

SHEET METAL WORKER

APPENDIX A

O*NET CODE 47.2211.00

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

WORK PROCESSES

	Approximate Hours
A. Tools and Machinery	1,500 – 2,000
1. Safety.	
2. Using and caring for hand tools and equipment.	
3. Using and caring for power tools and machinery.	
4. Using and caring for computerized machinery (if available).	
B. General Sheet Metal Work	2,250 – 3,000
1. Safety.	
2. Drafting and layout.	
3. Selecting materials.	
4. Cutting, stamping, bending, straightening, shaping stock.	
5. Fastening and joining.	
6. Finishing.	
7. Using ladders, scaffolding, hoists.	
8. Installing.	
C. Welding	750 – 750
1. Shielded metal arc welding.	
2. Gas metal arc welding.	
3. Gas tungsten arc welding.	
4. Orbital welding (optional).	
D. Heating, Ventilation and Air Conditioning Systems (HVAC)	1,500 – 1,750
E. Testing, Adjusting & Balancing (TAB) Service and Maintenance of HVAC Systems	500 – 750

F. Industrial Sheet Metal Work (optional)*	750 – 750
1. Including such work as:	
a. blow pipe	
b. cyclones	
c. bag houses	
d. conveyor systems	
G. Architectural Sheet Metal Work (optional)*	500 – 750
H. Food Service Equipment (optional)*	250 – 250
Approximate Total Hours	8,000 – 10,000

If optional Work Processes are not completed, the hours should be devoted to further mastery of the Work Processes that are required.

Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to <https://dol.ny.gov/public-work-and-prevailing-wage>.

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APPENDIX B

RELATED INSTRUCTION

Safety

1. OSHA 10-hour construction course
2. Shop safety
3. Field safety
4. Working safely
5. Emergency procedures
6. Hazard communication
7. Awareness of, and safety in working around, hazardous materials likely to be encountered in the trade
8. Asbestos Awareness – minimum 4 hours (see attachment)
9. Awareness of dangers of drug and alcohol abuse
10. Safety in field installation
11. Identifying hazards (shop and field)**
12. Emergency response preparedness and crisis management (optional)**
13. First Aid – minimum 6.5 hours every 3 years

Drafting/Blueprints, Plans & Specifications

1. Drafting equipment and materials
2. Geometric construction
3. Lines & lettering
4. Orthographic projection
5. Pictorial drawing
6. Freehand sketching
7. Reading and interpreting contract documents
8. Reading specifications
9. Architectural drawings (if Work Process “G” on Appendix A is selected)
10. Structural drawings
11. Mechanical drawings
12. Electrical drawings

13. Sheet metal shop drawings
14. CAD in the sheet metal industry (if available)
15. Using CAD (if available)
16. CAM in the sheet metal industry (if available)**
17. Using CAM (if available)**
18. Drafting HVAC duct sizing designs**
19. Drafting architectural and ornamental designs (if Work Process "G" on Appendix A is selected)**
20. Drafting food service and beverage dispensing equipment designs (if Work Process "H" on Appendix A is selected)**

Mathematics

1. Arithmetic, as applied to the trade
2. Algebra, as applied to the trade
3. Geometry, as applied to the trade
4. Trigonometry, as applied to the trade
5. Using true lengths in triangulation
6. Field measuring
7. Estimating
 - a. Hardware and buyout components**
 - b. Bidding and job costs
 - c. Computer estimating (if available)

Trade Theory and Science

1. Sheet metal & metal products
2. Plastics and fiberglass
3. Hand tools
4. Shop equipment
5. Organizing tools and equipment for a job
6. Principles of layout
7. Layout of metal
8. Introduction to parallel lines
9. Introduction to radial lines
10. Introduction to triangulation
11. Layout of penetrations
12. Advanced layout and pattern development**

- a. Industrial applications (pollution control) (If Work Process "F" on Appendix A is selected)
 - b. HVAC: air handling units (plenums and components)
 - c. Architectural & ornamental applications (if Work Process "G" on Appendix A is selected)
13. Shop fabrication
 14. Seams, locks, and edges
 15. Duct elbows other than 90 degrees
 16. Duct S offsets
 17. Introduction to field installation
 18. Hoisting and rigging
 19. Round tees (parallel lines)
 20. Round elbows
 21. Round tapers (radial lines)
 22. Round tapers (triangulation)
 23. Square-to-rounds on a pitch
 24. Transitions
 25. Duct change elbows
 26. Change ogee offsets
 27. Y branches
 28. Hangers and anchors
 29. Introduction to computer operations
 30. Introduction to HVAC systems
 31. Air and its properties
 32. Ventilation
 33. Heating
 34. Cooling
 35. Airflow in ducts
 36. Fans
 37. Duct systems
 38. Duct design
 39. Duct elevations and clearance
 40. Preparing the duct
 41. Fire and smoke dampers

42. Outlets and other HVAC buy out items
43. Installing HVAC systems
44. Installing central HVAC
45. Installing package units
46. TAB work
47. Preparation for TAB
48. TAB instrument use
49. TAB system balancing
50. Pressure testing
51. Indoor air quality
52. Special ventilation needs
53. Refrigeration cycle
54. Electricity
55. Controls
56. Servicing HVAC equipment
57. Start-up and commissioning of system
58. Energy management systems
59. Boiler breechings
60. Testing, adjusting and balancing of environmental system**
 - a. Air test preparation
 - b. Hydronics test preparation
 - c. Sound
61. Service work**
 - a. Power supplies (electrical & pneumatic)
 - b. Test instruments
 - c. Air distribution system
62. Soldering
63. Welding
 - a. Shielded metal arc welding
 - b. Gas metal arc welding
 - c. Gas tungsten arc welding
 - d. Codes and symbols
 - e. Carbon arc brazing**
 - f. Orbital welding (if available)**

64. If Work Process “F” on Appendix A is selected:

- a. Industrial work
- b. Blowpipe systems
- c. Material handling systems

65. If Work Process “G” on Appendix A is selected:

- a. Introduction to architectural sheet metal
- b. Architectural sheet metal practices
- c. Roof jacks
- d. Roof drainage systems
- e. Flashings
- f. Waterproofing roof edges and walls
- g. Installing strip items
- h. Metal roofs
- i. Specialized roofs
- j. Ventilators and louvers
- k. Siding and decking**
- l. Additional architectural sheet metal work

Interpersonal Workplace Skills

- 1. Communication
- 2. Customer relations
- 3. Time management
- 4. Introduction to supervision**
- 5. Industrial and labor relations (20 hours)
 - a. History and background (6 hours, 1st year)
 - b. Current laws and practices (14 hours, 2nd year)
- 6. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law

Other Related Courses as Necessary

** These topics are primarily intended for apprentices in 5-year programs.

A Minimum of 150 Hours of Related Instruction is Required for Each Apprentice for Each Year.

Appendix B topics are approved by New York State Education Department.

ATTACHMENT TO APPENDIX B

Asbestos Awareness

This course must be delivered by one of the following:

1. A provider currently approved by the New York State Department of Health to deliver asbestos safety training.
2. A person holding a current Asbestos Handler certificate from the New York State Department of Labor in the title of: Inspector, Supervisor, Project Monitor, Management Planner, or Project Designer.
3. Anyone otherwise approved by the New York State Education Department.

Minimum course contents must include the following:

1. Definition of asbestos
2. Types and physical characteristics
3. Uses and applications
4. Health effects:
 - a. Asbestos-related diseases
 - b. Risks to families
 - c. Cigarette smoking
 - d. Lack of safe exposure level
5. Employer-specific procedures to follow in case of potential exposure, including making a supervisor or building owner immediately aware of any suspected incidental asbestos disturbance so that proper containment and abatement procedures can be initiated promptly.

Notwithstanding the above course requirement, employers are advised that they must also be in compliance with New York State Department of Labor Industrial Code Rule 56 at all times.

Employers are further advised, and must advise all apprentices, that completion of the above course requirement does not authorize any person to remove, encapsulate, enclose, repair, disturb, or abate in any manner, any friable or non-friable asbestos, asbestos containing material, presumed asbestos containing material, or suspect miscellaneous asbestos containing material.