

Design and build of your BOC gas system

The widest selection of tanks available in the UK today, along with the largest fleet of delivery vehicles to ensure security of supply.



Vessel information

BOC supply more than just gas. We work with our customers to deliver total process solutions.

Our application specialists work with you to gain an in-depth understanding of your processes and strive to improve your productivity, yield, product quality and meet exacting environmental performance.

For processes that require high volumes of gaseous or liquid product, we supply a selection of products as liquid.

The liquid is delivered by a cryogenic tanker into a vacuum insulated bulk storage vessel on your site. The vessel will provide either a liquid or gaseous supply. The installation also includes a pressure-raising system to maintain the pressure within the vessel at a pre-determined value. This BOC service is designed to give you an unfailing supply of high-quality product. This in turn gives you security and reliability in your own production line. When you buy BOC, you buy the biggest name and best resources in the business.

What size vessel do I need?

The basic criteria are twofold – the amount of gas you need for your process and the size and frequency of deliveries which we can economically make. Bear in mind that the more efficient and cost-effective our operation can be, the better deal we can offer to you.

Key factors to consider are your required flow rate and your gas demand (whether it is steady or fluctuating), together with the peaks and troughs in your business. BOC will work with you to decide which type and size of vessel will best fit your requirements.



Vessel types and sizes

BOC can provide a range of over 60 sizes of storage vessels. The following tables show you the most common ranges. We will equip you with the nearest size vessel available for your requirements, usually within ±10% of the capacity shown. The size and frequency of the liquid delivery will then be adjusted to cover any slight variation in capacity from the ideal.

Normally low pressure vessels (up to 4 bar) are used for liquid nitrogen supplies for cooling purposes. Medium pressure (up to 18 bar) and high pressure (up to 35 bar) are used for gas supplies.

VIT vessel data - capacities, weights and dimensions

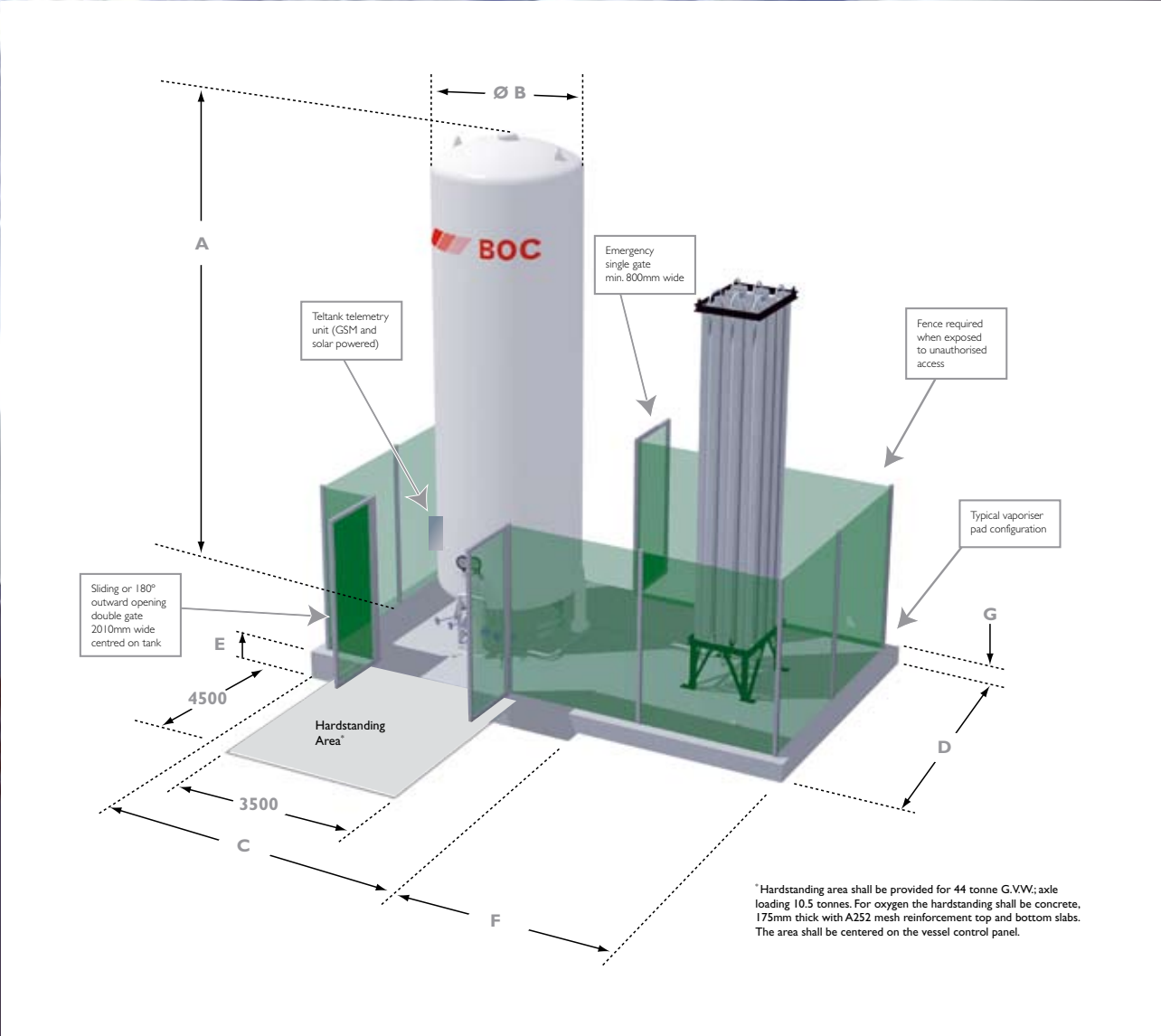
Model	Reinforcement category		Bolting category	Water capacity (litres)		Nominal product capacities HCM at 1013 mb and 15°C 11-HCM=100 m3			Vessel dimensions			Max weight (tonnes)			Vessel plinth dimensions (m)		
Gross	Net	O ₂	N ₂	Ar	Height (A)	Dia (B)	Empty	Full			W (C)	D (D)	T (E)				
			O ₂	N ₂	Ar				O ₂	N ₂	Ar						
21	B	None	2300	2070	17.4	14.2	17.1	3.19	1.62	1.5	4.5	3.8	4.9	3.5	3.5	0.30	
33-8	A	4 or 6	3323	3165	26.6	21.5	26.1	4.21	1.52	2.3	5.9	4.9	6.7	3.5	3.5	0.25	
41	A	4 or 6	4500	4160	35.1	28.4	34.4	4.11	1.85	2.8	7.5	6.2	8.6	3.5	3.5	0.25	
61-8	A	4 or 6	6082	5792	48.7	39.3	47.7	6.66	1.52	3.8	10.4	8.5	11.9	3.5	3.5	0.25	
109-5	B	None	10897	10378	87.2	70.4	85.5	4.68	2.50	5.4	17.2	13.8	19.9	4.0	4.0	0.30	
179	B	4 or 6	19400	17950	151.2	122.6	148.3	7.93	2.46	9.7	30.1	24.1	34.7	4.0	4.0	0.30	
194-5	B	4 or 6	19392	18468	155.1	125.3	152.1	7.18	2.50	8.0	29.0	22.9	33.7	4.0	4.0	0.35	
279-4	C	4 or 6	27887	26560	223.1	180.1	218.8	10.1	2.50	11.0	41.2	32.4	48.0	4.5	4.5	0.35	
345-6	C	None	34515	32870	276.8	224.2	270.8	7.07	3.57	14.3	51.8	40.9	60.1	5.0	5.0	0.35	
410	C	None	43000	40950	344.6	278.2	337.8	9.45	3.38	19.0	66.0	52.4	77.4	5.0	5.0	0.35	
432-6	C	None	43165	41110	345.3	278.8	338.5	8.15	3.57	17.4	64.4	50.6	75.0	5.0	5.0	0.35	
608-5	C	4 or 6	61200	58285	489.6	395.3	480.0	10.64	3.57	21.7	88.0	68.6	102.9	5.0	5.0	0.35	
1139-4	E	5	114570	109115	916.5	739.8	898.6	18.14	3.57	35.3	159.5	123.0	187.3	6.0	6.0	0.45	

The reinforcement category, bolting category and vessel plinth dimensions shown on these tables are applicable to the 'Build and Safety' section of this brochure.

VIE vessel data - capacities, weights and dimensions

Model	Reinforcement category	Bolting category	Water capacity (litres)		Nominal product capacities HCM at 1013 mb and 15°C 11-HCM=100 m3			Vessel dimensions		Empty	Max weight (tonnes)			Vessel plinth dimensions (m)		
			Gross	Net	O ₂	N ₂	Ar	Height (A)	Dia (B)		Full			W (C)	D (D)	T (E)
17	A	None	1885	1600	13.5	11.0	13.2	3.73	1.39	2.8	4.6	4.1	5.0	3.5	3.5	0.25
25	B	None	2773	2520	21.2	17.2	20.8	3.89	1.62	2.9	5.8	4.9	6.4	3.5	3.5	0.30
31S	A	4 or 6	3327	3080	25.9	20.9	25.4	4.27	1.62	3.6	7.1	6.1	7.9	3.5	3.5	0.25
33-17	A	4 or 6	3323	3165	26.6	21.5	26.1	4.21	1.52	2.7	6.3	5.3	7.1	3.5	3.5	0.25
42	A	4 or 6	4500	4160	35.1	28.4	34.4	4.70	1.70	4.6	9.2	7.8	10.3	3.5	3.5	0.25
56S	B	4 or 6	6087	5637	47.4	38.2	46.4	6.77	1.62	5.5	12.0	10.0	13.4	3.5	3.5	0.30
61-17	B	4 or 6	6082	5792	48.7	39.3	47.7	6.66	1.52	4.2	10.7	8.8	12.2	3.5	3.5	0.30
83	B	4 or 6	9000	8320	70.2	56.9	68.8	6.55	1.98	7.1	16.7	13.9	18.7	3.5	3.5	0.30
102	B	4 or 6	14514	10160	85.3	68.9	83.7	7.54	2.44	12.2	23.6	20.4	26.3	4.0	4.0	0.30
111-17	B	None	11115	10585	88.9	71.8	87.2	4.68	2.50	6.9	18.9	15.4	21.6	4.0	4.0	0.30
130	C	4 or 6	14400	13000	109.5	88.9	107.3	7.32	2.44	13.4	28.4	23.8	31.8	4.0	4.0	0.30
185IRD	B	4 or 6	19328	18408	155.0	125.0	152.0	7.10	2.40	5.8	26.8	20.7	31.5	4.0	4.0	0.30
196-17	B	None	19610	18675	156.9	126.6	153.8	7.18	2.50	10.3	31.6	25.3	36.5	4.0	4.0	0.30
207	C	None	22300	20661	174.0	140.9	170.2	8.30	2.70	14.3	37.9	31.0	43.1	4.5	4.5	0.35
281-17	C	4 or 6	28105	26767	224.9	181.5	220.4	10.10	2.50	14.5	45.0	36.0	51.8	4.5	4.5	0.35
337N	C	None	36350	33650	282.7	228.2	277.0	6.73	3.88	16.6	55.0	43.6	63.5	5.0	5.0	0.35
420UC	D	4 or 5	41600	39520	332.8	269.6	325.6	12.90	2.60	27.0	72.0	58.8	82.1	4.5	4.5	0.45
432-18	C	None	42835	40800	343.0	277.0	336.0	8.15	3.57	23.2	69.6	56.0	80.0	5.0	5.0	0.35
505N	C	None	54530	50480	424.0	342.2	415.7	9.10	3.88	21.6	79.0	62.2	92.0	5.0	5.0	0.35
608-18	C	None	60390	57515	483.1	390.0	473.6	10.64	3.57	29.4	94.8	75.6	109.5	5.0	5.0	0.35
785-17	D	None	77940	74230	763.9	616.7	749.0	13.32	3.57	36.5	121.0	96.2	139.9	5.5	5.5	0.45
962-17	D	4 or 6	95500	90950	763.9	616.7	749.0	15.81	3.57	42.8	146.6	116.4	169.6	5.5	5.5	0.45
1139-17	E	4 or 5	113050	107670	904.3	730.1	886.7	18.14	3.57	49.0	171.5	135.6	199.0	6.0	6.0	0.45





Build and safety requirements

Before we can install the vessel at your site, a certain amount of preparation work has to be undertaken. The site has to be chosen and measured. Access roads have to be looked at to make sure that our tankers can use them and that there is adequate turning space.

Finally, some legal work will be necessary to make sure there are no covenants which need to be observed. Once all these preliminaries are out of the way, a concrete plinth is prepared to take the weight of the filled vessel, with an adjacent hard-standing for our tanker to park when it arrives to deliver your gas.

The information below provides you with some of the standard build and safety requirements needed in order to install the vessel, although do be sure not to start laying concrete until you have talked to us.

This civil briefing is intended for guidance only and a detailed design should be undertaken by the qualified civil engineer, taking into account the ground conditions and topography of the specific site on which the vessel is being installed. The data has been calculated in accordance with the conservative standard method in BS6399-2, assuming a maximum basic wind speed of 25 m/s and site effective height and distance to the sea of 100 m and two kilometres respectively.

- The bearing capacity of the ground has been assumed to have a uniform strength of:
 - 75 kN/m² for category A and B plinths and hard-standing
 - 100 kN/m² for category C, D and E plinths
- The plinths and hard-standing shall be laid on 200mm on consolidated hardcore
- Hydrocarbon based surfacing shall not be used on oxygen plinths
- Concrete base designed to BS8110. Concrete should be C35 with a brush finish and should have a maximum fall of 1:150 to allow surface water to run off.

Fencing details

Where fencing is required it can be in either panel form or for 'roll round' installation. The following standard is recommended:

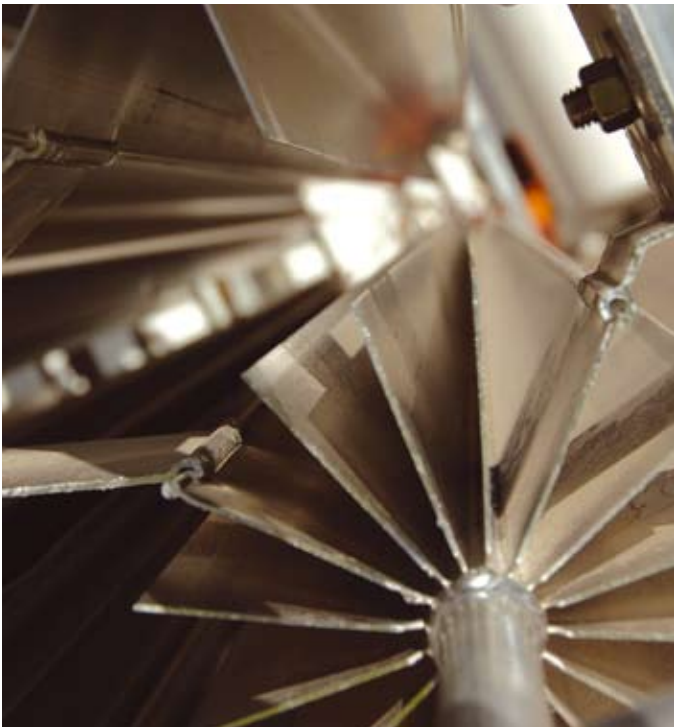
Fence type: 50 x 50 RSA 3 mm weld mesh panel to BS443, welded to BS1722 and BS4102. Panels to be hot-dipped galvanised to BS729.

or Roll round chain link with a medium grade industrial plastic coating.

Fence Height: 1.8 m (min)

Posts: 50 x 50 RHS hot-dipped galvanised to BS729. Posts to be provided with pre-drilled foot pads and M10 screw bolt fixings.

Gates: 50 x 50 RSA 3mm weld mesh BS443 welded to BS1722 and BS4102. Gates to be hot-dipped galvanised to BS729. Gate posts should be set in pockets. Single gate width 800 mm (min) Double gate width 2010 mm.



Bolting category

Bolt category	Holding-down-bolt details
1	1 x 20 mm rebar bolt/leg fixed 175 mm into concrete
2	1 x 20 mm rebar bolt/leg fixed 275 mm into concrete
3	2 x 20 mm rebar bolt/leg of 4 pairs equally spaced round skirt. All bolts fixed 400 mm into concrete at 200 mm minimum centres
4	1 x M20 HAS adhesive anchor with HVU resin capsule/leg fixed 170 mm into concrete
5	2 x M20 HAS adhesive anchor with HVU resin capsule/leg of 4 pairs equally spaced round skirt, fixed 340 mm into concrete at 200 mm minimum centres
6	1 x M20 HSA-KA stud anchor fixed 115 mm into concrete
7	1 x M16 HAS adhesive anchor with HVU resin capsule fixed 125 mm into concrete
8	1 x M16 HSA-KA stud anchor fixed 95 mm into concrete

Note for vessels: It is recommended to bolt through feet holes where provided. If a clamp is required, then the bolt should be positioned as close to the vessel leg as possible to reduce the lever arm effect on the clamp and bolt. In any case the dimensions stated on the drawings shall not be exceeded.

Plinth reinforcement category

Category	Reinforcement
A	A252 mesh top and bottom
B	A393 mesh top and bottom
C	12 dia bars (high yield) at 150 centres each way top and bottom
D	16 dia bars (high yield) at 200 centres each way top and bottom
E	16 dia bars (high yield) at 150 centres each way top and bottom

Mesh references are in accordance with B54483
Hot rolled bars shall be in accordance with B54449

Safety distances

Hazards	Oxygen (metres)		Argon/ Nitrogen (metres)
	<17,500 litres	17,500- 175,000 litres	
1 Property boundaries	5	8	1.5
2 Public roads	5	8	5
3 Railways	10	15	5
4 Places of public assembly	10	15	N/A
5 Offices, canteens, areas of congregation	5	8	3
6 Vehicle parking areas	5	8	1.5
7 Pits, ducts, drains to underground systems	5	8	3
8 Naked flames/smoking areas	5	8	N/A
9 LPG vessels and bulk flammable liquid storage	6-30*	6-30*	3
10 Compressed flammable gases	5-8**	5-8**	3**
11 Fuel gas vents	5	8	3
12 Continuous sections of flammable pipelines	3	3	1
13 Mechanically jointed pipelines, flammable gas or liquid	6-15***	6-15***	3
14 Process equipment and machinery	5	8	N/A
15 Compressors, ventilator air intakes	5	8	3
16 Large wooden structures	15	15	3
17 Site huts and small stocks of combustables	5	8	3
18 MV and HV substations	5	8	N/A

For more information refer to TD054 Safety distances for liquid oxygen storage; tables 1,2 & 3.

- * Dependent on volume of LPG/bulk flammable liquid storage. (Table 1)
- ** Dependent on volume of compressed flammable gases. (Table 2)
- *** Dependent on line size (Table 3)



Vaporiser information

A vaporiser to match your flow rate

If you want a gaseous supply, you will need a vaporiser. Which type we recommend will depend on your flow rate at your peak requirement. For lower flow rates, we fit an ambient vaporiser, which relies simply on the ambient air temperature to convert the liquid into gas. An ambient vaporiser clearly needs negligible maintenance and costs nothing to run. The size of the ambient vaporiser increases with flow rate requirements. For higher flow demands, a steam heated water bath vaporiser may be an option.

The vaporiser is mounted on a concrete plinth within the VIE compound, with the liquid gas inlet pipe work from the VIE as short and direct as possible.

Ambient vaporiser performance

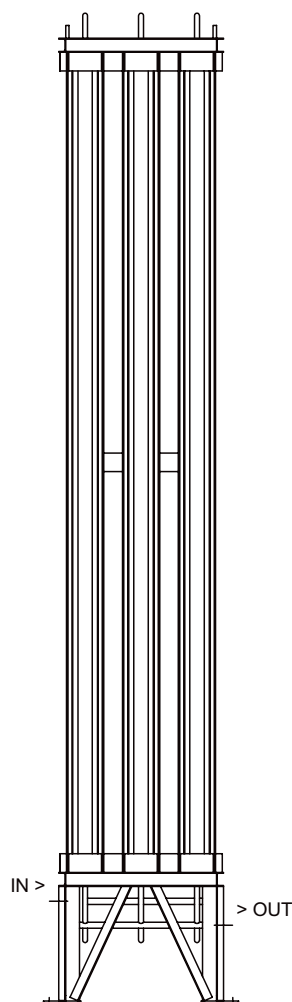
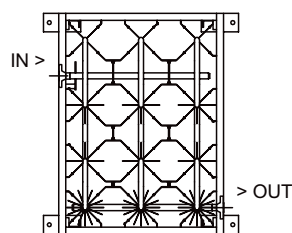
The flow rate capacities are based on a continuous flow of gas for eight to twelve hours with a gas outlet temperature 15°C to 20°C under ambient temperature. This is for ambient temperatures down to -5°C.

The flow rate capacities shown on the table are nominal and may not be achievable under specific site conditions, such as:

- Prolonged sub-zero ambient conditions (> 2 days)
- Sheltered locations
- Riverside locations

In these conditions BOC will select a unit suitable to the site conditions.

If the customer's process is a 24-hour operation then 2 banks of vaporisers must be installed with manual or automatic changeover valves, so that one bank is in use and one bank is defrosting thereby maintaining the continuous supply.



Hybrid vaporiser data – capacities, dimensions and anchoring details

Part number	Flow rate Nm ³ /hr	Model number	Weight kg		Vaporiser dimensions m			Plinth dimensions m		Bolting selection <i>Option 1</i>
			<i>Dry</i>	<i>Full of ice*</i>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>F</i>	<i>G</i>	
19303688	55	FF/TF/MF 0410AHF	82	992	3.87	0.65	0.76	2.25	0.20	4 off Cat 8
19303689	110	FF/TF/MF 0810AHF	143	1823	3.87	1.20	0.76	2.25	0.20	4 off Cat 8
19303690	165	FF/TF/MF 1210AHF	204	2724	3.87	1.20	1.06	2.50	0.20	4 off Cat 8
19303691	220	FF/TF/MF 1610AHF	263	3623	3.87	1.20	1.37	3.00	0.20	4 off Cat 8
19303677	250	FF/TF/MF 1215AHF	284	4064	5.39	1.20	1.06	2.50	0.25	4 off Cat 8
19303678	335	FF/TF/MF 1615AHF	370	5410	5.39	1.20	1.37	3.00	0.25	4 off Cat 8
19303679	500	FF/TF/MF 2415AHF	560	8112	5.39	1.22	2.00	3.50	0.30	4 off Cat 8
19303680	670	FF/TF/MF 3215AHF	730	10811	5.39	2.49	1.39	3.75	0.30	4 off Cat 8
19303681	800	FF/TF/MF 3218AHF	921	13018	6.61	2.51	1.41	3.75	0.30	4 off Cat 4
19303682	1000	FF/TF/MF 4018AHF	1127	16248	6.61	2.51	1.71	3.75	0.30	4 off Cat 6
19303683	1200	FF/TF/MF 4818AHF	1316	19461	6.61	2.51	2.02	3.75	0.30	4 off Cat 6
19303684	1400	FF/TF/MF 5618AHF	1556	22725	6.61	2.51	2.32	3.75	0.30	4 off Cat 6
19303685	1600	FF/TF/MF 6418AHF	1774	25967	6.61	2.51	2.59	3.75	0.30	4 off Cat 6
19303686	1950	FF/TF/MF 4035AHF	2155	31557	11.8	2.59	1.82	3.75	0.45	12 off Cat 4
19303687	2340	FF/TF/MF 4835AHF	2563	37845	11.8	2.59	2.11	3.75	0.45	12 off Cat 4

* The weight full of ice is the worst case figure, based on the vaporiser being used for 4 weeks continuously with no defrost time.

Notes

- Concrete plinths for vaporisers shall be reinforced top and bottom with A252 mesh
- The vaporisers should be positioned centrally on the concrete plinth and the wide face of the vaporiser should be parallel to the base width
- Dimension 'F' is for a single vaporiser. Additional vaporiser plinths can be overlapped provided that the vaporisers are positioned so that they have minimum clearance of 1m from the vessel and 1m from other process vaporisers
- Technical data for different bolting categories is found in the table on the preceding pages

BOC responsibility

We retain ownership of the storage equipment so it remains our responsibility to maintain it and make sure it is operational at all times. You have no worries and no capital outlay. You simply pay for the gas you use, plus a service charge. The system also gives you flexibility. Suppose, for instance your gas demands change. We will in the first place have suggested a size of vessel which will cater for higher or lower demand levels by a simple variation of the frequency and size of delivery. If it then becomes clear that the change is permanent, you might want to switch to a bigger or smaller vessel. In this case, we will take the original one away and install a replacement for a minimal cost and with the minimum of disruption.

Getting ahead through innovation

With its innovative concepts, BOC is playing a pioneering role in the global market. As a technology leader, it is our task to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

BOC offers more. We create added value, clearly discernible competitive advantages, and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardized as well as customized solutions. This applies to all industries and all companies regardless of their size.

If you want to keep pace with tomorrow's competition, you need a partner by your side for whom top quality, process optimization, and enhanced productivity are part of daily business. However, we define partnership not merely as being there for you but being with you. After all, joint activities form the core of commercial success.

BOC – more than just gas

Call BOC or talk to your Account Manager today to find out how we can deliver more to your business.

BOC UK

BOC, Customer Service Centre
Priestley Road
Worsley
Manchester
M28 2UT

UK Tel: 0800 111 333

Fax: 0800 111 555

BOC Ireland

BOC Ireland
P.O. Box 201
Bluebell
Dublin12

ROI Tel: 01 409 1800

Fax: 01 409 1801

For further information on gas supply options email us at: custserv@boc.com

www.boc.com

BOC

Customer Service Centre, Priestley Road, Worsley, Manchester M28 2UT, United Kingdom
Phone 0800 111 333, Fax 0800 111 555, www.boc.com

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