TITLE: GENERAL WELDING PROCEDURE SPECIFICATION FOR THE GAS TUNGSTEN ARC PROCESS

1.0 SCOPE:

1.1 This is a general Welding Procedure Specification to be used with a specific Welding Procedure Specification (WPS) when referenced on the WPS. In cases of conflict between this document and the specific WPS, the specific WPS shall govern.

2.0 REFERENCE:

2.1 ASME Boiler and Pressure Vessel Code, Section IX, Welding Qualifications, Edition and Addenda as shown on the specific WPS.

3.0 PROCEDURE QUALIFICATIONS:

3.1 Procedure qualifications have been made in accordance with the requirements of the ASME Code, Section IX and will be available for review.

4.0 PREPARATION OF BASE METAL:

4.1 The edges or surfaces of the pieces to be joined by welding shall be prepared by flame cutting, plasma arc cutting, arc gouging, machining, shearing, grinding, or chipping and shall be cleaned of detrimental oil, grease, scale and rust. The edges of the pieces may have a protective coating applied to them which need not be removed before they are welded unless specifically prohibited by the specific WPS.

5.0 WEATHER CONDITIONS FOR WELDING:

5.1 Welding shall not be performed when the surfaces in the welding area (within 6" (15.2 cm) of the arc) are wet; nor in periods of high winds unless the welder and the pieces to be welded are properly protected.

6.0 JOINTS: (QW-402)

6.1 Root Opening:

Normal root opening shall be 0-1/4" (0 mm-6.4 mm). See contract drawings for the specific joint detail. Spacer bar joints are considered 0" gap.

6.2 Wide Gaps:

The following technique shall be used for welding joints with wide gaps which exceed twice that specified on the applicable contract drawing. When zero gap is specified on the contract drawings, gaps exceeding 3/16" (4.8 mm) shall be reduced as outlined below to a 3/16" (4.8 mm) or smaller gap. Maximum weld build-up shall be T (where "T" is the thickness of the plate) for each plate edge or 1/2" (12.7 mm) whichever is smaller.

APPROVED
M. Fellahian 11/10/95 J. Jones LIGO 11-10-95

Method:

Plate edge build-up shall be done with a welding procedure approved for contract use. Weld passes shall be deposited utilizing a stringer bead technique to restore the plate edges to the gap and approximate joint configuration as shown on the contract drawings.

On single or square butt joints, a temporary back-up bar of compatible material may be used. The edges should be built-up using stringer beads to restore the joint to the gap and approximate joint configuration as shown on contract drawings, before tying the edges together.

The temporary back-up bar shall be removed by gouging, chipping or grinding to clean, sound-metal before welding the second side.

6.3 Narrow Gaps:

The following technique shall be used for correcting joints with gaps less than specified on the applicable contract drawing which are not sufficiently wide to allow free manipulation of the electrode in the joint.

Method:

The plate edges of the joint shall be prepared by flame cutting, plasma arc cutting, grinding, arc gouging, or chipping to restore the joint to the gap and approximate joint configuration shown on the contract drawings. Gouging dross, burning dross, or residue shall be removed by brushing or grinding before welding commences.

6.4 Retainers:

Nonmetallic retainers or nonfusing metal retainers may only be used when they are specified on the specific WPS.

6.5 Backing:

Double welded groove welds are considered welding with backing.

For single welded groove welds, the backing shall be as specified in the specific WPS.

7.0 FILLER METAL: (QW-404)

7.1 Supplemental filler metals or supplementary powdered filler metals may only be used when specified on the specific WPS.

7.2 Basic filler metal diameters for GTA welding are .45" (1.1mm), 1/16" (1.6mm), 3/32" (2.4mm) and 1/8" (3.2mm).

8.0 PREHEAT AND INTERPASS TEMPERATURE (When required by the specific WPS): (QW-406)

8.1 Method:

If required, preheat and/or interpass temperature shall be achieved by any suitable means which will keep the temperature of the joint within the specified limits shown on the specific WPS. The method of preheating and the heat source to be used may be changed or supplemented as deemed necessary or desirable.

8.2 Continuous Preheat:

When continuous preheat is required, it shall be a uniform preheat during the time of welding, obtained by pipe burners or strip heaters. On vertical joints or radial joints, the required preheat is necessary along the entire length. On circumferencial joints of larger diameter vessels, the required preheat is necessary along the area or areas being welded. When welders are spaced around the entire circumferential joint on small diameter vessels, the entire joint shall be preheated.

8.3 Monitoring:

Joints requiring preheat and/or interpass temperature control will be checked before and/or during welding of the joints to ensure that the minimum temperature is being maintained and that the maximum interpass temperature is not exceeded.

For temperatures greater than or equal to 150° F (66° C), temperature indicating crayons will normally be used to determine that the joint is at the required minimum temperature or above, but not exceeding the maximum interpass temperature.

9.0 SHIELDING GAS: (QW-408)

9.1 Care shall be taken to ensure that the shielding gas and shielding gas lines do not become contaminated with moisture or other detrimental particles.

10.0 ELECTRICAL CHARACTERISTICS: (QW-409)

10.1 Control of amperes and volts will be by amp and volt meters. Control of heat input/volume of weld metal will be by bead size where applicable.

10.2 The type of tungsten to be used in GTA welding may be pure tungssten (EW), 1% thoriated tungsten (EWTh-1), 2% thoriated tungsten (EWTh-2), or zirconia tungsten (EWZr).

10.3 Pulsing current on d.c. power may only be used when specified on the specific WPS.

11.0 TECHNIQUE: (QW-410)

11.1 Tack Welds:

Tack welds used to secure alignment shall either be removed completely, when they have served their purpose, or their stopping and starting ends shall be properly made and prepared so that they may be satisfactorily incorporated into the final weld. Defective tack welds shall be removed.

11.2 Cleaning:

Brushing or grinding may be used as an aid to clean the weld. Cleaning of stainless steel or Nickel-Chromium-Iron alloy weld metal or base metal shall be with uncontaminated stainless steel brushes, grinding discs or wheels or by other suitable means. All completed welds shall have the weld spatter removed and welds not ground shall be wire brushed.

11.3 Appearance of Welding:

Any defects that appear on the surface of any weld bead shall be removed by chipping, grinding, or arc gouging before depositing the next successive weld bead. The welding current and manner of depositing the weld metal shall be such that there shall be practically no undercutting of the finished joint except as permitted by the applicable Code. The surface of welds shall be free from coarse ripples or grooves, overlaps, and abrupt ridges or valleys. Reinforcement shall be according to the applicable Code.

11.4 Treatment of Backside of Welding Joint:

The backside of double butt welded groove welds shall be prepared by chipping, grinding, or arc gouging to clean sound metal. The root of the groove shall be sufficiently wide to permit fusion and allow free manipulation of the electrode. Gouging dross or residue shall be removed by brushing or grinding before welding commences.

11.5 Peening:

No peening shall be allowed unless specified on the specific WPS or unless specified in special instructions issued by the Welding and Q.C. Manager.

11.6 Cup Sizes:

The sizes of cups that are used for GTA welding are 3/8" (9.5mm)ø to 3/4" (19.1mm)ø.