The Easy Way to Meet ASME Code Welding Requirements

by

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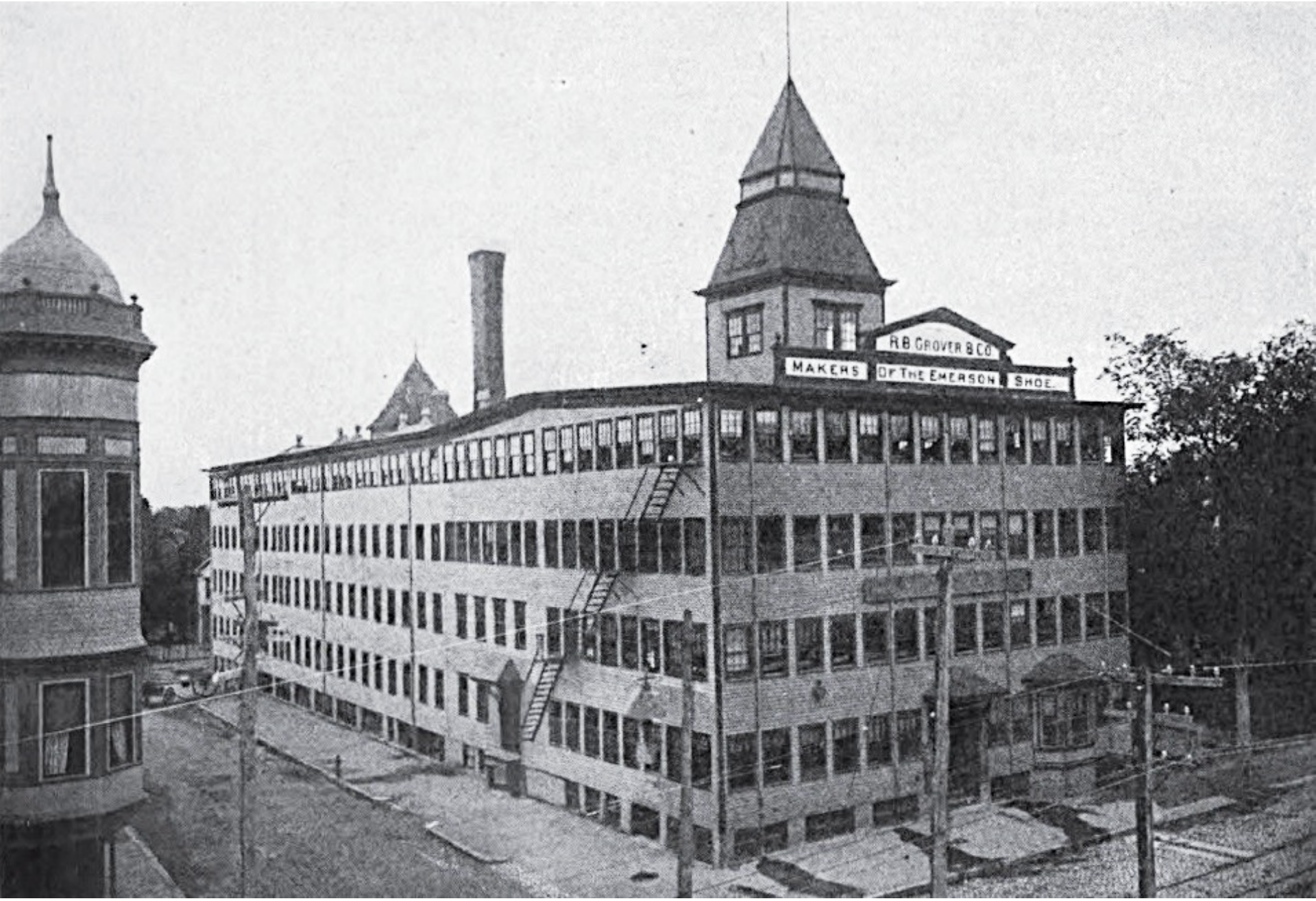
Notice

All statements by the speaker represent his opinion alone and do not necessarily represent the position of the ASME Boiler and Pressure Vessel Code Committee. All requests for interpretations or other inquiries relative to ASME Code and Standards should be addressed to the Secretary, ASME Boiler and Pressure Vessel Code Committee, ASME International, Two Park Avenue, New York, NY 10016-5990 .

Why do we have Codes. . .

- Industrial Revolution
- Steam became a prime mover for transportation, factories, space heating
- 1905, Brockton, MA
- R. B. Grover Shoe Factory


R B GROVER & CO.
MAKERS OF THE EMERSON SHOE.

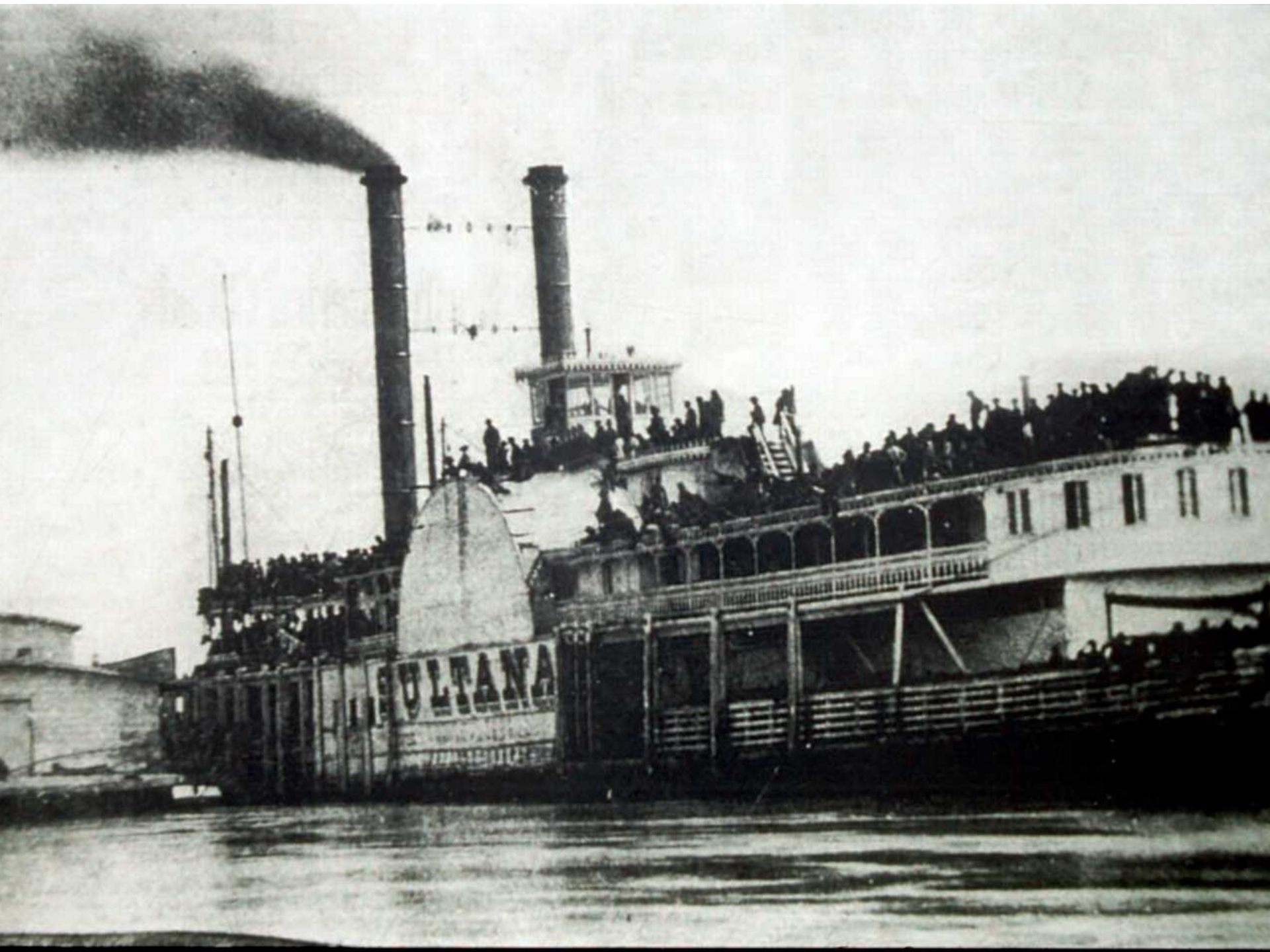
March 20, 1905, 7:30 AM

- Monday morning. Cold and damp. Plant engineer David Rockwell fired up the boilers, including the old boiler built in 1890, to heat the steam radiators to warm the building. . .
- The plant manager reported peculiar humming from the radiators at 7:45.
- The assistant plant engineer assured him that everything was OK. Five minutes later. . . .

- The 1890s model boiler ripped open and shot through the building roof with the force of 650 lbs of dynamite causing structural damage to the building and landing 200 feet away.

- The roof collapsed and floors buckled.
- Fire was fed by a broken natural gas line.
- Wooden building went burned down and several buildings adjacent also burned.
- 100 escaped, 58 died including plant Engineer Rockwell and 117 were injured.


IOLA HOUSE


SULTANA

SS Sultana
April 27, 1865

- SS Sultana built in 1863 was powered by 4 boilers mounted side by side and interconnected with a common header
- April 27 1865 stopped in Vicksburg Miss. for a hasty repair patch on one boiler
- The Captain was paid $0.50 for each POW he could carry North.
- The Sultana's legal capacity was 376.

SS Sultana

- To overcome the river current, the 4 boilers were pushed to exceed their maximum working pressures
- 2:00 A.M. April 27, 3 of her 4 boilers exploded damaging a good portion of the ship.
- Hot coals from the boilers turned the remaining superstructure into an inferno

FEDERAL TROOPS WERE GOING HOME

1547 Went Down With Sultana

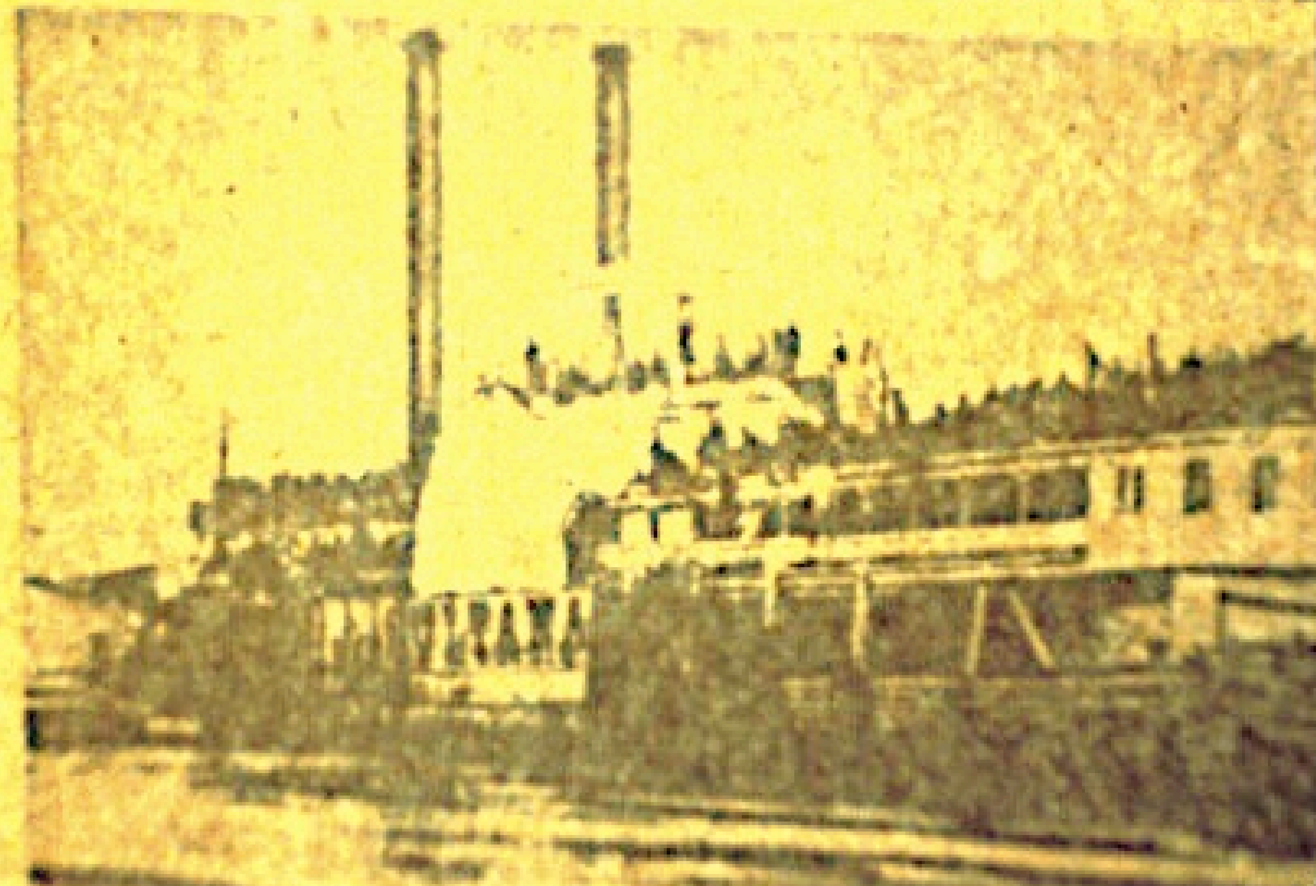
By GEORGE H. MONAGHAN
Globe-Democrat Staff Writer

The troop train crawled slowly westward, through Georgia, across Alabama and Mississippi, to Vicksburg.

There its passengers—Federal troops sick and crippled from years in harsh Confederate prison camps—were emptied into the light rain falling that night in April, 1865.

Behind them were the war years and the years in prisons at Andersonville, Macon, Ga., and Cahaba, Ala.

They were standing now at a point in history noted by Lee's surrender at the Appomattox Court House, the fall of the Confederate government and [illegible] the assassination of their [illegible] Lincoln.



Historical Background

- Code was written because boilers were blowing up killing people and destroying property.
- In the late 1800's, there were 300 to 400 boiler explosions annually in the US.
- In spite of laws passed by legislators prohibiting such events, they continued unabated well into the early 1900's.
- In 1911, ASME appointed a committee to write a code covering materials, design, fabrication, inspection, and testing of boilers.
- The *ASME Boiler Code* was published in 1914 and later adopted by local jurisdictions nationwide.
- The B31 *Code for Pressure Piping* was written by the Pressure Piping Society and first published in 1935.

Scopes of Common B31 Code Sections

B31.1, Power Piping (Power plants, high pressure steam and water).

B31.3, Process Piping (Refineries, chemical process, pharmaceutical, food, beverage, chip plants etc.).

B31.5, Refrigeration Piping (carries refrigerants, excluding circulating water).

B31.9, Building Services Piping (steam, water, air, 125 psig, nonflammable fluids at 350 psig, 1 atm vacuum, steam and water at 355 F, other gases at 200 F, nonflammable liquids at 250 F, NPS 30, 1/2 inch thick. If any parameter is exceeded, go to B31.1).

⁂ Since more than one code section could apply, there should be written agreement on which B31 Section applies!!!

Piping Codes Invoke Section IX

All B31 Code Sections refer to Section IX for welding.

- **If a contract specifies B31 construction, Section IX is automatically included**
  - **Some Boiler code sections add requirements to Section IX rules (e.g., Section III and VIII).**
  - **Some codes take exception to parts of Section IX rules (e.g., B31).**

Piping Codes Invoke Section IX

- **When Section IX is invoked:**
  - **Qualified Welding Procedure Specifications (WPSs) must be followed in construction**
  - **Qualified welders and welding operators must be used for all welding**
  - **Parallel requirements are invoked for brazing**
  - **Section IX is 400 pages long**

ASME Section IX

- **Welding Procedure Specification (WPS)**
- A WPS provides direction to the welder telling him how to make a production weld. The contractor is responsible for *providing* the WPS to the welder and for *being sure that it is followed*.
  - Section IX spells out the minimum information that has to be on the WPS (i.e., “variables”). They are Legion…
  - WPSs specify the limits of variables (process, base metals, electrode type, etc.) that the welder must follow while he is welding.
  - WPSs have to be “qualified”.

ASME Section IX

- Welding Procedure Qualification
  - Qualifications consists of welding together two pieces of metal following the WPS and destructively testing that test coupon. The record of the welding conditions and the test results is a Procedure Qualification Record (PQR).
  - Section IX spells out when a change in welding conditions (welding process, base metal, electrode type, heat treatment, etc.) is significant enough to require additional tests to be done (i.e. “essential variables”). The result is that more than one PQR may be needed to support a WPS.

ASME Section IX

- Section IX says that:
  - Each manufacturer or contractor must have its own WPSs
  - Procedure qualification test coupons must be welded by that manufacturer or contractor.

B31 Exception to Section IX for WPSs

B31 Sections recognize that contractors may belong to a technically competent group or agency (e.g., NCPWB).

Members may use WPSs developed by that organization without individually qualifying them under these conditions:

B31 Exception to Section IX for WPSs

- WPS has been qualified per Section IX
- Contractor's name is on WPS and PQRs
- Contractor signs WPS and PQRs
- Contractor demonstrates that he can follow the WPS by qualifying one welder following that WPS.
- NCPWB is not responsible for enforcing these requirements.

NCPWB WPSs

Welding Procedure Specification (WPS)

Company Name: _____

WPS Number: 1-12-1 **Revision:** 3A **Date:**

Supporting PQRs: 87102, 87103, 87110, 02101

Welding Process: SMAW

Type: Manual

Joints (QW-402)

Joint Design: Sq, Single V, U, J, Double V, U, J, Fillets, Repairs, Buildup **Details:** See other side for Typical Joints

Backing: Optional for EXX10, Required for EXX18 **Backing or Retainer Type:** Steel, when permitted

Base Metals (QW-403)

P / S-Number : 1 **Group Numbers:** 1, 2

to P / S-Number : 1 **Group Numbers:** 1,2

Thickness Range:

Base Metal 1/16 to 1.728"

Fillet Weld: All

Minimum Pipe Outside Diameter:

Grooves: >1" OD

Fillets: All

Postweld Heat Treatment (PWHT)(QW-407)

Temperature Range (°F): Not Permitted

Holding Time (hr.): Not Applicable

Filler Metals (QW-404)

	Root	Fill
Specification Number:	SFA 5.1, 5.5	SFA 5.1
AWS Classification:	E6010 or E7010-A1	E7018
F-Number:	3	4
A-Number:	1 and 2	1
Max. Deposited Weld Metal:		
Grooves:	3/4"	1.728"
Fillets:	All	All
Max. Bead Thickness:	1/4"	1/4"
Supplemental Filler Metal:	Not Applicable	Not Applicable
Consumable Insert:	Not Permitted	Not Applicable
Pulsed Power Source:	Optional	Not Applicable

E7010-A1 is preferred for Group 2 metals. E7018M and E7018-1 are permitted as alternates to E7018.

NCPWB WPSs

Gas (QW-408)	Positions (QW-405)	Preheat (QW-406)
Shielding Gas: Not Applicable **Backing Gas:** Not Applicable **Trailing Gas:** Not Applicable	**Welding Positions:** All **Progression:** Uphill	**Minimum Preheat (°F):** 50 **Maximum Interpass (°F):** 500* **Preheat Maintenance:** None Required

Electrical Characteristics (QW-409)

Weld Layer	Welding Process	Filler Metal		Current					Other
		Class	Dia. (in.)	Type	Polarity	Amps	Volts	Travel Speed*	
Groove									* these values are recommended only, not mandatory.
1	SMAW	EXX10	1/8	DC	EP (Rev)	75 to 125	N/A	2 to 4 ipm	
1 (alt)	SMAW	EXX10	3/32	DC	EP (Rev)	40 to 80	N/A	2 to 4 ipm	
Groove and Fillets	SMAW	EXX10	3/32	DC	EP (Rev)	40 to 80	N/A	2 to 4 ipm	
	SMAW	EXX10	1/8	DC	EP (Rev)	75 to 125	N/A	2 to 4 ipm	
	SMAW	EXX18	3/32	DC	EP (Rev)	70 to 100	N/A	2 to 4 ipm	
	SMAW	EXX18	1/8	DC	EP (Rev)	90 to 140	N/A	2 to 6 ipm	
	SMAW	EXX18	5/32	DC	EP (Rev)	120 to 190	N/A	2 to 6 ipm	

NCPWB WPSs

Technique (QW-410)

Tungsten Size /Type: Not Applicable
Shielding Gas Cup Size: Not Applicable
Pulsed Current: Not Applicable
Multiple or single pass per side: Either
Multiple or single electrodes: Not Applicable
Contact-tube-to-work Distance (stickout): Not Applicable
Backgouging: Grinding or carbon arc followed by grinding.
Repair Method: Grinding. Backwelding is permitted.

Initial Cleaning: Remove cutting oxide by grinding, solvent clean as needed using clean rag to remove oil and grease.
Interpass Cleaning: Remove slag with chipping hammer , wire brush or grinder.
Stringer or Weave Bead: Either
Peening: Not permitted
Other: Supplemental designators R, -H4, -H8 and -H16 are permitted to be used with EXX18 electrode types.

The undersigned Contractor, a member of the National Certified Pipe Welding Bureau, hereby adopts this jointly developed procedure as its Welding Procedure Specification and certifies that this procedure has been qualified as shown on the above referenced Procedure Qualification Records.

SEAL OF QUALITY — NATIONAL CERTIFIED PIPE WELDING BUREAU — PIPE WELDING

Company Name: _____

By: _____ **Date:** _____

Title: _____

NCPWB Form QW-482/4-1-91

WPS Number: 1-12-1

NCPWB WPSs
There are over 100 of them.

- Carbon steels
- Cr-Mo steels
- Grade 91
- Stainless Steels
- Combinations
- Aluminum alloys
- Copper
- Nickel Alloys
- Titanium

- GTAW
- SMAW
- GMAW
- GMAW-S
- FCAW
- SAW
- Brazing (HVAC and Med Gas)

NCPWB WPSs

WPS NUMBERING SYSTEM

X-Y-Z

The "X" identifies the base metal group ("P-number") to which materials are assigned

X-Y-Z

(for materials of the same P-number)

or

X1:X2-Y-Z

(for materials from two different P-Numbers)

Base metal P-number– Section IX -- QW/QB-422

Table QW/QB-422
Ferrous and Nonferrous P-Numbers
Grouping of Base Metals for Qualification

Spec. No.	Type or Grade	UNS No.	Minimum Specified Tensile, ksi (MPa)	Welding P-No.	Welding Group No.	Brazing P-No.	Brazing ISO 15608 Group	Nominal Composition	Typical Product Form
				Ferrous					
A/SA–36	...	...	58 (400)	1	1	101	11.1	C–Mn–Si	Plate, bar & shapes
A/SA–53	Type E, Gr. A	K02504	48 (330)	1	1	101	1.1	C	Resistance welded pipe
A/SA–53	Type S, Gr. A	K02504	48 (330)	1	1	101	1.1	C	Smls. pipe
A/SA–53	Type E, Gr. B	K03005	60 (415)	1	1	101	11.1	C–Mn	Resistance welded pipe
A/SA–53	Type F	K03005	48 (330)	1	1	101	11.1	C	Furnace welded pipe
A/SA–53	Type S, Gr. B	K03005	60 (415)	1	1	101	11.1	C–Mn	Smls. pipe
A/SA–105	...	K03504	70 (485)	1	2	101	11.1	C	Flanges & fittings
A/SA–106	A	K02501	48 (330)	1	1	101	1.1	C–Si	Smls. pipe
A/SA–106	B	K03006	60 (415)	1	1	101	11.1	C–Mn–Si	Smls. pipe
A/SA–106	C	K03501	70 (485)	1	2	101	11.1	C–Mn–Si	Smls. pipe
A108	1015	G10150	...	1	1	101	1.1	C	Bar
A108	1018	G10180	...	1	1	101	1.1	C	Bar
A108	1020	G10200	...	1	1	101	1.1	C	Bar
A108	8620	G86200	...	3	3	102	4.1	0.5Ni–0.5Cr–Mo	Bar
A/SA–134	SA283 Gr. A	K01400	45 (310)	1	1	101	1.1	C	Welded pipe
A/SA–134	SA285 Gr. A	K01700	45 (310)	1	1	101	1.1	C	Welded pipe
A/SA–134	SA283 Gr. B	K01702	50 (345)	1	1	101	1.1	C	Welded pipe

Base metal composition – Pnumbers.com

numbers

P Numbers

P#:	G#:	ISO:	Form:	Spec:	Type:	UNS:		Min. KSI (MPa):
any	any	any	any	SA-335			≤	any

P#	G#	ISO	Spec	Type	UNS	KSI (MPa)	Product Form
15E	1	6.4	A/SA-335	P92	K92460	90 (621)	Smls. Pipe
3	1	1.1	A/SA-335	P1	K11522	55 (379)	Smls. Pipe
3	1	4.2	A/SA-335	P2	K11547	55 (379)	Smls. Pipe
4	1	5.1	A/SA-335	P12	K11562	60 (414)	Smls. Pipe
3	1		A/SA-335	P15	K11578	60 (414)	Smls. Pipe
4	1	5.1	A/SA-335	P11	K11597	60 (414)	Smls. Pipe
5A	1	5.2	A/SA-335	P22	K21590	60 (414)	Smls. Pipe
5A	1	5.2	A/SA-335	P21	K31545	60 (414)	Smls. Pipe
5B	1	5.3	A/SA-335	P5c	K41245	60 (414)	Smls. Pipe
5B	1	5.3	A/SA-335	P5	K41545	60 (414)	Smls. Pipe
5B	1	5.3	A/SA-335	P5b	K51545	60 (414)	Smls. Pipe
5B	1	5.4	A/SA-335	P9	K90941	60 (414)	Smls. Pipe
15E	1	6.4	A/SA-335	P91	K90901	85 (586)	Smls. Pipe

NCPWB WPSs

In X-Y-Z, "Y" identifies the welding process

Y is the **Welding Process Number** based on the table below:

1) SMAW using F-3 Electrodes (E6010, E7010-A1, E6011, etc.)
2) SMAW using other than F-3 Electrodes (E7018, E308-16, etc.)
3) GTAW without Consumable Insert
4) GTAW with Consumable Insert
5) GMAW-S (Short Circuiting Transfer Mode)
6) GMAW (Globular, Spray or Pulsed Transfer Mode)
7) FCAW (Flux cored Wire Variation of GMAW)
8) SAW
9) OFW

In X-Y-Z, "Z" identifies a Variation

NCPWB Technical Support

NCPWB will provide responses to customer comments on NCPWB WPSs, i.e., if a customer or his engineer rejects an NCPWB WPS, NCPWB Technical Consultant will provide responses and assistance to ensure acceptance of NCPWB WPSs by Owners and their engineers.

ASME Section IX

- **Welder Qualification** is a completely separate activity from Welding Procedures.
- *Forget what we just talked about relative to WPSs.*
- A welder follows a WPS when he takes a test (Remember -- a WPS provides direction to the welder -- so don't forget everything)

ASME Section IX

- **Welder Qualification**
  - Welders must be tested to determine if they have the skill needed to make sound welds.
  - The contractor is responsible for the quality of weld produced by his welders.
  - The type of test given determines what the welder is allowed to do in production (e.g., a welder whose only test is on plate may not weld on pipe because welding on pipe requires more skill than welding on plate.). Section IX defines the “variables” that determine what the welder is qualified to weld in production.

ASME Section IX

- Welding of the test coupon must be done under the full supervision and control of a contractor. Testing of the coupon (visual examination and bend testing or radiography, etc.) may be done by others.

ASME Section IX

The welder must follow a WPS when welding the test coupon, but the following determine what the welder is allowed to do in production.

- *welding process* used,
- the *level of difficulty of the test coupon*
- *Code variables as applied to the test coupon.*

UA / NCPWB

Joint Welder Testing Program

Welder Qualification Test Record

Welder's Name: _____ Social Security No: _____ Stamp No: _____

Welder's Home Local: Test Location: _____ City: _____ State: _____

UA Welder ID No: _____

Testing Conditions and Ranges Qualified

Identification of WPS followed during welding of test coupon: 1-3-1

Specification of Test Coupon Base Metal: A/SA-106 or 53, Grade B Thickness(in.): 0.432 in.

Welding Variables	Actual Values	Range Qualified
Welding Process(es) used:	GTAW	GTAW
Type of welding (manual, semi-automatic):	Semi-automatic	Manual and Semi-automatic
Base Metal P or S-Number 1 to P or S-number:	1	1 through 15F
☐ Plate ☒ Pipe (enter diameter if pipe or tube):	NPS 6, Sch 80	2-7/8 in OD and over
Backing (metal, weld metal, backwelded, etc):	None	Optional
Filler Metal (SFA) Specification(s) (info. only):	SFA 5.18	
Filler Metal or Electrode Classification(s) (info. only):	ER70S-2 or 3	
Filler Metal or Electrode F-Number:	6	6
Solid, Metal Cored or Flux Cored wire for GTAW:	Solid	Solid
Consumable Insert for GTAW or PAW:	None	None
Max Deposit Thickness* for each process and variation (in.):	0.432	0.864
Position (2G, 6G, 3F, etc.):	6G	All
Progression (uphill, downhill):	Uphill	uphill
Fuel Gas for OFW, Backing Gas for GTAW, PAW, GMAW:	Used	Required
GMAW Transfer Mode (short circuiting, spray, etc.):	N/A	N/A
GTAW Current Type/Polarity (AC, DCEP, DCEN):	DCEN	DCEN

* indicates that at least 3 layers of weld metal were deposited

UA / NCPWB

Joint Welder Testing Program

Welder Qualification Test Record

Welder's Name: _____ Social Security No: _____ Stamp No: _____

Welder's Home Local: Test Location: _____ City: _____ State: _____

UA Welder ID No: _____

Testing Conditions and Ranges Qualified

Identification of WPS followed during welding of test coupon: 1-3-1

Specification of Test Coupon Base Metal: A/SA-106 or 53, Grade B Thickness(in.): 0.432 in.

Welding Variables	Actual Values	Range Qualified
Welding Process(es) used:	GTAW	GTAW
Type of welding (manual, semi-automatic):	Semi-automatic	Manual and Semi-automatic
Base Metal P or S-Number 1 to P or S-number:	1	1 through 15F
☐ Plate ☒ Pipe (enter diameter if pipe or tube):	NPS 6, Sch 80	2-7/8 in OD and over
Backing (metal, weld metal, backwelded, etc):	None	Optional
Filler Metal (SFA) Specification(s) (info. only):	SFA 5.18	
Filler Metal or Electrode Classification(s) (info. only):	ER70S-2 or 3	
Filler Metal or Electrode F-Number:	6	6
Solid, Metal Cored or Flux Cored wire for GTAW:	Solid	Solid
Consumable Insert for GTAW or PAW:	None	None
Max Deposit Thickness* for each process and variation (in.):	0.432	0.864
Position (2G, 6G, 3F, etc.):	6G	All
Progression (uphill, downhill):	Uphill	uphill
Fuel Gas for OFW, Backing Gas for GTAW, PAW, GMAW:	Used	Required
GMAW Transfer Mode (short circuiting, spray, etc.):	N/A	N/A
GTAW Current Type/Polarity (AC, DCEP, DCEN):	DCEN	DCEN

* indicates that at least 3 layers of weld metal were deposited

UA / NCPWB

Joint Welder Testing Program

Welder Qualification Test Record

Welder's Name: _____ Social Security No: _____ Stamp No: _____
Welder's Home Local: Test Location: _____ City: _____ State: _____
UA Welder ID No: _____

Testing Conditions and Ranges Qualified

Identification of WPS followed during welding of test coupon: 1-3-1
Specification of Test Coupon Base Metal: A/SA-106 or 53, Grade B Thickness(in.): 0.432 in

Welding Variables	Actual Values	Range Qualified
Welding Process(es) used:	GTAW	GTAW
Type of welding (manual, semi-automatic):	Semi-automatic	Manual and Semi-automatic
Base Metal P or S-Number 1 to P or S-number:	1	1 through 15F
☐ Plate ☒ Pipe (enter diameter if pipe or tube):	NPS 6, Sch 80	2-7/8 in OD and over
Backing (metal, weld metal, backwelded, etc):	None	Optional
Filler Metal (SFA) Specification(s) (info. only):	SFA 5.18	
Filler Metal or Electrode Classification(s) (info. only):	ER70S-2 or 3	
Filler Metal or Electrode F-Number:	6	6
Solid, Metal Cored or Flux Cored wire for GTAW:	Solid	Solid
Consumable Insert for GTAW or PAW:	None	None
Max Deposit Thickness* for each process and variation (in.):	0.432	0.864
Position (2G, 6G, 3F, etc.):	6G	All
Progression (uphill, downhill):	Uphill	uphill
Fuel Gas for OFW, Backing Gas for GTAW, PAW, GMAW:	Used	Required
GMAW Transfer Mode (short circuiting, spray, etc.):	N/A	N/A
GTAW Current Type/Polarity (AC, DCEP, DCEN):	DCEN	DCEN

* indicates that at least 3 layers of weld metal were deposited

Supervision and Control

Paragraph QG-106 requires that those who supervise welding of test coupons be qualified. That person have sufficient knowledge of welding and Section IX that the Supervisor can do the following:

- Positively identify the person being tested
- Record the Welding or brazing process to be used (SMAW, GMAW, TB, etc.) and whether it is manual, semi-automatic, machine or automatic.
- Record the number, revision and issue date of the WPS to be followed.
- Record the pipe size and the schedule or the thickness of material making up the test coupon, (e.g., NPS 2, Schedule 80, NPS 6, 0.432 wall, 1/4 inch thick plate, etc.)

Supervision and Control

- Record the Test coupon specification, type and grade (SA-106 Gr. B, SA-53, Gr. B, A-36, etc.).
- Record the Position of test coupon (6G, 2G, 5G, 1G, etc.) and mark the top center is if mechanical testing will be done.
- Record whether the joint is welded from one side or from both sides. If welded from one side (normal for pipe welds), whether a backing ring or no backing is used.
- Record whether or not gas backing is used (only applicable for GTAW and GMAW when welding is done from one side of the groove without a backing ring, as in a typical pipe weld.
- Record the electrode(s) or filler metal that will be used. For GTAW and PAW, whether welding of the root pass is done adding filler metal, using a consumable insert or welding autogenously (i.e., tight butt).

Supervision and Control

- For GTAW, Record the current type and polarity
- For GMAW, Record the transfer mode (based on volts and amps used).
- Record the direction of progression (uphill or downhill) that the welder will use. This may be different for the root pass and for the fill passes.
- When more than one process or electrode type is to be used, record the approximate deposit thickness for each process or electrode type
- Perform visual examination of the test coupon.

ASME Section IX

Testing the test coupon

All coupons receive visual examination including inside and outside surfaces. The following are unacceptable:

- Cracks
- Incomplete Penetration
- Incomplete fusion
- Porosity
- Slag
- Excessive undercut (Contractor's call)
- Excessive reinforcement (Contractor's call)
- Evidence of welding or grinding on the inside surface of a test coupon welded from one side without backing.

ASME Section IX

The contractor may bend and evaluate the specimens himself or send the coupon to a lab that cuts and bends the specimens. There are *no specific personnel qualifications* for the person who evaluates the specimens.

- The acceptance criteria: No single open discontinuity may exceed 1/8 inch.

Those who radiograph or ultrasonically examine test coupons must be qualified and their procedures must meet ASME Section V.

- Acceptance criteria: Cracks, lack of penetration, lack of fusion are not permitted. Limited indications of porosity and slag are permitted.

The *contractor is responsible* for work performed by others for him.

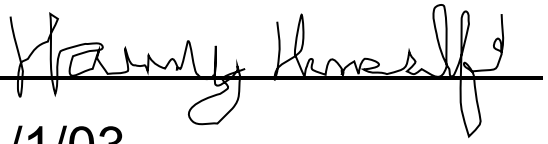
ASME Section IX

The contractor is responsible for proper completion of the forms to Code requirements. One of the benefits of being in NCPWB is that NCPWB will provide either competed forms (WPQTs and JPQTs) or consulting assistance in completing forms properly.

The Contractor who was there when the welder tested must sign the original qualification record in the lower-right corner of the form.

Harry's Rod Burners, Inc

Contractor/Fabricator Name

Signature 

Date 4/1/03

A **signature** is **required!!!**

ASME Section IX
Welder Expiration

Welders lose their qualifications if they don't use a process for 6 months. (QW-322).

- Contractors have to have a record that they did!

Continuity Log

Welder or Brazer [ ] Operator [ ] Name:_____Stamp:_____

~~Process:~~ SMAW [ ] GTAW [ ] GMAW/FCAW [ ] BRAZING [ ] OFW [ ]

Job Number	Date of Weld	Job Number	Date of Weld
Original Test			

ASME Section IX
Welder Expiration

- Welding does not have to be on Code work.
- Welding does not have to be nondestructively examined.
- The welder only has to be observed welding with the process.
- Updating depends on the welder using the **process**, not the WPS and not the electrode type.

Welder Interchange

Section IX says that each manufacturer must qualify his own welders.

But . . . . . .

B31 Code Sections take exception to this requirement!

Basis of Welder Interchange Program

- **B31.1, 127.5 says: "Qualification of .. Welders and welding operators…is required and shall be in accordance with ASME Section IX *except as modified herein*." (i.e. The welder has to be properly qualified in the first place!)**
  - Paragraph 127.5.1(B) says: "Each employer … may accept a Welder/Welding Operator Performance Qualification (WPQ) made by a previous employer.
  - (Subject to the approval of the owner or his agent.),
  - On piping,
  - Using the same or an equivalent procedure wherein the essential variables are within the limits established in Section IX, ASME Boiler and Pressure Vessel Code.

Basis of Welder Interchange Program

- **"An employer accepting such qualification tests by a previous employer shall obtain a copy (*from the previous employer*) of the WPQ, showing:**
  - **The name of the employer by whom the welders or welding operators were qualified.**
  - **The dates of such qualification**
  - **Evidence that the welder or welding operator has maintained qualification in accordance with QW-322 of Section IX *(i.e. the continuity log).***
- **The employer shall then prepare and sign the record required in para. 127.6 accepting responsibility for the ability of the welder or welding operator *(i.e., the new employing contractor must sign the WPQ Record)*.**

Basis of Welder Interchange Program

- B31.1 defines an "**employer**" as: **" The owner, manufacturer, fabricator, contractor, assembler, or installer responsible for the welding, brazing and NDE performed by his organization, including procedures and performance qualifications."** (i.e., it is not necessary to have the welder be "employed" to test him or to transfer his qualifications.)
  - Same rules apply to brazers!
  - B31.3, B31.5 and B31.9 rules are almost identical to the above.

Standardized Welder Tests

Standardized Welder Tests Consist of Two Parts

1) Standard Test Description and testing requirements
2) Qualification Record that matches already completed except for administrative information

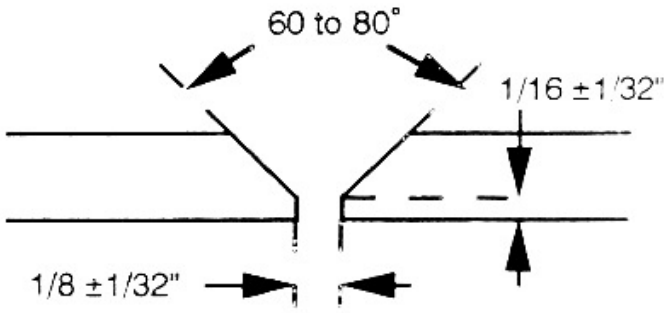
Standardized Welder Tests

National Certified Pipe Welding Bureau
Welder Performance Qualification Technique Sheet

Preliminary Conditions

Test Coupon Material:	SA106 Grade B or SA53 Grade B
Plate/Pipe Size and Schedule:	6 NPS Schedule 80
Test Coupon Thickness:	0.432"
Backing:	Not permitted
Testing Positon:	6G
Preheat Temperature (°F):	50
Backgouging:	Not permitted
Number of WPS Followed:	1-12-1, latest revision

Groove Details



Welding Conditions

Weld Layer:	1	2	Balance
Welding Process(es):	SMAW	SMAW	SMAW
Electrode/Filler Metal Class:	E6010	E7018	E7018
Electrode/Filler Metal Size:	1/8*	3/32"*	1/8"*
Consumable Insert:	N/A	N/A	N/A
Current Type and Polarity:	DCEP (Rev.)	DCEP (Rev.)	DCEP (Rev.)
Welding Current (amps):	75 to 125	70 to 100	90 to 140
Wire Feed Speed:	N/A	N/A	N/A
Voltage:	N/A	N/A	N/A
Progression:	Uphill	Uphill	Uphill
Travel Speed (ipm):	2 to 4*	2 to 4*	2 to 4*
Tungsten Size and Type:	N/A	N/A	N/A
Shielding Gas (CFH):	N/A	N/A	N/A
Gas Cup Size:	N/A	N/A	N/A
Backing Gas (CFH):	N/A	N/A	N/A
GMAW Transfer Mode:	N/A	N/A	N/A
Wire Stick-out:	N/A	N/A	N/A
String or Weave:	Stringer	Either	Either
Weld Deposit Thickness	0.094" (≈ 3/32")	0.338" (Total for E7018)	

* Indicates variables which may be changed to suit the actual welding conditions

Standardized Welder Tests

Inspection and Testing

The completed test coupon shall be visually examined internally and externally and found to be free of any cracks, incomplete fusion, incomplete penetration or excessive porosity before additional testing is performed. Testing shall consist of two root bends and two face bends or four side bends or radiography in accordance with ASME Section IX.

WPQT-01
Revision 2

NCPWB Form QW-487/5-15-91

Welder Qualification Test Record

Welder's Name:_____ SSN or UA Card No:_____ Stamp No:_____
Welder's Home Local:_____ Test Location:_____ City: _____ State:_____

Testing Conditions and Ranges Qualified

Identification of WPS followed during welding of test coupon: 1-12-1, latest revision
Specification of Test Coupon Base Metal A/SA 106 Grade B or SA53 Grade B Thickness(in.): 0.432

Welding Variables	Actual Values	Range Qualified
Welding Process(es) used:	SMAW/SMAW	SMAW/SMAW
Type of welding (manual, semi-automatic):	Manual	Manual
Base Metal P-Number 1 to P-Number:	1	P-1 through 15F
☐ Plate ☒ Pipe (enter diameter if pipe or tube):	6 NPS Schedule 80	2-7/8" OD and over
Backing (metal, weld metal, backwelded, etc):	None	Opt. for F-3 Req'd for others
Filler Metal (SFA) Specification(s) (info. only):	5.1	
Filler Metal or Electrode Classification(s) (info. only):	E6010/E7018	
Filler Metal or Electrode F-Number:	F-3/F-4	F-1 through 3/4
Solid, Metal Cored or Flux Cored wire for GTAW:	N/A	N/A
Consumable Insert for GTAW or PAW:	N/A	N/A
Deposit Thickness for each process and variation (in.):	0.094/0.338	0.864/0.676
Position (2G, 6G, 3F, etc.):	6G	All
Progression (uphill, downhill):	Uphill	Uphill
Fuel Gas for OFW, Backing Gas for GTAW, PAW, GMAW:	N/A	N/A
GMAW Transfer Mode (short circuiting, spray, etc.):	N/A	N/A
GTAW Current Type/Polarity (AC, DCEP, DCEN):	N/A	N/A

* Indicates that at least 3 layers of weld metal were

Standardized Welder Tests

Testing and Results

Visual Examination of Completed Weld: Acceptable **Date of Test:** _____

Bend Test ☐ Transverse Root and Face (QW-462.3(a)) ☐ Side (QW-462.2)

Type	Result	Type	Result	Type	Result

Radiographic Examination Results: Acceptable Lab Test No.: _____

Film or Specimens Evaluated By: _____ Title: _____ Company: _____

Contractor/Fabricator's Supervisor: _____ Title: _____ Company: _____

Welding Witnessed by: _____ Title: _____ Company: _____

We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Code.

National Certified Pipe Welding Bureau
Chapter Number: _____

_____
Contractor/Fabricator Name

Secretary: _____

Signature: _____

Date: _____

Date: _____

Standardized Welder Tests

When a Contractor gives a welder test and follows a Standard Test Description, all the contractor has to do is fill in the welder's name and other welder information, the test information and sign the record.

Joint UA/NCPWB Program

UA / NCPWB

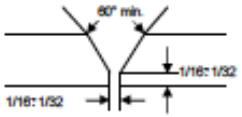
Joint Performance Qualification Test

Standard Test Description

PRELIMINARY CONDITIONS

Test Coupon Material:	A/SA106 or A/SA53 B
Plate/Pipe Size/Schedule:	NPS 6, Sch 40
Test Coupon Thickness	0.280"
Backing:	None
Test Position:	6G
Preheat:	50?F
Identification of WPS followed:	UA-1 or NCPWB 1-1-2, latest revisions

Joint Design and Fit-up



Welding Conditions

Weld Layer:	Root	Balance
Welding Process:	SMAW	SMAW
Electrode/Filler Class:	E6010	E6010
Electrode/Filler Size:	3/32"	1/8"
Consumable Insert:	N/A	N/A
Current Type/Polarity:	DCEP (Rev.)	DCEP (Rev.)
Welding Current (amps):	65 to 85*	70 to 110*
Wire Feed Speed (ipm):	N/A	N/A
Voltage:	N/A	N/A
Progression:	Downhill	Downhill
Travel Speed (ipm):	2 to 4*	3 to 5*
Tungsten Type/Size:	N/A	N/A
Shielding Gas (CFH):	N/A	N/A
Cup Size:	N/A	N/A
Backing Gas (CFH):	N/A	N/A
GMAW Transfer Mode:	N/A	N/A
Wire Stickout:	N/A	N/A
String or Weave:	String	Either
Backgouging or backgrinding:	Not Permitted	N/A
Weld Deposit Thickness (in.):	0.280 total thickness	

* Indicates variables which may be changed without affecting the validity of the test

Inspection and Testing

The test coupon shall be visually examined per UA Test Administration Procedure 001 and tested by two face bends and two root bends or by radiography in accordance with ASME Section IX.

UA/NCPWB Form QW-485/6-99 Revision: 0 JPQT STD-01

UA / NCPWB

Joint Welder Testing Program

Welder Qualification Test Record

Welder's Name: _____ SSN or UA Card No: _____ Stamp No: _____
Welder's Home Local: _____ Test Location: _____ City: _____ State: _____
UA Test Assembly ID No: _____

Testing Conditions and Ranges Qualified

Identification of WPS followed during welding of test coupon: UA-1, NCPWB (1-1-2)
Specification of Test Coupon Base Metal: A/SA-106 Grade B or A/SA-53 Grade B Thickness (in.): 0.280

Welding Variables	Actual Values	Range Qualified
Welding Process(es) used:	SMAW	SMAW
Type of welding (manual, semi-automatic):	Manual	Manual
Base Metal P-Number 1 to P-Number:	1	P-1 through 15F
☐ Plate ☒ Pipe (enter diameter if pipe or tube):	NPS 6, Sch 40 (0.280")	2-7/8 in OD and over
Backing (metal, weld metal, backwelded, etc):	None/Weld Metal	F-3 Opt., F-1,2 Req'd
Filler Metal (SFA) Specification(s) (Info. only):	5.1	
Filler Metal or Electrode Classification(s) (Info. only):	E6010	
Filler Metal or Electrode F-Number:	3	1 through 3
Solid, Metal Cored or Flux Cored wire for GTAW:	N/A	N/A
Consumable Insert for GTAW or PAW:	N/A	N/A
Deposit Thickness for each process and variation (in.):	0.280	0.560 Max
Position (2G, 6G, 3F, etc.):	6G	All
Progression (uphill, downhill):	Downhill	Downhill
Fuel Gas for OFW, Backing Gas for GTAW, PAW, GMAW:	N/A	N/A
GMAW Transfer Mode (short circuiting, spray, etc.):	N/A	N/A
GTAW Current Type/Polarity (AC, DCEP, DCEN):	N/A	N/A

* Indicates that at least 3 layers of weld metal were deposited

Testing and Results

Visual Examination of Completed Weld: Acceptable Date of Test: _____

Bend Test ☐ Transverse Root and Face (QW-462.3(a)) ☐ Side (QW-462.2)

Type	Result	Type	Result	Type	Result

Radiographic Examination Results: Acceptable Lab Test No.: _____
Film or Specimens Evaluated By: _____ Title: _____ Company: _____
Contractor/Fabricator's Supervisor: _____ Title: _____ Company: _____

We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Code.

National Certified Pipe Welding Bureau
Chapter Number: _____
Secretary: _____
Date: _____

United Association
Authorized Testing Representative
Name: _____
Date: _____

_____
Contractor/Fabricator Name
Signature: _____
Date: _____

Revised 09/06/12 UA/NCPWB Form QW-484 (S6.280/F3) JPQT-01

Standardized Welder Tests

Index of Standardized Welder Tests

GTAW	2 Sch. 80	0.218	8-3-1	UA-41	JPQT 41
GTAW - Manual	3/8 Sch 10	0.065	8-3-2	UA-13	JPQT 13
GTAW	6 Sch. 40	0.280	23-3-1	UA-31J	JPQT-31J
GTAW	6 Sch. 40	0.280	23-3-1	UA-31B	JOQT-31B
SMAW	6 XXS	0.864	1-12-1	UA-09S	JPQT 09S
GTAW/SMAW	6 XXS	0.864	8-32-1	UA-43	JPQT 43
GTAW – Automatic Orbital wo/filler	Any	Any	8-3-3 or 8-3-4	UA-18A	JPQT 18A
GTAW/SMAW	2 Sch. 80	0.218	1-32-1	UA-10	JPQT 10
GTAW/SMAW	6 XXS	0.436	1-32-1	UA-07T	JPQT 07T

Nonstandard Welder Tests – whatever you need

NCPWB Local Chapter

What does it do for you?

NCPWB Chapter Activities

- The primary function of NCPWB Chapters are to:
  - Facilitate interchange of welder qualifications,
  - Ensure that welder qualification records are administratively complete,
  - Maintain continuity records
  - Transfer qualification records to contractors when Welders change employers
  - Coordinate testing events with UA

UA/NCPWB Joint Welder Certification Program

- Joint Testing Program Highlights.
  - Contractor must be present and supervise the tests.
  - New forms are joint forms.
  - **Contractor signs qualification records** and submits them to the Chapter. **These are NCPWB's official qualification records.**
  - ATR is the "independent witness".
  - UA maintains continuity in parallel with Chapters. This allows coordination in finding welders and having them weld so they don't have to retest all the time.

NCPWB Cost

- Initiation fee is $250.
- Annual Membership fee is $375/year
- Less than the cost of qualifying a WPS
- The best part – you don’t need to figure out Section IX!

The Test

What is the easiest way to ensure compliance with the requirements of ASME Section IX regarding welding procedures and welder qualification?

The Test

What is the easiest way to ensure compliance with the requirements of ASME Section IX regarding welding procedures and welder qualification?

- Take my 3-day long seminar on how to read, follow and comply with Section IX, spend a lot of money qualifying welding procedures and welders, then have them rejected by your customers. . . .

The Test

Or. . .

- Join the NCPWB so you can utilize the NCPWB WPSs and the Joint UA/NCPWB welder interchange program.