HYDRA

TECHNICAL SPECIFICATION

HYDRA SL 3 – 1500

CONTAINERISED DIVE SYSTEMS

DOCUMENT INFORMATION				
Doc No:	**4623-001-SPEC**		**Status:**	**Confidential**
Revision:	**A**		**Mag File:**	**Dive Solutions HYDRA SL 3 - 1500 rev A**
Issued:	**Oct 2005**		**Author:**	**Mike Jessop**

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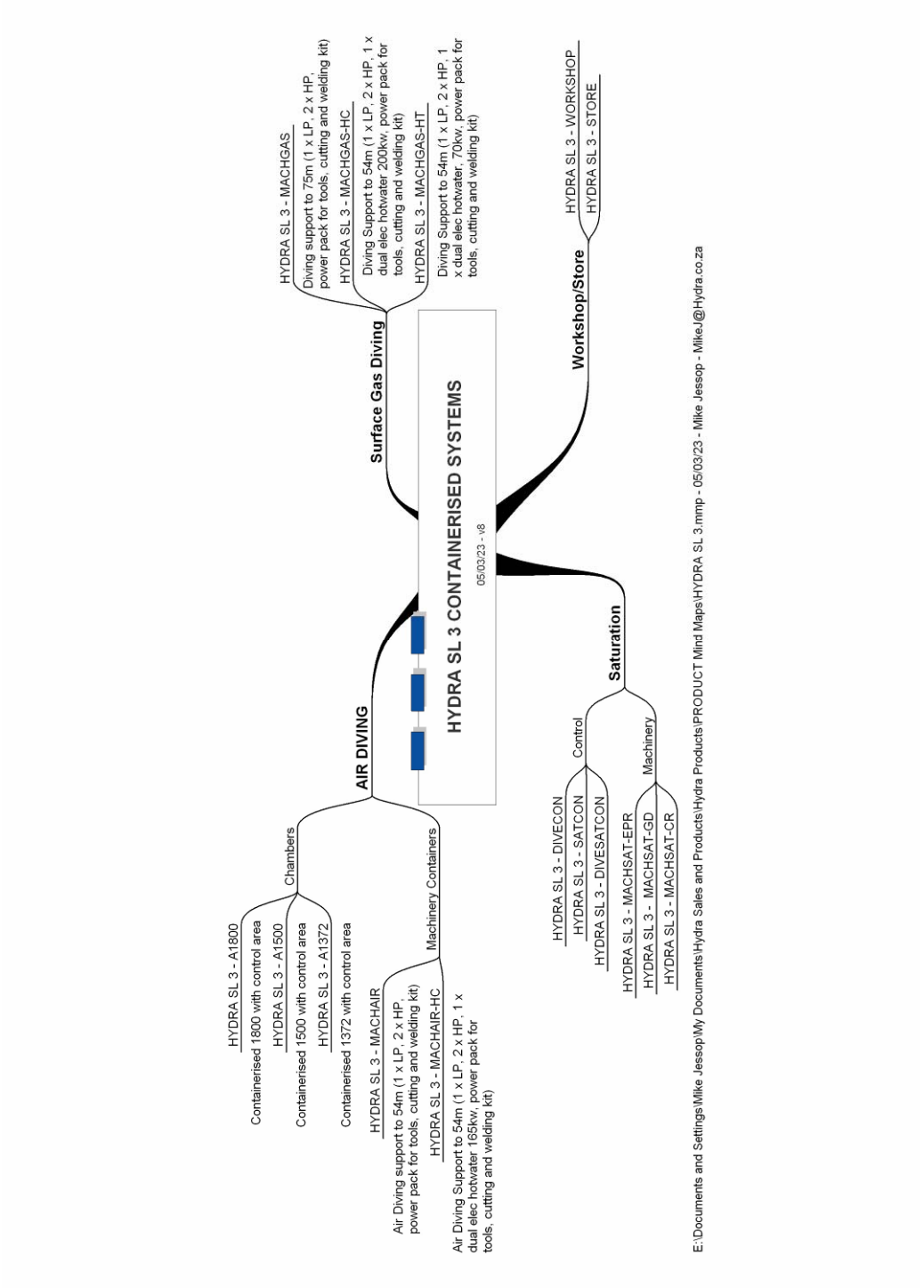
TECHNICAL SPECIFICATION

1 INTRODUCTION

We are pleased to present our technical specification for the HYDRA SL 3 - 1500 Containerized Diving System. The SL 3 Containerized systems are divided into the following ranges:



2 CONTROL CONTAINER

The Hydra SL 3 - 1500 Containerised Diving systems are specifically designed to give a compact option to diving systems offered by our competitors. We realise the necessity to use the least amount of deck space onboard a vessel and ensure that shipping & mobilisation costs are kept to a minimum.

A variety of layouts for systems are available and our design office can provide a custom system layout to suit your vessel and diving requirements. The configuration offered in this specification is viewed as being the most practical solution that complies with IMCA's diving standards and your specification requirements.

2.1 Guidance Codes and Standards

- IMCA D023: DESIGN - Diving Equipment Systems Inspection Guidance Note for Surface Orientated Diving Systems (Air & Mixed Gas) – Feb 2000
- IMCA D014: International Code of Practice for Offshore Diving
- South African Occupational Health and Safety Act 85/1993
- Lloyds Rules and Regulations for Diving Systems

3 TECHNICAL SPECIFICATIONS

This Section provides the reader with the technical specification of the HYDRA SL 3 - 1500 containerized diving system and describes, with illustrations, all the main components and their functions.

The HYDRA SL 3- system comprises the following main equipment and is clearly specified within this technical specification.

- Container Specification
- Container Fit out specification
- Chamber and Dive Control Specification

3.1 20ft Dive Control Container Physical data

Certification authority:	Lloyd's Register, DNV, ABS or as purchased.
Maximum load rating unmodified:	20,320 kg
Paint system:	Marine grade paint system to client specified colours.
20ft Standard length:	6,058mm
20ft Standard Height:	2,438mm
20ft Standard Width:	2,438mm
Access to roof top:	Ladder/steps provided on the door locking arms
MPI Inspection:	Full MPI inspection of container corner casting after load test in modified state.
Load Test:	Load test certificate in modified state.

3.2 Container Basic Fit out

3.2.1 Access Doors, Penetrations and Windows (Code SP 319H)

Self sealing access door to container c/w with window and lock.
This door uses very similar seals to the larger container doors and provides very good weather resistance.
Security covers for all electrical and gas penetrations c/w padlocks
Aluminium chequer plate flooring in all walking areas.

3.2.2 Sliding window (Code SP 179H)

Sliding window for the container side wall
Central locking latch
Penetration cover that locks externally to the container and prevents access.
Windows are tinted to reduce glare.

3.2.3 Electrical Fit out (Code SP 327H)

Fluorescent lights mounted on stainless steel chains to prevent breakage during shipping
Double socket European or American plug points (Please specify)
Electrical distribution board with double pole isolating breakers, RCD and suitable cable glands.
All switches are labelled appropriately.

3.2.4 Chamber Integration (Code SP H)

All chamber exhaust and BIBS exhaust is piped externally of the container to prevent a build up gases inside the container.
The exhausts are vented external of the container through a silencer
The area is marked with a hazard sticker.

3.2.5 Bookcase with Desk Area (Code SP H)

A book case is provided to store all relevant dive procedures, job information and system certification.
A small desk area is also created for use by the diving supervisor.
Lockable drawers are provided for storage of valuables

3.2.6 Fire Fighting (Code SP H)

Standard powder Fire extinguisher is provided.
The fire extinguisher is mounted in the container in a location that allows for ease of use should this be required.

3.2.7 12 Cylinder Air Storage Bank (Code SP 270H)

The air cylinder storage bank is split into 2 x 6 cyl banks which can be individually isolated. The specifications are as follows:

- Cylinders rated for 200 bar working pressure.
- Oxygen cleaned brass manifold with inlet filter, gauges and tubing.
- Pressure relief valve is mounted on the manifold.
- Mounted directly to the container side with galvanised mounting brackets and securing straps.
- IMCA specified labelling and certificates supplied
- Serial numbers marked for easy identification

3.2.8 HP Air Regulator Panel (Code SP 150H)

In order to regulate the HP air from the Storage bank to the chamber and the Dive panel, a High Pressure air management panel is used.
The panel consists of two regulators one for the chamber and one for the dive panel:
HP Inlet isolating valve
Inlet filter either inline or part of the regulator
HP regulator
Outlet non return valve
Outlet ¼ Turn ball valve
There is an additional cross connect feature for the regulated air. This provides the added feature of using the chamber regulator for support of the divers panel.

3.2.9 Air Conditioning – Wall Mountable (Code SP 233H)

24000 BTU Heating and Cooling air-conditioner
Variable speed unit
Permanelty mounted internally of the container using large ducting to provide circulation around the air conditioner.
Stainless steel trim on all threaded components

3.2.10 Thermal Insulation (Code SP232H)

Thermal insulation is by means of Lloyds approved Marine ply laminated with epoxy coated cromodex laminate.
The boards are then securely fastened to the container.
Rock wool insulation is installed between the boards and the container.
The roof only is insulated.

3.2.11 Incoming Power Transformer (Code SP341H)

Transformer accommodates 440VAC and 380VAC inputs with a selector switch.
Rugged housing with isolating switch and output circuit breakers
Circuit breakers rated for spike protection
Circulating fan for cooling of transformer

3.2.12 24VDC chamber power supply (Code SP225H)

24 VDC chamber power supply transformer
Designed to meet IMCA AODC 035 requirements
Robust and well ventilated case
Selector switches for incoming frequency requirements
Adjustable pot within transformer for fine tuning of output voltages
Fused outlet for added safety.

3.2.13 Emergency Container lighting (Code SP H)

All fluorescent lighting in the container is fitted with an emergency back up battery facility that automatically comes on when the mains power is lost.

3.2.14 Interconnect hoses (Code SP H)

15m long interconnect hoses are supplied with the system to connect the machinery container to the dive control container.
All fittings are supplied with dust caps

3.3 DIVE CONTROL AREA

The Dive control area is fitted with:

- 3 Diver Air control panel
- 2 x 3 Diver Amron Communications panel
- 220V to 12 or 24VDC transformer for light control with Split bobbin transformer
- Work surface
- 19in rack for mounting Customer supplied Diver TV unit
- Electrical plugs points for various items of CFE equipment

4 PLANNED MAINTENANCE

4.1 Asset list

- Complete list of all assets attached to contract
- Inclusive of asset numbers and serial no's
- Asset list provides all weights, dimensions and special information
- Provides a report on the existing status of the equipment

4.2 Asset Maintenance Schedule i.a.w IMCA D018

- Provides a detailed list of all maintenance to be completed on a specific type of equipment.
- Enables technicians to update and ensure their equipment is maintained properly.

4.3 Asset Overdue schedule

- Provides an immediate "in date" indication of all assets linked to the Saturation system.

5 INTEGRATED LOGISTIC SUPPORT

5.1 Spare Parts Availability

Hydra Marine is committed to supporting its products throughout their life-cycle and all spare parts are readily available from Hydra Marine for a minimum period of fifteen years after purchase. Prices for spare parts will be charged at Hydra Marine' standard list price. Instrumentation, valves and components used in the system are standard industry recognised products which are generally available worldwide from accredited agents and dealers.

5.2 Operating and Maintenance Manuals

For this contract the following documentation and specification for documentation will be provided:

1 set hardcopy - Operating and maintenance manuals containing all equipment engineering data, operating and maintenance information.
1 set CD Rom - Operating and maintenance manuals

A general overview of the system, main components and their functions, together with diagrams, physical data, operating conditions and interfaces
Operating information including equipment preparation, operating instructions, equipment shutdown procedures, fault diagnosis routines and recovery procedures. Also included are guidance notes on hazards associated with the use of the equipment.
Detailed user technical information, which provides the user with sufficient technical knowledge to understand the equipment and to cross-reference with the illustrated parts lists in the Maintenance Manual.

The Maintenance Manuals contain all the information necessary to effectively maintain the equipment throughout its life-cycle. Maintenance instructions are clear, concise and have sufficient depth of information to allow organisational level maintenance (OLM), intermediate level maintenance (ILM) and depot level maintenance (DLM). The information includes as a minimum:

- Facilities, equipment, tools and consumables required for maintenance.
- Product documentation including an updated system specification, a product breakdown structure, a master record index, illustrated parts lists, wiring diagrams, piping schematic diagrams, a recommended spare parts list.
- A planned maintenance programme, together with calendar-based maintenance frequencies.
- Detailed maintenance procedures for OLM, ILM and DLM.
- Test procedures and function tests.
- Component manufacturer's information on all bought-out components of the system.
- Resource information including drawings standards and symbols, conversion charts, and standard procedures are included.

5.3 Operator and Maintainer Training

An operator and maintainer training course is priced separately.

5.3.1 Operator Training

The operator training course will include:

(a) An introduction to the equipment
(b) Main components and their functions
(c) Start-up procedures
(d) Operation of the equipment in all modes for which the equipment is designed
(e) Fault diagnosis routines
(f) Shutdown procedures

5.3.2 Maintainer Training Course

The maintainer training course will include:

(a) Statutory requirements governing the use of the equipment
(b) An overview of the equipment and its sub-systems
(c) Facilities, tools and equipment required for maintenance
(d) Product breakdown structure interpretation
(e) Use of the Illustrated Parts Lists
(f) Planned maintenance schedules
(g) Maintenance procedures
(h) Test procedures

5.3.3 Training Material

Training material for the system is included and comprises:

(a) Training syllabus
(b) Lesson plan
(c) Course notes
(d) Power point presentation file

5.3.4 Training Facilities

Suitable classroom facilities with an overhead projector, data projector and whiteboard for theoretical training. Practical training will be conducted at the required site.

6 DELIVERY AND INSTALLATION

- **Delivery**
  - Typical manufacturing time will vary depending on specific contract items. Typically 3 to 5 months from order placement. Please ask regarding our stock chambers, we are constantly building a chambers for stock.
  - Where required a comprehensive delivery schedule per milestone item will be created to provide clarification on delivery.

7 CERTIFICATION AND WARRANTY

- **Warranty**

Hydra Marine warrants that all goods supplied are free from defects. Workmanship is guaranteed for 12 months from date of shipment. In addition, all suppliers' guarantees for equipment fitted are passed on to the client, including analysers, communications sets and other electronic items.

Hydra Marine will repair and replace materials and equipment covered by the 12 month warranty or supplier's guarantees for products returned to the Cape Town factory. Shipping and transport costs are however excluded.

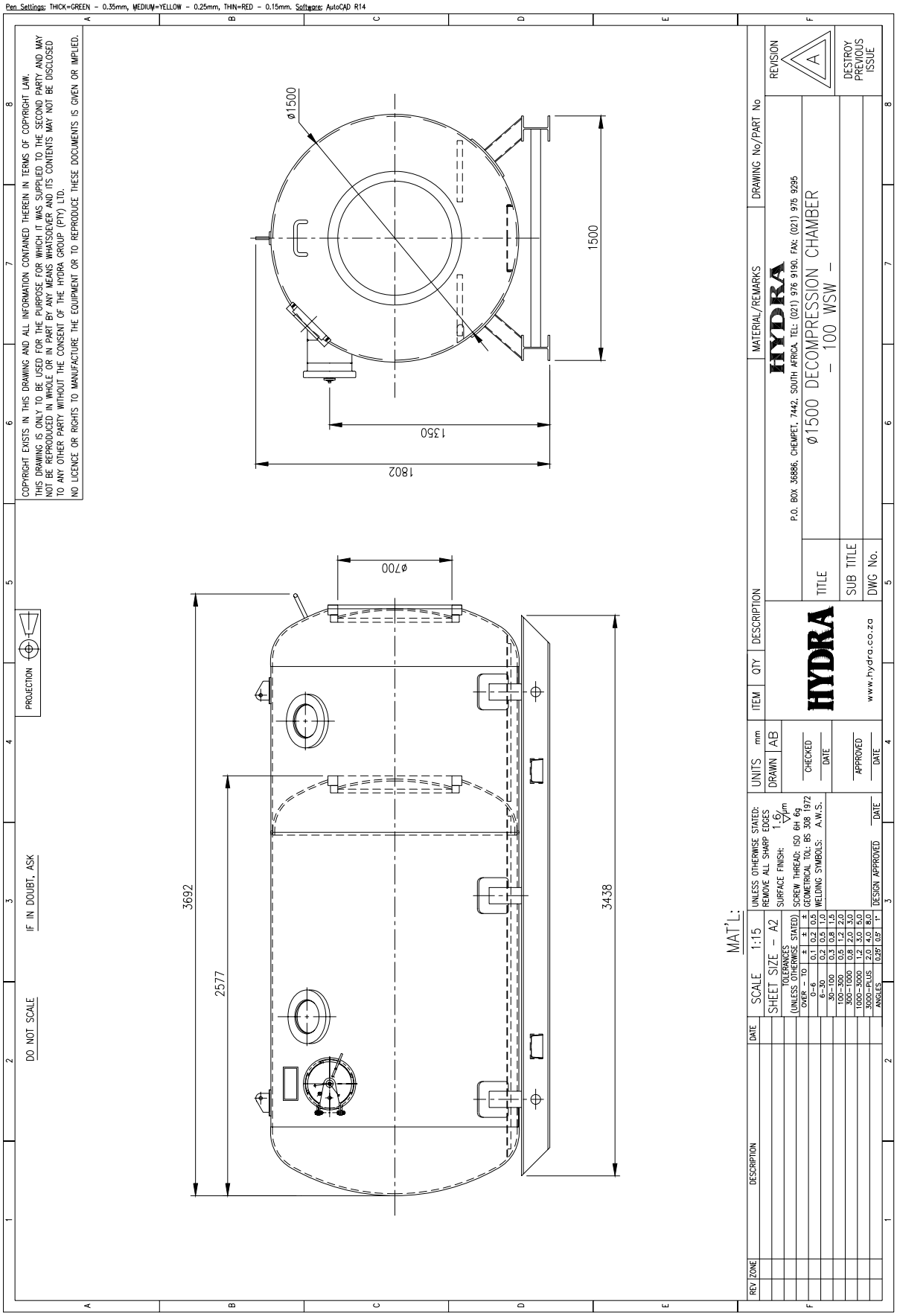
7.1 ISO Accreditation

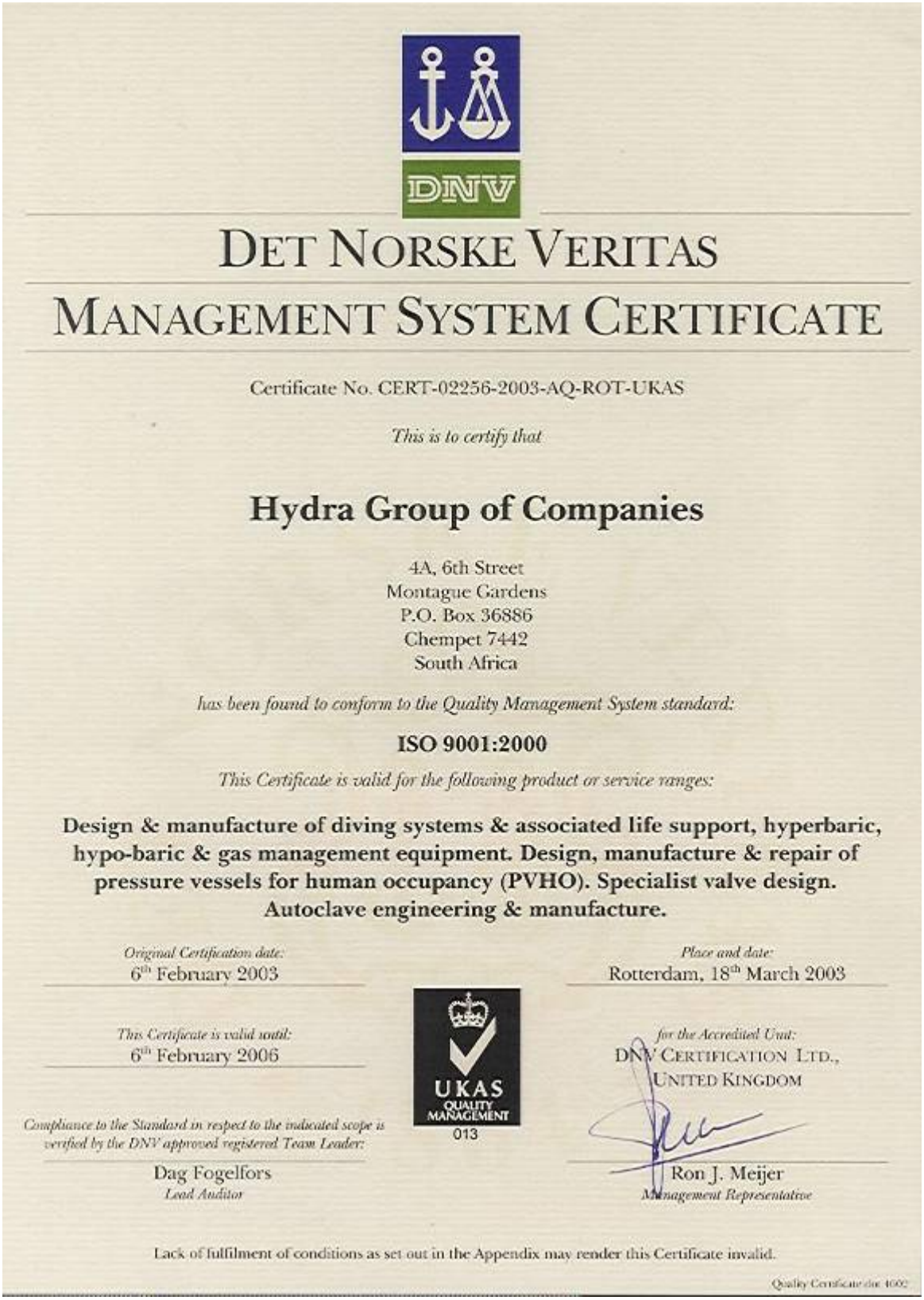
Hydra Marine is an accredited ISO 9001: 2000 company. Certificate no CERT-02256-2003-AQ-ROT-UKAS. The auditing company was DNV (Det Norske Veritas). See attached certificate.

The equipment is supplied with a comprehensive documentation pack that includes:

- Data book approval sheet
- Manufacturers data report
- Lloyd's Register load test certification
- Nameplate facsimiles
- Material certificates
- Mass certification
- Original certificates of calibration

- Final acceptance test certificates detailing specified and attained test parameters





DET NORSKE VERITAS

MANAGEMENT SYSTEM CERTIFICATE

Certificate No. CERT-02256-2003-AQ-ROT-UKAS

This is to certify that

Hydra Group of Companies

4A, 6th Street
Montague Gardens
P.O. Box 36886
Chempet 7442
South Africa

has been found to conform to the Quality Management System standard:

ISO 9001:2000

This Certificate is valid for the following product or service ranges:

Design & manufacture of diving systems & associated life support, hyperbaric, hypo-baric & gas management equipment. Design, manufacture & repair of pressure vessels for human occupancy (PVHO). Specialist valve design. Autoclave engineering & manufacture.

Original Certification date:
6th February 2003

Place and date:
Rotterdam, 18th March 2003

This Certificate is valid until:
6th February 2006

for the Accredited Unit:
DNV CERTIFICATION LTD.,
UNITED KINGDOM

UKAS QUALITY MANAGEMENT
013

Compliance to the Standard in respect to the indicated scope is verified by the DNV approved registered Team Leader:

Dag Fogelfors
Lead Auditor

Ron J. Meijer
Management Representative

Lack of fulfilment of conditions as set out in the Appendix may render this Certificate invalid.

Quality Certificate doc 4002

Figure 1: Hydra DNV Certificate

Figure 2: Typical Chamber with 12 cylinder bank and insulated container

Figure 3: Typical man way access door with chamber access external

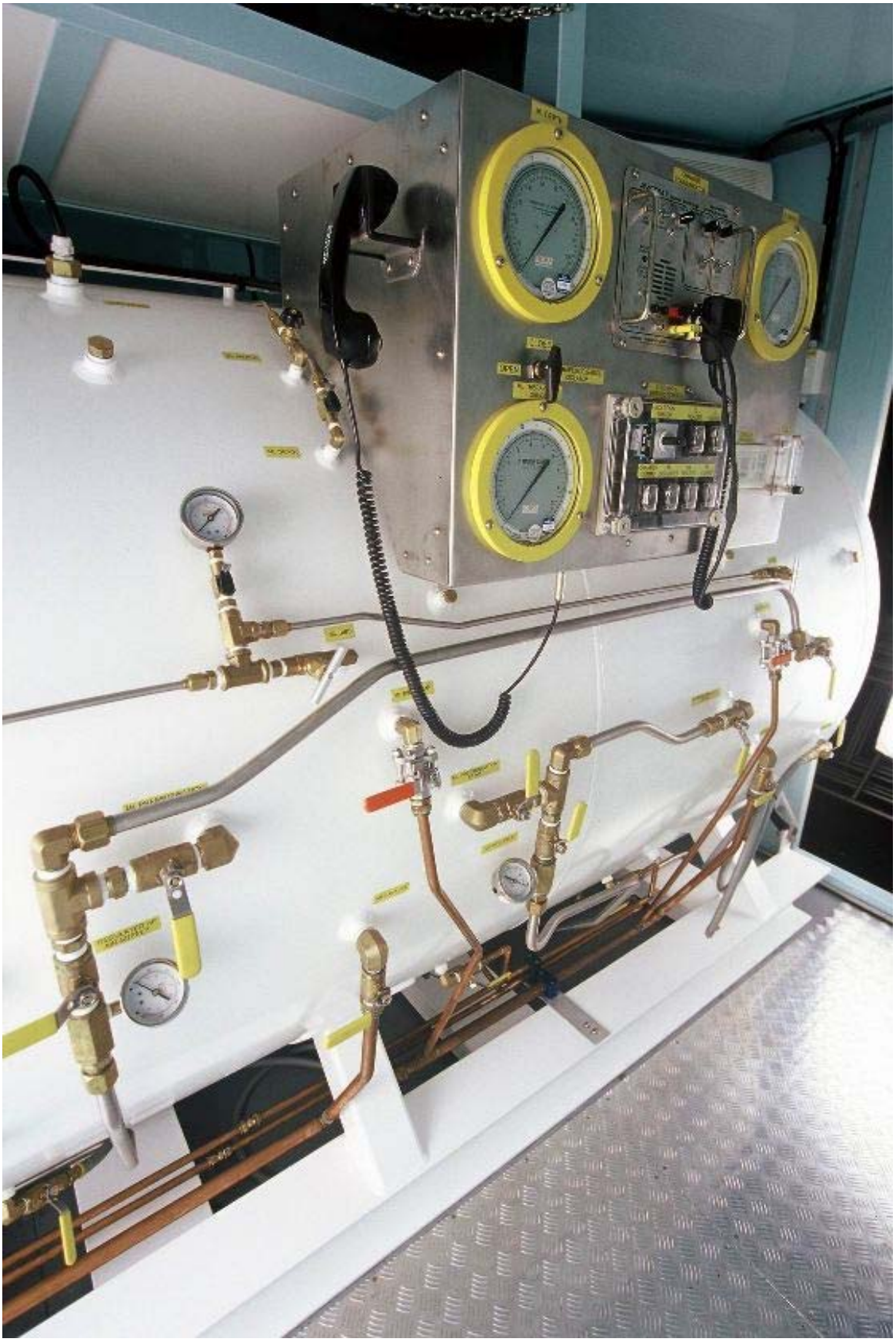


Figure 4: Typical SL 3 Chamber fitout

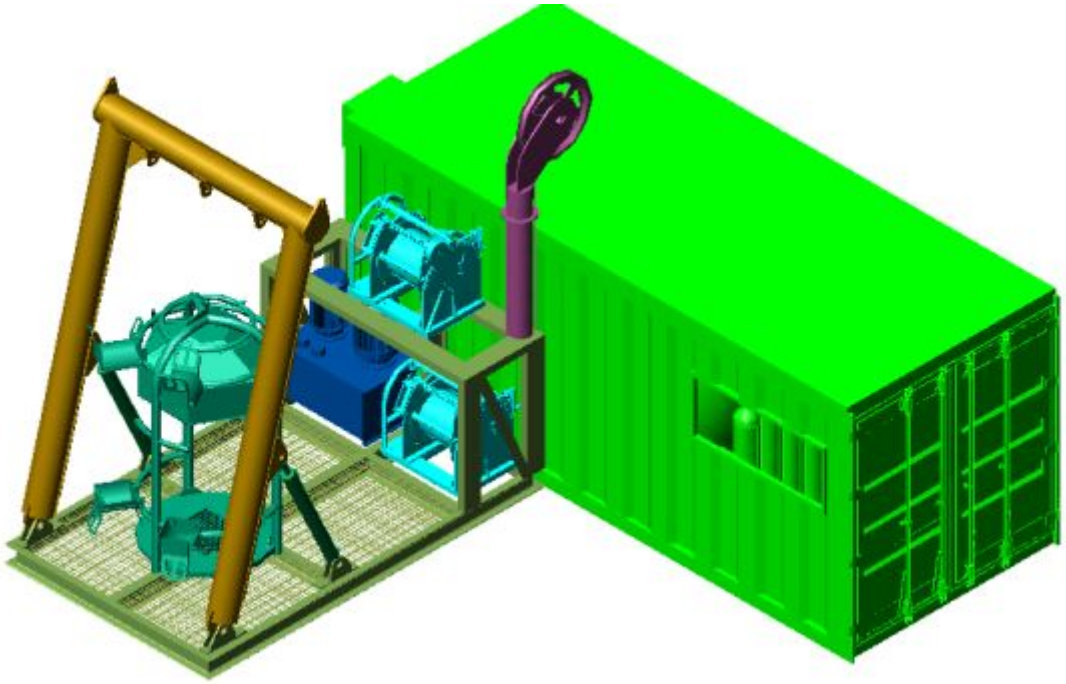


Figure 5: SL 3 Container next to LR 80 Wetbell System

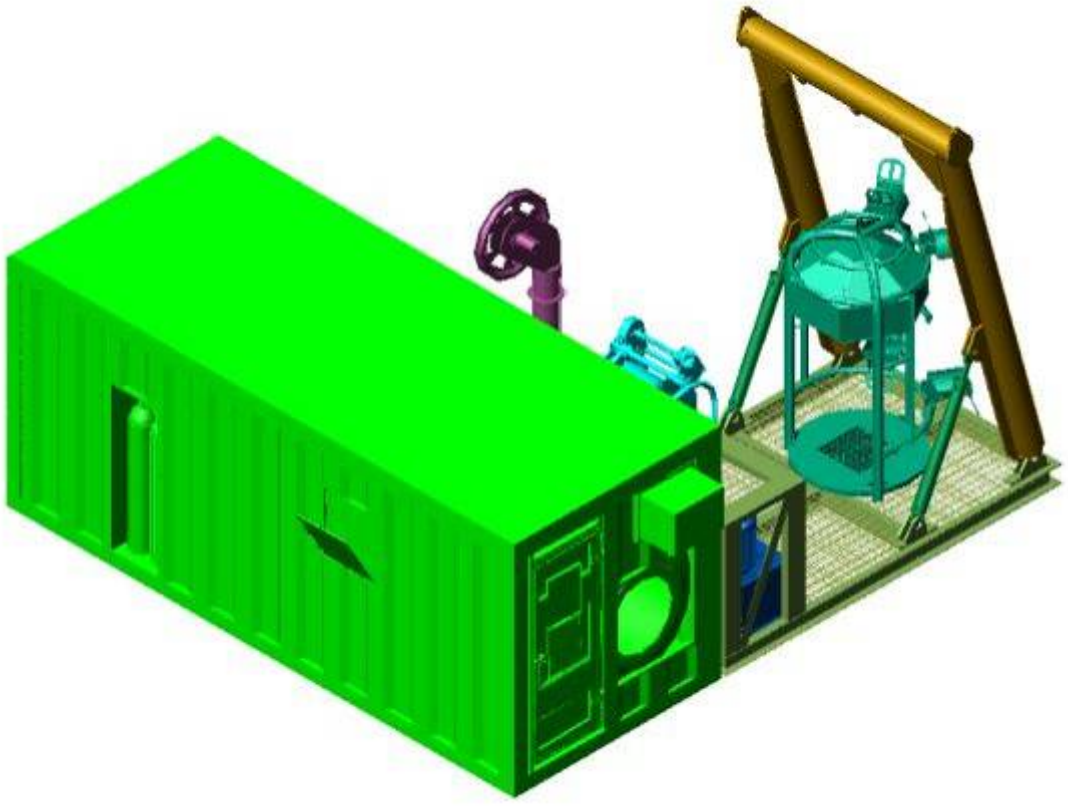


Figure 6: Shows access to Chamber in Container

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TECHNICAL SPECIFICATION

HYDRA SL 3 – MACHAIR^{HC} CONTAINERISED MACHINERY SYSTEM

DOCUMENT INFORMATION				
Doc No:	**4623-001-SPEC**		**Status:**	**Confidential**
Revision:	**B**		**Mag File:**	**Dive Solutions HYDRA SL 3 MACHAIRHC Rev B**
Issued:	**Oct 2005**		**Author:**	**Mike Jessop**

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3. LP Compressor .....
4. Upgrade container to DNV 2.7.1 corner castings .....

HYDRA

TECHNICAL SPECIFICATION

1 INTRODUCTION

This specification is prepared in accordance with our assessment of your requirements and is based on our standard and proven product range.

2 MACHINERY CONTAINER

2.1 Machinery Container

Certification authority:	Lloyd's Register, DNV, ABS or as purchased.
Maximum load rating unmodified:	20,320 kg
Paint system:	Marine grade paint system to client specified colours. All modified areas primed with Jotun Jotumastic Aluminium or better with Polyurethane topcoat. Base of container painted with Butamastic coating.
20ft Standard length:	6,058mm
20ft Standard Height:	2,438mm
20ft Standard Width	2,438mm
Access to roof top	Ladder/steps provided on the door locking arms
MPI Inspection	Full MPI inspection of container corner casting after load test in modified state.
Load Test	Load test certificate in modified state.
Flooring	Steel floor

2.2 Machinery Container Basic Fitout

2.2.1 Electrical Fitout

Fluorescent lights mounted on stainless steel chains to prevent breakage during shipping
One set of lights is fitted with an emergency battery back up
Double socket European or American plug points (Please specify)
Electrical distribution board with double pole isolating breakers, RCD and suitable cable glands.
All switches are labelled appropriately.
General Hazard labels are provided throughout the system in hazardous locations

2.2.2 Fire Fighting

Standard powder Fire extinguishers are provided.
The fire extinguisher is mounted in the container in a location that allows for ease of use should this be required.

2.2.3 Working and Service Area

A suitable working area is provided for servicing and maintaining of diving equipment.
The workbench is fitted with the following:

- Heavy duty vice
- Overhead light
- Tool board
- Shelf unit.
- Spares cupboard and rack area is provided depending on your requirements for storage of goods
- Lin Bin Storage facility – Approximately 5 units

2.2.4 Penetrations

Security covers for all electrical and gas penetrations c/w padlocks

2.2.5 Thermal Insulation

Thermal insulation is by means of Lloyds approved Marine ply laminated with Wilson Art fire resistant white laminate.
The boards are then securely fastened to the container.
Rock wool insulation is installed between the boards and the container.
Insulation is on the roof only.

2.2.6 Access Door

Self sealing access door to container c/w with window and lock.
The door is provided with a open stay
For machinery space purposes the door is also provided with ear muffler protection hooks and a place to store individual ear protection plugs.

2.2.7 Forced Draught Ventilation

2 x 0,5 kw FD fans are installed with inlet louvers
FD fans are designed to force air into the container thereby providing adequate circulation of air throughout the system
Fans are operated automatically when any of the compressors are switched on.

2.2.8 Compressor Installation Ventilation

In order to provide good circulation of cooling air passed the compressor block, a stainless steel louvre is provided mounted in the bulkhead nearest the compressor block.
The louvre is designed to provide adequate cooling for the compressor.
The louvre is designed to stop rain from entering the container.
The sizing and design of the trunking to the compressor will be as specified by the compressors manufacturer. Trunking will ensure a flow of air across the compressor block for adequate cooling.

2.2.9 Incoming Power Transformer

Transformer accommodates 440VAC and 380VAC inputs.
Rugged housing with isolating switch and output circuit breakers
Circuit breakers rated for spike protection
Circulating fan for cooling of transformer

2.2.10 Supply hoses

The following supply hoses will be supplied with the system and rated for 360 bar

- 4 x 10m 3/8” HP hoses with compatible end fittings
- 4 x 20m 3/8” HP hoses with compatible end fittings

3 HP COMPRESSOR BAUER IK12.14 II

BASIC SCOPE OF SUPPLY :

- Horizontal framed unit with belt guard.
- Belt driven, air cooled, 4 stage BAUER IK12.14 II new generation compressor block.
- P41 filter system. (Processes 1500m3 of air at 20 °C)
- 3 flexible filling hoses with DIN connections.
- Panel mounted lever type filling valves. (up to fill and down to bleed)
- Panel mounted oil filled air pressure gauge.
- Manual condensate drain valves.
- Basic tool kit, 1 litre spare oil, instruction and parts manual.

AIR QUALITY: Air quality exceeds SABS-019-1985-3, DIN EN 12021 and BS 4001.
WARRANTY: 1 year or 500 hour warranty.

FEATURES :

New long life, low maintenance industrial quality compressor block.
Compact with high performance.
Quiet and very smooth running.
Belt driven and blast air cooled by means of a multibladed fan.
Stainless steel corrosion resistant coolers, interfilters and fittings.
Positive pressure and splash lubrication.
Replaceable paper element oil filter for cleanest compressor lubricant.
Highly efficient floating final stage piston with new generation plastic rings.
Long life high capacity air purification system.
No special tools necessary for filter cartridge removal.
Filter cartridges are factory sealed and of the disposable type.
Mechanical belt tensioning system.

APPROXIMATE DIMENSIONS AND WEIGHT: L1250mm x W600mm x H750mm 240Kgs.
* Measured by filling a cylinder 0-20 MPa at sea level.

4 LP COMPRESSOR (QUINCY 63 CFM)

The Quincy LP compressors are pressure lubed, providing a positive lubrication of all critical areas, including the crankshaft bearings, rod journals and wrist spin surfaces. A convenient spin-on oil filter (optional on some models) assures contaminant free lubrication at all times.

The Quincy runs at lower speeds, resulting in lower operation temperatures and maximum compressor efficiency.
It features durable cast iron construction for longer life and less down-time, and heavy duty disc-type valves for efficient air flow, resulting in more air per horsepower.

The Quincy body has a thicker casting to prevent heat related distortion of internal tolerances.
The Quincy volumetric efficiency is enhanced by a combination of thick horizontal and vertical cooling fins, which control metal expansion and help prevent oil carry-over.

Basic scope of work:

Model:	63 CFM Tank Mount
Capacity:	63 cu ft/min @ 12 bar (175 PSI)
No of cylinders:	3 – 3 Stage
Lubrication:	Pressurised Gear-Rotor Pump
Motor Size:	25 HP TEFC = 20 kW
Starter:	Star/Delta 380/460 Volt 3 PH 50/60 HZ
Regulation:	LVD (Stop/Start Continuous Running)
Tank Size:	(250 Litres)

Code of Construction: ASME Code VIII

Other features

- Intercooler on compressor unit.
- Un-loader or auto stop system
- Stainless steel tool box and accessories locker
- Auto condensate drain and filtration system.
- Acceptable oil content to be 0.01 mg/m3
- Manifold connections 1 x 12 JIC , 3 x 6 JIC, Pressure gauge on the final delivery manifold.
- 10m Flexible intake hose and air filter
- Oil used is to be compatible with breathing air applications
- Breathing air quality standards. Certificate to be supplied
- Belt Guard

Filtration Package

Walker Filtration

Specification air quality to ISO 8573.1 class 1-1
System exceeds BS 4275:1997 breathing air quality

1st Stage

Model:	75 WS Water Separator
Conn:	¾” BSP

2nd Stage

Model:	A76X1
Capacity:	127 cu ft/min @ 7 bar
Particle Removal:	1 Micron
Max oil carryover @ 20°C:	0.1 mg/m3
Conn:	¾ inch BSP

3rd Stage

Model:	A76XA
Capacity:	127 cu ft/min @ 7 bar
Particle Removal:	0.1 Micron
Max Oil Carryover @ 20°C:	0.01 mg/m3
Conn:	¾ inch BSP

4th Stage

Model:	A76AC (Activated Carbon)
Capacity:	127 cu ft/min @ 7 bar)
Particle Removal:	0.01 Micron
Max oil carryover @ 20°C:	0.003 mg/m3 (0.003 ppm)
Conn:	¾ inch BSP

Please note that all units supplied as standard with electronic auto drains & service indicators except AC Unit.

5 DELIVERY AND INSTALLATION

5.1 Delivery

- Typical manufacturing time will vary depending on specific contract items. Typically end of April 2006.
- At present we have production capacity for this contract and are able to commit to a delivery contract.
- Where required a comprehensive delivery schedule per milestone item will be created to provide clarification on delivery.

6 CERTIFICATION AND WARRANTY

6.1 Warranty

Hydra Marine warrants that all goods supplied are free from defects. Workmanship is guaranteed for 12 months from date of shipment. In addition, all suppliers' guarantees for equipment fitted are passed on to the client, including analysers, communications sets and other electronic items.

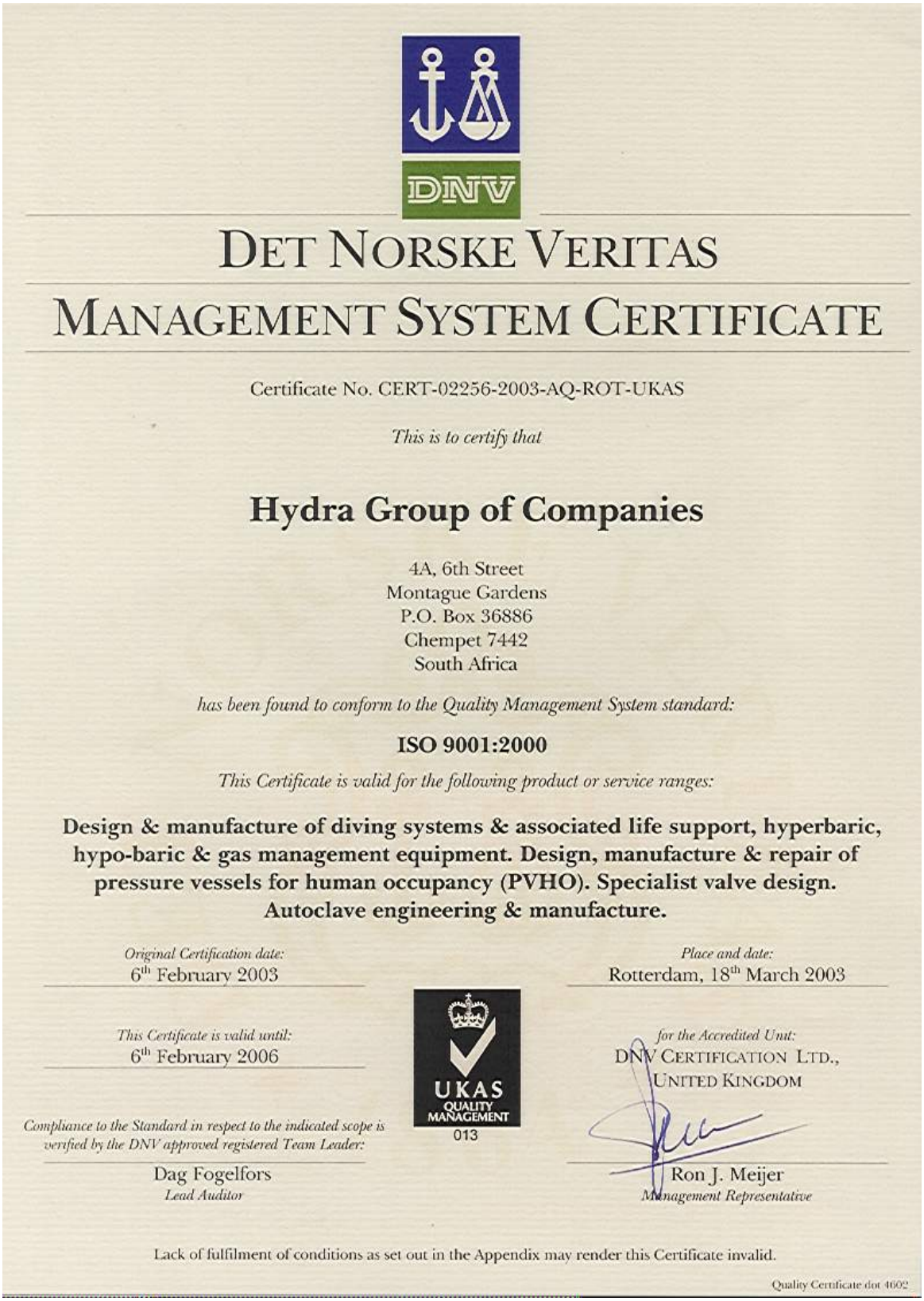
Hydra Marine will repair and replace materials and equipment covered by the 12 month warranty or supplier's guarantees for products returned to the Cape Town factory. Shipping and transport costs are however excluded.

6.2 ISO Accreditation

Hydra Marine is an accredited ISO 9001: 2000 company. Certificate no CERT-02256-2003-AQ-ROT-UKAS. The auditing company was DNV (Det Norske Veritas). See attached certificate.

The equipment is supplied with a comprehensive documentation pack that includes:

- Manufacturers data report
- Nameplate facsimiles
- Mass certification
- Original certificates of calibration
- Final acceptance test certificates detailing specified and attained test parameters



DET NORSKE VERITAS

MANAGEMENT SYSTEM CERTIFICATE

Certificate No. CERT-02256-2003-AQ-ROT-UKAS

This is to certify that

Hydra Group of Companies

4A, 6th Street
Montague Gardens
P.O. Box 36886
Chempet 7442
South Africa

has been found to conform to the Quality Management System standard:

ISO 9001:2000

This Certificate is valid for the following product or service ranges:

Design & manufacture of diving systems & associated life support, hyperbaric, hypo-baric & gas management equipment. Design, manufacture & repair of pressure vessels for human occupancy (PVHO). Specialist valve design. Autoclave engineering & manufacture.

Original Certification date:
6th February 2003

Place and date:
Rotterdam, 18th March 2003

This Certificate is valid until:
6th February 2006

for the Accredited Unit:
DNV CERTIFICATION LTD.,
UNITED KINGDOM

UKAS QUALITY MANAGEMENT
013

Compliance to the Standard in respect to the indicated scope is verified by the DNV approved registered Team Leader:

Dag Fogelfors
Lead Auditor

Ron J. Meijer
Management Representative

Lack of fulfilment of conditions as set out in the Appendix may render this Certificate invalid.

Quality Certificate dot 4602

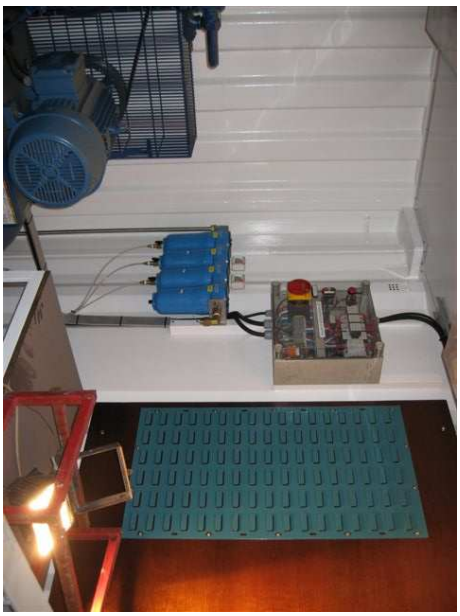
Figure 1: Hydra DNV Certificate

Figure 2: Typical Layout of Machinery Container




BREATHING AI





BAUER
Quincy

Quincy QR-390
Quincy