



[ISO/TC 44/SC 10](#)

Quality management in the field of welding

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Secretariat: DIN

Explanatory report on ISO 15607 (Form 08A) and observed comments

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Expected action Info



Form 8A: Committee decision for DIS

Secretariat: DIN	ISO/TC 44/SC10 N 1519
Project number and title: ISO/DIS 15607, Specification and qualification of welding procedures for metallic materials - General rules	

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ISO/TC 44/SC 10

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☒ By ballot initiated on 2018-07-09, see N 1518

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Listing of the P-members (NWIP, CD or Resolution)

P-members in favour:

Australia (SA), Austria (ASI), Belgium (NBN), Canada (SCC), China (SAC), France (AFNOR), Germany (DIN), Hungary (MSZT), Japan (JISC), Korea, Republic of (KATS), Netherlands (NEN), Portugal (IPQ), Romania (ASRO), Russian Federation (GOST R), Singapore (ESG), Slovenia (SIST), Sweden (SIS), Ukraine (DSTU), United Kingdom (BSI), United States (ANSI)

P-members voting against:

non

P-members abstaining: Denmark (DS) Finland (SFS) India (BIS), Luxembourg (ILNAS), Norway (SN), South Africa (SABS), Switzerland (SNV)
P-members who did not vote: non
Remarks: Adopted for DIS-vote by Resolution 16/2018

I hereby confirm that this draft meets the requirements of Part 2 of the ISO/IEC Directives :		
Secretariat: DIN	Date: 2018-08-15	Name/Signature of TC/SC Secretary: H. Zernitz

Specification and qualification of welding procedures for metallic materials — General rules

DIS stage

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee Technical Committee ISO/TC 44, Welding and allied processes, Subcommittee SC 10, Quality management in the field of welding..

This second edition cancels and replaces the first edition (ISO 15607:2003), which has been technically revised.

The main changes compared to the previous edition are as follows:

— **xxx xxxxxxxx xxx xxxxx TO BE COMPLETED ONLY AFTER DIS BALLOT**

Any feedback, question or request for official interpretation related to any aspect of this document should be directed to the Secretariat of ISO/TC 44/SC 10 via your national standards body. A complete listing of these bodies can be found at www.iso.org/members.html. Official interpretations, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

Introduction

Welding procedure specifications (WPSs) are needed in order to provide a well defined basis for planning of the welding operations and for quality control during welding. Welding is considered a special process in the terminology of standards for quality systems. Standards for quality systems usually require that special processes be carried out in accordance with written procedure specifications.

Preparation of a welding procedure specification provides the necessary basis for, but does not in itself ensure that the welds fulfil the requirements. Some deviations, notably imperfections and distortions, can be evaluated by non-destructive methods on the finished product.

Metallurgical deviations constitute a special problem, however, because non-destructive evaluation of the mechanical properties is impossible at the present level of non-destructive technology, this has resulted in the establishment of a set of rules for qualification of the welding procedure prior to the release of the specification to actual production. This document defines these rules

Specification and qualification of welding procedures for metallic materials — General rules

1 Scope

This document is part of a series of standards dealing with specification and qualification of welding procedures. Annex A gives details of this series of standard, annex B gives a flowchart for the use of these standards and Annex C gives a flow diagram for the development and qualification of a WPS.

This document defines general rules for the specification and qualification of welding procedures for metallic materials. This standard also refers to several other standards as regards detailed rules for specific applications.

This document is applicable to manual, partly mechanized, fully mechanized and automatic welding.

Welding procedures are qualified by conforming to one or more welding procedure qualification records (WPQR). The use of a particular method of qualification is often a requirement of an application standard.

Qualification of pWPS by more than one method is not recommended. It is assumed that welding procedure specifications are used in production by competent welders, qualified in accordance with the relevant part of ISO 9606 or by competent operators qualified in accordance with ISO 14732.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14555, *Welding — Arc stud welding of metallic materials*

ISO/TR 15608, *Welding — Guidelines for a metallic materials grouping system*

ISO 15609 (all parts), *Specification and qualification of welding procedures for metallic materials — Welding procedure specification*

ISO 15610, *Specification and qualification of welding procedures for metallic materials — Qualification based on tested welding consumables*

ISO 15611, *Specification and qualification of welding procedures for metallic materials — Qualification based on previous welding experience*

ISO 15612, *Specification and qualification of welding procedures for metallic materials — Qualification by adoption of a standard welding procedure specification*

ISO 15613, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test*

ISO 15614 (all parts), *Specification and qualification of welding procedures for metallic materials — Welding procedure test*

ISO 15620, *Welding — Friction welding of metallic materials*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 25901-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

NOTE 1 to entry: ISO 6520-1 and ISO 6520-2 contain comprehensive lists of imperfections.

3.1

manufacturer

<welding> person or organization responsible for the welding production

4 Welding procedure specification format

ISO 15609 (all parts) provide the technical content that shall be included in welding procedure specifications for the following welding processes:

- arc welding;
- gas welding;
- electron beam welding;
- laser beam welding;
- laser-arc hybrid welding;
- resistance welding.

WPS for other welding processes and for special applications may be covered by specific standards, for example:

- for stud welding, see ISO 14555;
- for friction welding, see ISO 15620.

A WPS shall be classified as a pWPS until qualified using an appropriate method in accordance with clause 5.

5 Development and qualification of welding procedures

5.1 General

Qualification of welding procedures shall be performed prior to actual welding in production.

The manufacturer shall prepare a pWPS and shall ensure that it is applicable for the actual production, using experience from previous productions and the general fund of knowledge of welding technology.

Each pWPS shall be used as a basis for establishment of WPQR qualified according to one of the methods listed in Table 1.

If the qualification involves welding of test pieces, then the test pieces shall be welded in accordance with the pWPS.

The WPQR shall comprise all variables (essential and non-essential) as well as the specified ranges of qualification given in the appropriate standard. On basis of the WPQR, the WPS for production welding is developed under the responsibility of the manufacturer unless otherwise required (see annex B).

Table 1 - Methods of qualification

Method based on	Application
Welding Procedure Test (see 5.2)	Can always be applied, unless the procedure test does not adequately correspond to the joint geometry, restraint, accessibility of the actual welds.
Tested welding consumables (see 5.3)	Application is limited to welding procedures using consumables. The testing of the consumables shall cover the parent material used in production. Further limitations as regards material and other parameters are specified in ISO 15610.
Previous welding experience (see 5.4)	Application is limited to procedures used previously for a large number of welds in comparable items, joints and materials. Requirements are specified in ISO 15611.
Standard welding procedure (see 5.5)	Similar to welding procedure test and limitations are specified in ISO 15612.
Pre-production welding test (see 5.6)	Can always be applied in principle but requires manufacture of a test piece under production conditions. Suitable for mass production. Requirements are specified in ISO 15613.
NOTE For the choice of a particular method, see Annexes A and B.	

5.2 Qualification based on welding procedure test

This method specifies how a welding procedure can be qualified by the welding and testing of a standardized test piece.

A welding procedure test may be required whenever the properties of the material in the weld metal and the heat affected zone are critical for the application.

The different parts of ISO 15614 define the welding procedure tests for the following welding processes:

- arc welding;
- gas welding;
- electron beam welding;

- laser beam welding;
- laser-arc hybrid welding;
- resistance welding.

Welding procedure tests for other welding processes and for special applications may be covered by specific standards, for example:

- for stud welding, see ISO 14555;
- for friction welding, see ISO 15620.

5.3 Qualification based on tested welding consumables

This method specifies how a welding procedure can be qualified by using tested welding consumables.

Some parent materials do not deteriorate significantly in the heat affected zones. In this case, this method of qualification may be used.

ISO 15610 defines the method of qualification by using tested welding consumables for the following welding processes:

- arc welding;
- gas welding.

Qualification by this method for other welding processes and for special applications may be covered by specific standards.

5.4 Qualification based on previous welding experience

This method specifies how a welding procedure can be qualified by demonstration of previous satisfactory welding ability.

A manufacturer may have a pWPS qualified by referring to previous experience in welding on condition that he can prove by appropriate documentation that he has previously satisfactorily welded the type of joint and materials in question.

Only welding procedures known from experience to be reliable should be used in such cases.

ISO 15611 defines the method of qualification by reference to previous welding experience for the following welding processes:

- arc welding;
- gas welding;
- electron beam welding;
- laser beam welding;
- laser beam welding;
- resistance welding.

Qualification by this method for other welding processes and for special applications may be also covered by specific standards, for example:

- for stud welding, see ISO 14555;
- for friction welding, see ISO 15620.

5.5 Qualification based on a standard welding procedure

ISO 15612 specifies how a manufacturer may adopt a welding procedure specification qualified and published as a standard welding procedure specification (SWPS) for arc and gas welding by a different organization.

The SWPS shall specify the ranges for all the relevant variables in accordance with the relevant part of ISO 15609. The organization may specify additional requirements in a SWPS it believes are necessary to follow to ensure suitable production joint weld quality.

Parent materials are limited to ISO/TR 15608 Groups 1.1, 1.2, 1.3, 11.1, 8.1, 21, 22.1 and 22.2. SWPSs for material thickness over 50 mm are not permitted for use under this standard.

The manufacturer is responsible for the appropriate selection and application of the SWPS.

5.6 Qualification based on a pre-production welding test

This method specifies how a welding procedure can be qualified by pre-production welding tests.

This method is the only reliable method of qualification for some welding procedures, in which the resulting properties of the weld strongly depend on certain conditions such as; component, special restraint conditions, heat sinks etc., which cannot be reproduced by standardized test pieces.

Qualification by a pre-production welding test may be used where the shape and dimensions of standardized pieces do not adequately represent the joint to be welded, e.g. attachment weld to thin pipe. In such cases, one or more special test pieces shall be made to simulate the production joint in all essential features. The test shall be carried out prior and under the conditions to be used in production.

Inspection and testing of the test piece shall be carried out in accordance with the appropriate standard for procedure testing, but this testing may need to be supplemented or replaced by special tests according to the nature of the joint in question. ISO 15613 defines the method of qualification by pre-production welding tests for the following welding processes:

- arc welding;
- gas welding;
- electron beam welding;
- laser beam welding;
- laser beam welding;
- resistance welding.

Qualification by this method for other welding processes and for special applications may be also covered by specific standards.

6 Validity

A qualification is valid indefinitely for the ranges qualified unless otherwise specified.

Annex A (informative)

Details of standards dealing with specification and qualification of welding procedures

See Table A.1.

Table A.1 – Standards dealing with specification and qualification of welding procedures

Process	Arc welding	Gas welding	Electron beam welding	Laser beam welding	Laser-arc hybrid welding	Resistance welding	Stud welding	Friction welding
General rules	ISO 15607							
Guidelines for a grouping system	ISO/TR 15608			NOT APPLICABLE	ISO/TR 15608	NOT APPLICABLE	ISO/TR 15608	
WPS	ISO 15609-1	ISO 15609-2	ISO 15609-3	ISO 15609-4	ISO 15609-6	ISO 15609-5	ISO 14555	ISO 15620
Previous welding experience	ISO 15611						ISO 15611 ISO 14555	ISO 15611 ISO 15620
Standard procedure	ISO 15612					NOT APPLICABLE		
Pre-production test	ISO 15613						ISO 15613 ISO 14555	ISO 15613 ISO 15620
Welding procedure test	<u>ISO 15614</u> Part 1: Steel/Nickel Part 2: Aluminium Part 3: Cast iron Part 4: Finishing welding of aluminium castings Part 5: Titanium /zirconium Part 6: Copper Part 7: Overlay welding Part 8: Tube to tube sheet Part 9: Wet hyperbaric Part 10: Dry hyperbaric	<u>ISO 15614</u> Part 1: Steel/Nickel Part 3: Cast iron Part 6: Copper Part 7: Overlay welding	<u>ISO 15614</u> Part 7: Overlay welding Part 11 : Electron beam/Laser beam		<u>ISO 15614</u> Part 14: Laser-arc hybrid welding of steels, nickel and nickel alloys	<u>ISO 15614</u> Part 12 : Spot, seam and projection Part 13 : Flash and butt	ISO 14555	ISO 15620

Annex B (informative)

Different phases in welding procedure qualification

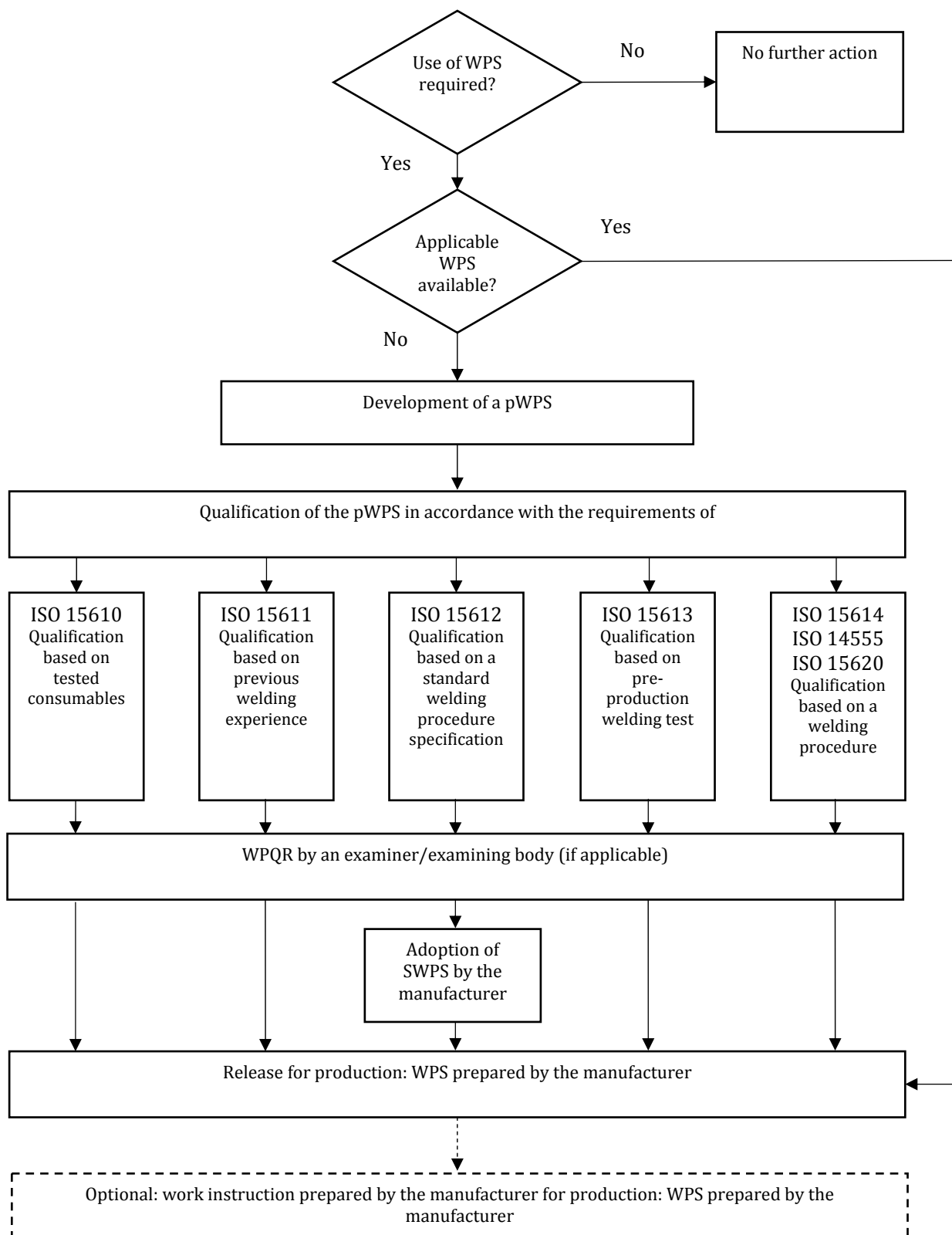
See Table B.1.

Table B.1 – Different phases in welding procedure qualification

Activity	Result	Party involved
Development of the Procedure	pWPS	Manufacturer
Qualification by any method	WPQR including the range of validity based on the relevant standard of qualification	Manufacturer ¹ and, if applicable, examiner/examining body ²
Finalization of the procedure	WPS based on this WPQR	Manufacturer
Release for production	Approved WPS or work instruction	Manufacturer
¹ An organisation other than the manufacturer can be involved in the case of the qualification of a SWPS ² In certain cases, an external independent examiner/examining body can be required.		

Annex C (informative)

Flow diagram for the development and qualification of a WPS



Bibliography

- [1] ISO 6520 (all parts), *Welding and allied processes - Classification of geometric imperfections in metallic materials*
- [2] ISO 9606 (all parts), *Qualification testing of welders — Fusion welding*
- [3] ISO 14732, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*

Template for comments and secretariat observations

Date:2018-08-09

Document: DIS 15607

Project:

MB/ NC ¹	Line number	Clause/ Subclause	Paragraph/ Figure/Table	Type of comment ²	Comments	Proposed change	Observations of the secretariat
JP 001		2		ge	Add ISO/TR 15608 and ISO/TR 25901-1 to Normative references	Add the following documents to Normative references. ISO/TR 15608, <i>Welding –Guidelines for a metallic materials grouping system</i> ISO/TR 25901-1, <i>Welding and allied processes –Vocabulary –Part 1: General terms</i>	Agreed
JP 002		2		ed	ISO 15609 (all parts), <i>Specification and approval of welding procedures for metallic materials –Welding procedure specification</i>	ISO 15609 (all parts), <i>Specification and qualification of welding procedures for metallic materials –Welding procedure specification</i>	Agreed
BE 003		5.2	3	te	Laser arc hybrid welding is missing in the list of welding processes	Add laser arc hybrid welding	Agreed
JP 004		5.2	3 rd par	ge	Add “laser-arc hybrid welding” between “laser beam welding” and “resistance welding”	— laser beam welding; — laser-arc hybrid welding; — resistance welding.	See above
US 005		5.3	2nd	te	(Shaw) “Some materials” needs to be clarified	Some <u>parent</u> materials ...	Agreed
JP 006		5.3	3 rd par	ed	Delete a hyphen. — — arc welding; — — gas welding.	— arc welding; — gas welding.	Agreed
US 007		5.4	2nd	te	“authentic” seems redundant with documentation. How would you define “authentic”, and how would you expect something to be declared “fake”?	Delete “authentic”	A manufacturer may have a pWPS qualified by referring to previous experience in welding on condition that he can prove by appropriate <u>authentic</u> documentation of <u>an independent nature</u> that he has previously satisfactorily welded the type of joint and materials in question.
US		5.4	2nd	te	It is unnecessary for the documentation to be “of an independent nature” as it may have been	Delete “of an independent nature”	See above

1 MB = Member body / NC = National Committee (enter the ISO 3166 two-letter country code, e.g. CN for China; comments from the ISO/CS editing unit are identified by **)

2 Type of comment: ge = general te = technical ed = editorial

Template for comments and secretariat observations

Date:2018-08-09

Document: DIS 15607

Project:

MB/ NC ¹	Line number	Clause/ Subclause	Paragraph/ Figure/Table	Type of comment ²	Comments	Proposed change	Observations of the secretariat
008					developed by the manufacturer and their own program. It is also difficult to define “independent.” If it has been tested by a subcontractor for the manufacturer, is it independent?		
JP 009		5.4	4 th par	ge	Add “laser-arc hybrid welding” between “laser beam welding” and “resistance welding”	— laser beam welding; — laser-arc hybrid welding; — resistance welding.	Agreed
JP 010		5.5	2 nd par	ed	... in accordance with ISO 15609.	... in accordance with the different parts of ISO 15609.	“With the relevant part of ISO 15609”
US 011		5.5	3rd	te	The standard cannot prohibit someone from publishing something, but the standard can prohibit someone from using that document.	Change “shall not be published” to “shall not be used”	Are not permitted for use under this standard
JP 012		5.6	4 th par	ge	Add “laser-arc hybrid welding” between “laser beam welding” and “resistance welding”	— laser beam welding; — laser-arc hybrid welding; — resistance welding.	Agreed
US 013		Annex A	Table A.1	ed	A question mark remains in “Guidelines for a grouping system” under “Laser”	Is this reference unresolved, or is it a draft remnant or typo?	Delete the question mark
JP 014		Annex A	Table A.1	ed	Laser arc hybrid welding	Laser arc hybrid welding	Agreed
BE 015		Annex A	Table A.1	ed	Guidelines for a grouping system for Laser arc hybrid welding, the question mark after ISO/TR 15608 should be removed.	Remove the question mark after ISO/TR 15608	Agreed
BE 016		Annex B	Table B.1	te	Step “release for production”, the result should be an “ approved ” WPS or work instruction” instead of “copy”	Replace “copy” with “approved”	Agreed
US 017		Annex C	Flow Diagram	te	The box “WPQR by an examiner / examining body” implies that such a person or body is required in all cases. There is no such requirement in this standard. Examiners / examining bodies are only mention in informative Annex B, with an “if	Delete the box. Optionally, add “if applicable” or “if required” to the statement in the box.	Add if applicable per Annex B

¹ MB = Member body / NC = National Committee (enter the ISO 3166 two-letter country code, e.g. CN for China; comments from the ISO/CS editing unit are identified by **)

² Type of comment: ge = general te = technical ed = editorial

Template for comments and secretariat observations

Date:2018-08-09	Document: DIS 15607	Project:
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MB/ NC ¹	Line number	Clause/ Subclause	Paragraph/ Figure/Table	Type of comment ²	Comments	Proposed change	Observations of the secretariat
					applicable” statement in the right column, and with a “can be required” in footnote 2.		

¹ **MB** = Member body / **NC** = National Committee (enter the ISO 3166 two-letter country code, e.g. CN for China; comments from the ISO/CS editing unit are identified by **)

² **Type of comment:** **ge** = general **te** = technical **ed** = editorial