

CONSTANT TEMPERATURE EXPERIMENTAL AQUARIUM LABORATORY CONTAINER SPECIFICATION

Section 1 Container Construction

1.0 General

The container is to be a standard 20' x 8' x 8' 6" high shipping container to ISO specification conforming to American Bureau of Shipping TIR and IMCO approval capable of 9 high stacking and UIC and CSC registration plate.

Container is to have a standard pair of fork lift lifting pockets. The underside of the container is to be fully plated with 3mm thick minimum steel plate, fully welded to container to retain the floor insulation.

The purpose of this container is to provide constant temperature facilities to undertake experiments and science in fixed temperature environments from -5°C to 30°C. The laboratory will be used for holding, experimental and incubation work for marine animals (benthos and plankton).

1.1 Floor

Floor is standard corrugated container floor to allow airflow from refrigeration unit and allow fixing of equipment and tanks to the floor. Floor drainage is required.

1.2 Ceiling

There is no requirement for a modified ceiling, standard ISO container construction will suffice.

1.3 Walls

Heavy duty 316 stainless steel Stauff rails suitable for M10 fixings are to be installed along the inside of both side walls for securing of shelves. The shelf configuration must be flexible (see drawings) and strong enough to support weight of aquarium tanks when full. The bidder shall describe how they will provide insulation properties but still allow for effective and safe fitting of shelves / tanks. The bidder shall describe whether they meet this requirement by having rails at regular intervals with insulation in between or whether they come up with a suitable alternative. Any internal material used for creating insulation would have to be waterproof and sealed. Bidder must ensure that the insulation doesn't affect the airflow.

1.4 Doors

The container will have standard double doors at one end, upon opening a small front area for services will provide electronic control units, communication and alarm (air & water temperature, fire, trapped in), connections to the ship, sockets, hand wash with hot and cold freshwater and hanging cabinets for storage.

1.5 Windows

No windows will be fitted to the container.

1.6 Services

Service entries are to be accommodated in a recess situated at lobby end of the container, to the right-hand side of the door at base level. The recess is to be approx 900mm high and 500mm deep and manufactured from 3mm plate fully welded in, sitting on the top edge of the

container bottom rail. The bottom of the recess is to have a fall of 25mm to the outside of the container to allow for drainage.

The recess is to have a hinged cover plate which can be locked in place prior to shipping.

A 316 stainless steel earthing boss, 25mm diameter x 25mm long, drilled and tapped M12 shall be fully welded in the base of the box.

Service entry recess is to accommodate -

Non toxic sea water supply – ABS hose tail to suit 1 inch bore hose. Seawater inlet should be to rear of container. Option for seawater intake to be directly from ship uncontaminated supply or via external chiller unit, dependent on ambient temperature and experimental requirements.

Fresh water supplies (hot and cold) - 316 stainless steel hose tails to suit ½" bore hose.
Air conditioning plant cooling water and drain connections (316 stainless steel hose tails - size to be determined by supplier).

Sink unit waste discharge – PVC hose tail.

All water connections are to be fully labelled with traffolyte labels.

440V three phase IP67 rated appliance inlet.

10 way socket for fire alarm and communications connection to ship.

Lycab gland assembly size approx. 120 mm x 160 mm for gas pipe/cable entries.

There should be one Lycab gland serving the lobby area for container services and junction box. In addition there should be a Lycab gland in the main area for water hoses etc serving the tanks. This would avoid running hoses into the lobby and then into the main tank section.

1.7 Painting

Container to be finished to the following specification or equivalent:-

Top and sides

Surfaces to be shot blasted to SAE. 2.5
Apply first coat of Temishield EPY 672 HB
Epoxy Micaceous Iron Oxide to 174 microns of dry film thickness.
Apply second coat of Temishield ERV series.
Apply coat white epoxy intermediate coat to 125 microns of dry film thickness.
Apply final coat of white vinyl container paint to 75 microns dry film thickness.
The container must have reflective corners and edges to ensure white container is visible if being stored in Antarctica to allow for snow accumulation.

Underside

Surfaces to be shot blasted to SAE. 2.5
Apply first coat Temishield EPY 672 HB
Epoxy Micaceous Iron Oxide to 175 microns of dry film thickness.
Apply second coat Temishield Coal tar and epoxy to 300 microns.

1.10 Container Markings

Container is to be fully marked in accordance with ISO regulations to include the owners mark "BASU – XXX XXX X" (number to be confirmed). Container is to be fitted with CSC Safety approval plate. A company manages the BAS numbering of containers. Details will be provided when required.

Section 2 Electrical Services

2.0 Design and Installation Standard

The design and installation standard of the electrical services shall conform fully to *BS 7671: Requirements for Electrical Installation and the Regulation and Recommendations for the Electrical and Electronic Equipment of Ships* and *IEE 17th edition*.

The container floor should be considered a wet area and therefore all electrical components and wiring should be installed at high level.

Lighting and power circuits are to be wired in single core silicone rubber cable contained within high impact PVC conduit.

2.1 Electrical Supply

The electrical supply to the container will be 440V 60Hz 63A 3 phase and will be provided by the vessel. Bidder to demonstrate whether this is suitable for the supplied equipment or whether this needs to be increased.

The incoming supply is to be connected to the container via an appliance inlet socket arrangement located in the services compartment. The appliance inlet is to be 4 pin (3P + E), IP67, rated for 440V 60Hz 63A to IEC-EN60309-2

The appliance inlet is to be wired to a 440V/110V isolation transformer suitable for powering all electrical equipment installed in the container and the two ring mains. It is to be mounted in the lobby at high level in a suitable waterproof enclosure.

A distribution panel is to be installed at high level in the lobby. The panel is to be fitted with mains isolator and residual current device to protect all circuits.

The panel is to be fitted with power conditioning unit(s) suitably sized to supply the two ring main circuits (see below).

Double pole miniature circuit breakers are to be provided for the following circuits:-

Lighting circuit.

Two 110V ring main circuits.

Fresh air ventilation fan, bidder to determine if this is required.

Fire alarm panel.

Air conditioning unit

Spare

Section 3 Electrical Installations

3.0 Lighting

The main laboratory is to be lit by corrosion resistant LED light with covers to IP66 or above.

There are three lighting requirements:

1. Red light
2. Low level white light on 12 hour cycle
3. Working light level (500 lux)

Two emergency light units to IP56 or above are to be positioned evenly spaced over walkway. These lights are to have external battery isolation switches fitted.

Entrance lobby area is to be lit by a single corrosion resistant LED light fitting to IP56 or above.

3.1 Ring Mains

All systems in the wet area are to be 110V (50Hz) due to the very nature of the combination of water and electricity is never a good thing.

3.2 Fresh Air Supply Fan

A variable speed ventilation fan and controller are to be installed at the non lobby end of the container (refer to sect. 1.8 – Air intake penetration). The fan should be rated to give a flow rate of 1.2 cubic metres per minute. The fan is to be fitted with a filter to prevent the ingress of dust and an internal PVC grill. A solution must be provided to prevent ingress / seal the vent when not in use but also prevent water ingress whilst in use.

3.3 Fire Alarm / Communications

A suitable junction box with terminal connections to be provided by the allow connection of the container systems to the ship. The junction box to be rated to IP66.

The following items will be wired in:

Two smoke / heat detectors compatible with the ships fire detection system.

Two fire alarm call points.

One alarm sounder.

One loud speaker compatible with the ships P.A. system.

One telephone compatible with the ships telephone system.

3.4 Panic alarm

A panic alarm to be fitted to allow a user to trigger should the need arise. The alarm will have an audible sounder and a visible beacon locally to allow user to recognise it has been triggered. A remote trigger signal will also be transmitted to the ships ACON alarm system.

3.5 LAN Installation

The container will require a Local Area network both for internal use, and to connect the containers to existing ship networks.

Ethernet cabling is to be installed. The specification of the cabling and outlets is to match and be accommodated in the main vessel provision.

Provision must be made in the design for connection to the ship's main LAN via a flying lead (or leads) through a waterproof (IP67) gland.

LAN connections for a camera and / or aquarium data logging / temperature monitoring system.

Section 4 Standards

4.1 Standards

A mix of International and British standards have been used throughout this specification, it should be noted that these do not always fully equate with equivalent European classifications. Should a Contractor utilise an alternative standard they are asked to confirm and justify that the equivalence for the particular material or procedure is either equivalent or superior to the quoted standard.

Section 4 Temperature Control / Environment

4.0 Design Criteria

Required range for a set temperature inside the container to be between -5°C and 25°C.

Normal control range -1/1°C +/- 2K.

Ambient temperatures range from -20°C (saturated) to +35°C (80% RH).

Air infiltration 1.2m³/min

Maximum seawater temperature (cooling water) is 32°C.

4.1 Electrical cable

25m Long hook up cable suitable for connecting to ships supply to be supplied. Cable to be flexible braided style suitable for use on a ships' deck. Fitted IP67 plug / sockets either end.

Section 5 Furniture and Major Fittings

5.0 General

The aquarium container houses 24 x 100 litre aquarium tanks in a configuration of 3 rows of 4 tanks per side of the container. Alternative configurations of 4 x 400 litre in a configuration of 2 x 1 row, or 8 x 200 litre aquarium tanks in a configuration of 2 x 2 row, on each side of the container.

In addition to this there are 2 x 115 litre round tanks for holding animals (krill or pelagic fish).

All tanks are on the same plumbing system. Each tank can be independently isolated through adjusting valves from the pumping system.

There will be a default temperature throughout all 26 tanks thus no requirement for different temperatures in different tanks.

The container must provide a chiller unit for cooling of sea water. Two seawater storage tanks will be provided, one sump tank with 1000 litres capacity, and one holding tank with 700 litres capacity.

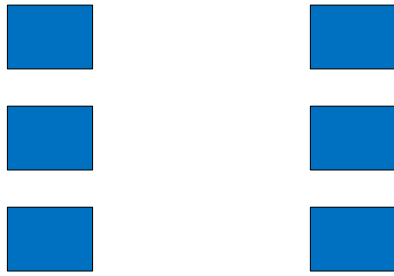
There must be 15-20 cm clearance above the tanks for access.

5.1 Shelving

The aquarium container must be equipped with suitable sea water resistant shelving to allow for large volumes of water / aquarium tanks to fix securely in place. Each shelf must be capable of supporting 4 x 100 litre tanks although three shelves supporting one tank each would also be considered. Ocean seawater is generally regarded at weighing 1.027kg per litre thus a 100 litre tank (containing 100 litre seawater) would weigh 102.7kg.

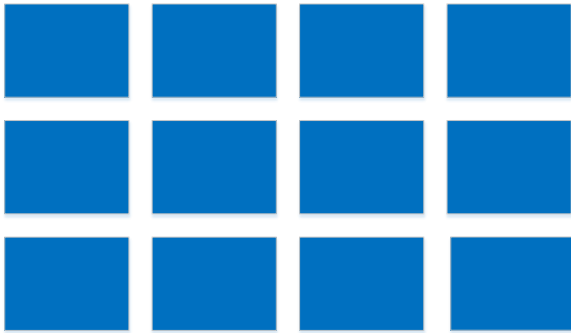
On any given wall there will be 12 tanks thus 1,232.4g of water. Weight of shelving, tanks, plumbing and samples will be in addition to these figures.

5.2 Standard Configuration Layout (side view, looking from front to rear)



Each square represents a 100 litre tank (W 65 cm x D 55 cm x H 30 cm)

5.3 Standard Configuration Layout (view of wall)



Each square represents a 100 litre tank (W 65 cm x D 55 cm x H 30 cm)

5.4 Fire Extinguishers

Two fire extinguishers of type: dry powder - 6.0kg to be located, one at either end of the container.

5.5 Chilling System

An external chiller system is required to pre-chill the seawater to 0°C before entering the container (for Polar research).

Internal temperature control unit required for 700 litre holding tank and 1000 litre sump tank to adjust water temperature to experimental requirements (potential range -3°C to 24°C). The two tanks will be maintained at the same temperature.

5.6 Aquaria

Each of the 24 tanks will have a capacity of 100 litres and will be rectangular in shape (W 65 cm x D 55 cm x H 30 cm). Tanks will have removable lids which can be locked securely in place.

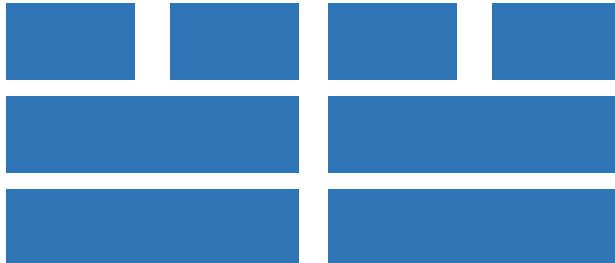
Alternative configurations (or combination of):

1. Four 400 litre tanks (W 130 cm x D 55 cm x H 60 cm) with eight 100 litre tanks (top shelf) for requirements of larger specimens.





2. Eight 200 litre tanks (W 130 cm x D 55cm x H 30cm) with eight 100 litre tanks (top shelf).



There will be 2 circular tanks with approximately 77 cm diameter and a capacity of 115 litres on one side (one above other).

5.7 Pump System

The sump tank will be filled from the holding tank (following water change). Waste water outlet from both sump and holding tanks. The system shall be designed as a closed system so that the system pumps water from the sump tank into the tanks and recirculates to the sump tank.

The system needs to be designed to constantly pump temperature controlled seawater around all 26 tanks taking the feed from the 1000 litre sump tank. Two separate distribution loops in the tank, one feeding the 12 tanks rectangular tanks and two circular tanks on one side and then the other distribution loop feeding the 12 rectangular tanks from the other side.

It must be possible to isolate each of the 24 tanks for individual water manipulation.

A minimum flow rate of 12 litres per minute is required.

Both holding tank and sump tank must be connected to a biological filtration system.

Section 6 Documentation

6.0 Manuals

Five copies of a detailed operation and maintenance manual are to be supplied along with a PDF copy with the container. This is to include full manufacturer's information on the pumps, air conditioning unit, door furniture, full manufacture drawings and spares listings.

6.1 Certification

Certification is to include: Container CSC, paint finish, electrical tests and commissioning tests.

Section 7 Standards

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