

Shielded Metal Arc Pipe Welding

Instructional/Task Analysis

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 1: Pipe Welding Orientation, Safety, and Equipment

1. Terms related to pipe welding orientation, safety, and equipment
2. Transmission-line pipe welding and industrial pipe welding
3. Characteristics of transmission-line pipe welding
4. How a cross-country pipe welding crew operates
5. API classifications for transmission-line pipe
6. Characteristics of industrial pipe welding
7. Classifications for industrial pipe
8. Welding skills required for good pipe welding
9. Organizations that set pipe and pipe welding standards
10. AWS positions for groove pipe welding
11. AWS positions for fillet pipe welding
12. AWS guidelines for G-position qualification
13. AWS guidelines for F-position qualification
14. Guidelines for pipe welding safety
15. Pipe welding situations that require special attention
16. Special precautions for pipe welding hot lines
17. Types of line-up clamps and their characteristics
18. Characteristics of pipe beveling machines
19. Jack stands and their uses
20. Center finders and their uses
21. Types of contour markers
22. Wrap-arounds and their uses

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Unit 1: Pipe Welding Orientation, Safety, and Equipment (continued)

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| 23. Templates and their uses | 25. Solve problems about pipe welding qualifications |
| 24. Other pipe welding tools and their uses | |

Unit 2: Print Reading and Layout for Pipe Welding

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| 1. Terms related to print reading and layout for pipe welding | 15. Solve trigonometry problems for unknown sides |
| 2. Methods for presenting pipe on prints | 16. Solve trigonometry problems for unknown angles |
| 3. Pipe symbols and their uses | 17. Develop a template for a two-piece 90° turn |
| 4. Common pipe symbols with their meanings | 18. Develop a template for a 90° branch with pipes of equal size |
| 5. Methods for dimensioning prints for pipe welding | 19. Develop a template for a 45° branch connection |
| 6. Symbols for common pipe fittings | |
| 7. Special welded fittings with their uses | |
| 8. Advantages of isometric drawings for pipe welding prints | |
| 9. Functions of a right triangle | |
| 10. Guidelines for solving trigonometric problems | |
| 11. Steps in laying out angles on 90° long radius elbows | |
| 12. The 12-inch rule for finding angles with a steel square | |
| 13. Standard references for commercial pipe identification | |
| 14. Standard weld fittings with their shapes | |

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Unit 3: Pipe Welding Techniques and Applications

1. Terms related to pipe welding techniques and applications with their definitions
2. Guidelines for beginning pipe welders
3. AWS classifications for mild steel and alloy electrodes
4. Electrode selection for pipe welding
5. Guidelines for joint preparation, fit-up, and alignment
6. Guidelines for joint dimensioning
7. Guidelines for joint preparation
8. Common methods of pipe alignment
9. Common problems in pipe welding
10. Pipe welding troubleshooting chart
11. Ways to prevent pipe welds from cracking
12. the concept of quartering
13. Performance qualification for pipe welding
14. Qualification testing and its importance in pipe welding
15. Methods of pipe inspection
16. Specimen locations for AWS welding procedure qualification
17. AWS specifications for specimen preparation
18. API procedure qualification
19. Specimen locations for AWS welder qualification
20. Bevel and prepare pipe for welding
21. Weld to specifications a V-groove butt joint on 6" schedule 40 pipe in the horizontal position
22. Conduct root- and face-bend tests on welded pipe
23. Weld to specifications a V-groove butt joint on 6" schedule 40 pipe in the vertical up position
24. Weld to specifications a V-groove butt joint on 6" schedule 40 pipe in the vertical up, 45° inclined position
25. Weld to specifications a V-groove butt joint on 6" schedule 40 pipe in the vertical down position
26. Weld to specifications a V-groove butt joint on 6" schedule 40 pipe in the vertical down, 45° inclined position