

WELD 0015C - PIPE WELDING CERTIFICATION - DOWNHILL

Catalog Description

Formerly known as WELD 83

Prerequisite: Completion with grade of "C" or better or concurrent enrollment in WELD 15B

Advisory: Student must be competent in SMAW pipe welding with E-6010 electrode in positions of 2G, 5G and 6G

Hours: 36 (5 lecture, 31 laboratory)

Description: Downhill pipe welding to prepare to qualify within the guidelines of American Petroleum Institute - welding of cross-country pipelines. Focus on manipulative skill development in preparation for certification test using downhill techniques. (not transferable)

Course Student Learning Outcomes

- CSLO #1: Apply safety standards for both learning and work site environments of cross country transportation pipeline applications.
- CSLO #2: Define terms related to this course: bell hole, pinhole porosity, restraint crack, hot pass, stripper pass, cap pass.
- CSLO #3: Utilize manipulative welding skills in welding demonstration for testing to American Petroleum Institute and use code standards to evaluate qualification to become certified to weld transportation pipe applications.
- CSLO #4: Explain the responsibilities of welding performed to code quality levels through destructive testing of each student welding as prescribed in pipe code requirements.

Effective Term

Fall 2019

Course Type

Credit - Degree-applicable

Contact Hours

36

Outside of Class Hours

10

Total Student Learning Hours

46

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-GMAW-S) and electrodes used for performing open root full penetration pipe welds downhill.
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 (downhill).

5. Explain the American Petroleum Institute - welding of cross-country pipelines to formulate PQR (procedure qualification record) and WPS (weld procedure specification).

Laboratory Objectives:

1. Demonstrate the SMAW welding process to deposit welds that meet API welding code evaluation.
2. Construct weld qualification test pipe joints in carbon steel pipe with 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

Methods of Evaluation

- Objective Examinations
 - Example: 1. Students will take a multiple choice exam. Example: Code requirement for root pass is: a. 1/16th b. 1/8th c. 5/32nds
- Skill Demonstrations
 - Example: 1. 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. Grade based on industry standard. 2. In addition to the guided bend test to pass the performance portion of above, each completed weld joint will be visually tested per the requirements of American Petroleum Institute (API section 1104) welding code. Failure to pass visual prohibits continuing on to cutting of weld samples for the performance guided bend test. Grade based on industry standard.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Following instructor demonstration, student will apply welding procedures and parameters through application to effect success by WPS (Weld Procedure Specifications) and PQR (Procedure Qualification Records).

Lecture:

1. Instructor lecture on formats of welding techniques and procedures used in downhill cross country pipe welding. Students will actively participate in discussion.

- Instructor lecture on the theory and application used in development welding parameters for temperature, amperes, voltage and electrode movement which apply during the laboratory application. Students will summarize the theories and applications.

Distance Learning

- 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

- Research API welding code and industry specifications for selection of parameters for each welding process, weld joints and testing criteria and related materials and be prepared to discuss in class.
- Student will read text chapter on pipe joint detailing and sketch correct detailing for downhill pipe welding.

Writing, Problem Solving or Performance

- Develop written welding procedures for each application performed. This would entail calculating travel speed and documentation of Amps, volts, weld passes, temperatures, and welding technique.
- Demonstrate downhill travel pipe welding techniques.

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

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

Required Materials

- Welding Principles and Practices
 - Author: Edward Bohnart
 - Publisher: McGraw Hill
 - Publication Date: 2018
 - Text Edition: 5th
 - Classic Textbook?:
 - OER Link:
 - OER:
- Petroleum & Natural Gas Industries Pipeline Transportation Welding
 - Author: ISO
 - Publisher: SO TC67/SC2/WG8
 - Publication Date: 2007
 - Text Edition: 2nd
 - 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:
- Pipe Welding Procedures
 - Author: Hoobasar Rampaul
 - Publisher: Industrial Press
 - Publication Date: 1993
 - Text Edition: 2nd
 - Classic Textbook?:
 - OER Link:
 - OER:

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

Power grinder and power wire brush.