Iowa SkillsUSA

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Welding 2017

Explanation

Similar to last year, we are providing the print for this year's project(s) in advanced so that instructors and contestants can prepare prior to the big day. We are providing this to everyone so that all have an opportunity to practice the welds prior to the contest.

The cutting torch test will be the same as last year. The print is attached. Cutting will be with acetylene as a fuel gas using Smith (now branded as Miller) torches. If you want to use your own torch tip, model numbers are in the tool list.

Each contestant will be given the weldment already tacked together for the GMAW and SMAW processes. The contestant will need to read the print and follow the welding procedures for the processes that are specified on the print for each of the welds. The contestants will take the weldment with them to each welding station for the different processes. They may start with SMAW, or GMAW and rotate to each of the other processes to complete the welds.

Only Post-secondary contestants will be required to weld the GTAW which will have a separate print.

Once the weldments are completed, it will be turned into the judges for grading. Welding instructors will not be allowed to be in the same area as the contestants while they are welding; however, we will allow welding instructors to witness the grading of the welds. Welding instructors will not be able to speak during the grading process. Once the weldments are graded, the completed weldments will be available for review by the contestants and the instructors. It is our desire that the contest will become an instructional time as well as a skills contest, thus providing additional value to both the instructor and the contestant.

The other component of this is the written test covering: weld symbols, safety, and each of the welding and cutting processes. During the written test you will be able to turn in your resumes.

As in previous years, the group of contestants will be divided into two groups. Group A will weld first and take the written exam second. Group B will take the written exam first and weld second. Judging of will begin on Group A weldments when they start the written exam. Judging of Group B weldments will begin when the time for welding has expired for Group B.

Judging criteria
Cutting test - cut to print and cut edge quality
Welding test - weld quality for each process, weld size, location and position per print

SKILLS USA 2012

AWS Iowa Section

1. **Alternating Current (AC) is used to GTA weld Aluminum because:**
   A. The electrode positive portion of the AC current cycle provides cleaning action at the Aluminum surface
   B. Aluminum conducts AC better than DC
   C. AC power supplies are generally less expensive than DC power supplies
   D. The electrode negative portion of the AC current cycle provides cleaning action at the Aluminum surface
   E. None of the above

2. **Which type of power supply is used for the SMAW process?**
   A. DCEP
   B. DCEN
   C. Constant Voltage
   D. Constant Current

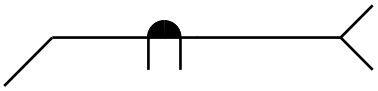
3. **Acetylene gas becomes unstable at what pressure?**
   A. 3 PSI
   B. 8 PSI
   C. 15 PSI
   D. 75 PSI

4. . **Which one of the following is a ferrous metal?**

   A. aluminum
   B. copper
   C. magnesium
   D. mild steel

5. **The selection of the correct filter plate shade number depends on the:**
   A. Brightness of the sun in the weld area
   B. Type of shielding gas in use
   C. Amount of current being used
   D. Type of filler metal being used
   E. All of the above

6. The weld symbol drawn below indicates:



A. A full-penetration square groove weld
B. A fillet weld with melt-through permitted
C. A Butt weld with the arrow side ground flush
D. A fillet weld with the arrow side ground flush

7. When GTA welding Carbon Steel plate, the Tungsten electrode should be:

A. Located well inside the cup
B. Balled
C. Pointed at the tip
D. Ground in such a fashion as to leave grind marks around the tip
E. None of the above

8. Which of the following are functions of the coating on SMAW electrodes:

A. Alloying
B. De-Oxidization
C. Shielding
D. All of the above
E. None of the above

9. When using an Oxy-Acetylene torch, the oxygen cylinder valve should be opened all the way.

A. True
B. False

10. The primary reason some suppliers coat their GMAW filler wire with copper is to:

A. Aid in deoxidixing the weld metal in the weld pool
B. Help smooth out the feeding of the wire
C. Improve electrical transfer at the contact tip
D. Prevent rusting of the filler wire

11. Potential hazards relating to electric arc welding include:

A. Heat
B. Radiation
C. Toxic gasses
D. All the above

12. The size of a coated electrode is determined by the

A. overall diameter
B. amperage setting
C. core diameter
D. AWS classification of electrodes

13. If the Tungsten electrode turns blue after GTA welding, you should:

A. Increase amperage
B. Increase preflow
C. Increase postflow
D. Decrease amperage

14. When experiencing 'arc blow' during SMAW welding, one possible remedy could be:

A. Use a full length electrode
B. Shorten the arc length
C. Change to DCEN from AC current
D. Whip the electrode

15. When Oxy-Fuel cutting, a general rule is that the torch angle should vary according to:

A. Type for fuel gas used
B. Size of tip used
C. Pressure settings
D. Thickness of metal to be cut

16. Which of the following is not an advantage of the Gas Metal Arc Welding process?

A. Higher deposition rates compared to other welding methods
B. Relatively easy process for beginners to learn
C. Suitable for ferrous alloys
D. Suitable for nonferrous alloys
E. None of the above

17. Undercutting is a condition that occurs when

A. welding current is too high
B. welding travel speed too slow
C. welding current is too low
D. arc length is too short

18. The distance through a fillet weld, from the face to the root is called the:

A. Leg
B. Stem
C. Throat
D. Heart

19. The proper current type for most welding of Stainless Steels with the GTAW process is:

A. DCEN
B. DCEP
C. Pulsed AC
D. None of the above

20. Which of the following SMAW electrodes are not suitable for use in all positions?

A. E6011
B. E6018
C. E7024
D. E7018

21. Argon and helium gases are

A. inert
B. reactive
C. reducing
D. oxidizing

22. In GMAW welding, shielding of the molten metal is accomplished through the use of:

A. Granular Flux
B. Coating generated gas
C. Slag
D. Inert and reactive gasses

23. The safest clothing materials to wear in a welding environment are:

A. Asbestos and Kevlar
B. Cotton and Wool
C. Nylon and Rayon
D. Polyester and Nylon

24. Which of the following is not considered a type of joint?

A. Butt
B. T
C. Fillet
D. Corner
E. Edge

25. A green paint band on a GTA electrode indicates:

A. Pure Tungsten electrode
B. Thorium
C. Lanthanum
D. Zirconium

26. When using the SMAW process, as the arc length increases, the current does what?

A. Increases
B. Decreases
C. Initially increases then subsequently decreases
D. Initially decreases then subsequently increases
E. None of the above

27. The flux on a SMAW electrode is broken down by the heat of the welding arc to produce,

A. Slag that reacts with the molten weld metal to reduce contaminates
B. Shielding gases to protect the molten weld from contaminating gases
C. A and B
D. None of the above.

28. Which of the following shielding gasses is the most economical to use for GMAW welding of Carbon Steel with the short circuiting transfer method?

A. Argon
B. Carbon Dioxide
C. 98% Argon, 2% Oxygen mix
D. 75% Argon, 25% Carbon Dioxide mix

29. An acceptable method of shielding yourself from the light from an electric arc while tackwelding is to:

A. Simply close your eyes while tackwelding
B. Hold your hands in front of the arc
C. Squint your eyes tightly while tacking
D. None of the above are acceptable
E All of the above are acceptable

30. When two members are in the same plane with their edges meeting the joint is termed a:

A. Corner joint
B. Lap joint
C. Butt joint
D. Tee Joint

31. When the electrode holder is connected to the positive (+) terminal on a Direct Current power supply, it is called:

A. Direct Current Straight Polarity (DCSP)
B. Direct Current Reverse Polarity (DCRP)
C. Direct Current Direct Deposit (DCDD)
D. Direct Current Indirect Polarity (DCID)

32. Which of the following popular SMAW electrodes is classified as low-hydrogen?

A. E6011
B. E6024
C. E7014
D. E7028
E. None of the above

33. When selecting a cutting tip for Oxy-Acetylene cutting, one should consider:

A. Use the cleanest, newest tip available
B. How fast does the job need to be done
C. The thickness of the metal being cut
D. All of the above

34. What metal will a plasma cutter cut?

A. stainless steel
B. aluminum
C. carbon steel
D. All of the above

35. When selecting a dark filter lens for a welding helmet, the higher the lens number is, the more arc light is blocked out.

A. True
B. False

36. Before opening the cylinder valves on Oxy-Fuel cylinders, the regulator adjusting screws should be turned in all the way.

A. True
B. False

37. Oxygen can be used for shielding gas when GMAW or GTAW welding, in an emergency.

A. True
B. False

38. Low hydrogen electrodes should be stored in a (an):

A. Electric Oven
B. Electrode oven
C. A cool, dry place
D. A warm, humid place
E. Both (A) and (B) above

39. What is the name for the opening produced during a cutting operation?

A. Drag line
B. Slag
C. Kerf
D. Wraparound
E. None of the above

40. The stringer bead weld is made with appreciable transverse oscillation.

A. True
B. False

41. Electric Arc welding performed with proper safety equipment presents great safety hazards.

A. True
B. False

42. On a completed groove weld, the surface of the weld on the side where the welding was performed is called the :

A. Crown
B. Weld reinforcement
C. Weld Face
D. Root Face
E. None of the above

43. Using the GTAW process, Aluminum can be successfully welded using DCSP.

A. True
B. False

44. When welding with the SMAW process, increasing the arc gap tends to have what effect on the molten pool?

A. Heat up
B. Cool down
C. No effect- Molten Pool remains at the same temperature
D. None of the above

45. When welding with an Oxy-Acetylene torch, the hottest part of the flame is:

A. The tip of the inner cone
B. The yellow area of the flame
C. The blue area of the flame
D. None of the above

46. "Arc Blow" is not found when using AC arc welding power sources.

A. True
B. False

47. Oil or grease, used as a lubricant around Oxy-Fuel equipment, is very hazardous.

A. True
B. False

48. Amperage (amp) is a measurement of the current in the welding circuit.

A. True
B. False

49. Welding or cutting on zinc plated (galvanized) steel may cause

A. metal fume fever
B. air quality problems
C. a rust resistant surface
D. A and B

50. The minimum protective shade number to be used for GMAW or FCAW processes is

A. #7
B. #8
C. #10
D. #12

51. What metal will a plasma cutter cut?

A. stainless steel
B. aluminum
C. carbon steel
D. All of the above

52. To safely light an oxy-fuel torch, a _____ should be used.

A. Match
B. Friction spark lighter
C. Butane lighter
D. Welding arc

53. Acetylene cylinders should be

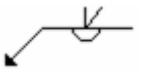
A. stored and used in an upright position
B. used as leg for a steel bench
C. used as roller to move a heavy load
D. Heated to get all the acetylene out of the tank.

54. The most common inspection method for welding is

A. dye penetrant inspection
B. visual inspection
C. Magnetic particle inspection
D. X-ray inspection

55. The "60" in E 6010 electrode specification stands for:

A. Pounds of electrodes per can
B. Minimum current setting
C. Tensile Strength
D. All of the above

56. What type of weld does this welding symbol refer to  **?**

A. Fillet With Backing
B. Square Groove With Backing
C. Bevel Groove With Backing
D. Bevel Groove Without Backing
E. Square Groove Without Backing

SKILLS USA 2012

AWS Iowa Section

Rules

- Safety first – PPE & other safe practices
- Integrity – no messing with other people's machines, settings, etc.
- Instructors – not allowed to speak during grading process

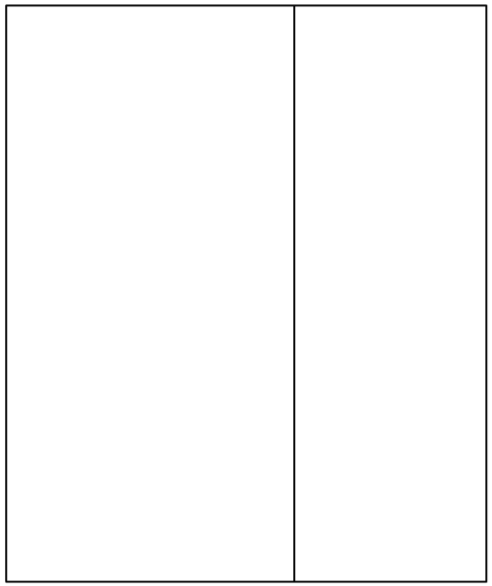
Clothing / Personal Protective Equipment (Fire-resistant Recommended)

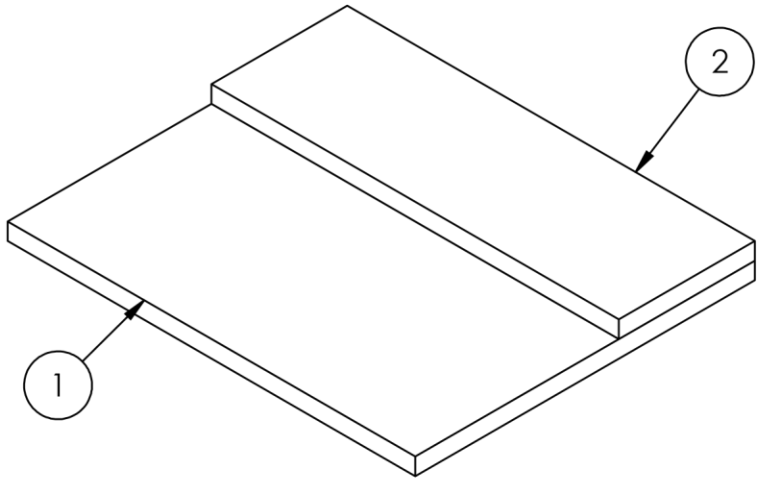
1. ANST Z-87 approved safety glasses with side shields
2. 100% cotton shirt. To be worn under the welding jacket or cape and bib
3. 100% cotton work pants with no holes or tears
4. Welding cape with sleeves and bib or welding coat
5. Welder's hat or skullcap
6. Leather gauntlet welding gloves (for other than GTAW)
7. Leather welding gloves GTAW
8. Leather boots (steel-toed recommended)
   (No tennis shoes allowed)
9. Hearing and/or ear protection
10. **Welding helmet with an appropriate filter plate or lens (#9 or #10) and a protective cover plate for arc welding.**
11. **Welding helmet, face shield, or goggles with an appropriate filter plate or lens (#5-#6) for OFC**

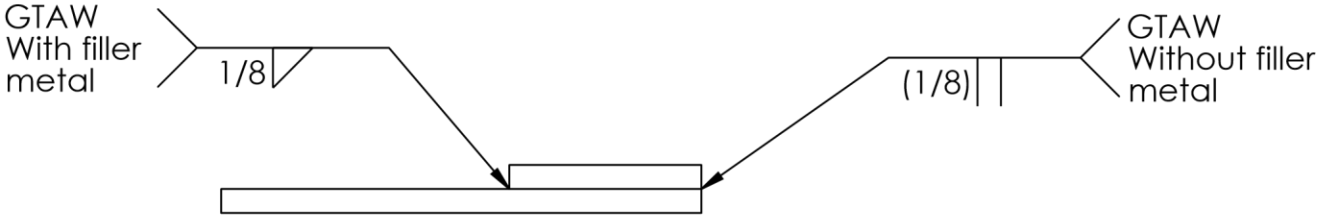
Equipment & Tools Required

1. Lead pencil or ball point pen
2. Soap stone with holder or silver welding pencil
3. Steel tape measure
4. Ball peen hammer
5. Combination square
6. Cold chisel
7. Center punch
8. Half round file
9. Oxy-fuel tip cleaner
10. Welding vise grips(suggest 9-r vise grips) 1 pair
11. Pliers
12. Side cutters
13. Welper pliers will substitute for 11 and 12
14. Chipping hammer
15. Carbon steel wire brush
16. Protractor
17. Smith (or Miller) torch tip or SC-12-1 (MC12-1)
18. Stainless steel wire brush

SKILLS USA 1







ITEM NO.	DESCRIPTION	QTY.
1	4" x 4" x 1/8" PLATE	1
2	2" x 4" x 1/8" PLATE	1

REV	ECN	CHANGE DESCRIPTION	CHANGE BY	DATE

3RD ANGLE PROJECTION

DIMNS. IN INCHES

A

DO NOT SCALE DRAWING

Approximate Weight = 2.97 lbs

1 PAGE OF 1

SUB. MATL SPECS MILD STEEL

DESCRIPTION
WELDING COMPETITION I

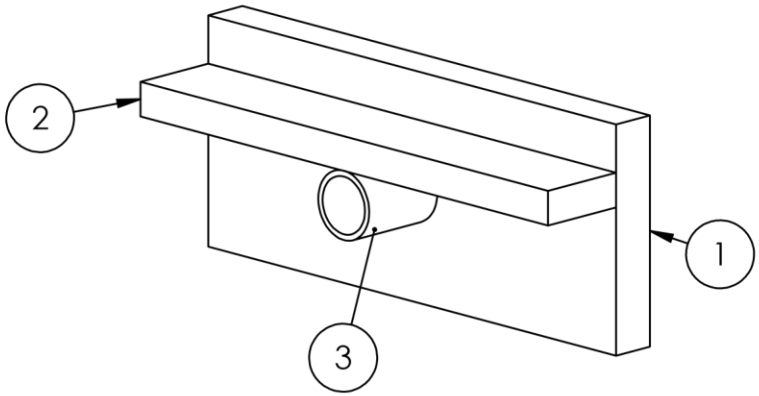
ITEM NUMBER
SKILLS USA 1

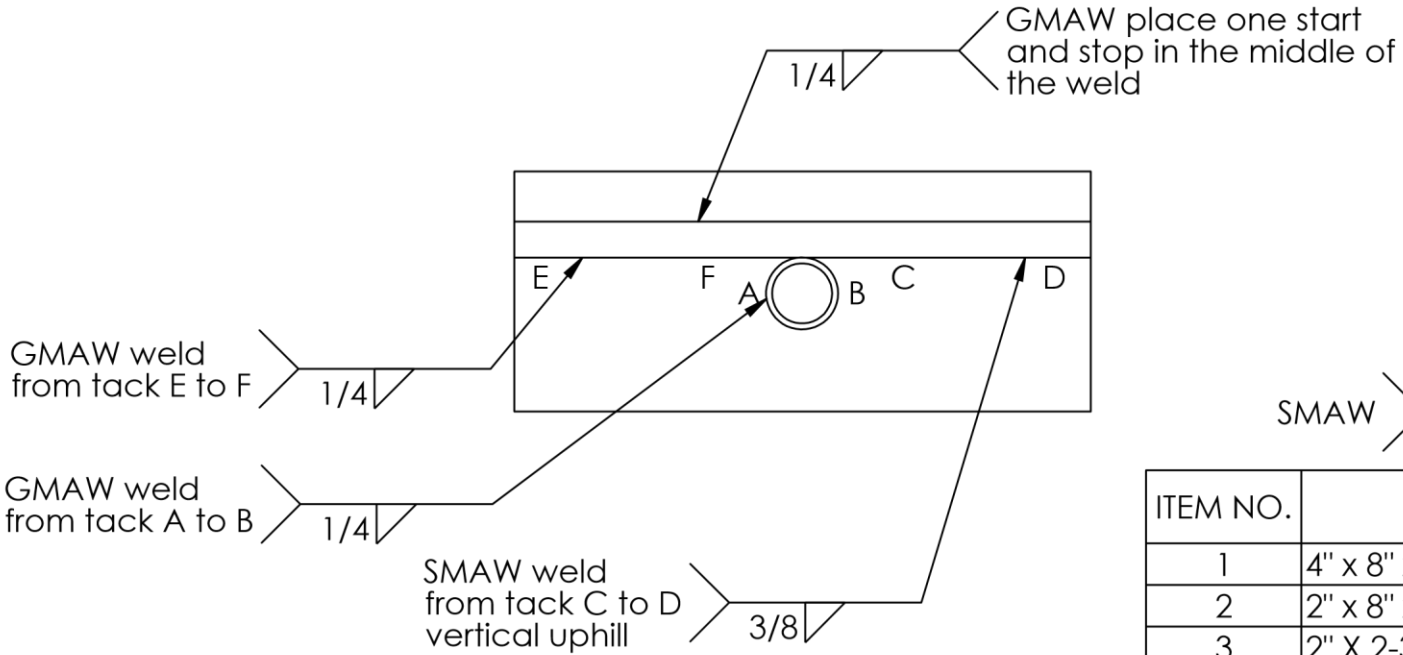
DESIGN BY D. MERRITT DATE 3/1/16

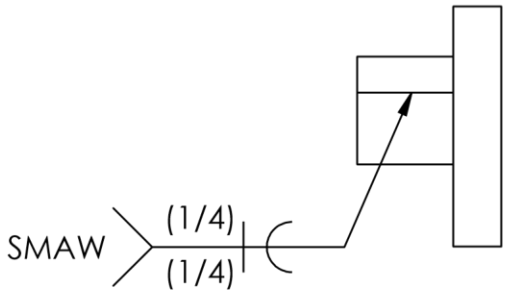
SkillsUSA

SKILLS USA 2

Notes:
Incorporate the tacks into the welds.
All positions are flat or horizontal except as noted in the tail section of the welding symbols.







ITEM NO.	DESCRIPTION	QTY.
1	4" x 8" x 3/8" PLATE	1
2	2" x 8" x 3/8" PLATE	1
3	2" X 2-3/8" OD X 1/4" WALL TUBE	1

REV	ECN	CHANGE DESCRIPTION	CHANGE BY	DATE

3RD ANGLE PROJECTION

DIMNS. IN INCHES

A

DO NOT SCALE DRAWING

1 PAGE OF 1

SUB. MATL SPECS MILD STEEL

DESCRIPTION
WELDING COMPETITION II

ITEM NUMBER
SKILLS USA 2

DESIGN BY D. MERRITT DATE 3/1/16

SkillsUSA

Skills USA - Iowa

AWS - Prequalified Welding Procedure Specification (pWPS)

WeldOffice WPS

Company name	Skills USA - Iowa
Welding process	SMAW
Process type	Manual

Identification #	SMAW_1	Rev. 1
Originated by	Joseph Bailey	
Date	3/11/2016	
Authorized by	David Landon	
Date	3/11/2016	

Joint design used

Joint type		BTC - Butt, T or corner joint
Joint design		N/A
Backing		No
Backing material		N/A
Root opening (R)*	(in.)	N/A
Root face (f)*	(in.)	N/A
Groove angle (a)*	(deg.)	N/A
Radius (J - U)*	(deg.)	N/A
Back gouging		No
Back gouging method		N/A

Position

Welding position:	Groove	F
	Fillet	V
Vertical progression		Up

Electrical characteristics

Transfer mode (GMAW)	N/A
Current type	DCEP
Other	

Technique

Stringer or weave bead			Stringer or Weave
Multi/single pass (per side)			Single or Multiple
Number of electrodes			Single electrode
Spacing:	Longitudinal	(in.)	-
	Lateral	(in.)	-
	Angle	(deg.)	-
Contact tube to work		(in.)	-
Peening			Not permitted
Interpass cleaning			Brushing and chipping or grinding

Base metals

* Datum, As Detailed (As Fit-Up)

Spec., type or grade			AWS D1.1 T3.1 Group I or II
Thickness:	Groove	(in.)	1/4 - 3/8
	Fillet	(in.)	3/8
Diameter (Pipe)		(in.)	Unlimited

Preheat

Preheat temp.:	Min.	(°F)	See notes
Interpass temp.:	Min.	(°F)	See notes
	Max.	(°F)	500

Filler metals

AWS Specification	5.1
AWS Classification	E7018

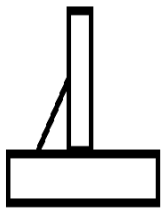
Post weld heat treatment

Temperature	(°F)	None
Time	(hrs)	-

Shielding

Flux		-
Electrode-flux (class)		-
Gas composition		-
Gas flow rate	(cfh)	-
Gas cup size	(in.)	-

Welding procedure

Layer	Pass	Process	Filler metal class	Filler metal diameter (in.)	Current type / polarity	Amps	Wire feed speed (in./min)	Volts	Travel speed (in./min)	Joint details
1	1G	SMAW	E7018	1/8	DCEP	110-130	-		as req.	
1	3F	SMAW	E7018	1/8	DCEP	100-110	-		as req.	
								Designation		

Notes

PREHEAT/INTERPASS
For thickness 1/8 to 3/4(in.): 32(°F). Preheat to 70(°F) if the base metal temperature is below 32(°F).

Signature 1

Name	Signature
Joseph S. Bailey	
Date	
3/11/2016	

Joseph S Bailey
CWI 14112541
QC1 EXP. 11/1/2017

Skills USA - Iowa

AWS - Welding Procedure Specification (WPS)

WeldOffice WPS

WPS record number	GTAW_1 Revision 1	Qualified to	AWS D1.1/D1.1M:2015
Date	3/9/2016	Company name	Skills USA - Iowa
Supporting PQR(s)	Standard Welding Procedure Specification B2.1-1-207-96		
Reference docs.	B2.1/2.1M:2014		

Scope	Gas Tungsten Arc Welding of 1/8 inch Carbon Steel Groove, fillet, no PWHT (As-welded)
Joint	Joint details for this welding procedure specification in: JOINTS section of this WPS

BASE METALS

Type	AWS B2.1 Table C.1 Group 1 & 2	P-no.	Grp-no. 1 & 2
Welded to	AWS B2.1 Table C.1 Group 1 & 2	P-no.	Grp-no. 1 & 2
Backing:	None	P-no.	Grp-no. -
Retainers	None		
Notes			

THICKNESS RANGE QUALIFIED (in.)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Complete pen.	1/8	3/8	-	-
Impact tested	-	-	-	-
Partial pen.	1/8	3/8	-	-
Fillet welds	1/8	3/8	-	-

DIAMETER RANGE QUALIFIED (in.)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Nominal pipe size	no min.	no max.	-	-

FILLER METALS

THICKNESS RANGE QUALIFIED (in.)

	SFA	Classification	F-no.	A-no.	Chemical analysis or Trade name	As-welded Min.	As-welded Max.	With PWHT Min.	With PWHT Max.
GTAW	5.18	ER70S-2	6	1		1/8	3/8	-	-
Cons. insert	-	-	-	-	-	- None -			
Flux	-	-	-	-	-	- None -			

WELDING PROCEDURE

Welding process			GTAW
Type			Manual
Minimum preheat/interpass temperature		(°F)	50
Maximum interpass temperature		(°F)	500
Tungsten size		(in.)	3/32
Tungsten type			AWS A5.12 EWCe-2
Filler metal size		(in.)	3/32
Layer number			All
Position			2F
Weld progression			Not applicable
Current/polarity			DCEN
Waveform control			
Energy		(J)	
Power		(J/s)	
Amperes			80-120
Volts			
Travel speed		(in./min)	5-15
Maximum heat input		(kJ/in.)	N/A
DC pulsing current			None
Shielding:	Gas type		Argon (A5.32 SG-A)
	Flow rate	(cfh)	12-25
Trailing:	Gas type		
	Flow rate	(cfh)	
Backing:	Gas type		
	Flow rate	(cfh)	
String or weave			Stringer or Weave
Orifice/gas cup size			as required
Multi/Single pass per side			Single pass
Multi/single electrode			Single electrode
Weld deposit chemistry			
Notes			

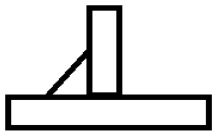
Skills USA - Iowa

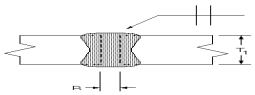
AWS - Welding Procedure Specification (WPS)

WeldOffice WPS

WPS record number	GTAW_1 Revision 1	Qualified to	AWS D1.1/D1.1M:2015
Date	3/9/2016	Company name	Skills USA - Iowa

JOINTS: Typical joint(s). See actual production drawings and engineering specifications for details.





Type of groove	N/A	Minimum groove angle (deg.)	
		Minimum root opening (in.)	
		Maximum root face (in.)	

TECHNIQUE

Closed or out-of-chamber	Not applicable
Peening	Not used
Surface preparation	Surfaces within 1/2in of any weld shall be free of material that will prevent proper welds
Initial/interpass cleaning	As required
Back gouging method	Not applicable

NOTES

Sharpen Tungsten electrode to a blunt point.

Signature 1

Name	Signature
Joseph S. Bailey	Joseph A. Bailey
Date	
3/11/2016	

Joseph S Bailey
CWI 14112541
QC1 EXP. 11/1/2017

Skills USA - Iowa

AWS - Prequalified Welding Procedure Specification (pWPS)

WeldOffice WPS

Company name	Skills USA - Iowa
Welding process	GMAW
Process type	Semi-automatic

Identification #	GMAW_1	Rev. 1
Originated by	Joseph Bailey	
Date	3/11/2016	
Authorized by	Joseph Bailey	
Date	3/11/2016	

Joint design used

Joint type		T - T joint
Joint design		N/A
Backing		No
Backing material		N/A
Root opening (R)*	(in.)	N/A
Root face (f)*	(in.)	N/A
Groove angle (a)*	(deg.)	N/A
Radius (J - U)*	(deg.)	N/A
Back gouging		No
Back gouging method		N/A

* Datum, As Detailed (As Fit-Up)

Position

Welding position:	Groove	
	Fillet	2F
Vertical progression		

Electrical characteristics

Transfer mode (GMAW)		Spray
Current type		DCEP
Other		Constant Voltage (CV) power supply

Technique

Stringer or weave bead			Stringer or Weave
Multi/single pass (per side)			Single or Multiple
Number of electrodes			Single electrode
Spacing:	Longitudinal	(in.)	-
	Lateral	(in.)	-
	Angle	(deg.)	-
Contact tube to work		(in.)	1/2 - 7/8
Peening			Not permitted
Interpass cleaning			As required

Base metals

Spec., type or grade			AWS D1.1 T3.1 Group I or II
Thickness:	Groove	(in.)	
	Fillet	(in.)	1/4 - 3/8
Diameter (Pipe)		(in.)	Unlimited

Preheat

Preheat temp.:	Min.	(°F)	See notes
Interpass temp.:	Min.	(°F)	See notes
	Max.	(°F)	500

Filler metals

AWS Specification	5.18
AWS Classification	ER70S-6

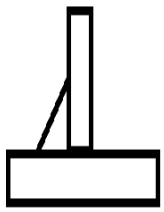
Post weld heat treatment

Temperature	(°F)	None
Time	(hrs)	-

Shielding

Flux		-
Electrode-flux (class)		-
Gas composition		AC-10 (A5.32 SG-)
Gas flow rate	(cfh)	30-45
Gas cup size	(in.)	

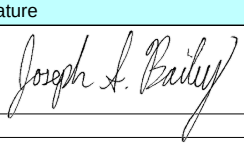
Welding procedure

Layer	Pass	Process	Filler metal class	Filler metal diameter (in.)	Current type / polarity	Amps	Wire feed speed (in./min)	Volts	Travel speed (in./min)	Joint details
1	All	GMAW	ER70S-6	0.045	DCEP	175-310	350-450	23-29	15-23	
								Designation		

Notes

PREHEAT/INTERPASS
For thickness 1/8 to 3/4(in.): 32(°F). Preheat to 70(°F) if the base metal temperature is below 32(°F).

Signature 1

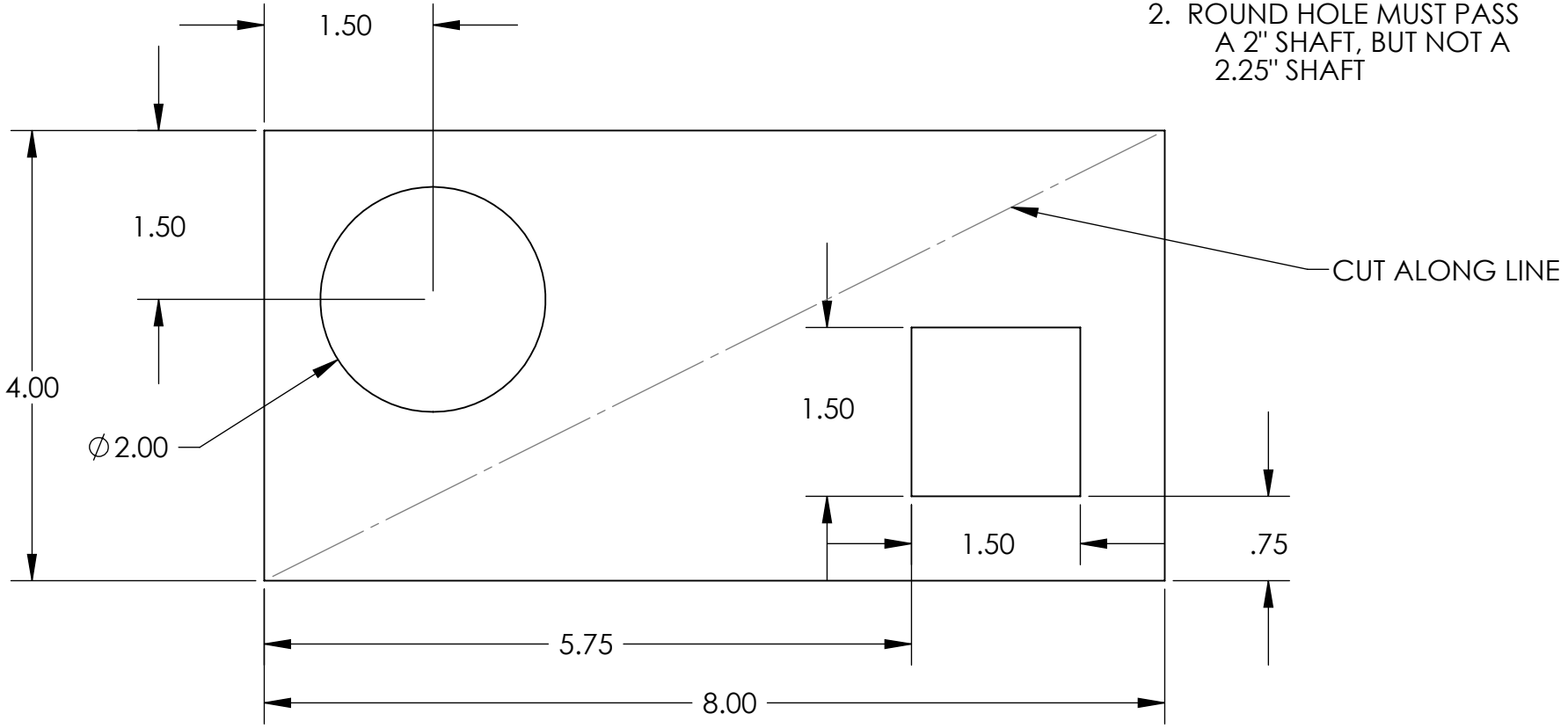
Name	Signature
Joseph S. Bailey	
Date	
3/11/2016	

Joseph S Bailey
CWI 14112541
QC1 EXP. 11/1/2017

TORCH CUTTING TEST

NOTE:
1. SQUARE CUT OUT MUST PASS A 1.50" SQ TUBE, BUT NOT A 1.75" SQ TUBE

2. ROUND HOLE MUST PASS A 2" SHAFT, BUT NOT A 2.25" SHAFT



REV	ECN	CHANGE DESCRIPTION	CHANGE BY	DATE

3RD ANGLE PROJECTION

DIMNS. IN INCHES

A

DO NOT SCALE DRAWING

Approximate Weight = 2.82 lb.

1 PAGE OF 1

SUB. MATL SPECS 3/8" THICK MILD STEEL PLATE

DESCRIPTION TORCH CUTTING TEST

ITEM NUMBER TORCH CUTTING TEST

DESIGN BY

DATE 3/11/2016

SkillsUSA