NCPWB
National Certified Pipe Welding Bureau

Technical Bulletin

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Qualification of Welding Operators for Orbital TIG Welding

There is occasional confusion among NCPWB members who use orbital pipe and tube welding machines when it comes to determining just what is required to qualify a welding operator and how to properly complete the QW-484 form.

This confusion occurs because the Section IX requirements for welding operators are significantly different from those for welders. A welder makes welds using manual skills, mostly his fine motor skills, whereas a welding operator operates a machine that makes the weld, and the welder needs to be able to operate the machine properly. These are, obviously, two different sets of skills, so Section IX has different ranges of qualification requirements for welders and operators. The other confusing factor is that customer specifications often specify operator testing that is significantly in excess of what the Code requires.

ASME Section IX distinguishes between welders and welding operators in the definitions in QW-492. Welders are individuals who weld using manual or semi-automatic welding processes, such as stick or manual TIG welding or hand-held MIG. A welding operator is an individual who uses a machine that does the welding, such as an orbital TIG machine or submerged arc machine. Section IX further distinguishes between two types of machine welding. Automatic welding is welding with equipment that performs the welding operation *without* adjustment of the controls by the welding operator. Machine welding is welding with equipment that performs the welding operation under *the constant observation and control* of the welding operator.

ASME Section IX, paragraph QW-360, provides the changes in welding conditions that affect welding operator qualification. These conditions of qualification are significantly different from those for welders in paragraph QW-350. When a welding operator is using automatic welding equipment, such as the automatic pipe and tube welders that are common in the electronics, pharmaceutical, and food processing industries, paragraph QW-361.1 applies. It says that there are only two welding conditions that affect the welding operator's performance qualifications:

1. if the welder changes from one welding process to another welding process or
2. if the welder changes from automatic welding to machine welding.

This means that a welding operator using automatic TIG can qualify on any diameter pipe, on any wall thickness, on any material, etc., and that operator is qualified to

weld on all diameters, all thicknesses of material, all materials, all etc. Since we are so accustomed to the restrictive rules for welder qualification, the rules for welding operator qualification appear shockingly lax. The reason that the operator rules are so open is that the welding procedure that the operator follows should be sufficiently detailed that, if he knows how to set up the equipment following the procedure, the weld should be acceptable; little to no welding knowledge is required. Extensive training on how to use the equipment, however, is usually required.

When an operator is using machine welding equipment, paragraph QW-361.2 applies. A few of the welding conditions for which a machine welding operator must qualify are the same as those for welders, including welding positions, use of backing, and use or non-use of consumable inserts, but additional variables such as automatic joint tracking and automatic arc voltage control are new. Since the operator of machine welding equipment is required to control the equipment by observing its operation, more knowledge about welding conditions is required than for operators who run automatic welding equipment.

NCPWB has prepared welding operator qualification records showing acceptable ways to document the qualification record for a welding operator who has tested using automatic TIG equipment. Form JPQT-18A shown on page 3 is for automatic welding. The only information contractors have to provide is the specification and grade of the pipe, the diameter and the thickness – and these are for information only. Note that the "range qualified" column is almost completely filled in with "Not Applicable." This indicates that the welding operator using automatic welding is qualified to weld on all thickness of base metal, all diameters of pipe or tube, all positions, uphill or downhill, and any other welding conditions that are specified by the WPS. This reflects the fact that the only variables affecting welding operators who run *automatic* welding equipment are a change in process and a change from automatic to machine welding.

Welding operator forms for machine welding are more complex. See the form JPQT-37 on page 4. Should you choose to qualify a welding operator using machine GTAW, GMAW or FCAW, please contact your Chapter Secretary for assistance in completing the record.

Contributed by
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UA / NCPWB

Joint Welder Testing Program

Operator Qualification Test Record

Welding Operators Using Automatic Welding Equipment

Welder's Name: _____ UA/NCPWB ID No. _____ Stamp No: _____
Test Location: _____ City: _____ State: _____

Testing Conditions and Ranges Qualified

Identification of WPS followed: UA-18A, NCPWB (8-3-3 or 8-3-4) ☐ Test coupon ☐ Production Weld
Specification and Grade of Base Metal(s)*: _____
Base Metal P-Number: 8 to P-number: 8 Position (2G, 6G, 3F, etc.): 5G (typical)
☐ Plate ☒ Pipe (enter diameter* if pipe or tube): _____ in. OD Thickness* (in.): _____
Filler Metal (SFA) Specification: None Filler Metal or Electrode Classification: None
* as selected by Contractor or ATR.

Welding Variables	Actual Values	Range Qualified
Welding Process(es) used:	GTAW-A	GTAW-A
Type of welding (machine, automatic):	Automatic	Automatic
The addition or deletion of filler metal EBW or LBW:	N/A	N/A
The type of laser for LBW (CO2, YAG, etc.):	N/A	N/A
Continuous or friction drive for FW:	N/A	N/A
Vacuum for EBW:	N/A	N/A

Testing and Results

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

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

Type	Result	Type	Result	Type	Result

☒ Radiographic / ☐ Ultrasonic Examination Results: _____ 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 _____
Secretary: _____
Date: _____

United Association Authorized Testing Representative
Name: _____
Date: _____

_____
Contractor/Fabricator Name
Signature: _____
Date: _____

UA / NCPWB

Joint Welder Testing Program

Operator Qualification Test Record

Machine Welding

Welder's Name: _____ UA/NCPWB ID No. _____ Stamp No: _____

Test Location: _____ City: _____ State: _____

Testing Conditions and Ranges Qualified

Identification of WPS followed: UA-18A, NCPWB (8-3-3 or 8-3-4) ☒ Test coupon ☐ Production Weld

Specification and Grade of Base Metal(s)* : _____

Base Metal P-Number: 8 to P-number: 8

☐ Plate ☐ Pipe (enter diameter* if pipe or tube): _____ in. OD Thickness* (in.): _____

Filler Metal (SFA) Specification: None Electrode Class: None Flux Trade Name: N/A

* As selected by Contractor.

Welding Variables	Actual Values	Range Qualified
Welding Process(es) used:	GTAW-A	GTAW-A
Type of welding::	Machine	Machine
Direct or remote Visual Control:	Direct	Direct
Automatic Arc Voltage Control (GTAW):	Not Used	Optional
Automatic Joint Tracking:	Not Used	Optional
Position (2G, 6G, 3F, etc.):	6G	All
Consumable Inserts (GTAW or PAW):	None	Optional
Use of Backing (metal, weld metal, etc.):	None	Optional
Single or Multiple Pass per Side:	Multiple	Either

Testing and Results

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

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

Type	Result	Type	Result	Type	Result

☒ Radiographic / ☐ Ultrasonic Examination Results: _____ 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 _____

Secretary: _____

Date: _____

United Association Authorized Testing Representative

Name: _____

Date: _____

_____

Contractor/Fabricator Name

Signature: _____

Date: _____