

The tubular heat exchanger series from Alfa Laval

Alfa Laval ViscoLine™ Monotube Unit

Applications

The ViscoLine™ Monotube unit is a tube-in-tube heat exchanger. The Monotube is especially used for grape mash, diced tomato, diced vegetable and diced fruits and also sauces and soups that contain particles. Can also be used for the heating, cooling and pasteurization of products with low and average viscosity that contains fibres, particles.

Standard design

The ViscoLine Monotube heat exchanger consists of a single tube mounted inside an outer shell tube. The product medium flows inside this tube, and the service medium around it. It is a fully welded construction with a bellow on shell tube to absorb thermal expansion. ViscoLine Monotube modules are normally connected in series and mounted on support frame or full frame.

Working principles

The product medium inside the tube flows in counter current to the service medium. The product tube is corrugated or it can be smooth. The shell tube is always corrugated. The installation is maintenance free, thus eliminating any need for spare parts.

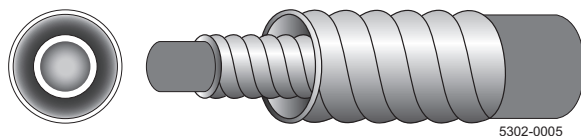
Standard materials

Product side (tubes):Stainless steel AISI 316

Service side (shell):Stainless steel AISI 304 or AISI 316L
(optional)

Frame:Stainless steel AISI 304 (units can be angled
for self-draining on request)

Other materials are available on request.



Graphic representation of the flow pattern
in the ViscoLine Monotube Unit.

Technical data

Mechanical design pressure

The ViscoLine Monotube unit was designed for a pressure of 15 barg on the product side (tube) and 10 barg on the service side (shell), depending on the connection. The unit can, however, accommodate higher pressure ratings, depending on component thickness and connection type.

The ViscoLine Monotube unit complies with the European Pressure Equipment Directive (PED), and is entitled to bear the CE mark, though depending on the design of the connections.

It is designed to operate at a temperature of 160°C. All units are provided with an expansion joint to absorb any thermal expansion stresses that arise.



Connections

Product side (tubes):SMS
DIN 11851
Tri-Clamp
Flange

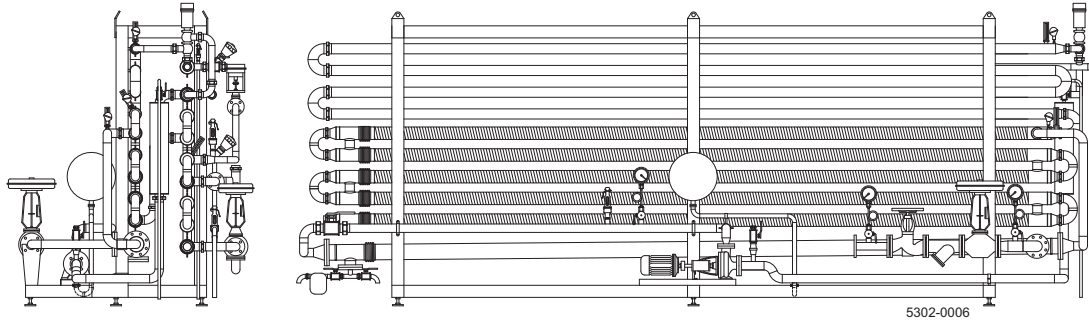
Service side (shell):SMS
DIN 11851
Tri-Clamp
Flange

Options

- Protection sheets
- Insulation
- Shell in steel grade AISI 316L

Other pressure and temperature ratings on request

ViscoLine VLO as single tube



ViscoLine VLO on a full frame

Designation

VLO 51/76-6-316L/304-C :

- VLO: ViscoLine Monotube
- 51: outer diameter of product tube
- 76: outer diameter of service shell
- 6: module length (m)
- 316L: material product side (tube)
- 304: material service side (shell)
- C: corrugated inner tube
- S: smooth inner tube

All types are also available in 3 meter length

Type	Volume in product tube [litres]	Heat transfer area [m ²]
VLO 16/25-6	0.92	0.28
VLO 20/38-6	1.53	0.36
VLO 25/40-6	2.49	0.45
VLO 28/52-6	2.95	0.50
VLO 34/52-6	4.53	0.61
VLO 38/63-6	5.81	0.69
VLO 40/63-6	6.45	0.73
VLO 38/70-6	5.81	0.69
VLO 40/70-6	6.45	0.73
VLO 51/76-6	10.8	0.93
VLO 52/76-6	11.3	0.95
VLO 51/85-6	10.8	0.93
VLO 52/85-6	11.3	0.95
VLO 63/89-6	16.7	1.16
VLO 70/89-6	20.5	1.28
VLO 70/102-6	20.5	1.28
VLO 70/104-6	20.5	1.28
VLO 76/104-6	24.5	1.40
VLO 76/114-6	24.5	1.40
VLO 85/114-6	30.9	1.56
VLO 76/129-6	24.5	1.40
VLO 85/129-6	30.9	1.56
VLO 102/140-6	44.9	1.88
VLO 102/154-6	44.9	1.88

The tubular heat exchanger series from Alfa Laval

Alfa Laval ViscoLine™ CIP Unit

Applications

The ViscoLine™ CIP unit is ideal for heating of water or cleaning-in-place (CIP) solutions by means of steam, less demanding applications to process low and average viscosity products. Products can contain fibres and small particulates. It is also suitable for general heating and cooling applications.

Working principle

The heat exchanger is formed by a tube bundle (welded at both ends onto flat tube plates) inside a shell. Product medium flows inside the tubes of the bundle and the service medium between and around these tubes. This makes it compact and easy to install.

All tubes are connected in parallel and in counter-current flow to the service medium. The product tubes are corrugated. The service media shell is smooth.

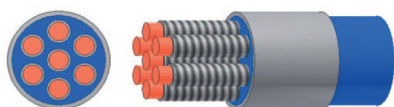
OBS! Vertical installation is recommended for steam to water heating in order to drain the condensate

Standard materials

Product side (tubes): AISI 316L

Service side (shell): AISI 304

Vertical installation is recommended for steam to water heating



Graphic representation of the flow pattern in the ViscoLine CIP Unit.

Standard design

ViscoLine CIP and water heater is available in 3 sizes.

Technical data**Max. operating pressure**

16 bar (232 PSI) on tube side. 11 bar (159 PSI) on shell side. Complies with the European Pressure Equipment Directive (PED). Design temperature -20/190°C (-4/374°F)

Connections

Product side (tubes): ISO 2037 SMS

Service side (shell): Flange EN 1092-1

Designation

VLC 20x16/104-2.0-316L/304-C

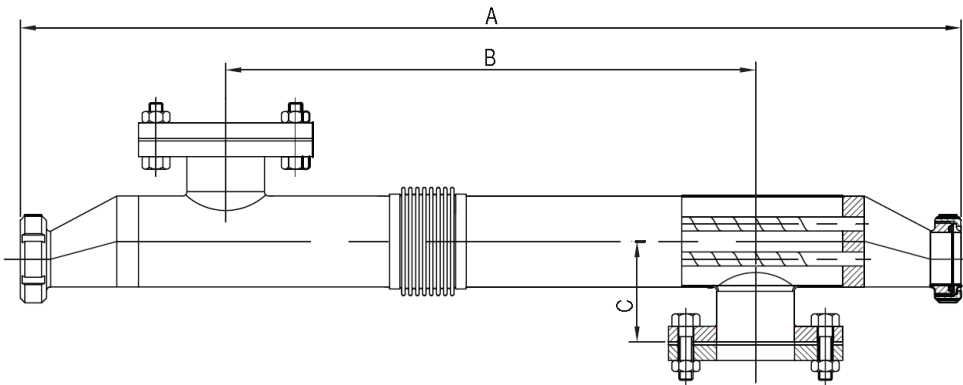
- VLC: ViscoLine CIP
- 20 Number of tubes
- 16 Outer diameter of product tubes (mm)
- 104 Outer diameter of service shell (mm)
- 2.0 Module length (m)
- 316L Material tube side
- 304 Material shell side
- C Corrugated product tubes



Dimensions (mm)		Dimensions (mm)			Connections		Volume in litre	
Type	Model	A	B	C	Shell Side	Tube Side	Shell Side	Tube Side
1	VLC 20x16/104-2	2.234	1.776	115	OD 76.1	SMS 63.5	7.33	6.03
2	VLC 31x16/129-2	2.239	1.76	138	OD 101.6	SMS 76.1	8.14	8.14
3	VLC 37x16/154-3	3.265	2.76	150	OD 101.6	SMS 101.6	19.77	16.85

Dimensions (Inch)		Dimensions (inches)			Connections		Volume in US gallons	
Type	Model	A	B	C	Shell Side	Tube Side	Shell Side	Tube Side
1	VLC 20x16/104-2	88.0	69.9	4.6	OD 3"	SMS 2.5"	1.9	1.6
2	VLC 31x16/129-2	88.1	69.3	5.5	OD 4"	SMS 3"	2.2	2.2
3	VLC 37x16/154-3	128.5	108.7	5.9	OD 4"	SMS 4"	5.2	4.5

OD = outer diameter



Type	Article nr.
VLC20x16/104-2	9680168330
VLC31x16/129-2	9680168331
VLC37x16/154-3	9680168334

The tubular heat exchanger series from Alfa Laval
 Alfa Laval ViscoLine™ Multitube Unit

Applications

The ViscoLine™ Multitube unit is ideal for the heating, cooling and pasteurization of products with low and medium viscosity, and products that contain fibres and small particulates.

These units are used in conjunction with a wide range of products, including milk, cream water, yellow fats, whole egg, egg white, egg yolk, fruit purée, baby food, many kinds of fruit juices containing pulp and fibres, fruit concentrates, beer mash, tomato juice and nectar, protein solutions, yeast and soft drinks.

Standard design

The ViscoLine Multitube unit consists of a bundle of tubes mounted inside an outer shell, and welded onto tube plates at both ends. The product medium flows inside these tubes, and the service medium between and around them.

All the product tubes are connected in parallel and the flow is counter-current in relation to the service medium.

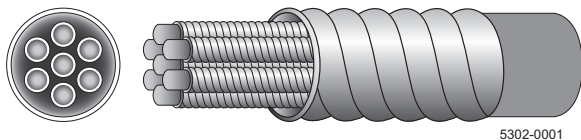
As standard inner tubes and shell tube are corrugated to increase heat transfer efficiency. ViscoLine Multitube modules are normally connected in series and mounted on support frame or full frame.

The installation is maintenance free, thus eliminating any need for spare parts.

Standard materials

- Product side (tubes):Stainless steel AISI 316L
- Service side (shell):Stainless steel AISI 304 or AISI 316L (optional)
- Frame:Stainless steel AISI 304 (units can be angled for self-draining on request)

Other materials are available on request is 254 SMO, inner tubes and tube plate. (Bends in AISI 316L)



Graphic representation of the flow pattern in the ViscoLine Multitube Unit

Working Principle

ViscoLine Multitube is a highly efficient tubular heat exchanger that incorporates corrugated tubes or other advanced profiles designed to increase turbulence in the flow of the fluid. This substantially increases the overall heat transfer coefficient



Technical data

Mechanical design pressure

The ViscoLine Multitube Unit is designed for a pressure of 15 bar on the product side (tubes) and 10 bar on the service side (shell), depending on the connection. The unit can, however, accommodate higher pressure ratings, depending on component thickness and connection type.

The ViscoLine Multitube unit complies with the European Pressure Equipment Directive (PED), and is entitled to bear the CE mark, though depending on the design of the connections. Where the CE mark is not required, ViscoLine Multitube will be manufactured according to good engineering practice.

It is designed to operate at a temperature of 160°C. All units are provided with an expansion joint to absorb any thermal expansion stresses that arise.

- Connections Product side (tubes): SMS
DIN 11851
Tri-Clamp
Flange
- Service side (shell): SMS
DIN 11851
Tri-Clamp
Flange



The ViscoLine tubular heat exchanger connected in series with insulation.

Options

- Protection sheets
- Thermal insulation
- Shell in steel grade AISI 316

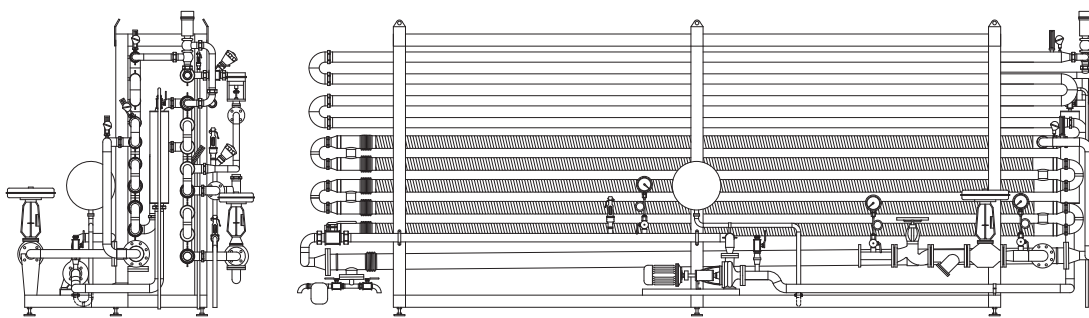
Designation

VLM19x25/154-6.0-316L/304-C

- VLM: ViscoLine Multitube
- 19: number of product tubes
- 25: outer diameter of product tubes
- 154: outer diameter of service shell
- 6.0: module length (m)
- AISI 316L: material product side (tube)
- AISI 304: material service side (shell)
- C: corrugated inner tubes
- S: smooth inner tubes

All types are also available in 3 meter length.

Type	Heat transfer area [m ²]
VLM 3x14/40-6	0.74
VLM 5x14/52-6	1.23
VLM 4x16/52-6	1.13
VLM 7x14/63-6	1.72
VLM 5x16/63-6	1.41
VLM 9x14/70-6	2.21
VLM 7x16/70-6	1.98
VLM 4x20/70-6	1.43
VLM 13x14/76-6	3.19
VLM 9x16/76-6	2.54
VLM 16x14/85-6	3.92
VLM 12x16/85-6	3.39
VLM 7x20/85-6	2.51
VLM 4x25/85-6	1.79
VLM 17x14/89-6	4.17
VLM 13x16/89-6	3.68
VLM 21x14/102-6	5.15
VLM 15x16/102-6	4.24
VLM 24x14/104-6	5.88
VLM 20x16/104-6	5.65
VLM 12x20/104-6	4.30
VLM 7x25/104-6	3.14
VLM 30x14/114-6	7.35
VLM 22x16/114-6	6.22
VLM 12x25/114-6	5.38
VLM 37x14/129-6	9.07
VLM 26x16/129-6	7.35
VLM 19x20/129-6	6.80
VLM 15x25/129-6	6.73
VLM 35x16/140-6	9.90
VLM 37x16/154-6	10.46
VLM 19x25/154-6	8.52
VLM 55x16/168-6	15.55
VLM 23x25/168-6	10.40
VLM 89x16/219-6	25.16
VLM 37x25/219-6	16.74



Alfa Laval ViscoLine Multitube system - example

The tubular heat exchanger series from Alfa Laval

Alfa Laval ViscoLine™ Annular Unit

Applications

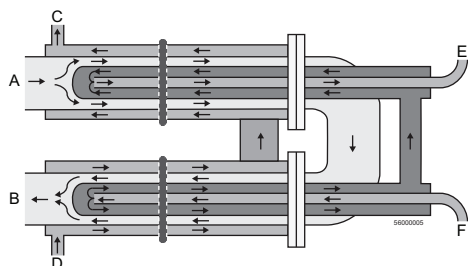
The ViscoLine™ Annular heat exchanger (VLA) is ideal for the heating, cooling and pasteurization of non-Newtonian products with high viscosity, and products that contain particulates. These units are most commonly used in conjunction with low acid products with average/high viscosity, such as tomato concentrate, banana paste, sourdough, chocolate sauce, mayonnaise, malt extract and tomato-based sauces in general.

Standard design

The VLA unit consists of four concentric tubes. The product medium flows in between two service channels, and is heated or cooled from the inside and outside at the same time. The unit features easy, full inspection of the product side by removing the tube insert. The outer shell is corrugated and the other three concentric tubes are not corrugated, smooth. If required, the product tube can be corrugated. To achieve a more even temperature on the product, static mixers can be welded on outside the third concentric tube. ViscoLine Annular heat exchangers are connected in series on product side and in parallel on water/service side and grouped on support frame or full frame.

Working principles

The product medium runs in between the second and the third concentric tube and is counter-current to the service medium. The only spare parts needed are the O-rings in the header. There is a maximum gap on the product side of 49.2 mm and a minimum gap of 5.8 mm.



A = Product in C = Outer Media out E = Inner media out
B = Product out D = Outer Media in F = Inner media in

Standard materials

Product side (tubes) . . .Stainless steel AISI 316L
Service side (shell) . . .Stainless steel AISI 304 or AISI 316L (optional)
FrameStainless steel AISI 304 (units can be angled for self-draining on request)

Other material available on request is 254 SMO on product side.
Product bends in AISI 316L



Technical data

Mechanical design pressure The ViscoLine Annular unit was designed for a pressure of 15 barg on the product side (tubes) and 10 barg on the service side (shell), depending on the connection and size. The unit can, however, accommodate higher pressure ratings up to 100 bar, depending on component thickness and connection type.

The ViscoLine Annular Unit complies with the European Pressure Equipment Directive (PED), and is entitled to bear the CE mark, though depending on the design of the connections. Where the CE mark is not required, ViscoLine Annular will be manufactured according to good engineering practice.

It is designed for a temperature of 160°C. All units are provided with an expansion joint to absorb any thermal expansion stresses that arise

Connections

Product side (tubes) . . .SMS
DIN 11851
Tri-Clamp
Flange
Service side (shell) . . .SMS
DIN 11851
Tri-Clamp
Flange

Options

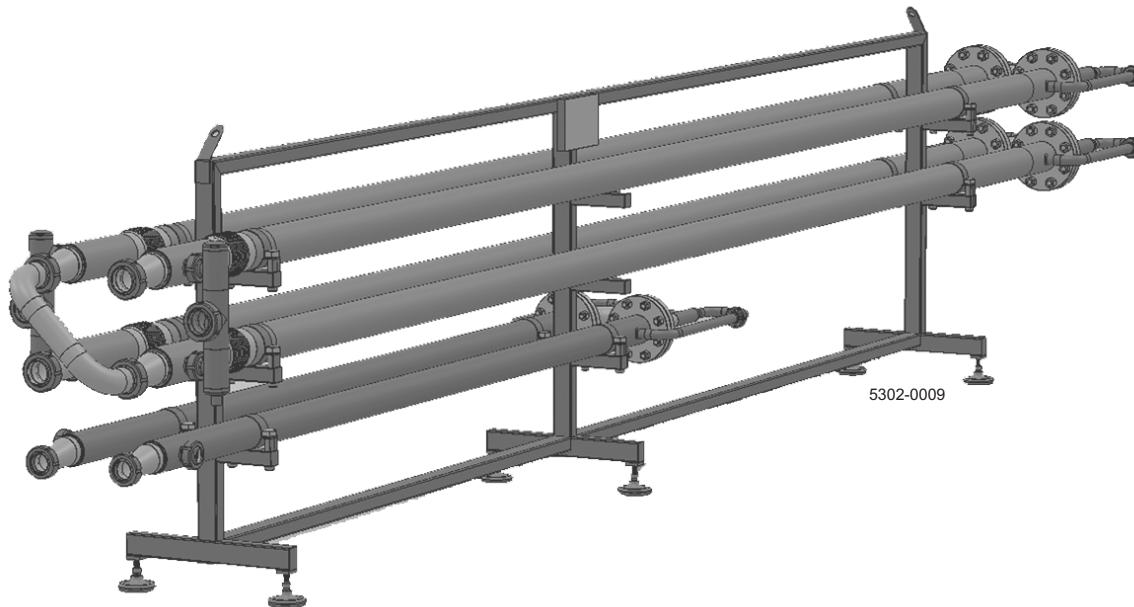
- Protection sheets
- Insulation
- Shell in steel grade AISI 316L
- Other pressure and temperature ratings on request

Designation

VLA 52/70/114/129-6.0-316L/304

VLA: ViscoLine Annular
52: 1 st tube diameter
70: 2 nd tube diameter
114,3: 3 rd tube diameter
129: 4 th and outer diameter of service shell
6.0: module length (meter)
316L: material product side (tube)
304: material service side (shell)

All types are also available in 3 meter length.



Type	Gap [mm]	Volume in product gap [litres]	Heat transfer area [m ²]
VLA 16/25/40/52-6	5.8	3.6	1.10
VLA 25/34/52/63-6	7.5	6.2	1.48
VLA 18/28/52/63-6	10.5	8.1	1.37
VLA 28/40/63/76-6	9.8	9.7	1.78
VLA 25/38/63/76-6	10.7	10.4	1.75
VLA 25/34/63/76-6	12.8	11.9	1.68
VLA 20/28/63/76-6	15.8	13.7	1.57
VLA 40/60/76/85-6	5.9	7.8	2.37
VLA 34/52/76/85-6	10.1	12.4	2.24
VLA 34/51/76/85-6	10.7	13.1	2.22
VLA 34/48/76/85-6	11.9	14.3	2.15
VLA 28/40/76/85-6	16.1	17.9	2.02
VLA 25/38/76/85-6	17.0	18.7	1.99
VLA 25/34/76/85-6	19.1	20.2	1.91
VLA 20/28/76/85-6	22.1	22.0	1.81
VLA 40/63/85/102-6	8.8	12.6	2.59
VLA 40/60/85/102-6	10.4	14.6	2.53
VLA 34/52/85/102-6	14.5	19.2	2.40
VLA 34/51/85/102-6	15.1	19.9	2.38
VLA 28/48/85/102-6	16.4	21.1	2.34
VLA 28/40/85/102-6	20.5	24.7	2.19
VLA 25/38/85/102-6	21.5	25.5	2.16
VLA 25/34/85/102-6	23.5	27.0	2.08
VLA 20/28/85/102-6	26.5	28.8	1.97
VLA 40/70/89/102-6	7.5	11.5	2.78
VLA 40/63/89/102-6	10.7	15.8	2.67
VLA 40/60/89/102-6	12.3	17.8	2.61
VLA 34/52/89/102-6	16.5	22.5	2.48
VLA 34/51/89/102-6	17.1	23.1	2.46
VLA 28/48/89/102-6	18.3	24.3	2.41
VLA 28/40/89/102-6	22.5	28.0	2.26
VLA 25/38/89/102-6	23.4	28.7	2.23
VLA 25/34/89/102-6	25.5	30.2	2.16
VLA 20/28/89/102-6	28.5	32.0	2.05
VLA 34/60/89/102-6	11.3	16.1	2.53
VLA 34/60/89/102-6	10.3	14.5	2.46
VLA 28/48/89/102-6	16.3	21.0	2.28
VLA 28/48/89/102-6	14.8	18.6	2.19
VLA 52/85/102/114-6	6.3	11.5	3.25
VLA 52/76/102/114-6	10.7	18.5	3.13
VLA 52/70/102/114-6	13.8	23.1	3.02
VLA 40/63/102/114-6	17.1	27.4	2.91
VLA 40/60/102/114-6	18.7	29.4	2.85
VLA 34/52/102/114-6	22.8	34.0	2.72
VLA 34/51/102/114-6	23.4	34.6	2.70
VLA 28/48/102/114-6	24.7	35.9	2.65
VLA 28/40/102/114-6	28.8	39.5	2.50
VLA 52/89/114/129-6	10.7	21.3	3.56
VLA 52/85/114/129-6	12.7	24.6	3.49
VLA 52/76/114/129-6	17.1	31.7	3.37
VLA 52/70/114/129-6	20.2	36.2	3.26
VLA 40/63/114/129-6	23.4	40.6	3.14
VLA 40/60/114/129-6	25.0	42.5	3.09
VLA 34/52/114/129-6	29.2	47.2	2.94
VLA 28/48/114/129-6	31.0	49.0	2.87
VLA 28/40/114/129-6	35.2	52.7	2.72
VLA 52/89/114/129-6	8.7	16.9	3.45
VLA 52/89/114/129-6	7.2	13.8	3.34
VLA 52/76/114/129-6	15.1	27.5	3.22
VLA 52/70/114/129-6	18.2	31.9	3.15
VLA 52/60/114/129-6	23.0	38.2	2.98
VLA 70/114/140/154-6	10.7	26.7	4.50
VLA 70/102/140/154-6	17.1	40.4	4.27
VLA 70/89/140/154-6	23.4	52.4	4.04
VLA 70/85/140/154-6	25.4	55.8	3.97
VLA 52/76/140/154-6	29.8	63.0	3.85
VLA 52/70/140/154-6	32.9	32.9	3.74
VLA 70/89/140/154-6	19.6	42.3	3.86
VLA 70/89/140/154-6	19.6	42.3	3.81

Type	Gap [mm]	Volume in product gap [litres]	Heat transfer area [m ²]
VLA 85/129/154/168-6	10.5	29.2	5.03
VLA 70/114/154/168-6	17.9	47.1	4.77
VLA 70/102/154/168-6	24.2	60.7	4.54
VLA 70/89/154/168-6	30.6	72.8	4.31
VLA 129/168/206/219-6	15.9	58.2	6.68
VLA 102/140/206/219-6	30.2	102.2	6.16
VLA 102/129/206/219-6	35.5	116.5	5.97
VLA 89/114/206/219-6	42.9	134.3	5.71
VLA 85/102/206/219-6	49.2	148.0	5.48
VLA 70/168/206/219-6	30.2	102.2	6.68
VLA 70/140/206/219-6	15.9	58.2	6.16

Auxiliary Membrane Filtration Equipment

Alfa Laval Multitube Heat Exchangers

Multitube heat exchangers are used to heat or cool products in membrane filtration plants. These heat exchangers are made of stainless steel (AISI 316L), in a hygienic design. All materials comply with FDA regulations.

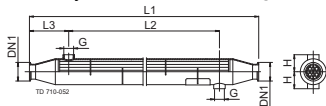
The multitube heat exchangers are available in two standard sizes: 1 m² and 2 m². They consist of an external pipe placed around 34 pipes (1 m²) or 60 pipes (2 m²). The cooling/heating medium flows on the outside of these pipes.

Customized dimensions and connections are available on request.

Technical Data

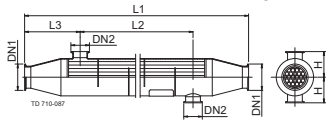
Multitube Heat Exchanger - 1 m²

Example of cooling capacity: 1 kW/°C, 15 m³/h product flow, 1 cP viscosity, and 1 m³/h cooling flow.



Multitube Heat Exchanger - 2 m²

Example of cooling capacity: 2.3 kW/°C, 75 m³/h product flow, 1 cP viscosity, and 3 m³/h cooling flow.



Code no.	1 m ² 104878	2 m ² 104880
Maximum pressure		
Product	30 bar (3.0 MPa)	30 bar (3.0 MPa)
Medium	10 bar (1.0 MPa)	10 bar (1.0 MPa)
Temperature		
Min.	1°C	1°C
Max.	80°C	80°C
Heat transfer area	1 m ²	2 m ²
Liquid volume in litres		
Product	3	8
Medium	4	6
Weight kg	15	24
L1 (mm)	1200	1254
L2 (mm)	930	870
L3 (mm)	135	192
H (mm)	58	90
Product DN1'	Diameter 51 mm 2" ISO 2852 clamp	Diameter 76 mm 3" ISO 2852 clamp
Medium		
DN2	-	Diameter 51 mm 2" ISO 2852 clamp
G	1" BSP female	-
Number of pipes	34	60