



Keep Your Process Ultra Clean

Tri-Clover® UltraPure Series B/ISO

Application

Alfa Laval Tri-Clover® UltraPure installation package is the perfect choice for ultra pure processes within the demanding pharmaceutical, biotech and personal care industries.

Standard design

The UltraPure Series B/ISO tubes & fittings are in accordance with series B in:

- DIN 32676 (Clamp connections).
- DIN 11865 (Bends, Tees, Reducers).
- DIN 11866 (Tubes).

Materials

UltraPure Series B/ISO is available in material 1.4404 and 1.4435 for fittings and in material 1.4404 for tubes.

All tubes are annealed, pickled and passivated in accordance with DIN EN 10217-7 W2Ab.



Steel material composition with accordance to DIN 10088-1

Steel designation		% by mass								
Number	Name	C	Si	Mn	P	S	N	Cr	Mo	Ni
1.4404	X2CrNiMo17-12-2	≤ 0.030	≤ 1.00	≤ 2.0	≤ 0.045	≤ 0.015 ^b	≤ 0.11	16.5 to 18.5	2.00 to 2.50	10.0 to 13.0 ^c
1.4435	X2CrNiMo18-14-3	≤ 0.030	≤ 1.00	≤ 2.0	≤ 0.045	≤ 0.015 ^b	≤ 0.11	17.0 to 19.0	2.50 to 3.00	12.5 to 15.0

b) For bars, rods, wire, sections, bright products and the relevant semi-finished products, a maximum content of 0.030 % S applies.

c) Where for special reasons, e. g. hot workability for the fabrication of seamless tubes where it is necessary to minimize the delta ferrite content, or with the aim of low magnetic permeability, the maximum Ni content may be increased by 1.50 % (m/m) for 1.4404

Elastomers

Seal rings are available in EPDM, FPM and PTFE

Elastomer properties

	EPDM	FPM	PTFE
FDA (CFR 21: 177.2600)	Yes	Yes	Yes
USP Class VI certified	Yes	Yes	No
Recommended operating temperature, °C	-10°C to +140°C	-10°C to +180°C	-10°C to +220°C
Resistance			
Steam resistance	Yes	No	Yes
Alkali resistance	Yes	No	Yes
Resistance to fats/oils	No	Yes	Yes
Ozone resistance	Yes	Yes	Yes

Dimensions

Dimensions and tolerances for tube material in accordance with DIN 11866 series B

External tube diameter	13.50	17.20	21.30	26.90	33.70	42.40	48.30	60.30	76.10	88.90
Internal tube diameter	10.30	14.00	18.10	23.70	29.70	38.40	44.30	56.30	72.10	84.30
External diameter tolerances	±0.05	±0.10	±0.10	±0.12	±0.15	±0.15	±0.20	±0.25	±0.30	±0.44
Wall thickness	1.60	1.60	1.60	1.60	2.00	2.00	2.00	2.00	2.00	2.30
Wall thickness tolerances ^a	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.12
Weight kg/m	0.47	0.63	0.79	1.01	1.59	2.02	2.32	2.92	3.71	4.99

a) For tubes which have undergone after treatment (honing, polishing, electro polishing) the minimum permissible wall thickness may be reduced by 0.05 mm.

Internal and external surface finish

Hygiene class ^a	Surface texture		
	Internal surface	Seam internal	External
H3o H3	Ra < 0.80 µm	Ra < 0.80 µm	Ra < 0.80 µm
H4o H4	Ra < 0.40 µm	Ra < 0.40 µm	
HE4o ^b HE4 ^b			

a) Tubular fittings with external surface of Ra<0.80 µm are marked with an o (e.g. H3o), Machined fittings with external surface of Ra<0,80 µm are marked without an o (e.g. H3)

b) Electro polished in accordance with standardized procedures involving the removal of at least 20 µm.

Fitting pressure rating

Pressure ratings in bar	
Bends, Tees, Reducers (80/200°C)	25/15
Clamp unions (80/200°C)	25/15

Tube pressure rating

Table C.1 - Permissible operating pressures at room temperature -20°C

Nominal size DN/OD	13.50	17.20	21.30	26.90	33.70	42.40	48.30	60.30	76.10	88.90
	Permissible operating pressures in bar for tubes									
Series B	379	298	240	190	190	151	132	106	84	82

The permissible operating pressures were calculated for seamless and welded tubes ($\nu = 1$) using the design value for material number 1.4404 to DIN EN 10088-2:1995-08, Table 10 - product from C (cold strip) assuming that the permissible design tension of 100% in the seam is used.

Other standards fulfilments

- All tubes and fittings are in accordance with the European pressure vessel directive (PED Directive 97/23/EC)
- All plastic protection end caps are in compliance with REACH (European Community Regulation on chemicals and their safe use)

Delivery condition

To ensure easy identification and immediate use, all Tri-Clover® UltraPure Series B tubes & fittings are delivered as follows:

- All tubes are delivered in lengths of 6 meters (0 to + 10 mm).
- Weld ends are delivered with straight-cut ends, free from burrs and breaks suitable for automatic welding.
- All fittings are individually marked with heat number, material, surface finish designation, and dimension.
- Internally cleaned and free from oils, grease, particulates, grinding compounds or electrolytes.
- Protected with end caps and individually dry-wrapped in plastic bags.
- Delivered with MTR (3.1) traceability certificate.

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