

# Hyperbaric Testing

Testing and trials for the subsea industry



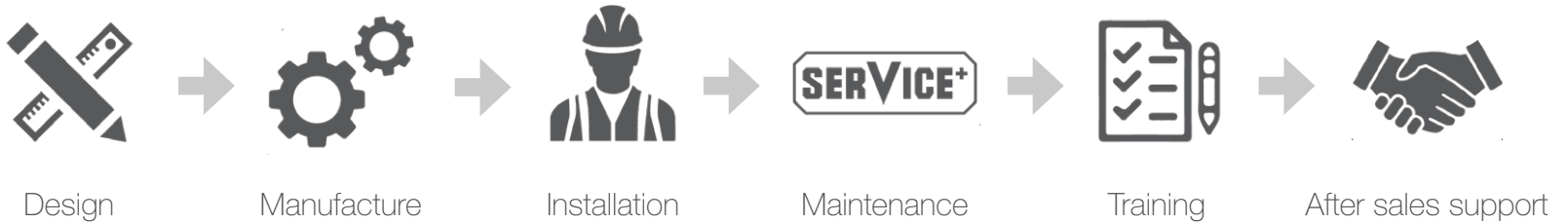
## About JFD

Our vision is to be the unrivalled, first choice partner to commercial operators and global defence forces within the hyperbaric industry and we will continue to support our clients core operations by offering market leading technology solutions and provide world class support.

JFD is at the forefront of hyperbaric rescue and is the leading supplier of commercial diving equipment and saturation systems.

JFD's products and services have been delivered globally for over 35 years and continues to set new standard for safety, quality and reliability, whilst being at the forefront on innovation.

JFD offers complete capability, from design and manufacture through to operation, maintenance and training.





# NHC testing

NHC testing offers a comprehensive range of services for research, development, testing and demonstration of high and low pressure applications.

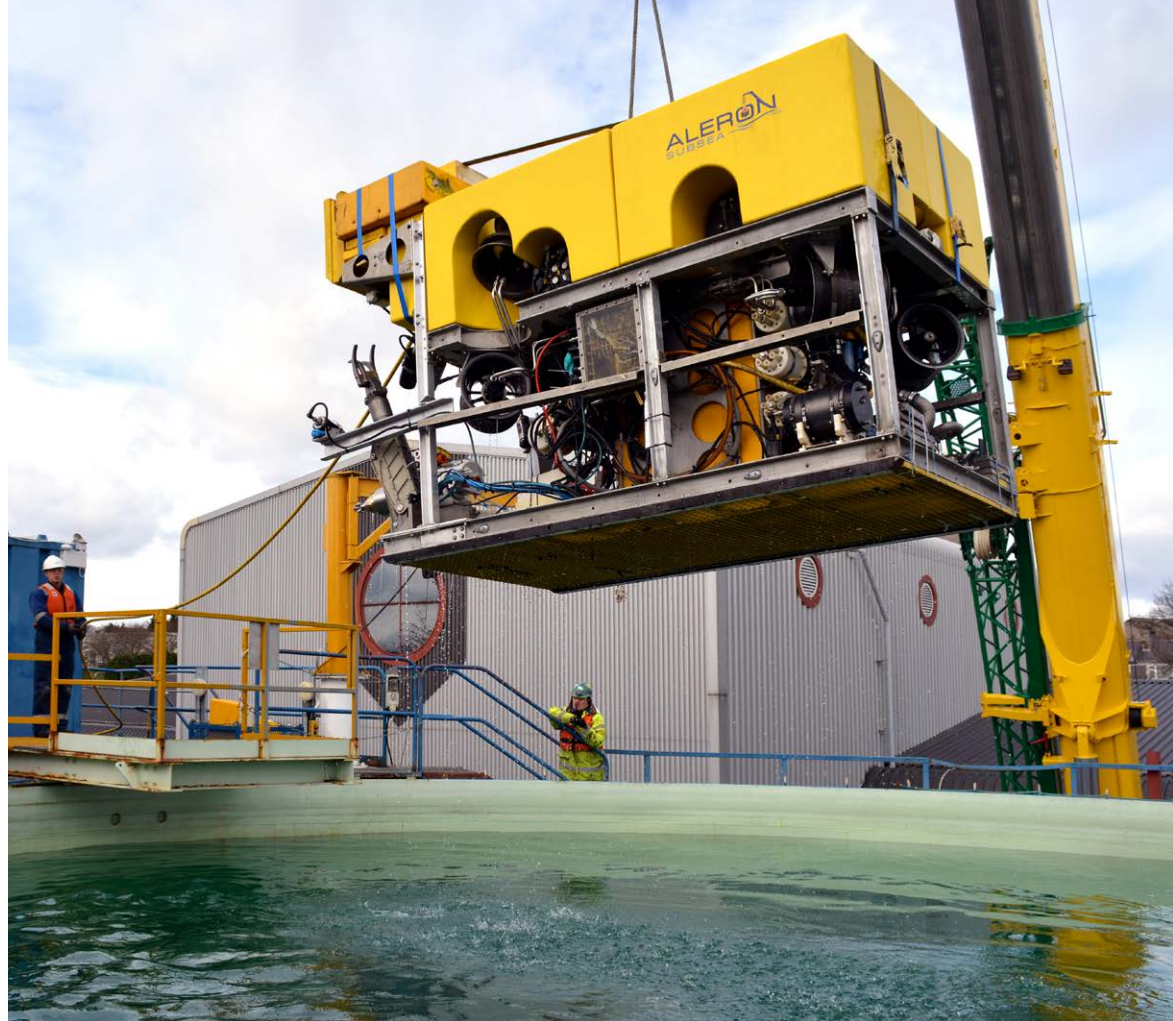
Our operating procedures, test equipment, recording and monitoring are regularly audited and re-approved to ensure the highest standards.

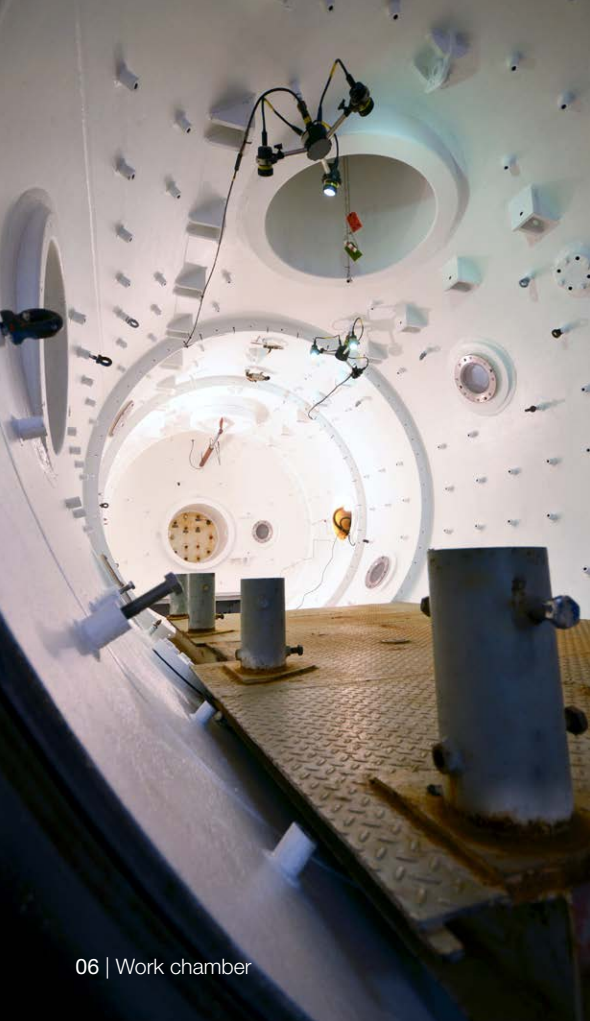
Considerable investments in the variety and capacity of test vessels within NHC testing have been made over the past 5 years, making our facilities amongst the biggest in the world. All our test equipment and chambers can be precisely controlled and monitored giving incredibly accurate test results.

The variety of chambers mean we can pressure test a wide range of equipment of all shapes and sizes such as subsea control modules, umbilicals, valves, actuators, ROV and submersible vehicles, buoyancy control devices and underwater housings. We have full instrumentation and logging facilities on site as well as craneage.

## Capabilities

- Altitude Testing
- Diving Equipment Testing
- Gas Leak Detection
- Hyperbaric Testing
- Nitrogen/Helium Testing
- Submersible Testing and Trials
- Subsea Cable Testing
- Subsea Umbilical Testing
- Subsea Valve Testing
- Subsea Winch and Wire Testing





## Work chamber

At the heart of the National Hyperbaric Centre is a deep simulation facility capable of manned and unmanned testing. The hydrostatic test chamber can simulate subsea environmental conditions to a depth of 1,000msw and altitudes to a height of 55,000ft at ambient temperatures.



### Dimensions

3000mm internal diameter  
8000mm internal length  
63m<sup>3</sup> internal volume



### Temperature

ambient



### Chamber Services

Gas and water sampling system  
Fume extraction  
Internal communications system, light and video  
Full air and mixed gas capability



### Pressure Rating

100bar/1000msw/1450psi - unmanned  
30bar/300msw/435psi - manned  
55,000ft maximum altitude



### Operating Medium

Fresh water  
Air or mixed gases



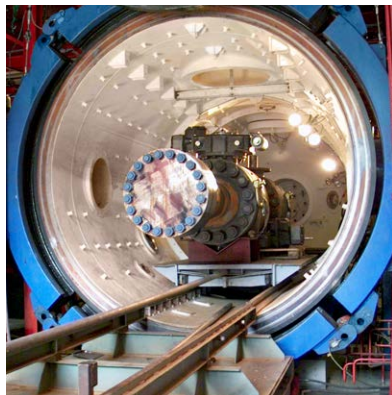
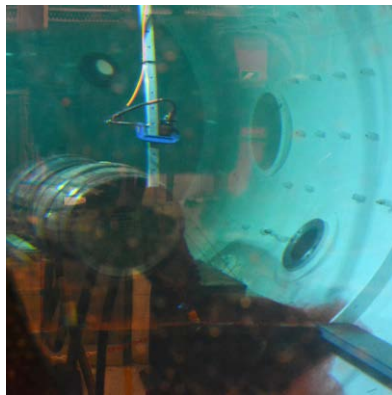
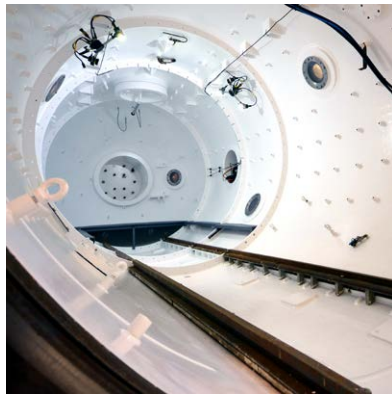
### Access

3000mm diameter main access  
door with gantry  
700mm manway through TUP  
Hydraulic and electrical penetration ports











# Hyperbaric welding

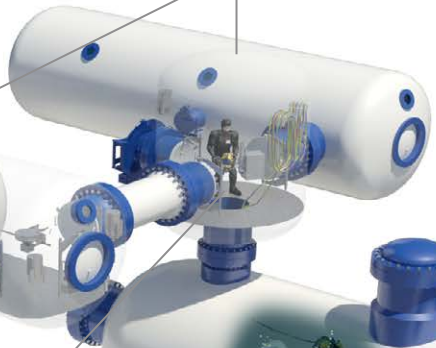
Our large work chamber can be adapted for a variety of welding situations and is attached to a full saturation diving system which is comfortably furnished for up to 16 divers to live in under saturation.

The unique facilities at the NHC permit problem free testing of dry welding and wet welding procedures. An established set up combined with interface flexibility allows a variety of habitat welding techniques: manual, mechanised and remotely operated. A tried and tested internal filtration system ensures the maintenance of good visibility during dry and wet welding operations in either a fresh water or mixed gas environment. A full video and communication system means that dives can be monitored and recorded and ensures a controlled and safe environment.

Dive control/Saturation control room



2 x 8-man twin lock deck decompression chambers (DDC) with sanitary facilities  
Rated to 300msw



- Additional equipment**
- 1 x main gas distribution panel
  - 1 x hydraulic power pack
  - 6 x habitat conditioning units - external regeneration
  - 1 x control master unit
  - 29 x gas storage cylinders
  - 1 x gas transfer compressor
  - 2 x HP breathing air compressors
  - Chamber domestic water and sanitary system
  - 1 x diver hot water unit

1 x medical twin lock treatment chamber with sanitary facilities  
Rated to 300msw  
(manned trials)

Transfer chamber



Work chamber  
Rated to 1000msw  
(unmanned trials) &  
300msw (manned trials)  
Can simulate wet or dry  
habitat environment



## Robotic and mechanised welding

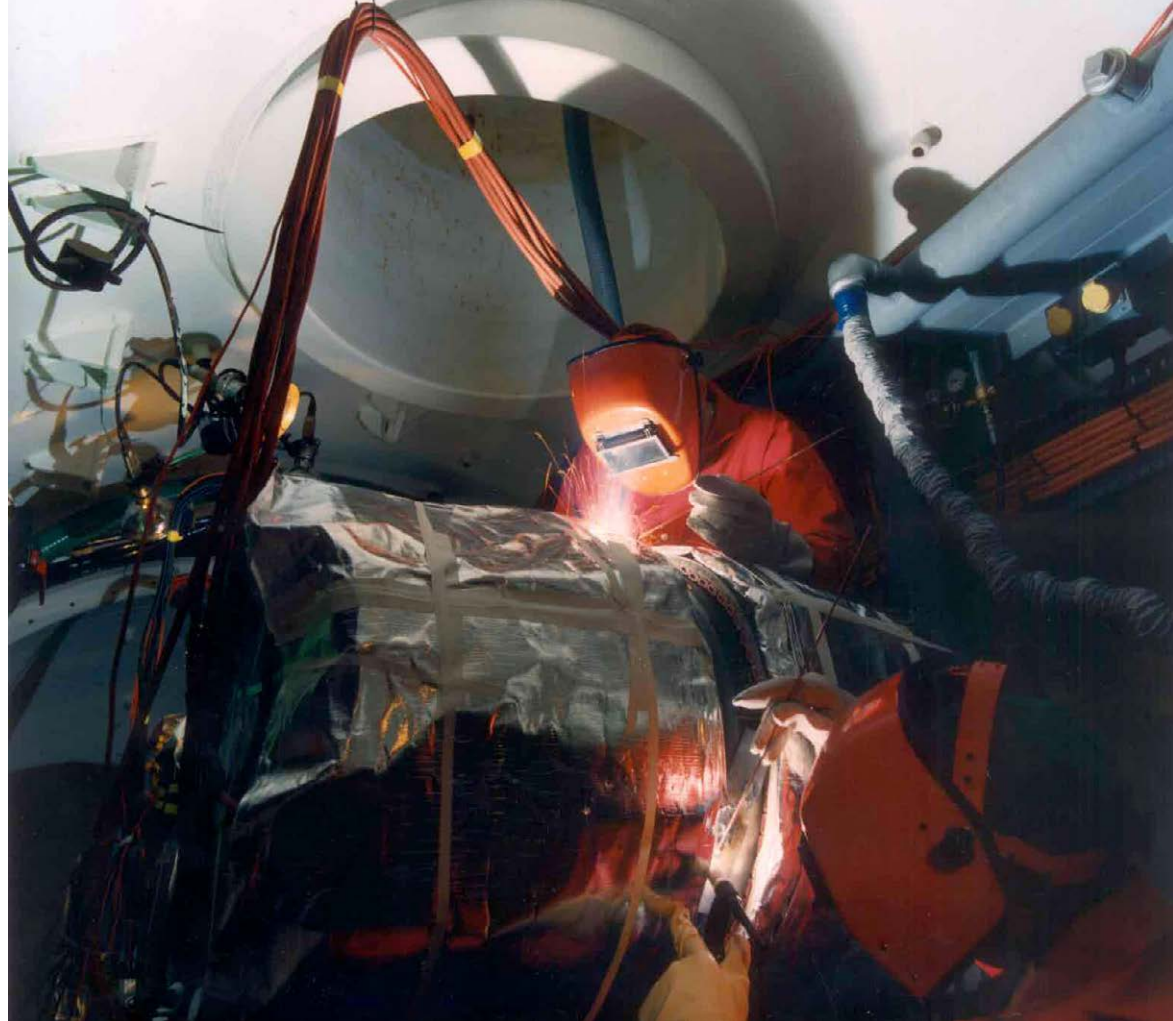
The chamber at the NHC can be used to test robots and mechanical welding systems to a simulated depth of 1000msw in wet or dry hyperbaric conditions. The NHC have completed a number of development projects on subsea welding and robotics developing systems for the repair of underwater pipelines and structures.

## Wet welding

- Complete welding equipment hook up, both inside to wet connectors and outside to welding sets, up to surface control panel
- All diving equipment including hat mounted camera system
- Dual weld control system with individual communications to divers
- Pan and tilt camera and fixed cameras
- Internal handling system to assist test piece preparation

## Habitat welding

- Full surface control/monitoring set up for welding and pre-heat
- Modularised chamber internal welding/control stations
- Internal regeneration and fume extraction
- Internal pipe handling system
- Transfer lock and trolley system to allow removal of test pieces up to 30" diameter
- Fixed pan and tilt camera system, inspection camera
- Fume extraction and hood with fume analysis





# 200bar chamber

This medium equipment chamber has a working pressure of 200bar and is ideal for pressure testing power supplies, cable assemblies, small electrical housings, underwater cameras and lights. One of the features of this chamber is its 6 multi-way penetration ports which allows easy access for monitoring equipment testing.



## Dimensions

270mm internal diameter  
685mm internal length



## Temperature

ambient



## Chamber Services

Gas pressurisation and exhaust  
Gas and water sampling system  
Hydraulic and electrical penetrations  
Full air and mixed gas capability



## Pressure Rating

200bar/2000msw/2900psi  
55,000ft maximum altitude



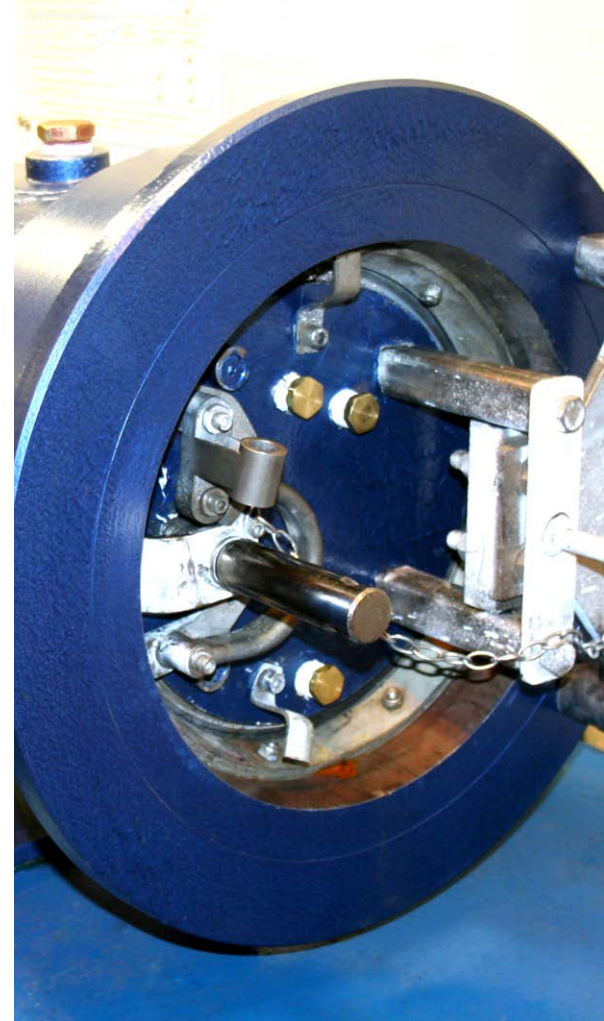
## Operating Medium

Fresh water  
Air or mixed gases



## Access

270mm diameter main entry  
685mm length main entry  
Lid: 3 x 1/2" NPT Pens  
Body: 5 x 1" NPT Pens  
4 x 3/4" NPT Pens  
2 x 1/2" NPT Pens  
2 x 1/4" NPT Pens





## 220bar chamber

National Hyperbaric Centre also has several smaller chambers, including our 220bar chamber, capable of pressure testing to 2200m. With internal access of 860mm wide and 1800mm deep this chamber is ideal for valve, actuator, pump, flow metre and cable assemblies including connections and penetrators.



### Dimensions

860mm internal diameter  
1810mm internal length



### Temperature

0°C to 34°C



### Chamber Services

Gas pressurisation and exhaust  
Gas and water sampling system  
Hydraulic and electrical penetrations  
Full air and mixed gas capability



### Pressure Rating

220bar/2200msw/3190psi  
55,000ft maximum altitude



### Operating Medium

Fresh water  
Air or mixed gases



### Access

860mm diameter main entry  
Lid: 3 x blanked viewports, 2 x 1" NPT  
1 x grey lock (DESTEC clamp)  
Body: 1 x blanked viewport  
1 x blanked viewport w/ 1½"NPT  
1 x Flange w/ ½"NPT  
1 x Flange w/ 1" NPT  
8 x 1" NPT, 2 x 1½" NPT



# 800bar chamber

The National Hyperbaric Centre's deep equipment chamber is again similar to its other chambers but has a much higher pressure rating, down to an impressive 8000m and again is ideal for power supplies, cable assemblies, small electrical housings, underwater cameras and lights in a wet, dry or gas filled environment.



## Dimensions

170mm internal diameter  
800mm internal length



## Temperature

Ambient



## Chamber Services

Gas pressurisation and exhaust  
Gas and water sampling system  
Hydraulic and electrical penetrations  
Full air and mixed gas capability



## Pressure Rating

800bar/8000msw/11600psi  
55,000ft maximum altitude



## Operating Medium

Fresh water  
Air or mixed gases



## Access

170mm diameter main entry  
800mm length main entry





## Test tank

The National Hyperbaric Centre's outdoor water tank provides testing facilities for a wide variety of subsea applications.

With a depth of 8 metres and a diameter of 12 metres, the 900,000 litre steel tank is large enough to accommodate the deployment and operation of work class ROVs, air diving systems and ancillary equipment. In addition, our tank is now complete with a 3 diver capability air diving control system with full diver communications and real-time video display and recording for manned diving operations.

A variety of structural component replicas can be provided to simulate realistic working environments for testing and performance trials.

Around the top of the tank there is an open walkway which is adjoined by a working platform capable of accepting modules such as control cabins and deployment systems.

In-water activity can be monitored via viewports which are situated at ground level around the base of the facility. Alternatively, video can be displayed on monitors within the National Hyperbaric Centre complex.





## Test tank uses

Diving Trials • ROV Trials • Liftbag Courses • Decommissioning Trials  
Nitrogen Leak Testing • Diving Bell Testing • Buoyancy Testing • Subsea Habitat Trials  
Nuclear Decommissioning • System Trials • Underwater Filming • Sonar Acoustic Trials



**Dimensions**  
12m diameter  
8m depth



**Construction**  
Steel



**Services**  
Air diving spread  
Underwater video and lighting  
Local area flood lighting  
Range of test modes  
3 phase and domestic power



**Loading**  
500kg (SWL) equipment  
handling davit/hoist



**Operating Medium**  
Fresh water



**Access**  
6m x 8m platform  
All round walkway  
Viewports at ground level  
Access for large mobile crane



# Altitude testing and trials

Our work chamber is capable of simulating heights of up to 55,000ft for the testing of equipment and manned exposure trials.

Altitude testing and trials are the main method of proving products such as aircraft components and medical equipment can survive and remain functional during extreme environmental changes.

During testing at NHC, all pressures and temperatures are digitally recorded in real-time ensuring accuracy. Results can be presented live, over the internet or printed. In-chamber cameras permit easy monitoring and the capability for video recording is also installed. Equipment can be externally actuated via a penetrator plate carrying video/communication signals and power.

An added feature of NHC chambers is that humidity and ambient temperature levels can be easily controlled.

The NHC has onsite mechanical and electronic engineers to assist clients with job-specific set up of chambers and equipment.



## Past jobs have included

- Fuel Tanks
- Refuelling Equipment
- Aircraft Lighting
- Aircraft Seating
- Aircraft Fire Extinguishers
- Heart Monitoring Equipment
- Defibrillators
- Electronic Recording Equipment
- Battery Casings
- Cameras and Housings





## Manned altitude trials

We also run manned altitude trials in our chambers in which people are taken to simulated heights of up to 3,200 m/10,500 ft in order to carry out tests and trials including the use of medical equipment for people who live in areas of high altitude and the effects of long haul flights.

Our chambers are comfortably furnished; fully fitted with communications, built-in breathing systems (BIBS), toilets, showers, bunks and video monitoring. Trials can be carried out at a variety of temperatures and humidity levels meaning a variety of different environments can be re-created.

The National Hyperbaric Centre's chambers benefit from the ability to be precisely controlled and monitored by our highly trained and experienced technicians.

Athletes, including champion swimmer Hannah Miley, have used our chambers to explore the benefits of hypobaric exposure in relation to naturally enhancing their performance.



## Medical equipment trials for people living in high altitude areas

- Pregnancy Test Kits
- Ovulation Kits
- Blood Glucose Monitoring
- Blood Coagulation
- In Vitro Diagnosis
- Respirators

## Altitude training trials

- Athletes explore the benefits of hypobaric exposure





# Viewport testing and certification

A viewport jig for high pressure testing of acrylic viewports used in saturation diving complexes and submarines is available at the NHC.

The use of acrylic plastic viewports has been standard for many years, however the development of polarised light testing has shown that there are various misconceptions about them. Acrylic viewports which are used under pressure are subjected to an increased rate of yield, giving them a slight permanent deformation and inbuilt stress. It is generally agreed that acrylic viewports should be replaced after 10 years of service.

**Referring to IMCA guidance D047, viewports should be certified before use:**

**“Viewports should be subjected to proof stress testing and relevant certification provided before installation.”**

**“All viewports in a pressure system need to be rated to the design pressure of the system.”**

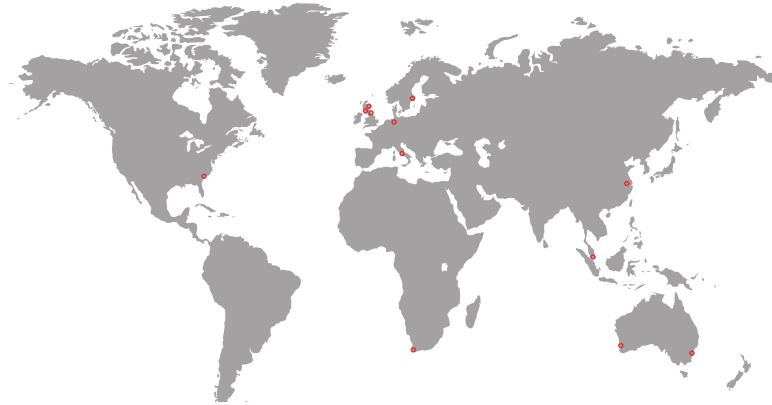
**“Viewports which are not marked or properly documented should not be used.”**

All viewport tests are independently witnessed by a class society. Successfully tested viewports are marked with indelible ink - date of examination.

## NHC viewport testing facility

- Hydro testing of viewports
- Accepts flat or conical acrylic viewports used for diving chambers and submarines
- Designed with an interchangeable core to allow various sizes and shapes of viewport testing
- 150bar/1500msw





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Perth | Portsmouth | Singapore | Stirling | Sydney | Vaxholm | Virginia



[jfdglobal.com](https://www.jfdglobal.com)

[enquiries@jfdglobal.com](mailto:enquiries@jfdglobal.com)