

Svetsstandardiseringen

2024-02-12

Utsänt till:  
Medlemmarna i AGS 445 och TK 134

sis

För kännedom:  
Måns Sjölander

## Rapport

### ISO/TC 44/SC 10/WG 5 zoom-möte 12 februari 2024

Ordf: Walter Sperko, USA

Sekr: Andrew Davis, USA

Följande länder var representerade med 21 deltagare (antal deltagare inom parentes):

Belgien (1): Benny Droesbeke

Danmark (2): Jörgen Hagelund, Frank Jeppesen

Finland (1): Michael Kraus

Frankrike (1): Alexandre Papadimopoulos

Japan (4): Yoji Nakai, Susumi Imaoka, Masaharu Sato, Akikazu Kitagawa

Kina (1): Donggaung Park

Nederländerna (2): Henk Bodt, Arjan Rosa

Storbritannien (5): Adam Gould, Clive Slocombe, Marcello Consonni, Karl Nicholson,  
Andy Spence

Sverige (1): Mathias Lundin

Tyskland (1): Ulrich Kahrstedt

USA (2): Walter Sperko, Andrew Davis

Denna arbetsgrupp behandlar kvalificering av svetsprocedurer. Nedan följer ett sammandrag av väsentligheterna under mötet.

## 1. Allmänt

Ordföranden hälsade välkommen. Dagordningen godkändes (N 256). Minuters från föregående möte 18 januari (N 257, 258) godkändes.

## 2. PWI 15614-1

Sena kommentarer från UK i N 263 accepterades att läggas till kommentarerna för genomgång på detta möte. Fortsatte genomgång av inkomna kommentarer i dokument N 259, från kommentar 22.

Arjan presenterade frågeställning och lösningsförslag till hanteringen av flera metoder i samma svets, 8.4.1.

I tidigare utgåva av 15614-1:2004 angavs (vilket det dessutom fanns en tolkning för):

### 8.4.1 Welding processes

Each degree of mechanization shall be qualified independently (manual, partly mechanized, fully mechanized and automatic).

In the same way, it is not allowed to change the means of implementation (manual, mechanised or automated).

The qualification is only valid for the welding process(es) used in the welding procedure test.

For multi-process procedures the welding procedure qualification may be carried out with separate welding procedure tests for each welding process. It is also possible to make the welding procedure test as a multi-process procedure test. The qualification of such a test is only valid for the process sequence carried out during the multi-process procedure test.

**NOTE** It is not allowed to use a multi-process procedure test to qualify any single process unless the testing carried out on the process conforms to this standard.

I ISO 15614-1:2017 anges följande:

For level 2: When the test piece is welded with more than one welding process, the procedure is valid only for the sequence of processes used on the test piece. Test specimens shall include deposited material from each welding process used.

Back run is permitted using one of the welding processes used in the qualification

If a single process of a multi-process qualification is used in production, this single process shall be tested individually in accordance with the standard.

2017 års utgåva tillåter alltså detta, medan 2004 utgåva inte gör det. Men 2017s utgåva är oklar vilket förvirrar användarna.

Som det nu står i förslaget (med frågetecken, eftersom detta ska diskuteras):

For level 2: When the test piece is welded with more than one welding process, the procedure is valid only for the sequence of processes used on the test piece. Test specimens shall include deposited material from each welding process used.

A back run is permitted using one of the welding processes used in the qualification.

If a single process of a multi-process qualification is used in production, this single process shall be tested individually in accordance with the standard.

"A multi-process procedure test can be used to qualify a single process only if the required testing carried out for the welding process in question conforms to this document."??

Arjan presenterade några olika alternativ:

#### Options 1.

Delete the current rules to make it mandatory that each welding process must be qualified separately and that there is no longer a range if a test coupon has been welded with multiple welding processes. (Easy approach, but bad for the industry because there are a lot of that kind of welding procedures in the industry)

#### Option 2.

Make new rules for the combination of different welding processes and/or different welding consumables in one test coupon and write comprehensive ranges for these cases.

- 1) An option might be to see if the yield strength and Charpy notch test temperatures of the filler materials of the processes are the same in one test coupon regardless of the welding processes.

In this situation, we could just run all the standard tests from Table 2 and give approval for all the welding processes used in the test coupon up to a thickness of 50 mm and the processes used (This is what we are doing now, see clause 7.7.4) provided that the yield strength and temperature of the Charpy kerf test are the same as the welding consumables used.

This option also prevents that if a root process is used separately the yield strength of the weld and the toughness is always guaranteed and that is not the case now because there can be totally different filler materials in a root which is not tested.  
\_\_\_\_\_ (This is a very expensive solution, multiple test coupons needed)

- 2) If we allow various welding processes and welding consumables to be tested in 1 test coupon the rules should be well defined, do we ask for kerf toughness tests in root, if so are sub sized Charpy notch specimen allowed or should the specimen be 10x10 mm.

Do we take into account me lowering the test temperature for sub sized specimen or do we count with a percentage of the 27 Joule.

Detta diskuterades ingående. Noterades att alternativ 1, att allt kvalificeras var för sig, inte är en önskvärd lösning för industrin.

Noterade UK kommentar på 8.4.1:

|                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A multi-process procedure test can be used to qualify a single process only if the required testing carried out for the welding process in question conforms to this document'.</p> <p>This paragraph is not considered strong enough to ensure that mechanical testing adequately tests each process.</p> | <p>Add the following sentence:</p> <p>'Ensuring full size mechanical test specimens have been, or are able to be, extracted from the test piece of each welding process, taking account of any dilution effect'.</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Frågades: Skulle någon använda ett mjukare tillsatsmaterial i roten för att "lura" provet, och i så fall varför? Kan förvisso förekomma.

Det är egentligen endast ett problem vid högre hållfastheter, >690.

Noterades att det inte är hållfastheten som är det stora problemet, men snarare slagseghet. Det är det senare som lett till diskussioner mellan tillverkare och labb.

Framfördes att kostnaden för procedurprov har minskat för att kraven på antal prover har minskat i och med de senaste två revisionerna. T.ex. med avseende på giltigheten för rördiameter. Så, att detta regleras något striktare kan synas rimligt i relation.

Föreslogs följande som sista stycke i 8.4.1:

- A multi-process procedure test can be used to qualify a single process only if:
- the required testing carried out for the welding process in question conforms to this document, and
  - full size mechanical test specimens have been, or are able to be, extracted from the test piece for each welding process, taking account of any dilution effect'

#### Angående 8.4.2 Svetslägen:

Diskuterade vad anledningen är till att ett separat prov skulle behövas för svetsning vertikalt nedåt. Vad är påverkan på egenskaperna vid byte av svetsläge om sträckenergin är inom giltighetsområdet? Diskuterade att stryka även vertikalt nedåt, men poängtera att gränserna för sträckenergi gäller. Ändrades till:

#### **8.4.2 Welding positions**

Welding of the test piece in any position (pipe or plate) qualifies for welding in all positions (pipe or plate), except that vertical down shall be qualified by a specific test piece.

When neither impact nor hardness requirements are specified, welding of the test piece in any position (pipe or plate) qualifies for welding in all positions (pipe or plate).

For qualification of all welding positions, the following requirements shall be fulfilled:

—specimens for impact test shall be taken from the weld in the highest heat input position;

—specimens for hardness test shall be taken from the weld in the lowest heat input position.

To satisfy both hardness and impact requirements, two test pieces in different welding positions are required, unless a single position qualification is required or in case of when a fixed pipe is used for the qualification. Where qualification is required for all positions, both test pieces shall be subjected to 100% visual testing and additional NDT methods.

Vertical down welding (welding positions PG, PJ and J-L045) shall be qualified by a specific test piece.

For material of group 10, the lowest and highest heat input positions shall be subjected to impact testing. For example, for butt welds in plate, the highest heat input position is normally PF and PA and the lowest heat input position is PC and PE.

Avsnitt 8.4.3:

Styckena a) och b) ersätts av nytt stycke a). Övriga numreras om:

For level 2: The range of qualification for the type of welded joints is as used in the welding procedure test subject to limitations given in other clauses (e.g. thickness) and additionally:

- a) butt welds qualify full and partial penetration butt welds and fillet welds, while fillet weld tests are required where T-joints are performed by fillet welds or partial penetration butt welds in the predominant form of welded connections in relation to the design and production welding;
- b) full penetration butt welds qualify full and partial penetration butt welds and fillet welds in any type of joints;

a) full penetration butt welds qualify full and partial penetration butt welds and fillet welds in any type of joints, except when welding is predominantly performed on T-joints using fillet welds or partial penetration butt welds, separate fillet weld tests are required.

- b) butt joints in pipe qualify branch connections with an angle  $\alpha \geq 60^\circ$  (see Figure 4 for  $\alpha$ );
- c) butt welds in T-joints with full penetration qualify full and partial penetration butt welds in T-joints and fillet welds but not vice versa;
- d) fillet welds qualify fillet welding only;
- e) welds made from one side without backing qualify welds made from both sides and welds with backing;

Angående avsnitt 8.4.7:

Föreslogs att tydliggöra att det är medelvärdet på sträckenergin som avses. Noterade att förslaget till ISO 8182 är tänkt att klargöra detta. Enades om att inte lägga till något om detta utan senare hänvisa till ISO 8182.

Föreslogs att ändra det gula tycket till det gröna stycket.

For level 2: When impact requirements apply, the upper limit of the heat input qualified is 25 % greater than used in welding the test piece. When hardness requirements apply, the lower limit of the heat input qualified is 25 % lower than that used in welding the test piece. If welding procedure test has been performed at both a high and a low heat input level, then all intermediate heat input levels are also qualified. It is not necessary to calculate every run.

If two separate welding procedure tests have been performed where one has qualified for a high heat input level and the other for a low heat input level, all intermediate heat input levels are also qualified.

Beslutade att stryka angående diameter för belagda elektroder:

~~For covered electrode, the heat input average shall be calculated for each used diameter in order to define the qualified heat input.~~

### Angående avsnitt 8.5.2.3:

Diskuterade att "pulse transfer" inte är en bågtyp. Föreslogs att stryka "pulse". Jag noterade avsnitt A.1 i ISO 4063:2023 där "pulsed transfer referred to as pulsed current". Användarna förväntar sig att giltigheten för spray inkluderar spray med pulsad ström.

Istället för att nämna bågtyperna ändrades till: "All other transfer modes qualify each other".

For solid and metal cored wires, qualification using short circuiting transfer qualifies only short circuiting transfer. All other transfer modes cover each other.

Qualification using spray pulse or globular transfer qualifies spray pulse and globular transfer.

Gick över till de sent inkomna kommentarerna från UK.

### Angående avsnitt 6.3:

Diskuterade begreppet "verified" och "witnessed". Noterade att förslaget till del 1 anger:

*"The welding and testing of the test piece shall be verified by the examiner and examining body"*

Del 2 anger "witnessed" istället för "verified".

Kommittén var eniga om att svetsningen ska bevitnas, men inte provningen, som bör vara verifierad.

Ändrade 6.3 till:

*"The welding of the test piece shall be witnessed by the examiner and examining body"*

Lade till i avsnittet för provning:

*"The testing of the test piece shall be verified by the examiner and examining body"*

### Angående avsnitt 7.6 Omprovning:

Diskuterade hur större provstycken hanteras. Stycket förtydligades (inklusive ändring av gränsen för tjocklek från 25 till 50 mm):

If the test piece fails to comply with any of the requirements for NDT:

a) For wall thicknesses > 50 mm, an analysis may be performed to determine the main cause of the failure. If it is established that the main cause of failure is not procedure-related, for example due to parent material defects, equipment issues, insufficient welder's or welding operator's skill, the examiner or examining body may accept the result and proceed to mechanical testing. Details of the evidence shall be included in the report, or

b) one further test piece shall be welded and subjected to the same examination.

Bestämde att skicka förslaget på ny kommittéomröstning vars kommentarer hanteras nästa möte.

## **3. Övrigt**

Inget.

## **4. Nästa möte med ISO/TC 44/SC 10/WG 5**

Nästa möte bestämdes till 23 maj 2024 (kl 13-17) via zoom.

Mathias Lundin