Polski Rejestr Statków

INFORMATIVE PUBLICATION No. 30/I

PRINCIPLES FOR EXAMINATION OF WELDERS

2016

Publications I (Informative) are issued by Polski Rejestr Statków S.A.
as guidance or explanatory notes to PRS Rules.

GDAŃSK

Publication No. 30/I – Principles for Examination of Welders – 2016, was accepted by Director for Ship Division of the Polish Register of Shipping S.A. on 25 April 2016.

The present Publication replaces *Publication No. 30/I – Principles for Examination of Welders – 2015.*

PRS/OP, 04/2016

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1 GENERAL

1.1 Application

1.1.1 The present *Publication* specifies the principles for examining welders and issuing welder's qualification certificates by PRS.

1.1.2 For examining welders, PRS applies valid standards on examining welders.

1.1.3 The manufacturer employing welders is obliged to keep a record of the welders qualified by PRS. The record shall include:
- the welder's full name,
- national personal identity number,
- the welder's code used for marking the welds that he performed,
- designation of welder's qualification,
- welder's qualification expiry date,
- Welder's *Qualification test certificate number*.

1.1.4 The present *Publication* refers to the provisions of other documents (e.g. standards). These provisions, through reference to this text, constitute the requirements of the present *Publication*. Standards, current at the time of the present *Publication* issue, are specified in sub-chapter 1.4. In practice, current editions of the reference documents should be used.

1.2 Declaration of Impartiality

Within the scope of welders' certification, the Polish Register of Shipping S.A. applies the principle of impartiality, i.e:
- does not advise the applicants how to omit the difficulties on the way to certification,
- does not provide any other products and services that when offered would damage confidentiality or impartiality of certification and decision making processes,
- does not conduct advisory and training activity which could endanger confidentiality, impartiality or objectivity, it also has no formal liaisons, either personal or structural, with any associated unit.
- tackles the conflicts of interests.

1.3 Definitions

Capping run – in multi-run welding, the run visible on the weld face after completion of welding.

Ceramic backing (temporary) – individually shaped ceramic material for the purpose of supporting molten weld metal and forming a face root run.

Filling run – in multi-run welding, the run deposited after the root run and before the capping run.

Heat affected zone (HAZ) – non-melted metal area in the welded joint adjacent to the weld, undergoing changes of structural, physical, mechanical and other properties under the effect of welding heat.

Manufacturer – a company employing welders, manufacturing or repairing steel structures.

Metal backing (permanent) – a plate made of metal having a melting point equal or almost equal to the melting point of the welded material, placed at the reverse side of the joint to be welded for supporting molten weld metal; the plate undergoes partial melting.

Metal backing (temporary) – a plate made of metal having a melting point significantly different from the melting point of the welded material, placed at the reverse side of the joint to be welded for supporting molten weld metal; the plate does not undergo partial melting.

Multi-run weld – weld made by depositing more than one run.

One-side welding – welding process where the whole weld is made from one side of a welded joint only.

One-side weld – weld made using one-side welding process.

Parent material – material from which the element to be welded is made.

Preliminary Welding Procedure Specification (pWPS) – a document specifying preliminary details of variable parameters required for a specified welding process.

Qualification test – test carried out to issue PRS qualification certificate to a welder for the first time or to extend the range of qualification already granted by PRS.

Revision test – test carried out at the request of PRS Surveyor, e.g. where the quality of the welds performed by welder has decreased significantly, to check the welder's current skills.

Root run – in multi-run welding, the run of the first layer deposited in the root.

Single-run weld – weld made by depositing a single run only.

Test piece – welded joint made during the welder's test.

Weld – part of a welded joint made of material melted during the welding process.

Welder's qualification prolongation test – test carried out to prolong the validity of the welder's qualification, granted by PRS, for further two years.

Weld run – metal melted or deposited under one heat source passage.

Welding consumable – material constituting the weld or that which allows making the weld; it may be, e.g. covered electrode, welding rod, wire, flux, gas.

Welding Procedure Specification (WPS) – a document stating details of variable parameters required for a specified welding process and ensuring that welded joints made in accordance with this document satisfy quality uniformity criteria.

Weld thickness – thickness of weld, excluding any reinforcement; for butt welds it is equal to the welded material thickness, whereas for fillet welds it is equal to the minimum height of the triangle inscribed into the weld cross-section.

1.4 Normative references

EN ISO 4063:2011 – Welding and allied processes - Nomenclature of processes and reference numbers.
EN ISO 6947:2011 – Welding and allied processes. Welding positions.
PN-EN ISO 9606-1:2014-02P – Qualification test of welders. Fusion Welding. Part 1: Steels.
EN ISO 9606-2:2007 – Qualification test of welders. Fusion welding. Part 2. Aluminium and aluminium alloys.
PN-EN ISO 9606-3 – Qualification test of welders – Fusion welding. Part 3: Copper and copper alloys.
PN-EN ISO 9606-4 – Qualification test of welders – Fusion welding. Part 4: Nickel and nickel alloys.
PN-EN ISO 9606-5 – Qualification test of welders – Fusion welding. Part 5: Titanium and titanium alloys, zirconium and zirconium alloys.
EN ISO 14175:2009 – Welding Consumables – Gases and gas mixtures for fusion welding and allied processes.
EN ISO 14731:2008 – Welding coordination – Tasks and responsibilities
TR/ISO 15608:2008 – Welding. Guidelines for a metallic materials grouping system.

2 APPLICATION AND ASSESSMENT PROCESSES

2.1 General

2.1.1 The firm holding the test shall request its direct supervision from the relevant PRS Branch Office or Survey Station. The list of welders, together with their application forms as shown in Annex 1, shall be enclosed with the request.

2.1.2 The *Examination board* shall consist of PRS Surveyor, representatives of the manufacturer and of the firm holding the examinations. PRS Surveyor is the chairman of the examination board.

2.1.3 Training courses which the welder has underwent to, as well as the hand-on experience in welding shall be documented, e.g. confirmed by appropriate entries in the *Welder's Book*.

2.1.4 The firm holding the test is responsible for providing such practical test conditions, which will allow PRS Surveyor to monitor the test welding processes carried out by particular welders.

2.1.5 The welding of test pieces may be carried out in places specially designated for that purpose or directly on the welding site. The welding site shall be provided with appropriate welding and other additional equipment so as to allow the welder to control both the welding process and to satisfy all requirements specified in the welding procedure specification pWPS or WPS for the test piece. The welding procedure specification shall contain basic data and welding process of test piece, to be executed during the qualification test.

2.1.6 Examination of the test pieces shall be performed by laboratories approved by PRS, or surveyed directly by the PRS Surveyor.

2.2 Admission to qualification test

2.2.1 A welder may be admitted to the welder's qualification test, provided he/she completed training course in the welding process being the subject of test. The training is not required to approved by PRS. Additionally, it is recommended that the welder should have appropriate hand-on experience in using this process for welding a group of parent materials to be welded during the qualification test.

2.2.2 Only a welder who has completed the training course in single-side butt welding on temporary backing strips, which form the weld root, shall be admitted to the qualification test within the scope of single-side butt welding on temporary backing strips.

2.2.3 A candidate for welder is required to be of age. There are no requirements in respect of his education background.

2.2.4 Prior to examination, the examining person shall check the candidate's ID.

3 EXAMINATION PROCESS

3.1 Job knowledge test

3.1.1 Job knowledge test is not required within each qualification test. It is recommended that the job knowledge test shall be performed at the first qualification test or after a break in welding longer than 6 months.

3.1.2 Job knowledge test shall be limited to the check of the welder's knowledge of the essential problems related to the welding process used during the test to allow the use of correct welding procedure and skilful operation of the welding equipment.
Job knowledge test shall comprise:
- identification of the range of qualification based on the current qualification test,
- properties and identification of parent materials within the material groups or sub-groups of the test pieces,
- properties and identification of parent materials within the material groups or sub-groups covered by the range of the qualification certificate to be issued,
- characteristic features of the welding process being the subject of the qualification test,
- properties and identification of welding consumables used for the particular welding process,
- the principles of edge preparation for welding and pre-welding assembly,
- the principles of selecting proper welding parameters,
- the principles of pre-heating and pre-heating control,
- proper interpass temperatures and their control,
- weld imperfections and their causes,
- method of repair of the welds below the acceptance level.

3.1.3 The form of job knowledge test is subject to acceptance by PRS Surveyor supervising the test. The job knowledge test result shall be stated as 'accepted' or 'not accepted'. The results of the test shall be documented.

3.2 Practical Test

3.2.1 During the practical test, the welder shall perform the test weld to prove the skill necessary to obtain a relevant qualification certificate.

3.2.2 Parent materials and welding consumables used during the test shall be properly selected for the applied examination programme and their grade and quality shall be certified. Base materials having *Materials Certificate 3.2* and welding consumables having *Type Approval Certificate* shall be used.

3.2.3 In qualification tests for welders of sea-going ship hulls, the plates of higher-strength hull steel ($R_{eH} \geq 355$ MPa) of minimum 8 mm in thickness are recommended for the test pieces.

3.2.4 The dimensions of typical test pieces are given in *Annex 2*. The length of submerged-arc welded test pieces shall be not less than 600 mm.

3.2.5 Tack welding of the test piece shall be performed by a welder. Welding consumables used for tack welding shall be the same as those used for actual welding. The use of other welding consumables is permitted if such provision has been made in the pWPS or WPS for the test piece welding process. The preparation of edges and gap shall comply with the pWPS or WPS; the prestrain of the tack-welded parts may be left at the discretion of welder.

3.2.6 Each test piece shall be identified with a durable mark. The mark shall allow an unambiguous identification of the welder performing the test piece, the welding process and the welding position.

3.2.7 After compliance of the tack-welded piece with the scope of the test has been checked, the test piece is marked by PRS Surveyor in two places with PRS stamp. In at least one of the places marked with PRS stamp, the examined welder shall stop and restart welding to perform the root run and weld face layer. The stop and restart of welding shall be typical for welder's work.

3.2.8 The procedure of welding the test piece shall comply with the welding procedure specification pWPS or WPS, which shall be available at the practical test welding stand. The welding time for the test piece shall correspond to the working time under usual production conditions. Any post-weld heat treatment required in the pWPS or WPS may be omitted unless bend tests are required.

3.2.9 The test piece with the butt weld applied on both sides shall be performed entirely in the same welding position.

3.2.10 Replacement of the initiated test piece by a new one is possible only in the case where, according to examination board, difficulties, not associated with the welder's qualifications, have occurred and the consequential defects cannot be removed without worsening the quality of the test piece.

3.2.11 Examination board may stop the practical test if:
- welding conditions do not comply with the relevant requirements,
- skills of the welder making a test piece are insufficient for the correct performance of welding process to be tested,
- safety or impartiality ruleas are breached.

3.3 Test Piece Examination

Prior to any examination, all slag and spatters shall be removed carefully and the weld profile and dimensions shall be checked. No grinding on the root and the face side of the weld is permitted. Stop and restart location of the welding process to make the weld root and face shall be explicitly identified and marked with PRS stamp.

The same marking and PRS stamp shall be placed on each test specimen taken from the examination test piece for destructive testing.

The results of all examinations shall be documented. The reports of the test piece examination shall contain identification marks of such test piece.

The reports of test pieces' tests contain the results obtained by the laboratories. The tests are commissioned to be performed by an approved laboratory or are witnessed by PRS Surveyor.

It is recommended that the test methods to be used for examination of the test piece, as well as the scope of such examination should comply with the standard the examination is based on.

4 DECISION ON CERTIFICATION

4.1 Assessment of qualification test results and *Welder's Qualification Test Certificate* issue

4.1.1 *Welder's Qualification Test Certificate* may be issued by PRS only when the overall result of the qualification test is considered satisfactory, if the results of the job knowledge test and the results of all examinations of the test piece performed during the test are satisfactory.

4.1.2 The results of the qualification test and other decisions shall be documented in a collective record.

4.1.3 A set of documents of the qualification test carried out shall include:
- application forms,
- welding procedure specifications (WPS) for the test pieces,
- copies of certificates for both parent materials and welding consumables used for the qualification test,
- records of all examinations of the test pieces,
- a collective record.

4.1.4 In general, for each test piece a separate *Welder's Qualification Test Certificate* shall be issued. If more than one piece is welded, a single *Welder's Qualification Test Certificate* can be issued that combines the ranges of qualification of the individual pieces. Only one of the below essential variables may be changed:
- type of weld,
- welding position,
- weld thickness.

4.2 Re-tests

If the practical test or the job knowledge test fails to comply with the requirements, the welder shall be given an opportunity to repeat the qualification test, however, no earlier than 14 days and no later than six months after the failed test.

4.3 Validity and range of qualification certificate

4.3.1 A welder is qualified not only for welding the test pieces in the conditions used in the test, indicated in the designation, but also for the joints made in conditions which are considered to be easier, according to the standard the examination is based on.

4.3.2 A qualification test made on steel groups qualifies for cast material and mixture of cast and wrought material, however, only to the scope set according to filler material group .

4.3.3 The qualification test certificate is issued to a welder for a period of 3 or 2 years commencing with the date of the practical test. Welder's qualification given for 2 years can be prolonged for further 2 years under conditions specified in 6. The qualification test certificate will be valid from the day following the date of qualification prolongation.

4.3.4 The *Welder's Qualification Test Certificate* is valid for a period of 3 or 2 years, provided that the person duly authorised by the employer to supervise welding operations and granted authorizations in accordance with PN-EN ISO 14731 Standard, endorses every 6 months the qualification test certificate. The person confirms that the welder has been working within the initial range of qualification.

4.3.5 The welder's qualification expires where he/she has not performed any welding operations for a period longer than 6 months.

4.3.6 The welder's qualification may be withdrawn at the request of PRS Surveyor who supervises the welding operations if the welder has failed to comply with the good welding practice or where the quality of the welds has decreased significantly.

4.3.7 A manufacturer (or welder itself in the case of self-employment) is responsible for control of welder's qualification, the welders' training and their continuous work to allow them to maintain their skills.

4.4 Designation of welder's qualification

4.4.1 The designation of a welder's qualification in *Welder's Qualification Test Certificate* is a conventional record of the practical test held. It constitutes a set of symbols (items) which define the conditions of the test piece performance. The designation is consistent with the standard, referred to at the beginning of the record. The designation items are arranged in one row; the order of particular items of the designation and information which the items provide are given in Table 4.4.1-1. The designation examples are given in Table 4.4.1-2.

Table 4.4.1-1
Designation of welder's qualification

The order of a particular item in qualification designation	Successive items of qualification designation and information they contain
1	Number of reference standard for the welder's qualification test, e.g.: PN-EN ISO 9606-1 for steel, and EN ISO 9606-2 for aluminium and its alloys
2	Three numbers which indicate numerical designation of the welding process used for the test piece in accordance with EN ISO 4063, e.g. 111; however, where two welding processes were used for the butt weld of the test piece, e.g. for the root run: 141 and for the filling run: 111, the designation of both processes is indicated as 141/111.
3	Capital letter – indicates the test piece type: P – plate, T – pipe.
4	Two capital letters – indicate the test piece weld type: BW – butt weld, FW – fillet weld.
5	For examinations acc. to Standard PN-EN ISO 9606-1 – numerical and letter designation indicates the group of the welding consumable used for the test piece in accordance with *Annex 2*. For examinations acc. to Standards PN-EN ISO 9606-2, PN-EN ISO 9606-3 – numerical designation indicates the group of the parent material used for the test piece, acc. to TR/ISO15608, see Annex 4.
6	Letter designation indicates a welding consumable used for the test piece: nm – test piece made without a consumable, S – solid wire/rod, one or two capital letters indicate the type of electrode coating of a covered electrode or powder type for flux-cored wires, see EN ISO 14175 Standard. If two different welding processes, e.g. 141/111 were used for the test piece with butt weld, then the designation of the consumables for both processes shall be S/B where electrodes with basic covering were used in process 111.
7	Designation of the welded material thickness. It consists of a small letter *t* for fillet welds, a letter *s* for butt welds and the number indicating the parent material thickness in accordance with the material approval certificate. If two different welding processes were used for the test piece with butt welds, then the welded material thickness designation is followed by the thicknesses (given in brackets) of the welds made using the particular processes, e.g. *s* 20 (5/15).
8	Where pipe T was used for the test piece, the designation of the pipe outside diameter consists of capital letter *D* and the number indicating the outside diameter of the welded pipe in accordance with the approval certificate.
9	Designation of the test piece welding position in accordance with EN ISO 6947. This usually consists of two capital letters, the first of which is P, indicating the test piece welding position.
10	Letter designation – indicates the test piece welding details; for butt welds BW, one of the following: ss nb, ss mb, bs, ss gb, ci, ss fb; for fillet welds FW, one of the following: sl, ml; for oxy-acetylene welding (311), additionally: lw, rw.

Table 4.4.1-2
Qualification designation examples

Standard	Welding process	Product type	Weld type	Filler material group	Filler material designation	Filler/material thickness	Pipe outside diameter	Welding position	Weld details
1	2	3	4	5	6	7	8	9	10
ISO 9606-1	111	T	BW	FM1	B	s10	D60	PA	ss nb
ISO 9606-1	141/111	T	BW	FM1	S/B	s20(5/15)	D60	HL045	ss nb/ss mb
ISO 9606-1	141	T	BW	FM1	S	s5	D60	HL045	ss nb
ISO 9606-1	111	T	BW	FM1	B	s15	D60	HL045	ss mb
ISO 9606-1	135	P	BW	FM5	S	s10		PC	ss mb
ISO 9606-1	136	P	FW	FM2	B	t12		PD	ml
EN ISO 9606-2	131	P	FW	22	S	t6		P**B**	ml

4.4.2 The order in which the items of welder's qualification designation are arranged is the same for all types of qualification test.

5 SUSPENSION, WITHDRAWAL OR EXTENSION OF CERTIFICATION

5.1 Extension of certification range is based on a separate Application sent using a specimen given in Annex 1. The proceedings are as described in paragraphs 3 and 4. Limitation of certification range is not provided. An amendment to the scope of certification requires a new request to be submitted.

5.2 The certificate may be suspended after a claim or complaint to certified welder activities has been received in PRS S.A. The suspension covers a limited time period, until explaining the complaint grounds and carrying out corrective actions.

5.3 The certificate may be cancelled (withdrawn) when the welder action was found non-conforming with concluded certification agreement. Certificate withdrawal is preceded by a written notification specifying the grounds for it. The certificate withdrawal may be preceded by its suspension.

6 RE-CERTIFICATION PROCESS

6.1 Prolongation of welder's qualification for further 2 years without the necessity to weld the test pieces can be made at the request of the manufacturer's welding supervisor. All records and evidence which constitute the basis for the request shall allow to identify the welder and the welding procedure (the WPS) used in the production. The request shall be accompanied by:

– reports confirming good quality of the test pieces made by the welder during the period of the qualification validity; the percentage of imperfections in the test pieces made by the welder shall not exceed 10 %,
– records of non-destructive tests (radiographic or ultrasonic), as well as destructive testing (fracture tests, bend tests, etc.), if applied, of minimum two test pieces made by the particular welder during the recent 6 months of the qualification validity. Only the test pieces which were made in the conditions corresponding to those of the qualification test for prolongation of the welder's qualification (welding process, product type, weld type, material group, filler metal, welding position, weld details) shall be taken into account. As regards the welded material thickness (t) or pipe diameter (D), it will be sufficient if they are within the range of the qualification to be prolonged.

6.2 The request shall be submitted to PRS before the expiry date of the welder's qualification to enable verification of the submitted documents regarding welder's qualification prolongation in due time. The documents related to welder's qualification prolongation shall be retained for a minimum of 2 years.

6.3 If conditions, referred to in 4.1, are not satisfied, in order to prolong the welder's qualification, the welder shall take and pass a test which should be held in accordance with the general principles applicable to welder's qualification tests.

7 APPLICATION OF CERTIFICATES AND CONFORMITY MARKS

7.1 The Applicant (welder) has the right to refer to certification in the scope of qualifications specified in *Welder's Qualification Test Certificate*.

7.2 PRS S.A. supervises the use of issued *Welder's Qualification Test Certificates* in the process of re-certification, acc. to 6 and by verifying the use of the certificate during performing PRS supervised works. In such case the verification is made by the PRS Surveyor at PRS request execution.

7.3 Where a case of misleading use of welder's certificate has been ascertained, PRS S.A. shall take appropriate actions, e.g. corrective actions, certificate withdrawal, making public information on the fact of transgression and taking legal actions, if necessary.

7.4 PRS is the exclusive owner of the certificates.

8 COMPLAINTS AND APPEALS TO PRS DECISIONS

8.1 The Applicant (welder) has the right to appeal against the decision on issuing the *Welder's Qualification Test Certificate* (the appeal may concern the scope of qualifications or the decision on non-issuance or withdrawal of the certirficate)

8.2 Appeals to the decisions of PRS S.A. shall be submitted within 30 days from the day of decision receiving from PRS S.A.

The appeals and complaints shall contain:

– the name and address of applicant or certificate holder,
– the description of appeal/complaint subject together with its justification.

8.3 Appeals and complaints/claims concerning the certification proceedings and substantive assessment shall be sent by a registered letter addressed to the Director of Ship Division of PRS S.A.

8.4 All appeals to the decision, as well as complaints/claims of applicants or certificate holders are considered by PRS S.A. impartially, maintaining the principle of protection of interested parties concerns. Appeals and complaints are considered by the persons which have not been engaged in the assessment/certification process.

8.5 Decisions made by PRS S.A. regarding reasonability of appeals/complaints are transferred, in writing, by the Director for Ship Division within 30 days from the day of the appeal/complaint receipt in PRS S.A.

Annex 1

Request to be Granted the Qualification of the Polish Register of Shipping S.A.

WELDER′S FULL NAME: .....

WELDER′S NATIONAL PERSONAL IDENTITY NUMBER: .....

DATE AND PLACE OF BIRTH: .....

EMPLOYER: .....

TESTING STANDARD/RULES: .....

WELDER′S BOOK NO.: .....

TYPE OF QUALIFICATION TEST: INITIAL, PROLONGATION, REVISION [1)]

WELDING PROCEDURE SPECIFICATION (pWPS or WPS): .....

PREVIOUS QUALIFICATION: …….

Scope of qualification test			Welder's Qualification Test Report No./ Welder's qualification No.
Qualification test details	Proposed	Carried out[2)]	
Welding process number			Date of test piece welding
Filler transfer method			
Product type			Test piece designation:
Weld type			
Group of welding consumable			Parent material group:
Designation of welding consumable			
Thickness of parent material [mm]			Welding consumable grade
Thickness of weld metal[3] [mm]			
Outside diameter of pipes [mm]			Result of VT weld examinations root: face:
Welding position			
Weld details			
Designation of parent material			Job knowledge test result
Shielding gas/flux			
Multi-run /single-run weld			Initials and signature of Surveyor
Current type and polarity			
Backing type			
Test piece with fillet weld made in PB position			

....., Date .....

.....
Signature and stamp of the applicant

Following the Act of 29 August 1997 on personal data protection (Journal of Laws 2014, item 1182 as further amended), I give my consent to processing my personal data by the Polish Register of Shipping S.A. through entering them in the list of persons granted PRS S.A. qualifications, published on the Internet and to making, by PRS, available all and any confidential information requestd by any state security institution dealing.

…….....
Date and welder's signature

[1)] Delete as appropriate.
[2)] To be completed by PRS Surveyor.
[3)] For combined welding processes, thickness for particular processes to be given

Annex 1

I oblige myself:

- to observe respective PRS Publications provisions concerning certification of welders,
- not use the certificate so that PRS prestige could be jeopardized and not make statements that PRS could consider misleading or unauthorized,
- to discontinue the use or stop referring to it after certificate suspension or withdrawal,
- use the held certificate only for documenting the scope of possessed qualifications,
- not use the certificate or report, nor any part thereof in a misleading way.

.....
Date and signature of welder

I apply for adapting the qualification test to specific needs.

YES ☐ NO☐

If so, please specify the needs?

.....

.....

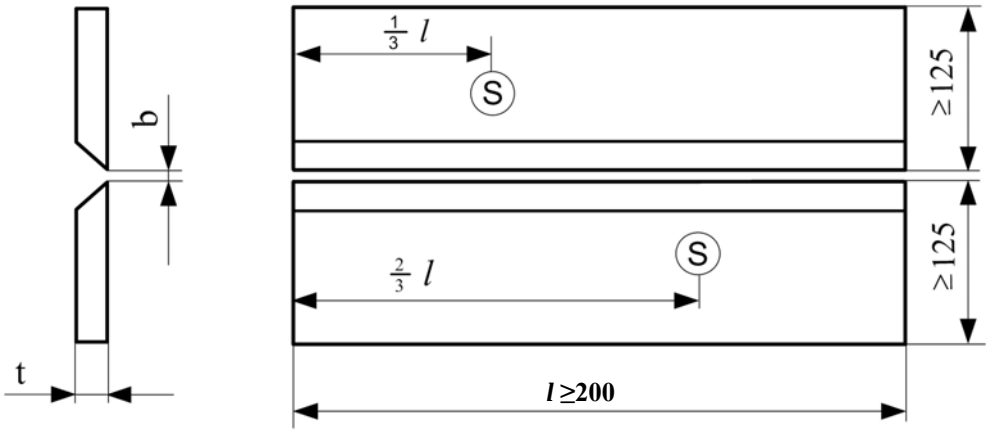
.....
Date and signature of welder

Annex 2

Groups of welding consumables for steels according to *PN-EN ISO 9606-1*

Group of welding consumable	Type of steel	Example designations of welding consumables
FM1	Low-alloy steels and fine grain steels	E 42 5 B 42 H5, G 42 4 M G 3Si1, W 46 5 W3Ni1, T 46 4 P M 1 H10
FM2	High strength steels	G 69 5 M Mn3Ni1CrMo, T 89 4 Mn2NiCrMo B M / 3 H5
FM3	Steels with chromium content Cr < 3,75%	E Mo B 4 2 H5, W CrMo1Si, S CrMo2, T CrMo1 B M / 3 H5
FM4	Steels with chromium content 3,75 ≤ Cr ≤ 12%	E CrMo5 B 4 2 H5, W CrMo5Si, S CrMo5, T CrMo5 B M / 3 H5
FM5	Stainless steels and high-temperature resistant steels	W 19 9 L, T 19 9 L MM 1
FM6	Nickel and nickel alloys	E Ni 6625 (NiCr22Mo9Nb), S Ni 6625 (NiCr22Mo9Nb)

a)



b)

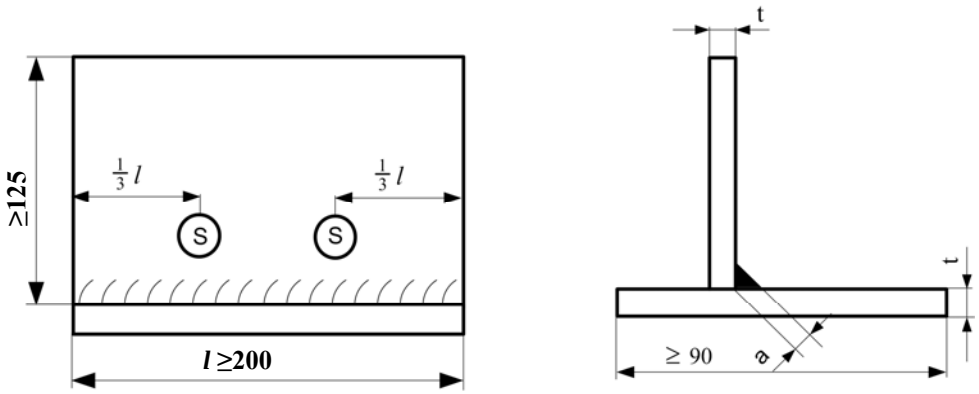
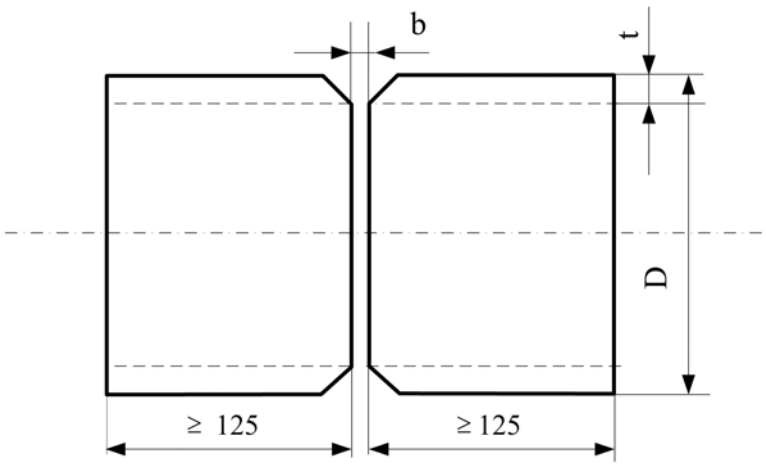


Fig. 1. Dimensions of plate test piece (P); "S" – PRS stamp.
a) butt weld (BW)
b) fillet weld (FW)), $0.5\ t \leq a \leq 0.7\ t$

a)



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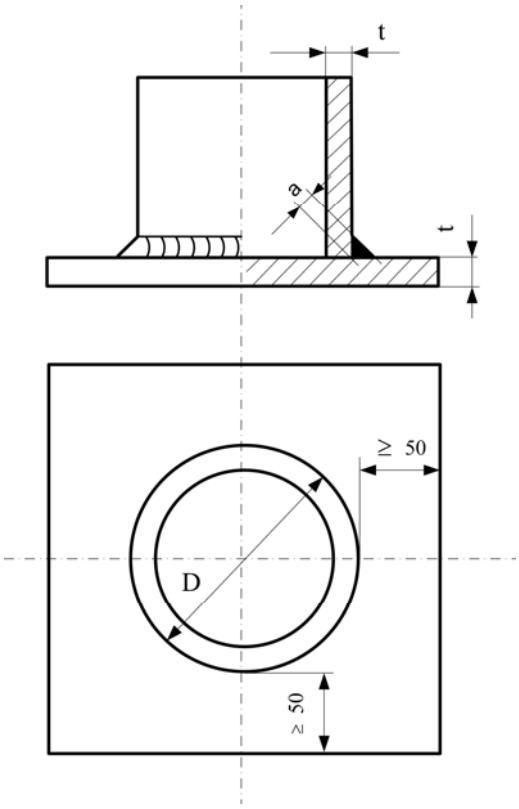

Fig. 2 Dimensions of pipe test piece (T).
a) butt weld (BW);
b) fillet weld (FW), $0.5\ t \leq a \leq 0.7\ t$

Annex 4

Grouping system for aluminium and aluminium alloys

according to Technical Report TR/ISO 15608

Group number	Sub-group number	Examples of alloy designation [1)]	
		Grade	Reference standard
1	2	3	4
Pure aluminium with ≤ 1% of impurities or alloy content			
21		EN AW-1098, EN AW-1198A, EN AW-1090, EN AW 1085, EN AW-1450, EN AW-1050A, EN AW-1060, EN AW-1070A, EN AW-1080A, EN AW-1100, EN AW-1200	EN 573-3
Not heat-treated alloys			
22	Aluminium-manganese alloys		
	22.1	EN AW-3003 (EN AW-AlMn1Cu); EN AW-3103 (EN AW-AlMn1); EN AW-3004 (EN AW-AlMn1Mg1); EN AW-3005 (EN AW-AlMn1Mg0,5); EN AW-3105 (EN AW-AlMn0,5Mg0,5)	EN 573-3
	Aluminium-magnesium alloys with Mg ≤ 1.5%		
	22.2	EN AW-5005 (EN AW-AlMg1(B)); EN AW-5050 (EN AW-AlMg1,5(C))	EN 573-3
	Aluminium-magnesium alloys with 1.5% < Mg ≤ 3.5%		
	22.3	EN AW-5052 (EN AW-AlMg2,5); EN AW-5251 (EN AW-AlMg2); EN AW-5149 (EN AW-AlMg2Mn0,5(A)); EN AW-5249 (EN AW-AlMg2Mn0,8Zr); EN AW-5454 (EN AW-AlMg3Mn(A)); EN AW-5754 (EN AW-AlMg3); EN AW-5154 A (EN AW-AlMg3,5(A)); EN AW-5154 B (EN AW-AlMg3,5Mn0,3), EN AC-51000 (EN AC-AlMg(b)); EN AC-51100 (EN AC-AlMg(a))	EN 573-3
	Aluminium-magnesium alloys with Mg > 3.5%		
	22.4	EN AW-5086 (EN AW-AlMg4); EN AW-5083 (EN AW-AlMg4,5Mn0,7); EN AW-5056A (EN AW-AlMg5); EN AW-5456A (EN AW-AlMg5Mn1(A)); EN AW-5383 (EN AW-AlMg4,5Mn0,9); EN AW-5186 (EN AW-AlMg4Mn0,4), EN AW-5383 (EN AW-AlMg4,5Mn0,9)	EN 573-3
		EN AC-51400 (EN AC-AlMg5(Si)); EN AC-51200 (EN ACAlMg9); EN AC-51300 (EN AC-AlMg5)	EN 1706
		5059	*Part IX* of PRS *Rules*
Heat-treated alloys			
23	Aluminium-magnesium-silicon alloys		
	23.1	EN AW-6005A (EN AW-AlSiMg(A)); EN AW-6060 (EN AW-AlMgSi); EN AW-6061 (EN AW-AlMg1SiCu); EN AW-6013 (EN AW-AlAg1Si0,8Cu); EN AW-6063 (EN AW-AlMg0,7Si), EN AW-6081 (EN AW-AlSi0,9MgMn); EN AW-6082 (EN AW-AlSi1MgMn), EN AW-6106 (EN AW-AlMgSiMn)	EN 573-3
	Aluminium-magnesium-zinc alloys		
	23.2	EN AW 7020 (EN AW-AlZn4,5Mg1); EN AW-7003 (EN AW-AlZn6Mg0,8Zr)	EN 573-3
Aluminium-silicon alloys with Cu ≤ 1%			
24	Aluminium-silicon alloys with Cu ≤ 1% and 5% < Si ≤ 15%		
	24.1	EN AC-44000 (EN AC-AlSi11); EN AC-44400 (EN AC-AlSi9); EN AC-44100 (EN AC-AlSi12(b)) ; EN AC-44200 (EN AC-AlSi12(a)) ; EN AC-44300 (EN AC-AlSi12(Fe)); EN AC-47000 (EN AC-AlSi12(Cu)	EN 1706
	Aluminium-silicon-magnesium alloys with Cu ≤ 1%; 5% < Si ≤ 15% and 0.1% < Mg ≤ 0.80%		
	24.2	EN AC-43300 (EN AC-AlSi9Mg); EN AC-42000 (EN AC-AlSi7Mg); EN AC-42100 (EN AC-AlSi7Mg0,3); EN AC-42200 (EN AC-AlSi7Mg0,6); EN AC-43000 (EN AC-AlSi10Mg(a)); EN AC-43100 (EN AC-AlSi10Mg(b)); EN AC 43200 (EN AC-AlSi10Mg(Cu)); EN AC-43300 (EN AC-AlSi9Mg); EN AC 43400 (EN AC-AlsI10Mg(Fe))	EN 1706
Aluminium-silicon-copper alloys with 5.0% < Si ≤ 15.0%; 1.0% < Cu ≤ 5.0%			

and Mg ≤ 0.8%			
25		EN AC-45000 (EN AC-AlSi6Cu4); EN AC-45100 (EN AC-AlSi5Cu3Mg); EN AC-45200 (EN AC-AlSi5Cu3Mn); EN AC-45300 (EN AC-AlSiCu1Mg); EN AC-45400 (EN AC-AlSi5Cu3); EN AC-46000 (EN AC-AlSi9Cu3(Fe)); EN AC-46100 (EN AC-AlSi11Cu2(Fe)); EN AC-46200 (EN AC-AlSi8Cu3); EN AC-46300 (EN AC AlSi7Cu3Mg); EN AC-46400 (EN AC-AlSi9Cu1Mg); EN AC-46500 (EN AC-AlSi9Cu3(Fe)(Zn)); EN AC-46600 (EN AC-AlSi7Cu2); EN AC-47100 (EN AC-AlSi12Cu1(Fe)); EN AC-48000 (EN AC-AlSi12CuNiMg)	EN 1706
Aluminium-copper alloys with 2% < Cu ≤ 6%			
26		EN AC-21000 (EN AC-AlCu4MgTi); EN AC-21100 (EN ACAlCu4Ti)	EN 1706

1) Numerical designation of the alloys intended for plastic working is in accordance with EN 573-1. The designation of cast alloys is in accordance with EN 1780-1. Designation of those alloys using chemical symbols according to EN 573-2 or EN 1780-2, respectively, is given in brackets.

Grouping system for cooper and cooper alloys

according to Technical Report TR/ISO 15608

Group number	Sub-group number	Examples of alloy designation [1]	
		Grade	Reference standard
1	2	3	4
Copper with 6% Ag and 3% Fe			EN 1652, EN 1653, EN 1654
31		Cu-ETP, Cu-FRTP, Cu-OF, Cu-DLP, Cu-DHP	
Copper-zinc alloys			
32	Double copper-zinc alloys		
	32.1	CuZn5, CuZn10, CuZn15, CuZn20, CuZn30, CuZn33, CuZn36, CuZn37, CuZn40	
	Multi component copper-zinc alloys		
	32.2	CuZn20Al2As, CuZn23Al2Co, CuZn38AlFeNiPbSn, CuZn38Sn1As, CuZn39Sn1	
Copper-tin alloys			
33		CuSn4, CuSn5, CuSn6, CuSn8, CuSn3Zn9	
Copper- nickel alloys			
34		CuNi25, CuNi9Sn2, CuNi10Fe1Mn, CuNi30Mn1Fe	
Copper-aluminium alloys			
35		CuAl8Fe3, CuAl9Ni3Fe2, CuAl10Ni5Fe4	
Copper-nickel-zinc alloys			
36		CuNi10Zn27, CuNi12Zn24, CuNi12Zn25Pb1, CuNi12Zn29, CuNi18Zn20, CuNi18Zn27	
Copper alloys with other components below 5%, not specified in groups 31 to 36			EN 1652, EN 1653, EN 1654
37		CuBe1,7, CuBe2, CuCo2Be, CuFe2P, CuNi2Be, CuNi2Si, CuZn0,5	
Copper alloys with other components above 5%, not specified in groups 31 to 36			
38		–	

List of amendments effective as of 25 April 2016

Item	*Title/Subject*	*Source*
1.2	Declaration on tackling conflicts of interests.	Standard ISO/IEC 17024
1.4	Reference standards added.	PN-EN ISO 9606-3 PN-EN ISO 9606-4 PN-EN ISO 9606-5
2.1.1	Editorial amendment to the Polish version	Standard ISO/IEC 17024
2.2	Clarification of the minimum qualification requirements	Standard ISO/IEC 17024
3.2.11	Reasons for stopping the qualifications test have been added	Standard ISO/IEC 17024
3.3	Additional requirements for testing the test pieces have been supplemented.	Standard ISO/IEC 17024
5	Principles for the certification scope amendment specified	Standard ISO/IEC 17024
6	Sub-chapter title amended	Standard ISO/IEC 17024
Annex 1	Annex title amended and information on making available, by PRS, candidate's personal data as requested by the state security institutions.	Standard ISO/IEC 17024