



RULES FOR BUILDING AND CLASSING

FACILITIES ON OFFSHORE INSTALLATIONS 2018

**American Bureau of Shipping
Incorporated by Act of Legislature of
the State of New York 1862**

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Rule Change Notice (2018)

The effective date of each technical change since 1993 is shown in parenthesis at the end of the subsection/paragraph titles within the text of each Part. Unless a particular date and month are shown, the years in parentheses refer to the following effective dates:

(2000) and after	1 January 2000 (and subsequent years)	(1996)	9 May 1996
(1999)	12 May 1999	(1995)	15 May 1995
(1998)	13 May 1998	(1994)	9 May 1994
(1997)	19 May 1997	(1993)	11 May 1993

Listing by Effective Dates of Changes from the 2017 Rules

Notice No. 1 (effective on 1 July 2017) to the 2017 Rules, which is incorporated into the 2018 Rules, is summarized below.

EFFECTIVE DATE 1 July 2017 – shown as (1 July 2017) (based on the contract date for new construction between builder and Owner)

<i>Part/Para. No.</i>	<i>Title/Subject</i>	<i>Status/Remarks</i>
3-6/17	Ventilation	To specify that manual shutdown of ventilation is to take place from emergency control station, upon determination of a responsible operator which system(s) to shutdown, and whether selectively or simultaneously. (Incorporates Notice No. 1)

EFFECTIVE DATE 1 January 2018 – shown as (2018) (based on the contract date for new construction between builder and Owner)

<i>Part/Para. No.</i>	<i>Title/Subject</i>	<i>Status/Remarks</i>
3-8/9.3	Fire Integrity of Bulkhead and Decks	To make Fixed Installations in Chapter 4, Section 8 of the <i>Facilities Rules</i> consistent with the fire integrity requirements for Floating Installations.
3-8/Table 9B	Fire Integrity of Decks Separating Adjacent Spaces/Areas	To make Fixed Installations in Chapter 4, Section 8 of the <i>Facilities Rules</i> consistent with the fire integrity requirements for Floating Installations.
3-8/9.9	Helideck	To incorporate provisions for the use of aluminum helidecks.
3-8/9.11	Ventilation	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
3-8/Figure 6 (New)	Ventilation Ducts Penetrating "A" Class Divisions	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
3-8/Figure 7 (New)	Ventilation Ducts Penetrating "B" Class Divisions	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/9.9	Helideck	To incorporate provisions for the use of aluminum helidecks.
4-8/9.11.2	Air Balance Ducts	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/9.11.3	Ventilation Duct Material	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/9.11.4	Ventilation Ducts Passing Through "A" Class Divisions	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .

<i>Part/Para. No.</i>	<i>Title/Subject</i>	<i>Status/Remarks</i>
4-8/Figure 5 (New)	Ventilation Ducts Penetrating "A" Class Divisions	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/9.11.5	Ventilation of Machinery Spaces of Category A, Galleys and Hazardous Areas	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/9.11.6	Ventilation of Accommodation Spaces, Service Spaces or Control Stations	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/9.11.7	Ventilation Ducts Passing through "B" Class Division	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/Figure 6 (New)	Ventilation Ducts Penetrating "B" Class Divisions	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/9.11.8	Galley Ventilation	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/9.11.9	Main Inlets and Outlets	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
4-8/9.11.12 (Deleted)	Jumper Ducts	To make ventilation requirements consistent among the <i>MODU Rules</i> , Fixed Installations in Chapter 4, Section 8, and Floating Installations in Chapter 3, Section 8 of the <i>Facilities Rules</i> .
5-1/Table 1	Surveys During Construction	To be consistent with the requirements of 5-1/3.3.4ix).
A3/1.1	<No Title>	To align the requirements with ASTM F3059-15, in line with IACS, IMO, and USCG policy.
A3/5	Fire Test Requirements	To align the requirements with ASTM F3059-15, in line with IACS, IMO, and USCG policy.
A3/7	Structural Fire Integrity Test Procedures	To align the requirements with ASTM F3059-15, in line with IACS, IMO, and USCG policy.
A3/Table 1	Structural Fire Integrity Matrix	To align the requirements with ASTM F3059-15, in line with IACS, IMO, and USCG policy.

Foreword

These Rules contain the technical requirements and criteria employed by ABS in the review and survey of hydrocarbon production facilities that are being considered for Classification and for maintenance of Classification. It is applicable to Hydrocarbon Production and Processing Systems and associated utility and safety systems located on fixed (bottom-founded) offshore structures of various types. It also applies to systems installed on floating installations such as ships shape based FPSOs, tension leg platforms, spars, semisubmersibles, etc.

There are differences in the practices adopted by the designers of fixed and floating installations. Some of these differences are due to physical limitations inherent in the construction of facilities on new or converted floating installations. Recognizing these differences, the requirements for facilities on fixed and floating installations are specified in separate chapters. Chapter 3 covers requirements for facilities on floating installations and Chapter 4 covers requirements for facilities on fixed installations.

Facilities designed, constructed, and installed in accordance with the requirements of these Rules on an ABS classed fixed or floating offshore structure, under ABS review and survey, will be classed and identified in the *Record* by an appropriate classification notation as defined herein.

These Rules have been written for world-wide application and as such, compliance with individual requirements may require comprehensive data, analyses and plans to be submitted to demonstrate the adequacy of the facility. ABS acknowledges that there is a wide range of documents that may be required for submittal to satisfy these Rules. It is not the intention of these Rules to impose requirements or practices in addition to those that have previously proven satisfactory in similar situations.

Design and installation requirements presented in these Rules are based on existing methodologies and attendant safety factors that are deemed to provide an adequate level of safety. Primarily, the use of such methods and limits in these Rules reflects what is considered to be the current state of practice in the design and installation of offshore facilities. The application of these Rules by ABS will not seek to inhibit the use of any technological approach that can be shown to produce an acceptable level of safety.

These Rules are applicable to the classification of facilities for which applications, or contracts for classification, are received on or after 1 January 2018.

Changes to Conditions of Classification (1 January 2008)

For the 2008 edition, Chapter 1, "Scope and Conditions of Classification" was consolidated into a generic booklet, entitled *Rules for Conditions of Classification – Offshore Units and Structures (Part 1)* for all units, installations, vessels or systems in offshore service. The purpose of this consolidation was to emphasize the common applicability of the classification requirements in "Chapter 1" to ABS-classed offshore units, pipelines, risers, and other offshore structures, and thereby make "Conditions of Classification" more readily a common Rule of the various ABS Rules and Guides, as appropriate.

Thus, Chapter 1 of these Rules specifies only the unique requirements applicable to facilities on offshore installations. These supplemental requirements are always to be used with the aforementioned *Rules for Conditions of Classification – Offshore Units and Structures (Part 1)*.



RULES FOR BUILDING AND CLASSING

FACILITIES ON OFFSHORE INSTALLATIONS

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CHAPTER 1 Scope and Conditions of Classification (Supplement to the ABS Rules for Conditions of Classification – Offshore Units and Structures)

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CHAPTER 1 Scope and Conditions of Classification

SECTION 1 Classification (*1 January 2008*)

The requirements for conditions of classification are contained in the separate, generic *ABS Rules for Conditions of Classification – Offshore Units and Structures (Part 1)*.

Additional requirements specific to facilities on offshore installations are contained in the following Sections.



CHAPTER 1 Scope and Conditions of Classification

SECTION 2 Application, System Classification Boundaries, Symbols, and Notations (1 January 2008)

A listing of Classification Symbols and Notations available to the Owners of vessels, offshore drilling and production units and other marine structures and systems, "List of ABS Notations and Symbols" is available from the ABS website "<http://www.eagle.org>".

The following classification boundaries, symbols and notations are specific to facilities on offshore installations.

1 Scope (1 July 2012)

The requirements in the Rules are applicable to hydrocarbon production and/or processing facilities located on floating or fixed offshore installations, and apply to the following systems and associated equipment:

- Hydrocarbon Production
- Hydrocarbon Processing
- Process Support
- Process Control
- Marine Support
- Electrical
- Instrumentation and Control
- Fire Protection and Personnel Safety

The following ABS Rules and Guide, latest edition, are applicable as referenced therein for systems or services other than for the hydrocarbon production and processing facilities.

i)	<i>FPI Rules</i>	<i>ABS Rules for Building and Classing Floating Production Installations</i>
ii)	<i>Offshore Installations Rules</i>	<i>ABS Rules for Building and Classing Offshore Installations</i>
iii)	<i>Steel Vessel Rules</i>	<i>ABS Rules for Building and Classing Steel Vessels</i>
iv)	<i>MODU Rules</i>	<i>ABS Rules for Building and Classing Mobile Offshore Drilling Units</i>

Appropriate flag state and port state authorities are to be consulted for their specific requirements.

- Chapter 2 provides definitions, references, abbreviations and acronyms associated with these Rules.
- Chapter 3 covers requirements for hydrocarbon production and processing facilities on floating installations.
- Chapter 4 covers requirements for hydrocarbon production and processing facilities on fixed installations.
- Chapter 5 covers requirements for survey during and after construction.

3 Classification Boundaries (1 July 2012)

The boundaries for classification where a hydrocarbon production and/or processing facility is installed on an offshore installation are defined to include the following major items:

- i) For floating installations:
 - a) Vessel, including hull structure, equipment, and marine machinery, subject to the requirements of the *FPI Rules*.
 - b) Position Mooring System, according to the requirements of the *FPI Rules*.
 - c) Hydrocarbon Production and/or Processing Facilities (topside), according to the requirements of these Rules.
- ii) For fixed installations:
 - a) Structure, subject to the requirements of the *ABS Rules for Building and Classing Offshore Installations (OI Rules)*.
 - b) Hydrocarbon Production and/or Processing Facilities (topside), according to the requirements of these Rules.
- iii) Classification of additional equipment and systems can be provided if requested by the owner.

5 Classification Symbols

5.1 Floating Installations

For floating installations, systems which have been designed, built, installed, and commissioned in accordance with approved plans to the satisfaction of the ABS Surveyors, and which are deemed to meet the full requirements of the applicable ABS Rules and Guides, or their equivalent, where approved by the Committee, for service in specified design environmental conditions, will be classed and distinguished in the *ABS Record* by the symbols **✠ A1** followed by the appropriate notation for the system's intended service.

Floating Production, Storage and Offloading System	(FPSO)
Floating Production (and Offloading) System	(FPS)
Floating Storage and Offloading System	(FSO)

5.3 Fixed Installations

For fixed installations, systems which have been designed, built, installed, and commissioned in accordance with approved plans to the satisfaction of the ABS surveyors, and which are deemed to meet the full requirements of the applicable ABS Rules and Guides, or their equivalent, where approved by the Committee for service in specified design environmental conditions, will be classed and distinguished in the *ABS Record* by the symbols **✠ A1** followed by the appropriate notation for the system's intended service:

Offshore Installation – Hydrocarbon Processing
Offshore Installation – Hydrocarbon Production

Note: The mark **✠** (Maltese Cross) signifies that the system was built, installed, and commissioned to the satisfaction of the ABS Surveyors.

7 Systems not Built Under Survey

Installations which have not been built under ABS's survey, but which are submitted for classification, will be subject to design review and a special classification survey.

Where found satisfactory and thereafter approved by the Committee, they will be classed and distinguished in the *Record* by the symbols and special notations described above, but the mark **✠** signifying survey during construction will be omitted.

9 Conversion of Existing Vessels

Modifications of existing floating structures intended for classification as Floating Installations are required to be converted under ABS design review and survey.

11 Conversion of Existing Structures

Modifications of existing structures intended for classification as Fixed Installations are required to be converted under ABS design review and survey.



CHAPTER 1 Scope and Conditions of Classification

SECTION 3 Rules for Classification (*1 July 2012*)

1 Application

These requirements are applicable to features that are permanent in nature and can be verified by plan review, calculation, physical survey or other appropriate means. Any statement in the Rules regarding other features is to be considered as guidance to the designer, builder, owner, etc.



CHAPTER 1 Scope and Conditions of Classification

SECTION 4 Recognition of Risk Based Techniques to Justify Alternatives

1 General (1 July 2012)

The requirements detailed herein provide an alternative route for an owner to obtain and maintain ABS Class. Any alternatives to the requirements of these Rules may be specially considered by ABS on the basis of a risk assessment submitted for review.

- i) In case of such alternatives, ABS approval will be contingent upon a demonstration of fitness for purpose and equivalent level of safety in accordance with the principles of ABS Guides and Rules, as well as recognized codes and standards.
- ii) Risk acceptance criteria are to be developed in line with the principles of the ABS Rules and will be subject to ABS approval. In instances where a direct alternative recognized code or standard is used, ABS verification of compliance with the standard will be considered demonstration of fitness for purpose.
- iii) The ABS publication, *Guidance Notes on Risk Assessment Application for the Marine and Offshore Oil and Gas Industries*, provides an overview of risk assessment techniques and additional information.

3 Application (1 July 2012)

A risk-based approach may be applicable either to the installation as a whole or to individual systems, subsystems, equipment or components.

- i) The boundaries of the components and systems of the installation to which a risk-based assessment is applied are to be logical.
- ii) As appropriate, account must be given to remote hazards outside the bounds of the system under consideration. Such account is to include incidents relating to remote hazards impacting on or being influenced by the system under consideration.
- iii) ABS will consider the application of risk-based techniques in the design of the installation, surveys during construction, and surveys for maintenance of class.
- iv) Portions of the installation not included in the risk assessment are to comply with the applicable parts of the ABS Rules and Guides.
- v) The following are the responsibility of the owner/operator:
 - a) Proposed risk acceptance criteria
 - b) Hazard identification
 - c) Risk assessment
 - d) Risk mitigation and management
 - e) Compliance of the system under consideration with the applicable requirements of Flag and Coastal State

5 Submittals (*1 July 2012*)

As a minimum, the following documents are to be submitted to ABS for review and approval for classification purpose:

- i) Proposed risk acceptance criteria
- ii) Methodology for risk assessment
- iii) Details of risk assessment
- iv) Risk mitigation and/or management measures, wherever applicable

7 Risk Evaluation Methodology (*1 July 2012*)

The risk assessment is to consider the installation in all anticipated operating modes.

The designer or owner is to apply a structured and systematic risk assessment process to identify all foreseeable incidents specific to his installation, making full consideration of the likelihood of occurrence of the incidents and their consequence.

ABS review and approval of the methodology selected by the designer or owner is required.

While various techniques/methods may be applied, the Owner is to justify the suitability and appropriateness of the particular method(s) selected. Some typical methods include:

- i) Hazard and Operability Study (HAZOP)
- ii) Failure Mode and Effects Analysis (FMEA)
- iii) Failure Mode, Effects and Criticality Analysis (FMECA)
- iv) Process Hazards Analysis (PHA)
- v) Safety Reviews
- vi) Checklists
- vii) Experience from previous analyses

Where risk assessment techniques are used to cover only part of an installation, the designer or owner is to clearly define the boundary or extent of the item(s) being considered. The extent of the boundary is to subject to review and approval by ABS.

9 Identification of Hazards

The Owner is to identify and consider all hazards that may affect his Installation or any part thereof. The Owner is to apply a systematic process to identify such situations where a combination or sequence of events could lead to an Incident, with consideration given to all foreseeable causes (initiating events).

The risk assessments are to consider, at a minimum, the following:

- i) Fire and Explosion
- ii) Hydrocarbon Release
- iii) Blow-out
- iv) Structural Failure
- v) Loss of Stability
- vi) Loss of Station Keeping /Mooring
- vii) Loss of Electrical Power
- viii) Toxicity

- ix) Extreme Weather
- x) Environmental Factors.
- xi) Dropped Objects
- xii) Ship & Helicopter Collision

11 Other Requirements

Where it is intended that risk-based techniques are used as a basis for compliance with Flag and Coastal State requirements, the owner is directed to contact the Administration, either directly or through ABS, to obtain an understanding as to the extent to which the Administration is prepared to consider alternatives to such requirements. The Administration may require additional hazards to be considered.



CHAPTER 1 Scope and Conditions of Classification

SECTION 5 Submission of Plans, Data, and Calculations

A generic list of plans and data to be submitted for facilities on floating installations is included in Chapter 3, Section 2.

A generic list of plans and data to be submitted for facilities on fixed installations is included in Chapter 4, Section 2.

It should be noted that due to the varying configurations of offshore facilities, all or portions of these requirements may be applicable to a given installation.



CHAPTER 2 Definitions, References, Acronyms and Abbreviations *(1 July 2012)*

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CHAPTER 2 Definitions, References, Acronyms and Abbreviations

SECTION 1 Definitions

The following definitions, references, abbreviations and acronyms are provided to clarify the use of terms in the context of these Rules.

1ooN – (2017) One out of the number (N) of detectors in the voting system in a specific area that is in alarm

2ooN – (2017) Two out of the number (N) of detectors in the voting system in a specific area that are in alarm

Abnormal Condition – A condition which occurs in a process system when an operating variable (flow, pressure, temperature, etc.) ranges outside of its normal operating limits.

Accommodation Spaces (Living Quarters)

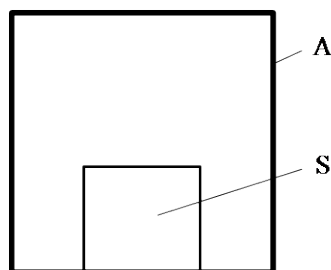
- *Spaces* used for public spaces, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, pantries containing no cooking appliances, and similar spaces.
- *Public Spaces* are those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.

Adequate Ventilation – (2017) Adequate ventilation is ventilation (natural or artificial) that is sufficient to prevent the accumulation of significant quantities of vapor-air mixtures in concentrations above 20 percent of their lower explosive limit (LEL).

Basis of Safety – (2017) The documented approach detailing the methodology used to identify and quantify hazards and the implementation of the needed safeguards to protect personnel, equipment and the environment.

Blockage Ratio – (2017) The ratio of the available cross section (A)/tested cross section (S).

FIGURE 1
Blockage Ratio (2017)



Classified Area – A location in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures (see the *MODU Rules*, API RP 500 or API RP 505 for additional details).

Closed Drains – Rigid piping drains from process components, such as pressure vessels, piping, liquid relief valves etc., to a closed drain tank without any break to atmosphere.

Completed Wells – Wells fitted with Christmas trees attached to the wellhead, such that the flow of fluids into and out of the reservoir may be controlled for production purposes.

Control Stations – Spaces containing:

- | | |
|---|--|
| i) Radio or main navigation equipment | vi) Fire recording or fire control equipment |
| ii) Central Process Control Rooms | vii) Fire-extinguishing system serving various locations |
| iii) Dynamical positioning control system | viii) Emergency source of power |
| iv) Centralized ballast control station | ix) CO ₂ Bottle Room |
| v) Battery Room | x) Fire Pumps |

Corridors – Passageways, generally with rooms or compartments opening onto them. For the fire protection purposes, lobbies are considered parts of corridors.

Critical Equipment – Refers to vessels, machinery, piping, alarms, interlocks, and controls determined by management to be vital in preventing the occurrence of a catastrophic release.

Divisions – Divisions formed by bulkheads and decks which are constructed of steel or other equivalent material, suitably stiffened, and designed to withstand and prevent the passage of smoke and flame for the duration of the one-hour standard fire test. Divisions are classified as follows:

- i) “A” *Class Divisions* – Insulated with approved non-combustible materials such that the average temperature of the unexposed side will not rise more than 139°C (250°F) above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180°C (324°F) above the original temperature, within the time listed below:

Class “A-60”: 60 minutes

Class “A-30”: 30 minutes

Class “A-15”: 15 minutes

Class “A-0”: 0 minutes

This division is to remain intact with the main structure of the vessel, and is to maintain its structural integrity after one (1) hour. *Structural Integrity* means that the structure will not fall under its own weight, nor will it crumble or break upon normal contact after exposure to the fire.

- ii) “B” *Class Divisions* – Divisions formed by bulkheads, decks, ceilings or linings which are designed to withstand and prevent the passage of flame for at least the first half hour of the standard fire test. They are to have an insulation value such that the average temperature of the unexposed side will not rise more than 139°C (250°F) above the original temperature, nor will the temperature at any one point, including any joint, rise more than 225°C (405°F) above the original temperature, within the time listed below:

Class “B-15”: 15 minutes

Class “B-0”: 0 minutes

“B” class divisions, unless specified in the design, are not required to be load bearing or maintain their structural integrity beyond 30 minutes of exposure. The only requirement outside of the design specification is to prevent the passage of flames for 30 minutes and maintain thermal requirements as described above.

- iii) “C” *Class Divisions* – Divisions constructed of approved non-combustible materials. They need meet neither requirement relative to the passage of smoke and flame, nor limitations relative to the temperature rise. The only requirement is that they do not add to the fire.

- iv) “H” *Class Divisions* – (2017) Divisions formed by bulkheads and decks that are constructed of steel or other equivalent material, suitably stiffened, and are designed to withstand and prevent the passage of smoke and flame for the 120-minute duration of a hydrocarbon fire test for H rated divisions. “H” class divisions are to be insulated so that a) the average temperature of the unexposed face will not increase by more than 139°C (250°F) above the initial temperature within the time listed below, and b) the temperature at any point on the unexposed face, including any joint, will not increase more than 180°C (324°F) above the initial temperature, within the time listed below:

Class “H-120”: 120 minutes

Class “H-60”: 60 minutes

Class “H-0”: 0 minutes

This division is to remain intact with the main structure of the vessel, and is to maintain its structural integrity after two (2) hours. Structural Integrity means that the structure will not fall under its own weight, nor will it crumble or break upon normal contact after exposure to the fire.

Penetration systems through H rated divisions are to be subjected to a hydrocarbon fire test for H rated divisions as noted above. The temperature rise is to be no more than 180°C (324°F) above the initial temperature for the time rating of system (i.e., 60 minutes for H-60).

- v) “J” Class Divisions – (2017) Divisions formed by bulkheads and decks that are constructed of steel or other equivalent material, suitably stiffened, and are designed to withstand and prevent the passage of smoke and flame for the duration of a jet fire test for J rated divisions. “J” class divisions are to be insulated so that a) the average temperature of the unexposed face will not increase by more than 139°C (250°F) above the initial temperature within the times are listed below, and b) the temperature at any point on the unexposed face, including any joint, rise more than 180°C (324°F) above the initial temperature during the fire test within the times are listed below:

Class “J-120”: 120 minutes

Class “J-60”: 60 minutes

Class “J-15”: 15 minutes

Penetration systems through J rated divisions are to be subjected to a jet fire test for J rated divisions as noted above. The temperature rise is to be no more than 180°C (324°F) at any point on the unexposed face above the initial temperature for the time rating of system (i.e., 30 minutes for J-30).

Escape Route – This is a designated path used by personnel to evade an immediate danger and ultimately leads to a temporary refuge or muster station.

Explosive Mixture – A vapor-air or gas-air mixture that is capable of being ignited by an ignition source that is at or above the ignition temperature of the vapor-air or gas-air mixture.

Fire Wall – A wall designed and constructed to remain structurally intact under the effects of fire and insulated so that the temperature on the unexposed side will remain below a specified temperature for a determined amount of time.

Fired Vessel – A vessel in which the temperature of the fluid is increased by the addition of heat supplied by a flame within the vessel. Specifically for hydrocarbon services, there are two (2) types of fired vessels:

- i) **Direct Fired Vessel** – A vessel in which the temperature of process hydrocarbon fluids is increased by the addition of heat supplied by a flame. The flame is applied directly to the fluid container. The combustion takes place in the heater.
- ii) **Indirect Fired Vessel** – A vessel in which the energy is transferred from an open flame or product of combustion (such as exhaust gases from turbines, engines, or boilers) to the hydrocarbon, through a heating medium, such as hot oil. The heating medium is usually non-combustible or has a high flash point. The combustion may, but does not necessarily, take place in the heater.

Fixed Installation – A bottom-fixed offshore facility permanently affixed to the sea floor. The term includes, but is not limited to, fixed platforms, guyed towers, jack-ups, converted fixed installations, etc.

Flammable Fluid – Any fluid, regardless of its flash point, capable of feeding a fire, is to be treated as **Flammable Fluid**. Aviation fuel, diesel fuel, hydraulic oil (oil based), lubricating oil, crude oil and hydrocarbon, are to be considered flammable fluids.

Flash Point – The minimum temperature at which a combustible liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid or within the vessel used, as determined by the test procedure and apparatus specified in NFPA 30. **Ignitable Mixture** means a mixture that is within the flammable range (between the upper and lower limits) and is therefore capable of propagation of flame away from the source of ignition.

Floating Installation – An offshore facility designed to provide hydrocarbon processing and/or hydrocarbon storage, and offload hydrocarbons. The term *Floating Installation* is used to generically identify a buoyant facility that is site-specific. This installation is securely and substantially moored so that it cannot be moved without a special effort. The term includes, but not limited to Tension Leg Platforms (TLP), Spar Buoy, Permanently Moored Shipshape Hulls and Semisubmersibles.

Hazardous Area – See “Classified Area”.

High Integrity Pressure Protection System (HIPPS) – An efficient option to replace a mechanical safety device; an example is a pressure safety valve, with instruments, valves and logic.

Hydrocarbon – Organic compounds of hydrogen and carbon, whose densities, boiling points, and freezing points increase as their molecular weights increase. Although composed of only two elements. Hydrocarbons exist in a variety of compounds because of the strong affinity of the carbon atom for other atoms and for itself. The smallest molecules of hydrocarbons are gaseous; the largest are solids. Petroleum is a mixture of many different hydrocarbons.

Hydrocarbon Fire Test for H Rated Divisions – (2017) A test in which specimens of the relevant bulkheads or decks are exposed, in a test furnace, to temperatures corresponding to the hydrocarbon fire time-temperature curve as defined by the U.K. Department of Energy/Norwegian Petroleum Directorate Interim Hydrocarbon Fire Resistance Test for Elements of Construction for Offshore Installations. The testing set up is to follow the arrangements as given in the FTP Code, Annex 1, Part 3. Penetration through H rated divisions are to be tested in accordance with the above listed standards.

Hydrocarbon Fire Test for Insulation for Structural Steel – (2017) A test in which specimens of steel structural elements are exposed to flame immersion, in a test furnace, in accordance with ISO TR 834-3 using the hydrocarbon time temperature curve as defined by the U.K. Department of Energy/Norwegian Petroleum Directorate Interim Hydrocarbon Fire Resistance Test for Elements of Construction for Offshore Installations.

Ignition Temperature – The minimum temperature required, at normal atmospheric pressure, to initiate the combustion of an ignitable mixture.

Inert Gas – A gaseous mixture, such as flue gas, containing insufficient oxygen to support the combustion of hydrocarbons.

Insulation for Structural Steel – (2017) Materials which are used to preserve the structural strength of steel when exposed to a hydrocarbon (pool) fire for a given time and maximum allowable temperature. The thickness requirements of the insulation material will be based on the following criteria: a) Maximum temperature of the steel during the time of protection, b) The duration of protection, and c) The physical arrangement of the steel; this is given as a ratio of the heated perimeter of a cross section of the structural element (beam or hollow section) over the area of the cross section of the structural element (H_p/A ratio).

The rating of the insulation is to be given as follows: HC / Structural Steel / “critical temperature” (degrees centigrade) / “period of resistance” (minutes). For example: HC / Structural Steel / 400 / 60 means that structural steel would be no more than a 400°C temperature rise in 60 minutes when exposed to a hydrocarbon (pool) fire.

Interim Class Certificate – A temporary representation to classification. The *Interim Class Certificate* is generally issued by the Surveyor attending commissioning of the facility and verification of compliance with these Rules. Issuance of an Interim Class Certificate is subject to the terms and conditions found therein.

Jet Fire – (2017) A fire resulting from the combustion of a flammable fluid continuously released under pressure with some significant momentum in a particular direction or directions. The flammable fluid (fuel) can be one phase (gaseous or liquid) or two phase (both gaseous and liquid). This type of fire is usually fueled by hydrocarbons; however, any flammable fluid can produce a jet fire.

Jet Fire Rating for Insulation on Structural Steel – (2017) Materials which are used to preserve the structural strength of steel when exposed to a jet fire for a given time and maximum allowable temperature. The thickness requirements of the insulation material will be based on the following criteria: a) Maximum allowable temperature of the steel, b) The duration of protection required, and c) The physical arrangement of the steel this is given as a ratio of the heated perimeter of a cross section of the structural element (beam or hollow section) over the area of the cross section of the structural element (Hp/A ratio).

The rating of the insulation is to be given as follows: JF / Structural Steel / “critical temperature” (degrees centigrade) / “period of resistance” (minutes). For example: JF / Structural Steel / 300 / 30 means that structural steel would see no more than a 300°C temperature rise in 30 minutes when exposed to an ISO 22899 jet fire.

Jet Fire Test for Insulation for Structural Steel – (2017) A test of the insulation material is tested as per ISO 22899 with the web as noted in Part 1, section 6.7. Tests without the web cannot be used to show that the insulation material is acceptable or to provide data points for a linear regression. The duration of jet fire testing can range from 15 minutes (minimum) and upward with no maximum.

Jet Fire Test for J Rated Divisions – (2017) A test of the insulation material is tested as per ISO 22899. Tests without the web (as noted in Part 1, section 6.7) can be accepted; however, the material can then only be used on flat plate construction (i.e., cannot be used on corrugated divisions). The duration of jet fire testing can range from 15 minutes (minimum) and upward with no maximum.

Penetrations for use through a J rated fire division are to be tested in a webless fire recirculation box such that the jet fire directly impinges upon the penetration system. Thermocouples on the penetration are to be located as per the Fire Test Procedures Code, Annex 1, Part 3 as appropriate.

Joiner Arrangement – Construction details showing the combination of all structural fire protection materials. For example, a detail showing the connection of the ceilings to decks, ceilings to bulkheads, bulkheads to bulkheads, bulkhead construction details, deck construction details, etc.

Jumper Ducts – Openings in bulkheads (usually in the top half) used for air balance or return air.

Lower Explosive Limit (L.E.L.) – The lowest concentration of combustible vapors or gases, by volume in mixture with air, which can be ignited at ambient conditions.

Machinery Spaces of Category A are spaces, and trunks to such spaces, which contain:

- i) Internal combustion engine(s) used for main propulsion; or
- ii) Internal combustion engine(s) used for other purposes where such machinery has, in the aggregate, a total power, or combined rating of 375 kW (500 hp) or more; or
- iii) Any oil-fired boiler or oil fuel unit

Manned Facility – A facility with permanent occupied living accommodations or one that requires continuous presence of personnel for more than 12 hours in successive 24-hour periods.

Marine Support Systems – For floating installations, those functions required for maintaining the normal operations of a vessel (or MODU), such as power generation, propulsion, navigation, HVAC, water treating, etc.

These functions are neither directly nor indirectly related to the hydrocarbon production and process systems.

Non-ducted Return – Means of re-circulating conditioned air back to the air handler without the use of a dedicated duct.

Open Drains – Gravity drains from sources which are at or near atmospheric pressure, such as open deck drains, drip pan drains, and rain gutters.

Operating Conditions – A set of conditions (i.e., flowrates, compositions, temperatures and pressures) chosen for normal operation of a production facility at a particular point in the life of an oil or gas field.

Other Machinery Spaces (versus Machinery Spaces of Category A) – All spaces, other than machinery spaces of Category A, containing machinery, boilers and other fired processes, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air-conditioning machinery and similar spaces; and trunks to such spaces.

Pad Gas – Gas added to the vapor space of a vessel or tank to prevent an explosive or ignitable vapor-air mixture from forming.

Process Areas – Areas where processing equipment is located. This includes wellhead/manifold areas.

Process Design Conditions – A set of conditions used to design process components and systems.

Process Support Systems – Utility and auxiliary systems that complement the hydrocarbon production and process systems. A typical list of such systems is included in Chapter 3, Section 4 and Chapter 4, Section 4. These systems do not directly handle hydrocarbons.

Produced Fluids – Fluids coming out of completed wells, which may consist of oil, water, gas, and condensable vapor.

Production Facilities – For the purpose of these Rules, *Production Facilities* are typically the processing, safety and control systems, utility and auxiliary equipment, for producing hydrocarbon liquid and gas mixtures from completed wells or other sources.

These facilities are generally inclusive from the inlet flange of the well fluid flowline above the water level to the point at which the departing pipeline enters the water. The facilities also include the safe disposal and/or collection of produced oil, gases and water.

For a floating installation with the storage and offloading capability to shuttle tanker, the production facility is terminated at the inlet flange discharge into the storage tank. The storage tank and offloading piping/electrical systems arrangement are considered marine systems.

Sanitary and Similar Spaces – Communal sanitary facilities such as showers, baths, lavatories, etc., and isolated pantries containing no cooking appliances. Sanitary facilities which serve a space and with access only from that space are to be considered a portion of the space where they are located.

Service Spaces (High Risk) – Lockers, storerooms, and working spaces in which flammable materials are stored, such as galleys, pantries containing cooking appliances, paint rooms and workshops other than those forming part of the machinery space.

Service Spaces (Low Risk) – Lockers, storerooms, and working spaces in which flammable materials are not stored, such as drying rooms and laundries.

Severe Environment – An environment in which regularly occurring conditions of wind, sea condition, ice, etc., would impede the orderly evacuation of an offshore facility.

Shut-in Condition – A condition resulting from a shutting-in of the facility (See API RP 14C) caused by the occurrence of one or more undesirable events.

Shut-in Tubing Pressure (SITP) – Pressure exerted by the well due to closing of the master valve.

Stairways – Interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto. In this context, a stairway which is enclosed only at one level is to be regarded as part of the space from which it is not separated by a fire door. Stairways penetrating only one level are required to be enclosed in “A” class bulkheads at one level. If penetrating more than one level, the requirement is for complete enclosure at all levels.

Standard Fire Test – A test in which specimens of the relevant bulkheads or decks are exposed in a test furnace to temperatures corresponding to the standard time-temperature curve and as defined by Annex 1 of Part 3 of the IMO Fire Test Procedures (FTP) Code.

Steel or Equivalent Material – For any material or combination of materials to be considered as equivalent to steel, the following four requirements are to be met:

- i) *Non combustibility*: The material is to be tested to the applicable section of the FTP Code, and approved as such.
- ii) *Integrity against the passage of flame of smoke*: The material is to be tested to the IMO FTP A.754(18) standards, and approved as such.
- iii) *Smoke and Toxicity*: The material is to be tested to the IMO FTP standard, and approved as such.
- iv) *Structural Integrity*: Based on its area of use, whether required to be load bearing or maintaining integrity, the material is to perform similarly to steel in similar situations. (For example, if required to be “A” class, material is to remain stable after the standard fire test of one hour.)

Suitably Stiffened – Stiffened according to requirements of the IMO FTP Code. When suitably stiffened, a bulkhead may be considered to be “A” class without having to be tested. If, however, a bulkhead is not stiffened according to the requirement of the IMO FTP Code, the bulkhead is to be tested.

Transient Condition – A temporary and short-lived condition (such as a surge) that usually does not cause an upset condition.

Upset Condition – A condition that occurs in a process component or system when an operating variable deviates substantially from its normal operating limits. If left unchecked, this condition can result in a threat to safety and may cause shutting-in of the process.

Ventilation – Adequate – Natural or artificial ventilation that is sufficient to prevent the accumulation of significant quantities of explosive mixtures in concentrations above 25% of their lower explosive limit (LEL).

Well Characteristics – The conditions of a well or reservoir defined by depth, temperature, shut-in pressure, flow rate, well fluid composition, etc.

Well Fluid Properties – The properties of a particular fluid stream defined by gas-oil ratio, flowing pressure and temperature, viscosity, density (API Gravity), composition, etc.

Zone – (2017) A defined area within the protected premises. An area from which a signal can be received, an area to which a signal can be sent or an area in which a form of control can be executed.

Zone Boundary – (2017) An approach limit at a distance from a zone within which there is an increased risk of hazards due to the crossing of gases beyond the limit. A structural component designed to contain fire to a specified space within a zone.



CHAPTER 2 Definitions, References, Acronyms and Abbreviations

SECTION 2 References

1 References (2014)

In addition to the ABS Rules, and Guides as listed in 1-2/1, the additional requirements of the following Guides, codes or standards are referenced in these Rules:

- *ABS Guidance Notes on Review and Approval of Novel Concepts (Novel Concepts Guide)*
- *ABS Guide for Risk Evaluations for the Classification of Marine-Related Facilities*
- *ABS Guidance Notes on Risk Assessment Applications for the Marine and Offshore Oil and Gas Industries*
- *ABS Guide for Well Test Systems*
- *ABS Guide for Certification of Lifting Appliances*
- *ABS Guide for Surveys Using Risk-Based Inspections for the Offshore Industry (RBI Guide)*
- *ABS Guide for Surveys Based on Reliability-Centered Maintenance (RCM Guide)*
- *AISC – American Institute of Steel Construction*
- *ANSI – American National Standards Institute*
- *API – American Petroleum Institute*
- *ASME – American Society of Mechanical Engineers*
- *ASNT – American Society for Nondestructive Testing*
- *ASTM – American Society for Testing and Materials*
- *AWS – American Welding Society*
- *ICEA – Insulated Cable Engineers Association*
- *IEC – International Electrotechnical Commission*
- *IEEE – Institute of Electrical and Electronic Engineers*
- *IACS – International Association of Classification Societies*
- *ISA – International Society of Automation*
- *ISO – International Organization for Standardization*
- *NACE – National Association of Corrosion Engineers*
- *NEMA – National Electrical Manufacturers Association*
- *NFPA – National Fire Protection Association*
- *TEMA – Tubular Exchangers Manufacturers Association*

ABS is prepared to consider other recognized codes, standards, alternative design methodology and industry practice, on a case-by-case basis, with justifications as indicated in Chapter 1, Section 4 of these Rules.



CHAPTER 2 Definitions, References, Acronyms and Abbreviations

SECTION 3 Acronyms and Abbreviations

1 Acronyms and Abbreviations (2014)

The following acronyms and abbreviations are used in these Rules:

- BPVC Boiler and Pressure Vessel Code
- CoC Certificate of Conformity
- ESD Emergency Shutdown
- FMEA Failure Modes and Effects Analysis
- FMECA Failure Modes and Effects Criticality Analysis
- FGS Fire and Gas Detection & Alarm System
- F&G Fire and Gas
- H₂S Hydrogen Sulfide
- HAZOP Hazard and Operability
- HAZID Hazard Identification
- HIPPS High Integrity Process Protection Systems
- HVAC Heating, Ventilation and Air Conditioning System
- ITP Inspection and Test Plans
- LEL Lower Explosive Limits
- LSL Level Safety Low
- MAC Manufacturer's Affidavit of Compliance
- MAC Manual Call Point
- MTR Material Test Report
- NDE Nondestructive Examination
- P&ID Piping and Instrumentation Diagram
- PSH Pressure Safety High
- PSV Pressure Safety Valve
- PQR Procedure Qualification Records
- RT Radiographic Examination
- SAC Safety Analysis Checklist
- SAFE Safety Analysis Function Evaluation
- SAT Safety Analysis Tables
- SSV Surface Safety Valve

- USV Underwater Safety Valve
- UT Ultrasonic Examination
- UTS Ultimate Tensile Strength
- WPS Welding Procedure Specifications

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CHAPTER 3 Floating Installations

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CHAPTER 3 Floating Installations

SECTION 1 General

1 Scope (1 July 2012)

This Chapter defines the minimum criteria for ABS Class applicable to hydrocarbon production and processing systems, subsystems and equipment on floating installations. See 1-2/1 of these Rules for Scope and Conditions of Classification.

Terms, definitions, references, abbreviations and acronyms, used in this Chapter are defined in Chapter 2.

3 Applicability

The requirements described in this chapter are applicable to facilities on floating installations of various configurations that provide hydrocarbon production and processing services. These services may include:

- Well fluid de-pressurization
- Phase separation
- Fluid cleaning, treatment and stabilization
- Dehydration
- Compression
- Reinjection
- Transfer
- Storage
- Metering
- Off-loading of processed hydrocarbon

5 Conditions of Classification

Refer to the *ABS Rules for Conditions of Classification – Offshore Units and Structures (Part 1)* and Chapter 1 of these Rules for information on Classification.

7 Design Considerations (1 July 2012)

7.1 Recognized Standards

The submitted design is to be in accordance with the requirements of the Rules and the specified codes and/or standards as referenced herein.

- i) Designs complying with other international or national standards not listed in Appendix 4 will be subject to special consideration in accordance with Chapter 1, Section 4 of these Rules.
- ii) ABS advises the designer/manufacturer to contact the ABS Technical office early in the design phase for acceptance of alternate design codes and/or standards.
- iii) When alternate design codes and/or standards are proposed, justifications can be achieved through equivalency, gap analysis or appropriate risk analysis/philosophy to demonstrate that the proposed alternate design code and standard will provide an equivalent level of safety to the recognized standards as listed in Appendix 4 and are required to be performed in accordance with Chapter 1, Section 4 of these Rules.

7.3 Alternative Basis of Design

Designs based on manufacturer's standards may also be accepted. In such cases, complete details of the manufacturer's standard and engineering justification are to be submitted for review.

- i) The manufacturer will be required to demonstrate by way of testing or analysis that the design criteria employed results in a level of safety consistent with that of a recognized standard or code of practice.
- ii) Where strain gauge testing, fracture analysis, proof testing or similar procedures form a part of the manufacturer's design criteria, the procedure and results are to be submitted for ABS review.
- iii) Historical performance data for production or process systems, subsystems, equipment or components is to be submitted for justification of designs based on manufacturer's standards.
- iv) ABS will consider the application of risk evaluations for alternative or novel features for the basis of design in accordance with Chapter 1, Section 4 of these Rules, as applicable.

7.5 Design Conditions

The production and process systems, subsystems, equipment, and/or components are to be designed to account for all applicable environmental, operational, and test loads, or combination thereof. These include, but are not limited to, the following:

- i) Environmental Conditions, as applicable
 - Earthquake
 - Ice
 - Current, waves
 - Wind
 - Temperature
 - 1, 10, 50, 100 year storm event, as applicable
- ii) Operational
 - Static pressure
 - Transient pressure excursion
 - Temperature excursion
 - Fluid static head and properties
 - Tension
 - Bending
 - Vibration
 - Acceleration loads due to movement of installation
- iii) Transportation
- iv) Installation
- v) Commissioning
- vi) Test Loads



CHAPTER 3 Floating Installations

SECTION 2 Design Plans and Data

1 Submissions of Design Plans and Data (1 July 2012)

The following sections describe the design plans and data submission requirements for ABS classing of floating installations and associated hydrocarbon production and processing systems, subsystems, equipment and/or components.

- i) 3-2/Table 1 and 3-2/3 through 3-2/23, as applicable, identifies the hydrocarbon production and processing systems, subsystems, equipment and/or components that require approval for ABS Classification of the floating installations.
- ii) The submitted design plans and data are to be in accordance with the requirements of these Rules and the latest edition of the specified codes and/or standards, as referenced herein and Appendix 4, from contract date.
- iii) The design plans and data, as specified in these Rules, are to be generally submitted electronically to ABS. However, hard copies will also be accepted.
- iv) All plan submissions originating from designers or manufacturers are understood to be made with the knowledge of the main contracting party.
- v) For production and processing systems, subsystems, equipment or components not listed in 3-2/Table 1 or 3-2/3 through 3-2/23, the designers or manufacturers should contact the appropriate ABS Technical Office for guidance on technical and survey requirements and completion of the approval process.
- vi) All plan submissions originating from manufacturers are understood to be made with the cognizance of the main contracting party. A fee may be charged for the review of plans that are not covered by the contract of Classification.

It should be noted that due to the varying configurations of offshore production facilities, portions of these requirements may not be applicable to a given installation.

TABLE 1
Design Plans and Data Submission Requirements (2014)

ABS technical documentation requirements for classing facilities on floating installations:

- 1. Facility Documentation**
 1. Project Specifications
 2. General Arrangement and Equipment Layout Drawings
 3. Area Classification and Ventilation Drawings

TABLE 1 (continued)
Design Plans and Data Submission Requirements (2014)

- 2. Hydrocarbon Production and Processing Systems**
 1. Process Flow Sheets
 2. Heat and Mass Balance
 3. Piping and Instrument Diagrams (P & ID's) for all facility systems and subsystems
 4. Safety Analysis Function Evaluation (SAFE) Charts
 5. Packaged Process Units
 6. Process Equipment Documentation
 7. Process Piping Specifications
 8. Pressure Relief and Depressurization Systems
 9. Flare and Vent Systems
 10. Spill Containment, Closed and Open Drain Systems
 11. Sub-sea Production Systems (Optional)
- 3. Process Support Systems**
 1. Piping and Instrument Diagrams (P & ID's) for each system or subsystem
 2. Equipment Documentation
 3. Process Support Piping Specifications
 4. Internal-Combustion Engines and Turbines
 5. Cranes (Optional)
- 4. Marine Support Systems**

See 4-6-1/9 of the *Steel Vessel Rules* and 4-2-1/7 of the *MODU Rules*, as applicable
- 5. Electrical Installations**
 1. Electrical One-line Diagrams
 2. Short-Circuit Current Calculations
 3. Coordination Study
 4. Specifications and Data Sheets for Generators and Motors
 5. Specifications and Data Sheets for Distribution Transformers
 6. Details of Storage Batteries
 7. Details of Emergency Power Source
 8. Standard Details of Wiring Cable and Conduit Installation Practices
 9. Switchboard and Distribution Panel
 10. Panelboard
 11. Installations in Classified Areas

TABLE 1 (continued)
Design Plans and Data Submission Requirements (2014)

- 6. Instrumentation and Control Systems**
 1. General Arrangements
 2. Data Sheets
 3. Schematic Drawings – Electrical Systems
 4. Schematic Drawings – Hydraulic and Pneumatic Systems
 5. Programmable Electronic Systems
 6. FMEA or FMECA for Computer-Based Systems
- 7. Fire and Gas Detection Systems**
 1. FGS Layout Drawings
 2. Cause and Effects Charts
 3. Detector Certificates
 4. Installation Inspection Log
 5. Maintenance Records (including test and calibration)
- 8. Fire Protection and Personnel Safety**
 1. Firewater System
 2. Water Spray (Deluge) Systems for Process Equipment
 3. Foam Systems for Crude Storage Tanks
 4. Fixed Fire Extinguishing Systems
 5. Paint Lockers and Flammable Material Storerooms
 6. Emergency Control Stations
 7. Portable and Semi-Portable Extinguishers
 8. Structural Fire Protection (which indicates classification of all bulkheads for: quarters section, machinery spaces and processing facilities)
 9. HVAC plan (including AHU location, duct layout, duct construction and bulkhead penetration details)
 10. Joiner detail arrangement and structural fire protection material certification
 11. Guard Rails
 12. Escape and Egress Routes (may be included on the fire control plan or separate plan)
 13. Muster Stations
 14. Lifesaving Appliances and Equipment Plan (escape routes must be indicated)
 15. Insulation of Hot Surfaces
- 9. Specific Arrangements**
 1. Arrangements for Storage Tank Venting and Inerting
 2. Arrangements for Use of Produced Gas as Fuel
- 10. Start-up and Commissioning Manual**
- 11. Topsides Structure and Structural Arrangements**

3 Details (1 July 2012)

Plans and data for equipment and components are to provide the following, as applicable:

- i) Model and size
- ii) Design specifications, including design codes, standards, and references
- iii) Design parameters: loads, temperature, environmental conditions, etc.
- iv) Design analysis and/or calculations, as applicable
- v) Dimensional details and drawings
- vi) Fabrication details and welding configurations
- vii) Material specifications and material properties

5 Facility Documentation (1 July 2012)

5.1 Project Specifications

Project specifications are to provide the following, but not limited to:

- i) Brief descriptions of field location
- ii) Environmental conditions
- iii) Well shut-in pressure
- iv) Well fluid properties
- v) Production plans
- vi) Hydrocarbon (oil/gas) storage and
- vii) Hydrocarbon (oil/gas) transportation arrangements

5.3 General Arrangement and Equipment Layout Drawings

General arrangement and layout drawings are to show:

- i) Arrangements and locations of living quarters, control rooms, and machinery spaces, including all entrances, exits and openings to these spaces
- ii) Arrangements and locations of machinery, process equipment, cargo storage, etc.

5.5 Area Classifications and Ventilation Drawings

- i) Plans for area classifications and ventilation are to show; as applicable:
 - Extent of all Class I, Division 1 and 2, areas and spaces; or
 - Extent of all Class 1, Zone 0, Zone 1 and Zone 2 areas and spaces
- ii) Arrangements for ventilation of enclosed spaces, and
 - Locations of all ventilation inlets and outlets, with respect to the hazardous areas
 - Locations of all entrances, exits and openings, with respect to the hazardous areas

5.7 Escape and Egress Route

Plans showing all escape and egress route on the complete facility.

5.9 Muster Locations

Plans showing all muster locations on the complete facility.

7 Hydrocarbon Production and Process Systems (1 July 2012)

7.1 General

To evaluate the process safety system, the assumptions as made by the designers and as provided in the following documents are to be submitted:

- Project Specification – See 3-2/5.1
- Process Flow Sheets – See 3-2/7.3
- Heat and Mass Balance – See 3-2/7.5

Although these documents will not be approved by ABS, they are critical to approval of the facility, and are to be kept for reference throughout the design review process.

7.3 Process Flow Sheets

Process flow sheets are to identify the following, as a minimum:

- i) Each process stream
- ii) Process equipment
- iii) Planned addition
- iv) Symbols used

7.5 Heat and Mass Balance

Heat and mass balance specifications for each process stream under normal operating and upset conditions are to include the following, as a minimum:

- i) Flow rate
- ii) Composition
- iii) Conditions (temperature, pressure, and vapor/liquid ratio)

7.7 Piping and Instrument Diagrams (P & ID's)

P & ID's diagrams showing:

- i) Design, and operating conditions
- ii) Designation and size of all major process equipment
- iii) Piping class specifications (designation and size) for:
 - Piping
 - Valves
 - Pipe fittings and in-line equipment/components such as strainers, filters, etc.
 - Sensing and control instrumentation,
- iv) Shutdown and pressure relief devices with set points specified
- v) Signal circuits
- vi) Set points for controllers
- vii) Continuity of all line pipes
- viii) Boundaries of skid units and process packages

Safety Analysis Function Evaluation (S.A.F.E.) Charts (see 3-2/7.9) are preferably to be submitted in conjunction with the P & ID's.

7.9 Safety Analysis Function Evaluation (S.A.F.E.) Charts and Cause and Effect Matrix

7.9.1 S.A.F.E. Chart

S.A.F.E. chart is to list all process systems, subsystems, equipment, components and associated emergency support systems with their required instruments, controls, safety devices, and is to list the functions to be performed by each device. See API RP 14C and API RP 14J.

7.9.2 Cause and Effect Matrix

Cause and Effect Matrix establishes the relation between the causes of a hazardous event and the effects of that event. Cause-and-Effect Matrix is to list all causes and the associated resulting effect or event. Cause-and-Effect Matrix can also uncover the interdependencies between the initiating causes and the resultant event or events (effect). Cause and Effect Matrix can be in the form of table, chart, or diagram format.

7.11 Packaged Process Units (2017)

Packaged process units include, but are not limited to, the following:

- Dehydration
- Separation
- Sweetening
- Stabilizing
- Vapor recovery
- Gas compression for fuel or re-injection.
- Water Injection
- CO₂ Injection

Documentation requirements for packaged process units include:

- i) Skid arrangements and assembly drawings
- ii) P & ID's – See 3-2/7.7
- iii) S.A.F.E. charts and Cause and Effect Matrix – See 3-2/7.9
- iv) Process equipment documentation – See 3-2/7.13
- v) Process piping system documentation – See 3-2/7.15
- vi) Pressure relief and depressurization systems – See 3-2/7.17
- vii) Electrical one-line diagrams – See 3-2/13.1
- viii) Control schematics – See 3-2/15.5
- ix) Structural design calculations for skid units in dry condition with a center of gravity height of more than 1.5 m (5 ft.), or a maximum operating weight in excess of 10 MT (metric tons) or 22.05 Kips.

7.13 Process Equipment Documentation

Complete design specifications including, but not limited to, the following documents for verification of compliance to recognized codes and/or standards for equipment as listed in 3-2/Table 2, as applicable.

- i) Equipment technical specifications
- ii) Design data (data sheets) such as pressure, temperature, corrosion allowances, service conditions, external loads etc.
- iii) Design calculations or analysis
- iv) Details of pressure relief arrangement
- v) Dimensional details/drawings covering arrangements and details
- vi) Corrosion allowances
- vii) Material specifications
- viii) Weld details and welding procedure specifications and qualifications
- ix) Extent and method of non-destructive testing
- x) Test pressure
- xi) Factory acceptance test procedures

TABLE 2
Major Equipment Plans/Calculations and Technical Documentation
for Class Requirements (2016)

	A	B	C
HYDROCARBON PRODUCTION PROCESS SYSTEMS and EQUIPMENT			
Production/Process Pressure Vessels	X		
Fired Vessels	X		
Heat Exchangers	X		
Storage Tanks	X		
Meters, Strainers, Filters, And Other Fluid Conditioners			
< 254 mm (10 in.) and 10.54 kg/cm ² (150 psi)		X	
≥ 254 mm (10 in.) or 10.54 kg/cm ² (150 psi)	X		
Pumps			
< 7 kg/cm ² (100 psi) and 757 liters/min (200 gpm)		X	
≥ 7 kg/cm ² (100 psi) or 757 liters/min (200 gpm)	X		
Compressors			
< 7 kg/cm ² (100 psi) and 28.3 m ³ /min (1000 scfm) or < 100 kW (134 hp)		X	
≥ 7 kg/cm ² (100 psi) or 28.3 m ³ /min (1000 scfm) or ≥ 100 kW (134 hp)	X		
Couplings/Gears			
< 100 kW (134 hp)		X	
≥ 100 kW (134 hp)	X		
Flowlines and Manifolds	X		
Scraper Launchers/Receivers	X		
Packaged Process Units	X		
Flare Systems	X		
Subsea Systems	X		
PROCESS SUPPORT SYSTEMS and EQUIPMENT			
Pressure Vessels			
< 7 kg/cm ² (100 psi) and 93.3°C (200°F)		X	
≥ 7 kg/cm ² (100 psi) or 93.3°C (200°F)	X		
Heat Exchangers			
< 7 kg/cm ² (100 psi) and 93.3°C (200°F)		X	
≥ 7 kg/cm ² (100 psi) or 93.3°C (200°F)	X		
Pumps			X
Air Compressors		X	
Engines and Turbines			
< 100 kW (134 hp)		X	
≥ 100 kW (134 hp)	X		
Couplings/Gears			
< 100 kW (134 hp)		X	
≥ 100 kW (134 hp)	X		
Compressors			
< 100 kW (134 hp)		X	
≥ 100 kW (134 hp)	X		
Packaged Support Systems			
< 7 kg/cm ² (100 psi) and 93.3°C (200°F)		X	
≥ 7 kg/cm ² (100 psi) or 93.3°C (200°F)	X		

TABLE 2 (continued)
Major Equipment Plans/Calculations and Technical Documentation
for Class Requirements (2016)

	A	B	C
MARINE SUPPORT SYSTEMS and EQUIPMENT			
All systems, subsystems, equipment and components are to comply with ABS <i>Steel Vessel Rules</i> or ABS <i>MODU Rules</i>			
ELECTRICAL SYSTEMS and EQUIPMENT			
Generators			
< 100 kW (134 hp)			X
≥ 100 kW (134 hp)	X		
Motors			
< 100 kW (134 hp)			X
≥ 100 kW (134 hp)	X		
Distribution Transformers			X
Switchboard, MCC, Panelboards	X		
Storage Batteries	X		
INSTRUMENT AND CONTROL SYSTEMS			
Control Panels	X		
FIRE PROTECTION & SAFETY SYSTEMS and EQUIPMENT			
Fire Pumps		X	
Fire Pump Skid Package	X		
Couplings/Gears			
< 100 kW (134 hp)		X	
≥ 100 kW (134 hp)	X		
Compressors			
< 100 kW (134 hp)		X	
≥ 100 kW (134 hp)	X		
Alarm Panels		X	
Fixed Fire Extinguishing Systems (Nozzles, Controls, Bottles, etc.)	X		
Fire and Gas Detection Systems (Sensors, Panel, Cables, etc.)	X		
EQUIPMENT SKID STRUCTURE			
For modules that require design review, see 3-3/7 and 3-2/7.11	X		

Index

- A Technical specifications, data sheets, dimensional details/drawings, design calculations/analysis, including manufacturer's affidavit of compliance are to be submitted for ABS Engineering review.
- B Manufacturer's affidavit of compliance to the applicable codes and/or standards are to be submitted to the satisfaction of the ABS Surveyor.
- C Documentations are to be verified by the attending Surveyor at the location of installation

7.15 Process Piping Specifications

Process piping line list including, but not limited to, the following:

- i) Design specifications such as pressure rating, temperature rating, service rating, etc.
- ii) Pipe and fitting material lists
- iii) Sizes

7.17 Pressure Relief and Depressurization Systems

Pressure relief valves and depressurization systems plans and data including, but not limited to:

- i) Design and capacity calculations
- ii) Sizes and arrangements
- iii) Set points
- iv) Materials

7.19 Flare and Vent System

Flare and vent system details including, but not limited to:

- i) Sizing and arrangements
- ii) Gas dispersion analysis including basis of analysis
- iii) Radiant heat intensities
- iv) Design calculations for blow-down rates
- v) Water seals and gas purging systems
- vi) Knockout drum sizing details
- vii) Details of flare tips
- viii) Details of pilots
- ix) Details for ignition system
- x) Details of pressure relief and depressurizations systems

In the case of proprietary flare tips, validation reports to supplement the radiant heat intensity values are to be specified and submitted.

7.21 Spill Containment, Closed and Open Drain Systems

Arrangements for spill containment, details of piping connections to all process equipment, and slope of drains are to be specified and submitted.

7.23 Subsea Production Systems (Optional)

Provide plans and data for subsea production systems including, but not limited to, the following:

- i) Stress calculations for structural components
- ii) P & ID's – See 3-2/7.7
- iii) S.A.F.E. charts – See 3-2/7.9
- iv) Equipment technical specifications and data sheets – See 3-2/7.13
- v) Control schematics – See 3-2/15.5
- vi) Assembly drawings
- vii) Installation and operation procedures

7.25 Nonstandard Components (2017)

Components not manufactured to a recognized national standard may be considered for acceptance based on manufacturers' specified pressure and temperature ratings and on presenting evidence, such as design calculations or type test data, that they are suitable for the intended purpose as per relevant codes and standards.

9 Process Support Systems (*1 July 2012*)

As defined in Chapter 2, Section 1 of these Rules, process support systems are utility and auxiliary systems that complement the hydrocarbon production and process systems.

These systems do not handle hydrocarbons, but serve and support the hydrocarbon production and process operations, or the drilling operations, as applicable.

A typical list of process support systems includes, but is not limited to, the following:

- i) Utility/Instrument Air System
- ii) Fuel/Instrument Gas System
- iii) Purging System
- iv) Use of Produced Gas as Fuel
- v) Inert Gas Supply
- vi) Fuel Oil System
- vii) Hydraulic System
- viii) Chemical Injection System
- ix) Material Handling System (Cranes) (Optional)
- x) Drilling Systems
- xi) Heating & Cooling Systems

Plans and data requirements for process support systems are as follows.

9.1 Piping and Instrument Diagrams (P & ID's)

Piping and Instrument Diagrams (P & ID's) for each process support system. See 3-2/7.7.

9.3 Equipment Documentation

Equipment technical specifications, for each process equipment such as pressure vessels, heat exchangers, pumps and compressors. See 3-2/7.13.

9.5 Piping Specifications

Submit specifications, materials, sizes, and pressure ratings for all pipes, valves and fittings, and calculations for pipe wall thickness. See 3-2/7.15.

9.7 Internal-Combustion Engines and Turbines

Technical specifications for internal-combustion engines and turbines including, but not limited to, the following:

- i) Types
- ii) Horsepower
- iii) Rated speed/revolutions per minute
- iv) Shutdown arrangements
- v) Manufacturer's affidavit of compliance verifying compliance with recognized standards

9.9 Cranes (Optional)

Technical specifications for cranes including, but not limited to, the following:

- i) Dimensional details/drawings
- ii) Structural design calculations

- iii) Load rating chart
- iv) Test certificates for wire rope

9.11 Nonstandard Components (2017)

Components not manufactured to a recognized national standard may be considered for acceptance based on manufacturers' specified pressure and temperature ratings and on presenting evidence, such as design calculations or type test data, that they are suitable for the intended purpose as per relevant codes and standards.

11 Marine Support Systems (1 July 2012)

Submissions are to be as required by the applicable parts of the *Steel Vessel Rules* or *MODU Rules*. See Chapter 2 for "Marine Support Systems" definition.

Typical marine support systems include, but are not limited to, the following:

- Steam Systems
- Power Generation
- Fuel Oil and Lube Oil
- Fresh Water
- Ballast and Bilge Systems
- Cargo Handling System
- Sea Water System
- Propulsion and/or Thruster Systems
- Steering Gear System
- Sewage Treatment System
- Helicopter Refueling System
- Integral Cargo Storage Tank Venting System
- Drainage System
- Inert Gas Supply
- Oil Fired Inert Gas Generator

13 Electrical Systems

13.1 Electrical One-Line Diagrams

Electrical one-line diagrams are to indicate, but not limited to, the following:

- i) Ratings of generators, transformers, motors, and other loads
- ii) Rated load current of each branch circuit
- iii) Type and size and temperature rating of cables
- iv) Rating or settings of circuit breakers, fuses, and switches
- v) Interrupting capacity of switchgear, motor control centers, and distribution panels

13.3 Short-circuit Current Calculations

To establish that the protective devices have sufficient short-circuit breaking and making capacities, data is to be submitted giving:

- i) The maximum calculated short-circuit current in symmetrical r.m.s. and asymmetrical peak values available at the main bus bars,
- ii) The maximum allowable breaking and making capacities of the protective device.
- iii) Similar calculations are to be made at other points in the distribution system where necessary, to determine the adequacy of the interrupting capacities of protective devices.

13.5 Coordination Study

A protective device coordination study is to be submitted and to include the following:

- i) The protective device coordination study is to consist of an organized time-current study of all protective devices in series.
- ii) The study is to be from the utilization equipment to the source for all circuit protection devices having different settings or time-current characteristics.
- iii) Where an over-current relay is provided in series and is adjacent to the circuit protection device, the operating and time-current characteristics of the relay are to be considered for coordination.

13.7 Specifications and Data Sheets for Generators and Motors

13.7.1 100 kW and Over

For generators and motors of 100 kW (134 hp) and over, submit the following:

- i) Assembly drawings
- ii) Seating arrangements
- iii) Terminal arrangements
- iv) Designed ambient temperature, temperature rise
- v) Data for complete rating, and class of insulation
- vi) Shafts, coupling, coupling bolts, stator and rotor details
- vii) Weights and speeds for rotating parts

13.7.2 Less than 100 kW

For generators and motors under 100 kW (134 hp), submit nameplate data along with degree of enclosure.

13.9 Specifications and Data Sheets for Distribution Transformers

Submit the following documents for transformers:

- i) Rating
- ii) Class of insulation
- iii) Rated ambient temperature
- iv) Rated temperature rise
- v) Details of enclosure and standard to which manufactured

Test reports in accordance with the standard of construction are to be made available upon request.

13.11 Details of Storage Batteries

Details of storage batteries are to include, but not limited, the following:

- i) Arrangement
- ii) Ventilation
- iii) Corrosion protection
- iv) Types and capacities
- v) Conductors and charging facilities
- vi) Over-current protection
- vii) Reverse current protection