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**CFETP
3E1X1WG
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**HEATING, VENTILATION, AIR CONDITIONING
AND REFRIGERATION
Wage Grade Series
2606/4742/4749/5301/5306/5309/5352/5402/5415**



CAREER FIELD EDUCATION AND TRAINING PLAN

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OPR: AFCEC/COF
Certified by: Mr. Charles Meshako, Civil Engineer Career Field Manager
Supersedes CFETP3E3X1WG Dated 1 Aug 2018

PART I

Preface

This Career Field Education and Training Plan (CFETP) is a comprehensive education and training document that identifies life-cycle education/training requirements and training support resources for all HVAC Equipment Mechanic/Boiler Mechanic/EMCS Equipment Mechanic Wage Grade series. The CFETP will provide Wage Grade personnel with a clear career path to success and instill rigor in all aspects of our Job Series training.

The CFETP consists of two parts used by the supervisor to plan, manage, and control training within the job series.

Part I includes the following:

- **Section A** provides general information about how the CFETP will be used.
- **Section B** identifies job series progression information, duties and responsibilities, training strategies, and the job series path.

Part II includes the following:

- **Section A** identifies the Group Series Training Standard (GSTS) to include duties, tasks, and technical references to support Wage Grade training programs.
- **Section B** identifies available support materials.
- **Section C** identifies a training course index supervisors can use to determine resources available to support training. Included here are both mandatory and optional courses, and exportable courseware.

Using guidance provided in the CFETP will ensure individuals in HVAC Wage Grade series receive effective and efficient training at the appropriate point in their careers. This plan will enable us to train today's work force for tomorrow's jobs. At the unit level, supervisors and trainers must use Part II to identify, plan, and conduct training commensurate with the overall goals of this guide and the local mission.

ABBREVIATIONS EXPLAINED

Air Force Civilian Career Field Manager (AFCCFM). An individual on the Air Staff charged with the responsibility for overseeing all training and career field management aspects of multiple Air Force job series in a functional area.

Air Force Civil Engineer Center (AFCEC). The focal point for all Civil Engineer training development. All Civil Engineer Force Development Managers (FDMs) are located at AFCEC.

Air Force Institute of Technology (AFIT). Provides vital, relevant, and connected education that enables Airmen to be ready engineers and great leaders who know how to build sustainable installations to last while leading the change for the Civil Engineer career field. Course list can be accessed at: <https://www.afit.edu/ce/>

Air Force Wage Grade Series Qualification Standard (AFWGSQS). A comprehensive task list that describes a particular series or duty position. Used by supervisors to document task qualifications. The tasks on the AFJQS are common to all persons serving in the described duty position.

Air Force Qualification Training Package (AFQTP). An instructional package designed for use as a training resource to qualify, or aid qualification, in a duty position or program, or on a piece of equipment. AFQTPs identify the Air Force's standardized method for performing the task. The AFQTP may be printed (paper-based), computer-based, in other audiovisual media formats, or all three.

Career Development Course (CDC). Self-paced, correspondence course published to provide the information necessary to satisfy the career knowledge component of on-the-job training (OJT). These courses are developed from references identified in the CFETP. CDCs will contain information on basic principles, techniques, and procedures common to a military AFSC or civilian job series. They do not contain information on specific equipment or tasks unless best illustrating a procedure or technique having utility to the entire career field.

Career Field Education and Training Plan (CFETP). A comprehensive, multipurpose document encapsulating the entire spectrum of education and training for various wage grade series. It outlines a logical growth plan that includes training resources and is designed to make job series training identifiable, to eliminate duplication, and to ensure this training is budget defensible.

CE Career Field SharePoint. Contains information on leadership courses and civilian tuition assistance for degree programs. Can be found at:
<https://usaf.dps.mil/sites/10016/Federal%20Wage%20System/Forms/AllItems.aspx?viewpath=%2Fsites%2F10016%2FFederal%20Wage%20System%2FForms%2FAllItems%2Easpx>

Civilian Training Home Page (myPers). Contains descriptions and requirements for several civilian training opportunities such as degree programs and civilian leadership courses. This page can be found at: https://mypers.af.mil/app/answers/detail/a_id/41427/p/2/p/2

Commercial Off the Shelf (COTS). Commercially procured training products or in resident vendor training.

Computer-Based Training (CBT). A self-paced stand-alone computer product used to deliver interactive subject and task knowledge.

Core Tasks. Mandatory tasks which the AFCCFM has identified as a minimum qualification requirement within a job series or duty position. These tasks are derived from the Standard Core Personnel Document (SCPD) for each Job Series.

Distance Learning (DL). Includes Video Tele-seminar (VTS), Video Tele-training (VTT), and CBT. Formal courses that a training wing or a contractor develops for export to a field location (in place of resident training) for trainees to complete without the on-site support of the formal school instructor. For instance, courses are offered by Air Force Institute of Technology, Air University, and Training Detachments.

DoD Civilian COOL: On-line source for civilian credentialing opportunities locate at: <http://dod-civ-cool-review.s3.amazonaws.com/index.htm>

Duty Position Tasks. Tasks identified by the work center supervisor as critical and common training tasks needed for the duty position and mission accomplishment.

Enlisted Professional Military Education (EPME). EPME provides a continuum of learning through progressive courses concentrated on developing Military and Civilian Airmen. EPME plays a vital role in preparing Civilian Airmen for increased supervision, leadership, and management challenges. The three levels of Air Force EPME are Airman Leadership School, Noncommissioned Officer Academy and Air Force Senior Noncommissioned Officer Academy. All levels of EPME are available to Wage Grade civilians. Information about enlisted PME can be found at: <https://www.airuniversity.af.edu/>

Education & Training Course Announcements (ETCA). Web platform, which contains descriptions, requirements, and reporting procedures for in resident Air Force courses. This is located at: <https://usaf.dps.mil/teams/app10-etca/SitePages/home.aspx>

Functional Advisory Council/Wage Grade Panel. The Wage Grade Panel is one of the three panels that make up the Civil Engineer Functional Advisory Council (FAC). The Wage Grade Panel charter is to work issues, develop policy, and provide recommendations to the FAC on matters related to civilian Wage Grade requirements. The Wage Grade Panel works through the FAC, in service to the CE Total Force community.

Group Series Training Standard (GSTS). Describes skills and knowledge that FWS Employees in a particular job series need on the job and for future career development opportunities. It further serves as the overall training requirements for a Wage Series taught in the resident and nonresident courses.

myLearning. Anytime, anyplace learning within DoD consisting of instructional modules comprised of sharable content objectives in an Internet/Intranet environment. This can be found at: <https://lms-jets.cce.af.mil/moodle/>

On-the-Job Training (OJT). Hands-on, over-the-shoulder training conducted to certify personnel in job qualification (duty position certification) training.

Proficiency Training. Additional training, either in-residence, advanced/supplemental training courses, or on-the-job training provided to personnel to increase their skills and knowledge beyond the minimum.

Red Vector. Commercial web-based training available free of charge to CE employees. Courses are effective for certification renewal and earn Continuing Educations Units (CEUs). Site can be found at: <http://afcec.redvector.com/lpe/course/search/b2b>

Regional Training Site (RTS). Total Force training centers managed by the Air National Guard. These sites offer training on specialized military equipment and are available to civilians who require training for local mission needs. Training can be coordinated through the FWS Force Development Team at AFCEC/COF.

Resource Constraints. Resource deficiencies, such as money, facilities, time, manpower, or equipment that precludes desired training from being delivered.

Total Force. All collective Air Force components (Active Duty, Reserve, Guard, and Civilian elements) of the United States Air Force.

Vendor Training. Training provided to the Air Force by a third party. Typically, a private vendor in the private sector not affiliated with the Department of Defense. Vendor training can be in the form of Web-Based Training, Computer-Based Training, or in resident training at a temporary duty location or even hosted on an Air Force installation.

Wage Grade Series Training. A mix of formal training (technical school) and informal training (on-the-job) to develop, maintain and enhance wage grade series specific technical skills.

Web-Based Training. A form of Distance Learning. The term Web-Based just means the training is online and requires access to the internet in addition to the actual course content.

Section A – GENERAL INFORMATION

A1. Purpose. The CFETP is designed to be a tool for supervisors to use in assessing the skill level of current and new employees. The CFETP may be used to document training and proficiency of the employee on associated task/s by the supervisor or certified trainer.

A1.1. Column 1 (*Tasks, Knowledge, and Technical References*). Lists the most common tasks, knowledge, and supporting technical references (TR) necessary for Civilian Airmen to perform duties in the Apprentice, Journeyman, Craftsman, and Supervisor level.

A1.2. Column 2 (*Tasks*). Identifies tasks that have a Core and/or Certification, Civilian Deployment, or Special Experience Identifier (SEI) requirement.

A1.3. Column 3 (*Certification of Training*). Used to record completion of tasks and knowledge training requirements. Task certification requires the task to be trained by a trainer designated by the supervisor. The trainer can be either civilian or military. Use the automated training record application to document individual qualifications. The training start and completion date are documented, the task is signed by the trainee and either the work center supervisor, a Master Sergeant (or above) or the unit training manager. This action will complete the task certification.

Note: The “trainer” signing the record MUST be the work center supervisor, work leader, a Master Sergeant (or above) or the Unit Training Manager. This person does not necessarily train the task but will ensure the training is conducted by a qualified trainer prior to completing task certification.

Note: If a work center supervisor, Work Leader, a Master Sergeant (or above) or the unit training manager are not available in a shop or unit to certify a task, the Operations Flight deputy commander will designate a certifier within the flight.

A1.4. Column 4 (*Tasks and Proficiency Codes*). Identifies duty position tasks (series training requirements) with a proficiency code and indicates training requirements. It shows the proficiency to be demonstrated on the job by the employee as a result of hands-on training on the task, knowledge and the career knowledge provided by formal courses, CDC, distance learning (DL) web-based training (WBT) and AFQTPs. CDC listing maintained by the unit education and training manager for current CDC listings.

A1.5. Qualitative Requirements. Contains the proficiency code key used to indicate the level of training and knowledge provided by CBT, WBT, COTS, in-resident training, and career development courses.

A1.6. Job Qualification Standard (JQS). The Group Series Training Standard (GSTS) becomes the JQS for OJT when entries are made in the GSTS. For OJT, the tasks in Column 1 are trained and qualified to the go/no go level. “Go” means the individual can perform the task without assistance and meets local requirements for accuracy, timeliness, and correct use of

A2. Uses. Managers and supervisors may use the plan at all levels to ensure comprehensive and cohesive training programs are available for each individual in the wage grade series.

A2.1. Wage Grade Panel of the Functional Advisory Council will develop/revise formal resident, non-resident, field, and exportable training based on requirements established by the users and documented in Part II of the CFETP. They will also work with the Air Force Civil Engineer Center Force Development Division (AFCEC/COF) to develop acquisition strategies for obtaining resources needed to provide the identified training.

A2.2. The Wage Grade Panel along with the Force Development Managers, will ensure their training programs complement the CFETP training requirements and identify requirements that can be satisfied by OJT, resident training, contract training, or exportable courses.

A2.3. Supervisors will guide each individual through completion of training specified in this plan.

A2.4. Each individual completes training requirements specified in this plan. The list of courses in Part II of this CFETP will be used as a reference to support training.

A3. Coordination and Approval. The Wage Grade Panel Chairs are the approval authority for the CFETP. The Wage Grade Panel along with the Force Development Managers will identify and coordinate on wage grade series training requirements. Using the list of courses in Part II, they will eliminate duplicate training.

A4. HQ USAF/A4C will review this CFETP annually and make updates and changes as deemed appropriate. Please send recommended changes to the AFCEC/COF Training Support Section at DSN 523-6879 or comm. 850-283-6879 or email afcec.ce.training@us.af.mil.

Section B – WAGE GRADE PROGRESSION AND INFORMATION

B1. Series Descriptions. See each individual's Standard Core Personnel Document for the description.

B1.1. Wage Grade Series Summary. Installs, operates, maintains, and repairs heating, ventilation, air conditioning, and refrigeration (HVAC/R) systems, combustion equipment, environmental control systems and industrial air compressors.

B2. Skill and Career Progression. Adequate training for progression from the apprentice to the mechanic level, and possibly into a supervisory position play an important role in the Air Force's ability to accomplish its mission. It is essential everyone involved in training do their part to participate in, plan, manage, and conduct effective training. The guidance provided in this part of the CFETP will identify viable training at appropriate points in an individual's career.

B2.1. Apprentice/Helper (A/H).

B2.1.1. Upon completion of initial skills training, an employee may work with a trainer to enhance their knowledge and skills to perform at the highest attainable level within their series.

B2.1.2. Utilize the Career Development Course (CDC) and other exportable courses for subject and task fundamentals in the series.

B2.1.3. Encourage apprentice/helpers to continue academic education and begin EPME by enrolling in Airman Leadership School either in-residence or by correspondence course.

B2.2. Journeyman (J).

B2.2.1. Journeymen may continue to advance their skills by completing additional training. Upon completing training, they may be assigned job positions such as team leader, trainer, or task certifier. Journeymen can pursue leadership training and skills in order to qualify for potential advancement to Work Leader or Work Supervisor positions.

B2.2.1. Encourage journeyman to enroll in the Noncommissioned Officer Academy (NCOA) either in-residence or by correspondence course.

B2.3. Craftsman (C).

B2.3.1. Craftsmen may continue to advance their skills by completing additional training. They may be assigned job positions such as team leader, trainer, or task certifier. Craftsmen are encouraged to pursue leadership training and skills in order to qualify for potential advancement to Work Leader or Work Supervisor positions.

B2.3.2. Encourage craftsmen to continue academic education and complete Noncommissioned Officer Academy (NCOA) either in-residence or by correspondence course, civilian leadership courses and degree programs.

B2.3.3. Master Craftsman are typically graded higher than WG-10 where skills, knowledge and abilities require higher technical abilities than standard craftsmen. They are duty/location specific and not for all job series.

B2.4. Work Leader (WL).

B2.4.1. Work Leaders are expected to perform limited functions of a First Line Supervisor or act as a Team Lead.

B2.4.2. Completion of AFIT Civilian Supervisors Course (WMGT 571) is highly encouraged.

B2.4.3. Should pursue increased knowledge of budget, manpower, resources, and personnel management.

B2.4.4. Recommend pursuit of additional higher education and completion of courses outside of their job series for career broadening opportunities.

B2.4.5. Encourage Work Leaders to continue academic education and complete Noncommissioned Officer Academy (NCOA) either in-residence or by correspondence course, civilian leadership courses and degree programs.

B2.5. First Line Supervisor.

B2.5.1. A supervisor can be expected to fill positions such as the Element Chief or Special Projects Supervisor.

B2.5.2. Must enroll and complete required mandatory supervisor or manager training courses within 1 year of appointment to a supervisory or managerial position and complete experience training every 3 years, thereafter.

B2.5.3. Completion of AFIT Civilian Supervisors Course (WMGT 571) is highly encouraged.

B2.5.4. Should pursue increased knowledge of budget, manpower, resources, and personnel management.

B2.5.5. Recommend pursuit of additional higher education and completion of courses outside of their job series for career broadening opportunities.

B2.5.6. Encourage supervisors to continue academic education and complete Senior Noncommissioned Officer Academy (SNCOA) by correspondence, civilian leadership courses and degree programs.

B3. Correspondence Course Directions. Nonresident attendance for professional military education courses is accomplished through the Air Force Portal.

B3.1. Login to the AF Portal <https://www.my.af.mil/>.

B3.2. Copy and paste the URL <https://www.airuniversity.af.edu/GCPME/> into your browser.

B3.4. “Distance Learning” tabs are on the right-side menu.

B3.5. Select the appropriate course.

B4. Resident Enlisted Professional Military Education (EPME). Scheduling enlisted professional military education for civilian personnel is a responsibility of AFPC/DP3DW unless otherwise noted. See DAFI 36-2670 Total Force Development, for more detailed information.

B4.1. Airman Leadership School (ALS). Airman Leadership School resident attendance is scheduled by the local Airman Leadership School commandant. Commandants build an annual schedule shortly after the staff sergeant (E-5) promotion release. Eligible Air Force and Department of Defense civilians are considered priority 3 for ALS. DAFI 36-2670 encourages ALS leadership to the extent possible, distribute Priority 2 and 3 students throughout the year to maximize diversity in the classroom.

B4.2. Noncommissioned Officer Academy (NCOA). Selection and scheduling are accomplished by AFPC/DP3DW. Eligible Air Force and Department of Defense civilians are considered priority 3 for NCOA and are considered on a space available basis.

B4.3. Senior Noncommissioned Officer Academy (SNCOA). Selection and scheduling are accomplished by AFPC/DP3DW and is driven by the senior master sergeant (E-8) promotion release. Eligible Air Force and Department of Defense civilians are considered priority 4 for SNCOA and are considered on a space available basis.

B5. Wage Grade Career Building Blocks (CBBs) and Continuous Development Framework Model.

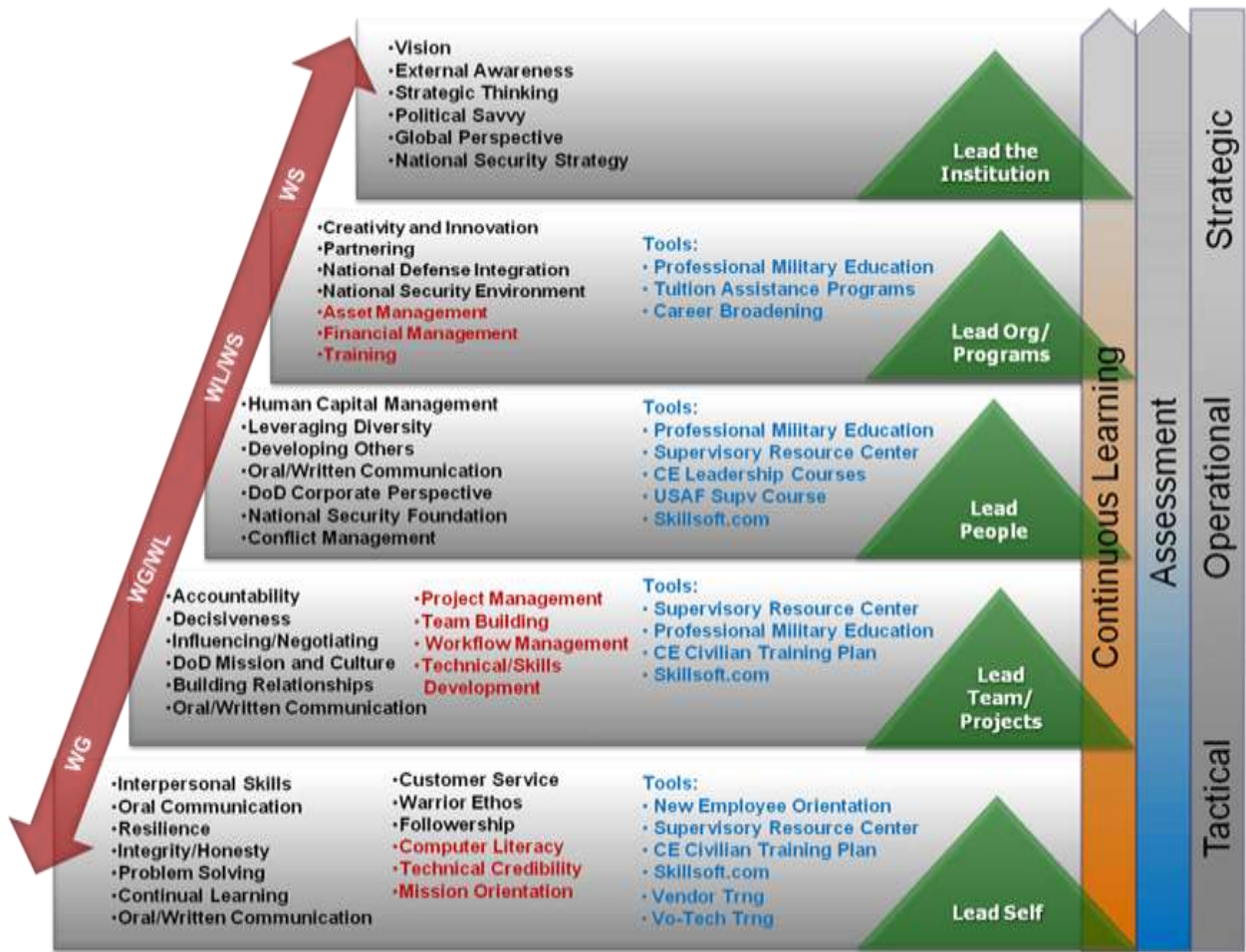
B5.1. The Career Building Blocks illustrate the dispersion of grades and relative experience levels (apprentice, journeyman, craftsman). As you progress through the grades, so should your breadth of experience. This not only includes technical experience, but leadership, supervisory and management experience as well. Using various on-the-job training, military, and civilian vocational schools, and PME, forms the foundation of the CBBs and the “Develop Exceptional Leaders” portion of the strategic vision in the CE Human Capital Road Map.

B5.1.1. The Wage Grade Career Building Blocks (CBBs) are an illustration or an example of your individual development plan or career path. Your individual roadmap may be different than others based on your occupational series and/or career path. The CBBs provide a few examples of development opportunities at the tactical, operational, and strategic levels of performance. Follow this link to see the CBBs for your job series.

<https://usaf.dps.mil/sites/10016/Career%20Building%20Blocks/Forms/AllItems.aspx>

B5.1.2. Once you have established your career goals, identify a mentor to help you align your steps in this learning and development continuum. A mentor can help you identify different kinds of experience and training you will need as well as the tools to attain them. Mentors also serve as a sounding board and can help you reassess or adjust your career goals when events in your life or career necessitate changes. As you complete these steps and move toward your career goals, it is important to reassess your goals. Once this is accomplished, you and your mentor will be able to further your progression and advancement through the continuous development framework model. See Figure 1 below for the Continuous Development Framework Model.

Figure 1.



PART II

Section A – GROUP TRAINING STANDARD

A1. Implementation. This STS is used for technical training provided by AETC, OJT and COTs training documentation.

A2. Purpose. As prescribed in DAFI 36-2670, *Total Force Development*, DAFMAN 32-1001, *Civil Engineer Federal Wage System Force Development* and in collaboration with the AFCCFM, this STS is mandatory for all FWS job series working under the Air Force Specialty Code 3E1X1, regardless of duty assignment. Each employee must use an automated training record.

A2.1. Column 1 (*Tasks, Knowledge, and Technical References*). Lists the most common performance and knowledge requirements necessary for an employee to perform successfully in their job series. The required behaviors will be used as the context for which learning will be assessed.

A2.2. Column 2 (*Core Tasks*). Tasks identified by the AFCCFM or shop foreman as mandatory for each duty position in a job series at their location.

A2.2.1 Column 2 (*Deployment/SEI*). Tasks identified as mandatory for employees who perform roles in Mission Critical, Mission Essential or have been identified for a civilian deployment tasking.

A2.3. Column 3 (*Provides Certification for OJT*). Used to record completion of each training requirement. Use the automated training system to document qualifications.

A2.3.1. Task certification of core and critical tasks. Require a training completion date and initials of the trainee, trainer, and a certifier. All non-core tasks require training completion date and initials of the trainee and trainer only.

A2.3.2. Performance Standard. All training requirements are trained and qualified to the “Go” level. “Go” means the individual can perform the task without assistance and meets local demands for accuracy, timeliness and, if applicable, correct use of procedures and Technical Orders.

A2.4. Column 4 (*Codes Used to Indicate level of Training*). Indicates whether the task is a Knowledge (K), Performance (P) or Performance and Knowledge (PK). Codes are provided in columns labeled for each level experience. These are labeled A/H for Apprentice/Helper, J for Journeyman, C/WL for Craftsman or Work Leader and S for Supervisor.

A2.5. Job Qualification Standard (JQS). The STS becomes a JQS for OJT when placed in an automated training application and used according to DAFI 36-2670, *Total Force Development* and DAFMAN 32-1001 *Civil Engineer Federal Wage System Force Development*. QTPs are available on myLearning to ensure that all supervisors use standardized procedures for training. When used as a JQS, the following requirements listed below apply.

A2.5.1. Documentation. Document and certify completion of training.

A2.5.1.1. Duty position. Requirements for each duty position (task group) will be developed and identified by the work center supervisor and loaded into the automated training management application. Completion of the identified tasks are mandatory for all duty positions. Ensure the correct duty position title is listed in the Profile section of the trainee's automated training record.

A2.5.1.2. AFQTP Training and Documentation. AFQTPs have been created for several task groups to fulfill performance (P) and knowledge (K) requirements for upgrade/qualification training. Each AFQTP provides the step-by-step procedures for the trainee, trainer, and certifier in completing each.

A2.5.1.2.2. Hands-On Training. For performance (P) training requirements, *DO NOT* sign off the tasks in the JQS until the trainee has completed hands-on/certification training.

A2.5.2. Transcribing from previous versions to new CFETP. The UETM and supervisor must conduct a review of the new STS to identify any new tasks and add those tasks to their unit specific duty positions.

A2.5.2.1. Previous training certification not listed. If previous training certifications are not listed in the individual training record, select the task to be transcribed, and click on the transcribe button. Enter the date of the original certification and sign off the task(s). The trainee will then sign off the task(s) to finalize the transcription of previous training certification. The automated application will place an entry into the trainee 623a and must be acknowledged by the transcriber and trainee.

A2.5.2.2. Transcribing external training certification. If a trainee attended a formal training course and received appropriate accreditation, select the formal training section of the users automated training record and locate the course title in the master task list, then enter the completion date. If the course is not listed, contact the UETM to have it loaded from the master catalog. If it is not listed in the master catalog, contact the FDM at AFCEC to have it loaded in the master catalog.

Section B – COURSE OBJECTIVE LIST

B1. Measurement. Measurement of each learning objective is indicated as follows:

B1.1. Use of Progress Checks (PCs) & Rubrics. Indicates formal measurement of knowledge (K) and/or performance (P) elements.

B2. Standard. Standards for measurement are indicated in the course objectives and delineated on the individual progress checklist and rubrics. The minimum standard is 70% on knowledge progress checks. Trainer assistance is used as the standard for performance progress checks and is provided, as warranted during the progress check. Trainee may be required to repeat all or parts of the learning outcome until satisfactory performance is attained.

B3. Proficiency Level. Student must demonstrate mastery on each learning outcome/objective before progressing to the next learning requirement.

B4. Course Objective List. These objectives are listed in the sequence taught by Blocks of Instruction. Per AETCI 36 - 2651, *Basic Military and Technical Training*, a detailed listing of the initial skills course learning objectives in the Basic Course are listed in the 3E1X1 AFSC STS.

Section C – SUPPORT MATERIAL

C1. Air Force Qualification Training Packages

C1.1. The AFQTPs for each task group are identified on the AFQTP Documentation Record located in Attachment 3.

C1.2.1. For a complete list of up-to-date AFQTPs applicable to the 3E1X1 AFSC, go to [myLearning](#).

C1.2.2. In addition to the AFQTPs there are web-based courses or assessments developed for certain tasks that are available on [myLearning](#) under AFCEC in the specialty topic area.

C2. Career Development Course (CDC) Assessment for Civil Engineer CDC/DL course

C2.1. FDMs have developed CDC assessments for each Air Force CE career field, and they are located on the [myLearning](#) under AFCEC in the topic header Civil Engineer Career Development Courses (CDCs) Assessments.

C2.2. CDC assessments are for the sole purpose of providing the trainer and the supervisor a predictive indicator of whether the trainee has a solid grasp on the knowledge portions of the STS.

Section D – EDUCATION AND TRAINING COURSE INDEX

D1. Purpose. This section of the CFETP identifies training courses available for the HVAC/R specialty. Refer to Education and Training Course Announcements ([ETCA](#)) web site for information on the Air Force in-residence courses.

D2. Air Force In-Residence Courses/Mobile Training Team (MTT) Courses.

<u>Course Number</u>	<u>Title</u>	<u>Developer</u>
J8AQR3E031 01AB	HVAC/R Apprentice ITRO Qual 1	366 TRS
J3ABR3E131 03AC	HVAC/R Apprentice AF Unique	366 TRS
J3ACR3E171 00AC	HVAC/R Craftsman Course	366 TRS

D3. Air Force Career Development Academy (AFCDA).

<u>Course Number</u>	<u>Title</u>	<u>Edit Code</u>
CDC 3E151	HVAC/R Journeyman	01

D4. Exportable/Web-based Courses/Information.

<u>Course Number</u>	<u>Title</u>	<u>Developer</u>
Web based	Arc Flash Safety Awareness QTP	AFCEC/COF
Web based	Civil Engineer 5-Level Core Concepts Course	AFCEC/COF
Web based	Civil Engineer 7-Level Core Concepts Course	AFCEC/COF
Web based	Confined Space Course	AFCEC/COF
Web based	Industrial Water Treatment Orientation Program	AFCEC/COF
Web based	130K BTU Heater	AFCEC/COF
Web based	3E1X1 Paper Based AFQTPs	AFCEC/COF
Web based	TRICON Refrigerated Container System (TRCS)	AFCEC/COF
Web based	HVAC/R Basic Electrical Diagnostics	AFCEC/COF
WENG 170	Cybersecurity for Control Systems	AFIT
WENG 200	Scoping and Estimating Course	AFIT
WENG 270	Advanced Control System Cybersecurity Course	AFIT
WENG 370	Control Systems Cybersecurity for CE Leaders	AFIT
WENG 400	Life-cycle Cost Estimating	AFIT
WENG 460	Introduction to Mechanical Systems	AFIT
WENG 560	Fundamentals of HVAC Design and Analysis	AFIT
WENG 561	Application of HVAC Design and Analysis	AFIT
WENG 563	HVAC Control Systems	AFIT
WENV 531	Air Quality Management	AFIT
WMGT 131	SMS Builder Course	AFIT
WMGT 301	Intro to Asset Management	AFIT
WMGT 322	Introduction to Project Management	AFIT
WMGT 436	Requirements and Optimization	AFIT

WMGT 437	Troop Construction Project Management	AFIT
WMGT 570	Civil Engineer Superintendent Course	AFIT

D5. Leadership Training and Academic Fellowships through the Eaker Center

Title

Squadron Officers School (SOS)

Developing Supervisor Course

Defense Emerging Leader Program

Civilian Associates Degree Program

Civilian Bachelors Degree Program

Located at: https://mypers.af.mil/app/answers/detail/a_id/41427/p/2

OFFICIAL

Reviewed by:

John Suarez
Wage Grade Panel Co-Chair

Daniel Barnett
Wage Grade Panel Co-Chair

3 Attachments

1. Qualitative Training Requirements (Proficiency Code Key)
2. 3E1X1WG Specialty Training Standards (STS)
3. AFQTP Tracker

Attachment 2
3E1X1WG Specialty Training Standard (STS)

A1. Qualitative Training Requirements

<i>This Block is for Identification Purposes Only.</i>		
Name Of Trainee		
Printed Name (Last, First, Middle Initial)	Initials (Written)	SSAN (Last four)
Printed Name of Trainer, Certifying Official and Written Initials		
<i>N/I</i>	<i>N/I</i>	

Behavioral Statement GSTS Coding System	
Code	Definition
K	Subject Knowledge Training - The verb selection identifies the individual's ability to identify facts, state principles, analyze, or evaluate the subject.
P	Performance Training - Identifies that the individual has performed the task to the satisfaction of the trainer/certifier; however, the individual may not be capable of meeting the field requirements for speed and accuracy.
PK	Performance Knowledge Training - The verb selection identifies the individual's ability to relate advanced facts, procedures, operating principles, and operational theory for the task.
X	Formal Course
*	Core Task. These are mandatory tasks identified by the Career Field Manager

A2. Specialty Training Standard.

A2.1. Identification. In the training record User Profile section, the UETM will assign individuals to the correct work center, upon in-processing into the unit.

A2.2. HVAC/R Specialty Tasks. The following are tasks the work center supervisor will use to track each duty position created for their work center.

1. Tasks, Knowledge And Technical References	2. Tasks		3. Certification For OJT					4. Proficiency Codes Used To Indicate Training/Information Provided via ICW and/or course			
	Core/Cert	Deployment / SEI	A	B	C	D	E	A	B	C	D
			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
1. CIVIL ENGINEER (CE) CORE CONCEPTS COURSE: TR: CE Virtual Learning Center (CE-VLC); AFDD 2-4-2; AFIs 10-209, 10-210, 10-211, 32-1022, 36-2101, 38-101, 51-903; Enlisted Classification Directory; AF PAM 32-1004 Vol 1-6; War Mobilization Plan (WMP) 1, Annex S											
1.1. Civil Engineer (CE) 5-Level Core Concepts Course								K	K	K	K
1.2. Civil Engineer (CE) 7-Level Core Concepts Course									K	K	K
2. HVAC/R SAFETY: TR: AFOSH 91-501, NFPA 70E											
2.1. Arc Flash Safety								K	K	K	K
2.1.1. Remove victim from energized circuits								PK	PK	PK	PK
2.1.2. Apply first aid procedures for electrical shock								PK	PK	PK	PK
2.2.. Confined space training:											
2.2.1. Confined space entry supervisor										PK	PK
2.2.2. Confined space attendant								P	PK	PK	PK
2.2.3. Confined space entrant								P	PK	PK	PK
2.3. Fall protection training								P	PK	PK	PK
3. HVAC/R PUBLICATIONS: TR: Fundamentals of HVAC/R 2nd Ed AHRI											
3.1. Technical Orders and Manufacturer's Manuals								K	K	K	K
3.2. Data Plate Specifications								K	K	K	K
3.3. National/DoD Certification requirements									K	K	K
3.4. Unified Facilities Criteria (UFC)										K	K
4. TOOLS & TEST EQUIPMENT: TR: TO's 32,33,34,35,38 series; Fundamentals of HVAC/R 2nd Ed AHRI											
4.1. Maintain and use tools (hand and powered)								PK	PK	PK	PK
4.2. Maintain and use precision measuring instrument:											
4.2.1. Digital temp sensors								P	PK	PK	PK
4.2.2. Digital humidity sensor								K	PK	PK	PK
4.2.3. Pyrometers								K	PK	PK	PK
4.2.4. Anemometers/Flow hood								K	PK	PK	PK
4.2.5. Gas Analyzers								K	PK	PK	PK
4.2.6. Pycrometers								K	PK	PK	PK
4.3. Maintain and use electrical test equipment:											
4.3.1. Digital Multimeter								P	PK	PK	PK
4.3.3. Ammeter								P	PK	PK	PK
4.3.4. Signal Generators								K	PK	PK	PK
4.4. Maintain and use computer equipment:											
4.4.1. Laptop computer stations								K	PK	PK	PK
4.4.2. Perform equipment firmware updates								K	PK	PK	PK
4.4.3. Troubleshoot HVAC equipment using laptop computer								K	PK	PK	PK

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	Core/Cert	Deployment / SEI	A	B	C	D	E	A	B	C	D
			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
5. PIPING/TUBING: TR: Fundamentals of HVAC/R 2nd Ed AHRI											
5.1. Types & sizes								K	K	K	K
5.2. Fittings								K	K	K	K
5.3. Piping systems fabrication:											
5.3.1. Fabricate piping and tubing systems								K	PK	PK	PK
5.3.2. Install piping and tubing systems								K	PK	PK	PK
5.4. Types and operation of valves								K	K	K	K
5.5. Interpret system drawings								K	K	K	K
6. BRAZING & SOLDERING: TR: ASM Handbook V-6 Welding Brazing and soldering											
6.1. Theory of operation:											
6.1.1. Acetylene equipment (air and hydrocarbon)								K	K	K	K
6.1.2. Oxyacetylene equipment								K	K	K	K
6.2. Use equipment:											
6.2.1. Cut								P	PK	PK	PK
6.2.2. Braze and solder								P	PK	PK	PK
6.3. Maintain equipment								P	PK	PK	PK
7. HVAC/R PHYSICS: TR: Fundamentals of HVAC/R 2nd Ed; AHRI Environmental Systems Technologies 2nd Ed; Principles of Refrigeration 5th Ed											
7.1. Structure of matter								K	K	K	K
7.2. Energy (Stored, Non-stored, Conversion)								K	K	K	K
7.3. Laws of thermodynamics								K	K	K	K
7.4. Heat flow (Energy, Measurement, Transfer)								K	K	K	K
7.5. Fluid flow (Properties, Statics, Dynamics)								K	K	K	K
7.6. Psychrometrics:											
7.6.1. Properties of air								K	K	K	K
7.6.2. Air-vapor relationship								K	K	K	K
7.6.3. Psychrometric chart								K	K	K	K
7.6.3.1. Terms								K	K	K	K
7.6.3.2. Psychrometric processes:											
7.6.3.2.1. Plot processes of conditioned air								K	PK	PK	PK
7.6.3.2.2. Interpretation of plotted processes								K	PK	PK	PK
7.7. Load Calculations:											
7.7.1. Calculate building heat load								K	PK	PK	PK
7.7.2. Determine system requirements								K	PK	PK	PK

1. Tasks, Knowledge And Technical References	2. Tasks		3. Certification For OJT					4. Proficiency Codes Used To Indicate Training/Information Provided via ICW and/or course			
	Core/Cert	Deployment / SET	A	B	C	D	E	A	B	C	D
			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
8. AIR and HYDRONIC SYSTEMS: TR: Environmental Systems Technology 2nd Ed; Trane Air Conditioning Manual; Principles of Refrigeration 5th Ed; Refrigeration and Air Conditioning 4th Ed (ARI)											
8.1. Air Systems:											
8.1.2. Principles of air distribution systems								K	K	K	K
8.1.3. Constant Volume								K	K	K	K
8.1.4. Variable Air Volume (VAV)								K	K	K	K
8.1.5. Duct airflow characteristics								K	K	K	K
8.1.6. Multi-zone								K	K	K	K
8.1.7. Dedicated Outside Air System (DOAS)								K	K	K	K
8.1.8. Fan and system curve relationships									K	K	K
8.1.9. Adjust dampers and linkages								K	PK	PK	PK
8.1.10. Perform air balancing								K	PK	PK	PK
8.1.11. System drawings								K	K	K	K
8.2. Hydronic Systems:											
8.2.1. Principles of hydronic distribution systems								K	K	K	K
8.2.2. Pumps:											
8.2.2.1. Types and construction features								K	K	K	K
8.2.2.2. Install circulating pumps								P	PK	PK	PK
8.2.2.3. Adjust centrifugal water pump flow								K	PK	PK	PK
8.2.2.4. Replace packing on water pumps								K	PK	PK	PK
8.2.2.5. Replace mechanical seals/couplings								K	PK	PK	PK
8.2.2.6. Pump and system curve relationships								K	K	K	K
8.2.3. Hydronic system flow:											
8.2.3.1. Hydronic volume measurement (methods, interpretation)									PK	PK	PK
8.2.3.2. Balance hydronic system									PK	PK	PK
8.2.4. Interpret system drawings									K	K	K
8.3. Associated Components and Equipment:											
8.3.1. Coils (Types & Applications):											
8.3.1.1. Cooling								K	K	K	K
8.3.1.2. Heating								K	K	K	K
8.3.1.3. Preheat								K	K	K	K
8.3.1.4. Reheat								K	K	K	K
8.3.2. Fan coil units								K	K	K	K
8.3.3. Filters								K	K	K	K
8.4. Install								K	PK	PK	PK
8.5. Troubleshoot and repair								K	PK	PK	PK
8.6. Perform Preventive Maintenance:											
8.6.1. Inspect and replace drive belts								P	PK	PK	PK
8.6.2. Adjust drive belt tension								P	PK	PK	PK
8.6.3. Adjust pulleys								P	PK	PK	PK
8.6.4. Clean strainers								P	PK	PK	PK
8.6.5. Clean air filters								P	PK	PK	PK
8.6.6. Inspect water valves for leaks								P	PK	PK	PK
8.6.7. Inspect fan coil units								P	PK	PK	PK
8.6.8. Clean air handlers								P	PK	PK	PK
8.6.9. Clean coils								P	PK	PK	PK
8.6.10. Service water pumps								P	PK	PK	PK

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			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
9. ELECTRICAL: TR: ANS1Y32.2; 32-1064; National Electric Code (NFPA 70); National Electrical Safety Code Handbook; Fundamentals of HVAC/R 2nd Ed AHRI											
9.1. Principles of electricity (AC and DC)								K	K	K	K
9.2. Types of circuits:											
9.2.1. Line Circuit								K	K	K	K
9.2.2. Load Circuit								K	K	K	K
9.2.3. Control Circuit (110/208volt) AC/DC)								K	K	K	K
9.3. Relationship of current, voltage, and resistance in circuits								K	K	K	K
9.4. Wiring Diagrams								K	K	K	K
9.5. Wiring Requirements:											
9.5.1. Supply Voltage								K	K	K	K
9.5.2. Wiring color code								K	K	K	K
9.5.3. Wire sizes								K	K	K	K
9.5.4. Distribution Panels									K	K	K
9.6. Protective devices:											
9.6.1. Circuit Breakers								K	K	K	K
9.6.2. Fuses								K	K	K	K
9.6.3. Ground Fault Current Interrupters (GFCI)								K	K	K	K
9.6.4. Motor Overload Protectors								K	K	K	K
9.6.4.1. Motor starters								K	K	K	K
9.6.4.2. Internal motor overload protection								K	K	K	K
9.7. Devices:											
9.7.1. Switches								K	K	K	K
9.7.2. Receptacles								K	K	K	K
9.7.3. Timers								K	K	K	K
9.7.4. Transformers								K	K	K	K
9.7.5. Types and principles of electromagnetic devices (relays, contactors, and across-the-line starters)									K	K	K
9.8. Motors:											
9.8.1. Single phase and three phase								K	K	K	K
9.8.2. Replace motors								P	PK	PK	PK
9.8.3. Perform operational test								K	PK	PK	PK
9.8.4. Align pulleys/couplings								P	PK	PK	PK
9.8.5. Electrically connect (single-phase and three phase)								K	PK	PK	PK
9.8.6. Reverse rotation of electric motors								K	PK	PK	PK
9.8.7. Measure motor current draw								K	PK	PK	PK
9.8.8. Service electrical motors									PK	PK	PK
9.9. Types and principles of motor controllers and variable frequency drives									K	K	K
9.10. Install electrical components								K	PK	PK	PK
9.11. Troubleshoot and repair electrical circuits and components								K	PK	PK	PK
9.12. Perform preventive maintenance on electrical circuits and components								K	PK	PK	PK

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	Core/Cert	Deployment / SEI	A	B	C	D	E	A	B	C	D
			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
10. HVAC CONTROL SYSTEMS: TR: AFMAN 32-1093; Fundamentals of HVAC/R 2nd Ed AHRI											
10.1. Types:											
10.1.1. Pneumatic HVAC Control Systems								K	K	K	K
10.1.2. Electrical HVAC Control Systems								K	K	K	K
10.1.3. Electronic HVAC Control Systems								K	K	K	K
10.1.4. Constant Air Volume (CAV)								K	K	K	K
10.1.5. Variable Air Volume (VAV)								K	K	K	K
10.1.6. Direct Digital Control (DDC)								K	K	K	K
10.2. Components:											
10.2.1. Variable Frequency Drives (VFD)								K	K	K	K
10.2.2. Principles sequence of operation								K	K	K	K
10.3. Calibrate and adjust control circuits:											
10.3.1. Controls Physics								K	K	K	K
10.3.1.1. Boolean Math Logic								K	PK	PK	PK
10.3.1.2. Truth Table								K	PK	PK	PK
10.3.1.3. Logic Circuits								K	PK	PK	PK
10.3.1.4. Component Timing								K	PK	PK	PK
10.3.1.5. Microprocessors/PLC's,								K	PK	PK	PK
10.3.1.6. Amplified Control Circuits								K	PK	PK	PK
10.4. System/Subsystem control strategies								K	K	K	K
10.5. Perform system changes:											
10.5.1. Programing								K	PK	PK	PK
10.5.2. Motion and timing								K	PK	PK	PK
10.5.3. Loop Tuning								K	PK	PK	PK
10.6. Energy monitoring & control systems (EMCS) operating principles and components:											
10.6.1. Energy Reports								K	K	K	K
10.6.2. Trending								K	PK	PK	PK
10.6.3. Alarming								K	PK	PK	PK
10.6.4. Reporting/Metering								K	PK	PK	PK
10.7. Computer Systems:											
10.7.1. Administrative Privileges								K	PK	PK	PK
10.7.2. Network Security									PK	PK	PK
10.7.3. Encryption Standards									K	K	K
10.7.4. Network Topologies									K	K	K
10.7.5. Principles of Network Distribution Cabling									K	K	K
10.7.6. Software Programing								K	PK	PK	PK
10.7.7. Communications:											
10.7.7.1. BACnet, Modbus, LonWorks								K	K	K	K
10.7.7.2. Wireless								K	K	K	K
10.7.7.3. Point/Multi Point to Point								K	K	K	K
10.8. Install								K	PK	PK	PK
10.9. Troubleshoot and repair								K	PK	PK	PK
10.10. Perform Preventative Maintenance								P	PK	PK	PK

1. Tasks, Knowledge And Technical References	2. Tasks		3. Certification For OJT					4. Proficiency Codes Used To Indicate Training/Information Provided via ICW and/or course			
	Core/Cert	Deployment / SEI	A	B	C	D	E	A	B	C	D
			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
11. HEATING & HOT WATER SYSTEMS: TR: ASHRAE Std 14											
11.1. Characteristics of fuels (oil, gas)								K	K	K	K
11.2. Types and principles of fuel systems								K	K	K	K
11.3. Environmental concerns								K	K	K	K
11.4. Inspect systems for leaks								P	PK	PK	PK
11.5. Install and maintain fuel lines								K	PK	PK	PK
12. BURNERS:											
12.1. Construction features and operation of burners (oil and gas)								K	K	K	K
12.2. Properties of combustion								K	K	K	K
12.3. Combustion analyzers								K	K	K	K
12.4. Perform pre-operational inspections								K	PK	PK	PK
12.5. Perform operational test								K	PK	PK	PK
12.6. Perform combustion analysis								K	PK	PK	PK
12.7. Compute combustion efficiency								K	PK	PK	PK
12.8. Adjust fuel/air ratio for proper combustion efficiency								K	PK	PK	PK
12.9. Perform preventative maintenance								P	PK	PK	PK
12.10. Repair components and compliance:											
12.10.1. Troubleshoot								K	PK	PK	PK
12.10.2. Correct malfunctions								K	PK	PK	PK
12.10.3. Environmental requirements								K	K	K	K
12.10.4. Electronic linkage-less burner control:											
12.10.4.1. Install									PK	PK	PK
12.10.4.2. Set-up									PK	PK	PK
12.10.4.3. Troubleshoot									PK	PK	PK
12.10.4.4. Adjust efficiency									PK	PK	PK

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			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
13. FORCED AIR AND RADIANT HEATING:											
13.1. Types and operation								K	K	K	K
13.2. Perform Pre-operational Inspection								K	PK	PK	PK
13.3. Perform operational test								K	PK	PK	PK
13.4. Preventive maintenance								P	PK	PK	PK
13.5. Troubleshoot and repair								K	PK	PK	PK
13.6. High efficiency condensing furnace:											
13.6.1. Install								P	PK	PK	PK
13.6.2. Troubleshoot and repair								K	PK	PK	PK
13.6.3. Perform preventive maintenance								P	PK	PK	PK
13.7. Portable Oil Fired Heaters:											
13.7.1. Set-up								K	PK	PK	PK
13.7.2. Troubleshoot and repair								K	P	PK	PK
13.7.3. Perform preventative maintenance								K	PK	PK	PK
13.8. Radiant Heating:											
13.8.1. Types								K	K	K	K
13.8.2. Operation								K	K	K	K
13.8.3. Perform pre-operational inspection								K	PK	PK	PK
13.8.4. Perform operational test								K	PK	PK	PK
13.8.5. Troubleshoot and repair								K	PK	PK	PK
13.8.6. Perform preventive maintenance								P	PK	PK	PK
14. STEAM GENERATION:											
14.1. Properties of steam								K	K	K	K
14.2. Principles of distribution systems (types and components)								K	K	K	K
14.2.1. Steam trap types and application								K	K	K	K
14.2.2. Steam heat exchangers								K	K	K	K
14.2.3. Condensate return systems								K	K	K	K
14.3. Principles of boilers (fire tubes, water tubes, and cast iron)								K	K	K	K
14.4. Construction features of boilers (waterside, fireside, and external fittings)								K	K	K	K
14.5. Auxiliary equipment (feedwater system, safety devices, and controls)								K	K	K	K
14.6. Perform pre-operational inspection								K	PK	PK	PK
14.7. Perform operational test								K	PK	PK	PK
14.8. Perform preventive maintenance								K	PK	PK	PK
14.9. Repair boilers and/or auxiliary equipment:											
14.9.1. Troubleshoot and repair								K	P	PK	PK
14.9.2. Replace/remove boiler sections								K	PK	PK	PK
14.10. Prepare boiler for inspection (Types A, B, C, D)								K	PK	PK	PK
14.11. High efficiency condensing boilers:											
14.11.1. Function and maintenance of flue gas condensate neutralizers								K	PK	PK	PK
14.11.2. Install								K	PK	PK	PK
14.11.3. Troubleshoot and repair									P	PK	PK
14.11.4. Perform preventative maintenance								P	PK	PK	PK
14.12. In floor heating systems:											
14.12.1. Troubleshoot and repair								K	P	PK	PK
14.13. Sidewalk heating systems:											
14.13.1. Troubleshoot and repair								K	P	PK	PK

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			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
15. AIR CONDITIONING & REFRIGERATION SYSTEMS: TR: Fundamentals of HVAC/R 2nd Ed AHRF; Modern Refrigeration and Air Conditioning, 19th Ed											
15.1. Refrigerants (types and uses)								K	K	K	K
15.2. Oils (types and uses)								K	K	K	K
15.3. Universal Certification								K	PK	PK	PK
15.4. Basic Refrigeration:											
15.4.1. Refrigeration cycle								K	K	K	K
15.4.2. Locate refrigerant leaks								K	PK	PK	PK
15.4.3. Recover and recycle refrigerant								K	PK	PK	PK
15.4.4. Pump down system								K	PK	PK	PK
15.4.5. Pressure check system								K	PK	PK	PK
15.4.6. Charge system:											
15.4.6.1. Determine and weigh in correct charge								K	PK	PK	PK
15.4.6.2. Compressor burnout procedures								K	K	K	K
15.4.6.3. Calculate and adjust superheat								K	PK	PK	PK
15.4.6.4. Calculate and adjust sub-cooling								K	PK	PK	PK
15.4.6.5. Utilize pressure-temperature charts								P	PK	PK	PK
15.4.6.6. Plot pressure enthalpy charts									PK	PK	PK
15.5. Tools:											
15.5.1. Leak detectors:											
15.5.1.1. Soap bubbles								K	K	K	K
15.5.1.2. Fluorescent Dye								K	K	K	K
15.5.1.3. Ultrasonic								K	K	K	K
15.5.1.4. Electronic								K	K	K	K
15.5.2. Recovery machines								K	K	K	K
15.5.3. Refrigerant cylinders (types, sizes, fill capacities)								K	K	K	K
15.5.4. Vacuum pump								K	K	K	K
15.5.5. Refrigerant Scales								K	K	K	K
15.5.6. Refrigerant gauges:											
15.5.6.1. Analog								K	K	K	K
15.5.6.2. Digital								K	K	K	K
15.5.6.3. Bluetooth								K	K	K	K
15.5.7. Maintain and use equipment								P	PK	PK	PK
15.5.8. APIMS required paperwork (Refrigerant tracking)								K	PK	PK	PK
15.6. Refrigeration components:											
15.6.1. Compressor types:											
15.6.1.1. Reciprocating								K	K	K	K
15.6.1.2. Centrifugal								K	K	K	K
15.6.1.3. Rotary								K	K	K	K
15.6.1.4. Screw								K	K	K	K
15.6.1.5. Scroll								K	K	K	K

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			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
15.6.2. Evaporators:											
15.6.2.1. Direct expansion								K	K	K	K
15.6.2.2. Indirect expansion								K	K	K	K
15.6.3. Condensers:											
15.6.3.1. Air cooled								K	K	K	K
15.6.3.1.1. Receivers								K	K	K	K
15.6.3.1.2. Condenser pressure regulator (CPR) (Head-Master)								K	PK	PK	PK
15.6.3.1.3. Fan cycling controls								K	PK	PK	PK
15.6.3.2. Water cooled/cooling tower								K	K	K	K
15.6.4. Metering devices:											
15.6.4.1. Fixed metering								K	K	K	K
15.6.4.2. Thermostatic expansion valve								K	K	K	K
15.6.4.3. Electronic expansion valve								K	K	K	K
15.6.5. Install								K	PK	PK	PK
15.6.7. Troubleshoot and repair								K	P	PK	PK
15.7. Refrigeration systems:											
15.7.1. Commercial:											
15.7.1.1. Walk in freezers								K	PK	PK	PK
15.7.1.2. Walk in coolers								K	PK	PK	PK
15.7.2. Ice machines								K	PK	PK	PK
15.7.3. Cold storage (permanent/portable)								K	PK	PK	PK
15.7.4. Install								K	PK	PK	PK
15.7.5. Troubleshoot and repair								K	P	PK	PK
15.7.6. Perform preventative maintenance								P	PK	PK	PK
15.8. Refrigeration Controls:											
15.8.1. High pressure & low pressure switches								K	PK	PK	PK
15.8.2. Thermostats (mechanical or digital)								K	PK	PK	PK
15.8.3. Oil pressure safety								K	PK	PK	PK
15.8.4. Condenser fan variable speed drives (VFD)								K	PK	PK	PK
15.9. Capacity Controls:											
15.9.1. Unloaders								K	PK	PK	PK
15.9.2. Hot Gas By-Pass Valves								K	PK	PK	PK
15.10. Air conditioning systems:											
15.10.1. Package units								K	K	K	K
15.10.2. Split systems								K	K	K	K
15.10.3. Heat pumps:											
15.10.3.1. Air to Air								K	K	K	K
15.10.3.2. Water to water								K	K	K	K
15.10.3.3. Water to air								K	K	K	K
15.10.3.4. Geothermal wells vertical & horizontal								K	K	K	K
15.10.4. Variable Refrigerant Flow (VRF)								K	K	K	K
15.10.5. Install									P	PK	PK
15.10.6. Troubleshoot and Repair								P	PK	PK	PK
15.10.7. Perform preventative maintenance								P	PK	PK	PK

1. Tasks, Knowledge And Technical References	2. Tasks		3. Certification For OJT					4. Proficiency Codes Used To Indicate Training/Information Provided via ICW and/or course			
	Core/Cert	Deployment / SEI	A	B	C	D	E	A	B	C	D
			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
15.11. Equipment cooling:											
15.11.1 Computer room air conditioners:											
15.11.1.1. Direct expansion (CRAC)								K	K	K	K
15.11.1.2. Chilled water (CRAH)								K	K	K	K
15.11.2. Humidifiers								K	K	K	K
15.11.3. Mini-split system								K	K	K	K
15.11.4. Install									PK	PK	PK
15.11.5. Troubleshoot and repair									P	PK	PK
15.11.6. Perform preventative maintenance								PK	PK	PK	PK
15.12. Chillers:											
15.12.1. Types:											
15.12.1.1. Air cooled								K	K	K	K
15.12.1.2. Water cooled								K	K	K	K
15.12.1.3. Evaporative condensed chillers								K	K	K	K
15.12.2. Sub-categories of chillers:											
15.12.2.1. Reciprocating								K	K	K	K
15.12.2.2. Centrifugal								K	K	K	K
15.12.2.3. Screw								K	K	K	K
15.12.2.4. Scroll								K	K	K	K
15.12.2.5. Absorption								K	K	K	K
15.12.3. Install									PK	PK	PK
15.12.4. Troubleshoot and repair									P	PK	PK
15.12.5. Perform preventative maintenance								P	PK	PK	PK
16. AIR COMPRESSING EQUIPMENT (non-aircraft generation/non-breathable): TR: AFI32-1068)											
16.1. Types of compressors											
16.1.1. Reciprocating								K	K	K	K
16.1.2. Rotary screws								K	K	K	K
16.1.3. Centrifugal								K	K	K	K
16.2. Auxiliary equipment:											
16.2.1. Aftercoolers								K	K	K	K
16.2.2. Filters								K	K	K	K
16.2.3. Separators								K	K	K	K
16.2.4. Dryers								K	K	K	K
16.3. Install								K	PK	PK	PK
16.4. Troubleshoot and repair								K	P	PK	PK
16.5. Perform preventative maintenance								K	PK	PK	PK

1. Tasks, Knowledge And Technical References	2. Tasks		3. Certification For OJT					4. Proficiency Codes Used To Indicate Training/Information Provided via ICW and/or course			
	Core/Cert	Deployment / SEI	A	B	C	D	E	A	B	C	D
			Tng Start	Tng Complete	Trainee Initials	Trainer Initials	Certifier Initials	A/H	J	C/WL	S
17. WATER TESTING & TREATMENT: TR: AFI 32-1054; BETZ Handbook of Industrial Water Conditioning; Principles of Industrial Water Treatment 9th Ed											
17.1. Water characteristics								K	K	K	K
17.2. Purpose and types of tests								K	K	K	K
17.3. Internal treatment methods:											
17.3.1. Determine and adjust water levels									P	PK	PK
17.3.2. Determine and adjust treatment levels									P	PK	PK
17.3.3. Determine and adjust conductivity									P	PK	PK
17.4. External treatment methods:											
17.4.1. Chemical feeding equipment/condensate return									K	K	K
17.4.2. Environmental requirements									K	K	K
17.4.3. Glycol characteristics:											
17.4.3.1. Chemical constituents (pH, freeze point, additives, etc.)									K	K	K
17.4.4. Perform water treatment									P	PK	PK
18. WORKCENTER MANAGEMENT:											
18.1. NEXGEN-TRIRIGA:											
18.1.1. Input labor									P	PK	PK
18.1.2. Create purchase request									P	PK	PK
18.1.3. Manage Preventative Maintenance (PM) program									P	PK	PK
18.1.4. Schedule work tasks										PK	PK
19. FORMAL TRAINING COURSES:											
19.1. WMGT 100 Air Force Civil Engineer Basic Course (On-demand web course)								X	X	X	X
19.2. WMGT 322 Introduction to Project Management Course (Self-paced on-demand web course)									X	X	X
19.3. Complete WMGT 131 SMS BUILDER Level 1								X	X	X	X
19.4. Complete AFIT WENG 170 Cybersecurity for Control Systems	*							X	X	X	X
19.5. Complete WMGT 231: SMS BUILDER Level 2										X	X
19.6. Complete AFIT WMGT 301 Intro to Asset Management								X	X	X	X
19.7. Complete AFIT WENG 270 Advanced Control Systems Cybersecurity Course	*							X	X	X	X
19.8. Complete AFIT WMGT 322 Project Management									X	X	X
19.9. Complete AFIT WENG 370 Control Systems Cybersecurity for CE Leaders	*									X	X
19.10. WENG 460 Introduction to Mechanical Systems (Self-pace web course)									X	X	X
19.11. WENG 560 Fundamentals of HVAC Design and Analysis (Hybrid)									X	X	X
19.12. WENG 561 Application of HVAC Design and Analysis (In resident)									X	X	X
19.13. WENG 563 HVAC Control Systems (Self-paced web course)									X	X	X
19.14. Civilian Supervisor Course										X	X
19.15. WMGT 571 Operations Flight Civilian Supervisor Course (In resident)										X	X

A3. AFQTP Documentation Record.

A3.1. To ensure each HVAC/R Specialist is trained to the correct standard an AF Qualification Training Package (AFQTP) has been developed for each task group identified in their STS. These AFQTPs are to be used by the trainee, trainer, and certifier in their on-the-job-training program for qualification training and developmental training.

A3.2. These AFQTPs ensure all aspects of the task are covered sufficiently and provide additional task knowledge, in preparation for hands-on training. AFQTPs summarize procedures on a task performance checklist for use by trainers, certifiers, and trainees.

A3.2.1. The UTM or supervisor can download paper based AFQTP's. Paper-based AFQTP's are found on [CE DASH](#) under documents in the AFQTP folder.

A3.2.2. In addition to the paper-based AFQTPs there are web-based courses or assessments developed for certain tasks that are available on [myLearning](#) under AFCEC in the Home Station topic area.

A3.3. Documentation. Before a core or diamond task can be signed off in the JQS section of the individual automated training record, the task must be signed off in the QTP section first.

Attachment 3
3E1X1WG AFQTP Tracker

A3.4. 3E1X1WG AFQTP Tracker.

Tasks, Knowledge, and Technical References	Core/Diamond Tasks		Certification of AFQTPs			
	Core	Deployment	Tng Start	Tng Complete	Trainee Initials	Trainer Initials
CIVIL ENGINEER (CE) COMMON CORE CONCEPTS COURSES						
Accomplish CE 5-Level Core Concepts Course						
Accomplish CE 7-Level Core Concepts Course						
SAFETY						
Demonstrate the safety practices associated when performing PM on HVAC equipment, components, and accessories (P)						
Demonstrate the safety precautions associated with troubleshooting cooling systems (P)						
Perform "Lock out and Tag" procedures on cooling equipment (P)						
Perform first aid procedures for electrical shock (P)						
Identify proper safety procedures to follow on discovery of a gas leak (K)						
Identify relevant safety topics and brief shop personnel to aid in the development of a culture of safety (P)						
AIR DISTRIBUTION & VENTILATION						
Perform preventative maintenance on an Air Handling Unit (AHU) using an AF PMTL (P)						
Replace and adjust a sheave / pulley on a belt driven blower (P)						
Identify & interpret a building indoor air quality (IAQ) inspection/evaluation (P)						
Calculate duct size, using duct sizing formulas for ductwork to be used in a temporary shelter (e.g., KSPAN, LAMS, B-Hut) (P)						
HYDRONICS						
Remove, install, and align centrifugal pumps & various types of pump couplings & seals (P)						
Identify, explain, remove, and install various types of gaskets and packing (P)						
Explain cavitation and demonstrate how to remove air from a hydronic system (P)						
Remove, fabricate, and install black iron pipe and fittings (P)						
ELECTRICAL						
Perform electrical tests and troubleshooting of compressors and motors (1 & 3 Phase) (P)						

Tasks, Knowledge, and Technical References	Core/Diamond Tasks		Certification of AFQTPs			
	Core	Deployment	Tng Start	Tng Complete	Trainee Initials	Trainer Initials
Describe the operation and characteristics of an Electronically Commutated Motor) (K)						
Install different types of motors (e.g., Shaded pole, split phase, PSC, Capacitor start capacitor run, and ECM) (3ph wire for Wye & Delta) (P)						
Isolate and correct malfunctions on a Chiller (P)						
Isolate and correct malfunctions on a hot water and steam boiler (P)						
Isolate and correct malfunctions on a Packaged AC unit (P)						
Isolate and correct malfunctions on a Walk in Refrigerator/Freezer (P)						
CONTROL SYSTEMS (CS)						
WENG 170 - Cybersecurity for Control Systems Course WBT (K)						
Demonstrate how to install typical sensors, actuators, power wiring, and communication wiring (P)						
Describe and test thermistor type & temperature sensors (PTC & NTC) (P)						
Program and operate a basic direct digital controller (P)						
Adjust Building Automation System parameters and explain how to verify the change (P)						
Perform troubleshooting on Building Automation System and correct system malfunctions (P)						
Evaluate and Install a Variable Speed Drive (VSD) & Variable Frequency Drive (VFD) (P)						
HEATING						
Clean, start up, and shut down a hot water Boiler (P)						
Adjust various types of igniters (e.g., Pilot Burner & Electric Spark) (P)						
Complete HVAC MEET 2 Course (Dominate in Cold/Artic Environment) (Contingency) (P)						
COOLING & REFRIGERATION						
Charge refrigerant into a system by the following methods: Weight, Subcooling, Superheat, Charging pressure chart (P)						
Demonstrate proper soldering and brazing techniques (P)						
Remove and install a compressor (5 ton or less system) (P)						
Evacuate a system using a vacuum pump and micron gauge, and explain deep vacuum and triple evacuation method (P)						
Use equipment manufacturer's troubleshooting aids to troubleshoot HVAC system components and accessories (P)						

Tasks, Knowledge, and Technical References	Core/Diamond Tasks		Certification of AFQTPs			
	Core	Deployment	Tng Start	Tng Complete	Trainee Initials	Trainer Initials
Use the manufacturer's literature to perform preventive maintenance (P)						
Safely join tubing by using flare, swag and compression fittings and identify the proper torque setting (P)						
Correctly cut and bend copper tubing (P)						
Isolate and correct mechanical malfunctions in a Cooling and a Refrigeration system (e.g., Coil leaks, oil issues, faulty boards, over/under charge) (P)						
Complete HVAC MEET 1 Course (Dominate in Hot/Desert Environment) (P)						
Install a Commercial Packaged air conditioning unit (P)						
Perform a contingency load estimate to determine the heating and cooling load of temporary shelters (e.g., KSPAN, LAMS, B-Hut) (P)						
PROGRAMS						
Assist shop APIMS program manager (P)						
WORK CENTER MANAGEMENT						
Identify and balance HVAC Preventive Maintenance requirements (i.e., manpower, equipment, materials, etc.) (P)						
Complete AFIT WMGT 301 Intro to Asset Management (P)						
Complete NexGen IT Training (P)						
Complete AFIT WMGT 322: Intro to Project Management (P)						
Communicate with stakeholders (i.e., customers, supervisor, NCOIC, facility managers and contractors) (P)						