

Iowa Skills USA Welding Fabrication Competition 2019

State Welding Fabrication Competitors:

Once again we will follow the national competition model. This year, we will have the Welding Fabrication contest at the DMACC Ankeny campus on **THURSDAY, APRIL 25**. We will have a maximum of 10 teams (combined secondary/post secondary) compete. Entry will be on a “first come first serve” basis. The entry fee for each team is \$175.00

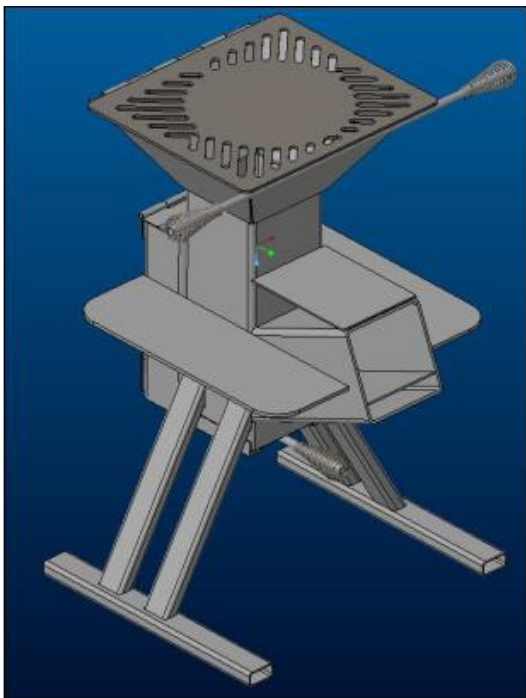
Please review these guidelines for the state competition. Now is the time to plan and practice your build. Your team will have 6.5 hours to complete your project. Keep in mind your team & project will be judged throughout your 6.5 hours. Manage your time wisely.

This year we will be trying something new. 1) There will be a standard fabrication project provided to all competitors. Information is provided in advance so your team can start to prepare.

2) In addition, teams will still be required to brainstorm and design a separate project. This project will not be built as part of the competition, rather it is the design portion of the competition. A project theme will be provided with guidelines. Prints for this project theme will be required this year and will be graded as they have been in the past as part of your overall grade.

- **Standard Fabrication Project:**

*(All teams will be fabricating on site – **Bring 11x17 copies of the print for your team to work from**)*



○ Rocket Stove

- **Material List Supplied by Committee:**

- Qty. 1 - 6"x 6"x 3/16" Sq Tube x 27'-7/16"
- Qty. 1 - 3"x 6"x 3/16" Tube x 12'-1/4"
- Qty. 1 - 1"x 2"x 1/8" Tube x 93"
- Qty. 1 - 3/16"x 16"x 14-3/8" SS
- Qty. 1 - 1/4"x 6-1/16"x 5-9/16" SS
- Qty. 3 - Steel Spring Handles
- Qty. 1 - 3" Continuous (Piano) Hinge 25" Long
- Qty. 1 - 1/8"x 18"x 38" HRS
- Qty. 1 - 1/4" 12 1/8"x 18" HRS
- Qty. 1 - 1/2" Round Bar x 36"
- Qty. 1 - 1"x 1"x 1/8" Angle x 12"

- **Welding Consumables Supplied by Committee:**

- 0.035 Lincoln SuperArc L-56 GMAW (ER70S-6)
- 0.045 Lincoln Ultracore 71A85 FCAW (E71T-1)
- 3/32" Lincoln ER70S-2 GTAW filler rod
- 3/32" Lincoln Excalibar 7018 MR (E7018) SMAW electrode
- 1/8" Lincoln Excalibar 7018 MR (E7018) SMAW electrode
- 3/32" Lincoln Fleetweld 5P (E6010) SMAW electrode
- 1/8" Lincoln Fleetweld 5P (E6010) SMAW electrode

- **Minimum Project Requirements:**

- 5 Individual SMAW Welds of 3" or greater (Two 3F vertical up welds required)
- 5 Individual GMAW Welds of 3" or greater (Two 3F vertical up welds required)
- 5 Individual GTAW Welds of 3" or greater (Two 3F vertical up welds required)
- 5 Individual FCAW Welds of 3" or greater (Two 3F vertical up welds required)
- 5 Individual OFC Cuts of 5" or greater

Please Note: Prints of your design must be ready to turn in at orientation. (See items supplied by teams)

- **Project Theme for Design Prints: (Team prints will be graded on this concept)**

- Utility cart with a separate removable workstation

A removable workstation is defined as a structure like a table, shelf, utility area that can be used as a working area, a storage area for tools or supplies, or serve as any other general purpose. This workstation is to be removable so that the cart can be used separately.

The utility cart with a removable workstation should be designed to move items with a 4 wheeled base and handle. The workstation should be designed to be added at any time for use in a shop or welding school.

- **Guidelines for Design:**

- Designed for indoor use
- Securable & weather proof enclosure
- Min 6 ft/sq, Max 8 ft/sq footprint

- **Blue Print Requirements for Design Project:**

- One set of prints on 11" x 17" paper printed in the Landscape mode (for grading)
 - In addition a USB type drive containing prints in PDF format is required
 - USB drive will not be returned
 - Drives will only contain prints for project theme
- No bindings or covers
- Title block in lower right hand corner with space titled Team #.
 - **Your team number will be recorded** by the SkillsUSA staff when you turn in your prints.
- No school name or identifying marks on the print
- Max of 10 pages – You must have overall dimensions of the finished product included within the drawings you submit.
- All Welds **MUST** have appropriate weld symbols included to show where the required welds and weld processes will be used on the parts
- All vertical welds shall be noted
- A blueprint can be neatly hand drawn if the team does not have access to design software.
 - An electronically scanned pdf copy is still required for all prints.
- All prints **MUST** be created by the team.
- Do NOT roll up paper copies

- **Judging Overview:**

Category	Points	Judging Detail
Safety	75	Each safety infraction will be a 5pt deduction
SMAW	100	5 required welds will be judged on joint fit-up, size, contour and appearance
GMAW	100	5 required welds will be judged on joint fit-up, size, contour and appearance
GTAW	100	5 required welds will be judged on joint fit-up, size, contour and appearance
FCAW	100	5 required welds will be judged on joint fit-up, size, contour and appearance
OFC	100	5 required cuts will be judged on angle, appearance, dimension, bottom edges slag free and cuts free of chipping marks (Cuts must be judged prior to any cleaning, grinding, etc)
TEAMWORK	100	Students will be judged on equal participation, team communication and ability to work together
FABRICATION	150	10 critical dimensions will be judged for accuracy. Overall appearance and functionality is also scored
ORAL EXPLANATION	50	2-5 minute oral explanation of the project design and team's preparation. This will be conducted randomly during the 6-1/2 hour fabrication part of the competition
WELD DRAWINGS		Minimum requirements for Blueprint: Title Block, Proper Critical Dimensions, No Tolerances, Proper Welding Symbols, Proper Finishing Symbols, Proper Views to Fabricate the project, Proper Sub Assembly Drawings
WRITTEN TEST	75	The 3 individual test scores are averaged for your team's total score
Lbs. of Unused Material	50	0 lbs. – 5.0 lbs. - 50 pts. 5.1 – 10.0 lbs. - 45 pts 10.1 lbs. -15.0 lbs. - 40 pts. 15.1 lbs. – 20.0 lbs. – 35 pts. 20.1 lbs. – 25.0 lbs. – 30 pts. 25.1 lbs. – 30 lbs. - 25 pts. 30.1 lbs. – 35.0 lbs. 20 pts. 35.1 lbs. – 40.0 lbs. - 15 pts. 40.1 lbs. – 45.0 lbs. - 10 pts. 45.1 lbs. – 50.0 lbs. - 5 pts. Over 50.1 lbs. - 0 pts.

• **Items that must be supplied by Teams:**

- All Personal Protective Equipment
- Hearing and/or ear protection
- Welding helmet with appropriate filter plate/lens and protective cover plate/lens in a flip or slide front. Auto darkening shields are permissible
- Welding helmet, face shield, or goggles with an appropriate filter plate or lens (#5-#6) for OFC
- Spare spatter and filter lenses/plates for arc welding helmet and oxyacetylene goggles
- Grinding face shields
- Blueprints for your fabrication project
- Blueprints for your design project – See “Blue print requirements for Design Project”
- Résumé
- Teams may bring own hand tools but are not needed to complete the project.

• **Tools Supplied by Committee to each team:**

- Welding Machines
 - Lincoln Electric C300 Powerwave used for GMAW/FCAW
 - Miller Electric Dynasty for SMAW/GTAW
- Environmental Equipment
 - 1 Environmental Extraction Unit per team
- ESAB OFC Torch Kit
- Tungsten Electrodes
- Materials from Bill of Materials
- Two 4 ½” angle grinders
- 3 cutting disks, 3 grinding disks and 3 sanding disks per team
- Tool boxes consisting of the following tools:

Tool	Quantity
Calculator	1
Clamp - 12" Bar Type	1
Clamp - 24" Bar Type	1
Hammer - 3# (Short Handle)	1
Hammer – Chipping	2
Level - 24" Bubble Type	1
Measuring Tape - 25'	3
Pliers - Channel Lock (Large)	1
Pliers - Channel Lock (Small)	1
Pliers - Diagonal Wire Cutters	1
Pliers - Lineman's (Large)	1
Pliers - Needle Nose (Large)	1
Pliers - Slip Joint (large)	1
Pliers - Slip Joint (Small)	1
Screwdrivers - Flat Blade (Various Sizes)	5
Screwdrivers - Phillips Head (Various Sizes)	3
Square – Framing	1
Tin Snips	1
Vise Grips - 10WR (Regular Type)	1
Vise Grips - 11R (Short C-Clamp Type/Without feet)	2
Vise Grips - 11SP (Short C-Clamp Type/With feet)	2
Vise Grips - 18SP (Long C-Clamp Type/With feet)	2
Wrench - 8" Adjustable	1
Wrench - Set - Combination 1/4" to 7/8" (10 pcs)	1

- **Other tools:**
 - N/A for 2019

- **Safety:**
 - Face shields must be worn while grinding
 - Helmets or oxyacetylene goggles must be worn while cutting
 - Welding jackets must be worn while welding
 - **Safety glasses must be worn at all times**
 - **Hearing protection must be worn at all times**
 - Only one welding machine may be used at time as there is only one piece of environmental equipment. Two grinders may be used in conjunction with the use of the one welding machine.
 - Grinding sparks on the welding equipment and/or other people will result in a deduction in points
 - Environmental equipment must be used at all times when welding. Points will be deducted for improper use.

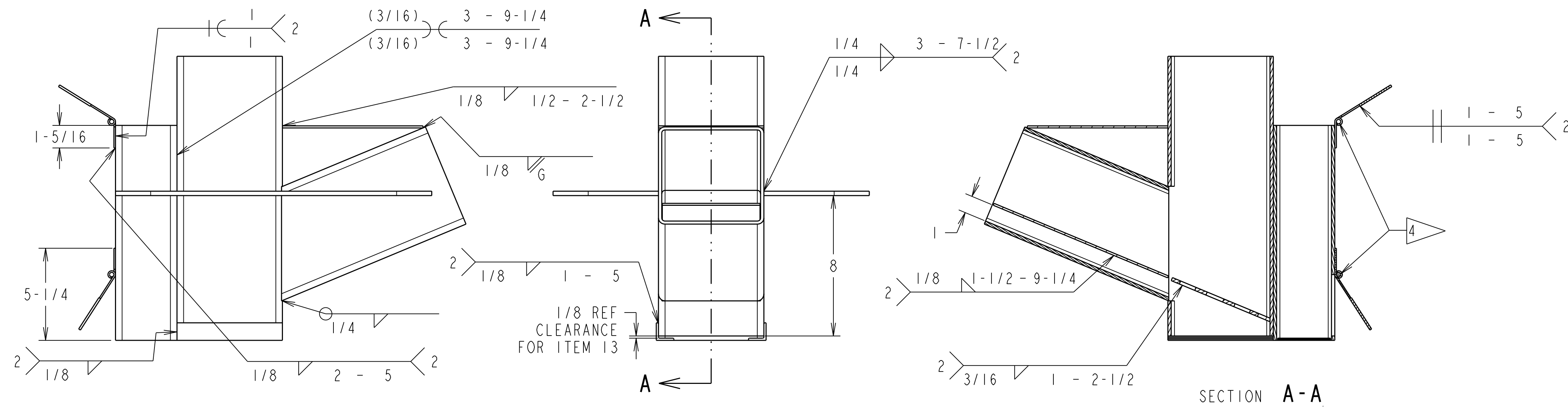
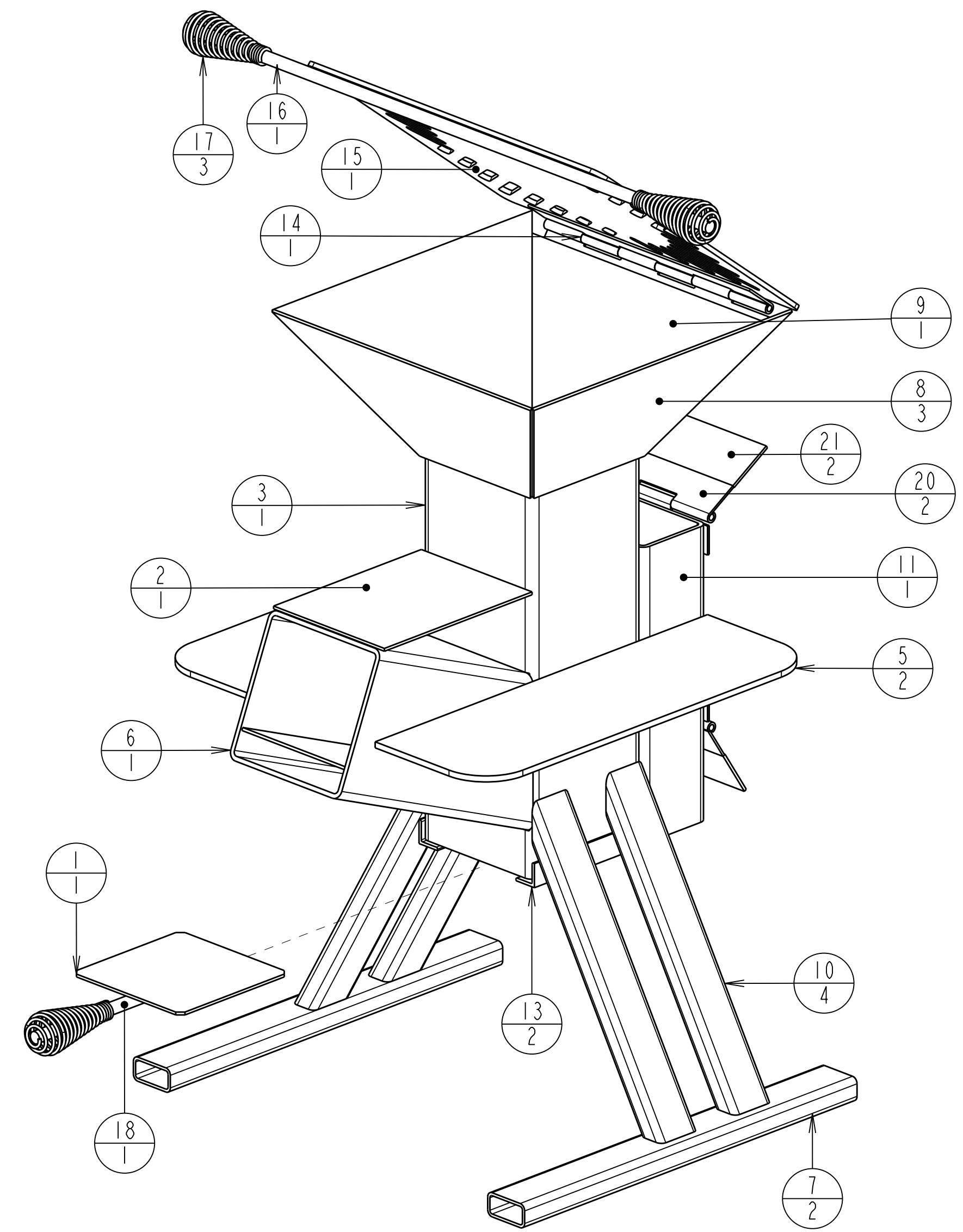
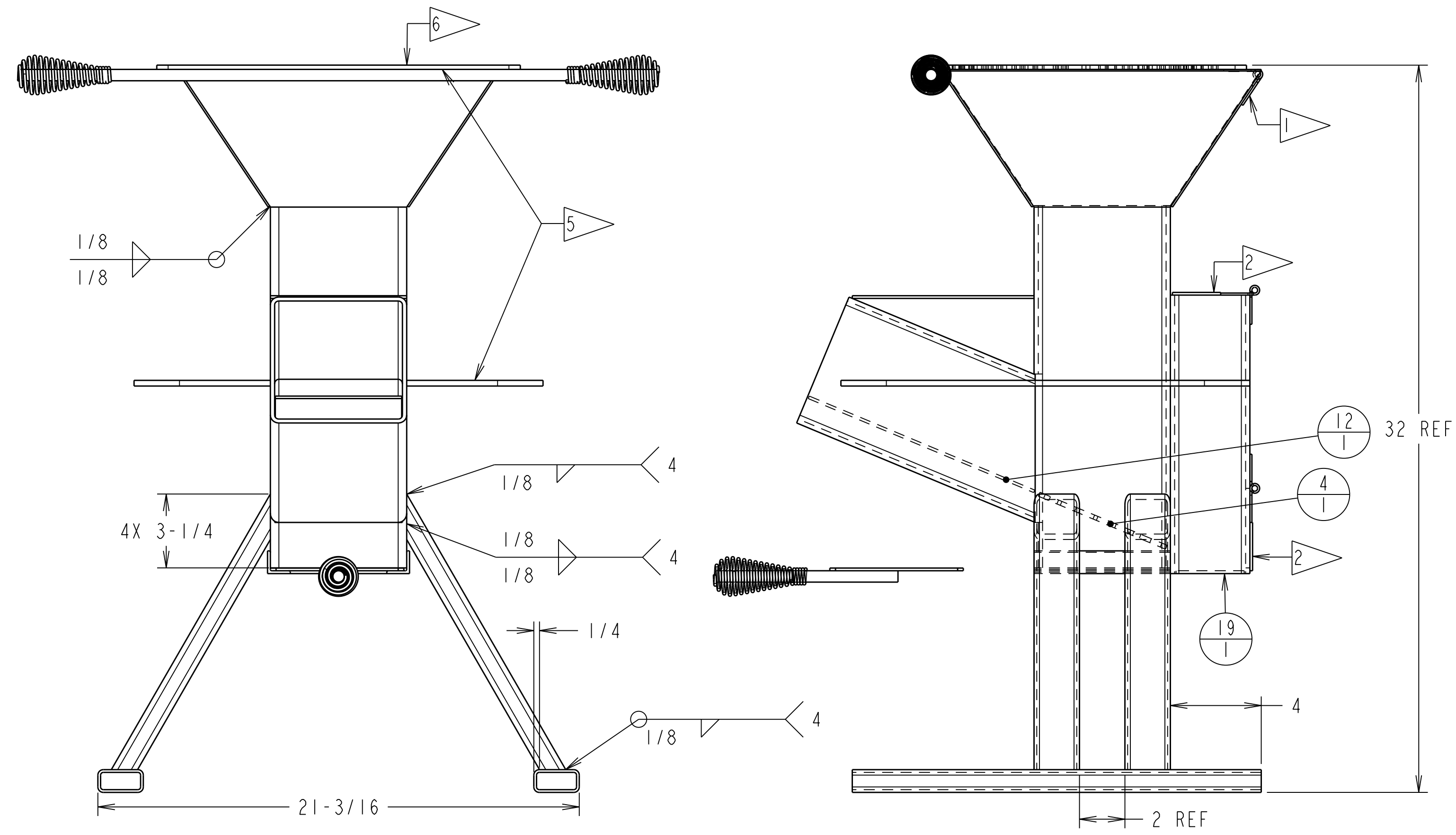
- **Other Information:**
 - When fabricating, sometimes parts and/or steel pieces are not supplied with the correct dimensions. If the dimensions are different than your prints, “on the job” corrections must be made. Notify the judges if materials are not the correct dimensions prior to any material prep. The judges will take that into consideration when judging.
 - The oral interview will be conducted randomly during the 6-1/2 hour fabrication part of the competition.
 - A team picture will be taken after your oral presentation has concluded
 - Pictures will be sent out to teams after the competition
 - All projects will be donated to a local organization supporting a good cause.
 - **Teams are not permitted to bring any power tools, templates or additional material.**
 - **Possession or use of any electronic communication devices are not allowed in the contest area at any time.**
 - **A collection box will be available to hold cell phones labeled with painters tape and team #**
 - **Cell phones may not be substituted for calculators!**

- **Ideas for Future Projects**
 - If your team has a suggestion for a project that is worthy of being a fabrication project please bring information with you to turn in with your prints
 - It’s encouraged to think of projects that can improve communities in some way
 - This is not a requirement
 - Provide as much information as possible to describe the project
 - Label the information as “Suggestion for Future Projects”
 - No points will be awarded for submissions
 - No guarantees the project will be chosen

- **Time Schedule for Welding Fabrication (Thursday, April 25)**
 - 7:00 - 7:30 Conference registration/team check-in (Building 10)
 - 7:30 - 8:15 written test
 - 8:15 - 8:45 safety brief
 - 8:45 - 12:00 competition
 - 12:00 - 12:45 lunch (no competition)
 - 12:45 - 4:00 competition
 - 4:00 - 4:30 clean-up

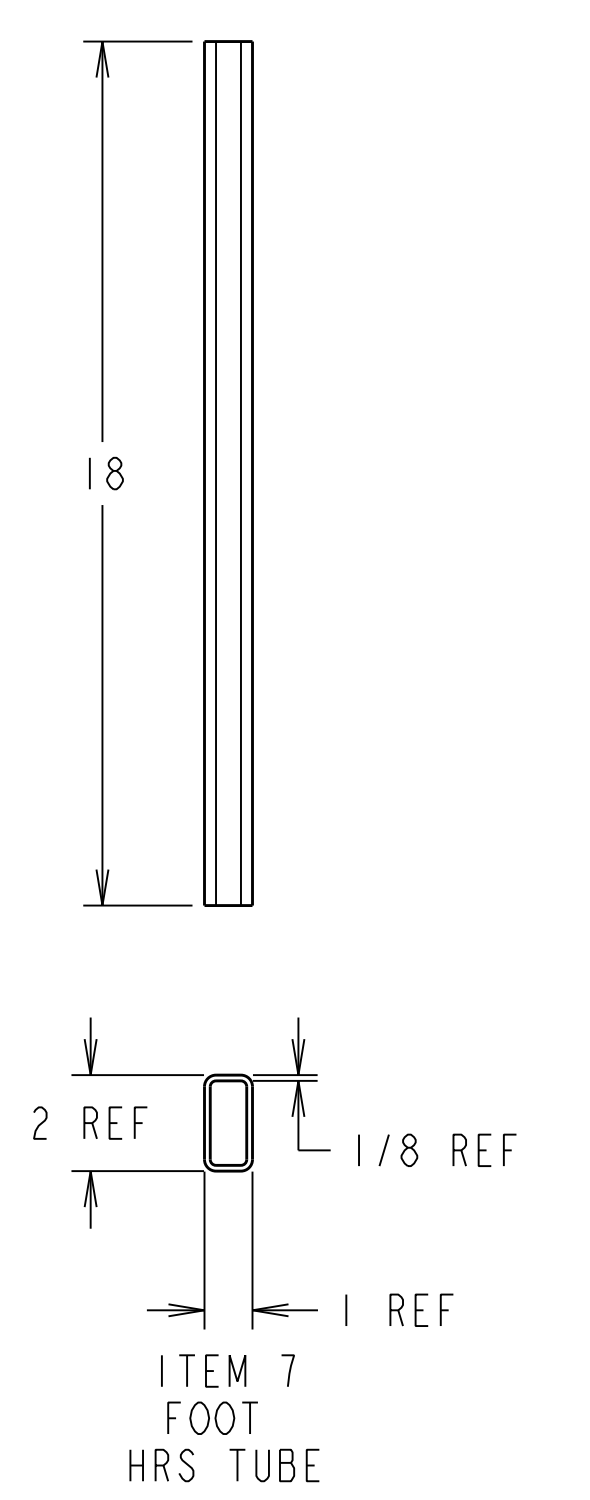
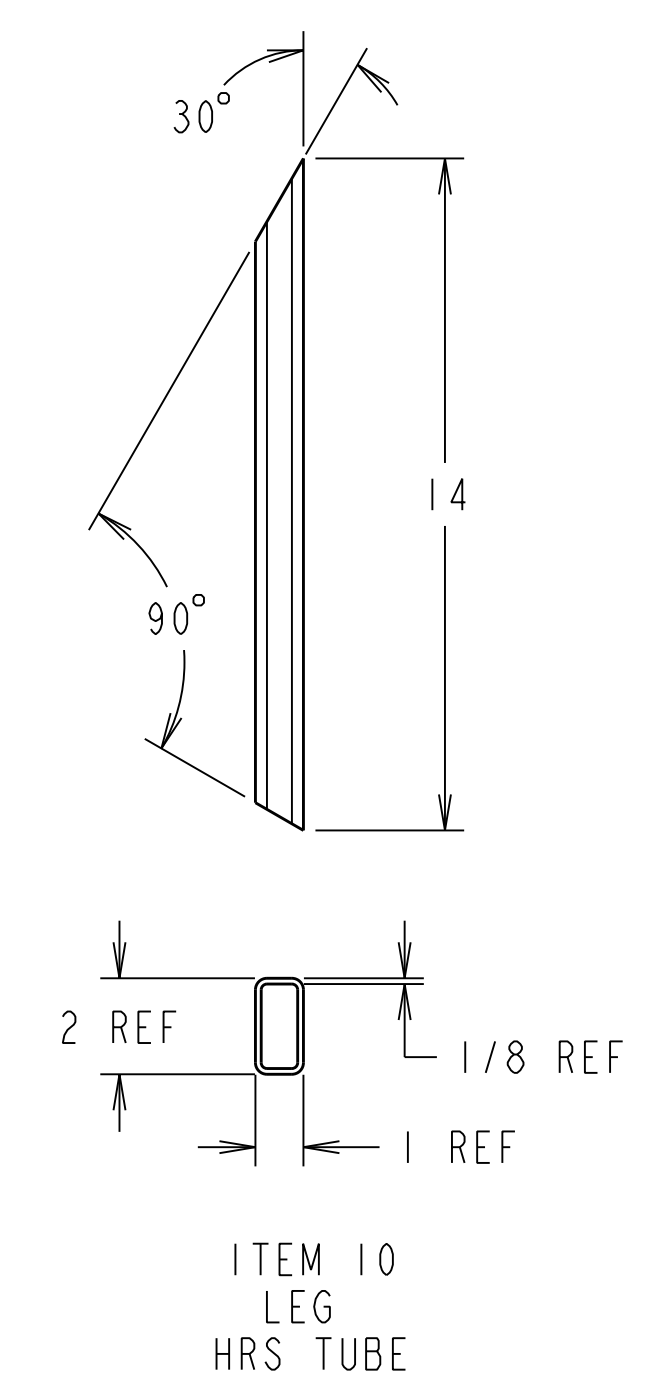
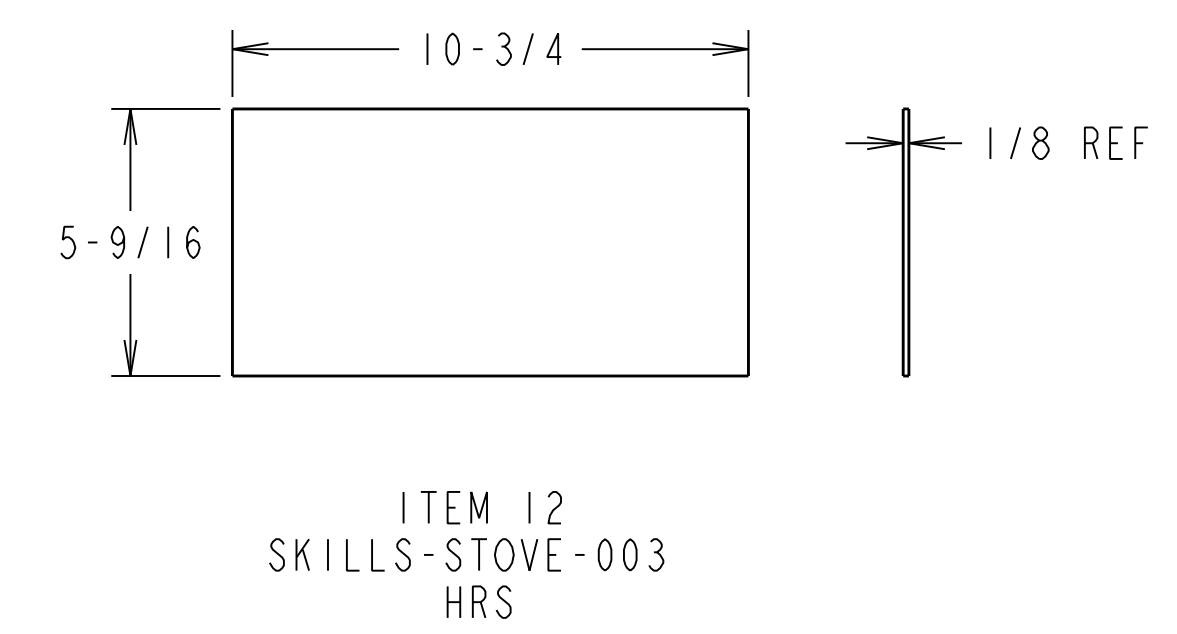
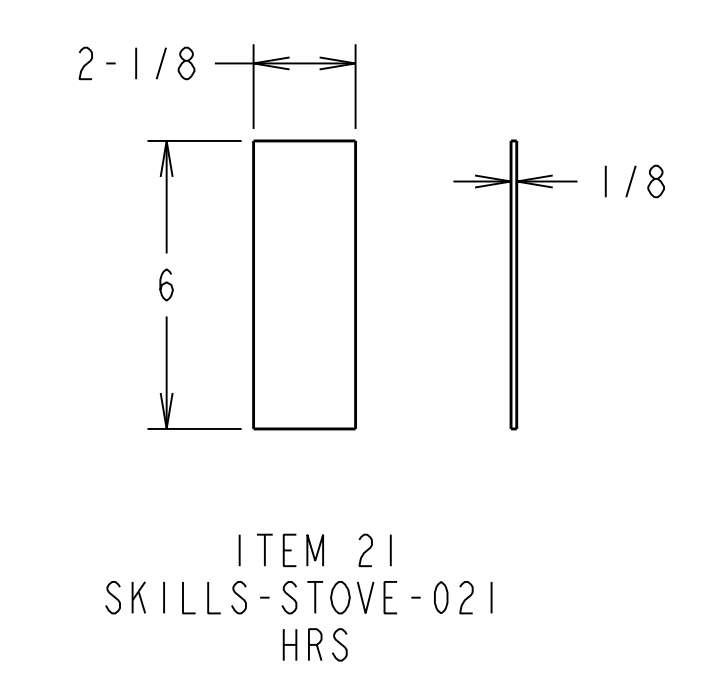
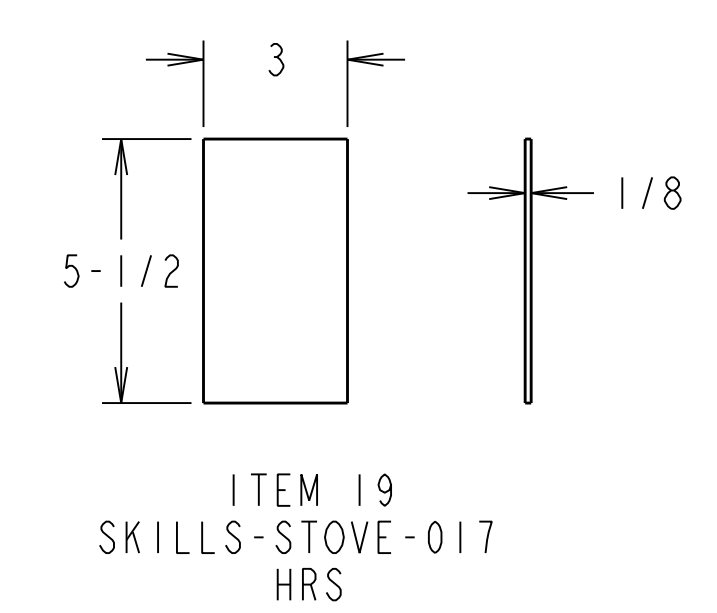
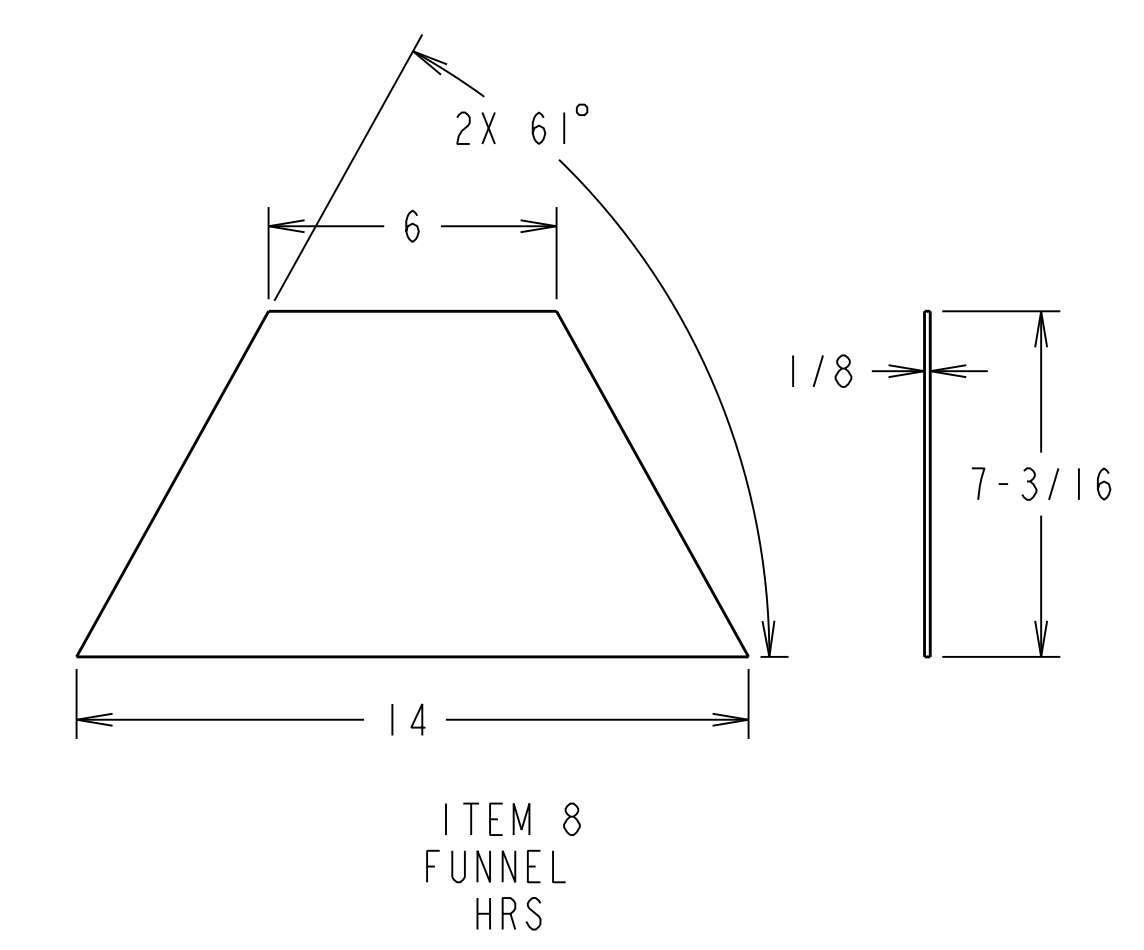
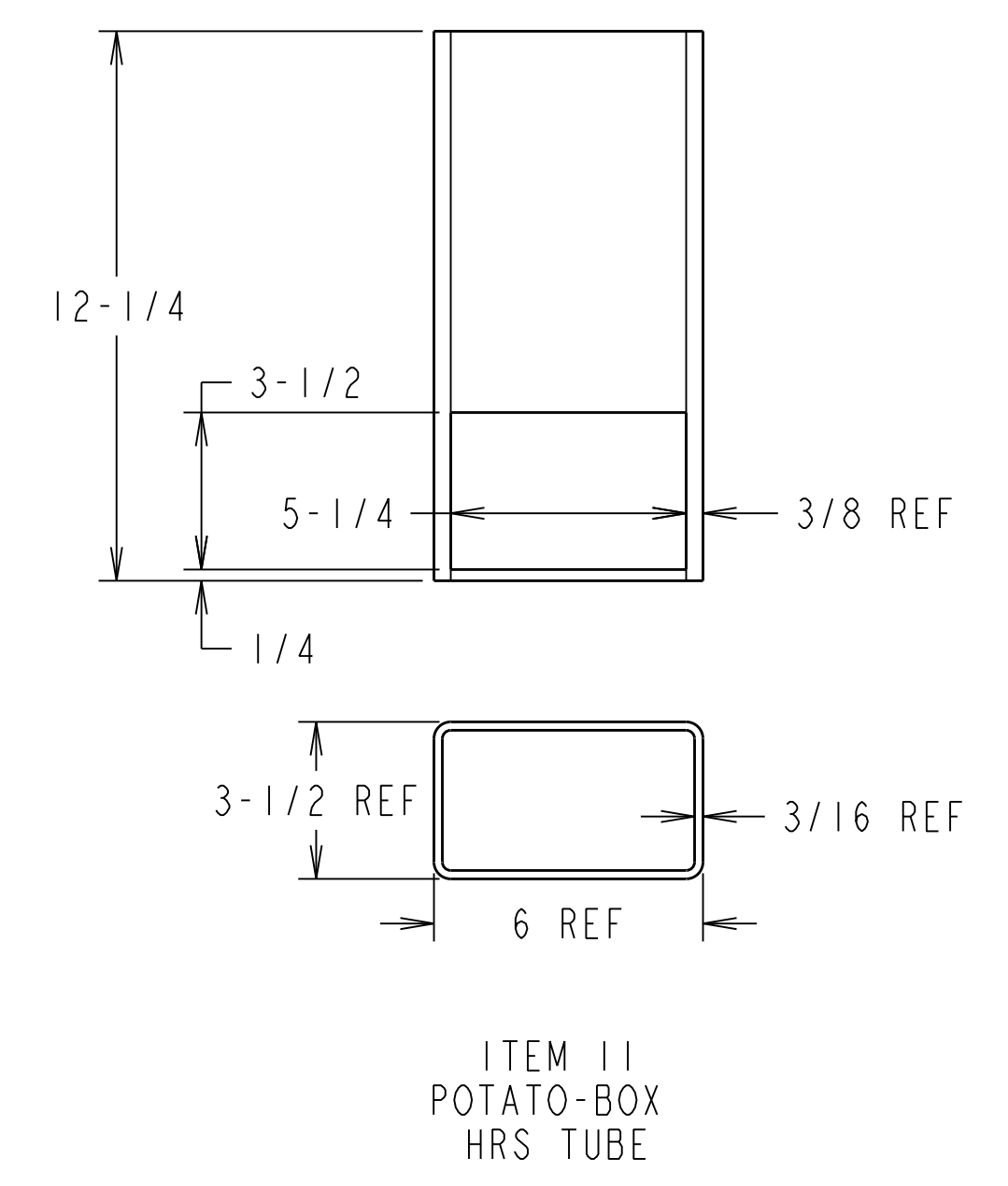
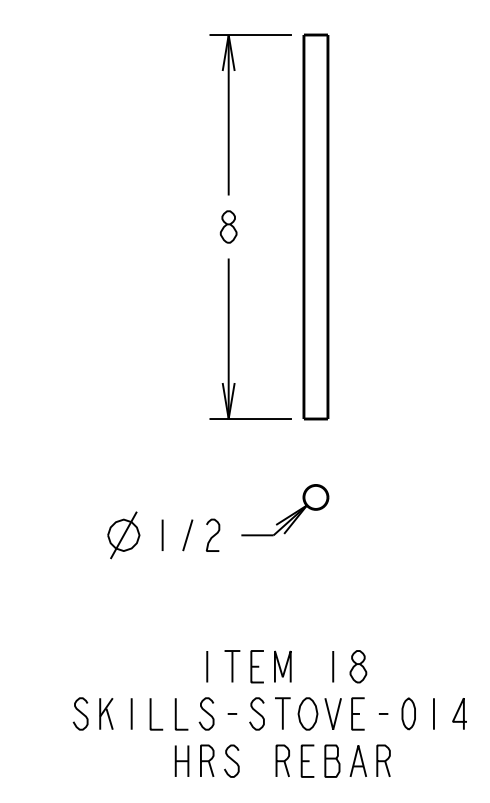
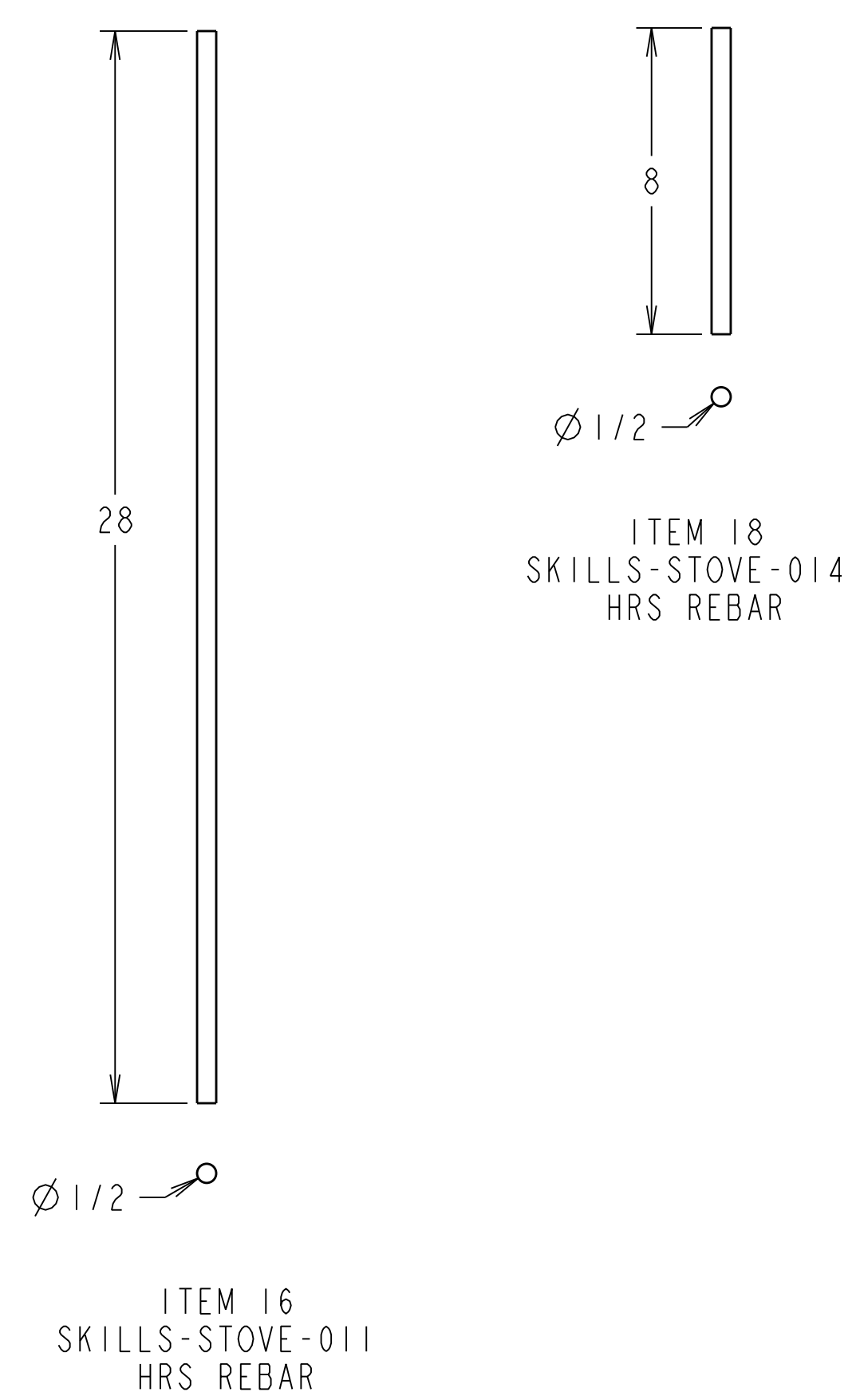
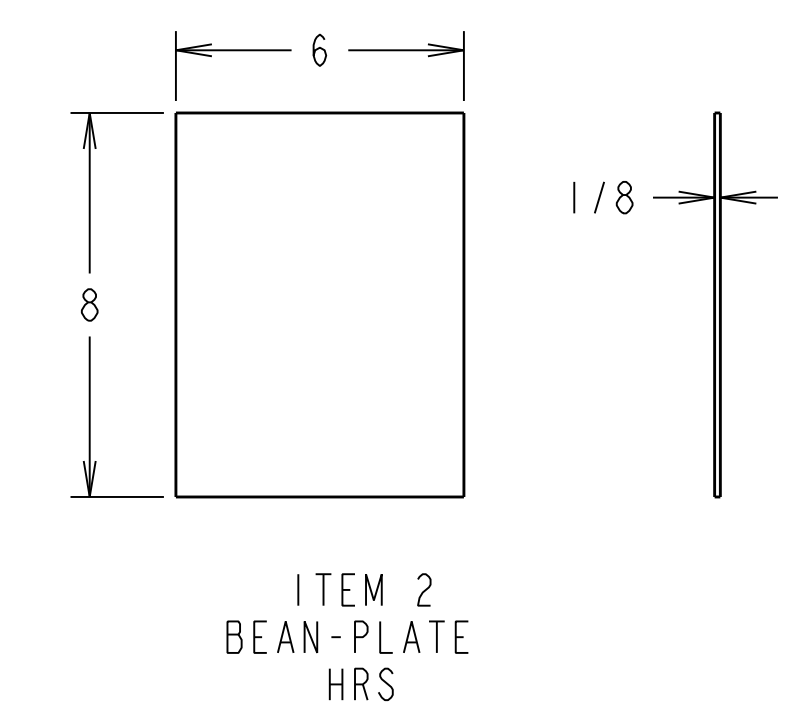
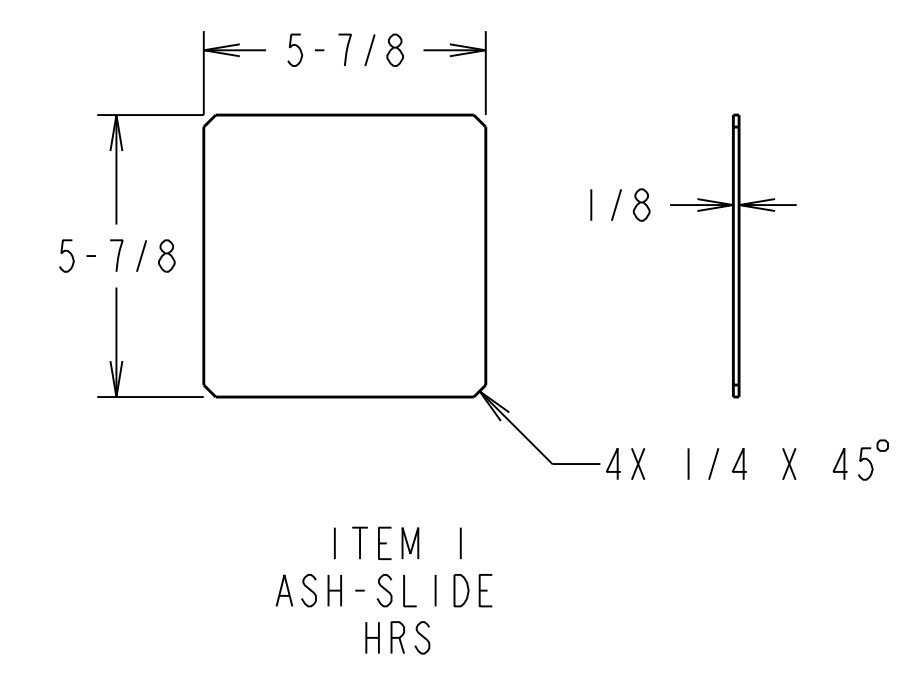
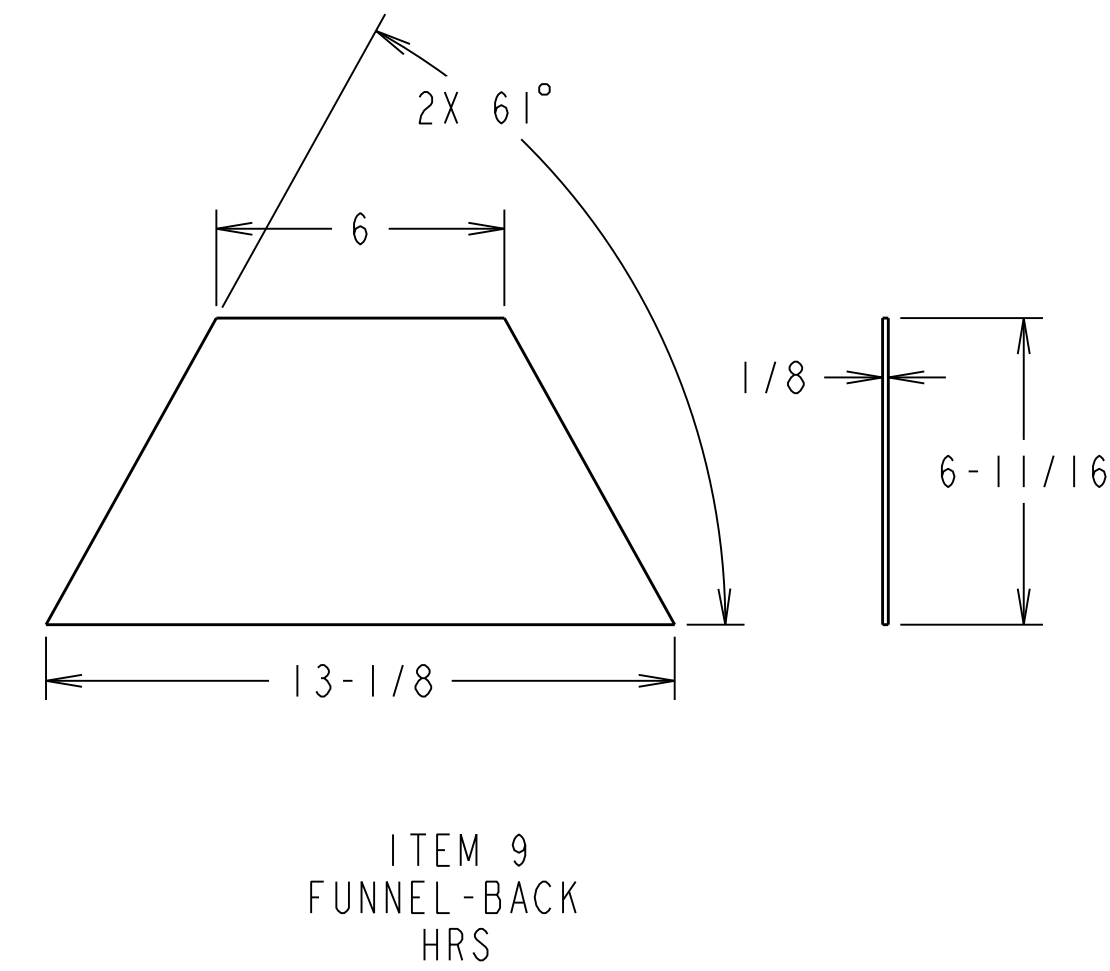
NOTES:

1. TABS (PROVIDED) TO BE WELDED IN LOCATIONS DEEMED APPROPRIATE BY WELDER FOR STOPPING OVER-TRAVEL OF ITEM 15.
2. TABS (PROVIDED) TO BE WELDED IN LOCATIONS DEEMED APPROPRIATE BY WELDER TO SERVE AS HANDLES FOR ITEM 21.
3. ROUND CORNERS.
4. PLUG WELD ONE END OF HINGE PIN TO PREVENT LOSS OF PIN.
5. FRONT EDGE OF FUNNEL TO BE PARALLEL WITH FRONT EDGES OF DISH-WARMERS.
6. FUNNEL & COOK TOP MUST BE LEVEL SIDE TO SIDE & FRONT TO BACK.
7. WELDERS MAY CHOOSE WHICH PROCESS TO USE FOR EACH WELD.



SHT	REMARKS	ITEM	NAME	MTL	SIZE	QTY
3	FABRICATE	21	SKILLS-STOVE-021	HRS	1/8 X 6 X 2-1/8"	2
2	FABRICATE	20	SKILLS-STOVE-020	ASSY	HINGE (RAYMOND PN 900-124) CUT TO Ø"	
3	FABRICATE	19	SKILLS-STOVE-017	HRS	1/8 X 5-1/4 X 3-1/8"	1
3	FABRICATE	18	SKILLS-STOVE-014	HRS	Ø1/2 REBAR X 8"	1
	PROVIDED	17	SKILLS-STOVE-012	PUR	STEEL SPRING HANDLE	3
3	FABRICATE	16	SKILLS-STOVE-011	HRS	Ø1/2 REBAR X 28"	1
	PROVIDED	15	SKILLS-STOVE-010	SS	3/16 X 16 X 14-3/8"	1
2	FABRICATE	14	SKILLS-STOVE-009	ASSY	PIANO HINGE CUT TO 12"	1
2	FABRICATE	13	SKILLS-STOVE-004	HRS	1 X 1 X 1/8 ANGLE X 6"	2
3	FABRICATE	12	SKILLS-STOVE-003	HRS	1/8 X 10-3/4 X 5-9/16"	1
3	FABRICATE	11	POTATO-BOX	HRS	3-1/2 X 6 X 3/16 TUBE X 12-1/4"	1
3	FABRICATE	10	LEG	HRS	1 X 2 X 1/8 TUBE X 14"	4
3	FABRICATE	9	FUNNEL-BACK	HRS	1/8 X 13-7/16 X 6-11/16"	1
3	FABRICATE	8	FUNNEL	HRS	1/8 X 14 X 7-3/16"	3
3	FABRICATE	7	FOOT	HRS	1 X 2 X 1/8 TUBE X 18"	2
2	FABRICATE	6	FEED-TUBE	HRS	6 X 6 X 3/16 TUBE X 11-3/8"	1
2	FABRICATE	5	DISH-WARMERS	HRS	1/4 X 18 X 6"	2
2	PROVIDED	4	COAL-GRATE	SS	3/16 X 6-1/16 X 5-9/16"	1
2	FABRICATE	3	CHIMNEY	HRS	6 X 6 X 3/16 TUBE X 15-15/16"	1
3	FABRICATE	2	BEAN-PLATE	HRS	1/8 X 8 X 6"	1
3	FABRICATE	1	ASH-SLIDE	HRS	1/8 X 5-7/8 X 5-7/8"	1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES		
TOLERANCE: 1/16	2018/04/03	
	D	SKILLSUSA-STOVE
1/4		SHEET 1 OF 3



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES TOLERANCE: 1/16	2018/04/03	
		D SKILLSUSA-STOVE
	1/4	SHEET 3 OF 3

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

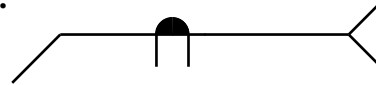
2. **Which type of power supply is used for the SMAW process?**
 - A. DCEP
 - B. DCEN
 - C. Constant Voltage
 - D. Constant Current

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 deoxidizing 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 contaminants
 - 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

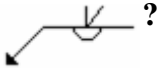
41. **Electric Arc welding performed with proper safety equipment presents great safety hazards.**
A. True
B. False
42. **On a completed groove weld, the surface of the weld on the side where the welding was performed is called the :**
A. Crown
B. Weld reinforcement
C. Weld Face
D. Root Face
E. None 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 ?
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- A. Fillet With Backing
B. Square Groove With Backing
C. Bevel Groove With Backing
D. Bevel Groove Without Backing
E. Square Groove Without Backing



PRACTICE WRITTEN TEST
AWS Iowa Section

