

## “Design of MODUs for harsh environment operation”

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### Abstract

The overall purpose of winterization is to ensure that MODUs can operate safely and efficiently in cold climate by providing satisfactory protection from freezing, build-up of snow and ice and protection from wind chill.

The extent of winterization measures will depend on intended operation areas and Owner’s winterization philosophy. MODU’s can relatively easily be winterized for operation in areas with open sea (“sub-arctic” areas). Operation in ice infested waters (arctic areas) will require additional winterization measures due to the presence of solid ice as well as lower air and water temperatures.

Winterization will normally include measures related to design as well as operation within the following categories: Material selection, anti-icing / anti-freezing measures (enclosure, heat-tracing, insulation, anti-freeze fluid, continuous flow piping, vibration /pneumatic panels, etc.), de-icing measures (steam / hot water, manual removal with shovel, etc.) and wind chill shielding (wind walls / enclosure).

Measures related to design for MODU’s planning operations in open waters in northern areas (i.e. Barents Sea up to Bjørnøya) normally include:

- Weather shielding and or enclosure of following areas to ensure protection from wind chill: Life boat stations, muster stations, BOP-and X-mas tree handling areas, drill floor including derrick, anchor winches, hose loading stations and potential additional areas resulting from wind chill study
- Anti-icing measures of following equipment/systems to ensure protection from freezing and/or ice/snow build up: Primary escape / evacuation routes, helicopter deck, air intakes and vents in exposed areas, drain systems in outdoor areas, pipe lines in outdoor and unheated indoor areas (e.g. fire line), water tanks in exposed areas (e.g. ballast tanks in columns), navigation equipment

For MODUS planning operations in ice-infested waters additional winterization measure will be required, e.g. hull strengthening.

Design of MODUs for operation in northern areas including sub-arctic as well as arctic areas, provides several challenges of which most challenges are relatively easily resolvable.

However, one task is still very challenging, i.e. enclosure of working areas which is preferred solution from a working environment point of view but not from a safety point of view.

Enclosure leads to confinement of hazardous gases in case of leaks which in turn leads to higher explosion risk as well as higher explosion / radiation loads in case of fire / explosion.

Enclosure / weather shielding may also result in reduced degree of line of sight in connection with crane operations which has a negative impact on safety.

In order to ease design / upgrade MODUs for operation in northern areas the following should be carried out:

1. Establish guidelines for optimal design balancing working environment as well as safety aspects if design with enclosure of working areas ( including derrick)
2. Align the requirements in NORSOK S-002 regarding “outdoor operations” to international (ISO 15743:2008) and/or US/Canadian standards.

3. Establish standard met-ocean data (including ice conditions) for the various areas in Barents Sea
4. Establish guidelines for evacuation and rescue in northern areas

Furthermore, in order to ensure safe and efficient operations of MODUs in northern areas the following should be arranged:

1. Improved facilities for communication and navigation at high latitudes (north of 75 deg. N), especially with respect to capacity. This will require deployment of new satellites covering the arctic areas.
2. Improved facilities for supply and logistics. The long distance to supply bases at mainland may represent a challenge with respect to crew change, oil pollution preparedness, etc. One solution may be to install a “logistics platform” between mainland and the “far north areas” with facilities for helicopters, fueling, hangar, emergency preparedness, oil pollution, etc.