Son Set Consultants

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The majority of the rules of welding codes that's gets confused involves wrong use one of the following three documents:

- Welding Procedure Specification (WPS) = weld recipe
- Procedure Qualification Record (PQR) = proof test of the weld recipe
- Welder Performance Qualification Record (WPQ) = welder test

The biggest source of confusion is the mixing of the rules between these three documents.

Most mistakes are made when one is working with one of the three documents, while applying a requirement from one of the other documents.

The welding industry Code writing committees would do a great service to industry if they would produce three separate Codes:

- The first for the "preparation" of the welding procedure specification (WPS) = weld recipe,
- The second for the "qualification" (proof test) of the WPS (weld recipe) and the documentation of that qualification on a Procedure Qualification Record (PQR),
- The third for the "qualification" of the welder's performance and the documentation of that qualification on a Welders Performance Qualification (WPQ) record.

These three documents, however, are intermixed within welding codes. One must know which of these three documents is being considered. Mixing of the rules for one document with another is the biggest source of confusion.

Another source of confusion is the common use of the word, "procedure."

When someone refers to "the procedure," or "welding procedure," it is not certain if they are referring to the welding procedure specification (WPS) or the procedure qualification record (PQR).

You may avoid this source of confusion if the proper terms are always used.

The scope of all welding codes is the qualification of welders and the welding procedure specifications employed in welding.

- Welding Procedure Specification (WPS) = weld recipe
- Procedure Qualification Record (PQR) = proof test of the weld recipe
- Welder Performance Qualification Record (WPQ) = welder test

The rules that apply to these three documents cover the majority of the requirements of any welding code.

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Then close the box and move to the next one

Weld Procedure Specification

WPS Number	Date	Revision	Page 1 of 2
[1]	[2]	[3]	

SUPPORTING PQR (s) ID.

[4]

SCOPE

[5]

WELDING PROCESS(ES) & TYPE

Process(es): [6]

JOINT DESIGN

Joint Design:	[7]
Root Spacing:	[8]
Backing Material:	[9]
Treatment of backside, method of gouging/preparation:	[10]
Maximum Mismatch:	[11]
Typical Joint Details:	[12]

[13]

BASE METALS

M-No. [14] Group No. [15] To M-No. [16] Group No. [17]

Thickness Range Qualified: [18]
Diameter (Tubular Only): [19]
Coating Description or Type: [20]

FILLER METALS

Process:	[21]
AWS Specification No.:	[22]
AWS No. (Classification):	[23]
F-No.	[24]
Weld Metal Analysis A-No.:	[25]
Weld Metal Deposit Thickness:	[26]
Filler Metal Size:	[27]
Flux-Electrode Classification:	[28]
Supplemental Filler Metal:	[29]
Consumable Insert & Type:	[30]
Consumable Insert:	[31]
Supplemental Deoxidant:	[32]
Energized Filler Metal "Hot"	[33]

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Annex VII (Informative) Welding Procedure Specification (WPS)

WPS Number	Date	Revision	Page 2 of 2
[1]	[2]	[3]	

POSITION	
Welding Positions:	[34]
Progression for Vertical Welding:	[35]

PREHEAT AND INTERPASS	
Preheat Minimum:	[36]
Interpass Temperature Maximum:	[37]
Preheat Maintenance:	[38]

HEAT TREATMENT	
PWHT Type:	[39]
PWHT Temperature:	[40]
PWHT Holding Time:	[41]
Heating and Cooling Rate:	[42]

SHIELDING GAS	Type and % Composition (if applicable)	Flow Rate Range
Torch Shielding Gas:	[43]	[48]
Root Shielding Gas:	[44]	[49]
Environmental Shielding:	[45]	
Vacuum Pressure:	[46]	
Gas Cup Size:	[47]	

ELECTRICAL	
Process:	[50]
Filler Metal Diameter:	[51]
Current Type and Polarity:	[52]
Amperage Range:	[53]
Transfer Mode:	[54]
Wire Feed Speed (ipm)	[55]
Voltage Range:	[56]
Tungsten Specification No.:	[57]
Tungsten Classification:	[58]
Tungsten Electrode Diameter:	[59]
Maximum Heat Input (J/in):	[60]
Pulsed Current:	[61]

VARIABLES	
Single to Multiple Electrodes:	[62]
Electrode Spacing (in.):	[63]
Single or Multipass:	[64]
Contact Tube to Work Distance (in.):	[65]
Cleaning:	[66]
Peening:	[67]
Conventional or Keyhole Technique:	[68]
Stringer or Weave Bead:	[69]
Travel-Speed Range (ipm):	[7]

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Annex VIII (Informative) Procedure Qualification Record (PQR)

WELDING PROCESS & Type	
Process 1:	[1]
Process 2:	[2]

BASE METALS			
Base Material Spec.:	[3]	to	[4]
M-No.:	Group No.:	M-No.:	Group No.:
Plate or Pipe:	[6]	Pipe Diam.:	[7]
Thickness:	[8]		
Coating:	[9]		

FILLER METALS	
Specification No.:	[10]
AWS No. Classification:	[11]
F-No.:	[12]
Weld Metal Analysis A-No.:	[13]
Filler Metal Size:	[14]
Supplemental Filler:	[15]
Weld Metal Deposit Thickness:	[16]

POSITION	
Position of Joint:	[17]
Vertical Welding Progression:	[18]

PREHEAT	
Min. Preheat Temperature:	[19]
Max. Interpass Temperature:	[20]

ELECTRICAL	
Current & Polarity:	[21]
Amperage Range:	[22]
Pulsed Current:	[23]
Wire Feed Speed (ipm)	[24]
Voltage Range:	[25]
Travel Speed IPM:	[26]
Transfer Mode:	[27]
Maximum Heat Input J/in.:	[28]
Tungsten Type:	[29]
Tungsten Diameter:	[30]

JOINTS	
Weld Type:	[31]
Groove Type:	[32]
Root Spacing:	[33]
Metal Backing:	[34]
Thermal Backgouging:	[35]

[36]

Sketch of Joint

POSTWELD HEAT TREATMENT	
PWHT Type:	[37]
PWHT Temperature:	[38]
PWHT Time:	[39]

GAS	
Shielding Gas:	[40]
Composition:	[41]
Flow:	[42]
Gas Cup Size:	[43]

TECHNIQUE	
Stringer or Weave:	[44]
Method of Cleaning:	[45]
Oscillation:	[46]
Contact Tube to Work Distance:	[47]
Multipass or Single pass per side:	[48]
Number of Electrodes:	[49]
Electrode Spacing:	[50]
Peening:	[51]

VISUAL EXAMINATION: [52]

TENSILE TESTS

Specimen No.	Width in.	Thickness in.	Area in.²	Ultimate Total Load (lbs)	Ultimate Unit Stress (psi)	Type of Failure & Location
[53]	[54]	[55]	[56]	[57]	[58]	[59]

GUIDED-BEND TESTS

Type	Results	Type	Results
[60]	[61]	[62]	[63]

Welder's Name [64] Stamp or Clock No. [65]

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of the Part B Practical CWI Exam Requirements. It is intended to be used for the CWI Part B Exam only and is not intended to be used for actual production welding or any other use without the written consent of AWS.

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Welder Qualification Test Record (WQTR)

Welder's Name [1] **ID No.** [2] **Symbol** [3]

Identification of WPS followed: [4]

Specification of base metal(s) welded: [5] **Thickness:** [6]

Testing Variables and Qualification Limits

Welding Variables			Actual Values	Range Qualified
Welding Process(es)			[13]	[31]
Type (i.e.; manual, semi-automatic)			[14]	[32]
Backing (metal, weld metal)	Process 1:	[7]	[15]	[33]
	Process 2:	[8]	[16]	[34]
☐ Plate ☐ Pipe (enter diameter if pipe or tube)			[17]	[35]
Base Metal M-Number to M-Number			[18]	[36]
AWS Filler metal or Electrode Specification(s)			[19]	
Filler metal or electrode classification(s)			[20]	
Filler metal F-Numbers	Process 1:	[9]	[21]	[37]
	Process 2:	[10]	[22]	[38]
Consumable Insert for GTAW			[23]	[39]
Weld deposit thickness for each welding process:				
	Process 1:	[11]	[24]	[40]
	Process 2:	[12]	[25]	[41]
Position Qualified (2G, 6G, etc.)			[26]	[42]
Vertical progression (Uphill or Downhill)			[27]	[43]
Inert gas backing for GTAW or GMAW			[28]	[44]
Transfer Mode (spray/globular or pulse to short circuit-GMAW)			[29]	[45]
GTAW welding current type/polarity (AC, DCEP, DCEN)			[30]	[46]

Results

Visual Examination of Completed Weld : [47]

Guided Bend Test Type: ☐ Transverse Side ☐ Transverse Root & Face

Specimen No.	Results	Specimen No.	Results
[48]	[49]	[50]	[51]

Alternative radiographic examination results [52]

Fillet Weld – fracture test [53] Length and percent of defects [54] in.

Macro Examination [55] Fillet size (in.) [56] x [57] Concavity/convexity (in.) [58]

Other tests [59]

Film or specimens evaluated by [60] Company [61]

Mechanical tests conducted by [62] Laboratory test no. [63]

Welding supervised by [64]

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Organization [65]

By [66] Date [67]