SERIE CSW

WATER/OIL HEAT EXCHANGER
SCAMBIATORI DI CALORE ACQUA/OLIO

CIESSE

Scelta di uno scambiatore di calore a fascio tubiero

Di seguito spiegheremo brevemente come procedere alla scelta dello scambiatore di calore più idoneo a partire dai dati in proprio possesso. La scelta può essere effettuata procedendo in più step!
I dati necessari per procedere sono essenzialmente tre:

- potenza da dissipare in **kW** o **Kcal/h**
- portata di olio fluente in **l/min**
- **ΔT**, che rappresenta la differenza di temperatura esistente fra olio entrante nello scambiatore ed acqua entrante!

SCELTA INIZIALE

In possesso di questi tre dati si può procedere alla scelta iniziale dello scambiatore utilizzando il "*diagramma di performance*" dove in ascisse si troverà la portata di olio mentre in ordinate ci sarà il coefficiente K_R che si può ottenere dividendo **la potenza da dissipare in kW** per il **ΔT**! Se si fosse in possesso della potenza da dissipare il Kcal/h basta moltiplicarla per 0,001163 per ottenere la potenza in kW!

SCELTA PARTICOLAREGGIATA

Una volta identificato il modello o i modelli che meglio si adeguano alle condizioni di funzionamento, andando a visionare le schede tecniche specifiche, si troveranno **i diagrammi di rendimento** e di **perdita di carico** relativi allo scambiatore specifico.

Utilizzo del diagramma di rendimento

Sulle ascisse è possibile andare ad identificare il **ΔT** relativo al caso in analisi. Tracciare una linea vericale! Andando ad identificare sull'asse delle ordinate la potenza da dissipare, tracciare una linea orizzontale fermandosi nel punto di intersezione con la linea verticale prima tracciata. Il punto identificato si troverà all'interno di due linee oblique che identificano il rendimento termodinamico di ogni fascio, dove la linea superiore indica la dissipazione per portata massima e la linea inferiore la dissipazione per portata minima. La presenza di tre diagrammi è dovuta alle differenti portate di acqua imponibili:

1. nel primo diagramma si ha una portata di acqua circa pari a **1 l/min per ogni Hp dissipato**
2. nel secondo diagramma si ha una portata di acqua circa pari a **2 l/min per ogni Hp dissipato**
3. nel secondo diagramma si ha una portata di acqua circa pari a **3 l/min per ogni Hp dissipato**

Utilizzo del diagramma di perdite di carico

Dall'ascissa della portata di olio tracciando una linea verticale si intersecherà la curva delle perdite di carico dello scambiatore. Tracciando una linea orizzontale dal punto di intersecazione identificato si potrà leggere nel punto d'incontro sulle ordinate le effettive perdite di carico. A questo punto se si conosce anche il tipo di olio fluente (ISOVG 32,46,68, ecc) si può moltiplicando il valore di **ΔP** trovato per il fattore correttivo **c**, ottenere il valore di perdita per ogni tipo di olio al variare della viscosità specifica. Nella pagina seguente si può vedere un esempio di tale procedura!

How to choose an shell and tube heat exchanger

Reading this short introduction you can find below a description of the best way to choose an heat exchanger starting by the knowledge of three data:

- Heat exchanged in **kW** or **Kcal/h**
- Oil flow in **l/min**
- **ΔT**, that is the difference between Oil inlet temperature and water inlet temperature.

FIRST CHOICE

Starting by these three data, you can identify the type of cooler best for you, using the "*Performance diagram*". Looking this one you can find oil flow as abscissa and the factor K_R as ordinate. This factor can be obtained by the ratio between **heat exchanged in kW** and **ΔT.** If you have heat exchanged in **Kcal/h** you have to convert this one in kW before calculate K_R.

FINAL CHOICE

Knowing the type of cooler best for you, you can look the specific **performance and pressure drop diagrams** of model or models chosen!

Use of specific performance diagram

On the abscissa axis you can find **ΔT**; trace a vertical line! Finding on ordinate axis the heat exchanged by the cooler, trace an horizontal line until the intersection with the vertical one. The specific point identified will be included inside two curve, that identify the performance of the cooler at different oil flow! The upper curve identify the performance with max oil flow and the lower the performance of min oil flow! You will find three different performance diagram, that allow to determinate the heat exchanged with different different water flow:

1. in the first diagram you can determinate the heat exchanged with a water flow of **1 l/min for each HP dissipated**
2. in the second diagram you can determinate the heat exchanged with a water flow of **2 l/min for each HP dissipated**
3. in the second diagram you can determinate the heat exchanged with a water flow of **3 l/min for each HP dissipated**

Use of pressure drop diagrame

On the abscissa axis you can find **Oil flow**; as done before tracing a vertical line from the abscissa axis to the point determinated by the intersection from the vertical line and line of pressure drop. Tracing an horizontal line from this point to ordinate axis you can read the specific pressure drop of this cooler in bar. Knowing the type of oil used (ISOVG 32,46...) you can find the exact value of pressure drop for oil of different viscosity, by product between the value read on ordinate axis with the value of factor **c**. You can find in the next page an example of this behaviour!

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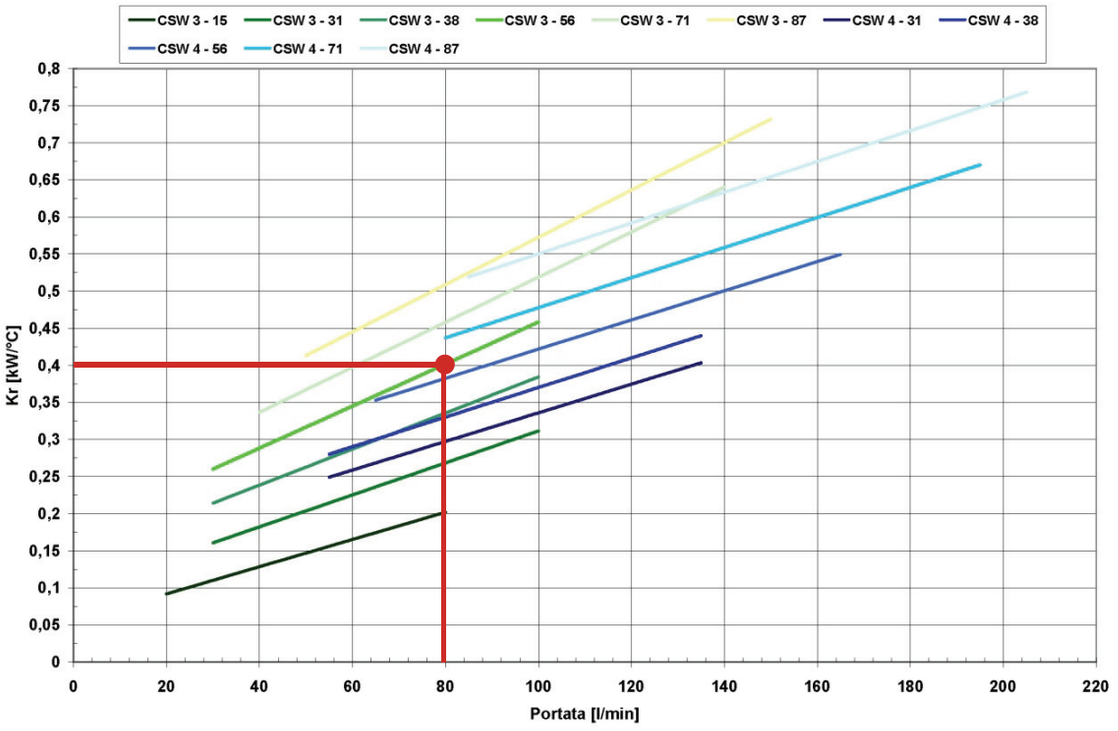
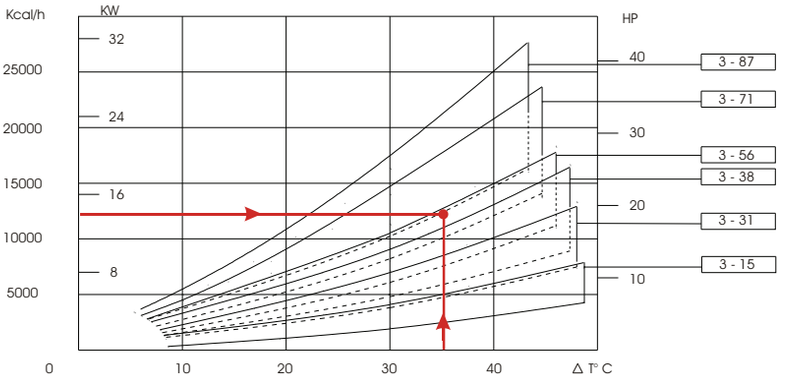
Dati disponibili / *Data* :
Potenza da dissipare / *Heat exchanged*: 14 kW
Portata di olio / *Oil flow*: 80 l/min
Differenza di tempertura / *Difference of temperture between oil and water* : 35 Celsius degrees



Appare evidente che il modello che meglio si adegua alle specifiche e' il nostro CSW 3-56; Procediamo all'analisi dei diagrammi specifici dello scambiatore identificato. ***From the previous diagram it's clear that the best cooler will be the water/oil one CSW 3-56; you can proceed with the looking of specific diagrams of this particular model!***

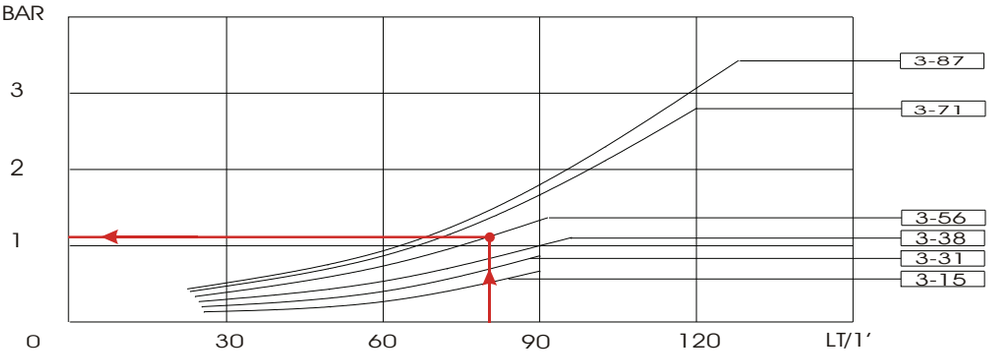
THERMIC EFFICIENCY



PRESSURE DROP

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20



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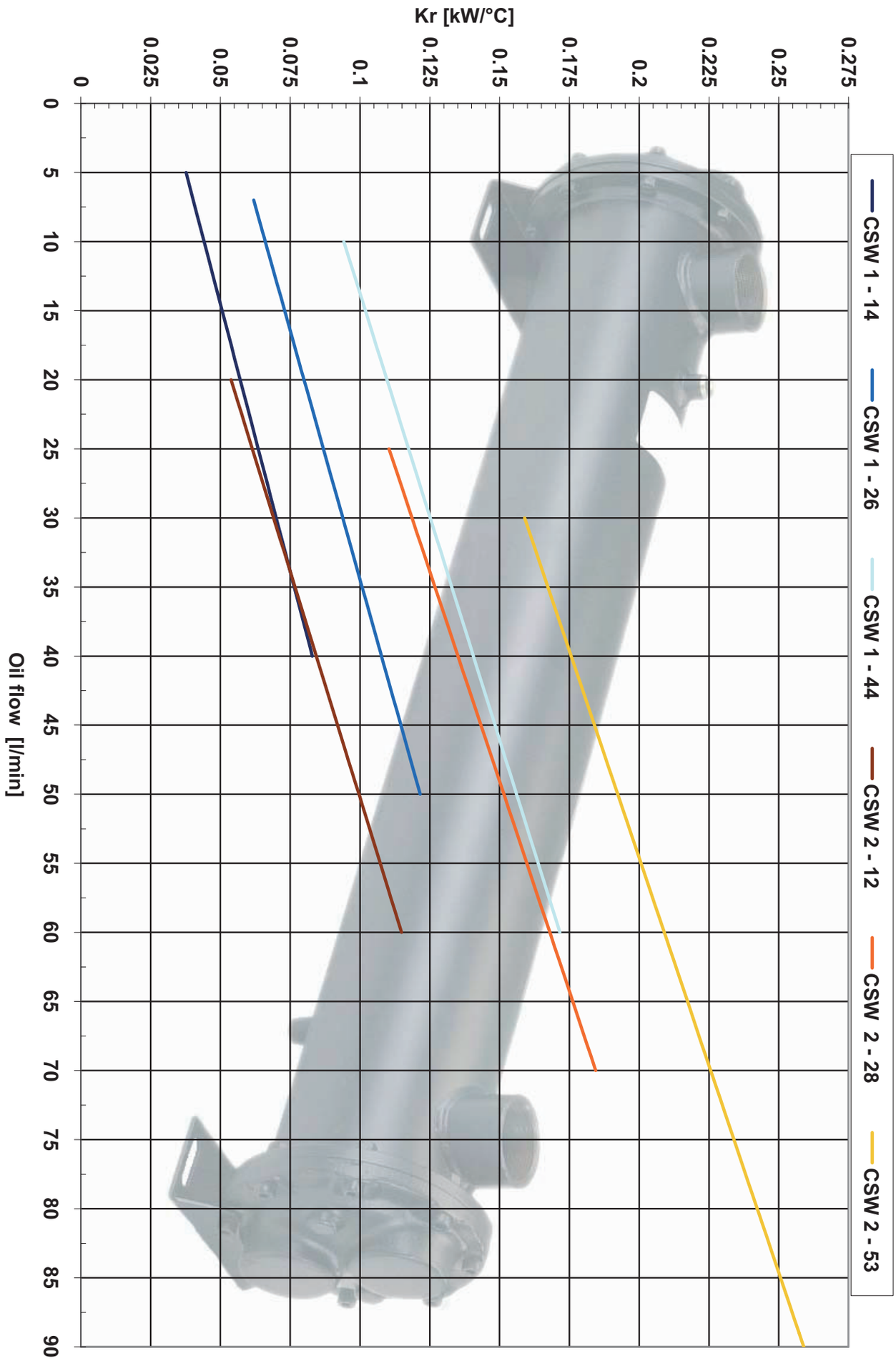
PERFORMANCE DIAGRAM FOR SHELL & TUBE COOLERS SERIES CSW 1 ÷ CSW 2



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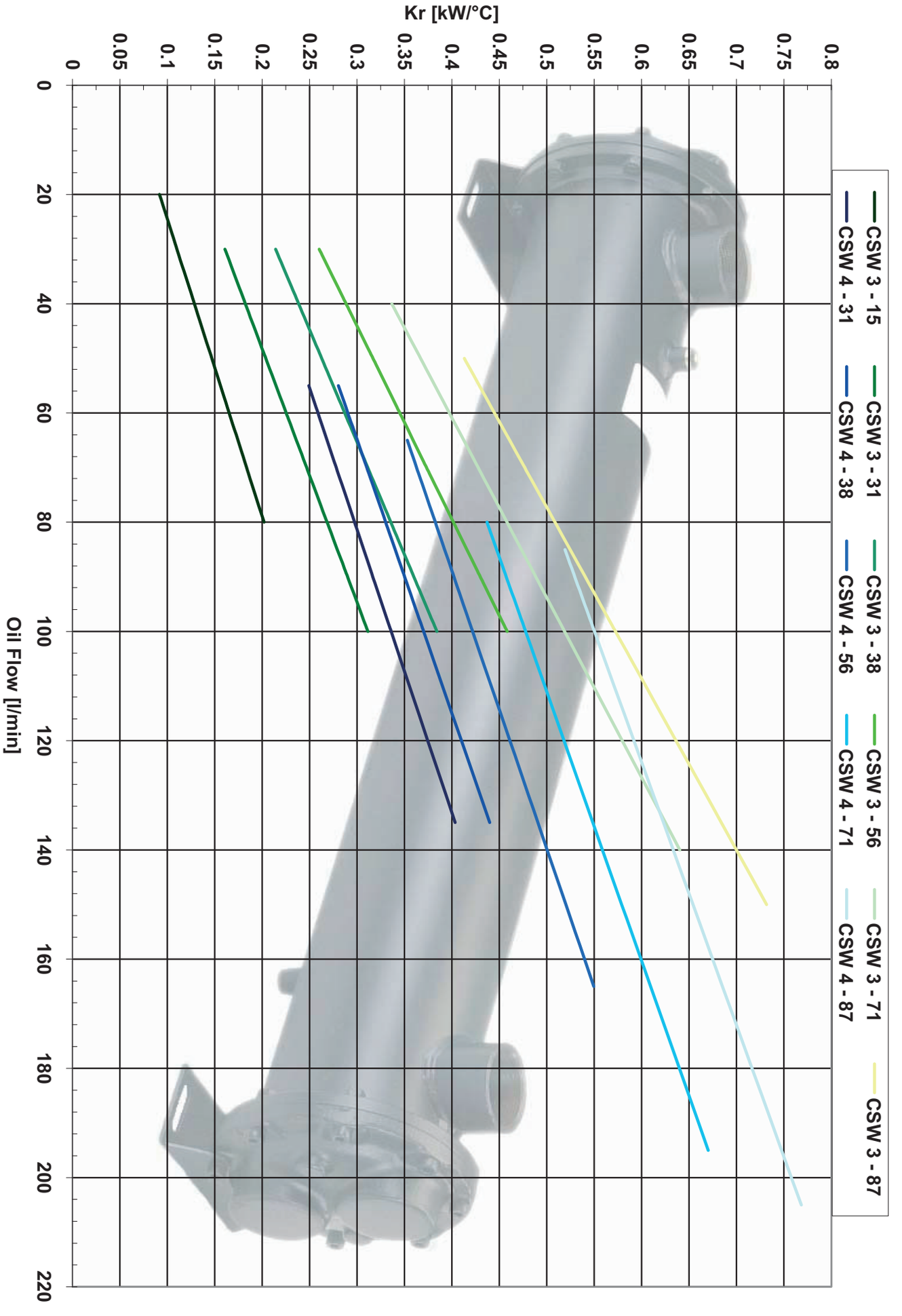
PERFORMANCE DIAGRAM FOR SHELL & TUBE COOLERS SERIES CSW 3 ÷ CSW 4



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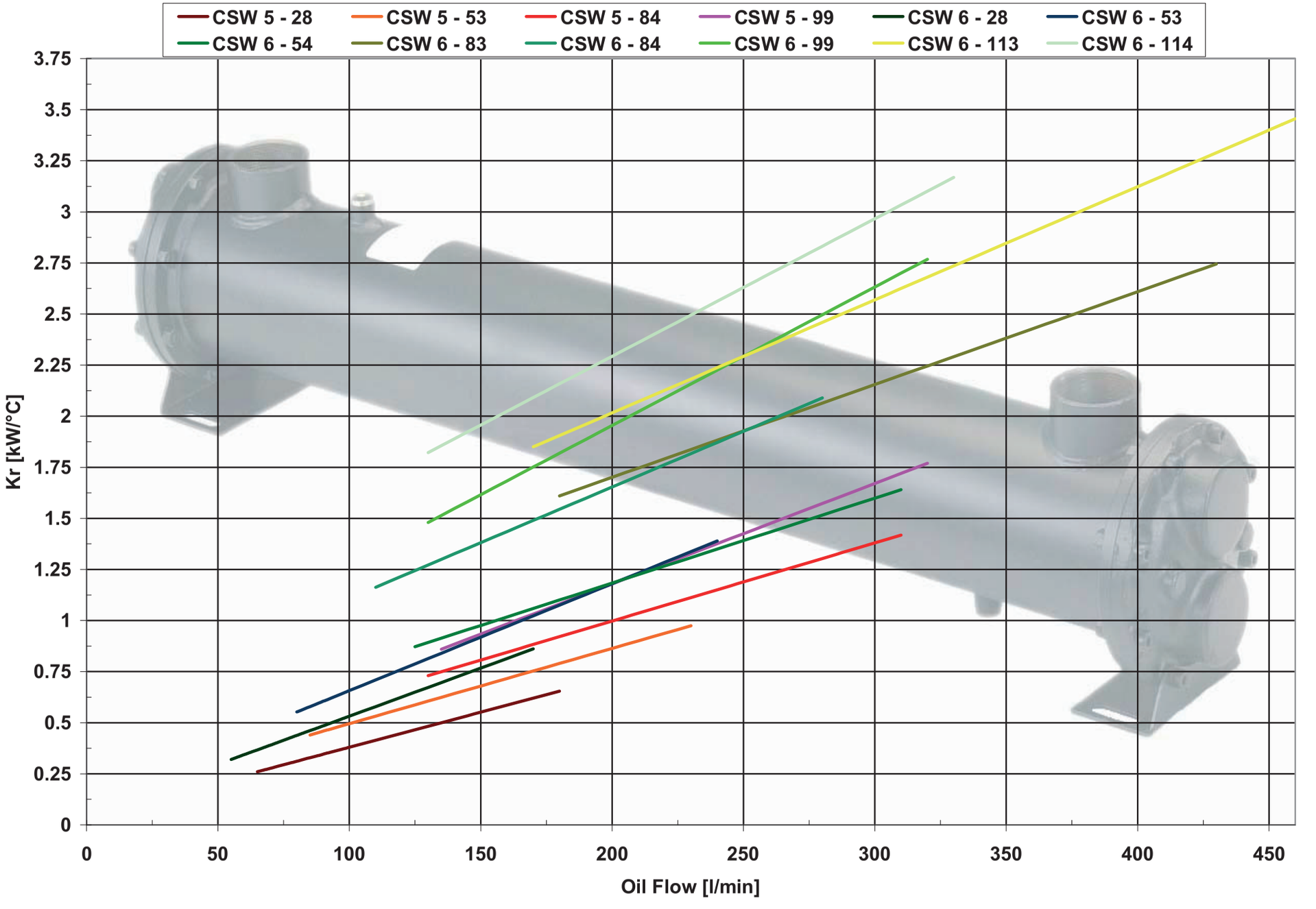
PERFORMANCE DIAGRAM FOR SHELL & TUBE COOLERS SERIES CSW 5 ÷ CSW 6



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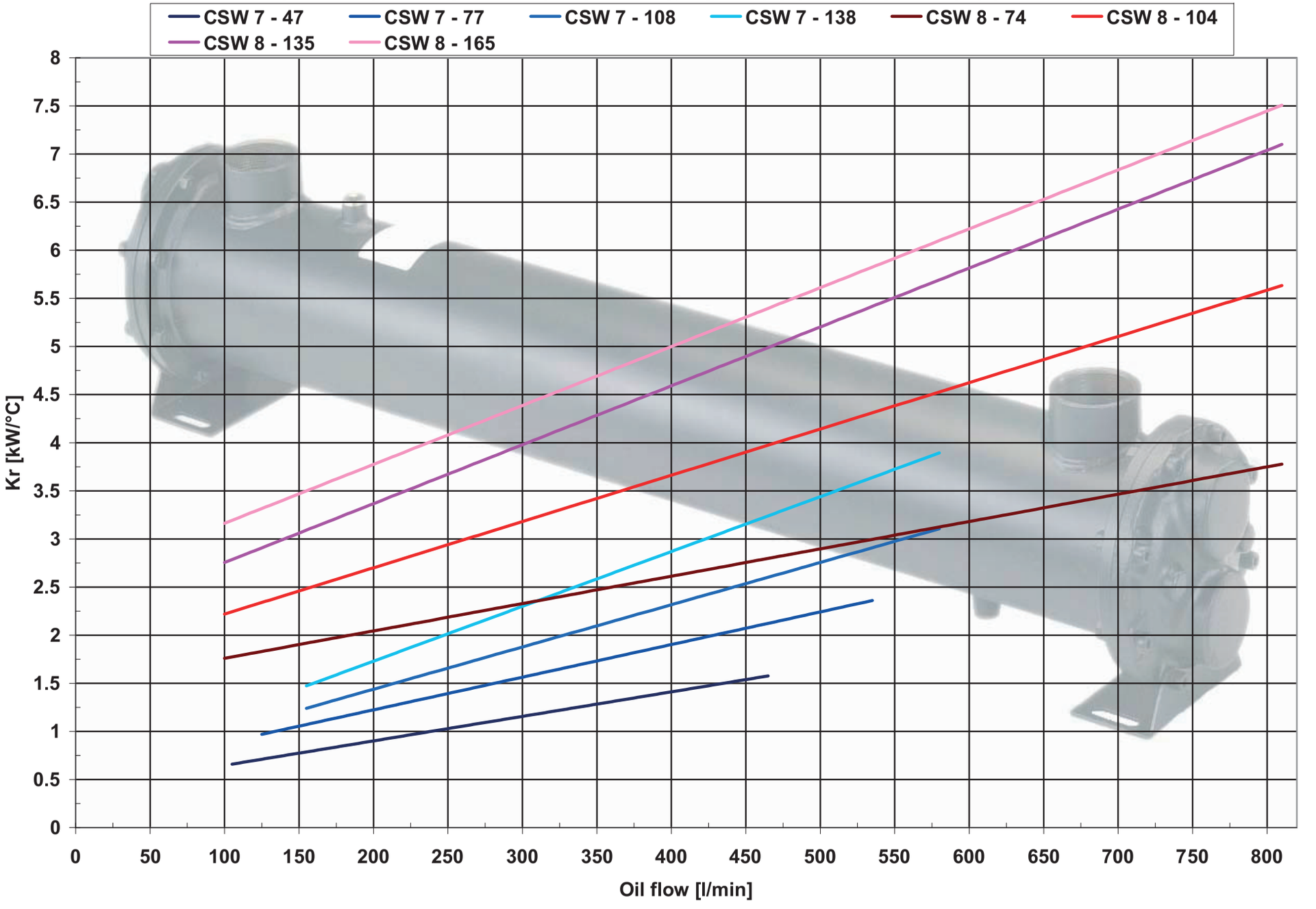
PERFORMANCE DIAGRAM FOR SHELL & TUBE COOLERS SERIES CSW 7 ÷ CSW 8



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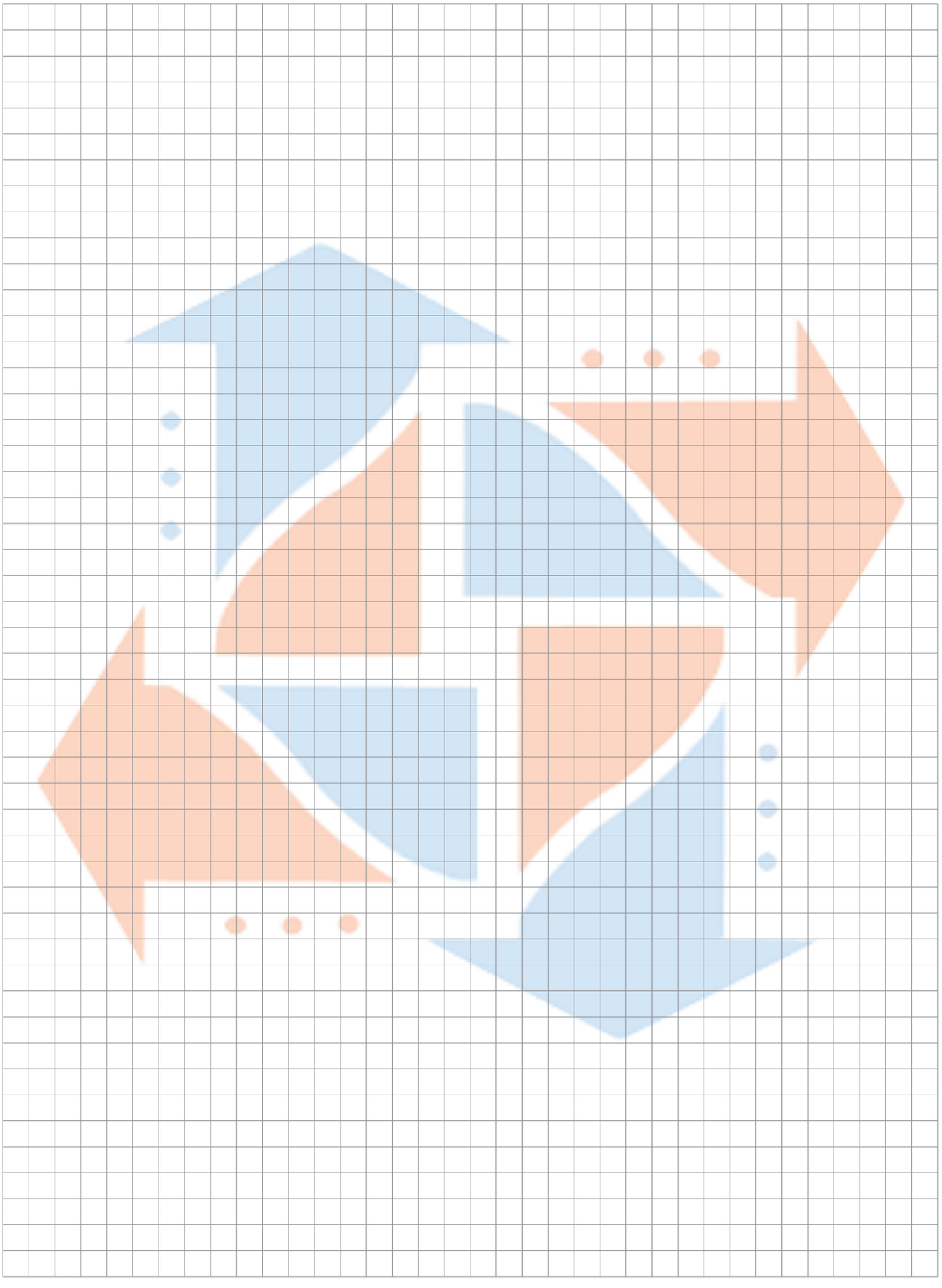
CSW



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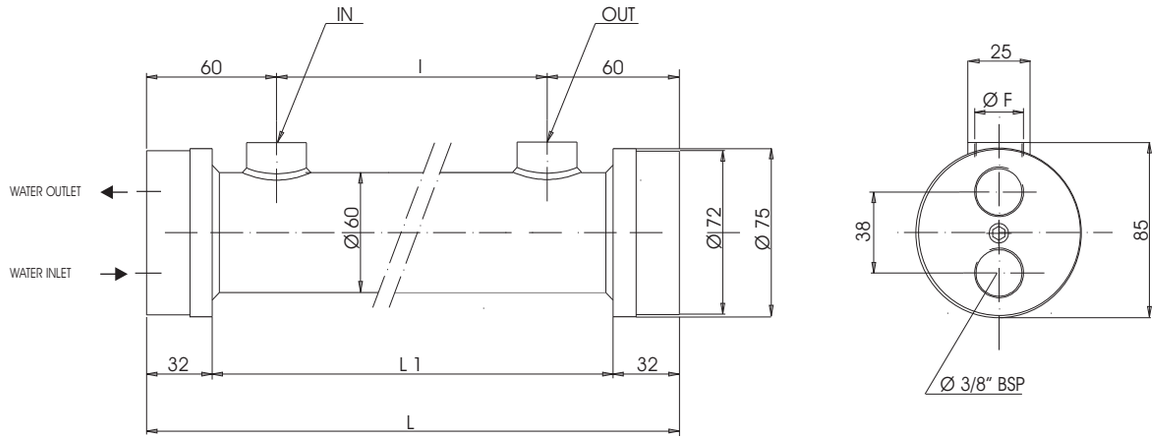
Water/oil coolers series CSW 1

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW1 - 14 -2	0.4	5 - 30	1,3 - 2,5	2.1	1/2"	140	260	196
CSW1 - 26 -2	0.6	7.5 - 40	2,2 - 3,8	4.0	1/2"	260	380	316
CSW1 - 44 -2	0.9	10 - 50	3,3 - 4,5	6.5	1/2"	440	560	496

* SEPARATE SUPPLY : N° 2 WATER MAFF ø 3/8" ÷ ø 13 L=20 mm



The kW stated in schedule are refered at conditions indicated on the Performance diagram "A"

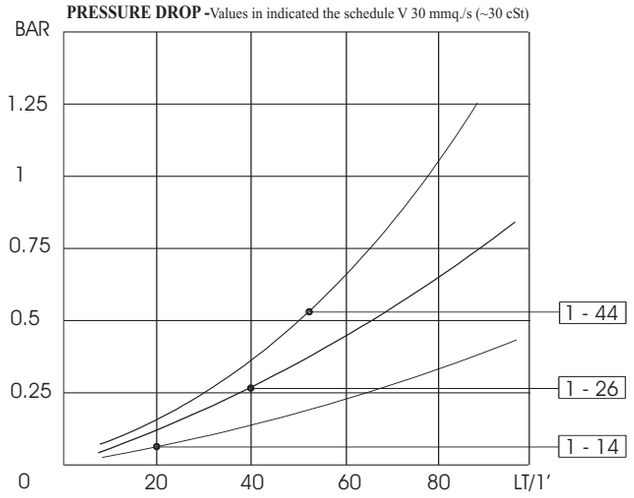
Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	Al Si 13	NBR	CuDHP	C40	C37

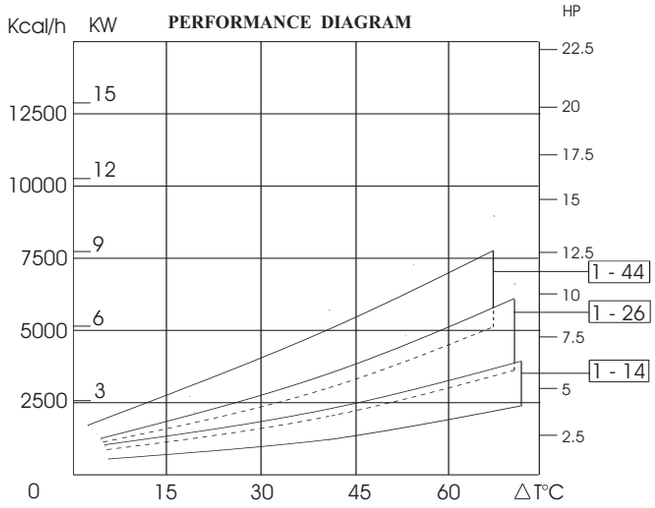
COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	: + 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20





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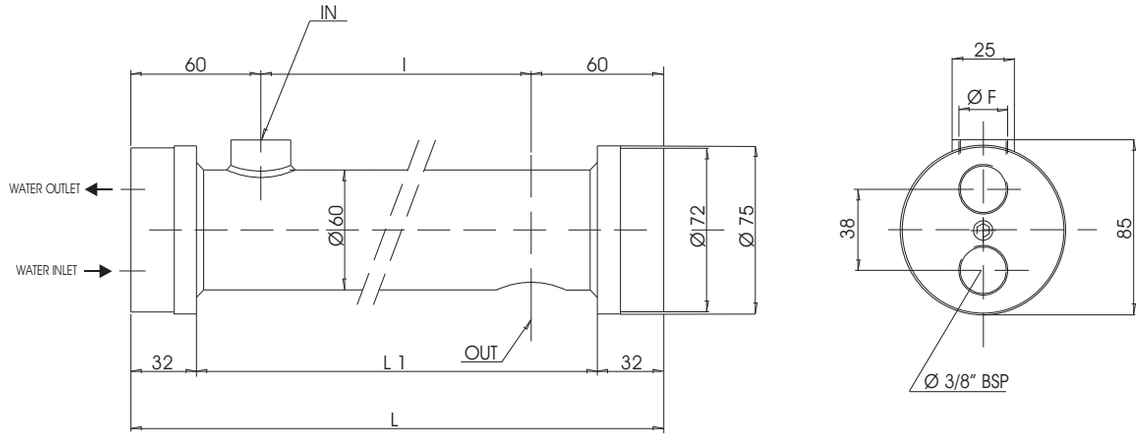
Water/oil coolers series CSW 1 I

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW1 - 9 -2I	0.3	5.0 - 30	1.0 - 2.0	1.8	1/2"	90	210	146
CSW1 - 19 -2I	0.4	7.5 - 40	2.0 - 3.7	2.5	1/2"	190	310	246

* SEPARATE SUPPLY : N° 2 WATER MAFF ø 3/8" ÷ ø 13 L=20 mm



The kW stated in schedule are refered at conditions indicated on the Performance diagram "A"

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	Al Si 13	NBR	CuDHP	C40	C37

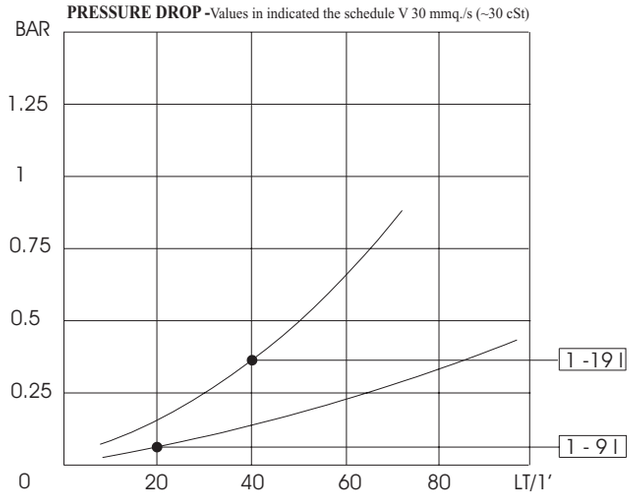
COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	: + 99° C

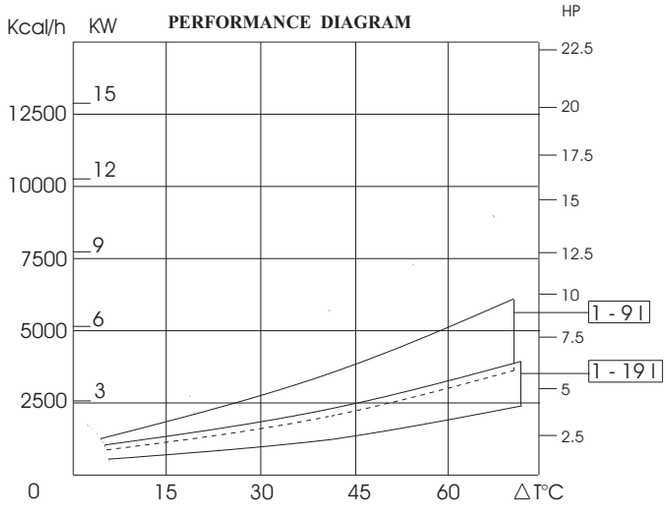
CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP - Values in indicated the schedule V 30 mmq./s (~30 cSt)



PERFORMANCE DIAGRAM



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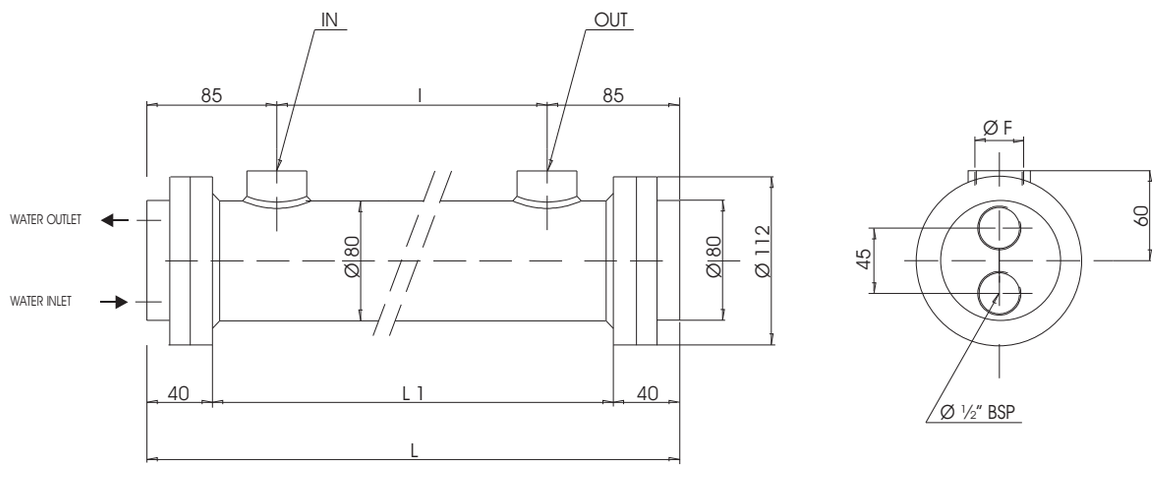
Water/oil coolers series CSW 2

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW2 -12-2	0.7	20 - 50	1,9 - 3,5	3.2	3/4”	120	290	210
CSW2 -28-2	1.1	25 - 60	3,9 - 5,9	4.5	3/4”	280	460	370
CSW2 -53-2	1.9	30 - 80	5,6 - 8,5	7.0	3/4”	530	710	620

* SEPARATE SUPPLY : N° 2 WATER MAFF ø ½” ÷ ø 13 L=20 mm



The kW stated in schedule are refered at conditions indicated on the Performance diagram “A”

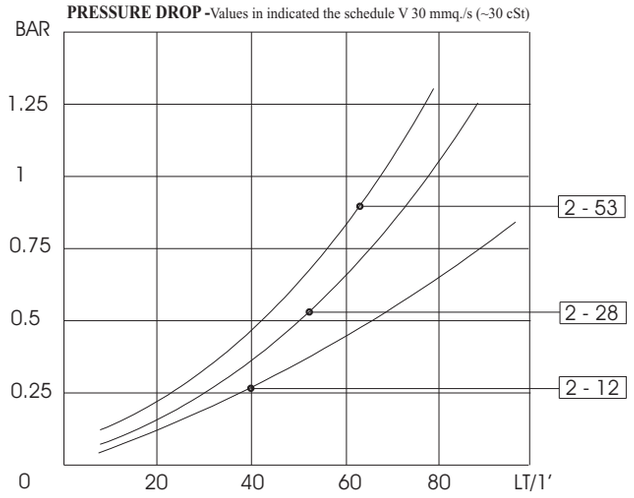
Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	C40/Al Si 13	NBR	CuDHP	C40	C37

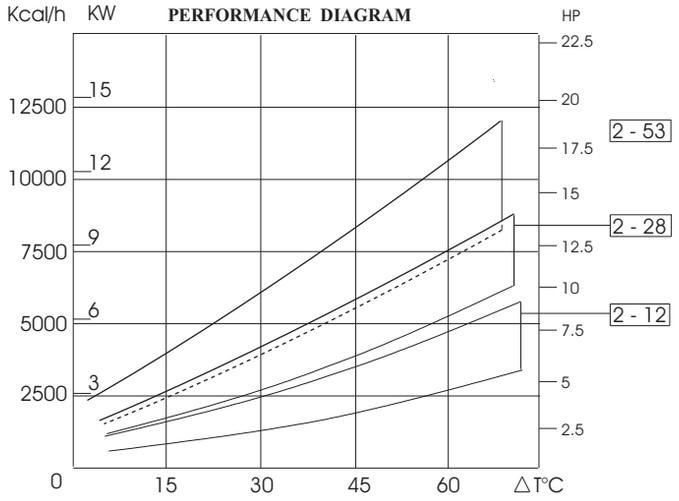
COOLERS TECHNICAL DATA

Max Working Pressure		: 12 bar
Test Pressure	-	: 18 bar
Max Working Temperature		: + 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20





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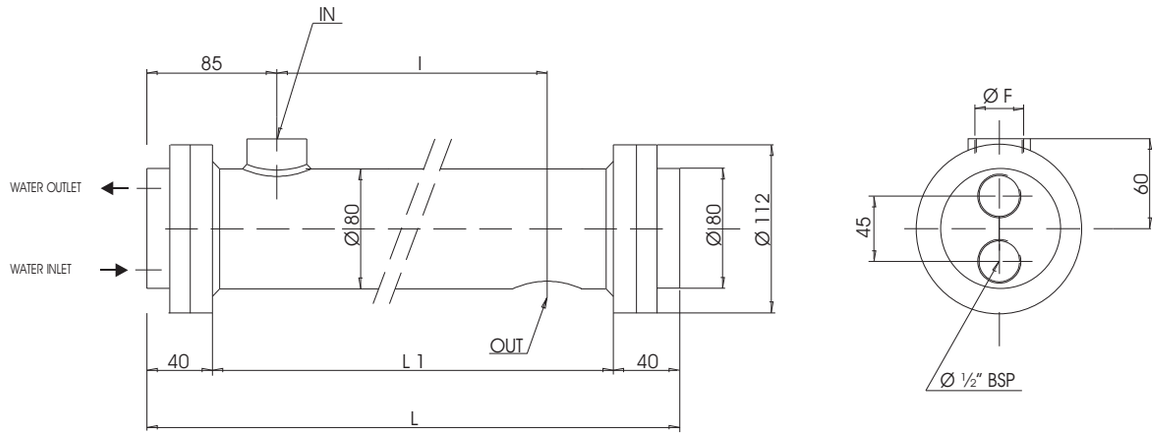
Water/oil coolers series CSW 2 I

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW2 - 8 - 2 I	0.5	25 - 60	2.2 - 5	2.5	3/4"	80	260	180
CSW2 - 18 - 2 I	0.7	30 - 80	4.1 - 7	3.7	3/4"	180	360	270

* SEPARATE SUPPLY : N° 2 WATER MAFF ø ½" ÷ ø 16 L=20 mm



The kW stated in schedule are refered at conditions indicated on the Performance diagram "A"

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	C40/Al Si 13	NBR	CuDHP	C40	C37

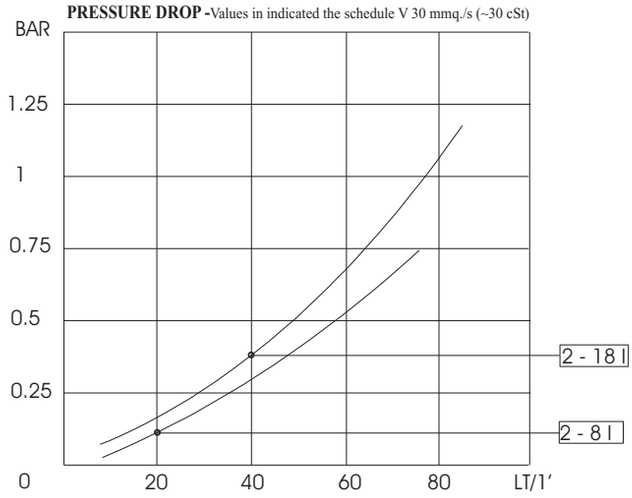
COOLERS TECHNICAL DATA

Max Working Pressure		: 12 bar
Test Pressure	-	: 18 bar
Max Working Temperature		: + 99° C

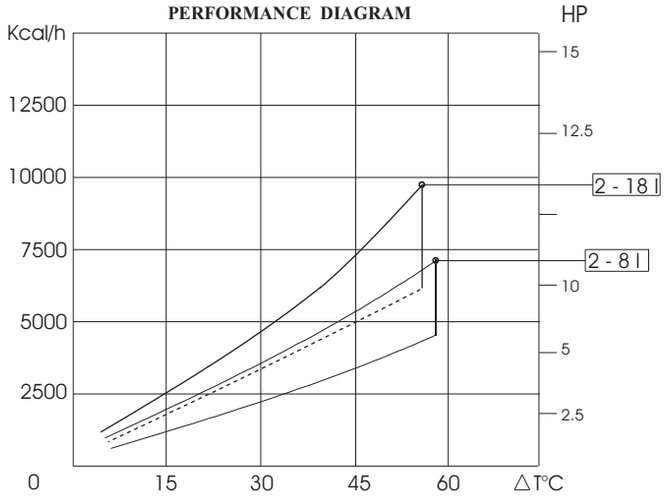
CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP - Values in indicated the schedule V 30 mmq./s (~30 cSt)



PERFORMANCE DIAGRAM



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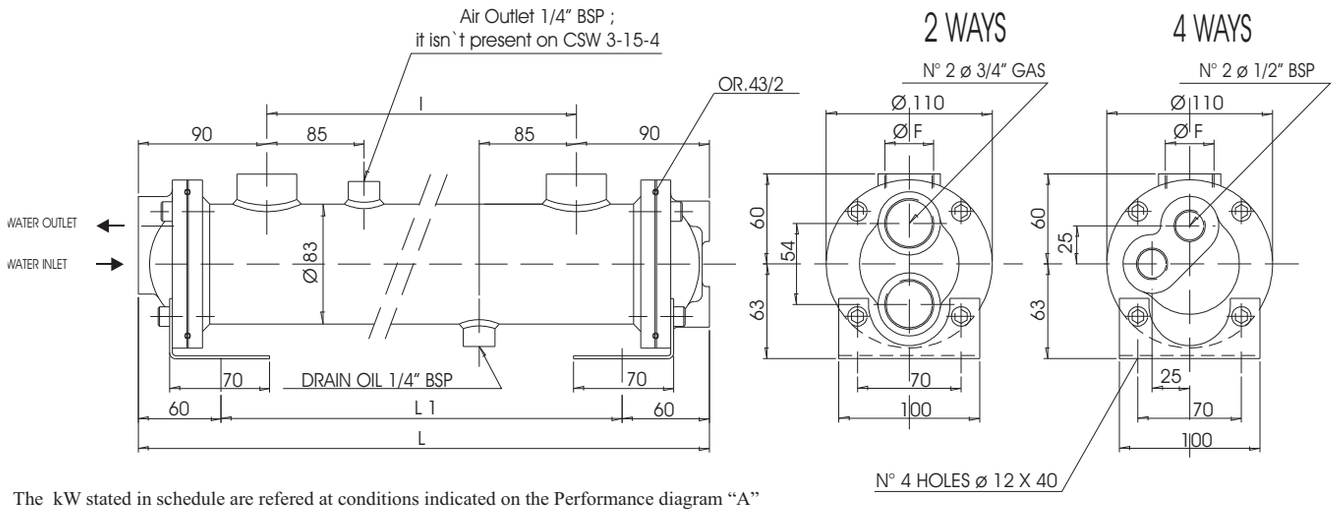
Water/oil coolers series CSW 3

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW3 – 15 – *	0.70	20 - 70	3 - 6	5.5	1”	150	330	210
CSW3 – 31 – *	1.20	30 - 90	6 - 10	7.0	1”	310	490	370
CSW3 – 38 – *	1.40	30 - 90	7 - 13	7.5	1”	385	565	445
CSW3 – 56 – *	2.00	30 - 90	9 - 15	9.3	1”	560	740	620
CSW3 – 71 – *	2.45	40 - 130	12 - 21	10.0	1”	715	895	775
CSW3 – 87 – *	2.80	50 - 140	15 - 25	12.0	1”	870	1050	930

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram “A”

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	Al Si 13	NBR	CuDHP	C40	C37

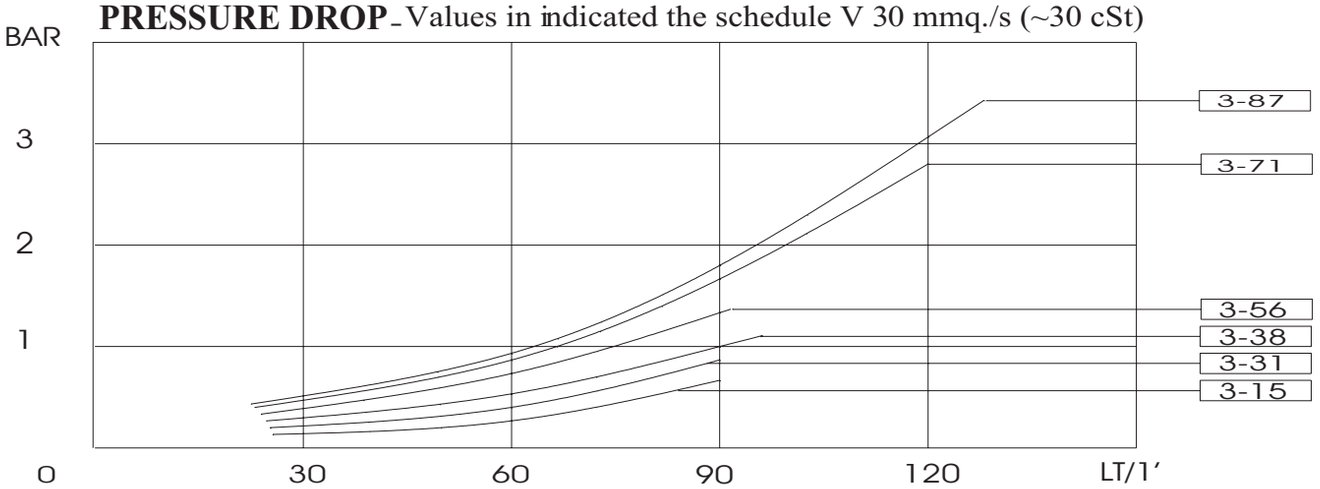
COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP - Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 3

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

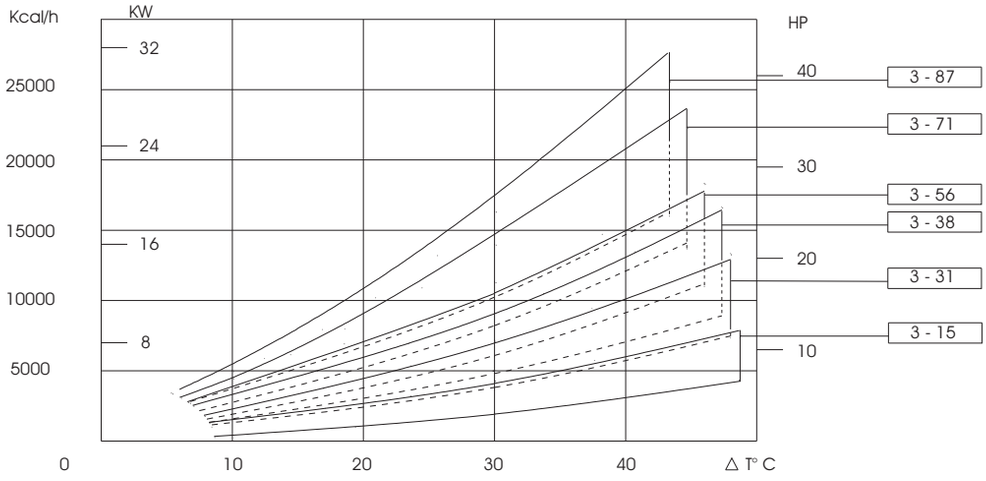


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

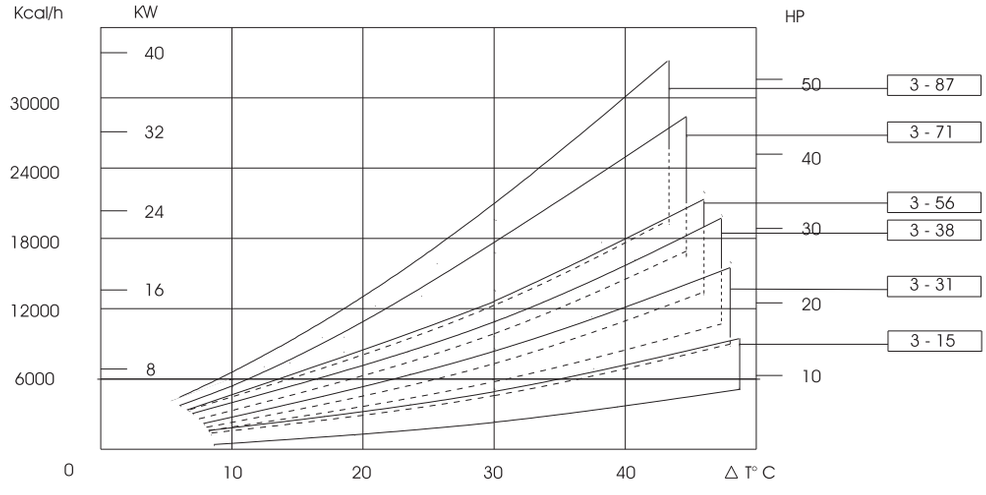
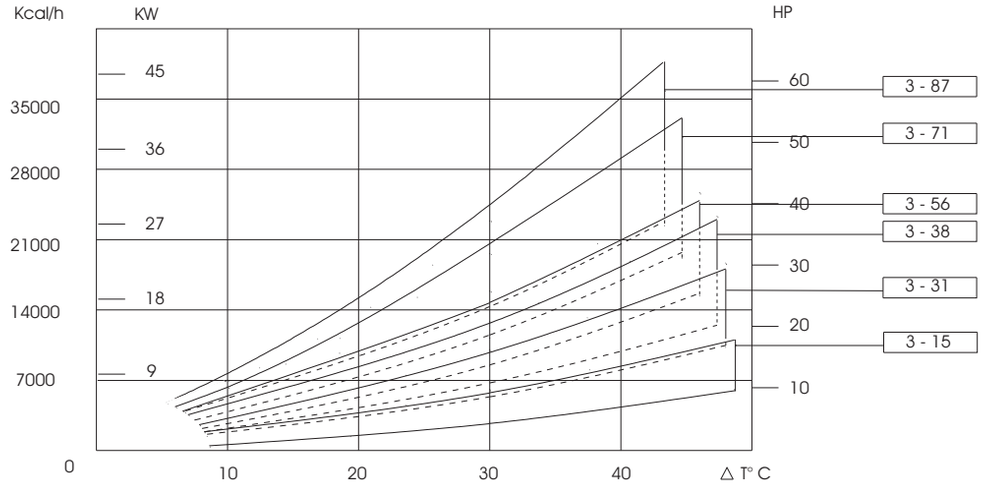


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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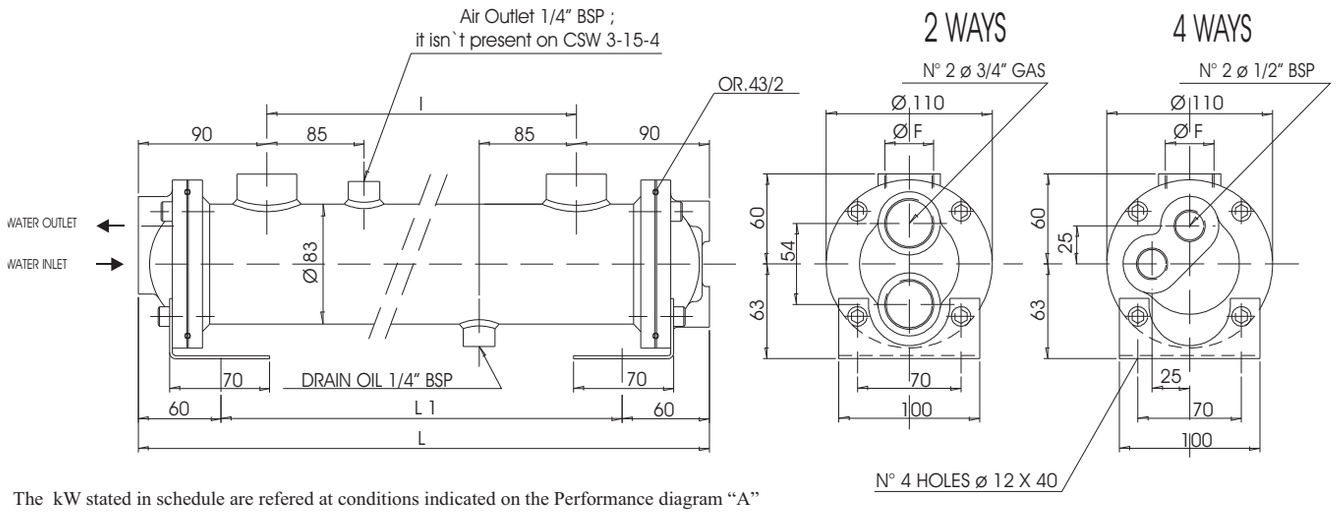
Water/oil coolers series CSW 3 -**-*-A

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW3 - 15 -*-A	0.70	20 - 70	3 - 6	5.5	1"	150	330	210
CSW3 - 31 -*-A	1.20	30 - 90	6 - 10	7.0	1"	310	490	370
CSW3 - 38 -*-A	1.40	30 - 90	7 - 13	7.5	1"	385	565	445
CSW3 - 56 -*-A	2.00	30 - 90	9 - 15	9.3	1"	560	740	620
CSW3 - 71 -*-A	2.45	40 - 130	12 - 21	10.0	1"	715	895	775
CSW3 - 87 -*-A	2.80	50 - 140	15 - 25	12.0	1"	870	1050	930

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram "A"

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	Al Si 13	NBR	Aisi321	C40	C37

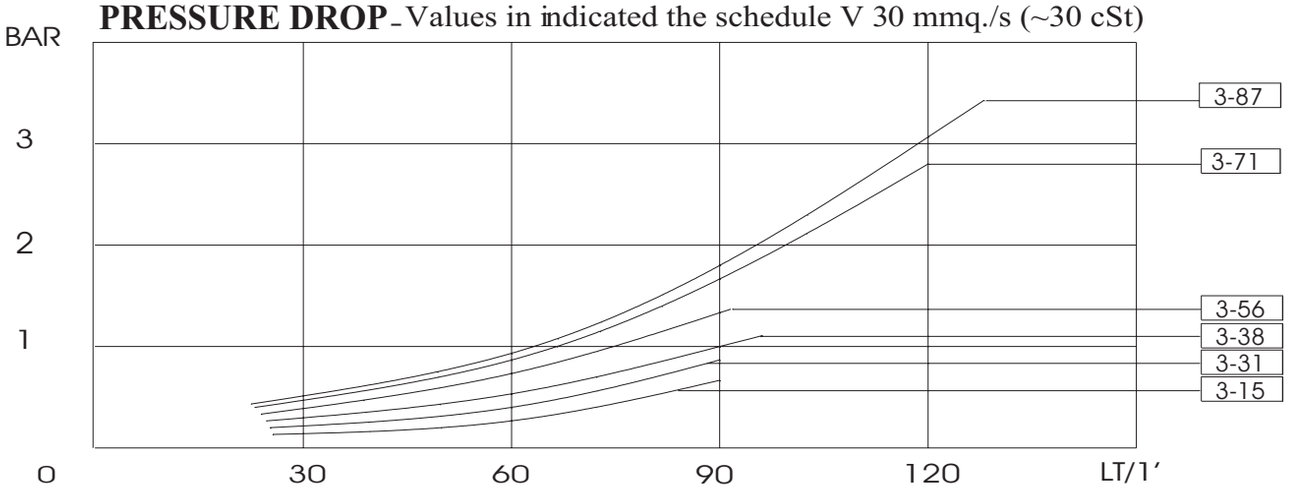
COOLERS TECHNICAL DATA

Max Working Pressure		: 12 bar
Test Pressure	-	: 18 bar
Max Working Temperature		:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP - Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 3 -**-*-A

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

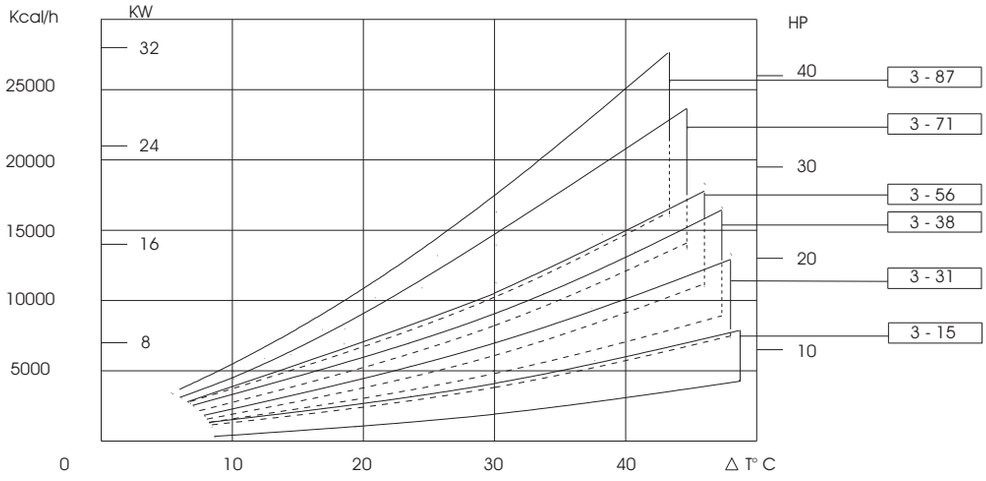


DIAGRAM " B" *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

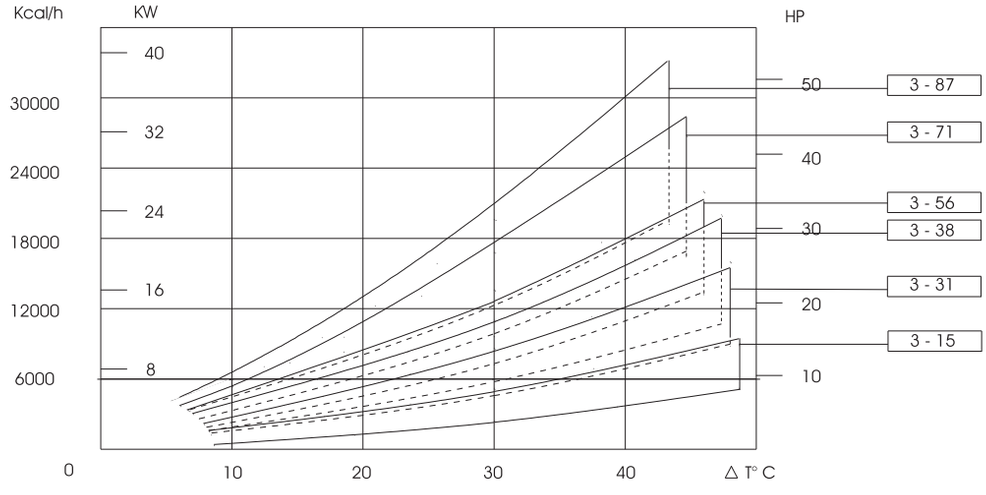
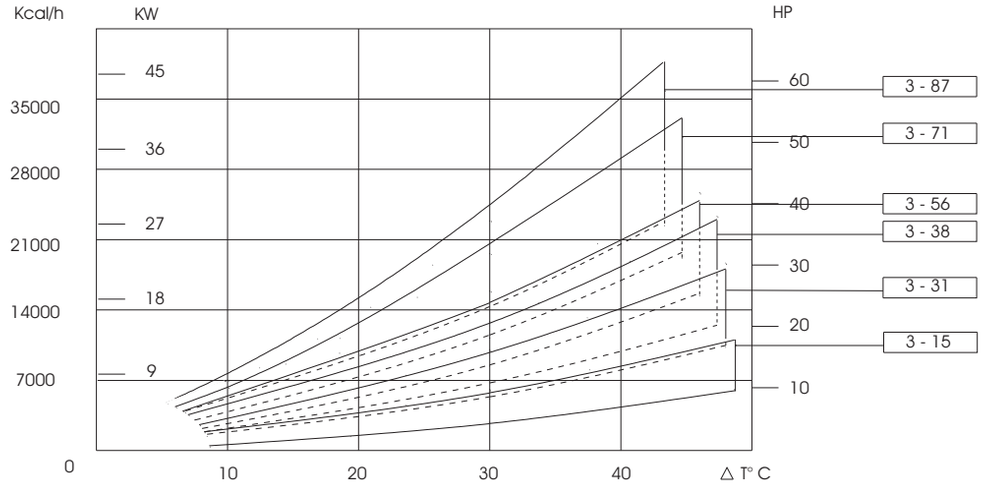


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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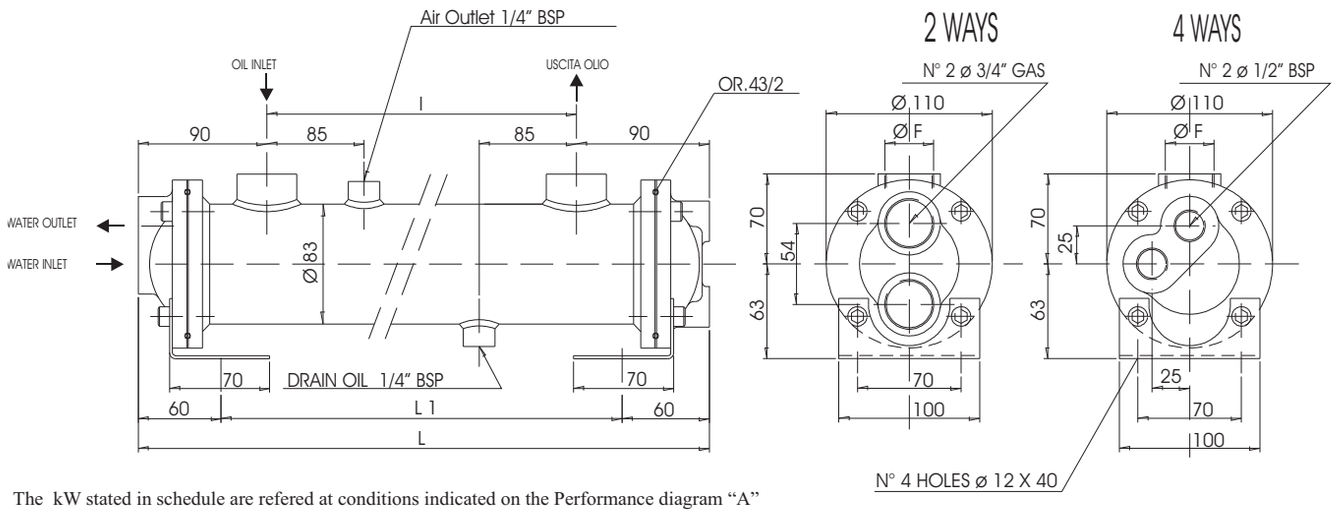
Water/oil coolers series CSW 4

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW4 - 31 - *	1.30	55 - 125	9 - 13	5.5	1-1/2"	310	490	370
CSW4 - 38 - *	1.50	55 - 125	10 - 15	7.0	1-1/2"	385	565	445
CSW4 - 56 - *	2.20	65 - 155	12 - 19	7.5	1-1/2"	560	740	620
CSW4 - 71 - *	2.50	80 - 185	15 - 23	9.3	1-1/2"	715	895	775
CSW4 - 87 - *	3.00	85 - 195	18 - 26	10.0	1-1/2"	870	1050	930

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram "A"

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	Al Si 13	NBR	CuDHP	C40	C37

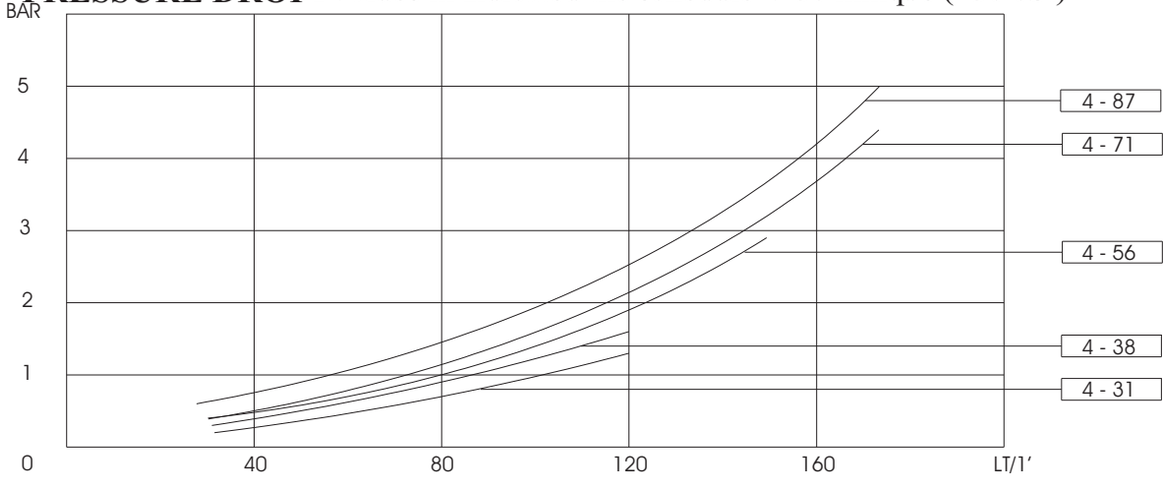
COOLERS TECHNICAL DATA

Max Working Pressure		: 12 bar
Test Pressure	-	: 18 bar
Max Working Temperature		:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP - Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 4

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

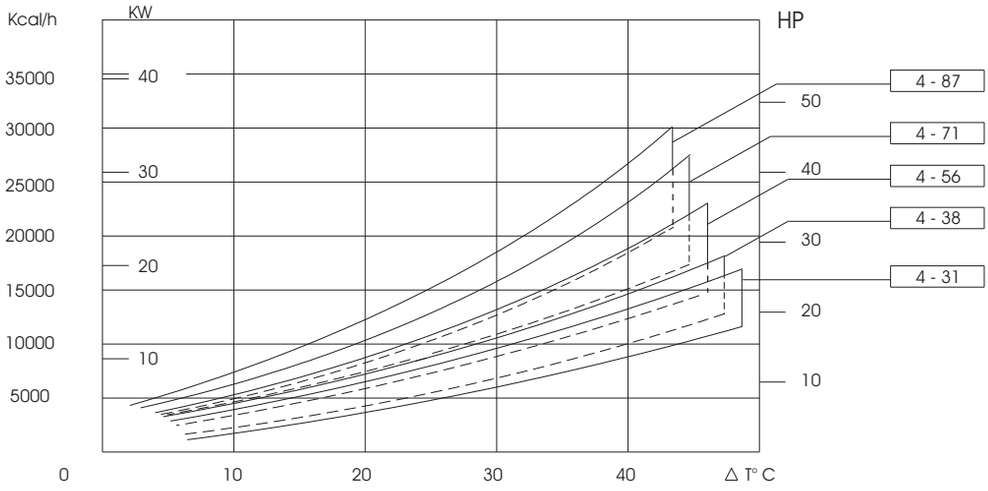


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

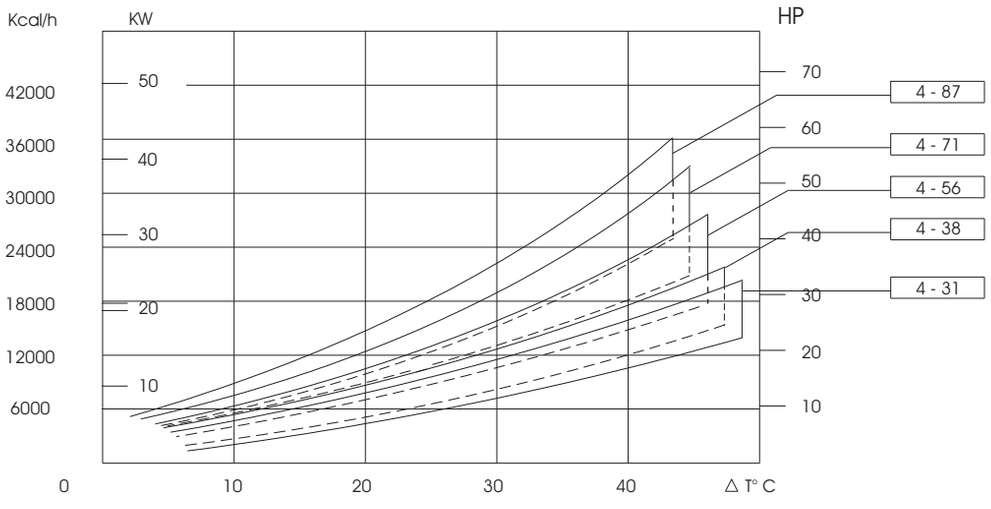
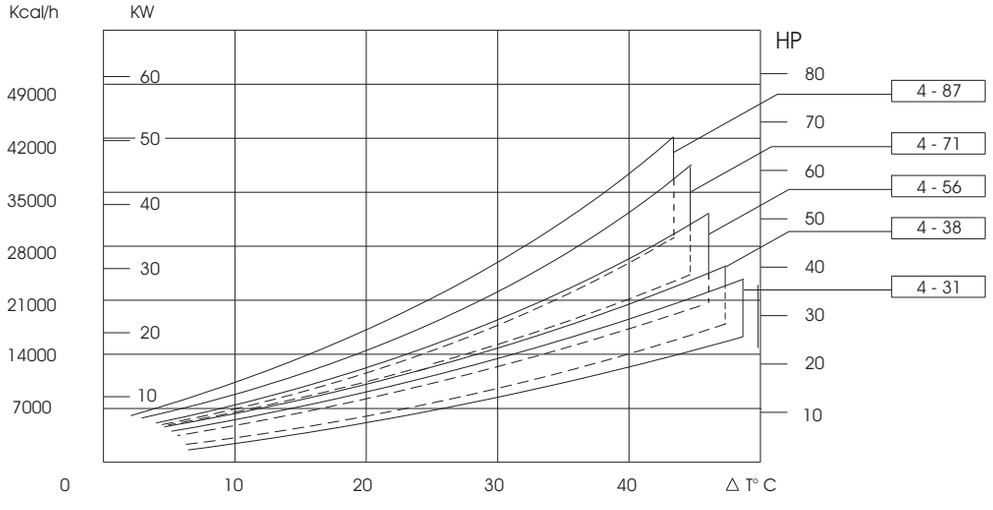


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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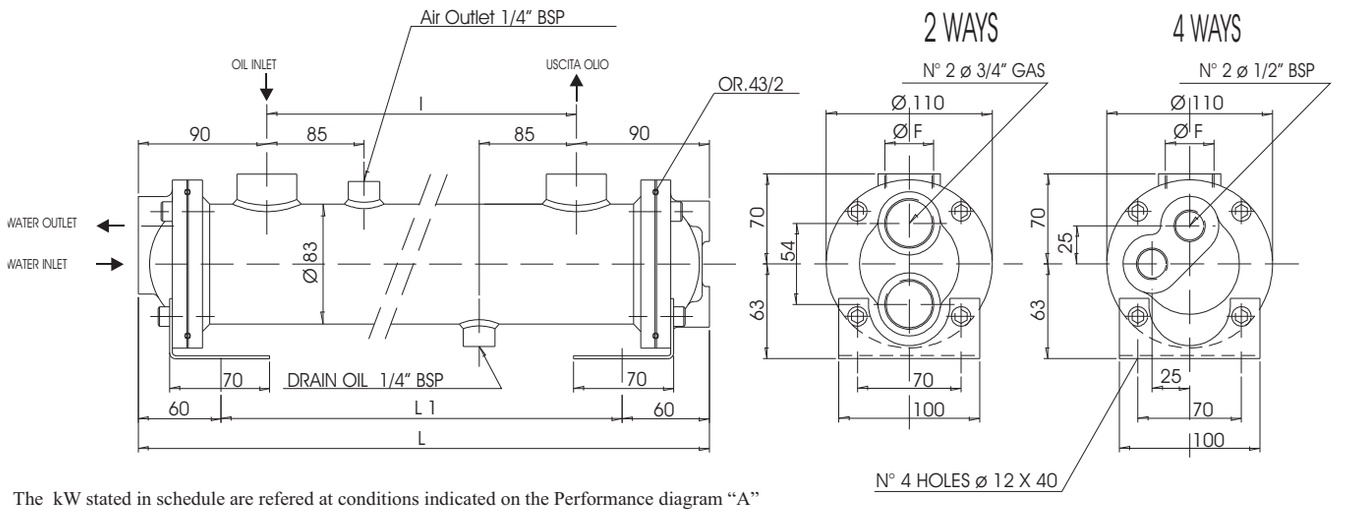
Water/oil coolers series CSW 4 -**-*-A

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions			
					F	I	L	L1
CSW4 - 31 - * - A	1.30	55 - 125	9 - 13	5.5	1-1/2"	310	490	370
CSW4 - 38 - * - A	1.50	55 - 125	10 - 15	7.0	1-1/2"	385	565	445
CSW4 - 56 - * - A	2.20	65 - 155	12 - 19	7.5	1-1/2"	560	740	620
CSW4 - 71 - * - A	2.50	80 - 185	15 - 23	9.3	1-1/2"	715	895	775
CSW4 - 87 - * - A	3.00	85 - 195	18 - 26	10.0	1-1/2"	870	1050	930

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram "A"

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	Al Si 13	NBR	Aisi321	C40	C37

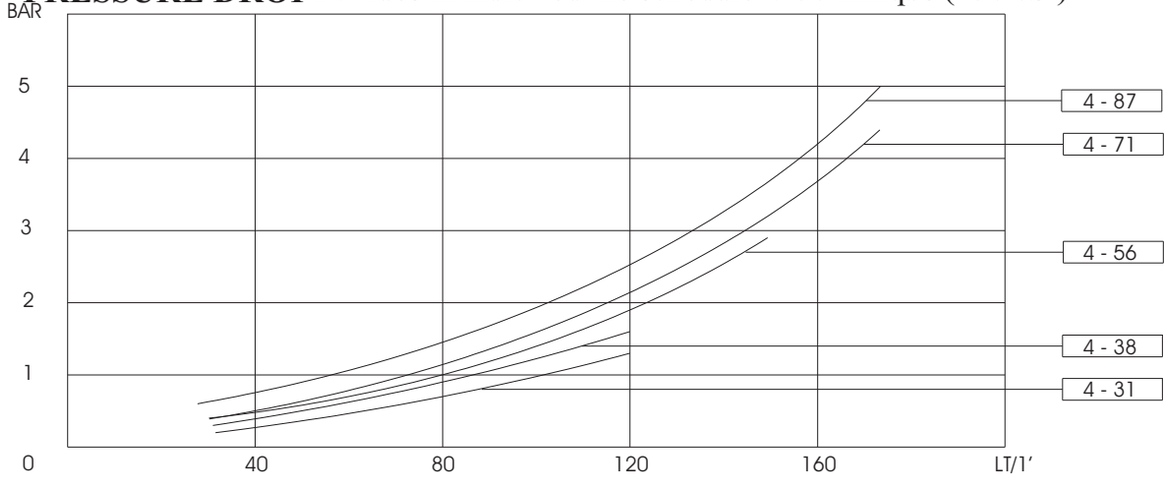
COOLERS TECHNICAL DATA

Max Working Pressure		: 12 bar
Test Pressure	-	: 18 bar
Max Working Temperature		:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP - Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 4 -**-*-A

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

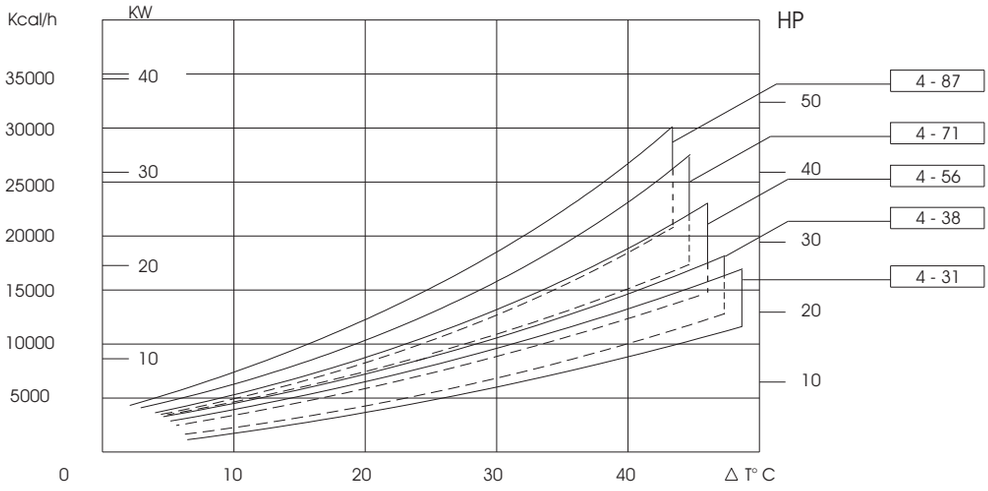


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

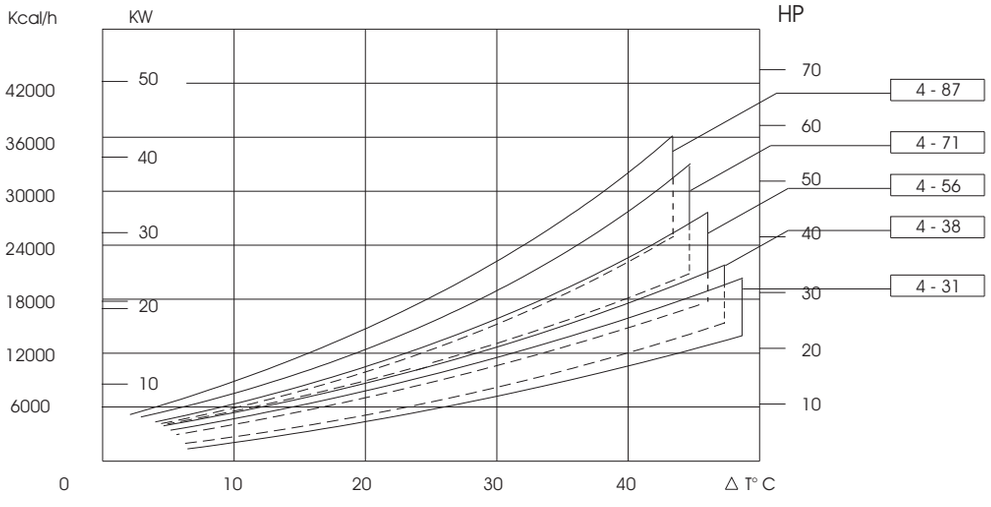
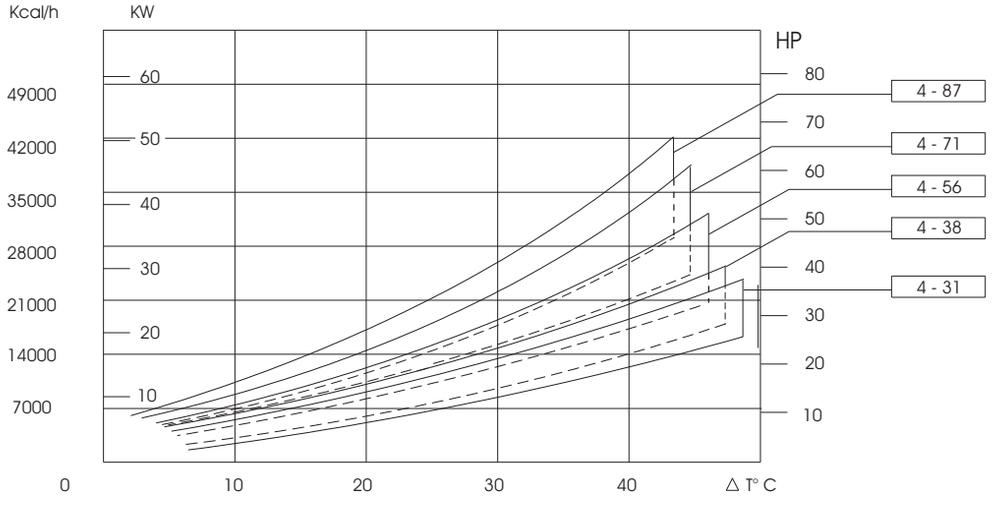


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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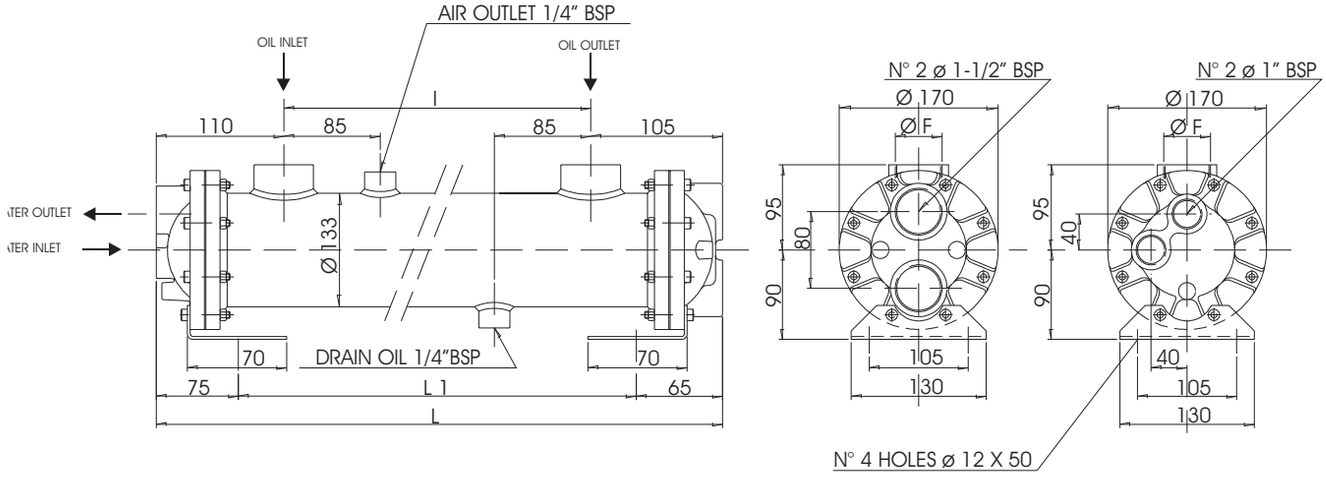
Water/oil coolers series CSW 5

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW5 – 28 – *	3.50	65 - 170	11 - 26	18.0	1-1/2”	285	500	360
CSW5 – 53 – *	5.50	85 - 220	15 - 33	25.0	1-1/2”	535	750	610
CSW5 – 84 – *	8.50	130 - 300	26 - 48	31.0	1-1/2”	845	1060	920
CSW5 – 99 – *	9.50	135 - 310	30 - 60	35.0	1-1/2”	995	1210	1070

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram “A”

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	G25	NBR	CuDHP	C40	C37

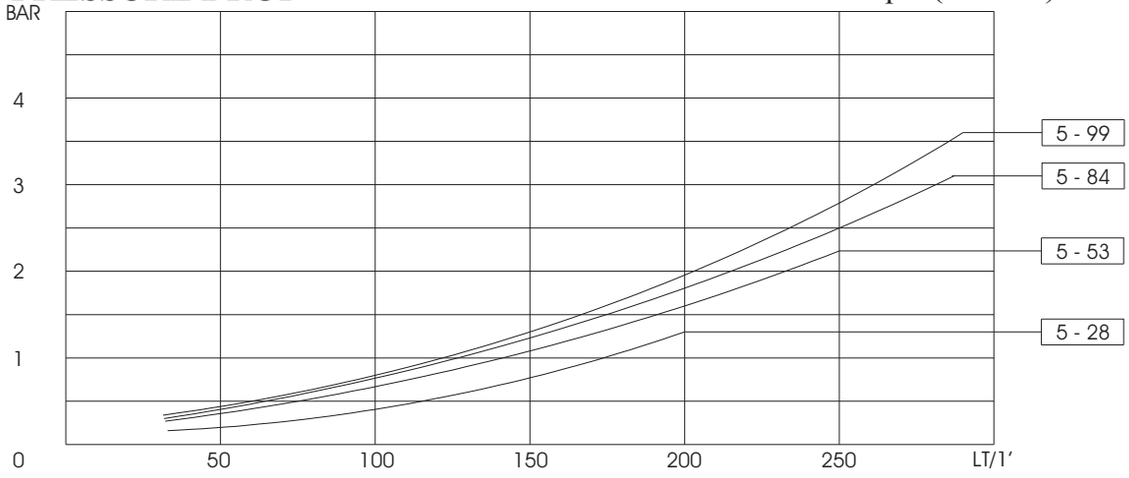
COOLERS TECHNICAL DATA

Max Working Pressure		: 12 bar
Test Pressure	-	: 18 bar
Max Working Temperature		:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP - Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 5

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

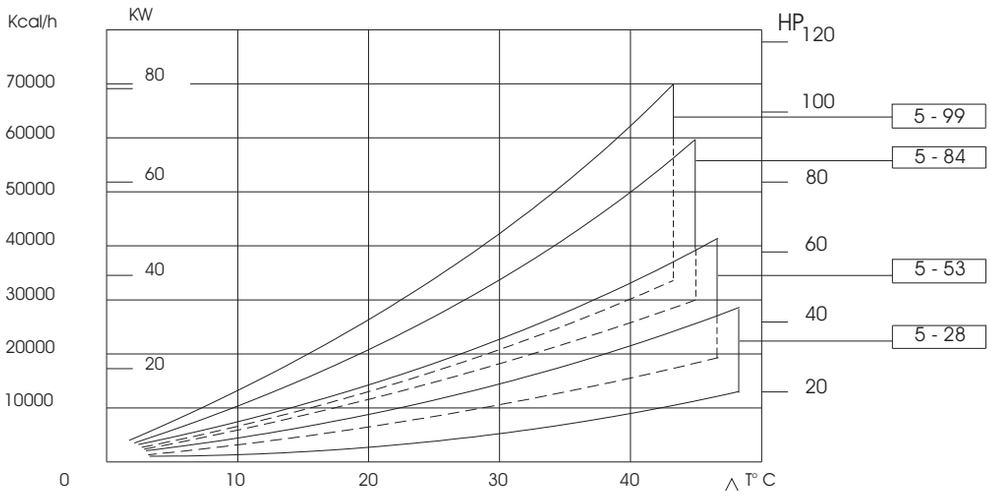


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

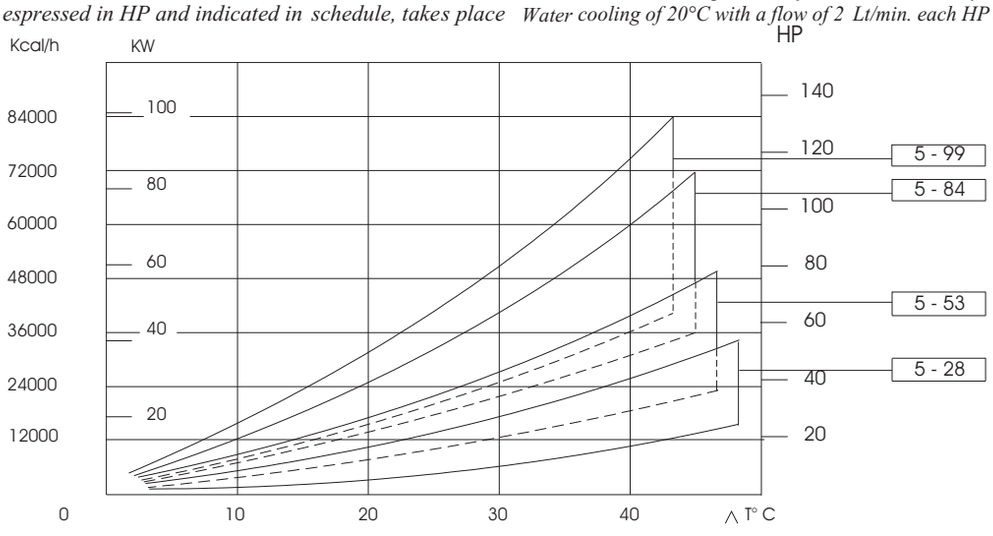
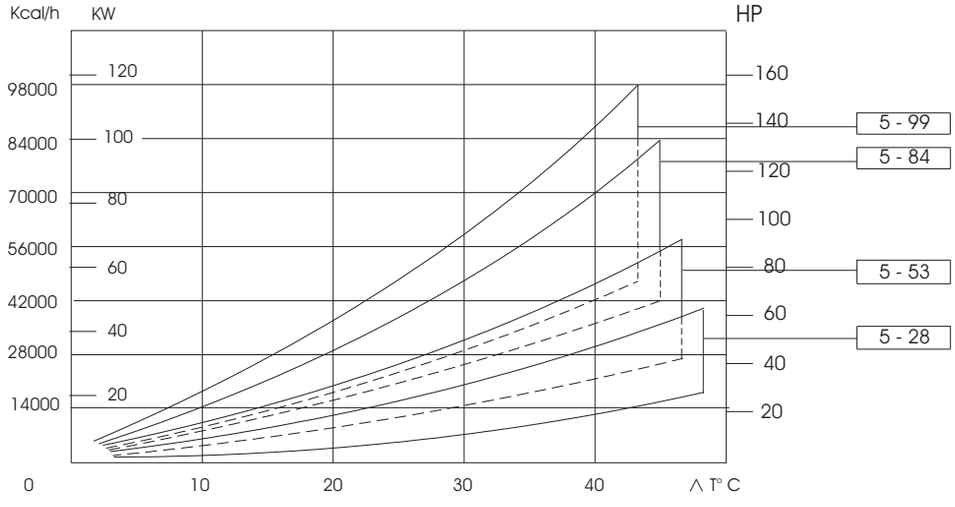


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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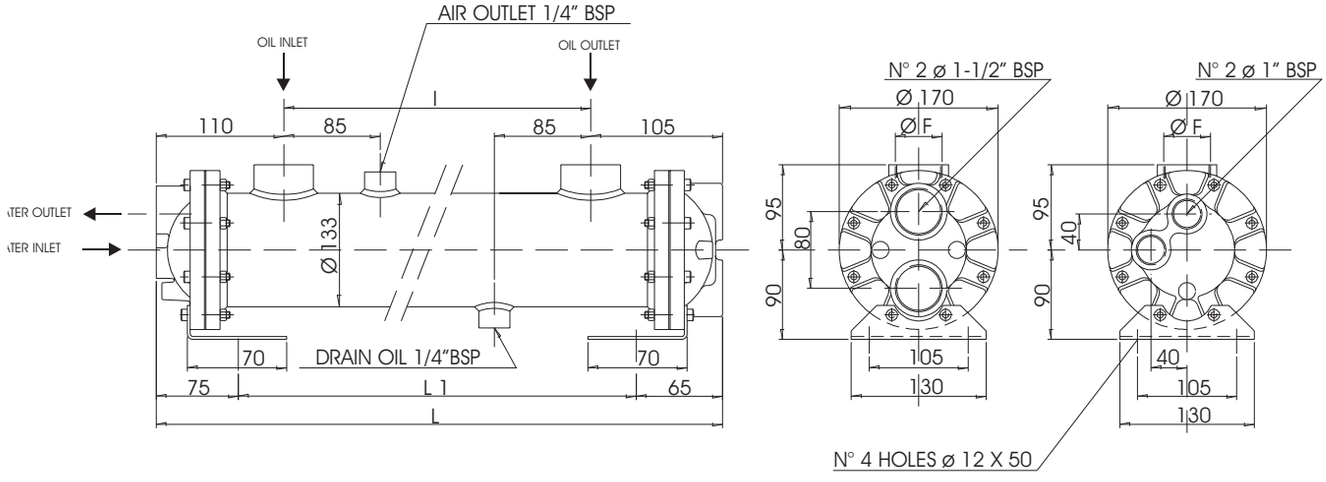
Water/oil coolers series CSW 5 -**-*-A

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW5 – 28 – * – A	3.50	65 - 170	11 - 26	18.0	1-1/2”	285	500	360
CSW5 – 53 – * – A	5.50	85 - 220	15 - 33	25.0	1-1/2”	535	750	610
CSW5 – 84 – * – A	8.50	130- 300	26 - 48	31.0	1-1/2”	845	1060	920
CSW5 – 99 – * – A	9.50	135- 310	30 - 60	35.0	1-1/2”	995	1210	1070

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram “A”

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	G25	NBR	Aisi321	C40	C37

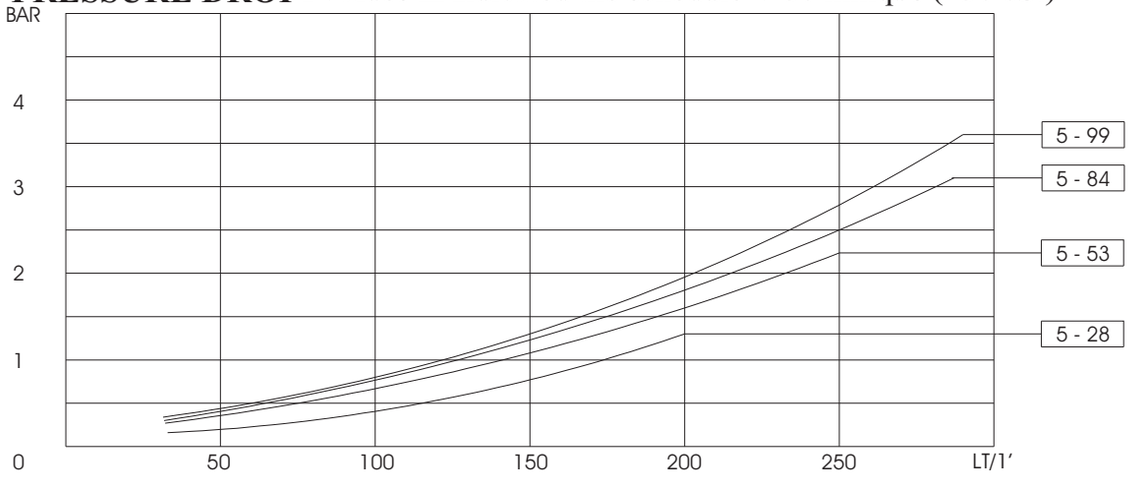
COOLERS TECHNICAL DATA

Max Working Pressure		: 12 bar
Test Pressure	-	: 18 bar
Max Working Temperature		:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP - Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 5 -**-*-A

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

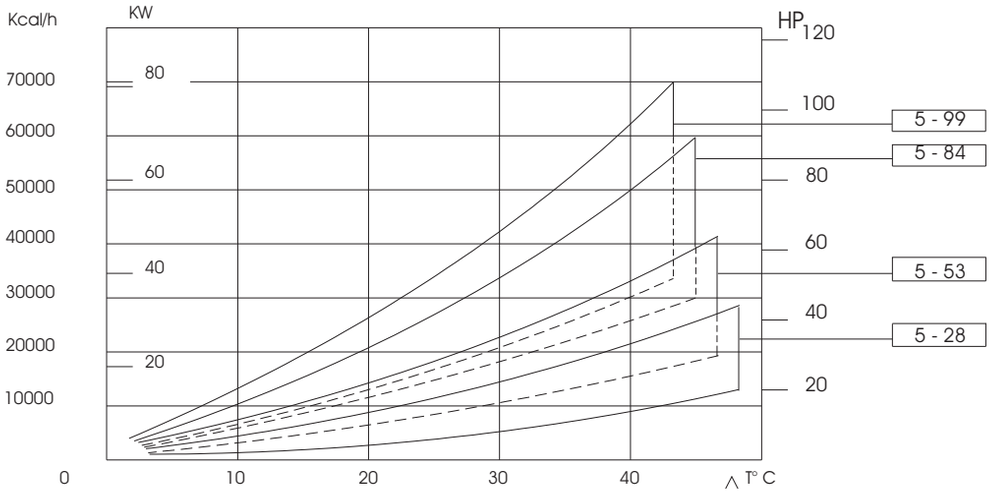


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

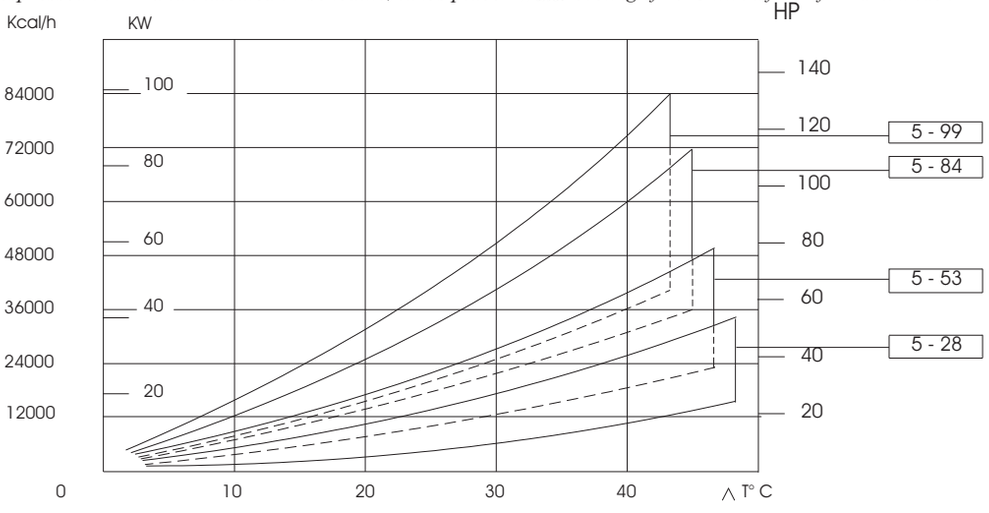
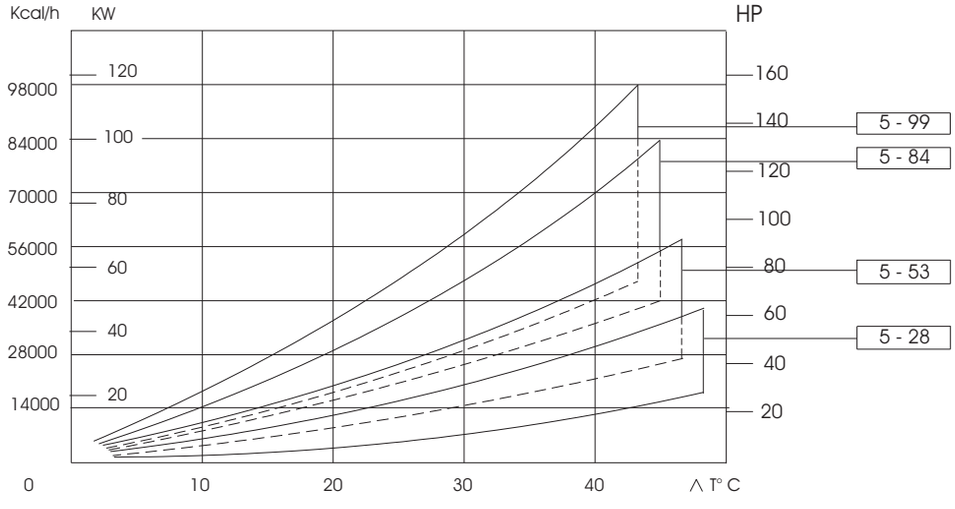


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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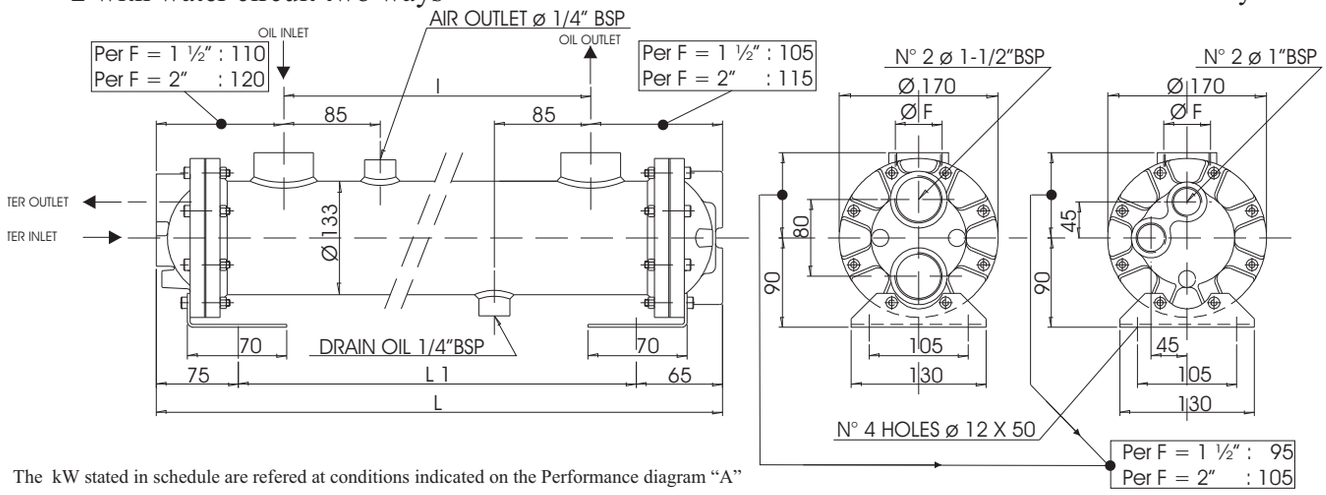
Water/oil coolers series CSW 6

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW6-28 - *	3.00	55 - 160	12 - 30	19.0	1-1/2"	285	500	360
CSW6-53 - *	5.00	80 - 230	19 - 52	26.0	1-1/2"	535	750	610
CSW6-54 - *	5.50	125 - 300	34 - 63	26.0	2"	520	755	615
CSW6-83 - *	8.00	180 - 420	56 - 94	36.0	2"	830	1065	925
CSW6-84 - *	7.50	110 - 270	40 - 71	36.0	1-1/2"	845	1060	920
CSW6-99 - *	9.00	130 - 310	51 - 97	40.0	1-1/2"	995	1210	1070
CSW6-113 - *	9.00	170 - 450	65 - 119	50.0	2"	1130	1365	1225
CSW6-114 - *	8.50	130 - 320	67 - 112	50.0	1-1/2"	1145	1360	1220

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram "A"

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	G25	NBR	CuDHP	C40	C37

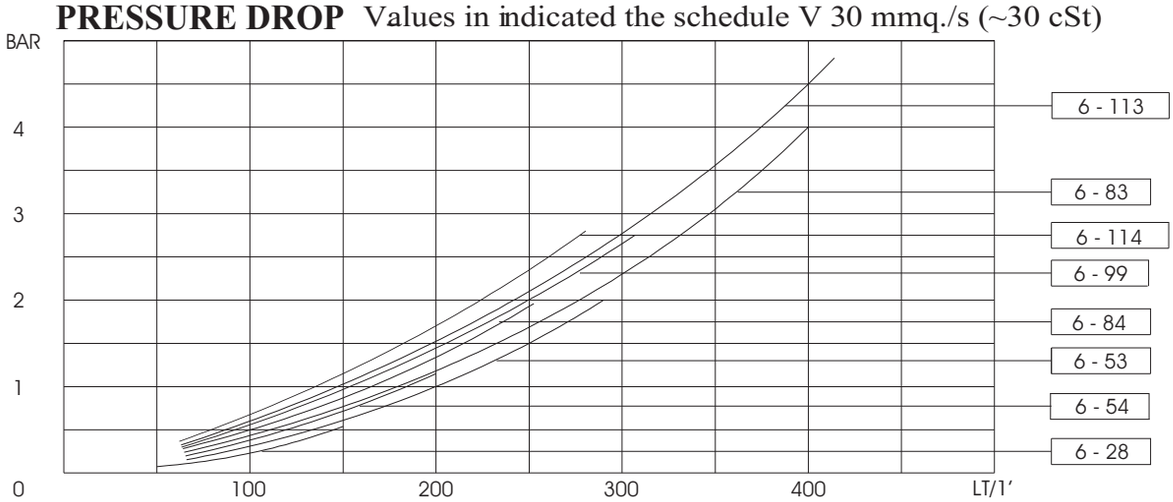
COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 6

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

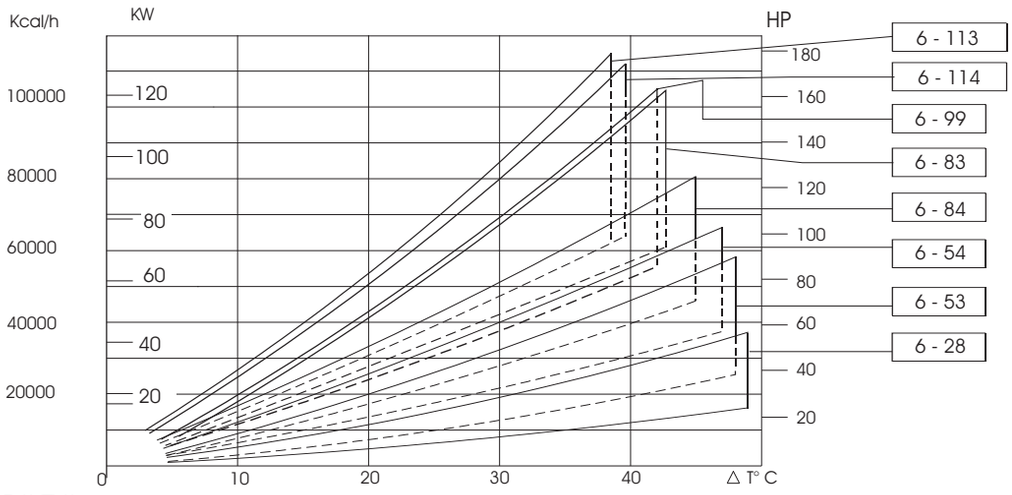


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

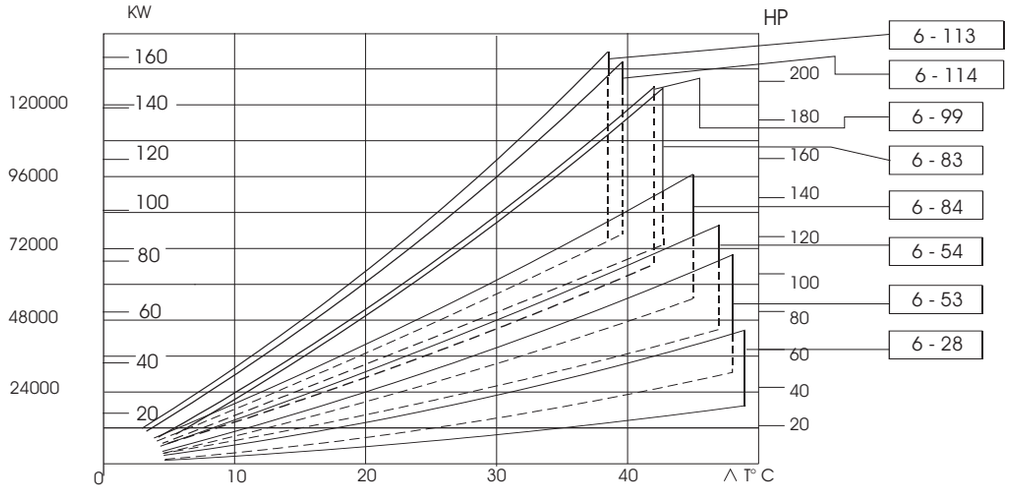
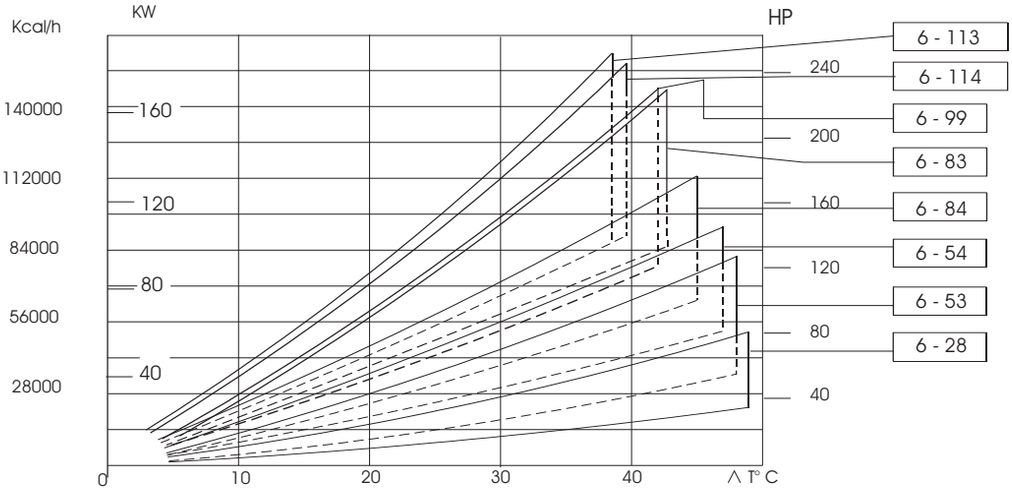


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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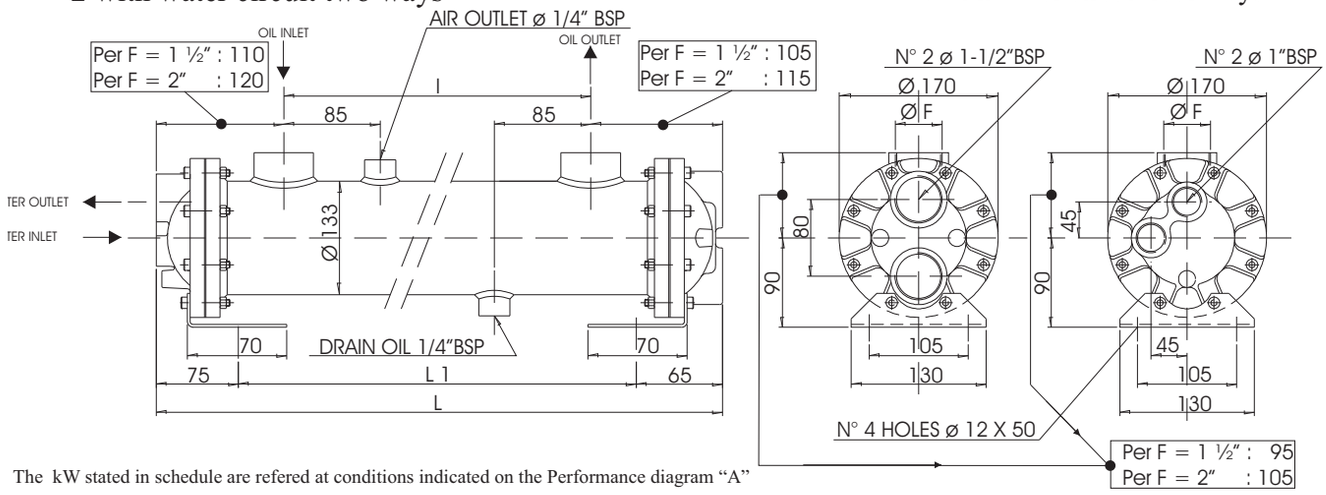
Water/oil coolers series CSW 6 -**-*-A

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW6-28 - * - A	3.00	55 - 160	12 - 30	19.0	1-1/2"	285	500	360
CSW6-53 - * - A	5.00	80 - 230	19 - 52	26.0	1-1/2"	535	750	610
CSW6-54 - * - A	5.00	125 - 300	34 - 63	26.0	2"	520	755	615
CSW6-83 - * - A	8.00	180 - 420	56 - 94	36.0	2"	830	1065	925
CSW6-84 - * - A	7.50	110 - 270	40 - 71	36.0	1-1/2"	845	1060	920
CSW6-99 - * - A	9.00	130 - 310	51 - 97	40.0	1-1/2"	995	1210	1070
CSW6-113 - * - A	9.00	170 - 450	65 - 119	50.0	2"	1130	1365	1225
CSW6-114 - * - A	8.50	130 - 320	67 - 112	50.0	1-1/2"	1145	1360	1220

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram "A"

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	G25	NBR	Aisi321	C40	C37

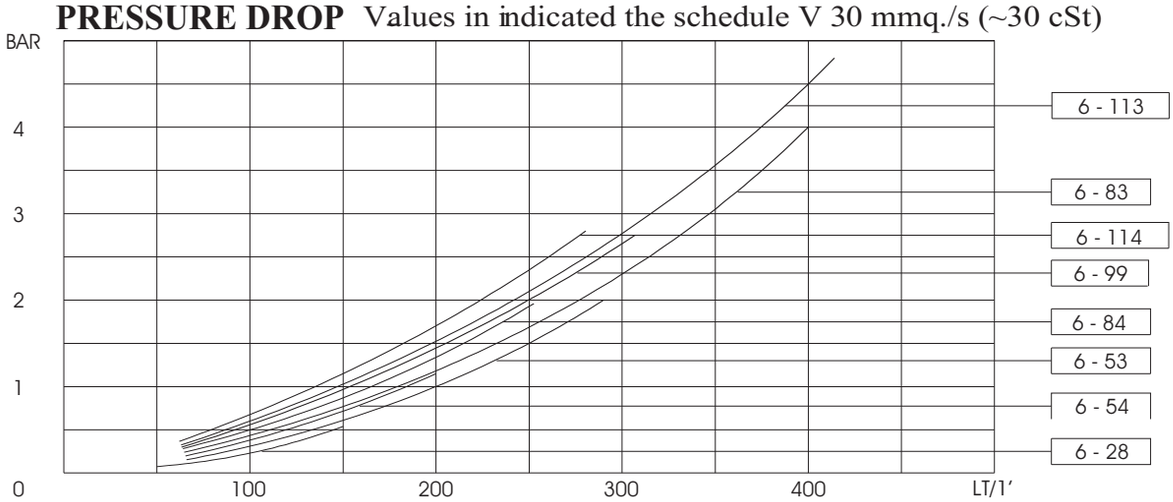
COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 6 -**-*-A

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

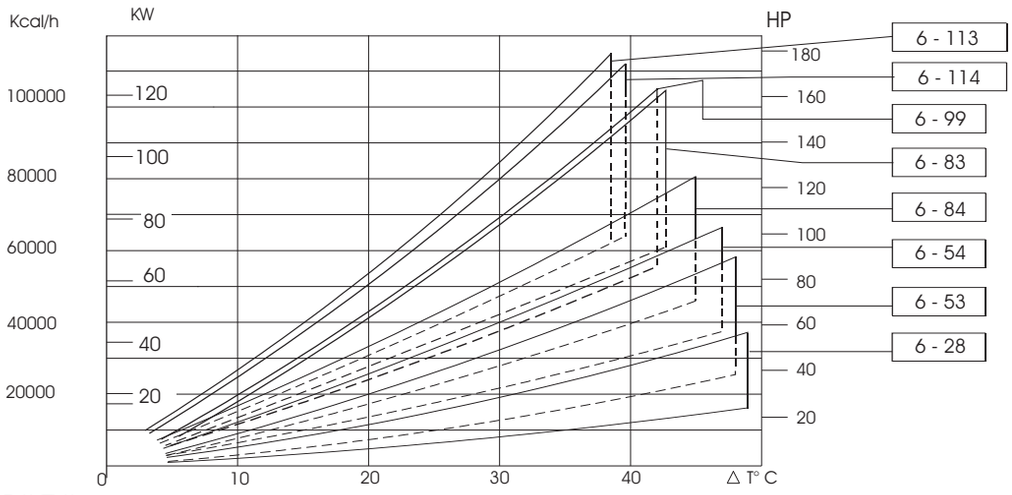


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

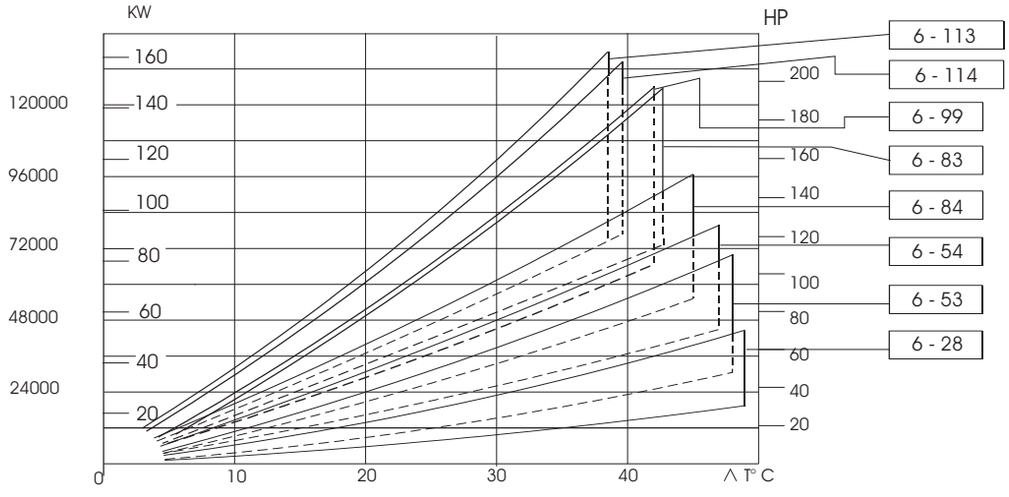
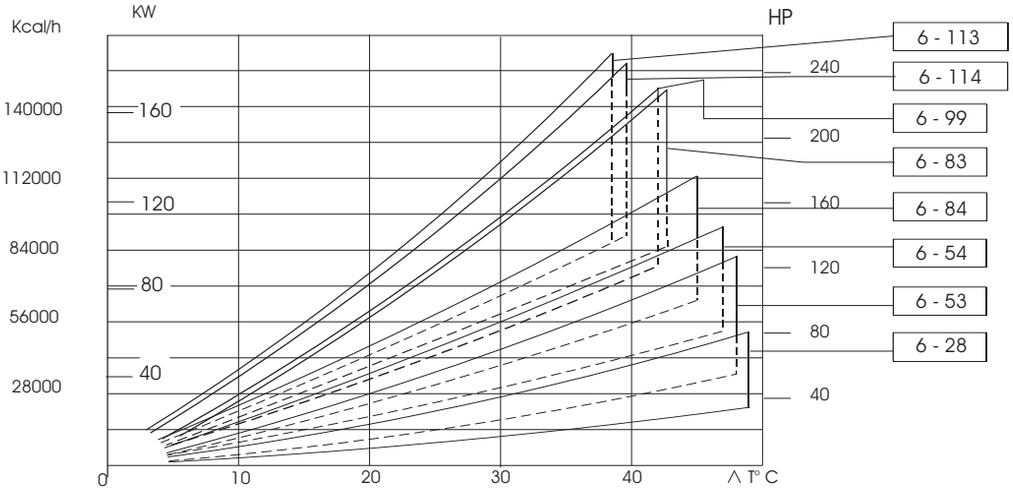


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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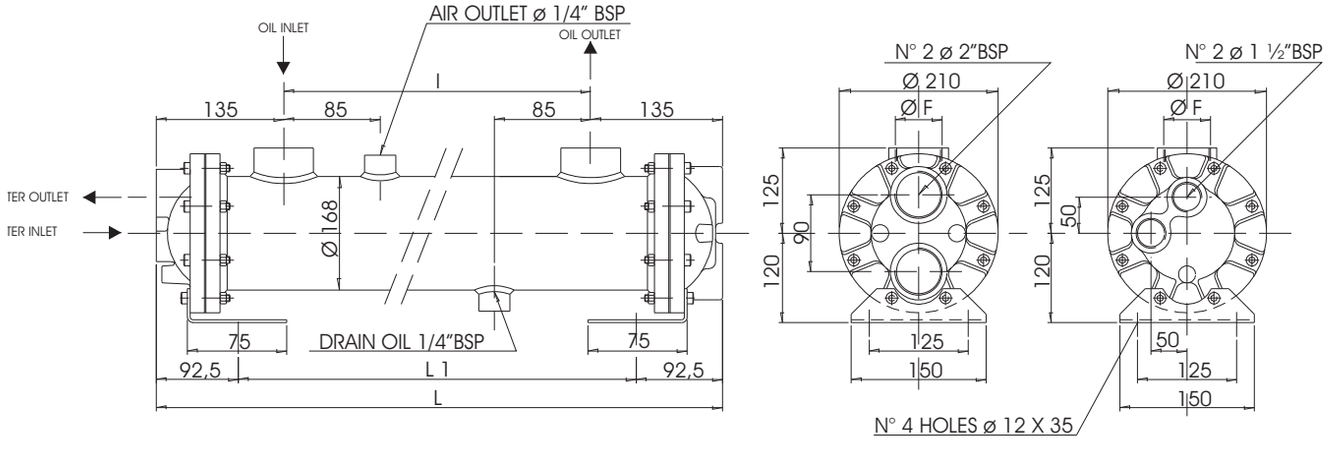
Water/oil coolers series CSW 7

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW7-47 - *	8.4	100 - 455	25 - 54	37.0	2”	470	740	555
CSW7-77 - *	12.7	125 - 525	34 - 80	45.0	2”	775	1045	860
CSW7-108 - *	16.9	155 - 570	42 - 108	55.0	2”	1080	1350	1165
CSW7-138 - *	22.0	155 - 570	56 - 130	60.0	2”	1385	1655	1470

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram “A”

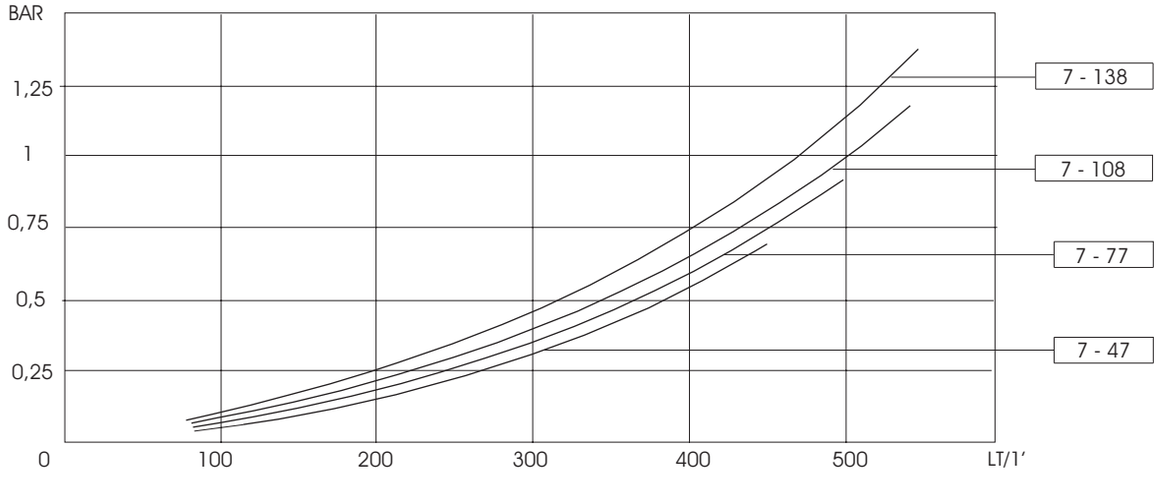
Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	G 25	NBR	CuDHP	C40	C37

COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20



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Performance Diagrams CSW 7

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

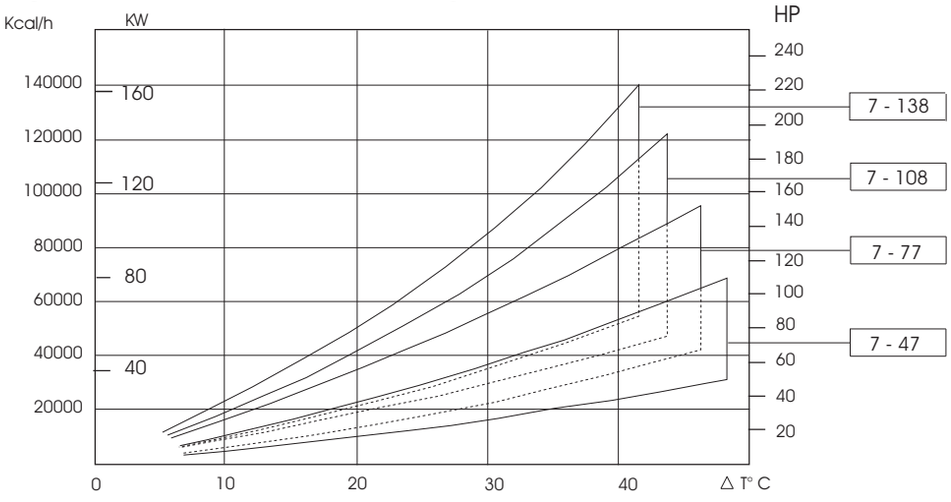


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

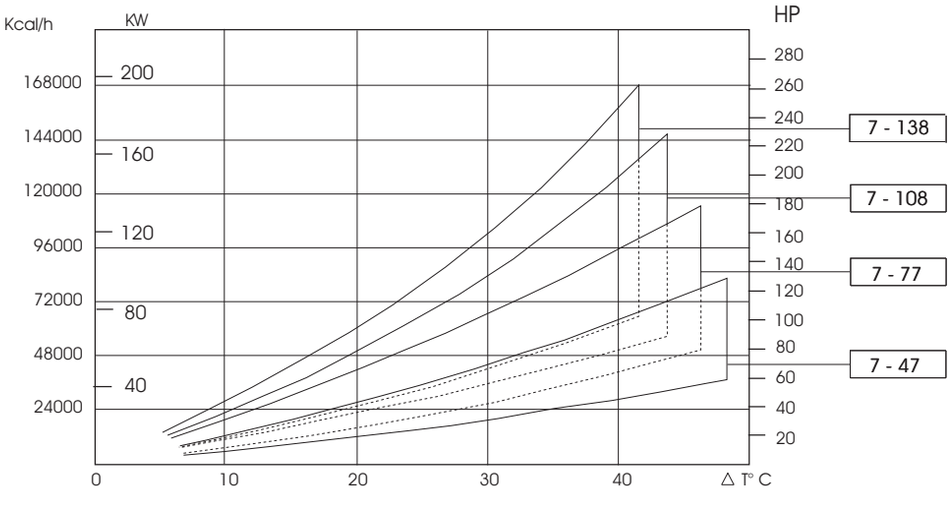
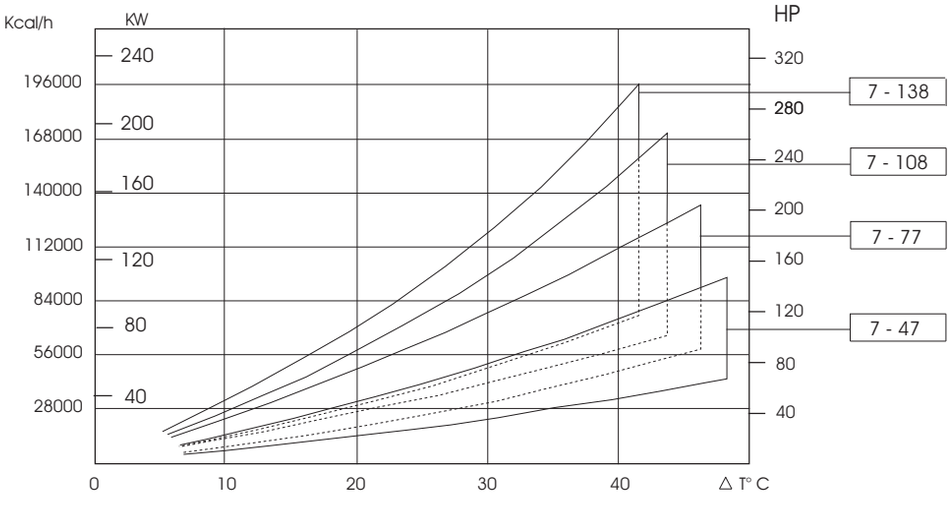


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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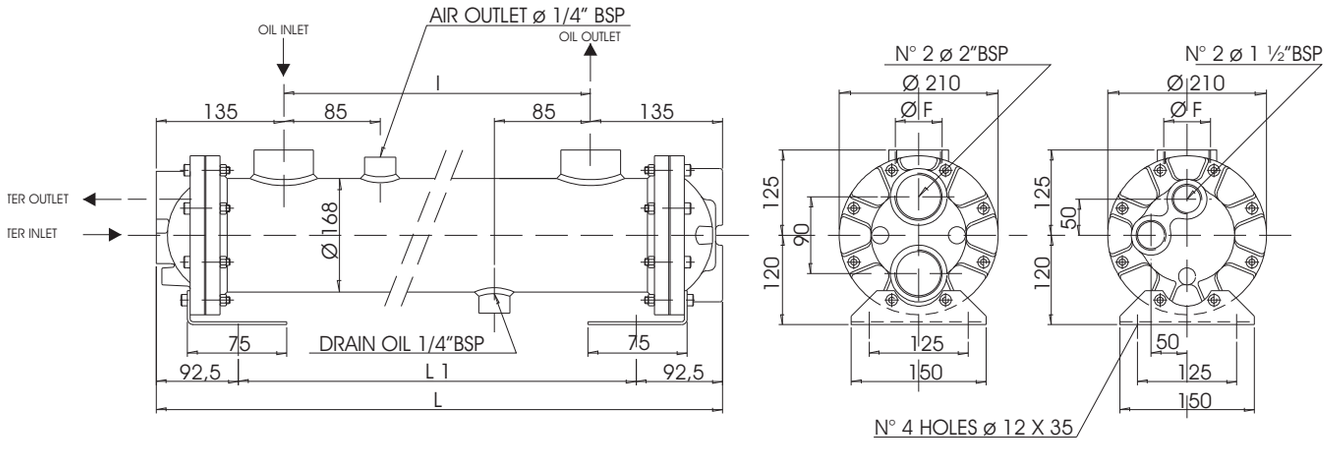
Water/oil coolers series CSW 7 -**-*-A

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW7-47 - * - A	8.4	100 - 455	25 - 54	37.0	2”	470	740	555
CSW7-77 - * - A	12.7	125 - 525	34 - 80	45.0	2”	775	1045	860
CSW7-108 - * - A	16.9	155 - 570	42 - 108	55.0	2”	1080	1350	1165
CSW7-138 - * - A	22.0	155 - 570	56 - 130	60.0	2”	1385	1655	1470

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram “A”

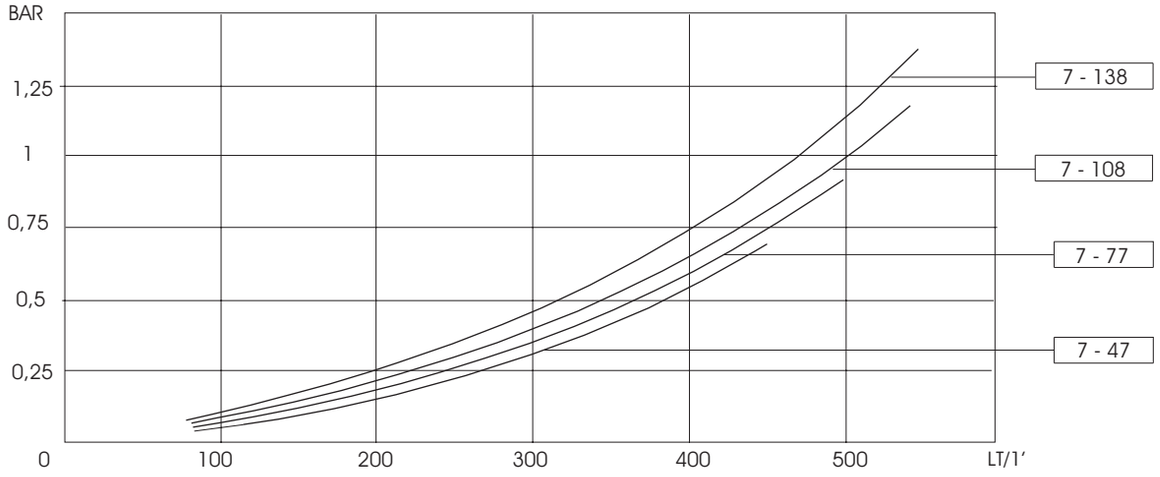
Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	G 25	NBR	Aisi321	C40	C37

COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20



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Performance Diagrams CSW 7 -**-*-A

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

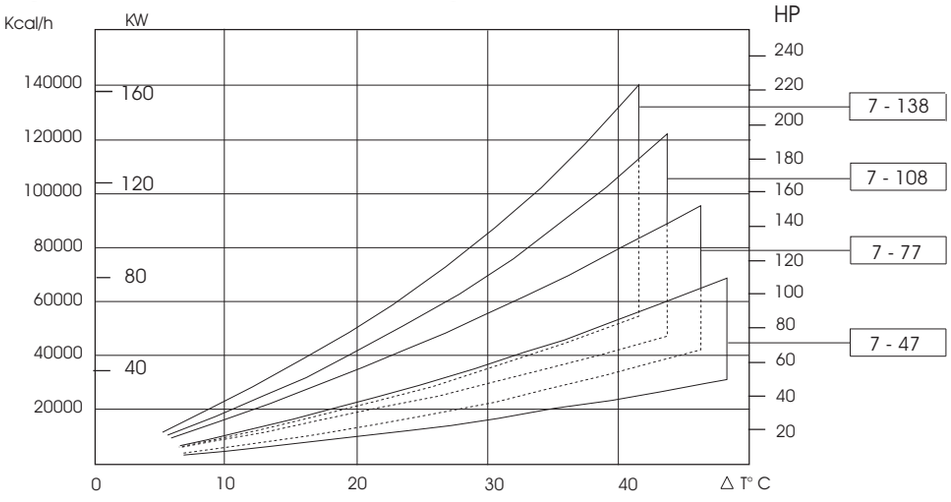


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

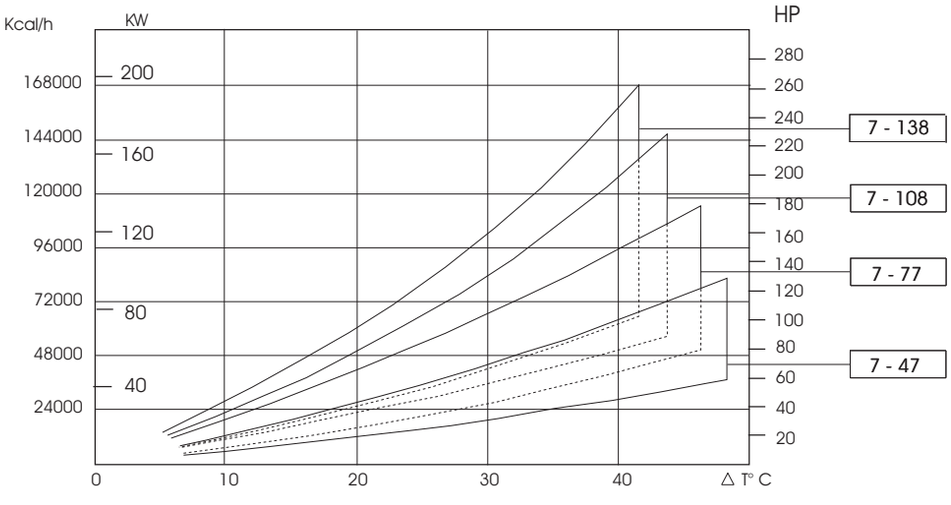
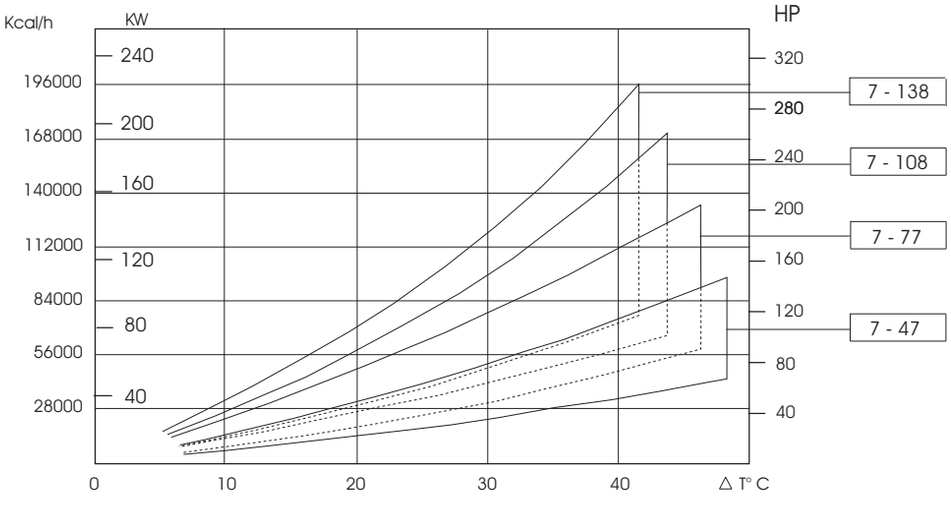


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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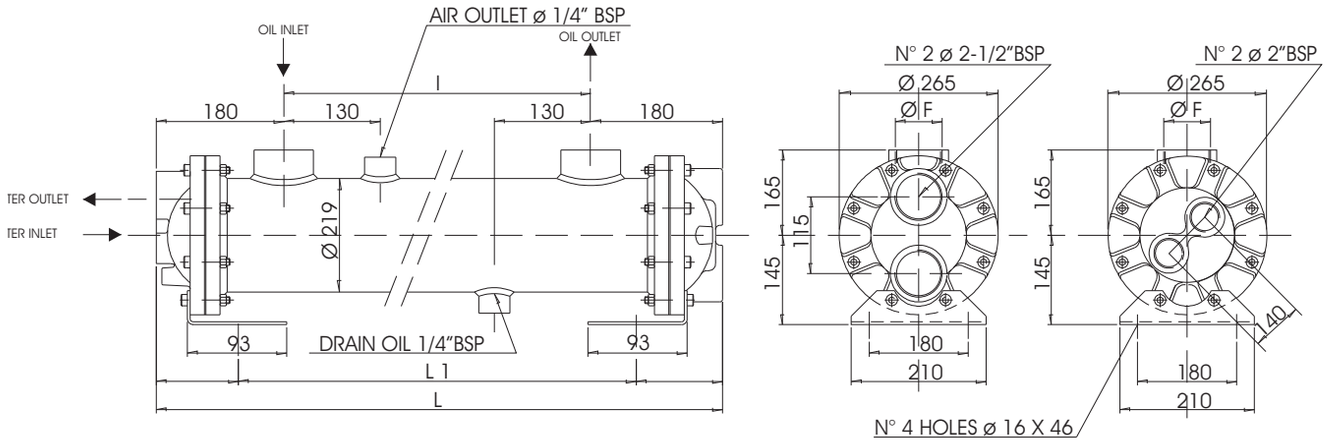
Water/oil coolers series CSW 8

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW8-74 - *	19.2	100 - 800	56 - 134	45.0	3”	740	1100	800
CSW8-104 - *	25.7	100 - 800	75 - 186	54.0	3”	1045	1405	1105
CSW8-135 - *	32.3	100 - 800	93 - 239	60.0	3”	1350	1710	1410
CSW8-165 - *	39.0	100 - 800	112 - 291	65.0	3”	1655	2015	1715

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram “A”

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	G 25	NBR	CuDHP	C40	C37

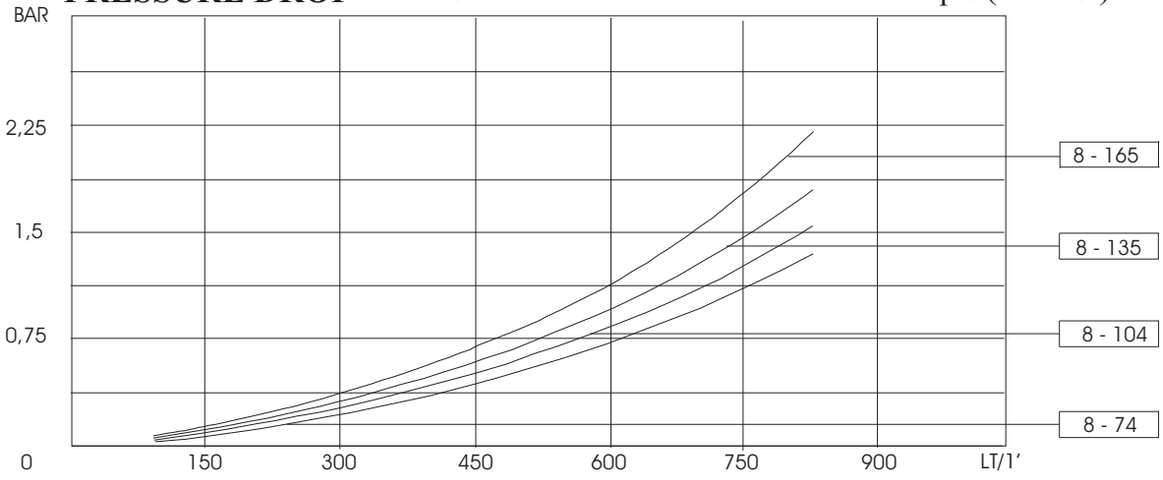
COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 8

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

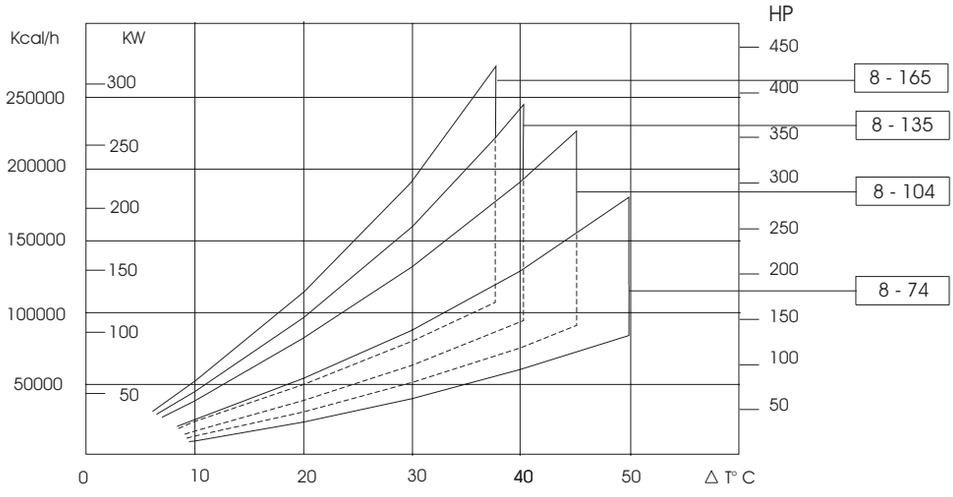


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

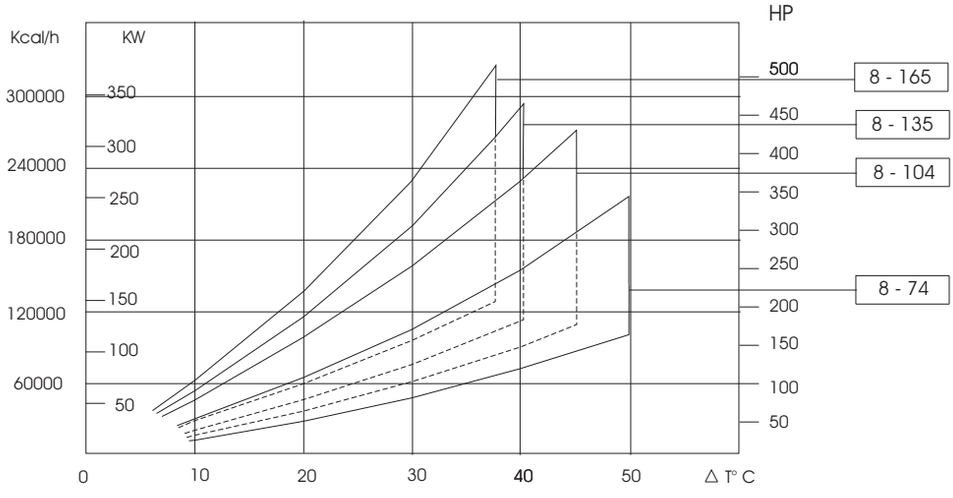
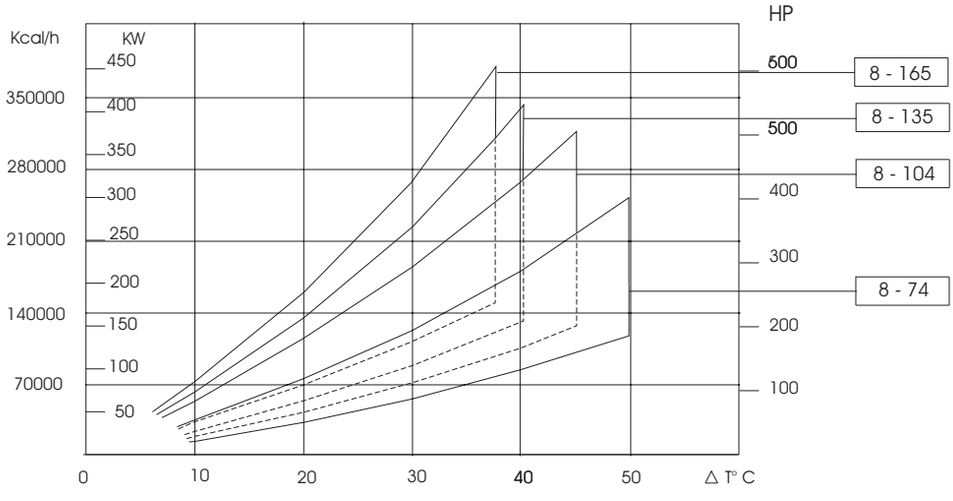


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reach es a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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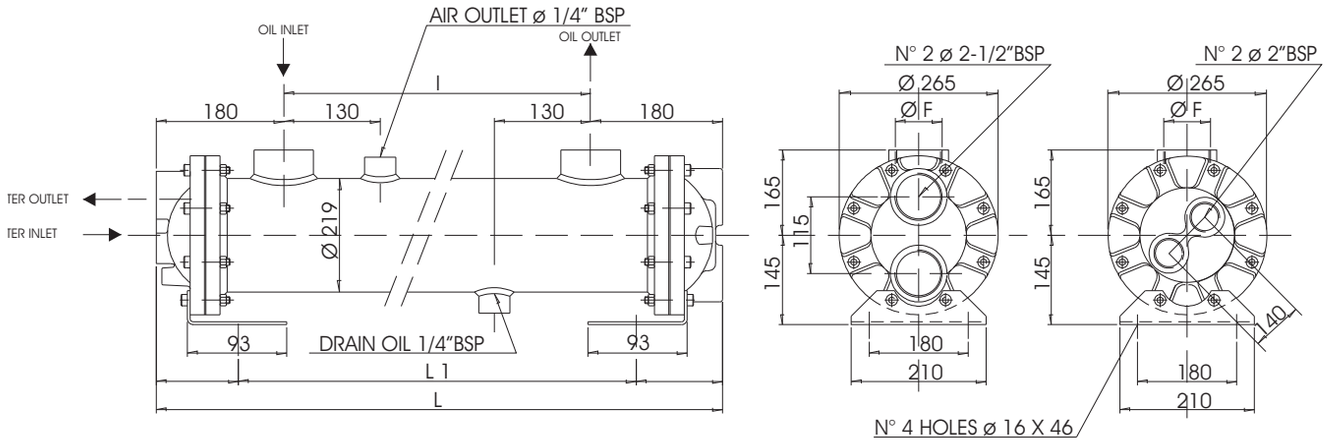
Water/oil coolers series CSW 8 -**-*-A

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW8-74 - * - A	19.2	100 - 800	56 - 134	45.0	3”	740	1100	800
CSW8-104 - * - A	25.7	100 - 800	75 - 186	54.0	3”	1045	1405	1105
CSW8-135 - * - A	32.3	100 - 800	93 - 239	60.0	3”	1350	1710	1410
CSW8-165 - * - A	39.0	100 - 800	112 - 291	65.0	3”	1655	2015	1715

* = 2 with water circuit two ways

* = 4 with water circuit four ways



The kW stated in schedule are refered at conditions indicated on the Performance diagram “A”

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	Fe 510.2	G 25	NBR	Aisi321	C40	C37

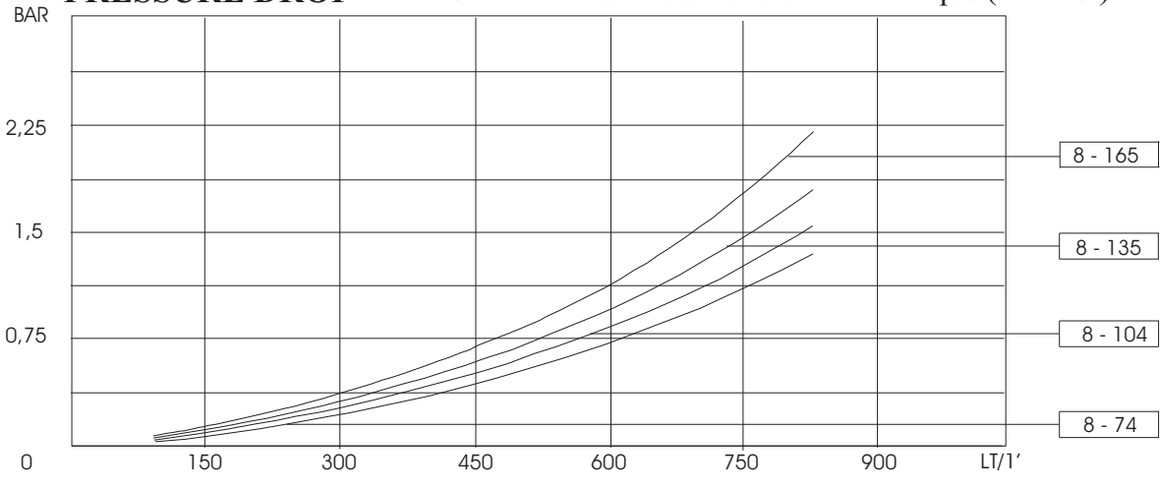
COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP Values in indicated the schedule V 30 mmq./s (~30 cSt)



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Performance Diagrams CSW 8 -**-*-A

DIAGRAM " A " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 1 Lt/min. each HP to be dissipated .

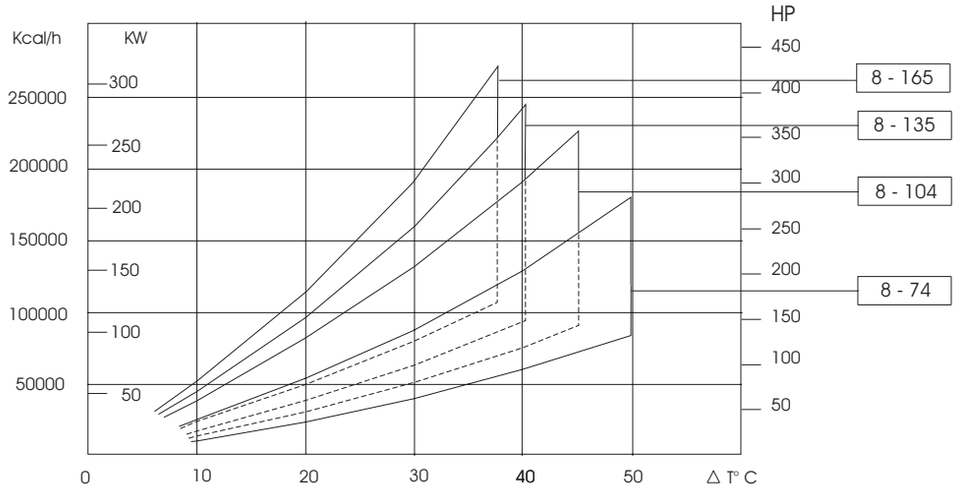


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

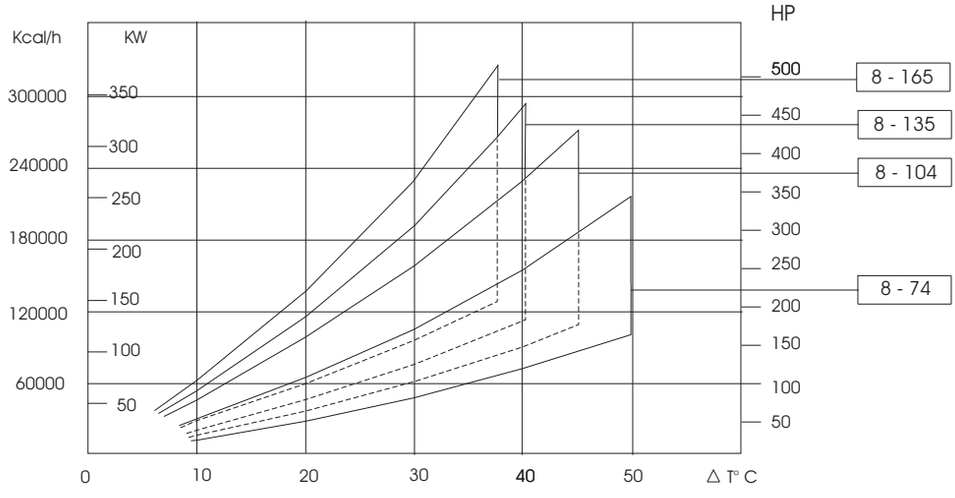
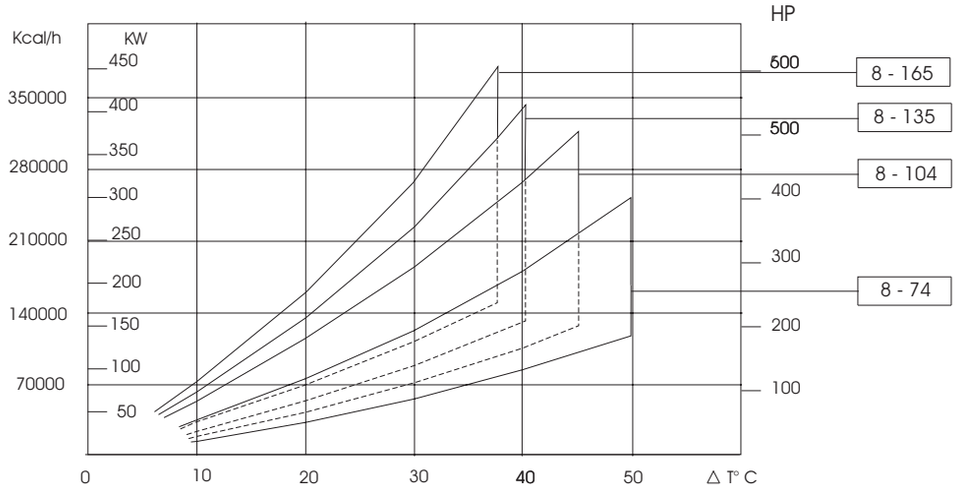


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reach es a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated



CORRECTION FACTOR TEMP °C with oil at 55° C

Water temp	20° C	25° C	30° C	35° C
Correction factor	1	0,88	0,75	0,65

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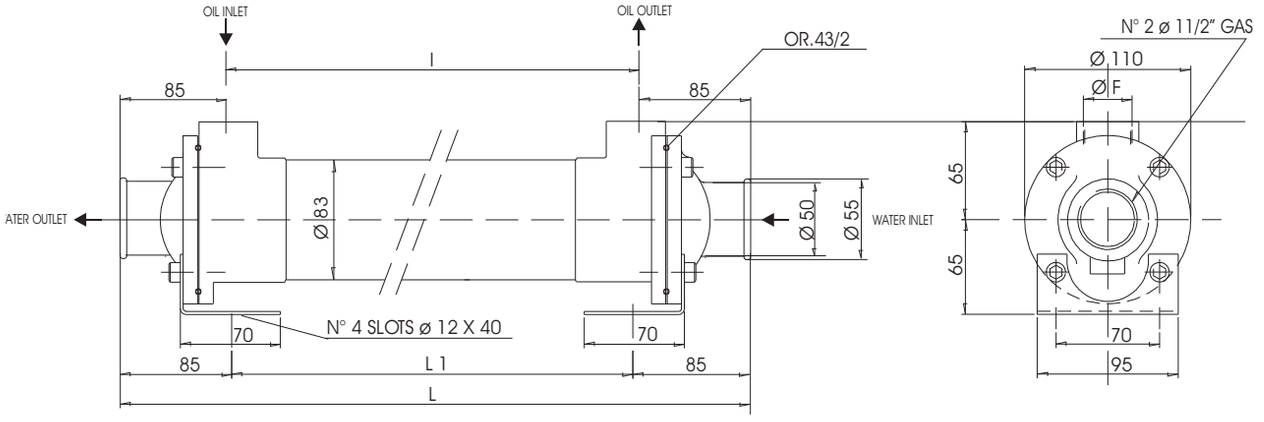
Water/oil coolers series CSW 3 SW

Code	Capacity .	Oil flow (L/min)	kW Dissipated (With oil 55 °C and H_2O 20 °C)	Weigth	Over all dimensions F	I	L	L1
CSW3 - 15 - 1	0.70	20 - 70	3 - 7	6.5	1"	150	325	135
CSW3 - 31 - 1	1.20	30 - 90	6 - 12	8.0	1"	310	485	295
CSW3 - 38 - 1	1.40	30 - 90	7 - 15	8.5	1"	385	560	370
CSW3 - 56 - 1	2.00	30 - 90	9 - 17	10.3	1"	560	735	545
CSW3 - 71 - 1	2.45	40 - 130	12 - 23	11.0	1"	715	890	700
CSW3 - 87 - 1	2.80	50 - 140	15 - 27	13.0	1"	870	1045	855



The kW stated in schedule are refered at conditions indicated on the Performance diagram "A"

Code	Shell	Covers	Seals	Pipes	Tubing plate	Deflector baffles
All	OT 58	OT 58	NBR	Cu Ni 90/10	OT 58	C37

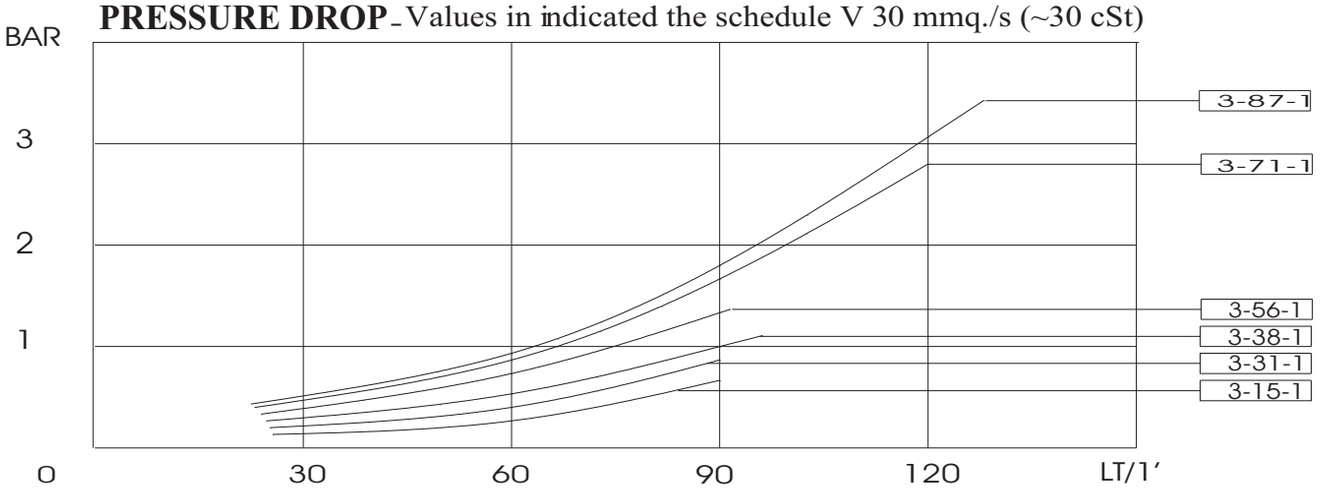
COOLERS TECHNICAL DATA

Max Working Pressure	: 12 bar
Test Pressure	: 18 bar
Max Working Temperature	:+ 99° C

CORRECTION FACTOR (C) - PRESSURE DROP

CSt	10	15	20	30	40	50	60	80	100	200	300
C	0,50	0,65	0,75	1,00	1,20	1,40	1,60	1,90	2,10	3,10	4,20

PRESSURE DROP - Values in indicated the schedule V 30 mmq./s (~30 cSt)



Technical characteristic herein mentioned are not binding and it can be modified from CIESSE without any notice.

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Performance Diagrams CSW 3 SW

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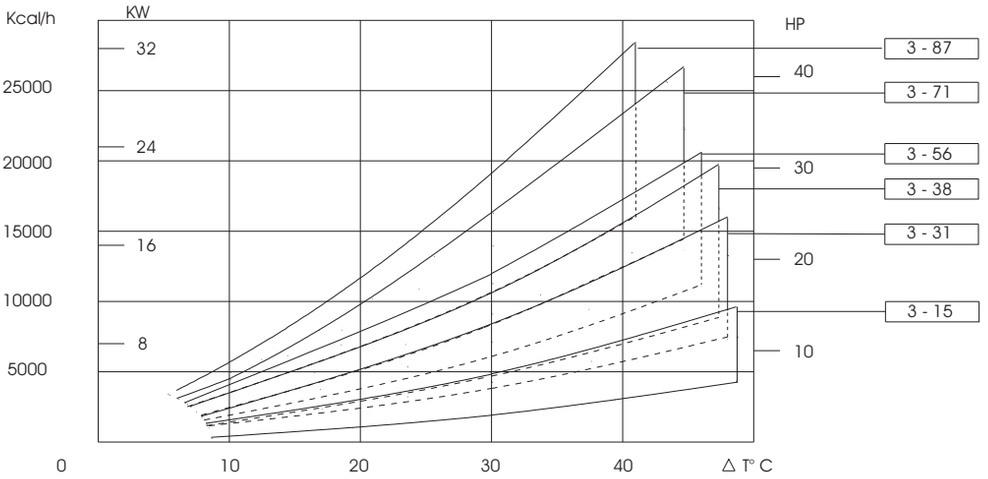


DIAGRAM " B " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 2 Lt/min. each HP to be dissipated .

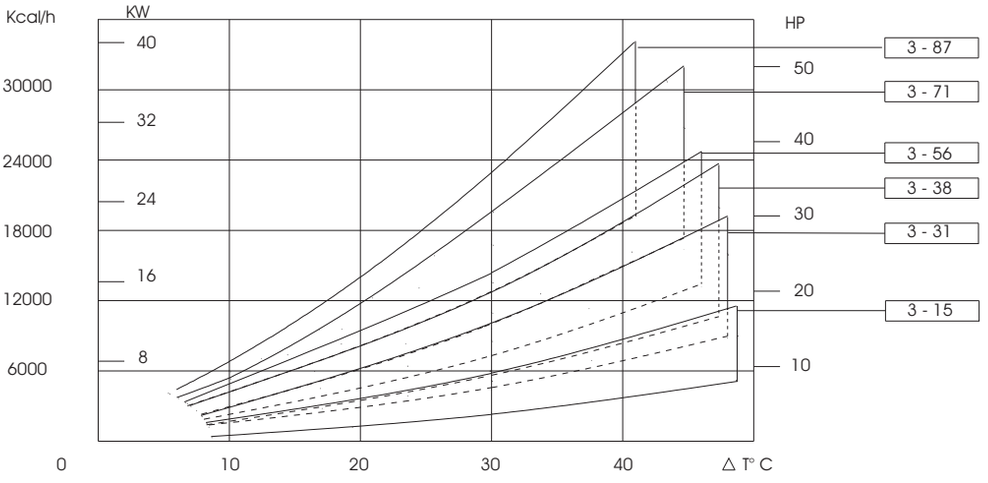
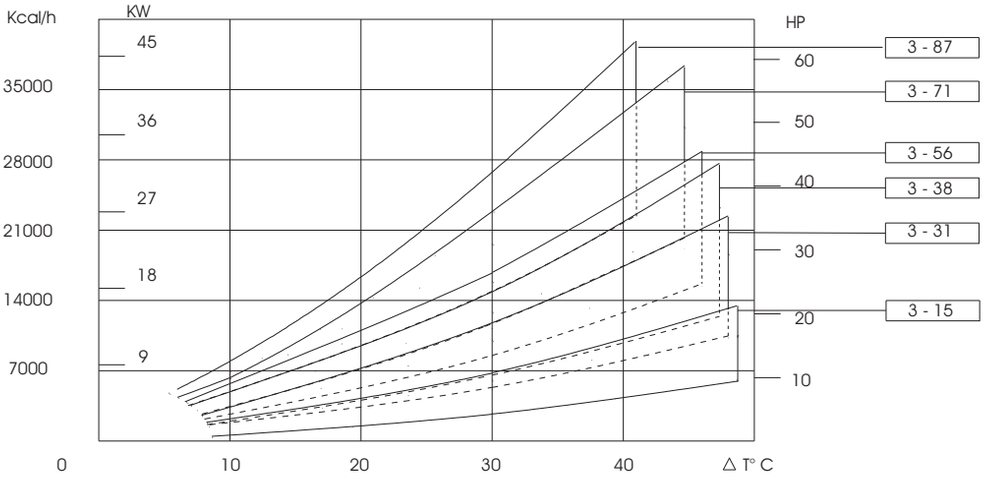


DIAGRAM " C " *Water circuit cooler 4 ways*
The dissipation, espressed in HP and indicated in schedule, takes place when:
Oil inlet reaches a temperature of 55°C and a viscosity of 30 cSt.
Water cooling of 20°C with a flow of 3 Lt/min. each HP to be dissipated .



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SCAMBIATORI A FASCIO TUBIERO CIESSE SRL

INSTALLAZIONE

1. In fase di montaggio dello scambiatore lasciare gli opportuni spazi nelle sedi in cui esso andrà collocato di modo da rendere possibile la sua apertura e l'ispezione delle parti interne periodica atta a garantire la sua pulizia e il mantenimento delle caratteristiche ottimali per il suo buon funzionamento;
2. Per rendere le operazioni di manutenzione più facili e veloci dotare l'impianto di valvole di esclusione in modo da poter rendere possibile l'isolamento dello stesso e la sua successiva apertura senza causare la dispersione dei fluidi in esso passanti;
3. Posizionare tutti i trasduttori di temperatura e pressione per la misurazione delle condizioni dei fluidi all'interno del fascio il più vicino possibile al fascio stesso, e dotare lo stesso delle necessarie valvole di spurgo di modo da garantire l'evacuazione di vapori e gas presenti all'interno dei tubi, che pregiudicherebbero il rendimento termico dello stesso;
4. È opportuno che nell'impianto vi siano montate anche delle sonde per visualizzare i livelli dei fluidi in modo che sia possibile identificare al più presto l'insorgenza di piccole o grandi perdite, prima che quest'ultime possano provcare qualche danno allo scambiatore;
5. Le valvole di spurgo non devono essere collegate a manicotti in modo da poter sempreavere sotto controllo il corretto spurgo dello scambiatore.

MESSA IN ESERCIZIO

1. A causa della possibile presenza di fluidi pericolosi è bene prima di procedere all'installazione vestirsi con abiti di sicurezza adeguati, di modo da garantire la protezione delle mani e degli occhi da possibili infortuni;
2. Nella fase di apertura dell'imballo valutare visivamente la presenza di eventuali danni causati dal trasporto; nel caso risultassero grossi ed evidenti evitare il montaggio e avvertire il corriere immediatamente!
3. Se la messa in esercizio non fosse immediata conservare lo scambiatore in luogo preferibilmente riscaldata; se lo stoccaggio in magazzino fosse molto prolungato (un periodo superiore a 45gg), risulta consigliabile in primo luogo una particolare cura del sito in cui lo scambiatore verrà conservato ed in fase di installazione un'accurata ispezione per valutare se lo stoccaggio prolungato ha provocato danni;
4. L'installazione deve essere fatta con cura di modo che le connessioni con le bocche dei fluidi sia effettuata senza nessuna forzatura;
5. Il collegamento dei raccordi dei fluidi (olio, acqua o altro) deve essere effettuato di modo da garantire la corretta espulsione dell'aria in essi contenuta con la normale circolazione dei fluidi durante il funzionamento regolare dello scambiatore. Ciò significa che preferibilmente lo scambiatore andrà montato orizzontalmente, l'acqua o il fluido utilizzato per raffreddare il fluido caldo dovrà entrare nel raccordo posto più in basso mentre i raccordi da cui entrerà il fluido da raffreddare (negli impianti oleodinamici si tratterà di olio ISOVG) devono essere rivolti verso l'alto. Nulla vieta comunque di installare lo scambiatore in posizione verticale, ed in tale situazione si consiglia di collocare gli ingressi dell'acqua nella parte superiore, e di far entrare il fluido caldo nel raccordo posto più in basso. Si può vedere qui a lato come debbano essere collegati i condotti di ingresso e di uscita dei fluidi al variare del montaggio dello scambiatore (Vd **figura1** e **figura2**), mentre nella terza immagine viene mostrato ciò che l'operatore può trovarsi una volta smontato uno dei fondi previo svitaggio dei bulloni di fissaggio; tale apertura viene effettuata periodicamente per l'eventuale pulizia dei tubi! (Vd **figura3**);
6. È buona norma comunque prima del montaggio dei manicotti rimouvere tutti i supporti ed i tappi montati per la corretta conservazione in magazzino.

Figura 3.

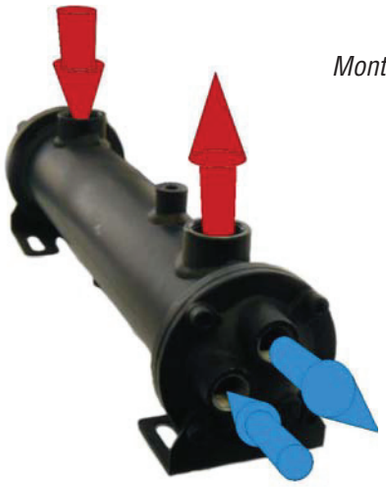

Figura 1
Montaggio orizzontale

Figura 2
Montaggio verticale

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SCAMBIATORI A FASCIO TUBIERO CIESSE SRL

FUNZIONAMENTO

1. Prima della messa in esercizio dello scambiatore è bene assicurarsi circa la pulizia di tutto l'impianto, preoccupandosi di aprire le opportune valvole di sfiato. È inoltre consigliabile che l'impianto a cui lo scambiaotore viene collegato sia dotato di valvole di bypass che garantiscono il non superamento delle pressioni di esercizio per cui lo scambiatore è stato progettato. I nostri scambiatori sono in grado di lavorare senza problemi fino a valori di pressione di esercizio non superiore a 12 bar, seppur siano collaudati con una pressione massima di 18 bar!
2. È inoltre consigliabile non porre in esercizio lo scambiatore facendo raggiungere all'impianto le condizioni di regime troppo repentinamente. Risulta preferibile un avvio che porti al raggiungimento di tali condizioni in maniera graduale!
3. La presenza di spurghi di liquido che fuoriescono dallo scambiatore devono essere asciugati per evitare che il liquido si accumuli al di sotto dello scambiatore rendendo l'ambiente scivoloso e favorendo il deposito e la corrosione del pezzo;
4. È da evitarsi la presenza di pressioni pulsanti nell'impianto che alimenta lo scambiatore; queste favorirebbero un aumento dell'usura del fascio riducendone in modo sensibile la vita utile.
5. È inoltre consigliabile la valutazione della portata effettivamente fluente nello scambiatore. Negli impianti Acqua-Olio si può valutare approssimativamente la portata dell'acqua semplicemente andando a valutare il salto termico che essa subisce nel passaggio al suo interno. Per temperature di ingresso pari a circa 15÷20 °C il salto termico ottimale è di 9÷10 °C mentre per temperature superiori tale salto può ridursi, sempre però mantenendosi superiore a 3÷4 °C. Per evitare l'eccessivo sedimentarsi del calcare presente nell'acqua, è bene evitare l'utilizzo di acque entranti con temperature maggiori di 45°C.

MANUTENZIONE

1. Prima di effettuare ogni tipo di manutenzione assicurarsi che lo scambiatore sia isolato dal circuito e che in esso non vi sia più presenza di fluidi in pressione! In presenza di fluidi in pressione non procedere assolutamente allo smontaggio di nessuna parte dello scambiatore!
2. La frequenza delle opere di manutenzione e pulizia deve essere tanto maggiore quanto le caratteristiche dei fluidi che in esso fluiscono impongono. In presenza di acque di raffreddamento particolarmente dure o sporche, è bene evitare di far passare troppo tempo fra una pulizia e l'altra, visto che il depositarsi di materiale all'interno dei tubi pregiudica fortemente l'efficienza dello scambiatore e può risultare sempre più difficile da eliminare con il passare del tempo.
3. Effetti limite di una non sufficiente opera di pulizia può tradursi nell'otturazione di uno o più passaggi, che comportano non solo il surriscaldamento eccessivo delle parti otturate e la presenza di sovra portate nei tubi rimasti aperti, con progressivo danneggiamento dello scambiatore.
4. **Pulizia del lato olio (o della parte in cui scorre il fluido caldo):** la pulizia di tale parte dello scambiatore rende necessario il suo smontaggio, tramite rimozione dei coperchi. Seguire le indicazioni del punto1! La pulizia è fattibile utilizzando appositi prodotti detergenti, da rimuovere una volta conclusa la pulizia del mantello con l'utilizzo di acqua pulita, preferibilmente calda.
5. **Pulizia del lato acqua (o della parte in cui scorre il fluido freddo):** La frequenza con la quale questa pulizia viene effettuata deve essere maggiore rispetto a quella del punto precedente, visto che l'otturamento di uno o più passaggi causati dal calcare presente nell'acqua può comportare la necessità di sostituire tutto lo scambiatore. In presenza di residui di calcare procedere alla plizia facendo fluire nei tubi una soluzione anticalcare (in mancanza una soluzione di acqua a cido cloridrico può risultare idonea) facendola fluire nel verso opposto a quello in cui il fluido fluisce nell'impianto. Una volta liberati i tubi da residui di calcare, pulirli dal prodotto utilizzato facendo fluire acqua per qualche minuto, preferibilmente calda! In presenza di residui dovuti a fango o impurità contenute nell'acqua è consigliabile l'utilizzo di uno scovolino per la loro totale rimozione (Si veda a riguardo figura 3, in cui è possibile osservare lo scambiatore smontato).

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CIESSE SRL SHELL AND TUBE HEAT EXCHANGERS

INSTALLATION

1. When assembling the exchanger, leave enough space in the area where it will be installed so it can be opened and routinely inspected for cleaning and maintenance, to ensure it is kept in good working order.
2. For quicker and easier maintenance, assemble safety valves on the exchanger to isolate and open it without causing the dispersion of fluids wich flow inside.
3. Position all temperature and pressure transducers for measuring fluid conditions inside the tube bundle as close as possible to the bundle itself, and assemble bleeder valves to ensure that vapours and gas inside the tubes, wich would affect thermal efficiency, can escape.
4. We also reccomend assembling probes in the exchanger to display fluid levels. This ensures that any small or major leaks can be detected as soon as possible, before major leaks cause any damage tothe exchanger.
5. The bleeder valves must not be connected to couplings so that bleeding of the exchanger can be controlled at all times.

START-UP

1. As hazardous fluid may be present, we recommend wearing suitable safety clothing before proceeding with installation, to protect the hands and eyes from any injuries.
2. When opening the packaging, inspect the contents for any damage caused during transit. If major and evident damage is detected, do not assemble the exchanger and inform the trasport company immediately.
3. If the exchanger is not being put into operation straightaway, store, preferably in a heated place. If the exchanger is stored for a very long period (more than 45 days), the storage area should be carefully monitored and the exchanger fully inspect during installation to check whether prolonged storage has caused any damage.
4. The exchanger must be installed taking care tahe connections with the fluid inlets are made without any force.
5. The couplings for fluids (oil, water or other fluids) must be connected so thet the air inside is expelled when fluids circulate during normal operation of the exchanger. This means the exchanger should preferably be assembled in a horizontal position. The water or fluid used to cool the hot fluid should flow into the coupling placed lowest down, while couplings from wich cooling fluid flows (ISO VG oil in the case of hydraulic fluid systems) must face upwards. It is possible however to install the exchanger in a vertical position and in this case it is advisable to place the water inlets in the top part and have hot fluid flowing into the coupling in the bottom part. looking at the **picture 1** and **2** it's clear how the connection of hot and cold fluid has to be done, according to the vertical or horizontal assembly of heat exchanger! In the **picture 3** it is shown what there is under the cover; the removal of this one it's necessary in order to make the periodic cleaning of tubes.
6. In any case, we recommend removing all supports and caps used during storage, before assembling the couplings.

Picture 3.

Picture 1
Horizontal assembly

Picture 2
Vertical assembly

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CIESSE SRL SHELL AND TUBE HEAT EXCHANGERS

OPERATION

1. Before starting uo the exchanger, make sure the entire plants is clean and open the air valves. We also recommend that the plant, wich the exchanger is connected to, has bypass valves to prevent exchanger operating pressure being exceeded. Our exchangers can operate without problems up to operating pressure of 12 bar, even though they are tested applaying a maximum pressure of 18 bar.
2. We also reccomend that the exchanger is not used in normal operating conditions too suddenly. It is best to start up the exchanger and reach normal operating conditions gradually.
3. Any liquid bled from the exchanger must be dried to prevent it accumulating below he exchanger, making the area slippery, and to prevent any deposits on and corrosion of equipment.
4. Pulsating pressures in the system powering the exchanger should be avoid as they increase the wear of the tube and considerably reduce its operting life.
5. We also recommend evaluating the actual flow rate in the exchanger. In Water-Oil systems, the water flow rate can be approximately evaluated by simply checking the termal head inside the exchanger. The optimal termal head, for inlet temperatures of approximately 15÷20 °C , is 9÷10 °C, while this value may drop for higher temperature thoug it will remain at around 3÷4 °C. To avoid the excessive sedimentation of limestone in water, the temperature of water flowing into the exchanger should not be higher than 45°C.

MAINTENANCE

1. before carrying out any maintenace, make sure the exchanger is isolated from the circuit and contains no pressurised fluids. If pressurised fluids are present, do not disassemble any part of the exchanger.
2. The frequency of maintenace and cleaning will depend on the properties of the fluids used. In the case of particularly hard or dirty cooling water, cleaning should be carried out regularly, as material deposited inside the tubes greatly affects exchanger efficiency and may be harder to eliminate as time goes by.
3. Insufficient cleaning may cause a blockage in one or more passages in the exchanger. This in turn overheats blocked parts and causes excessively high flow rates in tubes which are still clear, gradually damaging the exchanger.
4. **Cleaning the oil side (or side where hot fluids flows):** this part of the exchanger has to be disassembled for cleaning by removing the covers. Follow the instructions in point 1. Suitable detergents can be used and should be removed, after cleaning the shell, with clean - and preferably hot - water.
5. **Cleaning the water side (or side where cold fluids flows):** The water side should be cleaned more often than the oil side, as the blockage of one or more passages caused by limestone in water could require replacement of the exchanger. If liestone residues are present, clean by circulating a descaler in the tubes (or use a solution of water and hydrocloric acid instead), in the opposite direction to fluid flow in the system. After limestone residues hsve benn removed from all tubes, clean circulating water - which is prefrably hot - for a few minutes. We recommend using a pig to remove any residues from mud or impurities. (See the **picture 3**!).

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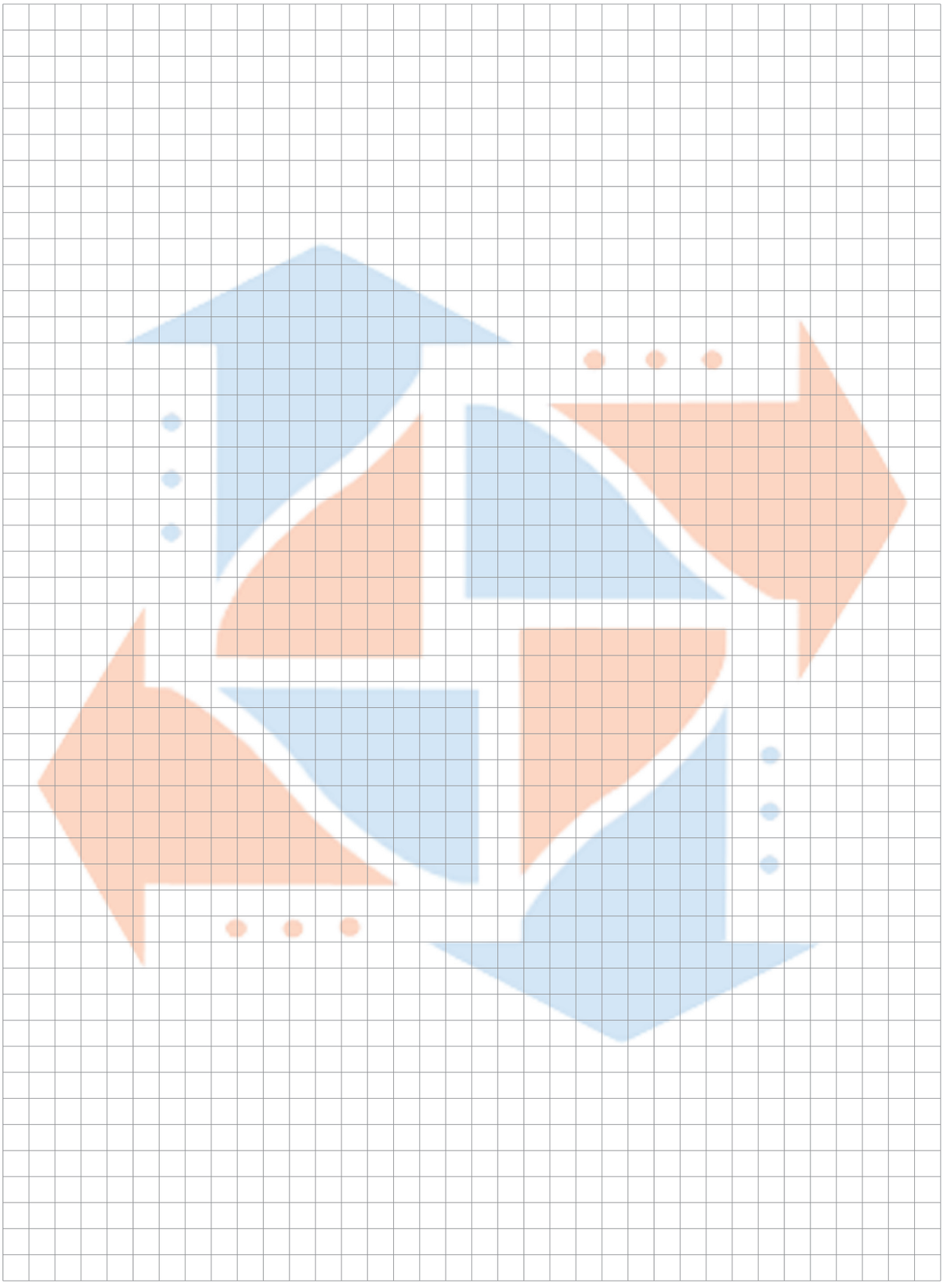

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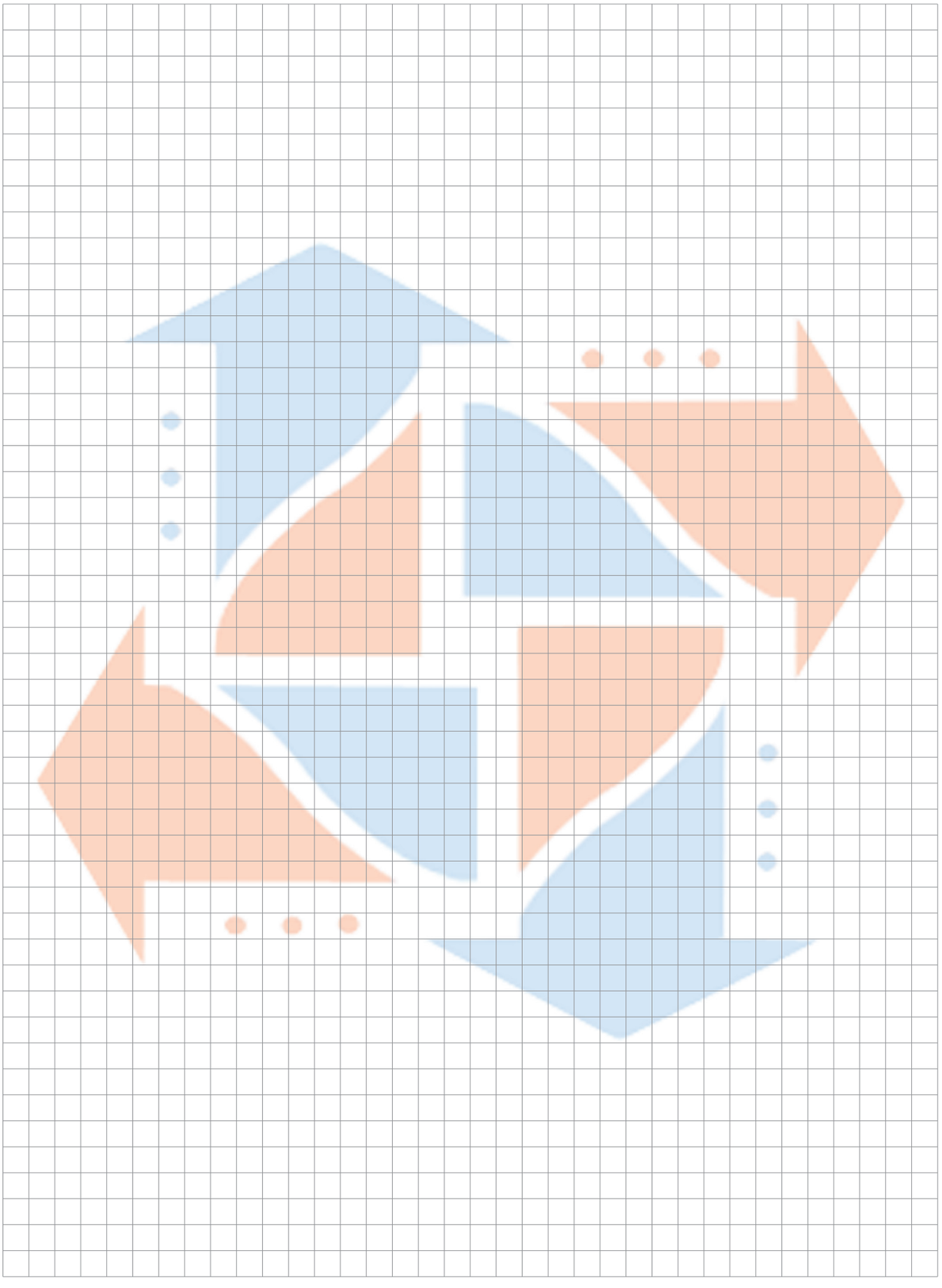

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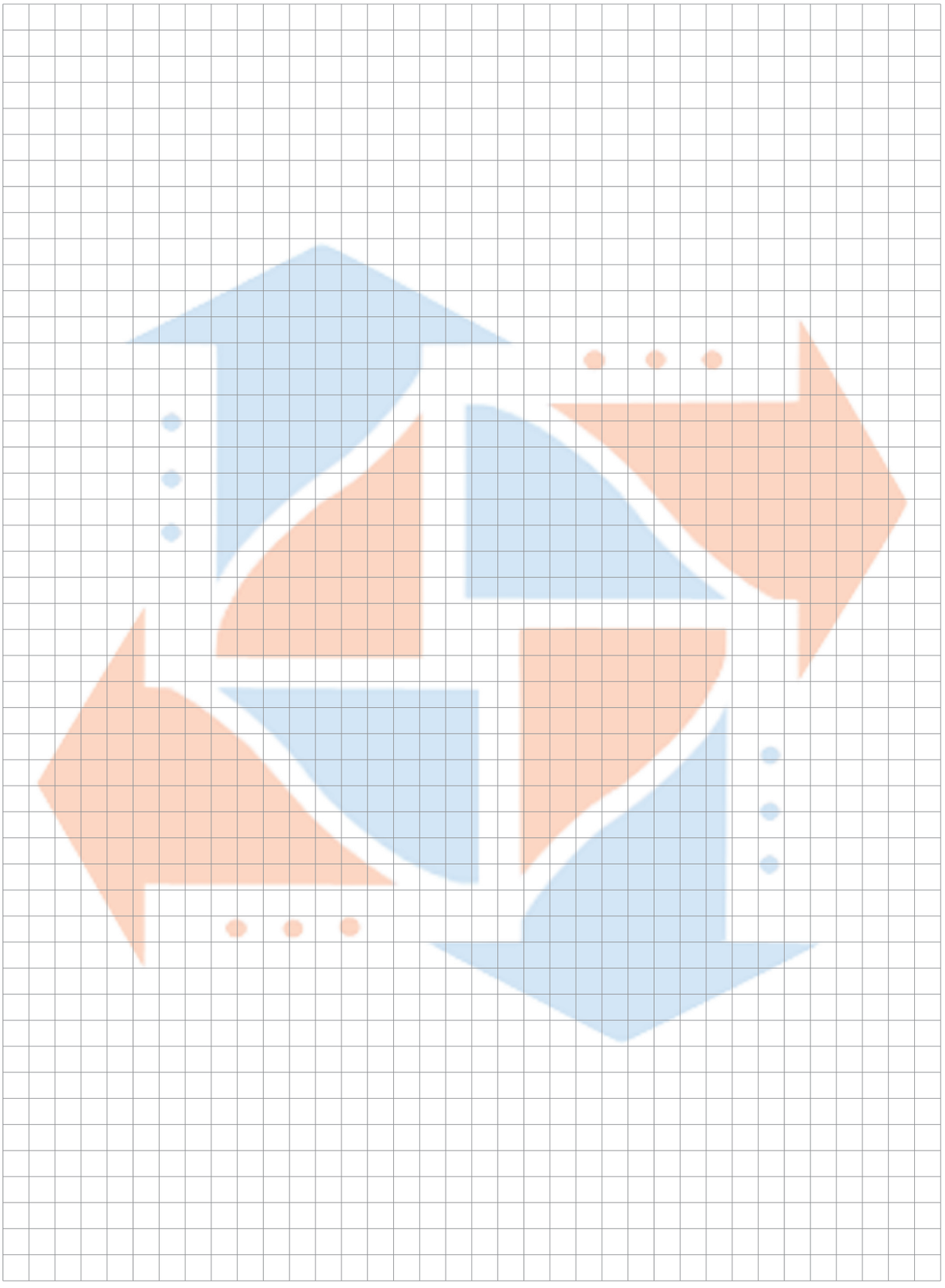

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