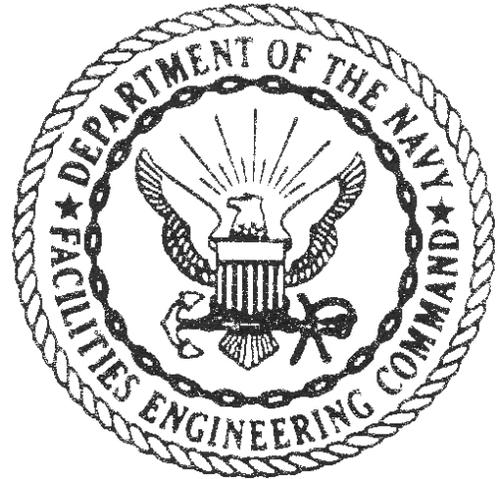
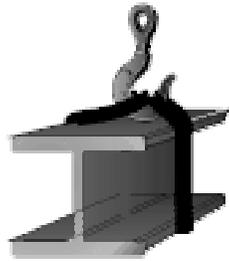


**C**ONSTRUCTION  
**B**ASIC  
**VET**ERANS



**STEELWORKER**  
Qualification Standards



**NAVFAC P-1155**

**Revised January 2003**

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NAVAL FACILITIES ENGINEERING COMMAND  
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QSB Electronically: <http://www.seabee.navy.mil/cbvet/QSB.htm>

# STEEL WORKER

## Qualification Standards

SW Topics - Phase 1 (SW-1)		SW Topics - Phase 2 (SW-2)	
<u>Topic #</u>	<u>Topic Title</u>	<u>Topic #</u>	<u>Topic Title</u>
600	Mathematics	601	Blueprint Reading and Drawing
608	Oxy/MAPP - Gas Cutting and Welding Basics	602	Sheet Metal Layout
609	Oxy/MAPP - Gas Cutting	603	Sheet Metal Fabrication Basics
610	Oxy/MAPP - Gas Welding and Brazing	604	Sheet Metal Fabrication From Patterns
611	Electric Arc Welding Equipment Basics	605	Reinforcing Steel
612	Electric Arc Welding	606	Fiber Line
		607	Pre-engineered Building Erection

The above items may be accomplished by (but are not limited to) utilizing one or more of the training resources listed below. Selecting the right training resource(s) is the responsibility of your chain of command. Considerations such as cost and availability must be included in determining which resource(s) best meet your and your command's particular needs.

### Training Resources

Mobile Training Teams	Vocational Technical Schools	Utility companies
NCTC Port Hueneme	Local Contractors	OJT "AT" with an active duty NMCB
NCTC Gulfport	Contract instructors	Municipal Public Schools (night school)
Other Naval/Service Schools	Municipal public works	Other(s)

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**STEELWORKER**  
**Qualification Standards**  
**Section 600**

**600 Mathematics**

References:

~~a. Mathematics, Vol. 1. NAVPERS 10069-C~~<sup>1</sup>

a. Mathematics, Basic Math and Algebra, NAVEDTRA, Course No: 14139

~~b. General Mathematics for Construction Ratings, NAVPERS 94415~~<sup>2</sup>

600.1 With the use of a calculator, **CONVERT** whole numbers, fractions, decimals, and percents (to the nearest  $1/16^{\text{th}}$ )<sup>3</sup>.

---

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.2 With the use of a calculator, **CALCULATE** the area for a polygon, a circle, and surface area for a cylinder.

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<sup>1</sup> Obsolete. Replaced with NAVEDTRA 14139. See NAVEDTRA Number Conversion Table, Updated 27 September 2002.

Note: NAVEDTRA 10069-C was more recently published as Mathematics, volume 1, NAVEDTRA 10069-D1 (also obsolete). Volume 1 provides a review of basic arithmetic and elementary algebra; it includes fractions, decimals, percentages, exponents, radicals, and logarithms. It also contains exercises in factoring polynomials, linear equations, ratio, proportions, variation, complex numbers and quadratic equations. It presents brief introduction to plane figures, geometric construction, and trigonometry. Reduction, and General Maintenance books.) Reference: *Electronics Technician Supervisor (ET1)* NAVEDTRA: 14085, page 1-6. Retrieved January 3, 2003 from [https://www.advancement.cnet.navy.mil/products/web-pdf/tramans/bookchunks/14085\\_ch1.pdf](https://www.advancement.cnet.navy.mil/products/web-pdf/tramans/bookchunks/14085_ch1.pdf)

<sup>2</sup> Obsolete.

<sup>3</sup> Tolerance courtesy of Naval Construction Training Center Gulfport, 09JAN2003.

**Section 600, cont'd**

- .3 With the use of a calculator, **CALCULATE** the volume for a prism, cone, sphere, cylinder, and rectangular-block shape.

---

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(Date)

- .4 With the use of a calculator, **CALCULATE** the square root of numbers and **SOLVE** mathematical problems common to the Steelworker rating.

---

(Signature)

(Date)





**STEELWORKER**  
**Qualification Standards**  
**Section 602**

**602 Sheet Metal Layout**

References:

- a. Construction Print Reading in the Field, TM5-704
- b. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- c. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996
- d. Blueprint Reading and Sketching, NAVEDTRA 14040

602.1 **IDENTIFY** procedures and **DESCRIBE** instruments used to layout patterns for sheet metal fabrication.

---

(Signature)

(Date)

.2 **DESCRIBE** sheet metal round work and practical sheet metal layout triangulation.

---

(Signature)

(Date)

.3 **SHOW** all math necessary to develop a pattern for a drip pan.

---

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(Date)

.4 **DEVELOP** a pattern for a drip pan using the simple layout method.

---

(Signature)

(Date)



**Section 602, cont'd**

- .10     **DEVELOP** a pattern for a two-piece 90-degree elbow with a tolerance for each dimension of  $\pm 1/16$  inch.

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(Date)

- .11     **DEVELOP** a pattern for a three-piece 90 degree round elbow with a tolerance of  $\pm 1/16$  inch.

---

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(Date)

- .12     **COMPUTE** all math necessary, **INTERPRET** a simple shop drawing and **DEVELOP** the pattern for the frustum of a right cone.

---

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(Date)

- .13     **COMPUTE** all math necessary, **INTERPRET** a simple shop drawing and **DEVELOP** the pattern for a square-to-round transition using a standing seam, and a spot weld seam.

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(Signature)

(Date)

**STEELWORKER**  
**Qualification Standards**  
**Section 603**

**603 Sheet Metal Fabrication Basics**

References:

- a. Construction Print Reading in the Field, TM5-704
- b. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- c. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996
- d. Blueprint Reading and Sketching, NAVEDTRA 14040
- e. Tools and Their Uses, NAVEDTRA 14256

603.1 **IDENTIFY** the most common hand tools associated with sheet metal fabrication.

\_\_\_\_\_  
(Signature) (Date)

. 2 **LIST** safety measures to protect self and co-workers while using fabrication tools and equipment.

\_\_\_\_\_  
(Signature) (Date)

.3 **LIST** and **DESCRIBE** the uses of supplies needed in soft soldering.

\_\_\_\_\_  
(Signature) (Date)

.4 **IDENTIFY** and **DESCRIBE** two types of soldering tools and their uses.

\_\_\_\_\_  
(Signature) (Date)

**Section 603, cont'd**

.5     **DESCRIBE** the types and uses of each of the five corrosive fluxes.

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.6     **DESCRIBE** the types and uses of the two non-corrosive fluxes.

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(Signature)

(Date)

.7     **DESCRIBE** the characteristics of the grade of soft solder.

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(Date)

.8     **EXPLAIN** the application of soft solder with various tools, fluxes, and solders to different metals.

---

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(Date)

.9     **DESCRIBE** the types of sheet metals and their characteristics.

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(Date)

.10    **SELECT** the corresponding US Standard Gauge when given a nominal thickness of sheet metal.

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(Signature)

(Date)

**Section 603, cont'd**

- .11 **DESCRIBE** the application, sizing, and spacing of these sheet metal fasteners: machine screws, sheet metal screws, and tinnerns rivets.

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(Signature)

(Date)

- .12 **DEMONSTRATE** the operation of a cornice standard hand break.

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(Signature)

(Date)

- .13 **DEMONSTRATE** the operation of a slip roll-forming machine.

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(Signature)

(Date)

- .14 **DEMONSTRATE** the operation of a foot operated squaring shear.

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(Signature)

(Date)

- .15 **DEMONSTRATE** the operation of a beading machine.

---

(Signature)

(Date)

- .16 **DEMONSTRATE** the operation of a crimping machine.

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(Signature)

(Date)



**STEELWORKER**  
**Qualification Standards**  
**Section 604**

**604 Sheet Metal Fabrication from Patterns**

References:

- a. Construction Print Reading in the Field, TM5-704
- b. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- c. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996
- d. Blueprint Reading and Sketching, NAVEDTRA 14040
- e. Tools and Their Uses, NAVEDTRA 14256

604.1 When provided with information sheets and shop drawings, **IDENTIFY**, the procedures and instruments used to fabricate sheet metal projects.

---

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(Date)

.2 **USING** the patterns developed, **TRANSFER** lines onto sheet metal, and **FABRICATE** a two-piece 90-degree elbow.

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.3 **USING** the patterns developed, **TRANSFER** lines onto sheet metal, and **FABRICATE** a three piece 90 degree round elbow.

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(Signature)

(Date)

**Section 604, cont'd**

- .4     **USING** the patterns developed, **TRANSFER** lines onto sheet metal, and **FABRICATE** a frustum of a cone.

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(Signature)

(Date)

- .5     **USING** the patterns developed, **TRANSFER** lines onto sheet metal, and **FABRICATE** a square-to-round transition.

---

(Signature)

(Date)

- .6     **USING** the patterns developed, **TRANSFER** lines onto sheet metal, and **FABRICATE** a square duct to be attached to square end of square-to-round with drive cleats and "S" cleats.

---

(Signature)

(Date)

- .7     **USING** layout instruments and sheet metal tools and equipment, **FABRICATE** an air conditioning/ heating duct.

---

(Signature)

(Date)

- .8     **USING** layout instruments and sheet metal tools and equipment, **FABRICATE** drive cleats and "S" cleats.

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(Signature)

(Date)

**STEELWORKER**  
**Qualification Standards**  
**Section 605**

**605      Reinforcing Steel**

References:

- a. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- b. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996
- c. Placing Reinforcing Bars, Western Concrete Reinforcing Steel Institute, 1499 Bayshore Hwy., Burlington, CA 94010
- d. Concrete and Masonry, TM5-742

605.1      **DISCUSS** the three factors affecting concrete strength.

---

(Signature)

(Date)

.2      **IDENTIFY** and **DESCRIBE** the uses of the following deformed rebar types: truss bars, stirrup, tie radius bend, spiral, offset column bars and hooks.

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(Signature)

(Date)

.3      **IDENTIFY** the most common welded wire fabric types and sizes.

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(Signature)

(Date)

.4      **DESCRIBE** the uses of wire welded fabric.

---

(Signature)

(Date)



**Section 605, cont'd**

- .10 **CALCULATE** the spacing of ties in rebar placement for various sizes of rebar and various applications.

---

(Signature)

(Date)

**STEELWORKER**  
**Qualification Standards**  
**Section 606**

**606 Fiber Line**

References:

- a. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- b. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996

606.1 **DISCUSS** the differences between the vegetable fiber lines manila, sisal, and hemp.

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(Signature)

(Date)

.2 **COMPARE** the advantages and disadvantages between vegetable fiber line and synthetic line.

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(Signature)

(Date)

.3 **NAME** the two ways to size a line and the criteria to use for deciding which way to measure.

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(Signature)

(Date)

.4 **DESCRIBE** what a right lay and left lay means in fabrication of a line.

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(Signature)

(Date)

**Section 606, cont'd**

- .5 **NAME** the three types of lays and **TELL** how each is constructed and its uses.

---

(Signature) (Date)

- .6 **EXPLAIN** the four general rules of line care - cleanliness, chafing gear, cutting, and shrinkage.

---

(Signature) (Date)

- .7 **TELL** under what conditions a fiber line may be stowed.

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(Signature) (Date)

- .8 **EXPLAIN** three points of checking a fiber line.

---

(Signature) (Date)

- .9 **EXPLAIN** how to uncoil a new line.

---

(Signature) (Date)

- .10 **COMPARE** the differences between three ways to make up a line - coiled down, Flemish down, and faked down.

---

(Signature) (Date)

**Section 606, cont'd**

.11 **EXPLAIN** the difference between worming, parceling, and serving.

---

(Signature)

(Date)

.12 **EXPLAIN** the difference between plain whipping and sewed whipping. **DEMONSTRATE** on a length of fiber line.

---

(Signature)

(Date)

.13 Using the proper formula, **CALCULATE** the breaking strength of various sizes of fiber line.

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(Signature)

(Date)

.14 **EXPLAIN** what Safe Working Load is and use the proper formula to **CALCULATE** the Safe Working Load of various sizes of fiber line.

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(Signature)

(Date)

.15 **DEFINE** Safety Factor (ratio).

---

(Signature)

(Date)

.16 **EXPLAIN** the following terms: running or bitter end, standing part, bight, loop, turn, knot, bend, hitch.

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(Signature)

(Date)

**Section 606, cont'd**

.17     **EXPLAIN** the use of an overhand knot and **DEMONSTRATE** how to tie it.

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(Signature)

(Date)

.18     **EXPLAIN** the use of a figure eight knot and **DEMONSTRATE** how to tie it.

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(Signature)

(Date)

.19     **EXPLAIN** the use of a square knot and **DEMONSTRATE** how to tie it.

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(Signature)

(Date)

.20     **EXPLAIN** the use of a sheepshank and **DEMONSTRATE** how to tie it.

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(Signature)

(Date)

.21     **EXPLAIN** the use of a bowline and **DEMONSTRATE** how to tie it.

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(Signature)

(Date)

**Section 606, cont'd**

.22     **EXPLAIN** the use of a becket bend and **DEMONSTRATE** how to make one.

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(Signature)

(Date)

.23     **EXPLAIN** the use of a clove hitch and **DEMONSTRATE** how to tie it.

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(Signature)

(Date)

.24     **EXPLAIN** the use of a short splice and **DEMONSTRATE** how to make one.

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(Signature)

(Date)

.25     **EXPLAIN** the use of an eye splice and **DEMONSTRATE** how to make one.

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(Signature)

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.26     **EXPLAIN** the use of a back splice and **DEMONSTRATE** how to make one.

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(Signature)

(Date)

**STEELWORKER**  
**Qualification Standards**  
**Section 607**

**607 Pre-Engineered Building Erection (PEB)**

References:

- a. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- b. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996
- c. Erection Manual, US Navy Rigid Frame Utility Warehouse Bldg., Butler Mfg. Co.
- d. Erection Manual, 40' x 100', Pascoe Mfg. Co.

607.1 Given the erection manual, **IDENTIFY** the major structural components of a PEB.

---

(Signature)

(Date)

.2 **EXPLAIN** the difference between: high tensile steel bolts, galvanized machine bolts, shoulder bolts, self-drilling and self-tapping screws, blind rivets, frame fasteners, sheeting fasteners, accessory fasteners, and **STATE** their uses.

---

(Signature)

(Date)

.3 **STATE** the proper safety precautions when utilizing ladders, scaffolding, power tools, power activated tools, and hoisting safety.

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(Signature)

(Date)

**Section 607, cont'd**

.4     **DESCRIBE** the two deck systems used with a PEB.

---

(Signature)

(Date)

.5     **DESCRIBE** how to layout the frame materials at the job site for easy assembly and erection.

---

(Signature)

(Date)

.6     Given job sheets, erection manual, equipment, tools and materials, **ASSEMBLE** and **ERECT** the frames, purlins, girders, sag rods, wall Brace rods, roof brace rods, base shoes, eaves struts, base angles, sheeting and bolts of a PEB.

---

(Signature)

(Date)

**STEELWORKER**  
**Qualification Standards**  
**Section 608**

**608 OXY/MAPP – Gas Cutting and Welding Basics**

References:

- a. Welding Encyclopedia, 17th Ed., pp. 0-2, 0-3, 0-4, 0-7, 0-10, F-54, G-17, and T-39, Monticello Books, PO Box 128, Morton Grove, IL 60053
- b. NCF Welding Materials Handbook, Civil Engineering Support Office, Code 151L, CBC, Port Hueneme, CA 93043-5005
- c. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- d. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996

608.1 **DESCRIBE** the characteristics of MAPP gas, how it is stored, and how the cylinders are marked.

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(Signature)

(Date)

.2 **DESCRIBE** the characteristics of Oxygen, how it is stored, and how the cylinders are marked.

---

(Signature)

(Date)

.3 **EXPLAIN** the safety considerations when working with both MAPP (acetylene) and oxygen together.

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(Signature)

(Date)



**Section 608, cont'd**

- .9     **DESCRIBE** the differences between a carburizing flame, neutral flame, and an oxidizing flame.

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10.    **DESCRIBE** backfire and flashback and five major causes for each.

---

(Signature)

(Date)

11.    **SELECT** the proper tools to **SETUP** the Oxy/MAPP gas cutting/welding equipment. **DEMONSTRATE** carburizing, neutral, and oxidizing flames.

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(Signature)

(Date)

**STEELWORKER**  
**Qualification Standards**  
**Section 609**

**609 OXY/MAPP - Gas Cutting**

References:

- a. Welding Encyclopedia, 17th Ed., pp. F-15 through F-38, Monticello Books, PO Box 128, Morton Grove, IL 60053
- b. How to Flame Cut with MAPP, MAPP Products, PO Box 105, 70 Diamond Rd., Springfield, NJ 07081<sup>6</sup>
- c. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- d. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996

609.1 **DEFINE** oxidation and **DESCRIBE** its effects on iron.

---

(Signature)

(Date)

.2 **EXPLAIN** the functions of the pre-heating flame and of the oxygen stream.

---

(Signature)

(Date)

.3 **IDENTIFY** the proper cutting tip for the following thicknesses of metal: 1/4", 3/8", 3/4", 1" and 1-1/2".

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(Date)

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<sup>6</sup> Mapp Products is no longer in business.

**Section 609, cont'd**

- .4 Given the following tip sizes, 00, 0, 1 and 2, **IDENTIFY** the proper oxygen pressure setting and the MAPP pressure setting for each tip.

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(Signature)

(Date)

- .5 **DESCRIBE** what coupling distance is and **SELECT** distances for various thickness of metal.

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(Signature)

(Date)

- .6 **COMPARE** coupling distances for different thickness of metal.

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(Signature)

(Date)

- .7 **DESCRIBE** what torch angle is and **SELECT** angles for various thickness of metal.

---

(Signature)

(Date)

- .8 **DESCRIBE** the procedure for cutting a straight cut. Provided with the tools and materials, **SELECT** the proper cutting tip and **CUT** a rectangular hole.

---

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(Date)

**Section 609, cont'd**

- .9      **DESCRIBE** the procedure for blowing a hole. Provided with the tools and materials, **SELECT** the proper cutting tip and **CUT** a round hole.

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(Signature)

(Date)

- .10      **DESCRIBE** the procedure for and **DEMONSTRATE** cutting a 30 degree bevel on a mild steel plate.

---

(Signature)

(Date)

- .11      **EXPLAIN** the reasons for the following faults: light gouging; slightly cupped just below top edge; deep gouging; top edges melted or beads; gouging at bottom of kerf; drag lines uneven; draglines curve at bottom.

---

(Signature)

(Date)

- .12      **DESCRIBE** the most important safety precautions to be utilized when 'Gas cutting' metal.

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(Signature)

(Date)

**STEELWORKER**  
**Qualification Standards**  
**Section 610**

**610 OXY/MAPP - Gas Welding and Brazing**

References:

- a. Welding Encyclopedia, 17th Edition, pp. 0-4 through 0-7, Monticello Books, PO Box 128, Morton Grove, IL 60053
- b. NCF Welding Materials Handbook, Civil and T-39, PO Box 128, Engineering Support Office, Code 151L, CBC, Port Heuneme, CA 93043
- c. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- d. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996
- e. Brazing Manual, American Welding Society, 2501 NW 7th St. Miami, FL 33125

610.1 **EXPLAIN** the difference in welding tips for MAPP and acetylene gas welding.

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(Signature)

(Date)

.2 **EXPLAIN** what counter-boring a welding tip accomplishes.

---

(Signature)

(Date)

.3 **EXPLAIN** the purpose of these steps in metal preparation: edges of the metal; cleaning; positioning the plates; tack welding.

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(Signature)

(Date)

**Section 610, cont'd**

- .4 **EXPLAIN** the proper method for introducing the welding rod into the weld in forehand gas welding.

---

(Signature)

(Date)

- .5 Provided with the tools and materials, **USE** Oxy/MAPP welding equipment to **WELD** a butt joint in two mild steel plates using proper torch and rod angles.

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(Signature)

(Date)

- .6 **DEFINE** the terms braze welding and tinning.

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(Signature)

(Date)

- .7 **EXPLAIN** six important principals of brazing.

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(Signature)

(Date)

- .8 **IDENTIFY** four metals that can be braze welded.

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(Signature)

(Date)

- .9 **DISCUSS** the steps of preparation for mild steel plate.

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(Signature)

(Date)

**Section 610, cont'd**

.10 **DESCRIBE** what flux is and its importance in the brazing process.

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(Signature)

(Date)

.11 **EXPLAIN** what filler metal is used as brazing rod.

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(Signature)

(Date)

.12 **DESCRIBE** the torch and rod angle in brazing.

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(Signature)

(Date)

.13 **DESCRIBE** the tacking process and how to determine if the correct temperature has been reached.

---

(Signature)

(Date)

.14 **EXPLAIN** the importance of tinning when filling a joint and **EXPLAIN** the process of filling a joint.

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(Signature)

(Date)

.15 Provided with the tools and materials, **USE** Oxy/MAPP welding equipment to **BRAZE** a lap joint in two mild steel plates.

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(Signature)

(Date)

**STEELWORKER**  
**Qualification Standards**  
**Section 611**

**611 Electric Arc Welding Equipment Basics**

References:

- a. Welding Encyclopedia, 17th Edition, pp. A-61 through A-80, Monticello Books, PO Box 128, Morton Grove, IL 60053
- b. Steelworker, Vol. 01, NAVEDTRA Course No: 14250, Edition: 1996
- c. Steelworker, Vol. 02, NAVEDTRA Course No: 14251, Edition: 1996
- d. Hobart Welding Manual

611.1 **EXPLAIN** the following phenomenon: the voltage output varies automatically to the demand of the arc.

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(Signature)

(Date)

.2 **EXPLAIN** what the difference is between a single control and a dual control in a DC welder.

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(Signature)

(Date)

.3 **DISCUSS** advantages and disadvantages of alternating current (AC) welders.

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(Signature)

(Date)

**Section 611, cont'd**

.4 **EXPLAIN** why a direct current rectifier is chosen for shop work.

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(Signature)

(Date)

.5 **DESCRIBE** the characteristics of straight polarity and its applications in DC welding.

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(Signature)

(Date)

.6 **DESCRIBE** the characteristics of reverse polarity and its applications in DC welding.

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(Date)

.7 **DEMONSTRATE** the preventive maintenance and starting of a diesel engine welder.

---

(Signature)

(Date)

.8 **EXPLAIN** why a diesel engine should never be allowed to run out of fuel.

---

(Signature)

(Date)



**Section 611, cont'd**

.14     **DESCRIBE** a welding hood and its protective properties.

---

(Signature)

(Date)

.15     Given a lens shade, **TELL** at what amperage you could weld without eye damage.

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(Signature)

(Date)

.16     **EXPLAIN** the purpose and use of flash goggles.

---

(Signature)

(Date)

.17     **DESCRIBE** the various pieces of protective welding clothing and in what situation each may be used.

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(Signature)

(Date)

.18     **EXPLAIN** why a carbon tetrachloride extinguisher should never be used on hot metal.

---

(Signature)

(Date)

**STEELWORKER**  
**Qualification Standards**  
**Section 612**

**612 Electric Arc Welding**

References:

- a. Welding Encyclopedia, 17th Edition  
Monticello Books, PO Box 128, Morton Grove, IL 60053
- b. Steelworker, Vol. 01, NAVEDTRA Course No: 14250,  
Edition: 1996
- c. Steelworker, Vol. 02, NAVEDTRA Course No: 14251,  
Edition: 1996
- d. AWS Structural Welding Code, AWS D1.1-75, American Welding  
Society, 2510 NW 7th St., Miami, FL 33125

612.1 **DESCRIBE** the proper way to clean metal plates in preparation for welding.

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.2 **DESCRIBE** the characteristics of a good tack weld.

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.3 The machine setting (amperage) is determined by the electrode.  
**EXPLAIN** what happens when the current is too low.

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**Section 612, cont'd**

.4 **NAME** two ways to strike an arc and **DESCRIBE** how to do each.

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(Signature) (Date)

.5 **DESCRIBE** by rule of thumb method, how to determine the length of arc.

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(Signature) (Date)

.6 **DESCRIBE** what happens when the welding arc is too long and what happens when the arc is too short.

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(Signature) (Date)

.7 **DESCRIBE** what happens when the speed is too fast and what happens when the speed is too slow.

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(Signature) (Date)

.8 **DISCUSS** four considerations in electrode selection.

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(Signature) (Date)

.9 **DESCRIBE** the position the electrode should be in relation to the plates being welded.

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**Section 612, cont'd**

- .10 Given 3/8" mild steel plate, **SELECT** the proper electrode; **SET** the welder to the correct polarity and the correct amps for running a bead in the vertical position for a Tee fillet.

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NOTE: The finished welds will have a minimum of 6" of sound weld, with an even appearance, with all beads locked to form complete fusion. Slag inclusion will not exceed 1/8 " in any 6" of weld; porosity will not exceed 1/16" maximum with not more than 1/8" total in any one square inch of weld; undercut will not exceed 1/32" in width, 1/32" in depth and not more than the combined total of 2" in any 6" of weld; reinforcement will blend smoothly into the plate following the *AWS Structural Welding Code*.

- .11 **DISCUSS** the three types of tee fillet welds.

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- .12 Arc **WELD** 3/8" mild steel plates with a three-bead tee fillet joint in the flat position.

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- .13 **LIST** four causes of poor fusion and the corrective measures to be taken to resolve the problem.

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**Section 612, cont'd**

- .14 **LIST** four causes of porosity and the corrective measures to be taken to resolve the problem.

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- .15 **LIST** four causes of incomplete penetration and the corrective measures to be taken to resolve the problem.

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- .16 **LIST** three causes of brittleness and the corrective measures to be taken to resolve the problem.

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- .17 **DESCRIBE** what causes arc blow and the corrective measures to be taken to resolve the problem.

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- .18 **DESCRIBE** how to recognize improper polarity and the corrective measures to be taken to resolve the problem.

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