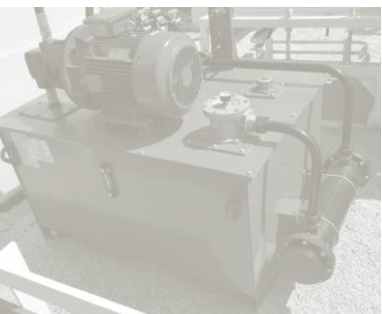




**Thermal Systems**  
**Tube & Fin Heat Exchanger**  
**Oil/Water Coolers**  
**ST Series**



**be different.**  
**make a difference.**

# Oil/Water Coolers, ST Series

## Shell tubes heat exchanger

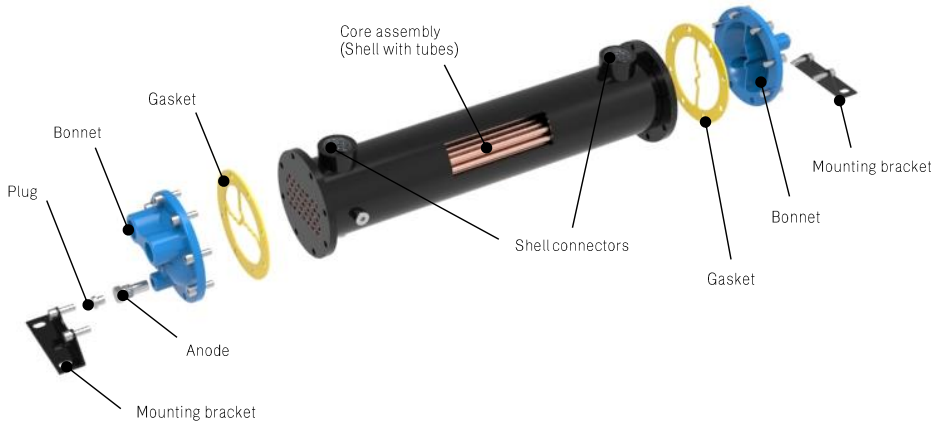


### Function

Our ST series is a modular range of shell and tube design heat exchangers. The main benefits of this design are the versatility of applications more independent of the used fluid quality and good maintenance ability compared to other heat exchanger types. Our modular setup allows the best suitable connection and flow principle for lowest pressure drop at highest cooling performance. We supply single or more pass configurations as well as different material combinations. For raising efficiency we offer all these configurations with hybrid finned tube technology.

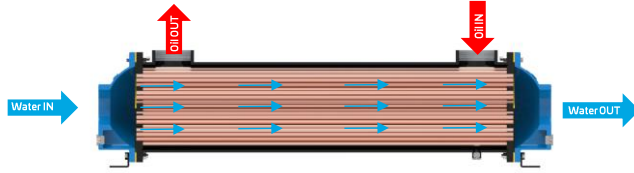
### Design

A bundle of tubes are rotary expanded on both end flanges to create two fluid circuits, for heat exchanging purpose. The end flanges are sealed with a gasket and the connection to the hydraulic system is implemented in the bonnet. One fluid flows through the tubes (the tube side) and the other through the outer tube (shell side), separated from each other. The heat transfers from one fluid to another through the tube walls, either from tube side to shell or the other way round.

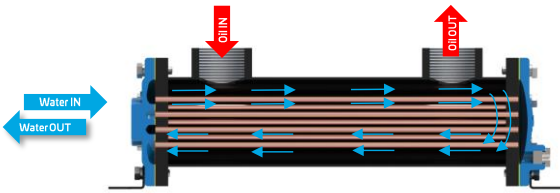


Apart from different sizes we offer one-pass, two pass and four pass configuration:

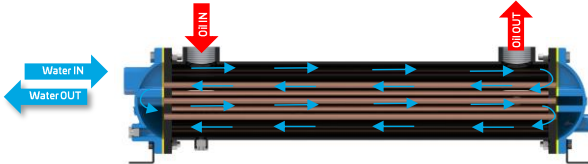
### one-pass



### two-pass



### four-pass



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# Oil/Water Coolers, ST Series

## Shell tubes heat exchanger



### Material and Limits

Depending on the projected application we offer different material configurations to all of our ST series modules.

Materials	A	B
shell	carbon steel	carbon steel
tube sheet	carbon steel	copper/nickel 90/10
tube	copper	copper/nickel 90/10
bonnet	cast iron	admiralty brass + zinc anode
extended fins	aluminium	aluminium
mounting brackets	carbon steel	carbon steel
coat of paint	shell / black bonnet / blue	shell / black bonnet / blue

### Working pressure

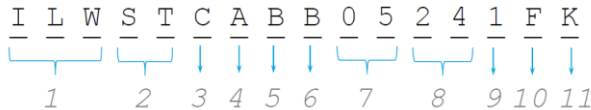
shell side (oil side)	max. 20 bar *
tube side	max. 10 bar

### Max. working temperature

oil	120°C
water	100°C

\*Valid only for liquids (oil) from group 2, of PED 2014/68/EU

### Order Code



#### 1 Product Series

I	Industrial Application
L	Heat exchanger
W	Oil/Water cooling

#### 2 Product Series

ST	shell tube cooler series
----	--------------------------

#### 3 Tube diameter

<i>hybrid with fin</i>	
C	5,0 mm tube Ø – with fin / only shell 02, 03 & 05
D	9,5 mm tube Ø – with fin / only shell 05, 06 & 08
<i>Plain w/o fin</i>	
A	6,35 mm tube Ø – on request
B	9,5 mm tube Ø – on request

#### 4 Material configuration

A	Oil/Water configuration A
B	Oil/Water configuration B
...	any other configuration and material on request

#### 5 Shell connection / compatible bonnet connection

B	BSP thread / only with BSP bonnet
N	NPT cone thread / only with NPT bonnet
U	SAE o-ring (UNF) / only with NPT bonnet
S	4-bolt SAE flange / only with NPT bonnet
F	Pipe flange (on request) / only with pipe flange bonnet

#### 6 Bonnet connection

B	BSP thread
N	NPT cone thread
F	Pipe flange (on request)

#### 7 Shell inner diameter / compatible tube lengths)

02	60 mm / only with 8 & 10
03	80 mm / only with 14 & 24
05	125 mm / only with 24 & 36
06	150 mm / only with 24, 36 & 48
08	200 mm / only with 36, 48, & 60

#### 8 Tube length

08	203 mm
10	254 mm
12	304 mm
14	355 mm
18	457 mm
24	609 mm
36	914 mm
48	1219 mm
60	1524 mm

#### 9 Flow passes

1	One pass
2	Two pass
4	Four pass

#### 10 Gasket material

F	Compressed fiber (standard)
P	PTFE (on request)
N	NBR (on request)
V	Viton / FPM (on request)

#### 11 Index / customized

K	Standard EU sales kit
BXX	To be advised by asa

#### Kommentiert [a/SG1]:

"Z:\Entwicklung\PE - Projektentwicklung\165 - Shell and tube\PED guidelines\Berechnungen zur Druckbehälterrichtlinie.xlsx"

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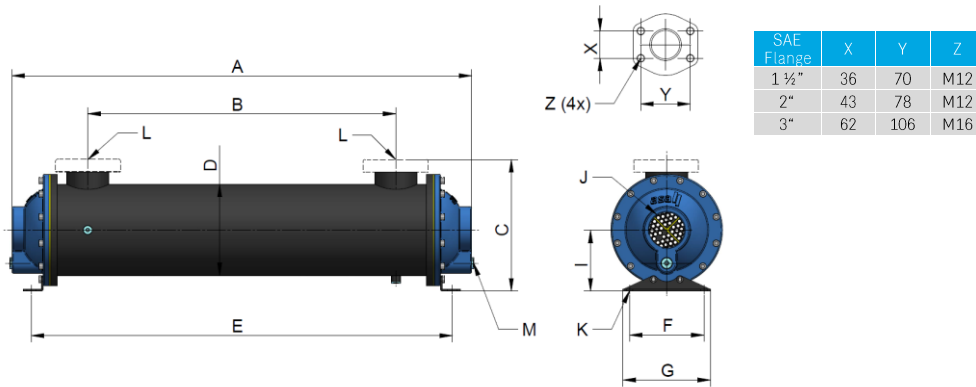
# Oil/Water Coolers, ST Series

## Shell tubes heat exchanger



### ONE PASS

### Dimension



### Technical Data

order number	A	B	C	D	E	F	G	I	J	K	L	M	weight		
	[mm]	[mm]	BSPP [mm]	SAE [mm]	∅ [mm]	[mm]	[mm]	[mm]	BSP/NPT	slot [mm]	BSPP/ NPT	SAE	BSPP	[kg]	
ILWSTCA...02081F	264	98	99	n/a	65	265	64	89	41	3/4"	9x16	3/4"	n/a	n/a	3
ILWSTCA...02101F	315	149	99	n/a	65	316	64	89	41	3/4"	9x16	3/4"	n/a	n/a	3
ILWSTCA...03141F	435	228	139	145	89	424	76	127	66	1 1/4"	11x19	1 1/2"	1 1/2"	3/4"	9
ILWSTCA...03241F	689	482	139	145	89	679	76	127	66	1 1/4"	11x19	1 1/2"	1 1/2"	3/4"	12
ILWSTCA...05181F	542	310	190	211	127	545	102	165	102	1 1/2"	11x25	1 1/2"	2"	3/4"	19
ILWSTCA...05241F	694	462	190	211	127	697	102	165	102	1 1/2"	11x25	1 1/2"	2"	3/4"	23
ILWSTCA...05361F	999	767	190	211	127	1002	102	165	102	1 1/2"	11x25	1 1/2"	2"	3/4"	30
ILWSTDA...05241F	762	511	190	203	133	697	102	133	102	2"	13x19	1 1/2"	2"	3/8"	20
ILWSTDA...05361F	1067	816	190	203	133	1002	102	133	102	2"	13x19	1 1/2"	2"	3/8"	30
ILWSTDA...06241F	765	483	222	238	159	714	127	159	114	3"	13x19	2"	2"	3/8"	45
ILWSTDA...06361F	1070	787	222	238	159	1019	127	159	114	3"	13x19	2"	2"	3/8"	57
ILWSTDA...06481F	1375	1092	222	238	159	1324	127	159	114	3"	13x19	2"	2"	3/8"	68
ILWSTDA...08361F	1149	781	295	318	219	1064	178	210	146	4"	16x22	3"	3"	3/8"	91
ILWSTDA...08481F	1454	1086	295	318	219	1369	178	210	146	4"	16x22	3"	3"	3/8"	114
ILWSTDA...08601F	1759	1391	295	318	219	1674	178	210	146	4"	16x22	3"	3"	3/8"	137



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# Oil/Water Coolers, ST Series

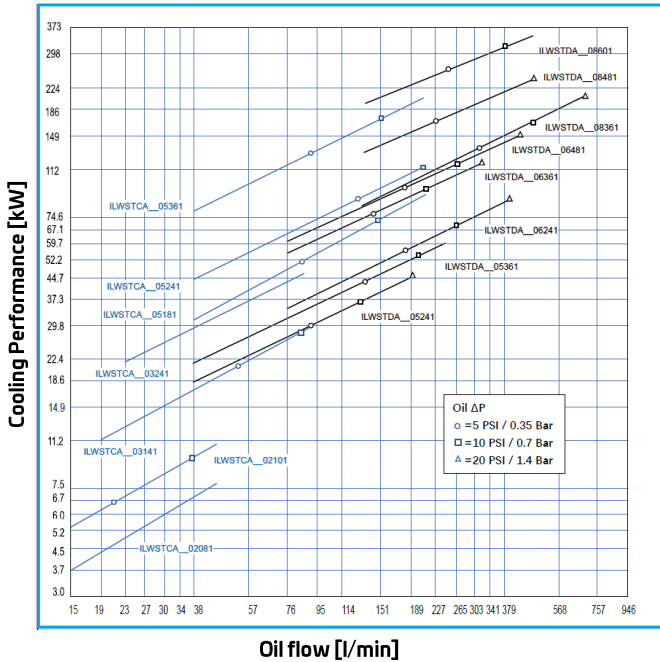
## Shell tubes heat exchanger



### ONE PASS

### Performance at 21cSt

### 1:1 Oil to Water Ratio-High Water Usage



**Kommentiert [a/SG2]:** Änderung von 30cSt auf 21cSt gilt für alle Kurven

**Kommentiert [a/SG3]:** [...\\PE - Projektentwicklung\165 - Shell and tube\Artikel\Product selection calculator.xlsx](#)

**Kommentiert [a/SG4]:** Z:\Entwicklung\PE - Projektentwicklung\165 - Shell and tube\Berechnungsprogram

Maximum Water Flow Rates 1 Pass	
size	l/min
2"	49
3"	91
5" (5mm)	212
5" (9,5 mm)	246
6"	454
8"	833

**Oil Pressure Drop**

- Most systems can tolerate a pressure drop through the heat exchanger of 1 to 2 Bar.
- Excessive pressure drop should be avoided.

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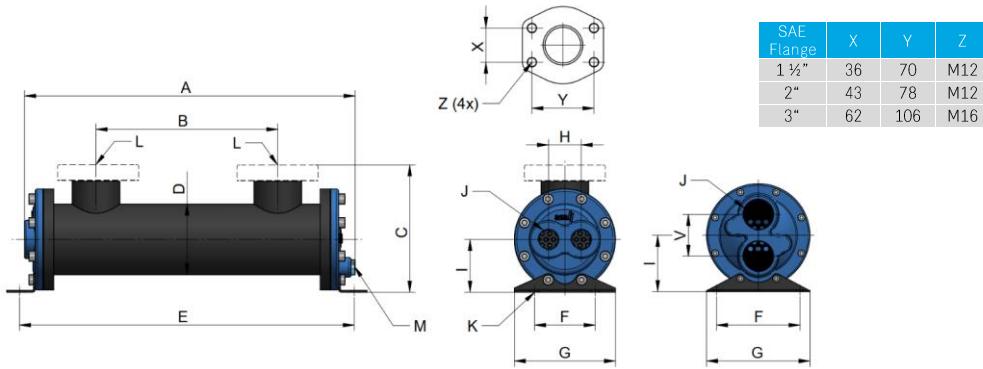
# Oil/Water Coolers, ST Series

## Shell tubes heat exchanger



### TWO PASS

### Dimension



### Technical Data

order number	A	B	C		D	E	F	G	H	I	J	K	L		M	V	weight
	[mm]	[mm]	BSPP [mm]	SAE [mm]	Ø [mm]	[mm]	[mm]	[mm]	[mm]	[mm]	BSPP/NPT	slot [mm]	BSPP/NPT	SAE	BSPP	[mm]	[kg]
ILWSTCA....02082F	264	98	99	n/a	65	265	64	89	29	41	3/4"	9x16	3/4"	n/a	n/a	-	3
ILWSTCA....02102F	315	149	99	n/a	65	316	64	89	29	41	3/4"	9x16	3/4"	n/a	n/a	-	3
ILWSTCA....03142F	411	228	139	145	89	416	76	127	41	66	3/4"	11x19	1 1/2"	1 1/2"	3/4"	-	9
ILWSTCA....03242F	665	482	139	145	89	679	76	127	41	66	3/4"	11x19	1 1/2"	1 1/2"	3/4"	-	12
ILWSTCA....05182F	522	310	190	211	127	545	102	165	61	102	1"	11x25	1 1/2"	2"	3/4"	-	19
ILWSTCA....05242F	674	462	190	211	127	697	102	165	61	102	1"	11x25	1 1/2"	2"	3/4"	-	23
ILWSTCA....05362F	979	767	190	211	127	1002	102	165	61	102	1"	11x25	1 1/2"	2"	3/4"	-	30
ILWSTDA....05242F	762	511	190	203	133	697	102	133	-	102	1 1/2"	13x19	1 1/2"	2"	3/4"	76	20
ILWSTDA....05362F	1067	816	190	203	133	1002	102	133	-	102	1 1/2"	13x19	1 1/2"	2"	3/4"	76	30
ILWSTDA....06242F	765	483	222	238	159	714	159	197	-	114	2"	13x19	2"	2"	3/4"	80	45
ILWSTDA....06362F	1070	787	222	238	159	1019	159	197	-	114	2"	13x19	2"	2"	3/4"	80	57
ILWSTDA....06482F	1375	1092	222	238	159	1324	159	197	-	114	2"	13x19	2"	2"	3/4"	80	68
ILWSTDA....08362F	1149	781	292	318	219	1064	210	267	-	146	2 1/2"	16x22	3"	3"	3/4"	114	91
ILWSTDA....08482F	1454	1086	292	318	219	1369	210	267	-	146	2 1/2"	16x22	3"	3"	3/4"	114	114
ILWSTDA....08602F	1759	1391	292	318	219	1674	210	267	-	146	2 1/2"	16x22	3"	3"	3/4"	114	137



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# Oil/Water Coolers, ST Series

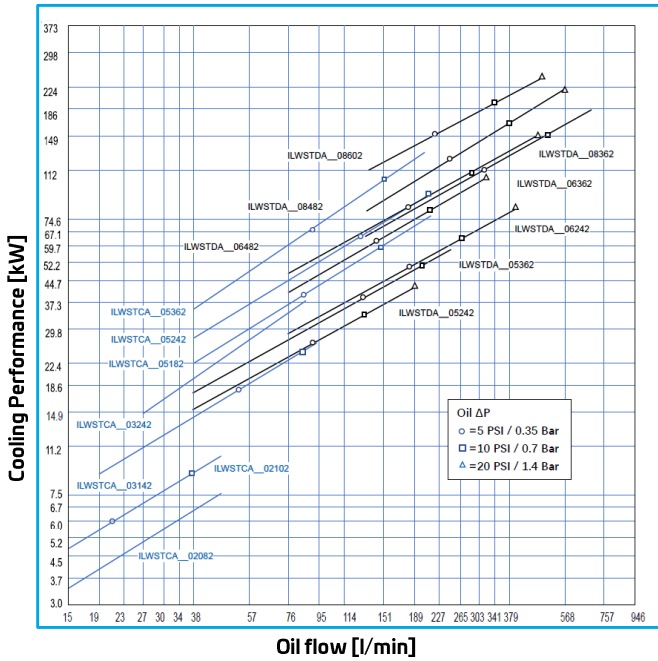
## Shell tubes heat exchanger



TWO PASS

Performance at 21cSt

2:1 Oil to Water Ratio-Medium Water Usage



Maximum Water Flow Rates 2 Pass	
size	[l/min]
2"	23
3"	45
5" (5mm)	106
5" (9,5 mm)	121
6"	227
8"	416

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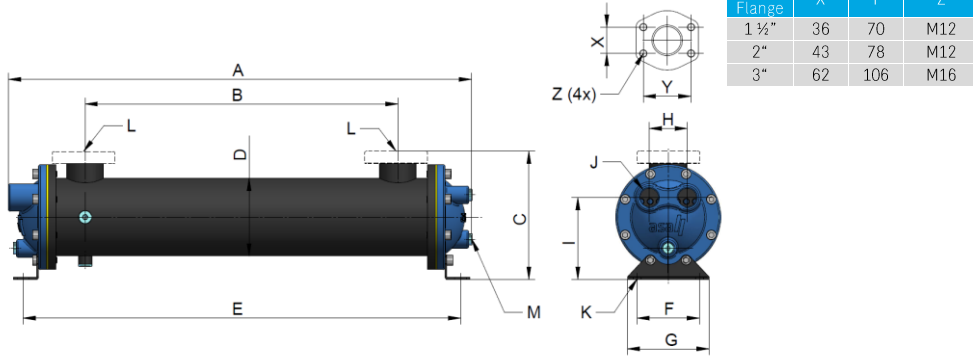
# Oil/Water Coolers, ST Series

## Shell tubes heat exchanger



### FOUR PASS

### Dimension



### Technical Data

order number	A	B	C	D	E	F	G	H	I	J	K	L	M	weight		
	[mm]	[mm]	BSPP [mm]	SAE [mm]	∅ [mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	BSPP	SAE	BSPP	[kg]	
ILWSTCA...03144F	411	228	139	145	89	424	76	127	45	84	1/2"	11x19	1 1/2"	1 1/2"	1/4"	9
ILWSTCA...03244F	665	482	139	145	89	679	76	127	45	84	1/2"	11x19	1 1/2"	1 1/2"	1/4"	12
ILWSTCA...05184F	522	310	190	211	127	545	102	165	64	125	3/4"	11x25	1 1/2"	2"	1/4"	19
ILWSTCA...05244F	674	462	190	211	127	697	102	165	64	125	3/4"	11x25	1 1/2"	2"	1/4"	23
ILWSTCA...05364F	979	767	190	211	127	1002	102	165	64	125	3/4"	11x25	1 1/2"	2"	1/4"	30
ILWSTDA...05244F	762	511	190	203	133	697	102	133	62	134	1"	13x19	1 1/2"	2"	1/4"	20
ILWSTDA...05364F	1067	816	190	203	133	1002	102	133	62	134	1"	13x19	1 1/2"	2"	1/4"	30
ILWSTDA...06244F	765	483	222	238	159	714	159	197	73	150	1 1/2"	13x19	2"	2"	3/4"	45
ILWSTDA...06364F	1070	787	222	238	159	1091	159	197	73	150	1 1/2"	13x19	2"	2"	3/4"	57
ILWSTDA...06484F	1375	1092	222	238	159	1324	159	197	73	150	1 1/2"	13x19	2"	2"	3/4"	68
ILWSTDA...08364F	1149	781	292	318	219	1064	210	267	108	190	2"	16x22	3"	3"	3/4"	91
ILWSTDA...08484F	1454	1086	292	318	219	1369	210	267	108	190	2"	16x22	3"	3"	3/4"	114
ILWSTDA...08604F	1759	1391	292	318	219	1674	210	267	108	190	2"	16x22	3"	3"	3/4"	137



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# Oil/Water Coolers, ST Series

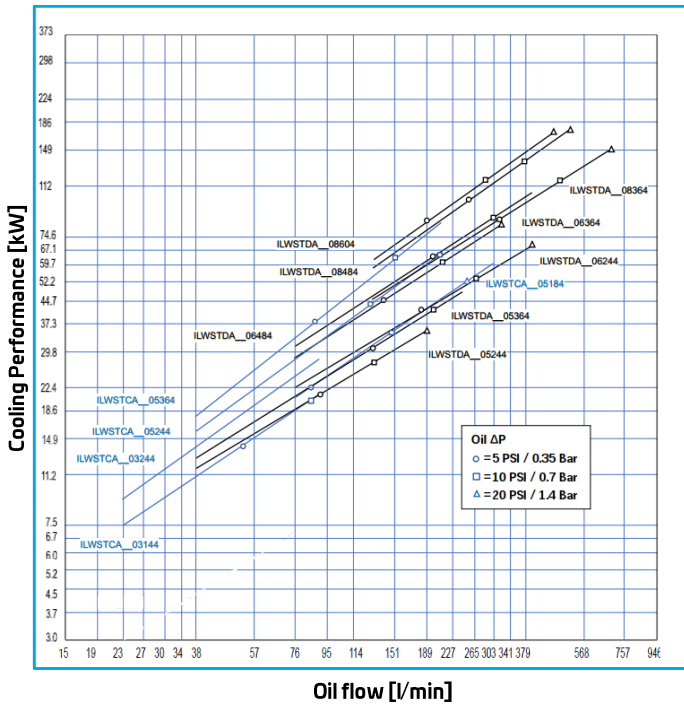
## Shell tubes heat exchanger



### FOUR PASS

### Performance at 21°Cst

### 4:1 Oil to Water Ratio-Low Water Usage



Maximum Water Flow Rates 4 Pass	
size	[l/min]
2"	n/a
3"	23
5" (5mm)	53
5" (9,5 mm)	61
6"	114
8"	246

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# Oil/Water Coolers, ST Series

## Shell tubes heat exchanger



### Selection Procedure

#### Step 1 Thermal Duty Determination.

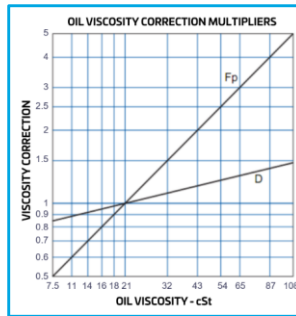
This will vary with different systems, but typically coolers are sized to remove 20% to 35% of the input nameplate kW.

#### Step 2 Determine Approach Temperature.

Desired oil leaving cooler °C – Water Inlet temp. °C = Actual Approach

#### Step 3 Determine kW Curve Heat Load

$$\text{kW heat load} \times \frac{22}{\text{Actual approach}} \times \text{Viscosity Correction D} = \text{Curve kW Power}$$



#### Step 4 Enter Curves

Enter the value of the kW Curve Heat Load on the vertical line oil flow on the cooling performance diagram (Pages 5, 7, 9), any curve above the intersecting point will work.

#### Step 5 Determine oil pressure drop

The values indicated in the diagram are valid for hydraulic oil with a viscosity of 21cSt (appr. ISO VG 32). Multiply the pressure drop by the Correction factor Fp according to the used hydraulic oil viscosity.

- =0,35bar
- =0,7 bar
- △=1,4bar

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## Oil/Water Coolers, ST Series

### Shell tubes heat exchanger

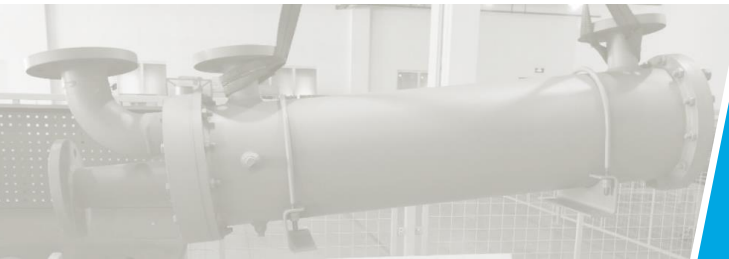
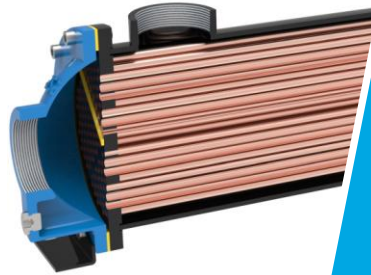
#### Customized to your applications

Apart from the actual application parameters of the fan drive, ambient conditions and scope of delivery, we offer customized heat exchanger solutions for many types of fluids. Please contact us with your specific requirements and use our benefits regarding consultation and most realistic verification.

Selection	Application
Type of fluids	Ambient / fluid conditions for material configuration
Flow rates	Connection size and flange types
In/outlet temperatures or heat load data	Space restrictions and mounting situation
Allowable pressure drops	Possible specified water fouling factors
Operating and design pressure	

#### your advantages:

- ✓ project management
- ✓ calculation and simulation
- ✓ verification on test bench
- ✓ procurement option system
- ✓ approved quality





**Thermal Systems  
Connection Technology  
Fluid Controls**

**be different.  
make a difference.**



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