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!!! Cannot replace the use of ASME Section IX !!!

Table		QW-253	QW-256	QW-255	QW-254	QW-252	QW-258	QW-257
Process		SMAW	GTAW	GMAW / FCAW	SAW	OFW	ESW	PAW
QW-402 Joints								
1	∅	Groove design	N	N	N	N	N	S
2	±	Backing				N		
3	∅	Backing composition				N		
4	-	Backing	N		N			
5	+	Backing or ∅ chemical composition		N				N
10	∅	Root spacing	N	N	N	N	N	N
11	±	Retainers	N	N	N		E	N
QW-403 Base Metal								
1	∅	P-Number				E	E	
2		Max. T qualified				E		
4	∅	Group number					S	
5	∅	Group number	S	S	S			S
6		T Limits toughness (16 mm min T)	S	S	S			S
8	∅	T Qualified	E	E	E			E
9		t pass > 1/2 in. (13 mm)	E		E		E	
11	∅	P-No. qualified	E	E	E			
12	∅	P-Number/melt-in						E
QW-404 Filler Metals								
3	∅	Size		N		N		N
4	∅	F-Number	E	E	E	E	E	E
5	∅	A-Number (ferrous materials only)	E	E	E	E	E	E
6	∅	Diameter	N		N		N	
9	∅	Flux-wire classification				E		
10	∅	Alloy flux				E		
12	∅	Classification SFA	S	S	S		E	S
14	±	filler		E				E
17	∅	flux type or composition					E	
18	∅	wire to plate					E	
19	∅	consum guide					E	
22	±	consumable insert		N				N
23	∅	solid or metal cored to flux-cored or v-v		E	E			E
24		± or ∅ supplemental Filler Metal			E	E		
27	∅	Alloy elements from supplemental filler			E	E		E
29	∅	Flux trade designation				N		
30	∅	t	E	E	E	E		E
33	∅	Classification	N	N	N		N	N
34	∅	Flux Type neutral or active P#1)				E		
35	∅	Flux-wire classification				S N		
36		Recrushed slag				E		
50	±	GTAW flux to aid penetration		N				
QW-405 Positions								
1	+	Position	N	N	N	N		N
3	∅	↑↓ Vertical Welding	N	N	N			N
QW-406 Preheat								
1		Decrease > 100°F (55°C)	E	E	E	E	N	E
2	∅	Preheat maintenance	N		N	N		
3		Increase > 100°F (55°C) (IP)	S	S	S	S		S
QW-407 PWHT								
1	∅	PWHT (none, <A1, >A3, >A1&<A3 or combination)	E	E	E	E	E	E
2	∅	PWHT (time & temperature range)	S	S	S	S	S	S

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Process	SMAW	GTAW	GMAW / FCAW	SAW	OFW	ESW	PAW

QW-408 Gas

1	±	trailing or Ø composition		N	N			N
2	Ø	shielding gas single, mixture or %		E	E			
3	Ø	shielding flow rate		N	N			
4	Ø	composition						E
5	±	backing or Ø composition or flow		N	N			N
7	Ø	Type fuel gas				E		
9	-	backing or Ø composition P4X, P10I, J, K P5X or P6X		E	E			E
10	Ø	shielding or trailing P10 I,J,K, P5X or P6X		E	E			E
21	Ø	flow rate						N

QW-409 Electrical Characteristics

1	>	Heat input	S	S	S	S		S
3	±	pulsing I to DC		N				
4	Ø	AC to DC or v-v, for DC Ø polarity	N	N	N	N		N
5	Ø	± 15% I & E range					E	
8	Ø	Amps & (except SMAW & GTAW) Volts range	N	N	N	N		N
12	Ø	tungsten electrode		N				N
30	Ø	AC to DC or v-v, for DC Ø polarity; not for P-Nos. 8, 21 through 26, and 41 through 49	S	S	S	S		S
32	Ø	Transfer mode			N			

QW-410 Technique

1	Ø	String or weave for manual or semiautomatic	N	N	N	N	N	N
2	Ø	Flame characteristics					N	
3	Ø	orifice cup, or nozzle size		N	N			N
4	Ø	← → Technique					N	
5	Ø	Method of cleaning	N	N	N	N	N	N
6	Ø	Method of back gouge	N	N	N	N		N
7	Ø	oscillation for machine or automatic		N	N	N		N
8	Ø	contact tube to work distance			N	N		
9	Ø	Multi to single pass per side	N	N	N	N		N
10	Ø	single to multi electrodes for machine & automatic		S N	S N	S N		S N
11	Ø	closed to out of chamber welding for P-N° 5X		E				E
15	Ø	electrode spacing machine & automatic		N	N	N	N	N
25	Ø	Manual or semiautomatic to machine or automatic	N	N	N	N		
26	±	Peening	N	N	N	N	N	N
64		Use of thermal process for P11A&P11B	E	E	E	E	E	E
86	Ø	oscillation					E	
87	Ø	Multiple to single pass/side	S	S	S	S		S
92	Ø	Bead width	S	S	S	S		S

LEGEND > Increase or greater than + Addition ↑ Uphill ← Forehand Ø Change
 < Decrease or less than - Deletion ↓ Downhill → Backhand

E = Essential Variables which must be indicated on both the WPS and recorded on the PQR .
 Any changes to these variables require requalification of WPS

S = Supplementary Essential Variables must be indicated on the WPS and recorded on the PQR when toughness testing is required.
 Changes to these variables when toughness testing is performed require requalification of WPS.

N = Nonessential variables must be indicated on the WPS but when changed do not require requalification of WPS

NOTE 1: WPS's are to indicate **all** Essential, Nonessential and when required Supplementary Essential variables applicable for the process. PQR's are to indicate **all** Essential and when required Supplementary Essential variables applicable for the process.
 Do not indicate variables which are not used as NA.
 They are applicable and should be entered on the WPS or PQR as "**None**" / "**Not used**" or similar.

NOTE 2: Be careful of converting a temperature **value** and a temperature **difference** for example: A preheat or interpass temperature of 200°C: (9 x 200°C)/5 + 32 = 392°F with a permitted decrease of 100°F gives 392°F - 100°F = 292°C converted back to °C (292°F-32)x5/9 = 144,44 °C; the difference is 200°C - 144,44°C = 55,56. This permits an increase or decrease of **55,56°C** not as would be assumed from converting 100°F(100°F-32)x5/9 = **32,7°C**

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