Deskriptoren: Schweißverfahrensprüfung, Interpretationen

1 Anwendungsbereich und Zweck

Dieses Merkblatt dient der Klärung von Fragen zur internationalen Norm ISO 15614-1.

Seit Veröffentlichung von ISO 15614-1 „Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys“ im Jahr 2004 sind aus verschiedenen Ländern Anfragen zum Verständnis und zur Auslegung der Norm gestellt worden. ISO/TC 44/SC 10 „Qualification requirements in the field of welding“ behandelt diese Fragen in seinen Sitzungen und veröffentlicht diese dann.

Die bislang gestellten Fragen wurden in den Sitzungen von ISO/TC 44/SC 10 behandelt und beantwortet und sind im Folgenden im Original wiedergegeben.

2 Gestellte Fragen

Im Folgenden sind die bisher gestellten Fragen in der Originalfassung zur ISO 15614-1:2004 / Amd 1:2008 + Amd 2:2012, entsprechend der Deutschen Fassung DIN EN ISO 15614-1, „Anforderung und Qualifizierung von Schweißverfahren für metallische Werkstoffe — Schweißverfahrensprüfung — Teil 1: Lichtbogen- und Gasschweißen von Stählen und Lichtbogenschweißen von Nickel und Nickellegierungen“, wiedergegeben.

ISO/TC44 /SC 10 wird dabei:

- keine Beratung zur Anwendung der Norm liefern,
- keine Erläuterungen der Anforderungen selbst geben;
- nur die Anforderungen in der Norm klären;
- die Antworten nur mit ja oder nein geben und ggf. lediglich kurze Erklärungen liefern, wo es dem Leser hilft.

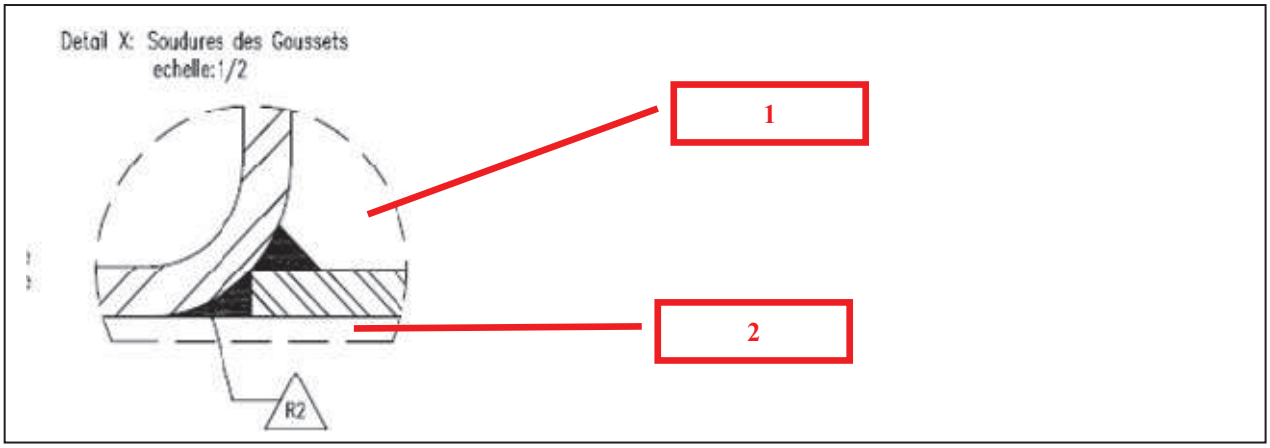
Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**How to qualify the welds?**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question



Answer proposed by the author of the question

1) The shape of the part serves as a weld preparation, so this weld = T-joint with partial penetration

2) To be qualified with a butt weld

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2015-07-07 in Helsinki, Finland:

According to ISO 2553:2013, Table 5, No. 1.7 HV butt weld

Type of question: ***Request for interpretation of ISO/TC 44 published standards***

Reference *(including edition and any published corrigenda or amendment)*	***Subclause number***	***SC in charge***
ISO 15614-1:2017 + Amd 1:2019	6.2.3 and Table 9	SC 10
Title		
Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys		

Needed interpretation :

6.2.3 NOTE states that pipe is used to mean e.g. hollow section except square or rectangular hollow section. However, Table 9 NOTE 1 states that there are other hollow sections besides circular.

Question 1:
Are square or rectangular hollow sections pipes in ISO 15614-1?

Question 2:
If square or rectangular hollow sections are not pipes, are they covered by butt weld qualification for plates (according to 8.3.3)?

Proposed interpretation by the author:

Question 1:
No

Question 2:
Yes *(NOTE We think that logically it would go like this, but it should be clearer in the future)*

Response from the SC responsible for the standard:

Q1. The intent of ISO 15614-1:2017 is that square and rectangular hollow sections are not considered to be pipe - see 6.2.3.
Q2. The intent is that square and rectangular hollow sections shall be treated as plate (butt welds and fillet welds).
This will be considered in the revision of ISO 15614-1.

Date of ISO/TC 44/SC 10/WG 5 revised answer: 2024-01-18 - FI abstained

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1	**Table 2 – Footnote f)**	

Question

For fillet welds, tee joints and branch connections where the joint configuration does not permit mechanical testing, Table 2 - footnote f, states 'Where mechanical properties are required by an application standard, it shall be tested accordingly' by means of an additional test piece using the same welding parameter range, parent material group, filler metal and heat treatment. In the case of a single pass fillet weld, is it acceptable to use a multi-pass butt joint qualification to demonstrate the required mechanical properties?

Answer proposed by the author of the question

Yes. The limitation in section 8.4.3 – Type of joint / weld, note j) does not apply in this instance. It is impractical and generally not possible to obtain mechanical test samples representative of a single pass fillet weld from a single pass butt joint. Parent material and weld metal mechanical properties are indicatively established by the multi-pass butt joint and may be used to support a single pass fillet, tee joint or branch connection providing the consumable classification and parent material group are the same and the welding heat input used for the single pass fillet is within the range permitted by the supporting butt weld qualification.

Answer of the responsible ISO/TC 44/SCs

Yes, unless impact testing is required - see 8.4.3 bullet point j).

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**Fig. 5**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Hardness measurements should be performed in the coldest area (should be near the start)
On a butt weld, the location of the hardness measurements is on location 6 (near end).
Shouldn't this be changed?

Answer proposed by the author of the question

Holger Zernitz (Secretary of ISO/TC 44/SC 10):
I agree with you, it makes no sense to have different locations for the hardness test specimen in a BW and in a T-joint. But although it is only a problem for welding without preheating. But also in this case the location of the hardness test specimen is not very important, because after 30 mm length of the weld the heat input should be high enough not to affect the results of the hardness test. Nevertheless, I agree that in the BW and a T-joint the location of the hardness test specimen should be similar! Therefore, we will modify figure 5 regarding the probe for hardness testing to the opposite position.

Answer of the responsible ISO/TC 44/SCs

Accepted by ISO/TC 44/SC 10

Type of question: **Interpretation**

ISO/TC 44

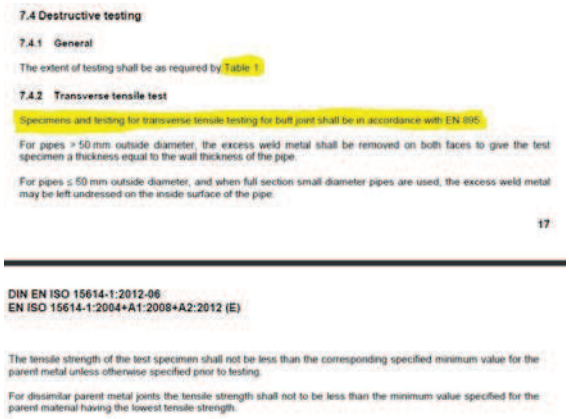
Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**7.4.1 and 7.4.2**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

I have a question regarding with extend of Tensile Testing described in Standard EN 15614-1 at item 7.4.1 and 7.4.2.

As per Table 1 referred by item 7.4.1 Tensile Test pieces to be extracted (from any size of plate) is defined **as two**. (Pls. see attached file)



7.4 Destructive testing

7.4.1 General

The extent of testing shall be as required by Table 1.

7.4.2 Transverse tensile test

Specimens and testing for transverse tensile testing for butt joint shall be in accordance with EN 895.

For pipes > 50 mm outside diameter, the excess weld metal shall be removed on both faces to give the test specimen a thickness equal to the wall thickness of the pipe.

For pipes ≤ 50 mm outside diameter, and when full section small diameter pipes are used, the excess weld metal may be left undressed on the inside surface of the pipe.

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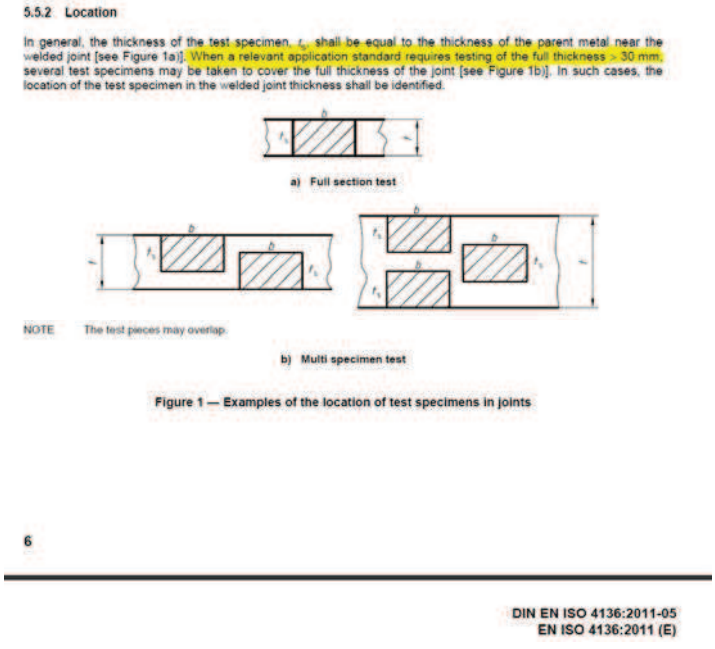
DIN EN ISO 15614-1:2012-06
EN ISO 15614-1:2004+A1:2008+A2:2012 (E)

The tensile strength of the test specimen shall not be less than the corresponding specified minimum value for the parent metal unless otherwise specified prior to testing.

For dissimilar parent metal joints the tensile strength shall not to be less than the minimum value specified for the parent material having the lowest tensile strength.

Whereas, EN 895 recently replaced by DIN EN ISO 4136 states at item "5.5.2 Location - ……When a relevant application standard requires testing **of the full thickness** > 30mm several test specimens may be taken to cover the full thickness of the joint." (Pls. see attached file)



5.5.2 Location

In general, the thickness of the test specimen, t_s, shall be equal to the thickness of the parent metal near the welded joint [see Figure 1a)]. When a relevant application standard requires testing of the full thickness > 30 mm, several test specimens may be taken to cover the full thickness of the joint [see Figure 1b)]. In such cases, the location of the test specimen in the welded joint thickness shall be identified.

a) Full section test

b) Multi specimen test

NOTE The test pieces may overlap.

Figure 1 — Examples of the location of test specimens in joints

6

DIN EN ISO 4136:2011-05
EN ISO 4136:2011 (E)

My question: What shall be the number of tensile test specimens for a butt welded test coupon with thickness 200mm? Two or more specimens to be extracted to represent full thickness (See attached example) depending on the capacity of the tensile testing machine?

Type of question: **Interpretation**

ISO/TC 44

It may be necessary to machine a number of specimens through the thickness of a weld, particularly on very thick joints where the capacity of the tensile machine is insufficient to pull a full thickness specimen, *Fig.3*.

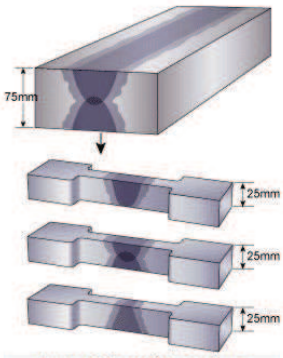


Fig.3. Multiple cross joint specimens machined from thick plate

Tolga Kantaroğlu

Answer proposed by the author of the question

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Answer of the responsible ISO/TC 44/SC s

ISO/TC 44/SC 10 meeting on 2015-07-07 in Helsinki, Finland:
According to clause 7.4.2, tensile testing shall fulfill EN 895 (new ISO 4136). In clause 5.5.2 in ISO 4136, a relevant application standard may require more than one specimen to cover the whole thickness. This additional requirement isn't required in ISO 15614-1, clause 7.4.2. Note: An additional requirement to cover the whole thickness with more than one specimen will be considered for the next issue of ISO 15614-1.

Number ***Subclause number*** ***SC in charge***

ISO/TC 44

INTERPRETATION REQUEST FORM

For ISO/TC 44 office use only **Date of arrival:** _____ _____

Requesting ISO Member Body or Liaison member	
Contact person	
Phone	
E-mail	
Requesting Organization	
Date of original request	*08.05.2017*
Contact person	*Alexander Luithle*
Phone	*0208-456-2981*
E-mail	*alexander.luithle@siemens.com*

Interpretation Request

Standard: DIN EN ISO 15614-1 Issue: 2004 / 2012 Clause(s) / subclause: 7.4.3 bend test

(Note: Please formulate the question in a format that enables either a YES or a NO answer)

Is an application of longitudinal bend test specimens instead of bend test specimens (transverse to the weldment) for dissimilar metal joints and heterogeneous butt joints in plates for plate thickness <12 mm according to DIN EN ISO 15614-1 possible if the applied weld deposit is weaker in relation to the base material(s)?

Please indicate the background scenario to the request:

A welding procedure qualification is performed according DIN EN ISO 15614-1. The tensile strength of both base material is high (Rm1 = 1000 MPa and Rm2 = 1350 MPa). In comparison to the tensile strength of the base materials the tensile strength of the weld material is low (Rm = 740 MPa). For the design the tensile strength of the weld material is acceptable.

The bend tests (transverse to the weld joint) showed that bend angles of 180° are not realizable because of the high strength of the base materials in comparison to the lower strength of the weld material. Both base materials show no or only low plastic deformation during the bend tests. The whole or nearly the whole plastic deformation is located in the small area of the joint (4 mm wide in the root; X-shaped weld preparation; plate thickness 6 mm). Despite of the high plastic deformability of the weld material the bend specimens failed in the weld material or in the transition between weld and base material before reaching the bending angle of 180°. Investigations on the fracture surfaces show no indications for welding defects.

Restricted Progress report to MB Date: _____
Final answer ISO/TC 44 Date: _____

Proposed answer

Based on the results of bend test and based on the hint given in DIN EN ISO 15614-1, paragraph 7.4.3 (bend test) for **dissimilar metal joints and heterogeneous butt joints** it is proposed to replace the bend specimens (transverse to the weld joint) **by longitudinal bend test specimens also for plate thicknesses below 12** mm if ***the applied weld deposit is weaker in relation to the base material(s).***

DIN EN ISO 15614-1 refers to DIN 910 and the follow specification DIN EN ISO 5173. Both specifications show a method for making longitudinal root and face bend tests to be used instead of transverse bend tests for heterogeneous assemblies when base materials and/or filler metal have a significant difference in their physical and mechanical properties in relation to bending independent from the thickness of the joint.

Decision of TC 44/SC 10

agreed (May 2017)

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004	**7.4.5**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

- Is our understanding correct, that the last sentence in para 7.4.5 quote “Where multiple welding processes are qualified in a single test piece, impact test specimens shall be taken from the weld metal and HAZ that include each process.” Unquote is applicable for two or more (multiple) processes only, which shall be qualified separately in one test piece for use in single-process WPS?
- Does it mean that the quoted requirement is **not** applicable for multi-process procedures, for which the combination and sequence of weld-processes is equal in the corresponding WPS?
- Does it also mean that a single testing of the overall weldmetal (e.g. by one set of notch impact specimen for weldmetal and one for HAZ as defined by standard), without differentiating between the different weld process and weld metals, which have been applied, qualify all processes and weld metal of the whole multi-process joint?

A difference between the single use of each process (“multiple welding processes” acc. to para 7.4.5) and a “multi-process” use is made. Also the “NOTE” in para 8.4.1 is emphasizing this understanding.

Bilfinger Piping owns several welding procedure qualifications on pipes above wall thickness 30 mm, in which the root is welded with process 141 (TIG) and filling is done with other processes, as 111 or 121 (SMAW or SAW). The corresponding WPS specifies the same multiprocess sequence. Impact testing on weld metal and heat affected zone, had been performed 2 mm below outside surface, as required by EN ISO 15614-1. A client believes that additional Impact Testing (WM and HAZ) on the TIG-root for all multiprocess welding procedures is mandatory and now likely to question our qualified WPQRs. This does not fit to our understanding of the standard and the different wording used in it.

Answer proposed by the author of the question

It is allowed, to use multi-process procedures with two sets of impact specimen (WM and HAZ) only. Additional impact testing on each process (e.g. TIG-root) is not required, if the corresponding WPS specifies the same combination and sequence of weld-processes.

Answer of the responsible ISO/TC 44/SCs

Answer from ISO/TC 44/SC 10 on 2013-10-15 in Paris

The answer is **NO**, unless the weld covers only two processes and the specimens are taken from the weld metal and HAZ that include both processes.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**7.4.6**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

New steels with min R_{eH} 960 to 1100 MPa that are thermomechanically treated, so called direct quenched, fine-grain steels are according to ISO/TR 15608 grouped as 2.2, since they are not tempered. However, they typically get > 400 HV in HAZ which is fine since the low carbon content present a relative ductile hardened structure. The situation is therefore similar as for the materials in group 3.

In ISO 15614-1 table 2 the materials in group 3 has a footnote b saying “For steels with min R_{eH} > 890 MPa special values shall be specified”. This means that the specified/permitted maximum hardness values come from the steel manufacturer..

Question:

For procedures qualified according to ISO 15614- 1:2004, what is the permitted maximum hardness value (HV 10) for steels in material group 2 according to ISO/TR 15608:2005 with min R_{eH} > 890 MPa?

Answer proposed by the author of the question

Answer of the responsible ISO/TC 44/SCs

meeting on 2010-10-23 in Hannover:

ISO 15614-1:2004 table 2 footnote b saying “For steels with min R_{eH} > 890 MPa special values shall be specified” also covers materials in group 2 according to ISO/TR 15608:2005.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.2**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Can a manufacturer simply give his qualified WPS to a subcontractor to perform the welding?
Is that WPS valid in this case?

Answer proposed by the author of the question

The standard says that it can be done in this way as long as the manufacturer retains the complete responsibility for all welding. The welding coordinator will have to supervise the welding so that he is sure the WPS is used in a good way.

Answer of the responsible ISO/TC 44/SCs

Declined by ISO/TC 44/SC 10

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004	**8.3.1**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Material grouping of 16Mo3 steel
16Mo3 - seamless tube for pressure purposes with Re_{min} 280 N/mm2, acc. to EN 10028-2 belongs to sub-group 1.2. (acc. chemical composition and mechanical properties).
The other similar 16Mo3 products (tubes with thk. >16 mm, plates, etc.) have lower specified Re (≤275 N/mm2) and acc. to CEN ISO/TR 15608 belongs to sub-group 1.1.

The sentence in EN ISO 15614-1; (*subclause 8.3.1: If one parent material belongs to two groups or sub-groups, it shall always be classified to lower group or sub-group)*
can be interpreted that above requirement valid only if a range of qualification of particular welded sample covers also thicknesses or products with lower specified Re (or $R_{p0,2}$). In this case it is reasonable to be clasified to lower group, as stated in subclause 8.3.1.
But, the particular welded sample on seamless tube for pressure purposes, for example 60,3 x 5,0 mm, covers wall thicknesses to including 10,0 mm which is also less than 16 mm. In this case the complete range of qualification is within the same sub-group 1.2. So, there should be no restrictions to issue WPQR with declared material grouping to sub-group 1.2.

Answer proposed by the author of the question

8.3.1; If one parent material belongs to two groups or sub-groups, concerning the fact that the particular welded sample covers range of qualification also for two groups or sub-groups, it shall always be classified to lower group or sub.group.
If particular welded sample used for welding procedure test, including the complete range of qualification, covers only one group or sub-group, the material should be classified to specified higher group or sub-group.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2015-07-07 in Helsinki, Finland:

According to ISO/TR 15608:2013, Table 1, Group 1.1

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**Table 3**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

There where the range of qualification is indicated with remarks a , b and c.
E.g. :
a) 1^a – 1 : a lot of confusion if the remark “a” is only applicable on the first 1 or both 1.
b) 4^b – 4 : a lot of confusion if the remark “b” is only applicable on the first 4 or both 4.

Answer proposed by the author of the question

a) The remark “a” is applicable on both 1, so you only qualify the materials from the same group and with equal or lower yield strength.

Examples:
PQR S235 (1.1) / S355 (1.2) does NOT qualify S355 (1.2) / S355 (1.2)
PQR S235 (1.1) / S235 (1.1) does NOT qualify S235 (1.1) / S355 (1.2)

b) The remark “b” is applicable on both 4, so you only qualify the materials from the same group and lower group.

Example:
PQR 4.1 / 4.1 does NOT qualify 4.1 / 4.2 and 4.2 / 4.2

Answer of the responsible ISO/TC 44/SCs

Accepted by ISO/TC 44/SC 10

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004	**8.3.2.1**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

How should the last sentence in clause 8.3.2.1 be interpreted?

Answer proposed by the author of the question

In our understanding it is applicable if you use a multi-process qualification to qualify a single process, but not for the thicknesses of each process in a multi-process application.

Otherwise with a qualification (wall thickness 11 mm, welded 4 mm 141 and 7 mm 111) it would be impossible to reach the lowest qualified wall thickness of 3 mm, because the min. qualified thickness for each process would be 3 mm (see table 5).

For the max. qualified wall thickness of 22 mm, it would be necessary to weld exactly the max. qualified thickness for each processes (8 mm for 141 and 14 mm for 111). This leads to unnecessary thick roots and is impractical for production.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2015-07-07 in Helsinki, Finland:
For qualification of a multi process, the complete thickness of butt weld (in summary) is relevant. That's means for 3 mm up to 22 mm independent of the thickness of the single used process; please keep in mind, note in 8.4.1.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.3.2.1**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

What significance does the thickness t have for the qualification of welding procedures in accordance with clause 8.3.2.1 c), d) and e)?

Answer proposed by the author of the question

Answer of the responsible ISO/TC 44/SCs

meeting on 2013-01-18 in Paris:

c) For the joint of a set-on branch connection, the thickness t_2 of the set-on branch in accordance with Figure 4 of DIN EN ISO 15614-1 is authoritative. (SC10 knows that it is in the present version in contradiction to the written text.)

d) For the joint of a set-in or set-through (pushed through) branch connection, the thickness t_1 of the main pipe in accordance with Figure 4 of DIN EN ISO 15614-1 is authoritative.

e) For the joint of a t-joint in plate with full penetration, the thickness t_2 of the fully penetrated plate in accordance with Figure 3 of DIN EN ISO 15614-1 is authoritative.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.3.2.1**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Can results of multiple welded test pieces with dimensions: Ø17,2 x 1,5; Ø60,3 x 5,6; Ø168,3 x 17,5 which are welded multilayer with process 141 be summarized in a WPQR record and certify therewith a total range of qualification Ø ≥ 8,6 to ∞ and t: 1,05 – 35 mm, or is a record with the range of qualification to be prepared for each of the welded test pieces?

See clause 9; „each test piece“ is written, but is it really intended?

Answer proposed by the author of the question

Answer of the responsible ISO/TC 44/SCs

Dipl.-Ing. J. Mußmann, Chair of ISO/TC 44/SC10, 2010-11-16

It is common to report the results of the welded test pieces together in a joint WPQR record, referring to the same basic materials, the same filler metals, the same procedure and only the different dimensions. The range of qualification of the WPQR will then no longer show the range of qualification of the individual test pieces.

Ø 17,2 x 1,5: Ø8,6 – 34,4; t: 1,05 – 3,0 mm
Ø 60,3 x 5,6: Ø 30,1 – ∞; t: 3,0 – 11,2 mm
Ø 168,3 x 17,5: Ø 84,1 – ∞; t: 3,0 – 35 mm
Instead, Ø ≥ 8,6 to ∞ and t: 1,05 – 35 mm are shown in the WPQR record.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.3.2.2**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

What is the range of qualification for thickness for branch connections?

- Main pipe t 12,5 mm and set-on-pipe t 9 mm

- No impact testing performed (according to table 1 and for obvious reasons)

In table 5 there is a foot note: *"when impact requirements are specified the upper limit of qualification is 12 mm unless impact testing has been performed."*

This note is only for test pieces t 3 mm – 12 mm.
The note is not there for test pieces t 12 mm – 100 mm, which in this case give the range of qualification t 6,25 mm – 25 mm. Is this correct?

In the old EN 288-3 the mentioned footnote in table 5 was for the whole table. Could it be that in the revision only the "usual" butt welds (in plate) was regarded?

Answer proposed by the author of the question

Answer of the responsible ISO/TC 44/SCs

ISO/TC44/SC10, meeting on 2010-10-23

If no impact requirements, the foot note is not valid and the range will be 3 mm – 18 mm and 6,25 mm - 25 mm respectively.

If there are impact requirements no impact testing is needed for test pieces between 3 mm and 12 mm (according to foot note table 5), but the range is then max 12 mm. Test pieces t > 12 mm shall be impact tested! If this is not practical a separate test piece in plate must be used.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**Table 5**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

a) Butt weld welded on both sides with 1 run is this single run or multi-run?
b) Remark “a when impact requirements are specified” When are they specified? If the customer does, if the applicable material standard does specify them?

Answer proposed by the author of the question

a) Butt weld welded on both sides with 1 run is considered as single run
b) If the applicable material standard specifies impact requirements

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

a) Was agreed.
b) It depends on product/material Standards or customer's specification.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**Table 5**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

a) Butt weld welded on both sides with 1 run is this single run or multi-run?
b) Remark “a when impact requirements are specified” When are they specified? If the customer does, if the applicable material standard does specify them?

Answer proposed by the author of the question

a) Butt weld welded on both sides with 1 run is considered as single run
b) If the applicable material standard specifies impact requirements

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

a) Was agreed.
b) It depends on product/material Standards or customer's specification.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.5.2.3 and 8.3.2.2 / Table 5**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Question:

A WPQR was performed using process 135 (MAG) with the short-circuiting transfer (dip) mode used for some passes and the spray transfer mode used for the remaining passes.

Question 1 : For measurement of the weld deposit thickness (t), is it required to measure the short-circuiting mode weld deposit separately from the spray mode weld deposit ?

Question 2 : Is it required that the separate weld deposit thicknesses for each transfer mode be applied individually for establishing the weld deposit thickness range in Table 5 ?

Answer proposed by the author of the question

Tom Doody 7160 Las Ventanas Drive Austin, TX 78731 (received via Andrew Davis from AWS)

No proposed answer.

Answer of the responsible ISO/TC 44/SCs

Both questions can be answered with “YES”.

(ISO/TC 44/SC 10 meeting in May 2016)

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**Table 6**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

What is the range of qualification if a plate of 3 mm is welded on a thick plate of 10 mm with a fillet weld?

Answer proposed by the author of the question

If 2 different plate thicknesses are used in case of a fillet weld, one should apply the range of qualification on each thickness independant. So in this case 2.1 mm to 6 mm on 5 mm to 12 mm.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

The range of qualification for a fillet weld with different material thicknesses, the range depends on each material thickness based on table 6. For both of these materials the range of qualification is based on this table.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.1**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Are the individual processes separately qualified through a multi-process procedure test (e.g. process sequences 141, 111, 121) in accordance with clause 8.4.1?

Answer proposed by the author of the question

Yes, if the individual processes have been completely checked in accordance with the mechanical-technological tests corresponding to Table 1 of EN ISO 15614-1:2004.
The welding processes 111 and 121 are applicable - performed individually – only if they are performed on backing in the production. Also, one or more can be omitted from a qualified WPS, assuming the weld thickness is found in the qualified range of each welding process(es) to be used.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

NO, see Note in clause 8.4.1.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.1**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

If you have to weld 2 plates with thickness of 200 mm with a butt weld (weld preparation is double V = X-weld) the root should be 10 mm TIG, the filler layers GMAW. Can I cover this with 2 PQR's : 1 for TIG on 10 mm plate and 1 for GMAW welded on a plate with thickness of 100mm?

Answer proposed by the author of the question

You can use 2 separate PQR's, but the range of qualification should cover the thickness of your plate and not only the thickness of your deposited material. So the first PQR of TIG on 10 mm plate covers only till 20 mm plate (table 5) and is not sufficient. The first PQR should have been welded on a plate > 100mm. The second PQR covers plates till 200 mm and can be used.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

The proposed answer is correct, agreed.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.2**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Question:

Regarding the validity of the WPQR for pipes with impact and hardness requirements, about the interpretation of clause 8.4.2 and its note, for the final qualification of all positions (ascending)

Case 1: Are the WPQR performed in position H-L045 valid, if the specimens are taken according to figure 6?

Answer proposed by the author of the question

Javier LÓPEZ-QUILES PASTOR
AENOR

Yes, test position HL-045 includes the flat, horizontal, vertical and horizontal overhead welding positions. If tests have been carried out taking the test pieces from the location indicated in the figure 6, the test covers welding in all positions. Nevertheless procedure may be completed with some specific test, PC, for hardness test.

Answer of the responsible ISO/TC 44/SCs

All welding position are qualified except PG and J-L045 as long providing the requirements of clause 8.4.8 for heat input are satisfied.

(ISO/TC 44/SC 10 on the meeting in December 2015)

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.2**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Question:

Regarding the validity of the WPQR for pipes with impact and hardness requirements, about the interpretation of clause 8.4.2 and its note, for the final qualification of all positions (ascending)

Case 2: If specimens are performed in PH and PC positions, are the tension and bending destructive tests valid for any position according to the note of clause 8.4.2?

Javier LÓPEZ-QUILES PASTOR
AENOR

No, seemingly the standard only requires that hardness and impact tests are carried out in specific positions. Nevertheless, being the PH position a fixed pipe, and being specified the positions where each test piece must be taken, in the case of tension and bending tests in PC position, this could be wrong. In this case perhaps all tests should be done in PH, and additionally tests for macrography and hardness in PC.

Answer of the responsible ISO/TC 44/SCs

No. The location of the tensile and bend test specimens is independent of the welding position.

(ISO/TC 44/SC 10 on the meeting in December 2015)

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.2**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Question:

Regarding the validity of the WPQR for pipes with impact and hardness requirements, about the interpretation of clause 8.4.2 and its note, for the final qualification of all positions (ascending)

Case 3: a) Is it necessary to perform all tests of the Table 1 in position PH and additionally hardness and macographic tests in position PC?

b) Or could it be possible to perform all tests except hardness and macrographic tests in position PH and hardness and macrographic tests in position PC?

Answer proposed by the author of the question

Javier LÓPEZ-QUILES PASTOR
AENOR

Yes to question a). The standard establishes that hardness test must be carried out in the overhead position, i.e. in PH. In this case all tests must be carried out in PH, and additionally tests for macrography and hardness in PC.

Answer of the responsible ISO/TC 44/SCs

No, all welding position are qualified except PG and J-L045 as long providing the requirements of clause 8.4.8 for heat input are satisfied.

(ISO/TC 44/SC 10 on the meeting in December 2015)

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.2**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Question:

Regarding the validity of the WPQR for pipes with impact and hardness requirements, about the interpretation of clause 8.4.2 and its note, for the final qualification of all positions (ascending)

Case 4: In order to qualify a WPQR in all positions (ascending), for which positions and which tests in each position are mandatory, according to the standard? Or are there several options as the suggested in the previous cases?

Answer proposed by the author of the question

Javier LÓPEZ-QUILES PASTOR
AENOR

All tests should be done in HL045 position or in PH position, completing with a test in PC, since the horizontal position doesn't appear in PH (yes in HL045). In PC they should be repeated NDT, macrography and hardness.

Answer of the responsible ISO/TC 44/SCs

H-L045 or PH welding position allows the testing requirements to be satisfied for both minimum and maximum heat input, see figure 6. No additional test piece is required in the PC position providing the requirements of clause 8.4.8 heat input are satisfied.

(ISO/TC 44/SC 10 on the meeting in December 2015)

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.2**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Question:

8.4.2 Welding positions

If we are welding pipes (material group 1.2 which requires hardness testing) and material thickness is 6 mm (so it doesn't require impact testing).

Which position(s) shall be welded in procedure tests (when we want range of approval to all other positions than PG and J-L045)?

Answer proposed by the author of the question

Mr. Ville Saloranta
Technical Adviser, M.Sc. (Tech.)
METSTA

Is PH enough or shall we weld PC and PH?

Answer of the responsible ISO/TC 44/SCs

Position PH is enough.

ISO/TC 44/SC 10 in May 2016

Type of question: ***Request for interpretation of ISO/TC 44 published standards***

Reference *(including edition and any published corrigenda or amendment)*	***Subclause number***	***SC in charge***
ISO 15614-1:2017 + Amd 1:2019	8.4.2	SC 10
Title		
Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys		

Needed interpretation - revised 2024-01-18 :
A fillet weld procedure test has been completed in the PB welding position and hardness testing has passed. Is it possible to extend the range of welding positions to other positions provided that the heat input in the other positions is equal to or greater than the heat input qualified on the fillet weld test piece?
Proposed interpretation by the author:
Yes, if it's been determined that the new position is a higher heat input position. In addition, the WPQR has to be amended to allow for other positions.
Response from the SC responsible for the standard:
Yes - However, see also Table 2, Footnote f
Date of ISO/TC 44/SC 10/WG 5 revised answer : 2024-01-18

Type of question: ***Request for interpretation of ISO/TC 44 published standards***

Reference *(including edition and any published corrigenda or amendment)*	***Subclause number***	***SC in charge***
ISO 15614-1:2004 + Amd 1:2008 + Cor 1:2005 + Amd 2:2012	8.4.2, 8.4.8	SC 10
Title		
Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys		

Needed interpretation :

Question 1:
Is it required to state the maximum heat input in the WPQR under item “Heat input”, or in a situation where there are no impact testing requirements (e.g. BW t < 12 mm)?

Question 2:
If only hardness testing is required (e.g. FW or BW t < 12 mm), does welding in the lowest heat input position qualify for welding in all positions (excluding PG)?

Proposed interpretation by the author:

Question 1:
It is not required to state the maximum heat input (however, in the WPS, the heat input range shall be specified).

Question 2:
Yes.

Response from the SC responsible for the standard:

Q1. It is not required to state the maximum qualified heat input on the WPQR when impact testing is not required.

Q2. Yes for the 2004 edition.

Date of ISO/TC 44/SC 10/WG 5 answer : 2023-11-22

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.3 a**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

What does “predominant form” means? Is it weld length, amount of welds,….?

Answer proposed by the author of the question

?

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

Predominant form means mostly used form in the production.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**Chapter 8.4.3**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Question:

Chapter 8.4.3 Type of joint/weld

h) It is not permitted to change a multi-run deposit into a single run (or single run on each side) or vice versa for a given process.

It means that single pass welding cannot qualify multi pass welding / multi pass welding cannot qualify single pass welding.

Is it also applicable on fillet welding qualification ?

Answer proposed by the author of the question

Tae-uk Park (Welding engineer, working in Samsung Heavy Industries)

No proposed answer.

Answer of the responsible ISO/TC 44/SCs

Answer to the question is “YES”.

ISO/TC 44/SC 10 in May 2016

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.4**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

8.4.4 Filler material, designation
Filler materials cover other filler materials as long as they have equivalent mechanical properties, same type of covering core or flux, same nominal composition and the same or lower hydrogen content according to the designation in the appropriate European standard for the filler material concerned.

Case 1:
A WPQR Test has been performed with process 135 and wire EN ISO 14341-A-G 42 4 M G3Si1 on S355J2 material. Impact on -20°C.
What is the range of qualification for the filler material?
Are you allowed to use a wire with classification EN ISO 14341-A-G 38 2 M G3Si1 to weld S275J0 referring to this WPQR? This wire has got the same designation "G3Si1". Indeed the mechanical properties are lower but in case of welding S275J0, it is enough.

~~**Case 2:**~~
~~A WPQR Test has been performed with process 135 and wire EN ISO 14341-A-G 38 2 M G3Si1.~~
~~What is the range of qualification for the filler material?~~
~~Are you allowed to use a wire with classification EN ISO 14341-A-G 42 4 M G3Si1 referring to this WPQR?~~
~~This wire has got the same designation "G3Si1". The mechanical properties are better for yield strength and impact.~~

Answer proposed by the author of the question

Case 1:
Though the wire has got the same classification for the chemical composition, the proposed wire has got lower mechanical properties for yield and impact. Par 8.4.4 states "as long as they have equivalent mechanical properties"
The proposed wire **cannot** be used under the WPQR.

~~Case 2:~~
~~Though the wire has got the same classification for the chemical composition, the proposed wire has got higher mechanical properties for yield and impact. Par 8.4.4 states "as long as they have equivalent mechanical properties" The standard does not mention equivalent or higher mechanical properties, though it makes sense to allow the proposed wire to be used under the WPQR.~~
~~The proposed wire **can** be used under the WPQR.~~

Answer of the responsible ISO/TC 44/SCs

Both answer (case 1 and ~~case 2~~) were confirmed.
ISO/TC 44/SC 10 meeting in May 2016

answer regarding case 2 was revoked in May 2017

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.4**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

8.4.4 Filler material, designation
Filler materials cover other filler materials as long as they have equivalent mechanical properties, same type of covering core or flux, same nominal composition and the same or lower hydrogen content according to the designation in the appropriate European standard for the filler material concerned.

Case 1:
A WPQR Test has been performed with process 135 and wire EN ISO 14341-A-G 42 4 M G3Si1 on S355J2 material. Impact on -20°C.
What is the range of qualification for the filler material?
Are you allowed to use a wire with classification EN ISO 14341-A-G 38 2 M G3Si1 to weld S275J0 referring to this WPQR? This wire has got the same designation "G3Si1". Indeed the mechanical properties are lower but in case of welding S275J0, it is enough.

~~**Case 2:**~~
~~A WPQR Test has been performed with process 135 and wire EN ISO 14341-A-G 38 2 M G3Si1.~~
~~What is the range of qualification for the filler material?~~
~~Are you allowed to use a wire with classification EN ISO 14341-A-G 42 4 M G3Si1 referring to this WPQR?~~
~~This wire has got the same designation "G3Si1". The mechanical properties are better for yield strength and impact.~~

Answer proposed by the author of the question

Case 1:
Though the wire has got the same classification for the chemical composition, the proposed wire has got lower mechanical properties for yield and impact. Par 8.4.4 states "as long as they have equivalent mechanical properties"
The proposed wire **cannot** be used under the WPQR.

~~Case 2:~~
~~Though the wire has got the same classification for the chemical composition, the proposed wire has got higher mechanical properties for yield and impact. Par 8.4.4 states "as long as they have equivalent mechanical properties" The standard does not mention equivalent or higher mechanical properties, though it makes sense to allow the proposed wire to be used under the WPQR.~~
~~The proposed wire **can** be used under the WPQR.~~

Answer of the responsible ISO/TC 44/SCs

Both answer (case 1 and ~~case 2~~) were confirmed.
ISO/TC 44/SC 10 meeting in May 2016

answer regarding case 2 was revoked in May 2017

Type of question: ***Request for interpretation of ISO/TC 44 published standards***

Reference *(including edition and any published corrigenda or amendment)*	***Subclause number***	***SC in charge***
ISO 15614-1:2004, Amd 1, Amd 2 ISO 15614-1:2017, Amd 1	8.4.5 (2004) 8.4.4 (2017)	SC 10

Title

Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys

Needed interpretation :

A welding procedure test has been completed and impact testing has passed. The filler material manufacturer decides to rename the filler material used in the test. The manufacturer provides a Declaration of Equivalence which proves the filler materials are technically identical.

Question 1: Under ISO 15614-1:2004, does using renamed filler material result in additional testing?

Question 2: Under ISO 15614-1:2017, does using renamed filler material result in additional testing?

Proposed interpretation by the author:

Question 1: No

Question 2: No

Response from the SC responsible for the standard:

The 2004 and 2017 editions are silent about this situation.
This can be addressed in the revision of ISO 15614-1

Date of ISO/TC 44/SC XX answer

2024-11-01

Type of question: ***Request for interpretation of ISO/TC 44 published standards***

Notes:

1. Requests should be submitted to national committees first (where they exist) before submittal to SC XX.
2. Requests should be submitted with a proposed response where SC XX can respond YES or NO with additional explanation as needed.
3. SC XX will not provide consulting services
4. SC XX will not provide justifications/explanations of any requirements
5. SC XX will only provide clarification of requirements

Type of question: **Interpretation**

ISO/TC 44

ISO 15614-1 :2004/Amd 1 :2008 **8.4.8** **10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

I would like to clarify the points referred on the e-mail below (see my comments in green):

A. When you are discussing:

Let's imagine that we perform the following welding qualification (50mm; S355N; GMAW):

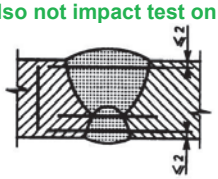
1. *First three layers are performed with a heat input of 1.0 kJ/mm;*
2. *The filling layers are performed with a heat input of 2.0 kJ/mm;*
3. *The last three layers are performed with a heat input of 3.0 kJ/mm;*

If the impact and hardness tests are performed in the filling layers (2.0 kJ/mm); the qualified heat input is 1.5 – 2.5 kJ/mm;

If the impact tests are performed in the last three layers (3.0 kJ/mm) and the hardness tests are performed in the first three layers (1.0 kJ/mm); the qualified heat input is 0.75 – 3.75 kJ/mm.

Do I understand it correctly? YES

We understand that the heat input qualified on the PQR is the one considering the complete sample. The maximum and minimum HI to be considered for the HI limits (+25% & -25%) are maximum and minimum ones for the complete sample.
Impact test: according to the standard EN 15614-1 point 7.4.5., the samples for the V-Charpy (weld & ZAT) must be taken maximum 2 mm. under the surface of the base metal and transversal to the welding. For thickness 50 mm. 2 additional impact test samples must be taken (weld & ZAT), in the centre of the thickness or in the root of the weld.
Hardness test: according to the standard EN 15614-1 point 7.4.6., for thickness 5 mm., 2 indentations (hardness test) must be done, one on the upper surface and other one in the lower surface of the weld, and maximum 2 mm. under the surfaces. For 2-side welds, one additional indentation on the root must be done, acc. to the examples of EN 1043-1, figure 1b. So, we understand that for PQR qualification, not impact test nor hardness test is requested for the filler layers. Also not impact test on the root / centre is requested for thickness ≤ 50mm. Please confirm.



B. About the WPS qualified for all positions, you refer that the welding parameters (I, V & travel speed) should be specified for each position.

We qualify the WPS for all the welding positions (PA, PC, PF...), except PG and J-L04, acc. to EN 15614-1 point 8.4.2.
Can you please tell us where states on the standards EN 15609-1 or EN 15614-1 that the welding parameters must be specified for each welding position? We cannot find this requirement on the welding standards.

Best regards,
Javier Bermejo

Answer proposed by the author of the question

-

Answer of the responsible ISO/TC 44/SC s

ISO/TC 44/SC 10 meeting on 2015-07-07 in Helsinki, Finland:

No, there is no requirement for each welding position/location.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.9**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

Is it permissible to summarize individual procedure tests of different procedures, in order to expand the range of qualification e.g. the wall thickness?
Example: Welding task; a plate t= 30 mm is to be welded. 2 procedure tests should be used for this. Procedure test 1: Process 141, permissible range of qualification t= 3 – 24 mm; procedure test 2: Process 111, permissible range of qualification t= 3 – 24 mm, thus, in this example min. 6 mm, max. theoretically 48 mm?

Answer proposed by the author of the question

No, a consolidation of multiple procedure tests in order to expand the range of qualification is not permissible. With a welding procedure test a preliminary welding procedure specification should be qualified. Individual welding procedure specifications are present here, whose combinations have especially not been verified for the present wall thickness. Only each individual verification is present for a partial section.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

Agreed.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.9**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

How is the lower limit of a qualification to be verified?

Previously, the temperature of the test piece (e.g. 20°C) has been documented and a lower limit of > 5°C (worksite conditions) was verified by the notified bodies. This is no longer entirely accepted. It is asked how such minimal deviations / tolerances can be accepted in the future.

Answer proposed by the author of the question

This claim of verification of a (minimum) preheat temperature is only applicable, if it is to be preheated. Because the material does not require preheating, this claim is invalid. Thus, > 5 °C applies as the lower limit.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

Agreed.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.9**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

A procedure test on S355J2 with a wall thickness of 50 mm and a preheat temperature of 150°C has been performed.

One can deduce from this that, in the present case, the qualification is only valid from a preheat temperature of 150°C.

The procedure test also includes, however, the material S235J2 with a wall thickness of 25 mm. For this material preheating is not required as a rule. The question remains whether the material S235J2 is also qualified without preheating (which would be correct from a welding technical point of view) by the procedure test.

Answer proposed by the author of the question

Because no preheating is required for the material S235J2, this material is qualified by the procedure test named below.

The preheat temperature is not an essential criteria for a range of qualification as different thicknesses and also different preheat temperatures are required to be used for a material/material combination.

The preheat temperature is to conform to the welding procedure specification in regards to materials.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

Disagreed, according to the current Standard the preheating temperature used recorded in the WPQR is the minimum preheating temperature used for the range of qualification independent from the material thickness.

Note: Sub-clause 8.4.9 will be reviewed in the next edition.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.10**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

A reasonable verification of the highest interpass temperature in accordance with EN ISO 15614-1 clause 8.4.10 is currently reached through temporary raising of the preheat temperature before the start of welding a filling run (at this point the temporary preheat temperature is the highest interpass temperature). Thus, the approach of the highest interpass temperature during welding of a test piece is not applicable for smaller dimensions. (Procedure test performed on thick-walled components, thin-walled product pipe)

Answer proposed by the author of the question

The highest interpass temperature is to be specified in the pWPS. Independent of the wall thickness given later from the range of qualification of a WPAR, this interpass temperature verified as highest in the procedure test may not be exceeded during production welding.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

Disagreed, according to the current Standard the interpass temperature used recorded in the WPQR is the maximum interpass temperature used for the range of qualification independent from the material thickness.

Note: Sub-clause 8.4.10 will be reviewed in the next edition.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.4.12**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

How should the sentence in clause 8.4.12 be interpreted?

In accordance with EN 12952, Part 5 clause 8.3.1, a welding procedure test shall be performed in accordance with EN 288 Part 3. In the meantime, this standard has been replaced by the successive document EN ISO 15614-1. Because EN 288 Part 3 is listed there as an undated reference, EN 15614-1 can be consulted for performance.

In the course of the manufacture of boiler components with joints of the same type and mixed joints, a foreign notified body demanded from the manufacturer the verification of multiple post-weld heat-treatments for a welded joint by way of a procedure test in accordance with EN ISO 15614- 1. Clause 8.4.12 has been referred to thereby. It has been interpreted here that all (additional) subsequent post-weld heat-treatments in the course of manufacture are to be verified by a procedure test for the weld joints intended.

Answer proposed by the author of the question

The first sentence in EN ISO 15614-1 clause 8.4.12 *„Addition or deletion of post-weld heat-treatment is not permitted.“* shall be interpreted as follows:

- If the welding procedure test has been performed with post-weld heat-treatment, it is not permissible to forego *(means delete or omit)* the post-weld treatment for the production weld.
- If the welding procedure test has been performed without post-weld heat-treatment, it is not permissible to include any type of post-weld heat treatment for the production weld.

However, the first sentence of this clause is not based on multiple post-weld heat-treatment, which occurs e.g. during the manufacture of a boiler or collector. Multiple post-weld heat treatments can occur at different temperatures if welded joints of the same type as well as mixed joints occur on a component which are required to be annealed one after the other at (low) temperatures. With a welding procedure test in accordance with EN ISO 15614-1 clause 8.4.12, only a post-weld heat treatment for this single welded joint is meant however. A verification of multiple heat treatment cycles in the sequence of the manufacturing process is not required.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2013-10-15 in Paris, France:

The first two conditions (performed with and without post-weld heat-treatment) were agreed.

Multiple post-weld heat-treatments during the manufacture of e. g. a boiler by having many welds with different materials is not covered by this Standard. This may be described in a product Standard.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.5.2.1**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

How should the 10 % be interpreted? Is it 10 % of the CO_2 content of the gas used, or 10% absolute.
E.g. The PQR has been performed with M21 with a) 18% CO_2 and b) 24% CO_2
What is the min. and max. CO_2 content qualified?

Answer proposed by the author of the question

- The min. CO_2 content qualified for a) and b) is given by the group M21 which has a CO_2 content > 15%.
- The max. CO_2 content qualified is given by the gas used in combination with the group.

Max. CO_2 content qualified is:

a) 18% + 1.8% = 19.8%

b) 24% + 2.4% = 26.4% but the CO_2 content should also not exceed the max. CO_2 content of the group M21 which is 25%. So here the max qualified CO_2 content is max. 25%

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2015-07-07 in Helsinki, Finland:
agreed

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.5.2.1**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

How should the 10 % be interpreted? Is it 10 % of the CO_2 content of the gas used, or 10% absolute.
E.g. The PQR has been performed with M21 with a) 18% CO_2 and b) 24% CO_2
What is the min. and max. CO_2 content qualified?

Answer proposed by the author of the question

The max. CO_2 content qualified is given by the gas used in combination with the group.

The word "*exceeds*" in the standard means a deviation in plus or minus.

CO_2 content qualified is:

a) 18% ± 1.8% = 16,2 % to 19.8%
b) 24% ± 2.4% = 21,6 % to 26.4% but the CO_2 content should also not exceed the min. or max. of the gas symbol used in ISO 14175.

Answer of the responsible ISO/TC 44/SCs

Based on the interpretation request from UK, see document N 1350, the statement was revised and agreed.

ISO/TC 44/SC 10 meeting in May 2016

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**8.5.2.3**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

a) What is/are the qualification(s) for pulsed arc welding?
b) Does a change in “puls shape” require new qualification?

Answer proposed by the author of the question

a) Pulsed arc welding is considered as spray/globular transfer so qualifies spray and globular transfer.
A qualification performed with spray or globular transfer qualifies also pulsed arc transfer.
b) The “puls shape” is not an essential variable for the moment so no new qualification is necessary as long as the heat input is in between the limits given by the standard. Nevertheless modern welding sources provide several “puls shapes” which can have big influence on the penetration, fusion,…
Should it be taken into account in the future?

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2015-07-07 in Helsinki, Finland:

a) A pulsed process is covered by the spray arc.
b) Will be noted by the next revision.

Type of question: **Interpretation**

ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**Range of qualification of a full penetration T-joint**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

a) Range of qualification of a full penetration T-joint: bottom plate is 30mm, plate on top is 10 mm thick

b) According table 1 remark "f":

f Tests as detailed do not provide information on the mechanical properties of the joint. Where these properties are relevant to the application an additional qualification shall also be held e.g. a butt weld qualification.

Which thickness needs to be taken for the butt weld qualification? 10 mm or 30 mm?

Answer proposed by the author of the question

a) A T-joint full penetration is considered as a butt weld, so the range of qualification for a butt has to be applied. Since the plates for butt weld should have the same thickness, it is not specified in the standard. Par 8.3.2.1 specifies which thickness you should take into account for a T-joint full penetration:

e) For a T joint in plate with full penetration:

the parent material thickness. and not "thicknesses

In this case which thickness has to be taken into account?

1)The plate thickness that is foreseen with the weld preparation or

2) should the range of qualification on both plates independent to be taken into account because it is mentioned in EN ISO 15613 and this piece is no standard test piece:

8 Range of qualification

Any qualification issued under this standard is limited to the type of joint used in the pre-production test.

The range of qualification is generally in accordance with the relevant parts of prEN ISO 15614 for welding procedure tests. However the range of qualification for thickness can be applied to each component in the joint, as well as weld thickness.

In case 1: the range is from 3 mm to 20 mm (consequence is that the thickness of the bottom plate doesn't matter while a thicker plate will cause rapid cooling > higher hardness)

In case 2: the range is from 15 mm to 60 mm on 3 mm to 20 mm

b) One needs to use the plate thickness that is foreseen with the weld preparation.

If in this case the 10 mm plate is foreseen with a bevel, one should do a butt weld qualification with 2 plates of 10 mm.

Answer of the responsible ISO/TC 44/SCs

ISO/TC 44/SC 10 meeting on 2015-07-07 in Helsinki, Finland:

a) The plate thickness that is foreseen with the weld preparation.

b) 10 mm is qualified.

Type of question: **Interpretation**

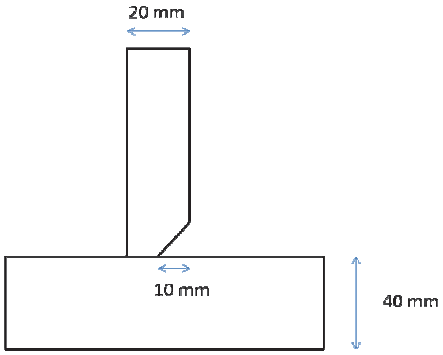
ISO/TC 44

Number	*Subclause number*	*SC in charge*
ISO 15614-1 :2004/Amd 1 :2008	**Range of qualification of a partial penetration T-joint**	**10**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1 : arc and gas welding of steels and arc welding of nickel and nickel alloys

Question

a) Range of qualification of a partial penetration: T-joint: bottom plate is 40mm, plate on top is 20 mm thick deposited weld thickness is 12 mm.



b) According table 1 remark "f":

[f] Tests as detailed do not provide information on the mechanical properties of the joint. Where these properties are relevant to the application an additional qualification shall also be held e.g. a butt weld qualification.

Which thickness needs to be taken for the butt weld qualification? 20 mm, 40 mm, 12 mm?

Answer proposed by the author of the question

a) Since this is no standard test piece, EN ISO 15614-1 does not apply. In this case, it is EN ISO 15613 that has to be used.

8 Range of qualification

Any qualification issued under this standard is limited to the type of joint used in the pre-production test.

The range of qualification is generally in accordance with the relevant parts of prEN ISO 15614 for welding procedure tests. However the range of qualification for thickness can be applied to each component in the joint, as well as weld thickness.

One plate has a weld preparation, so the table for butt weld is applicable.

Possible interpretations:

1) Apply the range for each of the plate thicknesses separate. So the range is from 10 mm to 40 mm on 20 mm to 80 mm. Regarding the deposited weld thickness? (the deposited weld thickness is the max thickness?)

2) Apply the range only on the deposited weld thickness. So the range is from 3 mm to 24 mm. (consequence is that the thickness of the bottom plate doesn't matter while a thicker plate will cause rapid cooling > higher hardness)

3) Apply the range on the bottom plate and on the deposited weld thickness. So the range is from 3 mm to 24 mm on 20 mm to 80 mm.

Type of question: **Interpretation**

ISO/TC 44

ISO/TC 44/SC 10 meeting on 2015-07-07 in Helsinki, Finland:
Since this is no standard test piece, ISO 15614-1 does not apply. In this case, it is ISO 15613 that has to be used.