Power Generation Units

November 2018
NR 656 DT R00

Rule Note

RULES & GUIDANCE NOTES

BUREAU VERITAS MARINE & OFFSHORE

GENERAL CONDITIONS

1. INDEPENDENCE OF THE SOCIETY AND APPLICABLE TERMS

1.1 The Society shall remain at all times an independent contractor and neither the Society nor any of its officers, employees, servants, agents or subcontractors shall be or act as an employee, servant or agent of any other party hereto in the performance of the Services.

1.2 The operations of the Society in providing its Services are exclusively conducted by way of random inspections and do not, in any circumstances, involve monitoring or exhaustive verification.

1.3 The Society acts as a services provider. This cannot be construed as an obligation bearing on the Society to obtain a result or as a warranty. The Society is not and may not be considered as an underwriter, broker in Unit's sale or chartering, expert in Unit's valuation, consulting engineer, controller, naval architect, designer, manufacturer, shipbuilder, repair or conversion yard, charterer or shipowner; none of them above listed being relieved of any of their expressed or implied obligations as a result of the interventions of the Society.

1.4 The Society only is qualified to apply and interpret its Rules.

1.5 The Client acknowledges the latest versions of the Conditions and of the applicable Rules applying to the Services' performance.

1.6 Unless an express written agreement is made between the Parties on the applicable Rules, the applicable Rules shall be the Rules applicable at the time of entering into the relevant contract for the performance of the Services.

1.7 The Services' performance is solely based on the Conditions. No other terms shall apply whether express or implied.

2. DEFINITIONS

2.1 **"Certificate(s)"** means classification or statutory certificates, attestations and reports following the Society's intervention.

2.2 **"Certification"** means the activity of certification in application of national and international regulations or standards, in particular by delegation from different governments that can result in the issuance of a Certificate.

2.3 **"Classification"** means the classification of a Unit that can result or not in the issuance of a classification Certificate with reference to the Rules. Classification is an appraisement given by the Society to the Client, at a certain date, following surveys by its surveyors on the level of compliance of the Unit to the Society's Rules or to the documents of reference for the Services provided. They cannot be construed as an implied or express warranty of safety, fitness for the purpose, seaworthiness of the Unit or of its value for sale, insurance or chartering.

2.4 **"Client"** means the Party and/or its representative requesting the Services.

2.5 **"Conditions"** means the terms and conditions set out in the present document.

2.6 **"Industry Practice"** means international maritime and/or offshore industry practices.

2.7 **"Intellectual Property"** means all patents, rights to inventions, utility models, copyright and related rights, trade marks, logos, service marks, trade dress, business and domain names, rights in trade dress or get-up, rights in goodwill or to sue for passing off, unfair competition rights, rights in designs, rights in computer software, database rights, topography rights, moral rights, rights in confidential information (including know-how and trade secrets), methods and protocols for Services, and any other intellectual property rights, in each case whether capable of registration, registered or unregistered and including all applications for and renewals, reversions or extensions of such rights, and all similar or equivalent rights or forms of protection in any part of the world.

2.8 **"Parties"** means the Society and Client together.

2.9 **"Party"** means the Society or the Client.

2.10 **"Register"** means the public electronic register of ships updated regularly by the Society.

2.11 **"Rules"** means the Society's classification rules and other documents. The Society's Rules take into account at the date of their preparation the state of currently available and proven technical minimum requirements but are not a standard or a code of construction neither a guide for maintenance, a safety handbook or a guide of professional practices, all of which are assumed to be known in detail and carefully followed at all times by the Client.

2.12 **"Services"** means the services set out in clauses 2.2 and 2.3 but also other services related to Classification and Certification such as, but not limited to: ship and company safety management certification, ship and port security certification, maritime labour certification, training activities, all activities and duties incidental thereto such as documentation on any supporting means, software, instrumentation, measurements, tests and trials on board. The Services are carried out by the Society according to the applicable referential and to the Bureau Veritas' Code of Ethics. The Society shall perform the Services according to the applicable national and international standards and Industry Practice and always on the assumption that the Client is aware of such standards and Industry Practice.

2.13 **"Society"** means the classification society **'Bureau Veritas Marine & Offshore SAS'**, a company organized and existing under the laws of France, registered in Nanterre under number 821 131 844, or any other legal entity of Bureau Veritas Group as may be specified in the relevant contract, and whose main activities are Classification and Certification of ships or offshore units.

2.14 **"Unit"** means any ship or vessel or offshore unit or structure of any type or part of it or system whether linked to shore, river bed or sea bed or not, whether operated or located at sea or in inland waters or partly on land, including submarines, hovercrafts, drilling rigs, offshore installations of any type and of any purpose, their related and ancillary equipment, subsea or not, such as well head and pipelines, mooring legs and mooring points or otherwise as decided by the Society.

3. SCOPE AND PERFORMANCE

3.1 Subject to the Services requested and always by reference to the Rules, the Society shall:

- review the construction arrangements of the Unit as shown on the documents provided by the Client;
- conduct the Unit surveys at the place of the Unit construction;
- class the Unit and enter the Unit's class in the Society's Register;
- survey the Unit periodically in service to note whether the requirements for the maintenance of class are met.

The Client shall inform the Society without delay of any circumstances which may cause any changes on the conducted surveys or Services.

3.2 The Society will not:

- declare the acceptance or commissioning of a Unit, nor its construction in conformity with its design, such activities remaining under the exclusive responsibility of the Unit's owner or builder;
- engage in any work relating to the design, construction, production or repair checks, neither in the operation of the Unit or the Unit's trade, neither in any advisory services, and cannot be held liable on those accounts.

4. RESERVATION CLAUSE

4.1 The Client shall always: (i) maintain the Unit in good condition after surveys; (ii) present the Unit for surveys; and (iii) inform the Society in due time of any circumstances that may affect the given appraisement of the Unit or cause to modify the scope of the Services.

4.2 Certificates are only valid if issued by the Society.

4.3 The Society has entire control over the Certificates issued and may at any time withdraw a Certificate at its entire discretion including, but not limited to, in the following situations: where the Client fails to comply in due time with instructions of the Society or where the Client fails to pay in accordance with clause 6.2 hereunder.

4.4 The Society may at times and at its sole discretion give an opinion on a design or any technical element that would 'in principle' be acceptable to the Society. This opinion shall not presume on the final issuance of any Certificate or on its content in the event of the actual issuance of a Certificate. This opinion shall only be an appraisal made by the Society which shall not be held liable for it.

5. ACCESS AND SAFETY

5.1 The Client shall give to the Society all access and information necessary for the efficient performance of the requested Services. The Client shall be the sole responsible for the conditions of presentation of the Unit for tests, trials and surveys and the conditions under which tests and trials are carried out. Any information, drawing, etc. required for the performance of the Services must be made available in due time.

5.2 The Client shall notify the Society of any relevant safety issue and shall take all necessary safety-related measures to ensure a safe work environment for the Society or any of its officers, employees, servants, agents or subcontractors and shall comply with all applicable safety regulations.

6. PAYMENT OF INVOICES

6.1 The provision of the Services by the Society, whether complete or not, involve, for the part carried out, the payment of fees thirty (30) days upon issuance of the invoice.

6.2 Without prejudice to any other rights hereunder, in case of Client's payment default, the Society shall be entitled to charge, in addition to the amount not properly paid, interests equal to twelve (12) months LIBOR plus two (2) per cent as of due date calculated on the number of days such payment is delinquent. The Society shall also have the right to withhold Certificates and other documents and/or to suspend or revoke the validity of Certificates.

6.3 In case of dispute on the invoice amount, the undisputed portion of the invoice shall be paid and an explanation on the dispute shall accompany payment so that action can be taken to solve the dispute.

7. LIABILITY

7.1 The Society bears no liability for consequential loss. For the purpose of this clause consequential loss shall include, without limitation:

- Indirect or consequential loss;
- Any loss and/or deferral of production, loss of product, loss of use, loss of bargain, loss of revenue, loss of profit or anticipated profit, loss of business and business interruption, in each case whether direct or indirect.

The Client shall defend, release, save, indemnify, defend and hold harmless the Society from the Client's own consequential loss regardless of cause.

7.2 Except in case of wilful misconduct of the Society, death or bodily injury caused by the Society's negligence and any other liability that could not be, by law, limited, the Society's maximum liability towards the Client is limited to one hundred and fifty per-cents (150%) of the price paid by the Client to the Society for the Services having caused the damage. This limit applies to any liability of whatsoever nature and howsoever arising, including fault by the Society, breach of contract, breach of warranty, tort, strict liability, breach of statute.

7.3 All claims shall be presented to the Society in writing within three (3) months of the completion of Services' performance or (if later) the date when the events which are relied on were first discovered by the Client. Any claim not so presented as defined above shall be deemed waived and absolutely time barred.

8. INDEMNITY CLAUSE

8.1 The Client shall defend, release, save, indemnify and hold harmless the Society from and against any and all claims, demands, lawsuits or actions for damages, including legal fees, for harm or loss to persons and/or property tangible, intangible or otherwise which may be brought against the Society, incidental to, arising out of or in connection with the performance of the Services (including for damages arising out of or in connection with opinions delivered according to clause 4.4 above) except for those claims caused solely and completely by the gross negligence of the Society, its officers, employees, servants, agents or subcontractors.

9. TERMINATION

9.1 The Parties shall have the right to terminate the Services (and the relevant contract) for convenience after giving the other Party thirty (30) days' written notice, and without prejudice to clause 6 above.

9.2 In such a case, the Classification granted to the concerned Unit and the previously issued Certificates shall remain valid until the date of effect of the termination notice issued, subject to compliance with clause 4.1 and 6 above.

9.3 In the event where, in the reasonable opinion of the Society, the Client is in breach, or is suspected to be in breach of clause 16 of the Conditions, the Society shall have the right to terminate the Services (and the relevant contracts associated) with immediate effect.

10. FORCE MAJEURE

10.1 Neither Party shall be responsible or liable for any failure to fulfil any term or provision of the Conditions if and to the extent that fulfilment has been delayed or temporarily prevented by a force majeure occurrence without the fault or negligence of the Party affected and which, by the exercise of reasonable diligence, the said Party is unable to provide against.

10.2 For the purpose of this clause, force majeure shall mean any circumstance not being within a Party's reasonable control including, but not limited to: acts of God, natural disasters, epidemics or pandemics, wars, terrorist attacks, riots, sabotages, impositions of sanctions, embargoes, nuclear, chemical or biological contaminations, laws or action taken by a government or public authority, quotas or prohibition, expropriations, destructions of the worksite, explosions, fires, accidents, any labour or trade disputes, strikes or lockouts.

11. CONFIDENTIALITY

11.1 The documents and data provided to or prepared by the Society in performing the Services, and the information made available to the Society, are treated as confidential except where the information:

- is properly and lawfully in the possession of the Society;
- is already in possession of the public or has entered the public domain, otherwise than through a breach of this obligation;
- is acquired or received independently from a third party that has the right to disseminate such information;
- is required to be disclosed under applicable law or by a governmental order, decree, regulation or rule or by a stock exchange authority (provided that the receiving Party shall make all reasonable efforts to give prompt written notice to the disclosing Party prior to such disclosure.

11.2 The Parties shall use the confidential information exclusively within the framework of their activity underlying these Conditions.

11.3 Confidential information shall only be provided to third parties with the prior written consent of the other Party. However, such prior consent shall not be required when the Society provides the confidential information to a subsidiary.

11.4 Without prejudice to sub-clause 11.1, the Society shall have the right to disclose the confidential information if required to do so under regulations of the International Association of Classifications Societies (IACS) or any statutory obligations.

12. INTELLECTUAL PROPERTY

12.1 Each Party exclusively owns all rights to its Intellectual Property created before or after the commencement date of the Conditions and whether or not associated with any contract between the Parties.

12.2 The Intellectual Property developed by the Society for the performance of the Services including, but not limited to drawings, calculations, and reports shall remain the exclusive property of the Society.

13. ASSIGNMENT

13.1 The contract resulting from to these Conditions cannot be assigned or transferred by any means by a Party to any third party without the prior written consent of the other Party.

13.2 The Society shall however have the right to assign or transfer by any means the said contract to a subsidiary of the Bureau Veritas Group.

14. SEVERABILITY

14.1 Invalidity of one or more provisions does not affect the remaining provisions.

14.2 Definitions herein take precedence over other definitions which may appear in other documents issued by the Society.

14.3 In case of doubt as to the interpretation of the Conditions, the English text shall prevail.

15. GOVERNING LAW AND DISPUTE RESOLUTION

15.1 These Conditions shall be construed and governed by the laws of England and Wales.

15.2 The Parties shall make every effort to settle any dispute amicably and in good faith by way of negotiation within thirty (30) days from the date of receipt by either one of the Parties of a written notice of such a dispute.

15.3 Failing that, the dispute shall finally be settled under the Rules of Arbitration of the Maritime Arbitration Chamber of Paris ("CAMP"), which rules are deemed to be incorporated by reference into this clause. The number of arbitrators shall be three (3). The place of arbitration shall be Paris (France). The Parties agree to keep the arbitration proceedings confidential.

16. PROFESSIONAL ETHICS

16.1 Each Party shall conduct all activities in compliance with all laws, statutes, rules, economic and trade sanctions (including but not limited to US sanctions and EU sanctions) and regulations applicable to such Party including but not limited to: child labour, forced labour, collective bargaining, discrimination, abuse, working hours and minimum wages, anti-bribery, anti-corruption, copyright and trademark protection, personal data protection (https://personaldataprotection.bureauveritas.com/privacypolicy).

Each of the Parties warrants that neither it, nor its affiliates, has made or will make, with respect to the matters provided for hereunder, any offer, payment, gift or authorization of the payment of any money directly or indirectly, to or for the use or benefit of any official or employee of the government, political party, official, or candidate.

16.2 In addition, the Client shall act consistently with the Bureau Veritas' Code of Ethics. https://group.bureauveritas.com/group/corporate-social-responsibility

RULE NOTE NR 656

NR 656

Power Generation Units

November 2018

Section 1 General

Section 2 POWERGEN Notations

SECTION 1 GENERAL

1 General

1.1 Application

1.1.1 This Rule Note applies to marine units (ships and/or offshore units) fitted with power generation equipment to serve as a power generation resource connected to the electricity grid:

- marine units complying with the requirements of this Rule Note are hereafter referred to as support unit, as defined in [3.1.3]
- power generation equipment is hereafter referred to as power plant, as defined in [3.1.4].

1.2 Scope

1.2.1 The requirements of this Rule Note cover the power plant and its interface with the support unit. There are to be considered in addition to the Rules applicable to the support unit according to [2], [3.1.1] and [3.1.2]:

- the interface between power plant and support unit
- the steel structure of the power plant
- the arrangement of the power plant
- the piping process safety features and mechanical integrity connected to the power plant
- the monitoring and control of the power plant
- the fire safety features of the power plant
- the electrical installations.

2 Classification

2.1 Additional service features POWERGEN

2.1.1 Support units may be assigned with one of the notations defined in [2.1.2] provided that the support unit is granted with a relevant service notation defined in one of the applicable Rules listed in [3.1.1] or [3.1.2].

2.1.2 Support units complying with the requirement of this Rule Note are granted one of the following additional service features:

- **POWERGEN(OIL)** when the power plant use fuel oil as fuel
- **POWERGEN(LNG/NG)** when the power plant use natural gas (NG) or liquefied natural gas (LNG) as fuel
- **POWERGEN(DUALFUEL)** when the power plant use both oil and gas as fuel.

The requirements for the assignment of these additional service features are given in Sec 2.

2.2 Document to be submitted for information and/or approval

2.2.1 Documents and drawings to be submitted to the Society for granting one of the notation **POWERGEN** are listed in Tab 1.

No additional or duplication of documents are required to be submitted when technical contents are already presented and included in typical standard documentation requested for the assignment of a service notation (see [3.1.1] and [3.1.2]) to the support unit.

3 Definitions

3.1

3.1.1 Ship rules

Ship Rules means Society Rules for the Classification of Steel Ships (NR467).

For the purpose of this Rule Note, the applicable requirements of the Ship Rules are those for ships greater than 65 m in length.

When reference is made to the Ship Rules, the latest version of these ones is applicable.

Note 1: The service notations to be assigned to a ship are defined in Pt A, Ch 1, Sec 2 of the Ship Rules

3.1.2 Offshore Rules

Offshore Rules means Society Rules for the Classification of Offshore Units (NR445).

When reference is made to the Offshore Rules, the latest version of these ones is applicable.

Note 1: The service notations to be assigned to an offshore unit are defined in Pt A, Ch 1, Sec 2 of the Offshore Rules

3.1.3 Support unit

The support unit is a ship or a offshore unit, whose purpose is to support the power plant. It may also be used for storage of cargo, ballast and production liquids. In addition, there are dedicated machinery spaces provided for essential generators, etc.

The support unit also includes

- the living quarters, which are to be designed and built in accordance with the relevant requirements for superstructures given in the Ship Rules.
- the supports for pertinent features of hull structure design, for example, hull topsides supports and foundations. Depending on the supporting arrangement, the interface point may be the bearing and sliding supports of the topside modules.

3.1.4 Power plant

The power plant is that part of the floating unit which contains equipment necessary for the electrical generation.

The definition of the power plant may include:

- power generation skid
- process equipment for power generation and export power systems
- spaces below the weather deck containing equipment necessary for the electrical generation.

3.1.5 Export power system

The export power system is that part of the power plant which allows to collect and transform the electrical power produced and to deliver it to the shore grid.

Table 1 : Document to be submitted

No.	A/I	Documents
1	I	General arrangement of power plant
2	I	General arrangement of the support unit including power plant layout
3	A	Power plant steel structure drawings and details
4	I	Process flow diagrams (PFD)
5	A	Piping and instrument diagrams (PID)
6	I	Power generation operational philosophy (includes process and safety)
7	A	Single line diagram including power export system (see [3.1.5])
8	I	Operational and maintenance manual
9	I	List of local authority applicable regulations (if any)
10	A	Hazardous area plans
11	I	Risks assessment and analysis study reports
12	A	Fire and gas detection and alarm systems
13	A	Safety cause and effect diagram and chart
14	A	Passive and active fire protection systems (including hull deck and regasification plant)
15	A	Escape route and evacuation plan
16	A	Detailed diagrams of the electrical installations of unit
17	I	Electrical power balance (main and emergency supply)
18	A	Architecture diagram of the automation systems
19	I	ESD philosophy arrangement

Note 1: A = to be submitted for approval
I = to be submitted for information.

Note 2: The Society may require additional documents and plans based on project scenario and operational philosophy.

SECTION 2 POWERGEN NOTATIONS

1 Application

1.1

1.1.1 Units intended to be assigned with the additional service feature **POWERGEN(OIL)** are to comply with the requirement of Articles [2], [3] and [5.1].

1.1.2 Units intended to be assigned with the additional service feature **POWERGEN(LNG/NG)**, or **POWERGEN(DUALFUEL),** are to comply with the requirements listed in [1.1.1], Article [4] and [5.2] for specific requirements for gas fuelled installations.

2 General requirements

2.1 Identified risk and hazards

2.1.1 A risk analysis is to be performed to validate the arrangement of the power plant and support unit, and to determine the accidental loads that the equipment and the systems are capable to withstand. The required analysis can be a HAZID or HAZOP analysis, a FMEA analysis or another type of analysis providing equivalent information.

Relevant hazard and risks scenarios (which might not be addressed by recognized code and Rule) are to be identified. Such risks might include but are not limited to:

- electrical system (arc discharge)
- electromagnetic fields
- fire and explosion
- blackout.

2.2 Layout / arrangement of the unit

2.2.1 The layout of the power plant is to be designed giving due consideration to the safety of personnel, prevention potential pollution, environmental impact and protection of floating unit.

2.2.2 The arrangement and layout of the power plant are to be considered in view of fire and explosion hazards, depending on the size and complexity of the plant, as well as its location, in relation to the accommodations, escape routes, shelters and evacuation facilities.

The escape routes and the emergency procedures of the power plant are to be coordinated and concur with the requirements concerning the power station itself, and the floating unit emergency escape procedures.

2.2.3 Adequate provisions and arrangement should be made to facilitate safe access for control, cleaning and inspection on various places on a regular basis during normal operation of power generation.

Arrangement should be made such that there is safe access at all times to valves that may need to be handled in normal operation.

2.2.4 According to the results of the HAZID and HAZOP study required in [2.1.1] and [4.2.1], arrangement is to be made to have adequate lighting and ventilation when deemed necessary.

2.3 Structure

2.3.1 The steel structure of the power plant is to be designed and strengthened so as to support component weight and relevant forces including weather and sea dynamic motions.

The local strength of the structure is to be assessed according to recognised methods, codes or standards to the satisfaction of the Society. Strength of plating under pressure loads is to be separately evaluated, using recognised codes or standards to the satisfaction of the Society.

Strength of lattice type structures is to be assessed using codes or standards recognised by the Society.

Note 1: e.g. ANSI/AISC 360 - Specification for structural steel buildings.

2.3.2 Structural elements for which fatigue is a probable mode of failure are to be adequately designed to resist the effects of cumulative damage caused by repeated application of fluctuating stresses.

The predominant cause of fluctuating stresses leading to crack propagation and fatigue failure is normally wave loading. However, other sources of cyclic loads such as wind, rotating machinery or cranes may also induce significant fatigue loadings and are to be given due consideration where relevant.

2.3.3 The power plant is to be protected from external forces and impact such as green seas and dropped objects as relevant.

2.3.4 Based on fire and explosion risk analysis and study findings outcome according to [2.1.1] mitigation of risk of explosion to other places might require fitting of an insulated fire rated steel bulkhead.

2.4 Piping process safety features, mechanical integrity

2.4.1 Piping systems are to comply with the provisions of Pt C, Ch 1, Sec 10 of the Ship Rules.

2.4.2 Piping systems are to be protected against over pressure and against undesired temperature.

2.4.3 Piping systems are to be in accordance with arrangement of fire safety features defined in [2.6.1].

2.4.4 Process cause and effect chart is to meet minimum requirement of rule monitoring and control system including process shut down and emergency shutdown philosophy.

2.5 Monitoring and control

2.5.1 In addition to local indication, monitoring are to be located in areas that are always easily accessible, typically control station, control room and navigation bridge.

2.6 Fire safety features

2.6.1 General

Enclosed power plant installations are to be considered as a "Machinery spaces of category A", as defined in the requirement of Pt C, Ch 4, Sec 1, [3.2.1] of the Offshore Rules.

Arrangement of fire safety features is to comply with the requirements of Part C, Chapter 4 and Pt D, Ch 1, Sec 13 of the Offshore Rules.

2.6.2 Risk assessment

When relevant, the findings of risk assessment study required in [2.1] are to be considered and implemented on design and drawings which are listed on Sec 1, Tab 1.

2.6.3 Hazardous area

Hazardous areas are to be defined according to Pt C, Ch 4, Sec 3 of the Offshore Rules. Electrical equipment, wiring and cables are not to be installed in hazardous areas unless they are of an approved "safe type" suitable for the relevant flammable atmosphere and for shipboard use.

2.6.4 Escape routes

At least two different escape routes are to be provided from each space or group of spaces in the power plant.

Escape routes are to be protected against fire and sources of excessive heat.

Where the main escape route is located in the fore part of the unit, arrangements are to be made to minimize the effect of green water on this escape route.

2.6.5 Fire alarm and communication system

The fire signalling system or plant communication system should provide the following:

- plant-wide audible fire alarm or voice communication systems, or both, for purposes of personnel evacuation and alerting of plant emergency organization. The plant public address system, if provided, should be available on a priority basis
- two-way communications for the plant emergency organization during emergency operations.

2.6.6 Indoor transformers

Enclosed or Semi-enclosed transformers are to be protected by A-60 divisions, as defined in Offshore Rules.

In addition, a fire-extinguishing system, as defined in Pt C, Ch 4, Sec 6, [4.1] of the Offshore Rules and complying with the requirements of Pt C, Ch 4, Sec 11 of the Offshore Rules is to be installed for transformer's protection.

2.6.7 Steam Generator

Boiler front fire protection systems are to be designed to cover the fuel oil burners and igniter and adjacent fuel oil piping and cable a 6,1 m distance from the burner and igniter, including structural members and walkways at these levels. Additional coverage is to include areas where oil can collect. Sprinkler and water spray systems are to be designed for a density of 10,2 L/min/m^2 over the protected area.

Compressed air foam systems are to be designed and installed in accordance with recognised standard (e.g. NFPA11 - Standard for low-, medium-, and high-expansion foam), and their listing for the specific hazards and protection objectives specified in the listing.

2.6.8 Turbine generator

All areas beneath the turbine-generator operating floor that are subject to oil flow, oil spray, or oil accumulation are to be protected by an automatic sprinkler or foam-water sprinkler system. This coverage normally includes all areas beneath the operating floor in the turbine building. The sprinkler system beneath the turbine-generator is to take into consideration obstructions from structural members and piping and is to be designed to a density of 12,2 L/min/m^2 over a minimum application of 464 m^2.

Lubricating oil lines above the turbine operating floor are to be protected with an automatic sprinkler system covering those areas subject to oil accumulation including the area within the turbine lagging (skirt). The automatic sprinkler system is to be designed to a density of 12,2 L/min/m^2.

3 Electrical installations

3.1 General

3.1.1 The electrical installation of the floating unit is to be divided in three functional subsystems:

- export power system which comprises the electrical generation and all high voltage equipment necessary to collect and transform the electrical power produced and to deliver it to the shore grid (See [3.1.2])
- main power system as defined in [3.2.1]
- emergency power system as defined in [3.3.1].

3.1.2 The export power system is not covered by Classification unless specified by the interested Party and agreed with the Society.

3.2 Main power system

3.2.1 The main power system is to be capable to supply all electrical services necessary for operating safely the unit within the design operational conditions and for maintaining the habitable conditions, whatever the status of the main power system and without recourse to the emergency power system. The main power system is to satisfy the requirements stipulated in Ships Rules or Offshore Rules, as applicable, for the main source of electrical power.

3.2.2 The capacity of the main power system is to be sufficient to start or to restore the export power system.

3.2.3 For non-propelled units permanently moored to a jetty during export power operations, the main source of electrical power may consist of a unique generating set. The loss of this generating set is not to lead to an unsafe situation. This scenario is to be taken into account during the risk analysis defined in [2.1].

3.2.4 During normal operation, the main distribution system may be supplied by the export power system.

3.3 Emergency power system

3.3.1 The emergency power system of the floating unit is to be capable to supply all those services that are essential for safety in an emergency in the event of outage of the main power system. The emergency power system is to satisfy the requirements stipulated in Ships Rules or Offshore Rules for the emergency source of electrical power.

3.4 Arrangement principles

3.4.1 Installation is to be segregated in order to minimize potential hazard overlay.

3.4.2 Areas of high risk potential are to be separated from areas of low risk potential.

3.4.3 The export power system is to be located in a non-hazardous area and as far as practicable is not to be enclosed by hazardous areas.

3.4.4 The arrangement of equipment of the export power system such as generators, electrical substation, power transformers and transmission lines is to be chosen taking into consideration:

- meteorological and oceanographic conditions
- functional and operational requirements
- maintenance and repair requirements
- evacuation in emergency situations
- fire-fighting activities.

3.4.5 The hazards linked to the presence of gas (SF6 in gas insulated switchgear) and oil (high voltage power transformer) are to be considered for the arrangement of the export power system.

3.4.6 Precautions are to be taken to ensure that people onboard are not exposed to hazards caused by the electrical system (arc discharge) or to electromagnetic fields (EMF) exceeding the limits given by applicable national regulations. Where necessary the areas containing high voltage equipment are to be segregated and their access restricted.

Note 1: For guidance, in Europe the maximum limits above which protection measures are to be implemented to preserve the health of personnel are 10000 v/m for the electrical fields and 500 µT for the magnetic fields (see Directive 2004/40/CE dated 29/04/2004).

4 Specific requirements for support units assigned with POWERGEN (LNG/NG) or (DUALFUEL) notations

4.1 General

4.1.1 In addition to the requirements given in this Article, power plant using liquefied natural gas or natural gas as fuel are to comply with the requirements of Pt D, Ch 9, Sec 16 of the Ship Rules, as relevant.

4.1.2 In case of conflict between this Article and Articles [2] or [3], the most stringent requirements are to be applied.

4.2 Identified risk and hazards

4.2.1 In addition to typical risk analysis required in [2.1], relevant hazard and risks scenarios with respect interactions between power plant and gas (LNG storage, piping and equipment) are to be identified.

Such risks might include but not limited to:

- fire and explosion
- evacuation
- extension of hazardous areas
- process upset conditions
- high pressure gas venting
- continuous presence of vapour cargo outside the cargo containment system
- piping process over-pressure and under pressure
- collision risk during berthing manoeuvres
- dropped objects
- environmental pollutions and impacts.

4.3 Process piping safety features, mechanical integrity

4.3.1 Process piping containing gas fuel (LNG or NG), are to be in accordance with requirements of Part D, Chapter 9 of the Ship Rules.

4.3.2 It is to be possible to isolate the gas fuel supply to each individual space containing a gas consumer(s) or through which fuel gas supply piping is run, with an individual master valve, which is located outside the power skid.

4.3.3 Process cause and effect chart is to meet minimum requirement of rule monitoring and control system including process shut down and emergency shutdown philosophy.

4.4 Fire safety Features

4.4.1 Access arrangement and ventilation

In case of a power plant installed in an enclosed space, access arrangement and ventilation are to be in accordance with requirements of Part D, Chapter 9 of the Ship Rules.

In case of a power plant installed in a semi enclosed space, precautions are to be taken to avoid any gas accumulation.

If plant fitted on the open deck, then arrangement with respect to adjacent spaces is to be agreed by Society on case by case basis.

4.4.2 Fire and gas detection

The arrangement and layout of fire and gas detections system are to be designed to cover power plant with respect to probability of presence of gas and fire risk.

Such arrangement is subject to Society approval and is to comply with the requirement of Pt D, Ch 9, Sec 16 of the Ship Rules.

4.4.3 Safety fire active system

Arrangement of water spray systems is to comply with the requirement of Pt D, Ch 9, Sec 11, [11.3.1] of the Ship Rules.

5 Tests after installations on-board

5.1 General

5.1.1 The fire safety features of the power plant are to be operationally tested in the presence of a Surveyor.

5.1.2 Power generation process safety features are to be tested, including process upset simulation and emergency shut down functioning, according to approved test procedure, in the presence of a Surveyor.

5.2 Installations using gas as fuel

5.2.1 For support units assigned with a notation **POWERGEN(LNG/NG)** or **POWERGEN(DUALFUEL)**, the power plant is to be tested, as defined in [5.1], taking into account the specific aspects of gas as fuel.

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