WLDG1391 - Pipe Welding

Catalog Description: An introduction to welding of pipe using the shielded metal arc welding process (SMAW), including electrode selection, equipment setup, and safe shop practices. Emphasis on weld positions 1G and 2G using various electrodes. Lecture Hrs = 2, Lab Hrs = 2

Prerequisite(s): None

Semester Credit Hours: 3
Lecture Hours per Week: 2
Lab Hours per Week: 2
Contact Hours per Semester: 64
State Approval Code: 4805080000

Course Subject/Catalog Number: WLDG 1391
Course Title: Pipe Welding

Course Rationale:
A student completing this class will have the basic knowledge of shielded metal arc welding and gas tungsten arc welding of pipe.

Instructional Goals and Purposes:
The purpose of this course is to provide the learners with the basic knowledge of shielded metal arc welding and gas tungsten arc welding of pipe.

Learning Objectives:
After completing this course, the student should be able to safely demonstrate shielded metal arc welding and gas tungsten arc welding of pipe.

Specific Course Objective:
Upon completion of this course, the student should be able to safely demonstrate and explain the following:

Shielded Metal Arc Welding of Pipe
I. Introduction (1ai, 1aii, 1aiii, 1aiv, 1av, 1bi, 1biii, 1biv, 1ci, 1cii, 1ciii, 1civ)
II. Pipe and Tubing (1ai, 1aiii, 1aiv, 1bi, 1bii, 1biv, 1ci, 1civ)
   a. pressure range
   b. advantages of welded pipe
III. Preparation and Fit up (1ai, 1aii, 1aiii, 1bii, 1biv, 1ci, 1civ)
   a. root face
   b. root gap
   c. root suck back
   d. concave root surface
IV. Practice Welds (1aiii, 1aiv, 1bii, 1biii, 1biv, 1ci, 1cii, 1ciii, 1civ, 1cv, 2aii, 2aiv, 2bi,
2biv, 2bv, 2bvi)
   a. weld standards
   b. root weld
   c. hot pass
   d. filler pass
   e. cover pass

V. Horizontal rolled position (1ai, 1aii, 1aiv, 1av, 1bi, 1bii, 1biv, 1ci)
   a. bending
   b. butt joint

VI. Vertical Fixed position (1ai, 1aii, 1av, 1bi, 1bii, 1biv, 1ci)
   a. stringer bead
   b. butt joint

VII. Horizontal fixed position (1ai, 1aii, 1av, 1bi, 1bii, 1biv, 1ci)
   a. welding uphill
   b. welding downhill
   c. stringer bead
   d. butt joint

VIII. 6G 45 degree inclined position (1ai, 1ai, 1av, 1bi, 1bii, 1biv, 1bv, 1civ)
   a. stringer bead
   b. butt joint

Other Constant-Potential Welding Processes
I. Introduction (1ai, 1aii, 1aiv, 1bi, 1bii, 1biv, 1ci, 1cii, 1civ, 1cv)
II. Submerged Arc Welding (1ai, 1aii, 1bii, 1biv, 1bi, 1bii, 1biv, 1ci, 1cii, 1ciii, 1civ, 1cv)
   a. granular fluxing

III. Weld Travel (1ai, 1aii, 1av, 1bi, 1bii, 1biv, 1ci, 1cii, 1ciii, 1civ, 1cv 2ai, 2aii, 2aiv)
IV. Electrode Feed (1ai, 1aii, 1aiii, 1bi, 1biv, 2ai, 2aiv, 2aiii)
V. Contact Tip (1ai, 1aii, 1aiii, 1bi, 1ci)
VI. Electrode (1ai, 1aii, 1aiii, 1bi, 1civ, 1ci)
   a. twisted wire
   b. strip electrodes
   c. classification

VII. Flux (1ai, 1aii, 1aiii, 1bi, 1ci)
   a. classification
   b. types
   c. fused fluxes
   d. bonded fluxes
   e. mechanically mixed fluxes
   f. flux storage

VIII. Advantages of Submerged Arc Welding (1ai, 1aii, 1aiii, 1bi,)
IX. Disadvantages of Submerged Arc Welding (1ai, 1aii, 1aiii, 1bi,)
X. Arc Starting (1ai,1aii, 1aiii 1aiiv, 1bi, 1ci, 1cii, 2aii, )
XI. Weld Backing (1ai, 1aii 1aiii)
XII. Hand-held Submerged Arc Welding (1ai, 1aii, 1aiii, 1bi, 1biv, 2ai, 2aiii)
XIII. Electro-slag Welding (1ai, 1aii, 1aiii, 1bi, 1biv, 2ai, 2aiii)
   a. water-cooled dams
   b. advantages
   c. disadvantages

XIV. Electro-gas Welding (1ai, 1aii, 1aiiii, 1bi, 1biv, 2ai, 2aiii)

Gas Tungsten Arc Welding of Pipe
I. Introduction (1ai, 1aii, 1aiii, 1bi, 1biv, 1ci, 1civ, 1cv)
II. Practices (1ai, 1aii, 1aiii, 1bi, 1ci, 1cii, 1ciii, 1civ, 1cv, 2ai,)
III. Joint Preparation (1ai, 1aii, 1aiii, 1bi, 1biv, 1ci, 1cii, 2aii, 2aiii, 2ci, )
IV. Root (1ai, 1aii, 1aiii, 1bi, 1biv, 1ci, 1cii, 2aii, 2aiii, 2ci, 2dii)
   a. penetration
b. reinforcement
c. incomplete fusion
d. concave root surface
   1. Concavity
e. excessive root reinforcement
   1. Grapes
   2. Stress points
f. root contamination
V. Backing gas (1ai, 1aii, 1aiii, 1ci, 2ai, 2aii, 2ci, 2di, 2dii, 2eii, 2eii)
VI. Filler Metal (1ai, 1aii, 1aiii, 1biv, 1bv, 1ci, 2ai, 2aii, 2dii, 2dii, 2eiii)
   a. consumable inserts
VII. Hot Pass (1ai, 1aii, 1bi, 1bii, 1biii, 1biv 1ci, 2ai)
VIII. Filler Pass (1ai, 1aii, 1bi, 1bii, 1biii, 1biv 1ci, 2ai)
IX. Cover Pass (1ai, 1aii, 1bi, 1bii, 1biii, 1biv 1ci, 2ai)

**Grading Policy:**

Your Grade will be determined from:

1. Assignments (10%)
2. Lab work (30%)
3. Quiz’s (10%)
4. Attendance (20%)
5. Exams (30%)

**Textbook and Supplies Requirement:**

1. Pen and Pencil
2. Notebook
4. Welding hood
5. Welding gloves
6. Safety Glasses
7. Boots
8. Welding shirt
9. Pliers
Secretary of Labor's Commission on Achieving Necessary Skills (SCANS)

1. BASIC SKILL COMPETENCIES

A. Basic Skills

i. Reading: Locate, understand and interpret written information in prose and in documents such as manuals, graphs and schedules.

ii. Writing: Communicate thoughts, ideas, information and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.

iii. Arithmetic & Mathematical Operations: Perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.

iv. Listening: Receive, attend to, interpret, and respond to verbal messages and other cues.

v. Speaking: Organize ideas and communicate orally.

B. Thinking Skills

i. Creative Thinking: Generate new ideas.

ii. Decision Making: Specify goals and constraints generate alternatives, consider risks and evaluate and choose the best alternative.

iii. Problem Solving: Recognize problems and devise and implement plan of action.

iv. Visualize ("Seeing Things in the Mind's Eye"): Organize and process symbols, pictures, graphs, objects, and other information.

v. Knowing how to learn: use efficient learning techniques to acquire and apply new knowledge and skills.

vi. Reasoning: Discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.

C. Personal Qualities

i. Responsibility: Exert a high level of effort and persevere toward goal attainment.

ii. Self-Esteem: Believe in one's own self-worth and maintain a positive view of oneself.

iii. Sociability: Demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.


v. Integrity & Honesty: Choose ethical courses of action.
2. WORKPLACE COMPETENCIES

A. Resources:
i. Time: Select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.

ii. Money: Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.

iii. Material & Facilities: Acquire, store, allocate, and use materials or space efficiently.

iv. Human Resources: Assess skills and distribute work accordingly, evaluate performance and provide feedback.

B. Interpersonal Skills:
i. Participate as Member of a Team: Contribute to group effort.

ii. Teach Others New Skills.

iii. Serve Clients/Customers: Work to satisfy customers' expectations.

iv. Exercise Leadership: Communicate ideas to justify position, persuade & convince others, responsibly challenge existing procedures & policies.

v. Negotiate: Work toward agreements involving exchange of resources, resolve divergent interests.

vi. Work with Diversity: Work well with men and women from diverse backgrounds.

C. Information:
i. Acquire and Evaluate Information.

ii. Organize and Maintain Information.

iii. Interpret and Communicate Information.

iv. Use computers to process information.

D. Systems:
i. Understand Systems: Know how social, organizational and technological systems work and operate effectively with them.

ii. Monitor & Correct Performance: Distinguish trends, predict impacts on system operations, and diagnose deviations in systems' performance.

iii. Improve or Design Systems: Suggest modifications to existing systems and develop new or alternative systems to improve performance.

E. Technology

i. Select Technology: Choose procedures, tools or equipment including computers and related technologies.

ii. Apply Technologies to Task: Understand overall intent and proper procedures for setup and operation of equipment.

iii Maintain and Troubleshoot Equipment: Prevent, identify, or solve problems with equipment, including computers and other technologies.