



ALIGNED WITH
OKLAHOMA
CONSTRUCTION
INDUSTRIES
BOARD
LICENSURE

**HVAC
NATURAL GAS PIPING
TECHNICIAN
SKILLS STANDARDS**

OD33402

COMPETENCY-BASED EDUCATION: OKLAHOMA'S RECIPE FOR SUCCESS

BY THE INDUSTRY FOR THE INDUSTRY

Oklahoma's *CareerTech* system of competency-based education uses industry professionals and certification standards to identify the knowledge and abilities needed to master an occupation. This industry input provides the foundation for development of instructional materials that help prepare the comprehensively trained, highly skilled employees demanded by our workplace partners.

TOOLS FOR SUCCESS

CareerTech relies on three basic instructional components to deliver competency-based instruction: skills standards, curriculum materials, and competency assessments.

Skills standards provide the foundation for competency-based instruction in Oklahoma's *CareerTech* system. The skills standards outline the knowledge, skills, and abilities needed to perform related jobs within an industry. Skills standards are aligned with national skills standards; therefore, a student trained to the skills standards possesses technical skills that make him/her employable in both state and national job markets.

Curriculum materials contain information and activities that teach students the knowledge and skills outlined in the skills standards. In addition to complementing classroom instruction, curriculum resources provide supplemental activities to enhance learning and provide hands-on training experiences.

Competency Assessments test the student over material outlined in the skills standards and taught using the curriculum materials. When used with classroom performance evaluations, written competency assessments provide a means of measuring occupational readiness.

Although each of these components satisfy a unique purpose in competency-based education, they work together to reinforce the skills and abilities students need to gain employment and succeed on the job.

MEASURING SUCCESS

Written competency assessments are used to evaluate student performance. Results reports communicate competency assessment scores to students and provide a breakdown of assessment results by duty area. The results breakdown shows how well the student has mastered skills needed to perform major job functions and identifies areas of job responsibility that may require additional instruction and/or training.

Group analysis of student results also provides feedback to instructors seeking to improve the effectiveness of career and technology training. Performance patterns in individual duties indicate opportunities to evaluate training methods and customize instruction.

TRUE TO OUR PURPOSE

"Helping Oklahomans succeed in the workplace" defines the mission of Oklahoma *CareerTech* and its competency-based system of instruction. Skills standards, curriculum, and assessments that identify and reinforce industry expectations provide accountability for programs and assure *CareerTech*'s continued role in preparing skilled workers for a global job market

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**HVAC
NATURAL GAS PIPING TECHNICIAN
SKILLS STANDARDS
Desired Skill Level Ratings**

Duty A: Apply Sound Business Practices

Duty B: Comply with Provisions of Workers' Compensation

Duty C: Comply with Lien Laws

Duty D: Comply with the Mechanical Licensing Act, Mechanical Industry Regulations, and Fee and Fine Schedule

Duty E: Demonstrate Safety and Environmental Skills

Duty F: Demonstrate Knowledge of DC Circuits

Duty J: Demonstrate Knowledge of Piping Principles and Practices

Duty K: Demonstrate Knowledge of Natural Gas Piping

Duty R: Demonstrate Employability Skills

Desired Skill Level: The level of training necessary for the student to be employable in the occupation specified:

- 4 – Skilled Can perform the task independently with no additional training
- 3 – Moderately Skilled Has performed the task independently during training program; limited additional training may be required
- 2 – Limited Exposure Has practiced task during training program; additional training is required to develop the skills
- 1 – No Exposure No experience or knowledge in this area
- * - Not Rated Tasks included for the benefit of the student's development only

***DSL = Desired Skill Level**

DUTY A: Apply Sound Business Practices

CODE	TASK	DSL
A.01	Calculate Social Security tax <ul style="list-style-type: none"> • Tax rate • Wage base 	1
A.02	Calculate Medicare tax <ul style="list-style-type: none"> • Tax rate • Wage base 	1
A.03	Calculate Federal Unemployment (FUTA) tax <ul style="list-style-type: none"> • Tax rate • Wage base 	1

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A.04	Calculate federal/state income tax withholdings	1
A.05	Prepare/distribute W-2/W-4 forms <ul style="list-style-type: none"> • Time schedule 	1
A.06	Deposit withholdings <ul style="list-style-type: none"> • Method • Schedule • Location 	1
A.07	Calculate/deposit sales tax	1
A.08	Prepare estimates and contracts <ul style="list-style-type: none"> • Materials • Labor 	1
A.09	Maintain inventory	2
A.10	Order supplies <ul style="list-style-type: none"> • Determine markup 	1
A.11	Calculate receivables/invoices <ul style="list-style-type: none"> • Discounts 	1
A.12	Pay bills <ul style="list-style-type: none"> • Discounts • Insurance • Liabilities • Payroll 	1
A.13	Maintain cash flow	1
A.14	Determine profits	1
A.15	Determine overhead expenses <ul style="list-style-type: none"> • Definition • Calculation 	1
A.16	Determine company assets	1

DUTY B: Comply with Provisions of Workers' Compensation

CODE	TASK	DSL
B.01	Select proper forms <ul style="list-style-type: none"> • Notice and Instructions to Employers and Employees • Employer's Application for Permission to Carry Its Own Risk Without Insurance • Employer's First Notice of Injury • Employee's First Notice of Accidental Injury and Claim for Compensation • Claimant's First Notice of Death and Claim for Compensation • Employee's Claim for Benefits from the Special Indemnity Fund • Attending Physician's Report and Notice of Treatment • Employer's Insurance Carrier or Claims Servicing Company's Initial Report of Payment of Compensation • Acknowledgement by Employee of Receipt of Compensation Payment • Motion to Set for Trial • Answer and Pretrial Stipulation Offered by Respondent 	1

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	<ul style="list-style-type: none"> • Response to Request for Payment of Charges for Medical or Rehabilitation Services • Motion to Terminate Temporary Compensation • Request for Pre-hearing Conference • Agreement Between Employer and Employee as to Fact with Relation to an Injury and Payment for Compensation • Request for Administrative Review of Medical Charges • I. Request for Payment of Charges for Medical or Rehabilitative Services • II. Notice of Appeal of Administration Order • Proof of loss in Death Claim 	
B.02	Initiate a claim <ul style="list-style-type: none"> • <10% owner of firm 	1
B.03	Initiate a claim against the Special Indemnity Fund	1
B.04	Initiate temporary compensation and medical treatment	1

DUTY C: Comply with Lien Laws

CODE	TASK	DSL
C.01	File mechanics lien <ul style="list-style-type: none"> • 5 w's • Time frame to file • Items not covered • Falsified statement = felony • Subcontractors • Rented/leased equipment 	1
C.02	Enforce lien <ul style="list-style-type: none"> • Required statement/signature • Lien waivers • Owners' right to withhold payment 	1
C.03	Submit "notice-filing of lien statement" <ul style="list-style-type: none"> • Charge/cost • Post notice on unoccupied property 	1
C.04	Discharge of lien <ul style="list-style-type: none"> • Cash for lien • Bond for other costs • Court costs • Interest • 5-day delay for possible bond increase 	1

DUTY D: Comply with the Mechanical Licensing Act, Mechanical Industry Regulations, and Fee and Fine Schedule

CODE	TASK	DSL
D.01	Describe make-up of Committee of Mechanical Examiners <ul style="list-style-type: none"> • 5 members appointed 	3
D.02	Describe Board of Health powers and duties <ul style="list-style-type: none"> • Responsible for licensing • Register apprentices • Inspect installations and appropriate licenses • Employ personnel to conduct investigations and inspections 	3

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	<ul style="list-style-type: none"> • Enforce standards, rules, and regulations • Promulgate, prescribe, amend, and repeal rules and regulations • Reprimands/probation • Investigate complaints • Disciplinary proceedings, prosecution, and injunctive proceedings • Establish/levy fines • Investigate qualifications of applicants • Develop and administer licensing examinations • Incidental powers 	
D.03	<p>Comply with licensing examination requirements</p> <ul style="list-style-type: none"> • Administered quarterly, or as necessary • Retake after 30 days • Retake after subsequent failure in another 90 days 	4
D.04	<p>Obtain appropriate license</p> <ul style="list-style-type: none"> • Submit a required application • Pay applicable fee • Pass applicable exam • Non-transferable • Expires June 30 • Maintain bond • Active contractor • Maintain insurance • Active contractor 	4
D.05	<p>Renew appropriate license</p> <ul style="list-style-type: none"> • Pay applicable fee • Pay applicable late fee • Take exam or re-examination if not renewed within a year 	4
D.06	<p>Obtain apprentice registration</p> <ul style="list-style-type: none"> • 16 years of age • Enrolled in approved mechanical training course or employed by an active mechanical contractor • Pay applicable fee • Valid for four years • Complete appropriate form 	4
D.07	Understand exceptions to act	4
D.08	<p>Understand penalties for violation of act</p> <ul style="list-style-type: none"> • Administrative fine • Suspension/revocation of license 	4
D.09	<p>Understand penalties for violation of act</p> <ul style="list-style-type: none"> • Fine • Court costs • Misdemeanor 	4
D.10	<p>Comply with "political subdivisions" rules, regulations, and standards</p> <ul style="list-style-type: none"> • Inspections • Permits • Fees • Registration of contractor/journeymen/apprentice 	4
D.11	<p>Adhere to actions taken by Mechanical Hearing Board</p> <ul style="list-style-type: none"> • Process initiated by Board or any written complaint • Investigation of any mechanical licensee or firm • May suspend, revoke, or refuse to issue/renew license or registration 	4
D.12	Adhere to local, state, and federal mechanical codes and interpretations of inspectors	4

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D.13	Provide notice of installment/modification/alteration of system in incorporated area with no adopted code or no appointed inspector (to Commissioner of Health)	3
D.14	Limit work to type of license issued <ul style="list-style-type: none"> • Journeyman • Contractor 	3
D.15	Limit work done to category of license issued <ul style="list-style-type: none"> • Air conditioning and heating • Natural gas piping • Refrigeration • Sheet metal • Process piping 	4
D.16	Provide documentation of experience/qualifications for license sought <ul style="list-style-type: none"> • Journeyman • Contractor 	3
D.17	Maintain contractor bond <ul style="list-style-type: none"> • \$5,000; continuous • Deposited with DOH • 30 day cancellation • Waived if license is inactive, employed by corporation/public entity and only working on equipment owned by the corporation/public entity • In contractor's name • Executed by the contractor 	2
D.18	Supervise apprentices <ul style="list-style-type: none"> • Direct supervision required • Maximum of three per licensee • Same category as licensee 	3
D.19	Identify active contractor responsibilities <ul style="list-style-type: none"> • Employ/supervise persons performing mechanical work • Not allow any apprentice to perform mechanical work at contractor's job site without supervision • Allow no more than three apprentices per licensee • Maintain a bond • Provide proof of financial responsibility to the OSDH 	3
D.20	Identify journeyman/inactive contractor responsibilities <ul style="list-style-type: none"> • Only allow an apprentice under his direct supervision to perform mechanical work for which journeyman is licensed to perform • Only perform mechanical work under the employment and supervision of a Mechanical Contractor 	3
D.21	Apply for Plan Review, Code Variance, or Appeal <ul style="list-style-type: none"> • Fee structure 	2
D.22	Pay examination, license, and registration fee <ul style="list-style-type: none"> • Fee structure 	2
D.23	Pay administrative fines <ul style="list-style-type: none"> • Fine schedule • Payable within seven days 	2
D.24	Request for hearing <ul style="list-style-type: none"> • Seven days 	2
D.25	Comply with hearing order <ul style="list-style-type: none"> • Payable within seven days 	2
D.26	Maintain contractor insurance <ul style="list-style-type: none"> • \$50,000 • Certificate deposited with DOH 	2

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	<ul style="list-style-type: none"> • 30-day cancellation • Waived if license is inactive, employed by corporation/public entity and only working on their equipment • Contractor's name on certificate 	
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DUTY E: Demonstrate Safety and Environmental Skills

CODE	TASK	DSL
E.01	Demonstrate knowledge of safety regulations and procedures <ul style="list-style-type: none"> • Material safety data sheet • Right to know 	4
E.02	Demonstrate knowledge of/comply with regulations for handling and disposing of hazardous materials <ul style="list-style-type: none"> • Federal • State • Local 	4
E.03	Demonstrate knowledge of/comply with Environmental Protection Agency (EPA) Regulations on refrigerants and oils <ul style="list-style-type: none"> • Obtain appropriate certification • Venting • Recovery • Reclaiming • Recycling • Handling • Disposal • Container 	4
E.04	Demonstrate knowledge of/comply with the Department of Transportation (DOT) Regulations on the transportation and handling of hazardous materials	4
E.05	Demonstrate knowledge of/comply with the Occupation Safety and Health Act (OSHA) regulations	4
E.06	Demonstrate knowledge of/comply with Environmental Protection Agency (EPA) regulation on indoor air quality and nitrous-oxide	4

DUTY F: Demonstrate Knowledge of DC Circuits

CODE	TASK	DSL
F.01	Relate electricity to nature of matter	4
F.02	Identify sources of electricity	4
F.14	Check anodes (electrolysis) <ul style="list-style-type: none"> • Millivolt meter 	4

DUTY J: Demonstrate Knowledge of Piping Principles and Practices

CODE	TASK	DSL
J.01	Demonstrate knowledge of principles of piping systems <ul style="list-style-type: none"> • Pipe materials 	4

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	<ul style="list-style-type: none"> • Pipe size • System design • Installation • Pipe auxiliary accessories 	
J.02	Read and interpret piping layouts <ul style="list-style-type: none"> • Schematics • Trains (excerpt) • Blueprints • Diagrams • Charts • Engineering specifications 	4
J.03	Identify/select/install proper fitting(s) or valve(s) for specific applications	4
J.04	Identify/apply principles of piping system	4
J.05	Perform metallic tubing operations <ul style="list-style-type: none"> • Cleaning • Pipe fitting • Set up soldering/brazing system • Cutting • Flaring • Mechanical joints • Soldering • Brazing • Bending • Swaging • Reaming • Proper tool usage 	4

DUTY K: Demonstrate Knowledge of Natural Gas Piping

CODE	TASK	DSL
K.01	Demonstrate knowledge of/apply principles of natural gas piping systems <ul style="list-style-type: none"> • Pipe materials • Pipe size • System design • Installation • Pipe auxiliary accessories • Code regulations 	4
K.02	Design and install a natural gas piping system	3
K.03	Identify/select specified natural gas piping, valves, connectors, and accessories	4
K.04	Read and interpret piping layouts <ul style="list-style-type: none"> • Schematics • Trains • Blueprints • Diagrams • Charts • Engineering specifications 	4
K.05	Perform metallic tubing operations <ul style="list-style-type: none"> • Cleaning • Pipe fitting • Set up soldering/brazing system • Cutting • Flaring 	4

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	<ul style="list-style-type: none"> • Mechanical joints • Soldering • Brazing • Bending • Swaging • Reaming 	
K.06	Perform metallic pipe operations <ul style="list-style-type: none"> • Cutting • Reaming • Threading • Mechanical joints • Welding • Fitting 	4
K.07	Perform non-metallic pipe operations <ul style="list-style-type: none"> • Cutting • Fitting • Cleaning • Reaming • Threading • Mechanical joints • Fusion • Solvent cementing • Bending 	4
K.08	Perform welding <ul style="list-style-type: none"> • Set up welding system • Arc welder • MIG welder • TIG welder • Oxyfuel welder • Fusion equipment 	3
K.09	Test for leaks	4

Duty R: Demonstrate Employability Skills

CODE	TASK	DSL
R.01	Maintain a courteous and responsive attitude toward all customers	
R.02	Maintain self-esteem in self and others <ul style="list-style-type: none"> • Analyze personal space and needs • Interpret emotional reactions • Determine values scale and attitudes • Cope with changes • Interpret sensory clues 	
R.03	Recognize the importance of team work and participate as a team member <ul style="list-style-type: none"> • Participate in team (group) meetings <ul style="list-style-type: none"> • Focus on topic and purpose of the meeting • Offer facts and ideas • Help others contribute facts and ideas • Pass on good ideas • Look for ways to help others • Give recognition for things well done • Let others know what you need to get the job done 	

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R.04	Maintain professional respect for supervisor and co-workers and supervisor	
R.05	Demonstrate professionalism <ul style="list-style-type: none"> • Follow facility dress code • Positive attitude • Initiative • Loyalty • Respect others • Flexibility • Commitment 	
R.06	Practice critical thinking skills for workplace situations <ul style="list-style-type: none"> • Distinguish appropriateness of equipment and tests • Decision making • Creativity • Use quality performance processes • Evaluate stressful situations • Evaluate how to manage ethical conflicts 	
R.07	Maintain satisfactory attendance <ul style="list-style-type: none"> • Punctuality • Tardiness • Early departure • Absence • Calling in 	
R.08	Function within the organizational structure <ul style="list-style-type: none"> • Chain of command • Amount of empowerment 	
R.09	Cooperate with co-workers in the completion of assignments	
R.10	Practice self-management (time management) techniques <ul style="list-style-type: none"> • Work independently • Self-evaluation • Organization • Prioritization 	
R.11	Practice deductive and inductive reasoning skills	
R.12	Use proper telephone technique <ul style="list-style-type: none"> • Project positive telephone image • Handle incoming telephone calls <ul style="list-style-type: none"> • Receive incoming calls • Transfer incoming calls when indicated • Utilize telephone log or computerized system • Handle the telephone calls <ul style="list-style-type: none"> • Inquiries • Handle telephone calls involving special problems <ul style="list-style-type: none"> • Unidentified callers • Angry callers • Calls from family and friends • Handle telephone calls involving mechanical emergencies • Record and deliver accurate telephone calls <ul style="list-style-type: none"> • Local • Long distance • Use telephone directories <ul style="list-style-type: none"> • Directory – types and organization • Telephone assistance and information • Company directory maintenance 	

R.13	Employ listening skills <ul style="list-style-type: none"> • Show interest • Ask questions and clarify what has been heard • Let person know what you understand 	
R.14	Compose written communication legibly using correct grammar, spelling, and format <ul style="list-style-type: none"> • Requisitions • Consent form • Select and use appropriate format for written communication <ul style="list-style-type: none"> • Dictionary • Thesaurus • Utilize proper grammar techniques <ul style="list-style-type: none"> • Abbreviate for words used in addresses, measurements, and months and days of the year • Proper use of commas in <ul style="list-style-type: none"> • Sentences listing items in a series • Sentences containing dates and addresses • Greetings and closing of a letter • Sentences containing names followed by abbreviated titles • Choose correct adjective and adverb • Correct word usage • Correct run-on sentences 	
R.15	Demonstrate ability to interpret and follow written directions and information	
R.16	Demonstrate ability to interpret and follow oral directions	
R.17	Use job related terminology, symbols, and abbreviations	
R.18	Utilize basic keyboarding skills and computer skills	
R.19	Use effective communication techniques <ul style="list-style-type: none"> • Co-workers • Visitors • Customers • Pronounce words distinctly 	
R.20	Use verbal and non-verbal communication techniques	
R.21	Apply behavior management techniques to workplace situations <ul style="list-style-type: none"> • Personal coping skills • Dealing with co-worker attitudes • Sense of humor • Use positive feedback techniques • Emphasize strengths 	
R.22	Identify personal and work related goals and monitor progress <ul style="list-style-type: none"> • Chart and set long, medium, and short term goals • Educational goals • Professional goals • Personal goals 	
R.23	Respond to compliments, complaints, conflicts, and criticism appropriately	
R.24	Retrieve, recognize, and calculate common statistical formulas <ul style="list-style-type: none"> • Addition, subtraction, multiplication, and division of <ul style="list-style-type: none"> • Whole numbers • Fractions • Decimals • Percentages • Measurements <ul style="list-style-type: none"> • U.S. • Metric 	

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	<ul style="list-style-type: none"> • Use of calculator • Estimation • Reading charts, graphs, and tables • Basic geometry 	
R.25	<p>Demonstrate negotiation skills</p> <ul style="list-style-type: none"> • Interpret how to reasonably disagree • Interpret ways to overcome objections • Solve everyday human relation problems 	
R.26	<p>Demonstrate career development skills</p> <ul style="list-style-type: none"> • Write cover/application letter • Complete job application • Interpret Form W-4 • Interpret a job description • Investigate an occupation • Explore career opportunities • Compare career options • Develop a personal career plan 	