



**BUREAU
VERITAS**

Approval Testing of Welders

January 2022

**Rule Note
NR 476 DT R02 E**

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1. INDEPENDENCE OF THE SOCIETY AND APPLICABLE TERMS

- 1.1 The Society shall remain at all times an independent contractor and neither the Society nor any of its officers, employees, servants, agents or subcontractors shall be or act as an employee, servant or agent of any other party hereto in the performance of the Services.
- 1.2 The operations of the Society in providing its Services are exclusively conducted by way of random inspections and do not, in any circumstances, involve monitoring or exhaustive verification.
- 1.3 The Society acts as a services provider. This cannot be construed as an obligation bearing on the Society to obtain a result or as a warranty. The Society is not and may not be considered as an underwriter, broker in Unit's sale or chartering, expert in Unit's valuation, consulting engineer, controller, naval architect, designer, manufacturer, shipbuilder, repair or conversion yard, charterer or shipowner; none of the above listed being relieved from any of their expressed or implied obligations as a result of the interventions of the Society.
- 1.4 Only the Society is qualified to apply and interpret its Rules.
- 1.5 The Client acknowledges the latest versions of the Conditions and of the applicable Rules applying to the Services' performance.
- 1.6 Unless an express written agreement is made between the Parties on the applicable Rules, the applicable Rules shall be the Rules applicable at the time of entering into the relevant contract for the performance of the Services.
- 1.7 The Services' performance is solely based on the Conditions. No other terms shall apply whether express or implied.

2. DEFINITIONS

- 2.1 "Certificate(s)" means classification or statutory certificates, attestations and reports following the Society's intervention.
- 2.2 "Certification" means the activity of certification in application of national and international regulations or standards ("Applicable Referential"), in particular by delegation from different governments that can result in the issuance of a Certificate.
- 2.3 "Classification" means the classification of a Unit that can result or not in the issuance of a classification Certificate with reference to the Rules. Classification (or Certification as defined in clause 2.2) is an appraisalment given by the Society to the Client, at a certain date, following surveys by its surveyors on the level of compliance of the Unit to the Society's Rules and/or to Applicable Referential for the Services provided. They cannot be construed as an implied or express warranty of safety, fitness for the purpose, seaworthiness of the Unit or of its value for sale, insurance or chartering.
- 2.4 "Client" means the Party and/or its representative requesting the Services.
- 2.5 "Conditions" means the terms and conditions set out in the present document.
- 2.6 "Industry Practice" means international maritime and/or offshore industry practices.
- 2.7 "Intellectual Property" means all patents, rights to inventions, utility models, copyright and related rights, trade marks, logos, service marks, trade dress, business and domain names, rights in trade dress or get-up, rights in goodwill or to sue for passing off, unfair competition rights, rights in designs, rights in computer software, database rights, topography rights, moral rights, rights in confidential information (including know-how and trade secrets), methods and protocols for Services, and any other intellectual property rights, in each case whether capable of registration, registered or unregistered and including all applications for and renewals, reversions or extensions of such rights, and all similar or equivalent rights or forms of protection in any part of the world.
- 2.8 "Parties" means the Society and Client together.
- 2.9 "Party" means the Society or the Client.
- 2.10 "Register" means the public electronic register of ships updated regularly by the Society.
- 2.11 "Rules" means the Society's classification rules (available online on veristar.com), guidance notes and other documents. The Society's Rules take into account at the date of their preparation the state of currently available and proven technical minimum requirements but are not a standard or a code of construction neither a guide for maintenance, a safety handbook or a guide of professional practices, all of which are assumed to be known in detail and carefully followed at all times by the Client.
- 2.12 "Services" means the services set out in clauses 2.2 and 2.3 but also other services related to Classification and Certification such as, but not limited to: ship and company safety management certification, ship and port security certification, maritime labour certification, training activities, all activities and duties incidental thereto such as documentation on any supporting means, software, instrumentation, measurements, tests and trials on board. The Services are carried out by the Society according to the Rules and/or the Applicable Referential and to the Bureau Veritas' Code of Ethics. The Society shall perform the Services according to the applicable national and international standards and Industry Practice and always on the assumption that the Client is aware of such standards and Industry Practice.
- 2.13 "Society" means the classification society 'Bureau Veritas Marine & Offshore SAS', a company organized and existing under the laws of France, registered in Nanterre under number 821 131 844, or any other legal entity of Bureau Veritas Group as may be specified in the relevant contract, and whose main activities are Classification and Certification of ships or offshore units.
- 2.14 "Unit" means any ship or vessel or offshore unit or structure of any type or part of it or system whether linked to shore, river bed or sea bed or not, whether operated or located at sea or in inland waters or partly on land, including submarines, hovercrafts, drilling rigs, offshore installations of any type and of any purpose, their related and ancillary equipment, subsea or not, such as well head and pipelines, mooring legs and mooring points or otherwise as decided by the Society.

3. SCOPE AND PERFORMANCE

- 3.1 Subject to the Services requested and always by reference to the Rules, and/or to the Applicable Referential, the Society shall:
 - review the construction arrangements of the Unit as shown on the documents provided by the Client;
 - conduct the Unit surveys at the place of the Unit construction;
 - class the Unit and enter the Unit's class in the Society's Register;
 - survey the Unit periodically in service to note whether the requirements for the maintenance of class are met.The Client shall inform the Society without delay of any circumstances which may cause any changes on the conducted surveys or Services.
- 3.2 The Society will not:
 - declare the acceptance or commissioning of a Unit, nor its construction in conformity with its design, such activities remaining under the exclusive responsibility of the Unit's owner or builder;
 - engage in any work relating to the design, construction, production or repair checks, neither in the operation of the Unit or the Unit's trade, neither in any advisory services, and cannot be held liable on those accounts.

4. RESERVATION CLAUSE

- 4.1 The Client shall always: (i) maintain the Unit in good condition after surveys; (ii) present the Unit for surveys; and (iii) inform the Society in due time of any circumstances that may affect the given appraisalment of the Unit or cause to modify the scope of the Services.
- 4.2 Certificates are only valid if issued by the Society.
- 4.3 The Society has entire control over the Certificates issued and may at any time withdraw a Certificate at its entire discretion including, but not limited to, in the following situations: where the Client fails to comply in due time with instructions of the Society or where the Client fails to pay in accordance with clause 6.2 hereunder.
- 4.4 The Society may at times and at its sole discretion give an opinion on a design or any technical element that would 'in principle' be acceptable to the Society. This opinion shall not presume on the final issuance of any Certificate nor on its content in the event of the actual issuance of a Certificate. This opinion shall only be an appraisalment made by the Society which shall not be held liable for it.

5. ACCESS AND SAFETY

- 5.1 The Client shall give to the Society all access and information necessary for the efficient performance of the requested Services. The Client shall be the sole responsible for the conditions of presentation of the Unit for tests, trials and surveys and the conditions under which tests and trials are carried out. Any information, drawing, etc. required for the performance of the Services must be made available in due time.
- 5.2 The Client shall notify the Society of any relevant safety issue and shall take all necessary safety-related measures to ensure a safe work environment for the Society or any of its officers, employees, servants, agents or subcontractors and shall comply with all applicable safety regulations.

6. PAYMENT OF INVOICES

- 6.1 The provision of the Services by the Society, whether complete or not, involves, for the part carried out, the payment of fees thirty (30) days upon issuance of the invoice.
- 6.2 Without prejudice to any other rights hereunder, in case of Client's payment default, the Society shall be entitled to charge, in addition to the amount not properly paid, interest equal to twelve (12) months LIBOR plus two (2)

per-cent as of due date calculated on the number of days such payment is delinquent. The Society shall also have the right to withhold Certificates and other documents and/or to suspend or revoke the validity of Certificates.

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

7. LIABILITY

- 7.1 The Society bears no liability for consequential loss. For the purpose of this clause consequential loss shall include, without limitation:
 - Indirect or consequential loss;
 - Any loss and/or deferral of production, loss of product, loss of use, loss of bargain, loss of revenue, loss of profit or anticipated profit, loss of business and business interruption, in each case whether direct or indirect.The Client shall defend, release, save, indemnify, defend and hold harmless the Society from the Client's own consequential loss regardless of cause.
- 7.2 Except in case of wilful misconduct of the Society, death or bodily injury caused by the Society's negligence and any other liability that could not be, by law, limited, the Society's maximum liability towards the Client is limited to one hundred and fifty per-cent (150%) of the price paid by the Client to the Society for the Services having caused the damage. This limit applies to any liability of whatsoever nature and howsoever arising, including fault by the Society, breach of contract, breach of warranty, tort, strict liability, breach of statute.
- 7.3 All claims shall be presented to the Society in writing within three (3) months of the completion of Services' performance or (if later) the date when the events which are relied on were first discovered by the Client. Any claim not so presented as defined above shall be deemed waived and absolutely time barred.

8. INDEMNITY CLAUSE

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

9. TERMINATION

- 9.1 The Parties shall have the right to terminate the Services (and the relevant contract) for convenience after giving the other Party thirty (30) days' written notice, and without prejudice to clause 6 above.
- 9.2 The Services shall be automatically and immediately terminated in the event the Client can no longer establish any form of interest in the Unit (e.g. sale, scrapping).
- 9.3 The Classification granted to the concerned Unit and the previously issued Certificates shall remain valid until the date of effect of the termination notice issued, or immediately in the event of termination under clause 9.2, subject to compliance with clause 4.1 and 6 above.
- 9.4 In the event where, in the reasonable opinion of the Society, the Client is in breach, or is suspected to be in breach of clause 16 of the Conditions, the Society shall have the right to terminate the Services (and the relevant contracts associated) with immediate effect.

10. FORCE MAJEURE

- 10.1 Neither Party shall be responsible or liable for any failure to fulfil any term or provision of the Conditions if and to the extent that fulfillment has been delayed or temporarily prevented by a force majeure occurrence without the fault or negligence of the Party affected and which, by the exercise of reasonable diligence, the said Party is unable to provide against.
- 10.2 For the purpose of this clause, force majeure shall mean any circumstance not being within a Party's reasonable control including, but not limited to: acts of God, natural disasters, epidemics or pandemics, wars, terrorist attacks, riots, sabotages, impositions of sanctions, embargoes, nuclear, chemical or biological contaminations, laws or action taken by a government or public authority, quotas or prohibition, expropriations, destructions of the worksite, explosions, fires, accidents, any labour or trade disputes, strikes or lockouts.

11. CONFIDENTIALITY

- 11.1 The documents and data provided to or prepared by the Society in performing the Services, and the information made available to the Society, will be treated as confidential except where the information:
 - is properly and lawfully in the possession of the Society;
 - is already in possession of the public or has entered the public domain, other than through a breach of this obligation;
 - is acquired or received independently from a third party that has the right to disseminate such information;
 - is required to be disclosed under applicable law or by a governmental order, decree, regulation or rule or by a stock exchange authority (provided that the receiving Party shall make all reasonable efforts to give prompt written notice to the disclosing Party prior to such disclosure).
- 11.2 The Parties shall use the confidential information exclusively within the framework of their activity underlying these Conditions.
- 11.3 Confidential information shall only be provided to third parties with the prior written consent of the other Party. However, such prior consent shall not be required when the Society provides the confidential information to a subsidiary.
- 11.4 Without prejudice to sub-clause 11.1, the Society shall have the right to disclose the confidential information if required to do so under regulations of the International Association of Classification Societies (IACS) or any statutory obligations.

12. INTELLECTUAL PROPERTY

- 12.1 Each Party exclusively owns all rights to its Intellectual Property created before or after the commencement date of the Conditions and whether or not associated with any contract between the Parties.
- 12.2 The Intellectual Property developed by the Society for the performance of the Services including, but not limited to drawings, calculations, and reports shall remain the exclusive property of the Society.

13. ASSIGNMENT

- 13.1 The contract resulting from to these Conditions cannot be assigned or transferred by any means by a Party to any third party without the prior written consent of the other Party.
- 13.2 The Society shall however have the right to assign or transfer by any means the said contract to a subsidiary of the Bureau Veritas Group.

14. SEVERABILITY

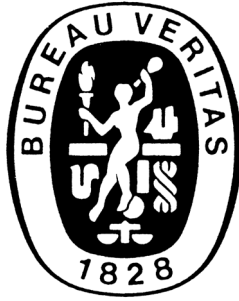
- 14.1 Invalidation of one or more provisions does not affect the remaining provisions.
- 14.2 Definitions herein take precedence over other definitions which may appear in other documents issued by the Society.
- 14.3 In case of doubt as to the interpretation of the Conditions, the English text shall prevail.

15. GOVERNING LAW AND DISPUTE RESOLUTION

- 15.1 These Conditions shall be construed in accordance with and governed by the laws of England and Wales.
- 15.2 Any dispute shall be finally settled under the Rules of Arbitration of the Maritime Arbitration Chamber of Paris ("CAM"), which rules are deemed to be incorporated by reference into this clause. The number of arbitrators shall be three (3). The place of arbitration shall be Paris (France). The Parties agree to keep the arbitration proceedings confidential.
- 15.3 Notwithstanding clause 15.2, disputes relating to the payment of the Society's invoices may be submitted by the Society to the *Tribunal de Commerce de Nanterre*, France, or to any other competent local Court, at the Society's entire discretion.

16. PROFESSIONAL ETHICS

- 16.1 Each Party shall conduct all activities in compliance with all laws, statutes, rules, economic and trade sanctions (including but not limited to US sanctions and EU sanctions) and regulations applicable to such Party including but not limited to: child labour, forced labour, collective bargaining, discrimination, abuse, working hours and minimum wages, anti-bribery, anti-corruption, copyright and trademark protection, personal data protection (<https://personaldataprotection.bureauveritas.com/prvacpolicv>).
- Each of the Parties warrants that neither it, nor its affiliates, has made or will make, with respect to the matters provided for hereunder, any offer, payment, gift or authorization of the payment of any money directly or indirectly, to or for the use or benefit of any official or employee of the government, political party, official, or candidate.
- 16.2 In addition, the Client shall act consistently with the Bureau Veritas' Code of Ethics and, when applicable, Business Partner Code of Conduct both available at <https://group.bureauveritas.com/group/corporate-social-responsibility/operational-excellence>.



RULE NOTE NR 476

NR 476 Approval Testing of Welders

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SECTION 1

GENERAL

1 General

1.1 Scope

1.1.1 This document gives requirements for a qualification scheme for welders intended to be engaged in fusion welding when required by applicable Bureau Veritas Rules for Classification.

1.1.2 This document is applicable to welding of hull structures or other productions both during new construction and the repair of ships.

1.1.3 The training of welders, control of their qualification and maintenance of their skills are the responsibility of shipyards and manufacturers. The Society Surveyor is to verify and be satisfied that the welders are appropriately qualified.

1.2 Variables for qualification of welders

1.2.1 A welder is to be qualified in relation to the following variables of welding:

- a) base metal
- b) welding consumables type
- c) welding process
- d) type of welded joint
- e) plate thickness
- f) welding position.

SECTION 2

QUALIFICATION SCHEME FOR WELDERS OF HULL STRUCTURAL STEELS

1 General

1.1 Scope

1.1.1 This Section gives requirements for a qualification scheme for welders intended to be engaged in the fusion welding of steels for hull structures.

1.1.2 This qualification scheme does not cover welders engaged in oxy-acetylene welding.

1.1.3 This qualification scheme does not cover welding of pipes and pressure vessels.

1.1.4 This qualification scheme covers welding of fillet weld of tubular section to plate with diameter $D > 25$ mm.

1.1.5 Those welders intended to be engaged in welding of hull structures in shipyards and manufacturers shall be tested and qualified in accordance with this scheme and issued with a qualification certificate endorsed by the Society.

1.1.6 Welders or welding operators qualified in accordance with national or international welder qualification standards may also be engaged in welding of hull structures at the discretion of the Society provided that standard is considered equivalent to this document from technical perspective covering examination, testing and range of approval.

Even if the requirements stipulated in the standards are applied, the requirement for revalidation of welders' qualification shall be in accordance with [5.2].

1.1.7 When national or international welder qualification standards are used, they are to be applied in full, cross-mixing requirements of qualification standards is not permitted.

1.2 Provisions about existing certificates

1.2.1 Initial qualification of welder or welding operator requested to the Society by an application dated on or after 1 January 2022 are to be carried out in accordance with this document.

Existing qualifications are to be renewed in accordance with this document when they become due.

1.3 Welding Operators

1.3.1 The welding operators responsible for setting up and/or adjustment of fully mechanized and automatic equipment, such as submerged arc welding, gravity welding, electro-gas welding and Metal Active Gas (MAG) welding with auto-carriage, etc., must be qualified whether he operates the equipment or not.

However a welding operator, who solely operates the equipment without responsibility for setting up and/or adjustment, does not need qualification provided that he has experience of the specific welding work concerned and the production welds made by the operators are of the required quality.

The qualification test and approval range of the welding operator are left to the discretion of the Society with reference to ISO 14732:2013.

2 Variables and range of qualification

2.1 Welding process

2.1.1 The welding processes for welder's qualification are to be classified in Tab 1 as, Manual welding (M), Semi-automatic welding/Partly mechanized welding (S) and TIG welding (T).

Each testing normally qualifies only for one welding process.

A change of welding process requires a new qualification test.

Table 1 : Welding processes for welder's qualification

Symbol	Welding process in actual welding works		ISO 4063
M	Manual welding	Manual metal arc welding (metal arc welding with covered electrode)	111
S	Semi-automatic welding/Partly mechanized welding	Metal inert gas (MIG) welding	131
		Metal active gas (MAG) welding Flux-cored arc (FCA) welding	135, 138 (1) 136 (2)
T	TIG welding	Tungsten inert gas (TIG) welding	141

The Society may require separate qualification for solid wires, metal cored wires and flux-cored wires as follows:

(1) A change from MAG welding with solid wires (135) to that with metal cored wires (138), or vice versa is permitted.

(2) A change from a solid or metal cored wire (135/138) to a flux-cored wire (136) or vice versa requires a new qualification test.

2.2 Welding consumables

2.2.1 Welding consumables used for qualification tests are to be approved by the Society in accordance with NR216, Ch 5, Sec 2, [2] to [9] and [11] unless otherwise agreed. The welding consumable grade is to be acceptable for the parent metal used for qualification tests.

Welding with filler material qualifies for welding without filler material, but not vice versa.

2.2.2 For manual metal arc welding, qualification tests are required using basic, acid or rutile covered electrodes. Qualification tests performed with a type of covered electrode may extend qualification to the use of other types of covered electrode as specified in Tab 2.

Table 2 : Range of qualification for the type of covered electrode

Type of covered electrode used for qualification test assemblies	Range of qualification
Acid or rutile-acid covering	Acid or rutile-acid covering
Rutile or rutile-basic or rutile-cellulosic or rutile-thick covering	Acid or rutile-acid covering or rutile or rutile-basic or rutile-cellulosic or rutile-thick covering
Basic covering	Acid or rutile-acid covering or rutile or rutile-basic or rutile-cellulosic or rutile-thick covering or basic covering
Cellulosic covering	Cellulosic covering

2.3 Base Metal

2.3.1 Base metals for qualification of welders or welding operators are combined into one group with a specified minimum yield strength $ReH \leq 460 \text{ N/mm}^2$. The welding of any hull structural steel in this group covers qualification of the welder or welding operator for the welding of any one steel grade (rolled products, castings, forgings) within this group.

The use of equivalent structural steel grades may be considered by the Society for the qualification tests.

2.4 Range of thickness

2.4.1 The qualified plate thickness range arising from the welder qualification test plate thickness is shown in Tab 3.

Table 3 : Plate thicknesses for welder's qualification

Thickness T of test assembly (mm)	Qualified plate thickness range t (mm)
$T < 3$	t to 2 t
$3 \leq T < 12$	3 mm to 2 t
$T \geq 12$	$t \geq 3 \text{ mm}$

2.5 Range of tubular section diameter

2.5.1 The qualified tubular section diameter range arising from the tubular section diameter used during the welder qualification test is shown in Tab 4.

Table 4 : Tubular section diameters for welder's qualification

Diameter D of test assembly (mm)	Qualified diameter range (mm)
$D > 25$	$\geq 0,5 D$ (25 mm min.)

2.6 Welding Position

2.6.1 The welding positions qualified as a result of the actual welding position used in a satisfactory welder's qualification test, are shown in Tab 5 and Tab 6.

Diagrams showing the definitions of weld position used in Tab 5 and Tab 6 are shown in Fig 1.

A change in the position of welding to one for which the welder is not qualified shall require new qualification testing.

The Society may require a qualification test with fillet welding for welders who are employed for fillet welding only.

Table 5 : Qualified welding positions when testing with butt welding

Qualification test position with butt weld	Qualified welding positions in actual welding works	
	Butt welds	Fillet welds
PA	PA	PA, PB
PC	PA, PC	PA, PB, PC
PE	PA, PC, PE	PA, PB, PC, PD, PE
PF	PA, PF	PA, PB, PF
PG	PG	PG

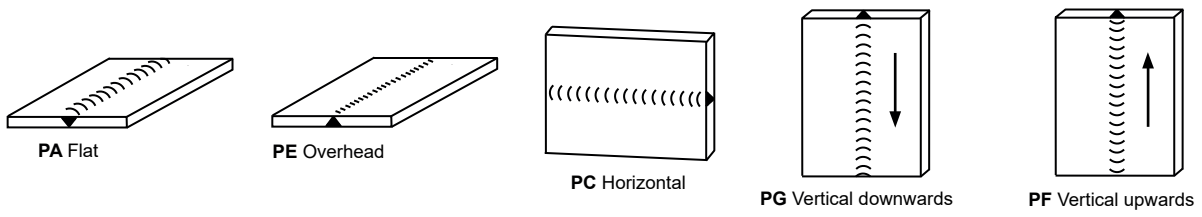
Table 6 : Qualified welding positions when testing with fillet welding

Qualification test position with fillet weld	Qualified welding positions in actual welding works (1)
	Fillet welds
PA	PA
PB	PA, PB
PC	PA, PB, PC
PD	PA, PB, PC, PD, PE
PE	PA, PB, PC, PD, PE
PF	PA, PB, PF
PG	PG
PH	PH

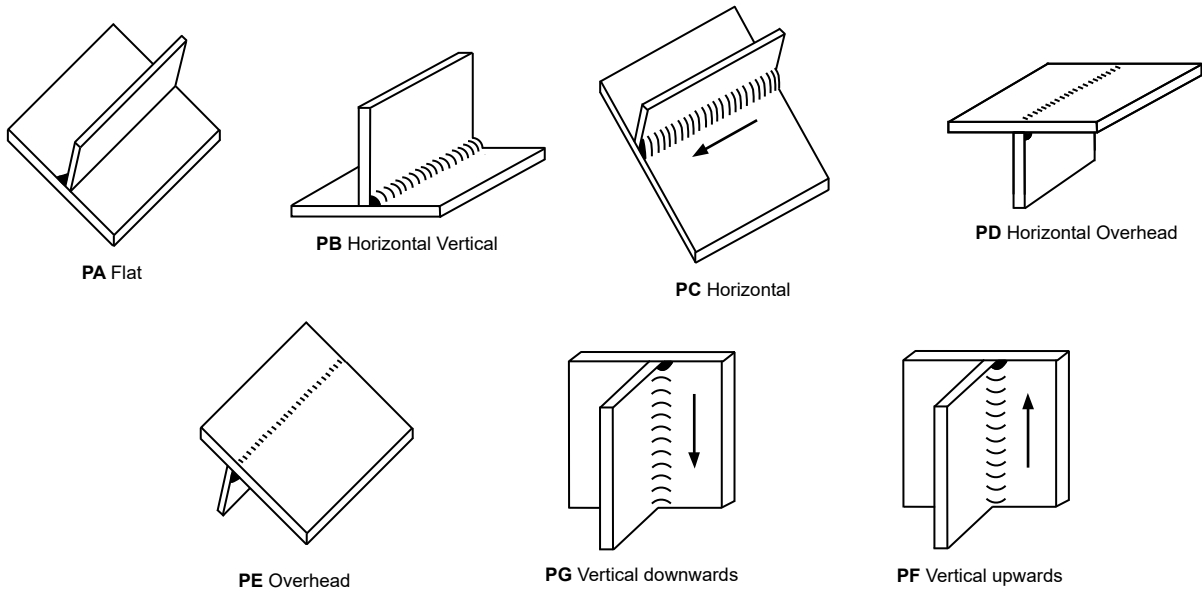
(1) Positions PB and PD cover fillet welding of plate to plate and tubular section to plate.

Figure 1 : Welding positions

a) Butt welds for plates



b) Filled welds for plates



c) Fillet welds of tubular section on plate

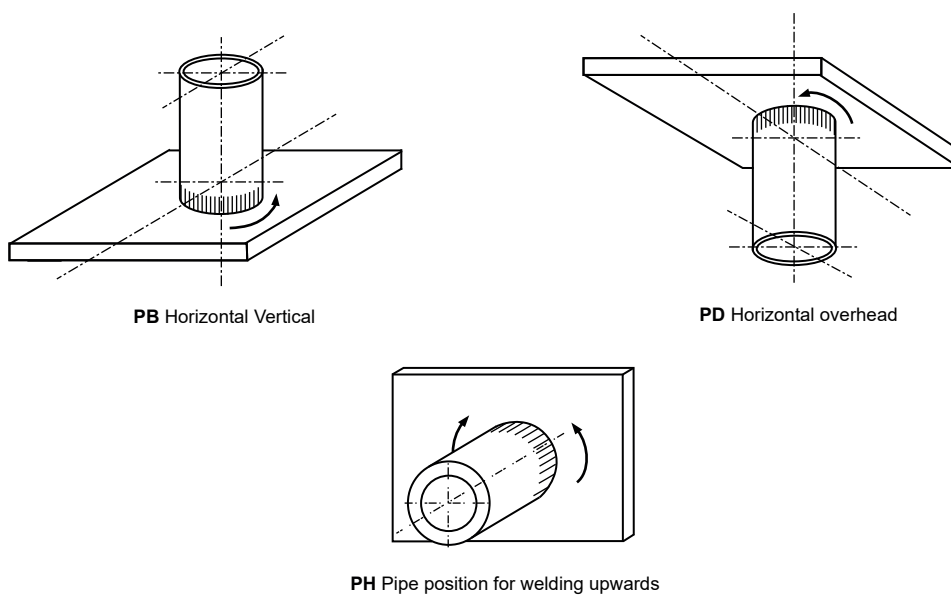


Table 7 : Types of welded joint for welder's qualification

Type of welded joint used in the test assembly for the qualification test			Range of qualification				
			Butt welds				Fillet welds
			Welded from one side		Welded from both sides		
			With backing	No backing	With gouging	No gouging	
Butt weld	One side	With backing	◇	–	x	–	x
		No backing	x	◇	x	x	x
	Both sides	With gouging	x	–	◇	–	x
		No gouging	x	–	x	◇	x
Fillet weld	–	–	–	–	–	–	x

◇ indicates the type of assembly of qualification.
x indicates on the same line as the symbol ◇ those welds for which the welder is also qualified.
– indicates on the same line as the symbol ◇ those welds for which the welder is not qualified.

2.7 Type of joint

2.7.1 Butt and fillet welds

The types of welded joint for welder's qualification are to be classified as shown in Tab 7 in accordance with the qualification test.

A change of type of weld joint to type for which the welder is not qualified shall require new qualification testing.

Welders engaged in full/partial penetration T welds shall be qualified for butt welds for the welding process and the position corresponding to the joints to be welded.

For fillet welding, welders who passed the qualification tests for multi-layer technique welding can be deemed as qualified for single layer technique, but not vice versa.

2.7.2 Tack welding

A welder qualified for butt or fillet welding can be engaged in tack welding for the welding process and position corresponding to those permitted in his certificate.

Alternatively, welders engaged in tack welding only can be qualified on the test assemblies shown in Fig 6 and Fig 7.

3 Qualification test

3.1 General

3.1.1 It is the responsibility of shipyard or manufacturer to ensure that the welder is having adequate knowledge of the welding process including the regulation of the parameters of the welding equipment used.

Welding of the test assemblies and testing of test specimens shall be witnessed by the Surveyor.

The Surveyor may stop the test if the welding conditions are not correct or if it appears that the welder does not have the skill to achieve the qualification requirements.

3.2 Test assemblies

3.2.1 Dimensions and types of test assembly

The number, shape and dimensions of test assemblies are to be selected so as to cover the production welding work taking into account the welding variables and range of qualification in Article [2].

Test assemblies for butt welds and fillet welds are to be prepared as shown in Fig 2, Fig 3, Fig 4 and Fig 5 in each qualification test.

Test assemblies for butt tack welds and fillet tack welds are to be prepared as shown in Fig 6 and Fig 7.

3.2.2 Welding of test assembly

The welder qualification test assembly is to be welded according to a welding procedure specification (WPS and pWPS) simulating the conditions in production, as far as practicable.

The following conditions apply:

- The test assembly shall have at least one stop and restart in the root run and in the top capping run which has to be identified for further examination.
- The welder is allowed to remove minor imperfections only in the stop by grinding before restart welding.
- Any preheat, interpass temperature or controlled heat input specified in the welding procedure is required for the test assembly.
- Any post-weld heat treatment specified in the welding procedure may be omitted unless bend tests are required.
- The test assemblies are to be suitably identified with the mark of the surveyor and the identification of the welder before welding starts.

3.3 Examinations and tests

3.3.1 General

The non-destructive examinations and destructive tests required according to Tab 8 are to be carried out, while the location of test specimens is to be in accordance with Fig 2, Fig 3 and Fig 4.

Prior to mechanical tests, backing strips where used are to be removed. The test assembly can be sectioned by thermal cutting or by mechanical means discarding the first and last 25mm of the test piece at the end of the plates.

3.3.2 Visual examination

The welds shall be visually examined prior to the cutting of the test specimen for the bend test and fracture test.

The result of the examination is to show the absence of cracks or other serious imperfections.

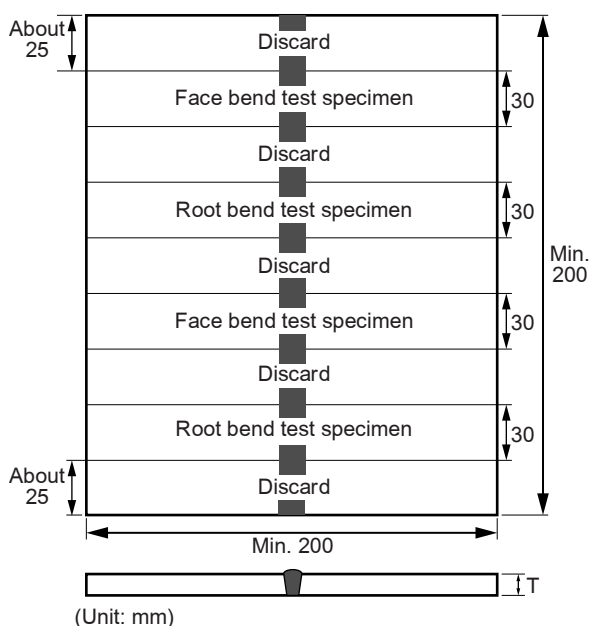
Imperfections detected are to be assessed in accordance with quality level B in ISO 5817:2014, except for the following imperfection types for which level C applies:

- excess weld metal
- excess penetration
- excess convexity and
- excess throat thickness.

3.3.3 Radiographic examination

When radiographic testing is used for butt welds, imperfections detected shall be assessed in accordance with ISO 5817:2014, level B.

Figure 2 : Dimensions and types of test assembly for butt welds (T<12mm)



3.3.4 Bend test

Transverse root bend, face bend and side bend test specimens are to be machined to the dimensions given in NR216, Ch 1, Sec 2, [3.1].

Two face bend test and two root bend test specimens are to be tested for initial qualification test, and one face and one root bend test specimens for extension of approval.

For thickness 12 mm and over, four side bend test specimens (two side bend test specimens for extension of approval) with 10 mm in thickness may be tested as an alternative.

At least one bend test specimen shall include one stop and restart in the bending part, for root run or for cap run.

The bending angle is to be 180°. The bend ratio (D/t) is to be that specified for “welding consumable approvals +1” (NR216, Ch 5, Sec 2, [2] to [9] and [11]).

After testing, the test specimens shall not to reveal any open defects, in any direction, greater than 3 mm. Defects appearing at the corners of the test specimen during testing should be investigated case-by-case.

3.3.5 Fracture test (butt welds)

For fracture test, one specimen shall be taken from the stop and restart area in the examination length.

The test assembly examination length shall be cut into four equal test specimens with a minimum width of 35 mm.

When fracture testing is used for butt welds, full test specimen in length is to be tested in accordance with ISO 9017:2017.

Imperfections detected shall be assessed in accordance with ISO 5817:2014, level B.

Figure 3 : Dimensions and types of test assembly for butt welds (T≥12mm)

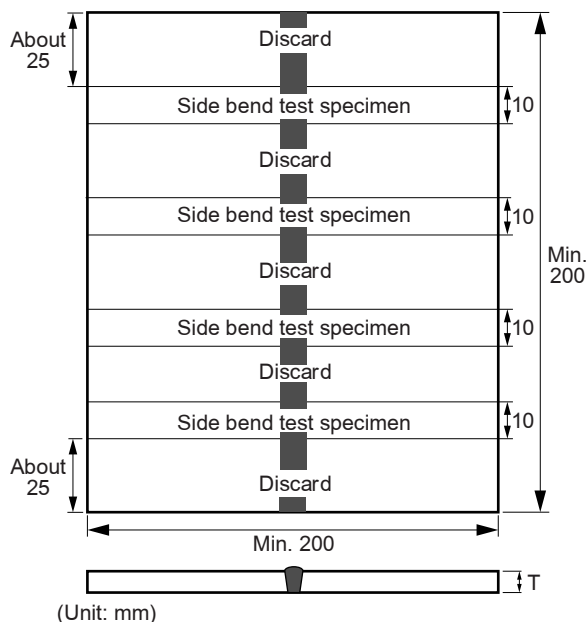
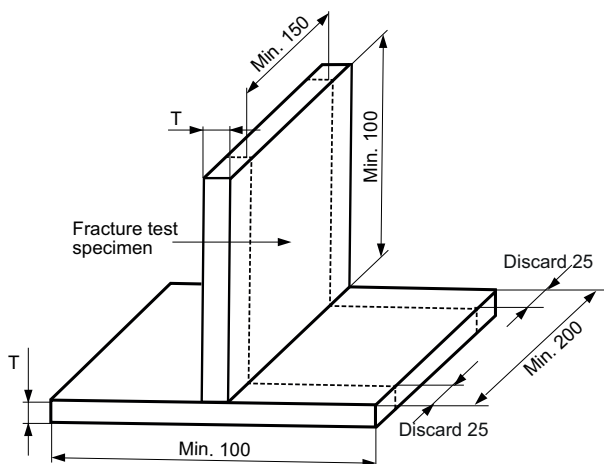


Figure 4 : Dimensions and types of test assembly for fillet welds



(Unit: mm)

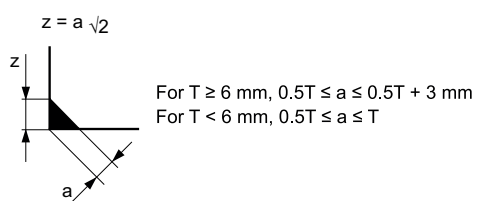
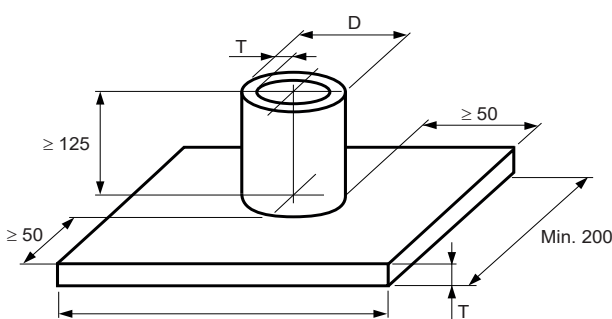
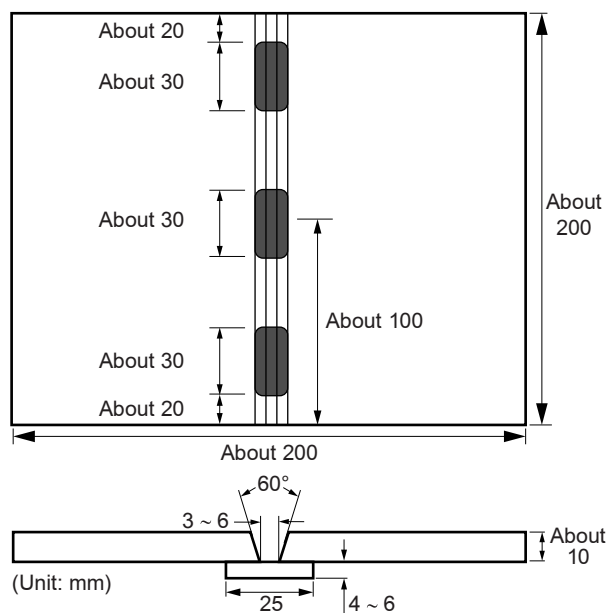


Figure 5 : Dimensions and types of test assembly for fillet welds of tubular section to plate



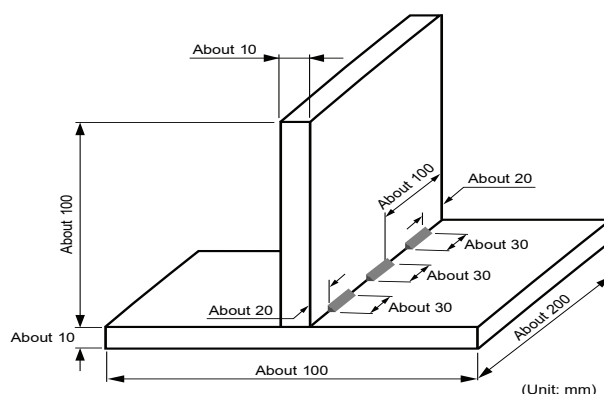
(Unit: mm)

Figure 6 : Dimensions and types of test assembly for tack butt welds



(Unit: mm)

Figure 7 : Dimensions and types of test assembly for tack fillet welds



(Unit: mm)

Table 8 : Examinations and tests

Type of examination or test	Extent of the examination or test		
	Butt weld	Fillet weld	Tack weld (4)
Visual examination	100%	100%	100%
Radiographic test	100% (1)	–	–
Bend tests (2)	2 face, 2 root (1)	–	–
Fracture tests	1 sample (1)	1 sample (3)	1 sample
Macro-examination (3)	–	2 sections	–

(1) Radiographic test or fracture test may be carried out in lieu of bend test except for the gas-shielded welding processes with solid wire or metal cored wire.

(2) Face and root bend tests may be substituted by 4 side bend tests for T ≥ 12 mm.

(3) The fracture test may be replaced by two macro sections, one of which in stop/restart position.

(4) Additional tests may be required, at the discretion of the Society.

3.3.6 Fracture test (fillet welds)

For fillet welds, the test assembly shall be fractured as one complete specimen.

If necessary the test assembly may be cut into several test specimens of equal width. In this case, one specimen shall include a stop and restart area.

For fillet welds of tubular section to plate, the test assembly shall be cut into four or more test specimens and fractured.

The fracture test is to be performed by folding the upright plate onto the through plate, in accordance with ISO 9017:2017.

Evaluation shall concentrate on cracks, porosity and pores, inclusions, lack of fusion and incomplete penetration. Imperfections that are detected shall be assessed in accordance with ISO 5817:2014, level B.

3.3.7 Macro examination

When macro examination is used for fillet welds, two test specimens are to be prepared from different cutting positions. At least one macro examination specimen shall be cut at the position of one stop and restart in either root run or cap run. These specimens are to be etched on one side to clearly reveal the weld metal, fusion line, root penetration and the heat affected zone.

Macro sections shall include at least 10 mm of unaffected base metal.

The examination is to reveal a regular weld profile, thorough fusion between adjacent layers of weld and base metal, sufficient root penetration and the absence of defects such as cracks, lack of fusion etc.

3.4 Retest

3.4.1 When a welder fails a qualification test, the following shall apply:

- a) In cases where the welder fails to meet the requirements in part of the tests, a retest may be welded immediately, consisting of another test assembly of each type of welded joint and position that the welder failed. In this case, the test is to be done for duplicate test specimens of each failed test.

All retest specimens shall meet all of the specified requirements.

- b) In cases where the welder fails to meet the requirements in all parts of the required tests or in the retest prescribed in [3.4.1] a), the welder shall undertake further training and practice.
- c) Where there is specific reason to question the welder's ability or the period of effectiveness has lapsed, the welder shall be re-qualified in accordance with the tests specified in [3.2] and [3.3].

3.4.2 Where any test specimen does not comply with dimensional specifications due to poor machining, a replacement test assembly shall be welded and tested.

4 Certification

4.1 Certification

4.1.1 Qualification certificates (see example in App 1) are normally issued when the welder has passed the qualification test in accordance with this document.

Each shipyard and manufacturer shall be responsible for the control of the validity of the certificate and the range of the approval.

4.1.2 The following items shall be specified in the certificate:

- a) Range of qualification for base metal, welding processes, filler metal type, types of welded joint, plate thicknesses and welding positions.
- b) Expiry date of the validity of the qualification.
- c) Name, date of birth, identification and the photograph of welder.
- d) Name of shipbuilder / manufacturer.
- e) The chosen maintenance option of qualification in accordance with [5.2.1] a), b) or c) with one of the following mentions:
 - 1) Revalidation method: Re-test every 3 years [NR476 5.2.1.a]
 - 2) Revalidation method: Production welds check every 2 years [NR476 5.2.1.b]
 - 3) Revalidation method: Based on quality system and verifications [NR476 5.2.1.c]

4.1.3 When a certificate is issued, the relative documents such as test reports and/or re-validation records shall be archived as annexes to the copy of certificate according to the Society's own practice.

4.1.4 The status of approvals of each individual qualification is to be demonstrated to the Society when requested.

5 Period of validity

5.1 Initial approval

5.1.1 Normally the validity of the welder's approval begins from the issue date of qualification certificate when all the required tests are satisfactorily completed.

The certificate is to be signed at six-month intervals by the shipyards/manufacturers personnel who is responsible for production weld quality provided that all the following conditions are fulfilled:

- a) The welder shall be engaged with reasonable continuity on welding work within the current range of approval. An interruption for a period no longer than six months is permitted.
- b) The welder's work shall in general be in accordance with the technical conditions under which the approval test is carried out.
- c) There shall be no specific reason to question the welder's skill and knowledge.

5.1.2 If any of these conditions are not fulfilled, the Society is to be informed and the certificate is to be cancelled.

The validity of the certificate may be maintained in agreement with the Society as specified in [5.2]. The maintenance scheme of qualification is in accordance with [5.2.1], a), b) or c).

5.2 Maintenance of the approval

5.2.1 Revalidation shall be carried out by the Society. The skill of the welder shall be periodically verified by one of the following options:

- a) The welder shall be re-tested every 3 years.
- b) Every 2 years, two welds made during the last 6 months of the 2 years validity period shall be tested by radiographic or ultrasonic testing or destructive testing and shall be recorded. The weld tested shall reproduce the initial test conditions except for the thickness. These tests revalidate the welder's qualifications for an additional 2 years.
- c) A welder's qualification for any certificate shall be valid as long as it is signed according to [5.1.1] subject that all the following conditions are fulfilled. In this option, the fulfilment of all the conditions is to be verified by the Society. The frequency of verification by the Society is to be no longer than 3 years and is to be agreed between the Society and the shipyards/manufacturers.
 - 1) The welder is working for the same shipyard/manufacturer which is responsible for production weld quality as indicated on his or her qualification certificate.

2) Society shall verify that the welder quality management system of the shipyard/manufacturer includes as minimum:

- A designated person responsible for the coordination of the welder quality management system.
- List of welders and welding supervisors in shipyard/manufacturer.
- If applicable, list of subcontracted welders.
- Qualification certificate of welders and description of the associated management system.
- Training requirements for welder qualification programme.
- Identification system for welders and WPS used on welds.
- Procedure describing the system in place to monitor each welder performance based on results of welds examination records (e.g. repair rate, etc.) including the criteria permitting the maintenance of the welder qualification without retesting.

3) The shipyards/manufacturers have to document at least once a year that the welder has produced acceptable welds in accordance with construction quality standards and Society requirements in the welding positions, type of welds and backing conditions covered by its certificate. Which documents are required and how to document the evidences should be in agreement between the Society and the shipyards/manufacturers.

5.2.2 The Society has to verify compliance with the above conditions and sign the maintenance of the welder's qualification certificate.

SECTION 3

QUALIFICATION SCHEME FOR WELDERS OF ALUMINIUM ALLOYS HULL STRUCTURES

1 General

1.1 Scope

1.1.1 This Section gives requirements for a qualification scheme for welders intended to be engaged in the fusion welding of aluminium alloys hull structures.

1.1.2 This qualification scheme does not cover welding of pipes and pressure vessels.

1.1.3 This qualification scheme covers welding of fillet weld of tubular section to plate with diameter $D > 25\text{mm}$.

1.1.4 Welders or welding operators qualified in accordance with national or international welder qualification standards may also be engaged in welding of hull structures at the discretion of the Society provided that standard is considered equivalent to this document from technical perspective covering examination, testing and range of approval.

Even if the requirements stipulated in the standards are applied, the requirement for revalidation of welders' qualification shall be in accordance with [5.2].

1.1.5 When national or international welder qualification standards are used, they are to be applied in full, cross-mixing requirements of qualification standards is not permitted.

1.2 Provisions about existing certificates

1.2.1 Initial qualification of welder or welding operator requested to the Society by an application dated on or after 1 January 2022 are to be carried out in accordance with this document.

Existing qualifications are to be renewed in accordance with this document when they become due.

1.3 Welding Operators

1.3.1 The welding operators responsible for setting up and/or adjustment of fully mechanized and automatic equipment, must be qualified whether he operates the equipment or not.

However a welding operator, who solely operates the equipment without responsibility for setting up and/or adjustment, does not need qualification provided that he has experience of the specific welding work concerned and the production welds made by the operators are of the required quality.

The qualification test and approval range of the welding operator are left to the discretion of the Society with reference to ISO 14732:2013.

2 Variables and range of qualification

2.1 Welding process

2.1.1 The welding processes for welder's qualification are to be classified in Tab 1 as, Semi-automatic welding/Partly mechanized welding (S) and TIG welding (T).

Each testing normally qualifies only for one welding process.

For the welding process 141, a change in current from direct current to alternating current and vice versa requires a new qualification test.

A change of welding process requires a new qualification test.

Table 1 : Welding processes for welder's qualification

Symbol	Welding process in actual welding works		ISO 4063
S	Semi-automatic welding / Partly mechanized welding	Metal inert gas (MIG) welding	131
T	TIG welding	Tungsten inert gas (TIG) welding	141

2.2 Welding Consumables

2.2.1 Welding consumables used for qualification tests are to be approved by the Society in accordance with NR216, Ch 5, Sec 2, [15] unless otherwise agreed.

The welding consumable grade is to be acceptable for the parent metal used for qualification tests.

Welding with filler material qualifies for welding without filler material, but not vice versa.

2.3 Base Metal

2.3.1 Qualification tests are made on plates of a typical marine aluminium alloy grade (usual 5083, 5086, 5754) and confer approval to production welds on plates of any Marine grade and/or with extruded products made of alloys 6005A, 6061 and 6082.

2.4 Range of thickness

2.4.1 The qualified plate thickness range arising from the welder qualification test plate thickness is shown in Tab 2.

2.5 Range of tubular section diameter

2.5.1 The qualified tubular section diameter range arising from the tubular section diameter used during the welder qualification test is shown in Tab 3.

Table 2 : Plate thicknesses for welder’s qualification

Thickness T of the test assembly (mm)	Qualified plate thickness range t (mm)
T ≤ 6	0,7 T ≤ t < 2,5 T
6 < T ≤ 15	6 mm < t ≤ 40 mm (1)
(1) A special test is required for material thicknesses greater than 40 mm. Such a special test shall be indicated on the welder’s certificate.	

Table 3 : Tubular section diameters for welder’s qualification

Diameter D of test assembly (mm)	Qualified diameter range (mm)
D > 25	≥ 0.5 D (25 mm min.)

2.6 Welding Position

2.6.1 The welding positions qualified as a result of the actual welding position used in a satisfactory welder’s qualification test, are shown in Tab 4 and Tab 5.

Diagrams showing the definitions of weld position used in Tab 4 and Tab 5 are shown in Fig 1.

A change in the position of welding to one for which the welder is not qualified shall require new qualification testing.

The Society may require a qualification test with fillet welding for welders who are employed for fillet welding only.

2.7 Type of joint

2.7.1 Butt and fillet welds

The types of welded joint for welder’s qualification are to be classified as shown in Tab 6 in accordance with the qualification test.

Welders who are engaged in full/partial penetration T welds shall be qualified for butt welds for the welding process and the position corresponding to the joints to be welded.

For fillet welding, welders who passed the qualification tests for multi-layer technique welding can be deemed as qualified for single layer technique, but not vice versa.

A change of type of weld joint to type for which the welder is not qualified shall require new qualification testing.

2.7.2 Tack welding

A welder qualified for butt or fillet welding can be engaged in tack welding for the welding process and position corresponding to those permitted in his certificate.

Alternatively, welders engaged in tack welding only can be qualified on the test assemblies shown in Fig 6 and Fig 7.

Table 4 : Qualified welding positions when testing with butt welding

Qualification test position with butt weld	Qualified welding positions in actual welding works	
	Butt welds	Fillet welds
PA	PA	PA, PB
PC	PA, PC	PA, PB, PC
PE	PA, PC, PE	PA, PB, PC, PD, PE
PF	PA, PF	PA, PB, PF
PG	PG	PG

Table 5 : Qualified welding positions when testing with fillet welding

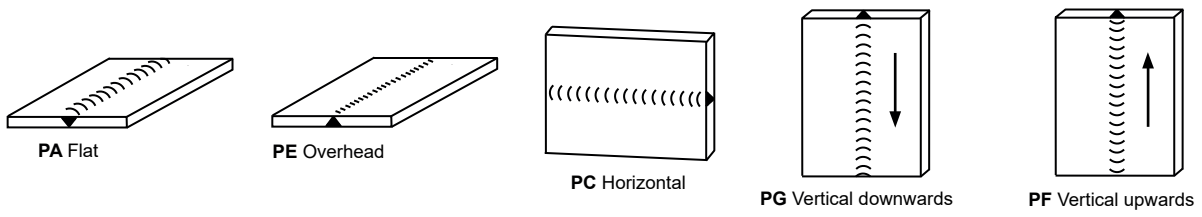
Qualification test position with fillet weld	Qualified welding positions in actual welding works (1)
	Fillet welds
PA	PA
PB	PA, PB
PC	PA, PB, PC
PD	PA, PB, PC, PD, PE
PE	PA, PB, PC, PD, PE
PF	PA, PB, PF
PG	PG
PH	PH
(1) Positions PB and PD cover fillet welding of plate to plate and tubular section to plate.	

Table 6 : Type of welded joint for welder’s qualification

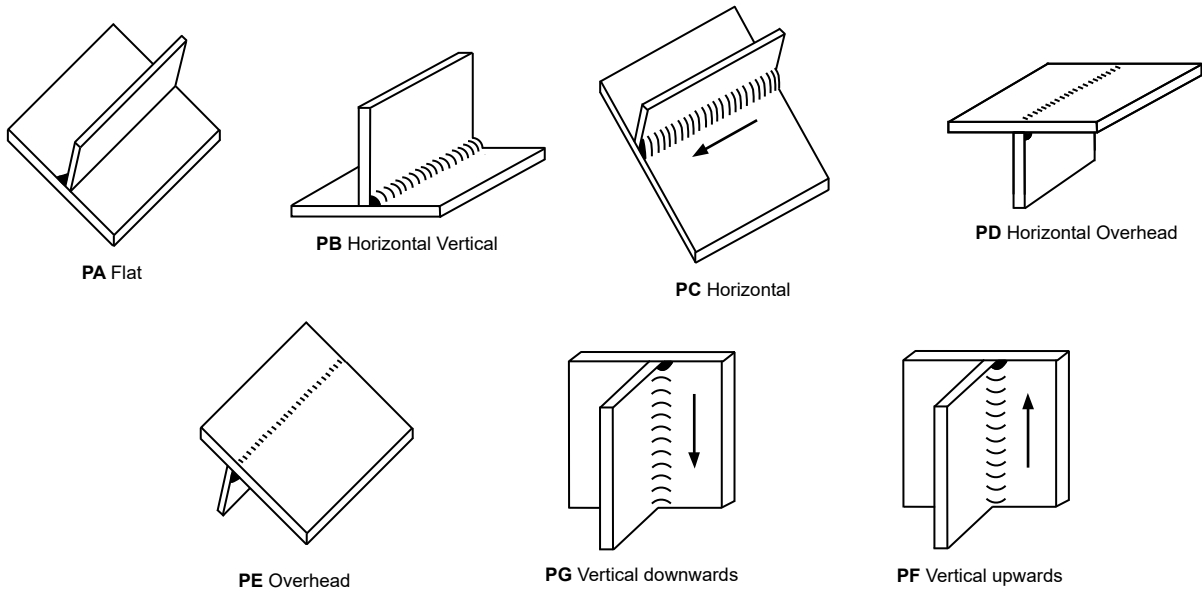
Type of welded joint used in the test assembly for the qualification test			Range of qualification				
			Butt welds				Fillet welds
			Welded from one side		Welded from both sides		
			With backing	No backing	With gouging	No gouging	
Butt weld	One side	With backing	∅	-	x	-	x
		No backing	x	∅	x	x	x
	Both sides	With gouging	x	-	∅	-	x
		No gouging	x	-	x	∅	x
Fillet weld	-	-	-	-	-	-	x
∅ indicates the type of assembly of qualification. x indicates on the same line as the symbol ∅ those welds for which the welder is also qualified. - indicates on the same line as the symbol ∅ those welds for which the welder is not qualified.							

Figure 1 : Welding positions

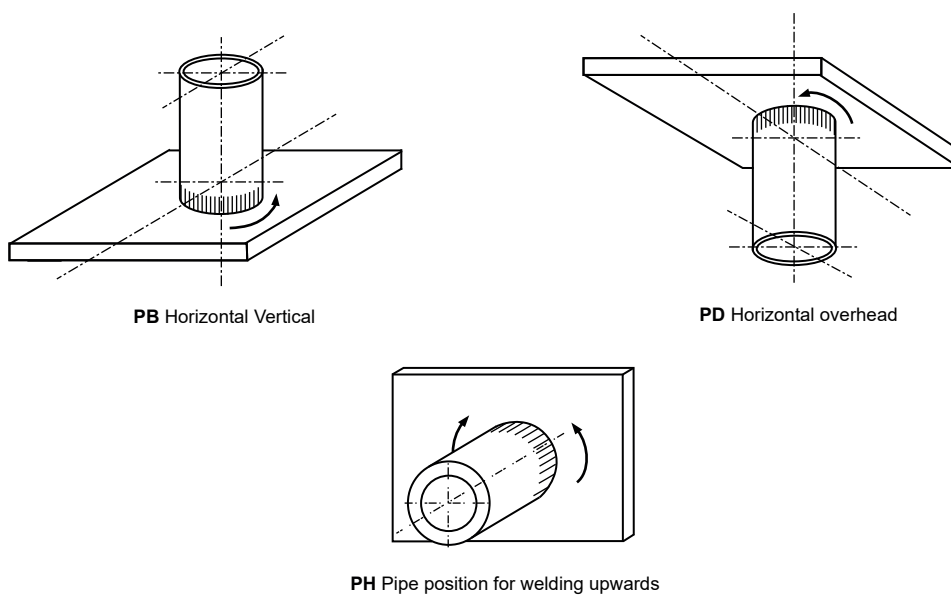
a) Butt welds for plates



b) Filled welds for plates



c) Fillet welds of tubular section on plate



3 Qualification test

3.1 General

3.1.1 It is the responsibility of shipyard or manufacturer to ensure that the welder is having adequate knowledge of the welding process including the regulation of the parameters of the welding equipment used.

Welding of the test assemblies and testing of test specimens shall be witnessed by the Surveyor.

Figure 2 : Dimensions and types of test assembly for butt welds (T<12mm)

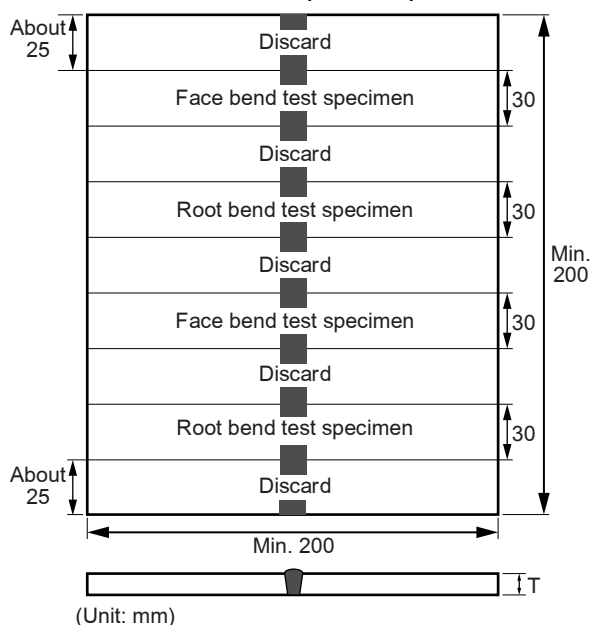
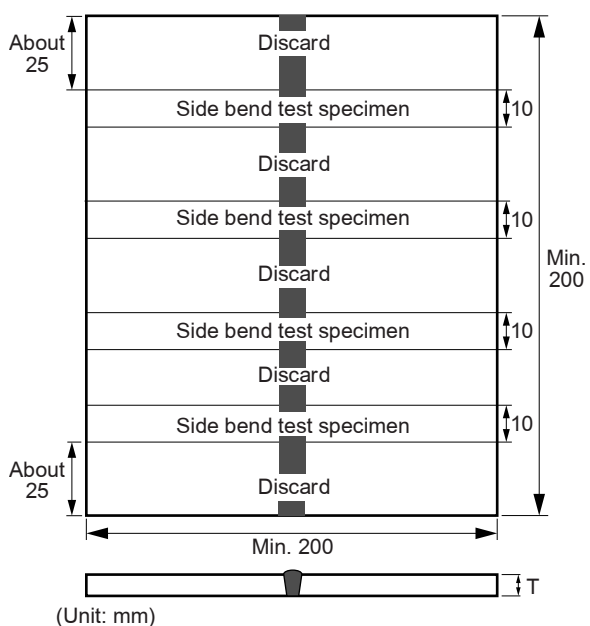


Figure 3 : Dimensions and types of test assembly for butt welds (T≥12mm)



The Surveyor may stop the test if the welding conditions are not correct or if it appears that the welder does not have the skill to achieve the qualification requirements.

3.2 Test Assemblies

3.2.1 Dimensions and types of test assembly

The number, shape and dimensions of test assemblies are to be selected so as to cover the production welding work taking into account the welding variables and range of qualification in Article [2].

Test assemblies for butt welds and fillet welds are to be prepared as shown in Fig 2, Fig 3, Fig 4 and Fig 5 in each qualification test.

Test assemblies for butt tack welds and fillet tack welds are to be prepared as shown in Fig 6 and Fig 7.

Figure 4 : Dimensions and types of test assembly for fillet welds

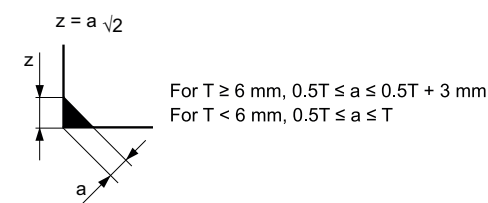
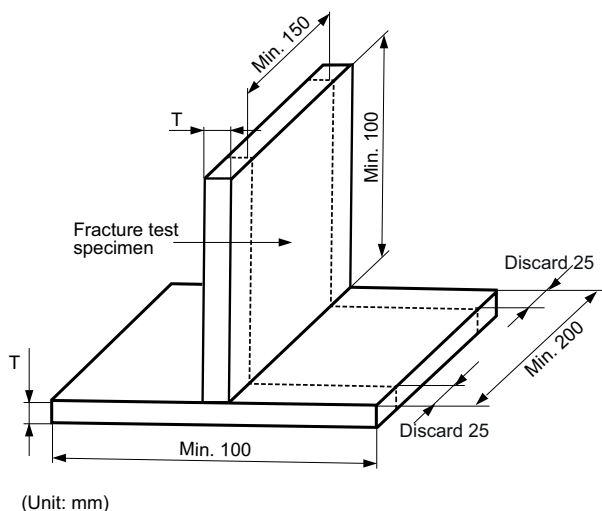


Figure 5 : Dimensions and types of test assembly for fillet welds of tubular section to plate

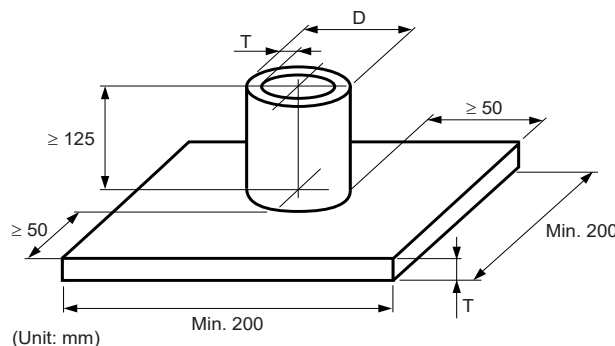
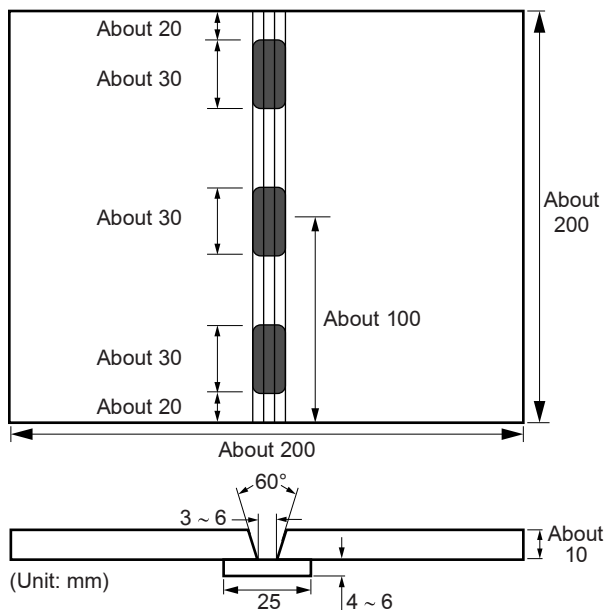


Figure 6 : Dimensions and types of test assembly for tack butt welds



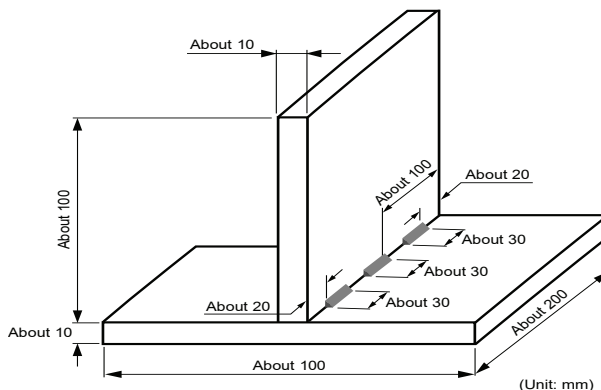
3.2.2 Welding of test assembly

The welder qualification test assembly is to be welded according to a welding procedure specification (WPS and pWPS) simulating the conditions in production, as far as practicable.

The following conditions apply:

- The test assembly shall have at least one stop and restart in the root run and in the top capping run which has to be identified for further examination.
- The welder is allowed to remove minor imperfections only in the stop by grinding before restart welding.
- Any preheat, interpass temperature or controlled heat input specified in the welding procedure is required for the test assembly.
- Any post-weld heat treatment specified in the welding procedure may be omitted unless bend tests are required.
- The test assemblies are to be suitably identified with the mark of the surveyor and the identification of the welder before welding starts.

Figure 7 : Dimensions and types of test assembly for tack fillet welds



3.3 Examinations and tests

3.3.1 General

The non-destructive examinations and destructive tests required according to Tab 7 are to be carried out, while the location of test specimens is to be in accordance with Fig 2, Fig 3 and Fig 4.

Prior to mechanical tests, backing strips where used are to be removed. The test assembly can be sectioned by thermal cutting or by mechanical means discarding the first and last 25mm of the test piece at the end of the plates.

3.3.2 Visual examination

The welds shall be visually examined prior to the cutting of the test specimens for the bend test and the fracture test.

The result of the examination is to show the absence of cracks or other serious imperfections.

Imperfections detected are to be assessed in accordance with quality level B in ISO 10042:2018, except for the following imperfection types for which level C applies:

- excess weld metal
- excess of penetration
- excess convexity and,
- excess throat thickness.

Table 7 : Examinations and tests

Type of examination or test	Extent of the examination or test		
	Butt weld	Fillet weld	Tack weld (4)
Visual examination	100%	100%	100%
Radiographic test	100% (1)	–	–
Bend tests (2)	2 face, 2 root (1)	–	–
Fracture tests	1 sample (1)	1 sample (3)	1 sample
Macro-examination (3)	–	2 sections	–

(1) Radiographic test or fracture test may be carried out in lieu of bend test except for process 131 (MIG).

(2) Only mandatory in addition to radiographic test for process 131 (MIG).

(3) The fracture test may be replaced by two macro sections, one of which in stop/restart position.

(4) Additional tests may be required, at the discretion of the Society.

3.3.3 Radiographic examination

When radiographic testing is used for butt welds, imperfections detected shall be assessed in accordance with ISO 10042:2018, level B, except for the following imperfection types for which level C applies:

- excess weld metal
- excess of penetration and,
- excess convexity.

3.3.4 Bend test

Transverse root bend, face bend and side bend test specimens are to be machined to the dimensions given in NR216, Ch 1, Sec 2, [3.1].

Two face bend test and two root bend test specimens are to be tested for initial qualification test, and one face and one root bend test specimens for extension of approval.

For thickness 12 mm and over, four side bend test specimens (two side bend test specimens for extension of approval) with 10 mm in thickness may be tested as an alternative.

At least one bend test specimen shall include one stop and restart in the bending part, for root run or for cap run.

The bending angle is to be 180°. The bend ratio (D/t) is to be that specified for welding consumables approvals (NR216, Ch 5, Sec 2, [15]).

After testing, the test specimens shall not to reveal any open defects, in any direction, greater than 3 mm. Defects appearing at the corners of the test specimen during testing should be investigated case-by-case.

3.3.5 Fracture test (butt welds)

For fracture test, one specimen shall be taken from the stop and restart area in the examination length.

The test assembly examination length shall be cut into four equal test specimens with a minimum width of 35 mm.

When fracture testing is used for butt welds, full test specimen in length is to be tested in accordance with ISO 9017:2017.

Imperfections detected shall be assessed in accordance with ISO 10042:2018, level B, except for the following imperfection types for which level C applies:

- excess weld metal
- excess of penetration and,
- excess convexity.

3.3.6 Fracture test (fillet weld)

For fillet welds, the test assembly shall be fractured as one complete specimen.

If necessary the test assembly may be cut into several test specimens of equal width. In this case, one specimen shall include a stop and restart area.

For fillet welds of tubular section to plate, the test assembly shall be cut into four or more test specimens and fractured.

The fracture test is to be performed by folding the upright plate onto the through plate, in accordance with ISO 9017:2017.

Imperfections detected shall be assessed in accordance with ISO 10042:2018, level B, except for the following imperfection types for which level C applies:

- excess weld metal
- excess of penetration and,
- excess convexity.

3.3.7 Macro examination

When macro examination is used for fillet welds, two test specimens are to be prepared from different cutting positions. At least one macro examination specimen shall be cut at the position of one stop and restart in either root run or cap run. These specimens are to be etched on one side to clearly reveal the weld metal, fusion line, root penetration and the heat affected zone.

Macro sections shall include at least 10 mm of unaffected base metal.

The examination is to reveal a regular weld profile, thorough fusion between adjacent layers of weld and base metal, sufficient root penetration and the absence of defects such as cracks, lack of fusion etc.

3.4 Retest

3.4.1 When a welder fails a qualification test, the following shall apply:

- In cases where the welder fails to meet the requirements in part of the tests, a retest may be welded immediately, consisting of another test assembly of each type of welded joint and position that the welder failed. In this case, the test is to be done for duplicate test specimens of each failed test.
All retest specimens shall meet all of the specified requirements.
- In cases where the welder fails to meet the requirements in all parts of the required tests or in the retest prescribed in [3.4.1] a), the welder shall undertake further training and practice.
- When there is specific reason to question the welder's ability or the period of effectiveness has lapsed, the welder shall be re-qualified in accordance with the tests specified in [3.2] and [3.3].

4 Certification

4.1 Certification

4.1.1 Qualification certificates (see example in App 1) are normally issued when the welder has passed the qualification test in accordance with this document.

Each shipyard and manufacturer shall be responsible for the control of the validity of the certificate and the range of the approval.

4.1.2 The following items shall be specified in the certificate:

- a) Range of qualification for base metal, welding processes, filler metal type, types of welded joint, plate thicknesses and welding positions.
- b) Expiry date of the validity of the qualification.
- c) Name, date of birth, identification and the photograph of welder.
- d) Name of shipbuilder / manufacturer.
- e) The chosen maintenance option of qualification in accordance with [5.2.1] a), b) or c) with one of the following mentions:
 - 1) Revalidation method: Re-test every 3 years [NR476 5.2.1.a]
 - 2) Revalidation method: Production welds check every 2 years [NR476 5.2.1.b]
 - 3) Revalidation method: Based on quality system and verifications [NR476 5.2.1.c]

4.1.3 When a certificate is issued, the relative documents such as test reports and/or re-validation records shall be archived as annexes to the copy of certificate according to the Society's own practice.

4.1.4 The status of approvals of each individual qualification is to be demonstrated to the Society when requested.

5 Period of validity

5.1 Initial approval

5.1.1 Normally the validity of the welder's approval begins from the issue date of qualification certificate when all the required tests are satisfactorily completed.

The certificate is to be signed at six-month intervals by the shipyards/manufacturers personnel who is responsible for production weld quality provided that all the following conditions are fulfilled:

- a) The welder shall be engaged with reasonable continuity on welding work within the current range of approval. An interruption for a period no longer than six months is permitted.
- b) The welder's work shall in general be in accordance with the technical conditions under which the approval test is carried out.
- c) There shall be no specific reason to question the welder's skill and knowledge.

5.1.2 If any of these conditions are not fulfilled, the Society is to be informed and the certificate is to be cancelled.

The validity of the certificate may be maintained in agreement with the Society as specified in [5.2]. The maintenance scheme of qualification is in accordance with [5.2.1] a), b) or c).

5.2 Maintenance of the approval

5.2.1 Revalidation shall be carried out by the Society. The skill of the welder shall be periodically verified by one of the following options:

- a) The welder shall be re-tested every 3 years.
- b) Every 2 years, two welds made during the last 6 months of the 2 years validity period shall be tested by radiographic or ultrasonic testing or destructive testing and shall be recorded. The weld tested shall reproduce the initial test conditions except for the thickness. These tests revalidate the welder's qualifications for an additional 2 years.
- c) A welder's qualification for any certificate shall be valid as long as it is signed according to [5.1.1] subject that all the following conditions are fulfilled. In this option, the fulfilment of all the conditions is to be verified by the Society. The frequency of verification by the Society is to be no longer than 3 years and is to be agreed between the Society and the shipyards/manufacturers.
 - 1) The welder is working for the same shipyard/manufacturer which is responsible for production weld quality as indicated on his or her qualification certificate.
 - 2) Society shall verify that the welder quality management system of the shipyard/manufacturer includes as minimum:
 - A designated person responsible for the coordination of the welder quality management system.
 - List of welders and welding supervisors in shipyard/manufacturer.
 - If applicable, list of subcontracted welders.
 - Qualification certificate of welders and description of the associated management system.
 - Training requirements for welder qualification programme.
 - Identification system for welders and WPS used on welds.
 - Procedure describing the system in place to monitor each welder performance based on results of welds examination records (e.g. repair rate, etc.) including the criteria permitting the maintenance of the welder qualification without retesting.
 - 3) The shipyards/manufacturers have to document at least once a year that the welder has produced acceptable welds in accordance with construction quality standards and Society requirements in the welding positions, type of welds and backing conditions covered by its certificate. Which documents are required and how to document the evidences should be in agreement between the Society and the shipyards/manufacturers.

5.2.2 The Society has to verify compliance with the above conditions and sign the maintenance of the welder's qualification certificate.

SECTION 4

QUALIFICATION SCHEME FOR WELDERS FOR OTHER PRODUCTIONS

1 General

1.1 Scope

1.1.1 This Section gives requirements for a qualification scheme for welders intended to be engaged in productions not included in Sec 2 and Sec 3 (such as some welded components, boilers and pressure vessels, pressure piping systems, butt weld on pipes,...etc).

1.1.2 This qualification scheme does not cover welders engaged in oxy-acetylene welding.

1.1.3 When national or international welder qualification standards are used, they are to be applied in full, cross-mixing requirements of qualification standards is not permitted. Even if the requirements stipulated in the standards are applied, the requirement for revalidation of welders' qualification shall be in accordance with [5.2].

1.2 Provisions about existing certificates

1.2.1 Initial qualification of welder or welding operator requested to the Society by an application dated on or after 1 January 2022 are to be carried out in accordance with this document.

Existing qualifications are to be renewed in accordance with this document when they become due.

1.3 Welding Operators

1.3.1 The welding operators responsible for setting up and/or adjustment of fully mechanized and automatic equipment, must be qualified whether he operates the equipment or not.

However a welding operator, who solely operates the equipment without responsibility for setting up and/or

adjustment, does not need qualification provided that he has experience of the specific welding work concerned and the production welds made by the operators are of the required quality.

The qualification test and approval range of the welding operator are left to the discretion of the Society with reference to ISO 14732:2013.

2 Variables and range of qualification

2.1 Reference to recognised standard

2.1.1 When reference is made to a recognised standard, the same standard is to be used for all variables.

2.2 Welding process

2.2.1 The welding processes for welder's qualification are to be classified in Tab 1 as, Manual welding (M), Semi-automatic welding/Partly mechanized welding (S) and TIG welding (T).

Each testing normally qualifies only for one welding process. A change of welding process requires a new qualification test.

2.3 Welding Consumables

2.3.1 Welding of steels

Welding consumables used for qualification tests are to be approved by the Society in accordance with NR216, Ch 5, Sec 2, unless otherwise agreed.

The welding consumable grade is to be acceptable for the parent metal used for qualification tests.

Welding with filler material qualifies for welding without filler material, but not vice versa.

Table 1 : Welding processes for welder's qualification

Symbol	Welding process in actual welding works		ISO 4063
M	Manual welding	Manual metal arc welding (metal arc welding with covered electrode)	111
S	Semi-automatic welding / Partly mechanized welding	Metal inert gas (MIG) welding	131
		Metal active gas (MAG) welding (3)	135,138 (1)
		Flux-cored arc (FCA) welding (3)	136 (2)
T	TIG welding	Tungsten inert gas (TIG) welding	141

The Society may require separate qualification for solid wires, metal cored wires and flux-cored wires as follows:

- (1) A change from MAG welding with solid wires (135) to that with metal cored wires (138), or vice versa is permitted.
- (2) A change from a solid or metal cored wire (135/138) to a flux-cored wire (136) or vice versa requires a new qualification test.
- (3) Only for steels.

2.3.2 Welding of copper and copper alloys

The welding consumable grade is to be acceptable for the parent metal used for qualification tests.

Welding with filler material qualifies for welding without filler material, but not vice versa.

2.4 Base Metal

2.4.1 Extra high strength steels

This group of base metal is corresponding to weldable structural steel grade with a specified minimum yield strength $R_{eH} > 460 \text{ N/mm}^2$.

Range of qualification shall be in accordance with recognised standards such as ISO 9606 series, ASME Section IX, ANSI/AWS D1.1.

2.4.2 Copper and Copper alloys

Range of qualification shall be in accordance with recognised standards such as ISO 9606 series, ASME Section IX, ANSI/AWS D1.1.

2.4.3 Others

Range of qualification shall be in accordance with recognised standards such as ISO 9606 series, ASME Section IX, ANSI/AWS D1.1.

2.5 Range of thickness

2.5.1 Range of qualification shall be in accordance with recognised standards such as ISO 9606 series, ASME Section IX, ANSI/AWS D1.1.

2.6 Range of pipe diameter

2.6.1 Range of qualification shall be in accordance with recognised standards such as ISO 9606 series, ASME Section IX, ANSI/AWS D1.1.

2.7 Welding Position

2.7.1 Range of qualification shall be in accordance with recognised standards such as ISO 9606 series, ASME Section IX, ANSI/AWS D1.1.

2.8 Type of joint

2.8.1 Range of qualification shall be in accordance with recognised standards such as ISO 9606 series, ASME Section IX, ANSI/AWS D1.1.

3 Qualification test

3.1 Scope

3.1.1 Test assemblies (dimensions, types), qualification tests and examinations with their acceptance criteria are to be based on recognised standards such as ISO 9606 series, ASME Section IX, ANSI/AWS D1.1.

4 Certification

4.1 Certification

4.1.1 Qualification certificates (see example in App 1) are normally issued when the welder has passed the qualification test in accordance with this document.

Each shipyard and manufacturer shall be responsible for the control of the validity of the certificate and the range of the approval.

4.1.2 The following items shall be specified in the certificate:

- Range of qualification for base metal, welding processes, filler metal type, types of welded joint, plate thicknesses and welding positions.
- Expiry date of the validity of the qualification.
- Name, date of birth, identification and the photograph of welder.
- Name of shipbuilder / manufacturer.
- The chosen maintenance option of qualification in accordance with [5.2.1] a), b) or c) with one of the following mentions:
 - Revalidation method: Re-test every 3 years [NR476 5.2.1.a]
 - Revalidation method: Production welds check every 2 years [NR476 5.2.1.b]
 - Revalidation method: Based on quality system and verifications [NR476 5.2.1.c]

4.1.3 When a certificate is issued, the relative documents such as test reports and/or re-validation records shall be archived as annexes to the copy of certificate according to the Society's own practice.

4.1.4 The status of approvals of each individual qualification is to be demonstrated to the Society when requested.

5 Period of validity

5.1 Initial approval

5.1.1 Normally the validity of the welder's approval begins from the issue date of qualification certificate when all the required tests are satisfactorily completed.

The certificate is to be signed at six-month intervals by the shipyards/manufacturers personnel who is responsible for production weld quality provided that all the following conditions are fulfilled:

- The welder shall be engaged with reasonable continuity on welding work within the current range of approval. An interruption for a period no longer than six months is permitted.
- The welder's work shall in general be in accordance with the technical conditions under which the approval test is carried out.
- There shall be no specific reason to question the welder's skill and knowledge.

5.1.2 If any of these conditions are not fulfilled, the Society is to be informed and the certificate is to be cancelled.

The validity of the certificate may be maintained in agreement with the Society as specified in [5.2]. The maintenance scheme of qualification is in accordance with [5.2.1] a), b) or c).

5.2 Maintenance of the approval

5.2.1 Revalidation shall be carried out by the Society. The skill of the welder shall be periodically verified by one of the following options:

- a) The welder shall be re-tested every 3 years.
- b) Every 2 years, two welds made during the last 6 months of the 2 years validity period shall be tested by radiographic or ultrasonic testing or destructive testing and shall be recorded. The weld tested shall reproduce the initial test conditions except for the thickness. These tests revalidate the welder's qualifications for an additional 2 years.
- c) A welder's qualification for any certificate shall be valid as long as it is signed according to [5.1.1] subject that all the following conditions are fulfilled. In this option, the fulfilment of all the conditions is to be verified by the Society. The frequency of verification by the Society is to be no longer than 3 years and is to be agreed between the Society and the shipyards/manufacturers.
 - 1) The welder is working for the same shipyard/manufacturer which is responsible for production weld quality as indicated on his or her qualification certificate.

- 2) Society shall verify that the welder quality management system of the shipyard/manufacturer includes as minimum:
 - A designated person responsible for the coordination of the welder quality management system.
 - List of welders and welding supervisors in shipyard/manufacturer.
 - If applicable, list of subcontracted welders.
 - Qualification certificate of welders and description of the associated management system.
 - Training requirements for welder qualification programme.
 - Identification system for welders and WPS used on welds.
 - Procedure describing the system in place to monitor each welder performance based on results of welds examination records (e.g. repair rate, etc.) including the criteria permitting the maintenance of the welder qualification without retesting.
- 3) The shipyards/manufacturers have to document at least once a year that the welder has produced acceptable welds in accordance with construction quality standards and Society requirements in the welding positions, type of welds and backing conditions covered by its certificate. Which documents are required and how to document the evidences should be in agreement between the Society and the shipyards/manufacturers.

5.2.2 The Society has to verify compliance with the above conditions and sign the maintenance of the welder's qualification certificate.

APPENDIX 1 WELDER'S QUALIFICATION CERTIFICATE


1 Welder's qualification certificate

1.1

1.1.1 An example of welder's qualification certificate is shown in Fig 1.

Figure 1 : Welder's qualification certificate

Certificate number :



WELDER'S QUALIFICATION CERTIFICATE
According to Bureau Veritas Rules for the Classification of Steel Ships

Employer's name and address :		Photograph
Welder's name :		
Identification :		
Method of identification :		
Date of birth :		
Sex :		

Production type	Hull structural steels	Aluminium alloy hull structures
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Manufacturer's Welding Procedure(s) Specification number			
Type of test and examination	Performed and accepted	Not required	Test Report Number
Visual examination			
Radiographic examination			
Surface examination			
Macro examination			
Fracture test			
Bend test			
Additional tests			
Items	Test piece	Range of qualification	
Welding process			
Base metal			
Filler metal type			
Plate thickness			
Type of welded joint			
Welding position			
Type of current, polarity			
Shielding gas			
Backing and gouging condition			
Other details			
Revalidation method			

This is to certify that the welder identified above has passed the qualification tests, in witnessing of Bureau Veritas, in accordance with Rule Note NR 476 and Bureau Veritas Rules for the Classification of Steel Ship, and is qualified to undertake welding operation specified in range of qualification of this certificate.

Date and place of issue :

Surveyor's name, signature and stamp :

This certificate is valid until :

Employer's endorsement to confirm the validity for the following six months (date, name, position, signature) and statements to be attached when applicable :

This Certificate is delivered within the scope of the General Conditions of BUREAU VERITAS Marine and Offshore Division. Any person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgment, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

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