

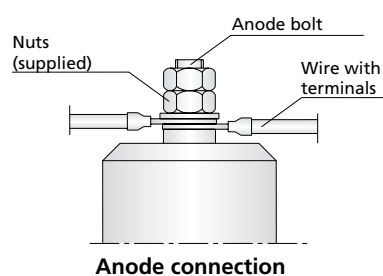
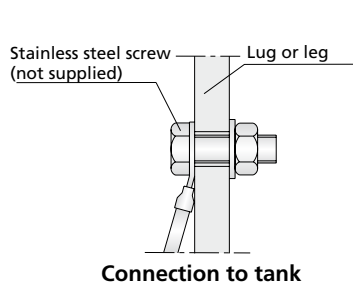
## CATHODIC PROTECTION FOR UNDERGROUND TANKS

When considered advisable, the underground tank should be equipped with active protection against corrosion.

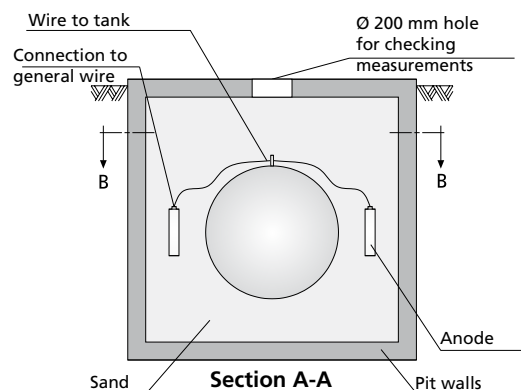
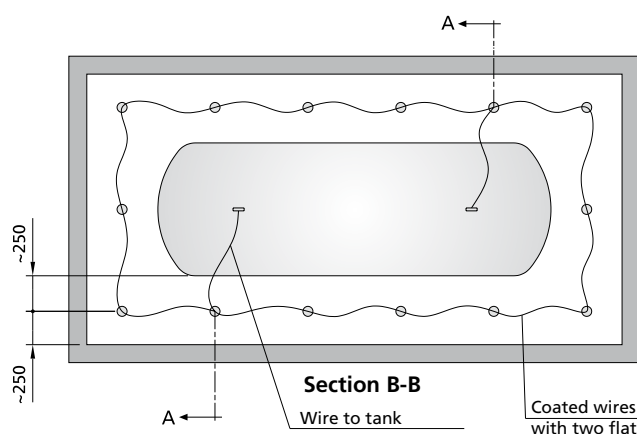
The type of cathodic protection equipment will be decided by specialized technicians, taking into account the specific characteristics of each installation. The following is an example of the cathodic protection system that LAPESA can supply, with sacrificial anodes (without impressed current).

- Anodes usually last 15 years, generating the potential specified in the standard, however it depends on the type of soil and the area in which it is installed. In some cases it will be necessary to place an activating mix around the anode.
- Anodes are connected to the tank through special holes in the lifting lugs.
- Optionally the cathodic protection equipment can be supplied with a bag of activating mix.

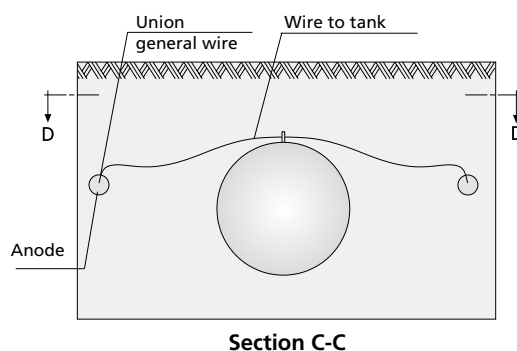
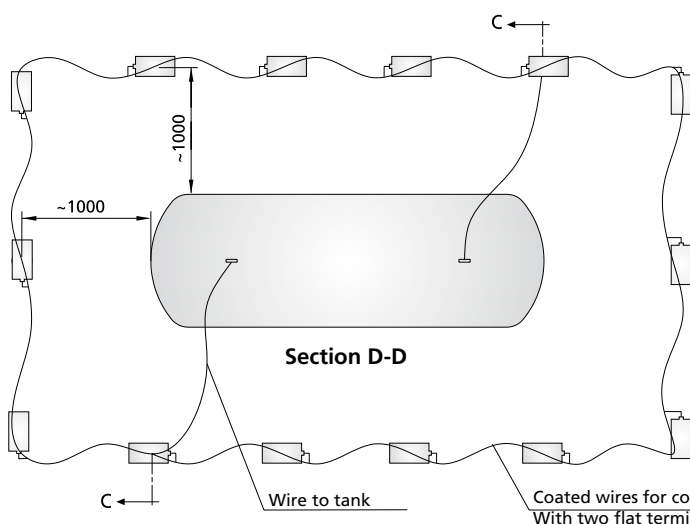
### DETAIL OF INSTALLATION\* OF ANODES IN UNDERGROUND TANKS



### LOCATION OF ANODES IN UNDERGROUND TANK WITH PIT



### LOCATION OF ANODES IN UNDERGROUND TANK WITHOUT PIT



(\*) Insulate connections with self-vulcanizing tape. Ensure correct contact of all connections. The tank should be electrically insulated from the rest of the installation (pipes, etc.).

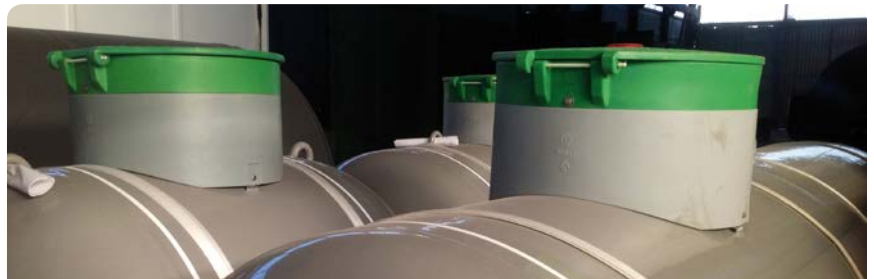
**BOOTHS FOR CYLINDERS**



**COVERS / INSPECTION CHAMBERS**



COVERS ON ABOVEGROUND TANKS



INSPECTION CHAMBERS ON UNDERGROUND TANKS

**lapesa**  
*Solutions*

**ANCHOR SLABS**



ANCHOR SLABS FOR ABOVEGROUND TANKS



ANTI-FLOTATION TRAYS FOR UNDERGROUND TANKS

## TECHNICAL INFORMATION

- Foundations and pits
- Natural vaporization tables
- LPG maximum degree of filling
- LPG pressures
- Tanks for storing ammonia ( $\text{NH}_3$ )

### FOUNDATIONS AND PITS

The foundations and pits for aboveground and underground tanks shown on pages 21 to 25 are for information purposes and should be reasoned for each specific installation project, apply the regulations in force.

### NATURAL VAPORIZATION TABLES

The natural vaporization values in a LPG tank depend on several factors related to the tank itself, the type of installation: aboveground or underground, consumption flows, ambient temperature and type of mix contained, amongst other factors. The tables provided on page 26 show the natural vaporization values for our standard models of tanks for propane in the conditions of installation and use indicated.

### MAXIMUM DEGREE OF FILLING

The maximum degree of filling for LPG tanks according to current regulations is 85%.

The table on page 27 gives the maximum filling heights for the tank and the free liquid heights, for the adjustment of the tubes on the valves indicating the maximum filling level.

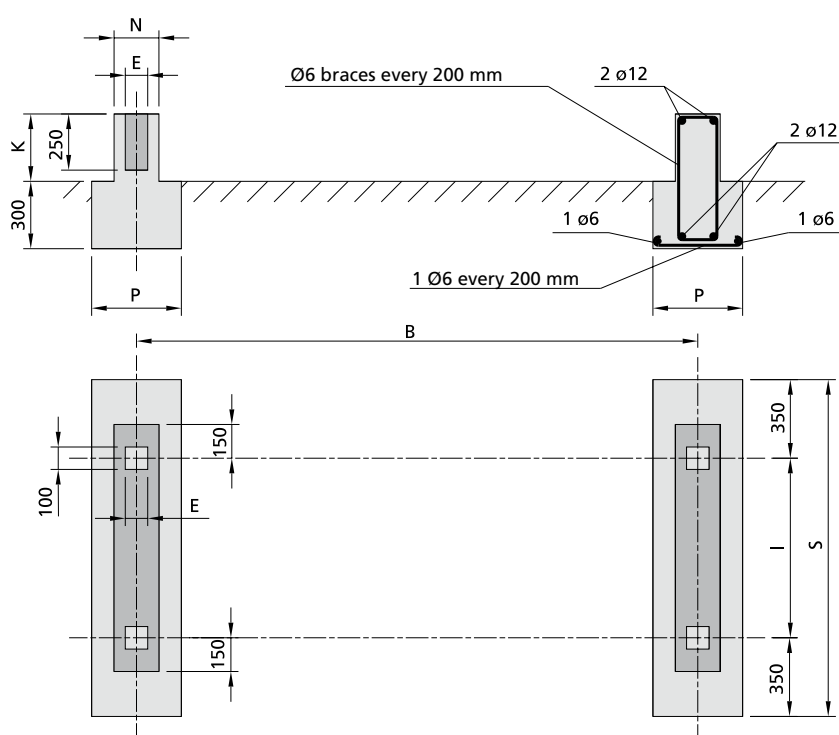
### TANKS FOR STORING AMMONIA ( $\text{NH}_3$ )

The whole range of tanks for LPG presented in this catalogue can be produced for storing anhydrous ammonia, by adapting their design:

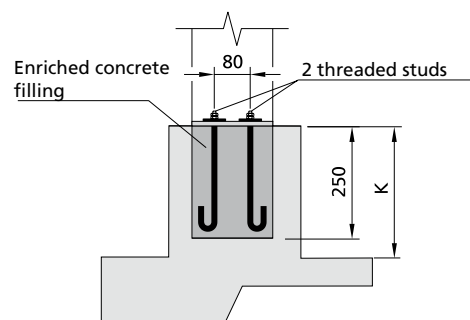
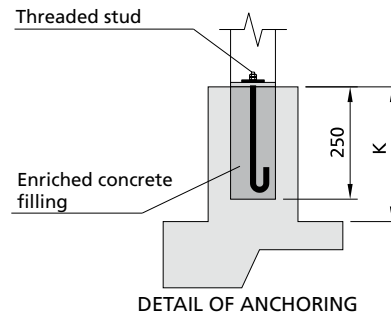
- Officially approved tanks for storing  $\text{NH}_3$
- Design pressure: 22 bar
- Composition materials compatible with  $\text{NH}_3$
- Corrosion allowance thickness: 1 mm
- Increase in X-ray control of welds
- Post welding heat treatment



## FOUNDATIONS FOR ABOVEGROUND TANKS 1.200, 1.500 and 1.750 diameters



Foundation valid for tanks with drain valve on bottom generatrix.



Option: Threaded studs housed in hole in concrete with bonding dowel (not expanding dowel)

The following are some of the suggested foundation options. Foundations must be calculated for each specific installation project.

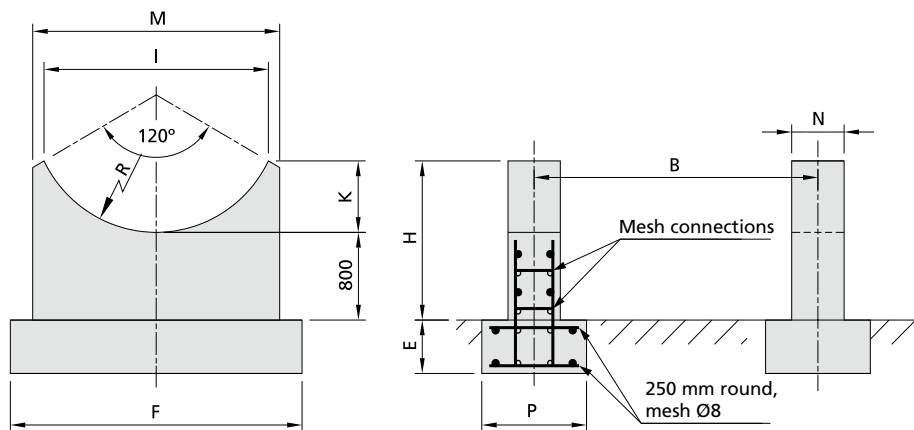
Dimensions of supports for terrains with a bearing capacity of 1 kg/cm²

CHARACTERISTICS TABLE

Model Ref.	Anchor stud (min)	Dimensions (mm)						
		B	P	N	S	I	K	E
LP2450A	M12	1.500	400	200	1.500	800	300	100
LP2670A	M12	1.500	400	200	1.500	800	300	100
LP4000A	M14	2.000	400	200	1.500	800	300	100
LP4440A	M14	2.300	400	200	1.500	800	300	100
LP4660A	M14	2.400	400	200	1.500	800	300	100
LP4880A	M14	2.500	400	200	1.500	800	300	100
LP6430A	M16	3.300	400	200	1.500	800	300	100
LP6650A	M16	3.400	400	200	1.500	800	300	100
LP6870A	M16	3.500	400	200	1.500	800	300	100
LP7090A	M16	3.600	400	200	1.500	800	300	100
LP8334A	M16	4.200	400	200	1.500	800	300	100
LP4950A	M16	1.500	400	200	1.700	1.000	300	100
LP7000A	M16	2.300	400	200	1.700	1.000	300	100
LP10A	M16	3.500	400	200	1.700	1.000	300	100
LP13A	M16	4.300	400	200	1.700	1.000	300	100
LP16A	M16	5.100	400	200	1.700	1.000	300	100
LP19A	M16	6.200	400	200	1.700	1.000	300	100
LP22A	M20	7.100	600	400	1.700	1.000	600	100
LP11A	M16	2.600	400	200	1.900	1.200	300	100
LP13A-17	M16	3.500	400	200	1.900	1.200	300	100
LP15A	M16	3.500	400	200	1.900	1.200	300	100
LP20A	M16	4.500	400	200	1.900	1.200	300	100
LP24A	M20	5.600	600	400	1.900	1.200	600	180
LP29A	M20	6.900	600	400	1.900	1.200	600	180
LP34A	M20	8.000	600	400	1.900	1.200	600	180
LP38A	M20	9.100	600	400	1.900	1.200	600	180



## SUPPORTS FOR ABOVEGROUND TANKS $\geq 2.200$ mm diameter



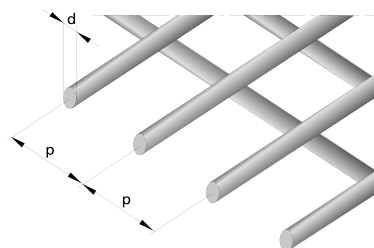
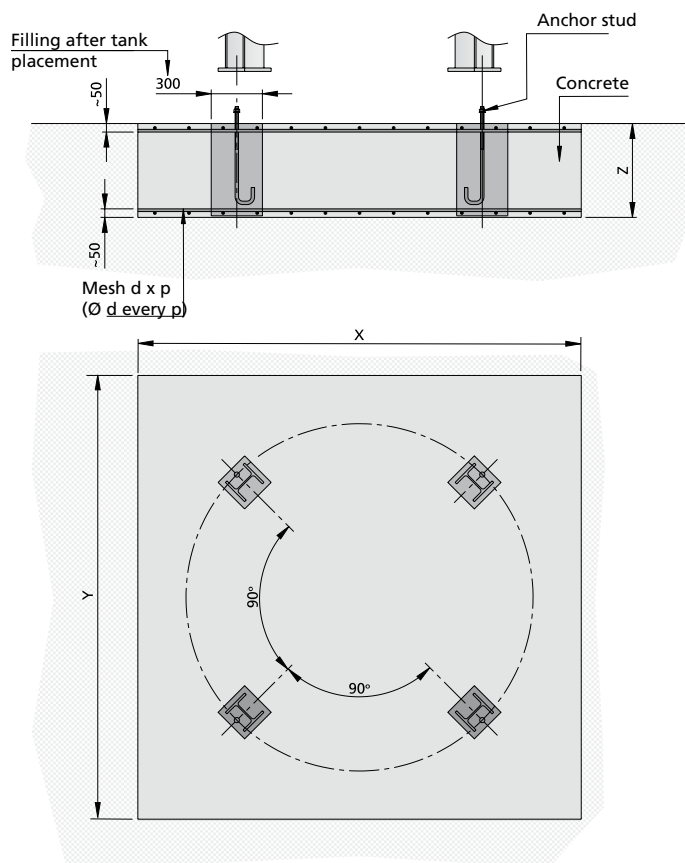
Foundations for terrains with a bearing capacity of  $2 \text{ kg/cm}^2$ , considering the largest tank model in the series

For this system the following is recommended:  
1- Build a flat wall with a height of 800 mm  
2- Place the tank on top.  
3- Carry out formwork once the tank is in place to obtain the indicated shape.

**CHARACTERISTICS TABLE**

Dimensions in mm	Tank diameter			
	2200	2450	3000	3500
E	400	500	600	800
F	3.000	3.200	3.800	4.000
H	1.355	1.418	1.555	1.680
I	1.923	2.139	2.615	3.048
K	555	618	755	880
M	2.300	2.500	3.000	3.500
N	400	500	600	800
P	800	1.100	1.500	1.900
R	1.110	1.235	1.510	1.760

## FOUNDATIONS FOR VERTICAL ABOVEGROUND TANKS



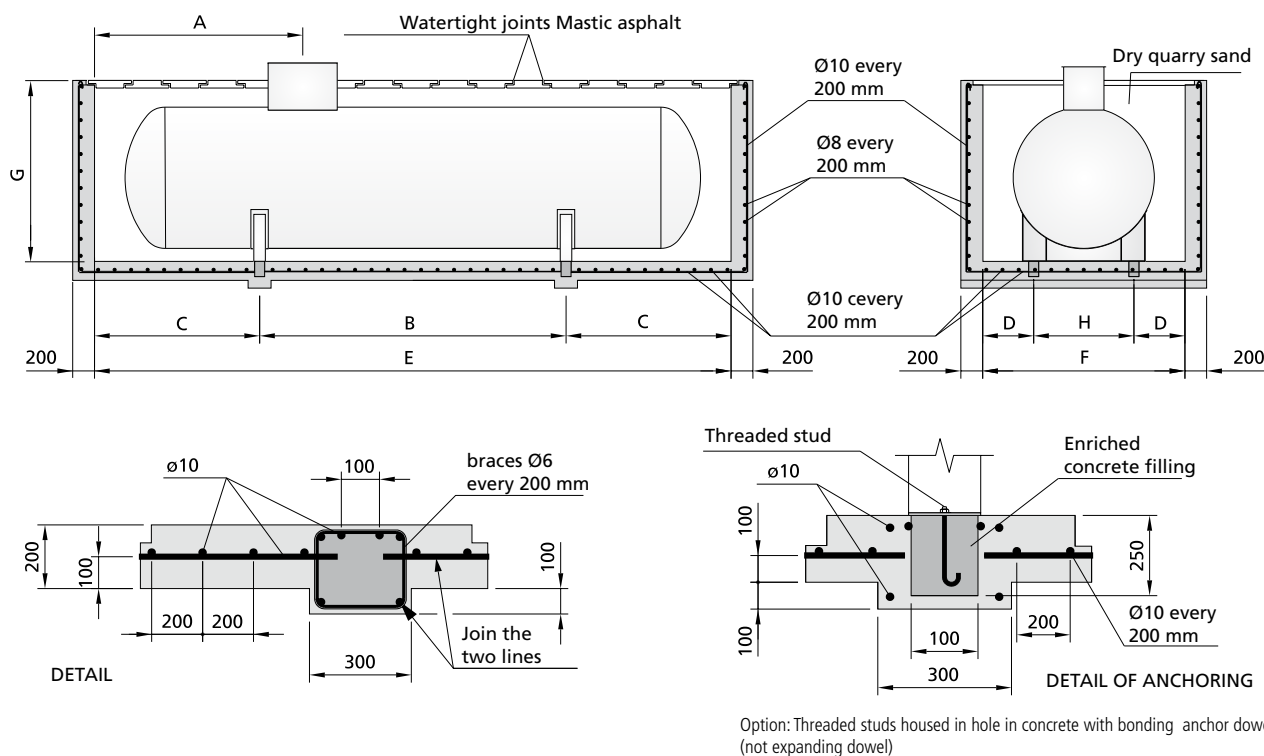
Foundations for aboveground vertical tanks.

**CHARACTERISTICS TABLE**

DIM. in mm	Anchor stud (minimum)	Dimensions (mm)				
		Footing			Mesh	
		X	Y	Z	d	p
LP1000V	M14	1000	1000	300	8	150
LP2450V	M14	1200	1200	300	8	150
LP5000V-17	M16	1600	1600	300	8	150
LP8400V-17	M16	1600	1600	300	10	150
LP13V-17	M18	2000	2000	550	10	150
LP20V	M20	2600	2600	550	16	200
LP33V	M22	3100	3100	550	20	200
LP50V	M24	3900	3900	600	25	200

Support dimensions for terrains with bearing capacity  $\geq 3 \text{ kg/cm}^2$

## PITS FOR UNDERGROUND TANKS OF LESS THAN 20 m<sup>3</sup>



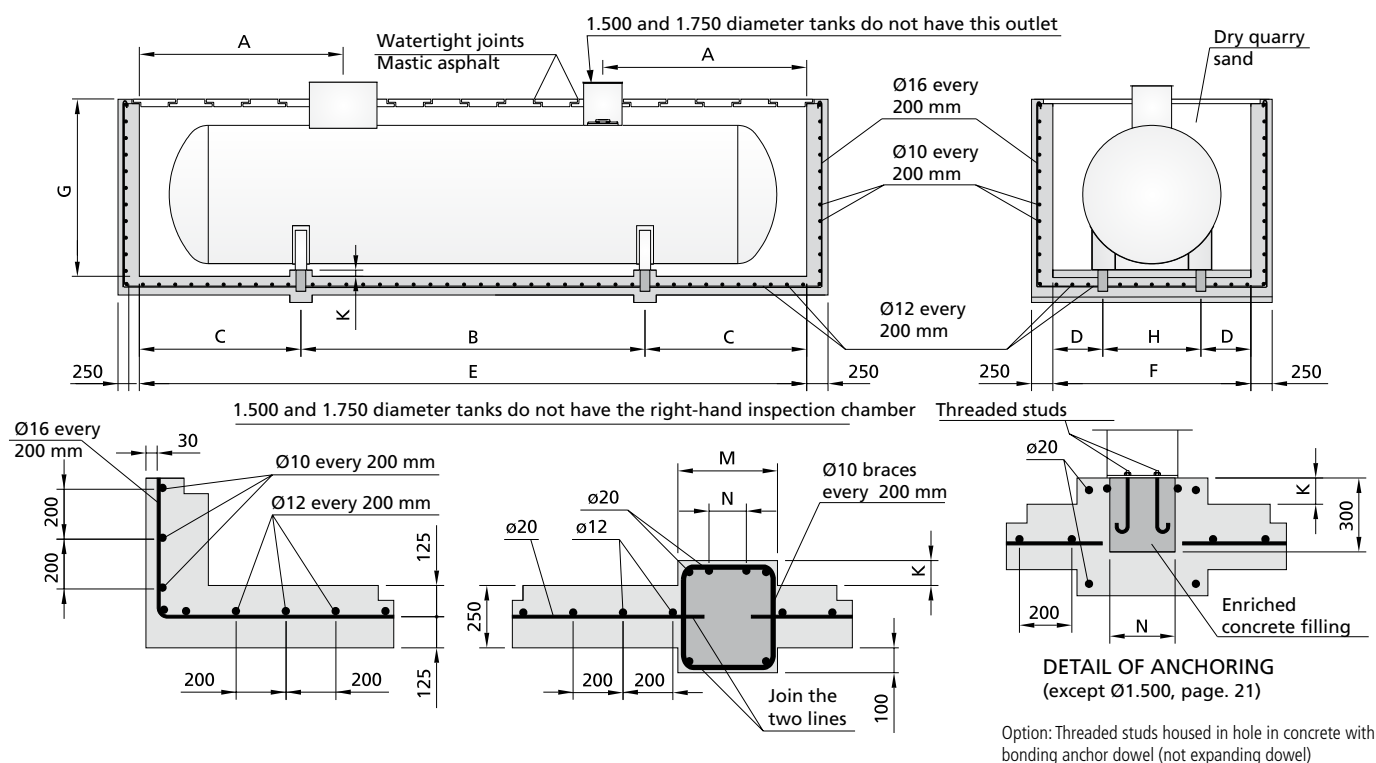
The dimensions indicated in the table are obtained based on a distance of 500 mm from the tank to the pit walls and a distance of 300 mm to the cover. For the "centred outlets" options (1.200, 1.500 and 1.750 mm diameters) dimension A should be corrected in accordance with dimension G1 of the table on page 15.

In addition to the pit shown, other types of pits can be made according to the regulations in force

CHARACTERISTICS TABLE

Model Ref.	Diameter ø	Anchor stud (minimum)	Dimensions (mm)							
			A	B	C	D	E	F	G	H
LP2450*	1.200	M12	1.520	1.500	975	700	3.450	2.200	1.700	800
LP2670*	1.200	M12	1.510	1.500	1.080	700	3.660	2.200	1.700	800
LP4000*	1.200	M14	1.510	2.000	1.420	700	4.840	2.200	1.700	800
LP4440*	1.200	M14	1.510	2.300	1.465	700	5.230	2.200	1.700	800
LP4660*	1.200	M14	1.510	2.400	1.520	700	5.440	2.200	1.700	800
LP4880*	1.200	M14	1.510	2.500	1.575	700	5.650	2.200	1.700	800
LP6430*	1.200	M16	1.510	3.300	1.855	700	7.010	2.200	1.700	800
LP6650*	1.200	M16	1.510	3.400	1.920	700	7.240	2.200	1.700	800
LP6870*	1.200	M16	1.510	3.500	1.965	700	7.430	2.200	1.700	800
LP7090*	1.200	M16	1.510	3.600	2.020	700	7.640	2.200	1.700	800
LP8334*	1.200	M16	1.510	4.200	2.315	700	8.830	2.200	1.700	800
LP4950*	1.500	M16	1.590	1.500	1.320	750	4.140	2.500	2.000	1.000
LP7000*	1.500	M16	1.590	2.300	1.510	750	5.320	2.500	2.000	1.000
LP10*	1.500	M16	1.590	3.500	1.775	750	7.050	2.500	2.000	1.000
LP13*	1.500	M18	1.590	4.300	2.245	750	8.790	2.500	2.000	1.000
LP16*	1.500	M20	1.590	5.100	2.710	750	10.520	2.500	2.000	1.000
LP19*	1.500	M22	1.590	6.200	3.025	750	12.250	2.500	2.000	1.000
LP11*	1.750	M16	1.660	2.600	1.640	775	58.80	2.750	2.250	1.200
LP13*-17	1.750	M16	1.660	3.500	1.675	775	68.50	2.750	2.250	1.200
LP15*	1.750	M20	1.660	3.500	2.160	775	78.20	2.750	2.250	1.200
LP20*	1.750	M22	1.660	4.500	2.630	775	97.60	2.750	2.250	1.200

## PITS FOR UNDERGROUND TANKS GREATER THAN 20 m<sup>3</sup>

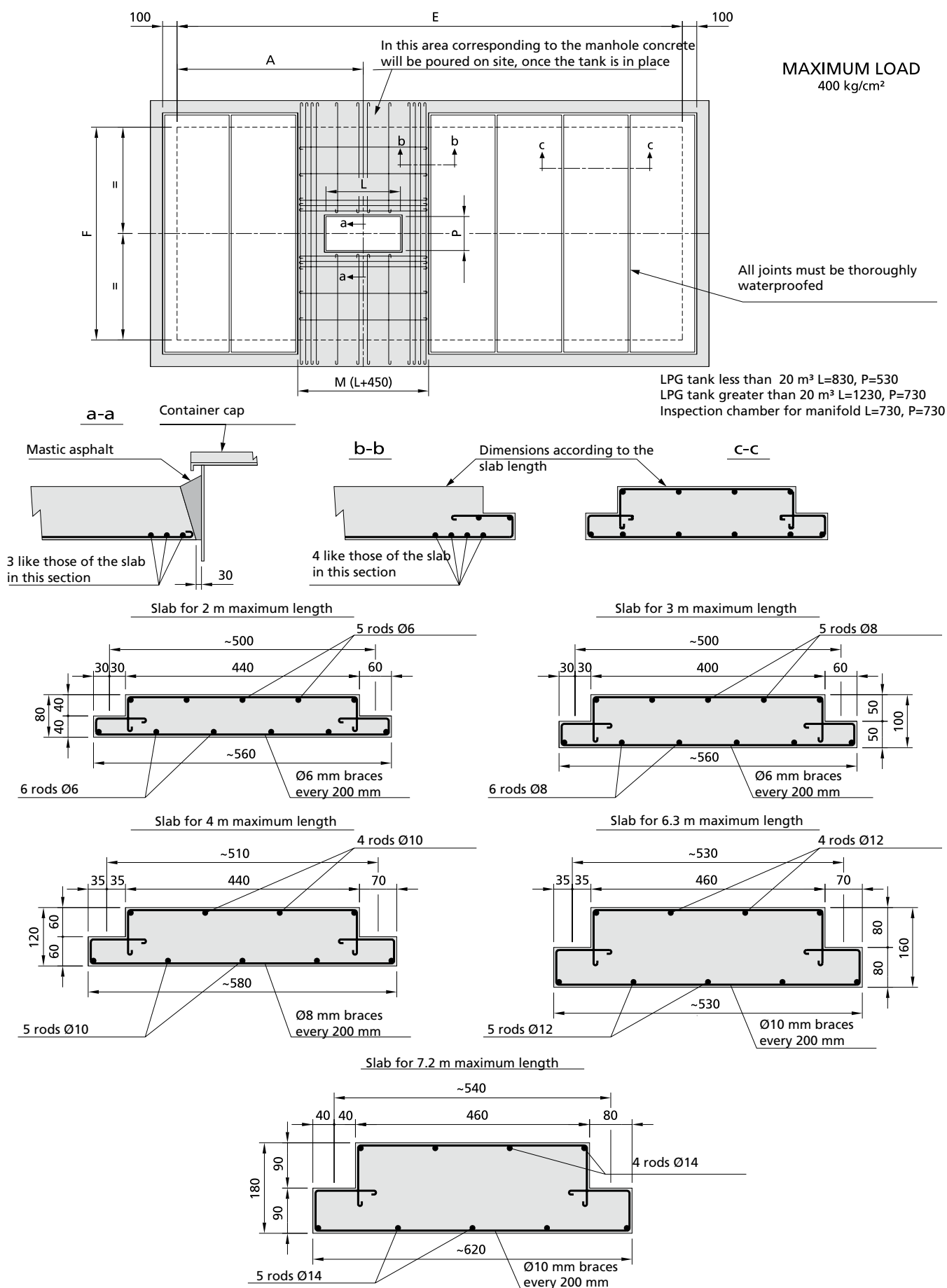


The dimensions indicated in the table are obtained based on a distance of 500 mm from the tank to the pit walls and a distance of 300 mm to the cover. For the "centred outlets" options (1.500 and 1.750 mm diameters) dimension A should be corrected in accordance with dimension G1 of the table on page 15. In addition to the pit shown, other types of pits can be made according to the regulations in force.

## CHARACTERISTICS TABLE

Model Ref.	Diameter ø	Anchor stud (minimum)	Dimensions (mm)										
			A	B	C	D	E	F	G	H	K	M	N
LP22E	1.500	M24	1.440	7.100	3.400	750	13.900	2.500	2.000	1.000		400	150
LP24E	1.750	M20	1.510	5.600	3.050	775	11.700	2.750	2.250	1.200		400	150
LP29E	1.750	M20	1.510	6.900	3.370	775	13.640	2.750	2.250	1.200		400	150
LP34E	1.750	M20	1.510	8.000	3.790	775	15.580	2.750	2.250	1.200		400	150
LP38E	1.750	M22	1.510	9.100	4.210	775	17.520	2.750	2.250	1.200		400	150
LP23E-22	2.200	M20	3.340	2.300	2.645	820	7.590	3.200	2.710	1.560	110	475	225
LP26E-22	2.200	M20	3.370	4.300	2.090	820	8.480	3.200	2.710	1.560	110	475	225
LP28E-22	2.200	M20	2.870	4.300	2.310	820	8.920	3.200	2.710	1.560	110	475	225
LP30E-22	2.200	M22	2.830	4.800	2.285	820	9.370	3.200	2.710	1.560	110	475	225
LP33E-22	2.200	M24	3.340	5.500	2.380	820	10.260	3.200	2.710	1.560	110	475	225
LP36E-22	2.200	M24	4.120	5.500	2.825	820	11.150	3.200	2.710	1.560	110	475	225
LP38E-22	2.200	M24	4.120	6.000	2.795	820	11.590	3.200	2.710	1.560	110	475	225
LP40E-22	2.200	M24	4.220	6.700	2.670	820	12.040	3.200	2.710	1.560	110	475	225
LP43E-22	2.200	M24	4.220	6.700	3.115	820	12.930	3.200	2.710	1.560	110	475	225
LP46E-22	2.200	M24	4.220	7.100	3.360	820	13.820	3.200	2.710	1.560	110	475	225
LP48E-22	2.200	M24	4.620	8.600	2.830	820	14.260	3.200	2.710	1.560	110	475	225
LP50E-22	2.200	M24	5.220	8.600	3.055	820	14.710	3.200	2.710	1.560	110	475	225
LP53E-22	2.200	M24	4.620	8.900	3.355	820	15.610	3.200	2.710	1.560	110	475	225
LP56E-22	2.200	M24	4.120	9.700	3.400	820	16.500	3.200	2.710	1.560	110	475	225
LP58E-22	2.200	M24	4.620	10.200	3.375	820	16.950	3.200	2.710	1.560	110	475	225
LP59E-22	2.200	M24	5.120	10.600	3.395	820	17.390	3.200	2.710	1.560	110	475	225
LP23E-24	2.450	M24	2.640	3.180	1.580	855	6.340	3.450	2.960	1.740	110	520	270
LP25E-24	2.450	M24	2.840	2.450	2.195	855	6.840	3.450	2.960	1.740	110	520	270
LP27E-24	2.450	M24	3.040	2.450	2.440	855	7.330	3.450	2.960	1.740	110	520	270
LP32E-24	2.450	M24	3.040	3.700	2.310	855	8.320	3.450	2.960	1.740	110	520	270
LP36E-24	2.450	M24	3.410	3.700	2.805	855	9.310	3.450	2.960	1.740	110	520	270
LP39E-24	2.450	M24	3.010	5.000	2.405	855	9.810	3.450	2.960	1.740	110	520	270
LP41E-24	2.450	M24	3.250	5.000	2.650	855	10.300	3.450	2.960	1.740	110	520	270
LP46E-24	2.450	M24	2.900	6.700	2.295	855	11.290	3.450	2.960	1.740	110	520	270
LP50E-24	2.450	M24	3.790	6.700	2.790	855	12.280	3.450	2.960	1.740	110	520	270
LP52E-24	2.450	M24	4.690	6.700	3.040	855	12.780	3.450	2.960	1.740	110	520	270
LP55E-24	2.450	M24	4.990	6.700	3.285	855	13.270	3.450	2.960	1.740	110	520	270
LP59E-24	2.450	M24	4.990	6.700	3.780	855	14.260	3.450	2.960	1.740	110	520	270

## COVER FOR PIT (underground tanks)





## TABLES OF NATURAL VAPORIZATION IN LPG TANKS

The natural vaporization of a tank with propane can be obtained by the expression:  $D = aSK (T_e - T_i)/q$  where D is the capacity of vaporization of propane in kg/h.

The following tables show the vaporization flow for LAPESA models at different working pressures and the values used to prepare these tables are:

a= percentage of the tank surface area in contact with the liquid. It depends on the percentage filling of tank. For horizontally positioned tanks and a filling percentage of 20%, a=0.336, for a filling percentage of 30%, a=0.397. The values in the tables are calculated for 20% filling of tank so that for to obtain the values for 30% filling, the table values have to be multiplied by 1.18 (only for horizontal tanks).

S= tank surface area in m<sup>2</sup>.

K= coefficient of heat exchange with exterior. This depends on several factors. In the tables the values used are K= 12 Kcal./hm<sup>2</sup>°C (in underground tanks this value is reduced by 30%, K= 8.4 Kcal./hm<sup>2</sup>°C).

T<sub>e</sub>= minimum temperature of environment in which the tank is installed (5°C for underground tanks).

T<sub>i</sub>= propane liquid-gas equilibrium temperature. It depends on the type of mix. The following values are considered:

Mains pressure:	1,25	1,50	1,75	2,00
Internal temp.:	-26	-22	-20	-17

q= Latent heat from vaporization of propane. A value of: q= 94 Kcal./kg. can be used.

Model Ref.	Rated capacity (L)	Diam. (mm)	Area (m²)	NATURAL VAPORIZATION FLOW (Kg. of propane per hour)																							
				Working pressure: 1'25 bar						Working pressure: 1'50 bar						Working pressure: 1'75 bar						Working pressure: 2'00 bar					
				Aboveground tanks					Underground tanks	Aboveground tanks					Underground tanks	Aboveground tanks					Underground tanks	Aboveground tanks					Underground tanks
				Minimum ext. temp (°C)						Minimum ext. temp (°C)						Minimum ext. temp (°C)						Minimum ext. temp (°C)					
-10	-5	0	5	10	-10	-5	0	5	10	-10	-5	0	5	10	-10	-5	0	5	10	-10	-5	0	5	10			
LP1000A	975	1000	5,2	3,6	4,8	5,9	7,0	8,2	4,9	2,7	3,9	5,0	6,1	7,3	4,3	2,3	3,4	4,5	5,7	6,8	4,0	1,6	2,7	3,9	5,0	6,1	3,5
LP1450	1460	1200	6,8	4,7	6,1	7,6	9,0	10,5	6,3	3,5	5,0	6,4	7,9	9,3	5,5	2,9	4,4	5,8	7,3	8,8	5,1	2,0	3,5	5,0	6,4	7,9	4,5
LP1825	1825	1200	8,1	5,6	7,3	9,0	10,8	12,5	7,5	4,2	5,9	7,6	9,4	11,1	6,6	3,5	5,2	6,9	8,7	10,4	6,1	2,4	4,2	5,9	7,6	9,4	5,4
LP2250*	2250	1200	9,3	6,4	8,4	10,4	12,4	14,4	8,7	4,8	6,8	8,8	10,8	12,8	7,5	4,0	6,0	8,0	10,0	12,0	7,0	2,8	4,8	6,8	8,8	10,8	6,1
LP2450*	2450	1200	10,1	6,9	9,1	11,3	13,4	15,6	9,4	5,2	7,4	9,5	11,7	13,9	8,2	4,3	6,5	8,7	10,8	13,0	7,6	3,0	5,2	7,4	9,5	11,7	6,7
LP2670*	2670	1200	10,9	7,5	9,8	12,2	14,5	16,8	10,1	5,6	7,9	10,3	12,6	15,0	8,8	4,7	7,0	9,4	11,7	14,0	8,2	3,3	5,6	7,9	10,3	12,6	7,2
LP4000*	4000	1200	15,3	10,5	13,8	17,1	20,3	23,6	14,2	7,9	11,2	14,4	17,7	21,0	12,4	6,6	9,8	13,1	16,4	19,7	11,5	4,6	7,9	11,2	14,4	17,7	10,1
LP4440*	4440	1200	16,8	11,5	15,1	18,7	22,3	25,9	15,6	8,6	12,3	15,9	19,5	23,1	13,6	7,2	10,8	14,4	18,0	21,6	12,6	5,0	8,6	12,3	15,9	19,5	11,1
LP4660*	4660	1200	17,6	12,1	15,9	19,6	23,4	27,2	16,4	9,1	12,8	16,6	20,4	24,2	14,3	7,5	11,3	15,1	18,9	22,6	13,2	5,3	9,1	12,8	16,6	20,4	11,6
LP4880*	4880	1200	18,4	12,6	16,6	20,5	24,5	28,4	17,1	9,5	13,4	17,4	21,3	25,3	14,9	7,9	11,8	15,8	19,7	23,7	13,8	5,5	9,5	13,4	17,4	21,3	12,2
LP6430*	6430	1200	23,5	16,1	21,2	26,2	31,2	36,3	21,9	12,1	17,1	22,2	27,2	32,3	19,1	10,1	15,1	20,2	25,2	30,2	17,6	7,1	12,1	17,1	22,2	27,2	15,5
LP6650*	6650	1200	24,3	16,7	21,9	27,1	32,3	37,5	22,6	12,5	17,7	22,9	28,1	33,4	19,7	10,4	15,6	20,8	26,1	31,3	18,2	7,3	12,5	17,7	22,9	28,1	16,1
LP6870*	6870	1200	25,1	17,2	22,6	28,0	33,4	38,8	23,4	12,9	18,3	23,7	29,1	34,5	20,3	10,8	16,1	21,5	26,9	32,3	18,8	7,5	12,9	18,3	23,7	29,1	16,6
LP7090*	7090	1200	25,9	17,8	23,3	28,9	34,4	40,0	24,1	13,3	18,9	24,4	30,0	35,6	21,0	11,1	16,7	22,2	27,8	33,3	19,4	7,8	13,3	18,9	24,4	30,0	17,1
LP8334*	8334	1200	30,3	20,8	27,3	33,8	40,3	46,8	28,2	15,6	22,1	28,6	35,1	41,6	24,6	13,0	19,5	26,0	32,5	39,0	22,7	9,1	15,6	22,1	28,6	35,1	20,0
LP4950*	4950	1500	16,1	11,0	14,5	18,0	21,4	24,9	15,0	8,3	11,7	15,2	18,6	22,1	13,1	6,9	10,4	13,8	17,3	20,7	12,1	4,8	8,3	11,7	15,2	18,6	10,6
LP7000*	7000	1500	21,7	14,9	19,5	24,2	28,9	33,5	20,2	11,2	15,8	20,5	25,1	29,8	17,6	9,3	14,0	18,6	23,3	27,9	16,3	6,5	11,2	15,8	20,5	25,1	14,3
LP10*	10000	1500	29,9	21	27	33	40	46	28	15	22	28	35	41	24	13	19	26	32	38	22	9	15	22	28	35	20
LP13*	13000	1500	38,1	26	34	42	51	59	35	20	28	36	44	52	31	16	25	33	41	49	29	11	20	28	36	44	25
LP16*	16000	1500	46,2	32	42	52	61	71	43	24	34	44	54	63	37	20	30	40	50	59	35	14	24	34	44	54	31
LP19*	19000	1500	54,4	37	49	61	72	84	51	28	40	51	63	75	44	23	35	47	58	70	41	16	28	40	51	63	36
LP22*	22000	1500	62,6	43	56	70	83	97	58	32	46	59	72	86	51	27	40	54	67	81	47	19	32	46	59	72	41
LP11*	10750	1750	28,6	20	26	32	38	44	27	15	21	27	33	39	23	12	18	25	31	37	21	9	15	21	27	33	19
LP13*-17	13000	1750	34,0	23	31	38	45	53	32	18	25	32	39	47	28	15	22	29	36	44	26	10	18	25	32	39	22
LP15*	15300	1750	39,3	27	35	44	52	61	37	20	29	37	46	54	32	17	25	34	42	51	30	12	20	29	37	46	26
LP20*	19900	1750	50,0	34	45	56	66	77	47	26	36	47	58	69	41	21	32	43	54	64	38	15	26	36	47	58	33
LP24*	24450	1750	60,6	42	55	68	81	94	56	31	44	57	70	83	49	26	39	52	65	78	45	18	31	44	57	70	40
LP29*	29000	1750	71,3	49	64	80	95	110	66	37	52	67	83	98	58	31	46	61	76	92	54	21	37	52	67	83	47
LP34*	33600	1750	82,0	56	74	91	109	127	76	42	60	77	95	113	66	35	53	70	88	106	62	25	42	60	77	95	54
LP38*	38200	1750	92,6	64	83	103	123	143	86	48	68	87	107	127	75	40	60	79	99	119	70	28	48	68	87	107	61
LP23*-22	23000	2200	48,4	33	44	54	64	75	45	25	35	46	56	66	39	21	31	42	52	62	36	15	25	35	46	56	32
LP26*-22	26300	2200	54,5	37	49	61	72	84	51	28	40	51	63	75	44	23	35	47	58	70	41	16	28	40	51	63	36
LP28*-22	28000	2200	57,6	40	52	64	77	89	54	30	42	54	67	79	47	25	37	49	62	74	43	17	30	42	54	67	38
LP30*-22	29650	2200	60,7	42	55	68	81	94	56	31	44	57	70	83	49	26	39	52	65	78	46	18	31	44	57	70	40
LP33*-22	32900	2200	66,8	46	60	74	89	103	62	34	49	63	77	92	54	29	43	57	72	86	50	20	34	49	63	77	44
LP36*-22	36200	2200	73,0	50	66	81	97	113	68	38	53	69	85	100	59	31	47	63	78	94	55	22	38	53	69	85	48
LP38*-22	37900	2200	76,0	52	68	85	101	117	71	39	55	72	88	104	62	33	49	65	81	98	57	23	39	55	72	88	50
LP40*-22	39600	2200	79,1	54	71	88	105	122	74	41	58	75	92	109	64	34	51	68	85	102	59	24	41	58	75	92	52
LP43*-22	42900	2200	85,3	59	77	95	113	132	79	44	62	80	99	117	69	37	55	73	91	110	64	26	44	62	80	99	56
LP46*-22	46200	2200	91,4	63	82	102	122	141	85	47	67	86	106	125	74	39	59	78	98	118	69	27	47	67	86	106	60
LP48*-22	47800	2200	94,5	65	85	105	126	146	88	49	69	89	109	130	77	41	61	81	101	122	71	28	49	69	89	109	62
LP50*-22	49500	2200	97,6	67	88	109	130	151	91	50	71	92	113	134	79	42	63	84	105	126	73	29	50	71	92	113	64
LP53*-22	52800	2200	103,7	71	93	116	138	160	97	53	76	98	120	142	84	44	67	89	111	133	78	31	53	76	98	120	69
LP56*-22	56100	2200	109,9	75	99	123	146	170	102	57	80	104	127	151	89	47	71	94	118	141	82	33	57	80	104	127	73
LP58*-22	57700	2200	113,0	78	102	126	150	174	105	58	82	107	131	155	92	48	73	97	121	145	85	34	58	82	107	131	75
LP59*-22	59400	2200	116,0	80	104	129	154	179	108	60	85	109	134	159	94	50	75	100	124	149	87	35	60	85	109	134	77
LP63*-22	62700	2200	122,2	84	110	136	162	189	114	63	89	115	142	168	99	52	79	105	131	157	92	37	63	89	115	142	81
LP66*-22	66000	2200	128,3	88	116	143	171	198	119	66	94	121	149	176	104	55	83	110	138	165	96	39	66	94	121	149	85
LP68*-22	67700	2200	131,4	90	118	147	175	203	122	68	96	124	152	180	107	56	85	113	141	169	99	39	68	96	124	152	87
LP69*-22	69300	2200	134,5	92	121	150	179	208	125	69	98	127	156	185	109	58	87	115	144	173	101	40	69	98	127	156	89
LP73*-22	72600	2200																									

# STATIC TANKS FOR STORAGE OF LPG TECHNICAL INFORMATION

Model Ref. Rated capacity (L.) Diam. (mm) Area (m²)				NATURAL VAPORIZATION FLOW (Kg. of propane per hour)																															
				Working pressure: 1'25 bar								Working pressure: 1'50 bar								Working pressure: 1'75 bar								Working pressure: 2'00 bar							
				Aboveground tanks Minimum ext. temp (°C)					Underground tanks	Aboveground tanks Minimum ext. temp (°C)					Underground tanks	Aboveground tanks Minimum ext. temp (°C)					Underground tanks	Aboveground tanks Minimum ext. temp (°C)					Underground tanks								
				-10	-5	0	5	10		-10	-5	0	5	10		-10	-5	0	5	10		-10	-5	0	5	10									
LP23*-24	22600	2450	44,7	31	40	50	59	69	42	23	33	42	52	61	36	19	29	38	48	58	34	13	23	33	42	52	30								
LP25*-24	24900	2450	48,5	33	44	54	64	75	45	25	35	46	56	67	39	21	31	42	52	62	36	15	25	35	46	56	32								
LP27*-24	27200	2450	52,3	36	47	58	70	81	49	27	38	49	61	72	42	22	34	45	56	67	39	16	27	38	49	61	35								
LP32*-24	31800	2450	59,9	41	54	67	80	92	56	31	44	57	69	82	49	26	39	51	64	77	45	18	31	44	57	69	40								
LP36*-24	36300	2450	67,5	46	61	75	90	104	63	35	49	64	78	93	55	29	43	58	72	87	51	20	35	49	64	78	45								
LP39*-24	38600	2450	71,3	49	64	80	95	110	66	37	52	67	83	98	58	31	46	61	76	92	54	21	37	52	67	83	47								
LP41*-24	40900	2450	75,1	52	68	84	100	116	70	39	55	71	87	103	61	32	48	64	81	97	56	23	39	55	71	87	50								
LP46*-24	45500	2450	82,8	57	75	92	110	128	77	43	60	78	96	114	67	36	53	71	89	107	62	25	43	60	78	96	55								
LP50*-24	50000	2450	90,4	62	81	101	120	140	84	47	66	85	105	124	73	39	58	78	97	116	68	27	47	66	85	105	60								
LP52*-24	52300	2450	94,2	65	85	105	125	145	88	48	69	89	109	129	76	40	61	81	101	121	71	28	48	69	89	109	62								
LP55*-24	54600	2450	98,0	67	88	109	130	151	91	50	71	92	113	135	79	42	63	84	105	126	74	29	50	71	92	113	65								
LP59*-24	59200	2450	105,6	72	95	118	140	163	98	54	77	100	122	145	86	45	68	91	113	136	79	32	54	77	100	122	70								
LP64*-24	63700	2450	113,2	78	102	126	151	175	105	58	83	107	131	155	92	49	73	97	121	146	85	34	58	83	107	131	75								
LP66*-24	66000	2450	117,1	80	105	131	156	181	109	60	85	111	136	161	95	50	75	100	126	151	88	35	60	85	111	136	77								
LP68*-24	68300	2450	120,9	83	109	135	161	187	113	62	88	114	140	166	98	52	78	104	130	156	91	36	62	88	114	140	80								
LP73*-24	72800	2450	128,5	88	116	143	171	198	120	66	94	121	149	176	104	55	83	110	138	165	96	39	66	94	121	149	85								
LP77*-24	77400	2450	136,1	93	123	152	181	210	127	70	99	128	158	187	110	58	88	117	146	175	102	41	70	99	128	158	90								
LP80*-24	79700	2450	139,9	96	126	156	186	216	130	72	102	132	162	192	113	60	90	120	150	180	105	42	72	102	132	162	92								
LP82*-24	82000	2450	143,7	99	129	160	191	222	134	74	105	136	166	197	116	62	92	123	154	185	108	43	74	105	136	166	95								
LP87*-24	86500	2450	151,4	104	136	169	201	234	141	78	110	143	175	208	123	65	97	130	162	195	114	45	78	110	143	175	100								
LP91*-24	91100	2450	159,0	109	143	177	211	246	148	82	116	150	184	218	129	68	102	136	171	205	119	48	82	116	150	184	105								
LP93*-24	93400	2450	162,8	112	147	182	216	251	152	84	119	154	189	223	132	70	105	140	175	209	122	49	84	119	154	189	108								
LP96*-24	95700	2450	166,6	114	150	186	222	257	155	86	121	157	193	229	135	71	107	143	179	214	125	50	86	121	157	193	110								
LP100*-24	100200	2450	174,2	120	157	194	232	269	162	90	127	164	202	239	141	75	112	149	187	224	131	52	90	127	164	202	115								
LP105*-24	104800	2450	181,8	125	164	203	242	281	169	94	133	172	211	250	147	78	117	156	195	234	136	55	94	133	172	211	120								
LP107*-24	107100	2450	185,6	127	167	207	247	287	173	96	135	175	215	255	150	80	119	159	199	239	139	56	96	135	175	215	123								
LP110*-24	109400	2450	189,4	130	171	211	252	292	176	97	138	179	219	260	154	81	122	162	203	244	142	57	97	138	179	219	125								
LP114*-24	113900	2450	197,1	135	178	220	262	304	183	101	144	186	228	271	160	85	127	169	211	254	148	59	101	144	186	228	130								
LP1000AV	990	1.000	5,2	3,1	4,1	5,1	6,0	7,0	4,2	2,3	3,3	4,3	5,2	6,2	3,7	1,9	2,9	3,9	4,9	5,8	3,4	1,4	2,3	3,3	4,3	5,2	3,0								
LP2450V	2.450	1.200	10,1	5,2	6,8	8,4	10,0	11,7	7,0	3,9	5,5	7,1	8,7	10,4	6,1	3,2	4,9	6,5	8,1	9,7	5,7	2,3	3,9	5,5	7,1	8,7	5,0								
LP5000V-17	4.990	1.750	15,2	8,8	11,6	14,4	17,1	19,9	12,0	6,6	9,4	12,2	14,9	17,7	10,4	5,5	8,3	11,1	13,8	16,6	9,7	3,9	6,6	9,4	12,2	14,9	8,5								
LP13V-17	13.000	1.750	34,0	16,3	21,5	26,6	31,7	36,8	22,2	12,3	17,4	22,5	27,6	32,7	19,3	10,2	15,3	20,4	25,5	30,7	17,9	7,2	12,3	17,4	22,5	27,6	15,7								
LP20V	19.900	1.750	50,0	22,7	29,8	36,9	44,0	51,2	30,8	17,1	24,2	31,3	38,4	45,5	26,9	14,2	21,3	28,4	35,5	42,6	24,9	9,9	17,1	24,2	31,3	38,4	21,9								
LP32V	31.800	2.450	59,9	28,8	37,8	46,9	55,9	64,9	39,1	21,6	30,6	39,6	48,7	57,7	34,1	18,0	27,0	36,0	45,1	54,1	31,5	12,6	21,6	30,6	39,6	48,7	27,8								
LP50V	50.000	2.450	90,4	41,0	53,8	66,7	79,5	92,3	55,6	30,8	43,6	56,4	69,2	82,0	48,5	25,6	38,5	51,3	64,1	76,9	44,9	17,9	30,8	43,6	56,4	69,2	39,5								
LP1000AV	990	1.000	5,2	3,9	5,4	6,4	7,6	8,2	5,3	7,9	4,2	5,4	6,6	7,8	4,6	2,4	3,7	4,9	6,1	7,3	4,3	1,7	2,9	4,2	5,4	6,6	3,8								
LP2450V	2.450	1.200	10,1	6,8	9,0	11,1	13,3	15,4	9,3	5,1	7,3	9,4	11,6	13,7	8,1	4,3	6,4	8,6	10,7	12,8	7,5	3,0	5,1	7,3	9,4	11,6	6,6								
LP5000V-17	4.990	1.750	15,2	11,2	14,7	18,2	21,6	25,1	15,2	8,4	11,9	15,4	18,9	22,3	13,2	7,0	10,5	14,0	17,5	20,9	12,2	4,9	8,4	11,9	15,4	18,9	10,8								
LP13V-17	13.000	1.750	34,0	22,4	29,4	36,4	43,4	50,5	30,4	16,8	23,8	30,8	37,8	44,8	26,5	14,0	21,0	28,0	35,0	42,0	24,5	9,8	16,8	23,8	30,8	37,8	21,6								
LP20V	19.900	1.750	50,0	32,0	42,0	52,0	62,0	72,0	43,4	24,0	34,0	44,0	54,0	64,0	37,8	20,0	30,0	40,0	50,0	60,0	35,0	14,0	24,0	34,0	44,0	54,0	30,8								
LP32V	31.800	2.450	59,9	39,4	51,7	64,0	76,4	88,7	53,5	29,6	41,9	54,2	66,5	78,8	46,6	24,6	37,0	49,3	61,6	73,9	43,1	17,2	29,6	41,9	54,2	66,5	37,9								
LP50V	50.000	2.450	90,4	57,7	75,7	93,8	111,8	129,8	78,2	43,3	61,3	79,3	97,4	115,4	68,2	36,1	54,1	72,1	90,1	108,2	63,1	25,2	43,3	61,3	79,3	97,4	55,5								

## MAX. DEGREE OF FILLING

The maximum degree of filling specified in regulations is 85%. The height of the liquid-free part depends on the ratio:  $h \sim 0.21 \text{ int. D}$

## FORCED VAPORIZATION

- Tanks with internal vaporizer
- Tanks with atmospheric vaporizers
- **"FEED OUT"** vaporizers
- Modular vaporization units
- Modular heating units

These systems add forced vaporization to the natural vaporization capacity of the tank, for installations with high consumption and space restrictions.





**Tanks with internal vaporization:** Tanks with removable heat exchanger built into the bottom part of the tank for forced LPG vaporization, for connection to water heating circuit via a heating boiler.

Optionally the tank can be supplied with the valve equipment already fitted, pneumatically tested and with nitrogen inerting of the tank. At the customer's request the tanks can be supplied with a gas train to regulate consumption in a stainless cabinet or on a support frame.

**Modular heating units for tanks with internal vaporizer:**

Complete heating modules ready for connection to the LPG tank internal vaporizer. These units comprise a wall-hung condensation boiler and electrical control and protection cabinet, totally installed in a metal booth with all of the necessary valves and pipes for connection and start-up.

**Modular vaporizers:** Own design LPG "Feed-out" vaporizers. Vaporization capacities from 500 to 5.000 Kg/h.

**Modular vaporization units.** Equipment with complete modular vaporizer installed inside metal booth, with the necessary valves and pipes for connection to the heating module and consumption system.

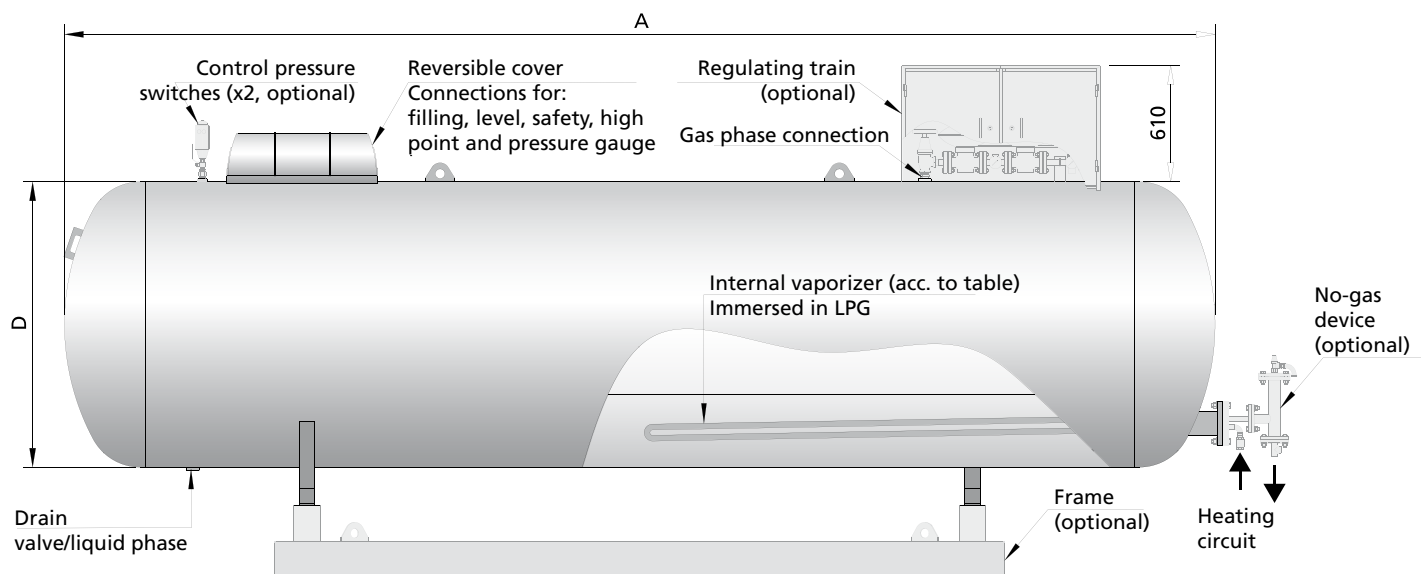
**Heating control units for modular vaporizers:**

Complete heating modules, ready to be connected to the modular vaporization units.

They comprise a heating boiler and electrical control and protection cabinet, fully installed in a metal booth with the pumps, valves and pipes required for connection and start-up.

**lapesa**  
*Solutions*





Drawing of aboveground tank. Models according to table (Example: LPVI 4880A+VIA300)

### CHARACTERISTICS TABLE

Vessels according to Lapesa's standard models, with removable internal vaporizer. Different vaporization capacities for each volume (see table). Heat provided via heating circuit. Lapesa has heating modules for installation with this unit (see page 32). This unit incorporates the benefits of a FEED BACK system and takes advantage of the natural vaporization of the tank. The tank's safety valves must be capable of discharging both natural and forced vaporization, which means they may vary between models from those of a standard tank without an internal vaporizer. The rated vaporization values indicated in the tables are only valid for tanks with 20% minimum degree of filling, which guarantees that the vaporizer is submerged in LPG.

Optional items:

- Frame for tank.
- NO-GAS device. Prevents gas input to heating circuit in the event of a connection between the two.
- Gas control line.
- Other options.

Basic LP <sup>(1)</sup> model	Volume	D (ø)	Vaporizer model					
			VIA 150	VIA 300	VIB 500	VIC 1000	VIC 1500	VIC 2000
			Vaporization capacity (Kg/h)					
			150	300	500	1000	1500	2000
			Minimum boiler power (KW)					
			17.5	35	58	117	175	233
LPVI 4000A	4.000	1.200	X					
LPVI 4880A	4.880	1.200	X	X	X			
LPVI 6650A	6.650	1.200	X	X	X			
LPVI 8334A	8.334	1.200	X	X	X			
LPVI 10A	10.000	1.500	X	X	X	X	X	
LPVI 13A	13.000	1.500	X	X	X	X	X	X
LPVI 16A	16.000	1.500	X	X	X	X	X	X
LPVI 19A	19.000	1.500	X	X	X	X	X	X
LPVI 22A	22.000	1.500	X	X	X	X	X	X
LPVI 20A	19.900	1.750	X	X	X	X	X	X
LPVI 24A	24.450	1.750	X	X	X	X	X	X
LPVI 34A	33.600	1.750	X	X	X	X	X	X
LPVI 33A-22	32.900	2.200	X	X	X	X	X	X
LPVI 50A-22	49.500	2.200	X	X	X	X	X	X
LPVI 59A-22	59.400	2.200	X	X	X	X	X	X
LPVI 50A-24	50.000	2.450	X	X	X	X	X	X
LPVI 59A-24	59.200	2.450	X	X	X	X	X	X

(1) (Rest of data like std. models)

### NOTES

- For details of natural vaporization with different tanks: please consult pages 26 and 27.
- Data valid for commercial propane only.
- Vaporization capacity decreases for gas delivery pressures of more than 3 bar (please consult).
- For ambient temperatures of less than -10°C, boiler power must be increased.
- Other volumes and capacities can be configured (please consult).
- Also available with ASME stamp.
- Units for underground installation can be designed and manufactured upon request. (Please consult).

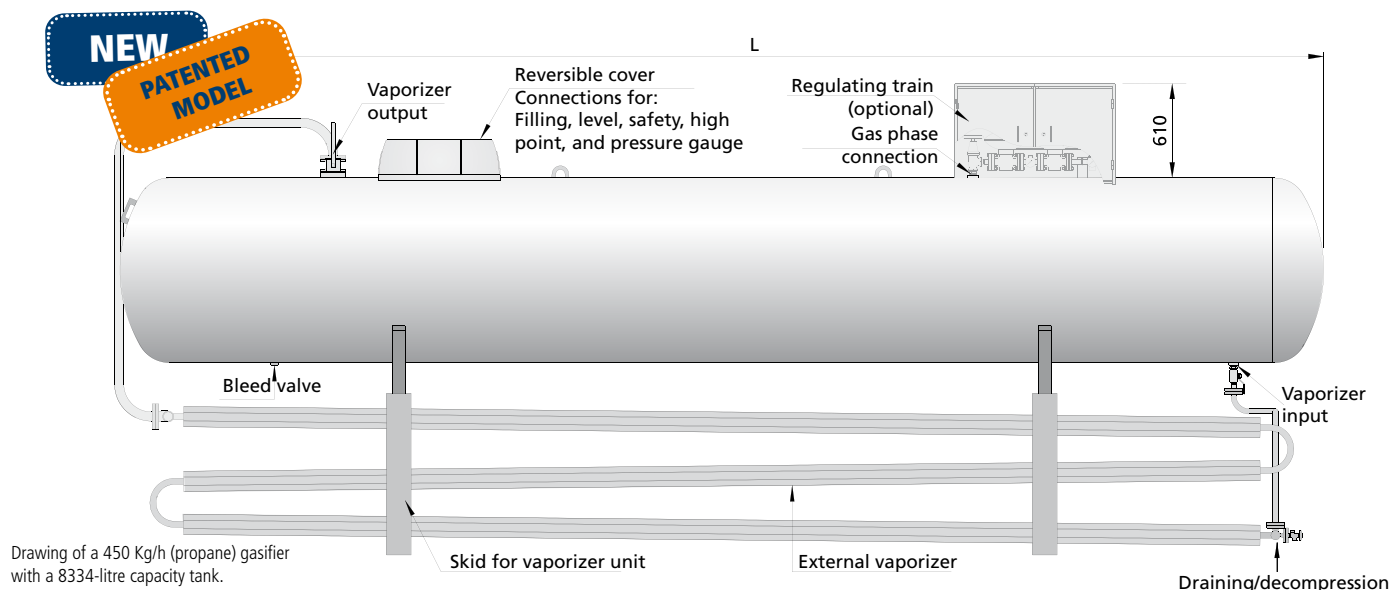




# STATIC TANKS FOR STORAGE OF LPG

## ABOVEGROUND TANKS WITH ATMOSPHERIC VAPORIZER

**lapesa**



Drawing of a 450 Kg/h (propane) gasifier with a 8334-litre capacity tank.

### VAPORIZATION DATA

EXTERNAL VAPORIZER MODEL VA 50		Propane flow rate kg/hr						
		Ambient temperature (°C)						
		-10	-5	0	5	10	15	20
Service pressure (barg)	1	18	28	39	50	62	73	85
	1,25	12	22	33	44	55	67	79
	1,5	7	16	27	38	49	60	72
	1,75	1	10	21	31	42	54	66
	2	-	7	17	27	38	50	61

EXTERNAL VAPORIZER MODEL VA 150		Propane flow rate kg/hr						
		Ambient temperature (°C)						
		-10	-5	0	5	10	15	20
Service pressure (barg)	1	58	91	125	161	197	234	272
	1,25	39	71	105	140	177	214	251
	1,5	21	52	85	120	156	193	231
	1,75	4	33	66	100	136	172	210
	2	-	21	53	87	122	159	196

EXTERNAL VAPORIZER MODEL VA 300		Propane flow rate kg/hr						
		Ambient temperature (°C)						
		-10	-5	0	5	10	15	20
Service pressure (barg)	1	115	181	250	321	394	468	544
	1,25	78	142	210	281	353	427	503
	1,5	42	104	171	241	312	386	462
	1,75	9	67	132	200	272	345	420
	2	-	43	106	173	244	317	392

EXTERNAL VAPORIZER MODEL VA 450		Propane flow rate kg/hr						
		Ambient temperature (°C)						
		-10	-5	0	5	10	15	20
Service pressure (barg)	1	173	272	375	482	591	702	816
	1,25	117	214	316	421	530	641	754
	1,5	63	156	256	361	469	579	692
	1,75	13	100	197	300	407	517	630
	2	-	64	159	260	366	476	588

### ATMOSPHERIC VAPORIZER

Model	Nominal vaporization (kg/h) <sup>(1)</sup>	Approx. length (mm)	Approx. height (mm)
VA50	50	3.000	250
VA150	150	7.400	400
VA300	300	7.400	750
VA450	450	7.400	1.000

(1) Nominal vaporization corresponds to the nominal working conditions:

- Service pressure 1,5 bar
- Ambient temperature 10° C
- LPG: 80% propane, 20% butane

\* A steady consumption or adverse ambient conditions can affect the nominal characteristics of the units (please consult).

\* Depending on the tank and vaporizer sizes, the unit can be sent completely mounted, including the piping between both elements. Otherwise, the elements will be mounted on site.

### ABOVEGROUND LPG TANKS WITH INTERNAL VAPORIZER -CHARACTERISTICS-

- Propane tank that incorporates external vaporizer.
- This system increases the natural vaporization capacity of tanks.
- Vaporization is obtained by heat exchange with the ambient.
- Includes all the advantages of a feed-back system.

### ADVANTAGES WITH RESPECT TO FORCED VAPORIZATION

- Savings:
  - Simple and economical installation.
  - Maintenance free.
  - No additional consumption (electricity, gas, etc.)
- Safety:
  - No additional pieces which could break down.
  - No electrical material used, neither boilers with flames.
- Installation time is greatly reduced.
- Environment-friendly: energy consumption 100% renewable.

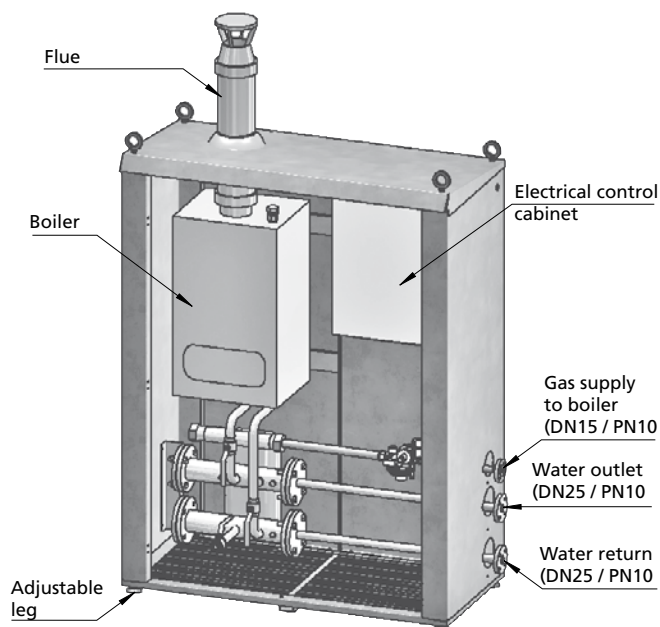
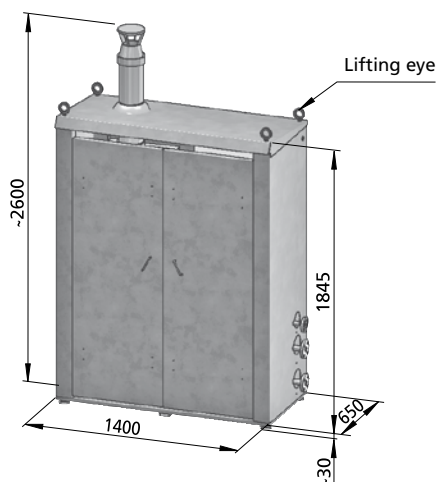


## COMPACT HEATING UNITS FOR TANKS WITH INTERNAL VAPORIZER

Unit comprising a tight wall-hung condensation boiler fully equipped to operate with propane gas, an electrical cabinet and all of the necessary pipes and valves for its connection to the tank with internal vaporizer. The whole unit is housed in a booth equipped for its connection and start-up.

**CHARACTERISTICS TABLE**

Model	Boiler power (kW)	Weight (Kg.)	For internal vaporizers	
VPC30C	45	265	VIA 300	VIA 150
VPC60C	65	275	VIA 500	

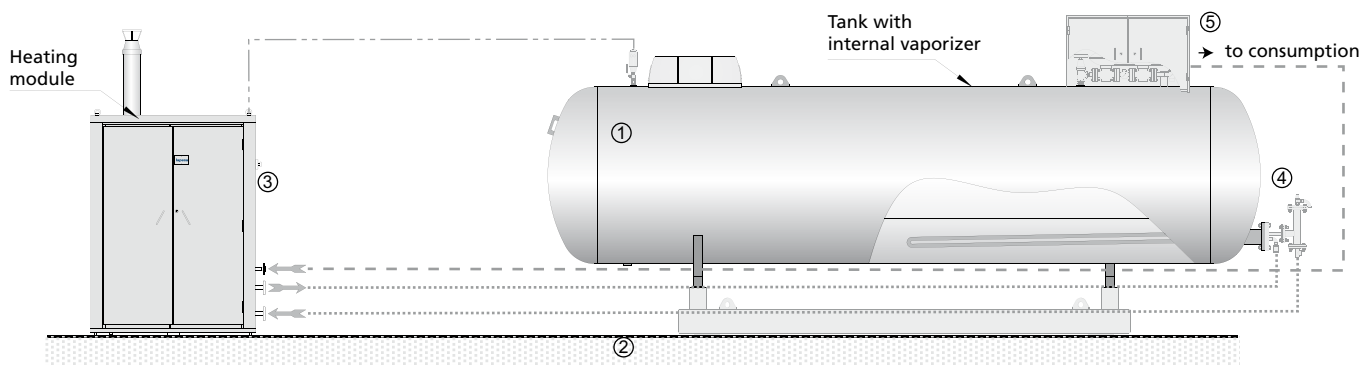


## TANK WITH INTERNAL VAPORIZER + MODULAR HEATING UNIT

Set comprising:

- 1- Tank with internal vaporizer with full valve equipment and control train to consumption.
- 2- Support frame.

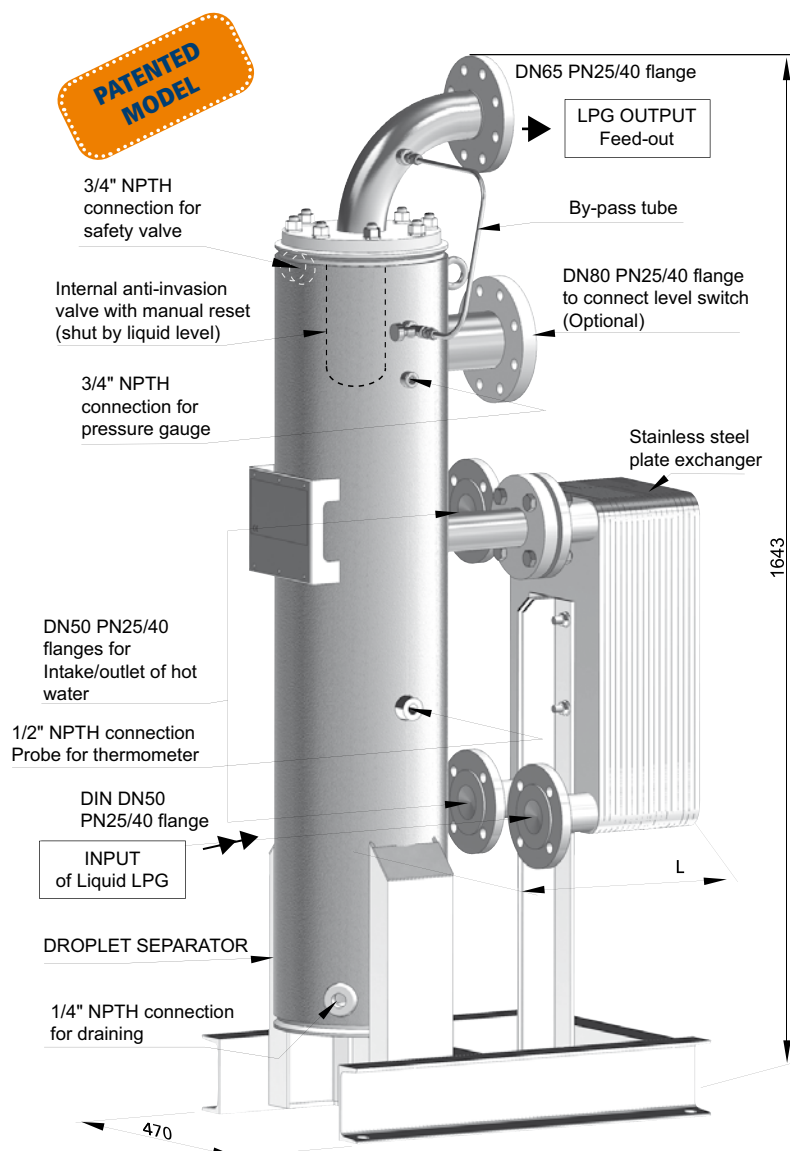
- 3- Heating module.
- 4- No-gas device.
- 5- Gas control line.



Installation to be carried out at destination site:

- Control cable (flameproof)
- - - - - Propane: boiler supply
- ..... Water: heating circuit internal vaporizer

Compact unit model	Tank (l.)	Vaporization (Kg/h)	Heating module model
LPVI4880A+VIA150+VPC30C	4.880	150	VPC30C
LPVI4880A+VIA300+VPC30C	4.880	300	VPC30C
LPVI4880A+VIB500+VPC60C	4.880	500	VPC60C
LPVI110A+VIA150+VPC30C	10.000	150	VPC30C
LPVI110A+VIA300+VPC30C	10.000	300	VPC30C
LPVI110A+VIB500+VPC60C	10.000	500	VPC60C
LPVI113A+VIA150+VPC30C	13.000	150	VPC30C
LPVI113A+VIA300+VPC30C	13.000	300	VPC30C
LPVI113A+VIB500+VPC60C	13.000	500	VPC60C

**MODULAR FEED-OUT VAPORIZERS**

- The system allows the vaporization capacity to be increased by easy replacement of the plate exchanger.
- Vaporization capacities of 500 to 5.000 kg/h.
- Design pressure: 20 bar.
- Rated operating conditions:  
Water input temperature: 55°C.  
Input-output temperature: 20 °C.  
Vaporization pressure: 4 bar.

**CHARACTERISTICS TABLE**

Vaporization capacity (Kg./h.)	Model Ref.	Approx. tare. (Kg.)	L (mm)
500	VPM 500	170	625
1.000	VPM 1000	175	660
1.500	VPM 1500	185	695
2.000	VPM 2000	195	745
3.000	VPM 3000	215	845
5.000	VPM 5000	240	935

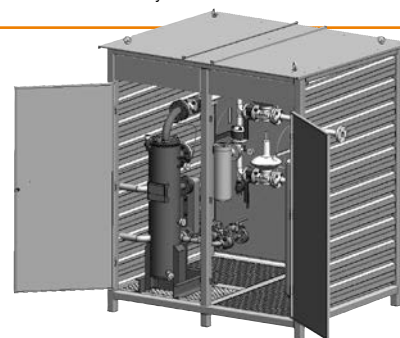
**MODULAR VAPORIZATION UNITS EMV Models**

They allow direct use of tank gas when consumption is small.

Gas supply to boiler

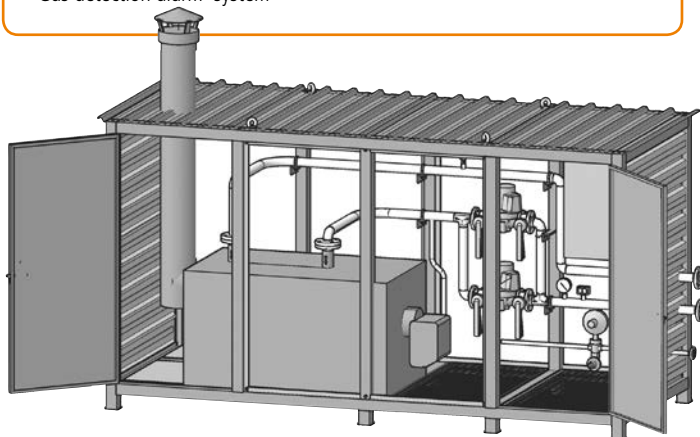
Complete unit comprising:

- Modular vaporizer
- Condensate separators
- Control train
- Valves and safety elements

**MODULAR HEATING UNITS. EMC models**

Complete unit comprising:

- Heating boiler
- Pump
- Regulators, pressure switches, etc.
- Electric control panel (for boiler module and vaporization module)
- Gas detection alarm system

**MODULAR HEATING-VAPORIZATION SETS**

This is a set formed by the following elements:

- 1 - Vaporization module with EMV modular vaporizer
- 2 - MC heating module.

On-site installation consists of connecting the gas and heating pipes between the modules (tank to vaporization module and this module to the heating module) and wiring up between booths.

**CHARACTERISTICS TABLE**

Modular unit model	Vaporizer (Kg./h.)	Rated boiler power (Mcal./h.)
EMV0500+EMC060C	500	60
EMV1000+EMC120C	1000	120
EMV1500+EMC180C	1500	180
EMV2000+EMC240C	2000	240
EMV3000+EMC360C	3000	360