



GUIDE FOR

**CONVERSION OF SELF-ELEVATING UNITS TO
OFFSHORE INSTALLATIONS**

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**American Bureau of Shipping
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Foreword

Converting a self-elevating unit to an offshore installation can be a cost effective option for developing an offshore field. When converting a self-elevating unit to an offshore installation, the classification of the existing self-elevating unit as a mobile unit is to be changed to be classified as a site-specific offshore installation.

This Guide provides guidance and specifies the classification requirements for converting self-elevating units to offshore installations. The marine and safety systems may be included within ABS's scope of classification if they are requested to be classed by the Owner. The jacking system is to be included in ABS's scope of classification until the unit is on station. The jacking system will remain a part of class if it is kept active, giving the ability to jack up or down and holding on station, or it is requested to be kept within class by the Owner.

This Guide is to be used in conjunction with the *ABS Rules for Building and Classing Mobile Offshore Drilling Units* and the *ABS Rules for Building and Classing Offshore Installations*.

This Guide becomes effective on the first day of the month of publication.

Users are advised to check periodically on the ABS website www.eagle.org to verify that this version of this Guide is the most current.

We welcome your feedback. Comments or suggestions can be sent electronically by email to rsd@eagle.org.



GUIDE FOR

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SECTION 1 General

1 Introduction

This Guide provides guidance for converting Self-Elevating Units (SEUs) to Offshore Installations (OIs) for Hydrocarbon Production and/or Processing service.

Where a SEU is converted to an OI, the classification requirements of this Guide are to be complied with, and the ABS **Offshore Installation** notation will be granted when found satisfactory.

If the marine and safety systems serving the entire installation are requested to be classed by the Owner, ABS's scope of classification work is to include the marine and safety systems and compliance with applicable ABS Rules and/or Guides, as referenced in 7-2-A3/3 of *ABS Rules for Building and Classing Mobile Offshore Drilling Units (MODU Rules)*, is required.

If non-structural items of the installation are excluded from ABS's scope of classification, and if the jacking system is only to be used during the initial jacking of the unit on site, the jacking system at a minimum is to be restricted to an examination to confirm the system's ability to elevate the unit to the required elevation at the final location in accordance with Section 5. A calculation is to be submitted confirming that the unit's final total load to be lifted does not exceed the jacking unit rated capacity.

Upon satisfactory review and survey, ABS will issue documentation to the unit for a single voyage from the conversion yard to the installation site. After the installation is completed and the Surveyor is satisfied, a report will be submitted to the Class Committee requesting issuance of a full term Class Certificate.

3 Governmental Regulations

It is recognized that an Offshore Installation is typically sited in the jurisdiction of one or more governmental authorities. ABS, at the request of the Operator and where recognized by the pertinent governmental authorities, may modify the scope of classification and apply criteria that conform to the technical standards specified by the governmental authority for the purposes of granting classification.

5 Operating Manual

An Operating Manual is to be submitted to verify changes to the design information and limitations considered in the conversion of the unit. The Operating Manual is to contain the information listed in Section 1-1-5 of the *MODU Rules* as applicable. The manual is to be placed aboard the unit for the guidance of the operating personnel. The primary language of the Operating Manual is to be English. ABS is not responsible for the operation of the unit.

7 Documentation

The documentation needed to verify the acceptability of the structure, equipment and systems for the selected scope of classification is to be provided for review. Reference is to be made to documentation requirements in the applicable Rules. The documentation is to include drawings, analyses, testing and inspection reports, material certificates, reports on geotechnical and other ground conditions, reports on the long-term environmental conditions at the operating site and those needed to assess conditions during transport and installation, and seismic condition where applicable, etc.

9 Application of Rules

References are made in this Guide to ABS publications and industry standards. The application of these Rules and Guides is based on the contract date of conversion between the shipbuilder and the Owner.

11 References

- i) *ABS Rules for Building and Classing Mobile Offshore Drilling Units (MODU Rules)*
- ii) *ABS Rules for Building and Classing Offshore Installations (OI Rules)*
- iii) *ABS Rules for Building and Classing Facilities on Offshore Installations (Facilities Rules)*
- iv) *ABS Guide for the Fatigue Assessment of Offshore Structures (Offshore Fatigue Guide)*
- v) *ABS Guide for Building and Classing Subsea Riser Systems (Riser Guide)*
- vi) *ABS Rules for Conditions of Classification – Offshore Units and Structures (Part 1)*
- vii) *ABS Rules for Materials and Welding (Part 2)*
- viii) *ABS Guidance Notes on Structural Analysis for Self-Elevating Units*
- ix) ISO 19905-1, Petroleum and natural gas industries – Site-specific assessment of mobile offshore units – Part 1: Jack-ups, 2012

Where a particular edition or date associated with a reference is given, it means that particular edition is relevant to the topic being presented in this Guide. Use of a later edition may be permitted upon consultation with ABS. ABS may consider at its discretion, upon the request of the Owner, the application of other appropriate alternative methods and recognized codes of practice.

13 Abbreviations

ABS	American Bureau of Shipping
ISO	International Organization for Standardization
LCG	Longitudinal Center of Gravity
OI	Offshore Installation
SEU	Self-Elevating Unit
TCG	Transverse Center of Gravity
VCG	Vertical Center of Gravity



SECTION 2 Scope and Conditions of Classification

1 Classification Notations and Options

When converting a SEU to an OI, the classification of the existing SEU as a mobile unit is to be changed to be classified as a site-specific offshore installation. The design is to be based on site-specific conditions of the operating site where the unit is to be installed and operated in the elevated condition.

The existing unit being converted was built under the supervision of ABS Surveyors to the requirements of these Rules or to their equivalent, where approved by the Classification Committee, will be classed and distinguished in the Record by the symbols **☒ A1 Offshore Installation**.

The basic scope of classification can be expanded to include the Hydrocarbon Production and/or Process Facilities and/or the Hydrocarbon Import and Export systems by applying the criteria contained in the *ABS Rules for Building and Classing Facilities on Offshore Installations (Facilities Rules)* and/or the *ABS Guide for Building and Classing Subsea Riser Systems (Riser Guide)*. Satisfaction of the relevant criteria will result in the granting of the following classification notations:

☒ A1 Offshore Installation – Hydrocarbon Production

☒ A1 Offshore Installation – Hydrocarbon Processing

☒ A1 Offshore Installation – Offshore Risers

If the existing unit being converted was built under ABS class, then the **☒** would be maintained for the converted offshore installations. For existing units constructed under survey of another recognized Classification Society or Authority, the Maltese Cross symbol **☒** will be omitted.

3 Scope of Classification

3.1 Minimum Design Life

The design life for future service is not to be less than 5 years. Prior service is to be suitably accounted for when determining the available future service life (i.e., consideration should be given to repairs, renewals, weld improvement, fatigue damage, wastage (erosion and corrosion), remaining anode mass, condition of coatings, etc.).

3.3 Offshore Installation Classification

3.3.1 Structure Design Criteria

The design criteria in the *Rules for Building and Classing Offshore Installations (OI Rules)* along with the *MODU Rules* are to be applied to the main structures listed in 3/3.3. The structures are subject to design review, survey during conversion and future surveys to maintain classification.

3.3.2 Other Major Considerations

In addition to the structural items mentioned above, the following major items are to be considered:

- i) The intact and damage stability of the platform structure in the wet tow condition, see Subsections 3/9 and 3/11.
- ii) Preloading and overturning stability, see Subsections 3/5 and 3/7.
- iii) Foundation, see Section 4.



SECTION 3 Structures and Hydrostatic Stability

1 General

1.1 Initial Structural Condition

Since the Installation is considered to be a conversion of an existing self-elevating unit, the effects of corrosion, erosion, renewals, repairs, modifications, fatigue damage, etc. are to be taken into account in the review of hull scantlings and the assessment of the structure after conversion for the loads expected during:

- i) The transport of the Installation to the operating site.
- ii) The offshore elevation, assembly and commissioning process.
- iii) The Offshore Installation service life.

1.3 Materials and Welding

The materials used in the original construction and those to be used for structural modifications are to be clearly identified. The existing material is to be checked for the service temperature at the intended installation site. The new material is to be selected in accordance with the *ABS Rules for Material and Welding (Part 2)*.

Welding is to be done in accordance with the *ABS Rules for Material and Welding (Part 2)*. The design of hull welds are to be in accordance with the *MODU Rules*. Other welds are to be designed in accordance with Subsection 3/3.

1.5 Environmental Conditions

The specification and determination of site-specific environmentally-induced loads are to be in accordance with [Section 3-1-2](#) of the *OI Rules*. In particular, refer to [3-1-2/5.1](#) and [3-1-2/5.3](#) of the *OI Rules* regarding the “*Design Environmental*” and “*Operating Environmental*” Conditions, respectively.

3 Structural Design Requirements

3.1 General

The applicable portions of [Sections 3-2-2](#) and [3-2-3](#) of the *OI Rules* are to be used for the design of steel structures.

The referenced sections of the *OI Rules* are to be applied, except where the use of the *MODU Rules* criteria is explicitly specified therein.

3.3 Design and Assessment of Structure

3.3.1 Design Criteria

The design criteria of the *OI Rules* apply to the following structural items:

- i) Hull and leg structures
- ii) Foundation structures (individual spudcans or mat foundation)
- iii) Leg to hull connections
- iv) Deckhouses
- v) Helideck

- vi) Appurtenant Structure, see 3-2-2/11 of the *MODU Rules* where applicable
- vii) Hydrocarbon Production and Process related structure (e.g., flare structure and its foundation)
- viii) The individual skids and frames directly supporting the production equipment
- ix) Module underdeck support structures
- x) Riser porches or foundations

3.3.2 Design and Assessment

The design and assessment of the structure are to include the following:

- i) The adequacy of the initial scantlings of the major structural elements and deckhouses are to be assessed in accordance with 3-2-3/3.3 and 3-2-3/15 of the *MODU Rules*.
- ii) The structural assessments of the pertinent structures are to be conducted using the acceptance criteria in [Section 3-1-2 through Section 3-2-3](#) of the *OI Rules*. The legs and spudcans are to be assessed in accordance with Subsection 3/7 of this Guide for the pre-load condition and 3-2-3/7.3 of the *MODU Rules* for the wet tow condition as applicable.
- iii) The wave-induced dynamic response is to be assessed according to 3-2-3/5.9 of the *MODU Rules*. Reference can be made to the *ABS Guidance Notes on the Structural Analysis of Self-Elevating Units*.
- iv) The adequacy of the soil condition at the intended site is to be assessed in accordance with [Section 3-2-5](#) of the *OI Rules*.
- v) The strength of structures listed in 3/3.3.1 for Hydrocarbon Production and Process Systems is to be assessed in accordance with [3-2-3/9](#) and [3-2-3/11](#) of the *OI Rules*.
- vi) If structural assembly will be performed offshore at the installation site, the allowable stresses given in [3-2-3/9.1.1](#) of the *OI Rules* are to be applied.
- vii) The remaining fatigue strength is to be assessed using the criteria in the *ABS Guide for the Fatigue Assessment of Offshore Structures (Offshore Fatigue Guide)* based on the service history which is to be provided by the Owner or Operator. For areas that are critical and not accessible for inspection a fatigue design factor of 10 is to be used. Reduced fatigue design factors may be allowed if the area is made accessible for inspections. For cylindrical legs with mat supports, reference is to be made to Subsection 7/1 for requirements.
- viii) Corrosion allowance for leg structure within the splash zone is to be properly accounted for in the design. The steel is to be protected by use of a corrosion protection system including coatings. Protection against corrosion and wear of leg structure within the splash zone is normally provided through increase of the member wall thickness. The wall thickness increase is not to be considered to contribute to the structural strength of the leg structure, but is to be included in weight calculations and in determination of wave and current loadings.
- ix) Protection of steel work is to be in accordance with 3-2-2/1.5 of the *MODU Rules* and [3-2-3/1.3](#) of the *OI Rules*.

3.5 Loads

The categories of loads to be considered are listed in [Section 3-2-1](#) of the *OI Rules*, which also specifies how the load magnitudes are determined.

[3-1-2/5](#), [3-2-2/3.5](#), and [3-2-3/5](#) of the *OI Rules* are to be followed regarding Environmental Design Criteria, including design conditions and combinations for the recurrence intervals specified for Operating and Design Environmental Loading Conditions.

The loads expected during Transit and Installation can be assessed using the *MODU Rules*, or they can be directly determined considering a minimum of 10 year Recurrence Period along the transit route.

5 Overturning Stability

3-2-3/5.1 and 3-2-3/5.3 of the *MODU Rules* are to be satisfied. When applying 3-2-3/5.3.1 of the *MODU Rules*, the loading conditions to be considered are the Operating Environmental and Design Environmental Conditions as defined in 3/3.5 of this Guide.

The air gap requirement is to follow the criteria in 3-2-2/5.3 of the *OI Rules*.

7 Preload

7.1 Capability

An installation without bottom mats is to have the capability of being preloaded such that the vertical leg reaction achieved on each leg is at least equal to the computed maximum vertical leg reaction due to the maximum gravity and functional loads plus overturning load under the Operating Environmental or Design Environmental Conditions as defined in 3/3.5, whichever is greater.

7.3 Leg Strength

All legs are to have adequate strength to withstand the preload condition described in 3/7.1. The factor of safety for combined loading given in 3-2-1/3.3 of the *MODU Rules* is to be used when considering structural aspects of the preload condition.

9 Subdivision and Stability

To assess stability, as required by 3-2-6/5.5 of the *OI Rules*, the subdivision and stability criteria as specified in Part 3, Chapter 3 of the *MODU Rules* are to be applied. The wind speed specified for “unrestricted service” is to be considered. Refer to 3-3-2/5.3 of the *MODU Rules* regarding watertight closures for external openings while the installation is afloat.

Afloat wet tow stability is also subject to flag administration and coastal state requirements, if any. If the wet tow is unmanned, special consideration can be given for application of only intact stability criteria, subjected to the agreement from flag administration and coastal state. Use of intact stability only (without damage stability) is not acceptable if tow is manned.

11 Inclining Experiment

An inclining test is required as near to completion of the conversion as practical and prior to leaving the conversion site to determine the lightweight and positions of center of gravity (LCG, VCG and TCG) of the unit. If integration of topsides takes place offshore, an alternative procedure may be applied using an inclining test or lightweight survey of the hull combined with weighing of the topside components to be installed. An inclining test procedure is to be submitted for review prior to the test. The inclining test or lightweight survey is to be carried out in the presence of an ABS Surveyor.

Changes of onboard load conditions after the inclining test and during service are to be carefully accounted for. The operations manual is to provide guidance for the maintenance of a weight change log and is to be kept onboard.

13 Earthquakes

An earthquake of magnitude which has a reasonable likelihood of not being exceeded during the platform life to determine the risk of damage, and a rare intense earthquake to evaluate the risk of structural collapse are to be considered in the design. The earthquakes so described are herein referred to as the Strength Level Earthquakes and Ductility Level Earthquakes respectively. Structures located in seismically active areas are to be designed to possess adequate strength and stiffness to withstand the effects of strength level earthquake. They are to have sufficient ductility to remain stable during rare motions of greater severity associated with ductility level earthquake. The structural analysis acceptance criteria for steel structures are given in 3-2-3/9 and 3-2-3/11 of the *OI Rules*. The design conditions specified in 3-1-2/5.1 and 3-2-3/5 of the *OI Rules*, and the earthquake loads specified in 3-2-1/5.11 and -2-2/3.5 of the *OI Rules* are to be considered.



SECTION 4 Foundations

1 General

The provisions of [3-2-5/1](#), [3-2-5/3](#), and [3-2-5/5](#) of the *OI Rules* are to be applied, as appropriate.

3 Mat Type Foundation

The provisions of [3-2-5/9](#) of the *OI Rules* concerning foundations for gravity structures are to be applied, as appropriate. Special attention should be paid to the unit's sliding resistance when the unit sits on weak seabed soils. General seabed soil information should be obtained before the detailed geotechnical investigation is performed. This information is to be used to define an appropriately detailed geotechnical investigation.

Geotechnical investigation should include proper sampling (like the box corer method) of soft seabed soils to provide adequate soil property data for the foundation assessment. Weak soils especially at or near the seabed surface, should be dredged or preloaded prior to platform installation to provide the adequacy of foundations. The soil depth and area to be removed or the required preload are to be determined by a recognized geotechnical consultant in compliance with the foundation stability criteria.

For areas with potential seismic activity, the foundation is to be designed for sufficient strength to sustain seismic loads and [3-2-5/9](#) of the *OI Rules* is to be followed.

5 Individual Leg Footing (Spudcan) Foundation

For an individual footing, the foundation design is to be in accordance with [3-2-5/9](#) of the *OI Rules*, as appropriate. Alternatively, reference can be made to ISO 19905-1.

To apply the criteria of ISO 19905-1 Section 9, the reactions at the spudcans need to be factored by the load factors given in the ISO 19905-1 prior to assessing the foundation with the resistance factors given in the same reference. Attention is to be paid to the possibility of punching through when the platform sits on a surface with a strong soil overlying a weaker soil. The guidance given in ISO 19905-1 Section 9 can be used to assess the possibility of punch through.

For areas with potential seismic activity, the foundation is to be designed for sufficient strength to sustain seismic loads. Reference is to be made to the ISO 19905-1 Section 9.



SECTION 5 Jacking System

1 General

1.1 Jacking System not Included in Class

If non-structural items of the installation are excluded from ABS's scope of classification, and if the jacking system is only to be used during the initial jacking of the unit on site, the jacking system at a minimum is to be restricted to an examination to confirm the system's ability to raise the unit to the required elevation at the final location. The jacking system is to be examined in the presence of the Surveyor by the original equipment manufacturer or other third party inspector mutually agreeable to the Owner and the Surveyor in order to make this determination. A calculation is to be submitted confirming that the unit's final total load to be lifted does not exceed the jacking unit rated capacity.

The fixation system used to hold the unit in the elevated position is to be included in the scope of Class, as applicable.

1.3 Jacking System Included in Class

If the jacking system is kept active, giving the ability to jack up or down and holding on station, the following classification requirements are to be complied with:

- If the loads and other demands placed on the jacking system are not greater than those experienced while the platform operated as a Mobile Unit, the review can be a cursory comparison of documented capabilities versus those planned for the installation process.
- If an existing jacking system for the installation is to be replaced or upgraded, it will be subject to design review.
- The jacking system will require survey as detailed in the *MODU Rules*.

The fixation system used to hold the unit in the elevated position is to be included in the scope of Class, as applicable.



SECTION 6 Hydrocarbon Production and Process Systems

1 General

When the Hydrocarbon Production and Process systems are requested to be classed, the applicable provisions of Chapter 4 of the *Facilities Rules* are to be applied. The scope of classification is to be expanded to include:

- i) Hydrocarbon Production and/or Process systems
- ii) The related structures (e.g., flare tower and its foundation)
- iii) The individual skids and frames directly support the production equipment

Specific references to the applicable Rules and acceptance criteria for the above mentioned additional structural items are given in Section 3.

When the hydrocarbon Import and Export Systems are considered in addition to the production and processing system, the provisions of the *Riser Guide* are to be applied.



SECTION 7 Surveys

1 Surveys during Conversion

The Surveys performed during the conversion are to be carried out to the satisfaction of the attending Surveyor in accordance with this Guide and Appendix 7-2-A3 of the *MODU Rules*.

A survey is to be carried out while the unit is placed in a dry-dock facility. For the platform, or the platform structure, [Part 5, Chapter 1](#) of the *OI Rules* and Part 7, Chapter 1 of the *MODU Rules* are to be referenced.

Jacking systems are to be examined in accordance with Section 5 of this Guide.

For mat-supported units, the cylindrical leg to mat connections are to be renewed at the time of conversion unless justified by fatigue analysis. Modification, if any, to the existing connection details are to be submitted for approval.

When the Hydrocarbon Production and Process Systems are classed, Chapter 5, Section 1 of the *Facilities Rules* is to be followed.

If the Import and Export Systems are included with the Hydrocarbon Production and Process Systems, reference is to be made to Chapter 1, Section 5 of the *Riser Guide*.

3 Surveys during Installation and System Start-Up and Commissioning

Stability information for the tow to the installation site is to be verified in accordance with Section 3/9.

The criteria that apply to the installation of the platform structure are given in [Section 3-2-6 and 5-1-2/21](#) of the *OI Rules*.

If machinery systems are requested to be classed, they are to be commissioned and tested in accordance with Part 7 Chapter 1 of the *MODU Rules*.

If the Hydrocarbon Production and Process Systems are being classed, survey during system start-up and commissioning is to be carried out to the satisfaction of the attending Surveyor in accordance with Chapter 5 of the *Facilities Rules*. If the Import and Export Systems are included in the production and processing system, refer to Chapter 1 of the *Riser Guide*.

5 Surveys after Construction

Annual and periodic surveys are to be performed to maintain the classification of the OI. For the OI platform structure, reference is to be made to [5-2-1/17](#) of the *OI Rules* and Part 7, Chapter 2 of the *MODU Rules*.

For Offshore Installation Classification, reference is to be made to 3/3.3.1 and 3/3.3.2 of this Guide respectively for structures and other major considerations that are subject to annual and periodic surveys.

If the Hydrocarbon Production and Process Systems and/or Import and Export systems are included in the class notation, then annual and periodic surveys are to be performed as follows:

- For the Hydrocarbon Production and Process Systems, Chapter 5, Section 2 of the *Facilities Rules* regarding surveys for the maintenance of class is to be followed; and
- For Import and Export Systems, Chapter 1, Section 5 of the *Riser Guide* is to be followed.