

Standards/Measurement Criteria

(**Draft)

Welding Technology

CIP No. 48.0500

These state standards are designed to be delivered in a sequence of courses. *Standards 1-13 are to be taught as an introduction within the Welding Technology program.

****Please note: The following CTE program Standards/Measurement Criteria are tentative until assessments are established.**

***1.0 CONDUCT A CAREER SURVEY OF THE WELDING TECHNOLOGY FIELD**

- 1.1 Explore career areas in welding technology
- 1.2 Recognize factors that influence career choices
- 1.3 Examine personal aptitudes and interests
- 1.4 Apply interests, skills, and attitudes to career exploration
- 1.5 Employ decision making skills to career choices
- 1.6 Examine the role of education in career preparation
- 1.7 Relate interests, skills and abilities to career choices in welding technology
- 1.8 Relate interests, skills, and abilities to successful employment in welding technology
- 1.9 Explain how personal choices affect career plans in welding technology

***2.0 DEMONSTRATE JOB SEARCH SKILLS NECESSARY TO OBTAIN EMPLOYMENT IN WELDING TECHNOLOGY**

- 2.1 Explain the steps in a job search
- 2.2 Use technology in a job search
- 2.3 Critique a job application

***3.0 PRACTICE EMPLOYABILITY SKILLS FOR JOB SUCCESS IN WELDING TECHNOLOGY**

- 3.1 Organize and deliver a demonstration/presentation on welding technology
- 3.2 Use math and language skills in an occupational context
- 3.3 Plan, organize and implement welding related activities
- 3.4 Demonstrate accountability for materials, equipment and facilities in welding technology
- 3.5 Complete tasks on time and accurately
- 3.6 Develop a plan to achieve employment and educational goals in welding technology
- 3.7 Discuss factors that contribute to successful performance at work
- 3.8 Discuss how social skills are helpful in obtaining and maintaining a job in welding technology
- 3.9 Practice continuous improvement procedures for the welding technology workplace
- 3.10 Discuss elements of professionalism in welding technology

***4.0 EXPLORE LEGAL AND ETHICAL ISSUES IN WELDING TECHNOLOGY**

- 4.1 Explain legal responsibilities of welding technology employees to comply with state and federal government laws and regulations
- 4.2 Explain employer expectations on ethical workplace behavior and how they are expressed in organizational policies and culture in welding technology
- 4.3 Identify workers' rights regarding the workplace issues including safety, drug testing, harassment, discrimination, privacy, etc.
- 4.4 Examine legal issues in the welding technology workplace

***5.0 EXPLORE ECONOMIC PRINCIPLES OF THE WELDING TECHNOLOGY FIELD**

- 5.1 Describe the effects of group dynamics on group decision-making and consensus building
- 5.2 Describe the roles of support staff, supervisors, managers, and technology in achieving goals
- 5.3 Explain the effects of productivity in an economy
- 5.4 Compare various forms of business ownership including sole proprietorship, partnership, corporation, and franchise
- 5.5 Describe how global competition affects welding technology business in the United States

***6.0 APPLY EFFECTIVE COMMUNICATION SKILLS FOR WELDING TECHNOLOGY**

- 6.1 Interpret verbal and nonverbal communication
- 6.2 Identify barriers to effective communication in welding technology
- 6.3 Practice skills used to communicate with internal and external customers
- 6.4 Identify guidelines for effective written communication (letters, reports, email) in welding technology
- 6.5 Apply effective communication skills to work situations
- 6.6 Apply active listening skills using reflection, restatement, and clarification techniques
- 6.7 Recognize the difference between objective and subjective information when communicating
- 6.8 Organize, write, and compile technical information and summaries
- 6.9 Use welding technology terminology in order to interpret, transcribe and communicate data, information and observations

***7.0 PARTICIPATE IN LEADERSHIP ACTIVITIES SUCH AS THOSE SUPPORTED BY A CAREER AND TECHNICAL STUDENT ORGANIZATION (SkillsUSA)**

- 7.1 Determine the roles and responsibilities that leaders and members bring to an organization
- 7.2 Evaluate characteristics of an effective team player
- 7.3 Evaluate characteristics of effective teams
- 7.4 Practice techniques to involve each member of the team
- 7.5 Practice team work
- 7.6 Practice effective meeting management
- 7.7 Participate in career development events
- 7.8 Develop and implement a personal and professional improvement plan
- 7.9 Discuss business etiquette
- 7.10 Distinguish between various leadership styles in welding technology
- 7.11 Identify personal leadership style

***8.0 DEMONSTRATE TECHNOLOGICAL LITERACY FOR THE WELDING TECHNOLOGY WORKPLACE**

- 8.1 Practice basic usage of computers (input/output and storage)
- 8.2 Access information electronically (via Internet, CD-ROM, etc.)
- 8.3 Access and use digital communication tools
- 8.4 Examine the uses of technology in the welding technology field
- 8.5 Apply word processing software to prepare business letters, memorandums, and reports
- 8.6 Apply presentations and multimedia software to prepare a welding technology related presentation

***9.0 APPLY PROBLEM SOLVING AND DECISION MAKING PROCESSES FOR WELDING TECHNOLOGY**

- 9.1 Practice problem solving skills for welding technology
- 9.2 Solve problems individually and as part of a team
- 9.3 Generate new and creative ideas using critical thinking skills in solving drafting and design related problems
- 9.4 Evaluate facts, use logic and reason in decision making
- 9.5 Troubleshoot a problem in welding technology
- 9.6 Access information using manuals and reference materials in order to solve a welding technology related problem

***10.0 APPLY MEASUREMENT TECHNIQUES TO PROBLEMS IN WELDING TECHNOLOGY**

- 10.1 Demonstrate knowledge of units of measurement (English and metric)
- 10.2 Identify common measurement tools used in welding technology and their functions
- 10.3 Select an appropriate measurement technique for a specific measurement need
- 10.4 Determine degree of accuracy required for a specific task or situation

***11.0 APPLY MATHEMATICAL PROCESSES TO PROBLEMS IN WELDING TECHNOLOGY**

- 11.1 Express problems in welding technology using numeric, symbolic and/or graphic representations
- 11.2 Perform mathematical calculations in the context of welding technology problems
- 11.3 Use technology in the solution of math-related problems

***12.0 MAINTAIN A SAFE AND SECURE WORK ENVIRONMENT IN WELDING TECHNOLOGY**

- 12.1 Explain appropriate safety precautions around common job-site hazards in welding technology
- 12.2 Wear/use protective clothing/gear to ensure personal safety in welding technology
- 12.3 Discuss safety policies and procedures in welding technology
- 12.4 Describe emergency procedures and protocols
- 12.5 Explain the importance of the OSHA (Occupational Safety and Health Administration) standards and HazCom (Hazard Communication Standard) requirements for welding technology
- 12.6 Recognize and demonstrate the safe use of basic hand tools in welding technology
- 12.7 Recognize and demonstrate the safe use of hand-held power tools in welding technologies
- 12.8 Recognize and demonstrate the safe use of power equipment in welding technology
- 12.9 Practice basic procedures for safe storage and upkeep of tools utilized in welding technology

***13.0 INTERPRET SCHEMATICS, BLUEPRINTS AND TECHNICAL DRAWINGS UTILIZED IN WELDING TECHNOLOGY**

- 13.1 Determine tolerances associated with dimensions
- 13.2 Recognize geometric tolerances
- 13.3 Interpret spatial layout of three-dimensional form from two-dimensional drawing

14.0 DEVELOP AN INDIVIDUAL CAREER PLAN WELDING TECHNOLOGY

- 14.1 Investigate career options in welding technology including entrepreneurship
- 14.2 Develop career goals in welding technology based on interests, aptitudes, and research
- 14.3 Review/revise plan/goals on annual basis
- 14.4 Manage personal and career goals
- 14.5 Describe factors that contribute to job satisfaction and success in welding technology

15.0 PREPARE FOR EMPLOYMENT IN WELDING TECHNOLOGY

- 15.1 Develop a résumé
- 15.2 Complete job application process
- 15.3 Research a company as a potential employer
- 15.4 Demonstrate interviewing skills, including pre-interview preparation and post-interview follow-up

16.0 PARTICIPATE IN WORK-BASED LEARNING EXPERIENCES IN WELDING TECHNOLOGY

- 16.1 Use technology appropriate for the job
- 16.2 Demonstrate positive work behaviors
- 16.3 Demonstrate positive interpersonal behaviors
- 16.4 Demonstrate safe and healthy work behaviors
- 16.5 Adapt to changes in the workplace
- 16.6 Participate in a variety of work-based experiences in welding technology, i.e. paid or non-paid job

17.0 DEMONSTRATE ORAL COMMUNICATION SKILLS FOR WELDING TECHNOLOGY

- 17.1 Conduct formal/informal research to collect appropriate topical information
- 17.2 Use questioning techniques to obtain needed information from an audience
- 17.3 Interpret oral and nonverbal communications of an audience
- 17.4 Demonstrate active listening during communications
- 17.5 Demonstrate appropriate technologies for a formal presentation
- 17.6 Prepare and deliver presentations on welding technology
- 17.7 Deliver presentation incorporating both appropriate verbal and nonverbal communication techniques
- 17.8 Communicate using equitable and culturally sensitive language for a diverse audience
- 17.9 Demonstrate effective telephone technique

18.0 DEMONSTRATE WRITTEN COMMUNICATION SKILLS FOR WELDING TECHNOLOGY

- 18.1 Conduct formal/informal research to collect appropriate topical information
- 18.2 Organize information and develop an outline
- 18.3 Write business communication using appropriate format for the situation
- 18.4 Using appropriate technology, prepare draft document using established rules for grammar, spelling and sentence construction
- 18.5 Utilize multiple technologies for written and presentation communications

19.0 EVALUATE THE ROLE OF SMALL BUSINESS IN THE ECONOMY

- 19.1 Evaluate the role of small business on local, state national and international economies
- 19.2 List the factors, including personal traits, which contribute to the success of small business
- 19.3 Compare/contrast the advantages/disadvantages of sole proprietorships, partnerships and corporations
- 19.4 Develop a business plan
- 19.5 Conduct an employee needs analysis for the organization based upon a business plan
- 19.6 Research business locations and equipment needs for the organization based upon the business plan
- 19.7 Analyze the relationship of customer service and customer satisfaction on the success of a business

20.0 DEMONSTRATE BUSINESS AND FINANCIAL MANAGEMENT PRACTICES NEEDED FOR ENTREPRENEURS IN WELDING TECHNOLOGY

- 20.1 Develop a budget based on an enterprise's business plan
- 20.2 Develop an income statement for an enterprise
- 20.3 Develop a balance sheet for an enterprise
- 20.4 Interpret financial information for decision making and planning
- 20.5 Monitor and adjust business operation based on financial performance
- 20.6 Analyze insurance and benefit needs in welding technology
- 20.7 Analyze available banking services
- 20.8 Describe the impact of quality business communications on the success of an organization
- 20.9 Manage customer relations

21.0 EVALUATE LEADERSHIP STYLES APPROPRIATE FOR THE WELDING TECHNOLOGY WORKPLACE

- 21.1 Determine personal characteristics of effective leaders in welding technology
- 21.2 Compare/contrast leadership and management styles
- 21.3 Describe how cultural/ethnic differences affect leadership styles within a group
- 21.4 Describe how cultural/ethnic differences affect interpersonal interactions/communications within a group

22.0 PARTICIPATE IN LEADERSHIP ACTIVITIES SUCH AS THOSE SUPPORTED BY A CAREER TECHNICAL STUDENT ORGANIZATION (SkillsUSA)

- 22.1 Determine the roles and responsibilities that leaders and members bring to an organization
- 22.2 Evaluate characteristics of effective teams
- 22.3 Evaluate characteristics of an effective team player
- 22.4 Practice techniques to involve each member of the team
- 22.5 Demonstrate team work
- 22.6 Practice effective meeting management
- 22.7 Demonstrate business etiquette
- 22.8 Practice decision-making processes

23.0 MAINTAIN A SAFE WELDING TECHNOLOGY WORK ENVIRONMENT

- 23.1 Identify regulations pertaining to welding (i.e. MSDS sheets, OSHA standards)
- 23.2 Wear/use personal safety clothing/gear/equipment
- 23.3 Demonstrate management of hazardous materials
- 23.4 Identify types of fires and fire extinguishers
- 23.5 Maintain worksheet safety and housekeeping
- 23.6 Describe school's first-aid policies
- 23.7 Develop safety plan for emergency situations
- 23.8 Demonstrate handling and lifting methods
- 23.9 Handle compressed gases safely
- 23.10 Demonstrate use of hand and power tools
- 23.11 Demonstrate use of power machinery

24.0 LAY OUT AND FIT UP PROJECT FROM BLUEPRINTS

- 24.1 Interpret drawings, symbols, and procedures
- 24.2 Use measuring devices
- 24.3 Lay out project from blueprints
- 24.4 Measure and cut materials
- 24.5 Tack materials into position for welding

25.0 SET UP AND USE CUTTING EQUIPMENT

- 25.1 Set up and use manual cutting equipment
- 25.2 Set up and use semi-automatic cutting equipment
- 25.3 Set up and use metal cutting saws

26.0 SET UP AND USE SHIELDED METAL ARC WELDING (SMAW) EQUIPMENT

- 26.1 Set up SMAW equipment
- 26.2 Identify and use types, storage, and handling of filler material
- 26.3 Make fillet weld, all positions, on carbon steel (all positions not required for S.E.N.S.E.)
- 26.4 Weld cast metals (not required for S.E.N.S.E.)
- 26.5 Hard face and build up steel surface with SMAW equipment

27.0 SET UP AND USE GAS METAL ARC WELDING (GMAW) EQUIPMENT

- 27.1 Set up GMAW equipment
- 27.2 Identify and use types, storage, and handling of filler material
- 27.3 Select and use proper gases appropriately
- 27.4 Make fillet welds, all positions, on carbon steel (all positions are not required for S.E.N.S.E.)
- 27.5 Weld aluminum (GMAW for aluminum not required for S.E.N.S.E.)
- 27.6 Perform routine maintenance on wire feed assembly

28.0 SET UP AND USE OXYFUEL EQUIPMENT

- 28.1 Set up and test oxyfuel equipment to industry standards
- 28.2 Weld carbon steels (not required for S.E.N.S.E.)
- 28.3 Braze carbon steels (not required for S.E.N.S.E.)
- 28.4 Braze castings (not required for S.E.N.S.E.)
- 28.5 Heat and shape metals (not required for S.E.N.S.E.)
- 28.6 Remove distortions (not required for S.E.N.S.E.)
- 28.7 Preheat and postheat metal with oxyfuel and test with temperature sticks (not required for S.E.N.S.E.)

29.0 SET UP AND USE GAS TUNGSTEN ARC WELDING (GTAW) EQUIPMENT

- 29.1 Set up GTAW equipment
- 29.2 Identify and use types, storage, and handling of filler material
- 29.3 Select and use gases appropriately
- 29.4 Weld aluminum
- 29.5 Weld stainless steel
- 29.6 Weld carbon steels
- 29.7 Weld cast metals (not required for S.E.N.S.E.)

30.0 SET UP AND USE FLUX CORED ARC WELDING (FCAW) EQUIPMENT

- 30.1 Set up, FCAW equipment
- 30.2 Identify and use types, storage and handling of filler material
- 30.3 Make fillet welds, all positions, on carbon steel
- 30.4 Perform routine maintenance on wire feed assembly

31.0 USE AUXILIARY EQUIPMENT AND TOOLS

- 31.1 Use power saw/abrasive wheel to cut material
- 31.2 Use power equipment to wire brush metal

32.0 PERFORM WELDMENT TESTING

32.1 Describe nondestructive test

32.2 Perform destructive test