

Svetsstandardiseringen

2023-02-22

Utsänt till:
Medlemmarna i AGS 445 och TK 134

För kännedom:
Måns Sjölander

sis

Rapport

ISO/TC 44/SC 10/WG 5 zoom-möte 22 februari 2023

Ordf: Walter Sperko, USA

Sekr: Andrew Davis, USA

Följande länder var representerade med 22 deltagare (antal deltagare inom parentes):

Belgien (1): Benny Droesbeke

Danmark (2): Jörgen Hagelund, Mads Jensen

Frankrike (3): Jérôme Dietsch, Laurent Carbonell, Alexandre Papadimopoulos

Japan (1): Yoji Nakai

Kina (1): Donggaung Park

Nederländerna (2): Henk Bodt, Arjan Rosa (anslöt)

Storbritannien (2): Clive Slocombe, Steve Roberts

Sverige (1): Mathias Lundin

Tyskland (7): Holger Zernitz, Ulrich Kahrstedt, Frank Kania, Gregor Machura, Stefan

Schreiber, Martin Lohr, Jochen Mussman

USA (2): Walter Sperko, Andrew Davis

Denna arbetsgrupp behandlar kvalificering av svetsprocedurer och speglar delvis CEN/TC 121/SC 4. Nedan följer ett sammandrag av väsentligheterna under mötet.

1. Allmänt

Ordföranden hälsade välkommen. Dagordningen godkändes (N 182). Förra mötet 13 februari handlade endast om kommentarer till ISO/DIS 15614-11, inga minutes.

2. Hantering av kommentarer till ISO/DIS 15614-2

ISO/DIS 15614-2 Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 2: Arc welding of aluminium and its alloys

Diskuterade kommentarer N175 och uppdaterat förslag N176. Återupptog diskussionen vid kommentar nr 60.

Diskuterade utformningen av kravet på vinkeln för grenrör.

8.3.3 Angle of branch connection

A welding procedure test carried out on a branch connection with angle α shall qualify all branch angles α_1 in the range of $\alpha \leq \alpha_1 \leq 90^\circ$.

Beslutade att ersätta/ändra till kravet som formulerat i del 1.

A welding procedure test shall be carried out on a branch connection with angle α (see Figure 8). A test piece made with a branch angle (α) between 60° and 90° in the procedure test qualifies the angle $60^\circ \leq \alpha < 90^\circ$. An angle $\alpha < 60^\circ$ requires a separate test piece and qualifies angles from α up to 90° .

Föreslogs förändring av nedre delen av giltighetsområdet för tunna material från t till $0,5t$. Diskuterade problem med för hög sträckenergi vid tunna material.

Table 5 — Range of qualification for butt welds, material thickness and deposited metal thickness

Dimensions in millimetres

Thickness of the test piece t	Range of qualification ^a	Maximum thickness of deposited weld metal qualified s
$t \leq 3$	0,5 t to $2t$	$2s$
$3 < t \leq 10$	3 to $2t$	$2s$
$10 < t \leq 20$	5 to $2t$	$2s$
$20 < t \leq 40$	5 to $2t$	$2s$, for $s < 20$ $2t$, for $s \geq 20$
$40 < t \leq 150$	5 to $2t$	$2s$, for $s < 20$ $2t$, for $s \geq 20$
> 150	5 to $1,5t$	$2s$, for $s < 20$ $1,5t$, for $s \geq 20$

^a for T-butt welds with different material thicknesses, the range of qualification of both thicknesses of the test pieces shall be calculated separately.

Beslutade att förtydliga angående kälsvetsprov.

Dimensions in millimetres

Table 6 — Range of qualification for material thickness and throat thickness of fillet welds			
Thickness of test piece t	Material thickness ^a	Range of qualification	
		Single run	Throat thickness Multi-run
$t \leq 3$	0,7 t to $2 t$	0,75 a to 1,5 a	No restriction
$3 < t < 30$	3 to $2 t$		
$t \geq 30$	≥ 5		

Where a fillet weld is qualified by means of a butt weld test, the throat thickness range shall be based on the thickness of the deposited weld metal.

NOTE a is the nominal throat thickness as specified in pWPS for the test piece.

^a In the case of different material thicknesses, the range of qualification of both thicknesses of the test pieces shall be calculated separately.

Where the majority of production work is fillet welding, an additional fillet weld test may be required in addition to the butt weld test.

Beslutade att ta bort kravet på mekaniseringsgrad som väsentlig parameter.
Egenskaperna i svetsen beror inte på om den är utförd med en människohand eller inte.
Tyskarna som enda land protesterade mot detta. Röstades igenom.

8.4.1 Welding process

~~Each degree of mechanisation shall be qualified independently (manual, partly mechanised, fully mechanised and automatic).~~

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~~

Noterade att detta ingick i prA2 till 15614-1 som röstades ner i Europa men inte i ISO. Anledningen till att den röstades ner var oenighet om andra halvan av prA2 som behandlade hantering av lager i kravet om sträckenergi. Anledningen till att dessa två saker hamnade i samma tillägg är att ISO inte tillåter ett 3e tillägg (A3). Konstaterade alltså att det finns stor majoritet för detta även för del 1.

Diskuterade typ av tillsatsmaterial. Tittade på referensen ISO/TR 17671-4 (som är identisk med EN 1011-4). Diskuterade att använda numerisk beckning istyp.

Table B.1 — Filler metal grouping system

Type	Alloy designation	Chemical designation	Remarks
Type 1	R-1450 R-1080A	Al 99,5Ti Al 99,8	Ti decreases the cracking susceptibility in the weld metal by means of grain reinforcement.
Type 3	R-3103	Al Mn1	
Type 4	R-4043A R-4046 R-4047A R-4018	Al Si5 Al Si10Mg Al Si12(A) Al Si7Mg	Type 4 filler alloys will oxidize by anodizing or atmospheric exposure to give a dark grey colour, the intensity of which increases with increase in Si content. Thus these filler metals will not provide a good colour match with wrought parent metal alloys. These alloys are specifically used to prevent solidification cracking in joints involving high dilution and high restraint.
Type 5	R-5249 R-5754 R-5556A R-5183 R-5087 R-5356	Al Mg2Mn0,8Zr Al Mg3 AlMg5,2Mn AlMg4,5Mn0,7(A) AlMg4,5MnZr AlMg5Cr(A)	If good corrosion resistance and colour matching are important considerations, then the Mg content of the filler metal should be matched to that of the parent metal. If high proof and rupture weld metal strengths are the important considerations, then a filler metal with a Mg content of 4,5 % to 5 % should be used. Cr and Zr decrease the cracking susceptibility in the weld metal by means of grain reinforcement. Zr reduces the risk of hot cracking.
NOTE 1 The type numbers 1, 3, 4 and 5 correspond to the first number of the alloy designation.			
NOTE 2 This table will be valid until a new filler metal standard is issued.			

ISO 18273 har också en indelning på numerisk beteckning respektive en typindelning:

Table 1 — Symbol for the chemical composition of solid wires and rods															
Alloy symbol		Chemical composition in % (m/m) ^a													
Numerical	Chemical	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ca, V	Ti	Zr	Al (min.)	Be	Other each	Other total
ALUMINIUM-LOW ALLOYED															
Al 1070	Al99,7	0,20	0,25	0,04	0,03	0,03	—	0,04	V 0,05	0,03	—	99,70	0,000 3	0,03	—
Al 1080A	Al99,8(A)	0,15	0,15	0,03	0,02	0,02	—	0,06	Ga 0,03	0,02	—	99,80	0,000 3	0,02	—
Al 1188	Al99,88	0,06	0,06	0,005	0,01	0,01	—	0,03	Ga 0,03 V 0,05	0,01	—	99,88	0,000 3	0,01	—
Al 1100	Al99,0Cu	Si + Fe 0,95		0,05 to 0,20	0,05	—	—	0,10	—	—	—	99,00	0,000 3	0,05	0,15
Al 1200	Al99,0	Si + Fe 1,00		0,05	0,05	—	—	0,10	—	0,05	—	99,00	0,000 3	0,05	0,15
Al 1450	Al99,5Ti	0,25	0,40	0,05	0,05	0,05	—	0,07	—	0,10 to 0,20	—	99,50	0,000 3	0,03	—
ALUMINIUM-COPPER															
Al 2319	AlCu6Mn2ZrTi	0,20	0,30	5,8 to 6,8	0,20 to 0,40	0,02	—	0,10	V 0,05 to 0,15	0,10 to 0,20	0,10 to 0,25	Rem	0,0003	0,05	0,15
ALUMINIUM-MANGANESE															
Al 5103	AlMn1	0,50	0,7	0,10	0,9 to 1,5	0,30	0,10	0,20	—	Ti + Zr 0,10	—	Rem	0,0003	0,05	0,15
ALUMINIUM-SILICIUM															
Al 4009	AlSi5Cu1Mg	4,5 to 5,5	0,20	1,0 to 1,5	0,10	0,45 to 0,6	—	0,10	—	0,20	—	Rem	0,000 3	0,05	0,15
Al 4010	AlSi7Mg	6,5 to 7,5	0,20	0,20	0,10	0,30 to 0,45	—	0,10	—	0,20	—	Rem	0,000 3	0,05	0,15
Al 4011	AlSi7Mg0,5Ti	6,5 to 7,5	0,20	0,20	0,10	0,45 to 0,7	—	0,10	—	0,04 to 0,20	—	Rem	0,04 to 0,07	0,05	0,15
Al 4018	AlSi7Mg	6,5 to 7,5	0,20	0,05	0,10	0,50 to 0,8	—	0,10	—	0,20	—	Rem	0,000 3	0,05	0,15
Al 4020 ^d	AlSi3Mn1	2,5 to 3,5	0,20	0,03	0,8 to 1,2	0,01	0,01	—	—	0,005	0,01	Rem	0,000 3	0,02	0,10
Al 4043	AlSi5	4,5 to 6,0	0,8	0,30	0,05	0,05	—	0,10	—	0,20	—	Rem	0,000 3	0,05	0,15
^a Single values shown in the table are maximum values except for Al which are minimum values. ^b For Alloy Al 5754, the sum (Mn + Cr): 0,10 to 0,6. ^c Consumables for which the chemical composition is not listed in this table shall be symbolized similarly and prefixed by the letter Z. The chemical composition ranges are not specified and therefore it is possible that two electrodes with the same Z classification are not interchangeable. ^d For Alloy Al 4020, B (Max.) = 0,005 %.															

Beslutade att tillämpa både typindelningen och numeriska beteckningen i indelningsstandarden för tillsatsmaterial för aluminium ISO 18273, och ange dessa i 15614-2.

8.4.4 Filler metal designation

The range of qualification for filler metals shall cover other filler metals within the same group in accordance with ISO 18273, as follows:

- aluminium-low alloyed (1000 alloys);
- aluminium-copper (2000 alloys);
- aluminium-manganese (3000 alloys);
- aluminium-silicon (4000 alloys);
- aluminium-magnesium (5000 alloys).

Strök därmed referensen till ISO/TR 17671-4 (här, förekommer på andra ställen).

Diskuterade krav för tjocklek för grundmaterial 8.3.2.1.

Arjan förslag:

Proposal to modify clauses regarding nominal thickness t in ISO 15614-1, ISO 15614-2, ISO 15614-5 and ISO 15614-6

Proposal for part ISO 15614-1:

Clause 8.3.2.1 General (replace second paragraph)

Nominal thickness t shall have the following meanings:

- a) For a butt joint
the parent metal thickness, which for joints between dissimilar thicknesses is that of the **thinner** material.
- b) For a fillet weld:
the parent metal thickness, which for joints between dissimilar thickness is that of the **thickest** material.
- c) For a set-on branch connection:
the thickness of the branch pipe.
- d) For a set-in or set-through branch connection:
the thickness of the main pipe
- e) For a T-butt joint in plate
the thickness of the **penetrated** plate.

The preheat temperature must be determined for the thickest material t in the joint using the applicable part of the ISO/TR 17671 series.

Beslutade följande:

Nominal parent material thickness t shall have the following meanings:

a) → For butt joints in plate and pipe, t is the material thickness (see Figure 1 and Figure 2);

b) → For a T joint (T butt weld or fillet weld), t is the thinner material thickness (see Figure 3), which for joints between dissimilar thicknesses, of the thinner parent material;

c) → For a fillet weld: the parent material thickness qualified for joints between different thicknesses is that of the thinner material. For each thickness range qualified in accordance with Table 6 there is also an associated range of qualified fillet weld throat thicknesses as given in 8.3.2.3;

d) → For a set on branch connection: t is the thickness of the branch pipe;

e) → For a set in or set through branch connection: t is the thickness of the main pipe;

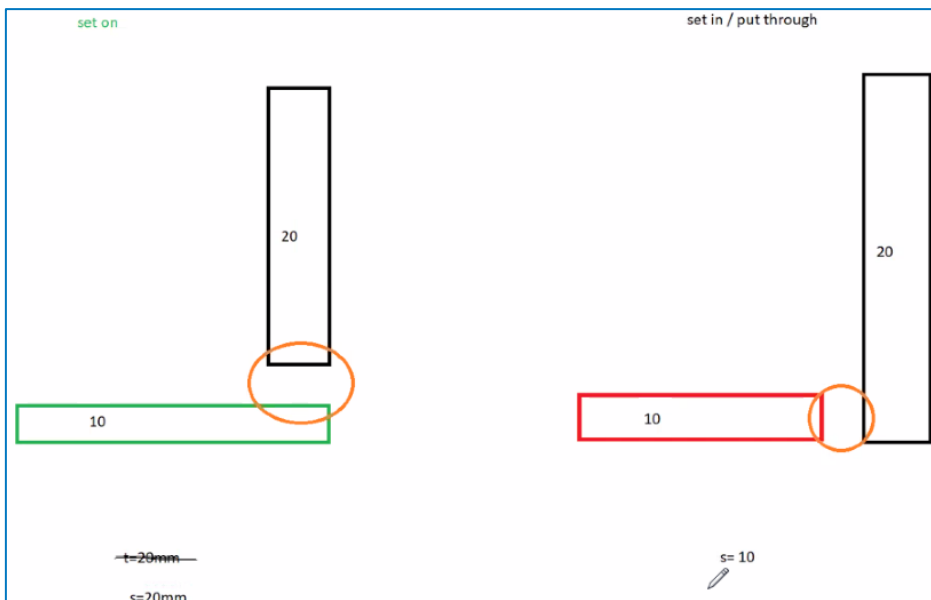
a) → For a butt joint: the parent metal thickness, which for joints between dissimilar thicknesses is that of the thinner material;

b) → For a fillet weld: the parent metal thickness, which for joints between dissimilar thickness is that of the thinner material;

c) → For branch connections: the thickness of the thinner material;

d) → For a T-butt joint in plate: the thickness of the thinner material;

Martin Lohr presenterade skilnaden mellan set on respektive set in/set through.



Noterade att det i tabellen finns en gräns för minsta tjocklek på grundmaterial, men inte för svetsgods.

Föreslogs att uppdatera tabellen för giltighetsområde för diameter till motsvarande som för del 1. Alltså utan övre gräns. Enligt följande:

Table7 — Range of qualification for pipe and branch connection diameters
Dimensions in millimetres

Diameter of the test piece D^a	Range of qualification
$D \leq 25$	$0,5 D$ to $2 D$
$D > 25$	$\geq 0,5 D$ (25 mm min)
NOTE — For structural hollow section, D is the dimension of the smaller side.	
^a — D is the outside diameter of the pipe or outside diameter of the branch pipe.	
NOTE 1 For hollow sections other than circular (for example, elliptic), D is the dimension of the smaller side.	
NOTE 2 $2 D$ is the outside diameter for the pipe of a butt weld or the outside diameter of the branch pipe for a branch connection (see Figure 4, outside diameter D_2).	

Noterade att för ”hollow sections”, som likställs med fyrkantströr, är D måttet på den kortaste sidan.

Inledde en diskussion om huruvida diameter påverkar egenskaperna i svetsen och verkligen behöver vara en väsentlig parameter. Efter lång diskussion beslutades att ta bort D som väsentlig parameter:

8.3.2.4 Range of qualification for the diameter of pipes and branch connections

Diameter D is not an essential variable for qualification of a welding procedure specification.

For non-circular hollow sections, for example square tubes or elliptical sections, D is the smaller dimension of the smaller side.

Qualification given for plates also covers pipes when the outside diameter is > 500 mm or when the diameter is > 150 mm welded in the welding position PA or PC (rotated position).

Table7 — Range of qualification for pipe and branch connection diameters
Dimensions in millimetres

Diameter of the test piece D^a	Range of qualification
$D \leq 25$	$0,5 D$ to $2 D$
$D > 25$	$\geq 0,5 D$ (25 mm min)
NOTE — For structural hollow section, D is the dimension of the smaller side.	
^a — D is the outside diameter of the pipe or outside diameter of the branch pipe.	
NOTE 1 For hollow sections other than circular (for example, elliptic), D is the dimension of the smaller side.	
NOTE 2 $2 D$ is the outside diameter for the pipe of a butt weld or the outside diameter of the branch pipe for a branch connection (see Figure 4, outside diameter D_2).	

Diskuterade förslag ändring av krav på värmebehandling efter svetsning. AVSLOGS:

8.4.9 Post-weld heat treatment or ageing

Post-weld heat treatment, for example artificial ageing or natural ageing, shall be specified in the pWPS in accordance with ISO 2107. Addition or deletion of post-weld heat treatment or ageing is not permitted.

Addition or deletion of post-weld heat treatment or ageing is not permitted except for destructive testing for qualification welding test for materials material groups ≥ 23 according to ISO/TR 15608.

The temperature range and the ageing conditions specified in the pWPS is the range-qualified.

Diskuterade förslag om förändring av krav på giltighet för sträckenergi. Noterade att det inte behövs någon undre gräns för aluminium och att grupp 23 är känsligt för hög sträckenergi, varför det som anges i förslaget är korrekt och lämnades så.

Noterade att det svenska förslaget (kommentar 89) löser problemet perfekt angående små avsiktliga tillsatser till skyddsgaser. Lades till 3 gånger MIG, TIG och Plasma.

8.5.1 Process 131

8.5.1.1 The qualification given to the shielding gas is restricted to the **sub-group**^I in accordance with ISO 14175. Shielding gases not covered by ISO 14175 are restricted to the nominal composition used in the test.

An intentional addition or deletion of maximum 0,1 % of any gas component does not require a new welding procedure test.

8.5.2 Process 141 and 142

The qualification given to shielding gas and backing gas is restricted to the symbol in accordance with ISO 14175 used in the welding procedure test. Shielding gases not covered by ISO 14175 are restricted to the nominal composition used in the test.

An intentional addition or deletion of maximum 0,1 % of any gas component does not require a new welding procedure test.

8.5.3.1 Qualification is restricted to the nominal composition of the plasma gas used in the welding procedure test.

8.5.3.2 Qualification of the shielding gas and backing gas is restricted to the classification used in the welding procedure test in accordance with ISO 14175. Shielding gases not covered by ISO 14175 are restricted to the nominal composition used in the test.

An intentional addition or deletion of maximum 0,1 % of any gas component does not require a new welding procedure test.

Avslutade därmed hantering av 95 kommentarer till ISO/DIS 15614-2.

Beslutade att cirkulera för ytterligare en WGC (Working Group Consultation).

3. Övrigt

Inget övrigt togs upp.

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

Nästa möte är tidigare bestämt till 9 maj 2023 via zoom, för hantering av kommentarer på övriga förslag, ISO/DIS 15613 (34 kommentarer), ISO/DIS 15614-4 (5 kommentarer), samt kommentarer till ISO/DIS 15614-2 (WGC).

SC 10 möte som var bestämt till 1 februari blev framskjutet.

Mathias Lundin