The International Marine Contractors Association

Norway/UK Regulatory Guidance for Offshore Diving

(NURGOD)

www.imca-int.com

IMCA D 034
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The International Marine Contractors Association (IMCA) is the international trade association representing offshore, marine and underwater engineering companies.

IMCA promotes improvements in quality, health, safety, environmental and technical standards through the publication of information notes, codes of practice and by other appropriate means.

Members are self-regulating through the adoption of IMCA guidelines as appropriate. They commit to act as responsible members by following relevant guidelines and being willing to be audited against compliance with them by their clients.

There are two core activities that relate to all members:

- Safety, Environment & Legislation
- Training, Certification & Personnel Competence

The Association is organised through four distinct divisions, each covering a specific area of members' interests: Diving, Marine, Offshore Survey, Remote Systems & ROV.

There are also four regional sections which facilitate work on issues affecting members in their local geographic area – Americas Deepwater, Asia-Pacific, Europe & Africa and Middle East & India.

IMCA D 034

The Norway/UK Regulatory Guidance for Offshore Diving (NURGOD) has been developed jointly by IMCA, under the direction of its Diving Division Management Committee, and OLF (Oljeindustriens Landsforening – The Norwegian Oil Industry Association).

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1 Introduction and Scope

1.1 General

The offshore commercial diving industry, while providing services to the oil and gas industry, can be the subject of various regulations and standards imposed by national governments of a particular area, the clients who wish the work carried out, the insurers of the diving contractor or other outside bodies.

The document is intended to assist the following, among others:

- Personnel involved in diving operations;
- Client's staff involved in the preparation of bid documents and contracts;
- Client and diving contractor representatives;
- Vessel owners and marine crews involved with diving operations;
- All personnel involved in operational management.

In order to provide a common approach for diving contractors, this guidance seeks to lay down minimum requirements which all IMCA members should follow when transferring diving support vessel (DSVs) between the UK and Norwegian regions and vice versa.

1.2 Background

United Kingdom and Norway each have their own set of legislation and guidance to which the respective diving contractors in the offshore oil industry have to abide. This bridging document has been developed to provide standardisation of procedures and approaches for managing the regulatory differences between the two nations. This should ease the operational process for offshore diving across the North Sea.

When crews and equipment from either UK or Norway are to operate in each others waters, it is necessary that the operation is carried out in accordance with the national laws of the respective offshore sector. That is, if a vessel crosses from UK to Norwegian waters it needs to satisfy Norwegian regulations in order to operate in the Norwegian sector. Likewise, if Norwegian crews or equipment cross from Norwegian to UK waters it is necessary that they operate according to UK regulations while in the UK sector.

1.3 Objectives

The main objective of this guidance document is to facilitate the use of diving vessels and resources between the two jurisdictions (UK and Norway); and add safety and efficiency to offshore diving operations by developing a common approach via the use of this document. The document is based on the assumption that the body of laws in the two countries is compatible in this context.

However, where differences have been identified the guidance highlights those differences. The process for revision of legislation is outwith the scope of this guidance.

1.4 Assumptions

It is presupposed that UK operators and diving contractors satisfy the UK laws and regulations for offshore diving operations. In the same manner, it is presumed that Norwegian operators and diving contractors satisfy the Norwegian body of laws.

The preparation of this guidance has been conducted jointly by the industries in UK and Norway whereby OLF (Oljeindustriens Landsforening - The Norwegian Oil Industry Association) and IMCA (International Marine Contractors Association) represent their respective members from these industries.

Where the guidance does not refer to a specific sector it should be read as being good practice for both sectors.

1.5 Methodology

This document has been developed by IMCA members and reviewed by interested parties including OLF, the Norwegian Petroleum Directorate (NPD) and the UK Health & Safety Executive (HSE).

The basis for the content of the document is a gap analysis which has been undertaken to review and document the differences between the UK and Norwegian sector legislation and regulations. This gap analysis is available upon request from IMCA.

1.6 Status of the Guidance

This guidance offers examples of good practice in the management of the transfer of diving operations between the above named sectors.

1.7 Updating Arrangements

This guidance is a dynamic document and the advice given in it will change with developments in the industry. It is intended that this guidance will be periodically reviewed and any necessary changes or improvements made.

Any person with suggested improvements is invited to forward these, in writing, to IMCA.

2 Normative References

A number of acts, regulations, guidelines and standards are referenced or have been used in the production of this document. In addition, the following listing contains documentation which can be used for further guidance and information on the requirements of each sector. Industry standards and guidelines are included:

Norway

1 Regulations relating to Health, Safety & the Environment in the Petroleum Activities, 1 Jan 2002, issued by the Norwegian Petroleum Directorate (NPD), the Norwegian Pollution Control Authority (SFT) and the Norwegian Board of Health (NBH), commonly known as *"The Framework Regulations"*

2 NORSOK Standard U100 – *Manned Underwater Operations*

3 NORSOK Standard U101 – *Diving Respiratory Equipment*

4 NORSOK Standard J103 – *Marine Operations*

UK

1 Health and Safety at Work etc. Act 1974 (*HSWA*)

2 Diving at Work Regulations 1997, SI No.2776 known as *"DWR 97"*

3 Approved Code of Practice (ACoP) L103, *Commercial Diving Projects Offshore* relating to DWR 97

4 Diving Information Sheets (DVISs) – issued by the UK HSE

IMCA *(incorporating DPVOA & AODC)*

A full list of current IMCA guidance documents is available on the IMCA website – www.imca-int.com

Diving Medical Advisory Committee (DMAC)

A full list of current DMAC guidance notes is available on the DMAC website – www.dmac-diving.org – or on the IMCA website.

European Diving Technology Committee (EDTC)

A full list of EDTC documents is available from the EDTC website – www.edtc.org

International Maritime Organization (IMO)

A468 *Code on Noise Levels on Board Ships*

A343 *Recommendations on Methods for Measuring Noise Levels*

3 Administrative Requirements

3.1 Organisation

Both sectors require that the companies have a system which ensures that the planning and performance of the projects are carried out in a safe manner.

The NORSOK U100 requirement is more specific to that:

> *The contractor's organisation shall include administrative functions responsible for areas that ensure a safe and efficient operation. As a minimum, these functions are: manned underwater operations; safety, health and environment; emergency preparedness; quality; personnel; and management of diving equipment including, if relevant, the work-site.*

Guidance:

Verify that the management system and personnel requirements are in accordance with both sector requirements.

3.2 Administrative Requirements

Both sectors require a system to make sure that the personnel working for the diving contractor fulfil the regulations in the country in question

In Norway the responsibility remains with the operator. In the UK, the main responsibility rests with the diving contractor. However, DWR 97 Regulation 4 places a duty to ensure compliance with these regulations. It further places responsibility on other persons that are not members of the dive team, but may affect the safety of the dive team such as the client, the principle contractor, OIM, client's representative, master and diving superintendent to ensure that the DWR regulations are complied with.

Guidance:

Establish a system which is able to fulfil this requirement for both country's legislation

3.3 Management of Exceptions

A diving contractor should have within its management system a method of obtaining an exemption from the relevant authority.

Guidance:

Norway: Any application for an exemption/deviation against a regulatory requirement has to go via the operator for further handling.

UK: The diving contractor may apply directly to HSE.

3.4 Application for Consent to Dive

The operator in Norway needs to obtain consent to dive from NPD before a manned underwater operation can start, whereas this is not required in UK. However, the diving contractor needs to be registered with the HSE in the UK.

Guidance:

Norway: The operator in Norway is responsible for the application for the consent to dive, whereas there is no requirement in the UK for an application for consent to dive. It is recommended that for Norwegian diving operations the diving contractor obtains a copy of the consent to dive from the operator.

3.5 Documentation

Both sectors require that comprehensive documentation is prepared and utilised on the work site and relevant to the work scope which is being performed.

In most aspects the requirements are identical and include:

- normal and emergency operating procedures for the equipment;
- checklists and similar verification documents to ensure that the equipment has been inspected and is fit for purpose (such as IMCA D 023 and D 024 "*DESIGN – Diving Equipment Systems Inspection Guidance Note*" documents);
- risk analysis and assessment reports relating to the operation of the equipment and the work tasks being undertaken;
- equipment maintenance system and reports;
- equipment certification documentation;
- bridging documentation between the diving contractor's management systems and the operator's systems, specific to the work site and work scope to be undertaken.

Variations in documentation include the following:

3.5.1 ISO 9000

The Norwegian legislation requires that the quality system should be based on ISO 9000 system; this is not defined in the UK requirements.

Guidance:

Management systems and quality assurance should be implemented in accordance with ref. 2.1 (ISO 9000 series Quality Systems Model for quality assurance in design, development, production, installation and servicing).

The diving contractor should establish a checklist for the management system to ensure that the documentation required in Table 1 in NORSOK U 100 section 4.5 is in place prior to commencing manned underwater operations in Norwegian waters.

3.5.2 Risk Assessment

Both sectors have a requirement for risk assessment and the detailed requirements are laid down in a number of different places within each of the sectors regulations.

Guidance:

Diving contractors need to have a system which ensures that regulatory requirements for risk assessment and contingency requirements are fulfilled in both sectors.

3.5.3 Job Descriptions

In the Norwegian sector it is a requirement that detailed job descriptions are in place for **all** personnel categories involved in manned underwater operations (MUO) (ref. NORSOK U100 section 4.2). In the UK sector this is not a specific requirement.

Guidance:

Job descriptions for** all **categories of personnel involved in MUO should be put in place at the work site.

3.5.4 Diving Tables

Norwegian Sector: When performing diving operations within the Norwegian sector, the diving contractor has to ensure that diving and decompression procedures comply with the following requirements:

Saturation diving

NPD Report OD-91-12 *Report regarding comparison of saturation diving tables and frame conditions for standardisation* (ref. NORSOK U100 2.23)

Surface oriented diving

Norwegian Diving and Treatment Tables, ISBN: 82-992411-0-3 (ref. NORSOK U100 2.24)

UK Sector:

Saturation diving

In UK waters, diving contractors use in-house diving and decompression procedures.

Surface oriented diving

Maximum bottom times should be in accordance with HSE Diving Information Sheet No. 5 – *Exposure limits for air diving operations* (ref. ACoP L103 paragraph 44).

Guidance:

The diving contractor should have a management system that caters for the differing sector requirements.

3.5.5 Compliance Measurement

Prior to performing diving operations in Norway it is required that an in-date compliance measurement with regards to the NORSOK U100 standard and relevant regulatory requirement should be available and any non-compliances forwarded to the operator for acceptance (ref. NORSOK U100 section 4.3).

Such a comprehensive compliance measurement is not specifically required in the UK sector. However, the diving contractor has the responsibility to ensure compliance with relevant regulatory requirements.

Guidance:

Compliance measurement documentation with regards to the NORSOK U100 standard and relevant regulatory requirement should be put in place and maintained up-to-date. Any non compliance in accordance with requirements needs to be forwarded to the operator in Norwegian sector.

Similar documentation should be put in place to verify compliance with the UK ACoP.

3.5.6 Divers' Certificates

In the UK sector it is a requirement under the ACoP that the divers have their original certificate in their possession at the work site. The Norwegian requirements do not specify that the original certificate is held at the work site.

Guidance:

Divers in both sectors should always ensure that they have their original certification with them at the work site.

3.5.7 Document Retention

In the 2002 NPD Information Regulations, section 4, a requirement has been imposed to retain the 'operation log' relating to manned underwater operations (MUO) for a period of 40 years. The UK ACoP requires that the diving operations record be retained for 2 years.

If a vessel moves between the sectors the "operation log" should be maintained for **both** sectors as the information therein may be considered relevant at some point in the future when considering the long term health effects on divers in saturation.

Guidance:

The contents of Norwegian 'operations log' have not been defined. It is recommended that, as a minimum, the diving contractor records the particulars to be included in the diving operation record (ref. Annex 1 of UK ACoP). For work in the Norwegian sector, the operations log should be retained for 40 years, in order to comply with the requirements of the NPD Information regulations section 4. For work in the UK sector, consideration should be given to the retention of diving operation record for a period of 40 years.

3.6 Reporting

In both sectors the diving contractor is required to submit detailed reporting to the operator and regulatory authorities for all manned underwater operations (MUO). Such reporting should include:

- Daily operations reports;
- Accident/incident reports.

The following describes differences in reporting requirements between the sectors:

3.6.1 Monthly/Quarterly Activity Reports

In Norway it is a requirement that a monthly activity report is submitted by the contractor to the operator (ref. NORSOK U100 section 4.6.2.3). The content of this report puts a high emphasis on health and medical aspects of the previous month's operations. The medical aspects should be reviewed by the working environment committee at the work site. If a vessel has transferred between sectors the monthly report is required to report **all** pertinent activities, specifying abnormalities, technical and operational problems of relevance to the health or safety of the personnel, and detailing corrective actions taken, whether the activities have been performed whilst working in one or both sectors, or for multiple operators.

Quarterly activity reporting of manned underwater operations (MUO) – the diving contractor is required to report to the operator the MUO activities during each quarter of a year, ten days after the quarter ends in accordance to form issued by NPD.

Guidance:

The diving contractor should prepare and submit monthly activity reports at the end of each calendar month to all operators for whom work has been performed in that month, containing the information requested in NORSOK U100 section 4.6.2.3

3.6.2 Annual/Final Experience Reports

NORSOK U100 section 4.6.2.4 requires that an annual or final report be prepared and submitted to the operator within three weeks of the demobilisation or at the end of a seasonal campaign. The content of this report may have additional requirements over and above the normal operator's requirements in the UK sector, particularly in the medical and health related aspects.

Guidance:

The diving contractor should develop and implement standardised end-of-job reporting format which meets the requirements of both operators/contractors as well as the requirements set out in the NORSOK U100 standard.

3.6.3 Accident/Near Accident/Incident Notification and Reporting

In both sectors the diving contractor is required to undertake and submit accident and incident reports with subsequent investigation and close-out reporting. In Norway the operator is responsible for reporting to NPD. In the UK, where this is related to a diving project the diving contractor is responsible for reporting to the HSE. The major difference between the reporting requirements of the two sectors is that in the Norwegian sector an

ear infection is a reportable occupational illness, whereas in the UK sector such infections are not reportable from the diving contractor to operator/regulatory bodies.

Guidance:

A standardised reporting format and content should be utilised in both sectors, including reporting of ear infections as medical 'events'.

The investigation of accidents, near accident or incident needs to be in accordance with each sector's requirements and the diving contractor should have this requirement in its management system.

3.7 Diving Contractor's Contingency Centre

NORSOK U100 states:

> *While in operation, the contractor shall maintain, in immediate readiness, a contingency room with adequate communication facilities, all relevant documentation and other necessary facilities for the contingency team.*

This is not specifically required in UK, though DWR 97 regulations 6 and 8 include a general statement that diving contractor should evaluate the the need for contingency systems.

Guidance:

The diving contractor should maintain such a contingency centre valid for both sectors.

4 Health, Working Environment and Safety

4.1 Health Organisation

The Diving Contractor is required to establish and maintain a Health Organisation to support his operations in both Sectors.

4.2 Medical Equipment

In both sectors suitable medical equipment shall be provided at the work site. A description of such medical equipment and facilities is set out in DMAC 015 - *Medical Equipment to be held at the Site of an OFFSHORE Diving Operation* and DMAC 028 – *The Provision of Emergency Medical Care for Divers in Saturation*.

4.3 Suitable Doctors

The physiology of diving and the problems encountered by an ill or injured diver are not subjects which most doctors understand in detail. For this reason it is necessary that any doctor who is involved in any way with examining divers or giving medical advice in relation to divers has sufficient knowledge and experience to do so.

The medical examiner of divers who certifies their fitness to dive needs to have an understanding of the working environment of the diver, which is normally gained by undertaking an appropriate training course. Such a doctor however may be unable to give the necessary advice in relation to treatment of decompression sickness or other diving related injury.

Some doctors, as a result of training and/or experience have the necessary knowledge to advise on suitable treatment of diving related injury. They are usually described as diving medical physicians.

A consultant in diving medicine should be competent to manage the medical and physiological aspects of complex diving activities. Such a doctor should have sufficient experience and training to advise the diving contractor concerning diving medicine issues.

In each sector these doctors need be registered and approved by the relevant authorities. As such, it is required that UK approved practitioners are utilised when working in the UK sector and Norwegian approved practitioners when working in the Norwegian sector.

The Joint Medical Sub-committee of the European Committee of Hyperbaric Medicine (ECHM) and the European Diving Technology Committee (EDTC) has prepared '*Training Standards for Diving and Hyperbaric Medicine*' which cover competences for a number of different job functions in diving and hyperbaric medicine including the medical examiner of divers, the diving medicine physician and the consultant in diving medicine.

4.4 Medical Checks

All divers at work need have a valid certificate of medical fitness to dive issued by a suitable doctor. The certificate of medical fitness to dive need be renewed prior to expiry if a diver wishes to continue diving at work. If the examination is carried out during the last thirty days of the validity of the preceding medical then the start date of the new certificate will be the expiry date of the old certificate.

The certificate of medical fitness to dive is a statement of the diver's fitness to perform work under water, and is valid for as long as the doctor certifies, up to a maximum of twelve months.

Guidance:

The diving contractor should check the diving medical certificates as restricted diving medicals may be issued, restricting the maximum depth for the diver in question.

Pre-dive medical checks are required for saturation exposure in both sectors. In Norway there is a further requirement for a post-dive medical check for saturation exposure and for pre- and post-dive medical checks for air diving exposure.

A nurse is required to perform medical checks for pre- and post- diving exposure in the Norwegian sector or on divers who commenced exposure in the Norwegian sector and who subsequently transferred to the UK sector.

4.5 Liaison with a Suitable Doctor

For manned underwater operations in Norwegian waters the diving contractor needs to have an arrangement with a suitably qualified doctor who has the medical responsibility (the consultant in diving medicine). In addition to this the diving contractor shall have a duty doctor arrangement with suitably qualified medical practitioners (diving medicine physicians).

Guidance:

The diving contractor should ensure that the consultant in diving medicine fulfils the requirements stated in NORSOK U100 5.1.2.2 – Medical Responsibility – and that the diving medicine physicians that are under the duty doctor arrangement fulfils the requirements in NORSOK U100 5.1.2.4 – Duty doctor arrangement and qualifications.

4.6 Nurse

A nurse is required to be present on the work site/DSV when manned underwater operations are being performed in Norwegian waters.

NPD Activities Regulations Section 6 states: *"On a facility, there shall be maintained at all times, a sufficient number of nurses to ensure the adequate performance of the health service".*

Guidance:

The diving contractor should ensure that a nurse with the required experience and training is present on the work site/DSV when performing manned underwater operations in Norwegian waters.

4.7 Safety Delegates

In Norway it is a requirement that safety delegates are elected by the work force on the work site/ DSV. Such elected safety delegates are required to have undertaken safety delegate training (Arbeidsmiljø kurs).

Guidance

The names of the safety delegates that are present at the work site/on board the vessel should be displayed on a notice board. This information should also be given to personnel during their work site induction/project familiarisation.

4.8 Working Environment Committee

In the Norwegian sector a particular emphasis is put on the formation of a working environment committee.

Members of the working environment committee include members of the onboard management team and members elected by the work force. Members of the working environment committee are required to have undertaken safety delegate training (Arbeidsmiljø kurs).

Whilst there is no direct equivalent within UK legislation, the vessel's flag state will normally require that a safety committee is established onboard and meets regularly. This committee should comprise members of the onboard management team as well as representatives of the onboard departments, and serves a similar function to the working environment committee.

Guidance:

The roles of the onboard safety committee and the working environment committee should be merged into one committee covering both functions, and this committee should be in place and operational at all times as required under the Norwegian Working Environment Act. This

will allow the committee to serve its required functions in either sector. it should also ensure that members of the committee undergo the required safety delegate training in advance of the vessel transferring into the Norwegian sector (as the members should be given such training whenever they are voted or appointed onto the committee).

5 Personnel Qualification Requirements

5.1 Familiarisation Process

In both sectors there are specific requirements in place to ensure that personnel are familiarised with the diving equipment and relevant operating and emergency procedures (NORSOK U100 section 6.2 and ACoP paragraphs 84/85). A well documented familiarisation programme should fulfil the requirements for either sector.

However, in the Norwegian sector there are additional familiarisation requirements for the marine crew where key marine crew members also need to be put through an in-house familiarisation programme covering diving operations.

Guidance:

Marine crew members in critical positions (such as Captain, DP Operators, Chief Engineer, Electrician and Crane Operator) should be familiarised with diving operations.

5.2 Training and Competence

Whilst both sectors specify certain standards for the qualification and competence levels for members of the dive team, there are certain additional requirements which differ between the sectors. IMCA has, through its members, implemented a competency scheme which will ensure that personnel involved in diving operations/manned underwater operations (MUO) are competent to perform their assigned duties.

Variations which have to be considered are:

5.2.1 Safety Delegate Training

In Norway safety delegates are required to have undertaken safety delegate training (Arbeidsmiljø kurs). Such safety delegate training should also be undertaken by designated Supervisory personnel who have positions of responsibility during the operation, including but not limited to:

- Vessel master
- Offshore manager/diving superintendent
- Diving supervisors
- Life support supervisors
- Chief engineer
- Chief officer/night master
- Catering manager
- Elected safety delegates

5.2.2 Diving Superintendent

Under the NORSOK U100 standard, section 6.3.1, specific requirements are set out for the diving superintendent which include requirements over and above those specified in the ACoP; namely that the diving superintendent needs to:

- Have a minimum of two years technical or administrative education, or similar level of career development
- Have completed an introductory DP course – this can be undertaken onboard the vessel using an in-house course.

Guidance:

Diving superintendents who may work in both sectors should be qualified as required by NORSOK U100 section 6.3.1

5.2.3 Diving Supervisor

Under the NORSOK U100 standard, section 6.3.2, specific requirements are set out for the diving supervisor which include requirements over and above those specified in the ACoP; namely that the diving supervisor needs to:

- Have completed an introductory DP course (if the vessel operates from DP) – this can be undertaken onboard the vessel using an in house course.
- Have completed an advanced first aid course (diver medic). There is no specific requirement for refresher training.

Guidance:

Diving supervisors who may work in both sectors should be qualified as required by NORSOK U100 section 6.3.2

5.2.4 Divers

In both sectors divers need to hold an approved diving qualification suitable for the work they will be undertaking. In the UK HSE has a list of approved qualifications which is available on their website. NPD accepts the qualifications included on the HSE list apart form the HSE Surface Supplied (with offshore top-up) certificate.

NORSOK U100 sets out training that divers need to cover which includes diving with self contained underwater breathing apparatus (SCUBA). When HSE revised its training requirements in 1998, it removed the requirement for training in the use of SCUBA for the surface supplied diver training. However in practice UK schools have continued to provide SCUBA training to their students on commercial air diving courses.

Guidance:

When working in Norway divers certification should be checked to ensure that SCUBA training has been covered as part of the surface supplied diver training course.

5.2.5 Divers in Saturation

The principal difference between the sectors is in the requirements for advanced first aid (diver medic) training.

In Norway it is specified that 80% of the divers in saturation should have such training, with a minimum of two divers at each level of saturation being qualified (NORSOK U100 section 6.3.5)

In the UK it is required that at least one person in the dive team, other than the diver in the water, should be qualified to a diver medic standard (ACoP paragraph 120). However the UK ACoP also requires that divers holding this qualification complete a refresher training course every three years.

These differences mean that there could be differing numbers or percentages of suitably qualified divers in saturation between sectors

Guidance:

It is recommended that all divers in saturation complete an advanced first aid (diver medic) course and hold an in-date advanced first aid (diver medic) certificate.

5.2.6 Life Support Supervisor and Life Support Technician

Under NORSOK U100 there is a specific requirement that life support supervisors (LSSs) and life support technicians (LSTs) need to have completed an advanced first aid (diver medic) course. However there is no requirement for refresher training.

Guidance:

LSSs and LSTs who may work in both sectors should be qualified as required by NORSOK U100 section 6.

5.2.7 All Personnel

All personnel who work offshore as their main area of employment are required to hold appropriate Offshore Survival certificate and Offshore Medical. There are, however, differences in the required courses or examinations between the two Sectors.

Guidance:

All diving and project personnel should hold appropriate combined UK/Norway offshore survival certificates and appropriate medical certificates.

5.2.8 Periods of Stay

The 2002 NPD Framework Regulations section 52 set out durations for periods of stay onboard the vessel (guidance on saturation period is covered in section 7 of this document) in Norwegian Sector. The regulations stipulate a 14 day duration with a seven day extension permissible after consultation with the employee's representative. Further extensions can be agreed by the NPD via the operator. Marine crew members are exempt from these guidelines.

This can be a particular issue when a vessel is transferring from the UK sector to the Norwegian sector as the personnel onboard may have already exceeded the 21 days period, as there is no similar ruling in the UK sector. Such personnel may be on regular 28 days on/ 28 days off rota for example in which case their qualified and competent relief may not be available for a further period of time.

Guidance:

When a vessel moves from UK to Norway the maximum number of days allowed onboard is 14 days plus extension as agreed onboard of up to 21 days and the time starts from entering the Norwegian sector, but if personnel have been onboard for example 21 of their 28 days in the UK sector then the maximum stay onboard is up to a further 7 days.

6 Technical Requirements

6.1 Diving Equipment - General

The dive system installed on a DSV or other 'diving platform' is required to be manufactured, installed, tested and maintained to acceptable standards. These are normally achieved by a variety of means including class society survey during manufacture and operation; self audit and third party audits against industry guidelines such as the IMCA D 023 and D 024 *'DESIGN'* documents; compliance verification documentation, etc.

There are, however, certain technical requirements set out in NORSOK U100 that differ from the class requirements and IMCA (industry) guidance. The UK ACoP generally offers limited guidance in the technical aspects as it relies on industry guidance and class requirements to detail such requirements.

A compliance verification report will ensure that a dive system and diving equipment will comply or will highlight non-compliance areas. The following gives some detail of these differences:

6.1.1 Physical Work Environment

NORSOK U100 section 5.2.2 sets out the requirements for control of the physical work environment for divers in the chambers, bell, in water etc. These requirements cover aspects such as temperature (thermal control and balance); humidity; lighting; noise; radiation, and gives detailed requirements for each aspect which shall be met.

Guidance:

An evaluation and upgrade as required should be performed of the equipment for thermal balance during normal operations for divers in water, chambers, bells, monobaric craft and/or habitats

An acceptable means of humidity control to maintain humidity levels between 40% and 60% relative humidity should be verified.

Lighting levels within chambers and bells should be reviewed, documented and upgrade if required, and this should include the facility to adjust the light to a comfortable level

The noise levels within the diving area (outer and inner areas) in operational conditions should be measured and documented and should be rectified if outwith the limits set out in NORSOK U100.

6.1.2 Ergonomic Design

Section 19 of the NPD Facilities Regulations sets out the required standard in Norway for the ergonomic design of work areas and work equipment. The UK Sector does not specify a requirement for ergonomic design assessments to be performed.

Guidance:

Documentation/records should be in place to verify that ergonomic assessments of the work place and work equipment have been undertaken, relating both to the support vessel and the diving equipment.

6.1.3 Chemical Work Environment

NORSOK U100 section 5.2.3 sets out the requirements for control of the chemical work environment for divers in the chambers, bell, in water etc. These requirements include:

- a documented system to ensure that all materials used in chambers, bells or breathing systems etc do not produce harmful gases or vapours;
- requirements for analysis of the breathing gas in relevant systems on a periodic basis
- information on limits for gas composition in breathing systems

Guidance:

A documented review of materials used in chambers, bells or breathing systems should be undertaken.

A regular analysis of breathing gas within the hyperbaric chambers, bells and breathing systems should be undertaken and documented. The analysis should cover all the parameters specified in NORSOK U100 standard.

The exposure levels for CO_2 in the diving contractor's diving manuals should comply with levels set out in the NORSOK standard.

CO exposure levels should be kept to the lowest possible levels and that the diving contractor's diving/health manuals should include advice on the symptoms and first aid treatment procedures for CO poisoning.

6.1.4 Chamber Dimensions

NORSOK U100 section 7.2.2 specifies that chamber height should be no less than 200 cm over the deck plates (measured in the middle of the chamber) and the inner volume should be at least 4m^3 per person (usable space which may be distributed between living, sleeping and TUP compartments)

Guidance:

The chamber dimensions should comply with NORSOK requirements.

6.1.5 Chamber Bunks

NORSOK U100 section 7.2.2 specifies that chamber bunks need to have a minimum dimension of 200 cm x 70 cm

Guidance:

Bunks within chambers should comply with the required NORSOK dimensions.

6.1.6 Chamber Gas Supplies

In NORSOK U100 section 7.5 it states "*There shall be two independent sources of gas supply to each section of a chamber complex where people may be staying if the sections can be isolated by pressure*". This requirement is not specified within the UK ACoP.

Guidance:

Two independent gas supplies need to be provided to each compartment of the saturation chamber complex.

6.1.7 Surface Orientated Diving Chambers

NORSOK U100 section 7.2.3 specifies that surface orientated diving chambers should have a minimum inside diameter of 180 cm and be at least 200 cm long.

Guidance:

The surface orientated diving chamber should meet the required dimensions set out in NORSOK.

6.1.8 Diving Bell Ergonomics

NORSOK U100 section 7.2.4.1 specifies that the diving bell shall have an inner volume of at least 4.5 m^3 for 2 divers plus an additional 1.5 m^3 per diver in excess of two. In addition it requires the tunnel for entry and exit to have a minimum of 80 cm inside diameter.

Guidance:

Diving bells should be of sufficient volume and have an 80cm inside diameter access trunk to meet the requirements of NORSOK.

6.1.9 Diving Bell Supply

The UK ACoP para 126 specifies that "*the divers breathing gas supplies shall include independent primary and secondary supplies*".

NORSOK U100 section 7.5 specifies that "*two independent supplies are required to the gas panel supplying the gas to the main umbilical. One supply shall be dedicated as emergency supply and shall be activated if the downstream gas analyser to the diver gives an alarm signal and/or the supply pressure drops below set values. The pre-set pressure on the emergency gas supply shall be lower than the main supply*".

Guidance:

The divers breathing gas supplies should have independent primary and secondary supplies which comply with the above requirements.

6.1.10 Onboard Gas Supply

NORSOK U100 section 7.2.4.2 specifies that the minimum onboard gas supplies capacity "*shall be 1250 usable litres of breathing gas for each diver, calculated to the ambient pressure (equals 20 minutes at a breathing rate of 62.5 l/min)*". Section 7.5 also states "*The bell-man shall have easy access to operate the gas panel in the diving bell. It is recommended that no more than two operations shall be required in order to activate the spare onboard gas supply in the event of a failure in the main supply*"

Guidance:

The onboard gas supplies should be sufficient for the required working depth at the consumption figure of 62.5 l/min.

The bell onboard gas panel should comply with the NORSOK requirements.

6.1.11 Emergency Connectors for Bells, Habitats and HRVs

In both sectors bells, habitats and HRVs are required to have an emergency connector panel in accordance with IMO requirements. However, in Norway NORSOK U100 section 7.2.4.3 specifies that they should also be fitted with connectors in accordance with the (now withdrawn) NPD guidelines relating to manned underwater operations.

Guidance:

Connector panels on bells, habitats and HRVs should be in accordance with previous NPD guidelines and IMO GUIDELINES.

6.1.12 Alternative Handling System

In the Norwegian sector, each bell should have an alternative handling system which has the capability to bring the bell back to the surface and to a position to be connected to the chamber complex in case of a failure of the main handling system. In the UK sector it is not specified that the bell needs to be brought back to the mating position, though IMCA D 024 '*DESIGN*' specifies that a secondary means of recovering the diving bell to the surface, bringing it on board and mating it to the chamber system should be provided.

Guidance:

An alternative handling system should be is in place and fully tested which is capable of bringing the bell back to the chamber complex in case of a failure of the primary system components.

6.1.13 Breathing Apparatus

In Norway, breathing apparatus used in manned underwater operations (MUO) is required to comply with the requirements of NORSOK U101 – *Diving Respiratory Equipment*. The average consumption figures utilised in this standard exceed those set out in IMCA guidance and, as

such, impact on several aspects of the diving equipment and operation. The NORSOK standard requires that:

- Breathing apparatus (masks and helmets used by divers underwater) be designed and tested for an average consumption of 62.5 l/min
- Emergency gas supplies (bell bottles and bailout systems) are be able to provide sufficient gas as specified elsewhere in the NORSOK U100 standard using the consumption figure of 62.5 l/min.

Guidance:

Breathing equipment utilised should have been type tested and approved for use under the NORSOK U101 Standard.

The capacity of onboard gas supplies should be verified for the required flow rates at the working depth.

6.1.14 Gas Supplies to Breathing Apparatus

NORSOK U100 section 7.8.1. requires that breathing apparatus fulfils the requirements of NORSOK U101. In this standard (section 4.1) it is required that an evaluation is undertaken to verify that the total gas supply system to breathing apparatus can supply sufficient gas to the various masks, BIBS, etc.

Guidance:

An evaluation should be undertaken to verify the capability of the breathing gas supply system to supply sufficient gas to the breathing apparatus.

6.1.15 Communications Systems

In the Norwegian Sector it is a requirement (NORSOK U100 section 7.13) that the communications system for divers in both water and hyperbaric chambers should have been tested for intelligibility, using a 'modified rhyme test' and to fulfil the requirements for operational communications systems in accordance with the relevant military standard MIL-STD-1472.

Guidance:

Documented evidence should be provided of type testing or site testing of communications equipment against the military standard.

A further requirement of NORSOK U100 section 13 is that "*Switching of communication channels shall be possible so that all persons who need to communicate have the possibility to do so; uninterrupted and independent of other communication channels. The panel containing the communication system shall be arranged in a logical and ergonomic manner. A traffic flow matrix of the system shall be documented and available on board*".

Guidance:

A traffic flow matrix for the communications system should be documented which shows how the requirements set out above are complied with.

NORSOK U100 section 7.13 also states *"Two independent main systems shall be installed for efficient communication between personnel engaged in manned underwater operations (MUO) and the dive operation control room. An alternative facility for communication between personnel working below surface and the operation management shall also be provided. This facility shall be independent of the main communication systems"*. In the UK sector the required standard (as set out in IMCA D 024 section 2.2.2) is that *"Two way voice communications with each diver and the standby diver (bellman) must exist. These facilities should be fitted with a back up power source, such as batteries"*.

Guidance:

There should be two independent main communication systems installed between personnel engaged in MUO and the diving control room.

6.1.16 Fire Protection

In the NPD Facilities Regulations section 36 it is required that hyperbaric chambers are protected internally by a fixed fire fighting system which can be activated externally.

Guidance:

Saturation chambers should be equipped with an externally activated fire fighting system (normally a water deluge system). Portable extinguishers will not be accepted as a part of this system as they cannot be activated from outside the chamber.

6.1.17 Water Supplies

In NORSOK U100 section 7.16 specific requirements for the treatment of both potable water for the divers in the chambers and also for the treatment of divers water for suit heating are set out. Such treatments involve both disinfecting and/or filtration of the water supplies and requirements for periodic examination thereof.

Guidance:

Water treatment systems for potable water should be provided for use in the diving system and for the diver's suit hot water.

Periodic examination and testing of such water systems should be undertaken and the results documented.

6.2 Maintenance and Certification Systems

Both sectors require that plant and equipment used to support manned underwater operations is maintained in a safe working condition. There are, however, differences between the sectors on how the maintenance system is administered.

6.2.1 Maintenance Effectiveness

The NPD Activities Regulations, section 46, states "*The effectiveness of the maintenance shall be evaluated systematically on the basis of recorded data for performance and technical condition in respect of facilities or parts thereof*". The UK ACoP does not state the requirement for evaluating maintenance effectiveness.

Guidance:

Any maintenance system utilised should be evaluated within pre-set parameters to determine the effectiveness of the system.

6.2.2 Maintenance Classification

Section 43 of the NPD Activities Regulations sets out a requirement for systems and equipment to be classified with regard to health, environment and safety related consequences of potential failures. It further states that this classification will constitute the basis for maintenance activities and maintenance frequency, and for the priority of different maintenance activities.

Guidance:

The maintenance system in place for the plant and equipment for manned underwater operations (MUO) should classify and prioritise maintenance tasks with regard to health, environment and safety related consequences of potential failure.

6.2.3 Certification of Loose Lifting Equipment

In both sectors there is a requirement that lifting appliances and lifting gear are inspected, tested and certified in accordance with the national legislation in each sector. There is, however, a difference between the two sectors in the period between such inspection, testing and certification; namely **six months** in the UK sector and **12 months** in the Norwegian sector.

Guidance:

The inspection, testing and certification regime is in place should satisfy the sector legislation.

6.3 Support Vessel

Most saturation diving operations which take place in both sectors does so from dynamically positioned (DP) diving support vessels (DSVs). These vessels are generally classed with one of the major classification societies with a DP Class notation and, in the case of vessels built since 1994, issued with an IMO equipment class FSVAD (flag state verification acceptance document). There are identified differences between the two sectors relating to operations from DP vessels and other general differences relating to the support vessel.

6.3.1 DP Operations

DP support vessels can be categorised under the IMO guidelines as one of the following:

- Equipment Class 1 – equivalent to DNV DP Class AUT, LR DP Class DP (A), ABS DPS-1
- Equipment Class 2 - equivalent to DNV DP Class AUTR, LR DP Class DP (AA), ABS DPS-2
- Equipment Class 3 - equivalent to DNV DP Class AUTRO, LR DP Class DP (AAA), ABS DPS-3

In the UK ACoP para 58 it states "*Diving from dynamically positioned vessels can be hazardous to divers…*" and para 59 states "Any vessel operating on dynamic positioning should meet industry technical and operational standards". However the ACoP is not prescriptive about which Class of DP vessel is utilised for the support of diving operations; it relies on the "diving project plan" and associated risk assessment to determine the appropriate DP Class for the support vessel.

In Norway the selection of DP support vessel Class is more prescriptive. The guidelines to the NPD Activities Regulations section 81 states "*Manned underwater operations where loss of position entails a high risk for divers or diver platforms – Equipment Class 3*" and "*Manned underwater operations where loss of position entails risk for divers or diver platforms – Equipment Class 2*". In addition, the NORSOK J003 Marine Operations Standard states "*Manned Subsea operations Class 3 for diving inside structures etc.*" and "Manned Subsea operations Class 2 for diving in open water".

Guidance:

The selected DP support vessel should be suitably classed and operated appropriately for the operations to be undertaken.

6.3.2 Portable Electrical Power Tools

In the UK sector under the HSW Act and supporting regulations it is a requirement that portable electrical power tools used in damp areas and on deck are 110V supply. This is not a requirement in the Norwegian sector, where typically 220/240V supplied power tools are used.

Guidance:

All deck power tools should be fed from 110V supplies.

6.3.3 Noise Levels

Onboard support vessels there are requirements to provide noise protection equipment in areas of high noise. However, the pre-set levels at which such equipment should be provided differs between the sectors – in the UK the limit is 90 dB (A) and in Norway it is 83 dB (A).

Noise requirements for vessels are set out in IMO A468 *"Code on Noise Levels on Board Ships"* and A343 *"Recommendations on Methods for Measuring Noise Levels"*.

Norwegian Sector: NPD Facilities Regulations Section 22 define noise that is harmful to hearing as "*By noise that is harmful to hearing is meant a daily noise exposure which in the course of a workshift exceeds a twelve-hour equivalent sound level of 83 dB(A), or an impulsive sound level of Lpeak=130 dB(C)"*.

Noise levels for manned underwater requirements are considerably less than 83 dB(A). guidelines to Section 22 of NPD Facilities Regulations states "*in order to fulfil the requirement to noise, the NORSOK U100 standard section 5.2.2.5 should be used for manned underwater operations*".

The requirements given in NORSOK U100 section 5.2.2.5 are:

"Sleeping chambers	*60 dB(A)*
Living chambers	*65 dB(A)*
Control room	*65 dB(A)*
Diving bell	*65 dB(A)*
**Habitats*	*65 dB(A)*
**diver in water*	*70 dB(A)*

**Does not include self induced noise*".

UK Sector: In the UK waters noise levels are set out in the Offshore Electricity and Noise Regulations 1997. These regulations make the Noise at Work Regulations 1989 applicable for work offshore. The requirement in the Noise at Work Regulations 1989 are:

"the first action level means a daily personal noise exposure of 85 dB(A);
the peak action level means a level of peak sound pressure of 200 pascals;
the second action level means a daily personal noise exposure of 90 dB(A)".

Where the noise exposure is above the first action level but less than the second action level employees should, at their request, be provided with suitable and efficient ear protectors.

Where the noise exposure exceeds the second action level employees need to be provided with suitable personal ear protectors.

Guidance:

All personnel working in areas where the ambient noise levels exceed 83 dB should be provided with suitable noise protection equipment.

Where noise levels exceed requirements given in NORSOK U100 all practical efforts need to be made to reduce the noise to an acceptable level on existing vessels.

7 Operational Requirements

This section refers to the regional requirements and differences for the safe performance of manned underwater operations (which are not addressed elsewhere in this document).

7.1 Numbers of Personnel/Team Size

In general the two sectors follow similar requirements for numbers of personnel and team sizes, as described in the following references:

UK Sector: In the UK sector the number of personnel/team size need to comply with the ACoP and follow the guidance set out in information note IMCA D 28/98 *"Minimum Supervisory Requirements for Offshore Diving Operations Carried Out on the UK Continental Shelf"*, this allows one supervisor within the control room and the other within close proximity of the control room.

Norwegian Sector: Requirements on dive team size are set out in the NORSOK U100 standard. In section 8.5.1, namely in the manning of control rooms it is specified that there need to be at least two qualified persons present in a control room (both saturation control and dive control) during all phases of the work. For short periods (such as meal breaks) one of the qualified persons may be replaced by a competent person. In addition there is a requirement for a nominated gasman to be included in the dive team.

Guidance:

A gasman should be provided on board for Norwegian operations. The control room should be adequately supervised in accordance with the sector requirements.

7.2 Working Periods/Time Provisions

7.2.1 UK Sector

The following guidance set out in IMCA D 014 *"IMCA International Code of Practice for Offshore Diving"* describes the UK requirements for working periods relating to diving operations:

It is recognised that long hours are sometimes required, but such circumstances should be exceptional and never planned. It should be remembered that accidents are more likely when personnel work long hours because their concentration and efficiency deteriorate and their safety awareness is reduced.

Work should be planned so that each person is normally asked to work for a maximum of 12 continuous hours, and is then given a 12-hour unbroken rest period between shifts.

Members of the diving team will not be asked to work for more than 12 hours without having at least 8 hours of unbroken rest during the previous 24 hours. Similarly, the longest period a person will be asked to work, and only in exceptional circumstances, will be 24 hours before being given 8 hours unbroken rest. This may be, for example, where a diving team has been on standby, but not diving, for a number of hours before diving is needed. In such cases, extreme care will need to be taken and allowance will need to be made for the effects of fatigue.

In saturation diving, the divers will not be asked to undertake a bell run exceeding 8 hours from seal to seal. They will then need to be allowed at least 12 hours of unbroken rest.

Extended work periods offshore without a break can reduce safety awareness. Work will therefore need to be planned so that personnel do not work offshore for long periods without being allowed time onshore. These times may need to vary to suit operational needs or exceptional circumstances, but personnel should be given a reasonable onshore break related to the period spent offshore.

No person will be expected to work a 12-hour shift without a meal break taken away from their place of work. Personnel also need toilet and refreshment breaks during their shifts.

To allow for these breaks, the diving contractor will need to ensure that the planned work either has natural breaks (for example, during periods of strong tide) or that qualified and experienced personnel are available to act as reliefs during breaks. This is particularly important in relation to supervisors whose responsibilities are often onerous and stressful. Any such handovers of responsibility should be recorded in writing in the operations log.

7.2.2 Norwegian Sector

NORSOK U100 section 8.4 sets out the following requirements relating to time provisions:

- *Stay at working depth:*

  During saturation diving stay at working depth shall not exceed 14 days. For diving deeper than 250 msw this stay shall not exceed 10 days.

  The planning shall take into consideration the strain that the divers will be exposed to during the operation when the time period for stay at working depth is determined. The strain on the divers shall be continuously considered during the operation with regard to whether a shorter period should be applied. It is a prerequisite that the total length of stay under pressure is the subject of discussions with the representatives of the personnel including safety delegates.

  In addition, Activity regulation section 85 g) work free period for work under increased pressure states:

  "Divers working in water or working or under increased ambient pressure shall in the course of a twenty-four hour period have a continuous work free period of at least 12 hours. Work and rest periods shall be specified in a shift program and shall be planned at regular hours".

- *Time between saturation periods*

  NORSOK U100 section 8.4.2 states *"The time between saturation periods shall at least be equal to the duration of the preceding saturation period. In the case of diving deeper than 250 msw the time between saturation periods shall be at least twice the duration of the last saturation period."*

- *Bell run*

  NORSOK U100 section 8.4.3 states *"Maximum time for a bell run is 8 hours for ordinary saturation diving, and 6 hours for diving deeper than 200 msw. Workloads shall be assessed during planning of the diving operations, and if applicable a shorter bell run may be chosen. If the divers request that the dive should be suspended before the maximum permissible time is up, this shall be decisive. Timing of bell run duration starts when the clamp is first taken off."*

- *Time in water*

  NORSOK U100 section 8.4.4 states *"Continuous time in water during a 12-hour period shall not exceed 4 hours. For diving deeper than 200 msw this shall not exceed 3 hours."*

- *Provisions relating to time on breathing masks*

  The following provisions relating to time periods also apply with regard to manned underwater operations:

  e) use of breathing mask:

  after a maximum of 4 hours, divers using breathing mask in the submerged habitat shall have a rest period in an atmosphere that does not require the use of a breathing mask

- *Supervisor in direct communication with divers in water*

  Surface personnel in direct communication with divers in the water should not have this function for more than 4 consecutive hours without a break. Total time for this function should be limited upwards to 8 hours in the course of a twelve-hour period.

7.3 General

7.3.1 Umbilical Management

In both sectors an umbilical management system is required. However, in the Norwegian sector a standardised umbilical marking system needs to be utilised (NORSOK U100 section 7.9).

Guidance:

The standardised Norwegian umbilical marking methodology across both sectors should be followed.

In the UK sector there is no specific limitation on the length of divers umbilicals – the limitations are set by practical limitations (umbilical storage etc) as well as by operational constraints (distance to nearest hazard for example). However in Norway U100 sets a limit for the length of the working diver's umbilical to 45m (for normal operations).

Guidance:

When working in Norway, working divers umbilicals should be restricted to 45m length and that the work is planned around this restriction.

In both sectors the working diver's umbilical length needs be restricted to ensure that the diver can maintain a distance from the nearest hazard (e.g. thrusters, water intakes etc) of **5m**. In the UK the distance from the nearest obstruction for determining the length of the standby diver's umbilical is **3m**, whereas in Norway the distance is **2m**.

Guidance:

In both sectors the UK guidance of maintaining 5m and 3m respective distances from the nearest hazard for the working diver(s) and standby diver should be followed.

7.3.2 Saturation Duration Limitations

Due to the differing requirements set out in the UK ACoP and in the NPD 2002 Regulations concerning time limits for divers in saturation, the following guidance is given relating to the management of this matter when transferring a DSV from the UK sector to Norwegian sector with divers in saturation. The operator in the Norwegian sector has responsibility for the divers until successful completion of the bend watch.

Guidance:

When transferring from the Norwegian Sector to the UK Sector the 28 days maximum duration as set out in the ACoP 82 will apply.

- ***Responsibility for the divers through to the completion of the bend watch may be delegated in writing to the Diving Contractor by the Operator. This should include details of the continuing work scope and diving tables to be used. The intention to undertake this action should be highlighted in the consent to dive application by the Operator.***

Divers may transfer from the UK sector to the Norwegian sector on the basis that they can comply with the following provisos:

- ***A time limit for personnel involved in manned underwater operations on board a vessel in Norwegian waters is 21 days maximum.***
- ***For divers in saturation when depth is less than 250 meters: 14 days bottom + decompression + bend watch must not exceed 21 days***
- ***For divers in saturation when depth is more than 250 meters: 10 days bottom + decompression + bend watch must not exceed 21 days (This scenario unlikely to occur when transiting from a UK diving operation).***

With the above in mind, the following should be taken into account when a vessel with divers in saturation enters Norwegian waters from UK waters to perform manned underwater operations:

- ***Divers that have been in saturation for 21 days or more - decompress in accordance with UK procedures.***
- ***Divers in saturation whose time in saturation + decompression time + 24 hour bend watch is more than 21 days - decompress in accordance with UK procedures.***
- ***Divers in saturation whose time in saturation + decompression time + 24 hour bend watch is less than 21 days - This saturation would be allowed to continue after an appropriate stabilisation period had been completed and transferred over to the Norwegian tables. The stabilisation period would be determined by the company diving medical adviser (a diving medical physician or consultant in diving medicine (see section 4.3)) and would take into account any previous excursion penalties that would influence this stabilisation period. An example is a total stay of 21 days on board starting when these divers where blown down; i.e. 14 / 10 day bottom time + decompression + completion of bend watch and departing the vessel shall not exceed 21 days.***

7.3.3 Monitoring Systems

NORSOK U100 section 8.3.2 sets out requirements for on-line monitoring and recording of diver, chamber, bell, habitat and ADS parameters.

Further additional parameters should also be monitored and recorded during "deep diving" operations (beyond 200msw).

Guidance:

To comply with these requirements an on-line monitoring and recording system should be installed and integrated into the relevant sensors and instrumentation.

7.3.4 Diving Tables

In the UK Sector the ACoP does not specify compression rates, excursion limits or decompression rates, etc. (information commonly contained in 'diving tables'). It is the responsibility of the diving contractor to provide such information to the personnel at the work site and to verify that the use of such tables will not be detrimental to the health or safety of the divers.

In the Norwegian sector there are certain constraints imposed which entail having 'Norway-specific' diving tables for use by the diving contractor and his personnel. The use of the UK or other 'diving tables' may not comply with these constraints.

Guidance:

When undertaking manned underwater operations (MUO) in Norway approved 'Norwegian' diving tables should be used. When undertaking MUO in the UK the contractor's approved diving tables may be utilised – these may also be 'Norwegian' tables, but when moving between tables the company diving medical adviser (a diving medical physician or consultant in diving medicine (see section 4.3)) should be consulted.

7.3.5 Weather Limitations

NORSOK U100 section 9.1.2 states that "*Operations shall not be performed in sea - states exceeding 90% of the system's capacity*". In the UK sector, ACoP para 153 states that a plant register should be maintained on board and that this register should contain details of any design limitations such as weather.

Guidance:

The weather limitations of the system need to be known and documented. In Norway operations should cease at 90% of the maximum operational sea state.

7.3.6 Bend Watch

UK references DMAC 07 – *Recommendations for Flying After Diving* – for guidance on bend watch duration where as Norway has a mandatory 24 hours bend watch.

8 Emergency and Contingency Equipment

8.1 Hyperbaric Evacuation

Although both sectors set out requirements for the provision of hyperbaric evacuation systems, there are additional requirements in place in the Norwegian sector as follows:

In Norway the diving contractor's plan for hyperbaric evacuation should be based on risk analyses covering the launch, stabilisation, recovery and normalisation phases of an evacuation and the following phases should be described in the contingency plan:

i) Transfer of divers to the evacuation unit, and launching of the unit;

ii) The evacuation unit in the water, including a description of how the life support functions are planned to be maintained, where and how the rescue unit is to be moved and, if applicable, taken out of the water;

iii) Evacuation unit taken under control and decompression of divers

Guidance:

A hyperbaric contingency plan should be established which fulfils the requirements for both sectors. In addition the diving contractor should document:

a) the time taken from the moment the last diver enters the evacuation unit to the unit being 100 metres away from the mother vessel/worksite is less than 15 minutes;

b) the total time period from notification of evacuation, with divers in the chamber complex until the time the evacuation unit is 100 meters away from the mother vessel/worksite should not exceed 30 minutes.

This time includes the time required to equalise the system, should there be a split level saturation and or decompression ongoing, to enable transfer of all divers into the evacuation unit.

8.1.1 Pressure Differential

In NORSOK U100 section 9.3.2 it is required that, if there are more than 18 Bars pressure differential between persons who are to be evacuated, it should be possible to maintain a difference in pressure during evacuation.

Guidance:

The NORSOK requirement only be achieved in practice by the following methods:

- ***Having a Twinlock evacuation system***
- ***Having two hyperbaric evacuation systems***
- ***Maintaining the persons in saturation with less than 18 Bar pressure differential***

8.1.2 Recovery Systems

In the 2002 NPD Facilities Regulations section 43 it is required that "*Hyperbaric Evacuation Systems shall be designed so that they can be towed and lifted out of the water in the weather conditions relevant to the use of such lifeboats*". An evaluation of the towing arrangements and recovery arrangements is required to verify how this requirement is met. At present there are practical restrictions in complying with this regulation and current (at time of issue of this document) practice is to apply for an exemption from NPD.

Guidance:

An evaluation to determine the maximum weather limitations for recovery of a hyperbaric evacuation system should have been undertaken and that these limits should be documented and understood by all relevant parties

A towing evaluation should have been performed and documented and that relevant information on the towing characteristics and limitations of the hyperbaric evacuation system should understood and available to all relevant parties

8.1.3 Hyperbaric Evacuation System

In the UK ACoP it is required that a hyperbaric evacuation system is provided for the divers in saturation, and that this system needs to have life support for 24 hours (ACoP para 67).

In Norway such a system is also required, however there are additional requirements imposed in NORSOK U100 section 7.4:

- *"The HRV shall be capable of maintaining an acceptable environment for 72 hours, including a facility to provide such service even if the HRV primary power supply is unavailable"*

  Guidance:

  The capability of the HRV to provide an acceptable environmental control for 72 hours (refer to new IMCA information note on the thermal testing of hyperbaric evacuation systems) should be verified and documented.

- *"The HRV shall have its own propulsion facility, which shall be capable of functioning for at least 72 hours. It shall be reasonably powered and strengthened for its size and mass when fully equipped and manned. It shall further contain equipment for oral communication with other craft, e.g. a two way marine VHF radiotelephone"*

  Guidance:

  The HRV's propulsion needs to be able to function for a minimum of 72 hours and should be equipped with the relevant communications equipment. This should be documented.

- NORSOK also requires that the HRV is equipped with an O_2 connection point. This is in addition to the connectors mentioned in section 6.1.11 of this guidance document.

  Guidance:

  The HRV should be equipped with an O_2 connection point

- NORSOK requires that the HRV has a facility for the chamber occupants to control the O_2 make up and gas supply in case of the crew having to leave the HRV

  Guidance:

  The chamber occupants should be able to take control of O_2 and gas supplies if required.

- NORSOK requires that a life support package (LSP) is provided at a suitable location where it can reach the HRV in a reasonable time.

  Guidance:

  The LSP availability should be documented within project/DSV contingency plans.

In addition, the NPD Facilities Regulation section 43 requires that an HRV can be lifted out of the water by a single anchorage point.

Guidance:

The HRV should be able to be recovered by a single point lift, typically a suitable 2 leg sling arrangement which is permanently installed on the HRV.

8.2 Habitats

The UK ACoP is non-specific about the use of habitats for support or performance of underwater operations, however survival times for divers in Habitats is taken to be 24 hours in the UK Sector (treated as for survival times in a bell); in NORSOK U100 section 7.2.8 a habitat "*must be equipped to maintain vital functions for a minimum of 48 hours, when primary supplies are not available, and have an outside panel for emergency connections including gas, heat and communication*".

In addition the same section of the NORSOK standard sets out other specific requirements for emergency and contingency facilities to be incorporated into habitats, including:

- *"It shall be possible to rescue personnel from a submerged habitat even if the normal access cannot be used".*
- *"The habitat shall provide a dry and safe working area for the divers, shall be equipped with an adequate number of breathing masks, and should include a non-contaminated compartment".*
- *"Habitats shall be designed to make complete flooding impossible, leaving sufficient gas volume to allow personnel to dress into survival equipment and to allow personnel occupancy in an emergency situation".*
- *"It shall be possible to close all pipe penetrations both internally and externally".*

Guidance:

Any habitats which may be used in the Norwegian sector should comply with the requirements of Section 7.2.8 of the NORSOK U100 standard.

8.3 Plant & Equipment

8.3.1 Equipment for Emergency Thermal Balance

Although both sectors have requirements for the provision of plant and equipment for emergency situations, the UK sector is non-specific about the duration of support that is to be provided. The ACoP para 121 states "*sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency*". The NORSOK U100 Standard is more specific when relating to equipment to provide thermal balance in an emergency, Section 5.2.2.2 stating "*The minimum capacity for emergency situations shall be:*

- *Divers in the water* — *10 minutes*
- *Diving bells* — *24 hours*
- *Chambers and HRVs* — *72 hours*
- *Habitats* — *48 hours"*

Guidance:

An evaluation to verify the capability of the plant and equipment which is in place at the dive site to maintain the thermal balance of the divers within acceptable limits for the durations set out above, when working in the Norwegian sector, should be undertaken and documented.

8.3.2 Bail-Out Durations

In both sectors requirements are in place for durations of bail-out systems.

*In the UK Sector it has, for many years, been the practice for calculating the bail-out duration of **1 minute per 10m** of diver's umbilical at the working depth. This is to be calculated at a consumption rate of **35 l/min** (based on AODC 014, published in 1983).*

In the Norwegian sector the requirement is for bail-out duration of **10 minutes** (irrespective of umbilical length) calculated on a breathing rate of **62.5 l/min** at the working depth.

Guidance:

The bail-out systems should be capable of operating for the appropriate period for the sector.

8.3.3 System to Locate, Assist and Recover Bell/Habitat/ADS

In the UK Sector the 'diving project plan' and associated risk assessment needs to identify and ensure that the necessary systems and equipment are be put in place to locate, assist and recover a bell/habitat or ADS.

In the Norwegian Sector the requirements are more specific:

NORSOK U100 section 9.1.2 states "*When undertaking manned underwater operations, means to effectively locate, assist and recover the bell/habitat/ADS shall always be available. Such means shall be an additional diving bell for depths exceeding 200msw, or, for shallower depths, a large ROV capable of assisting units in distress, or additional ADS*".

It further states that "*An ROV may, for instance, provide connections for necessary supplies to emergency panels on diving bells and submerged habitats, or attach emergency lifting gear on to units that are unable to make use of ordinary facilities for recovery to the surface*".

Guidance:

For diving operations deeper than 200msw in Norway, a twin bell dive system is required.

For diving shallower than 200msw in Norway, a twin bell diving system should be used or a large (work class) ROV should be available to assist in location, assistance and recovery operations.

8.3.4 Access to Telecommunications Link

In both sectors there is a requirement to provide communications facilities between personnel who may be treating an injured diver and shore based specialists. In the UK sector it is stated that this may be by radio or telephone, with pre-arranged methods of transferring information from the doctor to the site. In Norway, however, the requirement is more specific. In NORSOK U100 section 5.1.6.3 it is stated "*The person performing advanced first aid shall have priority and unimpeded access to suitable telecommunications with the responsible doctor*". This is generally interpreted as a telephone link via the unscrambler system to the treatment chamber.

Guidance:

A telecommunications link should be provided to allow the person in the chamber who is providing advanced first aid to speak directly with the shore based specialist.