

**HS Cooler**  
**High-Performance Heat Exchanger**

**INSTALLATION AND OPERATING  
MANUAL**

**KS/K/KK/KW Standard Product Line/ EXOT Product Line 1000-  
3999 and 7700-8499**



Type/Drawing Number: **KK12-BCV-421(V1) L635**  
PO Number: **A16-21991**  
Serial Number: **A16-21991A**  
Customer: **Impexron GmbH**  
Customer's PO Number: **129756**

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HS-Cooler GmbH Wittenburg is not liable for any defect resulting from any improper use of the product. We reserve the right to adapt this operating manual at any time without prior notice to include the latest developments.

## (1) General

- **Installation/Start-up**

Prior to installing/starting up the heat exchanger, the operating manual (including drawings/part lists/data sheets) should be read thoroughly.

- **Service**

For all service inquiries, please contact our factory, our sales force or your contracting party directly. In the case of spare part orders, please always indicate the designation of the device and/or the spare part. The necessary specifications can be taken from the enclosed drawings and from parts lists.

- **Warranty**

Warranty claims are to be taken from our general delivery and payment terms, providing no other individual agreements were made. The goods should be inspected for damage at the time of delivery. Any damage must be clearly indicated on the delivery slip. In addition, HS Cooler and the forwarding agent should be notified immediately.

Repairs of defective parts at a later stage may only be carried out with our approval. If circumstances should not permit that you obtain our approval, you may ignore it. In such a case, you must inform us as soon as possible.

In principle, any changed service conditions must be approved by us in writing. By not adhering to the operating manual, or not using original spare parts, you forfeit the warranty.

- **Conservation**

Under normal conditions, internal surfaces of the devices are protected for a duration of 6 months. The protection must be renewed after 6 months. The preserving liquid and the note on safety can be provided by us. The preservation agent used is compatible with all mineral lubricants. Should the removal of these substances be necessary, this can be done by using any regular solvent (check material compatibility!). The devices should only be stored in closed rooms. Condensation through strong temperature fluctuations must be avoided.

- **Transportation**

Damage to the device must by all means be avoided. The transportation of the unpackaged device, when using lifting systems, has to be carried out with sufficient number of transportation straps set around the casing. In case of isolated heat exchangers, the welded lifting lugs must be used. Please note the dead weight of the device indicated on the current data sheet or the type plate.

- **Environmental Regulations**

The mounting and operation of the heat exchangers must be carried out on site in accordance with environmental regulations and legislation. Disposal of the device must take place in accordance with regional and federal disposal regulations.

## (2) Structural build-up

- **Tube bundle**

The tube bundle consists of two facing identical tube plates with three grooves. The tubes are rolled or welded into the tube plate wholes. Between the tube plates at the outer side of the tubes, the surface is enlarged forming fins, which are connected to the tubes. The result is a compact finned bundle. At the outer side of the finned bundle, there are grooves across the whole length which are used to take up sealing straps. In the finned bundle, a different number of baffles can be installed. A groove is milled in the top of the baffle which contains one or two laminar rings (depending on groove width). The interior O-ring grooves in the tube plates seal against the casing in assembled state. The external grooves are used for sealing the bonnet. In this way, a intermixing

of the media is avoided if a seal becomes defective and a leakage localization is simplified. In the central groove, sheets are positioned, which fix the tube plate in assembled state, and allow for a thermal expansion for the opposite tube plate. With double-path devices, the fixation must be at the side of the connections. In any case, the side of fixation is marked by an imprinted 'F' at the flange of the casing in the area of the flanges M1 or M2. The fixation must be positioned at this side when the device is being operated.

- **Shell**

The shell is used for taking up the tube bundle and forms the shell side casing. It consists of end pieces or flanges, which are circular-welded with the shell tube. The end pieces can be placed in such a way that the connections are positioned at one side or rotated by 180°. The shell tube is a precision tube with restricted allowances. Changes must not be carried out on the casing.

At the starting area of the end pieces or flanges, the interior groove of the tube plates seals by means of an O-ring. This area must be treated carefully in order to guarantee a sealing effect.

- **Bonnets**

The bonnets consist of different materials (see part list), depending on the version of the device. The bonnets, together with the tube bundle, forms the chamber of the cooling medium and is fixed to the casing by screws. At one side of the device, sheets are inserted between bonnet and casing which fix the tube plate. At the other side, washers form a spacer.

The single-path versions have two identical bonnets positioned opposite each other. With the double-path version, one bonnet with two connections is mounted at one side of the device, at the other side there is a reversing cover. To separate the two chambers in the bonnet, a plastic or aluminium path is inserted into the tube plate at the connection side. In assembled state, the path partition seals bonnet and tube plate, i.e. it splits the flow of tube-side medium through the device.

Seawater resistant versions may contain sacrificial anodes.

### (3) Service

- **Installation**

- ✓ Protective caps fitted to connections must be removed. If there is no protective cap on a connection, check whether it has been pushed into the connection or foreign bodies have penetrated the device.
- ✓ Foreign bodies may not penetrate the openings of the connections.
- ✓ The connection of the pipes must be tension-free to ensure that no inadmissibly high thermal or mechanical tensions affect the device in service.
- ✓ Prior to connecting the heat exchanger to the system, it must be ensured that the surfaces of the seal faces and seals are free of debris, scratches, and damage.
- ✓ Pipes that are connected through threads, may only be screwed into the maximally usable thread depth.
- ✓ All circuits must be designed to avoid penetration of dirt and dust. We recommend the assembly of dirt traps and suitable filters.
- ✓ Tubes must be correctly installed so that air locks cannot build up.
- ✓ The assembly can be horizontal or vertical.
- ✓ Sufficient space should be available to ensure easy accessibility to all screw connections. Take particular care to provide sufficient space to pull the tube bundle. You can find the required space dimensions for the removal of the tube bundle in the drawing.
- ✓ The pipe connection and flow direction may be found on the enclosed drawing and data sheet.
- ✓ Before start-up, the device must be completely bled.

- ✓ When mounting the heat exchanger, you must take linear expansion into account, which could occur as a result of the device being heated.
- ✓ Never weld or modify the device.
- ✓ For systems with specific requirements for the purity level, the heat exchangers, with the exception of the loads, must be cleaned professionally.
- ✓ Orifice plates must only be installed at the outlet side of the device.
- ✓ Heat exchangers are pressure vessels that are used and manufactured for specific dimensioning or operating conditions. The maximum/minimum pressures and temperatures indicated on the type plate must never be exceeded/fallen below. The total system is the responsible of the system manufacturer/operator, and must contain all required safety and control systems to ensure that the operating parameters are adhered to. This includes safety valves, expansion tanks, safety temperature limiters, ventilators, depot containers, etc. You should adhere particularly closely to the regulations governing the site.
- ✓ The heat exchanger, or the system that is electrically connected with it, is to be connected to ground manifold using a copper wire (16mm<sup>2</sup> diameter). In this connection, you should ensure that the connecting points of the ground strap are free of colour or other electrically isolating materials.
- ✓ When operating with steam, you must ensure that no steam impact occurs due to accumulation of condensate. Only suitable control valves should be used. The outflow of condensate must take place by means of a suitable steam trap.

- **Screw fasteners**

To ensure a safe operation and a long service of fastening elements, the screw fastenings should only be torqued. In this connection, the torque should be increased step-by-step until it reaches the maximum value. The table below lists the torque figures for the screws applied. Through influence of various factors, the specified values may show a deviation which in individual cases require lower or higher values. The screw threads must be lubricated using a suitable lubricating agent.

Connection between housing/mat/cover			Flange joint connection		
Type	Bolt/ Strength	Tightening torque [Nm]	Bolt/ Strength	Thread material	Tightening torque [Nm]
K10	M8 / 8.8	12	M8 / 5.6	GG25 / Aluminium	10
KK12/KA12	M10 / 8.8	23	M10 / 5.6	GG25 / Aluminium	20
K12/KS12/KK12/KW12	M12 / 5.6	40	M10 / 5.6 / 8.8	Steel	23
	M12 / 8.8	86	M12 / 5.6 / 8.8	Steel	40
K20/KS20/KK20/KW20	M16 / 5.6	100	M12 / 5.6	GG25 / Aluminium	30
	M16 / 8.8	210		Bronze	30
K25/KS25/KW25	M20 / 5.6	190	M16 / 5.6	GG25 / Aluminium	75
	M20 / 8.8	410		Bronze	75
K35	M24 / 5.6	330	M24 / 5.6	Steel	100
	M24 / 8.8	710		Steel	300

- **Type plate**

The type plate is at the side of the device and is permanently fixed. The type plate must not be removed.

- **Start-up**

At first, the device must be filled up with the intended medium, and then the entire system must be checked for leakage. The flow of the cold medium must first be established. Next, the flow of the hot medium is slowly added. Both heat exchange circuits must be ventilated. Once the operating parameters have been reached (pressure and temperature), the device must be ventilated again, and a leakage test should be carried out. The flow rate volumes indicated on the data sheet must be adhered to. If not, there is an increased risk that the heat exchanger corrodes/erodes. Operating the device without flow of cooling medium is not permissible. Abrupt temperature fluctuations and pressure surges should be avoided. Prior to adding an inhibitor to one of the media, the stability of the heat exchanger material should be checked (in accordance with the parts list).

Only for water-cooled units:

If the flow adjustment is carried out by a control, we recommend an oil-sided control, especially when operating with river or sea water.

Discuss the control of cooling water with our factory, because factors like material and quality of cooling water are very important to avoid later problems.

The use of additives in the cooling water has to be confirmed by HS-Cooler GmbH.

- **Operating instructions**

During the operation, make sure, by suitable means, that pre-set parameters for which the devices are designed are adhered to. If reserve devices with switch-over valves are present, switch these devices on periodically (every 2-3 days) or load the reserve device daily for some time with the full water volume. The compensating line between both apparatuses must be kept open at all times during operation, in order to protect the decommissioned apparatus against overpressure. The compensation line should be closed only during the removal of a cooler, to ensure that no medium leaks into the environment.

- **Switching off/standstill of the unit**

With a short-term standstill (<4 days) of the unit, the device can remain filled. If the heat exchanger is not used for a longer period of time (>4 days), it must be emptied completely and dried with hot pressurized air. If the device was used in connection with a corrosive medium, this measure (emptying and drying) must be carried out if the standstill time exceeds one (1) day. In addition, the device must be rinsed with fresh water after it has been emptied.

In case of frost, suitable measures should be taken to prevent the media from freezing.

## (4) Maintenance

- **Periodic inspections**

Devices manufactured by HS-Cooler are normally reliable and easy to maintain. However, some periodic inspections of the device are necessary to provide a safe, continuous operation. Normally inspections on the tube-side predominate. The shell-side is less inclined to pollution, which means that an inspection can be carried out based on the experience of the operator.

- ✓ When operating with sea water, sacrificial anodes are installed in the bonnets. These should be checked in the initial phase every 3 months. If the anodes are used up, they must be replaced by new ones. In the case of excessively fast consumption of the anodes, water quality and the electrical potential of the system must be checked. The shell-side of the heat exchanger must be inspected every 6 months.
- ✓ The device should be cleaned at the tube side at least once a year. An excessive pollution of the tubes must by all means be avoided. The intervals are to be shortened during long ship operation in harbours or in other polluted waters and in accordance with the experience of the operator.

- ✓ At shorter intervals, the device must be subject to an external visual inspection, in order to identify leakage or other problems early. Through the double O-ring sealing, leakages can be precisely located and the effort needed to counter the problem can be estimated.

- **Dismounting**

- ✓ **Note:**  
**Appendix B: Supplement to chapter (4) Maintenance/Dismounting/Dismounting Without Pulling Out The Tube Bundle must be adhered to**

***Proceed as follows when dismantling the device:***

- ✓ Lock-up any pipelines.
- ✓ Both media must have cooled down to ambient temperature.
- ✓ Empty the device at the tube side, and if it is necessary to remove the tube bundle, also empty the shell side.
- ✓ Remove the pipelines at the tube side.
- ✓ Remove the bonnets/covers. For this purpose, the screws at the bonnet/casing connection must be loosened. Between the bonnet/cover there are 4 fixing plates or washers. These must be replaced at the same side again during re-assembly. The marking on the casing flange must be adhered to in this connection.
- ✓ If you want to dismount without removing the tube bundle, the bonnet/cover must be disassembled first without fixing plates in order to protect the tube bundle against displacement before you remove the fixing plates. This can be done with another set of fixing plates or with similar tools.

***Dismounting without removing the tube bundle:***

- ✓ Remove the O-rings from the external groove of the tube plates, and secure the tube bundle to the casing with four screws and the four fixing plates in the middle groove of the tube plates. The tube side can now be inspected and cleaned mechanically. The shell side can remain under pressure.

***Dismounting with the tube bundle removed:***

- ✓ Remove the O-rings from the external groove of the tube plates. At one tube plate, a marking of the fixed position in relation to the casing is attached. A half of an 'X' is stamped at the front of the tube plate and the adjacent casing flange. Check the position of the marking. Push the tube bundle (where appropriate with auxiliary tools) so far sideways until the O-ring of the interior groove becomes visible. Remove the O-ring from the interior groove. Pull out the tube bundle in the opposite direction. Remove the tube bundle carefully from the casing without damaging the fins. To the extent possible, suspend the tube bundle with the help of large-surface transportation straps. The grooves accommodating the O-rings must not be damaged.
- ✓ When dismantling vertically fixed devices, make sure at all times that the tube bundle does not slip down after removing the fixing plates. We recommend keeping an additional set of fixing plates at hand, and to start the removal at the side where no fixing plates are mounted. There the bundle must first be secured. After dismantling the second bonnet, the bundle can be removed carefully. While assembling, only one set of fixing plates is permitted at the side of the marking.

- **Assembly**

The assembly is carried out in reverse order to the dismantling. The following must also be considered:

- ✓ You should generally use new seals and clean the seal faces.
- ✓ Note the marking for proper assembly of the tube bundle (mounting position) (Marked "X").
- ✓ Note the marking for correct assembly of the fixing plates ("F").

- ✓ If sealing strips have been placed sideways in the tube bundle, they should only be replaced in case of damage. When pushing in the tube bundle, take care that the sealing straps are not displaced or twisted. Before assembling the tube bundle, the sealing straps should be greased. You can use the operating medium to this end. The sealing straps must be operant along the entire length of the tube bundle.
- ✓ Laminar rings in the baffle groove should be checked for damage. When mounting the baffle grooves, the laminar rings must be pressed onto the entire area, so that the bundle can be slid into the shell. To this purpose, you can use a metal strip (available from HS-Cooler) or a similar auxiliary tool. The mounting of the bundle in the shell is clarified further in Appendix A of this operating manual.
- ✓ Lubricate O-rings with suitable O-ring grease.
- ✓ During insertion of the tube plate into the seal faces, make sure that the O-rings do not shear. The bonnets/covers must be set up in parallel onto the tube plate and must be pushed evenly onto the O-ring; ensure also that the O-ring does not shear.
- ✓ With double-path devices, a path partition must be fitted at the side of the bonnet in the tube plate with the two connections. At this side, the fixing sheets must also be installed later.
- ✓ When assembling the double-path bonnet, make sure that the path partition is correctly placed.
- ✓ If the screws and nuts are reused, it must be checked that they are undamaged.
- ✓ Then continue as described under 'Operation'.

- **Cleaning**

The tube side can be cleaned mechanically if the level of dirt/dust is low. Disassemble the device as described under 'dismounting without removing the tube bundle' and clean each tube on the inside with a suitable nylon brush (do not use metal brushes), and then clean with water. Never remove stuck deposits or coarse dirt by force. In the case of stuck deposits, the tube bundle must be cleaned chemically. This can be carried out by rinsing the tube in the assembled state or submerging it in disassembled state. Such a cleaning must only be carried out by trained specialists. Only suitable solvents must be used. To select a suitable agent, refer to the heat exchanger part list. Take the materials of the plastic separator strip and O-rings in the assembled state into consideration.

Provided that the type designation gets a C at the 11th position (example: KS12-BCN-821CL1000), then it is a coated tube bundle. To prevent damage caused by corrosion, this bundle is weld-coated on the inside of the tubes and on the tube sheets. When dismantling the bundle, and during cleaning, make sure that the coating will not be damaged or destroyed. Use only nylon cleaning brushes and approved cleaning agents. If there are any doubts about the suitability of an agent, please contact our service department.

## (5) Troubleshooting

- **Insufficient performance**

- ✓ Check all temperatures and material flows in accordance with the design data (refer to the data sheet).
- ✓ Are foreign bodies in pipe or in device causing obstruction?
- ✓ Is the tube bundle correctly assembled? Check the marking "X".
- ✓ Are the path partition and the fixing plates correctly assembled in the double-path bonnet?
- ✓ Are all pressure rooms vented?
- ✓ Are tube side or shell side too dirty (too thick deposits)?
- ✓ Are more than 10% of the tubes plugged?



- **Leaky tubes**

If a presumption exists that tubes have become leaky, proceed as with 'dismounting without removing the tube bundle'. The shell side can remain under pressure. After cleaning the tube plates, you can identify the defective tube by the state of the emerging medium. The leaking tube must be mended on both sides. HS-Cooler GmbH offers reparation kits for this purpose. You can lock 10% of the tubes at the most without a noticeable reduction in performance. Dismounting the defective tube is not possible.

- **Leaky rolling connection/welding points**

If it is found during the check for leaky tubes that a rolling connection is leaky, it can be rolled again with a specific rolling tool. If a pipe welding joint is leaky, it can be welded. This work, however, is only to be carried out by specially trained personnel. Since defects of this type are uncommon, a check of the complete bundle in our factory is recommended.

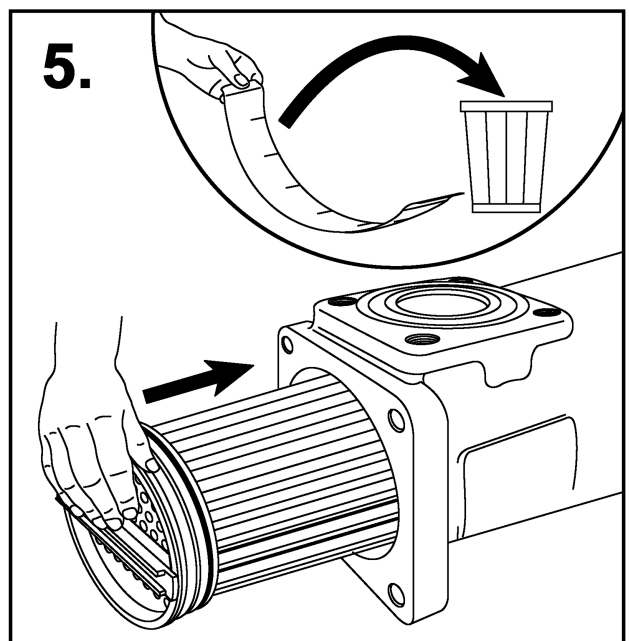
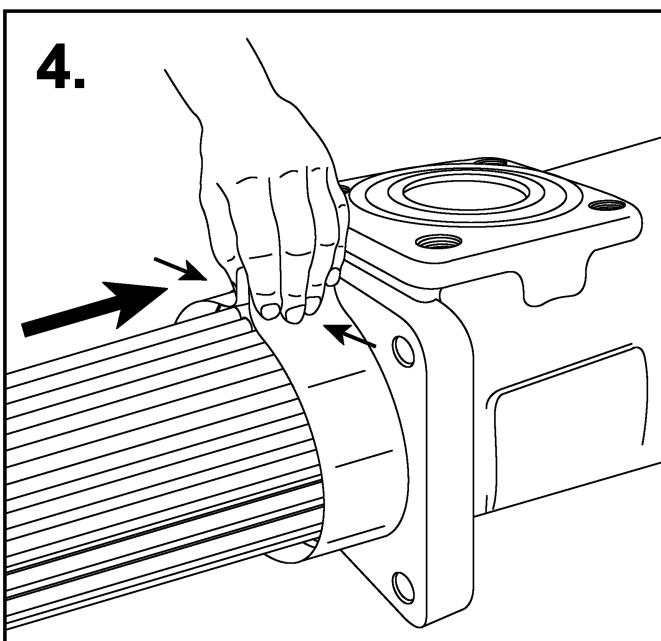
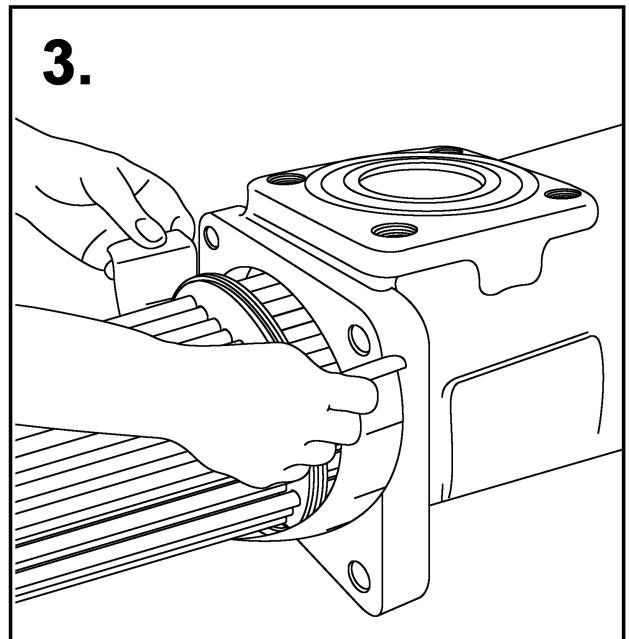
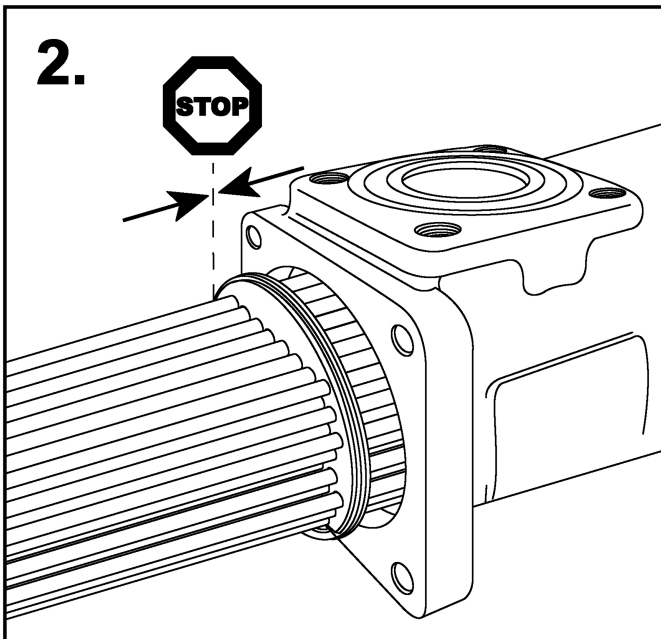
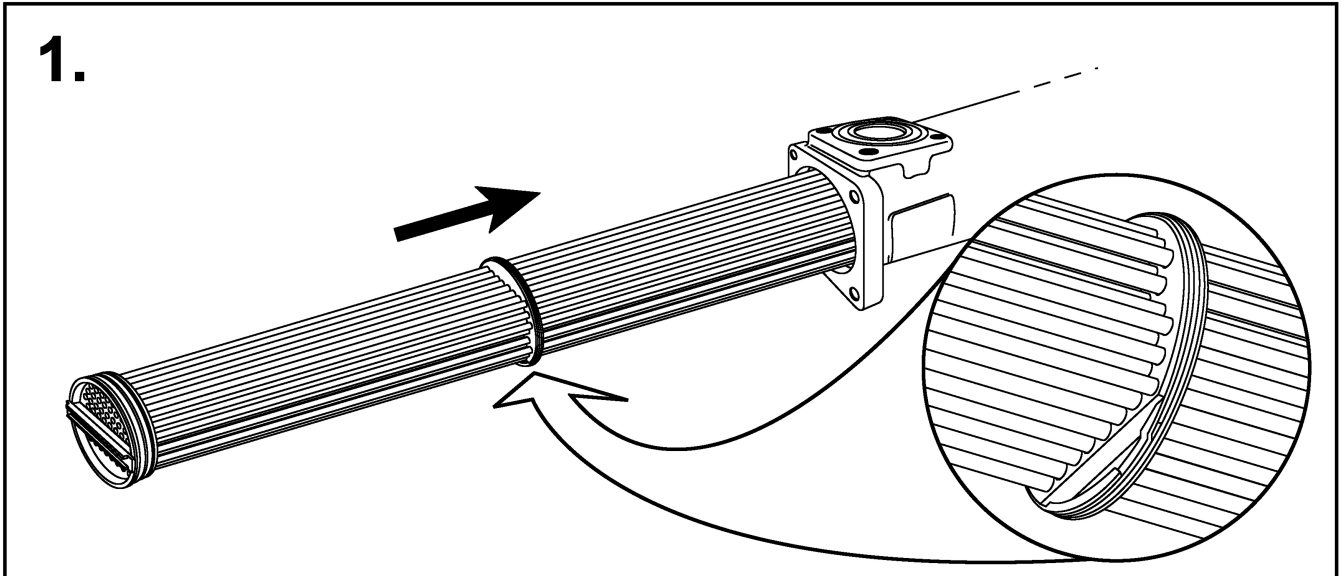
- **Leaky O-ring**

If a leakage is found between bonnet/cover and casing, an O-ring in the tube plate is defective. The emerging medium type defines at which groove of the tube plate the defect developed. In the case of a defect on the tube side, proceed as described under 'dismounting without removing the tube bundle'. In the case of a defect at the shell side, proceed as described under 'dismounting with removal of the tube bundle'. In this case, of course, the tube bundle does not need to be removed completely from the casing. Assemble the O-ring as described in 'Assembly'.

- **Repair/spare parts**

Repairs must only be carried out by specially trained personnel. However, we recommend to carry out any and all repairs at our factory. You can purchase spare parts directly from us by indicating the drawing number. Please contact our head offices or our sales office.

**(6) Appendices**



- Ergänzung zu Kapitel ‚Wartung/Demontage/Demontage ohne Herausziehen des Rohrbündels‘. Bei Zusammenbau müssen die Fixierplatten wieder an der richtigen Seite des Wärmetauschers eingebaut werden - siehe dazu die Bedienungsanleitung!

- Addition to chapter ‚Maintenance/Dismounting/Dismounting without remove the test bundle‘. During assembly the fixing plates have to be assembled to the correct side of the heat exchanger – see the instruction manual!

- En complément du chapitre « maintenance/démontage/démontage sans tirer vers l'extérieur le faisceau tubulaire ». Lors de l'assemblage les dalles de fixation doivent être encastrées dans le côté exact de l'échangeur de chaleur - voir à cet effet l'instruction d'exploitation.

- Complemento al capítulo “Mantenimiento/Desmontaje/Desmontaje sin extraer el haz de tubos”. Al realizar el montaje, las placas fijadoras se han de volver a colocar en el lado correcto del intercambiador de calor - ver para ello las instrucciones de servicio.

- Completamento del capitolo ‚Manutenzione/Smontaggio/Smontaggio senza estrazione del fascio tubolare‘. Nella fase di assemblaggio, le piastre di fissaggio devono essere rimontate sul corretto lato dello scambiatore di calore – vedi a questo proposito le istruzioni per l'uso!

- Suplemento do capítulo “Manutenção/Desmontagem/Desmontagem sem extração do feixe de tubos”. No momento da montagem, as placas de fixação deverão ser outra vez aplicadas no lado correcto do permutador térmico -- consulte o manual de instruções!

- Aanvulling bij het hoofdstuk ‚Onderhoud/demontage/demontage zonder uittrekken van de buizenbundel‘. Bij de montage moeten de fixeerplaten opnieuw aan de correcte zijde van de warmtewisselaar worden ingebouwd – zie ook de gebruiksaanwijzing!

- Komplettering av kapitel ‚Skötsel/demontage/demontage utan att dra ut rörpaketet‘. Vid sammansättningen måste fixerplattorna åter monteras på rätt sida av värmeväxlaren - se bruksanvisningen om detta!

- Supplement til kapittel ‚Vedlikehold/demontering/demontering uten uttrekking av rørbunt. Ved sammensetting må posisjoneringsplatene monteres på korrekt side av varmeveksleren - se bruksveiledningen!

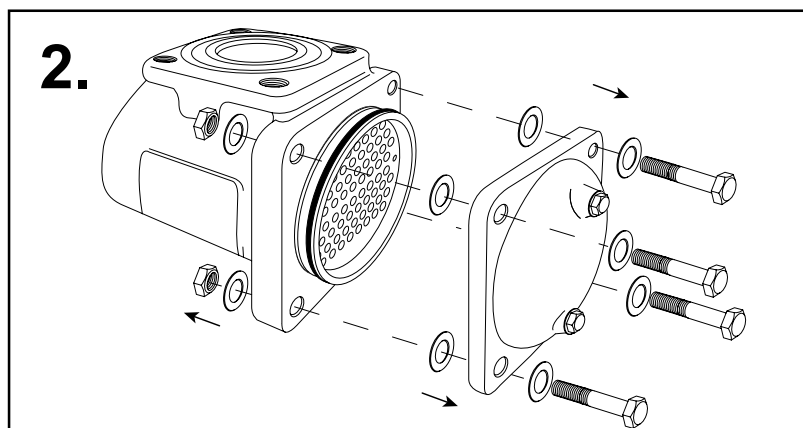
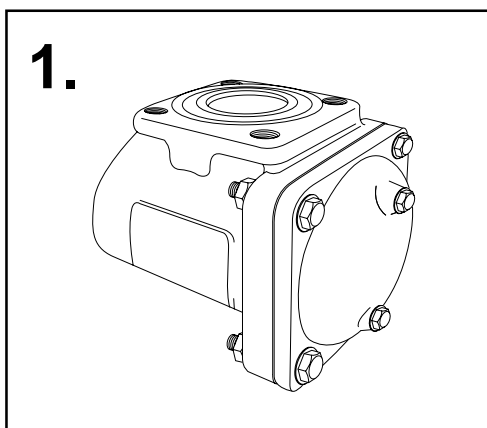
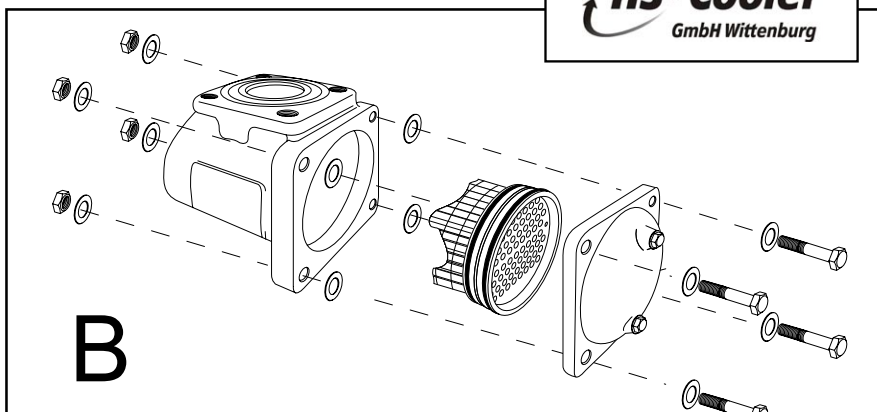
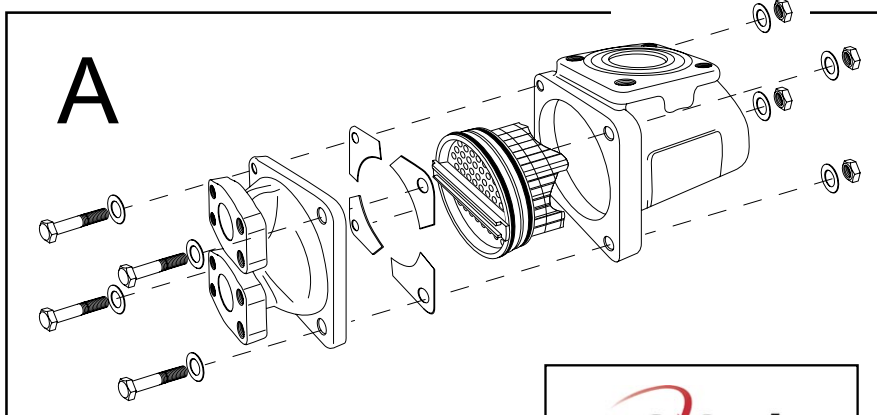
- Täydennys lukuun ‚Huolto/Purkaminen/purkaminen ilman putkinipun ulosvetämistä‘. Koottaessa on kiinnityslevyt asennettava taas oikein lämmönvaihtimen sivulle – katso käyttöohje!

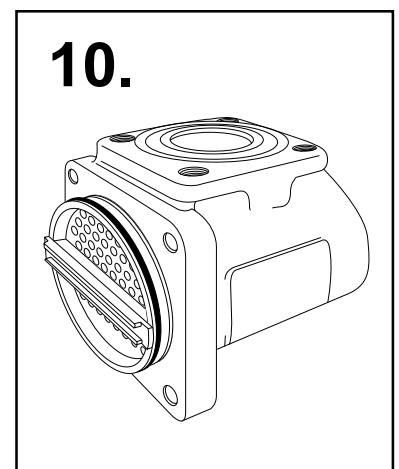
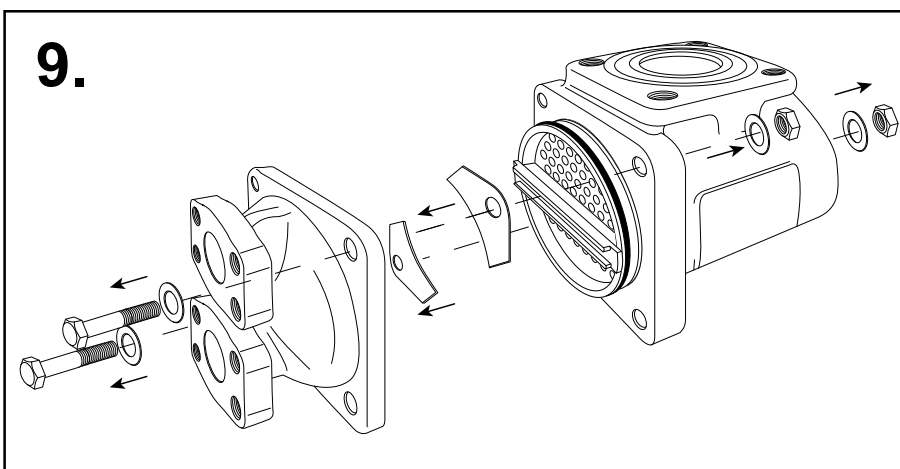
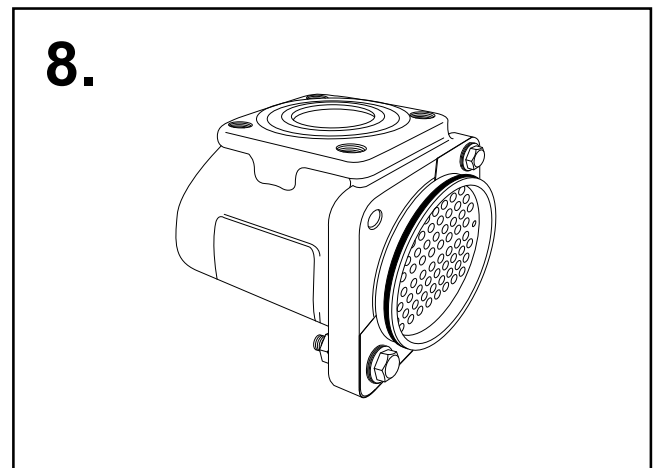
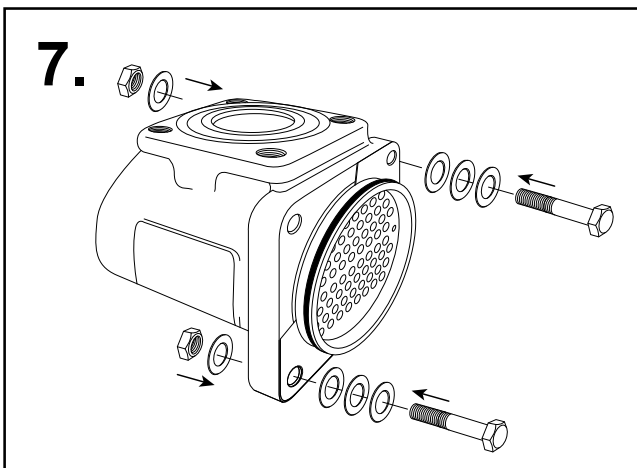
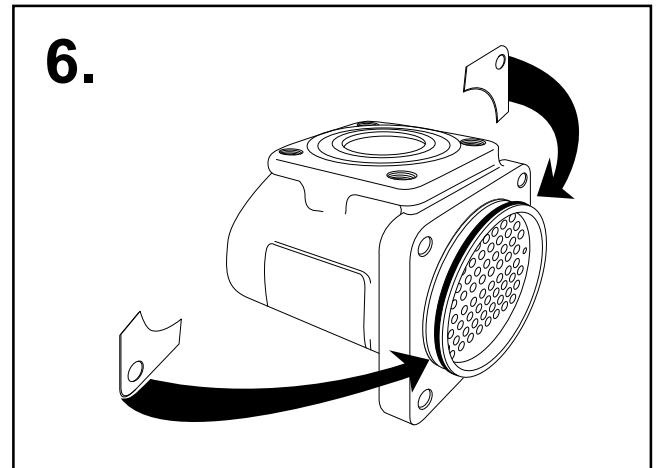
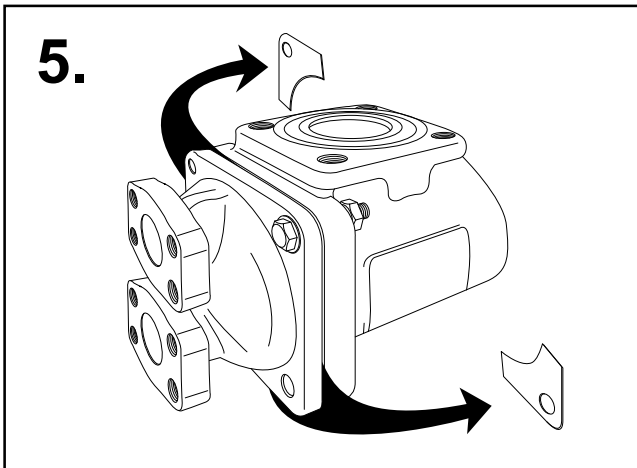
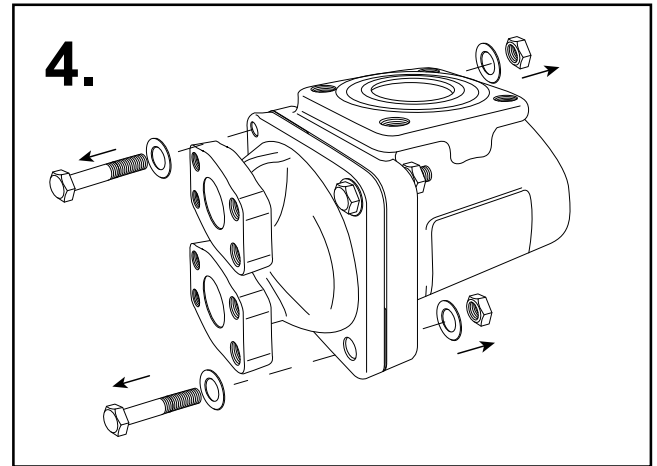
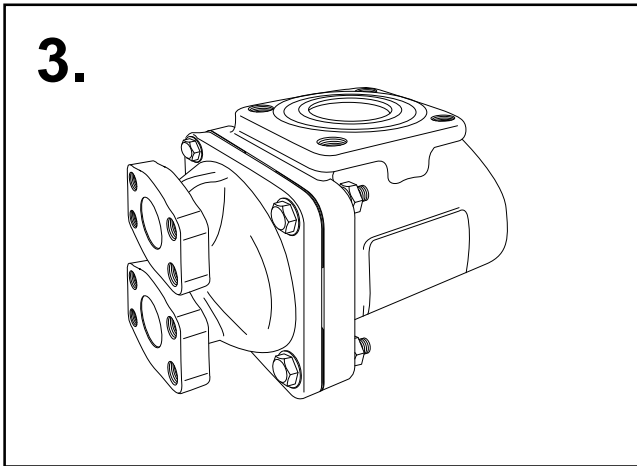
- Дополнение к главе ‚Техобслуживание/демонтаж/демонтаж без выдергивания пучка труб‘ - При сборке все фиксирующие пластины должны монтироваться в правильной стороне теплообменника – смотри касательно этого инструкции по эксплуатации!

- Uzupełnienie do rozdziału ‚Konserwacja/Demontaż/Demontaż bez wyciągnięcia wiązki rurowej‘. Przy montażu, płyty ustalające muszą zostać znowu wbudowane po właściwej stronie wymiennika ciepła – patrz: Instrukcja obsługi!

- Dodatek k poglavju ‚Vzdrževanje/Demontaž/demontaž brez izvlačenja snopa cevi‘. Pri sestavi je potrebno fiksne ploščice spet vgraditi nazaj na pravilni strani toplotnega izmenjevalnika – glejte k temu navodila za upravljanje!

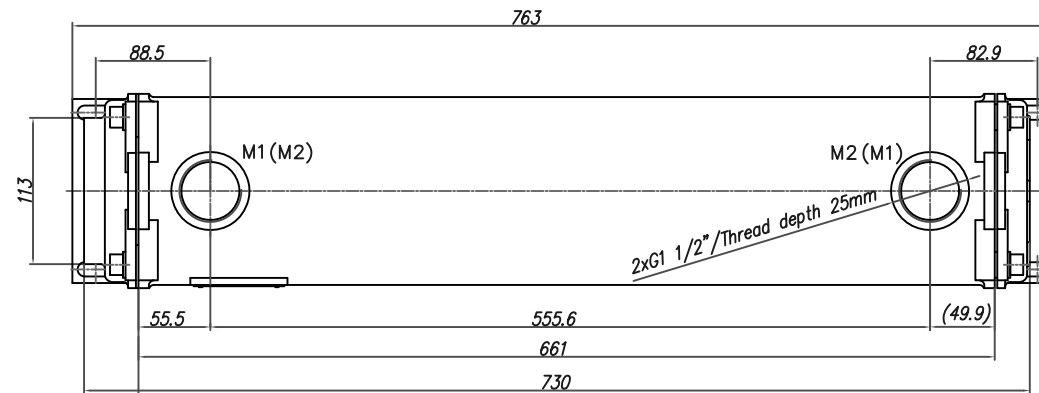
- Dodatek ku kapitole ‚Udržba/demontáž/demontáž bez vytáhovania zväzku trubiek‘. Pri montáži je potrebné fixačné dosky znowu namontovať na správnu stranu výmenníka tepla – pozri v tejto súvislosti návod na obsluhu!



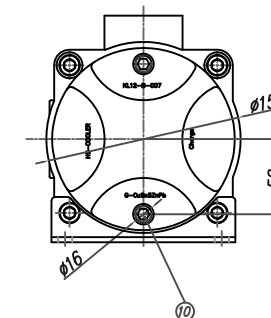
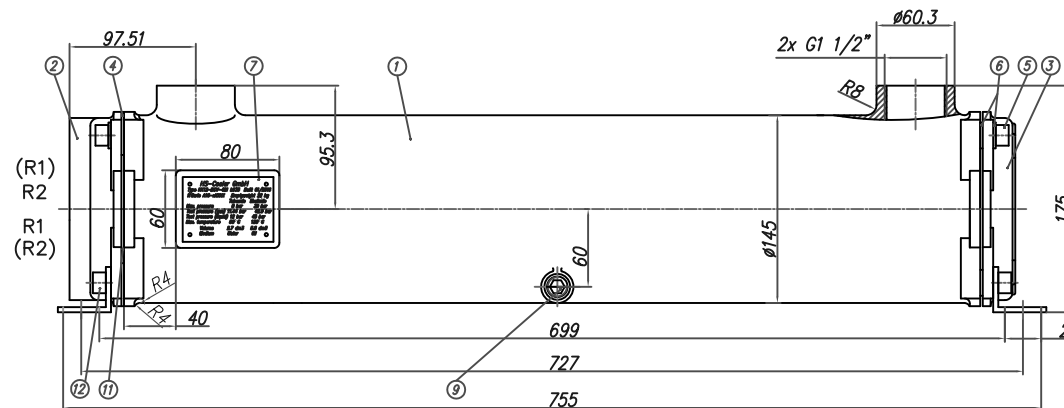
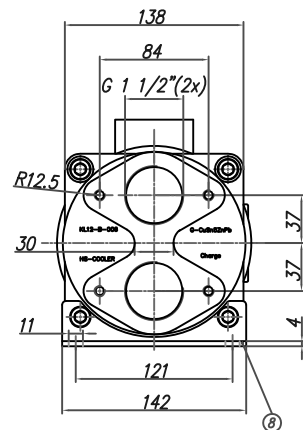


**(7) Drawing/Part List/Data Sheet**

	Shellside	Tubeside
Max. pressure, PS, bar	30	8
Test pressure, PT, bar	42,9	11,44
Max. temperature, TS, °C	120	80
Content	5,6 l	2,7 l
Connection (1=IN/2=OUT)	M1/M2=G 1 1/2" R1/R2=G 1 1/2"	
Medium	*	*
Weight (empty)	22 kg	
	acc. to data sheet	

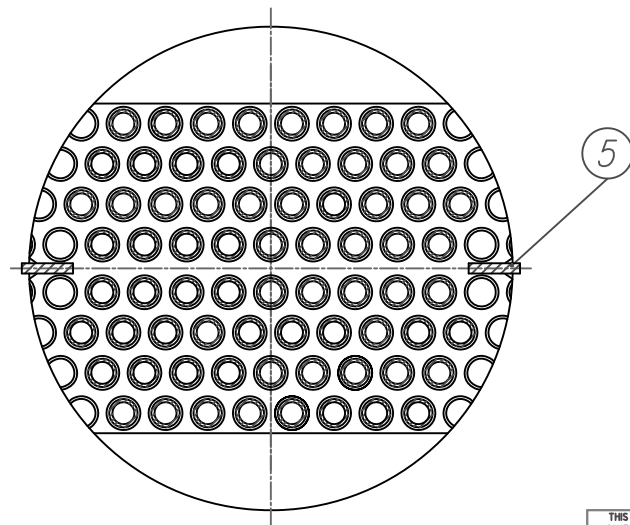
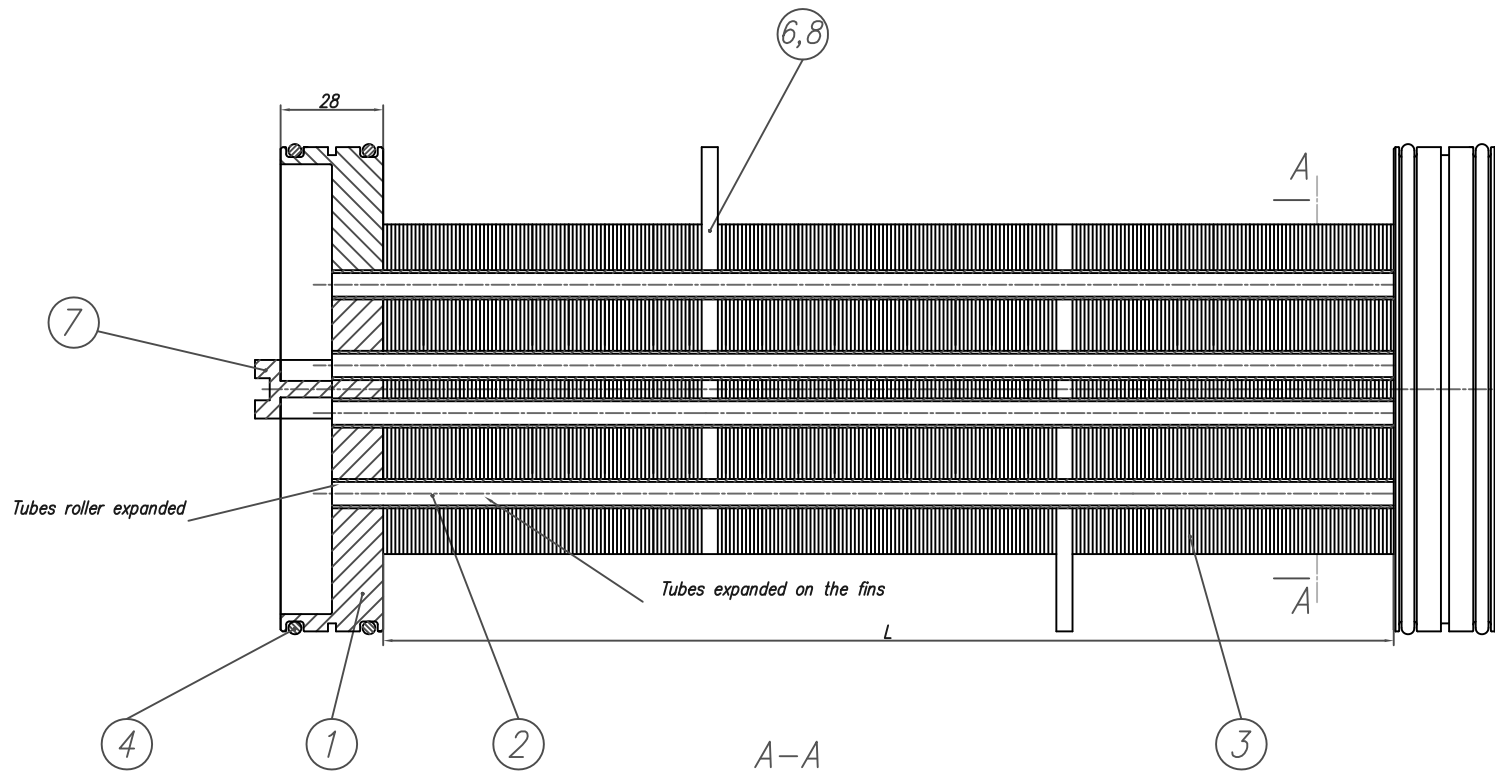


Required distance to  
remove the bundle > 691  
(removable to both sides)



Materials:  
 Tubes CuNi10Fe1Mn or 1.4404 AD-W2 or Titan Grade 1  
 Tubesheets CuAl10Fe or 1.4301 AD-W2 or Titan Grade 2  
 Bonnets CuSn5ZnPb  
 Shell Aluminium

THIS DRAWING AND ALL THE DATA CONTAINED HEREIN IS THE EXCLUSIVE PROPERTY OF HS-COOLER GMBH AND MAY NOT BE DISCLOSED TO OTHERS WITHOUT WRITTEN CONSENT.		SURFACE QUALITY	GENERAL TOLERANCE	Scale: 1:2	Weight: 22 kg
		ISO 2768-r	ISO 19908-r	Material: (-)	Format: A1
		DATE	NAME	Heat exchanger L635	
		DRAWN	GRADUATED		
		CHECKED	DATE	KK12-BCV-421(V1)	
		CLEAR	DATE	SHEET: 1	
		DATE	NAME	15A	
		DATE	NAME	AutCAD LT 2009 File: KK12-BCV-421(V1).dwg	



Number of Baffles (Pos. 6)  
according to Parts List of Tube Bundle

Water Partition (Pos. 7)  
according to Parts List of Tube Bundle  
(RL12-##-#1# No Water Partiton)  
(RL12-##-#2# 1 pc. Water Partition)

THIS DRAWINGS AND ALL THE DATA CONTAINED HEREIN IS THE EXCLUSIVE PROPERTY OF HS-COOLER GMBH AND MAY NOT BE DISCLOSED TO OTHERS WITHOUT WRITTEN CONSENT.				SURFACE QUALITY DIN ISO 1302		GENERAL TOLERANCE DIN 2768-m		SCALE: 1:1		(WEIGHT:)	
				DATE		NAME		(MATERIAL:)		Format: A2	
				DRAW 03.11.99		Garbe		Tube Bundle			
				CHECK 21.02.00		Graulich					
B Temperature Z		01.07.03		Gar				RL12-C#-###		SHEET: 1	
A Pressure Y and Z		01.02.02		Gar						1 Sh.	
SYM REV.RECORD		DATE		NAME		AutoCAD 2009		FILE: RL12-C#-###.dwg			



