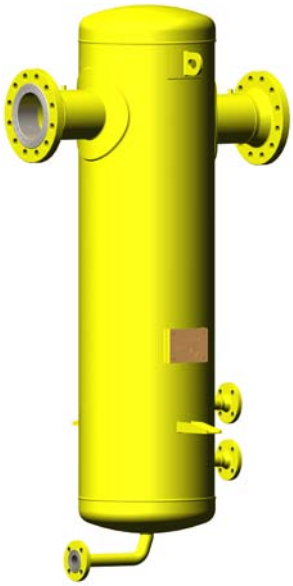
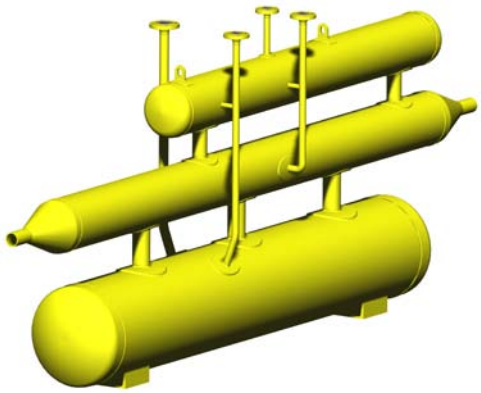
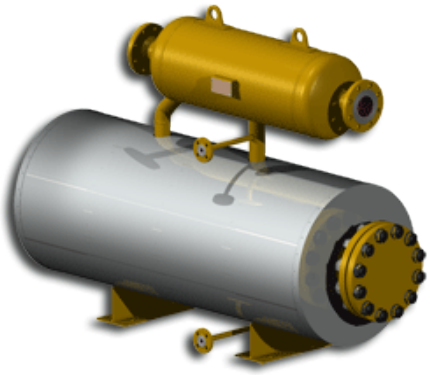
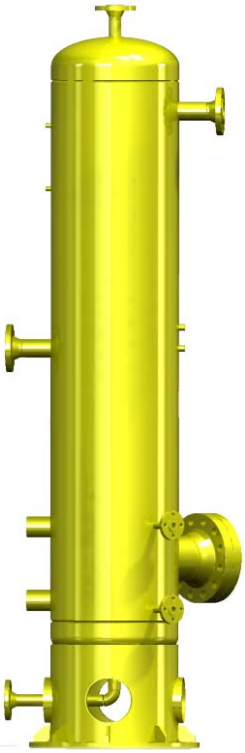
TOTALGAZ INDUSTRIE

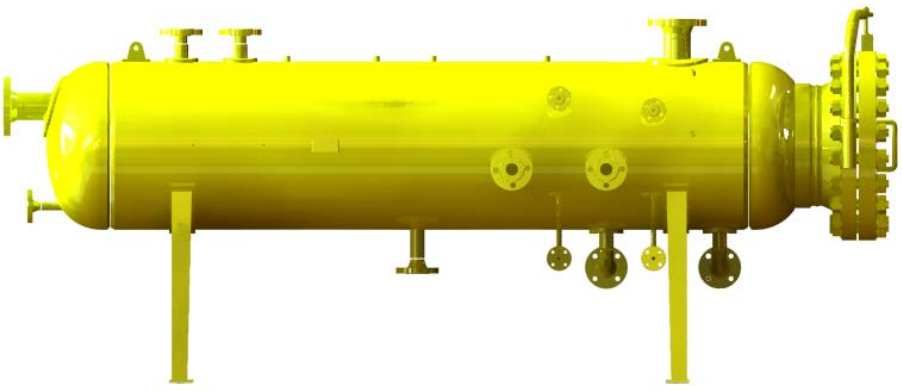
GAS SEPARATORS STG 650











Introduction

STG 650 gas separators are mechanical devices designed to collect and remove solid and liquid impurities from the gas flow, in order to prevent the tubes, equipment, and devices against damages caused due to particle contaminated gas.

Considering the operating conditions, STG 650 gas separators can be inner provided with deflector, demister, coalescer plates, vane plates, axial cyclone, multicyclone.
On request, Totalgaz Industrie can provide gas separator custom solutions in order to meet the most demanding client requirements.
Every gas separator is manufactured in accordance with European *Pressure Equipment Directive* (PED), ASME Code for *Unfired pressure vessels*, ISCIR (State Inspection for Control of Boilers, Pressure Vessels and Hoisting Equipment) or with any other local, state, and regional provisions specified by the client.

Depending on the provided inner equipment, STG 650 separators can be used in natural gas regulating – metering stations, gas delivery stations, gas dehydration units, compressor stations, etc. in order to collect solid and liquid impurities.
On demand, in order to ensure higher operational safety, the separators can be equipped with:

- Level indicator to monitor liquid level from the collection chamber;
- Level indicators / transmitters;
- Minimum - minimorum level signal;
- Maximum – maximorum level signal;
- Automatic drain of impurities;
- Safety valve;
- Thermal insulation;
- Pressure gauge;
- Differential pressure gauge;
- Thermometer;
- Collection chamber electrical heating;
- Drain pipelines electrical heating.

Advantages of STG 650 separators

- high separation efficiency and low pressure drop;
- excellent liquid and solid particles removal;
- require virtually no maintenance;
- excellent operational reliability due to the high quality materials, accurate processing and regular control;
- multiple applications;
- size range providing proper solution to any problem mentioned
- design based on international standards governing this type of products, ISO 9001 certified production system.

Technical characteristics

Table 1 – Technical characteristics

Separator type		
STG 651	**Inlet / outlet diameter**	DN 25 ÷ DN 500
	Design pressure [bar]	PN 6, 16, 25, 40, 64, 100
STG 652	**Inlet / outlet diameter**	DN 25 ÷ DN 300
	Design pressure [bar]	PN 6, 16, 25, 40, 64, 100
STG 653	**Inlet / outlet diameter**	DN 25 ÷ DN 300
	Design pressure [bar]	PN 6, 16, 25, 40, 64, 100
STG 654	**Inlet / outlet diameter**	DN 80 ÷ DN 600
	Design pressure [bar]	PN 6, 16, 25, 40, 50, 64, 80, 100, 150, 250
STG 655	**Inlet / outlet diameter**	DN 80 ÷ DN 600
	Design pressure [bar]	PN 6, 16, 25, 40, 50, 64, 80, 100, 150, 250
Working fluid		Natural gas or other non-corrosive gases
Ambient temperature [^{o}C]		-20 ÷ 80 (optionally, -30 ÷ 80)*
Working fluid temperature [^{o}C]		-10 ÷ 60 (optionally, -20 ÷ 60)*

*On request, lower temperatures can be considered.

Materials

Table 2 – Materials employed for STG 650 separators

Part	Material
Body	**Carbon steel**
Flange	**Carbon steel**
Cover	**Carbon steel**
Connection	**Carbon steel**
Gaskets	**NBR, Viton, PTFE,**
Vanes	**Stainless steel, carbon steel**
Cyclones	**Cast iron, stainless steel, carbon steel**

Custom design separators can be manufactured using materials upon request.

Constructive variants

Centrifugal separators

Operation

Centrifugal separator uses centrifugal force to remove solid and liquid particles out of the gas stream. This force speeds up the settling and the coalescence of fine liquid droplets and makes possible the solid particle separation. The gas stream enters the inlet connection and flows through the axial cyclone. The solid and liquid particles separate from gas under the action of the centrifugal force and are collected at the lower part of the vertical separator body, respectively in the collection chamber placed under the horizontal separator body. The clean gas is exhausted through the outlet connection.

Efficiency

Centrifugal separators manufactured by **Totalgaz Industrie** provide a high separation rate of both liquid and solid particles. More than 99 % of the particles larger than 12 micrometers are removed from the gas stream.

Multicyclone separators

Operation

The multicyclone separators are designed to remove both solid and liquid particles from the gas stream, providing high efficiency over a wide range of flows and pressures. The separators operate on centrifugal force principle. The solid or liquid particles from the gas stream enter the multicyclones with higher inertia than of the gas molecules. The multicyclones create a reverse flow cyclonic vortex and the centrifugal strength forces the particles on the cyclone wall, the solid impurities fall down to the bottom, while the liquid droplets coalesce until they get a sufficient size to drop by their own weight. The liquid drains down to a sump while the clean gas flows through outlet nozzle.

Efficiency

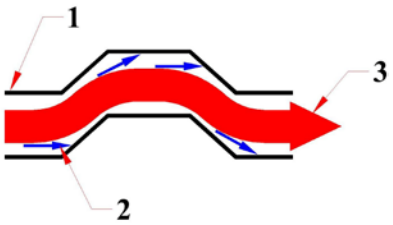
Totalgaz Industrie multicyclone separators ensure the following separation rates:

- 99.9 % separation of solid particles larger than 10 microns;
- 99.5 % separation of liquid particles larger than 3 microns.

Vane type separators

Operation

The working principle is based on the law of gravity and centrifugal force principle. As schematized in Figure 5, the mist laden gas passes through the parallel vane plates and is forced to change direction several times. As the gas changes direction, inertia or kinetic energy maintain the straight flow path of the liquid droplets and determine some droplets to strike adjacent vanes. There, they are held by surface forces and coalesce with other droplets. The agglomerate liquid drains down vane surface to a sump.



1 – vane plate;

2 – liquid droplets striking the plates;

3 – gas stream, changing directions between plates.

Figure 1 – Gas and mist flow (top view)

Efficiency

Vane type separators manufactured by **Totalgaz Industrie** ensure 99.9% separation efficiency for liquid particles larger than 3 microns.

Three - phase separators

Operation

The three-phase separator operation is indicated in Figure 2. The well effluent enters the separator body through inlet connection and reaches the deflector (1). The impact causes initial separation of the liquid from the gas flow and fluid flow atomization that cause faster droplet separation. The liquid is forced to flow to the accumulation area and the large droplets from the gas flow start to fall due to the centrifugal force, as well as due to sudden speed decrease caused by the passage area extension.

The low gas density and the small droplets float in the upper side of the vessel, while the liquid phases accumulate at the lower part. Natural separation takes place between water and condensate due to density. A weir plate (7) separates the water collecting area from that of the condensate. The weir plate (7) can be of adjustable height and therefore, the three-phase separator can accommodate to different well effluent phase concentrations.
Then, the fluid passes between the coalescer plates (3) that forward the liquid droplets to coalesce for centrifugal separation.
In order to ensure the foam breaking of the liquid phase, the separator is fitted with a straightening plate (4). Prior to leaving the vessel, the gas flows the demister (5) that filters the small residual droplets from the flow. The gas pressure stays constant due to a pneumatic pressure retroregulator.
The water and liquid condensate are discharged through specially provided connections. The purging is performed by means of pneumatic control valves actuated by pneumatic level controllers. Liquid levels can be monitored due to visual magnetic level indicators.

Once the phases are separated and discharged from the vessel, they can be measured.

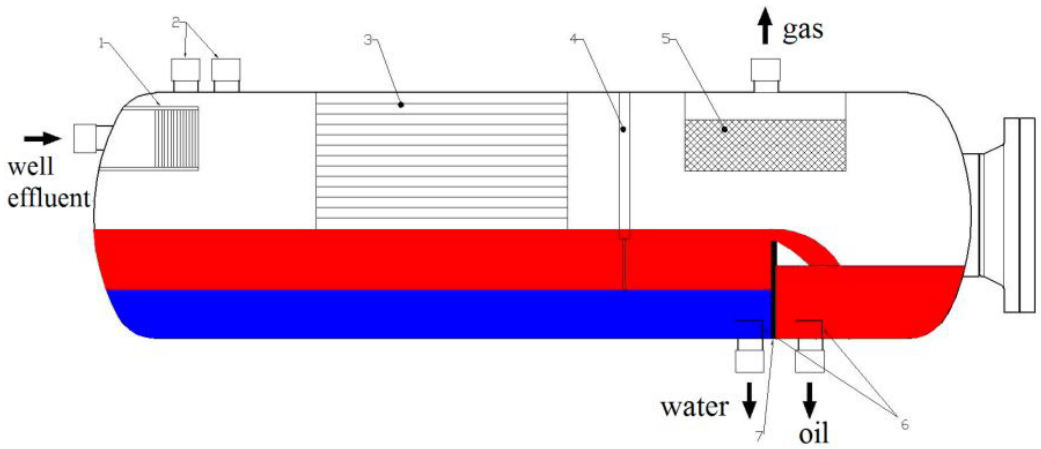


Figure 2 – Three –phase separator vessel

1 - deflector; 2 – safety valve connections; 3 – coalescer plates; 4 – straightening plate; 5 - demister; 6 – flow regulators; 7 – weir plate.

Other separators

Large size separators with virtually unlimited configuration options, suitable for any instrumentation, piping or orientation arrangement can be designed and produced by **Totalgaz Industrie**. This includes fully equipped two-phase and three-phase separators, as well as test separators. They can be mobile skid mounted, truck or trailer mounted, stationary, etc.

Configuration options

Totalgaz Industrie gas separators are available in a wide range of configurations. The customary options of vertical separators are specified in Figure 3, while of the horizontal separators are indicated in Figure 4. Other configurations can be manufactured on request, as well as customer - specific separators, designed and manufactured for any application, size, material and pressure.

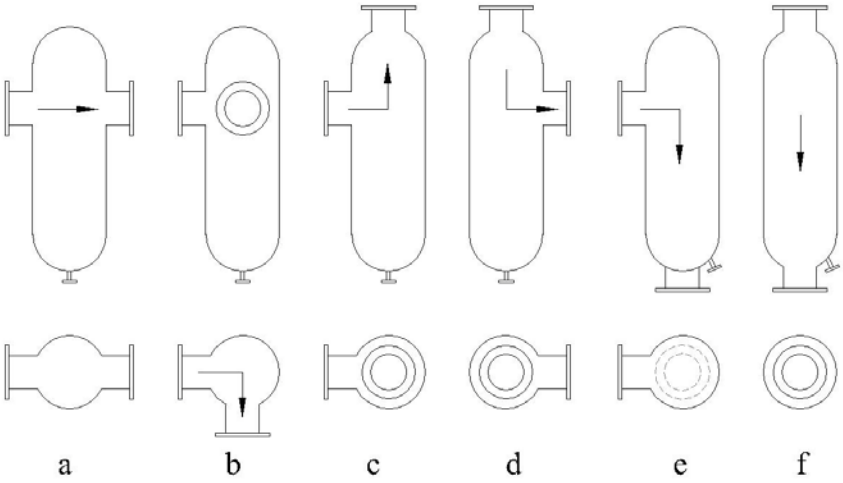


Figure 3 – Optional configurations of vertical separators

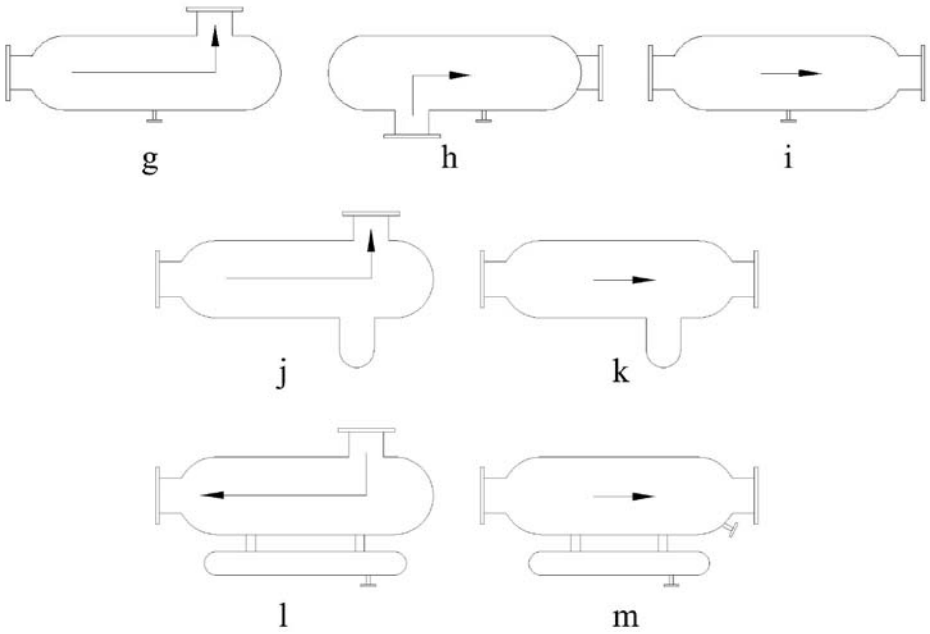


Figure 8 – Optional configurations of horizontal separators

j, k, l, m – with liquid collector

In order to meet client requirements regarding installation, **Totalgaz Industrie** gas separators are available in 3 variants of base support arrangements (Figure 5).

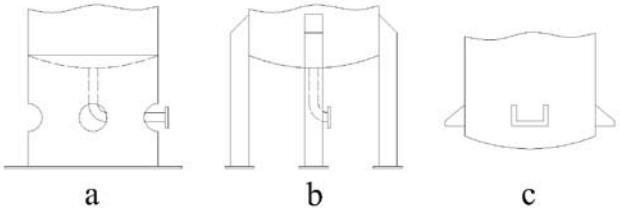
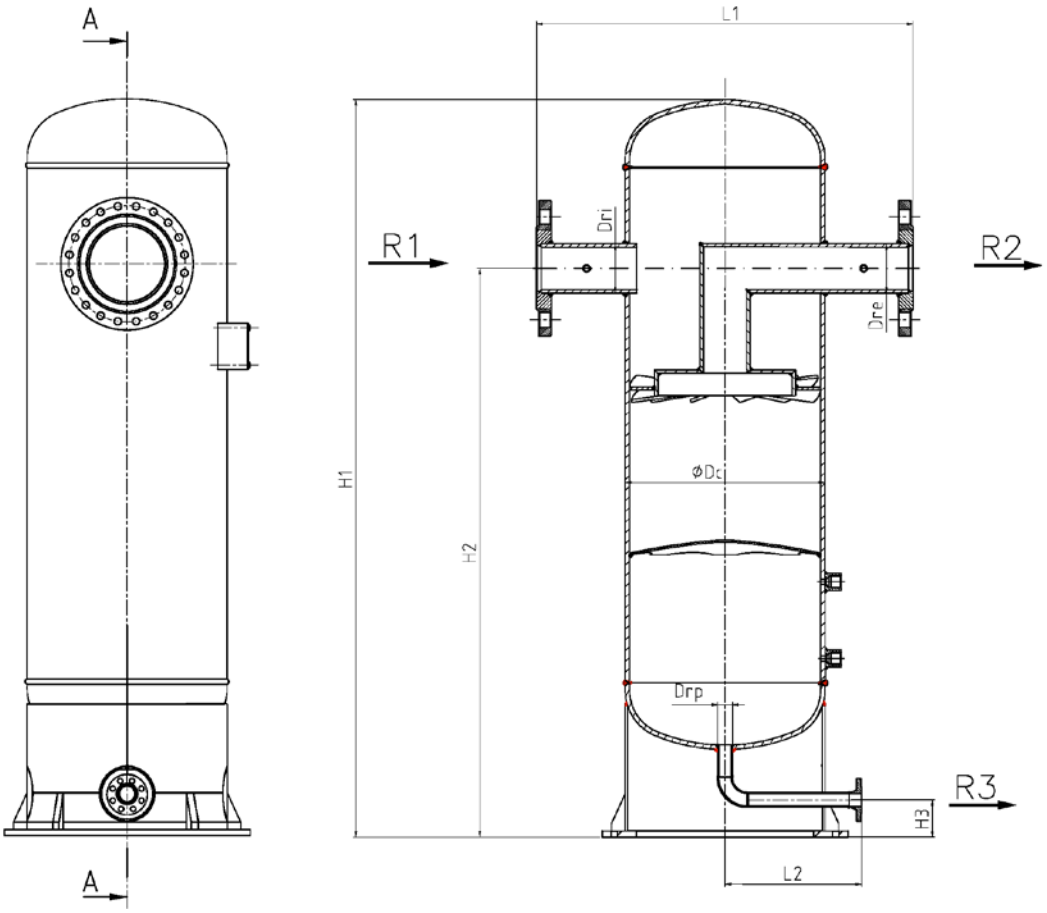


Figure 5 – Base supports

a – „skirt" and base ring support; b – saddle support; c – „lug" support

Overall dimensions

STG 651



Separator model	Dri [mm]	Dre [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Dc [mm]	Drp [mm]	L1 [mm]	L2 [mm]
STG 651	25	25	730	600	150	139.7	33.7	400	160
	32	32	730	600	150	139.7	33.7	400	160
	40	40	760	630	150	139.7	33.7	415	170
	50	50	770	630	150	168.3	33.7	450	180
	65	65	800	630	150	193.7	33.7	490	190
	80	80	950	760	200	219.1	60.3	520	220
	100	100	1000	820	200	273	60.3	610	240
	125	125	1200	980	200	323.9	60.3	670	270
	150	150	1300	1000	200	355.6	60.3	710	300
	200	200	1600	1220	200	508	88.9	900	390
	250	250	2000	1540	200	610	88.9	1035	430
	300	300	2300	1770	230	711	114.3	1170	500
	350	350	2500	1900	230	813	114.3	1260	560
	400	400	2700	2100	230	914	114.3	1390	640
	500	500	3000	2200	230	1118	114.3	1620	740

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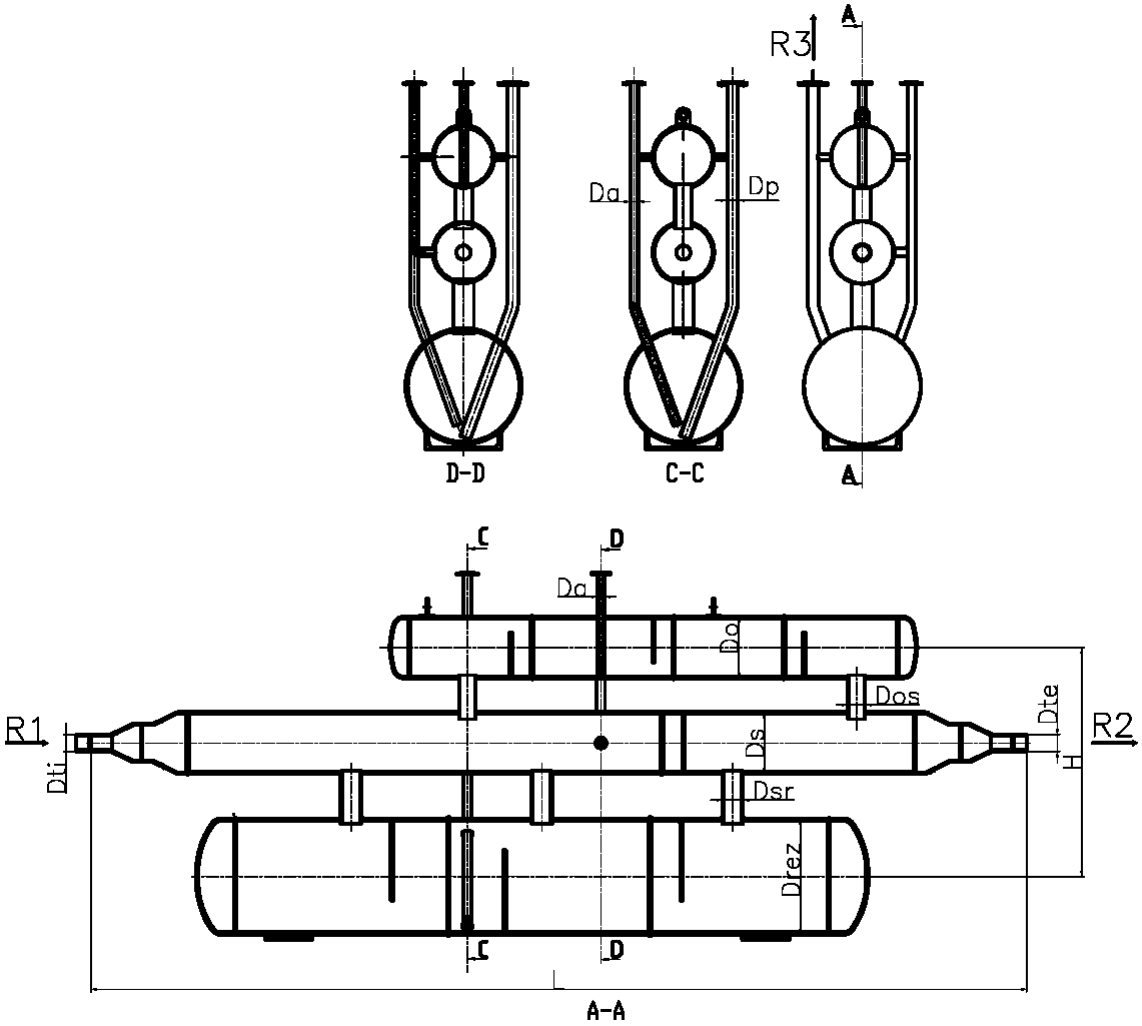
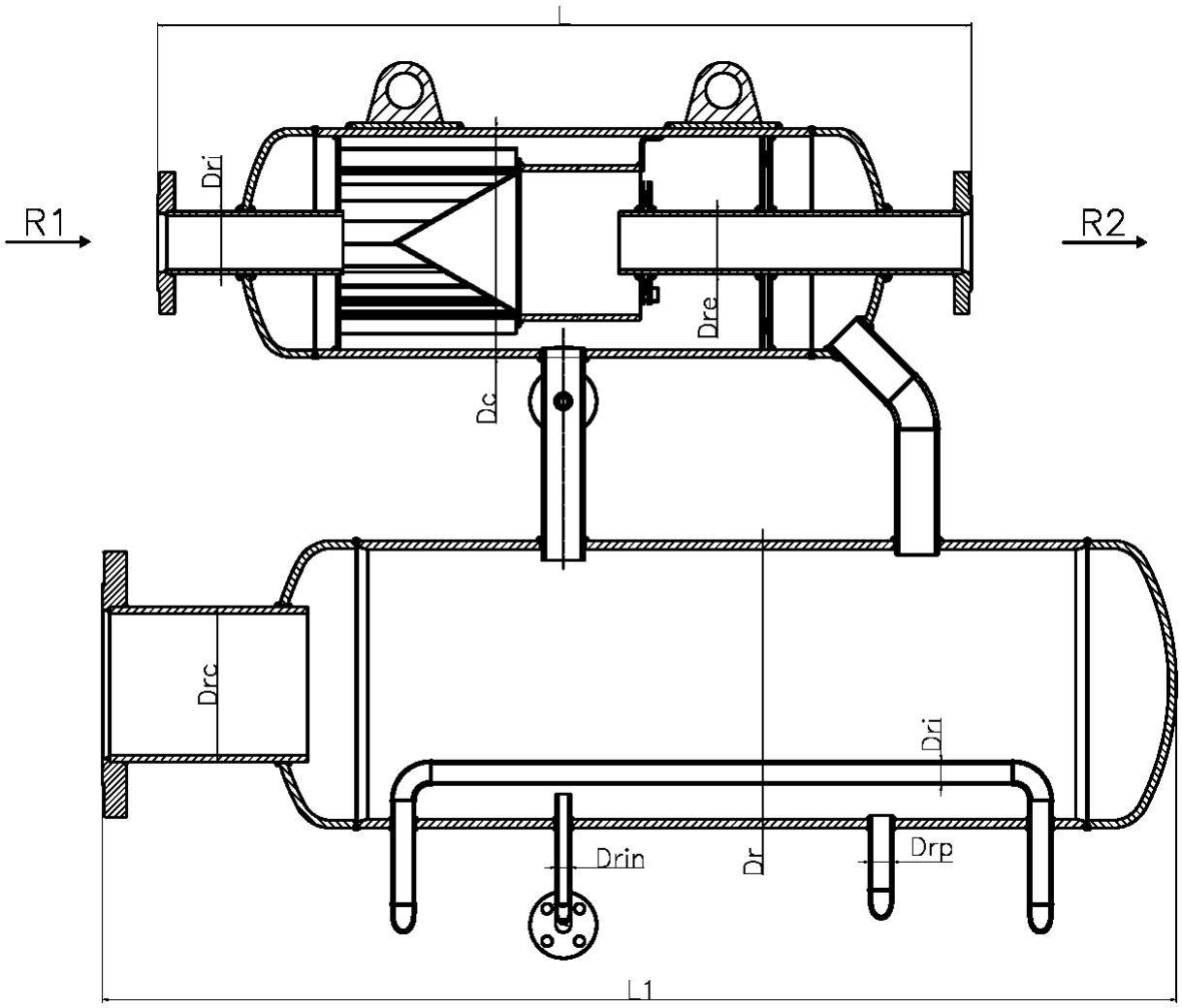
STG 652



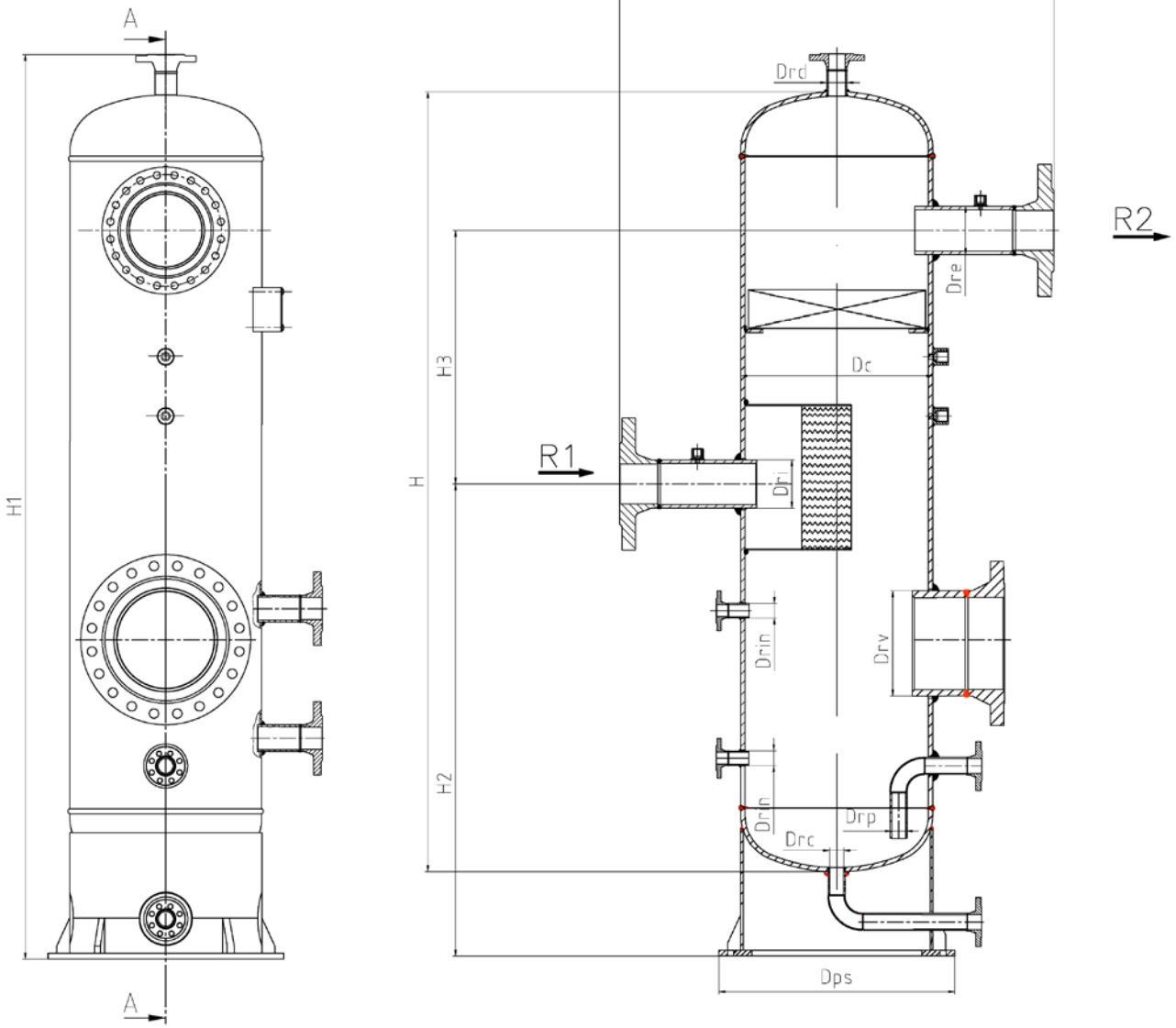
Separator model	DN	Dti/Dte [mm]	Ds/Do [mm]	Drez [mm]	Dos/Dsr [mm]	Dp [mm]	Da [mm]	H [mm]	L [mm]
STG 652	25	33.7	114.3	323.9	48.3	60.3	33.7	800	4200
	32	42.4	114.3	323.9	48.3	60.3	33.7	800	4200
	40	48.3	114.3	323.9	48.3	60.3	33.7	800	4200
	50	60.3	219.1	406.4	88.9	60.3	33.7	1000	4600
	80	88.9	219.1	406.4	88.9	60.3	33.7	1000	4600
	100	114.3	323.9	508	114.3	60.3	48.3	1200	5000
	150	168.3	406.4	610	168.3	114.3	48.3	1350	5200
	200	219.1	406.4	610	219.1	114.3	60.3	1350	5200
	250	273.1	610	711	273.1	114.3	60.3	1500	5500
	300	323.9	610	711	323.9	114.3	60.3	1500	5500

STG 653



Separator model	DN	Dri/Dre [mm]	Dc [mm]	Dr [mm]	Drc [mm]	Drp [mm]	Drin [mm]	Dri [mm]	L [mm]	L1 [mm]
STG 653	25	33.7	219.1	323.9	114.3	33.7	21.3	33.7	950	1300
	32	42.4	219.1	323.9	114.3	33.7	21.3	33.7	950	1300
	40	48.3	219.1	323.9	114.3	33.7	21.3	33.7	1150	1500
	50	60.3	323.9	406.4	219.1	33.7	21.3	33.7	1150	1500
	80	88.9	323.9	406.4	219.1	33.7	21.3	33.7	1350	1700
	100	114.3	323.9	406.4	219.1	60.3	21.3	33.7	1500	1850
	150	168.3	508	610	323.9	60.3	21.3	33.7	1650	2000
	200	219.1	508	610	323.9	60.3	21.3	33.7	1750	2100
	250	273.1	610	813	406.4	60.3	21.3	33.7	1900	2250
	300	323.9	610	813	406.4	60.3	21.3	33.7	2100	2500

STG 654


A
H1
A
L
Drd
R2
Dre
H3
Dc
H
R1
Dri
Drin
Drv
H2
Drin
Drp
Drc
Dps

Separator model	Dri [mm]	Dre [mm]	Dc [mm]	H [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Drv [mm]	Drc [mm]
STG 654	80 100 150 200		406	1500 2500	750	2300 3300	1200 2200	750	168.3	60.3
	80 100 150 200 250 300		610	1500 2500 3000	950	2700 3700 4200	1200 2200 2700	1000	323.9	88.9
	80 100 150 200 250 300 350 400		813	2500 3000 4500	1150	3700 4200 5800	2000 2500 4000	1250	406.4	114.3
	80 100 150 200 250 300 350 400 450 500 600		1219	3000 4500 6000	1550	4300 5900 7400	2100 3600 5100	1700	508	114.3
	80 100 150 200 250 300 350 400 450 500 600		1524	3000 4500 6000	1850	4700 6200 7700	1900 3400 4900	2100	508	114.3
	80 100 150 200 250 300 350 400 450 500 600		1829	3000 4500 6000	2150	4900 6400 7900	1600 3100 4600	2500	508	114.3

STG 655

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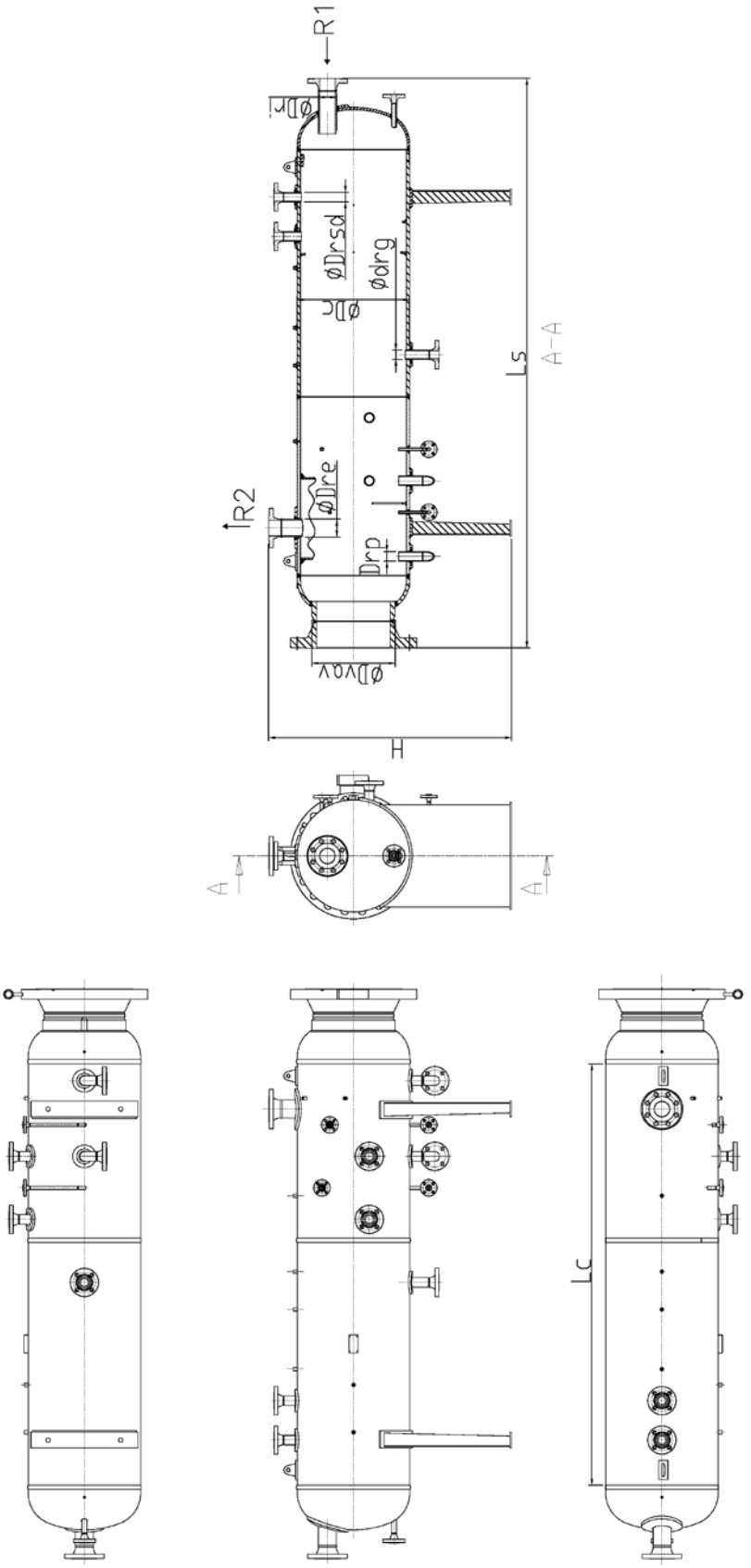
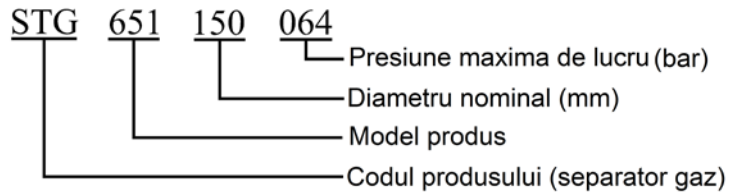


	Dri [mm]	Dre [mm]	Dc [mm]	Lc [mm]	Ls [mm]	H [mm]	Dvav [mm]	Drp [mm]	drg [mm]

STG 655	80 100 150	80 100 150	406	1500 2500	2100 3100	1500	330	60.3	60.3
	80 100 150 250 300 350	80 100 150 250 300 350	711	2500 3000 4500	3400 3900 5400	1650 1750	330	60.3	60.3
	80 100 150 250 300 350 400 450 500	80 100 150 250 300 350 400 450 500	1118	3000 4500 5500	4000 5500 6500	2350 2450 2550	520	60.3	60.3
	80 100 150 250 300 350 400 450 500 600	80 100 150 250 300 350 400 450 500 600	1321	3000 4500 5500	4200 4700 6700	2450 2550 2650	520	88.9	88.9
	80 100 150 250 300 350 400 450 500 600	80 100 150 250 300 350 400 450 500 600	1524	4500 5500 8500	5900 6900 8900	3050 3150 3250	520	88.9	88.9
	80 100 150 250 300 350 400 450 500 600	80 100 150 250 300 350 400 450 500 600	1829	4500 5500 9000	6150 7150 10650	3200 3300 3400	520	88.9	88.9

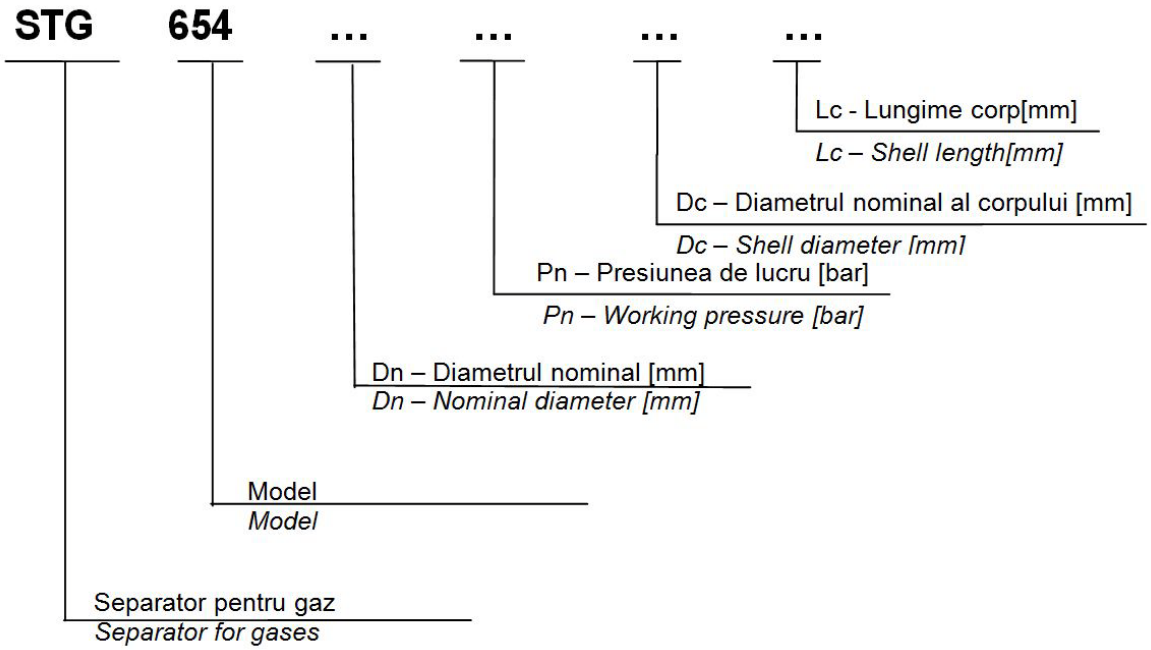
Ordering code

The gas separators STG 651, STG 652 and STG 653 type can be ordered by specifying the constructive form, inlet-outlet connection diameter, and maximum working pressure.



For example, the ordering code STG 651-150-064 designates STG 651 vertical separator, inlet-outlet connection diameter 150 mm, and maximum working pressure 64 bar. Additional requirements, if any, must be specified when placing the order.

STG 654 and STG 655 gas separators can be ordered by specifying product type, inlet – outlet connection diameter, maximum working pressure, body diameter, and body length.



For example, the ordering code STG 651-100-064-1100-4500 designates STG 654 horizontal separator, inlet-outlet nominal diameter 100 mm, maximum working pressure 64 bar, body nominal diameter 1100 mm and body length 4500 mm. Additional requirements, if any, must be specified when placing the order.

The manufacturer reserves the right to make modifications without any prior notification.

CT Nr. 478 / 2011

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Nr. R.C.: J-22-3277/1994
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IBAN: RO28BRDE240SV13842272400
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