Tetra Spiraflo® C

Tubular heat exchangers

Tetra Spiraflo C – model CM shown here with two cover sections removed

Applications

General heating and cooling duties, heat recovery, pasteurisation and UHT treatment of a broad range of food products.

Product Portfolio

Tetra Spiraflo C comprises a family of the following single-pass shell-and-tube heat exchangers:

- **Tetra Spiraflo CD**, double tube, for multipurpose thermal treatment of particulate products.
- **Tetra Spiraflo CM**, multitube heat exchangers for thermal treatment of most liquid products.
- **Tetra Spiraflo CMR**, multitube for product-to-product heat recovery of low-viscosity products.
- **Tetra Spiraflo CHD, CHM and CHMR**, high-pressure versions of the CD, CM and CMR models.
- **Tetra Spiraflo CMRF**, multitube for product-to-product heat recovery of low-viscosity products with pulp and fibres.
- **Tetra Spiraflo CMP**, multitube for products with a very high pulp or fibre content.
- **Tetra Spiraflo CC**, concentric tubes for processing viscous and particulate food products.

Working Principle

In Tetra Spiraflo CD, CM and CMP models, the product flows through one tube (CD) or a bundle of parallel tubes (CM, CMP) and the service medium flows between and around them.

By allowing product-to-product heat recovery, the CMR and CMRF models offer unique opportunities for energy savings. The processed product flows through a bundle of parallel tubes and the unprocessed product flows between and around them.

The CC model has three concentric tubes. The product flows in the second (middle) tube and the service medium flows on both sides of the product.

Tubes are normally corrugated to increase turbulence and heat transfer efficiency, while a few tubes are smooth, for special applications, e.g. high-viscosity products.

Each complete Tetra Spiraflo heat exchanger tube is designed for single-pass operation, with all inner tubes connected in parallel and in counter-current flow to the service medium. The complete tubes are normally connected in series and grouped on a common frame.

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Standard Design

The heat transfer surface consists of a bundle of straight tubes or three straight concentric tubes welded into tube plates at both ends. The tube plates are sealed from the shell connections by O-rings and the shell connections are sealed from the shell in the same way — creating a system that allows movement between the different parts as well as between individual tubes. The complete tube rests on a cradle which also allows movement. This design — the Floating Protection System — absorbs the effects of ΔT and ensures that the tubes will not crack due to thermal expansion. Moreover, it enables the product tubes to be removed from the shell for inspection, for improved food safety, and it allows replacement of individual parts, reducing downtime and cost significantly.

Tetra Spiraflo C heat exchangers are based on a modular concept that simplifies expansion and/or reconfiguration of tube modules. Different tube types and sizes can be mounted on the same frame.

In the special Tetra Spiraflo CMRF model, the inner tubes are spring-loaded, which stretches them and thus eliminates the need for baffles that create problems with fibrous products. This opens the door to product-to-product heat recovery, which means opportunities for reduced energy consumption, even with fibrous products (fibre length up to 15 mm).

The standard tube length is 6 m.

Material

Product-wetted surfaces in pressure-vessel steel,1.4404 (AISI 316L), other parts in 1.4301 (AISI 304).
Product seals in EPDM.

Design temperature

Design temperature: 160°C (320°F)

Approval

The tubes and shells are designed in accordance with PED (European Pressure Equipment Directive) for the specified temperature and for the pressure ranges shown in the table on the opposite page.

Key to type designations

CM 85 / 12 x 16 C - 6
a b c d e f

a Ex. CM = Multitube model
CMR = Multitube model, regenerative execution
b Outer shell diameter in mm
c Number of product tubes
For CC model, N = Normal or W = Wide channel gap
d Outer product tube diameter in mm
e C = corrugated tube
S = smooth tube
f Module length in m (3 or 6)

Options

Materials

- Most tube inserts and bends can be supplied in 254 SMO
- Shell in grade 1.4404 (AISI 316L)

Insulation

- One or several sections of tubes with carpets of 25 mm mineral wool covered with silicon cloth

Seals

- Product seals in PTFE

Accessories

- Base frame
- Holding tubes, single or double, in lengths adapted to the flow and holding time. Several tubes can be connected in series.
- Protective panels (compulsory for high-temperature and high-pressure applications)

Design

- 3 m lengths (except CMRF and CC versions)

Approval

- PED certification or other pressure-vessel codes available for different models

Commissioning

- Kit with tools (for maintenance) and extra seals (for tube inserts and product flanges)

Particulars Required for Quotation

To assure an accurate quotation on the most suitable unit, order enquiries should include particulars of:

- required flow rates
- temperature programme
- physical properties of product and media
- desired working pressure
- maximum acceptable pressure drop

Environment

Utility consumption and heat recovery are optimised for each specific case. The exact amount of energy consumed depends on the duty the specific heat exchanger performs. In pasteurisation duties, it is possible to utilise product-to-product heat recovery, thereby reducing energy consumption considerably.

Tetra Spiraflo heat exchangers consist of parts that can be separated for recycling purposes.

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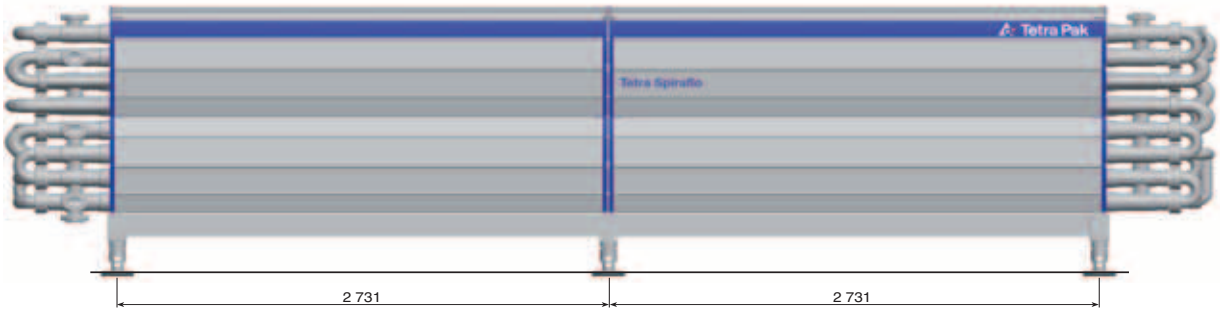
Design Pressure, acc to Standard Design

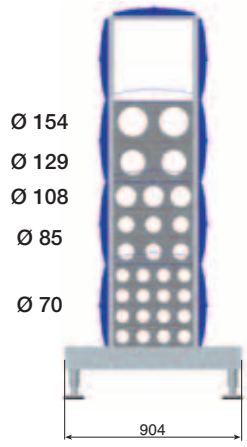
Shell tube designation	Model	Design pressure tube (MPa)	shell (MPa)
C70	CD, CM, CMR, CMRF, CC[1)] CHD, CHM, CHMR	5 8	2 2
C85	CD, CM, CMR, CMRF, CMP CHD, CHM, CHMR	4 6	1.6 1.6
C108	CD, CM, CMR, CMRF, CMP CC[1)] CHD, CHM, CHMR	4 5 6	1.6 1.6 1.6
C129	CD, CM, CMR, CMP CHD, CHM CHMR	2.5 4	1 1
C154	CD, CM, CMR, CMP CHD, CHM, CHMR	2.5 3.2	1 1

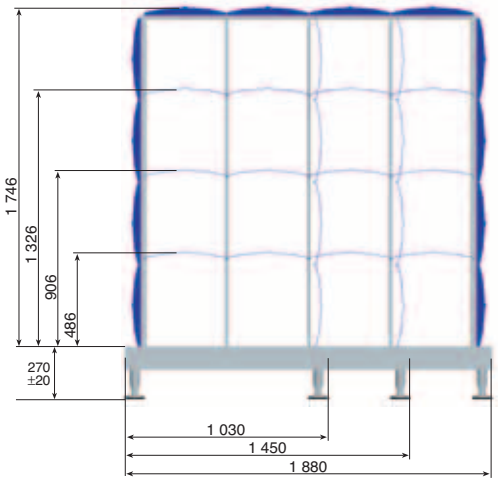
[1)] For Tetra Spiraflo CC, “tube” refers to product side and “shell” refers to media side

Dimensions

Measurements in mm







Tubes of different sizes can be mounted on the same frame. The number of tubes of different shell diameters behind each protective panel are shown in the picture.

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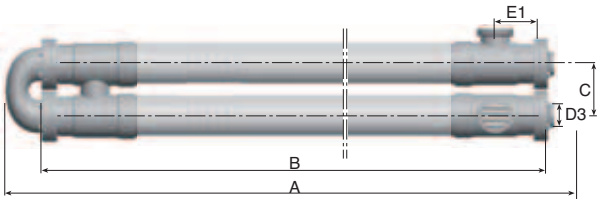
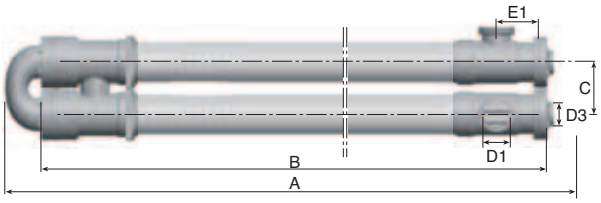
Dimensions, cont.

Measurements in mm

Tetra Spiraflo CD/CHD/CM/CHM/CMR/CHMR/CMRF/CMP



Models CD, CHD, CM, CHM, CMR, CHMR and CMP

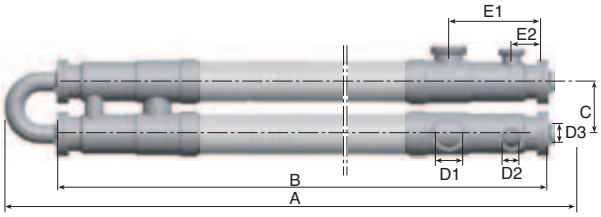


Model CMRF

Size	C70	C85	C108	C129	C154
	6 m / 3 m	6 m / 3 m	6 m / 3 m	6 m / 3 m	6 m / 3 m
A	6 190/3 220	6 249/3 279	6 267/3 297	6 364/3 394	6 382/3 412
B	5 986/3 016	5 998 / 3 028	6 004/3 034	6 008/3 038	6 008/3 038
C	105	140	140	210	210
D1	51, 1/6	76, 1/6	76, 1/6	104, 1/4	104, 1/4
D3	38 x 1.5	51 x 1.5	63.5 x 1.6	76 x 1.6	104 x 2
E1	103	118	118	118	118

A = max. length bend to bend
B = max. length counterflange to counterflange
C = center to center
D1 = SMS
D3 = flange with welding end
E1 = center SMS to split ring

Tetra Spiraflo CC



Model CC

Size	CC70	CC108
A	6 368	6 507
B	6 178	6 256
C	105	140
D1	51, 1/6	76, 1/6
D2	38	51
D3	25 x 1.2	51 x 1.5
E1	207	253
E2	66.5	84.5
Product channel gap		
N = Normal gap	6	6
W = Wide gap	12	14

A = max. length bend to bend
B = max. length counterflange to counterflange
C = center to center
D1 = SMS
D2 = SMS
D3 = flange with welding end
E1 = center SMS to split ring
E2 = center SMS to split ring

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