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Code for welder technical qualification

焊工技术考核规程

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Code for welder technical qualification

1 Scope

This standard stipulates the welder's technical qualification methods in the production, installation, maintenance and transformation of power generation and power supply equipment in the power industry.

This standard applies to the welding methods such as shielded metal arc welding (SMAW), tungsten inert gas welding (TIG), melting electrode (solid and flux cored) gas metal arc welding (GMAW, FCAW), oxygen fuel gas welding (OFW), submerged arc welding (SAW), etc.

The technical qualification of welders for other welding methods may refer to this regulation and other professional standards, to formulate assessment content.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this document. For undated references, the latest version (including all amendments) applies to this document.

GB/T 985.1 Recommended joint preparation for gas welding, manual metal arc welding, gas metal arc welding, high energy dense beam welding

GB/T 985.2 Recommended joint preparation for submerged arc welding

GB/T 2653 Bend test methods on welded joints

DL/T 754 Code of the welding technique for aluminum bus bar

DL/T 821 Radiographic examination and quality classification of welded burr joints in metallic materials

DL/T 868 The code of welding procedure qualification

DL/T 869 The code of welding for power plant

DL/T 1097 The code of welding for tube-sheet of condenser of power plant

JB/T 4730 Nondestructive testing of pressure equipments

4 Welder technical examination committee

4.1 Establish a welder technical examination committee.

4.1.1 The examination committee shall meet the following basic conditions:

a) Established the welder assessment agency;

b) Established the work system of the welder technical examination committee;

c) The managed number of welders and welding machine operators shall be more than 100.

4.1.2 The established examination committee shall be reported to the higher-level business department for filing.

4.2 The examination committee shall be composed of the following persons:

- The senior managers of the enterprise;

- Professional welding engineer;

- Non-destructive testing personnel with qualifications of level II and above;

- Welding technician or welding skill instructor;

- A representative of the quality inspection department;

- A representative of the human resources department.

4.3 The examination committee has one chairman, one to two vice-chairmen, and several members. The chairman shall be served by the top management of the enterprise; at least one of the vice chairman shall be a professional welding engineer.

4.4 Enterprises that have not established an examination committee shall entrust other enterprise examination committees to conduct an examination of welders.

4.5 Responsibilities of the examination committee:

- Verify the welder's qualification plan;

- Examine the qualifications of welders;

- Verify the assessment content;

6 Assessment content and scope of application

6.1 Basic knowledge assessment

6.1.1 Basic knowledge assessment content:

a) Basic knowledge of metal materials;

b) Basic knowledge of welding materials (electrode, wire, flux and gas, etc.);

c) Basic knowledge of welding equipment's types, principles, use and maintenance;

d) Basic knowledge of welding process (methods, characteristics, specification parameters, preheating, interlayer temperature, post-weld heat treatment, etc.);

e) Basic knowledge of the hazards, causes and prevention methods of welding defects, control criteria and treatment measures;

f) Basic knowledge of welded joint performance and its influencing factors;

g) Basic knowledge of the causes and prevention methods of welding stress and deformation;

h) Basic knowledge of the characteristics and working conditions of the workpiece to be welded, joint form, weld code, drawing recognition;

i) Basic knowledge of welding joint inspection;

j) Basic knowledge and regulations on welding occupational health, safety technology and environment.

6.1.2 Basic knowledge assessment shall be conducted in the following situations:

a) Participate in the assessment for the first time;

b) Re-assessment;

c) Add new welding methods.

6.2 Operation skill assessment

6.2.1 Welding method and scope of application:

a) The welding method (see Table 1) can be assessed individually or in combination.

6.2.5.3 There is no need to reassess the change of flux, protective medium, tungsten electrode types.

6.2.6 Requirements for assessment of welding:

6.2.6.1 Before the assessment, the oil, paint, rust, dirt and other sundries within the range of 10 mm ~ 15 mm from the groove of the test piece and its edge shall be removed until the metallic luster is exposed.

6.2.6.2 The welding rod, flux and welding wire used for assessment shall be matched with the test piece. The welding rod and flux shall be dried according to the specified requirements before use. The surface of the welding wire shall be cleaned of oil, rust and other sundries.

6.2.6.3 Only one side of the weld of the T-joint of the sheet shall be welded.

6.2.6.4 For pipe test pieces, the tack welds shall not be placed in the overhead welding position.

6.2.6.5 Welders participating in the assessment shall weld each test piece independently; others shall not be allowed to guide them.

6.2.6.6 Once the test piece is welded, the welding position shall not be changed or changed arbitrarily.

6.2.6.7 During the examination of the welding machine operator, it is allowed to add the arc ignition sheet and the lead sheet.

6.2.6.8 The weld, surface or root of the test piece shall not be repaired.

6.2.6.9 The assessment test piece shall not be corrected in any way.

6.2.6.10 After the test piece is welded, the weld slag and spatter on the surface of the weld and the base metal must be cleaned up; the welder and welding position shall be marked on the designated part of the test piece.

6.3 Types of welders and permitted scope of work

6.3.1 Welders who pass the examination of the sheet-shaped test piece can obtain the qualification of category III welders.

6.3.2 Welders who have passed the assessment of the corresponding position of the small-diameter pipe (diameter not greater than 63.5 mm) side barrier butt-joined test piece or the examination of the insertion test piece can obtain the qualification of category II welder, see Figure 2a).

6.3.3 Welders who have passed the examination of small diameter pipe cross barriers or 13 mm < T ≤ 25 mm pipe's butt joint test pieces or pipe-sheet's

a - Welding method: Directly mark the symbols of various methods. When two or more welding methods are combined for assessment, the welding methods are separated by "/".

b - Steel category group (the welding machine operator does not have this item): Directly mark the steel category group on both sides of the joint. When dissimilar steel is welded, the steel is separated by "/".

c - Welding position: Directly mark the welding position, as shown in Figure 1.

d - Base metal or deposited metal thickness: Directly mark the thickness, in millimeters. In case of combined assessment, the corresponding deposited metal thickness of different welding methods is separated by "/".

e - Outer diameter of test piece (sheet-shaped test piece does not have this item): Directly mark the outer diameter of the test piece, in millimeters.

f - The acidity and alkalinity of electrode coating (the welding machine operator does not have this item): J is used for alkalinity and S is used for acidity.

g - Welder category (the welding machine operator does not have this item): Directly mark the welder category.

Examples of writing assessment items:

① SMAW-AI-2G-20-S-III

SMAW is shielded metal arc welding; AI is category A steel grade I; welding is applied in the lateral position; 20 mm sheet thickness. If no code before S, it is a sheet test piece; if has code S, it is acid electrode; category III welder quality.

② TIG/SMAW-BIII-5G-5 (355) /35 (355) -J-I

The category BIII steel pipe with a wall thickness of 40 mm and an outer diameter of 355 mm, which is welded at a horizontal fixed welding position; using tungsten argon arc welding for bottoming and shielded metal arc welding to fill the cover; the bottom weld metal thickness is 5 mm, the filling cover thickness is 35 mm; alkaline electrode, category I welder quality.

③ TIG-BI/CIII-5G-5.5(48)-II

TIG is tungsten inert gas welding; category BI steel is welded to the category CIII dissimilar steel welding (such as 15CrMo/12Cr18Ni9); 5G is a horizontal fixed welding position; a tubular test piece with a wall thickness of 5.5 mm and

9 Organization and supervision of assessment

9.1 Assessment organization

9.1.1 The assessment shall implement a reporting system. The organization that organizes the assessment declares the assessment plan to the assessment committee in writing 10 to 15 days before each assessment; the assessment can only be organized after approval.

9.1.2 After passing the basic knowledge assessment, the operation skills assessment will be carried out.

9.1.3 The content of the basic knowledge assessment shall be closely integrated with the content of the operational skills assessment; a closed-book written test shall be adopted.

9.1.4 The assessment shall limit the time. The basic knowledge assessment should take 2 hours. The operating skills shall determine the assessment time according to the specific conditions of the test piece's type, material, specification, joint form, welding position, welding method, etc.

9.2 Assessment supervision

9.2.1 The assessment shall implement a supervision system. The chief examiner and invigilator shall be determined by the examination committee for each examination. The chief examiner shall be the technical person in charge of the examination institution or a person with qualifications of welding engineer and above.

9.2.2 The assessment supervision contents are as follows:

9.2.2.1 Check whether the welder's assessment plan and test papers and test pieces are consistent with the actual assessment content.

9.2.2.2 Check whether the assessment management system is complete; review the qualifications of welders participating in the assessment.

9.2.2.3 Verify that the material of the test piece, re-inspection of counterparts, tack welding and welding conditions conform to the welding procedure specification.

9.2.2.4 Check the welding specification parameters; observe the welding operation process; check the examination room discipline; fill in the supervision record.

9.2.2.5 Supervise the visual inspection and evaluation of the test piece.

is insufficient for sampling, it allows to weld other test pieces.

10.4.3 Taking a double number of specimens to make re-examination means: if one piece (piece) is unqualified, two pieces can be taken for re-examination; however, in one of the following cases, the re-examination is not allowed.

10.4.3.1 In the bending test, both face and back bends are unqualified;

10.4.3.2 Two pieces of the fracture inspection are unqualified;

10.4.3.3 The metallographic inspection of the sheet's T-joint and the pipe-sheet test piece failed;

10.4.3.4 In the inspection process, two or more items are unqualified at the same time (such as bending and metallography, bending and fracture, metallography and fracture, etc.).

10.4.4 When the double number of re-examinations is still unqualified, the welder shall be allowed to make exercise for not less than one week within one month, then take the re-examination; if the re-examination is still unqualified, the test item is judged as unqualified.

10.5 If the re-examination is still unqualified, there must be an interval of more than 3 months. After re-training, the applicant can apply for re-examination after having the welding technical ability of this type.

10.6 A welder with a welder qualification certificate must perform technical qualification again when the welding work is interrupted for more than 6 months.

11 Welder certificate

11.1 Basic conditions for the issuance of welder certificate.

11.1.1 For the welder who participates in the assessment for the first time, it must assess the sheet-shaped butt joint test piece; if no less than two items (sheet-shaped 1G must be qualified), it can apply for certificate.

11.1.2 The welder who is subject to the examination of tubular test piece for the first time, must have the basis for the four qualifications of the sheet butt joint test piece.

11.1.3 See Appendix A for the welder certificate format.

11.2 The following information shall be provided for the issuance of the welder qualification certificate, meanwhile a file shall be established in the assessment committee:

e) Failing to conduct re-examination or re-assessment according to the regulations, but continue the assessment;

f) Exceeding the certificate deadline.

11.5 The welder qualification certificate is valid for 4 years from the date of issuance.

11.6 Management of welder qualification certificate.

11.6.1 The welder qualification certificate shall be managed by the organization.

11.6.2 Two months before the expiration of the validity period of the welder certificate, the welder certificate management organization shall submit a re-examination application plan to the examination committee; the examination committee will organize welders' re-examination work on a regular basis.

11.6.3 Qualified welders have expired and are not allowed to engage in welding work for corresponding items.

11.7 Test-free certificate.

11.7.1 To apply for a test-free certificate, the following conditions shall be met:

a) The quality status of welders' daily operations shall be counted by the quality department of the enterprise according to the project; meanwhile reported to the examination committee for filing (see Table C.6 in Appendix C).

b) The welding engineering quality is consistently excellent.

11.7.2 To apply for a test-free certificate, 2 months before the expiration of the certificate, the welder management organization shall submit a written application report to the examination committee based on the conditions of the test-free certificate. The assessment committee shall proceed the certificate with the upper level authority or its authorized agencies.

11.7.3 When issuing test-free certificate, each qualified item is limited to one time and the extension period is 4 years.

11.8 Revocation of the welder certificate.

11.8.1 In any of the following situations, the welder certificate will be revoked:

a) The welding quality is consistently low, serious quality accidents or large-scale rework occur;

b) Those who do not perform welding in accordance with the welding

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