Tasneef

هيئة الإمارات للتصنيف
Emirates Classification Society

Rules for the classification of Wing-In-Ground (WIG) Craft

Effective from 1/1/2022

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GENERAL CONDITIONS

Definitions:

"*Administration*" means the Government of the State whose flag the Ship is entitled to fly or under whose authority the Ship is authorised to operate in the specific case.

"IACS" means the International Association of Classification Societies.

"*Interested Party*" means the party, other than the Society, having an interest in or responsibility for the Ship, product, plant or system subject to classification or certification (such as the owner of the Ship and his representatives, the ship builder, the engine builder or the supplier of parts to be tested) who requests the Services or on whose behalf the Services are requested.

"*Owner*" means the registered owner, the ship owner, the manager or any other party with the responsibility, legally or contractually, to keep the ship seaworthy or in service, having particular regard to the provisions relating to the maintenance of class laid down in Part A, Chapter 2 of the Rules for the Classification of Ships or in the corresponding rules indicated in the specific Rules.

"Rules" in these General Conditions means the documents below issued by the Society:

(i) Rules for the Classification of Ships or other special units;
(ii) Complementary Rules containing the requirements for product, plant, system and other certification or containing the requirements for the assignment of additional class notations;
(iii) Rules for the application of statutory rules, containing the rules to perform the duties delegated by Administrations;
(iv) Guides to carry out particular activities connected with Services;
(v) Any other technical document, as for example rule variations or interpretations.

"*Services*" means the activities described in Article 1 below, rendered by the Society upon request made by or on behalf of the Interested Party.

"Ship" means ships, boats, craft and other special units, as for example offshore structures, floating units and underwater craft.

"*Society*" or *"TASNEEF"* means Tasneef and/or all the companies in the Tasneef Group which provide the Services.

"*Surveyor*" means technical staff acting on behalf of the Society in performing the Services.

Article 1

1.1. The purpose of the Society is, among others, the classification and certification of ships and the certification of their parts and components. In particular, the Society:
(i) sets forth and develops Rules;
(ii) publishes the Register of Ships;
(iii) issues certificates, statements and reports based on its survey activities.

1.2. The Society also takes part in the implementation of national and international rules and standards as delegated by various G overnments.

1.3. The Society carries out technical assistance activities on request and provides special services outside the scope of classification, which are regulated by these general conditions, unless expressly excluded in the particular contract.

Article 2

2.1. The Rules developed by the Society reflect the level of its technical knowledge at the time they are published. Therefore, the Society, although committed also through its research and development services to continuous updating of the Rules, does not guarantee the Rules meet state-of-the-art science and technology at the time of publication or that they meet the Society's or others' subsequent technical developments.

2.2. The Interested Party is required to know the Rules on the basis of which the Services are provided. With particular reference to Classification Services, special attention is to be given to the Rules concerning class suspension, withdrawal and reinstatemen t. In case of doubt or inaccuracy, the Interested Party is to promptly contact the Society for clarification.
The Rules for Classification of Ships are published on the Society's website: www.tasneef.ae.

2.3. The Society exercises due care and skill:
(i) in the selection of its Surveyors
(ii) in the performance of its Services, taking into account the level of its technical knowledge at the time the Services are performed.

2.4. Surveys conducted by the Society include, but are not limited to, visual inspection and non-destructive testing. Unless otherwise required, surveys are conducted through sampling techniques and do not consist of comprehensive verification or monitoring of the Ship or of the items subject to certification. The surveys and checks made by the Society on board ship do not necessarily require the constant and continuous presence of the Surveyor. The Society may also commission laboratory testing, underwater inspection and other checks carried out by and under the responsibility of qualified service suppliers. Survey practices and procedures are selected by the Society based on its experience and knowledge and according to generally accepted technical standards in the sector.

Article 3

3.1. The class assigned to a Ship, like the reports, statements, certificates or any other document or information issued by the Society, reflects the opinion of the Society concerning compliance, at the time the Service is provided, of the Ship or product subject to certification, with the applicable Rules (given the intended use and within the relevant time frame).
The Society is under no obligation to make statements or provide information about elements or facts which are not part of th e specific scope of the Service requested by the Interested Party or on its behalf.

3.2. No report, statement, notation on a plan, review, Certificate of Classification, document or information issued or given as p art of the Services provided by the Society shall have any legal effect or implication other than a representation that, on the basis of the checks made by the Society, the Ship, structure, materials, equipment, machinery or any other item covered by such document or information meet the Rules. Any such document is issued solely for the use of the Society, its committees and clients or other duly authorised bodies and for no other purpose. Therefore, the Society cannot be held liable for any act made or document issued by other parties on the basis of the statements or information given by the Society. The validity, application, meaning and interpretation of a Certificate of Classification, or any other document or information issued by the Society in connection with its Services, is governed by the Rules of the Society, which is the sole subject entitled to make such interpretation. Any disagreement on technical matters between the Interested Party and the Surveyor in the carrying out of his functions shall be raised in writing as soon as possible with the Society, which will settle any divergence of opinion or dispute.

3.3. The classification of a Ship, or the issuance of a certificate or other document connected with classification or certificati on and in general with the performance of Services by the Society shall have the validity conferred upon it by the Rules of the Society at the time of the assignment of class or issuance of the certificate; in no case shall it amount to a statement or warranty of seaw orthiness,

structural integrity, quality or fitness for a particular purpose or service of any Ship, structur e, material, equipment or machinery inspected or tested by the Society.

3.4. Any document issued by the Society in relation to its activities reflects the condition of the Ship or the subject of certifi cation or other activity at the time of the check.

3.5. The Rules, surveys and activities performed by the Society, reports, certificates and other documents issued by the Society are in no way intended to replace the duties and responsibilities of other parties such as Governments, designers, ship builders, manufacturers, repairers, suppliers, contractors or sub-contractors, Owners, operators, charterers, underwriters, sellers or intended buyers of a Ship or other product or system surveyed.

These documents and activities do not relieve such parties from any fulfilment, warranty, responsibility, duty or obligation (also of a contractual nature) expressed or implied or in any case incumbent on them, nor do they confer on such parties any right, claim or cause of action against the Society. With particular regard to the duties of the ship Owner, the Services undertaken by the Society do not relieve the Owner of his duty to ensure proper maintenance of the Ship and ensure seaworthiness at all times. Likewise, t he Rules, surveys performed, reports, certificates and other documents issued by the Society are intended neither to guarantee the buyers of the Ship, its components or any other surveyed or certified item, nor to relieve the seller of the duties arising out of the law or the contract, regarding the quality, commercial value or characteristics of the item which is the subject of transaction.

In no case, therefore, shall the Society assume the obligations incumbent upon the above-mentioned parties, even when it is consulted in connection with matters not covered by its Rules or other documents.

In consideration of the above, the Interested Party undertakes to relieve and hold harmless the Society from any third party claim, as well as from any liability in relation to the latter concerning the Services rendered.

Insofar as they are not expressly provided for in these General Conditions, the duties and responsibilities of the Owner and Interested Parties with respect to the services rendered by the Society are described in the Rules applicable to the specific Service rendered.

Article 4

4.1. Any request for the Society's Services shall be submitted in writing and signed by or on behalf of the Interested Party. Such a request will be considered irrevocable as soon as received by the Society and shall entail acceptance by the applicant of all relevant requirements of the Rules, including these General Conditions. Upon acceptance of the written request by the Society, a contract between the Society and the Interested Party is entered into, which is regulated by the present General Conditions.

4.2. In consideration of the Services rendered by the Society, the Interested Party and the person requesting the service shall be jointly liable for the payment of the relevant fees, even if the service is not concluded for any cause not pertaining to the Society. In the latter case, the Society shall not be held liable for non-fulfilment or partial fulfilment of the Services requested. In the event of late payment, interest at the legal current rate increased by 1.5% may be demanded.

4.3. The contract for the classification of a Ship or for other Services may be terminated and any certificates revoked at the request of one of the parties, subject to at least 30 days' notice to be given in writing. Failure to pay, even in part, the fees due for Services carried out by the Society will entitle the Society to immediately terminate the contract and suspend the Services.

For every termination of the contract, the fees for the activities performed until the time of the termination shall be owed to the Society as well as the expenses incurred in view of activities already programmed; this is without prejudice to the right to compensation due to the Society as a consequence of the termination.

With particular reference to Ship classification and certification, unless decided otherwise by the Society, termination of the contract implies that the assignment of class to a Ship is withheld or, if already assigned, that it is suspended or withdrawn; any st atutory certificates issued by the Society will be withdrawn in those cases where provided for by agreements between the Society and the flag State.

Article 5

5.1. In providing the Services, as well as other correlated information or advice, the Society, its Surveyors, servants or agents operate with due diligence for the proper execution of the activity. However, considering the nature of the activities performed (see art. 2.4), it is not possible to guarantee absolute accuracy, correctness and completeness of any information or advice supplied. Express and implied warranties are specifically disclaimed.

Therefore, except as provided for in paragraph 5.2 below, and also in the case of activities carried out by delegation of Governments, neither the Society nor any of its Surveyors will be liable for any loss, damage or expense of whatever nature sustained by any person, in tort or in contract, derived from carrying out the Services.

5.2. Notwithstanding the provisions in paragraph 5.1 above, should any user of the Society's Services prove that he has suffered a loss or damage due to any negligent act or omission of the Society, its Surveyors, servants or agents, then the Society will pay compensation to such person for his proved loss, up to, but not exceeding, five times the amount of the fees charged for the specific services, information or opinions from which the loss or damage derives or, if no fee has been charged, a maximum of AED5,000 (Arab Emirates Dirhams Five Thousand only). Where the fees charged are related to a number of Services, the amount of the fees will be apportioned for the purpose of the calculation of the maximum compensation, by reference to the estimated time involved in the performance of the Service from which the damage or loss derives. Any liability for indirect or consequential loss, damage or expense is specifically excluded. In any case, irrespective of the amount of the fees charged, the maximum damages payable by the Society will not be more than AED5,000,000 (Arab Emirates Dirhams Five Millions only). Payment of compensation under this paragraph will not entail any admission of responsibility and/or liability by the Society and will be made without prejudice to the disclaimer clause contained in paragraph 5.1 above.

5.3. Any claim for loss or damage of whatever nature by virtue of the provisions set forth herein shall be made to the Society in writing, within the shorter of the following periods: (i) THREE (3) MONTHS from the date on which the Services were performed, or (ii) THREE (3) MONTHS from the date on which the damage was discovered. Failure to comply with the above deadline will constitute an absolute bar to the pursuit of such a claim against the Society.

Article 6

6.1. These General Conditions shall be governed by and construed in accordance with United Arab Emirates (UAE) law, and any dispute arising from or in connection with the Rules or with the Services of the Society, including any issues concerning responsibility, liability or limitations of liability of the Society, shall be determined in accordance with UAE law. The courts of the Dubai International Financial Centre (DIFC) shall have exclusive jurisdiction in relation to any claim or dispute which may arise out of or in connection with the Rules or with the Services of the Society.

6.2. However,

(i) In cases where neither the claim nor any counterclaim exceeds the sum of AED300,000 (Arab Emirates Dirhams Three Hundred Thousand) the dispute shall be referred to the jurisdiction of the DIFC Small Claims Tribunal; and

(ii) for disputes concerning non-payment of the fees and/or expenses due to the Society for services, the Society shall have the

right to submit any claim to the jurisdiction of the Courts of the place where the registered or operating office of the Interested Party or of the applicant who requested the Service is located.

In the case of actions taken against the Society by a third party before a public Court, the Society shall also have the right to summon the Interested Party or the subject who requested the Service before that Court, in order to be relieved and held harmless according to art. 3.5 above.

Article 7

7.1. All plans, specifications, documents and information provided by, issued by, or made known to the Society, in connection with the performance of its Services, will be treated as confidential and will not be made available to any other party other than the Owner without authorisation of the Interested Party, except as provided for or required by any applicable international, European or domestic legislation, Charter or other IACS resolutions, or order from a competent authority. Information about the status and validity of class and statutory certificates, including transfers, changes, suspensions, withdrawals of class, recommendations/conditions of class, operating conditions or restrictions issued against classed ships and other related information, as may be required, may be published on the website or released by other means, without the prior consent of the Interested Party.

Information about the status and validity of other certificates and statements may also be published on the website or released by other means, without the prior consent of the Interested Party.

7.2. Notwithstanding the general duty of confidentiality owed by the Society to its clients in clause 7.1 above, the Society's clients hereby accept that the Society may participate in the IACS Early Warning System which requires each Classification Society to provide other involved Classification Societies with relevant technical information on serious hull structural and engineering systems failures, as defined in the IACS Early Warning System (but not including any drawings relating to the ship which may be the specific property of another party), to enable such useful information to be shared and used to facilitate the proper working of the IACS Early Warning System. The Society will provide its clients with written details of such information sent to the involved Classification Societies.

7.3. In the event of transfer of class, addition of a second class or withdrawal from a double/dual class, the Interested Party undertakes to provide or to permit the Society to provide the other Classification Society with all building plans and drawings, certificates, documents and information relevant to the classed unit, including its history file, as the other Classification Society may require for the purpose of classification in compliance with the applicable legislation and relative IACS Procedure. It is the Owner's duty to ensure that, whenever required, the consent of the builder is obtained with regard to the provision of plans and drawings to the new Society, either by way of appropriate stipulation in the building contract or by other agreement.

In the event that the ownership of the ship, product or system subject to certification is transferred to a new subject, the latter shall have the right to access all pertinent drawings, specifications, documents or information issued by the Society or which has come to the knowledge of the Society while carrying out its Services, even if related to a period prior to transfer of ownership.

Article 8

8.1. Should any part of these General Conditions be declared invalid, this will not affect the validity of the remaining provisions.

Index Part A

Chapter 1 - Premise

1.1 General

1.1.1 These Rules incorporate the text in full of the IMO Guidelines for Wing-In-Groud Craft in MSC.1/Circ.1592 dated 18 May 2018, referred to in these Rules simply as "MSC.1/Circ.1592".
In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

1.1.2 In view of the configuration of WIG craft, which are between the maritime and aviation regulatory regimes, MSC.1/Circ.1592 has been developed on a flexible risk management basis with reduced emphasis on prescriptive standards compared to the IMO 2000 HSC Code. Notwithstanding the changed emphasis, MSC.1/Circ.1592 is intended to achieve comparable safety standards to those of the 1974 SOLAS Convention and include relevant recommendations adapted from the IMO 2000 HSC Code.
In order to provide as much guidance as possible to those involved in the design, construction and operation of WIG craft, MSC.1/Circ.1592 has been prepared in three parts:

- Part A provides general information applicable to all craft;
- Part B includes provisions that may be subordinate to measures developed through the safety assessment recommendations of part C; and
- Part C details the safety assessments required for all craft.

1.1.3 The requirements in part A of MSC.1/Circ.1592 are included in Part A, Chapter 2 of these Rules as follows:

- the text copied from MSC.1/Circ.1592 is in italics and the parts not applicable for the purpose of classification are identified by grey shadow and a vertical line in the margin of the text; and
- classification requirements additional to the provisions in Part A of MSC.1/Circ.1592 are in paragraphs prefixed by the letter C not in italics.

1.1.4 The requirements in part B of MSC.1/Circ.1592 are to be applied to WIG craft as class requirements (except for the parts mentioned in [1.1.6] to [1.1.8] below) as specified in Part B of these Rules where the text of part B of MSC.1/Circ.1592 has been referred to without copying it and additions/deviations for classification purposes have been included when deemed necessary.

1.1.5 The requirements in part C of MSC.1/Circ.1592 are to be applied to WIG craft as class requirements when requested in other parts of MSC.1/Circ.1592 and have not been copied in these Rules since they are applicable without any need of additional classification requirements.

1.1.6 Requirements in Part B, Charter 1 which contain **damage stability** requirements are not applicable for the purpose of classification but, upon request of the Interested Party, the additional class notation **DMS** is assigned to units classed by the Society and complying with the requirements of these items.

1.1.7 In general the requirements regarding **fire safety** are no longer mandatory for the purpose of classification, except where the Society carries out surveys relevant to fire safety statutory requirements on behalf of the flag Administration. In such cases, fire safety statutory requirements are considered a matter of class and therefore compliance with these requirements is also verified by the Society for classification purposes at class surveys.

1.1.8 Equipment and arrangements dealt with in the parts of MSC.1/Circ.1592 **concerning life-saving appliances, navigational equipment and radiocommunications**, which are not subject to control by the Society for the purpose of classification, are intended to be covered by the relevant statutory certification.

1.1.9 In the provisions of MSC.1/Circ.1592 that are being used for classification purposes, the words "Administration" and "Guidelines", wherever mentioned, are to be understood as equivalent to the words "Society" and "Rules", respectively.
The Tasneef Rules for Classification of Ships are referred to in these Rules simply as the "Society Rules".
The Tasneef Rules for the Classification of High-Speed Craft are referred to in Part B of these Rules simply as the "HSC Rules".

1.2 Application

1.2.1 Craft for which classification only is requested
These craft are to comply in full with the requirements of these Rules, except for those identified by a vertical line placed in the margin of the text (see [1.1.3]).

1.2.2 Craft for which both classification and the IMO Certification are requested
These craft are to comply in full with the requirements of these Rules.

1.3 Class notation

1.3.1 Craft complying with the classification requirements of these Rules are assigned the notation **WIG**, completed by one of the following additional service features, specifying the category of the craft in accordance with the MSC.1/Circ.1592:

- **WIG - TYPE A passenger ship** for a WIG which can be defined according to MSC.1/Circ.1592 as a Type A and which carry more than 12 passengers
- **WIG - TYPE A cargo ship** for a WIG which h can be defined according to MSC.1/Circ.1592 as a Type A and which carry not more than 12 passengers
- **WIG -TYPE B passenger ship** for a WIG which can be defined according to MSC.1/Circ.1592 as a Type B and which carry more than 12 passengers
- **WIG -TYPE B cargo ship** for a WIG which can be defined according to MSC.1/Circ.1592 as a Type B and which carry not more than 12 passengers

The Classification is only applicable to Type A and Type B WIG effect craft intended for maritime operations. Type C craft are not within the scope of these Rules.
The Classification of WIG effect craft is subject to craft operating:

(a) Within a specified range from a place of refuge.
(b) Within an area where there will be suitable rescue facilities readily available.
(c) Within an area where weather forecasts and maintenance facilities are readily available.
(d) Landing and take off locations having basic meteorological information available, e.g. wind magnitude/ direction and sea states.

1.3.2 Wave height Take-Off/Landing notations
All WIG effect craft Classed under these Rules will be assigned a wave height take-off/landing notation WTL/WEL followed by a number, e.g. WTL0.5/WEL2.0. The figures refer to the significant wave height for Sea States. WTL indicates the acceptable wave height sea conditions for normal take-off and landing and WEL the maximum extreme wave height conditions for landing without causing damage to the craft.

1.3.3 Wind speed Take-Off/Landing notations
All WIG effect craft Classed under these Rules will be assigned a wind speed take-off/landing notation WSC followed by a number, e.g. WSC10. The figures refer to the maximum cross wind conditions for normal take-off in terms of knots.

Example: C * WIG TYPE A passenger ship WTL0.8/WEL1.5 WSC8.

1.3.4 Interpretation of the Rules
The interpretation of these Rules is the sole responsibility, and at the sole discretion, of the Society.

1.3.5 Documentation to be submitted
Construction documentation required by these Rules includes a design submission where required by these Rules and it may include:

(a) Design plans and plans register.
(b) Calculations and technical reports relating to strength, operational stability, stall characteristics, manoeuvrability, buoyancy, performance and system design.
(c) Development tests and trials programmes reports.
(d) Weight and Centre of Gravity calculations and reports.
(e) Technical and Process Specifications.
(f) Technical Construction File.
(g) Design deviations.
(h) Defect investigation reports.
(i) Modifications.

(j) Testing and trials documents and trials register.

Construction documentation required by these Rules includes plans and information necessary for the construction of the craft and equipment and systems that will enable the Society to verify that the product and processes are in accordance with these Rules.

1.3.6 Classification

When it is intended to build a WIG effect craft for Classification constructional plans and all particulars relevant to the craft structure, equipment and machinery, as detailed in these Rules, are to be submitted for appraisal before the work is commenced.

Any subsequent modifications or additions to the scantlings, arrangements or equipment shown on the appraised plans are also to be submitted for appraisal.

Where the proposed construction of any part of the craft structure or machinery is of novel design, or involves the use of unusual material, assembly or construction technique, or where experience has not sufficiently justified the principle or mode of application involved, special tests or examinations before and during service may be required.

The materials used in the construction of craft structures and machinery intended for Classification are to be of good quality and free from defects and are to comply with the requirements of these Rules. Material is to be manufactured by manufacturers approved or by manufacturers that have quality standards for the products that are acceptable to the Society.

Alternatively, tests to the satisfaction of the Society will be required to demonstrate the suitability of the material.

New WIG effect craft intended for Classification are to be built under Society Survey. The Surveyors are to be satisfied that the materials, workmanship and arrangements are in accordance with these Rules. Any items found not to be in accordance with these Rules or the appraised plans, or any material, workmanship or arrangements found so to be, are to be rectified or a detailed technical analysis is to be submitted to the Society for further considerations..

New craft intended for the Classification are to have had satisfactory testing and trials to the satisfaction of Society Surveyors.

1.4 Compliance with other rules

1.4.1 For any items not expressly stipulated or modified for classification purposes by these Rules, the requirements of the Society Rules are to apply wherever relevant.

Classification of a craft with the Society, or more generally any Society actions and decisions, do not absolve the interested parties from compliance with additional and/or more stringent requirements and provisions for their application, issued by the Administration of the State whose flag the craft is entitled to fly and/or of the State where the base port from which the craft is intended to operate is situated.

1.5 Novel or unusual features

1.5.1 Craft presenting novel or unusual arrangements for items such as systems, apparatuses and devices, described in these rules, to which the requirements of these rules do not apply directly either in whole or on part, may be subjected to special consideration by the Society and may be classed on an individual basis, at the discretion of the Society.

1.6 Dangerous goods

1.6.1 In general, WIG are not intended to carry dangerous goods. In case of carriage of these items it is required the conformity to an International Standard.

Chapter 2 - General Requirements, Surveys and Certificate

2.1 General

2.1.1 *These Guidelines should be applied as a complete set of comprehensive provisions. They contain provisions for wing-in-ground (WIG) craft engaged in international voyages, in particular their design and construction, the equipment that should be provided and the conditions for their operation and maintenance. The Guidelines are intended to set levels of safety which are equivalent to those of conventional ships required by the International Convention for the Safety of Life at Sea (SOLAS) , 1974, as amended, and the International Convention on Load Lines (Load Line), 1966 through the application of constructional and equipment standards in conjunction with strict operational controls.*

2.1.2 *The requirements applying to a specific craft in a particular service will, in general, be the risk control measures developed in accordance with the Safety Assessment under part C, which is to be completed for all craft. Information on generally accepted risk control measures is provided in part B. Prescriptive recommendations related to craft systems may be over-ridden by measures developed under part C.*

C2.1.2(a) The attention of Shipowners, Shipdesigners and Flag Administrations is drawn to the innovative aspects of designs of WIG craft.
The present Rules may need to be adapted to cover particular designs.
It is assumed as a condition precedent to classification that the craft are operated with professional care and normal prudent seamanship.

C2.1.2(b) Craft satisfying the requirements of these Rules are assigned the notation WIG (see [1.3.1]).

2.2 General requirements

2.2.1 *The application of the provisions of these Guidelines is subject to the following general requirements:*

.1 *the Guidelines will be applied in their entirety;*
.2 *the management of the company operating the craft exercises strict control over its operation and maintenance by a quality-management system*;*
.3 *the management ensures that only persons qualified to operate the specific type of craft used on the intended route are employed;*
.4 *the distances covered and the worst intended conditions (including minimum required visibility) in which operations are permitted will be restricted by the imposition of operational limits;*
.5 *the craft will at all times be in reasonable proximity to a place of refuge;*
.6 *adequate communications facilities, weather forecasts and maintenance facilities are available within the area of operation;*
.7 *in the intended area of operation there will be suitable rescue facilities readily available;*
.8 *areas of high fire risk such as machinery spaces and special category spaces are protected with fire-resistant materials and fire-extinguishing systems to ensure, as far as is practicable, containment and rapid extinguishing of fire;*
.9 *efficient facilities are provided for the rapid and safe evacuation of all persons into survival craft;*
.10 *all passengers and crew are provided with seats; and*
.11 *no enclosed sleeping berths for passengers are provided.*

2.2.2 *Categories and types of WIG craft*

a) Passenger craft may be assisted craft or unassisted craft, depending on the characteristics of the craft and the route which it serves. An unassisted craft must have its machinery and safety systems arranged such that, in the event of damage disabling any essential machinery and safety systems in one compartment, the craft retains the capability to navigate safely.
b) In order to qualify as a cargo craft under these Guidelines, a craft must be capable of maintaining the main functions and safety systems of unaffected spaces, after damage in any one compartment on board.
c) The type designation for a craft, type A, type B or type C, relates to its aerodynamic capabilities and is unrelated to the category designation described in a) and b).

C2.2.2(a) The limitations on navigation indicated in 2.2.1.4 and 2.2.1.5 are subject to specific navigation/restriction notations in Society Rules.

C2.2.2(b) For the application of item 2.2.1.8 relevant to fire safety, see [1.1.6].

2.3 Application

2.3.1 *These Guidelines apply to WIG craft which are engaged in international voyages.*

C2.3.1 In addition to the craft specified in 2.3.1, these Rules also apply to WIG craft engaged in national voyages. Exemptions from some of the requirements of these Rules may be granted when, in the opinion of the Society, particular circumstances warrant this.

2.3.2 *These Guidelines apply to:*

.1 assisted and unassisted passenger craft as described in 2.2.1 and defined in 4.2 and 4.42 respectively;
.2 cargo craft as described in 2.2.2 and defined in 4.8; and
.3 any craft proceeding not more than 4 hours from a port of refuge or 200 nm, whichever is the lesser.

2.3.3 *The application of these Guidelines should be verified by the Administration and be acceptable to the Governments of the States in which the craft will be operating.*

C.2.3.3 The Classification of a craft, or more generally any Society acts and decisions, do not absolve the interested parties from compliance with any additional and/or more stringent requirements issued by the Administration of the State whose flag the craft is entitled to fly, and provisions for their application.

2.3.4 *These Guidelines do not apply to type C craft or their operations. Such craft are defined as aircraft by the International Civil Aviation Organization (ICAO) and should comply with all relevant ICAO requirements. References to type C craft are included in these Guidelines for reference only.*

2.4 Definitions

2.4.1 Definitions as per MSC.1/Circ.1592

2.4.1.1 "Administration" means the Government of the State whose flag the craft is entitled to fly.

2.4.1.2 "Assisted craft" is any passenger WIG craft

.1 *operating on a route where it has been demonstrated to the satisfaction of the flag and port States that there is a high probability that in the event of an evacuation at any point of the route all passengers and crew can be rescued safely within the least of:*
  .1 *the time to prevent persons in survival craft from exposure causing hypothermia in the worst intended conditions;*
  .2 *the time appropriate with respect to environmental conditions and geographical features of the route; or*
  .3 *four hours; and*
.2 *carrying not more than 450 passengers.*

2.4.1.3 Auxiliary machinery spaces are spaces containing internal combustion engines of a power output up to and including 110 kW; driving generators; pumps, such as sprinkler, drencher or fire pumps, and bilge pumps; oil filling stations; switchboards of an aggregate capacity exceeding 800 kW; similar spaces and trunks to such spaces.

2.4.1.4 Auxiliary machinery spaces having little or no fire risk are spaces containing refrigerating, stabilizing, ventilation and air conditioning machinery, switchboards of an aggregate capacity of 800 kW or less, similar spaces and trunks to such spaces.

2.4.1.5 "Base port" is a specific port identified in the route operational manual and provided with:

.1 appropriate facilities providing continuous radio communications with the craft at all times while in port and at sea;
.2 means for obtaining a reliable weather forecast for the corresponding region and its due transmission to all craft in operation;
.3 for an assisted craft, access to facilities provided with appropriate rescue and survival equipment; and
.4 access to craft maintenance services with appropriate equipment.

2.4.1.6 "Base port State" means the State in which the base port is located.

2.4.1.7 "Breadth (B)" means width of the broadest part of the moulded watertight envelope at or below the design waterline in the displacement mode with no lift or propulsion machinery active.

2.4.1.8 "Cargo craft" is any WIG craft other than a passenger craft, which machinery and safety systems in any one compartment being disabled, the craft retains the capability to navigate safely. The damage scenarios considered in chapter 1 of part B should not be inferred in this respect.

2.4.1.9 "Cargo spaces" are all spaces used for cargo and trunks to such spaces.

2.4.1.10 "Continuously manned control station" is a control station which is continuously manned by a responsible member of the crew while the craft is in normal service.

2.4.1.11 "Control stations" are those spaces in which the craft's radio or navigating equipment or the emergency source of power and emergency switchboard are located, or where the fire recording or fire control equipment is centralized, or where other functions essential to the safe operation of the craft, such as propulsion control, public address and stabilization systems, are located.

2.4.1.12 "Convention" means the International Convention for the Safety of Life at Sea, 1974, as amended.

2.4.1.13 "Crew accommodation" are those spaces allocated for the use of the crew and include cabins, sick bays, offices, lavatories, lounges and similar spaces.

2.4.1.14 "Critical design conditions" means the limiting specified conditions, chosen for design purposes, which the craft should retain in displacement mode. Such conditions should be more severe than the "worst intended conditions" by a suitable margin to provide for adequate safety in the survival condition.

2.4.1.15 "Design waterline" means the waterline corresponding to the maximum operational weight of the craft with no lift or propulsion machinery active and is limited by the requirements of chapters 1 and 2 of part B.

2.4.1.16 "Dynamic air cushion" means a high pressure region originating between the airfoil and a water surface or some other surface as the airfoil moves within the zone of the aerodynamic effect of this surface.

2.4.1.17 "Flap" means an element formed as integrated part of, or an extension of, a foil, used to adjust the of hydrodynamic or aerodynamic lift the foil.

2.4.1.18 "Flashpoint" means a flashpoint determined by a test using the closed-cup apparatus referenced in the International Maritime Dangerous Goods (IMDG) Code.

2.4.1.19 "Foil" means a profiled plate or three dimensional construction at which hydrodynamic or aerodynamic lift is generated when the craft is under way.

2.4.1.20 "Ground effect" is a phenomenon of increase of a lift force and reduction of inductive resistance of a wing approaching a surface. The extent of this phenomenon depends on the design of the craft but generally occurs at an altitude less than the mean chord length of the wing.
Maximum vertical extent of ground effect h_{ge} for an actual craft is determined experimentally or by calculations proceeding from a condition:
$h_{ge} = h$ (when $L_h / L_{h=\infty} = k$), where:

- *L_h aerodynamic lift force at an altitude h of a craft approaching to a surface;*
- *$L_{h=\infty}$ aerodynamic lift force of a craft at large altitude $h=\infty$ above the surface and outside ground effect; and*
- *$k > 1.0$ aerodynamic coefficient, taking into account peculiarities of the craft and agreed by the Administration. In the absence of data it is recommended that k=1.1.*

2.4.1.21 "Length (L)" means the overall length of the underwater watertight envelope of the rigid hull, excluding appendages, at or below the design waterline in the displacement mode with no lift or propulsion machinery active.

2.4.1.22 "Lightweight" is the displacement of the craft in tonnes without cargo, fuel, lubricating oil, ballast water and fresh water in tanks, consumable stores, passengers and crew and their effects.

2.4.1.23 "Machinery spaces" are spaces containing internal combustion engines with an aggregate total power output of more than 110 kW, generators, oil fuel units, propulsion machinery, major electrical machinery and similar spaces and trunks to such spaces.

2.4.1.24 "Maximum operational weight" means the overall weight up to which operation in the intended mode is permitted by the Administration.

2.4.1.25 "Maximum speed" is the speed achieved through the air at the maximum continuous propulsion power for which the craft is certified at maximum operational weight.

2.4.1.26 "Muster station" is an area where passengers can be gathered in the event of an emergency, given instructions and prepared to abandon the craft, if necessary. The passenger spaces may serve as muster stations if all passengers can be instructed there and prepared to abandon the craft.

2.4.1.27 "Oil fuel unit" is the equipment used for the preparation of oil fuel for delivery to equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure of more than 0.18 N/mm2.

2.4.1.28 "Open vehicle spaces" are spaces:

1. *to which any passengers carried have access;*
2. *intended for carriage of motor vehicles with fuel in their tanks for their own propulsion; and*
3. *either open at both ends or open at one end and provided with adequate natural ventilation effective over their entire length through permanent openings in the side plating or deckhead or from above.*

2.4.1.29 "Operating compartment" means the enclosed area from which the navigation and control of the craft is exercised.

2.4.1.30 "Operating station" means a confined area of the operating compartment equipped with necessary means for navigation, manoeuvring and communication, and from where the functions of navigating, manoeuvring, communication, commanding, conning and lookout are carried out.

2.4.1.31 "Operational speed" is the normal operating speed at reduced level of propulsion power in ground effect mode.

2.4.1.32 "Organization means" the International Maritime Organization.

2.4.1.33 "Passenger" is every person other than:

1. *the master and members of the crew or other persons employed or engaged in any capacity on board a craft on the business of that craft; and*
2. *a child under one year of age.*

2.4.1.34 "Passenger craft" is a craft which carries more than twelve passengers.

2.4.1.35 "Place of refuge" is any naturally or artificially sheltered area which may be used as a shelter by a craft under conditions likely to endanger its safety.

2.4.1.36 "Public spaces" are those spaces allocated for the passengers and include main seating areas, lavatories and similar permanently enclosed spaces allocated for passengers.

2.4.1.37 "Service spaces" are those enclosed spaces used for pantries containing food warming equipment but no cooking facilities with exposed heating surfaces, lockers, storerooms and enclosed baggage rooms.

2.4.1.38 "Skeg" is a vertical or inclined profiled plate or a volumetric construction, which forms part of or is attached to a wing for the purpose of decreasing the inductive aerodynamic resistance or increasing the effectiveness of static or dynamic air cushions. When operating up to the ground effect mode it can be also used for sliding on the water or other surface and for providing stability.

2.4.1.39 "Special category spaces" are those enclosed spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access for embarking and disembarking, including spaces intended for the carriage of cargo vehicles.

2.4.1.40 "Static air cushion" means a high-pressure region generated by directing air from the propulsion engine or other engine underneath the craft's body and/or wings.

2.4.1.41 "System Safety Assessment (SSA)" means a systematic, comprehensive evaluation of the implemented systems to establish safety objectives and to show that the relevant safety requirements are met. The method is described in part C of MSC.1/Circ.1592.

2.4.1.42 "Unassisted craft" is any passenger WIG craft other than an assisted craft, which machinery and safety systems arranged such that, in the event of damage disabling any essential machinery and safety systems in any one compartment, the craft retains the capability to navigate safely.

2.4.1.43 "Worst intended conditions" means the specified environmental conditions within which the intended operation of the craft is provided for in the certification of the craft. This should take into account parameters such as the worst conditions of wind force allowable, wave height (including unfavourable combinations of length and direction of waves), minimum air temperature, visibility and depth of water for safe operation and such other parameters as the Administration may require in considering the type of craft in the area of operation.

2.4.1.44 "WIG craft" is a multimodal craft which, in its main operational mode, flies by using ground effect above the water or some other surface, without constant contact with such a surface and supported in the air, mainly, by an aerodynamic lift generated on a wing (wings), hull, or their parts, which are intended to utilize the ground effect action.

2.4.1.45 "WIG craft types": WIG craft are categorized according to the following types:

1. *type A: a craft which is certified for operation only in ground effect. Within prescribed operational limitations, the structure and/or the equipment of such a craft should exclude any technical possibility to exceed the flight altitude over the maximum vertical extent of ground effect, as defined in 4.20;*
2. *type B: a craft which is certified for main operation in ground effect and to temporarily increase its altitude outside ground effect to a limited height, but not exceeding 150 m above the surface, in case of emergency and for overcoming obstacles; and*
3. *type C: a craft which is certified for the same operation as type B; and also for limited operation at altitude exceeding 150 m above the surface, in case of emergency and for overcoming obstacles.*

2.4.1.46 "WIG craft operational modes":

1. *"Amphibian mode" is the special operational mode of amphibian WIG craft over the surface other than water, when at rest or in motion its weight is fully or predominantly supported by appropriate combination of forces of static and dynamic air cushion and/or by vertical forces produced on the hull or other devices due to their contact with such a surface and/or due to sliding on it;*
2. *"Displacement mode" means the regime, whether at rest or in motion, where the weight of the craft is fully or predominantly supported by hydrostatic forces;*
3. *"Transitional mode" denotes the transient mode from the displacement mode to the planing mode (or amphibian mode) and vice versa;*
4. *"Planing mode" denotes the mode of steady state operation of a craft on water surface by which the craft's weight is supported mainly by hydro-dynamic forces;*
5. *"Take off/landing mode" denotes the transient mode from the planing mode (or amphibian mode) to the ground effect mode and vice versa;*
6. *"Ground effect mode" is the main steady state operational mode of flying the WIG craft in ground effect above water or other surface;*
7. *"Fly-over mode" denotes increase of the flying altitude for WIG craft of types B and C within a limited period, which exceeds the vertical extent of the ground effect but does not exceed the minimal safe altitude for an aircraft prescribed by ICAO provisions; and*
8. *"Aircraft mode" denotes the flight of a WIG craft of type C above the minimal safe altitude for an aircraft prescribed by ICAO regulations.*

2.4.1.47 "Wing" denotes an air foil or other air lift generating surface to support the weight of the craft in flight and may include the fuselage.

C2.4.2 Additional definitions for classification purposes

C2.4.2.1 “Approved type” means the status conferred by the Society on a particular and clearly identified material, item of equipment or process, shown by design assessment to meet all the stipulations of Society Rules for the specified application(s).

C2.4.2.2 “Accident” is an unintended event involving fatality, injury, craft damage or loss or environmental damage.

C2.4.2.3 “Air Speed” is the speed of the craft relative to the air mass in which it is flying.

C2.4.2.4 “Augmented stabilization” is a combination of self-stabilisation and forced (artificial) stabilisation.

C2.4.2.5 “Automatic safety control” is a logic unit for processing data and making decisions to put the craft into the displacement or other safe mode if a condition impairing safety arises.

C2.4.2.6 “Availability” is the ability of an item to perform its required function at a stated instant or period of time.

C2.4.2.7 “Bridge-to-bridge communications” means safety communications between craft and ships from the position from which the craft is normally navigated.

C2.4.2.8 “Casualty” is damage to life, property or the environment.

C2.4.2.9 “Clear water” is water having sufficient depth to permit the normal development of wind generated waves.

C2.4.2.10 “Cooper – Harper ratings”. The levels of handling qualities which quantify the degree of acceptability of an airborne vehicle in terms of its ability to complete a task for which it is designed. There are ten levels on the Cooper – Harper scale that seek to indicate the pilot workload in the execution of a flight, these are defined in Table 1.1.1.

Table 1.1.1 – Cooper ratings

Adequacy for selected task	Craft characteristic	Demand on pilot (Workload)	Pilot rating
Satisfactory	Excellent	Very low	1
Satisfactory	Good	Low	2
Satisfactory	Fair	Minimal pilot compensation required	3
Unsatisfactory – warrants improvements	Minor deficiencies	Moderate pilot compensation required	4
Unsatisfactory – warrants improvements	Moderate deficiencies	Considerable pilot compensation required	5
Unsatisfactory – warrants improvements	Tolerable deficiencies	Extensive pilot compensation required	6
Unacceptable – requires improvements	Major deficiencies	Adequate performance not attainable	7
Unacceptable – requires improvements	Major deficiencies	Considerable pilot compensation required for control	8
Unacceptable – requires improvements	Major deficiencies	Intense pilot compensation required for control	9
Catastrophic – improvement mandatory	Major deficiencies	Loss of control likely	10
Note: This scoring systems is interntionally used and recognized by all qualified test pilots in assessing the mission performance of a new aircraft			

C2.4.2.11 “Cosmetic structure” is that structure or fitting that has no intentional influence on the strength or stiffness of the main structure, and is fitted for aesthetic purposes only. Where failure of such structure may result in a catastrophic effect, it shall not be identified as cosmetic structure.

C2.4.2.12 “Crew compartments” are those spaces allocated for the use of the crew, and include cabins, sick bays, offices, lavatories, lounges and similar spaces.

C2.4.2.13 “Cross wind speed” is the velocity of the wind speed vector component acting perpendicular to the nose-tail axis of the craft.

C2.4.2.14 “Damping device” denotes a device designed to reduce the effects of vertical loads during take-off and landing modes of operation of a WIG effect craft.

C2.4.2.15 “Dead craft condition” means that the entire machinery installation, including the power supply, is out of operation and that the auxiliary services (e.g. compressed air, batteries, etc.) for bringing the main propulsion systems into operation and for the restoration of the main power supply are not available.

C2.4.2.16 “Displacement mode” means the regime, whether at rest or in motion, where the weight of the craft is fully or predominantly supported by hydrostatic forces.

C2.4.2.17 “Docking workstation” is a place equipped with necessary means for docking the craft.

C2.4.2.18 “Down flooding point” means any opening through which flooding of the reserve buoyancy spaces could take place while the craft is in the intact or damage condition, and heels to an angle past the angle of equilibrium.

C2.4.2.19 “Dynamic air cushion” means a high pressure region originating between the airfoil and a water surface or some other surface as the airfoil moves within the zone of the aerodynamic effect of this surface.

C2.4.2.20 “Dynamically stable” means that the craft has no tendencies to diverge from the manoeuvre commanded by the pilot.

C2.4.2.21 “Engineering system” is a series of elements, including all equipment and associated sub-systems necessary to provide specified functions within the intended context of use in the system. Typical sub-systems include control and monitoring arrangements and their user interfaces, data communications, power supplies (electrical, hydraulic or pneumatic), fuel, lubricating, cooling, etc.

C2.4.2.22 “Essential services” are those necessary for the propulsion, directional control and safety of the craft within the Mobility and Craft Function categories.

C2.4.2.23 “Failure condition” exists where a system functions incorrectly in a particular manner (i.e. the Failure Condition is the resultant condition of the system rather than the cause(s) of that condition). A particular Failure Condition may arise:

(a as a result of a single failure,
(b) as a result of independent failures in combination within a system; or
(c) as a result of independent failures in combinations involving more than one system, taking into account:
(i) any undetected failure that is already present;
(ii) such further failures as would be reasonably expected to follow the failure under condition.

(NB: In assessing the further failures which follow, account should be taken of any resulting more severe operating conditions for items that have not up to that time failed) where the overall effect of the functioning of the system is the same in each case.

C2.4.2.24 “Fail safe” is the principle by which a failure or malfunction of a component in a system causes its output to automatically adjust to a predetermined safe state. The safe state, according to the application, will be predetermined in terms of priority for the safety of the craft and may be generally taken as the least critical one for the main components and auxiliaries of, for example, the propulsion plant.

C2.4.2.25 “Fetch” is the extent of clear water across which a wind has blown before reaching the craft.

C2.4.2.26 “Fly-over mode” denotes increase of the flying altitude for WIG effect craft of the Type B within limited period that exceeds the vertical extent of the ground effect.

C2.4.2.27 “Flying qualities” qualify the degree of acceptability of a airborne vehicle in terms of its ability to complete a task for which it is designed. There are three levels on the Flying Quality scale that seek to indicate quality of flight, these are defined as follows:

- Level 1 Flying qualities clearly adequate for the task flight phase.
- Level 2 Flying qualities adequate to accomplish the mission flight phase, but with an increased pilot work load and/or degradation in mission effectiveness.

- Level 3 Degraded flying qualities, but such that the craft can be controlled, inadequate mission performance or high and limiting pilot workload.

This scoring system is internationally used and recognised by all qualified test pilots in assessing the mission performance of a new aircraft and is formulated from pilot perception. *See also* Handling qualities.

C2.4.2.28 “Forced (artificial) stabilisation of the craft” is stabilization achieved by:

- an automatic control system; or
- a manually assisted control system; or
- a combined system incorporating elements of both automatic and manually assisted control systems.

C2.4.2.29 “Fully submerged foil” means a foil having no lift components piercing the surface of the water in the foil-borne mode.

C2.4.2.30 “Ground effect altitude” is the maximum altitude at which a Type A or Type B WIG effect craft can sustain continuous flight under its own power. If a craft has the ability to sustain self propelled flight outside of ground effect mode, the craft is considered to be of Type C and is outside the scope of these Rules.

C2.4.2.31 “Ground effect mode” is the steady state main operation mode of flying the WIG effect craft near to free water surface or to other supporting surface in the range of altitude of acting the ‘ground effect altitude’.

C2.4.2.32 “Ground speed” is the absolute speed of the craft relative to the ground.

C2.4.2.33 “Handling qualities” are a qualitative measure of the response of the aeroplane through pilot manipulation of the flight control system. This is usually formulated from pilot perception. *See also* Flying qualities and Cooper-Harper ratings.

C2.4.2.34 “Hazard” is a potential threat to human life, health, property or the environment.

C2.4.2.35 “Heading” means the direction in which the craft’s longitudinal axis is directed, relative to a defined parameter which may be:

- Wind /wave direction
- Compass direction
- Current direction

C2.4.2.36 “Head wind speed” is the velocity of the wind speed vector component acting parallel to longitudinal axis of the craft in the opposite direction to craft motion.

C2.4.2.37 “Hull”, unless the context states otherwise, is to be taken to include the main structure of the WIG effect craft, its superstructures, cabins, control surfaces and similar parts, including anchoring and mooring equipment.

C2.4.2.38 “Lift power limitations” are those limitations imposed on the machinery and components which provide lift.

C2.4.2.39 “Machinery” means an assembly of linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits etc. joined together for a specific application.

C2.4.2.40 “Machinery mounting structure” is that structure which is used for supporting or aligning machinery or used for transmitting load to the primary structure.

C2.4.2.41 “Major effect” is an effect which produces:

(a) a significant increase in the operational duties of the crew or in their difficulty in performing their duties which by itself should not be outside the capability of a competent crew provided that another major effect does not occur at the same time; or
(b) significant degradation in handling characteristics; or
(c) significant modification of the permissible operating conditions, but will not remove the capability to complete a safe journey without demanding more than normal skill on the part of the operating crew.

C.4.2.42 “Minor effect” is an effect that may arise from a failure, an event, or an error, which can be readily compensated for by the operating crew. It may involve:

(a) a small increase in the operational duties of the crew or in their difficulty in performing their duties; or

(b) a moderate degradation in handling characteristics; or
(c) slight modification of the permissible operating conditions.

C2.4.2.43 “Multihull craft” means a craft that, in any normally achievable operating trim or heel angle, has a rigid hull structure that penetrates the surface of the sea over more than one discrete area.

C2.4.2.44 “Porpoising” means oscillating symmetrical movements of a craft when planing; pitching instability on the water as distinct from instability under airborne conditions.

C2.4.2.45 “Primary structures” are those structural members supporting secondary members and will be the primary load bearing element.

C2.4.2.46 “Reasonable weather”. Wind strengths of force six or less on the Beaufort scale, associated with sea states sufficiently moderate to ensure that wave height is less than the WIG effect craft – surface clearance, and do not impair operation of the craft.

C2.4.2.47 “Sea States”. World Meteorological Organisation (WMO) sea state code:

Sea state code	Significant Wave Height (m)		Description
	Range	Mean	
0	0	0	Calm (glassy)
1	0-0,1	0,050	Calm (rippied)
2	0,1-0,5	0,30	Smooth (wavelet)
3	0,5-1,25	0,875	Slight
4	1,25-2,5	1,875	Moderate
5	2,5-4,0	3,250	Flough
6	4,0-6,0	5,000	Very rough
7	6,0-9,0	7,500	High
8	9,0-14,0	11,500	Very high
9	Over 14,0	Over 14,0	Phenomenal

C2.4.2.48 “Secondary structures” are those structural members supporting shell, deck or bulkhead plating.

C2.4.2.49 “Service speed” is the maximum continuous forward air speed, over water in calm conditions, during normal operations, at maximum certified weight and with the centre of gravity within the design limits.

C2.4.2.50 “Sheltered water” is where the fetch is six nautical miles or less.

C2.4.2.51 “Sideslip” is the component of the motion of the craft in the plane of its lateral axis, the angle of sideslip is that between the craft’s longitudinal axis and the airspeed vector.

C2.4.2.52 “Significant wave height” is the average height of the one third highest observed wave heights over a given period.

C2.4.2.53 “Skimming mode” denotes the mode of steady state operation of a craft on water surface by which the craft's weight is supported mainly by hydro-dynamic forces.
.
C2.4.2.54 “Stabilisation control system” is a system intended to stabilise the main parameters of the craft's attitude. The main elements of a stabilisation control system may include the following devices such as rudders, foils, flaps, fans, pumps for moving fluids; power drives actuating stabilisation devices; and stabilisation equipment for accumulating and processing data for making decisions and giving commands such as sensors, logic processors and automatic safety control.

C2.4.2.55 “Stabilisation device” means a device which generates the forces for controlling the craft's attitude.

C2.4.2.56 “Statically stable” means that the craft has no tendencies to diverge from its current state when travelling in static equilibrium, i.e. at constant velocity.

C2.4.2.57 “Stick fixed” refers to the design of a control lever that hold the control surfaces in a fixed position where there is no pilot intervention.

C2.4.2.58 “Stick free” refers to the design of a control lever that allows the control surfaces to take up a natural position in the aerodynamic form of the craft when there is no intervention from the pilot.

C2.4.2.59 “Take off/Landing” denotes the transitional mode from the skimming to the ground effect mode and vice versa.

C2.4.2.60 “Tail wind speed” is the velocity of the wind speed vector component acting parallel to the nose-tail axis of the craft.

C2.4.2.61 “Terminal” is any beach, ramp, quay, harbour or other place at which a WIG makes scheduled or contracted calls in ordinary service conditions, i.e. excluding emergencies.

C2.4.2.62 “Transitional mode” denotes the transient mode from the displacement one to the skimming mode and vice versa.

C2.4.2.63 “Trim” means the ability to adjust the control settings of a craft to achieve a steady state flight condition with no control forces required by the pilot.

C2.4.2.64 “Turning” is the rate of change of direction of a craft.

C2.4.2.65 “Watertight in relation to a structure”, means capable of preventing the passage of water through the structure in any direction under the head of water likely to occur in the intact or damage condition.

C2.4.2.66 “Weathertight” means that water will not penetrate into the craft in any wind and wave conditions up to those specified as Critical Design Conditions.

C2.4.2.67 “Weights” are:

- Maximum Weight = Basic Weight + Variable Load + Disposable Load
- Light Weight = Basic Weight + Variable Load
- Basic Weight includes:
  - Weight of structure, power plants, systems, etc. integral to the vessel.
  - Unusable fuel and oil.
  - Other non-consumable liquids including non-consumable ballast.
  - Portable fire fighting equipment.
  - Portable emergency equipment.
  - Radio, radar, navaids.
  - Permanent ballast, lead weights, etc.
  - Plus the following, except where they are included in ‘role equipment’.
  - Passenger and crew seats.
  - Trim and furnishings, etc.
  - Toilet washing and galley facilities.
  - Buoyant life saving equipment.
  - Long range tankage systems.
- Variable Load includes:
  - Crew.
  - Crews baggage and equipment.
  - Role equipment.
- Disposable Load includes:
  - Domestic and windscreen water.
  - Food, drinks, bonded stores.
  - Consumable liquid ballast.
  - Main fuel.
  - Reserve fuel.
  - Long range fuel.
  - Passengers and passenger's baggage.
  - Cargo/freight.

C2.4.2.68 “Weiselberger Curve” Diagrammatic representation of the theoretical relationship between the lift to drag ratio and the height of the craft above the surface, with respect to mean chord length for any particular

craft. For the purposes of these Rules, the pilot is also to include the actual ground effect altitude and h/c factor for normal operation.

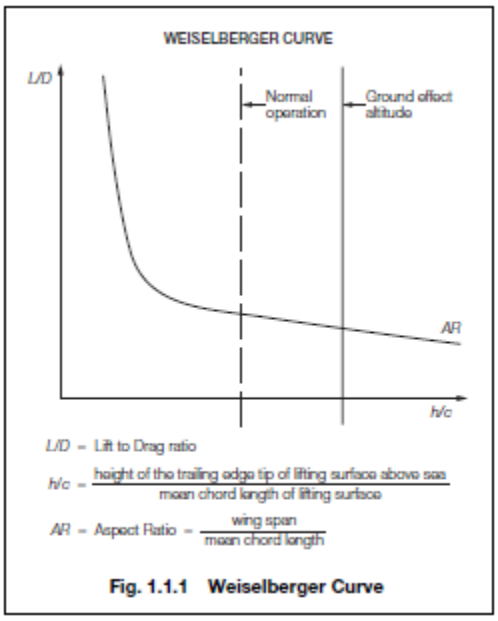


Fig. 1.1.1 Weiselberger Curve

C2.4.2.69 “Wind speed” the absolute mean speed of the air relative to the ground. For WIG effect craft assessment, this relates to the wind speed at a height of 10 metres above the surface.

C2.4.2.70 “Wing” denotes a lift generating surface to support the weight of the craft in flight and may include sections of the fuselage.

C2.4.2.71 “Wing angle of incidence” is the angle between the chord line of the wing and the velocity vector of the air inflow to the wing.

C2.4.2.72 “Worst permitted design altitude” is the flight altitude in the ground effect mode with the service speed and in waves corresponding to the worst permitted conditions.

2.5 Maximum/minimum allowable altitude of WIG craft in different flight modes

2.5.1 *Main operational mode (ground effect mode) for types A, B and C:*

- *the maximum allowable altitude corresponds to the maximum vertical extent of ground effect as defined in 4.20;*

2.5.2 *Fly-over mode for types B and C for emergency situations:*

- *the maximum allowable altitude for a flight outside of ground effect should be based on the craft’s technical features, taking into account the area of operation, but this altitude is not to exceed 150 m.*

2.5.3 *Aircraft mode for type C:*

- *the minimum altitude of the flight corresponds to the minimum safe altitude for an aircraft prescribed by ICAO regulations. When flying over water it should be at least 150 m; and*
- *the maximum allowable altitude of the flight is determined in accordance with ICAO provisions.*

2.6 Surveys

2.6.1 *Each craft should be subject to the surveys specified below:*

.1 an initial survey before the craft is put into service or before the WIG Craft Safety Certificate is issued for the first time;

.2 a renewal survey at intervals specified by the Administration but not exceeding 5 years except where 2.9.5 or 2.9.10 is applicable;

.3 a periodical survey within three months before or after each anniversary date of the WIG Craft Safety Certificate; and
.4 an additional survey as the occasion arises.

C2.6.1(a) For the purpose of Classification, the renewal (special) survey and periodical (annual) survey include a bottom survey in dry condition.
Other surveys (e.g. tailshaft surveys, boiler surveys, surveys of additional class notations) are required according to Society Rules.

C.2.6.1(b) At the end with good result of the new building procedure a Class certificate is issued by Tasneef. The validity of this certificate is not exceeding 5 years.
In general the procedure for:
- classification of existing WIG,
- reclassificate a WIG,
- deal with damage alterations and modifications,
- issue of the Certificate,
- withdrawal and suspension of class

are the same as for ships to which the Society Rules apply.
The scope of the initial survey for the classification are the same required by the Guidelines.

2.6.2 *The surveys referred to in 2.6.1 should be carried out as follows:*
.1 the initial survey should include:
.1.1 an appraisal of the safety assessment and safety management assumptions made as per part C and limitations proposed in relation to loadings, environment, speed and manoeuvrability;
.1.2 an appraisal of the data supporting the safety of the design, obtained, as appropriate, from calculations, tests and trials;
.1.3 a System Safety Assessment (SSA) as required by these Guidelines;
.1.4 an investigation into the adequacy of the various manuals to be supplied with the craft; and
.1.5 a complete inspection of the structure, safety equipment, radio installations and other equipment, fittings, arrangements and materials to ensure that they comply with the provisions of the Guidelines, are in satisfactory condition and are fit for the service for which the craft is intended;
.2 the renewal and periodical surveys should commence with an assessment of the continued validity of the safety assessment. These surveys should also include a complete inspection of the structure, including the outside of the craft's bottom and related items, safety equipment, radio installations and other equipment as referred to in 2.6.2.1 to ensure that they comply with the requirements of the Guidelines, are in satisfactory condition and are fit for the service for which the craft is intended. The inspection of the craft's bottom should be conducted with the craft out of the water under suitable conditions for close-up examination of any damaged or problem areas; and
.3 an additional survey, either general or partial according to the circumstances, should be carried out after a repair resulting from investigations prescribed in 2.8.3, or whenever any important repairs or renewals are made. The survey should be such as to ensure that the necessary repairs or renewals have been effectively carried out, that the material and workmanship of such repairs or renewals are in all respects satisfactory, and that the craft complies in all respects with the provisions of the Guidelines.

C2.6.2(a) With reference to 2.6.2.1.4, for classification, also refer to manuals required by it.

C2.6.2(b) With reference to 2.6.2.1.5, for classification, refer to Society Rules.

C2.6.2(c) With reference to 2.6.2.2, for classification, the periodical (annual) and renewal surveys consists in a complete inspection of external and accessible parts of the structure, machinery and electrical. The periodical survey for passenger unit shall include the lightweight and centre of gravity verifications.

C2.6.2(d) With reference to 2.6.2.3, as regards the classification, such additional surveys also apply to any other circumstances liable to affect classification of the craft. Relevant inspections are to ensure that the necessary repairs/replacements are satisfactory for the purpose of classification.
All surveys are to be made by Society Surveyors at the request of the Owner.

2.6.3 *The periodical surveys referred to in 2.6.1.3 should be endorsed on the WIG Craft Safety Certificate.*

C2.6.3 Procedures for issue or endorsement of classification certificates are stipulated in Society Rules.

2.6.4 *The inspection and survey of the craft, as provided for in these Guidelines, should be carried out by officers of the Administration. The Administration may, however, entrust the inspections and surveys either to surveyors nominated for the purpose or to organizations recognized by it.*

2.6.5 *An Administration nominating surveyors or recognizing organizations to conduct inspections and surveys as set forth in 2.6.4 should, as a minimum, empower any nominated surveyor or recognized organization to:*

.1 require repairs to a craft; and

.2 carry out inspections and surveys if requested by the appropriate authorities of a port State.

The Administration should notify the Organization of the specific responsibilities and conditions of the authority delegated to nominated surveyors or recognized organizations.

2.6.6 *When a nominated surveyor or recognized organization determines that the condition of the craft or its equipment does not correspond substantially with the particulars of the Certificate or is such that the craft is not fit to operate without danger to the craft or persons on board, such surveyor or organization should immediately ensure that corrective action is taken and should, in due course, notify the Administration. If such corrective action is not taken, the Certificate should be withdrawn and the Administration should be notified immediately; and, if the craft is in an area under the jurisdiction of another Government, the appropriate authorities of the port State should be notified immediately. When an officer of the Administration, a nominated surveyor or a recognized organization has notified the appropriate authorities of the port State, the Government of the port State concerned should give such officer, surveyor or organization any necessary assistance to carry out their obligations under this section. When applicable, the Government of the port State concerned should ensure that the craft does not continue to operate until it can do so without danger to the craft or the persons on board.*

C2.6.6 With reference to what above, conditions for validity of class of craft are stipulated in the Society's Rules.

2.6.7 *In every case, the Administration should fully guarantee the completeness and efficiency of the inspection and survey and should undertake to ensure the necessary arrangements to satisfy this obligation.*

2.7 Approvals

2.7.1 *The owner of a craft should accept the obligation to supply sufficient information to enable the Administration to fully assess the features of the design. It is strongly recommended that the owner and Administration and, where appropriate, the port State or States commence discussions at the earliest possible stage so that the Administration may fully evaluate the design in determining what additional or alternative requirements should be applied to the craft to achieve the required level of safety.*

C2.7.1 Conditions of design review of the craft, for classification purposes, are stipulated in the Society Rules.

2.8 Maintenance of conditions after survey

2.8.1 *The condition of the craft and its equipment should be maintained to conform with the provisions of these Guidelines to ensure that the craft in all respects will remain fit to operate without danger to the craft or the persons on board.*

C2.8.1 With reference to above the above responsibility lies with the Owner of the craft (or his representative).

2.8.2 *After any survey of the craft under section 6 has been completed, no change should be made to the structure, equipment, fittings, arrangements and materials covered by the survey without the sanction of the Administration.*

2.8.3 *Whenever an accident occurs to a craft or a defect is discovered, either of which affects the safety of the craft or the efficiency or completeness of the structure, equipment, fittings, arrangements and materials, the person in charge or owner of the craft should report at the earliest opportunity to the Administration, the nominated surveyor or recognized organization responsible, who should cause investigations to be initiated to determine whether a survey, as required by section 6, is necessary. If the craft is in an area under the jurisdiction of another Government, the person in charge or the owner should also report immediately to the appropriate authorities of the port State and the nominated surveyor or recognized organization should ascertain that such a report has been made.*

C2.8.2 With reference to 2.8.2 and 2.8.3, it is the Owner's responsibility to inform the Society of any modification, damage or repair affecting the class of the craft.

2.9 WIG Craft Safety Certificate

2.9.1 *A Certificate called a WIG Craft Safety Certificate is issued after completion of an initial or renewal survey to a craft which complies with the provisions of the Guidelines. The Certificate should be issued or endorsed either by the Administration or by any person or organization recognized by it. In every case, that Administration assumes full responsibility for the Certificate.*

2.9.2 *A Contracting Government to the Convention may, at the request of the Administration, cause a craft to be surveyed and, if satisfied that the provisions of the Guidelines are complied with, should issue or authorize the issue of a Certificate to the craft and, where appropriate, endorse or authorize the endorsement of a Certificate for the craft in accordance with the Guidelines. Any Certificate so issued should contain a statement to the effect that it has been issued at the request of the Government of the State the flag of which the craft is entitled to fly, and it should have the same force and receive the same recognition as a Certificate issued under 2.9.1.*

2.9.3 *The Certificate should be of the model given in annex 1 to MSC.1/Circ.1592. If the language used is neither English, French or Spanish, the text should include a translation into one of these languages.*

2.9.4 *The WIG Craft Safety Certificate should be issued for a period specified by the Administration which should not exceed 5 years.*

2.9.5 *Notwithstanding the requirements of 2.9.4, when the renewal survey is completed within three months before the expiry date of the existing Certificate, the new Certificate should be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of expiry of the existing Certificate.*

2.9.6 *When the renewal survey is completed after the expiry date of the existing Certificate, the new Certificate should be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of expiry of the existing Certificate.*

2.9.7 *When the renewal survey is completed more than 3 months before the expiry date of the existing Certificate, the new Certificate should be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of completion of the renewal survey.*

2.9.8 *If a Certificate is issued for a period of less than 5 years, the Administration may extend the validity of the Certificate beyond the expiry date to the maximum period specified in 2.9.4, provided that the surveys required when a Certificate is issued for a period of 5 years are carried out.*

2.9.9 *If a renewal survey has been completed and a new Certificate cannot be issued or placed on board the craft before the expiry date of the existing Certificate, the person or organization authorized by the Administration may endorse the existing Certificate and such a Certificate should be accepted as valid for a further period which should not exceed 5 months from the expiry date.*

2.9.10 *If a craft, at the time when a Certificate expires, is not in the place in which it is to be surveyed, the Administration may extend the period of validity of the Certificate but this extension should be granted only for the purpose of allowing the craft to proceed to the place where it is to be surveyed, and then only in cases where it appears proper and reasonable to do so. No Certificate should be extended for a period longer than one month, and a craft to which an extension is granted should not, on its arrival at the place where it is to be surveyed, be entitled by virtue of such extension to leave that place without having a new Certificate. When the renewal survey is completed, the new Certificate should be valid to a date not exceeding 5 years from the date of expiry of the existing Certificate before the extension was granted.*

2.9.11 *In special circumstances, as determined by the Administration, a new Certificate need not be dated from the date of expiry of the existing Certificate as required by 2.9.6 or 2.9.10. In these circumstances, the new Certificate should be valid to a date not exceeding 5 years from the date of completion of the renewal survey.*

2.9.12 *If a periodical survey is completed before the period specified in section 6 of MSC.1/Circ.1592, Part A then:*

.1 the anniversary date shown on the relevant Certificate should be amended by endorsement to a date which should not be more than 3 months later than the date on which the survey was completed;

.2 the subsequent periodical survey required by section 6 of MSC.1/Circ.1592, Part A should be completed at the intervals prescribed by 2.6.1.3, using the new anniversary date; and

.3 the expiry date may remain unchanged provided one or more periodical surveys are carried out so that the maximum intervals between the surveys prescribed by 2.6.1.3 are not exceeded.

***2.9.13** A Certificate issued under 2.9.1 or 2.9.2 should cease to be valid in any of the following cases:*

.1 if the relevant surveys are not completed within the periods specified in 2.6.1;

.2 if the Certificate is not endorsed in accordance with 2.6.3;

.3 upon transfer of the craft to the flag of another State. A new Certificate should only be issued when the Government issuing the new Certificate is fully satisfied that the craft is in compliance with the requirements of 2.8.1 and 2.8.2. In the case of a transfer between Governments that are Contracting Governments to the Convention, if requested within 3 months after the transfer has taken place, the Government of the State whose flag the craft was formerly entitled to fly should, as soon as possible, transmit to the Administration a copy of the Certificate carried by the craft before the transfer and, if available, copies of the relevant survey reports.

C2.9.13 With reference to 2.9.13.2, for classification purpose, the Society Rules apply.
Conditions for validity of class are stipulated in the Society Rules.

***2.9.14** The privileges of the Guidelines may not be claimed in favour of any craft unless it holds a valid Certificate.*

2.10 Permit to Operate WIG Craft

***2.10.1** The craft should not operate commercially unless a Permit to Operate WIG Craft is issued and valid in addition to the WIG Craft Safety Certificate. Transit voyage without passengers or cargo may be undertaken without the Permit to Operate.*

***2.10.2** The Permit to Operate should be issued by the Administration to certify compliance with 2.2.1.2 to 2.2.1.7 and stipulate conditions of the operation of the craft and should be drawn up on the basis of the information contained in the route operational manual specified in chapter 17 of part B.*

***2.10.3** Before issuing the Permit to Operate, the Administration should consult with each port State to obtain details of any operational conditions associated with the operation of the craft in that State.*
Any such conditions imposed should be shown by the Administration on the Permit to Operate and included in the route operational manual.

***2.10.4** A port State may inspect the craft and audit its documentation for the sole purpose of verifying its compliance with the matters certified by and conditions associated with the Permit to Operate.*
Where deficiencies are shown by such an audit, the Permit to Operate ceases to be valid until such deficiencies are corrected or otherwise resolved.

***2.10.5** The provisions of section 9 of MSC.1/Circ.1592, Part A should apply to the issue and the period of validity of the Permit to Operate.*

***2.10.6** The Permit to Operate should be of the model given in annex 2 to MSC.1/Circ.1592. If the language used is neither English, French or Spanish, the text should include a translation into one of these languages.*

2.11 Control

***2.11.1** The provisions of regulation I/19 of the Convention should be applied to include the Permit to Operate in addition to the Certificate issued under section 2.9 of MSC.1/Circ.1592, Part A.*

2.12 Equivalents

***2.12.1** Where these Guidelines require that a particular fitting, material, appliance or apparatus, or type thereof, should be fitted or carried in a craft, or that any particular provision should be made, the Administration may allow any other fitting, material, appliance or apparatus, or type thereof, to be fitted or carried, or any other provision to be made in the craft, if it is satisfied by trial thereof or otherwise that such fitting, material, appliance or apparatus, or type thereof, or provision, is at least as effective as that required by these Guidelines.*

C2.12.1 With reference to 2.12.1, for classification purpose, the Society Rules apply.

2.12.2 *Where compliance with any of the provisions of these Guidelines would be impractical for reasons of the particular design of the craft, the Administration may substitute those with alternative provisions, provided that equivalent safety is achieved. The Administration which allows any such substitution should communicate to the Organization particulars of these substitutions and the reasons for their acceptance, which the Organization should circulate to its Member Governments for information*.

2.13 Information to be made available

2.13.1 *The Administration should ensure that the management of the company operating the craft has provided the craft with adequate information and guidance in the form of manuals to enable the craft to be operated and maintained safely. These manuals should include a route operational manual, craft operating manual, maintenance manual and servicing schedule. Such information should be updated as necessary.*

2.13.2 *The manuals should contain at least the information specified in chapter 17 of MSC.1/Circ.1592 part B and information relating to craft operation and maintenance generated in the safety assessment (see part C of MSC.1/Circ.1592). They should be in a language understood by the crew. Where this language is not English, a translation into English should be provided of at least the route operational manual and the craft operating manual.*

C2.13.2 With reference to 2.13, the operating manual is to be considered as a class matter.

2.14 Further developments

2.14.1 *Due to ongoing research and development in the design of WIG craft with a different geometry to that envisaged during the formulation of these Guidelines, it is important that these Guidelines do not restrict this progress and the development of new designs.*

2.14.2 *A design may be produced which cannot comply with the provisions of these Guidelines. In such a case the Administration should determine the extent to which the provisions of the Guidelines are applicable to the design and, if necessary, develop additional or alternative provisions to provide an equivalent level of safety for the craft. The full application of the safety assessment and safety management provisions of these Guidelines at all times remains a fundamental component of such alternative provisions.*

2.14.3 *The foregoing should be considered by the Administration when assessing the granting of equivalents under the Guidelines.*

2.15 Circulation of safety information

2.15.1 *In the event that an Administration has cause to investigate an accident involving a craft to which these Guidelines apply, that Administration should provide a copy of the official report to the Organization, which should invite Member States to note the existence of the report and to obtain a copy.*

2.15.2 *In the event that operational experience reveals structural or equipment failures affecting the safety of a design, craft owners should inform the Administration.*

2.16 Review of the Guidelines

2.16.1 *The Guidelines should be reviewed by the Organization at intervals preferably not exceeding four years to consider a revision of existing provisions to take account of new developments in design and technology.*

2.16.2 *Where a new development in design and technology has been found acceptable to an Administration, that Administration may submit particulars of such development to the Organization for consideration for incorporation into the Guidelines during the periodical review.*

Index Part B

Chapter 1 - Buoyancy, stability and subdivision

1.1 General

1.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 1 and relevant Annexes 3, 4, 5 and 8 apply except for all the requirements for buoyancy and stability in the displacement mode following damage, since these requirements are not applicable for the purpose of classification; however, upon request of the Interested Party, the additional class notation **DMS** is assigned to units classed by the Society and complying with these requirements.

1.2 Documents to be submitted

1.2.1 The following drawings and documents are to be submitted for approval where appropriate. The Society reserves the right to ask for supplementary copies if deemed necessary in particular cases.

.1 Hull, plotted and numerically;
.2 Side contour, plotted and numerically;
.3 Coordinates of non-watertight and nonweather-tight openings;
.4 Hydrostatic tables;
.5 Cross curve tables;
.6 Data of boundaries of all subcompartments and a plan in which these compartments are stated;
.7 Damage stability investigation, complete input and output data including initial loading conditions*;
.8 Damage control plan*;
.9 Inclining test report;
.10 Intact stability booklet.

* Documents as per items .7 and. 8 are requested for the assignment of the additional class notation **DMS.**

Chapter 2 – Structures

2.1 General

2.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 2 apply with the following deviations/additions.

2.2 References

2.2.1 The Tasneef Rules for the Classification of High-Speed Craft are referred to in this Chapter simply as the "HSC Rules", as stated in Part A, [1.1.9].

2.3 Displacement, transitional and planing modes

2.3.1 In the displacement, transitional and planing modes as defined in in Part A, [2.4.1.46.2] to [2.4.1.46.4], the WIG craft is considered to be equivalent to a High-Speed Craft (HSC) for what concerns the structural loading and response.
Due to the above consideration, the relevant requirements of HSC Rules, also apply to the verification of the WIG craft structures. More details can be found in the following paragraphs.
Considering that WIG craft operating speeds are much higher than the ones of HSC, the formulas in the HSC Rules requirements may be evaluated by the Society based on designer's proposals justified by different calculation methods or model-based tests.

2.3.2 Documents to be submitted
Depending on the overall dimensions of the WIG craft, departures from what is required by HSC Rules C3.0 can be applied.
As a matter of example, SWBM and SWSF distributions (global overall loads) will not be applicable to WIG craft of reduced longitudinal dimensions (i.e. less than or equal to 24 m of scantling length L).
In general, the structural drawings may follow a more aeronautical nomenclature, however plans covering the entire structure, including the details are to be submitted.

2.3.3 General
The requirements in HSC Rules C3.1 apply.

2.3.4 Materials and connections
For WIG craft built using steel, aluminum alloy and/or Fiber Reinforced Plastic (FRP) the requirements in HSC Rules C3.2 apply.
The welding, rivet connection and FRP bonding are to be carried out in accordance with HSC Rules C3.2.

2.3.5 Design acceleration
In general, the requirements in HSC Rules C3.3 apply. The service area is to be clearly defined according to the significant wave height H_S.

2.3.6 Overall loads
The overall loads, if their application is justified by the dimensions of the WIG craft (more than 24 m in scantling length L), may be found in HSC Rules C3.4.

2.3.7 Local Loads
The local loads, including impact pressures, sea pressure (hydrostatic + wave) and internal inertial loads, may be found in HSC Rules C3.5, as applicable.

2.3.8 Direct Calculations for monohull and catamarans
Provisions for direct calculations for monohull and catamarans, as applicable, may be found in HSC Rules C3.6.

2.3.9 Calculation of scantlings for Steel and aluminum alloy WIG craft
Provisions for calculations of scantlings for Steel and aluminum alloy WIG craft, as applicable, may be found in HSC Rules C3.7, including checks for yielding and buckling failure modes applied to plating, ordinary stiffeners and primary supporting members, including pillars (if present).

2.3.10 Calculation of scantlings for FRP WIG craft

Provisions for calculations of scantlings FRP WIG craft, as applicable, may be found in HSC Rules C3.8, including checks for yielding and buckling failure modes applied to plating, ordinary stiffeners and primary supporting members, including pillars (if present).

2.3.11 Scantlings of Hydrofoil Hull Structures

If applicable, provisions for calculations of hydrofoil hull structures can be found in HSC Rules, Appendix C3A1.

2.4 Take off/landing, Ground effect, Fly over and Aircraft modes

2.4.1 In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in Part A, [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane for what concerns the structural loading and response.

Due to the above consideration, the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

2.5 Fatigue evaluation

2.5.1 Fatigue life

The design life of WIG craft is to be minimum 20 years, unless otherwise accepted by the Flag Administration on the basis of the operational profile and maintenance requirements of the WIG craft.

2.5.2 Fatigue checks

In the displacement, transitional and planing modes as defined in in Part A, [2.4.1.46.2] to [2.4.1.46.4], when the WIG craft is considered equivalent to a HSC, the fatigue requirements in HSC Rules C3.7.4 apply.

In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in Part A, [2.4.1.46.5] to [2.4.1.46.8], when the WIG craft is considered equivalent to an airplane, the fatigue requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

Chapter 3 - Accommodation and escape measures

3.1 General

3.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 3 and relevant Annex 6 apply, except for the ones in paragraphs 3.1, 3.2, 3.3.1, 3.7, 3.8 and 3.10 that are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification.
In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

3.1.2 In general, items of MSC.1/Circ.1592, Part B, Chapter 3 containing requirements regarding fire safety are not mandatory for the purpose of classification, except where the Society carries out surveys relevant to fire safety statutory requirements on behalf of the flag Administration.
In such cases, fire safety statutory requirements are considered a matter of class and therefore compliance with these requirements is also verified by the Society for classification purposes at class surveys.

3.2 Documents to be submitted

3.2.1 The following plans and documents are to be submitted:

- Windows, arrangements and details.
- Plan showing the arrangement of means of communication.
- Calculation of the collision load and relevant arrangement of the accommodation spaces (containing the indication of seat characteristics, arrangement and installation, the characteristics of the safety belts).

Where the Society carries out surveys relevant to fire safety statutory requirements on behalf of the flag Administration, the following plans and documents are also to be submitted:

- Plans showing the means of escape and the means of access to the various craft spaces.
- Evacuation procedure and evacuation time calculation.

Further documentation may be required if deemed necessary by the Society.

Chapter 4 - Directional, attitude and altitude control systems

4.1 General

4.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 4 and relevant Annex 8 apply with the following deviations/additions.
In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

4.1.2 Arrangement deviating from MSC.1/Circ 1592 will be given special consideration.

4.2 Documents to be submitted

4.2.1 The following drawings and documents are to be submitted for approval:
1. assembly and general drawings of all directional control systems;
2. diagrams of hydraulic and electric equipment;
3. detail drawings of all load-transmitting components.

4.2.2 The drawings and other documents must contain all data necessary for verifying scantlings and power calculations as well as material specifications.

4.2.3 Further documentation may be required if deemed necessary by the Society.

4.3 General requirements

4.3.1 Steering devices are to be installed so as to be accessible at all times and to be able to be maintained without difficulty.

4.3.2 Steering devices are to be mounted on substantial seatings in order to transmit the force sufficiently to the hull structure.

4.3.3 Important load-transmitting components and components subjected to internal pressure are to be made of steel or other approved ductile material.
At the discretion of the Society, grey cast iron may be used for certain components with low stress level.

4.3.4 The pipes of hydraulic systems are to be made of seamless or longitudinally welded steel tubes.
At the discretion of the Society, copper may be used.

4.3.5. Approved high-pressure hose assemblies may be used for short pipe connections.

4.4 Testing of materials

4.4.1 The materials of important load-transmitting components, including pressurized pipes and casings, are to be tested in the presence of the Surveyor in accordance with Society Rules for Materials.

4.5 Reliability

4.5.1 Guidance to probability levels is given in Annex 9.

4.5.2 The actuation system is to be operated by power:
- for passenger craft,
- in any case where the maximum effective torque to be applied to the directional control device exceeds 25 kNm.

4.5.3 The secondary means of actuating the device is to be power-operated if the effective torque to be applied to the directional control device by the secondary means exceeds 40 kNm.

4.5.4 A secondary means of actuating the device need not be installed in a craft equipped with two rudders and/or similar devices, or with two approved means for steering, provided that each system is capable of steering the craft with the other system out of operation.

4.5.5 The average rate of turning of the main actuation system in general is to be not less than 2,3 degrees per second. It may be reduced with the consent of the Society, if hazard to the stability of the craft can occur.

4.5.6 The average rate of turning of the secondary actuation system is to be not less than 0,5 degrees per second.

4.5.7 Steering devices are to be provided with suitable mechanical stopping arrangements at the maximum design steering device angle.

4.5.8 Power-operated directional control systems are to be provided with power cut-off arrangements which stop the steering device before the mechanical stoppers are reached. These arrangements are to be synchronized with the steering device itself and not with the control system.

4.5.9 Steering devices are to be able to be locked in any required position for maintenance purposes.

4.5.10 Power-operated directional control systems are to be provided with an overload protection device. This device is to be secured to prevent later adjustment by unauthorized persons. Means are to be provided for checking the setting while in service.

4.5.11 The pipes of hydraulically operated control systems are to be installed in such a way as to ensure maximum protection while remaining readily accessible. They are to be installed at a sufficient distance from the craft shell.

4.5.12 Hydraulic power supply and piping for steering is not to be used for other purposes.
At the discretion of the Society, exemptions may be permitted tor water jets, azimuth thrusters and similar units.

4.5.13 In the event of loss of hydraulic oil, it is to be possible to isolate the damaged system in such a way that the second control system remains fully serviceable.

4.2.14 Tanks forming part of a hydraulic control system are to be fitted with oil level indicators.

4.2.15 A low-level alarm is to be provided at the craft's operating position.

4.2.16 Filters for cleaning the fluid are to be located in the piping system.

4.2.17 In power-operated hydraulic main steering control systems, an additional permanently installed storage tank is to be provided with the capacity to refill at least one of the control systems, including the service tank.

4.3 Demonstrations

4.3.1 Each power unit is to be subjected to a type test in the manufacturer's workshop according to a program accepted by the Society. During the test, no overheating, excessive vibration or other irregularities are to occur. After the test the power unit is to be dismantled and inspected.

4.3.2 Pressure vessels including cylinders and pipes are to be subjected to a pressure test. The test pressure is to be 1,5 times the maximum working pressure.
Tightness tests are to be conducted on components for which this is appropriate.

Chapter 5 - Anchoring, towing and berthing

5.1 General

5.1.1 The requirements in MSC.1/Circ.1592 Chapter 5 apply, except for the ones in paragraphs 5.1.2, 5.2.2, 5.2.3., 5.3 and 5.4 that are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification.

5.2 Documents to be submitted

5.2.1 A detailed drawing, showing all the elements necessary for the evaluation of the equipment number of the craft, is to be submitted together with the calculations of the EN number.
The anchoring equipment to be fitted on the concerned craft is to be specified.
Windlass, brake and chain stopper are subject to approval by the Society; the relevant documentation is to be submitted.

5.3 Equipment

5.3.1 In general, the requirements in HSC Rules, Chapter 6, C6.5 apply.

Chapter 6 - Fire safety

6.1 General

6.1.1 The fire safety requirements in MSC.1/Circ.1592, Part B, Chapter 6 are not mandatory for the purpose of classification, except where the Society carries out surveys relevant to fire safety statutory requirements on behalf of the flag Administration.
In such cases, fire safety requirements in MSC.1/Circ.1592, Part B, Chapter 6 are considered a matter of class and therefore compliance with these requirements is also verified by the Society for classification purposes at class surveys.
In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

6.2 Documents to be submitted

6.2.1 The following drawings and documents are to be submitted:

1. Plan showing the arrangements of the fire subdivision, including doors and other closing means of openings in fire resisting divisions.
2. Schematic plan concerning the natural and mechanical ventilation, with indication of location of dampers and identification numbers of the fans serving each craft section.
3. Plan showing automatic fire detection systems and manually operated call points, including fire alarm systems.
4. Plan relating to the water fire-fighting system (pumps, piping, etc.).
5. Plan relating to the arrangement of fixed fire extinguishing systems.
6. Constructional plans relevant to pressure vessels or bottles serving fixed fire extinguishing systems mentioned under .5.
7. Plans of pumping and drainage means for the water delivered by fixed water-spraying fire extinguishing systems.
8. Plan relating to all other fire-fighting installations, either fixed or portable.

Further documentation may be required, if deemed necessary by the Society.

Chapter 7 - Life-saving appliances and arrangements

7.1 General

7.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 7 and relevant Annex 7 are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification.

7.1.2 Davits and life saving arrangements permanently attached to the hull structure are to be examined by the Society in accordance with the applicable requirements of Chapter III of the Convention and the LSA Code.

Chapter 8 - Machinery

8.1 General

8.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 8 apply (except for the ones in paragraph 8.1.1.2 that are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification) with the following deviations/additions.
In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

8.1.2 Arrangement deviating from MSC.1/Circ 1592 will be given special consideration

8.1.3 Pressure vessels and steam and hot water generators are to be designed, constructed, equipped and tested according to Society Rules.
For the installation of oil-fired steam and hot-water generators automatic oil, steam or air atomizing burners or rotary cup burners complying with Society Rules are to be provided.

8.2 Classification

8.2.1 Designs which deviate from the Rules may be approved provided that such designs have been examined by the Society for suitability and have been recognized as equivalent.

8.2.2 Machinery installations which have been developed on novel principles and/or which have not yet been sufficiently tested in shipboard service require the Society's special approval.
Such machinery may be designated by a suffix attached to the character of classification and be subjected to intensified survey, if sufficiently reliable proof cannot be provided of its suitability and equivalence.

8.2.3 In addition to the Rules, the Society reserves the right to impose further requirements in respect of all types of machinery, where this is unavoidable due to new findings or operational experience, or the Society may permit deviations from the Rules where these are specially warranted.

8.2.4 National rules or regulations outside the Society Rules remain unaffected.

8.3 Ambient conditions

8.3.1 The selection, layout and arrangement of all shipboard machinery, equipment and appliances is to be such as to ensure faultless continuous operation under the ambient conditions specified in Tables 8.1 and 8.2.

8.4 Design and construction of machinery installation

8.4.1 General

Main propulsion and maneuvering equipment must provide full control of speed and direction of the craft.
Every important, automatically or remotely controlled system must have alternative arrangements for operation.

Table 8.1 – Inclinations (see note)

Installations, Components	Angle of inclinations (°) **(2)**			
	Athwartship		Fore-and-aft	
	static	dynamic	static	dynamic
Main and auxiliary machinery	15	22,5	5	7,5
Ship safety equipment, e.g. emergency power installations, emergency fire pumps and their	22,5	22,5	10	10
Switchgear, electrical and electronic appliances **(1)** and remote-control systems				

(1) Up to an angle of inclination of 45° no undesired switching operations or functional changes may occur.
(2) Athwartships and fore-and-aft inclinations may occur simultaneously.

Note: The Society may be consider deviations from these angles, taking into consideration the type, size and service condition of the craft.

Table 8.2 - Environmental conditions for machinery and electrical installations (see note)

Seawater temperature +32°C	
Ambient air temperature -25°C to +45°C, relative humidity (1 bar / 45°C) 60%	
Enclosed machinery spaces	Temperature range 0°C to 55°C. Relative humidity 100%. Ability to withstand oil vapour and salt-laden air
Air-conditioned control rooms	Temperature range 0°C to 40°C. Relative humidity 80%
Open deck	Temperature range -25°C to +45°C. Ability to withstand temporary flooding with seawater and salt-laden spray
Note: The Society may approve other conditions for craft operating only in special agreed geographical areas.	

8.5 Materials, welding and tests

8.5.1 All materials and components subject to the Rules are to be manufactured and tested in accordance with Society Rules.

8.5.2 The fabrication of welded components, approval of companies and testing of welders are subject to Society Rules.

8.5.3 Machinery and its components are subject to constructional and material tests, pressure and leakage tests and trials. All the tests prescribed in the following sections are to be conducted under the supervision of the Society.

8.5.4 In the case of parts produced in series, other methods of testing may be agreed with the Society instead of the tests prescribed, provided that the former are recognized as equivalent by the Society.

8.5.5 The Society reserves the right, where necessary, to increase the scope of the tests and also to subject to testing those parts which are not expressly required to be tested according to the Rules.

8.5.6 After installation on board of propulsion and auxiliary machinery, operational functioning of the machinery including the associated auxiliary equipment is to be verified. All safety equipment is to be tested, unless adequate testing has already been performed at the manufacturer's works in the presence of the Society Representative.

8.5.7 In addition, the entire machinery installation is to be tested during sea trials as far as possible under intended service conditions.

8.6 Shipboard trials (dock and sea trials)

8.6.1 Dock trials are to be carried out to the satisfaction of the Society Surveyor.

8.6.2 Sea trials with propulsion engines driving fixed propellers are to include at least the following tests:
.1 at rated engine speed for at least 4 hours, with gas turbines for at least 2 hours;
.2 at minimum on-load speed;
.3 starting and reversing manoeuvres;
.4 astern trial at the maximum expected astern speed, for 15 minutes;
.5 final testing of monitoring and safety systems.

8.6.3 Sea trials with propulsion engines driving controllable-pitch propellers, reversing gears or water jets are to include at least the following tests:
.1 at 100% power at engine speed no for at least 4 hours, with gas turbines for at least 2 hours;

.2 manoeuvring trials with various propeller pitches; where provision is made for combinator operation, the combinator curves are to be plotted and verified by measurements;
.3 astern trial at the maximum expected astern speed for at least 15 minutes;
.4 final testing of monitoring and safety systems.

8.6.4 The engines driving electrical generators are to be subjected to an operational test for at least four hours in accordance with the shipboard test programme of the Society.

8.6.5 Stopping test from full ahead is to be carried out. Time and distance are to be noted.

8.7 Gas turbines

8.7.1 Documents to be submitted
For every gas turbine installation, the drawings and documents required in Society Rules are to be submitted for approval by the turbine manufacturer.

8.7.2 Materials
The materials of shafts, turbine and compressor wheels, guide vanes and blades, turbine and compressor casings, combustion chambers and heat exchangers are to be tested in accordance with test specifications laid down by the gas turbine manufacturer and recognized by the Society as part of the approval procedure.

8.7.3 Startup is to take place automatically, in a fixed sequence.

8.7.4 The following minimum monitoring equipment is to be provided:
.1 air pressure and temperature at compressor inlet;
.2 gas pressure and temperature at gas generator outlet;
.3 lubricating oil pressure and temperature;
.4 gas generator and power turbine speeds.

8.7.5 Gas turbine and compressor rotors are to be dynamically balanced when in the condition ready for assembly and are to undergo an overspeed test.

8.7.6 Sea trials have to be carried out according to [8.6].

8.8 Diesel engines for main propulsion and essential auxiliaries

8.8.1 Documents to be submitted
For each diesel engine type, that is required to be approved according to the Society Rules, the drawings and documents required in the Society Rules are to be submitted to the Society for approval by the engine manufacturer.

8.8.2 Auxiliary engines intended as prime movers for harbour generator sets with less than 50 kW are not subject to approval.

8.8.3 For the purposes of these Rules, diesel engines are reciprocating internal combustion engines.

8.8.4 When required by the Society Rules, diesel engines are to be designed such that their rated power when running at rated speed can be delivered as continuous power.

8.8.5 The continuous power for which the engine is to be designed is defined as in ISO 3046/1.
Subject to the approval of the Society for propulsion plants where overload is used/required frequently, the diesel engines may be designed for a continuous power (fuel stop power) which cannot be exceeded.

8.8.6 Diesel engines must have been type-tested by the Society.
For this purpose, a type-approval test in accordance with Society Rules for diesel engines is to be performed.

8.8.7 The speed ranges where excessive vibrations may be encountered are to be marked in red on the tachometer, where practicable, and an instruction plate indicating that the engine is not to be continuously operated within these speed ranges is to be fitted near each control station.

8.8.8 Where crankcase venting systems are provided, their clear opening is to be as small as possible. The vent pipes of two or more engines are not to be combined.

8.8.9 Tests and trials
Material tests for main components of diesel engines, pressure tests and shop trials have to be conducted according to Society Rules for diesel engines.

8.9 Filters

8.9.1 Lubricating oil filters
Lubricating oil lines are to be fitted with lubricating oil filters of suitable size and fineness, located in the main oil flow on the delivery side of the pumps.
Steps are to be taken to ensure that main flow filters can be cleaned without interrupting operation and filtration.

8.9.2 Fuel filters
The supply lines of the fuel-injection pumps are to be fitted with switch-over duplex filters.

8.9.3 Filters for emergency engines
For emergency generators and emergency fire extinguishing pump sets, simplex filters for fuel oil and lubricating oil are acceptable.

8.9.4 Filter arrangements
Fuel and lubricating oil filters are not to be located above rotating parts or in the immediate proximity of hot components.
Where this arrangement is not feasible, rotating parts and hot components are to be sufficiently shielded.
Drip pans of suitable size are to be mounted under fuel filters.
The same applies to lubricating oil filters if oil can escape during dismantling of the filter.

8.10 Starting equipment

8.10.1 The starting equipment is to enable engines to be started up from the shut-down condition using the starting equipment available in the machinery space.

8.10.2 Details of the starting equipment as well as the number of starts are to be in compliance with Society Rules.

8.11.1 Starting air compressors are to be approved according to Society Rules.

8.12 Control equipment

8.11.1 Main engines
An engine control position is to be provided from which the propulsion plant (including reversing gear or controllable pitch propeller) can be operated and monitored.
As a minimum requirement, the engine control position is to be equipped with the following indicators, which are to be clearly and logically arranged:

1. speed.
2. lubricating oil pressure at engine inlet;
3. fuel pressure at engine inlet.;
4. cylinder cooling water pressure;
5. starting air pressure;
6. charging air pressure;
7. control air pressure at engine inlet.

Indicators are to be provided directly on the engine for the following readings:

- lubricating oil temperature;
- coolant temperature;
- exhaust gas temperature, wherever the dimensions permit, at each cylinder outlet and at the turbocharger inlet/outlet. In case of geared transmissions or controllable-pitch propellers, the scope of the control equipment mentioned above is to be extended accordingly.

8.11.2 Auxiliary engines

As a minimum requirement, the following indicating instruments are to be mounted in a logical manner on the engine:

.1 tachometer;
.2 pressure gauge for lubricating oil pressure;
.3 pressure gauge for fuel pressure;
.4 pressure gauge for cooling water pressure;
.5 thermometer for cooling water.

8.12 Transmissions

8.12.1 The design and arrangement of transmission components such as shaftings, couplings, clutches and gears in propulsion, maneuvering and lifting devices are subject to approval and certification.

8.12.2 Documentation and strength calculations on the basis of Society Rules are to be submitted. Alternatively, recognized calculation procedures may be accepted.

8.12.3 Steel shaft lines

Materials are to comply with Society's Rules.
Shaft Dimensions are to comply with Society's Rules standard calculations.
Alternatively for shafts protected from seawater (no direct contact between steel and seawater):

- a fatigue strength calculation e.g.according to DIN 743 or similar may be accepted. This calculation is to be based on the loads (torque, bending moment, thrust etc.) acting on the shaft at MCR conditions.
- in addition to a fatigue strength calculation, a static load calculation is required. At no location of the shaft is the von Mises (equivalent) stress to exceed the yield point of the shaft material for the torque at MCR multiplied by the safety factor S, where S ≥3

In any case for thin walled hollow shafts, a safety factor S against buckling is required in reference to the torque at MCR, where S ≥3
All relevant load and material data have to be submitted.

8.12.4 Composites shaft lines

Materials are to comply with Society's Rules.
Mathematical analysis of the relevant types of failure (static, fatigue, buckling and vibrations) according to classical laminate theory for a simple geometry or FEM for a complex geometry is required.
The material components and manufacturing process has to be specified and an experimental strength analysis (tests on samples and prototypes in presence of Society representative) is to be provided. The required safety factors and the validity of experimental strength analysis for the full scale component have to be agreed with the Society.
If fire protection requirements are relevant for the composites shafting, specific arrangements are to be provided at the satisfaction of the Society.

8.13 Vibrations

8.13.1 Torsional vibrations calculations

Calculations for torsional vibration behaviour are to be submitted to the Society in due time. Calculations must include the equivalent mass-elastic system, natural frequencies and corresponding vibration modes, as well as the forced response for gears, couplings, shaftings. Calculations are to be checked in accordance with Society Rules.
Torsional vibration measurements may be required by the Society. Such measurements will be necessary to detect dynamic torques, especially for plants working under unclearly defined conditions. As far as such measurements aim to provide special knowledge concerning load and response characteristics, adequate measuring techniques are to be applied, by agreement with the Society.

8.13.2 Stability of the system

The closed loop system including governor and plant must be stable under all conditions. This may be checked during sea trials for normal and misfiring conditions, clutch-in procedures, parallel connecting of units, loading of generators, etc.
In special cases, stability calculations may be required by the Society.

8.13.3 Whirling vibrations

Calculations of natural frequencies for whirling may be required by the Society. This will regularly be the case for thin, long shaftings supported by few bearings. The calculations may be required in a simplified form (natural frequencies), or as complete forced vibrations using methods or programmes approved by the Society.

8.13.4 Lateral vibrations

Vibration calculations for resiliently mounted reciprocating main engines are to be submitted to the Society for approval. Calculations may be carried out in a simplified form, i.e. natural frequencies for the six degrees of freedom and corresponding modes, provided that no resonances excited by major engine orders are within the operational speed range.

8.14 Propulsion and lift devices

8.14.1 The design and arrangement of propulsion and lift devices are subject to approval and certification.

8.14.2 Documentation and strength calculations on the basis of Society Rules are to be submitted. Alternatively, recognized calculation procedures may be accepted.

8.14.3 The scantlings of propellers intended for hydrofoils classed as HSC category A is to be such that the strength of the blade, at the relevant verification sections, is not less than 4 with respect to the ultimate tensile strength of the propeller blade material. The designer is to be present the Society, together with the propeller drawings, a detailed hydrodynamic load and stress analysis at the relevant verification sections.

8.14.4 For stabilization means:

1. The different situations are described in C3.11 of HSC Rules.
2. In case of situation 1, only power activated items such as foils, trims and tabs are assessed. The following parts are reviewed:
   - hydraulic system used for activation of stabilization system,
   - associated electrical devices.
3. In case of situation 2, only possible interference between hydraulic/electrical installations and the safety of the craft are to be checked. The hydraulic/electrical systems documentation is to be submitted for that purpose.

The applicable regulations depend on the location of the hydraulic power pack. The working principles are not checked.

Chapter 9 - Auxiliary systems

9.1 General

9.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 9 apply with the following deviations/additions. In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

9.1.2 Arrangement deviating from MSC.1/Circ 1592 will be given special consideration

9.2 Documents to be submitted

9.2.1 Diagrammatical plans for piping systems and arrangements, including all the details necessary for approval as listed below, are to be submitted for approval.

1. Tank arrangement for fuel and other flammable fluids
2. Fuel systems (bunkering, transfer and service)
3. Lubricating oil systems
4. Cooling water systems (seawater and fresh water)
5. Compressed air systems (starting air, control air, working air)
6. Exhaust gas systems
7. Bilge pumping and drainage systems
8. Oily bilge water and oil residue systems
9. Ballast and antiheeling systems
10. Steam heating, feed water and condensate systems
11. Air, overflow and sounding pipes
12. Sanitary systems
13. Fittings on side and bottom
14. Arrangement of remote controlled valves
15. Hydraulic systems for hatch covers, shell closing appliances, watertight doors and hoists.

9.2.2 The diagrammatical plans or accompanying lists are to include the following particulars:

1. Outside diameters and wall thicknesses of pipes
2. Materials for pipes, valves and fittings
3. Type and capacity of pumps
4. Type of flexible hoses and expansion elements
5. Maximum working pressures
6. Temperature ranges
7. Equipment list.

9.2.3 Machinery arrangement plan showing the layout of machinery components such as engines, fans, heat exchangers, generators, switchboards, pumps, purifiers, excluding pipes, valves and accessories.

9.2.4 Further documentation may be required if deemed necessary by the Society.

9.2.5 Definitions

Maximum allowable working pressure PB is the maximum allowable working pressure for components and piping systems with regard to the materials used, requirements, working temperatures and undisturbed operation.

Nominal pressure PN is the term applied to a selected pressure/temperature ratio used for the standardization of structural components.

In general, the numerical value of the nominal pressure for a standardized component made of the material specified in the standard will correspond to the maximum allowable working pressure PB at 20°C.

Test pressure PP is the pressure to which components and piping systems are subjected for testing purposes.

Design pressure PR is the maximum allowable working pressure PB for which components and piping systems are designed with regard to their mechanical characteristics. In general, the design pressure is the maximum allowable working pressure at which the safety equipment will intervene (e.g. activation of safety

valves, opening of return lines of pumps, operating of overpressure safety arrangements, opening of relief valves) or at which the pumps will operate against closed valves.

9.3 Materials

9.3.1 For the testing of pipes, selection of joints, welding and heat treatment, pipes are divided into three classes, as indicated in Tables 9.1 and 9.2.
Details of approved materials are given in Table 9.3. The Society Rules for Materials are also to be observed.

9.3.2 Steel pipes, valves and fittings
Pipes belonging to Classes I and II are to be either of seamless drawn material, or produced by a welding procedure approved by the Society. In general, carbon and carbonmanganese steel pipes, valves and fittings are not to be used for temperatures above 400°C.

Table 9.1 - Classification of pipes

Medium/type of pipeline	Design pressure PR (MPa) Design temperature t (°C)		
Toxic and corrosive media Inflammable media with service temperature above the flash point Inflammable media with a flash point below 60°C	all	**(1)**	-
Steam	PR > 1,6 or t > 300	PR ≤ 1,6 and t ≤ 300	PR ≤ 0,7 and t ≤ 170
Air, gas Lubricating oil, hydraulic oil Boiler feedwater, condensate Seawater and fresh water or cooling brine in refrigerating plant	PR > 4,0 or t > 300	PR ≤ 4,0 and t ≤ 300	PR ≤ 1,6 and t ≤ 200
Liquid fuels	PR > 1,6 or t > 150	PR ≤ 1,6 and t ≤ 150	PR ≤ 0,7 and t ≤ 60
Refrigerants	-	all	-
Open-ended pipelines (without shutoff) e.g. drains, venting pipes, overflow lines and boiler blowdown lines	-	-	all
Pipe Class	I	II	III
(1) Classification in Class II is possible if special safety arrangements are available and structural safety precautions are arranged.			

Table 9.2 - Approved materials and types of material certificates

Pipe Class	Type of component	Approved material	Design temperature	Subject to testing	Type of certificate (EN 10204)		
					3.1.C **(3)**	3.1.B **(3)**	2.2 **(4)**
I + II	Pipes, pipe elbows, fittings	Steel, Copper, Copper alloy	-	all	x	-	-
	Valves, flanges, metal expansion joints and hoses, other components	Steel, Cast steel	> 300°C	DN > 32	x	-	-
				DN ≤ 32	-	x	-
		Steel, Cast steel, Nodular cast iron	≤ 300°C	PB x DN > 250 or DN ≥ 250	x	-	-
				PB x DN ≤ 250 or DN ≤ 250	-	x	-
		Copper, Copper alloy	> 225°C	DN > 32	x	-	-
				DN ≤ 32	-	x	-
			≤ 225°C	PB x DN > 150	x	-	-
				PB x DN ≤ 150	-	x	-
III	Pipes, valves **(2)**, flanges, other components	Steel, Cast steel, Grey cast iron **(1)**, Nodular cast iron, Copper, Copper alloy	-	-	-	-	x

(1) No material test in the case of grey cast iron.
(2) Casings of valves and pipe branches fitted on ship sides are to be included in pipe class II.
(3) Inspection certificate.
(4) Test report.

Table 9.3 - Approved materials

Material or application		Pipe Class		
		I	II	III
Steels	Pipes	Pipes for general applications: • above 300°C: high-temperature steel pipes • below -10°C: pipes made of steel with high low-temperature toughness, stainless steel pipes for chemicals	Pipes for general applications	Steel not subjected to any special quality specification, weldability in accordance with the Society Rules
	Forgings, Plates, Flanges	Steels suitable for the corresponding loading and process conditions, for temperatures > 300°C, high temperature steels, for temperatures below -10°C, steels with high low-temperature toughness		
	Bolt, Nuts	Bolts for general machinery construction: • above 300°C: high-temperature steels • below -10°C: steels with high low-temperature toughness	Bolts for general machinery construction	
Castings (valves, fittings, pipes)	Cast steel	Cast steel for general applications: • above 300°C: high-temperature cast steel • below -10°C: cast steel with high low-temperature toughness • for aggressive media: stainless castings	Cast steel for general applications	
	Nodular cast iron	Only ferritic grades, elongation A_5 at least 15%		
	Cast iron with lamellar graphite	–	–	At least GG-20 up to 200°C, Grey cast iron is not permitted in valves and fittings on ship's side, collision bulkhead and fuel and oil tanks
Non-ferrous metals (valves, fittings, pipes)	Copper, Copper alloys	–	For seawater and alkaline water, only corrosion resist- ant copper and copper alloys	
	Aluminium, Aluminium alloys	–	Upon special approval of the Society	See C10.1.6.2
Non-metallic materials	Non-metallic	–	–	See C10.1.6.3

Table 9.4 - Choice of minimum wall thickness for steel pipes

<table>
<tr><th rowspan="2">Piping system</th><th colspan="10">Location</th></tr>
<tr><th>Machinery spaces</th><th>Cofferdam / void spaces</th><th>Cargo holds</th><th>Ballast water tanks</th><th>Fuel and change over tanks</th><th>Fresh cooling water tanks</th><th>Lubricating oil tanks</th><th>Hydraulic oil tanks</th><th>Drinking water tanks</th><th>Living quarters</th><th>Weather deck</th></tr>
<tr><td>Bilge lines</td><td rowspan="3">M</td><td rowspan="8">M</td><td rowspan="4">M</td><td>-</td><td rowspan="3">-</td><td rowspan="6">X</td><td rowspan="3">X</td><td rowspan="3">X</td><td rowspan="3">X</td><td>M</td><td>-</td></tr>
<tr><td>Ballast lines</td><td rowspan="2">M</td><td>X</td><td rowspan="6">N</td></tr>
<tr><td>Seawater lines</td><td>M</td></tr>
<tr><td>Fuel lines</td><td rowspan="5">N</td><td>-</td><td>N</td><td rowspan="2">X</td><td rowspan="3">X</td></tr>
<tr><td>Lubricating lines</td><td rowspan="2">-</td><td rowspan="4">X</td><td rowspan="4">X</td><td>N</td><td rowspan="2">N</td></tr>
<tr><td>Hydraulic lines</td><td>-</td></tr>
<tr><td>Drinking water lines</td><td rowspan="2">M</td><td rowspan="2">X</td><td rowspan="2">X</td><td>N</td><td rowspan="2">N</td></tr>
<tr><td>Fresh cooling water lines</td><td>N</td><td>X</td></tr>
<tr><td colspan="12">Note: M, N: Refer to Table C10.6; X: Pipelines are not to be installed;
(-): Pipelines may be installed by special agreement with the Society.</td></tr>
</table>

Table 9.5 - Choice of minimum wall thickness for air, overflow, sounding and sanitary pipes made of steel

<table>
<tr><th rowspan="3">Piping system or position of open pipe outlets</th><th colspan="8">Location</th></tr>
<tr><th rowspan="2">Tanks with same media</th><th rowspan="2">Tanks with disparate media</th><th colspan="3">Drain lines and scupper pipes</th><th colspan="2">Air, sounding and overflow</th><th rowspan="2">Cargo holds</th><th rowspan="2">Machinery spaces</th></tr>
<tr><th colspan="2">Below freeboard deck or datum</th><th>above free-board deck</th><th>above open deck</th><th>below open deck</th></tr>
<tr><th></th><th></th><th></th><th>without shutoff on ship's side</th><th>with shutoff on ship's side</th><th></th><th></th><th></th><th></th><th></th></tr>
<tr><td>Air, overflow and sounding pipe</td><td>M</td><td>C</td><td>-</td><td>-</td><td>-</td><td>C</td><td>M</td><td>M</td><td>M</td></tr>
<tr><td>Scupper pipes from open deck</td><td rowspan="3">A</td><td rowspan="3">B</td><td rowspan="2">B</td><td rowspan="3">A</td><td>A</td><td rowspan="3">-</td><td rowspan="3">-</td><td rowspan="3">B</td><td rowspan="3">A</td></tr>
<tr><td>Discharge and scupper pipe leading directly overboard</td><td>-</td></tr>
<tr><td>Discharge of pumps of sanitary systems</td><td>-</td><td>A</td></tr>
<tr><td colspan="10">Note: A, B, C: Refer to Table C10.10;M: Refer to Table C10.6.</td></tr>
</table>

Table 9.6 - Minimum wall thickness for steel pipes

Group						Group M			
d_a **(1)** (mm)	s (mm)	d_a **(1)** (mm)	s (mm)	d_a **(1)** (mm)	s (mm)	d_a **(1)** (mm)	s (mm)	d_a **(1)** (mm)	s (mm)
from 10,2	1,6	from 114,3	3,2	from 406,4	6,3	from 21,3	3,2	from 219,1	5,9
from 13,5	1,8	from 133,0	3,6	from 660,0	7,1	from 38,0	3,6	from 244,5	6,3
from 20,0	2,0	from 152,4	4,0	from 762,0	8,0	from 51,0	4,0	from 660,4	7,1
from 48,3	2,3	from 177,8	4,5	from 864,0	8,8	from 76,1	4,5	from 762,0	8,0
from 70,0	2,6	from 244,5	5,0	from 914,0	10,0	from 177,8	5,0	from 863,6	8,8
from 88,9	2,9	from 323,9	5,6			from 193,7	5,4	from 914,4	10,0
(1) d_a = outside diameter									

Table 9.7 - Minimum wall thicknesses for austenitic stainless steel pipes

Pipe outside diameter d_a (mm)	Minimum wall thickness s (mm)
up to 17,2	1,0
up to 48,3	1,6
up to 88,9	2,0
up to 168,3	2,3
up to 219,1	2,6
up to 273,0	2,9
up to 406,0	3,6
over 406,0	4,0

Table 9.8 - Minimum wall thickness for copper and copper alloy pipes

Pipe outside diameter d_a (mm)	Minimum wall thickness s (mm)	
	Copper	Copper alloys
8 - 10	1,0	0,8
12 - 20	1,2	1,0
25 - 44,5	1,5	1,2
50 - 76,1	2,0	1,5
88,9 - 108	2,5	2,0
133 - 159	3,0	2,5
193,7 - 267	3,5	3,0
273 - 457,2	4,0	3,5
(470) -	4,0	3,5
508 -	4,5	4,0

Table 9.9 - Minimum wall thickness for aluminium and aluminium alloy pipes

Pipe outside diameter (mm)	Minimum wall thickness (mm)
< 10	1,5
12 - 38	2,0
43 - 57	2,5
76 - 89	3,0
108 - 133	4,0
159 - 194	4,5
219 - 273	5,0
> 273	5,5
Note: For seawater pipes the wall thickness is to be not less than 5,0 mm.	

Table 9.10 - Minimum wall thickness of air, overflow, sounding and sanitary pipes made of steel

Pipe outside diameter (mm)	Minimum wall thickness (mm)		
	A	B **(1)**	C
38 - 82,5	4,5	7,1	6,3
88,9 -	4,5	8,0	6,3
101,6 - 114,3	4,5	8,0	7,1
127 - 139,7	4,5	8,8	8,0
152,4 -	4,5	10,0	8,8
159 - 177,8	5,0	10,0	8,8
193,7 -	5,4	12,5	8,8
219,1 -	5,9	12,5	8,8
244,5 - 457,2	6,3	12,5	8,8
(1) The pipe thickness may not be greater than the thickness of the shell plates.			

9.3.3 Pipes, valves and fittings of aluminium and aluminium alloy

Aluminium and aluminium alloys are to comply with Pt D, Ch 3, Sec 2 of the Society Rules for Ships, and may be used for temperatures up to 200°C.

Pipes made of aluminium may be used for the following services:

- fresh cooling water systems;
- Bilge systems outside areas of major fire hazard, as defined in MSC.1/Circ.1592, Part B, para. 6.1.3;
- air and sounding pipes; for air and sounding pipes of tanks containing flammable liquids outside of major fire hazard areas, as defined in MSC.1/Circ.1592, Part B, para. 6.1.3;
- pipes containing flammable liquids outside areas of major fire hazards, as defined in MSC.1/Circ.1592, Part B, para. 6.1.3;
- pipes for non-essential services.

Seawater cooling pipes and ballast pipes and other seawater pipes made of aluminium alloys, may be accepted at the discretion of the Society.

9.3.4 Pipes, valves and fittings of non-metallic materials

Pipes, connecting pieces, valves and fittings made of plastic materials may be used at the discretion of the Society.

Note: Plastic pipes and the application are to comply with IMO Resolution A.753(18).

Plastic pipes are to be permanently marked with the following particulars:

- manufacturer's marking;
- standard specification number;
- outside diameter and wall thickness;
- year of manufacture.

Valves and connecting pieces made of plastic shall, as a minimum requirement, be marked with the manufacturer's marking and the nominal diameter.

9.3.5 Pipes, valves and fittings of copper and copper alloys

Pipes of copper and copper alloys are to be of seamless drawn material, or produced by a method approved by the Society. Copper pipes for Classes I and II are to be seamless.
In general, copper and copper alloy pipelines are not to be used for media having temperatures above the following limits:

- copper and aluminium brass: 200°C;
- copper nickel alloys: 300°C;
- high-temperature bronze: 260°C.

9.3.6 Pipes, valves and fittings of nodular ferritic cast iron

Pipes, valves and fittings of nodular ferritic cast iron according to the Society Rules may be used for bilge and ballast pipes within double-bottom tanks, and tanks for other purposes approved by the Society. In special cases (applications corresponding in principle to Classes II and III) and at the Society's discretion, valves and fittings made of ferritic nodular cast iron may be accepted for temperatures up to 350°C.

9.3.7 Pipes, valves and fittings of lamellar graphite cast iron (grey cast iron)

Pipes, valves and fittings of grey cast iron may be used for Class III systems.
The use of grey cast iron is not permitted:

- for media at temperatures above 220°C and for pipelines subject to water hammering, severe stresses or vibration;
- for valves and pipes fitted on craft sides, and for valves fitted on the collision bulkhead;
- for valves on fuel and oil tanks which are subject to static head.

9.4 Testing

9.4.1 Testing of materials

Pipes, bends, fittings, valve bodies and flanges for piping systems belonging to Classes I and II are subject to tests in accordance with the Society Rules for Materials under the Society's supervision.

9.4.2 Testing prior to installation on board

All Class I and II piping as well as all piping for compressed air and flammable liquids with a design pressure PR greater than 0,35 MPa are, after completion of manufacture but before insulation and coating, to be subjected to a hydraulic pressure test in the presence of a Surveyor at a pressure of 1,5·PR.
When technical reasons do not allow complete hydraulic pressure tests on all pre-fabricated pipe sections before assembly on board, proposals are to be submitted for approval to the Society.
When hydraulic pressure tests of piping are carried out on board, they may be conducted in conjunction with the tests required under 9.4.3.
Pressure testing of pipes with nominal diameters less than 15 mm may be omitted, at the Society's discretion, pending the application.

9.4.3 Testing after installation on board

After assembly on board, all piping covered by these Rules is to be subjected to a tightness test in presence of a Surveyor.
In general, all pipe systems are to be tested for leakage under operational conditions. If necessary, alternative tests to hydraulic pressure tests may be applied.
Heating coils in tanks and piping for flammable liquids are to be tested at a pressure of 1,5 PR, but in no case at less than 0,4 MPa.

9.4.4 Testing of valves

Valves are to be subjected to a hydraulic pressure and tightness test in the manufacturer's works, in presence of a Surveyor:

- Valves of pipe Classes I and II to 1,5 PR
- Valves and connections in the ship's side to not less than 0,5 MPa.

9.5 Minimum wall thickness

9.5.1 Minimum pipe thicknesses are stated in Table 9.4 to Table 9.10. These minimum thicknesses may be increased if considered necessary, following stress analysis.
Slight differences in diameters and wall thicknesses based on recognized standards may be accepted.
Provided that pipes are effectively protected against corrosion, the wall thicknesses of group M steel pipes may, at the discretion of the Society, be reduced by up to 1 mm. The amount of the reduction is to be in relation to the wall thickness.
Protective coatings (e.g. hot-dip galvanizing) may be recognized as effective corrosion protection provided that its preservation during installation is guaranteed.

9.6 Pipe connections

9.6.1 The following pipe connections may be used for steel pipes:

- fully penetrating butt welds with/without provision to improve the quality of the root;
- socket welds with suitable fillet weld thickness;
- screw connection of a type approved by the Society;
- steel flanges of a recognized standard.

Screwed socket connections or similar are permitted only for subordinate systems for pipes below DN 65.

9.6.2 Flanges made of non-ferrous metals may be used in accordance with recognized standards and within the limits laid down in approvals.

9.6.3 Non-metallic pipes are to be connected by approved methods (e.g. welding, glueing or cementing) or by approved detachable connections.

9.6.4 Type-approved pipe couplings may be used in the following systems:

- bilge and ballast lines;
- sea water lines;
- fresh and seawater cooling lines;
- firefighting and deckwash lines;
- vent, fill and sounding pipes;
- drinking water lines;
- sanitary discharge lines.

Use of pipe couplings is not permitted in:

- bilge lines inside ballast and fuel tanks;
- ballast lines inside cargo holds and fuel tanks;
- pipes containing flammable liquids within major fire hazard areas as defined in MSC.1/Circ.1592, Part B, para. 6.1.3, cargo holds and ballast tanks.

9.7 Layout, marking and installation

9.7.1 Piping systems are to be identified according to their purpose. Valves are to be permanently marked.

9.7.2 Pipe penetrations through bulkheads and tank walls are to be water- and oil-tight. Bolts penetrating bulkheads are not permitted. Holes for set screws are not to be drilled in tank walls.

9.7.3 The installation of pipes for water or oil behind or above electric switchboards is to be avoided. If this is impracticable, pipes and valves are to be well shielded and/or located as far as possible from the switchboard.

9.7.4 Piping systems are to be so arranged that they may be completely emptied, drained and vented. Piping systems in which accumulation of liquids during operation could cause damage are to be equipped with special draining devices.

9.7.5 Pipelines laid through coated tanks are to be either effectively protected against corrosion or made of a material with low susceptibility to corrosion.
The protection against corrosion of the tanks as well as that of the pipes are to be compatible to each other.

9.7.6 Water pipes, air and sounding pipes passing through freezing chambers are to be avoided as far as practicable.

9.7.7 Piping systems are to be adequately supported, to prevent detrimental vibrations occurring in the system.

9.8 Valves

9.8.1 Shutoff devices

Shutoff devices are to comply with a recognized standard. Valves with screwed-on covers are to be secured, to prevent inadvertent loosening of the cover.
Hand-operated shutoff devices are to be closed by turning in a clockwise direction.
Valves are to be clearly marked to show whether they are open or closed.

9.8.2 Craft side valves

- Craft side valves are to be easily accessible and capable of being operated from above the floor. Where, subject to 9.3.3 and 9.3.4, sea water pipes made of aluminium alloys or non-metallic materials are accepted by the Society, craft's side valves inside machinery spaces and other spaces with major fire hazard are to be provided with means of remote closure from outside the space.
- Valves are to be of a flanged type and made of metallic ductile material.
- The minimum wall thickness of pipe branches connected to the craft's hull below the datum shall be as follows:
    - for steel pipes: in accordance with Table 9.10, Group B
    - for aluminium pipes: at least 8 mm but not greater than the thickness of the shell plate.

9.9 Remote-controlled valves

9.9.1 General

For remote-controlled valves, failure of power supply is not to cause:

- opening of closed valves
- closing of open valves on fuel tanks and in cooling water systems for propulsion and power generating machinery.

Remote-controlled valves are to be equipped with an emergency operating arrangement.
They are to be accessible for maintenance and repair work.

9.9.2 Power units

Power units for remote-controlled valves are to be equipped with at least two independent power supply units. For the closing of valves which are not closed by spring action, power units are to be fitted with pressure accumulators.
Pneumatically operated valves may be supplied by air from the general compressed air system.

9.9.3 Control station

At the control station, means are to be provided to show whether the valves are open or closed.
For visual indication of the closed position of valves, limit position indicators approved by the Society are to be provided.
The control position is to be located in a space which is normally attended, e.g. operating compartment.

9.9.4 Bilge piping

Valves and control lines for bilge systems are to be located as far as possible from the bottom and side shell of the craft.

9.9.5 Fuel pipes

Valves mounted directly at fuel tanks above the double bottom are to be capable of being closed from outside the compartment in which they are installed (e.g. from craft's operating compartment or other suitable locations).

9.10 Hose assemblies and compensators of non-metallic materials

9.10.1 Requirements

Hose assemblies and compensators of non-metallic material are to be type-approved and tested according to the Society Rules for the Type Approval of Flexible Hoses and Expansion Joints.
Hose assemblies and compensators including their couplings are to be suitable for media, pressures and temperatures.
Selection of hose assemblies and compensators is to be based on the maximum allowable working pressure of the system concerned. 0,5 MPa is to be considered as the minimum working pressure.

9.10.2 Installation

Hose assemblies are not to be longer than necessary for the application.
The minimum bending radius is not to be less than the radius specified by the manufacturer.
Hose assemblies and compensators are to be accessible.
Hoses used in fresh water systems with working pressures ≤ 0,5 MPa, or in charging air and scavenging air ducts, may be fastened with double clips. Hoses which are installed directly near hot surfaces are to be provided with additional heat-resistant sheathing.

9.11 Pumps

9.11.1 General

Construction, materials and tests of pumps are to comply with the Society Rules.

9.11.2 Relief valves

Positive displacement pumps are to be fitted with relief valves which cannot be adjusted to the closed position. They are to discharge into the suction side of the pump.

9.11.3 Tests

The pumps listed below are subject to tests carried out at the manufacturer's works, under the Society supervision:

- fire pumps and emergency fire pumps;
- bilge pumps;
- seawater cooling pumps;
- fresh water cooling pumps;
- fuel transfer pumps;
- fuel service pumps;
- fuel injection valve cooling pumps;
- lubricating oil pumps;
- ballast pumps;
- boiler feedwater pumps;
- boiler water circulating pumps;
- other pumps considered necessary for performance of essential functions.

9.12 Arrangement of oil fuel, lubricating oil and other flammable oil

9.12.1 As far as practicable, flammable liquid lines are not to be arranged in the vicinity of boilers, turbines or equipment with surface temperatures greater than 220°C, nor above electrical equipment.

9.12.2 Pumps are to be provided with shutoff valves.

9.12.3 Filling pipes for tanks containing flammable liquids are to terminate on open deck and are to be arranged so that leakages are collected by suitable coamings. Fuel-oil filling connections are, as far as practicable, to be arranged on both sides of the craft.

9.12.4 All tanks not forming part of the craft structure are to be fastened securely and arranged so that they can be readily inspected.
Free-standing fuel tanks are to be installed so as to allow free circulation of air around the tanks.
Fuel tanks for emergency diesel generators are to be located inside the emergency generator room.

9.12.5 Appliances, mountings and fittings not forming part of the fuel tank equipment may be fitted to tank walls only by means of intermediate supports. Only components forming part of the tank equipment may be fitted to freestanding tanks.
For valves and pipe connections, the tank walls are to be provided with strengthening flanges. Bolt holes are not to be drilled in tank surfaces.
Instead of strengthening flanges, short, thick pipe flange connections may be welded to the tank surfaces.

9.13 Oil fuel arrangements

9.13.1 Fuel lines are not to pass through tanks containing feedwater, drinking water or lubricating oil.

9.13.2 Fuel tanks are to be separated by voids/cofferdams from tanks containing lubricating, hydraulic, thermal or edible oil and drinking water. Fuel service tanks inside machinery spaces are to be made of steel.

9.13.3 The controls of tank valves per MSC.1/Circ.1592, Part B, para. 6.1.4.2.3 are to be located outside the space in which the tanks are arranged, as far as possible combined in one location, preferably the craft's operating compartment.

9.13.4 Valves subject to static head are to be made of ductile material.

9.13.5 Remote-controlled shutoff valves may be dispensed with for tanks with a capacity of less than 50 litres.

9.13.6 Tanks located above the double bottom are to be fitted with self-closing drains.

9.13.7 Level-indicating devices which are not type approved by the Society may be accepted if sounding pipes are provided in addition.
Sight glasses and oil gauges fitted directly on the tank wall, and cylindrical glass gauges, are not permitted.

9.13.8 Sounding pipes are to terminate outside main fire hazard areas and as far as possible above the open deck. However, where this is not possible, the following requirements are to be met:
- Oil-level gauges are to be provided in addition to sounding pipes.
- Sounding pipes are either to terminate in locations remote from ignition hazards or to be fitted with effective screens to prevent spillages coming into contact with a source of ignition.
- Sounding pipes are to be fitted with self-closing shutoff devices and self-closing testing devices.

9.13.9 Lines of relief/safety valves and overflow lines are to discharge into leakage, drain or overflow tanks.

9.13.10 When reference is made to fire resistance of hoses, this should be evaluated according to:
- ISO 15540:1999 on Test methods for fire resistance of hose assemblies, and
- ISO 15541:1999 on Requirements for the test bench of fire resistance of hose assemblies.

9.14 Lubricating oil arrangements

9.14.1 Flexible pipes are permissible in positions where the Society is satisfied that they are necessary. Such flexible pipes and end attachments in pressure lubricating systems located in machinery spaces and auxiliary machinery spaces are to be of approved fire-resistant material of adequate strength and constructed to the satisfaction of the Society.

9.14.2 Lubricating oil systems are to be constructed to ensure reliable lubrication over the whole range of speed and during run-down of the engines, and are to ensure adequate heat transfer.

9.14.3 Independent standby pumps are to be provided for propulsion engines. For craft with more than one main engine, each provided with an independent lubricating oil system, standby pumps are not required.
Engines and gears fitted with attached pumps are to be provided with an independent auxiliary lubricating pump if lubrication before starting is necessary.

9.14.4 Equipment for suitable treatment of lubricating oil (e.g. purifiers, automatic back-flushing filters, filters, free-jet centrifuges) are to be provided.

9.14.5 Lubricating oil filters are to be fitted in pump pressure lines.
Uninterrupted supply of filtered oil has to be ensured under maintenance conditions of filter equipment. Mesh size and filter capacity are to be in accordance with the engine manufacturer's requirements.

9.14.6 Main filters are to be provided with differential pressure monitoring.
Back-flushing cycles of automatic filters are also to be monitored.

9.14.7 Engines for emergency power supply or emergency fire pumps may be provided with simplex filters.

9.15 Arrangements for other flammable oils

9.15.1 The provisions of MSC.1/Circ.1592, Part B, para. 9.2.4.6, 9.2.5.2 and 9.2.5.3 are to be complied with where applicable, as well as the provisions of 9.2.4.9 in respect of the approval of the fire-resistant materials of flexible pipes.

9.15.2 Service tanks are to be fitted with high- and low-level alarms.

9.16 Bilge pumping and drainage systems

9.16.1 Bilge suctions are to be suitably arranged and fitted with mud boxes.

9.16.2 Every machinery space is normally to be provided with at least two bilge suctions, one at each side.
Additional suctions may be required for craft having long machinery spaces.

9.16.3 Bilge suctions are to be arranged so as not to impede the cleaning of bilges and bilge wells.

9.16.4 Valves in pipe connections between bilge and seawater or ballast water systems, as well as between bilge connections of different compartments, are to be arranged so that even in the event of faulty operation or intermediate positions of the valves, seawater is safely prevented from penetrating through the bilge system.

9.16.5 To prevent penetration of ballast and seawater into the ship through the bilge system, two means of reverse-flow protection are to be fitted in the bilge connections, one of which is to be a screw-down non-return valve.
One such means of protection is to be fitted in each branch line.
For emergency and direct suctions, one screw-down nonreturn valve is sufficient.

9.16.6 A combination of a non-return valve with positive closing device and shutoff valve may be recognized as equivalent to a screw-down non-return valve, at the discretion of the Society.

9.16.7 Discharges below the datum are to be provided with shutoff valves located at the shell.

9.16.8 In the event of pump failure, one pump for fire fighting and one pump for bilge pumping are to remain available.

9.16.9 Bilge ejectors are acceptable for bilge pumping arrangements if an independent supply of driving water is provided.

9.16.10 Internal diameter of suction branches is to be not less than the larger between 25 mm and the value given by the formula:

$$dB = 25 + 2{,}15\,[LB(B1 + d)]0{,}5$$

where:

dB: Internal diameter, in mm, of the branch pipes
LB: Length, in m, of the watertight compartment
B1: Average breadth, in m, of the compartment at or below the design waterline.

9.16.11 Each machinery space is normally to be provided with at least two bilge alarms.

9.16.12 For reverse-flow protections, see 9.3.4 and 9.3.5.

9.16.13 Arrangements for oily bilge water and oil residues
Each craft is to be provided with at least:
- a collecting tank for oily bilge water, fuel and oil residues
- equipment for discharge of oil residues to reception facilities.

Note: MARPOL 73/78 as amended and national requirements are to be observed.

9.17 Ballast systems

9.17.1 Where pipes intended to deal with ballast water are led through the collision bulkhead, a shutoff valve, made of ductile metallic material, is to be fitted directly at the collision bulkhead.
The valve is to be capable of being closed by remote control from the operating compartment.

9.18 Cooling Systems

9.18.1 General
Cooling water circuits are to be provided with automatic temperature controls in accordance with the general requirements of HSC Rules, Chapter 11. Control devices whose failure may impair the functional reliability of the system are to be equipped for manual operation.

9.18.2 Cooling water pumps
Main and standby cooling water pumps are to be provided for propulsion systems with one main engine, or systems with more than one engine using a common cooling water system.
For propulsion plants with more than one engine, and for auxiliary engines provided with individual cooling circuits, standby pumps may be dispensed with, provided the safety of the craft is not impaired.
Standby cooling water pumps shall be driven independently.

9.18.3 Heat exchangers, coolers
For common cooling systems, the number and capacity of heat exchangers and coolers is to be considered by the Society.
Heat exchangers and coolers are to be provided with:
- shutoff valves at inlet and outlet
- vents and drains.

9.18.4 Keel coolers
Keel coolers are to be fitted with pressure gauges at the fresh water inlet and outlet.

9.18.5 Seawater cooling systems
At least two sea inlets are to be provided.
Wherever possible, sea chests are to be provided and positioned as low as possible on either side of the craft.
On multi-hull craft or craft with independent engine rooms, one sea chest or sea inlet for each hull or engine room is considered sufficient.
Each sea chest is to be provided with an effective vent and a connection to flush the sea chest gratings.
The flushing media may not exceed the construction pressure of the sea chest.
The suction lines of seawater pumps are to be fitted with strainers.
Strainers are to be arranged so that they can be cleaned while the pumps are in operation.
For multiple-engine installations, single strainers are considered sufficient.

9.18.6 Sea valves
The provisions of 9.8.2 are to be complied with.
Discharge pipes for seawater cooling systems are to be fitted with a shutoff valve at the shell. If discharges are located above the datum, shutoff valves may be dispensed with.

9.18.7 Fresh water cooling systems
Where heat exchangers for fuel or lubricating oil are incorporated in cylinder cooling water circuits of propulsion engines, the entire cooling water circuit is to be monitored for fuel and oil contamination.
Expansion tanks are to be fitted with filling connections, aeration/de-aeration devices, water level indicators and drains.
Means are to be provided for preheating as required.

9.19 Ventilation systems

9.19.1 The provisions of HSC Rules, Chapter 7, para 7.6 are to be complied with.

9.19.2 Each independent machinery space is to be provided with its own ventilation system.
In general, ventilation systems for machinery spaces are to be independent of each other.

9.19.3 The height of the coamings from the inlet and outlet openings is, as far as practicable, to comply with the requirements of IMO International Convention on Load Lines, 1966, and in no case be less than the datum. If water traps are to be provided, air velocity is to be taken into account.

9.19.4 The air is to be conducted in such a way as to avoid local accumulations of heat wherever possible (e.g. by means of a secondary system of selective ventilation or by under-floor ducting of exhaust air).

9.19.5 The air supply is not to be directed immediately towards hot machine parts, turbine components, measuring instruments or switchboards. Electrical machinery and installations (e.g. switch cabinets) are to be protected, so that water particles penetrating into air ducts will not cause damage. Risks of this kind are to be minimized by appropriate arrangement of ducts and air outlets.

9.19.6 The capacity and arrangement of ventilation systems/ducts is to ensure that accumulation of oil vapour is avoided and a slight overpressure in the machinery space during normal operation is guaranteed.
Provision is to be made to remove CO_2, in case of flooding of the machinery space.

9.19.7 Ventilation capacity is to be based on the heat rejection of equipment installed in the space.

9.20 Exhaust systems

9.20.1 Exhaust pipes are to be installed separately from each other, taking structural fire protection into account.
Account is to be taken of thermal expansion when laying out and suspending lines.
Exhaust lines and silencers are to be provided with suitable drains of adequate size.

9.20.2 Shutoff flaps may be omitted if the overflow point of the exhaust pipe is located above the most unfavourable damage water line.
Shutoff devices are to be fitted with means for remote controlled closing above the datum, preferably from the operating compartment. The closed position is to be indicated.

9.20.3 The use of flexible hoses in wet exhaust systems may be accepted at the discretion of the Society, if the hoses are suitable for this purpose (media, pressure and temperature).

9.20.4 Materials used in exhaust systems are to be resistant to sea water corrosion and exhaust products.

9.20.5 Exhaust lines, silencers and exhaust gas boilers are to be insulated properly.
Insulating materials are to be incombustible.
Exhaust lines inside engine rooms are to be provided with metal sheathing or other approved type of hard sheathing.

9.21 Compressed air systems

9.21.1 Starting equipment

Where main and auxiliary engines are arranged for starting by compressed air, two or more air compressors are to be fitted with a total capacity sufficient to supply within one hour, the receivers being at atmospheric pressure, the quantity of air needed for 6 consecutive starts of the main e engine and 3 starts of each auxiliary engine.
For multi-engine installations where all the air receivers may be used to start all propulsion engines, the total number of starts of main engines, required to be provided from the starting air receivers may be reduced to 8.
This capacity is to be approximately equally divided between the number of compressors fitted, excluding the emergency compressor

At least one of the compressors is to be independent of the engines for which starting air is supplied and is to have a capacity of not less than 50% of the total.

9.21.2 Compressed air lines

Pressure lines connected to air compressors are to be fitted with non-return valves at the compressor outlets. Oil and water separators are to be provided.

The starting air line to each engine is to be fitted with a non return device and drain.

A safety valve is to be fitted behind each pressure-reducing valve.

The compressed air supply for blowing through sea chests may not exceed the design pressure of the sea chest (see 9.18.5).

9.21.3 Control air system

Control air systems for essential consumers are to be provided with the necessary means of air treatment.

9.22 Steam heating, feedwater and condensate systems

9.22.1 General

For steam and hot water generators as well as for oil-fired burners, the provision of HSC Rules, Chapter 9, para 9.1.13 are to be complied with.

Pipes, pumps and valves belonging to these systems are also subject to the following requirements.

9.22.2 Steam lines

Steam lines are to be installed and supported so that expected stresses due to thermal expansion, external loads and shifting of the supporting structure under both normal and interrupted service conditions will be safely compensated.

Sufficiently rigid positions are to be arranged as fixed points for the steam piping systems. Steam lines are to be provided with sufficient expansion arrangements.

Steam lines are to be installed so that water pockets will be avoided. Means are to be provided for reliable drainage of the piping system.

Steam lines are to be effectively insulated to prevent heat losses. Pipe penetrations through bulkheads and decks are to be insulated to prevent heat conduction. At points where there is a possibility of contact, the surface temperature of the insulated steam lines may not exceed 60°C. Wherever necessary, additional protection arrangements against unintended contact are to be provided.

9.22.3 Feedwater lines

Feedwater lines are to be fitted with shutoff valves and check valves at the boiler inlet. Where shutoff and check valves are not directly connected in series, the intermediate pipe is to be fitted with a drain.

Feedwater pumps are to be fitted with shutoff valves on the suction side and screw-down non-return valves on the delivery side. The pipes are to be arranged so that each pump can supply each feedwater line.

Provision of only one feedwater line for auxiliary and exhaust gas boilers is sufficient if the preheaters and automatic regulating devices are fitted with bypass lines.

Continuous-flow boilers need not be fitted with these valves, provided that the heating of the boiler is automatically switched off if the feedwater supply fails, and that the feedwater pump supplies only one boiler.

Feedwater lines may not pass through tanks which do not contain feedwater.

9.22.4 Capacity of feedwater pumps

Provision of only one feedwater pump is sufficient if the boiler is not intended for essential services.

Where two feedwater pumps are provided, the capacity of each is to be equivalent to at least 1,25 times the maximum permitted output of all the connected steam producers.

Where more than two feedwater pumps are installed, the combined capacity of all other feedwater pumps, in the event of failure of the pump with the largest capacity, is to comply with the requirements above.

For continuous-flow boilers, the capacity of the feedwater pumps is to be at least 1,0 times the maximum steam output.

Special conditions may be accepted for the capacity of the feedwater pumps, for plants incorporating a combination of

oil-fired and exhaust-gas boilers or other arrangements.

9.22.5 Boiler water circulating systems

The provision of only one circulating pump for each boiler is sufficient in the following cases:

- boilers are heated only by gases whose temperature does not exceed 400°C; or
- a common standby circulating pump is provided, which can be connected to any boiler;
- the burners of oil- or gas-fired auxiliary boilers are arranged so that they are automatically shut off if the circulating pump fails and the heat stored in the boiler does not cause any unacceptable evaporation of the available water in the boiler;
- the boiler is not intended for essential services.

9.22.6 Condensate recirculation

The condensate of all heating systems used to heat oil (e.g. fuel, lubricating, cargo oil) is to be led to condensate observation tanks. These tanks are to be fitted with vents to the open deck.

9.23 Air, overflow and sounding pipes

9.23.1 General

The minimum wall thickness for steel pipes is to be in accordance with Table 9.5, Table 9.6 and Table 9.10.
The minimum wall thickness for pipes in material other than steel shall be at least:

- in accordance with Tables 9.7, 9.8 or 9.9 below the open deck
- increased by at least 50% above the open deck.

All compartments and tanks arranged with filling and/or drainage equipment are to be fitted with air pipes and sounding devices.

9.23.2 Air and overflow pipes

Voids, cofferdams and tanks are to be fitted with air pipes.
The arrangement is to allow total filling of tanks under normal trim conditions.
Air pipes located on open deck are to be fitted with automatic air pipe heads approved by the Society at a height not lower than 760 mm above deck.
Note: Refer to IMO International Convention on Load Lines, 1966 Reg. 20, as amended.
Air pipes of tanks which contain fuel oil are to terminate on open deck to safe locations with no risk of ignition.
Air pipes of tanks which contain liquids other than fuel oil may terminate inside closed spaces. Means are to be provided for safe drainage in the event of overflow.
Air pipes of integral tanks located at the shell side are to terminate above the datum.
Air and overflow pipes are to be arranged in such a way that they are self-draining under normal conditions.
Where air and overflow pipes of several tanks are connected to a common line, the common line and connections are to be arranged so that, if a leakage occurs in one tank due to hull damage or listing of the ship, fuel or water cannot flow into another tank.
The minimum inner diameter of air/overflow pipes is not to be less than 40 mm.
The clear cross-sectional area of air/overflow pipes is to be at least 1,25 times the cross-sectional area of the filling pipes. However, pump capacity and pressure head are to be considered in sizing air and overflow pipes.

9.23.3 Sounding pipes

Sounding pipes are to be provided for tanks, cofferdams and void spaces and bilge wells in spaces which are not accessible at all times. As far as possible, sounding pipes are to be laid straight and are to extend as near as possible to the bottom of the tank close to the pump suction.
Sounding pipes may not be used as filling pipes.
Where tanks are fitted with remote level indicators approved by the Society, provision of sounding pipes may be dispensed with.
Sounding pipes which terminate below the datum are to be fitted with self-closing shutoff devices. Such sounding pipes are permissible only in spaces which are accessible at all times. All other sounding pipes are to be extended to the open deck. Sounding pipe openings are always to be accessible and fitted with watertight closing devices.
Sounding pipes for tanks which contain flammable liquids are to extend to the open deck, or comply with the requirements of HSC Rules, Chapter 10, para 10.2.4.7.
Sounding pipes are to have a nominal inside diameter of at least 32 mm.

9.24 Sanitary systems

Sanitary discharge pipes are to be arranged so that, in the event of damage, undamaged compartments cannot be flooded by damaged discharge lines, even if the craft inclines temporarily.

Where discharge lines from several watertight compartments are connected to one tank, the compartments are to be separated from each other by gate or ball valves at the watertight bulkheads. Valves shall be capable of being closed by remote control from the craft operating compartment or another space above the datum. An indicator for the closed position is to be provided among the controls.

The minimum wall thicknesses of sanitary discharge pipes are to be determined in accordance with Table 9.5 and Table 9.10. Penetrations of pipes of smaller thickness, pipes of special types and plastic pipes through bulkheads or decks of type A fire integrity require Society approval.

Overboard discharges are to be fitted with means of preventing ingress of water from the sea. The IMO Load Line Convention (LLC) as amended is to be applied analogously.

9.24.1 Sewage tanks and sewage treatment systems

Sewage tanks are to be fitted with air pipes leading to the open deck above the datum.

Sewage tanks are to be fitted with a filling connection, a connection for flushing the tank and a level alarm. Existing overflows to the bilge or openings for adding of chemicals are considered as internal openings.

The discharge lines of sewage tanks below the datum are to be fitted with a non-return valve and a gate valve. The gate valve is to be fitted directly at the craft's shell.

A single screw-down non-return valve may be used instead of the gate and non-return valves.

The second means of reverse-flow protection may be a pipe loop with an overflow height which remains above the water level in the worst anticipated damage condition. The pipe loop is to be fitted with an automatic ventilation device located 45° below the crest of the loop.

Ballast and bilge pumps may not be used for emptying sewage tanks.

9.25 Hydraulic systems for hatch covers, shell closing appliances, watertight doors and hoists

9.25.1 General

Cylinders are preferably to be made of steel, cast steel or nodular cast iron (with a predominantly ferritic matrix).

For cylinders, where PB·Di > 2000, materials are to be tested in accordance with the Society Rules (Di being the inside diameter, in mm).

Testing of materials by the Society may be dispensed with in the case of cylinders for secondary applications, provided that evidence in the form of a works test certificate (e.g. to EN 10 204 - 2.3) is supplied.

9.25.2 Hydraulic operating equipment for hatch covers

Hydraulic operating equipment for hatch covers may be served either by a common power station for all hatch covers or by several power stations individually assigned to a single hatch cover. Where a common power station is used, at least two pump units are to be fitted. Where the systems are supplied individually, changeover valves or fittings are required so that operation can be maintained if one pump unit fails.

Movement of hatch covers may not be initiated by starting of the pumps. Special control stations are to be provided to control the opening and closing of hatch covers. Controls are to be so designed that, as soon as they are released, movement of the hatch covers stops immediately.

Hatches are normally to be visible from control stations. If, in exceptional cases, this is impossible, opening and closing of the hatches are to be signalled by an audible alarm. In addition, the control stations are then to be equipped with indicators to monitor movements of the hatch covers. At control stations, the controls governing opening and closing operations are to be appropriately marked. Suitable equipment is to be fitted in, or immediately adjacent to, each power unit (cylinder or similar) used to operate hatch covers, to enable the hatches to be closed slowly in the event of a power failure (e.g. due to a pipe rupture).

Hatch covers are to be fitted with devices which prevent them from moving into their end positions at excessive speed. Such devices are not to cause the power unit to be switched off.

9.25.3 Pipes

Pipe dimensions are to be calculated according to the Society Rules.

Piping systems are to be fitted with filters to clean the hydraulic fluid.

Equipment is to be provided to enable the hydraulic systems to be vented.

The accumulator space of the hydraulic accumulator is to have permanent access to the relief valve of the connected system. The gas chamber of the accumulator may be filled only with inert gases. Gas and operating media are to be separated by accumulator bags, diaphragms or similar devices.

Connection between the hydraulic systems used for hatch cover operation and other hydraulic systems is permitted only at the discretion of the Society.
Tanks forming part of the hydraulic system are to be fitted with oil-level indicators.

9.25.4 Emergency operation
Devices shall be fitted that are independent of the main system and which enable hatch covers to be opened and closed in the event of failure of the main system. Such devices may, for example, take the form of loose rings enabling hatch covers to be moved by cargo winches, warping winches etc.

9.26 Hydraulically operated closing appliances in the craft's shell

9.26.1 Scope
The following requirements apply to the power equipment of hydraulically operated closing appliances in the craft's shell, such as shell and landing doors which are not normally operated while at sea.

9.26.2 Design and construction
The movement of doors and other closing devices in the shell may not be initiated by starting of the pumps at the power station.
Local control, inaccessible to unauthorized persons, is to be provided for every closing appliance in the craft's shell. As soon as the controls (push-buttons, levers or similar) are released, movement of the appliance is to be stopped immediately.
Closing appliances in the craft's shell are normally to be visible from control stations. If the movement cannot be observed, audible alarms are to be fitted. In addition, control stations are to be equipped with indicators enabling the movement to be monitored.
Closing appliances in the craft's shell are to be fitted with devices which prevent them from moving into their end positions at excessive speed. Such devices are not to cause the power unit to be switched off.
As far as necessary, mechanical means are to be provided to lock closing appliances in the open position.
Every power unit driving horizontally hinged or vertically operated closing appliances is to be fitted with throttle valves or similar devices, to prevent sudden dropping of the closing appliance.
Driving power shall be shared between at least two mutually independent pump units.

9.27 Hydraulic operating systems for watertight doors
The hydraulic operating system for watertight doors is to be designed and arranged to satisfy the requirements in HSC Rules, Chapter 2, para. 2.2.2.

9.28 Hoists

9.28.1 Scope
For the purposes of these requirements, hoists include hydraulically operated appliances such as wheelhouse hoists, lifts and similar equipment.

9.28.2 Design and construction
Hoists may be operated either by a combined power station or by individual power stations.
In the case of a combined power supply, with hydraulic drive pipes connected to other hydraulic systems, a second pump unit is to be fitted.
The movement of hoists is not to be initiated merely by starting the pumps. The movement is to be controlled from special operating stations. Controls are to be so arranged that, as soon as they are released, the movement of the hoist stops immediately.
Local controls, inaccessible to unauthorized persons, are to be fitted. The movement of hoists is normally to be visible from the operating stations. If the movement cannot be observed, audible and/or visual warning devices are to be fitted. In addition, operating stations are to be equipped with indicators to monitor the movement of the hoist.
Devices are to be fitted which prevent the hoist from reaching its end position at excessive speed. Such devices are not to cause the power unit to be switched off. As far as necessary, mechanical means are to be provided to lock the hoist in its end positions.
Suitable equipment is to be fitted in, or immediately adjacent to, each power unit used to operate hoists to enable them to be lowered slowly if the power unit fails or a pipe ruptures.

9.29 Tests at the manufacturer's works

9.29.1 Testing of power units
Power units are to undergo testing on a test bed. Factory test certificates for this testing are to be submitted at final inspection of the hydraulic system.

9.29.2 Pressure and tightness tests
Pressure components are to undergo a pressure test at test pressure PP = 1,5·PR.
For the definitions of the PP and PR see 9.1.5. However, for maximum working pressures above 20 MPa, the test pressure need not exceed PR + 10 MPa.
For pressure testing of pipes, their valves and fittings, see 9.4.
Tightness tests are to be performed on components for which this is appropriate.

9.29.3 Function tests
Watertight doors are to be subjected to a functional test with an adverse list of 15°.

9.29.4 Shipboard trials
After installation, the equipment is to undergo an operational test.
Operational testing of watertight doors is to include the emergency operating system and measurement of closing times.

Chapter 10 - Remote control, alarm and safety systems

10.1 GENERAL

10.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 10 apply with the following deviations/additions. In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

10.1.2 Arrangement deviating from MSC.1/Circ 1592 will be given special consideration

10.2 Documents to be submitted

10.2.1 The following drawings and documents are to be submitted in triplicate for approval. The Society reserves the right to ask for supplementary copies if deemed necessary in particular cases.

1. Layout diagrams showing the location of individual components, input and output devices, control cabinets and interconnection lines between the components;
2. Wiring and piping diagrams including details of their material and connecting units;
3. Plans and specification showing the working principles of the system with comprehensive description;
4. List of instruments stating name of manufacturers, types, working ranges, set points and application with regard to their environmental conditions;
5. Plans of control and monitoring panels with details on their instrumentation and control devices;
6. List of operating values of machinery and limits for alarm and safety action threshold;
7. Diagrams of electric and non-electric power supply;
8. System analysis of programmable electronic systems including hardware configuration, algorithms and −on special request− data structure and storage allocations
9. FMEA documentation as required in Annex 4 where manual intervention for averting of a danger is not possible;
10. Testing programmes of the equipment in the manufacturer's works and on dock and sea trial.

10.2.2 Further documentation may be required if deemed necessary by the Society.

10.3 General

10.3.1 The operation of the remote control from the craft's operation station is to be so designed and constructed that it does under normal conditions not require the operator's particular attention of the details of the machinery.
The remotely control systems consisting of steel cable links or equivalent are to be submitted to the Society for special consideration.
The equipment, to which this Chapter applies, shall be of state of the art design and construction and shall have proved their reliability in marine service. If evidence on the required reliability cannot be given by relevant documentation, the equipment has to be subjected to an approval according to the Rules of the Society.

10.4 Emergency controls

10.4.1 Unless it is considered impracticable, a single failure of the emergency controls is not to have an inadvertent effect on the system which it serves. In case of such a failure, an alarm is to be given in the craft's operating compartment.
The stopping device for main engine(s) is to be independent from the remotely control system at the craft's operating station.

10.5 Alarm system

10.5.1 In addition to the alarms requested under MSC.1/Circ 1592 Part B, para 10.4.1.1, the following alarms, giving indication that is distinctive and in full view of crew members in the operating compartment, are to be provided:

1. fire (alarm to summon the crew);

2. general emergency alarm (alarm to summon crew and passengers to muster stations);
3. fire-extinguishing medium imminent release;
4. watertight doors imminent closing, compartment flooding.

10.5.2 The machinery is to be monitored in the scope as listed in Table 10.1 to Table 10.6.

10.5.3 Alarm systems including their power supply have to be separate for each independent propulsion unit and its essential auxiliaries.

Table 10.1 - Propulsion diesel engines

Parameter	Alarm level	Remark
Lubricating oil pressure	low	
Lubricating oil temperature inlet	high	
Differential pressure across lubricating oil filter	high	
Pressure or flow of cooling water	low	
Temperature of cooling water outlet	high	
Level in cooling water expansion tank	low	
Deviation of each cylinder from average of exhaust gas temperature, or Exhaust gas temperature of each cylinder	high low + high	if cylinder power above 130 kW
Exhaust gas temperature after turbocharger	high	if cylinders not monitored individually and if cylinder power below 130 kW
Pressure of fuel oil to engine	low	if supplied by electrical pumps
Temperature of fuel oil to engine	low + high	if heated
Pressure of control air	low	
Pressure of starting air	low	
Safety system	failure	

Table 10.2 - Propulsion gas turbines

Parameter	Alarm level	Remark
Lubricating oil pressure	low	
Lubricating oil temperature	high	
Differential pressure across lubri- cating oil filter	high	
Bearing temperature	high	
Exhaust gas temperature outlet	high	
Vibrations	high	
Axial displacement	high	
Combustion/ignition	failure	
Hydraulic service oil pressure	low	
Safety system	failure	

Table 10.3 - Transmission, shaft gears

Parameter	Alarm level	Remark
Lubricating oil pressure to gears	low	
Lubricating oil temperature of gears with sliding bears	high	
Servo oil pressure of gears and transmissions	low	
Thrust bearing temperature	high	Only for sliding bears
Stern tube temperature	high	

Table 10.4 - Main diesel generator sets

Parameter	Alarm level	Remark
Lubricating oil pressure	low	
Pressure or flow of cooling water	low	
Temperature of cooling water out- let	high	
Starting power capacity	low	
Voltage	low	
Frequency	low	
Overspeed	tripped	
Safety system	failure	

Table 10.5 - Auxiliary boilers

Parameter	Alarm level	Remark
Water level	low	
Steam pressure	low + high	
Flame failure	shut down	
Safety system	failure	

Table 10.6 - Miscellaneous

Parameter	Alarm level	Remark
Remote control of propulsion	failure	
Safety system of each machinery	tripped	
Override of safety system	activated	
Power of alarm system	failure	
Electrical non-essential consumers	tripped	
Insulation resistance	low	
Emergency controls	failure	
Fire alarm system	failure	
Stand-by function of auxiliaries	start	
Machinery space bilge level	high	2 sensors at least for each
Fuel oil service tank temperature	high	if heated above flash-point
Purifier	failure	

10.6 Stand-by systems

10.6.1 Where stand-by units are required, they shall start up automatically:

- on failure of operational units
- to preserve stored energy resources (e.g. compressed air)
- on operational demand, if auxiliary machinery are operated in staggered service.

10.6.2 The threshold for activation of the stand-by system shall be such that normal operation is restored before the safety system is activated.

10.6.3 The changeover to a stand-by unit due to a fault is to be signalled visually and audibly. However, an alarm is not to be tripped in the case of machinery installations with auxiliary machines driven mechanically from the propulsion plant where the stand-by machines start up automatically in the lower speed range.

10.6.4 Sets which have suffered a malfunction and have shut down automatically may only be provided for restart after manual reset independent of the alarm acknowledgement.

Chapter 11 - Electrical installations

11.1 General

11.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 11 apply with the following additions.
In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

11.1.2 In general, requirements regarding fire safety are not mandatory for the purpose of classification, except where the Society carries out surveys relevant to fire safety statutory requirements on behalf of the flag Administration.
In such cases, fire safety statutory requirements are considered a matter of class and therefore compliance with these requirements is also verified by the Society for classification purposes at class surveys.

11.2 Documents to be submitted

11.2.1 The documents listed in Tab 1 are to be submitted. The Society reserves the right to request the submission of additional documents if it is deemed necessary in particular cases for the evaluation of the system, equipment or components.

Table 1: Documents to be submitted

No.	A/I **(1)**	Document
1	A	Single line general electric diagram of the installation (including emergency installation)
2	A	Diagram of power supplies or converters
3	A	Electrical load analysis
4	I	Calculation of short-circuit currents for each installation in which the sum of rated power of the energy sources which may be connected contemporaneously to the network is greater than 500 kVA (kW), and in each installation where selective protective devices are foreseen
5	A	List of circuits including, for each supply and distribution circuit, data concerning the nominal current, the cable type, length and cross-section, nominal and setting values of the protective and control devices
6	A	Single line and functional diagram of the main switchboard
7	A	Single line and functional diagram of the emergency switchboard
8	A	Diagram of the most important section boards
9	A	Diagram of the supply, monitoring and control systems of the steering gear
10	A	Diagram of the supply, monitoring and control systems of the propulsion plant
11	A	Diagram of the general alarm system **(2)**
12	A	Diagram of the navigation-light switchboard **(2)**
13	A	Electrical diagram of the gas fire extinguishing system **(2)**
14	A	Electrical diagram of the sprinkler fire extinguishing system **(2)**
15	A	Electrical diagram of the firedoor control and monitoring **(2)**
16	A	Diagram of the emergency stop systems **(2)**
17	A	Diagram of the public address system or other inter-communication systems **(2)**

(1) A = to be submitted for approval I = to be submitted for information
(2) As regards these documents, see [11.1.2]

11.2.2 In addition to the documentation requested above, the following is also required:

.1 For passenger WIG craft:

(a) Single line diagram of the main cable runs showing cables for duplicated equipment and the location of the main distribution and emergency switchboards

(b) Diagrams of switchboards for control, indication and alarm of watertight doors.

.2 For passenger and cargo WIG craft with spaces intended for the carriage of motor vehicles with fuel in their tanks and/or spaces intended for the carriage of dangerous goods:

(a) Plan of dangerous spaces giving details of types of cables and safety characteristics of the equipment installed therein

(b) Diagrams of control and monitoring systems for doors, closed-circuit television or monitoring systems for flooding on passenger craft with ro-ro spaces or special category spaces

(c) Diagrams of supplementary emergency lighting systems for the craft in the previous item (b).

Further documentation may be required, if deemed necessary by the Society.

11.3 Main source of electrical power

11.3.1 Electrical propulsion

For electrically propelled craft with two or more propulsion generating sets, the craft's service electric power may be derived from this source and additional service generators need not be fitted, provided that effective propulsion be maintained with one propulsion generator out of service.

11.3.2 Shaft-driven generators

One of the required generators may be a generator driven by a main propulsion unit (shaft generator) intended to operate at constant speed, (e.g. a system where craft speed and direction are controlled only by varying propeller pitch).

Shaft generator installations which do not comply with this criterion may be fitted as additional source(s) of power provided that:

1. on loss of power from the shaft generator(s),a stand-by generating set starts up automatically;
2. the capacity of the stand-by set is adequatefor the loads necessary for craft propulsion and safety;
3. these services are restored as quickly aspracticable.

11.3.3

(a) In addition to the normal operational conditions of pro-pulsion and safety as per 12.2.2, steering conditions are also to be provided.

(b) Those services necessary to provide normal operational conditions of propulsion, steering and safety do not include services such as:

1. thrusters not forming part of the main propulsionsystem;
2. windlass;
3. moorings;
4. cargo handling gear;
5. cargo pumps;
6. air conditioning.

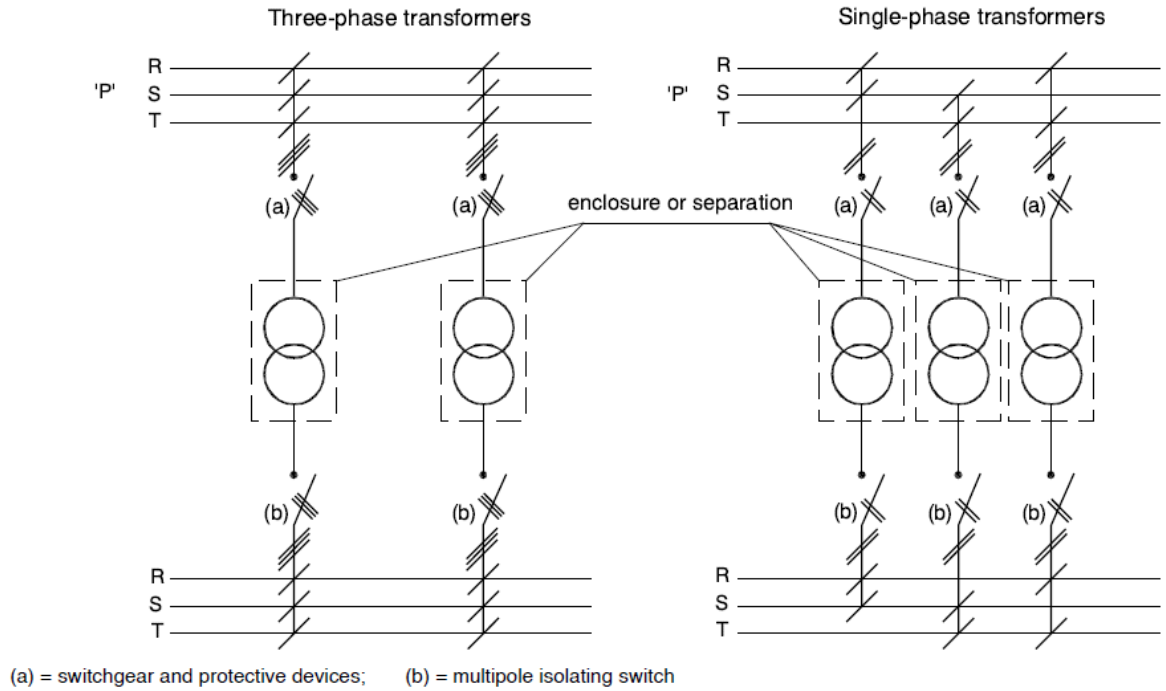
11.3.4 The requirement in requirements in MSC.1/Circ.1592, Chapter 11, paragraph 11.2.5 also applies to static converters or charging units.

The following requirement also applies to these transformers.

The number, capacity and arrangement of power transformers supplying auxiliary electrical systems are to be such that, with any one transformer not in operation, the remaining transformer(s) is (are) sufficient to ensure the safe operation of those services necessary to provide normal operational conditions of propulsion and safety. Minimum comfortable conditions of habitability are also to be ensured, including at least adequate services for cooking, heating, domestic refrigeration, mechanical ventilation, sanitary and fresh water.

Each transformer required is to be located as a separate unit, with a separate enclosure or equivalent arrangement,and is to be served by separate circuits on the primary and secondary sides. Each primary circuit is to be provided with switchgear and protective devices in each phase.
Each of the secondary circuits is to be provided with a multipole isolating switch.
See the examples given in Figure 11.3.4. Transformers supplying a bow thruster are excluded.

Figure 11.3.4



11.4 Emergency source of electrical power

11.4.1 With reference to the requirement in requirements in MSC.1/Circ.1592, Chapter 11, paragraph 11.3.5.2, for the purpose of classification, the time for generator start-up and loading is not to exceed 30 s.

11.5 Precautions against shock, fire and other hazards of electrical origin

11.5.1 The voltage mentioned in MSC.1/Circ.1592, Chapter 11, paragraph 11.6.3, specified by the Society is 50 V.

11.5.2 With reference to the requirement in requirements in MSC.1/Circ.1592, Chapter 11, paragraph 11.6.4, for the purpose of classification, the indication of abnormally low insulation value is required to be both audible and visual.

11.5.3 Cables and wiring

a) Cables, cores and wires are normally to be ofa type approved by the Society, on the basis of IEC standards, 60092 series. Use of other cables is subject to special consideration by the Society, and to appropriate and satisfactory testing.
Where cables are bunched, provisions are to be made to limit fire propagation. This may comprise by either of the following methods:
- use of cables successfully tested according to IEC 60332-3, or to an equivalent testing procedure;
- fitting of suitable fire-stop screens;
- use of an appropriate protective coating.

In areas attended by passengers and in service areas, only halogen-free cables shall be used for permanent installations.

Electric cables having low emission of smoke and toxic gases according to national or international standards (e.g.IEC 60754-1, IEC 61034-1, IEC 61034-2) may be accepted.

Exceptions for individual cables for special purposes haveto be agreed with the Society.

In all other areas of the craft, the use of halogen-free cableis recommended.

b) For fire-resistant cables, the scope of installation is as follows:
   1. Cables for services required to be operable under fire conditions, including those for their power supplies, are to be of a fire resistant type, complying with IEC 60331 where they pass through high fire risk areas, fire zones or decks, other than those which they serve.
   2. Systems that are self monitoring, fail safe or duplicated with cable runs as widely separated as is practicable may be exempted provided their functionality can bemaintained.

      Note: In case of cables for services required to be operable underfire conditions, the fire resistant cables are to extend from the control monitoring panel to the nearest local distribution panel serving the relevant deck/area.

      In case of power supply cables used for services required to be operable under fire conditions, the fire resistant cables are to extend from their distribution point within the space containing the emergency source of electrical power to the nearest local distribution panel serving the relevant deck/area.
   3. Emergency services required to be operableunder fire conditions include:
      - Fire and general alarm system,
      - Fire extinguishing systems and fire extinguisher mediumalarms,
      - Fire detection system,
      - Control and power systemsto power operated fire doorsand status indication for all fire doors,
      - Control and power systems to power operated water-tight doors and their status indication,
      - Emergency lighting,
      - Public address system.
   4. The cables shall be arranged in such a way asto minimize the loss of operational availability as a result of a limited fire in any area.
   5. The cables shall be installed as straight as possible and with strict observance of special installation requirements, e.g. permitted bending radii.

c) “Special precautions” as per MSC.1/Circ.1592, Chapter 11, paragraph 11.6.5.4 stipulated by the Society include the following provisions:
   1. Where there are risks of corrosion, an impervious non-metal sheath is to be applied on top of the armouring;
   2. Cables are to be protected against mechanical damage;
   3. Cables of intrinsically safety circuits if any are to be separated from the others

11.5.4

(a) With reference to the requirement in requirements in MSC.1/Circ.1592, Chapter 11, paragraph 11.6.10.6, see also MSC.1/Circ.1592, Chapter 11, paragraph 11.6.6.2.

(b) With reference to the requirement in requirements in MSC.1/Circ.1592, Chapter 11, paragraph 11.6.10.10, stainless steel is also acceptable.

Chapter 12 - Navigational equipment

12.1 General

12.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 12 are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification.

12.2 Electric power supply distribution panels

12.2.1 Local distribution panels are to be provided for all items of electrically operated navigational equipment. These panels are to be supplied by two exclusive circuits, one fed from the main source of electrical power and one fed from an emergency source of electrical power. Each item of navigational equipment is to be connected individually to its distribution panel.

12.2.2 Power supplies to distribution panels are to be provided with automatic changeover facilities. Failure of the main power supply to the distribution panels is to set off an audible and visual alarm.

12.2.3 Following loss of power (black-out), necessary arrangements are to be made to enable all primary functions to be reinstated within 30 seconds.

Chapter 13 - Radiocommunications

13.1 General

13.1.1 The requirements in IMO HSC Code 2000, Chapter 14 are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification.

Chapter 14 - Operating compartment layout

14.1 General

14.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 14 are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification.

Chapter 15 - Aerodynamic stabilization systems

15.1 General

15.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 15 and relevant Annex 8 apply with the following additions.
In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

15.2 Scope and information

15.2.1 This Chapter states the Classification requirements for directional control systems.

15.2.2 Aerodynamic control systems are those required for the purposes of controlling the direction of the craft and aerodynamic behavior of the craft.

15.2.3 The craft control system is to have adequate strength and suitable design to enable the craft's direction of travel to be effectively controlled without undue physical effort at all speeds and in all conditions for which the craft is classed.

15.2.4 Directional control systems belong to the Mobility category engineering systems.

15.2.5 Directional control may be achieved by means of air and/or water rudders, foils, flaps, steerable propellers, yaw control port or side thrusters, differential propulsive thrust, control surfaces, variable geometry of the craft or its lift system components or by a combination of these devices.

15.3 Information to be submitted

15.3.1 A general statement of the intended modes of operation and the theory behind the design intent is to be submitted together with any supporting information and plans.

15.3.2 An FMEA for the directional control systems as required by Part 1, Chapter 1 is to be submitted. The FMEA is to address the failure conditions identified in this Chapter and is to include the following sub-systems:

1. Actuating;
2. securing/mounting;
3. control and monitoring;
4. electrical power supplies.

15.4 Performance

15.4.1 WIG effect craft are to be shown by analysis, tests, or both, to be capable of continued safe flight and landing after any of foreseeable failure conditions in the flight control system and surfaces (including trim, lift, drag, and feel systems), within the normal flight envelope, without requiring exceptional piloting skill or strength. Probable malfunctions are to have only minor effects on control system operation and are to be capable of being readily counteracted by the pilot.

15.4.2 Power assisted steering controls are to be capable of being operated without undue physical exertion in the event of power system failure.

15.4.3 The control systems are to be of adequate strength to withstand all the loads which the pilot can exert on them during normal operation and emergency conditions. This is to include wind gust and wing tip strike.

15.4.4 Each element of each directional control system is to be designed, or distinctively and permanently marked, to minimize the probability of incorrect assembly that could result in the malfunctioning of the system.

15.4.5 A design incorporating a power drive or an actuation system employing powered components for normal directional control is to provide a secondary means of actuating the device, which may be manually driven, unless an alternative system is provided.

15.4.6 Aerodynamic control systems are to be constructed so that a single failure in one drive or system, as appropriate, will not render any other one inoperable.

15.4.7 All directional control positions are normally to be operated from the craft's operating station.

15.4.8 If directional control systems can be operated from other positions, then two-way communication is to be arranged between the operating station and these other positions.

15.4.9 Adequate indications are to be provided at the operating station and these other positions to provide the person controlling the craft with verification of the correct response of the directional control device to this demand, and also to indicate any abnormal responses or malfunction.

15.4.10 The indications of steering response or rudder angle indicator are to be independent of the system for directional control. The logic of such feedback and indications are to be consistent with the other alarms and indications so that in an emergency, operators are unlikely to be confused.

15.4.11 Wherever practicable, the sense of motion involved in the operation of all controls is to correspond with the sense of the response either of the craft or, if the craft response is relatively unimportant, of the part operated.

15.4.12 All control systems are to be designed and installed so as to prevent any jamming, chafing, interference by passengers, cargo, or loose objects.

15.4.13 All control systems are to be provided with stops which positively limit the range of movement of the operator's controls and are so located in the control systems that the range of travel of the control surface is not appreciably affected by wear, slackness or tensioning adjustments.

15.4.14 Power operated/assisted control systems are to be designed to ensure that the malfunctioning of the power control unit or the failure of the power supply will not affect an alternate control system nor impair the safety of the vessel or its occupants.

15.4.15 The craft is to be designed so that it is controllable if it loses propulsion power. Compliance with this requirement may be shown by analysis where that method has been shown to be dependable.

15.4.16 It is to be possible to adjust and set the trim prior to flight so as to allow the pilot the necessary craft response to control lever adjustments, without unnecessary effort or concentration.

15.5 Testing requirements

15.5.1 In general, testing and trials are to be conducted to demonstrate that the control system has adequate strength and performance to enable an appropriately qualified pilot to perform the tasks for which the craft has been designed, noting that the design is in accordance with these Rules and Regulations.

15.5.2 Trials are in particular to demonstrate that the system:

1. is free from jamming;
2. is free from excessive friction;
3. can be operated without excessive physical force; and
4. is able to tolerate the forces which may be imposed during emergency conditions.

15.5.3 Limit load tests of control surfaces are required. These tests are to include the horn or fitting to which the control system is attached.

Chapter 16 - Handling, controllability and performance

16.1 General

16.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 16 and relevant Annex 8 apply, except for the ones in paragraphs 16.1, 16.2, 16.3 and 16.5.1 that are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification.
In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

16.1.2 For the purpose of classification, controllability is to be established in the way defined in MSC.1/Circ.1592, Part B, Chapter 16, para. 16.3.

16.2 Documents to be submitted

16.2.1 Plans, calculations and details supporting the craft design, aerodynamic stability, flight and handling characteristics in all modes of operation, are to be submitted.

16.2.2 The content of the submitted information is to demonstrate that, as a minimum, the technical requirements specified in this Part of the Rules have been satisfied.

16.2.3 Trials, testing and survey conducted on completion of the craft will be required to confirm the design assumptions.

16.3 Aerodynamic stability

16.3.1 WIG effect craft are to be safely controllable and manoeuvrable during:

1. takeoff;
2. level flight, and landing;
3. increasing altitude above the ground effect altitude and returning to the design flight altitude (Type B craft only).

Due cognizance is to be taken of the likely positions of the centre of gravity of the loaded craft.

16.4.2 It is to be possible to make a smooth transition from one flight condition to any other flight condition without exceptional piloting skill, alertness, or strength, and without danger of damage to the craft occurring, during all normal and foreseeable failure conditions.

16.3.3 It is to be possible in all anticipated conditions of loading, configuration, speed and power to ensure that the pilot will not be unduly fatigued or distracted by the need to apply control forces.

16.3.4 Evidence is to be provided to show that the craft has been designed and constructed such that the static margin is sufficiently large to ensure that the craft can maintain stable flight of uniform altitude without undue input by the pilot.

16.3.5 Evidence is to be provided to show that the static margin of the craft is not so large as to prevent desired manoeuvrability, without undue input from the pilot.

16.3.6 The craft is to be capable of safely recovering from sideslip with the rudder and ailerons free.

16.3.7 The craft is to be designed to ensure that the flying and handling qualities are such that they provide adequate task performance and flight safety in all phases of flight.

16.3.8 The craft is to be statically stable and all dynamic instabilities are to be such that they do not cause an unacceptable increase in pilot workload or otherwise endanger the craft.

16.3.9 The craft is to be arranged such that the pilot can trim the craft during all normal operation without undue exertion. See Vol 6, Pt 2, Ch 2 for control system requirements.

16.3.10 If the craft is capable of stall during normal operation or emergency operating conditions the following are to be satisfied:

1. There is to be a clear and distinctive stall warning.
2. The stall warning may be furnished either through the inherent aerodynamic qualities of the craft or by a device that will give clearly distinguishable indications under expected conditions of flight. However, a visual stall warning device that requires the attention of the crew within the cockpit is not acceptable in itself.
3. During the stall tests, it is to be demonstrated that the stall warning is to begin sufficiently in advance of the stall for the stall to be averted by pilot action taken after the stall warning first occurs.

16.3.11 It is to be possible to produce and to correct roll by unreversed use of the rolling control and to produce and to correct yaw by unreversed use of the directional control, up to the time the craft stalls.

16.3.12 After the craft has stalled, it is to be possible to regain level flight, or a safe re-entry into the water by normal use of the flight controls but without increasing power and without:

1. undue pitch-up;
2. exceeding the maximum permissible speed or allowable limit load factor;
3. during the entry into and the recovery from the manoeuvre, it is to be possible to prevent excessive roll or yaw by the normal use of controls.

Chapter 17 - Operational provisions

17.1 General

17.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 17 are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification.

17.2 Documents to be submitted

17.2.1 The craft operating manuals and route operational manual are to be transmitted to the Society for information.

Chapter 18 - Inspection and maintenance provisions

18.1 General

18.1.1 The requirements in MSC.1/Circ.1592, Part B, Chapter 18 are not subject to control by the Society for the purpose of classification and are intended to be covered by the relevant statutory certification.

18.1.2 The periodical class inspections will be carried out with the periodicity and consistence al Part A, Chapter 2, Paragraph 6.
In the Take off/landing, Ground effect, Fly over and Aircraft modes as defined in [2.4.1.46.5] to [2.4.1.46.8], the WIG craft is considered to be equivalent to an airplane and the requirements of aeronautical rules acceptable to the Flag Administration are to be applied.

18.1.3 It is the Owner's responsibility to apply to the Society concerning any modification, damage or repair affecting the class of the craft.