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-RT-12-04	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-12-06	1/2" x 1/4"	12.70 x 6.35	0.065 / 0.035	1.65 / 0.89	3.748	95.20	1.874	47.60
XX-RT-12-08	1/2" x 3/8"	12.70 x 9.53	0.065 / 0.035	1.65 / 0.89	3.748	95.20	1.874	47.60
XX-TE-12	1/2" x 1/2"	12.70 x 12.70	0.065 / 0.065	1.65 / 1.65	3.748	95.20	1.874	47.60
XX-RT-16-04	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-16-06	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-16-08	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-RT-16-12	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-TE-16	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-TE-04	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-06-04	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-TE-06	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-RT-08-06	1" x 1"	25.40 x 25.40	0.065 / 0.065	1.65 / 1.65	4.252	108.00	2.126	54.00

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-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"	50.80 x 38.10	0.065 / 0.065	1.65 / 1.65	4.748	120.60	2.374	60.30
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 38.10	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.

CR
CONCENTRIC REDUCER



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

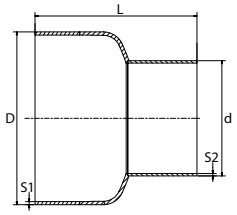
Part-No.	Imperial Nominal Size (d)		Wall Thickness (S1/S2)		Length (L)	
	Inch	mm	Inch	mm	Inch	mm
XX-CR-06-04	3/8" x 1/4"	9.53 x 6.35	0.035 / 0.035	0.89 / 0.89	1.625	41.28
XX-CR-08-04	1/2" x 1/4"	12.70 x 6.35	0.049 / 0.035	1.24 / 0.89	1.875	47.63
XX-CR-08-06	1/2" x 3/8"	12.70 x 9.53	0.049 / 0.035	1.24 / 0.89	1.875	47.63
XX-CR-12-06	3/4" x 3/8"	12.70 x 9.53	0.065 / 0.035	1.65 / 0.89	2.000	50.80
XX-CR-12-08	3/4" x 1/2"	12.70 x 12.70	0.065 / 0.049	1.65 / 1.24	2.125	53.98
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
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
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
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
XX-CR-24-16	1" x 1"	38.10 x 25.40	0.065 / 0.065	1.65 / 1.65	2.500	63.50
XX-CR-32-16	2" x 1"	50.80 x 25.40	0.065 / 0.065	1.65 / 1.65	3.375	85.73
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
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
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
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

CR
CONCENTRIC REDUCER

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 (L)	
	Inch	mm	Inch	mm	Inch	mm
XX-CR-48-24	3" x 1 ½"	76.20 x 38.10	0.065 / 0.065	1.65 / 1.65	4.250	107.95
XX-CR-48-32	3" x 2"	76.20 x 50.80	0.065 / 0.065	1.65 / 1.65	3.375	85.73
XX-CR-48-40	3" x 2 ½"	76.20 x 63.50	0.065 / 0.065	1.65 / 1.65	2.625	66.68
XX-CR-64-32	4" x 2"	101.60 x 50.80	0.083 / 0.065	2.11 / 1.65	5.125	130.18
XX-CR-64-40	4" x 2 ½"	101.60 x 63.50	0.083 / 0.065	2.11 / 1.65	4.250	107.95
XX-CR-64-48	4" x 3"	101.60 x 76.20	0.083 / 0.065	2.11 / 1.65	3.875	98.43
XX-CR-96-48	6" x 3"	152.40 x 76.20	0.109 / 0.065	2.77 / 1.65	7.250	184.15
XX-CR-96-64	6" x 4"	152.40 x 101.60	0.109 / 0.083	2.77 / 2.11	5.625	142.88

FCR
FORMED CONCENTRIC REDUCER

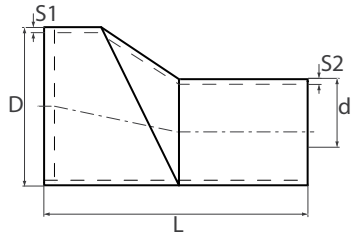


Please add the quality to the Part-No.
UL = Ultron
FT = Finetron
TC = TCC
T4 = TCC 304L

Part-No.	Imperial Nominal Size (d)		Wall Thickness (S1/S2)		Length (L)	
	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
XX-FCR-96-64	6" x 4"	152.40 x 101.60	0.109 / 0.083	2.77 / 2.11	5.625	142.88

Further dimensions on request. Subject to alteration.

ER
ECCENTRIC REDUCER



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

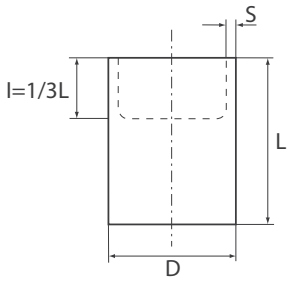
Part-No.	Imperial Nominal Size (d)		Wall Thickness (S1/S2)		Length (L)	
	Inch	mm	Inch	mm	Inch	mm
XX-ER-06-04	3/8" x 1/4"	9.53 x 6.35	0.035 / 0.035	0.89 / 0.89	1.625	41.28
XX-ER-08-04	1/2" x 1/4"	12.70 x 6.35	0.049 / 0.035	1.24 / 0.89	1.875	47.63
XX-ER-08-06	1/2" x 3/8"	12.70 x 9.53	0.049 / 0.035	1.24 / 0.89	1.875	47.63
XX-ER-12-06	3/4" x 3/8"	12.70 x 9.53	0.065 / 0.035	1.65 / 0.89	2.000	50.80
XX-ER-12-08	3/4" x 1/2"	12.70 x 12.70	0.065 / 0.049	1.65 / 1.24	2.125	53.98
XX-ER-16-08	1" x 1/2"	25.40 x 12.70	0.065 / 0.049	1.65 / 1.24	2.500	63.50
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
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
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
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
XX-ER-32-16	2" x 1"	50.80 x 25.40	0.065 / 0.065	1.65 / 1.65	3.375	85.73
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
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
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
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

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 (L)	
	Inch	mm	Inch	mm	Inch	mm
XX-ER-48-24	3" x 1 ½"	76.20 x 38.10	0.065 / 0.065	1.65 / 1.65	4.250	107.95
XX-ER-48-32	3" x 2"	76.20 x 50.80	0.065 / 0.065	1.65 / 1.65	3.375	85.73
XX-ER-48-40	3" x 2 ½"	76.20 x 63.50	0.065 / 0.065	1.65 / 1.65	2.625	66.68
XX-ER-64-32	4" x 2"	101.60 x 50.80	0.083 / 0.065	2.11 / 1.65	5.125	130.18
XX-ER-64-40	4" x 2 ½"	101.60 x 63.50	0.083 / 0.065	2.11 / 1.65	4.250	107.95
XX-ER-64-48	4" x 3"	101.60 x 76.20	0.083 / 0.065	2.11 / 1.65	3.875	98.43
XX-ER-96-48	6" x 3"	152.40 x 76.20	0.109 / 0.065	2.77 / 1.65	7.250	184.15
XX-ER-96-64	6" x 4"	152.40 x 101.60	0.109 / 0.083	2.77 / 2.11	5.625	142.88

Further dimensions on request. Subject to alteration.

WC
WELD CAP



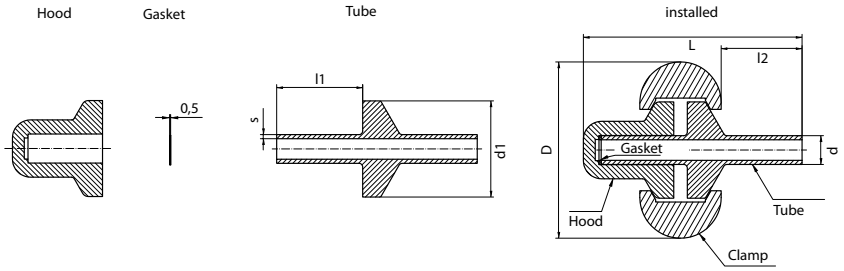
Please add the quality to the Part-No.
UL = Ultron
FT = Finetron
TC = TCC
T4 = TCC 304L

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

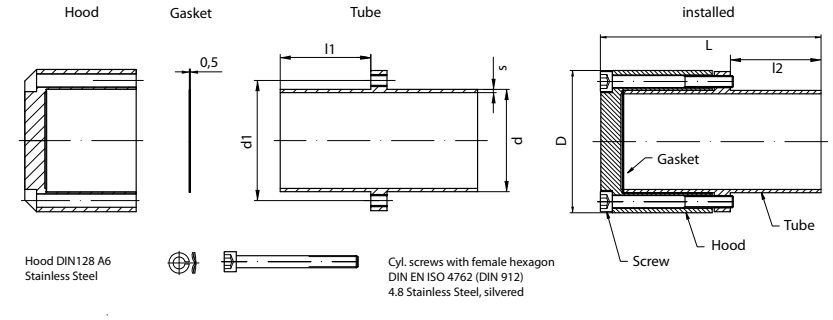
Further dimensions on request. Subject to alteration.

RWC
REMOVABLE WELD CAP (DOCKWEILER CAP)

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

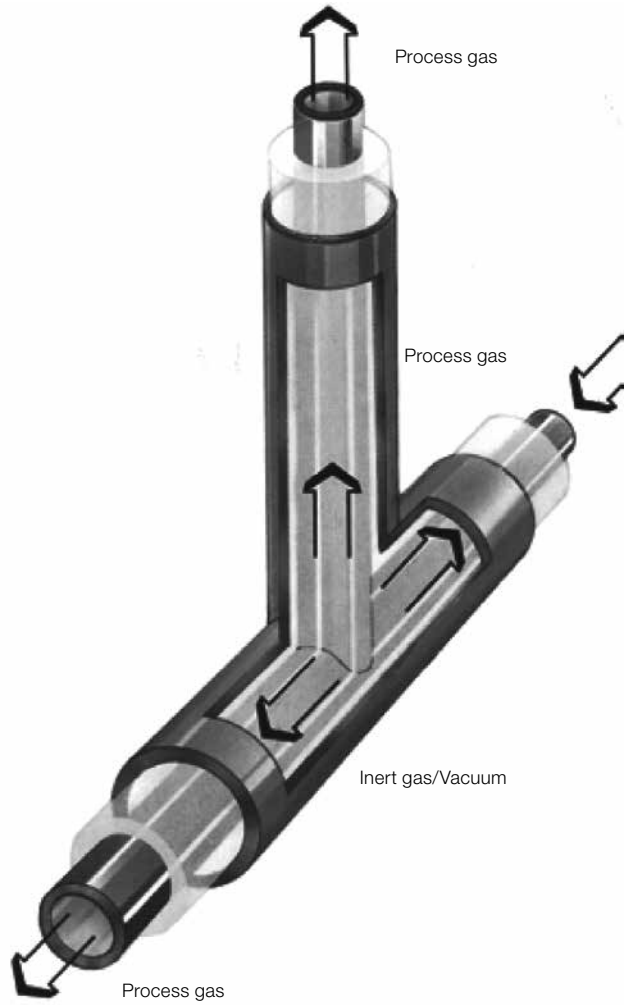
Further dimensions on request. Subject to alteration.

COAXIAL TUBE SYSTEM

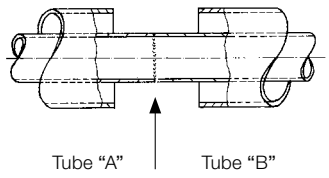
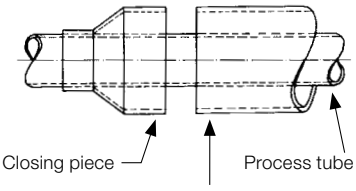
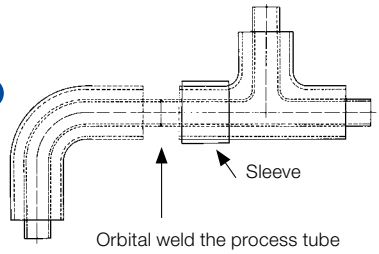
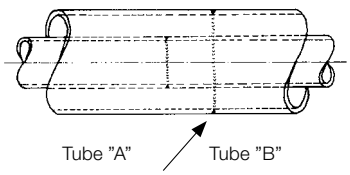
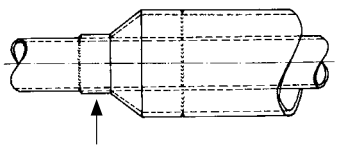
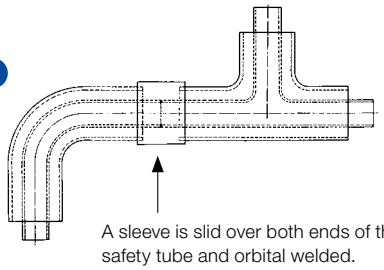
The special twin wall tube system consists of an inner electrochemically polished process tube and an outer safety tube. Both are prepared for orbital welding and manufactured from high quality stainless steel AISI 316L or 304L – acc. to customer specification (the tube is also available in other alloys on demand).

Spacers centre 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 neutralised and harmlessly discharged from the system.

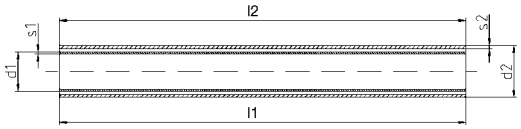
The coaxial tube system is easy to install by orbital welding and can also be integrated existing systems and plants.



INSTALLATION INSTRUCTIONS FOR THE COAXIAL TUBE SYSTEM

Tube to tube or tube to fitting	Closing the outer safety tube	Fitting to fitting
1  Orbital weld the process tube and helium leak test.	1 	1  Orbital weld the process tube
2  Slide the outer safety tubes together so that the weld on the inner process tube is covered. Orbital weld the outer tube and helium leak test.	2  Orbital weld the closing piece to the process tube.	2  A sleeve is slid over both ends of the safety tube and orbital welded.

CO-UL6 / CO-UL4
TUBING

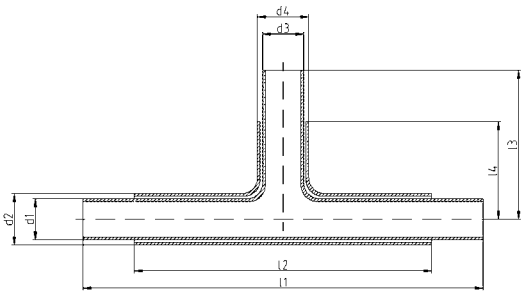


Part-No.		INNER TUBE		OUTER TUBE	
Outer Tubing TCC	Outer Tubing TCC 304L	Inch	mm	Inch	mm
CO-UL6-04-T6	CO-UL6-04-T4	1/4"	6.35	1/2"	12.70
CO-UL6-06-T6	CO-UL6-06-T4	3/8"	9.53	5/8"	15.88
CO-UL6-08-T6	CO-UL6-08-T4	1/2"	12.70	3/4"	19.05
CO-UL6-12-T6	CO-UL6-12-T4	3/4"	19.05	1"	25.40
CO-UL6-16-T6	CO-UL6-16-T4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

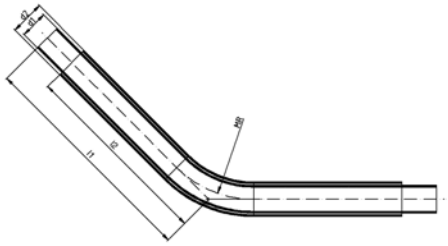
CTE/CRT
COAXIAL TEE / COAXIAL REDUCING TEE



DIMENSIONS INNER TUBE											
Part-No.	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

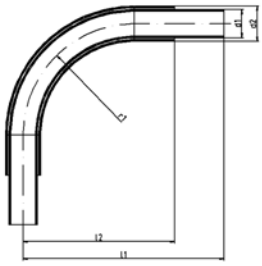
DIMENSIONS OUTER TUBE										
Tube						Branch				
Nominal Size (d2)		Wall Thickness (s2)		Length (l2)		Nominal Size (d3)	Wall Thickness (s4)		Length (l4)	
Inch	mm	Inch	mm	Inch	mm	mm	Inch	mm	Inch	mm
1/2" x 1/2"	12.70	0.049	1.24	3.500	88.90	12.70	0.049	1.24	1.750	44.45
5/8" x 1/2"	15.88	0.049	1.24	3.500	88.90	12.70	0.049	1.24	1.750	44.45
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
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
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
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
1" x 1/2"	25.40	0.065	1.65	3.750	95.25	12.70	0.049	1.24	1.875	47.63
1" x 5/8"	25.40	0.065	1.65	3.750	95.25	15.88	0.049	1.24	1.875	47.63
1" x 3/4"	25.40	0.065	1.65	3.750	95.25	19.05	0.065	1.65	1.875	47.63
1" x 1"	25.40	0.065	1.65	3.750	95.25	25.40	0.065	1.65	1.875	47.63
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
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
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
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
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

C4L
COAXIAL 45° ELBOW



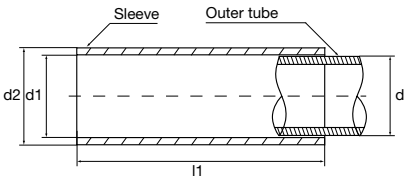
DIMENSIONS										
Part-No.	Inner Tube				Outer Tube					
	Nominal Size (d1)		Length (d1)		Nominal Size (d2)		Length (d2)		Radius (MR)	
	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CO-UL-C4L-04	1/4"	6.35	3.875	98.45	0.500	12.70	3.125	79.40	1.500	38.10
CO-UL-C4L-06	3/8"	9.53	3.875	98.45	0.625	15.88	3.125	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	1.500	38.10

C9L
COAXIAL 90° ELBOW



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

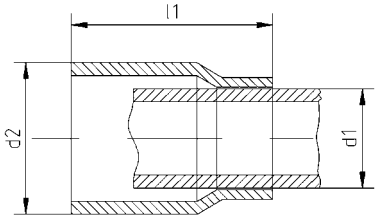
CWS/CWS3
COAXIAL WELD SLEEVE



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)

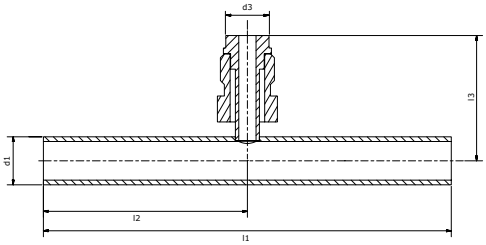
Part-No.	Process Tube		Outer Tube		Sleeve					
			Nominal Size (d)		Nominal Size (d1)		Nominal Size (d2)		Length (l1)	
	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CO-UL-XXX-04	1/4"	6.35	0.500	12.70	0.508	12.90	0.625	15.88	4.000 / 3.000	101.60 / 76.20
CO-UL-XXX-06	3/8"	9.53	0.625	15.87	0.634	16.11	0.750	19.05	4.000 / 3.000	101.60 / 76.20
CO-UL-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-UL-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-UL-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

CTM
COAXIAL TERMINATOR



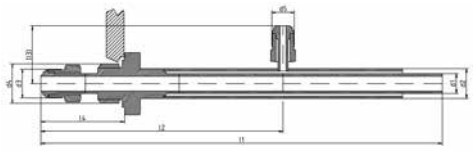
DIMENSIONS						
Part-No.	Nominal Size (d1)		Nominal Size (d2)		Length (l1)	
	Inch	mm	Inch	mm	Inch	mm
CO-UL-CTM-04	1/4"	6.35	0.500	12.70	4.752	120.70
CO-UL-CTM-06	3/8"	9.53	0.625	15.88	5.146	130.70
CO-UL-CTM-08	1/2"	12.70	0.750	19.05	7.260	184.40
CO-UL-CTM-12	3/4"	19.05	1.000	25.40	7.510	190.75
CO-UL-CTM-16	1"	25.40	1.500	38.10	9.250	234.95

CPT
COAXIAL PURGE TEE



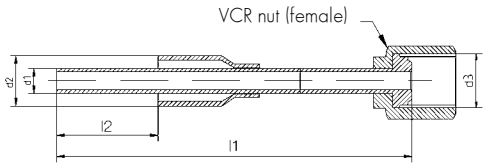
DIMENSIONS											
Part-No.	Inner Tube Nominal Size (d1)		Inner Tube Nominal Size (d2)		Length (l1)		Length (l2)		Length (l3)		Size
	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	d3
CO-UL-CPT-04	1/4"	6.35	0.500	12.70	5.748	146.00	2.874	73.00	1.311	33.30	1/4" VCR*
CO-UL-CPT-06	3/8"	9.53	0.625	15.88	6.000	152.40	3.000	76.20	1.370	34.80	1/4" VCR*
CO-UL-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-UL-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-UL-CPT-16	1"	25.40	1.500	38.10	6.500	165.10	3.250	82.55	1.685	42.80	1/4" VCR*

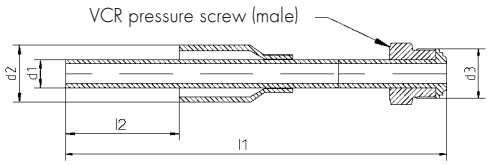
CBP
COAXIAL BULKHEAD PURGE TEE



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	1.311	33.30	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*

CFG/CMG
COAXIAL VCR* FEMALE/MALE GLAND





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 acc. to customer design

MATERIAL

Tube systems:	ULTRON TCC/TCC1 TCC 304L/TCC1 304L
Surfaces:	electropolished (clean room), anodic clean, bright finish

PREFABRICATED LATERALS FOR GASES

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 clean room 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 ¼" 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 clean room conditions to fulfil ultra high purity specifications according to requirement. Ask for our complete literature.

UHP PREFABRICATED LATERALS WITH DIAPHRAGM VALVE

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

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

NEW OPTION

A STEP AHEAD

OF STATE OF THE ART.

PREFABRICATED LATERALS WITH BALL VALVES

PREFABRICATED LATERALS WITH BALL VALVES

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

RESULT:
High cost savings – optimisation of the quality of the total installation

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

CONTAINERS AND COMPONENTS

PRODUCT INFORMATION

- Bubbler 100 and Bubbler Crossover
- Custom made fittings – Elbows and T-pieces

MATERIAL

Tube systems:	ULTRON TCC/TCC[1]
Surfaces:	electropolished, anodic clean, bright finish
Cleanliness:	acc. Specification

PRODUCT INTEGRITY

IN STAINLESS STEEL.

BUBBLER 100
BUBBLER CROSSOVER

BUBBLER SPECIFICATION

Material	UNS S31603 / 316L Hastelloy on request
Helium-Leak test	Helium-leak tested to 4 x 10 - 9 mbar l/s
Pressure Test	300 psi (21 bar) – according to DOT*
Marking	In accordance with DOT*, customer information optional
Documentation	Delivery in tubular container or case for safe transport
Test procedures	Verification of dimensions, visual inspection, roughness measurements, conductivity test (DI water), TOC-measurement of DI-water, particle measurement
Packing and delivery	Filled with N2 (99.9948%) and bagged in polythene PE, single packed in cartons crate

*) Department of Transportation

Qualities	ULTRON (UHP, HP)
Surface Options	Ra ≤ 10µin (0.25 µm), electropolished (16 Min.)
Cleanroom	Class 10

IMPROVED SAFETY.
PURITY.
EFFICIENCY.

BUBBLER 100

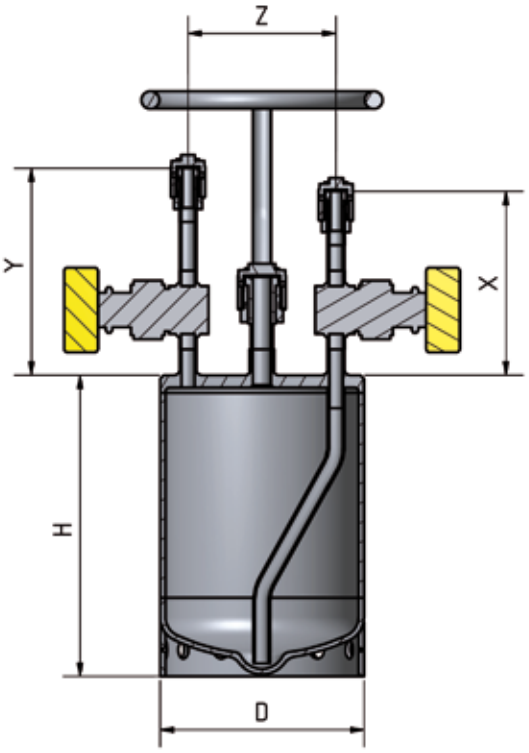
FEATURES

- Dockweiler orbital welding technology
- High quality diaphragm valves
- Helium-leak tested to 4 x10–9 mbar l/s
- Pressure tested to 300 psi (21 bar), according to DOT
- Inspection port 1/2"
- Valve protection cap
- Available in 3 qualities:
  – UHP: Ultron*) final weld electropolished
  – HP: Ultron*)
  – P: finetron*)

  *) acc. to Dockweiler Product Specifications

USER BENEFITS

- Handle to protect valves
- Returnable and reusable
- Guaranteed quality through controlled process



DOCKWEILER BUBBLER 100 AND BUBBLER CROSSOVER

Bubbler 100	Bubbler 100 Crossover	Diameter D (inch)	Volume V (ml)	Height H (inch)	Inlet X (inch)	Outlet Y (inch)	Width Z (inch)
Product Code	Product Code						
63-400/48		2.500	400	5.709	4.134	4.134	1.890
63-400	C63-400	2.500	400	5.709	5.472	5.984	3.268
114-1300	C114-1300	4.500	1,300	6.692	4.488	5.000	3.268
114-3200	C114-3200	4.500	3,200	15.748	4.488	5.000	3.268
168-3150	C168-3150	6.626	3,150	6.692	4.488	5.000	3.268
168-8000	C168-8000	6.626	8,000	15.748	4.488	5.000	3.268
168-22000	C168-22000	6.626	22,000	42.126	4.488	5.000	3.268

DOCKWEILER BUBBLER WITH VALVE PROTECTION CAP

273-56000	C273-56000	10.750	56,000	40.827	4.488	5.000	3.268

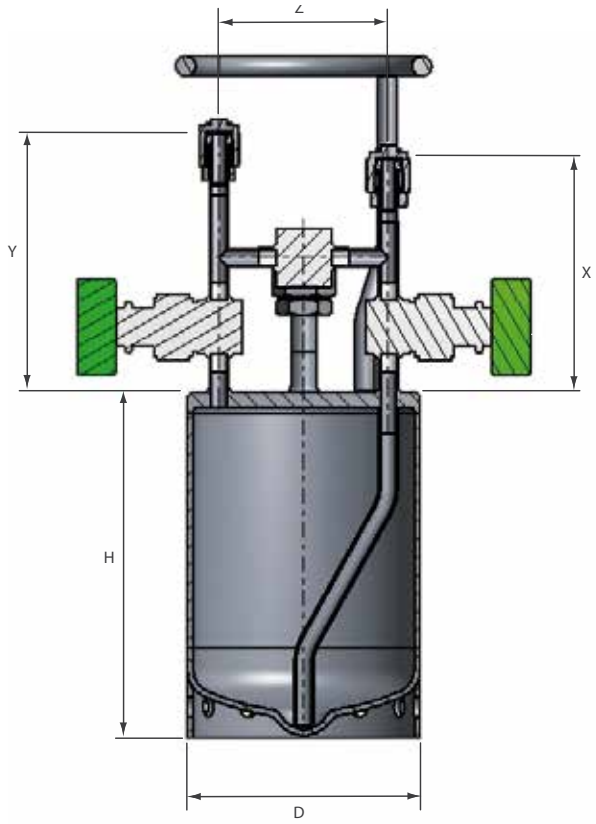
BUBBLER CROSSOVER

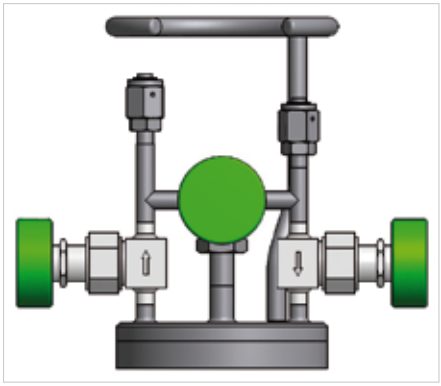
FURTHER FEATURES

- Integrated purge valve
  - – Minimized dead volumes
  - – Best possible purge practice
- Approvals for Transportation

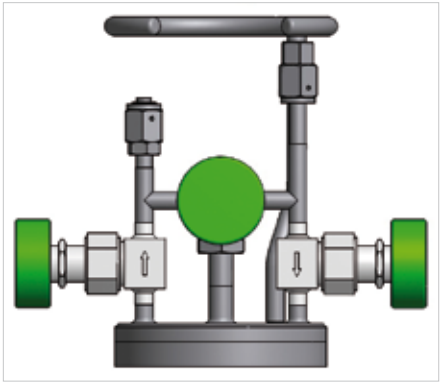
USER BENEFITS

- Optimized and safer handling
- Faster commissioning
  - – Complete rinseability
  - – Reduced dead volume
  - – Optimum chemical usage and cleaning times

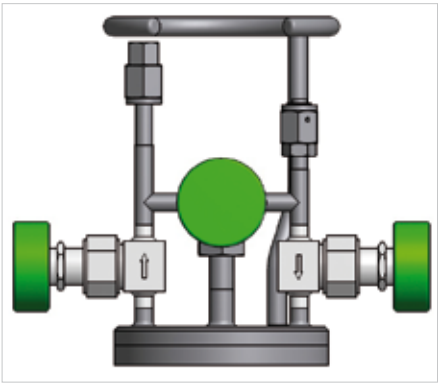




Standard Configuration



PFD* Configuration



PMD* Configuration

*) PFD: Polarized Female-Dip tube, PMD: Polarized Male-Dip Tube

SPECIAL TUBE FITTINGS
T-PIECES WITH INCLINED BRANCH AND Y-PIECES

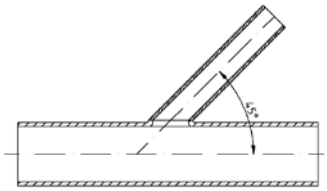
In addition to T-pieces with 90° branch (see dimension tables) Dockweiler also produces T-pieces with differently inclined branches.
Here the manufacture mostly follows customer specifications for the relevant special applications.

Material

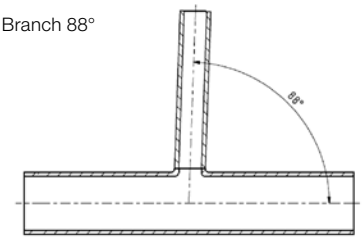
Tube components:	Dockweiler stainless steel tube systems ULTRON, finetron/finetron.1, TCC/TCC.1, safetron, weldtron
Prematerial:	1.4404 / 1.4435 / UNS S 31603 (316L), 1.4539 / UNS NO 8904 (904L)
Surfaces:	bright finish, anodic clean, electropolished
Ra-values:	as per customer specification
Dimensions: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

Examples

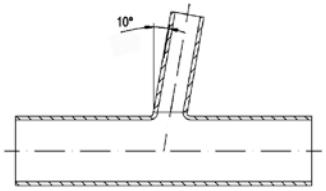
Branch 45°



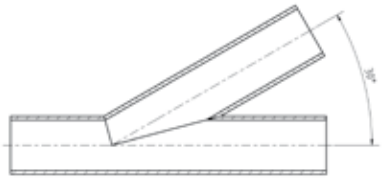
Branch 88°



Branch 10°



Branch 30°



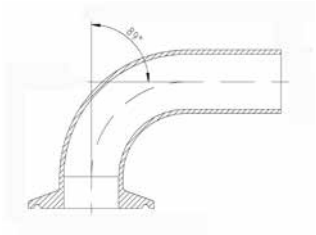
SPECIAL TUBE FITTINGS
ELBOWS

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.

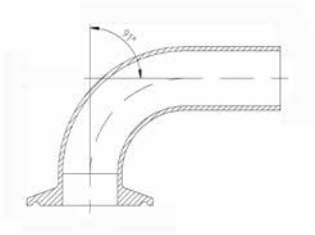
Material

Tube components:	Dockweiler stainless steel tube systems ULTRON, finetron/finetron.1, TCC/TCC.1, safetron, weldtron
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

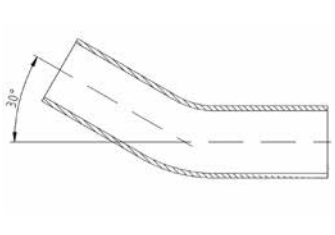
Examples



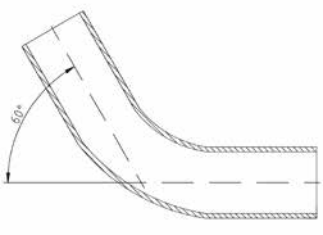
Elbow 89°



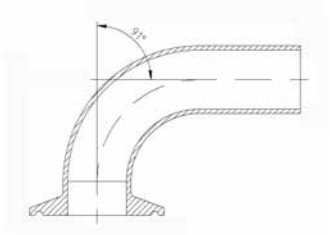
Elbow 91°



Elbow 30°



Elbow 60°



Elbow 92°

INFORMATION

TECHNICAL INFORMATION

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

CERTIFICATES

CERTIFICATE TÜV NORD

Management system as per
DIN EN ISO 9001 : 2008

Dockweiler AG
An der Autobahn 30
19306 Neustadt-Glewe
Germany

Development, manufacture and sales of stainless steel tube systems and components

DIN EN ISO 9001

Lloyd's Register ZERTIFIKAT Certificate

Dockweiler AG
D-19306 Neustadt-Glewe
Germany

AD 2000-Merkblatt HPO & EN ISO 3834-2

Herstellung von Edelstahlrohren und Formteilen DN 4 bis DN 500.

Lloyd's Register Quality Assurance GmbH

AD 2000 HPO & EN ISO 3834-2

CERTIFICATE TÜV NORD

Management system as per
DIN EN ISO 14001 : 2009

Dockweiler AG
An der Autobahn 30
19306 Neustadt-Glewe
Germany

Development, manufacture and sales of stainless steel tube systems and components

DIN EN ISO 14001

Lloyd's Register ZERTIFIKAT

Dockweiler AG
D-19306 Neustadt-Glewe
Germany

Modul A1

Herstellung von Druckhaltern und Rohrleitungskomponenten.

CE 0525

LRQA GmbH Kennnr. 0525

PED 97/23/EGw

The current certificates for download on the internet:
www.dockweiler.com

PRESSURE RATINGS
ASME

Maximum Permissible Design Pressure for Tube and Pipe.
Design Pressure for straight tube and pipe calculated acc. to ASME B31.3.
The listed ratings apply to seamless tube UNS S31603 acc. to ASME SA213, welded tube UNS S31603 acc. to ASME SA249, and seamless and welded pipe acc. to ASTM A 312, Weld Joint Strength Reduction Factor W = 1, Basic Quality Factor for Longitudinal Weld Joints in Pipes and Tubes Ej = 0,8. A zero corrosion allowance is specified.

OD Tubing

Outside Diameter[a]		+Tol.	Wall Thickness[a]		-Tol.	OD and Wall Thickness Tolerances[b] acc. to ASTM A 269 / A 270[c] / A 632 / ASME BPE Maximum Permissible Design Pressure			
						100 °F (38 °C)	200 °F (93 °C)	300 °F (149 °C)	400 °F (204 °C)
[inch]	[mm]	[inch]	[inch]	[mm]	[%]	[psi]	[psi]	[psi]	[psi]
1/8	3.18	0.003	0.022	0.56	-10.0%	4716	4716	4716	4434
1/4	6.35	0.004	0.035	0.89	-10.0%	3678	3678	3678	3458
3/8	9.53	0.004	0.035	0.89	-10.0%	2378	2378	2378	2236
1/2	12.70	0.005	0.049	1.24	-10.0%	2508	2508	2508	2358
1/2	12.70	0.005	0.065	1.65	-15.0%	3203	3203	3203	3011
5/8	15.88	0.005	0.049	1.24	-10.0%	1981	1981	1981	1862
3/4	19.05	0.005	0.049	1.24	-10.0%	1637	1637	1637	1539
3/4	19.05	0.005	0.065	1.65	-10.0%	2207	2207	2207	2075
1	25.40	0.005	0.065	1.65	-10.0%	1631	1631	1631	1533
1 1/4	31.75	0.005	0.065	1.65	-10.0%	1293	1293	1293	1216
1 1/2	38.10	0.008	0.065	1.65	-10.0%	1069	1069	1069	1005
2	50.80	0.008	0.065	1.65	-10.0%	797	797	797	749
2 1/2	63.50	0.010	0.065	1.65	-10.0%	634	634	634	596
3	76.20	0.010	0.065	1.65	-10.0%	527	527	527	495
4	101.60	0.015	0.083	2.11	-10.0%	504	504	504	474
6	152.40	0.030	0.109	2.77	-10.0%	440	440	440	414

[a] Calculation of maximum permissible design pressure is based on the data given in [inch], data given in [mm] are for information only
[b] All referenced standards shall be met
[c] ASTM A 270, S2. Pharmaceutical Quality Tubing

ISO Dimensions

Outside Diameter	+Tol.	Wall Thickness	-Tol.	OD and Wall Thickness Tolerances acc. to DIN EN ISO 1127. D4/T3 Maximum Permissible Design Pressure			
				100 °F (38 °C)	200 °F (93 °C)	300 °F (149 °C)	400 °F (204 °C)
[mm]	[mm] / [%]	[mm]	[mm] / [%]	[psi]	[psi]	[psi]	[psi]
13.50	0.10	1.60	-0.20	2997	2997	2997	2817
17.20	0.10	1.60	-0.20	2311	2311	2311	2173
21.30	0.5%	1.60	-0.20	1843	1843	1843	1733
26.90	0.5%	1.60	-0.20	1443	1443	1443	1357
33.70	0.5%	2.00	-10.0%	1483	1483	1483	1394
42.40	0.5%	2.00	-10.0%	1168	1168	1168	1098
48.30	0.5%	2.00	-10.0%	1021	1021	1021	959
60.30	0.5%	2.00	-10.0%	812	812	812	764
76.10	0.5%	2.00	-10.0%	640	640	640	602
88.90	0.5%	2.30	-10.0%	630	630	630	592
114.30	0.5%	2.30	-10.0%	488	488	488	459
139.70	0.5%	2.30	-10.0%	398	398	398	374
168.30	0.5%	2.60	-10.0%	373	373	373	351
219.10	0.5%	2.60	-10.0%	286	286	286	269

PRESSURE RATINGS
ASME

Metric Dimensions

Outside Diameter	+Tol.	Wall Thickness	-Tol.	OD and Wall Thickness Tolerances acc. to DIN EN ISO 1127, D4/T3 Maximum Permissible Design Pressure			
				100 °F (38 °C)	200 °F (93 °C)	300 °F (149 °C)	400 °F (204 °C)
[mm]	[mm] / [%]	[mm]	[mm] / [%]	[psi]	[psi]	[psi]	[psi]
3.00	0.10	0.50	-0.20	2802	2802	2802	2634
6.00	0.10	1.00	-0.20	3915	3915	3915	3680
8.00	0.10	1.00	-0.20	2865	2865	2865	2693
10.00	0.10	1.00	-0.20	2259	2259	2259	2124
12.00	0.10	1.00	-0.20	1865	1865	1865	1753
13.00	0.10	1.50	-0.20	2880	2880	2880	2707
15.00	0.10	1.50	-0.20	2470	2470	2470	2322
18.00	0.10	1.50	-0.20	2036	2036	2036	1914
19.00	0.10	1.50	-0.20	1923	1923	1923	1808
22.00	0.5%	1.50	-0.20	1648	1648	1648	1549
23.00	0.5%	1.50	-0.20	1573	1573	1573	1479
28.00	0.5%	1.50	-0.20	1281	1281	1281	1205
29.00	0.5%	1.50	-0.20	1235	1235	1235	1161
34.00	0.5%	1.50	-0.20	1048	1048	1048	985
35.00	0.5%	1.50	-0.20	1017	1017	1017	956
40.00	0.5%	1.50	-0.20	887	887	887	833
41.00	0.5%	1.50	-0.20	864	864	864	813
52.00	0.5%	1.50	-0.20	678	678	678	637
53.00	0.5%	1.50	-0.20	665	665	665	625
70.00	0.5%	2.00	-10.0%	697	697	697	656
85.00	0.5%	2.00	-10.0%	572	572	572	538
104.00	0.5%	2.00	-10.0%	466	466	466	438
129.00	0.5%	2.00	-10.0%	375	375	375	352
154.00	0.5%	2.00	-10.0%	313	313	313	294
204.00	0.5%	2.00	-10.0%	236	236	236	222

Seamless and Welded PIPE Schedule 5S (ASTM A 312M)

Outside Diameter[a]		+Tol.	Wall Thickness[a]		-Tol.	OD and Wall Thickness Tolerances acc. to ASTM A 999M / A 312M Maximum Permissible Design Pressure			
						100 °F (38 °C)	200 °F (93 °C)	300 °F (149 °C)	400 °F (204 °C)
[mm]	NPS[b]	[mm]	[mm]	[inch]	[%]	[psi]	[psi]	[psi]	[psi]
21.34	1/2	0.4	1.65	0.065	-12.50%	1874	1874	1874	1761
26.67	3/4	0.4	1.65	0.065	-12.50%	1488	1488	1488	1399
33.40	1	0.4	1.65	0.065	-12.50%	1181	1181	1181	1110
42.16	1 1/4	0.4	1.65	0.065	-12.50%	931	931	931	875
48.26	1 1/2	0.4	1.65	0.065	-12.50%	812	812	812	763
60.33	2	0.8	1.65	0.065	-12.50%	643	643	643	604
73.03	2 1/2	0.8	2.11	0.083	-12.50%	681	681	681	640
88.90	3	0.8	2.11	0.083	-12.50%	559	559	559	525
101.60	3 1/2	0.8	2.11	0.083	-12.50%	488	488	488	459
114.30	4	0.8	2.11	0.083	-12.50%	434	434	434	408
141.30	5	1.6	2.77	0.109	-12.50%	459	459	459	431
168.28	6	1.6	2.77	0.109	-12.50%	385	385	385	362
219.08	8	1.6	2.77	0.109	-12.50%	296	296	296	278
273.05	10	2.4	3.40	0.134	-12.50%	291	291	291	273
323.85	12	2.4	3.96	0.156	-12.50%	286	286	286	269
355.60	14	2.4	3.96	0.156	-12.50%	260	260	260	245
406.40	16	2.4	4.19	0.165	-12.50%	241	241	241	226
457.20	18	2.4	4.19	0.165	-12.50%	214	214	214	201
508.00	20	3.2	4.78	0.188	-12.50%	220	220	220	206
558.80	22	3.2	4.78	0.188	-12.50%	200	200	200	188
609.60	24	3.2	5.54	0.218	-12.50%	212	212	212	199
762.00	30	4.0	6.35	0.250	-12.50%	194	194	194	183

a) Calculation of maximum permissible design pressure is based on the data given in [inch], data given in [mm] are for information only
b) NPS = nominal pipe size

PRESSURE RATINGS
ASME

Seamless and Welded PIPE Schedule 10S (ASTM A 312M)

Outside Diameter[a]		+Tol.	Wall Thickness[a]		-Tol.	OD and Wall Thickness Tolerances acc. to ASTM A 999M / A 312M Maximum Permissible Design Pressure			
						100 °F (38 °C)	200 °F (93 °C)	300 °F (149 °C)	400 °F (204 °C)
[mm]	NPS[b]	[mm]	[mm]	[inch]	[%]	[psi]	[psi]	[psi]	[psi]
10.29	1/8	0.4	1.24	0.049	-12.50%	2951	2951	2951	2774
13.72	1/4	0.4	1.65	0.065	-12.50%	2975	2975	2975	2797
17.15	3/8	0.4	1.65	0.065	-12.50%	2352	2352	2352	2212
21.34	1/2	0.4	2.11	0.083	-12.50%	2434	2434	2434	2288
26.67	3/4	0.4	2.11	0.083	-12.50%	1927	1927	1927	1812
33.40	1	0.4	2.77	0.109	-12.50%	2032	2032	2032	1910
42.16	1 1/4	0.4	2.77	0.109	-12.50%	1594	1594	1594	1498
48.26	1 1/2	0.4	2.77	0.109	-12.50%	1386	1386	1386	1303
60.33	2	0.8	2.77	0.109	-12.50%	1094	1094	1094	1028
73.03	2 1/2	0.8	3.05	0.109	-12.50%	994	994	994	935
88.90	3	0.8	3.05	0.120	-12.50%	814	814	814	765
101.60	3 1/2	0.8	3.05	0.120	-12.50%	711	711	711	668
114.30	4	0.8	3.05	0.120	-12.50%	631	631	631	593
141.30	5	1.6	3.40	0.134	-12.50%	565	565	565	531
168.28	6	1.6	3.40	0.134	-12.50%	474	474	474	446
219.08	8	1.6	3.76	0.148	-12.50%	403	403	403	379
273.05	10	2.4	4.19	0.165	-12.50%	359	359	359	337
323.85	12	2.4	4.57	0.180	-12.50%	330	330	330	310
355.60	14[c]	2.4	4.78	0.188	-12.50%	315	315	315	296
406.40	16[c]	2.4	4.78	0.188	-12.50%	275	275	275	259
457.20	18[c]	2.4	4.78	0.188	-12.50%	244	244	244	230
508.00	20[c]	3.2	5.54	0.218	-12.50%	255	255	255	240
558.80	22[c]	3.2	5.54	0.218	-12.50%	232	232	232	218
609.60	24	3.2	6.35	0.250	-12.50%	244	244	244	229
762.00	30	4.0	7.92	0.312	-12.50%	243	243	243	228

[a] Calculation of maximum permissible design pressure is based on the data given in [inch], data given in [mm] are for information only
[b] NPS = nominal pipe size
[c] Nominal wall thickness for these dimensions does not comply with ANSI B36.10-1979 American National Standard for Welded and Seamless Wrought Steel Pipe.

PRESSURE RATINGS
EN

Maximum Permissible Design Pressure for Tube and Pipe.
Design Pressure for straight tube and pipe calculated acc. to EN 13480-3.
The listed ratings apply to seamless tube 1.4404 or 1.4435 acc. to EN 10216-5, welded tube 1.4404 acc. to EN 10217-7,
Weld Joint Factor z = 1. A zero corrosion allowance is specified.

Imperial

OD[a]		+Tol.	Wall Thicknessa)		-Tol.	Standard for tube tolerances[b] ASTM A 269 / A 270[c] / A 632 / ASME BPE Maximum Permissible Design Pressure			
						20 °C	50 °C	100 °C	150 °C
[inch]	[mm]	[inch]	[inch]	[mm]	[%]	[bar]	[bar]	[bar]	[bar]
1/8	3.18	0.003	0.022	0.56	-10.0%	548	529	485	439
1/4	6.35	0.004	0.035	0.89	-10.0%	424	409	375	339
3/8	9.53	0.004	0.035	0.89	-10.0%	271	262	240	217
1/2	12.70	0.005	0.049	1.24	-10.0%	287	276	253	229
1/2	12.70	0.005	0.065	1.65	-15.0%	368	355	325	294
5/8	15.88	0.005	0.049	1.24	-10.0%	225	217	199	180
3/4	19.05	0.005	0.049	1.24	-10.0%	186	179	164	148
3/4	19.05	0.005	0.065	1.65	-10.0%	251	243	222	201
1	25.40	0.005	0.065	1.65	-10.0%	185	178	163	148
1 1/4	31.75	0.005	0.065	1.65	-10.0%	146	141	129	117
1 1/2	38.10	0.008	0.065	1.65	-10.0%	121	116	107	96
2	50.80	0.008	0.065	1.65	-10.0%	90	86	79	72
2 1/2	63.50	0.010	0.065	1.65	-10.0%	71	69	63	57
3	76.20	0.010	0.065	1.65	-10.0%	59	57	52	47
4	101.60	0.015	0.083	2.11	-10.0%	56	54	50	45
6	152.40	0.030	0.109	2.77	-10.0%	49	47	43	39

[a] Calculation of maximum permissible design pressure is based on the data given in [inch], data given in [mm] are for information only
[b] All referenced standards shall be met
[c] ASTM A 270, S2. Pharmaceutical Quality Tubing

ISO

OD	+Tol.	Wall Thickness	-Tol.	Standard for tube tolerances DIN EN ISO 1127, D4/T3 Maximum Permissible Design Pressure			
				20 °C	50 °C	100 °C	150 °C
[mm]	[mm] / [%]	[mm]	[mm] / [%]	[bar]	[bar]	[bar]	[bar]
13.50	0.10	1.60	-0.20	344	332	304	275
17.20	0.10	1.60	-0.20	264	254	233	211
21.30	0.5%	1.60	-0.20	209	202	185	167
26.90	0.5%	1.60	-0.20	163	158	144	131
33.70	0.5%	2.00	-10.0%	168	162	148	134
42.40	0.5%	2.00	-10.0%	132	127	117	105
48.30	0.5%	2.00	-10.0%	115	111	102	92
60.30	0.5%	2.00	-10.0%	91	88	81	73
76.10	0.5%	2.00	-10.0%	72	69	63	57
88.90	0.5%	2.30	-10.0%	71	68	62	56
114.30	0.5%	2.30	-10.0%	55	53	48	44
139.70	0.5%	2.30	-10.0%	44	43	39	35
168.30	0.5%	2.60	-10.0%	42	40	37	33
219.10	0.5%	2.60	-10.0%	32	31	28	25

PRESSURE RATINGS
EN

Metric

OD	+Tol.	Wall Thickness	-Tol.	Standard for tube tolerances			
				DIN EN ISO 1127, D4/T3 Maximum Permissible Design Pressure			
				20 °C	50 °C	100 °C	150 °C
[mm]	[mm] / [%]	[mm]	[mm] / [%]	[bar]	[bar]	[bar]	[bar]
3.00	0.10	0.50	-0.20	321	310	284	257
6.00	0.10	1.00	-0.20	452	436	400	362
8.00	0.10	1.00	-0.20	328	317	290	263
10.00	0.10	1.00	-0.20	258	248	228	206
12.00	0.10	1.00	-0.20	212	204	187	169
13.00	0.10	1.50	-0.20	330	318	292	264
15.00	0.10	1.50	-0.20	282	272	249	226
18.00	0.10	1.50	-0.20	232	223	205	185
19.00	0.10	1.50	-0.20	219	211	193	175
22.00	0.5%	1.50	-0.20	187	180	165	149
23.00	0.5%	1.50	-0.20	178	172	158	143
28.00	0.5%	1.50	-0.20	145	140	128	116
29.00	0.5%	1.50	-0.20	140	135	123	112
34.00	0.5%	1.50	-0.20	118	114	104	94
35.00	0.5%	1.50	-0.20	115	111	101	92
40.00	0.5%	1.50	-0.20	100	96	88	80
41.00	0.5%	1.50	-0.20	97	94	86	78
52.00	0.5%	1.50	-0.20	76	73	67	61
53.00	0.5%	1.50	-0.20	75	72	66	60
70.00	0.5%	2.00	-10.0%	78	75	69	63
85.00	0.5%	2.00	-10.0%	64	62	57	51
104.00	0.5%	2.00	-10.0%	52	50	46	42
129.00	0.5%	2.00	-10.0%	42	40	37	33
154.00	0.5%	2.00	-10.0%	35	34	31	28
204.00	0.5%	2.00	-10.0%	26	25	23	21

Welded and seamless PIPE Schedule 5S (ASTM A 312M)

OD[a]		+Tol.	Wall Thickness[a]		-Tol.	Standard for tube tolerances ASTM A 999M / A 312M Maximum Permissible Design Pressure			
						20 °C	50 °C	100 °C	150 °C
[mm]	NPS[b]	[mm]	[mm]	[inch]	[%]	[bar]	[bar]	[bar]	[bar]
21.34	1/2	0.4	1.65	0.065	-12.50%	213	205	188	170
26.67	3/4	0.4	1.65	0.065	-12.50%	169	163	149	135
33.40	1	0.4	1.65	0.065	-12.50%	133	129	118	107
42.16	1 1/4	0.4	1.65	0.065	-12.50%	105	101	93	84
48.26	1 1/2	0.4	1.65	0.065	-12.50%	91	88	81	73
60.33	2	0.8	1.65	0.065	-12.50%	72	69	64	58
73.03	2 1/2	0.8	2.11	0.083	-12.50%	76	74	68	61
88.90	3	0.8	2.11	0.083	-12.50%	63	60	55	50
101.60	3 1/2	0.8	2.11	0.083	-12.50%	55	53	48	44
114.30	4	0.8	2.11	0.083	-12.50%	48	47	43	39
141.30	5	1.6	2.77	0.109	-12.50%	51	49	45	41
168.28	6	1.6	2.77	0.109	-12.50%	43	41	38	34
219.08	8	1.6	2.77	0.109	-12.50%	33	32	29	26
273.05	10	2.4	3.40	0.134	-12.50%	32	31	28	26
323.85	12	2.4	3.96	0.156	-12.50%	32	31	28	25
355.60	14	2.4	3.96	0.156	-12.50%	29	28	25	23
406.40	16	2.4	4.19	0.165	-12.50%	27	26	24	21
457.20	18	2.4	4.19	0.165	-12.50%	24	23	21	19
508.00	20	3.2	4.78	0.188	-12.50%	24	23	21	19
558.80	22	3.2	4.78	0.188	-12.50%	22	21	19	17
609.60	24	3.2	5.54	0.218	-12.50%	23	23	21	19
762.00	30	4.0	6.35	0.250	-12.50%	21	21	19	17

[a] Calculation of maximum permissible design pressure is based on the data given in [inch], data given in [mm] are for information only
[b] NPS = nominal pipe size

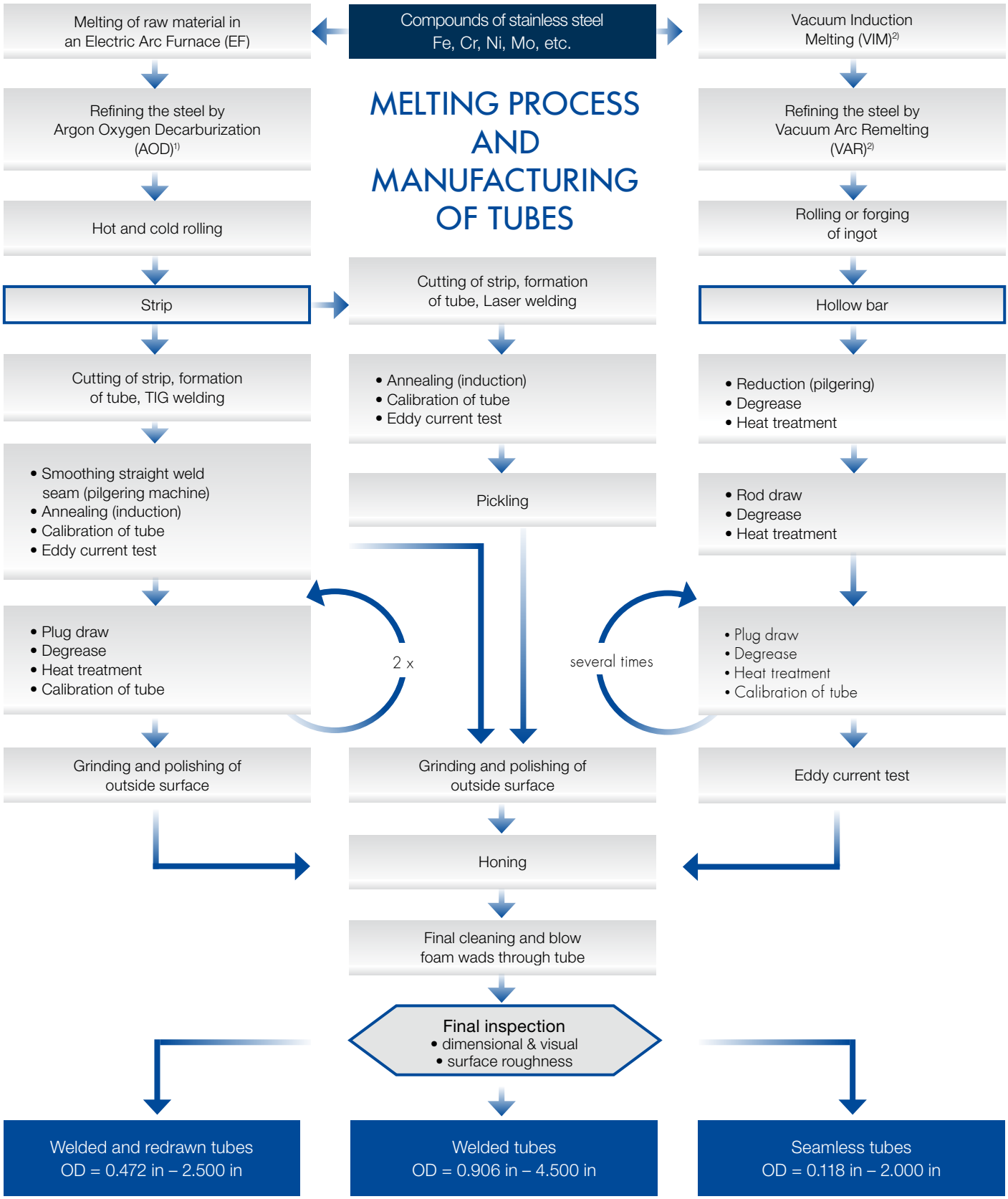
PRESSURE RATINGS
EN

Seamless and Welded PIPE Schedule 10S (ASTM A 312M)

OD[a]		+Tol.	Wall Thickness[a]		-Tol.	Standard for tube tolerances ASTM A 999M / A 312M Maximum Permissible Design Pressure			
						20 °C	50 °C	100 °C	150 °C
[mm]	NPS[b]	[mm]	[mm]	[inch]	[%]	[bar]	[bar]	[bar]	[bar]
10.29	1/8	0.4	1.24	0.049	-12.50%	338	326	299	271
13.72	1/4	0.4	1.65	0.065	-12.50%	341	329	302	273
17.15	3/8	0.4	1.65	0.065	-12.50%	268	259	237	215
21.34	1/2	0.4	2.11	0.083	-12.50%	278	268	246	222
26.67	3/4	0.4	2.11	0.083	-12.50%	219	211	194	175
33.40	1	0.4	2.77	0.109	-12.50%	231	223	204	185
42.16	1 1/4	0.4	2.77	0.109	-12.50%	181	174	160	144
48.26	1 1/2	0.4	2.77	0.109	-12.50%	157	151	139	125
60.33	2	0.8	2.77	0.109	-12.50%	123	119	109	99
73.03	2 1/2	0.8	3.05	0.109	-12.50%	112	108	99	90
88.90	3	0.8	3.05	0.120	-12.50%	91	88	81	73
101.60	3 1/2	0.8	3.05	0.120	-12.50%	80	77	71	64
114.30	4	0.8	3.05	0.120	-12.50%	71	68	62	56
141.30	5	1.6	3.40	0.134	-12.50%	63	61	56	51
168.28	6	1.6	3.40	0.134	-12.50%	53	51	47	42
219.08	8	1.6	3.76	0.148	-12.50%	45	43	40	36
273.05	10	2.4	4.19	0.165	-12.50%	40	39	35	32
323.85	12	2.4	4.57	0.180	-12.50%	37	35	32	29
355.60	14[c]	2.4	4.78	0.188	-12.50%	35	34	31	28
406.40	16[c]	2.4	4.78	0.188	-12.50%	31	29	27	24
457.20	18[c]	2.4	4.78	0.188	-12.50%	27	26	24	22
508.00	20[c]	3.2	5.54	0.218	-12.50%	28	27	25	22
558.80	22[c]	3.2	5.54	0.218	-12.50%	26	25	23	20
609.60	24	3.2	6.35	0.250	-12.50%	27	26	24	21
762.00	30	4.0	7.92	0.312	-12.50%	27	26	24	21

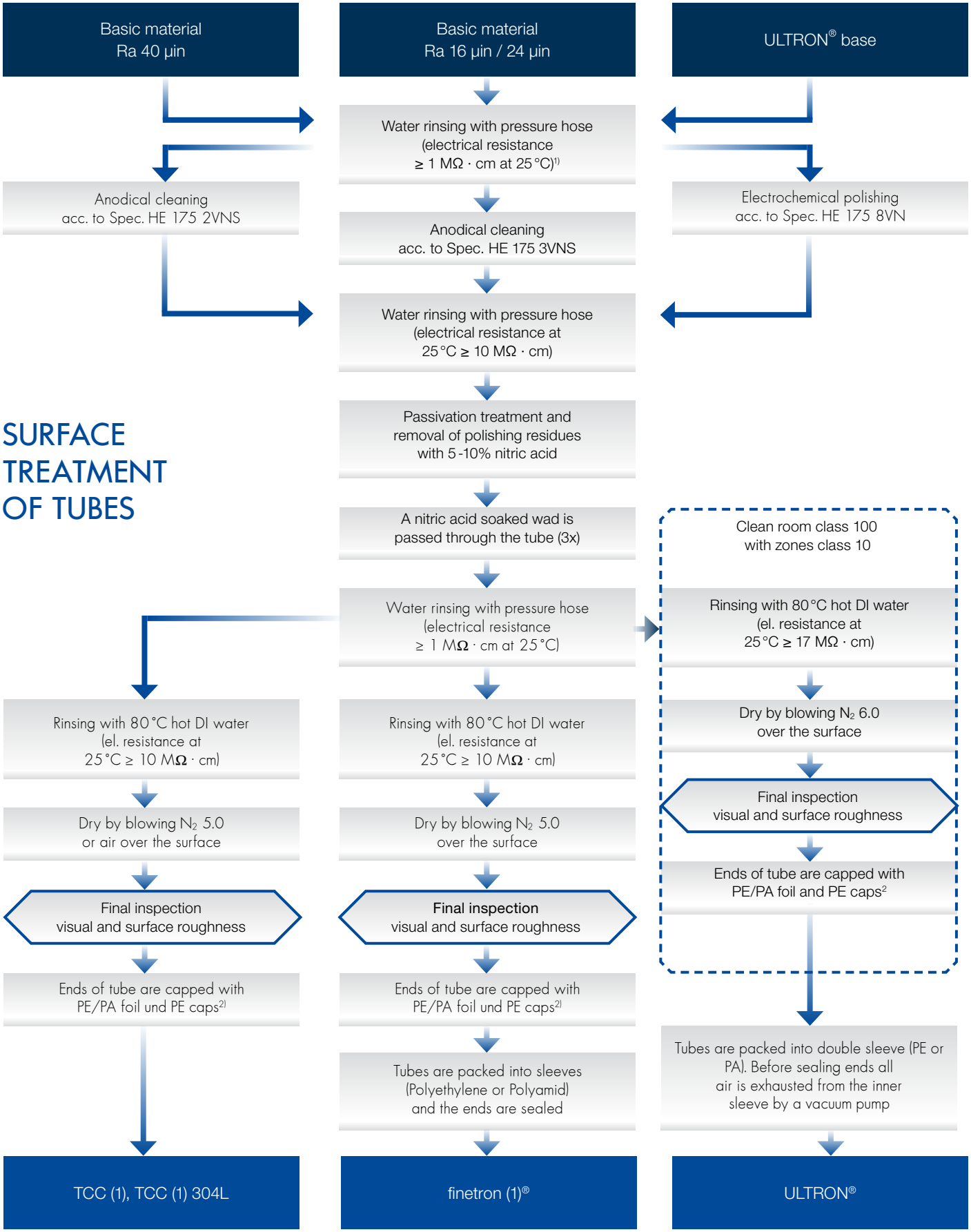
[a] Calculation of maximum permissible design pressure is based on the data given in [inch], data given in [mm] are for information only
[b] NPS = nominal pipe size
[c] Nominal wall thickness for these dimensions does not comply with ANSI B36.10–1979 American National Standard for Welded and Seamless Wrought Steel Pipe.

MELTING PROCESS AND MANUFACTURING OF TUBES



[1] Alternatively Vacuum Oxygen Decarburization (VOD) is applied for refining instead of AOD
[2] Base material for Ultron LM

SURFACE TREATMENT OF TUBES



1) 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.
2) If the marking is hardly legible after the frequent cleaning steps, tubes will be marked again.

GLOSSARY SEMICONDUCTOR

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 ft3.
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 semiconductors.
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 - 9; 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 in the internet: www.sematech.org · www.semiconductorglossary.com

GLOSSARY STAINLESS STEEL

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.

GLOSSARY STAINLESS STEEL

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 lighterthan 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.

For more information: **www.steel.org** · **www.amtubeco.com**

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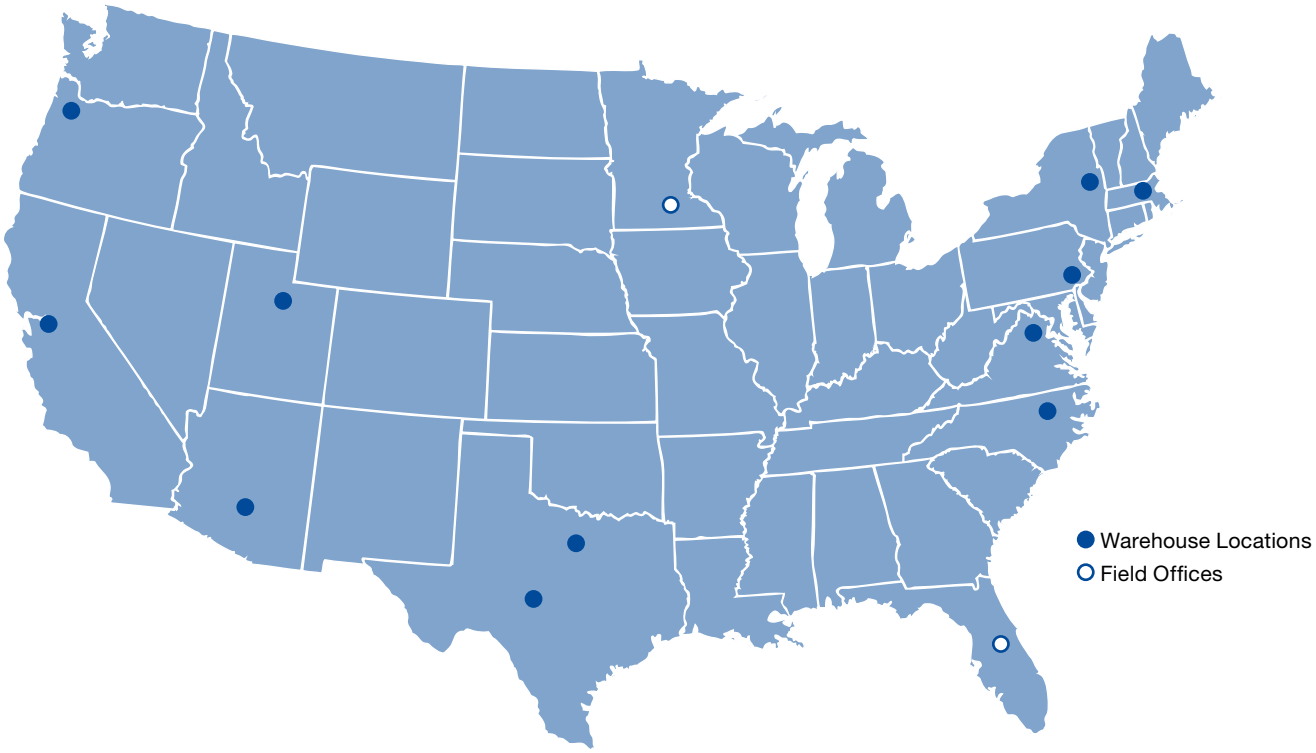

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