



Floating installations

**OFFSHORE TECHNOLOGY REPORT
2001/048**



Floating installations

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FOREWORD

This document provides technical information previously contained in the Fourth Edition of the Health and Safety Executive's '*Offshore Installations: Guidance on Design, Construction and Certification*' (1990 edition plus amendments)⁽¹⁾. The 'Guidance' was originally published in support of the certification regime under SI289, the Offshore Installations (Construction and Survey) Regulations 1974⁽²⁾. However, SI289 was revoked by the Offshore Installations (Design and Construction, etc) Regulations, 1996, which also introduced the verification provisions into the Offshore Installations (Safety Case) Regulations, 1992. The 'Guidance' was formally withdrawn in its entirety on 30 June 1998 (see HSE OSD Operations Notice 27⁽³⁾).

The withdrawal of the 'Guidance' was not a reflection of the soundness (or otherwise) of the technical information it contained; some sections (or part of sections) of the 'Guidance' are currently referred to by the offshore industry. For this reason, after consultation with industry, relevant sections are now published as separate documents in the HSE Offshore Technology (OT) Report series.

It should be noted that the technical content of the 'Guidance' has not been updated as part of the re-formatting for OTO publication, although prescriptive requirements and reference to the former regulatory regime have been removed. **The user of this document must therefore assess the appropriateness and currency of the technical information for any specific application. Additionally, the user should be aware that published sections may cease to be applicable in time and should check with Operations Notice 27, which can be viewed at http://www.hse.gov.uk/hid/osd/notices/on_index.htm, for their current status.**

1. INTRODUCTION AND SCOPE

This Offshore Technology (OT) Report provides technical information on matters specific to mobile Installations, such as the use of classification rules for Mobile Offshore Units. It also provides information on fixed floating Installations that use the same principles as mobile Installations. It is based on guidance previously contained in Section 30 of the Fourth Edition of the Health and Safety Executive's 'Offshore Installations: Guidance on Design, Construction and Certification'⁽¹⁾ which was withdrawn in 1998. As discussed in the Foreword, whilst the text has been re-formatted for Offshore Technology publication, the technical content has not been updated. The appropriateness and currency of the information contained in this document must therefore be assessed by the user for any specific application.

2. DESIGN AND CONSTRUCTION REQUIREMENTS

2.1 SHIP CLASSIFICATION SOCIETY RULES

Subject to specific requirements set out elsewhere, any Offshore Installation intended to operate or manoeuvre afloat may be designed in accordance with the latest rules for ships or mobile Installations, as appropriate.

2.2 STEEL

Account should be taken of recommendations on fatigue analysis given in OTO 2001 015 particularly where the Classification Society rules are not adequate or applicable for some aspects of steel design or construction.

2.3 CONCRETE

Most fixed concrete Offshore Installations are afloat only whilst under construction and during transit from building site to final location. During the transit period and until permanently settled on the seabed, the information in this OT Report is concerned only that the Installation should not be exposed to conditions more severe than those envisaged in the design for this period. Information on tow-out and placing of concrete structures is given in OTO 2001 046.

In the absence of other standards or codes, concrete Installations intended to operate while afloat may be designed in accordance with the relevant parts of the latest rules for mobile Installations.

Good concrete design and construction practice will produce sound concrete irrespective of the type of structure into which it will be incorporated. The information contained in OTO 2001 046 should be considered. Loads and stresses may be assessed by established design techniques with allowance being made for the behaviour characteristics of the material.

A relevant commentary may be found in OTH 89 304 'Guidance for Concrete Structures: Background Report'⁽⁴⁾, Clause 4.2.4.

2.4 EXISTING MOBILE INSTALLATIONS (FATIGUE AND BRITTLE FRACTURE)

If there are insufficient records of the previous service history, the materials used or the methods of construction, an investigation of the risk of brittle fracture and the fatigue performance of the primary structure may be made according to OTO 2001 015.

As part of a major survey, an examination of the primary structure of the Installation may be required and consideration may be given to including testing for cracks in susceptible areas, e.g. joints, load carrying structural details, dents, and other damaged or repaired areas.

Impact specimens may be obtained from samples of welded material or parent plate and tested in order to ascertain the full transition temperature range of absorbed energy and the corresponding fracture appearance. The possible existence of substandard conditions may then be identified by comparison

with data in OTO 2001 015. Where such conditions are found, a more rigorous examination may be made with a view to removing substandard material and weldments and replacing them with new materials and construction in accordance with recommended practices.

2.5 FLOODED MEMBER DETECTION IN SEMI-SUBMERSIBLES

Experience has shown that flooded member detection in watertight tubular bracing members in semi-submersibles can be a valuable aid to the prevention of failure of these critical structural members by timely detection of through thickness cracks.

Consideration should be given to the following:

- Bracing members normally submerged at operating draught are watertight and kept dry whenever possible, at least in way of critical connections (e.g. brace/column, brace/brace) and other areas containing significant stress concentrations or lower fatigue life details.
- Facilities are provided to enable internal inspection of these void spaces whilst the unit is afloat at operating draught, with access from within the unit wherever possible.
- Facilities are provided and operating procedures implemented to ensure prompt detection of any significant ingress of water which might indicate a through thickness crack in the wall of the tubular.
- In the event of water ingress being detected, there is likely to be a need to investigate the cause of leakage immediately. Confirmed through thickness cracks in these members will normally require immediate repair.

The provision of such facilities are unlikely to be a satisfactory alternative to the periodical surveys by means of visual and non-destructive examination. The two are entirely complementary. The visual and non-destructive examinations are intended to identify cracks at the earliest opportunity and this is imperative. Flooded member detection, on the other hand, will not detect defects until they have progressed through thickness; nevertheless it offers a back-up to detect defects before it is too late.

3. SITE-SPECIFIC INVESTIGATION

Before moving an Installation onto an operating location, consideration should be given to making an investigation of the proposed site, to determine if the conditions are suitable for the Installation to operate there safely.

The investigation is likely to always include an assessment of the environmental conditions by a competent person. If the unit is bottom-supported, or anchored, an appropriate survey of the seabed should be considered. Special recommendations for self-elevating Installations are given in OTO 2001 012.

4. REFERENCES

1. Department of Energy. Offshore Installations: Guidance on Design, Construction and Certification, 4th Edition. HMSO, Consolidated Edition, 1993 (plus Amendment No. 3, 1995). [Withdrawn 1998 by Operations Notice 27].
2. SI 1974 / 289 – The Offshore Installations (Construction and Survey) Regulations 1974, HMSO, 1974. [Revoked and has been replaced by SI 1996 / 913 – The Offshore Installations and Wells (Design and Construction etc.) Regulations, 1996 – ISBN: 0 110 54451 X].
3. Health and Safety Executive. Status of Technical Guidance on Design, Construction and Certification. Operations Notice 27. Revised and Reissued, August 1998.
4. Department of Energy. Guidance for Concrete Structures: Background Report. OTH 89 304. [Available on the HSE web site as OTO Report 96 050].



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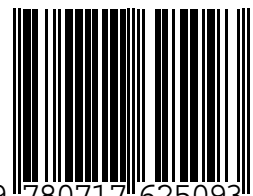
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