



RUSSIAN MARITIME REGISTER OF SHIPPING

CIRCULAR LETTER

No. 314-04-1654c

dated 08.11.2021

Re:

amendments to the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships, 2021, ND No. 2-020101-139-E, in connection with coming into force of IACS Unified Requirement (UR) W32 (Rev.1 Sep 2020)

Item(s) of supervision:

welding and welders' certification

Entry-into-force date:

01.01.2022

~~Cancels / amends / adds Circular Letter No.~~

dated

Number of pages: 1 + 25

Appendices:

Appendix 1: information on amendments introduced by the Circular Letter

Appendix 2: text of amendments to Part III "Technical Supervision during Manufacture of Materials"

Acting Director General

Sergey A. Kulikov

Text of CL:

We hereby inform that the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be amended as specified in the Appendices to the Circular Letter

It is necessary to do the following:

1. Bring the content of the Circular Letter to the notice of the RS surveyors, as well as interested organizations and persons in the area of the RS Branch Offices' activity.
 2. Apply the provisions of the Circular Letter when performing technical supervision of welders' certification centers requested for recognition on or after 01.01.2022, and during welders' certification requested on or after 01.01.2022.
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List of the amended and/or introduced paras/chapters/sections:

Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships:

Part III: paras 4.1.2 — 4.1.4, 4.2.4, 4.2.5, 4.2.8, 4.2.9, 4.3.1 and 4.3.2.1 — 4.3.2.6, Tables 4.3.3.1-1, 4.3.3.1-2 and 4.3.3.1-3, paras 4.4.1 and 4.4.2.1, Table 4.4.4.1, paras 4.4.4.4, 4.4.4.9, 4.4.5.1 — 4.4.5.3, 4.4.5.5, 4.4.6.1, 4.5.5, 4.5.8, 4.6.4 — 4.6.8 and 4.6.10 — 4.6.13, Figures 9 and 10 of Appendix 1 to Section 4, Appendices 3 and 4 to Section 4, paras 2.3, 2.4 and 3.2 — 3.5 of Appendix 5 to Section 4 and para 6.2.2.1

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**Information on amendments introduced by the Circular Letter
(for inclusion in the Revision History to the RS Publication)**

Nos.	Amended paras/chapters/ sections	Information on amendments	Number and date of the Circular Letter	Entry-into-force date
1	Part III	Throughout the text of the Part terms "visual examination and "visual testing" has been replaced with "visual and measurement testing" considering IACS UR W33 (Dec.2019 and Rev.1 May 2020)	314-04-1654c of 08.11.2021	01.01.2022
2	Para 4.1.2	Welder Approval Test Certificate form has been specified considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
3	Para 4.1.3	Requirements for welders' qualification procedure have been specified	314-04-1654c of 08.11.2021	01.01.2022
4	Para 4.1.4	Requirements for welders' qualification procedure have been specified considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
5	Para 4.2.4	Requirements for welders' qualification procedure have been specified considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
6	Para 4.2.5	Terminology has been specified	314-04-1654c of 08.11.2021	01.01.2022
7	Para 4.2.8	Requirements for periodical qualification of welders have been specified considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
8	Para 4.2.9	Requirements for attestation performance request have been specified considering IACS UR W32 (Sep 2016 и Rev.1 Sep 2020); terminology have been specified	314-04-1654c of 08.11.2021	01.01.2022
9	Para 4.3.1	Definitions "Approval" and "Welder Approval Test Certificate" have been specified considering IACS	314-04-1654c of 08.11.2021	01.01.2022

Nos.	Amended paras/chapters/ sections	Information on amendments	Number and date of the Circular Letter	Entry-into-force date
		UR W32 (Sep 2016 и Rev.1 Sep 2020).		
10	Para 4.3.2.1	Terminology has been specified considering IACS UR W32, W34, W33 (Corr.1 Aug 2021)	314-04-1654c of 08.11.2021	01.01.2022
11	Para 4.3.2.2	Terminology has been specified considering ISO 4063:2009; reference to ISO standard has been specified	314-04-1654c of 08.11.2021	01.01.2022
12	Para 4.3.2.3	References to ISO standards have been specified	314-04-1654c of 08.11.2021	01.01.2022
13	Para 4.3.2.4	Reference to ISO standard has been specified	314-04-1654c of 08.11.2021	01.01.2022
14	Para 4.3.2.5	Reference to ISO standard has been specified	314-04-1654c of 08.11.2021	01.01.2022
15	Para and Table 4.3.2.6	Reference to ISO standard has been specified; terminology has been specified considering ISO 14174:2019	314-04-1654c of 08.11.2021	01.01.2022
16	Table 4.3.3.1-1	Terminology has been specified considering ISO/TR 15608:2017	314-04-1654c of 08.11.2021	01.01.2022
17	Table 4.3.3.1-2	Terminology has been specified considering ISO/TR 15608:2017	314-04-1654c of 08.11.2021	01.01.2022
18	Table 4.3.3.1-3	Reference to ISO standard has been specified	314-04-1654c of 08.11.2021	01.01.2022
19	Para 4.4.1	Requirements for welders' qualification procedure have been specified	314-04-1654c of 08.11.2021	01.01.2022
20	Para 4.4.2.1	Terminology has been specified considering IACS UR W33 (Dec. 2019 and Rev.1 May 2020)	314-04-1654c of 08.11.2021	01.01.2022
21	Table 4.4.4.1	Terminology has been specified considering IACS UR W33 (Dec. 2019 and Rev.1 May 2020)	314-04-1654c of 08.11.2021	01.01.2022
22	Para 4.4.4.4	Reference to ISO standard has been specified	314-04-1654c of 08.11.2021	01.01.2022
23	Para 4.4.4.9	Terminology has been specified considering IACS UR W33 (Dec. 2019 and Rev.1 May 2020)	314-04-1654c of 08.11.2021	01.01.2022
24	Para 4.4.5.1	Terminology has been specified considering IACS UR W33 (Dec. 2019 and Rev.1 May 2020); reference to ISO standard has been specified	314-04-1654c of 08.11.2021	01.01.2022

Nos.	Amended paras/chapters/ sections	Information on amendments	Number and date of the Circular Letter	Entry-into-force date
25	Para 4.4.5.2	References to ISO standards have been specified	314-04-1654c of 08.11.2021	01.01.2022
26	Para 4.4.5.3	References to ISO standards have been specified	314-04-1654c of 08.11.2021	01.01.2022
27	Para 4.4.5.5	References to ISO standards have been specified	314-04-1654c of 08.11.2021	01.01.2022
28	Para 4.4.6.1	Requirements for additional test pieces have been specified	314-04-1654c of 08.11.2021	01.01.2022
29	Para 4.5.5	Requirements for practical test have been specified; reference to ISO standard has been specified	314-04-1654c of 08.11.2021	01.01.2022
30	Para 4.5.8	Reference to ISO standard has been specified	314-04-1654c of 08.11.2021	01.01.2022
31	Para 4.6.4	Requirements for Welder Approval Test Certificate forms have been specified considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
32	Para 4.6.5	Requirements for Welder Approval Test Certificate forms have been specified considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
33	Para 4.6.6	Requirements for validity period of for Welder Approval Test Certificate have been specified considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
34	Para 4.6.7	Requirements for prolongation of for Welder Approval Test Certificate validity period have been specified considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
35	Para 4.6.8	Para has been completely revised as regards the requirements for prolongation of for Welder Approval Test Certificate validity period considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
36	Para 4.6.10	Para has been deleted	314-04-1654c of 08.11.2021	01.01.2022

Nos.	Amended paras/chapters/ sections	Information on amendments	Number and date of the Circular Letter	Entry-into-force date
37	Para 4.6.11 (renumbered 4.6.10)	Requirements for Welder Approval Test Certificate forms have been specified considering IACS UR W32 (Sep 2016 and Rev.1 Sep 2020)	314-04-1654c of 08.11.2021	01.01.2022
38	Para 4.6.12	Para has been deleted	314-04-1654c of 08.11.2021	01.01.2022
39	Para 4.6.13 (renumbered 4.6.11)	Para has been renumbered	314-04-1654c of 08.11.2021	01.01.2022
40	Appendix 1 to Section 4, Figures 9 and 10	Missing titles to Figures have been added (Russian version of the Rules only)	314-04-1654c of 08.11.2021	01.01.2022
41	Appendix 3 to Section 4	Appendix has been revised considering the specified terminology	314-04-1654c of 08.11.2021	01.01.2022
42	Appendix 4 to Section 4	Appendix has been revised considering the specified terminology	314-04-1654c of 08.11.2021	01.01.2022
43	Para 2.3 of Appendix 5 to Section 4	Terminology has been specified	314-04-1654c of 08.11.2021	01.01.2022
44	Para 2.4 of Appendix 5 to Section 4	Terminology has been specified	314-04-1654c of 08.11.2021	01.01.2022
45	Para 3.2 of Appendix 5 to Section 4	Terminology has been specified	314-04-1654c of 08.11.2021	01.01.2022
46	Para 3.3 of Appendix 5 to Section 4	Terminology has been specified	314-04-1654c of 08.11.2021	01.01.2022
47	Para 3.4 of Appendix 5 to Section 4	Terminology has been specified	314-04-1654c of 08.11.2021	01.01.2022
48	Para 3.5 of Appendix 5 to Section 4	Terminology has been specified	314-04-1654c of 08.11.2021	01.01.2022
49	Para 6.2.2.1	List of welding processes has been specified; terminology has been specified considering ISO 4063:2009	314-04-1654c of 08.11.2021	01.01.2022

RULES FOR TECHNICAL SUPERVISION DURING CONSTRUCTION OF SHIPS AND MANUFACTURE OF MATERIALS AND PRODUCTS FOR SHIPS, 2021,

ND No. 2-020101-139-E

PART III TECHNICAL SUPERVISION DURING MANUFACTURE OF MATERIALS

1 Throughout the text of the Part term "visual examination" and "visual testing" is replaced by "visual and measurement testing".

4 WELDING. REGULATIONS FOR WELDERS' CERTIFICATION

2 **Paras 4.1.2 — 4.1.4** are replaced by the following text:

4.1.2 Welder Approval Test Certificate (form 7.1.30) is the document verifying that a particular welder meets all the requirements specified in this Section (forms 7.1.30-1 and 7.1.30-2).

4.1.3 Successful practical test and passing theoretical examination by a welder provides the basis for issuing the Welder Approval Test Certificate.

4.1.4 The procedure for welder's certification performance and issuance of the Welder Approval Test Certificates shall comply with the requirements given below. The qualification test and scope of approval of the welding operator operating automatic welding equipment shall comply with procedural requirements, similar to those in ISO 14732:2013.”.

3 **Para 4.2.4 and 4.2.5** are replaced by the following text:

4.2.4 The standing qualification panel is the working body of the certification centre that directly conducts welders' certification.

The RS surveyor carrying out the technical supervision of test performance is the member of the qualification panel and shall be present during performance of welders' practical tests verifying results thereof. The RS surveyor may participate in welders' theoretical examination and take into account their results confirmed by the qualification panel.

4.2.5 In survey of the certification centre to confirm its competence, the RS surveyor shall carry out the following:

.1 review the Regulation on the Certification Centre with appendices (with positive results, the stamp "СОГЛАСОВАНО/AGREED" is put on it);

.2 review and approve the program of theoretical training and the list of examination paper questions (to be stamped "ОДОБРЕНО/APPROVED");

.3 review and approve the programme of welders' practical tests performance (to be stamped "ОДОБРЕНО/APPROVED"), as well as the forms of welding procedure specifications completed for practical tests performance (to be signed by the surveyor and witnessed with a personal stamp);

.4 survey the material base including:

process of preparation of test assemblies for welders' practical tests (plates and pipes);

organization of storage and issuance of welding consumables for practical tests (the availability and technical condition of heating furnaces, heat chambers and heating cabinets for storage);

organization of the preliminary check of welding consumables quality prior to their issuance for tests (the availability of a press for T-shape test specimens fracture, the availability and serviceability of an instrument for checking the eccentricity of electrode coverings, equipment for measuring the moisture content of electrode coverings and fluxes, or for checking diffusion hydrogen content in weld metal, etc.);

check the availability and functioning of equipment for back chipping away (by heat gouging — air arc or gas, or by machining);

check the availability and functioning of equipment for the non-destructive testing of welded joints (ultrasonic, radiographic, magnetic particle and dye penetrant testing).

Note. When the testing of welded joints is carried out by external organizations, an illuminator for radiographs inspection shall be available in the certification centre;

check the availability of instrumentation for the testing of welded joints by visual and measurement testing (reports of instruments calibration shall be checked);

check the availability and functioning of equipment for mechanical testing of welded joints (reports of test machines calibration shall be checked).

Note. When welders are qualified for stainless steel welding, the equipment for performance of intercrystalline corrosion tests and the analysis of a ferritic component content in weld metal shall be available;

check the availability and serviceability of equipment for practical tests performance including the survey of stations for those welding methods which are presented for the welders' approval test;

check the serviceability of the local (welding stations) and general plenum-exhaust ventilation in spaces for practical tests;

check the serviceability of instrumentation for measurements of welding conditions parameters including an interpass temperature (reports of calibration shall be checked);

.5 survey the personnel qualification engaged in test performance including the members of the qualification panel and administrative personnel;

.6 survey the premises for the work of qualification panel members;

.7 check the availability of checking copies of the scientific documentation referred to in the programs of theoretical and practical tests (including the lists of check questions)."

4 **Paras 4.2.8 and 4.2.9** are replaced by the following text:

"4.2.8 The welders' qualification is classified as initial, additional, periodical and occasional.

Subject for initial qualification are welders aged 18 years and older who did not previously pass approval tests for the welding of objects and equipment under the Register technical supervision, who are certified as welders and have the work experience of welding performance according to the qualification assigned for at least 12 months, and also have undergone the special theoretical and practical training according to the programs drawn up individually for each type of works and for each welding process in actual welding works for which the welder shall be qualified.

Additional qualification of welders who had undergone the initial qualification is carried out prior to their approval for performance of works other than those specified in the Welder Approval Test Certificate, as well as after a break over six months in performance of the relevant welding works.

All welders undergo periodical qualification to confirm their skills and prolong the validity period of the Welder Approval Test Certificate in compliance with the requirements of 4.6. The welders are subject to the periodical qualification at least once in two years for confirmation of the Welder Approval Test Certificate validity, performed by Option b) and once in 3 years for confirmation of the in the Welder Approval Test Certificate validity, performed by Options a) and c) in accordance with the requirements of 4.6.7.

All welders undergo the occasional qualification prior to their approval for performance of welding after the temporary removal from work due to a poor quality and deviations from the welding procedure. The training period for the occasional qualification (for additional education and training) shall be at least a month since the date of being removed from the work.

In additional, periodical and occasional qualification, the special theoretical and practical training extent is established by the qualification panel and shall be individually agreed with the Register. With the welders' periodical qualification performance theoretical examination is not required, unless otherwise decided by the qualification panel."

4.2.9 For the welders' approval testing by the Register, manufacturer (employer) administration shall send to the RS Branch Office where the procedure for the attestation is to be performed the request which specifies the following:

- name and address of the certification centre where the welders will be qualified;
- list of the welders to be qualified with their (for every worker) full names, year and place of birth, place of work, specialty and job skill, experience in the work to be qualified for;
- proposed option of the periodical qualification (a, b or c) in accordance with the requirements of 4.6.7;
- copies of documents to confirm the job skill of the workers in the type of the work to be qualified for;
- welding procedure, welding positions and other particulars needed for the qualification and completion of the Welder Approval Test Certificate;
- guarantees of payment for the Register services on Firm Conformity according to the current rates."

5 **Para 4.3.1** is replaced by the following text:

"4.3.1 Definitions and terms.

Certification is a combination of actions to determine the skill level of a welder with a view to ascertain the possibility of his approval for performance of the specific type of welding works.

Certification panel is a team of certification centre specialists that is responsible for the organization of works and the reliability of the results on welders' certification.

Certification centre is a competent body authorized by the Register for performing tests on welders' certification according to the requirements of the RS rules.

Approval test is a special procedure providing the determination of a welder's skill through his certification and the issuance of an official document, i.e. the Welder Approval Test Certificate (CДC, forms 7.1.30-1 and 7.1.30-2), for verifying permission to perform welding in objects under the RS technical supervision within the range of approval specified by the Certificate.

Filling run, in multilayer welding is(are) the run(s) deposited after the root run(s) and before the capping run(s).

Root run, in multilayer welding is(are) the run(s) of the first layer deposited in the root.

Range of approval is the extent of welder's skill recognition by the Register basing on the tests carried out in certification.

Capping run, in multilayer welding, is(are) the run(s) visible on the weld face(s) after completion of welding.

Test specimen is the part of a test piece used for performance of destructive tests.

Backing is material placed at the reverse side of a joint preparation for the purpose of supporting molten weld metal.

Test piece is a welded assembly used in practical tests for welder's certification.

Welder is a person performing the welding of metals. It is a collective term for a manual welder who welds by hand in different ways and for a welding operator who operates semiautomatic and automatic welding sets.

Welder Approval Test Certificate(forms 7.1.30-1 and 7.1.30-2) is the RS document verifying that a particular welder has succeeded in passing the approval test in the scope of the RS rules requirements and is approved for welding in structures under the RS technical supervision, within the range of approval specified by the Certificate.

Weld metal thickness is thickness of the weld metal excluding any reinforcement."

6 **Paras 4.3.2.1 — 4.3.2.6** are replaced by the following text:

"4.3.2.1 Welders shall be qualified according to the below requirements separately for each of the following welding type:

M — manual welding in which welding wire is fed and welding torch is moved along and across weld by the welder (manually);

S — partly mechanized (semi-automatic) welding in which welding wire is fed mechanically and welding torch is moved along and across weld by the welder;

A — fully mechanized (automatic) welding in which welding wire is fed and welding torch is moved mechanically without direct involvement of the welder;

T (TIG welding) — tungsten inert gas welding;
FSW — friction stir welding.

4.3.2.2 Welders shall be qualified separately for each welding process in accordance with Table 4.3.2.2.

Table 4.3.2.2

Welding Processes for Welder Qualification

Symbol	Welding process in actual welding works		Code acc. to ISO 4063:2009
M	Manual welding	Manual metal arc welding with covered electrode (SMAW)	111
		Oxy-acetylene welding (OAW)	311
S	Semi-automatic welding	Metal inert gas welding (MIG)	131
		Metal active gas welding (MAG)	135
		Flux-cored wire metal arc welding with metal cored wires in active gas (MAG)	138 ¹⁾
		Flux-cored wire metal arc welding with slag cover in active gas (MAG), FCAW-G	136 ²⁾
		Flux cored inert gas arc welding (MIG)	133
		Flux cored self-shielded arc welding (FCAW-S)	114
A	Automatic welding	Submerged arc welding with solid wire electrode (SAW)	121
		Submerged arc welding with flux cored electrode (SAW)	125
		Plasma arc welding	15
		Electroslag welding (ESW)	72
		Arc welding with forced weld formation and gas shield (EGW)	73
T	Tungsten welding in inert gas	Tungsten inert gas (TIG) arc welding with or without solid filler material (wire/rod)	141, 142
FSW	Friction stir welding	Refer to 1.2.1, Part XIV "Welding" of the Rules for the Classification and Construction of Sea-Going Ships	43

¹⁾ A change from Metal active gas welding (MAG) (135) to that with flux-cored wire metal arc welding with metal cored wires in active gas (MAG) (138), or vice versa is permitted without additional testing.
²⁾ A change from metal active gas welding (MAG) (135) or flux-cored wire metal arc welding with metal cored wires in active gas (MAG) (138) to flux-cored wire metal arc welding (MAG), FCAW-G (136) requires a new welder qualification test.

4.3.2.3 For assigning the range of approval of the Welder Approval Test Certificates for welding processes 111, 114, 131, 133, 135, 136 the types of electrode covering, wires and flux-cored wire filler shall be indicated in accordance with the instructions given below.

According to ISO 2560:2020, the type of electrode covering, depending on its composition, (welding process 111) is shown by the following letter indices:

- A = acid (oxidizing) covering;
- B = basic covering;
- C = cellulose covering;
- R = rutile covering;
- RA (AR) = mixed rutile-acid covering;
- RB = mixed rutile-basic covering;
- RC = mixed rutile-cellulosic covering;
- RR = rutile thick covering;

The use of solid wire for welding processes 131 and 135 is indicated by S letter index.

According to ISO 17632:2015, depending on the composition, the filler type for flux-cored welding wire (welding processes 114, 133 and 136) is indicated by letter indices according to Table 4.3.2.3.

Table 4.3.2.3

Symbols for types of electrode core (according to ISO 17632:2015)

Symbol	Characteristics	Type of weld	Shielding gas
R	Rutile, slow freezing slag	Single and multiple pass (run)	Required
P	Rutile, fast freezing slag	Single and multiple pass (run)	Required
B	Основной	Single and multiple pass (run)	Required

Symbol	Characteristics	Type of weld	Shielding gas
M	Metal powder	Single and multiple pass (run)	Required
V	Rutile or Basic/fluoride	Single pass (run)	Not required
W	Basic/fluoride slow freezing slag	Single and multiple pass (run)	Not required
Y	Basic/fluoride fast freezing slag	Single and multiple pass (run)	Not required
Z	Other types	–	–

Note A description of the characteristics of each of the types of core is given in Appendix 7.

4.3.2.4 To designate the composition of the shielding gas used for welders' practical tests, the alphanumeric indices unified with ISO 14175:2008 and corresponding to those given in Table 6.2.2.5 are used.

4.3.2.5 To designate the flux type used for welders' practical tests, the letter indices unified with ISO 14174:2019 which identify a manufacture method are used:

F = fused flux;

A = sintered (ceramic) flux;

M = mixed fluxes (various types of mechanical mixtures and sintered fluxes).

4.3.2.6 For designation of the flux composition used for welders' practical tests, the letter indices unified with ISO 14174:2019 may be used according to Table 4.3.2.6.

Table 4.3.2.6

Symbols for types of flux, characteristic of chemical constituents according to ISO 14174:2019^{1,2}

Symbol	Name of compound	Characteristic of flux chemical compound	
		Constituents	Limit of constituent, % of mass
MS	Manganese-silicate	MnO+SiO ₂	≥ 50
		CaO	≤ 15
CS	Calcium-silicate	CaO+MgO+SiO ₂	≥ 55
		CaO+MgO	≥ 15
CG ³	Calcium-magnesium	CaO+MgO	5 — 50
		CO ₂	≥ 2
		Fe	≤ 10
CB ³	Calcium-magnesium-basic	CaO+MgO	30 — 80
		CO ₂	≥ 2
		Fe	≤ 10
CG-1 ³	Calcium-magnesium-iron	CaO+MgO	5 — 45
		CO ₂	≥ 2
		Fe	15 — 60
CB-1 ³	Calcium-magnesium-iron-basic	CaO+MgO	10 — 70
		CO ₂	≥ 2
		Fe	15 — 60
GS	Magnesium silicate	MgO+SiO ₂	≥ 42
		Al ₂ O ₃	≤ 20
		CaO+CaF ₂	≤ 14
ZS	Zirconium-silicate	ZrO ₂ +SiO ₂ +MnO	≥ 45
		ZrO ₂	≥ 15
RS	Rutile-silicat	TiO ₂ +SiO ₂	≥ 50
		TiO ₂	≥ 20
AR	Aluminate-rutil	Al ₂ O ₃ +TiO ₂	≥ 40
BA	Aluminate-basic	Al ₂ O ₃ +CaF ₂ +SiO ₂	≥ 55
		CaO	≥ 8
		SiO ₂	≤ 20
AAS	Acidic-aluminate-silicat	Al ₂ O ₃ +SiO ₂	≥ 50
		CaF ₂ +MnO	≥ 20
AB	Aluminate-basic	Al ₂ O ₃ + CaO+MgO	≥ 40
		Al ₂ O ₃	≥ 30
		CaF ₂	≥ 5
AS	Aluminate-silicat	Al ₂ O ₃ + SiO ₂ + ZrO ₂	≥ 40
		CaF ₂ +MgO	≥ 30
		ZrO ₂	≥ 5
AF	Aluminate-fluoride-basic	Al ₂ O ₃ + CaF ₂	≥ 70
FB	Fluoride-basic	CaO+MgO+ CaF ₂ +MnO	≥ 50
		SiO ₂	≤ 20
		CaF ₂	≥ 15
Z	–	Any other composition	–

Symbol	Name of compound	Characteristic of flux chemical compound	
		Constituents	Limit of constituent, % of mass
¹ Carbonates such as CaCO ₃ and MgCO ₃ , in agglomerated flux are calculated to CaO and MgO and the constituent (as % of molecular weight) shall be the ratio of the remaining amount exclusive of CO ₂ content in the flux based on the total content of all constituents in flux equal to 100.			
² All of metallic Si and Si-compound and/or their alloys are converted to SiO ₂ , and all of metallic Mn and Mn-compound and/or their alloys are converted to MnO (as % of their molecular weight) considering their oxidation during welding.			
³ The amount of constituent in the agglomerated flux shall be the ratio of remaining amount exclusive of Fe content in the flux.			

7 Table 4.3.3.1-1 is replaced by the following text:

"Table 4.3.3.1-1

Grouping system for steels according to ISO/TR 15608:2017

Group	Sub-group	Types of steel
1		Steels with a specified minimum yield strength $R_{eH} \leq 460$ MPa ^a and with analysis in %: C $\leq 0,25$; Si $\leq 0,60$; Mn $\leq 1,80$; Mo $\leq 0,70$ ^b ; S $\leq 0,045$; P $\leq 0,045$; Cu ^b $\leq 0,40$; Ni ^b $\leq 0,5$; Cr $\leq 0,3$ (0,4 for castings); Nb $\leq 0,06$; V $\leq 0,10$ ^b ; Ti $\leq 0,05$
	1.1	Steels with a specified minimum yield strength, $R_{eH} \leq 275$ MPa
	1.2	Steels with a specified minimum yield strength, 275 MPa $< R_{eH} \leq 360$ MPa
	1.3	Normalized fine grain steels with a specified minimum yield strength $R_{eH} > 360$ MPa
	1.4	Steels with improved atmospheric corrosion resistance whose analysis may exceed the requirements for the single elements as indicated under 1
2		Thermomechanically treated fine grain steels and cast steels with a specified minimum yield strength $R_{eH} > 360$ MPa
	2.1	Thermomechanically treated fine grain steels and cast steels with a specified minimum yield strength 360 MPa $< R_{eH} \leq 460$ MPa
	2.2	Thermomechanically treated fine grain steels and cast steels with a specified minimum yield strength $R_{eH} > 460$ MPa
3		Quenched and tempered steels and precipitation hardened steels except stainless steels with a specified minimum yield strength $R_{eH} > 360$ MPa
	3.1	Quenched and tempered steels with a specified minimum yield strength 360 MPa $< R_{eH} \leq 690$ MPa
	3.2	Quenched and tempered steels with a specified minimum yield strength $R_{eH} > 690$ MPa
	3.3	Precipitation hardened steels except stainless steels
4		Low vanadium alloyed steels Cr-Mo-(Ni) with Mo $\leq 0,7$ % and V $\leq 0,1$ %
	4.1	Steels with Cr $\leq 0,3$ % and Ni $\leq 0,7$ %
	4.2	Steels with Cr $\leq 0,7$ % and Ni $\leq 1,5$ %
5		Cr-Mo steels free of vanadium with C $\leq 0,35$ %
	5.1	Steels with $0,75$ % \leq Cr $\leq 1,5$ % and Mo $\leq 0,7$ %
	5.2	Steels with $1,5$ % $<$ Cr $\leq 3,5$ % and $0,7$ % $<$ Mo $\leq 1,2$ %
	5.3	Steels with $3,5$ % $<$ Cr $\leq 7,0$ % and $0,4$ % $<$ Mo $\leq 0,7$ %
	5.4	Steels with $7,0$ % $<$ Cr $\leq 10,0$ % and $0,7$ % $<$ Mo $\leq 1,2$ %
6		High vanadium alloyed Cr-Mo-(Ni) steels
	6.1	Steels with $0,3$ % \leq Cr $\leq 0,75$ %, Mo $\leq 0,7$ % and V $\leq 0,35$ %
	6.2	Steels with $0,75$ % $<$ Cr $\leq 3,5$ %; $0,7$ % $<$ Mo $\leq 1,2$ % и V $\leq 0,35$ %
	6.3	Steels with $3,5$ % $<$ Cr $\leq 7,0$ %; Mo $\leq 0,7$ % и $0,45$ % \leq V $\leq 0,55$ %
	6.4	Steels with $7,0$ % $<$ Cr $\leq 12,5$ %; $0,7$ % $<$ Mo $\leq 1,2$ % and V $\leq 0,35$ %
7		Ferritic, martensitic or precipitation hardened steels with C $\leq 0,35$ % and $10,5$ % \leq Cr ≤ 30 %
	7.1	Ferritic stainless steels
	7.2	Martensitic stainless steels
	7.3	Precipitation hardened stainless steels
8		Austenitic stainless steels with Cr ≤ 35 %
	8.1	Austenitic stainless steels with Cr ≤ 19 %
	8.2	Austenitic stainless steels with Cr > 19 %
	8.3	Manganese austenitic stainless steels with $4,0$ % $<$ Mn $\leq 12,0$ %
	8.4	Austenitic stainless steels with Cr > 18 %; 4 % $<$ Mn ≤ 12 % и 3 % $<$ Ni ≤ 8 %
9		Nickel alloy steels with Ni $\leq 10,0$ %
	9.1	Nickel alloy steels with Ni $\leq 3,0$ %
	9.2	Nickel alloy steels with $3,0$ % $<$ Ni $\leq 8,0$ %
	9.3	Nickel alloy steels with $8,0$ % $<$ Ni $\leq 10,0$ %
10		Austenitic ferritic stainless steels (duplex)

Group	Sub-group	Types of steel
	10.1	Austenitic ferritic stainless steels with Cr ≤ 24,0 % и Ni ≤ 4,0 %
	10.2	Austenitic ferritic stainless steels with Cr > 24,0 % и Ni > 4,0 %
	10.3	Austenitic ferritic stainless steels with Ni ≤ 4,0
11		Steels with chemical composition identical to group 1 ^c except content of 0,30 % < C ≤ 0,85 %
	11.1	Steels assigned to group 11 with 0,30 % < C ≤ 0,35 %
	11.2	Steels assigned to group 11 with 0,35 % < C ≤ 0,5 %
	11.3	Steels assigned to group 11 with 0,5% < C ≤ 0,85 %
<p>Note . Based on the actual production chemical composition steel of group 2 may be assigned to group 1^c. If the material has different minimum yield strengths depending on thickness, the maximum yield strength shall be used to define the sub-group.</p> <p>a) In accordance with the steel product standards, R_{eH} may be replaced by $R_{p0,2}$ or $R_{t0,5}$.</p> <p>b) A higher value is accepted, provided that Cr + Mo + Ni + Cu + V ≤ 0,75 %.</p> <p>c) A higher value is accepted, provided that Cr + Mo + Ni + Cu + V ≤ 1,0 %.</p>		

8 **Table 4.3.3.1-2** is replaced by the following text:

"Таблица 4.3.3.1-2

Grouping system for aluminium and aluminium alloys according to ISO/TR 15608:2017

Group	Sub-group	Type of aluminium and aluminium alloys
21		Pure aluminium ≤ 1 % impurities content ≤ 1 %
22		Non heat treatable alloys
	22.1	Aluminium-manganese alloys
	22.2	Aluminium-magnesium alloys with Mg ≤ 1,5 %
	22.3	Aluminium-magnesium alloys with 1,5 % < Mg ≤ 3,5 %
	22.4	Aluminium-magnesium alloys with Mg > 3,5 %
23		Heat treatable alloys
	23.1	Aluminium-magnesium-silicon alloys
	23.2	Aluminium-zinc-magnesium alloys
24		Aluminium-silicon alloys with Cu ≤ 1 %
	24.1	Aluminium-silicon alloys with Cu ≤ 1 % и 5 % < Si ≤ 15 %
	24.2	Aluminium-silicon-magnesium alloys with Cu ≤ 1 %, 5 % < Si ≤ 15 % and 0,1 % < Mg ≤ 0,80 %
25		Aluminium-silicon-copper alloys with 5 % < Si ≤ 14,0 %; 1,0 % < Cu ≤ 5,0 % and Mg ≤ 0,8 %
26		Aluminium-copper alloys with 2 % < Cu ≤ 6 %
<p>Note . Groups 21 — 23 are generally for wrought materials and groups 24 — 26 are generally used for cast materials.</p>		

9 **Table 4.3.3.1-3** is replaced by the following text:

"Table 4.3.3.1-3

Grouping system for copper and copper alloys according to ISO/TR 15608:2017

Group	Sub-group	Type of copper and copper alloys
31		Copper 6with % Ag and 3 % Fe
32		Copper-zinc alloys
	32.1	Copper-zinc binary alloys
	32.2	Copper-zinc complex alloys
33		Copper-tin alloys
34		Copper-nickel alloys
35		Copper-aluminium alloys
36		Copper-nickel-zinc alloys
37		Copper alloys, low alloyed (with less than 5 % of other elements) not covered by groups 31 — 36
38		Other copper alloys (5 % or more other elements) not covered by groups from 31 — 36

10 **Para 4.4.1** is replaced by the following text:

"4.4.1 General requirements for welders' certification performance procedure.

The procedure for welders' certification comprises taking theoretical examination and practical by the welder to be certified

The certification shall be started with the practical testing. If the welder fails to pass the practical testing, he is not admitted to theoretical examination and is considered to have failed to be certified.

During the theoretical examination, the welder shall answer at least 15 questions covering the major sections of general and special (by profession) subjects. The questions are selected for each welding process by the certification panel.

In theoretical examining, the certification panel applies one of the following methods or the combination thereof:

- written verification of knowledge;
- oral questioning;
- computer verification of knowledge;
- written description followed by a practical demonstration on the relevant equipment.

The examination results are assessed by the certification panel as "Accepted/Not accepted". The designation "Accepted" corresponds to at least 80 % of the correct answers to the questions asked. The welder is considered to be certified when passing both practical testing and theoretical examination.

If the welder has passed the practical testing, but has failed the theoretical examination, he is allowed to resit the latter by an additional application within half a year since the day of the first examination, but not earlier than two weeks after the initial date of the theoretical examination. In case of reoccurring negative result of the theoretical examination, the welder is considered to have failed the certification."

11 Para 4.4.2.1 is replaced by the following text:

"4.4.2.1 Materials for test pieces and welding materials shall meet the requirements of Part XIII "Materials" and Part XIV "Welding", the Rules for the Classification and Construction of Sea-Going Ships.

Welders shall be practically tested by welding test pieces as specified in Appendix 1.

The test pieces shall be welded in presence of at least three members of qualification commission:

- one professional welding engineer;
- one quality control representative skilled sufficiently to make conclusion from visual and measurement testing and;
- one RS representative."

12 Table 4.4.4.1 is replaced by the following text:

"Table 4.4.4.1

**Methods of testing of welded joint test pieces in welders' practical tests
in accordance with ISO 9606-1:2012**

Testing methods	Type of welded joint test piece											
	P ₁		P _{1tack}	P ₃		P ₂ and P ₄	P _{2tack}	P ₅ and P ₆		P ₇	P ₈	
	3 ≤ t < 12	t ≥ 12		3 ≤ t < 12	t ≥ 12			3 ≤ t < 12	t ≥ 12		C ₁ and C ₂	C ₃ and C ₄
Visual and measurement testing	+	+	+	+	+	+	+	+	+	+	+	+
Radiographic test	+ ^{1,2}	+ ^{1,2}	–	+ ^{1,2}	+ ^{1,2}	–	–	+ ^{1,2}	+ ^{1,2}	–	+	–
Ultrasonic test	+ ²	+ ²	–	+ ²	+ ²	–	–	+ ²	+ ²	+	+	–
Bend test	+ ^{1,3}	–	–	+ ^{3,4}	–	–	–	+ ^{1,3,4}	–	–	–	–
Side bend	–	+ ^{1,3}	–	–	+ ^{1,3,4}	–	–	–	+ ^{1,3,4}	–	–	–
	+ ^{1,3}	+ ^{1,3}	+ ⁵	+ ^{1,3,4}	+ ^{1,3,5}	+ ⁶	+ ⁵	+ ^{1,3,4}	+ ^{1,3,4}	–	–	–
Fracture test	–	–	–	–	–	+ ⁶	–	+1 pc.	+1 pc.	+3 pc.	+3 pc.	–
Macro examination	–	–	–	–	–	+ ⁶	–	–	–	+	+	–
Magnetic particle or dye penetrant testing	–	–	–	–	–	+ ⁶	–	–	–	+	+	–

¹ Either radiographic testing or bend or fracture tests shall be used.

² For thickness of 8 mm and more, the radiographic testing may be replaced by an ultrasonic testing except for austenitic and austenitic ferritic steels (groups 8 and 10, respectively) and for aluminum and copper alloys.

³ When radiographic or ultrasonic testing (rather than bend or fracture tests) is used, then additional bend or fracture tests are mandatory for welding processes 131, 135, 141 and 311.

⁴ For outside pipe diameter of butt joints D ≤ 25 mm, the bend or fracture tests may be replaced by a notched tensile test of the complete test piece (refer to Fig. 4.4.4.4-2).

⁵ Additional tests may be required at the discretion of the Register.

⁶ Instead of the fracture test of a weld, it is allowed to examine the welding quality using magnetic particle/dye penetrant testing in combination with at least two macro examinations.

13 Para 4.4.4.4. Reference to "ISO 9017" shall be replaced by "ISO 9017:2017".

14 **Para 4.4.4.9.** Term "visual testing" is replaced by "visual and measurement testing".

15 **Para 4.4.5.1** is replaced by the following text.

"4.4.5.1 Evaluation of welded joint quality in visual and measurement testing.

4.4.5.1.1 The weld surface as such and the adjacent zone of base metal within at least 20 mm from the fusion line along the entire extent of a welded joint shall be subject to visual and measurement testing.

The visual and measurement testing shall usually be carried out without use of any special optical devices. In doubtful cases, magnifying glasses of no better than ×10 magnification may be used.

If cracks or their indications are detected in the visual and measurement testing of a welded joint, it is recommended to carry out the further flaw detection of a test piece using:

magnetic particle method/dye penetrant testing;

grinding of the surface followed by the chemical cleaning with the reagent used for macrostructure detection.

A depth of undercuts, a height of scaling and unevenness shall be checked by the comparison of welds with standards using special templates or replicating the surface relief. The latter is cut so that the dimension being checked is in the notch plane. In so doing, the dips between beads, and between the weld and base metal shall be measured on the base of 12 mm, the scaling and unevenness, between tops of hillocks and scales.

The measurements of welded joints shall be made in places where deviations from the dimensions specified may be expected at visual and measurement testing. Three measurements, as a minimum, of geometric parameters of a welded joint shall be made within the length of the welded joint test piece.

4.4.5.1.2 Before testing the welded joints by the visual and measurement testing the following shall be checked:

complete removal of the spatter metal from the tested surface;

no grinding on the face side and the root side of the weld;

identification mark of stop and re-start in the root run and in the top capping run;

availability of mandatory and additional marking on the test piece in accordance with 4.4.2.2.

Unless otherwise is agreed with the Register, the assessment of the welded joints quality by the visual and measurement testing results shall be carried out up to quality level B according to the base metal of the international standards:

ISO 5817:2014 for joints in steel, nickel, titanium and their alloys (refer to Table 3.4.2.1, Part XIV "Welding" of the Rules for the Classification and Construction of Sea-Going Ships);

ISO 10042:2018 for joints in aluminum and copper alloys (refer to Table 3.5.2.1, Part XIV "Welding" of the Rules for the Classification and Construction of Sea-Going Ships).

Here, criteria may be relaxed down to quality level C for the following types of external defects: weld expulsion, excessive root penetration, excessive weld convexity, and excessive effective throat thickness.

16 **Paras 4.4.5.2 and 4.4.5.3** are replaced by the following text:

"4.4.5.2 Assessment of welded joints quality in radiographic testing.

4.4.5.2.1 General requirements for testing.

The radiographic method is preferable for the testing of welded joint test pieces. Unless the otherwise is agreed with the Register, the requirements and parameters of the radiographic testing shall be in compliance with ISO 17636-1:2013, ISO 17636-2:2013 (digital detectors/with reference numbers) for Test class B (refer to 3.2.4, Part XIV "Welding" of the Rules for the Classification and Construction of Sea-Going Ships).

4.4.5.2.2 Unless otherwise is agreed with the Register, assessment of welded joints quality according to the radiographic testing results shall be carried out up to Quality level 1 according to the relevant base metal of the international standards:

ISO10675-1:2016 for steel welds as well as nickel, titanium and their alloys (refer to Table 3.4.5.3, Part XIV "Welding" of the Rules for the Classification and Construction of Sea-Going Ships);

ISO10675-2:2017 for aluminium and its alloys (refer to Table 3.5.4.3, Part XIV "Welding" of the Rules for the Classification and Construction of Sea-Going Ships).

4.4.5.3 Assessment of welded joints quality by ultrasonic testing results.

An ultrasonic testing shall be performed according to the agreed national standards.

Weld test scheme on the quantity of scanning directions and scan camera angles applied (PEC inclined input angle) shall comply with the requirements for Control level B in compliance with ISO17640:2017 или EN 1712:1997 + A1:2002.

Unless otherwise is agreed with the Register, assessment of the ultrasonic testing results shall be carried out in accordance with the accepted levels based on the echo-signal length and amplitude as per ISO 11666:2018 and the following requirements for their application and the interpretation of the testing results as regards instructions of 5.1 of the above-mentioned standard.

All imperfections, echo-signal of which exceeding the reference level of sensitivity, shall be assessed in accordance with the definition of the characteristics of ISO 23279:2017, Stage 3, in order to identify the planar (two-dimensional) imperfections. All detected planar (two-dimensional) imperfections are considered inadmissible. Other imperfections are assessed for Acceptance Level 2 (AL-2) according to ISO 11666:2018 (refer to Table 3.4.6.1, Part XIV "Welding" of the Rules for the Classification and Construction of Sea-Going Ships).".

17 **Para 4.4.5.5** is replaced by the following text:

"4.4.5.5 Assessment of welded joints quality by fracture test results.

4.4.5.5.1 After the performance of butt welded joint fracture tests, the fracture surface shall be visually tested. The weld defects visible are subject to estimation to quality level B according to ISO 5817:2014.

4.4.5.5.2 Quality of welded T-joints shall be checked for presence of cracks, porosity and pores, extraneous inclusions, lacks of fusion and incomplete penetration. The weld defects visible are subject to estimation to quality level B according to ISO 5817:2014.".

18 **Para 4.4.6.1** is replaced by the following text:

"4.4.6.1 In cases when the certification panel has reliably established that the unsatisfactory result of initial practical tests is due to the causes not associated with the welder's skill (e.g. welding equipment faults, defects of welding electrode covering, etc.), the welder shall be approved for retests on the same number of test pieces. In this case, the quality of base metal and welding consumables, as well as the serviceability of welding equipment shall be properly checked by the certification panel members. If the specimen does not meet the size requirements due to improper machining, a new specimen shall be prepared, manufactured from a new test piece or an old test piece if there is sufficient amount of waste left and tested in accordance with the established procedure.".

19 **Para 4.5.5** is replaced by the following text:

"4.5.5 In order to reduce the number of practical qualification tests, materials with similar welding characteristics are grouped according to CR ISO/TR15608:2017 (refer to Tables 4.3.3.1-1, 4.3.3.1-2 and 4.3.3.1-3).

The practical test during which for welding of any metal in a base metal group confers qualification on the welder for the welding of all other metals within the same group with the range of approval of the Welder Approval Test Certificate, as well as other base metal groups according to Tables 4.5.5-1, 4.5.5-2 and 4.5.5-3.

Table 4.5.5-1

Range of approval of the Welder Approval Test Certificate for base metal (steel)

Base metal group ¹ of the test piece	Range of approval based on test results												
	1.1;1.2; 1.4	1.3	2	3	4	5	6	7	8	9		10	11
										9.1	9.2+9.3		
1.1;1.2;1.4	x	–	–	–	–	–	–	–	–	–	–	–	–
1.3	x	x	x	x	–	–	–	–	–	x	–	–	x
2	x	x	x	x	–	–	–	–	–	x	–	–	x
3	x	x	x	x	–	–	–	–	–	x	–	–	x
4	x	x	x	x	x	x	x	x	–	x	–	–	x
5	x	x	x	x	x	x	x	x	–	x	–	–	x
6	x	x	x	x	x	x	x	x	–	x	–	–	x
7	x	x	x	x	x	x	x	x	–	x	–	–	x
8	–	–	–	–	–	–	–	–	x	–	x	x	–
9	9.1	x	x	x	–	–	–	–	–	x	–	–	x
	9.2 + 9.3	x	–	–	–	–	–	–	–	–	x	–	–
10	–	–	–	–	–	–	–	–	x	–	x	x	–
11	x	x	–	–	–	–	–	–	–	–	–	–	x

¹ Base metal group according to ISO/TR 15608:2017.

Symbols:

"x" – indicates those base metal groups for which the welder is qualified.

"–" – indicates those base metal groups for which the welder is not qualified.

The range of approval of the Welder Approval Test Certificate for metals of different base metal groups is defined in compliance with the following requirements:

.1 the welder may be allowed for welding of dissimilar metal joints in any combination of base metal groups for welding of which he is qualified in accordance with Tables 4.5.5-1, 4.5.5-2 and 4.5.5-3. In this case the welding consumable shall correspond to the group of one of the welded base metal;

.2 when for dissimilar metal joints welding consumables from base metal group 8 (austenitic stainless steels) or 10 (austenitic ferritic stainless steels) are used, all combinations with base metal group 8 or 10 to other base metal groups are covered.

Table 4.5.5-2

Range of approval of the Welder Approval Test Certificate for base metal (aluminum alloys)

Base metal group ¹ of the test piece	Range of approval based on test results					
	21	22	23	24	25	26
21	x	x	–	–	–	–
22	x	x	–	–	–	–
23	x	x	x	–	–	–
24	–	–	–	x	x	–
25	–	–	–	x	x	–
26	–	–	–	x	x	x

¹ As in Table 4.5.5-1.

Symbols: as in Table 4.5.5-1.

Table 4.5.5-3

Range of approval of the Welder Approval Test Certificate for base metal (copper and copper alloys)

Base metal group ¹ of the test piece	Range of approval based on test results							
	31	32	33	34	35	36	37	38
31	x	–	x	x	x	–	–	–
32	–	x	–	–	–	x	–	–
33	–	–	x	–	–	–	–	–
34	–	–	–	x	x	–	–	–
35	–	–	–	x	x	–	–	–
36	–	x	–	–	–	x	–	–
37	–	–	–	–	–	–	x	–
38	–	–	–	–	–	–	x	x

¹ As in Table 4.5.5-1.

Symbols: as in Table 4.5.5-1.

A practical qualification test made on wrought base metal groups gives qualification for cast material and a mixture of cast and wrought material in the same base metal group.

When welding base metal outside the grouping system according to ISO/TR 15608:2017, a separate qualification test is required."

20 **Para 4.5.8.** Reference to "ISO 6947" shall be replaced by "ISO 6947:2019".

21 **Paras 4.6.4 — 4.6.8** are replaced by the following text:

4.6.4 Based on the record of welder's certification and provided all the above requirements are met, the Register draws up and issues the Welder Approval Test Certificate:

form 7.1.30-1, when periodical qualification/certification is required once in two years to confirm the Welder Approval Test Certificate validity, performed by Option b) in accordance with 4.6.7;

form 7.1.30-2, when periodical qualification/certification is required once in three years to confirm the Welder Approval Test Certificate validity, performed by Options a) and c) in accordance with 4.6.7.

4.6.5 Certificates as per forms 7.1.30-1 and 7.1.30-2 (the Welder Approval Test Certificate) are executed and issued by the RS Branch Office carrying out the technical supervision during the construction of ships or structures. The document is signed by the Head of the RS Branch Office and witnessed with the round anchor stamp. The registration of the Welder Approval Test Certificates is performed in the RS Branch Office according to the place of issuance. Copies of the documents issued can be submitted to RHO on its special demand only.

4.6.6 The Welder Test Approval Certificate issued is valid prior to periodical certification and prolongation of its validity in the Register provided that it is confirmed every six months by the responsible personnel of the employer. Confirmation of the Welder Test Approval Certificate validity upon each qualification shall be reported to the Register on demand. The confirmation entry introduced in the appropriate columns of the Welder Test Approval Certificate is the acknowledgment by the employer of the fact that the following requirements were complied with in the process of the welder performance of his professional duties within the period of account:

the welder shall be continuously engaged on welding work within the current period of approval. In this case, an interruption in work over six months is not permitted;

the welder's work in production shall correspond in its complexity to the range of approval specified in the Welder Test Approval Certificate;

the welder's skill and knowledge shall not be questioned during working.

If any of these conditions are not fulfilled, the Welder Test Approval Certificate becomes invalid. In this case, the matter of its renewal or issuance of the new one is handled individually in each particular case.

The Welder Test Approval Certificate is valid for 6 years taking into account terms specified in 4.6.8. Upon expiry of the specified period the Register issues a new Welder Test Approval Certificate based on the satisfactory results of the welder's qualification in the scope of the initial one.

Note. In accordance with the practice adopted in the national legislation, the welder shall pass regular medical examination and get positive conclusion of a medical commission on professional fitness.

4.6.7 Prolongation of the Welder Test Approval Certificate validity shall be carried out by the Register based on the confirmation of welders' qualification in the scope of the periodical certification by one of the following options:

Option a). The welder shall be re-tested every 3 years in accordance with 4.6.8;

Option b). Based on revalidation of the welder's qualifications for the previous 2 years in accordance with the requirements specified in 4.6.9;

Option c). Based on revalidation of the welder's qualifications for the previous 2 years in accordance with 4.6.10.

Request for prolongation of the Welder Test Approval Certificate validity shall be submitted to the Register within 30 days before and after the due date for the Certificate renewal. Validity of the Welder Test Approval Certificate may be prolonged within 90 days upon expiry of the 2-year period for Option b) and 3-year period for Options a) and c).

Revalidation of the Welder Test Approval Certificate as per option c) does not cover welders certified in welding of pipes and pressure vessels or oxy-acetylene welding (311).

The documents for the Welder Test Approval Certificate prolongation shall be kept for two years as a minimum.

4.6.8 Terms of the Welder Test Approval Certificate validity prolongation.

4.6.8.1 Terms of the Welder Test Approval Certificate validity prolongation as per Option a) in accordance with 4.6.7.

The Welder Test Approval Certificate may be prolonged by the Register for up to three years provided the welder has passed new practical testing. At that, passing theoretical examination is not required unless otherwise decided by the qualification panel.

Note. For prolongation of the Welder Approval Test Certificate the following deviations from the conditions of the initial tests are permitted:

material thickness may vary within the initial range of approval of the Welder Approval Test Certificate; outside pipe diameter may vary $\pm 50\%$ from the initial test piece.

The prolongation of the Welder Approval Test Certificate for the next 3-year period shall be performed by the Register subject to requirements in 4.6.6, and the manufacturer (employer) shall submit to RS the following documents:

conclusion on the specific non-destructive testing RT or UT (or their advanced alternatives) of at least two weld joint areas for each welder, 400 — 500 mm in length, performed within the last 6 months of the 3-year period);

test report based on the results of practical testing with the attached conclusion on the specific non-destructive testing of weld test pieces.

4.6.8.2 Terms of the Welder Approval Test Certificate validity prolongation as per Option b) in accordance with 4.6.7.

The Welder Approval Test Certificate may be prolonged by the Register for the next 2-year period without performance of new practical tests and changing of range of approval. Revalidation of the Welder Approval Test Certificate for the next 2-year period is performed by the Register, provided that the conditions listed in 4.6.6 are complied with and provided that the manufacturer (employer) has submitted to the Register conclusions on the specific non-destructive testing (RT or UT or their advanced alternatives of at least two weld joint areas for each welder, 400 — 500 mm in length, performed within the last 6 months of the 2-year period)

the submitted results of the non-destructive testing shall demonstrate that the welder has performed all works under conditions identical to those as at the initial approval test except for dimensions of welded joint (material thickness and outside pipe diameter).".

4.6.8.3 Terms of the Welder Approval Test Certificate revalidation as per option c) in accordance with 4.6.7.

The Welder Approval Test Certificate may be prolonged by the Register for the next period of three years without performance of new practical tests and changing the range of approval. Prolongation of the Welder Approval Test Certificate for the next 3-year period is performed by the Register, provided that the conditions listed in 4.6.6 are complied with as well as the following additional terms and conditions:

The welder is working for the same shipyard/manufacturer (employer) which is responsible for production weld quality as indicated on his or her qualification certificate;

The Register shall verify that the welder quality management system of the shipyard/manufacturer includes as a minimum:

designated person responsible for the coordination of the welder quality management system;

list of welders and welding supervisors (QCD) in shipyard/manufacturer;

if applicable, list of subcontracted welders;

training requirements for welder qualification program;

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.

The shipyards/manufacturers (employers) have to document at least once a year that the welder has produced acceptable welds in accordance with construction quality standards and requirements of Section 3, Part XIV "Welding" of the Rules for the Classification and Construction of Sea-Going Ships in accordance with the welding positions, type of welds and backing conditions covered by the Welder Approval Test Certificate. Conclusions on the specific non-destructive testing (RT or UT or their advanced alternatives) of at least four weld joint areas for each welder, 400 — 500 mm in length, performed for each year of the 3-year period shall be submitted to the Register."

22 **Para 4.6.10** is deleted. **Existing para 4.6.11** is renumbered **4.6.10**, the text of the para is replaced as follows:

"4.6.10 In the event that the welder shall be approved for the works, which are beyond the scope of the initial range of approval according to the Certificate (forms 7.1.30-1 and 7.1.30-2), the new approval tests shall be performed in accordance with the above requirements.

When the welder's skill or knowledge is questioned (refer to 4.6.6 and 4.6.8), the RS surveyor can make a decision on invalidation of the valid Certificate and/or demand the performance of unscheduled approval tests."

23 **Existing para 4.6.12** is deleted. **Existing para 4.6.13** is renumbered **4.6.11**.

24 **Appendix 1 to Section 4**. Titles for **Figures 9** and **10** are introduced. (Russian version of the Rules only).

(certification body)

**RECORD
of certification panel meeting**

" _____ " _____ 202

date, month, year

Panel members:

Chairman _____
(surname, initials)

members _____
(surname, initials)

Issue considered: *certification of welders* _____
(titles of normative documents whereby

_____ the certification is carried out)

1 Surname _____

Name _____

Patronymic _____

2 Year of birth _____

3 Welder's qualification document No. or previous qualification certificate No _____

4 Welding experience _____

5 Type of certification _____

6 Details of check welded joint:

6.1 Marking (stamp) _____

6.2 Welding process _____

6.3 Type of parts welded _____
(plate (P) or pipe (T);

6.4 Symbol _____
of welded joint, index (4.3.3.2)

6.5 Welding positions _____

6.6 Preheating and additional heating _____
(yes, no)

6.7 Heat treatment _____
(yes, no)

7 Material of base metal:

7.1 Brand and group _____

7.2 Thickness (mm) _____

7.3 Outside pipe diameter (mm) _____

8 Welding consumables:

8.1 Electrode or filler wire _____
(brand and type)

8.2 Shielding gas or flux _____
(brand)

9 Results of control:

9.1 Visual and measurement testing _____
(satisfactory, unsatisfactory)

(report No. and date)

9.2 Radiographic testing _____
(satisfactory, unsatisfactory)

(report No. and date)

9.3 Ultrasonic testing _____
(satisfactory, unsatisfactory)

(report No. and date)

9.4 Bend test _____
(satisfactory, unsatisfactory)

(report No. and date)

9.5 Macro examination _____
(satisfactory, unsatisfactory)

(record No. and date)

9.6 Additional methods of testing _____

10 Title of normative document on quality assessment standards

11 Assessment of theoretical knowledge _____
(credited, not credited)

12 Decision of certification panel _____
(certification: designation and range

of approval,

details of approval test)

13 Date of periodical certification
Chairman of panel _____
(signature, surname, initials)
Members of panel _____
(signature, surname, initials)

**PRACTICAL RECOMMENDATIONS FOR COMPLETING FORMS 7.1.30-1 AND 7.1.30-2
"WELDER TEST APPROVAL CERTIFICATE"**

1. As a rule, a separate Welder Test Approval Certificate shall be drawn up for each particular version of essential variables. If more than one test piece was tested during the qualification test, then, the only one variation of the below listed essential variables is permitted for combining in one Certificate:

- type of weld;
- welding position;
- dimensions of welded joint (material thickness and outside pipe diameter).

In this case the Welder Test Approval Certificate is drawn up for combination of the ranges of approval for each test piece.

2. For welding processes with gas shield, the test performing conditions and range of approval of the Welder Test Approval Certificate are set according to the following requirements:

for welding processes 135 and 136, the qualification tests are performed with one of the shielding gas compositions of C or M groups, which is mostly used in production process and cover all gases compositions of these two groups (C1, C2, M1, M2 and M3);

for welding processes 131, 133, 141 and 15, qualification tests are performed with one of the shielding gas compositions of group I, which are mostly used in production process and cover all gases compositions of this group (I1, I2, I3).

Note. Shielding gases of R and F groups are normally not employed for shipbuilding materials, and, therefore, they are not used for testing qualification of welders.

3. For welding processes with the use of fluxes, the range of approval of the Welder Test Approval Certificate is not regulated. The designation (trademark) and manufacture method (indices F, A or M according to 4.3.2.5) of the flux used during the qualification tests are shown in the corresponding column of the Certificate and a dash (–) is inserted in the column for range of approval.

4. In column "Employer", the full name of the manufacturer is entered where the welder works and which applied for his certification.

5. In column "Code/Testing Standard", the rules of Russian Maritime Register of Shipping ("RS Rules") are noted

6. The explanations and indications on completing the main Table "Range of test and approval" are detailed in the Table.

When filling out information about consumables used for weld test details in relevant columns (7, 8, 9) of the Welder Test Approval Certificate (forms 7.1.30-1 and 7.1.30-2), it is recommended to put trade marks (designation) of the consumables used in brackets additionally For instance: wm/S (CB-08Г2C-O), M21 (80%Ar+20%CO₂), MS (AH-348A), B (УОНИИ-13/55), etc.

In item "Option for the Welder Test Approval Certificate prolongation" one of options shall be specified in accordance with 4.6.7.

7. Table "Test results" of the Welder Test Approval Certificate is drawn as follows. Results of practical tests and theoretical examination shall be indicated by terms "Accepted" or "Not tested".

8. Table "Validity and prolongation for approval". The left half of the Table is completed by the employer's official in charge according to the requirements of 4.6.6 and 4.6.9.

The entry on prolongation of the Welder Test Approval Certificate validity period shall be made in the right half of the Table by the RS surveyor according to 4.6.8. and certified by his personal signature and stamp.

9. In the row "Date of first test" the date of issuing the minutes of meeting of the Certification Committee shall be indicated. This date means a commencement of the welder's certificate.

In the row "Valid until" the date of extension from the date of the initial tests shall be indicated in compliance with 4.6.6. The row "Location and date of issue" shall contain the name of the RS Branch Office issued the Welder Approval Test Certificate, RS-approved certification center where

the tests for issuing of the Welder Approval Test Certificate have been carried out (where applicable) and the actual date of the Certificate issuing.

Table

Forms 7.1.30-1 and 7.1.30-2, columns	Weld test details (to be entered)	Range of approval (to be entered)
1 Welding procedure specification	No. of appropriate WPS if drawn up for practical tests	Insert a dash (–)
2 Welding type	Coded welding type designation (refer to 4.3.2.1)	Coded type designation and its full name
3 Welding process	Coded welding type designation (refer to 4.3.2.2)	Coded welding process designation and its abbreviated alphabetical designation is indicated according to Table 6.2.2.1
4 Plate or pipe	Coded designation P or T (refer to 4.3.4.1)	Code designation of test piece type according to 4.5.3 and reference "refer to welding positions"
5 Joint type	Full code designation of weld type of test piece, including details of welding process. Possible designation variants:	Coded designation of the welded joint type and of welding details according to 4.5.4 and 4.5.9. Possible designation variants:
	A;	A, C, F;
	B;	A, B, C, D, F;
	C;	A, C, F;
	D;	A, C, D, F;
	F	F;
6 Base metal group/designation	Designation of base metal subgroup (group) (refer to Tables. 4.3.3.1-1, 4.3.3.1-2 and 4.3.3.1-3), and for shipbuilding materials, after "/" symbol, the category designation in compliance with Part XIII "Materials" of the Rules for the Classification and Construction of Sea-Going Ships. For other materials, brands may be additionally designated in accordance with the national standards	Designations of base metal subgroups according to 4.5.5 (refer to Tables. 4.5.5-1, 4.5.5-2 and 4.5.5-3)
7 Filler material type / designation	In numerator: coded designation for filler material: wm — welding with filler material; nm — welding without filler material. In denominator: filler material type: E — covered electrodes; S — solid wire; FCW — flux-cored wire; SR — solid rod; FR — flux-cored rods. For welding without filler material a dash (–) is inserted.	Range of approval of the Welder Test Approval Certificate for the presence and type of filler material taking into account the expanded range of approval in accordance with 4.5.6 for specific welding processes
8 Shielding gas composition/flux	Group of shielding gas composition in use during tests for the range of qualification (refer to 4.3.2.4). For welding processes 121 and 125 flux designation (brand) and method of its manufacture are indicated (refer to 4.3.2.5)	According to the requirements 2 and 3 of this Appendix
9 Type of flux or electrode covering	Coded designation of electrode covering or filler of the flux-cored wire used during the tests (refer to 4.3.2.3)	Range of approval of Welder Test Approval Certificate according to requirements of Table 4.5.6
10 Auxiliary materials	Data on auxiliary materials, namely: backing type and material, various pastes and fluxes for oxy-acetylene welding, composition of shielding gas for backing on the back of weld, etc.	Range of a approval of the Welder Test Approval Certificate by auxiliary materials of the same type as that used in testing, or in case of no auxiliary materials, a dash (–) is inserted.

Forms 7.1.30-1 and 7.1.30-2, columns	Weld test details (to be entered)	Range of approval (to be entered)
11 Base metal thickness	Actual thickness of base metal of test pieces welded (refer also to Table 4.5.2 for combination of welding processes on one test piece)	Range of thicknesses of base metal the welder is approved for according to 4.5.7. For a combination of welding processes the range of thickness is indicated separately for each welding process and their combination. E.g.: 141: 3 mm ≤ t ≤ 10 mm 135 : t ≥ 5 mm or 141/135: t ≥ 5 mm
12 Pipe outside diameter	Actual values of outside pipe diameters of test pieces welded	Range of pipe diameters the welder is approved for according to 4.5.7
13 Welding position (s) / type of test piece	In numerator: designations of test piece welding positions according to Appendix 2 separated by "/" symbol. In denominator: designation of test piece in accordance with Appendix 1	Welding positions the welder is approved for according to 4.5.8 (for plates and pipes separately). For shortening the record, the entry: "All except... " is permitted.....»

27 **Paras 2.3 and 2.4 of Appendix 5 to Section 4** are replaced by the following text:

"**2.3** The application for certification centre accreditation shall include: certification centre name and full postal and financial details;

full names of the head and the official in charge of contacting the Register;

list of welding processes the welders will be certified for, and the list of groups of a base metal type composition;

guarantee of payment for the Register services.

The following documents shall be attached to the application:

copy of the Charter of the certification centre;

draft Regulations on Certification Centre;

sets of programs of preparation for certification, and of collections of examination questions, and also of practical exercises for all the types of examinations to be performed.

2.4 The Regulations on Certification Centre shall include:

information on the availability of spaces for theoretical examinations and practical tests;

information on the organizational structure of the centre;

information on the material base including the welding equipment, stock of machine tools and outfit available and used in certification, on the equipment and means of welded joints quality control, computer equipment;

information on the centre personnel including examiners and certified specialists on non-destructive testing methods;

information on certification activities organization;

information on the procedure for sending and testing appeals;

procedure of keeping the register of certified welders, and of archiving."

28 **Paras 3.2 — 3.5 of Appendix 5 to Section 4** are replaced by the following text:

"**3.2** Certification panels conducting theoretical examinations and practical tests are part of the certification centre.

The main objectives of the certification panel include:

organization and control over the welders' preparation for approval testing;

development of programs of welders' special theoretical and practical training for certification;

setting target times for certification performance;

preparation of the relevant training and testing base;

preparation of the collection of examination questions on welding processes and the base metal type;

establishment of the procedure for theoretical examination performance;

performance of the theoretical examination and assessment of its results;

development of the welding procedure specifications for the performance of test welding joints;

inspection of materials to be used for welders' practical test;

monitoring of welders' performance in welding and of welded joints marking;

organization of welded joints quality control performance and assessment of their quality in accordance with the RS rules requirements;

execution of a test report and taking decision on the results of the welder's approval test;
preparation of proposals for updating normative documents on welder's certification issues.

The certification panel is authorized to:

remove welders from an approval test if they do not fulfill the requirements of a welding procedure or violate the procedure for test performance;

give a conclusion on the possibility to prolong the validity period of the Welder Approval Test Certificate;

set up working groups to review the activities of the locations ensuring control over welders' performance at manufacturers;

submit proposals on updating the welders' certification procedure.

3.3 The certification panel members are approved by the head of the certification centre and agreed with the RS Branch offices.

The certification panel includes:

chairman and his deputy being certified specialists in welding;

authorized RS representative;

certified specialist on non-destructive testing authorized to sign the conclusions on the results of visual and measurement testing, and also on X-ray testing (or ultrasonic testing).

The following persons may also be drawn into activities of the certification panel on the permanent or temporary basis (depending on the certification centre status):

the person in charge of welding at an employer's (a senior welder, the head of a welding shop, etc.);

the person in charge of monitoring welders' performance at the employer's;

the authorized representative of an employer's technical control service;

highly qualified specialists in the area of individual welding processes or in the groups of a base metal type composition (e.g. specialists in the welding of non-ferrous metals and their alloys, etc.).

3.4 The certification centers include a training and testing base which provides an opportunity to perform theoretical examinations and practical tests for welders' approval.

Generally, the training and testing base needs the following spaces for its normal functioning:

welding shop with working stations for practical tests performance;

space for preparing parts for welding;

space for power supply (gas and electrical supply, ventilation and heating) equipment;

space for studies (lectures);

domestic spaces;

spaces for mechanical testing and welded joints quality control.

3.5 The main functions of the certification centre are the welders' certification, and also office work performance and keeping a record of the welders certified.

In certification performance, the centre ensures

drawing up of welders' certification programs;

forming certification programs;

approval testing for specific welding processes and groups of a base metal type composition;

keeping up of the operational status of the training and testing base;

control over the observance of requirements unity and over the objectivity of the examination results assessment.

The office work performance provides for keeping a card index for every certified welder, which includes the following:

application for certification;

copy of a document on education;

copy of a document on special training;

reference on work experience in welding (an extract form of the work-record card);

reference on the state of health;

examination sheets;

copies of reports of welded joints quality control;

report on passing the examinations by the welder being certified with the conclusion of the examination panel;

3 x 4 cm photograph and the signature pattern of a certified welder;

copy of the Welder Approval Test Certificate.

Note. The extent of the card index may be reduced for the certification centers established at manufacturers and providing services to their employees.

The information on certified welders shall be retained within two validity periods of the Welder Approval Test Certificate following the last certification.

If the welder fails examinations, the information about this is kept in the certification centre a year after the decision has been taken by the certification panel."

29 **Para 6.2.2.1** is replaced by the following text:

"6.2.2.1 The designations for welding processes according to ISO 4063:2009 shall correspond to those given in Table 6.2.2.1.

Table 6.2.2.1

Corresponding ISO 4063:2009 reference numbers for the welding and cutting processes

Reference numbers for the welding processes	Another commonly used designations (acronyms and abbreviations) for the welding processes	Name of welding or cutting processes
111	MMAW (SMAW:USA)	Manual metal arc welding (metal arc welding with covered electrode)
112	GAW	Gravity (arc) welding with covered electrode
114	(FCAW-S:USA)	Self-shielded tubular cored arc welding
12	SAW	Submerged arc welding with:
121	SAW	solid wire electrode;
122	SAW	submerged arc welding with strip electrode;
124	SAW	submerged arc welding with metallic powder addition;
125	SAW	submerged arc welding with tubular cored electrode;
126	SAW	submerged arc welding with cored strip electrode;
13	GMAW	Shielding gas metal arc welding in particular:
131	MIG	Metal inert gas (MIG) welding with solid wire electrode;
132	MIG	MIG welding with flux cored electrode;
133	MIG	MIG welding with metal cored electrode;
135	MAG	Metal Active Gas (MAG) welding with solid wire electrode;
136	MAG FCAW-G (USA)	MAG welding with flux cored electrode;
138	MAG	MAG welding with metal cored electrode; gas metal arc welding using active gas and metal cored electrode;
14	TIG (GTAW:USA)	Gas-shielded arc welding with non-consumable tungsten electrode:
141	TIG	Tungsten inert gas TIG welding with solid filler material (wire/rod);
142	TIG	Autogenous TIG welding;
143	TIG	TIG welding with tubular cored filler material (wire/rod)
15	PAW	Plasma arc welding:
151	-	Plasma MIG welding;
152	-	Powder plasma arc welding
31	OFW (USA)	Oxyfuel gas welding:
311	OAW (USA)	Oxyacetylene welding
43	FSW	FSW (Friction Stir Welding)
51	EBW (USA)	Electron beam welding
52	LBW (USA)	Laser welding
72	ESW	Electroslag welding
73	EGW	Arc welding with forced weld formation and gas shield (EGW)