TES SERIES

EVAPORATOR

ENERGY SAVING AND ENVIRONMENTALLY FRIENDLY COOLING

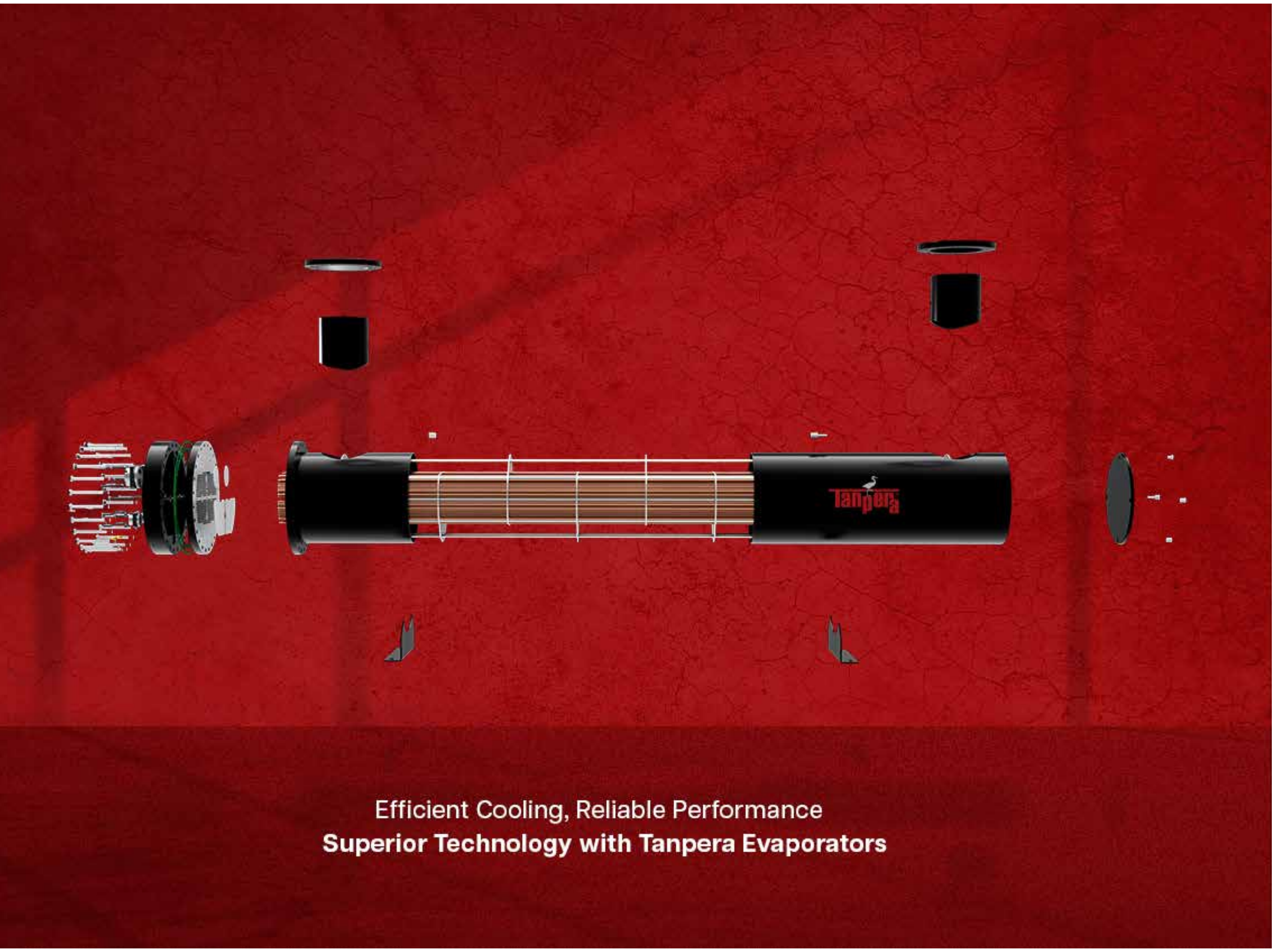
2025

What is an Evaporator?

An evaporator is a heat exchanger used as a vaporizer in cooling systems. Cooling systems consist of four main components to complete the cooling cycle. These components are compressor, condenser, expansion valve, and evaporator. The compressor increases the pressure and temperature of the gas through compression and sends it to the condenser. The hot and high-pressure gas transferred to the condenser is then condensed and partially depressurized before being sent to the expansion valve. The gas passed through the expansion valve has its pressure and temperature reduced.

The gas-liquid mixture leaving the expansion valve is sent to the evaporator, where the refrigerant is fully converted to a gas phase and returned to the compressor. This completes the gas cycle.

Evaporators can be designed in various types depending on the type of gas used and the working pressure. They are typically produced using inner grooved copper tubes. Depending on the type of fluid, evaporators can also be made with stainless steel or copper-nickel (CuNiFe) tubes and with galvanized or stainless-steel shell.



Why Should Evaporators Be Used?

For industrial and commercial cooling systems to work efficiently and reliably, the correct heat transfer components are essential. Evaporators are one of the key components of a cooling system. The success of a cooling system directly depends on the efficient operation of the evaporator.

Evaporators are the heart of a cooling system, and when chosen correctly, they directly improve the overall performance and energy efficiency of the system. **TANPERA TES Series Evaporators** are advanced technology products that meet all these needs.

Because;

- **High Heat Transfer Efficiency**
  Evaporators directly affect the energy efficiency of a cooling system. A high-performance evaporator provides more cooling with less energy consumption, significantly reducing operating costs.
- **Precisex Temperature Control:**
  Many industrial processes require precise temperature control. Evaporators maintain the desired temperature levels by ensuring the refrigerant turns into gas, thus ensuring stability in production processes.
- **Various Application Areas**
  Evaporators have a wide range of applications in cooling systems. Thanks to various design and material options, they provide effective and reliable performance in all types of cooling applications, from low-temperature requirements to precise temperature control.
- **Durability and Longevity**
  TANPERA TES Series Evaporators are designed to withstand tough working conditions. Made with high-quality materials and superior engineering, they provide long-term use, enhancing system reliability.
- **Easy Maintenance and Flexibility**
  Their design makes evaporators easy to install and maintain. Additionally, with different capacity and material options, they provide solutions tailored to all kinds of needs.

Advantages;

- **High Energy Efficiency**
  Provides maximum performance with low energy consumption, reducing operating costs.
- **Durable and Long-lasting Design**
  Manufactured to withstand harsh industrial conditions for long-term use.
- **Wide Range of Applications**
  Evaporators are an essential part of cooling systems in HVAC and industrial applications. These systems, which can be adapted to different needs, offer energy efficiency and high performance in cooling processes.
- **Eco-friendly Technology**
  Supports sustainability through environmentally friendly production processes and cooling solutions.
- **Easy Installation and Maintenance**
  Evaporators simplify maintenance and installation processes thanks to their practical design. Produced with various capacity and material options, these systems offer customized solutions for all cooling needs.
- **Flexible Capacity Options**
  Offers solutions for various needs with models of different capacities.
- **Improved Heat Transfer Efficiency**
  Ensures high efficiency in cooling processes through effective heat transfer.
- **Wide Product Range**
  Provides solutions for every industry with a wide variety of models and features.
- **Advanced Technology Usage**
  Manufactured using the latest engineering standards with state-of-the-art technology.
- **High Reliability**
  Offers reliable and quality products based on Tanpera's extensive experience.

Areas of Application

Evaporators, which provide efficient and reliable solutions for industrial and commercial refrigeration systems, are widely used in various sectors. With a range of capacity and design options, they offer flexible solutions suitable for all types of cooling applications. These systems aim to reduce operating costs through energy savings, durability, and high performance.

Air Conditioning and Heat Pump Systems
It saves energy by maintaining the desired temperature. In heat pumps, it offers efficiency with heat recovery.

Cold Storage
Minimizes temperature fluctuations and keeps products fresh. Reduces operating costs with energy efficiency.

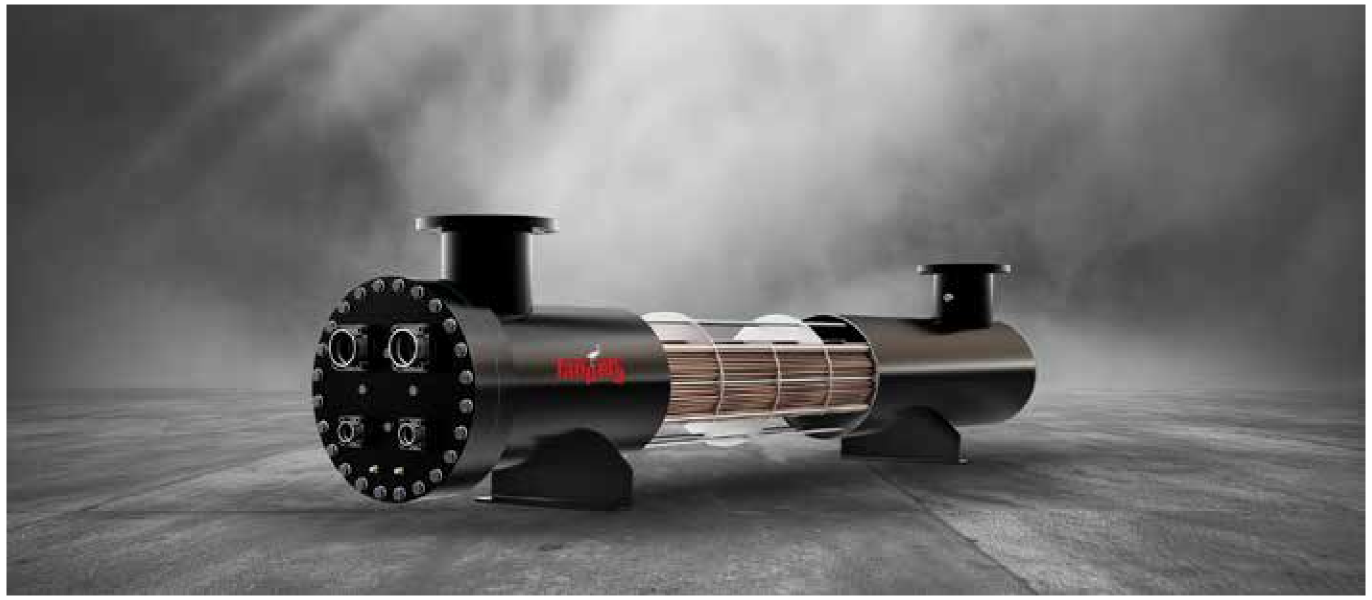
Food Industry
Preserves the freshness and nutritional value of products. Reduces operating costs by saving energy.

Iron and Steel Casting Sector
Ensures continuity of metal production by preventing overheating. Supports production processes with high heat exchange capacity.

Basic Features and Design Factors of Product Groups

Tanpera TES Series Evaporators are designed by Tanpera engineers to be compatible with HCFC, HFC, and HFO refrigerants, though they are standardly designed for R407C gas. The TES series dry expansion evaporators offer high performance and broad operating capabilities for chiller groups used in heating and cooling applications in the industry and HVAC sectors. TES series evaporators are produced in four different independent gas circuits with the highest technology, high engineering, and design capabilities within Tanpera.

Design and Material Information
All mechanical calculations of Tanpera TES series evaporators are performed by Tanpera engineers, and they are manufactured using materials that comply with EN standards. The TES series evaporators are produced to deliver high performance based on customer requirements with different material options and design conditions.



TES Series Standard Evaporator Material Specifications
Heat Transfer Tubes: Copper - Interner Grooved Copper
Endplates, Body, Cover, and Connections: Carbon Steel
Baffle: Polyethylene

TES Series Special Evaporator Material Specifications
Heat Transfer Tubes: Copper-Nickel, AISI316L, AISI304L, Carbon Steel
Endplates, Body, Cover, and Connections: AISI316L, AISI304L
Baffle: AISI316L, AISI304L, Carbon Steel

Quality and Testing

The thermal and mechanical calculations of Tanpera TES Series Evaporators are performed by Tanpera engineers in accordance with the relevant standards. The refrigerant side of the TES series standard evaporators is tested with 33 bar dry nitrogen, while the water side is tested at 11 bar. In product groups with 1, 2, 3, and 4 circuits, different pressure and methods are applied to prevent leaks between circuits.

Product Coding
TES - 1 - 4.0 - 660 + L300 + 2

- Curtains
- Height
- Nominal Capacity
- Body Diameter
- Number of Circuits
- Heat Exchanger Group

Factors to Consider for Proper Evaporator Selection

Fouling Factor

One important rule to consider in evaporator selection is the fouling factor. During operation, your evaporator will accumulate a film layer on the pipe surfaces, depending on the quality of the water used. This film layer, which forms over time, will lead to capacity and performance loss in the evaporator. To prevent these losses, the fouling factor should be chosen based on the water source when selecting an evaporator. Some fouling factors required for certain conditions are as follows:

Closed Circuit Water: 0,043 m^2K/W
Open Circuit Water: 0,086 m^2K/W
Glycol Solution 40%: 0,086 m^2K/W
Glycol Solution 40%: 0,0172 m^2K/W

Antifreeze Ratio

One of the rules to be considered in evaporator selection is the pollution factor.

Freezing Point	Ethylene Glycol Ratio %	Propylene Glycol Ratio %
-5	% 12	% 16
-10	% 22	% 26
-15	% 30	% 34
-20	% 36	% 40
-25	% 40	% 44
-30	% 44	% 48
-35	% 48	% 52
-40	% 52	% 56

Installation and Usage Recommendations

Tanpera engineers recommend following the guidelines below for the optimal and long-lasting use of TES series evaporators:

- Evaporators should be installed and used in a horizontal position as per the user manual.
- When commissioning the evaporator, all air within the system and the evaporator must be completely purged.
- Ensure the evaporator operates at the pressure drop specified in its design conditions when put into service.
- Do not stop the water flow through the evaporator without first removing the refrigerant. Otherwise, freezing may occur in the coils.
- When the evaporator is not in use, it is recommended to completely drain the water or fill it with antifreeze, ensuring no air remains inside.
- The chemical properties and antifreeze ratio, if applicable, inside the evaporator should be regularly monitored.
- Ensure the water flow does not exceed the recommended maximum flow rate for the evaporator.
- To prevent any particles and contaminants from entering the water circuit of the evaporator, install a filter, and check the filters periodically.
- If pressure loss due to fouling increases, leading to a capacity drop, the water inside the evaporator can be periodically reversed to clean it.

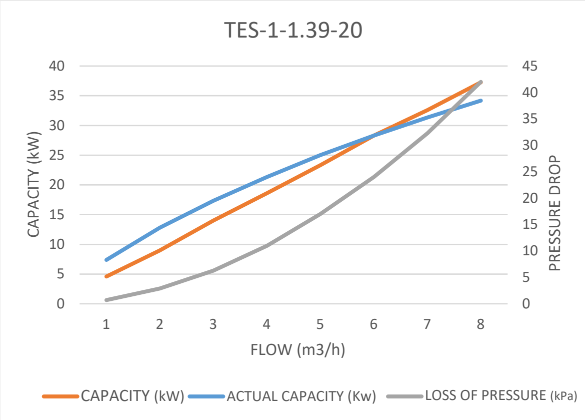
Capacity, Volume, and Water Flow Rate Table

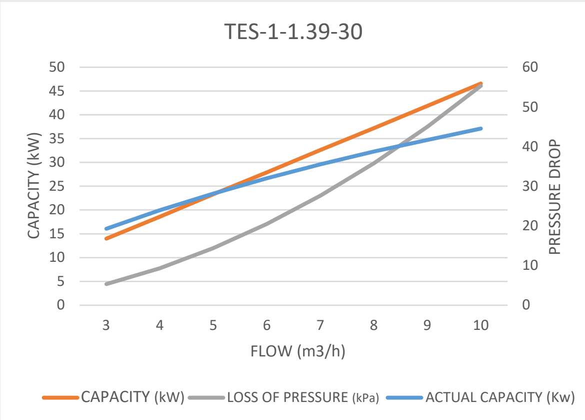
The values provided in the table below are calculated based on specific working conditions.

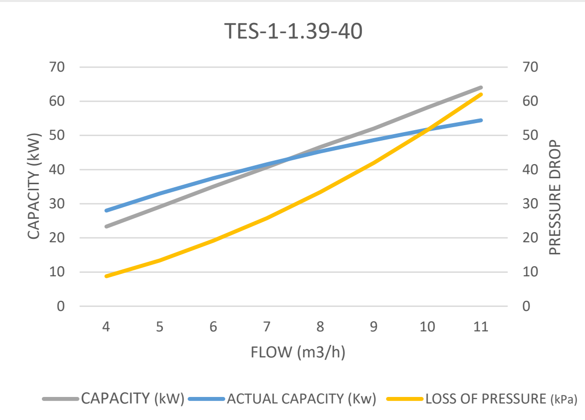
Working Conditions:
Refrigerant: R407C
Water Inlet Temperature: 12°C
Water Outlet Temperature: 7°C
Condensation Temperature: 45°C
Evaporation Temperature: 2.75°C
Superheat: 5 K
Fouling Factor: 0.043 m^2K/W

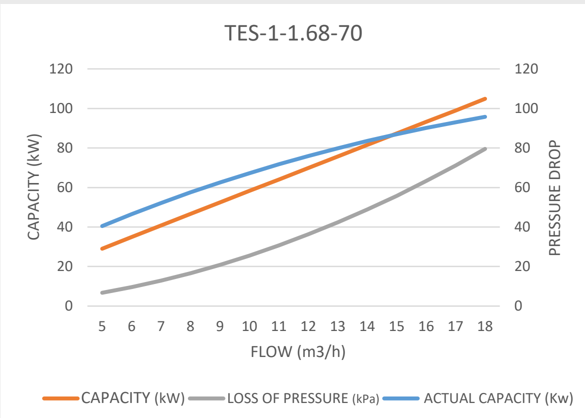
Model	Nominal Capacity (kW)	Nominal Pressure Loss (KpaA)	Nominal Flowrate (m^3/h)	Maximum Flowrate (m^3/h)	Gas Volume (L)	Water Volume (L)
TES-1-1.39-20	22	11	4	6	2,5	8
TES-1-1.39-30	28	20,5	6	7	3	9,5
TES-1-1.39-40	40	25,8	7	11	3,6	11,6
TES-1-1.39-50	53	44	9	13	4,1	13,2
TES-1-1.39-60	64	35	11	15	5,5	18,7
TES-1-1.68-70	70	36	12	18	6,3	20,9
TES-1-1.68-80	82	42	14	21	7,1	23,8
TES-1-1.68-100	100	64	18	25	7,9	26,1
TES-1-1.94-135	135	74	23	31	11	35,8
TES-1-1.94-145	145	75	25	35	12,8	41,2
TES-1-1.94-165	164	85	28	39	14,1	15,2
TES-1-2.19-185	187	78	32	45	15,8	34,2
TES-1-2.19-205	206	75	35	49	19,3	59,2
TES-1-2.19-245	245	95	42	59	21,8	66,7
TES-1-2.73-290	292	47	50	70	26	116,6
TES-1-2.73-340	343	66	59	83	28,5	113,5
TES-1-2.73-390	370	98	68	95	33,7	107,4
TES-1-3.23-450	455	55	78	108	40,7	165,4
TES-1-3.23-500	502	70	86	123	45	160,2
TES-1-3.23-590	595	106	102	139	49,9	153,4
TES-1-4.06-660	665	74	114	162	61	268,8
TES-1-4.06-770	770	106	132	185	69,5	259
TES-1-4.06-850	850	140	146	210	76,6	250,7
TES-1-4.06-920	921	165	158	224	82,7	243,4
TES-1-4.06-920	1055	170	181	253	98	286,2
TES-1-4.06-1050	1155	100	198	280	118,8	373
TES-1-4.57-1250	1251	118	214	298	124,1	366,8
TES-1-5.08-1350	1363	108	234	330	134,5	471,8
TES-1-5.08-1500	1514	145	260	371	151,2	452,5

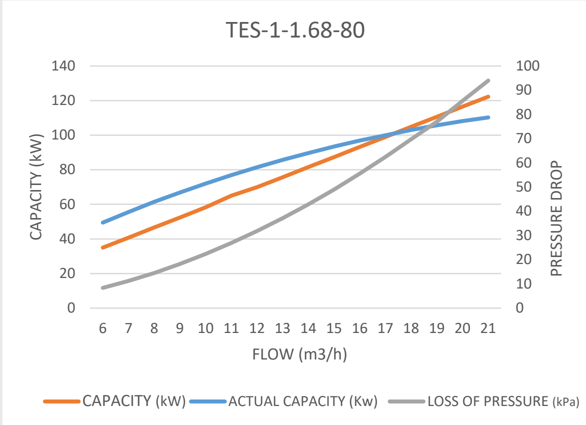
Capacity Charts

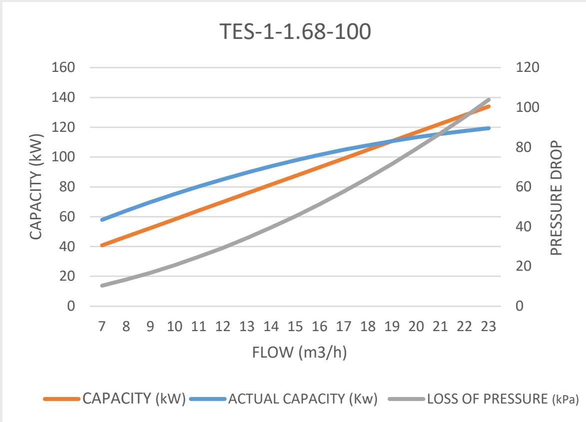


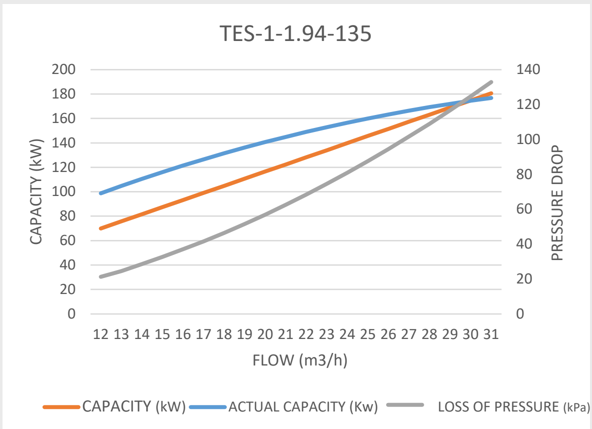


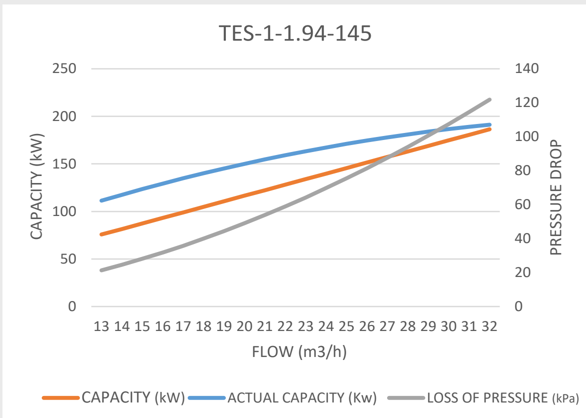












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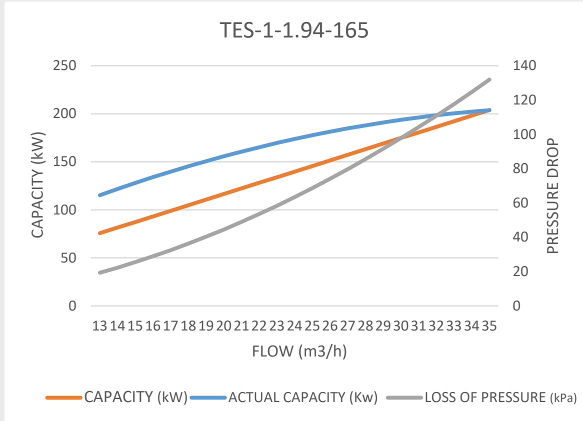

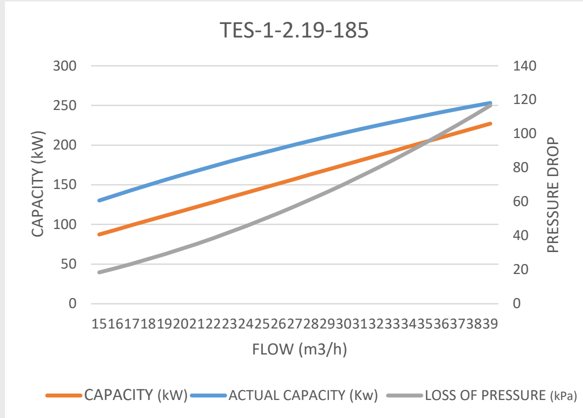

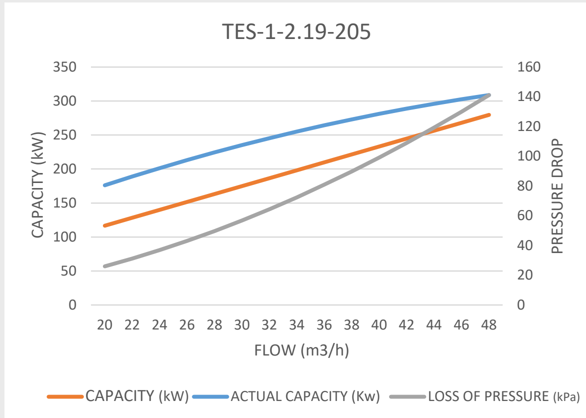

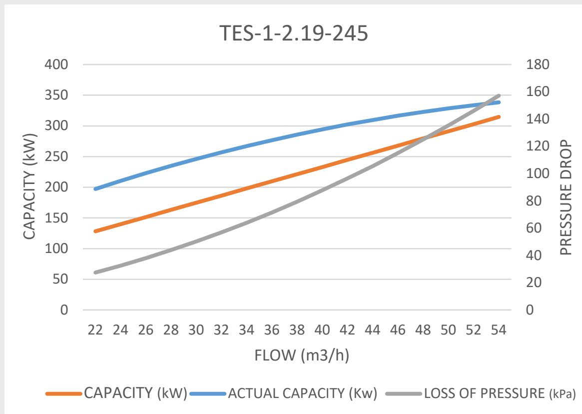

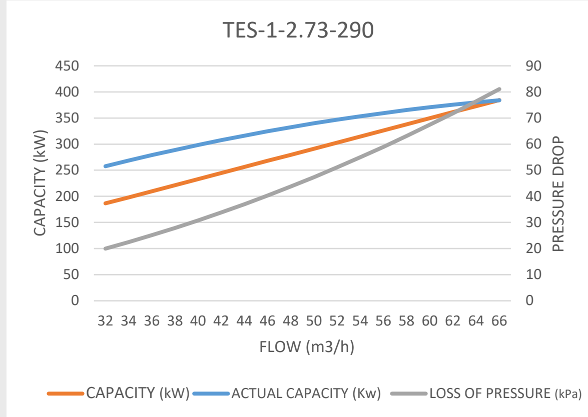

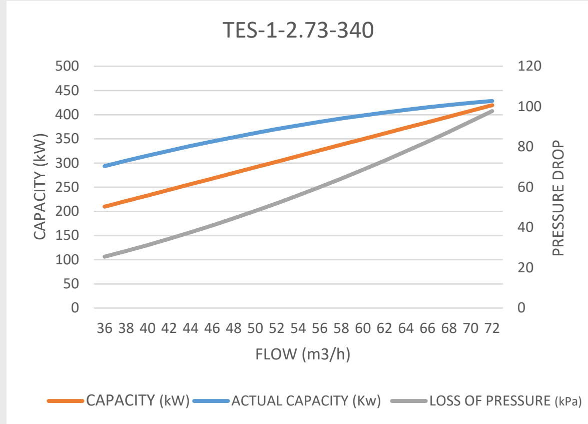

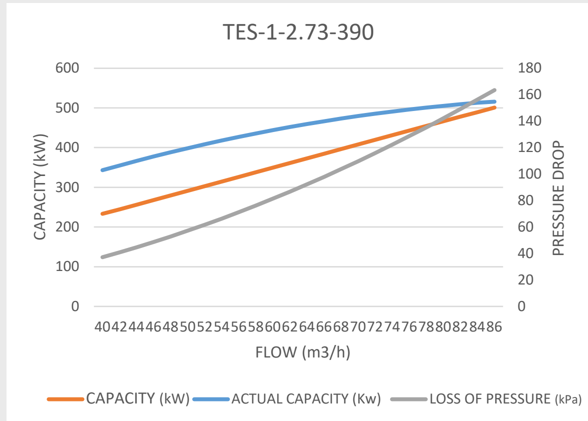

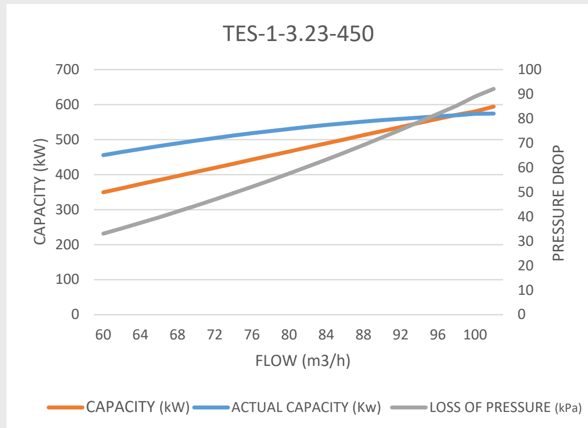

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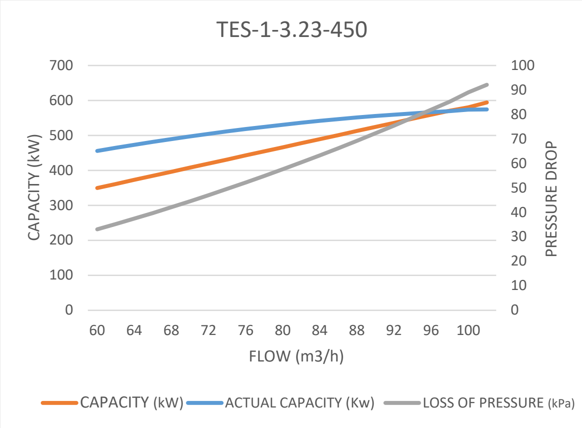

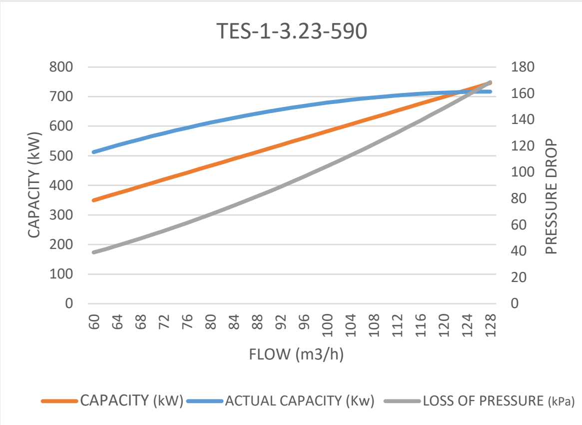

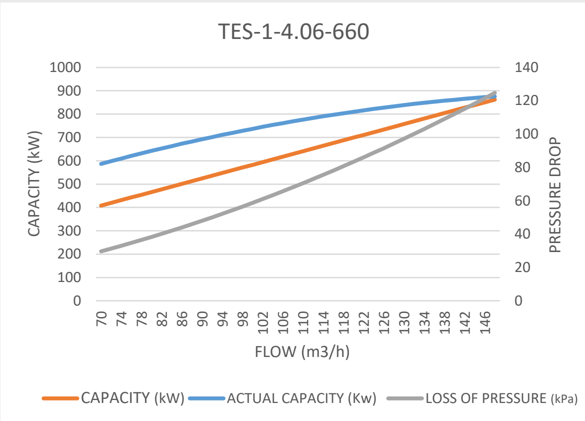

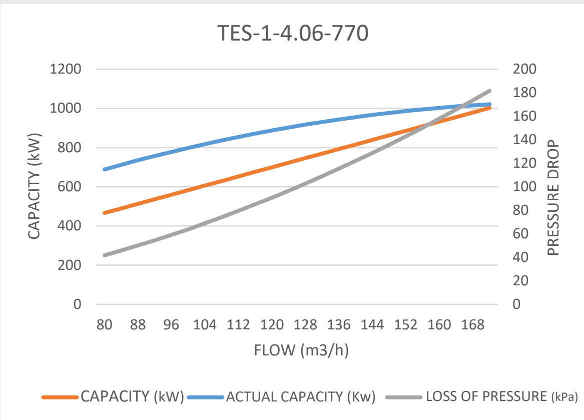

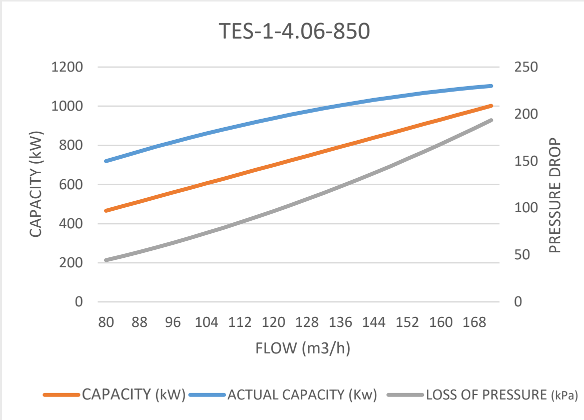

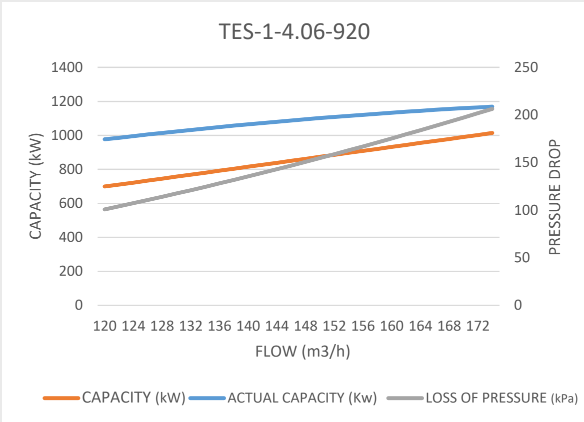

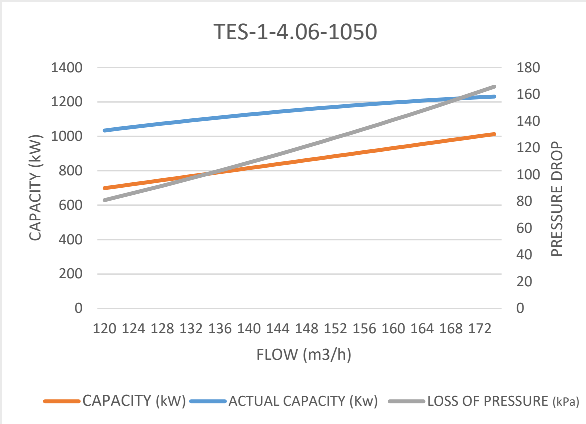

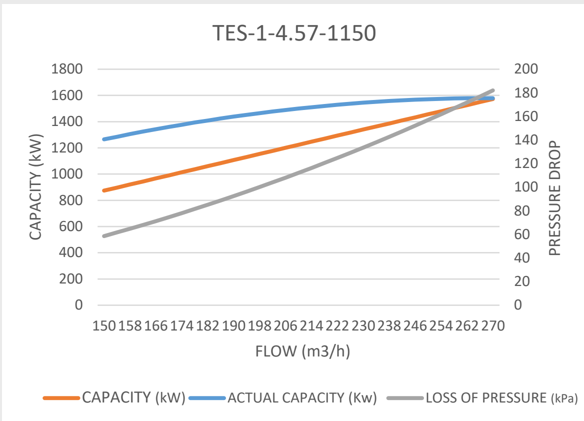

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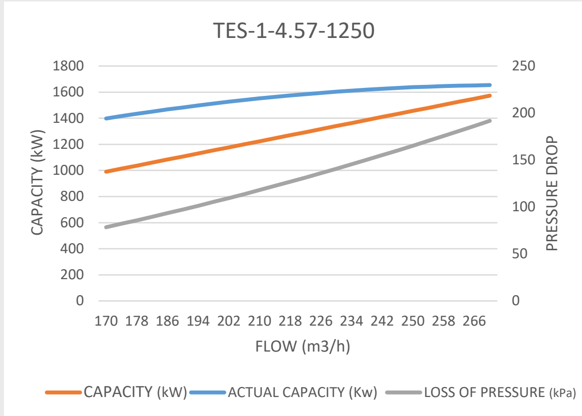
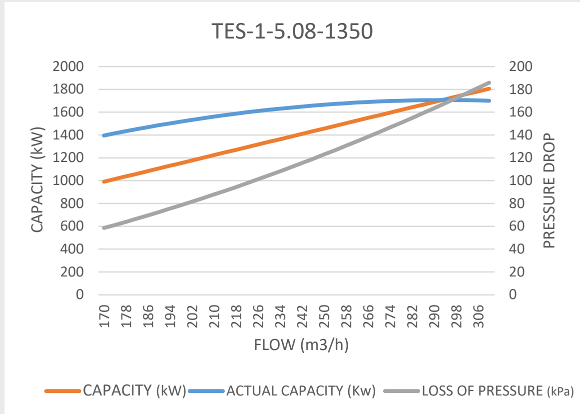
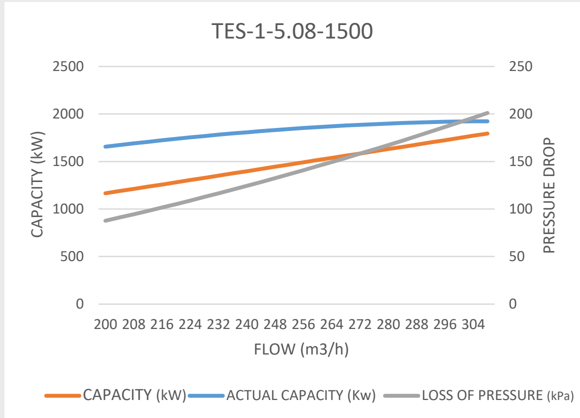


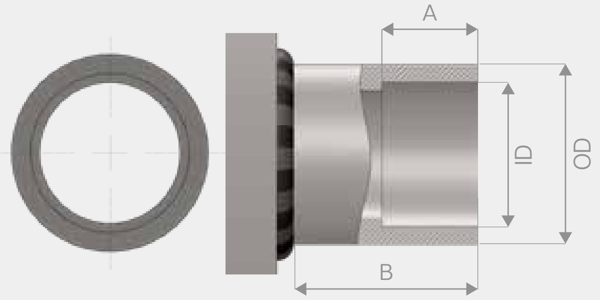




Connection Dimension Table

Welded Type Connection (W)

Dimensions (mm)				
CODE	A	B	ID	OD
W16	15	30	16,2	21,3
W19	15	30	19,4	25
W22	15	30	22,6	26,9
W28	15	30	28,8	33,7
W35	15	30	35,4	42,4
W42	15	35	42,3	48,3
W54	20	45	54,3	60,3
W67	20	50	67	76
W80	20	50	80,5	88,9
W105	20	50	106	114

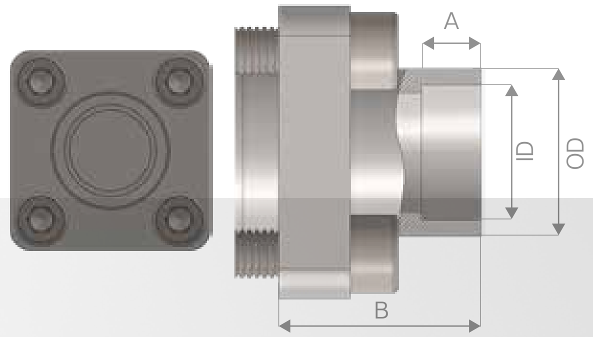


Flanged Type Connection (DN)

Dimensions (mm)		
CODE	DN(mm)	E(mm)
DN 100	114	120
DN 125	140	120
DN 150	168	120
DN 200	220	120

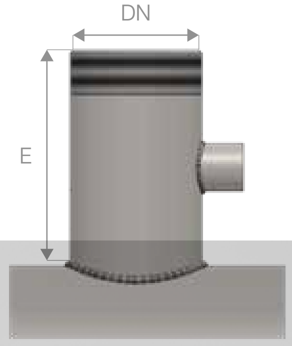
Flanged Type Connection (FL)

Dimensions (mm)				
CODE	A	B	ID	OD
FL16	15	40	16,1	20,5
FL19	15	40	19,4	24
FL22	15	40	22,6	28
FL28	15	40	29	35
FL35	15	40	35,4	41,4
FL42	15	40	42	48
FL54	15	50	54,8	61
FL67	25	55	67	74
FL80	25	55	80,5	85
FL105	25	55	106	115



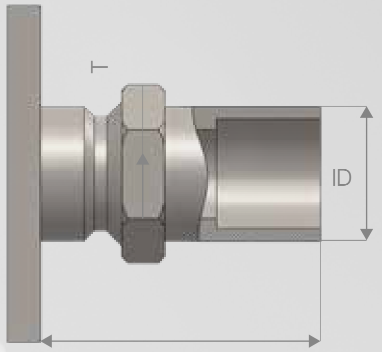
Threaded Pipe Type Connection (G)

Dimensions (mm)		
CODE	G(mm)	E(mm)
G 1"	33,7	120
G 1½"	48,3	120
G 2"	60,4	120
G 2½"	73,1	120
G 3"	88,9	120



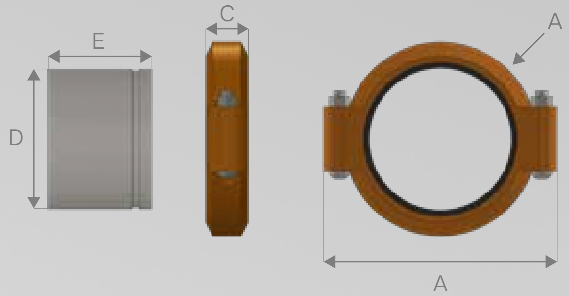
Rotalock Type Connection (RLA)

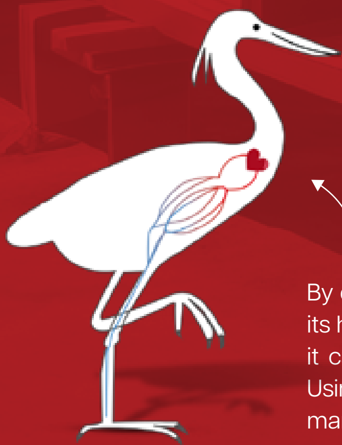
Dimensions (mm)		
CODE	ID	T
RLA 16	16,2	1"14-UNS
RLA 19	19,4	1"14-UNS
RLB 22	22,6	1¼"12-UNF
RLB 28	28,8	1¼"12-UNF
RLC 35	28,8	1¾"12-UN
RLC 35	35,4	1¾"12-UN
RLC 35	42,3	1¾"12-UN



Flexible Coupling Connection (FLC)

Dimensions (mm)					
CODE	A	B	C	D	E
J3 FLC089	165	115	50	88,9	80
J4 FLC114	200	145	50	114,3	100
J5 FLC140	245	175	50	139,7	100
J6 FLC168	275	205	55	168,3	150
J8 FLC220	345	265	60	219,1	150





By effective heat transfer betweenn the blood coming from its heart at 40°C and the blood returning from its feet at 1°C, it can stay in cold water for a long time without freezing. Using these natural principles, we design our engineering marvel heat exchangers.

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