

WELD 0015B - PIPE WELDING CERTIFICATION - UPHILL

Catalog Description

Formerly known as WELD 82

Prerequisite: Completion of WELD 15A with grade of "C" or better and completion with grade of "C" or better or concurrent enrollment in WELD 5C

Advisory: Students must be competent in horizontal, vertical and overhead position welding with open root groove joints using the welding processes of SMAW; if GTAW root pass certification is the goal, WELD 3B skill set competency for GTAW is also needed

Hours: 54 (14 lecture, 40 laboratory)

Description: Designed to certify the welder within the guidelines of Section IX of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or the American Petroleum Institute (API) Standard 1104 Welding of Pipelines and Related Facilities. Focus on manipulative skill development using SMAW, GTAW and GMAW processes in preparation for the actual certification test. (CSU)

Course Student Learning Outcomes

- CSLO #1: Explain safety standards for both a learning environment and work-site environment of in plant pipe welding to American Society of Mechanical Engineers code.
- CSLO #2: Define terms related to this course: American Society of Mechanical Engineers (ASME), clocking the flange, internal undercut, keyhole, heavy end tie-in, pipe schedule, cluster porosity, root face, loop weave.
- CSLO #3: Execute manipulative welding skills in testing to American Society of Mechanical Engineers section IX and use code standards to evaluate qualification to become certified to weld pressure pipe and vessel applications.
- CSLO #4: Explain the importance of the responsibilities of welding performed to code quality levels.

Effective Term

Fall 2019

Course Type

Credit - Degree-applicable

Contact Hours

54

Outside of Class Hours

28

Total Student Learning Hours

82

Course Objectives

Lecture Objectives:

1. Employ safe practices when using equipment, as well as understand the impact and value of the welding certification standard in public safety.
2. Examine and discuss the various welding processes (SMAW-GTAW-GMAW-S) and electrodes used for performing open root full penetration pipe welds.
3. Examine and discuss the various weld joint designs used for each welding process and direction of travel (uphill vs downhill).
4. Examine and discuss the various techniques' to use for each welding process and direction of travel (uphill).
5. Apply Section IX of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code or the American Petroleum Institute (API) Standard 1104 Welding of Pipelines and Related Facilities to formulate the Procedure Qualification Record (PQR) and the Weld Procedure Specification (WPS) for the welding process used.

Laboratory Objectives:

1. Demonstrate the SMAW or GTAW or GMAW welding process to deposit welds that meet ASME or API welding code evaluation.
2. Construct weld qualification test pipe joints in carbon steel pipe with SMAW or GTAW/SMAW welding process.
3. Operate cutting equipment to properly perform weld test pipes and create sample weld specimens for testing the completed welds.
4. Inspect completed weld specimens after testing to evaluate weld fusion and soundness.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable

Methods of Evaluation

- Objective Examinations
 - Example: 1. Timed final objective examination of pipe welding techniques and Pipe Welding code, Weld Procedure Specifications and welder qualifications. Example: What is the length of time allowed between the root pass and the filler pass?
- Skill Demonstrations
 - Example: 1. Student demonstrates the correct open root joint design for SMAW uphill with F3 electrode group. Graded based on industry standards. 2. Welding performance test required for the successful completion of the course. On-site welding inspector to evaluate/observe weld tests and evaluate completed weld specimens. Graded based on industry standards.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. After instructor lead demonstration on methods of root pass, filler pass, and cap pass, each individual welding student is expected to apply welding procedures and parameters to Weld Procedure Specifications (WPS) and Procedure Qualification Records (PQR) in accomplishing successful pipe testing.

Lecture:

1. Instructor lecture on formats of welding procedures as applied to the most common welding process used in root pass application on pipe uphill. Students will actively participate in the discussion.
2. Instructor lead lecture on welding parameters encompassing pipe temperature, amperes, voltage and electrode movement to be applied during the laboratory period. Students will summarize the main points of the lecture.

Distance Learning

1. Instructor will use slide show presentation, instructor created video, or lecture presentation on a learning platform to teach about best safety practices in the for personal protective equipment, the weld lab environment, and/or tools & equipment. Students will be given a scenario and expected to list the best safety practices that should be employed and explain why they should be used. Students will submit the assignment via text entry, file upload, video or audio recording.

Typical Out of Class Assignments Reading Assignments

1. Research ASME code in reference area of library for selection of parameters for each welding process, weld joint and testing criteria. Be prepared to discuss in class.
2. Review past welding industry procedures and apply parameters in creating Weld Procedure Specification (WPS) and Procedure Qualification Record (PQR).

Writing, Problem Solving or Performance

1. Develop written welding procedures for each application performed.
2. Write Weld Procedure Specification (WPS) and Procedure Qualification Record (PQR) for each welding process performed and material used.

Other (Term projects, research papers, portfolios, etc.)

1. Test weld procedure and correct as required to achieve successful weld test.

Required Materials

- Pipe Welding Procedures
 - Author: Hoobasar Rampaul
 - Publisher: Industrial Press
 - Publication Date: 2003
 - Text Edition: 2nd
 - Classic Textbook?:
 - OER Link:
 - OER:
- Welding Principles and Practices
 - Author: Bohnart
 - Publisher: McGraw Hill
 - Publication Date: 2018
- Text Edition: 5th
- Classic Textbook?:
- OER Link:
- OER:
- Study Guide for API 1104
 - Author: Committee
 - Publisher: AWS
 - Publication Date: 2009
 - Text Edition: 2nd
 - Classic Textbook?:
 - OER Link:
 - OER:
- Industrial Piping Practice and Maintenance
 - Author: Kirshna Murty
 - Publisher: Industrial Press
 - Publication Date: 2010
 - Text Edition: 1st
 - Classic Textbook?:
 - OER Link:
 - OER:
- Pipefitting Practices
 - Author: Louis G. Lamit
 - Publisher: Industrial Press
 - Publication Date: 2012
 - Text Edition: 1st
 - Classic Textbook?:
 - OER Link:
 - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.