

## 5442 Sales Guide

“All the reliability and serviceability of the 5437 but with 85% more output in one class leading package”



The technical data above is based upon the performance of the 5442 Industrial gas machine when compressing Nitrogen.

The 5442 is also more than capable of compressing other gases such as those listed in the table below as well as gas mixtures. Given the different properties of each gas some of the performance may not be available for all. Please contact CompAir Reavell directly for assistance.

➤ Argon	➤ Ethane	➤ Hydrogen
➤ Biomethane	➤ Ethylene	➤ Methane
➤ Carbon Dioxide	➤ Helium	➤ Neon
➤ Carbon Monoxide	➤ Heliox	➤ Nitrous Oxide
		➤ Sulphur Hexafluoride
➤ And gas mixtures		

For Biomethane & Methane applications please refer to CompAir's CNG Vehicle Refuelling Solutions.

Installation Data (for Air and Gas)		
Water inlet temperature	Max: 37°C	Min: 0°C *
Final delivery temperature above water inlet	1.5°C / 3°C dependant upon speed and pressure	
Noise level at 1m	85-89 dB(A)	
Water Pressure	Max: 5.1 barg	Min: 0.9 barg
Oil Capacity (crankcase + cooler system)	37.5 liters	
Oil carry over after final separator	8ppm by weight	
Final delivery diameter connections	½ “ BSP	
Water connections	In: 1¼”BSP	Out: 1¼”BSP
Inlet connections (AIR)	Suction filter silencer	
Inlet connections (GAS)	DN100, PN16 Flange to BS4504	
Heat Energy dissipated to the surroundings from external surfaces of:		
Compressor	Approximately 10 – 15% of absorbed power	
Electric Motor	Approximately 10 – 15% of rated motor power	

\* Lower temperatures via appropriate treatments are possible, on request

\*\*Ambient temperatures: -10°C to 45°C, Performance figures are typical and are not the full range available and are based on an inlet temperature of 20°C and water cooling temperature of 15°C, Flow rates (FAD) measured in accordance with ISO 1217:1996, performance on electric motors are based on a 50Hz supply\*\*

## Industries & Applications

### Hydrogen

**INDUSTRIES:** Oils & Fat hydrogenation, Glass & Ceramics, Chemical, Electronics, Transportation, Gas Companies, Nuclear & Thermal Power, Meteorological, Metallurgical, Pharmaceutical

#### APPLICATIONS:

- ✿ Hydrogenation of edible oils and fatty acids
- ✿ Producing protective atmosphere for heat treatment of metals
- ✿ Production of chemicals and plastics
- ✿ Protective atmosphere for manufacture of electronic components and float glass casting
- ✿ Annealing furnaces for steel production
- ✿ Argon purification, cylinder gas distribution
- ✿ Corrosion control and alternator cooling in Nuclear / Thermal Power Plants
- ✿ Observation balloon filling
- ✿ Alternative fuel for vehicles

### Helium

**INDUSTRIES:** Universities, Aerospace, Diving, Gas Companies, Laboratories, Cryogenics, Meteorological, Leak Testing, Chemical

#### APPLICATIONS:

- ✿ Leak Testing
- ✿ Supersonic wind tunnels
- ✿ Cylinder gas
- ✿ Cryogenics plants
- ✿ Observation Balloon filling
- ✿ Heliox
- ✿ Gas Transfer & Reclaimer systems
- ✿ Growing silicon crystals for semi-conductor manufacture

## Nitrogen

**INDUSTRIES:** Pharmaceutical, Plastics, Marine, Food, Power, Healthcare, Steel, Chemical, Petrochemical, Glass & Ceramics

### APPLICATIONS:

- ♣ Inert blanketing gas
- ♣ Deoxidisation
- ♣ Sparging – removal of volatile components
- ♣ Purging
- ♣ Rubber tyre production
- ♣ Well head cleaning
- ♣ Compensator systems
- ♣ Pneumatic slag stopper
- ♣ Nuclear reactor cooling
- ♣ Injection moulding

## Argon

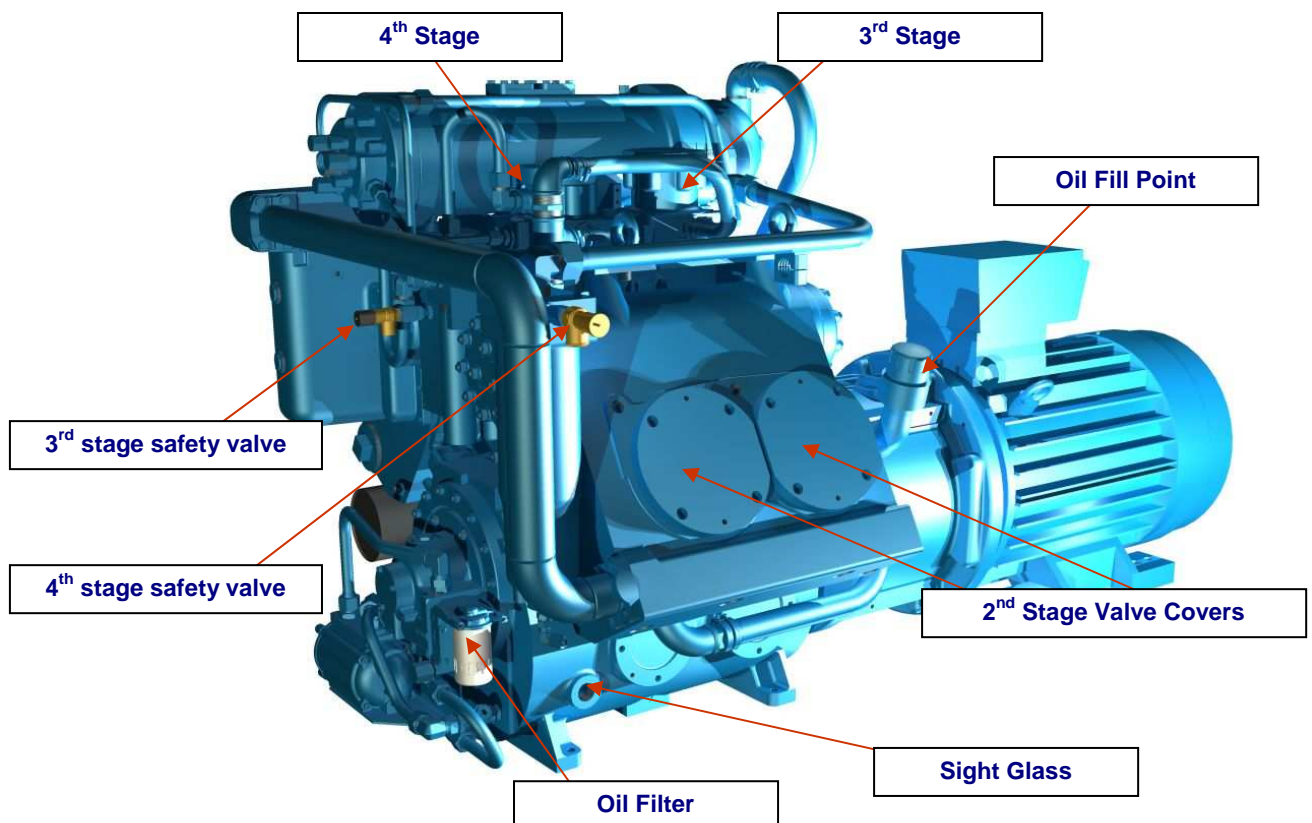
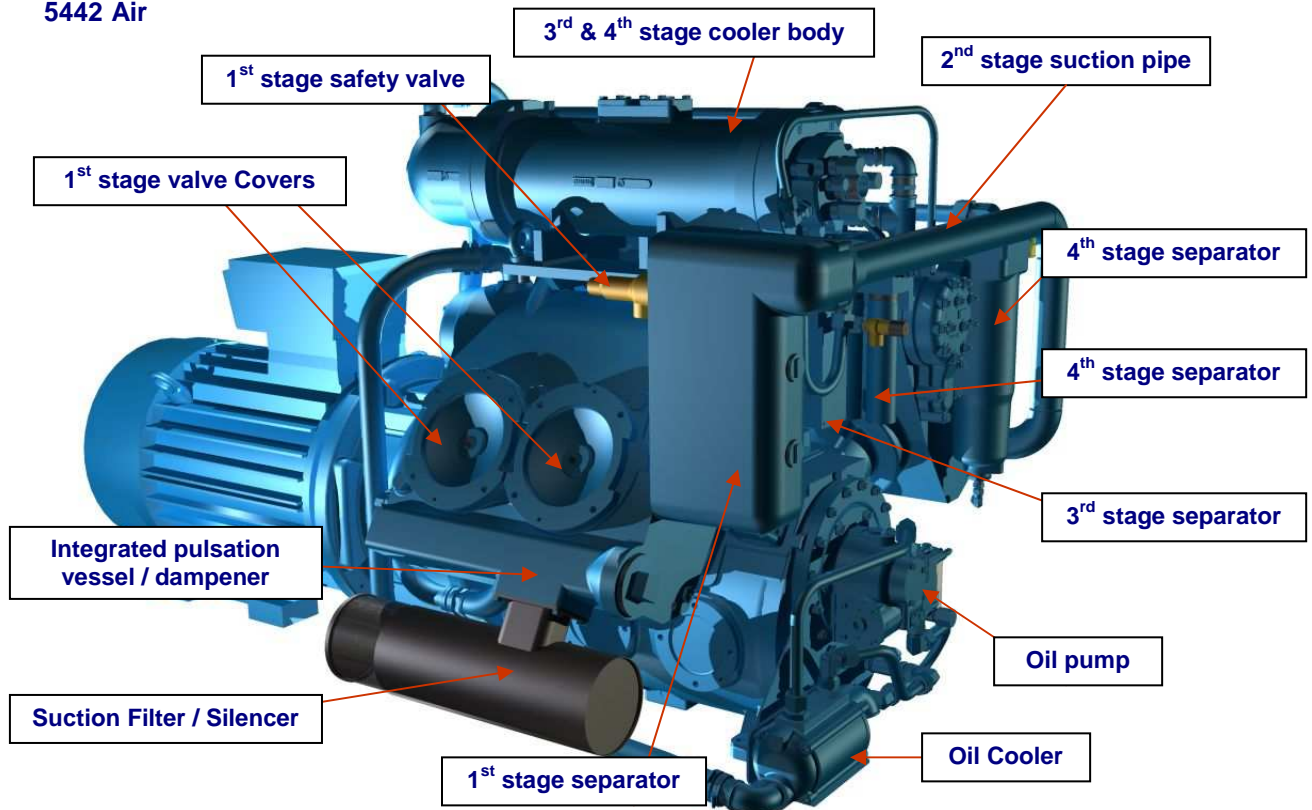
**INDUSTRIES:** Metallurgy

### APPLICATIONS:

- ♣ Gas Atomisation
- ♣ Growing silicon crystals for semi-conductor manufacture
- ♣ Filler gas for light bulbs

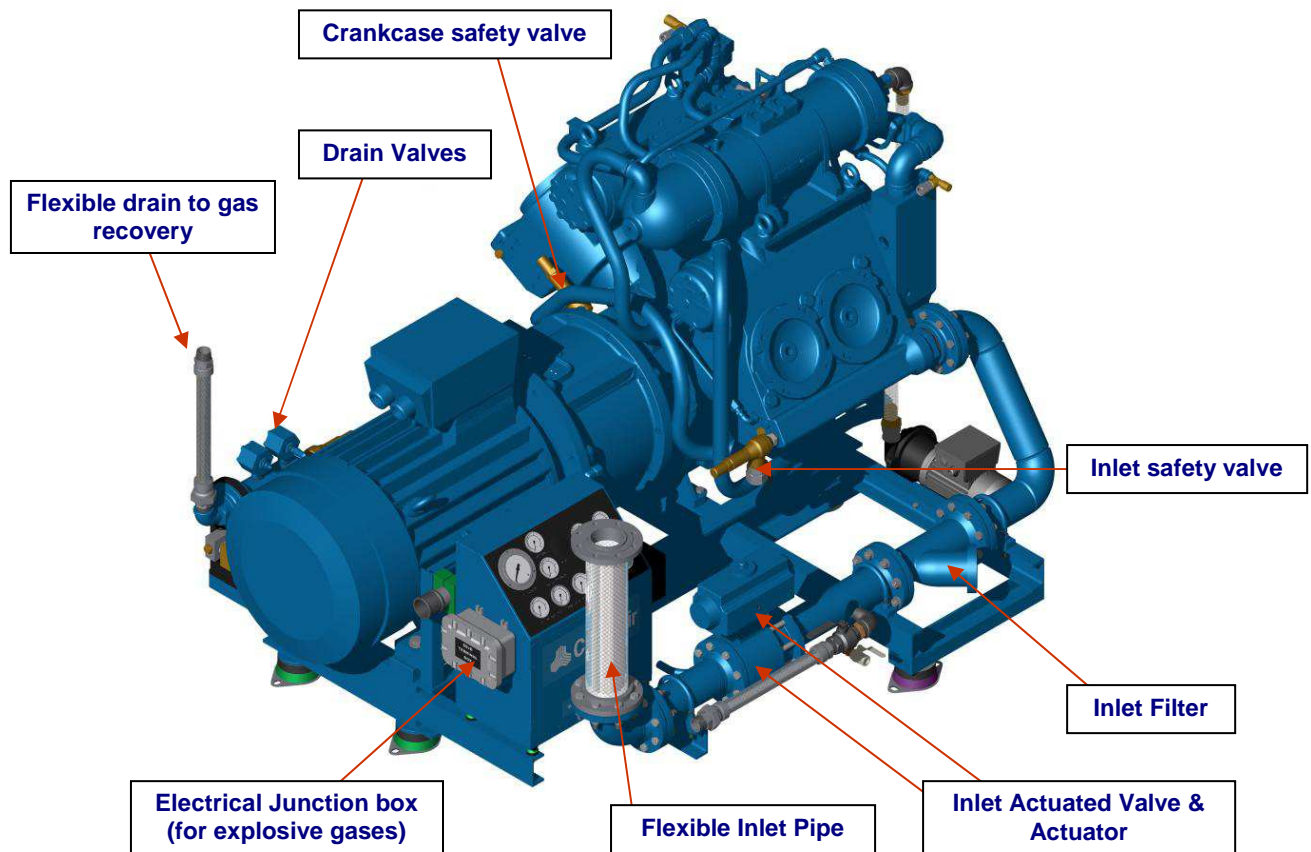
## Key Features & Benefits

5442 Air





## 5442 Industrial Gas



### Well balanced design

The well-balanced compressor design combined with anti-vibration mounts and flexible connections reduces vibration, removing the need for special foundations and minimising civil work requirements.

- 6 cylinder 120 degree 'W' configuration
- Balance weights on each crank throw coupled with matched masses of reciprocating components keep vibration to a minimum without the use of power sapping balance shafts. This allows the compressor unit to stand on anti-vibration mounts on any surface (suitable for the weight of the compressor.) No foundation inertia block or further isolation is required.
- Flexible connections on all pipework to and from the compressor set ensure that the small amount of structure-borne vibration in the set is not transmitted to the building or auxiliary equipment.

### Separators

Individual compression stage separation, using CompAir-designed high efficiency separators, reduces moisture carryover between stages thereby increasing component life.

- The separators on the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> stages employ cyclone technology to maintain the process gas at high acceleration for a longer period ensuring the highest levels of separator efficiency.

## Piston and Rings

3rd and 4th stage pistons and rings are supplied as a cartridge for quick and easy replacement. Crosshead and running gear remain in position.

- ✿ Replacement of the piston and rings on either of these stages can be completed in less than 5 minutes

## Liners and pistons

Liners and pistons are all removable with easy access through top end.

- ✿ To access the liner and piston on each stage, simply remove the individual valve cover, followed by the valve.
- ✿ The 1<sup>st</sup> and 2<sup>nd</sup> stages have the big end cap removed, allowing removal of the connecting rod and piston assembly.
- ✿ The 3<sup>rd</sup> and 4<sup>th</sup> stages liners and pistons can be accessed without the removal of the connecting rod and crossheads. The piston and ring pack is retained by a single bolt.

## Valves

Valves are protected under valve covers and easily removable.

- ✿ All valve covers are clamped by 4 or 6 studs, and have tappings for easy extraction. On 3<sup>rd</sup> and 4<sup>th</sup> stage valves carbon formation around the valve in the valve pocket is eliminated by the use of PTFE o-rings on the bottom face of the valve and double rings on the top face. There are also o-rings in between the valve sections for added protection. This prevention of carbon formation aids valve removal. A simple tool is available to allow easy removal of all stage valves.

## Bearings

No selective fitting of bearings:

- ✿ Bearings have single part numbers for ordering; ensuring no measurement of bearing clearance is required when purchasing new parts.

## Coolers

Water cooled compressor.

Coolers are all withdrawable and of straight tube design for ease of cleaning:

- ✿ Internally finned tubes are used on a number of cooler passes to increase cooler efficiency. The cooler is designed without water-side finning, which is susceptible to fouling.

## General Servicing

Through normal service life, no lifting gear is required for top end service. Maximum top end component weight is 25 kg:

- ✦ Wherever possible component weight has been kept to a minimum to ensure that a single person, without lifting gear can complete the majority of service tasks.
- ✦ Once fitted to the crankcase, the cylinder blocks and cooler bodies are not required to be removed for the life of the compressor when correctly maintained.

The majority of service work is accessible from one side of the compressor.

- ✦ This allows close installation of auxiliary equipment.
- ✦ In belt drive configuration a more compact package is achievable due to closer motor placement.

## Inlet Filter

- ✦ The inlet filter comprises of a high efficiency suction filter and silencer **(AIR)**
- ✦ Inlet filter cleaning does not require pipeline dismantling. The Y-type strainer has an inspection and filter removal panel, which is externally accessible. **(GAS)**

## Oil

Automotive style spin-on oil filter for ease of maintenance.

- ✦ An optional hand pump is available on request to top up the oil sump without any release of gas; this can be operated whilst the compressor is running (although the level should be checked in the sight glass whilst the compressor is idle). **(TYPICALLY GAS)**

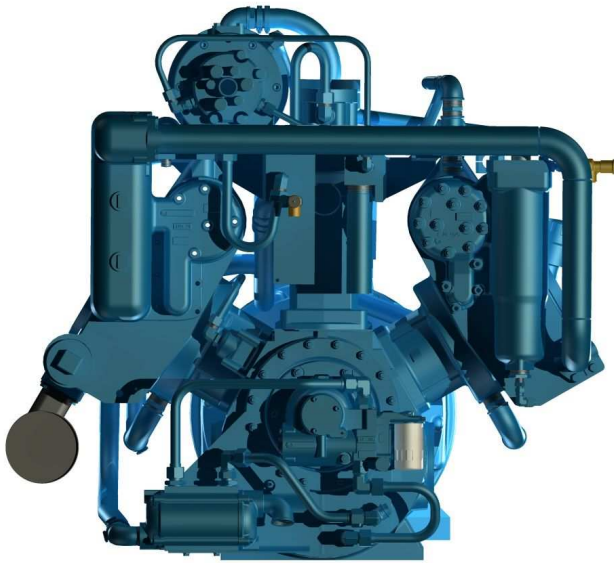
## Installation

Installation is made quick and simple through:

- ✦ The use of flexible connection to final delivery **(AIR)**
- ✦ The use of flexible connections to gas inlet, final delivery, relief valve manifold and recovery vessel return **(GAS)**
- ✦ Piping of all pressure safety valves to a single outlet manifold **(GAS)**
- ✦ Wiring of all safety trips and indicators to explosion proof and intrinsically safe terminal boxes **(GAS)**



## 5442 Standard Specifications



A standard specification Air and Gas set typically incorporates the following:

### Air & Industrial Gas

- ✦ 3 or 4 stage compression depending upon system pressures
- ✦ Pressure gauges on all compression stages + lubrication system
- ✦ Relief valves on all stages
- ✦ Integral inter and aftercoolers with separators on each stage of compression
- ✦ Automatic isolating valve on cooling water inlet or pump
- ✦ Pneumatically controlled automatic unloader/drainage (solenoid valve operated)
- ✦ Forced lubrication
- ✦ Corrosion rods and safety bursting disc in cooling water jacket
- ✦ Controlling pressure switch
- ✦ Drive arrangement – vee belt drive or direct coupled
- ✦ Anti-vibration mounts

Standard instruments are conventional switch devices. As an alternative, transmitter devices (4 – 20 mA) can be quoted for on request.

### Air Only

- ✦ Compressor non return valve
- ✦ TEFV, IP55 electric motor

## Gas Only

- Gas inlet actuated valve
- Integral gas inlet pulsation vessel
- High & low gas inlet pressure protection switches
- Gas inlet pressure gauge and relief valve
- Gas tight crankshaft oil seal assembly
- Gas tight oil filler assembly
- Gas tight crankcase with breather piped back to suction and a safety valve
- Double no return valve
- EXD electric motor (for explosive gases)

The “Standard” specifications listed above, typically indicate the scope of supply for a typical Air / Industrial gas compressor. Machines that are configured for specific duties may differ slightly in scope of supply.

## Fully Packaged sets

The 5442 standard specification can also be equipped with various ancillaries, depending on the application, including:-

- ♣ Base plate mounted
- ♣ Starter control panel
- ♣ Filtration
- ♣ Drying equipment
- ♣ Condensate collection
- ♣ Storage / Receivers
- ♣ Acoustic / Weather Protector enclosure

Also available for industrial gas applications:-

- ♣ Gas sensor (e.g. Carbon Monoxide)
- ♣ Gas recovery systems

### Examples of large water cooled packages



## Gazpack 42 References (Co Technical Data

### Air

Inlet Pressure		Max Pressure		Speed	FAD		Shaft Power	
Bar a	PSI	Bar	PSI	rpm	m³/hr	CFM	kW	HP
1.013	14.7	160	2320	750	141	83	40.6	23.8
1.013	14.7	160	2320	1000	188	111	55.1	32.4
1.013	14.7	160	2320	1250	235	139	68.9	40.5
1.013	14.7	160	2320	1485	279	165	81.9	48.2
1.013	14.7	250	3625	750	140	82	43.8	25.7
1.013	14.7	250	3625	1000	187	110	59.5	35
1.013	14.7	250	3625	1250	233	137	74.4	43.7
1.013	14.7	250	3625	1485	277	163	88.4	52
1.013	14.7	350	5076	750	138	81	46.9	27.6
1.013	14.7	350	5076	1000	184	108	63.7	37.5
1.013	14.7	350	5076	1250	230	135	79.6	46.8
1.013	14.7	350	5076	1485	274	161	94.6	55.6

### Industrial Gas 160 Bar

Inlet Pressure		Max Pressure		Speed	FAD		Shaft Power	
Bar g	PSI	Bar	PSI	rpm	m³/hr	CFM	kW	HP
0.015	0.217	160	2320	750	137	80	39.6	53.6
0.015	0.217	160	2320	1000	182	107	52.3	70.1
0.015	0.217	160	2320	1250	228	134	64.7	86.7
0.015	0.217	160	2320	1485	271	159	76.1	102
0.2	2.9	160	2320	750	170	100	46.3	62
0.2	2.9	160	2320	1000	227	133	61.1	81.9
0.2	2.9	160	2320	1250	284	167	75.7	101.5
0.2	2.9	160	2320	1485	337	198	89	119
0.35	5	160	2320	750	195	115	51.1	68.5
0.35	5	160	2320	1000	261	154	67.4	90.3
0.35	5	160	2320	1250	326	191	83.5	111.9
0.35	5	160	2320	1485	387	227	98.2	131.6

0.4	5.8	160	2320	750	204	120	53	71
0.4	5.8	160	2320	1000	271	159	69.9	93.7
0.4	5.8	160	2320	1250	339	199	86.6	116.1
0.4	5.8	160	2320	1485	403	237	101.8	136.5
0.55	7.9	160	2320	750	229	135	57.7	77.3
0.55	7.9	160	2320	1000	305	179	76.2	102.3
0.55	7.9	160	2320	1250	381	224	94.4	126.6
0.55	7.9	160	2320	1485	453	266	111	148.8

#### Industrial Gas Boosters 160 Bar

Inlet Pressure		Max Pressure		Speed	FAD		Shaft Power	
Bar g	PSI	Bar	PSI	rpm	m³/hr	CFM	kW	HP
3	43.5	160	2320	750	150	82	30.2	40.4
3	43.5	160	2320	1000	200	118	39.8	53.3
3	43.5	160	2320	1250	250	147	49.3	66.1
3	43.5	160	2320	1485	297	174	58	77.7
3.5	50.7	160	2320	750	169	99	32.8	43.9
3.5	50.7	160	2320	1000	225	132	43.3	58
3.5	50.7	160	2320	1250	281	165	53.6	71.8
3.5	50.7	160	2320	1485	334	196	63	84.4
4	58	160	2320	750	188	110	35.4	47.4
4	58	160	2320	1000	251	147	46.8	62.7
4	58	160	2320	1250	313	184	57.9	77.6
4	58	160	2320	1485	372	218	68.1	91.3



# Industrial Gas 250 Bar

Inlet Pressure		Max Pressure		Speed	FAD		Shaft Power	
Bar g	PSI	Bar	PSI	rpm	m³/hr	CFM	kW	HP
0.015	0.217	250	3625	750	137	80	80	57.9
0.015	0.217	250	3625	1000	182	107	57	76.4
0.015	0.217	250	3625	1250	228	134	70.6	94.6
0.015	0.217	250	3625	1485	271	159	83	111.3
0.2	2.9	250	3625	750	170	100	50.5	67.7
0.2	2.9	250	3625	1000	227	133	66.6	89.3
0.2	2.9	250	3625	1250	284	167	82.5	110.6
0.2	2.9	250	3625	1485	337	198	97	130
0.35	5	250	3625	750	195	115	55.7	74.6
0.35	5	250	3625	1000	261	154	73.5	98.5
0.35	5	250	3625	1250	326	191	91	122
0.35	5	250	3625	1485	387	227	107	143.4
0.4	5.8	250	3625	750	204	120	57.7	77.3
0.4	5.8	250	3625	1000	271	159	76.2	102.1
0.4	5.8	250	3625	1250	339	199	94.4	126.5
0.4	5.8	250	3625	1485	403	237	111	148.8
0.55	7.9	250	3625	750	229	135	62.9	84.3
0.55	7.9	250	3625	1000	305	179	83.1	111.4
0.55	7.9	250	3625	1250	381	224	102.9	137.9
0.55	7.9	250	3625	1485	453	266	121	162.2
0.68	9.8	250	3625	750	248	145	66.1	88.6
0.68	9.8	250	3625	1000	331	194	87.2	116.9
0.68	9.8	250	3625	1250	414	243	108	144.8
0.68	9.8	250	3625	1485	492	289	127	170.3
0.7	10.1	250	3625	750	252	148	66.6	89.3
0.7	10.1	250	3625	1000	336	197	87.9	117.8
0.7	10.1	250	3625	1250	420	247	108.8	145.9
0.7	10.1	250	3625	1485	499	293	128	171.6

0.8	11.6	250	3625	750	267	157	69.2	92.7
0.8	11.6	250	3625	1000	356	209	91.4	122.5
0.8	11.6	250	3625	1250	445	261	113.1	151.6
0.8	11.6	250	3625	1485	529	311	133	178.3
1	14.5	250	3625	750	298	175	73.9	99.1
1	14.5	250	3625	1000	397	233	97.5	130.7
1	14.5	250	3625	1250	497	292	120.7	161.8
1	14.5	250	3625	1485	590	347	142	190.4

#### Industrial Gas Booster 250 Bar

Inlet Pressure		Max Pressure		Speed	FAD		Shaft Power	
Bar g	PSI	Bar	PSI	rpm	m³/hr	CFM	kW	HP
3	43.5	250	3625	750	150	88	32.9	44.1
3	43.5	250	3625	1000	200	117	43.4	58.2
3	43.5	250	3625	1250	250	147	53.7	72
3	43.5	250	3625	1485	297	174	63.2	84.7
3.5	50.7	250	3625	750	169	99	35.7	47.8
3.5	50.7	250	3625	1000	225	132	47.2	63.2
3.5	50.7	250	3625	1250	281	165	58.4	78.3
3.5	50.7	250	3625	1485	334	196	68.7	92.1
4	58	250	3625	750	188	110	38.6	51.7
4	58	250	3625	1000	251	147	51	68.3
4	58	250	3625	1250	313	184	63.1	84.6
4	58	250	3625	1485	372	219	74.2	99.5
4.5	65.2	250	3625	750	209	123	41.3	55.3
4.5	65.2	250	3625	1000	278	163	54.5	73
4.5	65.2	250	3625	1250	348	204	67.4	90.3
4.5	65.2	250	3625	1485	413	243	79.3	106.3
5	72.5	250	3625	750	229	134	43.9	58.8
5	72.5	250	3625	1000	306	180	57.9	77.6
5	72.5	250	3625	1250	382	224	71.7	96.1

5	72.5	250	3625	1485	454	267	84.3	113
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5.5	79.7	250	3625	750	250	147	46.6	62.4
5.5	79.7	250	3625	1000	333	195	61.5	82.4
5.5	79.7	250	3625	1250	417	245	76.2	102.1
5.5	79.7	250	3625	1485	495	291	89.6	120.1
6	87	250	3625	750	270	158	49.3	66.1
6	87	250	3625	1000	360	211	65.1	87.3
6	87	250	3625	1250	450	264	76.2	102.1
6	87	250	3625	1485	535	314	89.6	120.1
6.8	98.6	250	3625	750	293	172	53	71
6.8	98.6	250	3625	1000	391	230	69.9	93.7
6.8	98.6	250	3625	1250	488	287	86.5	115.9
6.8	98.6	250	3625	1485	580	341	101.8	136.5

#### Industrial Gas 350 Bar

Inlet Pressure		Max Pressure		Speed	FAD		Shaft Power	
Bar g	PSI	Bar	PSI	rpm	m³/hr	CFM	kW	HP
0.015	0.217	350	3625	750	137	80	46.4	62.2
0.015	0.217	350	3625	1000	182	107	61.3	82.2
0.015	0.217	350	3625	1250	228	134	75.9	101.7
0.015	0.217	350	3625	1485	271	159	89.2	119.6
0.2	2.9	350	3625	750	170	100	54.2	72.6
0.2	2.9	350	3625	1000	227	133	71.6	96
0.2	2.9	350	3625	1250	284	167	88.7	118.9
0.2	2.9	350	3625	1485	337	198	104.3	139.8
0.35	5	350	3625	750	195	115	59.8	80.1
0.35	5	350	3625	1000	261	154	79	105.9
0.35	5	350	3625	1250	326	191	97.8	131.1
0.35	5	350	3625	1485	387	227	115	154.2
0.4	5.8	350	3625	750	204	120	62.1	83.2
0.4	5.8	350	3625	1000	271	159	82	109.9

0.4	5.8	350	3625	1250	339	199	101.4	135.9
0.4	5.8	350	3625	1485	403	237	119.3	119.3
0.55	7.9	350	3625	750	229	135	67.7	90.7
0.55	7.9	350	3625	1000	305	179	89.3	119.7
0.55	7.9	350	3625	1250	381	224	110.6	148.3
0.55	7.9	350	3625	1485	453	266	130.1	174.4
0.68	9.8	350	3625	750	248	145	71	95.2
0.68	9.8	350	3625	1000	331	194	93.8	125.7
0.68	9.8	350	3625	1250	414	243	116.1	155.6
0.68	9.8	350	3625	1485	492	289	136.5	183
0.7	10.1	350	3625	750	252	148	71.6	96
0.7	10.1	350	3625	1000	336	197	94.5	126.7
0.7	10.1	350	3625	1250	420	247	117	116.8
0.7	10.1	350	3625	1485	499	293	137.6	184.5

#### Industrial Gas Booster 350 Bar

Inlet Pressure		Max Pressure		Speed	FAD		Shaft Power	
Bar g	PSI	Bar	PSI	rpm	m³/hr	CFM	kW	HP
3	3	43.5	3625	750	150	88	35.3	47.3
3	43.5	350	3625	1000	200	117	46.7	62.6
3	43.5	350	3625	1250	250	147	57.8	77.5
3	43.5	350	3625	1485	297	174	67.9	91
3.5	50.7	350	3625	750	169	99	38.4	51.4
3.5	50.7	350	3625	1000	225	132	50.7	67.9
3.5	50.7	350	3625	1250	281	165	62.8	84.2
3.5	50.7	350	3625	1485	334	196	73.9	99.1
4	58	350	3625	750	188	110	41.5	55.6
4	58	350	3625	1000	251	147	54.8	73.4
4	58	350	3625	1250	313	184	67.8	90.9
4	58	350	3625	1485	372	219	79.8	107
4.5	65.2	350	3625	750	209	123	44.3	59.3
4.5	65.2	350	3625	1000	278	163	58.6	78.5

4.5	65.2	350	3625	1250	348	204	72.5	97.2
4.5	65.2	350	3625	1485	413	243	85.2	114.2
5	72.5	350	3625	750	229	134	47.1	63.1
5	72.5	350	3625	1000	306	180	62.2	83.4
5	72.5	350	3625	1250	382	224	77	103.2
5	72.5	350	3625	1485	454	267	90.6	121.4
5.5	79.7	350	3625	750	250	147	50.1	67.1
5.5	79.7	350	3625	1000	333	195	66.2	88.7
5.5	79.7	350	3625	1250	417	245	81.9	109.8
5.5	79.7	350	3625	1485	495	291	96.3	129.1
6	87	350	3625	750	270	158	53	71
6	87	350	3625	1000	360	211	70	93.8
6	87	350	3625	1250	450	264	86.6	116.1
6	87	350	3625	1485	535	314	101.9	136.6



### GazPack 42 References (compressed Natural Gas version of 5442)

COUNTRY	CUSTOMER	MODEL	QUANTITY	YEAR
Worldwide	Various	Gazpack 42	54	Since 2006

### Large Water Cooled Industrial Air References

COUNTRY	CUSTOMER	MODEL	QUANTITY	YEAR
Canada	Electrolyser	5417	1	1999
Pakistan	Caltex	5437	2	2000
Hong Kong	Swire Engineering	5417	1	2000
India	National Thermal Power	5417	1	2000
U.K.	BP Oil Coryton	5417	1	2001
U.K.	Golden West Foods	5417	1	2002
China	China Precion Machenary	5417	1	2002
Peru	P & G Industrial	5417	1	2004
Korea	Public Procurement Service	5437	2	2005
Norway	Saipem Scarabeo 6	5437	1	2006
U.K.	Chesterfield Cylinders	5437	1	2006
U.S.A.	Diamond Drilling	5437	2	2006
Kazakhstan	AGIP/Siemens Water Treatment	5437	2	2006
India	Aban Loyd Chiles Offshore	5437	1	2006
Korea	Samsung Heavy Industries	5437	1	2006
Ireland	Kerry Ingredients	5417	1	2006
Switzerland	Furgo Oceansismica	5437	3	2007
Brazil	Queiroz Galvão Perfurações	5417	3	2007

\*\*Above references are a small selection of CompAir's substantial experience, hence many more are available on request\*\*

## Large Water Cooled Industrial Gas References

COUNTRY	CUSTOMER	MODEL	QUANTITY	YEAR
Saudi Arabia	Saudi Industrial Gas Company	5417 H2	1	2001
India	Mahindra Intertrade Ltd	5417 H2	1	2003
Australia	Global Gas	5437 HE	1	2003
U.A.E.	Pure Helium Gulf	5437 HE	1	2003
U.K.	Sandvik Osprey	5437 AR / N2	1	2003
Thailand	Bangkok Motor Works	5417 H2	1	2004
U.K.	Leeds University	5417 HE	1	2004
U.K.	Sandvik Osprey	5437 AR / N2	1	2005
U.K.	Phoenix Scientific Industries	5337 AR	2	2005
Germany	IFW Institut fur Festkorper	5417 HE	2	2006
Australia	Supagas	5437 HE	1	2006
Norway	West Drill	5437 B N2	1	2006
U.K.	Exxon mobil Chemical	5437 B N2	1	2006
Norway	Snorre A	5417 B N2	1	2006
U.K.	Haskel Energy Systems	5437 B N2	2	2006
U.K.	Dominion Technology Gases	5437 HE	1	2007
Singapore	Global Gases & Chemicals	5437 HE	1	2007
South Africa	Global Gases & Chemicals	5437 HE	1	2007
U.K.	Haskel Energy Systems	5437 B N2 5417 B N2	1 1	2007
Norway	West Eminence	5437 B N2	2	2007

\*\*Above references are a small selection of CompAir's substantial experience, hence many more are available on request\*\*

## Case Studies

### Air

#### **Brazilian Naval Commission, 2004** AIR

4 x 5436 have been ordered by the Brazilian Naval Commission for the refit of the Niteroi class frigates, with further orders expected next year.

#### **REFREX – Brazil, 2004** AIR

2 x 5417's have been ordered by REFREX, Brazil for refrigerator tube manufacture. A 5417 compressor is teamed with a dryer, filters and receiver and is used to expand the pressed tubes prior to assembly.

#### **Airdyne – U.S.A. , 2006** AIR

Paul Green, USA, comments that the Offshore market in North America is still booming with a new order for three 5437 for Airdyne International in Houston for drill rig motion compensation. This brings the total of 5437's for Airdyne to 25 units in the last 12 months. Other applications have included portable units for emergency on-site support and High Pressure test cells.

#### **Queiroz Galvão Perfurações – Brazil, 2006** AIR

In Brazil Jair Carlos de Oliveira says they are also seeing growth in the Oil and Gas markets with a new order for three 5417 air compressors for Star International Drilling. The end customer, Queiroz Galvão Perfurações, currently has 5 rigs using CompAir 5417's; again the application is drill rig motion compensation. The three new compressors will replace older 5417's currently in use. Further projects with this customer are expected over the next 5 years.

#### **Fugro Oceansismica – Switzerland / Italy, 2007** AIR

CompAir Aeberhardt has recently received an order for 3 x 5437 water cooled compressor sets from Fugro Finance, part of the Fugro group of companies which specialise in geotechnical, survey and geoscience services.

The compressors were quoted by Giambattista Melissari of ETS SnC, CompAir's long standing Italian distributor for marine and naval products and will be used for seismic survey applications.

The customer Fugro Oceansismica, based in Rome, has been supplying marine geophysical and geological surveys, positioning services and environmental studies for more than 30 years, covering most of the world's oceans with particular focus on the Mediterranean, Caspian, Red and Black Seas.

The Vee-belt drive compressors have a capacity of 150 m<sup>3</sup>/h at a delivery pressure of 350 bar g and are supplied with DoL starter control panel and demister vessel.

Fugro has over 8,500 employees in 275 offices worldwide and an annual turnover in excess of 1 billion Euros. The group owns over 30 vessels and several hundred CPT (Cone Penetration Test) and drilling units. Contact details for Fugro offices worldwide can be found at: [www.fugro.com/v\\_company/search.asp](http://www.fugro.com/v_company/search.asp)

#### **ONERA – France, 2005 AIR**

France has received an order for 3 x 5437's from ONERA, the French National Aerospace Research Establishment. The wind tunnel application requires 74m<sup>3</sup>/h at 250 bar g. ONERA are a long-standing customer of CompAir France, currently using 3 x HE80's supplied by Luchard between 1965 and 1976, and 3 x 5436's supplied in June 1991. The current order was won against Bauer, Sauer Giraudin and Greenfield.

#### **National Grid – U.K., 2005 AIR**

CompAir continues to strengthen its reputation as a leading designer of bespoke solutions for industry, following a successful repeat order from National Grid Transco, UK.

Last year CompAir and another UK compressor manufacturer were asked to design a "plug and play" mobile emergency backup unit for use at substations around the country. Based on the success of the first three CompAir units, National Grid have placed a repeat order with CompAir.

The brief was simple: design a portable unit, moveable by forklift or vehicle-mounted crane, suitable for air blast switch gear at both 600 and 3000 psi duties. Above all, make it "idiot proof".

National Grid wanted to avoid a trailer unit due to issues with road tax and ongoing roadworthiness, so Dave Brown, UK Sales Manager, and John Cook, Chief Project Engineer, took inspiration from the highly successful Gazpack series, creating a fully enclosed acoustic canopy for each 5437 unit. With sound levels of less than 75 DbA, the unit is not only highly secure, but also gives full flexibility to the customer allowing them to be used in substations near residential areas.

All six units are designed with connections for use at either 600 or 3000 psi due to variations in voltage (132kV, 275kV or 400kV) at substations across the country.

In order to create the "idiot proof" unit requested, John Cook designed simple connection options so that it was not necessary for an engineer to install the unit. This way, essentially anyone delivering the unit to site would be able to plug in the power and outlet hoses, and the emergency unit would be on-line.

The machines will largely be operated on unmanned sites, so another important specification was to ensure that the compressor stopped operating in the event of a broken or disconnected hose. Detection equipment, unique to the Reavell machine, was installed in both 600 and 3000 psi delivery lines to trip the compressor should this event occur. Also fitted with membrane dryers, the 5437 units provide the exceptionally low maintenance and guaranteed dry oil free air, necessary from an emergency unit.

The resulting design scored highly with National Grid engineers due to ease of installation, reliable operation and the attractive canopy design.

Such a highly flexible unit is ideal for this application but its key features - ease of installation, unmanned operation, reliability and flexibility, also mean the unit would work well within the Hire Industry, where these are critical factors.



#### **Airdyne – U.S.A., 2006 AIR**

October was another bumper month in the U.S. for Paul Green with orders for a further 10 x 5437 compressors received.

Eight of these water-cooled units are for Airdyne International, a longstanding CompAir distributor and packager based in Houston.

Airdyne package the units (right) for the offshore oil and gas industry headquartered in Texas. Each semi submersible drilling rig is equipped with 2 or 3 x 5437 air compressors which are used for rig stabilization and motion compensation systems on the platforms to enable the rig to maintain their drilling operations in all weather.

Many of the major Oil Companies have now standardized on the CompAir / Airdyne packaged 5437 and 5417 compressor units for their offshore drilling operations for both new platforms and those existing platforms undergoing retrofitting.

"The recent successes can be attributed to the combined efforts of Roger McCorkle of Airdyne and myself visiting the Oil Companies in Texas over a number of years, and shows the importance of keeping good customer relationships, even when the markets are in a relatively depressed state," comments Paul Green.

Although the majority of the Oil companies have their own maintenance personnel offshore, Airdyne have strong offshore service and maintenance support which is essential in the demanding offshore market. This new order brings the total of units ordered by Airdyne in 2006 to 19.

"The current upsurge in the Oil and Gas market in the US is expected to continue for the next 2 years, so we're looking forward to receiving further orders."



The other order for two off 5437's received in October was from Siemen's Water Technologies Inc. formerly known as US Filters. The order was placed through Zorn Cochrane in Wisconsin, an existing CompAir 'low pressure' distributor. This project was started following a presentation given by Paul Green to the Engineers of Siemens last year.

CompAir's success with this order is due to the ability to provide a fully engineered solution for the high ambient environment in the Water Treatment Plant in Kazakhstan where the compressors will be used as plant process units. To meet the stringent operating temperature requirements the compressor blocks will be modified to reduce the compression ratio in the final stages and to reduce the stage temperatures. The machines will be integrated into Siemens' control system as self-contained radiator sets and will work on a 24/7 operational cycle.

## Industrial Gas

### Phoenix Scientific Industries Ltd – UK, 2005 ARGON

Phoenix Scientific Industries Ltd (PSI) are one such user. The UK-based company supply equipment, technology and services for Advanced Materials Processing. PSI works with organisations to develop their Materials technology and products, such as helping to lower operating costs for gas atomisation. A recent order from a Swiss company for a newly developed process has in turn led to PSI placing an order with CompAir for two 5337 Argon compressors.

The compressors, along with a common filtration package, will be installed initially at the PSI plant in Hailsham, East Sussex in October where trials are being conducted. The entire process equipment will then be dismantled and reinstalled in Switzerland in January 2006.

### Sandvik Osprey – UK, 2005 ARGON

Sandvik Osprey are another UK-based metallurgy company who have recently purchased a 5437 as part of the expansion of their facilities for gas-atomised metal powders and spray-formed products. The plant in Neath, Wales already has two high pressure CompAir compressors: a 5437 and a 5436. The production process requires both high pressure nitrogen and argon and the high efficiency cooling system of the 5437 allows it to effectively handle gases such as argon which give high compression temperatures. This second 5437 unit will replace the original 5436, which in turn will switch to a backup role.



5437 for Sandvik Osprey  
shortly before despatch

### Eastern Electrolyser – India, 2006 HYDROGEN

Eastern Electrolyser, India are set to receive the first of two sets of two 5417 Hydrogen compressors for turbine cooling at two separate power generation projects.

Hydrogen is used over air as a means of removing heat from turbine generators as the density of hydrogen is one fourteenth that of air and minimises power loss due to gas being churned by the rotor and its circulation through the fans and cooling passages. It is also preferred as the heat transfer capability of hydrogen is up to twice that of air and specific heat (heat capacity per unit of mass) gives a more effective heat removal resulting in lower temperature and smaller coolers. Another benefit is that degradation of insulation through oxidation cannot occur in a hydrogen atmosphere.

The hydrogen for this application is to be produced on site by means of an electrolytic plant and stored at 150 bar in high pressure storage cylinders.

#### **Watt's S.A. - Chile , 2006** HYDROGEN

Watt's S.A., a leading fruit, edible oil and dairy product manufacturer, started manufacturing fruit preserves and fruit juice in Chile in 1963. The expansion into margarine production in 1978 brought with it a requirement for high pressure hydrogen compressors for the hydrogenation process involved in margarine manufacture.

Watt's S.A. have been using four Reavell CSA8E vertical twin cylinder hydrogen compressors for 28 years as part of their manufacturing processes. Two of the CSA8E compressors were replaced by two 5236 models around 12 years ago. Now a new order will see the remaining two CSA8E's in the Watt's margarine plant replaced by two further 5236 hydrogen compressors each supplying 220 m<sup>3</sup>/hr at 19 bar.

Watt's also operate two Cyclon 218 units and one Cyclon 337 as process air for packing machines.

CompAir hydrogen compressor's dominate the Chilean market with up to 90% of the market share

## **Heliox**

### **Swedish Navy, 2005 HELIOX**

A CompAir 5417 Heliox Compressor was supplied to the Swedish Navy for use on a Navy Dive Vessel for deep sea diving applications.

### **Hallin Marine Systems Ltd, 2007 HELIOX**

CompAir Far East received an order for two heliox units from Hallin Marine Systems Ltd, a company which provides underwater services to the marine, survey, cable and offshore oil & gas industries in the South East Asia region.

According to Sebastien Fuan of CFE, the customer has a business associate in Italy who recently experienced a catastrophic failure on a 6-month old Heliox compressor, an occurrence that possibly contributed to their purchase of CompAir units with their strong reputation for reliability and long operational life in marine environments. Both heliox units are to be installed in the third quarter of 2008 onboard a dive support vessel. A second dive support vessel is planned for 2008.



### **Geo Subsea Pty Ltd, 2007 HELIOX**

CompAir Australasia have also had success with heliox: a 5437 heliox compressor was sold to Geo Subsea Pty Ltd, a global subsea services contractor with offices in Norway, Singapore, Australia, Aberdeen, Canada, USA and Brazil.

Geo Subsea have a maintenance dive contract for an oil and gas project with Woodside Petroleum in the northwest of Western Australia (about 3000km north of Perth). This is the first heliox order from Geo Subsea in Australia.

### **Subsea 7, 2003 HELIOX**

Subsea 7 dive support vessel the Mayo (shown below), now equipped with CompAir heliox and air compressors, was involved in the rescue of the Kursk nuclear submarine in 2001.



### **Divex, 2006 HELIOX**

Over the last few years, the UK sales team have seen the CompAir 5437 water cooled compressor become the industry standard for heliox compressors.

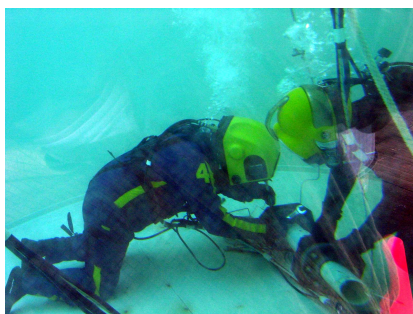
This has been emphasised by a recent order from Divex, a world leader in the design, supply and manufacture of diving and subsea equipment for commercial, professional, and military divers.

One particular order was for compression equipment for 3 dive support vessel ships. The first ship will have 2 x 5437 heliox compressors and 1 x 5437 breathing air compressor, while the other two ships will have 3 x 5437 heliox compressors and 1 x 5437 breathing air compressor. The scope of supply includes the direct driven compressor unit, starter panel and filtration.

This order is not the first from Divex: in May 2005 they purchased 2 x 5437 breathing air compressors for a submarine rescue system; prior to this they tended to buy from Hamworthy.

Having standardised on the CompAir 5437 Heliox compressor, Divex have developed a standard specification with a standard part number in their system which will be used for all future orders, making the order process simpler for both parties.

The delivery of these orders were scheduled for March, June and July 2007. The expectation is that one ship per year will be ordered over the next 3-5 years.





### **Brazilian Navy, 2006 HELIOX**

The Brazilian Navy have ordered two 5437 compressors capable of running on either heliox or air. These two units are to be use with a naval diving hyperbaric chamber funded by Petrobras. The flange-coupled sets will provide 90m<sup>3</sup>/hr at 300 bar g and are supplied with a marine-style starter / control panel plus a special filtration system for gas cleaning with CO monitoring and a demister vessel. Located dockside, the units can use either mains or seawater for cooling.

The order resulted from a visit made by Paul Green to the Brazilian Navy in Rio Janeiro in August 2006, arranged by naval agent Barry Guard of Vospers. Approved local service company MANUTEST will provide full installation, commissioning and a long-term service package with genuine CompAir parts.

### **Sealion, 2007 HELIOX**

CompAir UK has received a substantial order from Sealion Shipping for 2 dive ships currently under construction in Norway and Holland. The order includes 2 x 5437 Heliox compressors with filtration plus 2 x 5417 and 2 x 5236 air compressors.

Competition came from both Hamworthy and Sauer, but the order was awarded to CompAir with the customer's advising consultant stating that CompAir are the industry standard for Heliox. This is further confirmation of reports to that effect following receipt of the Divex Heliox orders.

The units were due for delivery in April/May 2007 where they were to be installed in the ships' hulls before work commences on the superstructure of the vessel.

The dive ships are due for launch in 2008 and are likely to be sent to the Gulf of Mexico where repair work following Hurricane Katrina and Rita continues to draw in most of the worldwide capacity. Over 100 platforms were destroyed during the hurricanes and serious damage was done to over 300 of 4,000 active rigs and platforms. Repairs are expected to continue for a number of years.

### **Cal Dive, 2007 HELIOX**

CompAir USA received an order for four 5437 Heliox compressors with control panels identical to the Divex Heliox compressor packages. The order came from Cal Dive International Inc., a marine contractor with 26 vessels providing manned diving, pipelay and pipe burial services to the offshore oil and natural gas industry. Cal Dive, a majority owned subsidiary of Helix Energy Solutions, is believed to have the largest saturation diving support fleet in the world.

## General Arrangement Drawing

The following General Arrangement (GA) Drawing is attached to the end of this document; this shows the typical arrangement for the standard specification 5442 air compressor block and the associated general dimensions.

 [5442 compressor block GA Drawing](#) AIR