

# Science, Engineering & Technology

## Department H

### Division 920 – Welding

#### Rules

1. The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so owner of the exhibit may be identified if the entry tag is separated from the exhibit.
2. Several classes require a display board which should be a height of 24 inches and not to exceed 1/4-inch thickness. A height of 24 7/8 inches is acceptable to allow for the saw kerf (width) if two 24 inch boards are cut from one end of a 4 foot by 8-foot sheet of plywood. Nothing should be mounted within 3/4 inch of the top or bottom of the board. (Example: Woodworking & Electricity.)
3. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
4. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
5. Demonstration boards should include an overall title for the display, plus other necessary labeling.
6. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.

#### Eligibility

All static exhibits must have received a purple ribbon at the county fair to advance to the State Fair.

#### ARCS AND SPARKS

All welds exhibited in class 1 or 2 must be mounted on a 12" high x 15" long display board of thickness not to exceed 3/8". Attach each weld on a wire loop hinge or equivalent, so the judge can look at the bottom side of the weld when necessary. Each weld should be labeled with information stated 1) type of welding process (stick, MIG, TIG, Oxy-Acetylene, etc.) 2) kind of weld, 3) welder setting, 4) electrode/wire/rod size, and 5) electrode/wire/rod ID numbers.

**Attach a wire to display board so it can be hung like a picture frame. If no plans are included with welding article or welding furniture, item will be disqualified.**

**4-H Welding Project Tips and Suggestions: Class 1**

1. All welds should be made with the same electrode/wire/rod size and number.
2. Welds should be made only on one side of metal so penetration can be judged.
3. Welds should be cleaned with chipping hammer and wire brush. Apply a coat of light oil (penetrating oil) to the metal to prevent rusting. Wipe off excess oil.
4. It is suggested that all welds be on the same size and thickness of metal. These pieces, referred to as coupons, should be 1.5 to 2 inches wide and 3.5 to 4 inches long. A good way to get this size is to buy new cold rolled strap iron and cut to length. The extra width is needed to provide enough metal to absorb the heat from the welding process and prevent the coupons from becoming too hot before the bead is completed. Narrower coupons will become very hot, making an average welder setting too cold at the bead start, just about right in the middle, and too hot at the end. The correct way to weld narrow strips is to make short beads and allow time to cool, however this project requires a full length bead.

[e-5.](#) Stick welding: Suggested coupon thickness - 1/4" if using 1/8" rod. Suggested rod-AC and DC straight or reverse polarity- first E-7014, second E-6013

[e-6.](#) MIG welding: Suggested coupon thickness - 1/4" if using .035 wire and 1/8" if using .023 wire

[e-7.](#) Oxy-Acetylene: Suggested coupon thickness - 1/8". Suggested rod- 1/8" mild steel rod 4-H

#### **4-H Welding Project Tips and Suggestions: Class 2**

1. It is suggested that all welds be on same size and thickness of metal. These pieces are referred to as coupons. The welds can be on one coupon that is about 4" x 4" or on individual coupons that are about 2" x 4" inch and 1/4" thick. Suggested rods for this class of position welds for AC and DC straight or reverse polarity is, first E-6013, second E-7014 and E-6010 for DC reverse polarity only.

2. Welds should be cleaned with a chipping hammer and wire brush. Apply a coat of light oil (penetrating oil) to the metal to prevent rusting. Wipe off excess oil.

[3.](#) 4-H Welding Project Tips and Suggestions: Class 3 & 4 1. All welds should be cleaned and protected from rust with paint or light oil. Plans are to be complete enough that if they were given to a welding shop, the item could be made without further instructions. Bill of materials should include a cost for all items used including steel, electrodes, paint, wheels, etc.

- CLASS 1 WELDING JOINTS (SF281)**  
A display of one butt, one lap and one fillet weld.
- CLASS 2 POSITION WELDS (SF281)**  
A display showing three beads welded in the vertical down, horizontal and overhead positions.
- CLASS 3 WELDING ARTICLE (SF281)**  
Any shop article or piece of furniture where welding is used in the construction. 60% of item must be completed by 4-Her and notes regarding laser welding or machine welding must be included. All plans, plan alternations, and a bill for materials must be attached to the article. Protect plans with a cover. All plans and a bill for materials must be attached to the article. Protect plans with a cover. If project is designed to be outside it is required to have appropriate outdoor finish because project may be displayed outside.
- CLASS 4 WELDING FURNITURE (SF282)**  
Any furniture with 75% welding is used in the construction. 60% of item must be completed by 4-Her and notes regarding laser welding or machine welding must be included. All plans, plan alternations, dimensions and a bill for materials must be attached to the article. Protect plans with a cover. May be displayed outside. If project is designed to be outside it is required to have appropriate outdoor finish because project may be displayed outside.
- CLASS 5 PLASMA CUTTER/WELDER DESIGN (SF279)**  
Plasma cutters/welders allowed for detailed design(s) to butt cut into metal. 4Hers will create a notebook describing the design process to create the "artwork" to butt cut into the metal. This exhibit is not eligible for entry at the State Fair.  
In the notebook include:
- a) A photo (front and back) of the finished project. Also include detailed photographs of the project to allow judges to examine cuts.
  - b) Instructions on how the design was created, this allows for replication of the project.
  - c) Lessons learned or improvements to the project.
- Class 6 COMPOSITE WELD PROJECT (SF280)**  
60% of the project must be welded and 40% made from other materials such as wood, rubber, etc. All plans, plan alternations, and a bill for materials must be attached to the article. Protect plans with a cover. If project is designed to be outside it is required to have appropriate outdoor finish because project may be displayed outside.

All outside projects MUST have entry tag and supporting information placed in a protective bag to prevent damage from weather events such as rain and be ATTACHED to projects with string, zip ties, etc.

## Resources

### ARC Welding

Learn to cut metal with an arc solder; Weld high carbon, spring steel and alloy steels; Weld horizontal, vertical and overhead positions

URL: [https://4hcurriculum.unl.edu/index.php/main/program\\_project/143](https://4hcurriculum.unl.edu/index.php/main/program_project/143)