OPERATING and INSTALLATION MANUAL

INDIRECT WATER HEATERS

OKC 300 NTR/1MPa
OKC 400 NTR/1MPa
OKC 500 NTR/1MPa
OKC 750 NTR/1MPa
OKC 1000 NTR/1MPa

OKC 300 NTRR/1MPa
OKC 400 NTRR/1MPa
OKC 500 NTRR/1MPa
OKC 750 NTRR/1MPa
OKC 1000 NTRR/1MPa

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Read carefully the below instructions prior to the installation of the heater!

Dear Customer,
The Works Cooperative of Dražice – Machine Plant, Ltd., would like to thank you for your decision to use a product of our brand.

The manufacturer reserves the right for engineering modification of the product.
The product is designed for permanent contact with drinkable water.

Guide Contents

Environment Type:

It is recommended to use the product in indoor environment with air temperatures from +2°C to 45°C and a max. relative humidity of 80%.

1. USE

Indirect stationary heaters lines NTR and NTRR are used for water heating in conjunction with another source of heating water, most often a gas boiler. The NTRR types combine two sources of heating water (gas boiler + a solar system or a heat pump). Their nominal performance provides sufficient amount of hot water for large flat units, premises, restaurants, and similar establishments. **In case of increased hot water consumption, these tanks heat water continuously, operating similarly to flow heaters.**

2. PRODUCT DESCRIPTION

The heater tank is welded from a steel sheet; it is entirely coated with hot water resistant enamel. Magnesium anode is added in the vessel as an additional protection against corrosion, which regulates the electric potential of the inside of the vessel and thus reduces the effects of corrosion. Inside the tank, hot and cold water and circulation pipes; a thermostat well; and either one or two spiral steel pipe heat exchangers (enamelled on the outside) are all welded on. ***The pipe heat exchanger is only intended for the heating circuit.***
On the heater side, there is a cleaning and revision opening ending with a 110 mm flange; the clearance including eight M8 bolts is 150 mm - 300 to 500 litres, for 180 mm clearance the spacing of ten bolts is 225 – 750 o 1000 litres. A heating unit with various output containing an operating and safety thermostat can be mounted in the opening. The NTR series heaters are equipped with a G 1 ½ " aperture for in-screwing an additional heating element. Such version is used when the heater is connected to either a solar system or a system with a heat pump, to heat water in the upper part of the heater to the temperature required. The tank is insulated with 50-80 mm of polyurethane freon-free foam. The tank shell is made of a steel sheet painted with a powder coating (the 400-500 L types only; other are in plastic) and the connecting parts are metal-coated.

3. IMPORTANT NOTICE

- Check and exchange the Mg anode regularly.
- **No stop valves can be put between the heater and the safety valve.**
- All hot water outputs must have a mixing battery.
- Before filling the heater with water for the first time, it is recommended to fasten the flange connection nuts of the tank.
- It is not allowed to handle the thermostat, aside from temperature resetting with a control button.
- All electric installation handling, adjustment and replacement of the regulation elements shall only be performed by an authorised service company.
- **The thermal fuse must not be turned off!** In case of thermostat defect, the thermal fuse interrupts electric power input to the heating element if the water temperature in the heater exceeds 90 °C.
- As an exception, the thermal fuse may also switch off due to water overheating caused by overheating the hot water heating system boiler (in case of a combined heater).
- **We recommend you operate the heater with one type of energy.** In case a solar system is connected to the bottom exchanger, it is necessary to connect a TJ 6/4" line element in the coupling above the heater for potential additional heating.

4. PUTTING THE HEATER INTO OPERATION

After connecting a heater to the water main, the hot water heating system, the electric network, and after testing its safety valve (based on the valve manual attached), the heater may be put into operation.

Procedure:
Check both water and electric installation; for combined heaters, check the installation to a hot water heating system.
Check proper placement of operating and safety thermostat sensors. The sensors must be inserted all the way in; first the operating and then the safety thermostat.
Open the hot water valve on the combination faucet
Open the cold water inlet valve to the heater.
As soon as the water starts running through the hot water valve, the heater is filled and the valve closes.
In case of a leakage (flange lid), we recommend fastening the flange lid bolts.
Fasten the electric installation cover.
In case of service water heating by electric energy, turn on the electricity (for combined heaters, the heating water valve at the heating water entry to heating insert must be closed).
When heating service water with electric energy from the hot water heating system, turn the electricity off and open the valves of heating water input and output, possibly de-aerate the exchanger. When commencing operation, flush the heater until the cloudiness in the water is gone.
Make sure to fill in properly the warranty certificate.

5.TECHNICAL DATA

Chart 1

Type		OKC 300 NTR/1MPa	OKC 400 NTR/1MPa	OKC 500 NTR/1MPa	OKC 750 NTR/1MPa	OKC 1000 NTR/1MPa
Tank capacity	l	300	385	485	750	975
Diameter	mm	670	700	700	910	1010
Weight	kg	108	123	173	253	337
Operating hot service water pressure	MPa	1	1	1	1	1
Operating heating water pressure	MPa	1,6	1,6	1,6	1,6	1,6
Max temperature of heating water	°C	110	110	110	110	110
Max temperature of hot service water	°C	95	95	95	95	95
Exchanger heat surface	m2	1,5	1,8	1,9	3,7	4,5
Exchanger performance at temperature drop 80/60°C	kW	35	57	65	99	110
Performance number accord.to DIN 4708	NL	8	15,2	19,1	30,5	38,8
Permanent TUV* performance	l/h	1100	1395	1590	2440	2715
TUV*heating time by exchanger at temperature drop 80/60°C	min	24	20	23	24	26
Heat losses	kWh/24h	1,86	2	2,3	3,6	3,9

*TUV - Hot service water 45°C

Chart 2

Type		OKC 300 NTRR/1MPa	OKC 400 NTRR/1MPa	OKC 500 NTRR/1MPa	OKC 750 NTRR/1MPa	OKC 1000 NTRR/1MPa
Tank capacity	l	295	380	470	750	995
Diameter	mm	670	700	700	910	1010
Weight	kg	124	144	183	245	315
Operating hot service water pressure	MPa	1	1	1	1	1
Operating heating water pressure	MPa	1,6	1,6	1,6	1,6	1,6
Max temperature of heating water	°C	110	110	110	110	110
Max temperature of hot service water	°C	95	95	95	95	95
Upper exchanger heat surface	m2	1	1,05	1,3	1,17	1,12
Lower exchanger heat surface	m2	1,5	1,8	1,9	1,93	2,45
Exchanger performance at temperature drop 80/60°C	kW	35/27	57/31	65/40	60/33	76/32
Performance number accord.to DIN 4708 upper exchanger	NL	2,9	3,4	5,9	6,2	7,1
Performance number accord.to DIN 4708 lower exchanger	NL	4,2	15,2	19,1	21	26
Permanent TUV performance* of upper exchanger	l/h	1100	1395	1590	1460	1490
Permanent TUV performance* of lower exchanger	l/h	670	740	970	815	780
TUV*heating time by exchanger at temperature drop 80/60°C	min	24/16	20/14	23/16	37/28	43/37
Heat losses	kWh/24h	1,68	2	2,3	3,6	3,9

*TUV - Hot service water 45°C

6. CONNECTING A HEATER TO A HOT WATER DISTRIBUTION

Implement the connection in accordance with the scheme on page 6.

Scheme of Heater's Water Inputs and Outputs

OKC 300 NTR/1MPa, OKC 400 NTR/1MPa
OKC 500 NTR/1MPa
OKC 750 NTR/1MPa, OKC 1000 NTR/1MPa

OKC 300 NTRR/1MPa, OKC 400 NTRR/1MPa,
OKC 500 NTRR/1MPa,
OKC 750 NTRR/1MPa, OKC 1000 NTRR/1MPa

The heater's cold water inlet must be fitted with T-fittings with a discharge valve for any discharge of water from the heater (see Section No. 11).
On the hot water input, each individually closable heater must have a test cock, backflow valve, safety valve, and a manometer.

7. SECURITY EQUIPMENT

Each hot service water pressure heater must have a safety valve with a membrane spring. Nominal clearance of safety valves is defined in the ČSN 06 0830 standard. The heaters are not equipped with a safety valve. The safety valve must be easily accessible, as close to the heater as possible. The input pipes must have at least the same clearance as the safety valve. The safety valve is placed high enough to secure dripping water drain by gravity. We recommend mounting the safety valve onto a branch pipe. This allows easier exchange without having to drain the water from the heater. Safety valves with fixed pressure settings from the manufacturer are used for the assembly. Starting pressure of a safety valve must be identical to the maximum allowed heater pressure, and at least 20% higher than the maximum pressure in the water main. If the water main pressure exceeds such value, a reduction valve must be added to the system. No stop valves can be put between the heater and the safety valve. During the assembly, follow the guide provided by the safety equipment manufacturer. It is necessary to check the safety valve each time before putting it into operation. It is checked by manual moving of the membrane from the seat, turning the make-and-break device button always in the direction of the arrow. After being turned, the button must click back into a notch. Proper function of the make-and-break device results in water draining through the safety valve outlet pipe. In common operation, such a check needs to be implemented at least once a month, and after each heater shutdown for more than 5 days. Water may be dripping off the drain pipe of the safety valve; the pipe must be open into the air, pointed down; environment temperatures must not drop below zero.

When draining the heater, use a recommended draining valve. First, close water input into the heater. Find necessary pressure values in the following table. For proper safety valve operation, a backflow valve must be mounted on the inlet pipes, preventing spontaneous heater draining and hot water penetrating back into the water main.

Safety valve starting pressure (Mpa)	Admissible operating water heater pressure (MPa)	Max pressure in the cold water pipe (Mpa)
0,6	0,6	do 0,48
0,7	0,7	do 0,56
1	1	do 0,8

When assembling the security equipment, follow ČSN 06 0830.

8. SPARE PARTS

- Magnesium anode
- contact thermometer

When ordering spare parts, give part name, type, and type number from the heater label.

9. HEATER CLEANING AND ANODE ROD EXCHANGE

Repetitive water heating causes limestone sediment on both the enamelled tank walls and chiefly the flange lid. The sedimentation depends on the hardness of water heated, its temperature, and amount of hot water consumed.

We recommend checking and cleaning the vessel from scale and eventual replacement anode rod after two years of operation. Anode life is theoretically calculated for two years of operation; however, it changes with water hardness and chemical composition in the place of use. Based on such an inspection, the next term of anode rod exchange may be determined. Have the company in charge of service affairs clean and exchange the anode. When draining water from the heater, the mixing battery valve for hot water must be open, preventing occurrence of under-pressure in the heater tank, which would stop the water from draining.

10. INSTALLATION REGULATIONS

Regulations and instructions that must be obeyed connect the heater

For the heating system
ČSN 06 0310 – Thermal systems in buildings – Designing and Installation
ČSN 06 0830 – Thermal systems in buildings – Protecting devices
to the electrical network
ČSN 33 2180 - Connecting of electric devices and appliances
ČSN 33 2000-4-41 - Low voltage electric installations Protective measure to ensure safety
- Protection from injury caused by electricity
ČSN 33 2000-7-701 - Low voltage electric installations: Single-purpose devices and devices in special premises - Premises with tub or shower
to the hot water heating system
ČSN 06 0320 - Thermal systems in buildings - Hot water preparation – Design and Project Engineering
ČSN 06 0830 – Thermal systems in buildings – Protecting devices
ČSN 73 6660 – Internal water conduits
ČSN 07 7401 - Water and steam for thermal energy equipments with working steam pressure up to 8 MPa
ČSN 06 1010 - Tank water heaters with water and steam heating; and combined with electric heating. Technical requirements. Testing.
ČSN 75 5455 – Calculation of water installations inside buildings
ČSN EN 12897 – Water supply – Indirectly heated closed tank-type water heaters

Both electric and water installation must follow and meet requirements and regulations relevant in the country of use.

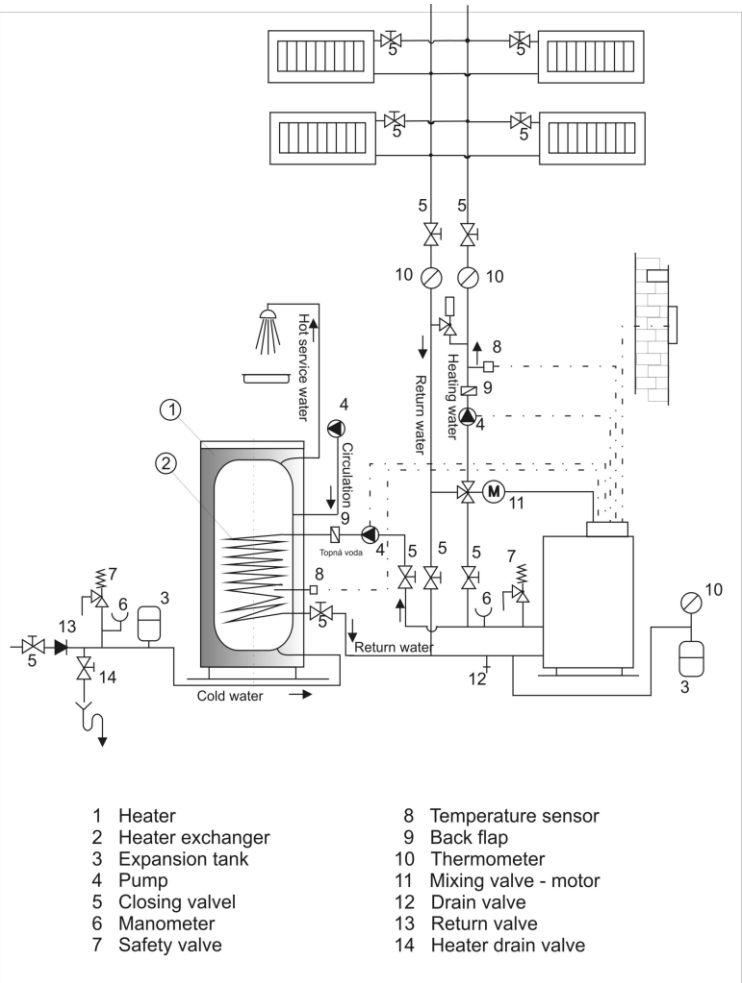
NOTICE

To prevent the occurrence of bacteria (e.g. Legionella pneumophila) within stack heating it is recommended, if absolutely necessary, to increase the temperature of hot service water periodically for a transitional period of time to at least 74 °C. It is also possible to make use of another way of disinfecting the hot water system.

11. CONNECTING A HEATER TO A HEATING SYSTEM

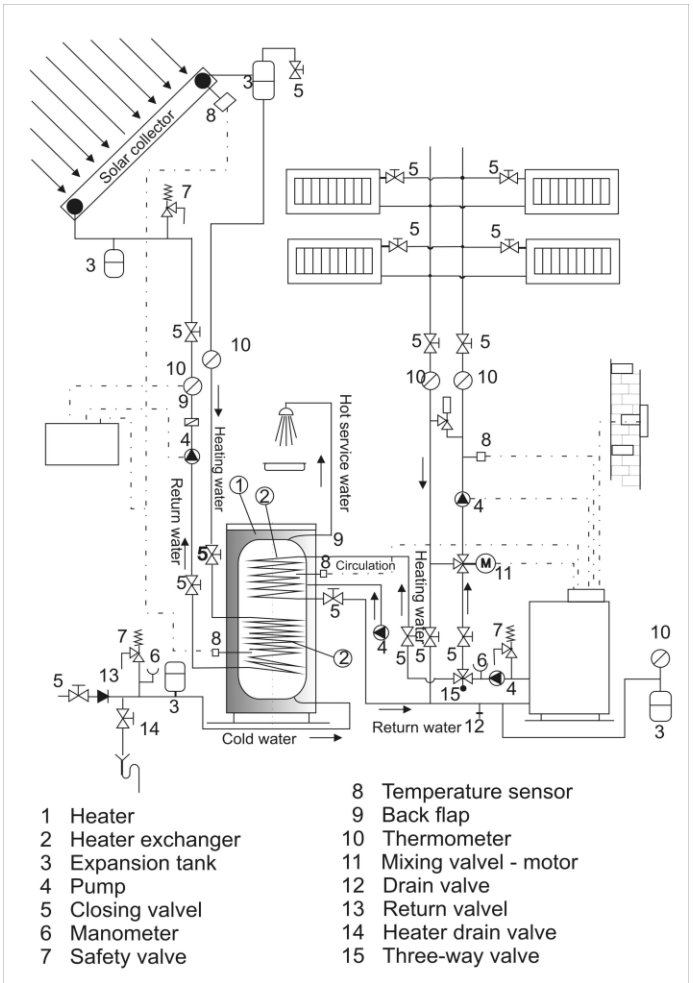
The heater is placed on the ground, next to the heating source, or in its vicinity. The heating circuit is connected to marked inputs and outputs of the heater exchanger; deaerating valve is mounted in the highest place. It is necessary to install a filter into the circuit in order to protect the pumps, the three-way valve, and backflow flaps, and the exchanger from sedimentation. It is recommended to flush the heating circuit before the assembly. All wiring connections must be properly insulated from heat. Should the system work with priority heating of hot service water using a three-way valve, always follow the installation instructions of the three-way valve's manufacturer.

OKC 300-1000 NTR
heated by a gas boiler with two pumps
Fig. 2



1 Heater
2 Heater exchanger
3 Expansion tank
4 Pump
5 Closing valvel
6 Manometer
7 Safety valve
8 Temperature sensor
9 Back flap
10 Thermometer
11 Mixing valve - motor
12 Drain valve
13 Return valve
14 Heater drain valve

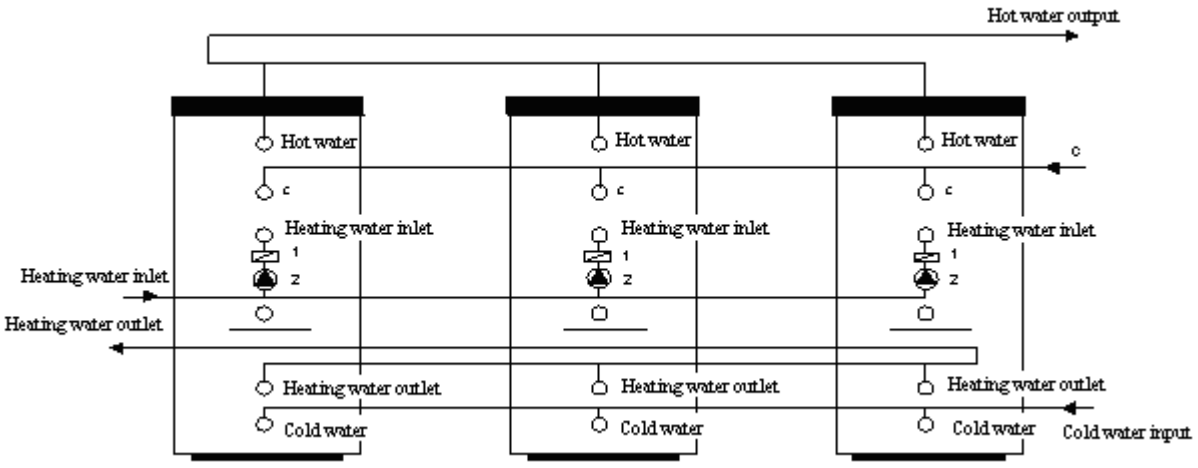
OKC 300-1000 NTRR
heated by a gas boiler and solar collectors
controlled by a three-way valve



1 Heater
2 Heater exchanger
3 Expansion tank
4 Pump
5 Closing valvel
6 Manometer
7 Safety valve
8 Temperature sensor
9 Back flap
10 Thermometer
11 Mixing valvel - motor
12 Drain valve
13 Return valvel
14 Heater drain valve
15 Three-way valve

An example of a group heater connection for steady hot service water consumption from all tanks using Tichelmann's method

Fig. 3



OV – Heating water
SV - Cold water
C - Circulation

TUV - Hot service water
1 - Back-pressure valve
2 - Pump

12. PERFORMANCE DATA

Chart 3

Type	Inlet heating water temperature	NL Power Factor at tsv = 10°C tsv = 10°C ttv = 45°C tsp = 50°C tsp = 60°C				Permanent hot water output tsv = 10°C ttv = 45°C ttv = 60°C								Flow in 10 minutes tsv =10°C ttv = 45°C tsp = 50°C tsp = 60°C		Heating water flow	Losses in 24 hrs
		HV	SV	HV	SV	SV		HV		SV		HV					
	°C	-	-	-	-	l/h	kW	l/h	kW	l/h	kW	l/h	kW	l/10min	l/10min	m3/h	kWh
OKC 300 NTRR/1MPa	50	1,1	1,8	-	-	431	17,1	259	10,4	-	-	-	-	111	-		
	60	1,3	2,2	1,6	2,6	594	24	348	14,1	446	18	261	10,6	127	152		
	70	1,7	2,7	2	3,3	818	33,6	468	19,1	614	25,2	351	14,3	145	174	2,7/2,7	1,68
	80	2,1	3,4	2,5	4,1	1086	44,2	629	25,9	815	33,2	472	19,4	166	199		
	90	2,7	4,4	3,2	5,3	1299	52,6	757	30,6	974	39,5	568	23	161	217		
OKC 400 NTRR/1MPa	50	3,2	5,3	-	-	493	19,6	305	12,2	-	-	-	-	221	-		
	60	3,7	6	4,4	7,2	679	27,4	410	16,6	509	20,6	308	12,4	243	292		
	70	4,2	6,9	5	8,2	935	38,4	551	22,5	701	28,8	413	16,9	268	321	3,0/3,0	2
	80	4,8	7,8	5,7	9,4	1241	50,5	740	30,5	931	37,9	555	22,9	294	353		
	90	5,8	9,6	7	11,5	1485	60,1	891	26	1114	45,1	668	19,5	316	379		
OKC 500 NTRR/1MPa	50	3,8	6,2	-	-	583	23,5	395	15,9	-	-	-	-	332	-		
	60	4,7	7,8	5,7	9,3	790	32	531	21,5	593	24	399	16,1	360	432		
	70	5,9	9,7	7,1	11,7	1070	43,5	715	29,2	803	32,6	536	21,9	390	468	3,0/3,0	2,3
	80	7,4	12,2	8,9	14,7	1430	58	962	39,6	1073	43,5	722	29,7	423	507		
	90	9	14,8	10,8	17,8	1720	70	1157	46,8	1290	52,5	868	35,1	450	540		

HV - upper exchanger tsv- cold water temperature
SV - lower exchanger ttv- hot water temperature
tsp- medium temperature of the heater

Chart 4

Type	Inlet heating water temperature	NL Power Factor at tsv = 10°C ttv = 45°C tsp = 50°C tsp = 60°C		Permanent hot water output tsv = 10°C ttv = 45°C ttv = 60°C				Flow in 10 minutes tsv =10°C ttv = 45°C tsp = 50°C tsp = 60°C		Heating water flow	Losses in 24 hrs
	°C	-	-	l/h	kW	l/h	kW	l/10min	l/10min	m3/h	kWh
OKC 300 NTR/1MPa	60	4,3	-	617	25,1	-	-	290	-		
	70	5,3	8,4	888	36,1	622	26,8	322	403		
	80	5,3	8,4	1100	47,4	816	39,8	358	448	2,7	1,68
	90	5,3	8,4	1451	59	1015	52,5	398	497		
OKC 400 NTR/1MPa	60	6,8	-	738	29,9	-	-	399	-		
	70	10,1	12,8	990	43,2	745	32,1	443	554		
	80	10,1	15,2	1394	56,7	976	47,6	492	615	3	2
	90	10,1	15,2	1733	70,4	1212	62,7	547	684		
OKC 500 NTR/1MPa	60	11,3	-	842	34,2	-	-	500	-		
	70	15,2	15,8	1210	49,2	847	36,7	556	694		
	80	15,2	19,1	1584	64,4	1109	54,2	617	771	3	2,3
	90	15,2	19,1	1965	79,9	1376	71,2	686	858		
OKC 750 NTR/1MPa	60	12,9	-	1279	52	-	-	817	-		
	70	15,4	25,6	1828	74	1364	56	848	1060		
	80	18,3	30,5	2437	99	2065	84	880	1100	5	3,6
	90	21	35	3046	124	2719	111	928	1160		
OKC 1000 NTR/1MPa	60	16,6	-	1424	58	-	-	862	-		
	70	19,7	32,8	2034	83	1518	62	908	1135		
	80	23,3	38,8	2712	110	2298	94	957	1197	6	3,9
	90	27	45	3390	138	3026	123	1003	1254		

HV - upper exchanger tsv- cold water temperature
SV - lower exchanger ttv- hot water temperature
tsp- medium temperature of the heater

NL Power Factor

Based on DIN, the expression of a normal flat is introduced for apartment houses in the FRG. Such a flat has four rooms; it is occupied by 3.5 people; it has a bathtub, a hand basin, and a sink. Flats of other sizes, number of occupants and different equipment are converted to normal flats using the relations given in the standard (NL). The situation in our apartment houses, massively built until the recent past, is similar.

Flats intended for 3 to 4 people are equipped identically with normal German flats. Smaller flats tend to have smaller bathtub or

a shower; larger, so-called two-generation flats tend to have an extra hand basin. Apartment buildings with luxury flats and high standard equipment, with higher number of fittings, or fittings equipped with high standard drain armatures, both hot water and heat energy needs must be adjusted.

13. PRESSURE LOSSES

Fig. 4

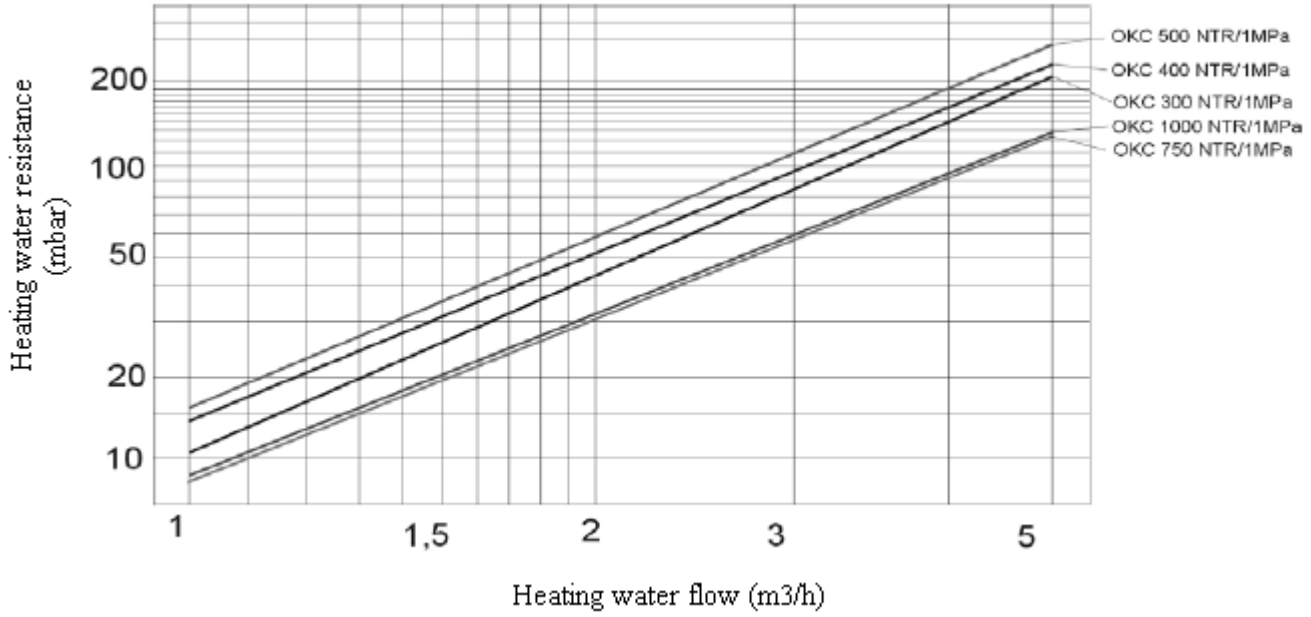
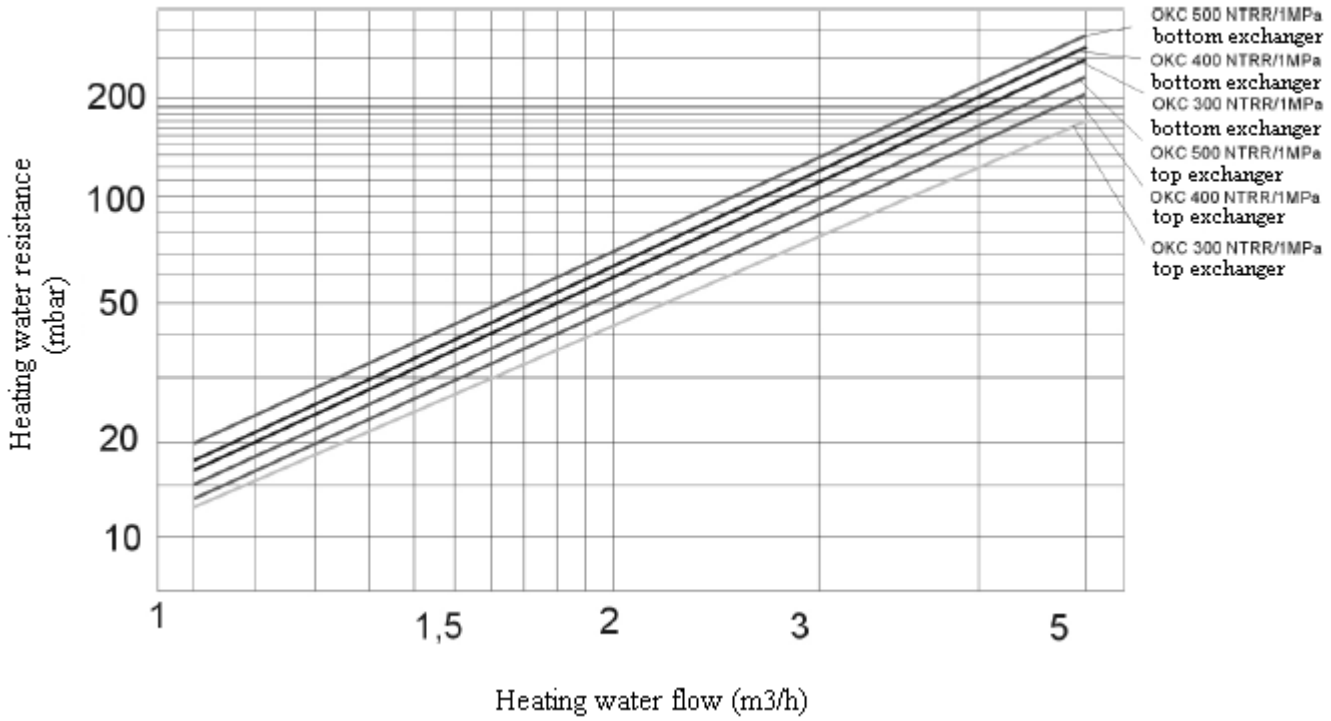


Fig. 5



Disposal of Packaging Material

For the package, in which the water heater was delivered, the service fee for back taking and utilisation of the packaging material was paid.
The service fee was paid in accordance with Act No. 477/2001 Coll., as amended by later regulations of EKO-KOM a.s.
Company client number is F06020274.
Dispose of the water heater packages in a location determined as the waste storage by the town.

Disposal of old water heater

After operation termination, disassemble and transport the dead and unserviceable heater to a waste recycling centre (collection yard), or to a bulk waste collection yard.

14. ASSEMBLY GUIDE FOR ZIP-FASTENER INSULATION

Only concerns heaters with the capacity of 750 and 1000 litres

Two people are enough to implement the assembly; three people are required for larger boilers; the assembly must be implemented in areas with the temperature of at least 18°C.

If the insulation includes tank bottom insulation, the latter must be mounted first. Consequently, the insulation is inserted around the boiler; pre-pressed insulation openings must be respected.

By slight pull in the direction of the arrows, pull both sides of the zip-fastener insulation so that (as shown on Fig. 6) the insulation does not slide and the insulation holes sit on the boiler inlets and outlets.

It must be secured that before closing, both halves of the zip-fastener were not further than 20 mm apart (see Fig.7). No foam shall get into the zip-fastener on closing.
After the insulation coat is properly mounted and the zip closure closed properly, insert the top lid made of foam material and cover it with either a foil cover or a plastic lid. It is also possible to glue the outlet caps to connection places (see Fig. 8). The insulation may only be stored in dry storage places.
We take no responsibility for damages caused by not respecting this guide.

Fig. 6

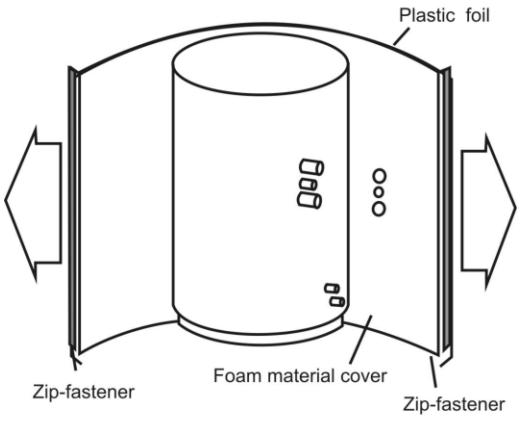


Fig. 7

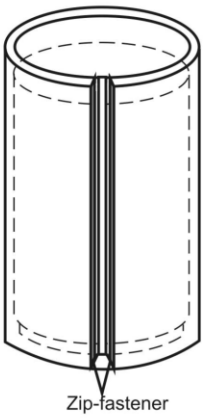
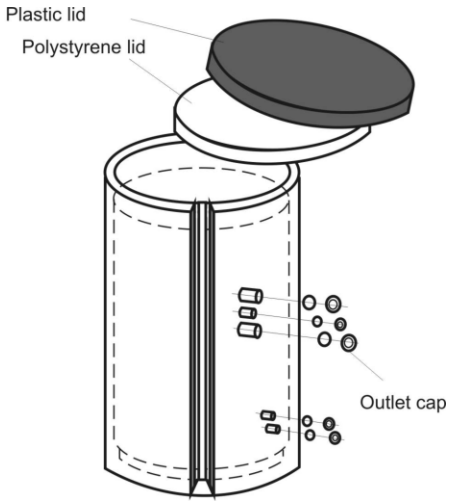
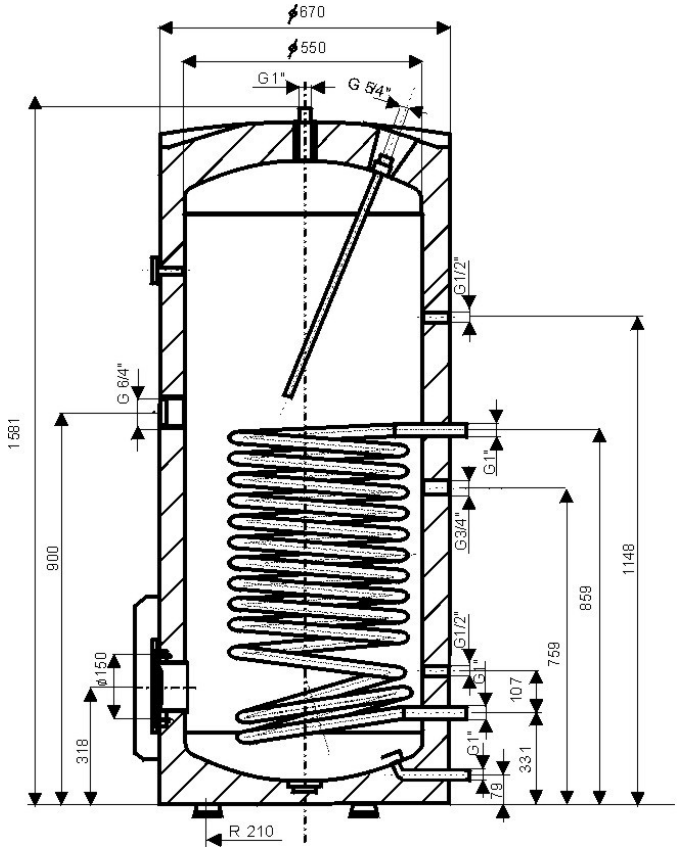


Fig. 8



15. CONSTRUCTION HEATER PARAMETERS

OKC 300 NTR/1MPa,
Fig. 9



OKC 300 NTR/1MPa

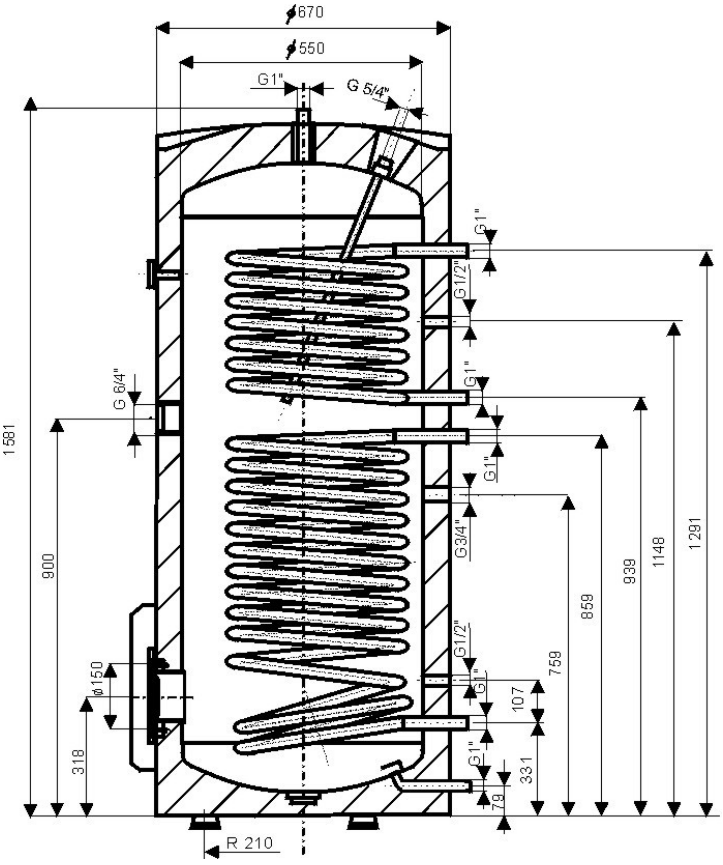
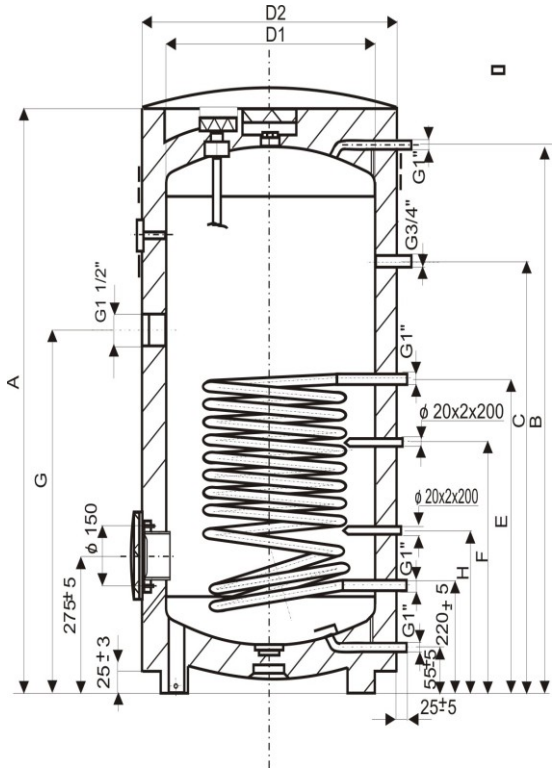


Fig. 10

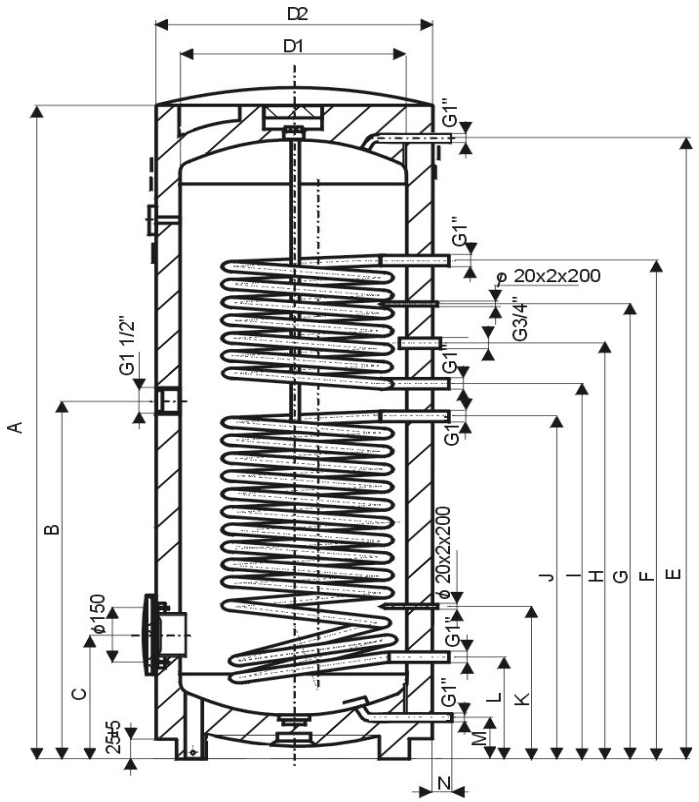
OKC 400 NTR/1MPa, OKC 500 NTR/1MPa



	OKC 400 NTR/1MPa	OKC 500 NTR/1MPa
A	1591	1921
B	1523	1853
C	1111	1264
D1	597	597
D2	700	700
E	909	965
F	684	695
G	957	1040
H	369	388

Fig. 11

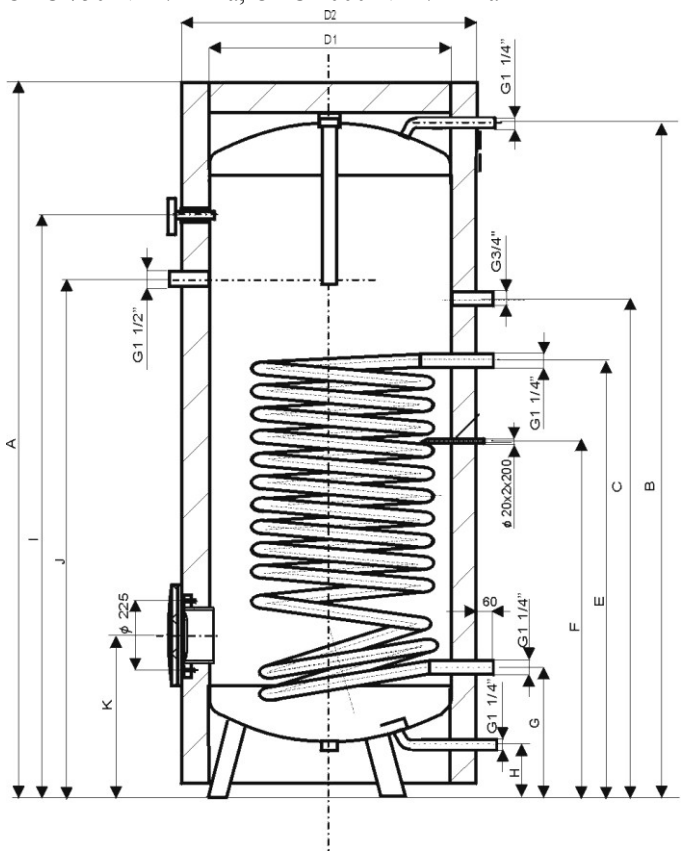
OKC 400 NTRR/1MPa, OKC 500 NTRR/1MPa



	OKC 400 NTRR/1MPa	OKC 500 NTRR/1MPa
A	1631	1961
B	957	1040
C	275	275
D1	597	597
D2	700	700
E	1523	1853
F	1354	1604
G	1223	1409
H	1111	1264
I	1006	1114
J	909	965
K	369	380
L	220	220
M	55	55
N	25	25

Fig. 12

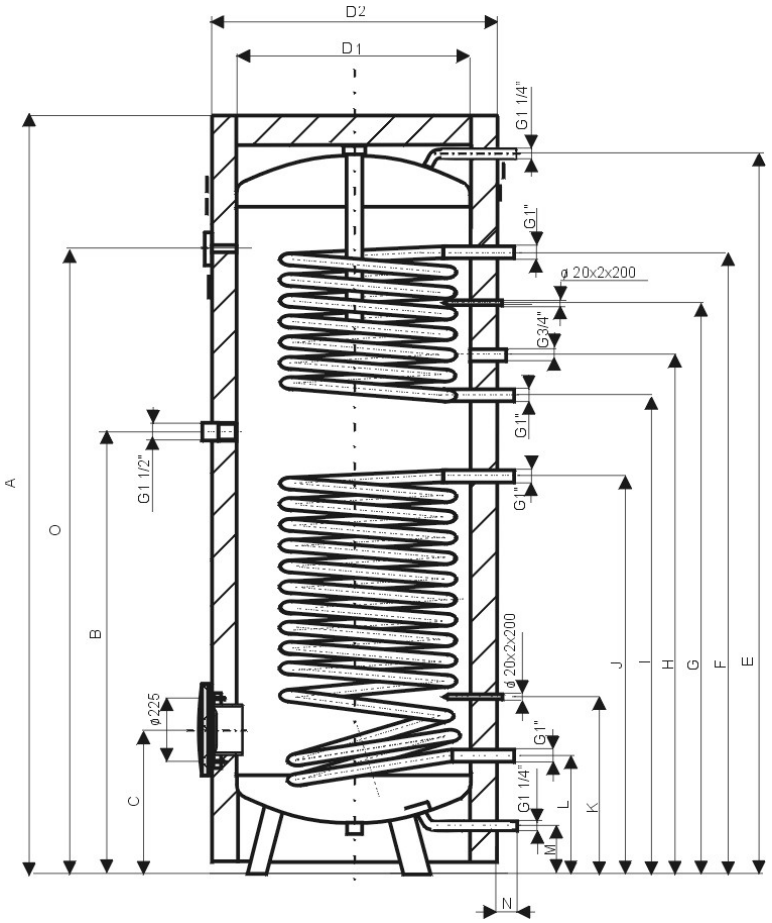
OKC 750 NTR/1MPa, OKC 1000 NTR/1MPa



	OKC 750 NTR/1MPa	**OKC 1000 NTR**/1MPa
A	1998	2025
B	1887	1905
C	1417	1490
D1	750	850
D2	910	1010
E	1314	1324
F	1079	1087
G	288	295
H	99	103
I	1643	1672
J	1005	1025
K	375	385

Fig. 13

OKC 750 NTRR/1MPa, OKC 1000 NTRR/1MPa



	OKC 750 NTRR/1MPa	**OKC 1000 NTRR**/1MPa
A	1998	2025
B	1005	1025
C	378	387
D1	750	850
D2	910	1010
E	1887	1905
F	1467	1423
G	1375	1375
H	1242	1243
I	1151	1153
J	830	884
K	402	411
L	297	297
M	99	103
N	55	45
O	1643	1672