

Rev: 0
June 10, 2015

Fermilab In-Process Weld Examination Form

Filled by engineer:		
Project: _____	Weld Type: _____	WPS #: _____
Drawing #: _____	Pipe #1 Size: _____	Engineer: _____
Weld #: _____	Pipe #2 Size: _____	Date: _____

Filled by inspector:		
Welder: _____	Inspector: _____	
WPQ Qualified? YES <input type="checkbox"/>	Other <input type="checkbox"/>	

Filled by examiner in field:		
Date: _____	Examiner: _____	

In-Process Visual Examination (see more info on the next page)

Check if OK

a) joint preparation and cleanliness Joint surfaces are free of chips, particles, dust, rust, scale, oil, grease, etc.	
b) pre-heating: (N/A if ambient temperature $\geq 50^{\circ}$ F [10° C]) ambient temp. _____ pre-heat temp. _____	
c) AWS Filler Metal Specification _____ Manufacturer _____ Filler rod: Class _____ Diameter(s) _____ Is filler certified? _____ Is a copy of CMTR or COA available _____ Heat #(s) _____ Lot#(s) _____ gap _____ type of purge gas _____ purge flow-rate & duration _____ or O ₂ reading _____	
c)(1) for butt welds: confirm ID at end preparation is within $\pm 1/32$ " and OD is aligned properly	
d) for brazing: position, flux, brazing temperature, wetting, and capillary action	
e) for welding: condition of root pass (after cleaning) – external and/or internal	
e)(1) for SMAW (stick welding): slag removal and weld condition between passes	
f) appearance of finished joint: No visible cracks, lack of fusion, porosity, obvious imperfections, incomplete penetration _____ Filler material is fused to edges of parent material _____ Depth of undercut ($< 1/32$ ", N/A if non-existent) _____	

Best welding practices

a) Joint Preparation and Cleanliness:

Use scotch bright or Aluminum oxide to clean the joint. Use only wire brushes dedicated for stainless steel on stainless steel. Carbon steel brushes can leave carbon particles in the joint.

b) Preheating:

Minimum temperature for P1 (carbon steel) and P8 (304/316 stainless steel) is 50° F [10° C]. For all other materials or atypical stainless steels, refer to para. 330 of B31.3.

c) Variable specified by WPS (Welding Procedure Specification):

* Welding Machine:

Remote foot pedal required

DC straight machine required.

* Filler rod must be AWS A5.9 designation (for stainless)

* Record diameter and class (308SS or 304LSS ... etc.) of filler rod

* Required Filler Rod Class

If connecting 304SS to 304SS use 308 filler rod

If connecting 304SS to 304LSS use 308L filler rod

If connecting 304LSS to 304LSS use 308L filler rod

If connecting 316SS or 304 SS to 316SS use 316 filler rod

For any other combination consult with the Fermilab weld shop.

* CMTR--Certified Material Test Report, COA-Certificate of Analysis, COC-Certificate of Conformance

* Purge Gas

Purge gas must be 99.995% pure welding grade Argon. Boil off gas from a liquid argon dewar is acceptable.

*Purge Flow

Purge gas must flow through the pipe, past weld joint to remove oxygen. As a general rule the pre-weld purge should give 5-6 volume changes.

* Oxygen concentration

Oxygen concentration must be less than 1%. If available, use an oxygen monitor to measure the O₂ concentration of the exhausting purge gas.

* Joint Clearance (gap)

Butt weld: per WPS

* Socket weld: 1/16" (+1/16", -none) clearance between socket base and adjoining piece.

End Preparation: Align inside surfaces of joint within $\pm 1/32$ " or WPS requirement (whichever is smaller). For unequal pipe diameters or thicknesses, refer to design drawing.

* Internal Alignment:

Butt Weld: If the two pieces have the same OD and wall thickness, alignment can be confirmed using a straight edge on the OD.

(e) Inspection:

Repeat inspection after every pass (does not need a separate form)