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Hazardous Energy Control

QUALIFICATION TRAINING PACKAGE
(QTP)

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Chapter 1

INTRODUCTION

1.1. Overview. This Qualification Training Package (QTP) aligns with the training requirements outlined in 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*, and DAFMAN 91-203, *Air Force Occupational Safety, Fire, and Health Standards*, Chapter 21, *Hazardous Energy Control*, focusing on The Control of Hazardous Energy (Lockout/Tagout). The purpose of this training is to provide thorough and standardized training to personnel, ensuring their qualification to recognize, control, and effectively manage hazardous energy sources in various work environments.

1.1.2. Send comments and suggested improvements on DAF Form 847, Recommendation for Change of Publication, through your MAJCOM/FLDCOM to the Air Force Safety Center (AFSEC) (afscseg@us.af.mil).

1.2. Objectives. The primary objective is to deliver comprehensive and standardized training to personnel, ensuring their qualification to manage hazardous energy effectively in diverse work environments. Covering key aspects of lockout/tagout, the training aims to equip trainees with the knowledge and skills needed for the recognition, control, and implementation of Hazardous Energy Control (HEC) procedures. The program encourages the use of practical examples, case studies, and real-world scenarios to enhance the learning experience.

1.3. Desired Learning Outcomes. The desired learning outcomes include trainees' ability to assess the applicability of regulations in specific work environment, understand the purpose of these regulations in preventing injuries, grasp key definitions and terminology of the HEC program, and implement energy control procedures proficiently.

1.4. Lesson Duration. The recommended training duration for this program is a minimum of eight hours. Depending on the specific workplace and the complexity of the equipment involved, additional time may be required. The goal is to ensure that trainees develop a strong understanding of the regulation and its practical implementation.

1.5. Optional Training, Aids, and Equipment. Enhance the training experience by incorporating various methods to reinforce HEC understanding. This can include inviting experienced personnel to share insights specific to your installation, conducting on-site demonstrations utilizing relevant equipment, organizing mock drills to assess trainees' practical implementation of HEC procedures. As well as reviewing case studies and real-life incidents for a deeper understanding of compliance importance, and offering access to online resources such as videos, articles, and manufacturer instructions.

1.6. QTP Attachments. In addition, this QTP provides several resources to facilitate training.

1.6.1. Attachment 2. Example – Lockout/Tagout Devices Found in the Workplace

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Chapter 2

QTP ROLES AND RESPONSIBILITIES

2.1. Trainer Responsibilities.

2.1.1. Ensure Comprehensive Training: The trainer must ensure that all trainees receive thorough instruction in HEC concepts and procedures using this QTP and relevant regulations.

2.1.2. Conduct Detailed Lectures: Provide in-depth lectures on each aspect of the HEC program, actively addressing questions to enhance trainee understanding.

2.1.3. Integrate Real-World Scenarios: Customize the training program to incorporate real-world scenarios, offering practical insights and examples to reinforce understanding.

2.1.4. Demonstrate HEC Equipment: Illustrate the proper functioning of HEC equipment either through on-site practical demonstrations or by employing examples.

2.1.5. Organize Hands-On Training: Arrange and provide hands-on training during site visits within the work center or at the nearest installation, covering the assessment of a HEC program, equipment inspection, evaluation of documentation, and identification and rectification of hazards.

2.1.6. Collaborate with MAJCOM SEG: Liaise with the respective MAJCOM Safety and Environmental office (SEG) to access pertinent HEC and Lockout/Tagout standards, including ANSI/ASSP Z244.1-2016: *Control of Hazardous Energy: Lockout*.

2.1.7. Administer Multiple-Choice Test: Conduct a Knowledge Check test for the trainee, see **Attachment 11 Knowledge Check** for the test and answer key. Thoroughly review any questions missed by the trainee during the test, ensuring a comprehensive understanding.

2.2. Trainee Responsibilities.

2.2.1. Actively engage in their HEC training program.

2.2.2. Be familiarize with this QTP, relevant HEC regulations, and forms, to include those listed in the **Attachments**.

2.2.3. Effectively communicate with the trainer or supervisor if any aspect of the training is unclear or if there are questions regarding procedures.

2.2.4. Successfully complete the Knowledge Check administered by the instructor with a score of **90% or higher**. See **Attachment 11 Knowledge Check** for the test and answer key. Collaborate with the instructor to review and address any incorrectly answered questions.

Chapter 3

HAZARDOUS ENERGY CONTROL PROGRAM

3.1. Purpose. 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*, and DAFMAN 91-203, *Air Force Occupational Safety, Fire, and Health Standards*, Chapter 21, *Hazardous Energy Control*, establish the HEC (lockout/tagout) program. The focus is on the servicing and maintenance of machines and equipment to prevent injury due to unexpected energization, start-up, or release of stored energy. See **Table 3.1.** for examples.

3.1.1. 29 CFR 1910.147(a)(1)(i) sets forth minimum performance requirements for controlling hazardous energy during servicing and maintenance activities.

3.1.2. Prior to any servicing or maintenance activity where unexpected energizing, start-up, or release of stored energy could cause injury, the machine or equipment must be isolated from the energy source and rendered inoperative.

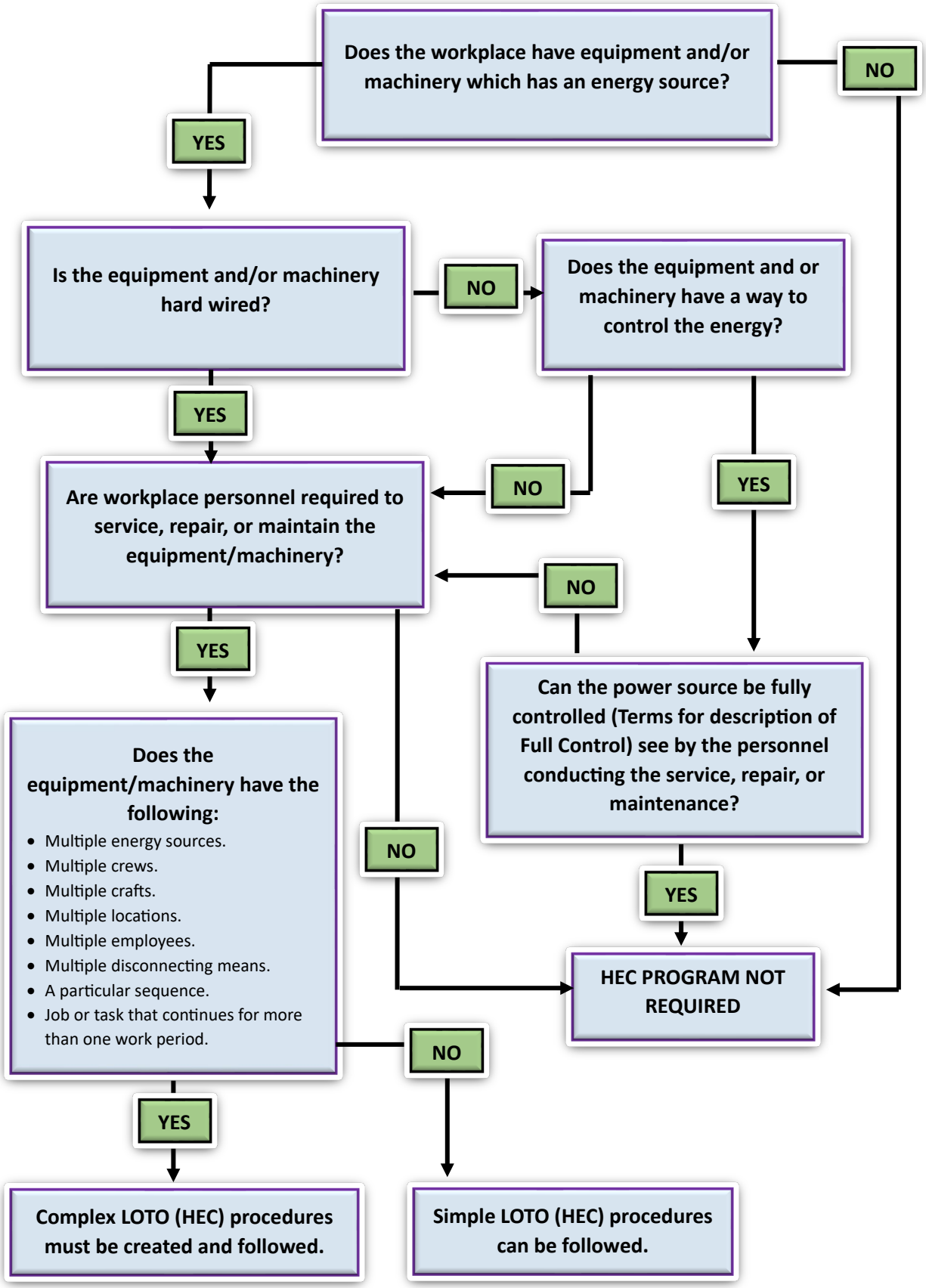
Table 3.1. Common Hazardous Energy Categories and Corresponding Sources.

Category	Hazardous Energy Sources		
Electrical	• Power Transmission Lines • Generators • Machine Power Cords	• Motors • Capacitors • Conductors	• Solenoids • Batteries
Mechanical	• Blades • Materials in supply lines of bins or silos • Springs	• Raised Loads • Reciprocating Motions • Pinch Points • Actuators	• Counterweights • Top or movable part of a press or lifting device Augers
Pressurized Liquids and Gases	• Supply Lines	• Storage Tanks and Vessels	
Hydraulic	• Presses • Rams • Hammers	• Shears • Cylinders	• Punches • Drives Hose and Line Failure
Pneumatic	• Air Lines • Pressure Reservoirs • Accumulators	• Rams • Air Surge Tanks	• Cylinders • Tools
Note: This table is not all-inclusive and only represents common examples. Wind, gravity and kinetic energy need to be considered when controlling hazardous energy. Hand-operated machinery/equipment may store hazardous energy or pose hazards to employees if broken or defective and require the use of this program.			

3.2. Program Implementation. Work center/shop supervisors are directed to establish a comprehensive HEC Program (DAFMAN 91-203, 21.2.). The employer is mandated to institute a program encompassing energy control procedures, employee training, and periodic inspections (29 CFR 1910.147(c)(1)/ DAFMAN 91-203, 21.2.2.). See **Figure 3.1.** for additional guidance.

3.2.1. As part of program development, supervisors shall, when required, create procedures for tagout-only processes. It is imperative that the tagout program demonstrates an equivalent level of safety to that achieved through a lockout program (DAFMAN 91-203, 21.2.1.).

Figure 3.1. Do I need a HEC Program?



3.3. Lockout/Tagout Overview. IAW 29 CFR 1910.147(c)(2)(iii), after January 2, 1990, whenever replacement or major repair, renovation or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment shall be designed to accept a lockout device.

3.3.1. If an energy isolating device is not capable of being locked out, the tagout system shall be utilize (29 CFR 1910.147(c)(2)(i)).

3.3.2. If an energy isolating device is capable of being locked out, lockout shall be utilized, unless the employer can demonstrate that the utilization of a tagout system will provide full employee protection (29 CFR 1910.147(c)(2)(ii)).

3.3.3. When you use a tagout device on a power cutoff device that can be locked, put the tagout device in the same place where you would attach a lockout device. In this situation, the employer must show that the tagout program is just as safe as using a lockout program (29 CFR 1910.147(c)(3)(i)).

3.3.4. To ensure the tagout program is as safe as using a lockout device, the employer must fully comply with tagout-related standards and incorporate extra safety measures, such as removing circuit elements, blocking switches, opening disconnecting devices, or taking out valve handles to prevent accidental activation (29 CFR 1910.147(c)(3)(ii)).

Chapter 4

SCOPE AND EXEMPTIONS

4.1. Scope. The HEC standards and procedures apply specifically to situations where employees engage in servicing and/or maintenance activities, excluding normal production operations (29 CFR 1910.147(a)(2)(ii)).

4.1.1. Notably, during normal production operations, coverage under the standards is limited to instances where employees are required to remove or bypass safety devices, or when their body is introduced into areas where work is conducted on the material being processed (point of operation) or where associated danger zones exist during a machine operating cycle (29 CFR 1910.147(a)(2)(ii)(A)-(B)).

4.1.1.1. Exceptions exist for routine, repetitive, and integral minor tool changes, and adjustments during normal production operations, provided alternative measures ensuring effective protection are implemented.

4.2. Exemptions. The HEC standard does not apply to the following:

4.2.1. Work on cord and plug connected electric equipment if exposure to unexpected energization or start-up is controlled by unplugging the equipment from the energy source, with the plug under the exclusive control of the employee performing servicing or maintenance (29 CFR 1910.147(a)(2)(iii)(A)).

4.2.2. Hot Tap operations involving transmission and distribution systems for substances such as gas, steam, water, or petroleum products when they are performed on pressurized pipelines, provided that the employer demonstrates that (29 CFR 1910.147(a)(2)(iii)(B)):

4.2.2.1. Continuity of service is essential.

4.2.2.2. Shutdown of the system is impractical.

4.2.2.3. Documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.

Chapter 5

HEC PROCEDURES

5.1. Procedures. Procedures for the control of potentially hazardous energy shall be developed, documented, and utilized during relevant activities. IAW DAFMAN 91-203, 21.6., develop and document specific procedures for each piece of equipment identified in the hazardous energy control program unless exempted in 29 CFR 1910.147(a)(2). See **Table 5.1. Common Errors Found Within HEC Documentation** for common errors identified during inspection of HEC procedures.

5.1.1. The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques for the control of hazardous energy (29 CFR 1910.147(c)(4)(ii)).

5.1.2. Procedures will include all steps described in **Table 5.2. Eight-Step Hazardous Energy Control Procedure Checklist** and **Table 5.3. Three-Step Release from Hazardous Energy Control Procedure Checklist** (DAFMAN 91-203, 21.6.).

5.1.3. The means to enforce compliance shall include, but are not limited to the following:

5.1.3.1. A specific statement of the intended use of the procedure.

5.1.3.2. Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy.

5.1.3.3. Specific procedural steps for the placement, removal, and transfer of lockout devices or tagout devices and the responsibility for them.

5.1.3.4. Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

Table 5.1. Common Errors Found Within HEC Documentation.

1	Failure to have written HEC procedures for each separate piece of equipment controlling hazardous energy during service or maintenance activities separate from the Eight-Step Hazardous Energy Control Procedures.
2	Detailed procedures are required for shutting down equipment, isolating energy sources, affixing lockout/tagout devices, verifying de-energization, and releasing stored energy.
3	When writing procedures shift change is not include when shops are manned 24 hours.
4	Failure to provide annual retraining on lockout/tagout procedures. OSHA mandates that authorized employees receive refresher training at least annually on energy control program procedures.
5	Hazardous Energy Control Locks are used for other purpose, such as placed on toolboxes, lockers, cabinets, or cages.
6	Tags being used instead of locks being placed on equipment without following 29 CFR 1910.147 instructions.

Table 5.2. Eight-Step Hazardous Energy Control Procedure Checklist.

The authorized employee shall:	
1. Preparation	Determine if written hazardous energy control procedures for the machinery/equipment are applicable to the task. If so, the authorized employee shall review hazardous energy control procedures and ensure they are followed correctly.
	Prior to shutting down machinery/equipment, the authorized employee must have knowledge of and assess the type (e.g., electrical, mechanical, hydraulic), magnitude (e.g., 120 volts, 60 psi) and hazards of the energy to be controlled, including hidden energy sources such as springs, capacitors, elevated parts, etc. **Warning:** Machinery/equipment may contain more than one type of energy.
2. Notification	Notify all affected employees of the impending shutdown and that they shall not touch hazardous energy control devices or attempt to restart the machinery/equipment until informed it is safe to resume normal operations.
3. Shutdown	Verify it is safe to shut down the machinery/equipment.
	The machinery/equipment shall be turned off or shut down using normal stopping and shutdown procedures (depress stop button, open toggle switch, close shut off valve, etc.).
4. Isolation	Isolate all energy sources by operating (switch off, valve off, etc.) energy-isolating device(s).
	All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).
5. Authorized Lockout/Tagout (LOTO) Device Application	Affix lockout device to hold energy-isolating devices in an "off" or "safe" position that physically prohibits normal operation of the device. If possible, both locks and tags shall be installed.
	Tags shall indicate date, time, reason, and name of the authorized employee installing device.
	To prevent inadvertent or accidental detachment, tags shall be securely attached with a self-locking and non-releasable attachment (e.g., a nylon or plastic cable tie-off strap) with a minimum unlocking strength of 50 pounds.
	For group hazardous energy control procedures, conduct IAW DAFMAN 91-203 paragraph 21.6.1.
6. Verification	Once the system is locked/tagged out, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, or otherwise rendered safe. Insert physical restraints (blocks, chocks) for moving or raised parts, blind flanges for pressurized piping, disconnect springs (if safe to do so), etc., to ensure moving parts are physically restrained or disconnected. Machinery/equipment shall be in a zero-energy state.
	When the equipment to be worked on does not have normal controls, e.g., energy-isolating device, on/off switch, use the following procedure for isolation confirmation. Test potential energy sources using appropriately rated and calibrated instruments or testers. Instruments used to test voltage, pressure or temperature shall be checked for proper operation both before and after use. If the authorized employee is not qualified to test the energy being isolated, he or she shall ensure the energy is tested by a qualified person.
	Physically attempt to operate energy-isolating devices and attempt to restart the equipment or machinery using normal controls. **Caution:** Return energy-isolating devices to "safe" or "off" position after the test.

7. Keep Authorized Hazardous Energy Control Devices in Place	The LOTO device shall remain in place until work on the machinery/equipment is complete.
	When circumstances require testing, adjustment or repositioning of machinery/equipment, it may be necessary to temporarily remove LOTO devices before work is complete to verify functionality. The following sequence of actions shall be used when LOTO devices must be temporarily removed from the energy-isolating device:
	1. Notify all affected employees and supervisors.
	2. Clear machinery/equipment of tools and materials.
	3. Remove all employees from machinery/equipment area and ensure required tools are safely and properly positioned.
	4. Remove all repositioning and blocking devices and return all vents and valves to normal operating positions.
	5. Remove all grounding/shorting conductors, hooks, or wands.
	6. Don any required PPE.
	7. Energize and proceed with testing or positioning.
	8. De-energize all systems; reapply hazardous energy control measures; notify all affected employees and supervisors; and continue servicing, maintenance or modification of equipment or machinery.
8. Before Restoring Machinery Equipment to Service	The authorized employee will ensure the steps in ***Three-Step Release from Hazardous Energy Control Procedure Checklist*** are followed in order. **Note:** When the authorized employee is unavailable, follow 29 CFR 1910.147(e)(3).
Note: Review 29 CFR 1910.147(d)(1) through 1910.147(d)(6)	

Figure 5.3. Three-Step Release from Hazardous Energy Control Procedure Checklist.

1. Preparation and Notification	Before removing LOTO devices and reenergizing machinery/equipment, the authorized employee shall:
	1. Notify all affected employees the system is ready for return to service. Ensure all personnel are clear of the equipment point of operation and other hazard zones.
	2. Inspect the work area and ensure all tools, debris and non-essential personnel are removed or are a safe distance from the machinery/equipment.
	3. Replace safety guards, inspect machinery/equipment, and ensure guards are operational.
2. Removal of Additional Devices	Remove any additional devices applied in accordance with hazardous energy control application.
	Remove all safety grounding devices.
	Verify the work for which hazardous energy control was applied is complete and it's safe to reenergize the machinery/equipment.
3. Removal of all LOTO Devices	Each LOTO device shall be removed only by the authorized employee who applied it. When the authorized employee who applied the device is not available to remove it, their supervisor may remove the device IAW DAFMAN 91-203 paragraph 21.6.3. This is considered an emergency procedure, undertaken only in extreme circumstances, e.g., use of machinery/equipment is required immediately.
	Authorized employees shall remove all LOTO devices and restore the energy-isolating device to the "ON" position.
	Notify all employees the hazardous energy control condition has been cleared (LOTO devices removed) and machinery/equipment is ready for service.
	Energize the machinery/equipment and restore to normal operating condition.

5.2. Exceptions to Documentation. IAW 29 CFR 1910.147(c)(4)(i) the employer is not required to document the procedure for a specific machine or equipment if the following conditions are met:

5.2.1. The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutting down which could endanger employees.

5.2.2. The machine or equipment has a single energy source that can be readily identified and isolated.

5.2.3. The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment.

5.2.4. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.

5.2.5. A single lockout device will achieve a locked-out condition.

5.2.6. The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.

5.2.7. The servicing or maintenance does not create hazards for other employees.

5.2.8. The employer, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

Chapter 6

ELECTRICALLY SAFE WORK CONDITION

6.1. DAFMAN 91-203, 21.7. outlines the procedures for controlling hazardous energy when establishing an electrically safe work condition, as mandated by NFPA 70E, *Electrical Safety in the Workplace*, Article 120.

6.2. Simple Lockout/Tagout Procedure: A basic lockout/tagout procedure involves an authorized person(s) de-energizing a single set of conductors or circuit part source solely to protect employees from electrical hazards. No written documentation is mandated for each instance of a basic lockout/tagout. Instead, individual responsibility is assigned to authorized employees, and they are accountable for their own lockout/tagout procedures (DAFMAN 91-203, 21.7.1.).

6.3. Complex Lockout/Tagout:

6.3.1. A complex lockout/tagout procedure is necessary under the following conditions (DAFMAN 91-203, 21.7.2.1.):

6.3.1.1. Involvement of multiple energy sources, such as electrical and other sources.

6.3.1.2. Participation of multiple crews.

6.3.1.3. Engagement of multiple crafts.

6.3.1.4. Operations at multiple locations.

6.3.1.5. Inclusion of multiple employers.

6.3.1.6. Utilization of multiple disconnecting means.

6.3.1.7. Specific sequences are involved.

6.3.1.8. The job or task extends for more than one work period.

6.3.2. Complex lockout/tagout procedures must be accompanied by a written plan of execution in identifying the person(s) in charge (DAFMAN 91-203, 21.7.2.2.).

6.3.3. Primary responsibility for executing the complex lockout/tagout procedure rests with an authorized employee overseeing those working under the protection of a group lockout or tagout device, such as an operation lock or lockbox. The person(s) in charge is held accountable for the safe execution of the complex lockout/tagout (DAFMAN 91-203, 21.7.2.3.).

6.3.4. Each authorized employee must attach a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when initiating work. Removal of these devices is mandatory when the employee concludes work on the serviced or maintained machine or equipment (DAFMAN 91-203, 21.7.2.4.).

6.3.5. All complex lockout/tagout plans must specify the method for accounting for all individuals potentially exposed to electrical hazards during the lockout/tagout process (DAFMAN 91-203, 21.7.2.5.).

Chapter 7

TRAINING

7.1. Employee Training. The employer, as mandated by 29 CFR 1910.147(c)(7)(i), shall provide comprehensive training to ensure employees understand the purpose and function of the energy control program. Training shall equip authorized employees with the knowledge and skills for the safe application, usage, and removal of energy controls. Training shall include:

7.1.1. Recognition of hazardous energy sources, the type and magnitude of energy in the workplace, and methods for energy isolation and control (29 CFR 1910.147(c)(7)(i)(A)).

7.1.2. Instruction for affected employees on the purpose and use of energy control procedures (29 CFR 1910.147(c)(7)(i)(B)).

7.1.3. Instruction for other employees in areas where energy control procedures may be utilized, including the prohibition against attempts to restart or reenergize locked out or tagged out machines or equipment (29 CFR 1910.147(c)(7)(i)(C)).

7.1.4. When tagout systems are used, employees shall also be trained in the following limitations of tags (29 CFR 1910.147(c)(7)(ii)(A)-(F)):

7.1.4.1. Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.

7.1.4.2. When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.

7.1.4.3. Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, to be effective.

7.1.4.4. Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.

7.1.4.5. Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.

7.1.4.6. Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

7.2. Employee Retraining. Retraining is required for authorized and affected employees in the event of job assignments changes, new hazards, alterations in machinery, equipment, processes, or deviations from energy control procedures (29 CFR 1910.147(c)(7)(iii) / DAFMAN 91-203, 21.3.2).

7.2.1. Retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary (29 CFR 1910.147(c)(7)(iii)(C)).

7.3. Certification and Documentation.

7.3.1. The employer shall certify that employee training is completed and up to date, including each employee's name and training dates (29 CFR 1910.147(c)(7)(iv) / DAFMAN 91-203, 21.3.1).

7.3.2. Documentation of all related training activities shall be maintained IAW DAFI 91-202, *The US Air Force Mishap Prevention Program*. Documentation methods encompass various methods, including but not limited to the AF Form 55, Employee Safety and Health Record. Additionally, electronic mediums like AFFORMs/MAF 42, LOG C2/G081, or locally created products can be utilized (DAFI 91-202, 1.6.28.7.1).

Chapter 8

ADDITIONAL HEC REQUIREMENTS

8.1. Testing or Positioning of Machines, Equipment or Components Thereof. In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment, or component thereof, the following sequence of actions shall be followed:

8.1.1. Clear the machine or equipment of tools and materials IAW 29 CFR 1910.147(e)(1).

8.1.2. Remove employees from the machine or equipment area IAW 29 CFR 1910.147(e)(2).

8.1.3. Remove the lockout or tagout devices as specified in 29 CFR 1910.147(e)(3).

8.1.4. Energize and proceed with testing or positioning.

8.1.5. Deenergize all systems and reapply energy control measures IAW 29 CFR 1910.147(d), continue the servicing and/or maintenance.

8.2. Group Lockout or Tagout. When servicing or maintenance is conducted by a crew, craft, department, or other group, a procedure ensuring an equivalent level of protection to personal lockout or tagout devices shall be employed IAW 29 CFR 1910.147(f)(3)(i).

8.2.1. Designate an authorized employee with primary responsibility for a set number of employees working under the protection of a group lockout or tagout device (e.g., operations lock) (29 CFR 1910.147(f)(3)(ii)(A)).

8.2.2. Provide a mechanism for the authorized employee to determine the exposure status of individual group members regarding the lockout or tagout of the machine or equipment (29 CFR 1910.147(f)(3)(ii)(B)).

8.2.3. In cases involving more than one crew, craft, or department, assign overall job-associated lockout or tagout control responsibility to an authorized employee designated to coordinate affected workforces and ensure continuity of protection (29 CFR 1910.147(f)(3)(ii)(C)).

8.2.4. Each authorized employee shall attach a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism at the start of work and remove these devices when work ceases on the serviced or maintained machine or equipment (29 CFR 1910.147(f)(3)(ii)(D)).

8.3. Group Verification Procedure (DAFMAN 91-203, 21.6.2.).

8.3.1. Group hazardous energy control procedures shall include a walkthrough by authorized employees to verify isolation at each lockout/tagout device.

8.3.2. After verification, each authorized employee participating in the group Lockout/Tagout shall affix their personal devices to the group lockout/tagout box before initiating servicing or maintenance.

8.3.3. In cases where there is a potential for the release or re-accumulation of hazardous energy, the verification of isolation must be continued.

8.3.4. Employee Rights. All group Lockout/Tagout authorized employees must be informed of their right to verify the effectiveness of the hazardous energy control procedure and confirm that hazardous energy sources have been effectively isolated.

8.4. Shift or Personnel Changes. Specific procedures shall be implemented during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, minimizing exposure to hazards from the unexpected energization, start-up, or the release of stored energy (29 CFR 1910.147(f)(4) / DAFMAN 91-203, 21.6.4.).

8.5. Exception - Lockout or Tagout Devices Removal.

8.5.1. Each person who applied a lockout or tagout device must be the one to take it off from each energy isolating device. An exception is if the person who applied the device is not around to remove it; in that case, the employer can instruct someone else to remove it. However, there must be specific procedures and training for this removal, documented and included in the employer's energy control program. The employer must show that these procedures are just as safe as having the person who applied the device remove it (29 CFR 1910.147(e)(3)).

8.5.2. The specific procedure should include at least the following elements:

8.5.2.1. Verification by the employer that the authorized employee who applied the device is not at the facility (29 CFR 1910.147(e)(3)(i)).

8.5.2.2. Making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed (29 CFR 1910.147(e)(3)(ii)).

8.5.2.3. Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility (29 CFR 1910.147(e)(3)(iii)).

8.5.2.4. Individual employee device removal indicates that employees are no longer exposed to the hazards from the servicing or maintenance operation (DAFMAN 91-203, 21.6.3.).

8.6. Contractors. Interaction with contractors will be in accordance with DoDI 6055.01, *DoD Safety and Occupational Health (SOH) Program*, AFI 91-202, *The US Air Force Mishap Prevention Program* and 29 CFR 1910.147(f)(2). These details will be specified in the contract (DAFMAN 91-203, 21.8.).

Chapter 9

PROGRAM INSPECTION

9.1. Periodic Inspection. IAW 29 CFR 1910.147(c)(6), the employer shall conduct periodic inspections of the HEC Program to ensure compliance with the standard and its requirements.

9.1.1. These inspections, performed at least annually, are designed to identify, and rectify any deviations or inadequacies observed in the energy control procedures (29 CFR 1910.147(c)(6)(i)).

9.1.2. Periodic inspections shall be conducted by an authorized employee, distinct from those utilizing the energy control procedure being inspected (29 CFR 1910.147(c)(6)(i)(A)).

9.1.3. IAW DAFMAN 91-203, 21.4.1., shop periodic inspections shall be conducted by authorized employees, with one acting as an inspector and another performing maintenance/servicing activities.

9.1.4. For equipment using lockout, the inspection shall include a review, between the inspector and each authorized employee, of their responsibilities under the energy control procedure (29 CFR 1910.147(c)(6)(i)(C)).

9.1.5. For equipment using tagout, the inspection shall include a review, between the inspector and each authorized and affected employee, of their responsibilities under the energy control procedure and elements outlined in section (c)(7)(ii) of 29 CFR 1910.147 (29 CFR 1910.147(c)(6)(i)(D)).

9.2. Inspection Requirements. IAW DAFMAN 91-203, 21.4.1.1. through 21.4.1.5., inspection requirements include:

9.2.1. Identification of equipment covered by the hazardous energy control program.

9.2.2. Review of each employee's responsibilities under the program.

9.2.3. Verification of current and documented training.

9.2.4. Review of hazardous energy control procedures with authorized employees, including a demonstration of required practices.

9.2.5. Out brief to the shop or unit supervisor, documented in the written report.

9.3. Certification Requirements. IAW 29 CFR 1910.147(c)(6)(ii)) and DAFMAN 91-203, 21.4.1., the organization shall certify that periodic inspections have been performed. The certification shall include:

9.3.1. Machine or equipment details where the energy control procedure was utilized.

9.3.2. Date of inspection.

9.3.3. List of employees included in the inspection.

9.3.4. Name of the person performing the inspection.

9.4. Ensuring Compliance. A qualified occupational safety inspector shall review the annual self-inspection hazardous energy control report during the organization’s safety assessment to ensure compliance (DAFMAN 91-203, 21.4.2.).

Chapter 10

MATERIALS AND HARDWARE

10.1. Compliance and Availability. IAW 29 CFR 1910.147(c)(5), the employer shall provide locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware for isolating, securing, or blocking machines or equipment from energy sources. IAW DAFMAN 91-203, 21.5.2., functional managers or supervisors shall ensure an adequate supply of energy-isolating devices is available. See **Attachment 2 Example – Lockout/Tagout Devices Found in the Workplace** for example of common devices used.

10.2. Specific Requirements. IAW 29 CFR 1910.147(c)(5) and DAFMAN 91-203, 21.5.1., lockout/tagout devices shall meet the following requirements:

10.2.1. Durability.

10.2.1.1. Devices shall withstand environmental exposure for the expected duration.

10.2.1.2. Tagout devices shall resist deterioration in corrosive environments.

10.2.2. Standardization.

10.2.2.1. Devices shall be standardized within the facility based on color, shape, or size.

10.2.2.2. Tagout devices shall follow standardized print and format.

10.2.3. Substantial.

10.2.3.1. Lockout devices shall prevent removal without excessive force.

10.2.3.2. Tagout devices and attachments shall prevent inadvertent removal and be non-reusable, self-locking, and non-releasable with a minimum unlocking strength of 50 pounds.

10.2.4. Identifiable.

10.2.4.1. Devices shall indicate the identity of the employee applying them.

10.2.5. Warning Labels.

10.2.5.1. Tagout devices shall include a warning against hazardous conditions if the machine or equipment is energized, with legends such as: Do Not Start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate.

10.2.6. Keying.

10.2.6.1. Devices shall be singularly keyed, with only authorized employees retaining the key(s) when in use (DAFMAN 91-203, 21.5.1.).

10.3. Tag Supplements. When using tags, at least one additional safety measure shall supplement the tag to provide a level of safety equivalent to a lock (DAFMAN 91-203, 21.5.).

10.4. Tag Forms. AF Form 983, Danger – Equipment Lockout Tag, or DoD tag, or commercial equivalent tags, shall be used with energy-isolating devices (DAFMAN 91-203, 21.5.2.).

Chapter 11

MISHAP PREVENTION TAGS

11.1. Mishap Prevention Tags. Mishap prevention tags include, but are not limited to: Danger, Warning, Caution, Out of Order and Do Not Start. These tags shall meet requirements describe in DAFI 91-202, *The Us Air Force Mishap Prevention Program* and 29 CFR 1910.145, *Specifications for Accident Prevention Signs and Tags*. Tag text shall be provided by, and the reverse side completed by, the responsible on-duty supervisor.

11.2. AF Form 979 - Danger Tag.

11.2.1. Danger tags, including equivalent DoD and commercial danger tags, are reserved for immediate hazards (RAC 1 through 3) requiring specific precautions for personnel or property protection, as mandated by Technical Orders or other manuals (DAFMAN 91-203, 17.5.2.1.).

11.2.2. Placement: Attach Danger tags to damaged equipment, ensuring immediate action to take the equipment out of service until repaired. Tag wording must read “DO NOT USE THIS EQUIPMENT” or “DEFECTIVE EQUIPMENT, DO NOT USE”.

11.3. Warning Tags.

11.3.1. Warning tags, equivalent to DoD and commercial tags, identify items with the potential to cause equipment damage, or death or serious injury to personnel (DAFMAN 91-203, 17.5.2.2.).

11.3.2. Hazard Classification: Events posing hazards between "Caution" and "Danger" fall under warnings. For guidance, contact the unit supervisor, installation Occupational Safety office, Fire & Emergency Services (F&ES) Flight, or Bioenvironmental Engineering (BE) Flight.

11.4. AF Form 980 - Caution Tag. Caution tags, equivalent to DoD and commercial tags, apply where hazards pose a threat of equipment damage or present a lesser threat of worker injury (DAFMAN 91-203, 17.5.2.3.).

11.5. AF Form 981 - Out of Order Tag.

11.5.1. Out of Order tags, equivalent to DoD and commercial tags, indicate hazardous equipment outages (DAFMAN 91-203, 17.5.2.4.).

11.5.2. Reparable Equipment: For reparable equipment, a Technical Order (TO) prescribed green tag may replace the Out of Order tag. Annotate applicable equipment records. Lock the energy source per DAFMAN 91-203 Chapter 21 if its activation could cause injury or damage.

11.6. AF Form 982 - Danger Tag: Do Not Start.

11.6.1. Do Not Start tags, equivalent to DoD and commercial tags, are for alerting hazards associated with restarting equipment for a short period until the energy isolating device can be locked out (DAFMAN 91-203, 17.5.2.5.).

11.6.2. Placement: Attach Do Not Start tags conspicuously, effectively blocking the starting mechanism if the equipment is energized. May be used in conjunction with AF Form 979. On-duty supervisors are responsible for attachment; contact appropriate safety office if in doubt.

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

ANSI/ASSP Z244.1-2016: *Control of Hazardous Energy: Lockout*

DAFI 91-202, *The Us Air Force Mishap Prevention Program*, 12 March 2020

DAFMAN 91-203, *Air Force Occupational Safety, Fire, and Health Standards*, 25 March 2022

DoDI 6055.01, *DoD Safety and Occupational Health (SOH) Program*

NFPA 70E, *Electrical Safety in the Workplace*, Article 120

29 CFR 1910.145, *Specifications for Accident Prevention Signs and Tags*

29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*

Abbreviations and Acronyms

BE–Bioenvironmental Engineering

F&ES –Fire & Emergency Services

HEC –Hazardous Energy Control

LOTO –Lockout/Tagout

QTP –Qualification Training Package

TO –Technical Order

Terms

Affected Employee–An employee whose job requires him/her to operate or use a machine or equipment on which servicing, or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

Authorized Employee–A person who locks out or tags out machines or equipment to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

Capable of Being Locked Out–An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

Energized–Connected to an energy source or containing residual or stored energy.

Energy Isolating Device–A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

Energy Source–Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Full Control–When the power source is in the direct vicinity and view of the member removing all possibility of someone attempting to apply power to the equipment.

Hot Tap–A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels, or tanks) under pressure, to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

Lockout–The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout Device–A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.

Normal Production Operations–The utilization of a machine or equipment to perform its intended production function.

Servicing and/or Maintenance–Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and adjusting or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

Tagout–The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout Device–A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Attachment 2

EXAMPLE – LOCKOUT/TAGOUT DEVICES FOUND IN THE WORKPLACE

Cable Lockout

Circuit Breaker Lockout

Gas Cylinder Lockout

Wall Switch Lockout

Lockout Hasp

Group Lockout Box

Valve Lockout

Lockout Padlock

Plug Lockout

Attachment 3

EXAMPLE – HEC INSPECTION SHEET

HEC Inspection Sheet	
Location:	Date:
System/Equipment Under Maintenance:	
Authorized Worker(s)	
Name:	Name:
AFSC:	AFSC:
Types of Energy Being Isolated (circle)	
Electrical Chemical Hydraulic Pneumatic	
Mechanical Steam Gas / Other:	
Inspection Questions	
1. Has equipment or machinery being isolated had a hazard assessment to identify all sources of energies present? Yes / No	
2. If equipment or machinery energy(s) cannot be controlled by a single source, are specific procedures written and posted? Yes / No	
3. Has authorized worker(s) received training and shown satisfactory knowledge of procedure requirements? Yes / No	
4. Have authorized worker(s) been issued locks, tags and other devices as needed? Yes / No	
5. Did authorized worker(s) verify system/equipment energy(s) was isolated before conducting maintenance? Yes / No	
Notes / Comments / Recommendations:	
Inspector's Signature: _____ Location: _____ Date: _____	
Note: This is a tool and does not replace established checklists or procedures.	

Attachment 4

EXAMPLE - HEC PROCEDURES CHECKLIST

HEC Procedure Checklist		
NOTIFICATION: I have notified all affected employees that a lockout is required and of the reason for the lockout.		
Date:	Time:	Signature:
SHUTDOWN: I understand the reason the equipment is to be shutdown following normal procedures.		
Date:	Time:	Signature:
DISCONNECTION OF POWER SOURCES: I have operated the switch, valve, or other energy isolating device(s) so that each energy source (electrical, mechanical, hydraulic, etc.), has been disconnected or isolated from the equipment. I have dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc. all stored energy (such as capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems and air, gas, steam, or water pressure).		
Date:	Time:	Signature:
LOCKOUT: I have locked out the energy isolating devices with assigned and check marked individual locks.		
Date:	Time:	Signature:
SAFETY CHECK: After ensuring that no personnel are exposed, and as a check on having disconnected all energy sources, I have operated that start button or other normal operating controls to make certain that the equipment will not operate.		
Date:	Time:	Signature:
The Equipment is Now Locked Out		
RESTORING EQUIPMENT TO SERVICE - EQUIPMENT/PERSONNEL CHECK: All equipment and personnel have been cleared from the area and there is no danger to either one.		
Date:	Time:	Signature:
START-UP: All locks have been removed and the energy isolating devices may now be operated to restore energy to the equipment.		
Date:	Time:	Signature:
JOB COMPLETION/CERTIFICATION: The job has been completed and the equipment has been tested by me and found to be in proper working order.		
Date:	Time:	Signature:

Attachment 5

EXAMPLE – LOCKOUT / TAGOUT PROCEDURES

The following is a step-by-step guide to implementing the HEC program for a Power Roller.

NOTE: This equipment is powered with 230 volts, 60 hertz. **CAUTION:** Electric shock can kill.

HAZARDOUS ENERGY PROCEDURES

Step 1. Refer to the Hazardous Energy procedures before attempting to lock any machines.

Step 2. Notify all affected employees of the impending shutdown and that they shall not touch hazardous energy control devices or attempt to restart the machinery/equipment until informed it is safe to resume normal operations.

Step 3. If this equipment is operating, shut the machine down by turning the power knob to the off position located on the control panel.

Step 4. Turn off the lever on the side of the machine to "Service disconnect position."

Step 5. On the left side of the Service disconnect position lever, apply the red "danger do not operate" tags to the lock with a zip tie and lock.

Step 6. After ensuring that no personnel are exposed, turn the control power to the "ON" position to make certain the machine is locked out.

Step 7. The hazardous energy device shall remain in place until work on the machinery/equipment is complete.

Step 8. Verify all steps are completed.

RETURNING TO SERVICE

Step 1. Notify all personnel that the machine is being restored to operation.

Step 2. Remove the lock/tags on the Service disconnect position level and switch the lever to the “On Position.”

Step 3: Energize the equipment by turning the power knob to the on position located on the control panel restoring normal operating condition. Notify all employees the hazardous energy control condition has been cleared and machinery/equipment is ready for service.

Attachment 6

EXAMPLE – HEC SELF-ASSESSMENT TOOL

Facility:	Equipment ID:	
Responsible Worker(s):		
Appraisal Conducted by:		Date:
HEC Program Requirements	**Satisfactory (Yes/No)**	**Comments**
Written lockout/tagout procedures		
Manufactures Manual available		
Management responsibilities understood		
Authorized worker responsibilities		
Lockout/tagout procedure review		
Correct lockout/tagout sequences		
Communication with contractors working on site, as required.		
Record and documentation system established		
Training for authorized workers		
Roles and responsibilities		
Periodic retraining completed, if applicable		
Refresher training completed		
Training records maintained, AF IMT 55		
Standardized locks used		
AF-standardized tags used		
Lockout devices available to workers		
Annual inspections conducted		
Tagout-only procedure established		
Lockout/tagout records completed		
Removing locks in absence of authorized workers is documented		
Group lockout/tagout procedure established		
Shift/schedule change procedure established		
Procedures followed during program execution		
Additional Comments/Recommendations:		

Attachment 7

EXAMPLE - ANNUAL HEC PROGRAM INSPECTION

Annual HEC Self-Assessment

Assessment Conducted by Name: _____
(Must be accomplished by an "Authorized Worker")

Signature: _____ Date: _____

SQ/Unit: _____ Bldg.#: _____

HEC Procedures Demonstrated by:
_____

Member is proficient and has adequate knowledge of procedures and equipment: Yes / No

Comments:
_____

Date of last Self-Assessment by "Authorized Worker": _____

Note: Strongly recommend conducting the self-assessment 6 months after your annual inspection. Wing Safety inspects the "self-assessments" and "annual inspections" of each SQ/Unit to ensure compliance.

Inspected Program Elements (at a minimum)	**Satisfactory (Yes / No)**	**Comments (Required)**
Validate the list identifying all equipment and machinery for which the HEC program is current and complete.		
Accomplish a thorough review of each workers responsibilities under the program.		
Ensure all necessary training has been conducted, is current, and properly documented.		

Additional Comments, Recommended Improvement Areas or Corrective Actions Needed: *(Additional space is availableon the backside of this form)*

Attachment 8

EXAMPLE - SHOP LEVEL PERIODIC HEC PROGRAM INSPECTION

Periodic HEC Inspection		
Inspection Conducted by Name:		
Note: Must be accomplished by the inspector, recommend using members from other shops who are trained as an "Authorized Worker" but do not use the shop energy control procedures. Signature: _____ Date: _____ SQ/Unit: _____ Bldg.#: _____		
HEC Procedures Demonstrated by: _____ Member is proficient and has adequate knowledge of procedures and equipment: Yes / No Comments: _____		
Date of last Self-Assessment by "Authorized Worker": _____ **Note:** Strongly recommend conducting the self-assessment 6 months after your annual inspection. Wing Safety inspects the "self-assessments" and "annual inspections" of each SQ/Unit to ensure compliance.		
Inspected Program Elements (at a minimum)	**Satisfactory (Yes / No)**	**Comments (Required)**
Review HEC procedures with authorized workers.		
Review the previous self-assessment report and ensure any deviations or inadequacies were resolved and compliance has been achieved.		
Ensure all necessary training has been conducted, is current, and properly documented.		
Additional Comments, Recommended Improvement Areas, or Corrective Actions Needed:		
Shop / Unit Supervisor Out Brief conducted on this date: _____ Name & Signature of Shop / Unit Supervisor briefed: _____		

Attachment 9

EXAMPLE - ANNUAL REVIEW LOGS

Authorized Worker or Supervisor Representative Annual Review

Review Date	Print Name	Signature

Periodic Inspections

Review Date	Print Name	Signature

Occupational Safety High-Interest Spot Inspection

Review Date	Print Name	Signature

Attachment 10

EXAMPLE – HEC LOG

Lockout/Tagout Log							
Lock Number	Date Applied	Equipment Description	Equipment ID/Serial Number	Reason Applied (maintenance, service, inspection, other)	Name	Date Removed	Review (Initial/Date)
Note: A log should be used to document the use, location, and review of Lockout/Tagout, where appropriate. This is a tool and does not replace established documents or procedures.							

Attachment 11

EXAMPLE - LIST OF AUTHORIZED PERSONNEL

Personnel authorized to Lockout/Tagout	Office Symbol	Duty Phone

Attachment 12

KNOWLEDGE CHECK

1. What Department of the Air Force publication covers Hazardous Energy Control program requirements?
   A. DAFI 91-204
   B. DAFMAN 91-203
   C. AFMAN 99-205

2. What OSHA publication covers the control of Hazardous Energy (Lockout/Tagout)?
   A. 29 CFR 1926. 147
   B. 29 CFR 1910.147
   C. DAFMAN 91-203

3. True or False: Common hazardous energy categories include Pressurized Liquids and Gases?
   A. True
   B. False

4. True or False: It is imperative that the tagout program demonstrates a DIFFERENT level of safety to that achieved through a lockout program?
   A. False
   B. True

5. If an energy isolating device is not capable of being locked out, what can be utilized?
   A. Nothing, a lock out must be used no matter what.
   B. Anything approved by the Commander.
   C. The tagout system.

6. True or False: There are NO exceptions to the development, documentation, and utilization of energy control procedures?
   A. True
   B. False

7. True or False: Hot tap operations involve transmission and distribution systems for substances such as gas, steam, water, or petroleum products?
   A. True
   B. False

8. What should HEC procedures document?
   A. Emergency numbers.
   B. Projected incoming equipment.
   C. Specific procedures for each piece of equipment identified.

9. What is Step 1 of the Eight-Step HEC Procedure checklist?
   A. Shutdown
   B. Preparation
   C. Device Application

10. From the “Verification” step within the Eight-Step HEC Procedure Checklist, what is one way the worker can ensure the equipment is properly isolated?
    A. Physically attempt to operate and restart the equipment.
    B. Verifying a lock is attached to the junction box.
    C. Notifying their supervisor.

11. From the “Preparation and Notification” step within the Three-Step Release from Hazardous Energy Control Procedure Checklist, what must be done before a lock and tag are removed?
    A. Notify all affected employees the system is ready for return to service.
    B. Notify the supervisor.
    C. Annotate the lock being removed.

12. What National Fire Protection Association (NFPA) establishes standard for Electrical Safety in the workplace?
    A. NFPA 70E
    B. NFPA 30B
    C. NFPA 13D

13. Who is held accountable for safe execution of the Complex Lockout/Tagout?
    A. The employer
    B. The supervisor
    C. The person(s) in charge.

14. What is a requirement when conducting complex lockout/tagout procedures?
    A. Supervisor approval.
    B. A written plan of execution.
    C. Secure multiple locks and tags.

15. IAW the OSHA HEC regulation, who provides training to each authorized employees on the purpose and function of the energy control program?
    A. The Employer
    B. The Commander
    C. The equipment operator.

16. Who requires HEC training?
    A. Authorized Employees
    B. Affected Employees
    C. All the Above

17. What is a limitation of tags?
    A. Tags may evoke a false sense of security.
    B. Tags are essentially warning devices.
    C. Both A&B

18. What is/are reason(s) to provide energy control program retraining to all authorized and affected employees?
    A. Alterations in machinery, equipment, processes.
    B. Shift Change.
    D. When directed by the supervisor.

19. What is NOT a way to document HEC training?
    A. AF Form 55 Employee Safety and Health Record
    B. AFFORMs/MAF 42.
    C. Job Safety Training Outline (JSTO.)

20. For Group Lockout or Tagout, each authorized employee shall attach a personal lockout or tagout device?
    A. True
    B. False

21. When is it acceptable to remove a lockout/tagout device by an employee who DID NOT apply the device?
    A. Anytime you know that another employee will be working the job.
    B. When the specific procedures and training for such removal have been developed, documented, and incorporated into the employer's energy control program.
    C. Never, this is a serious violation.

22. What is a HEC program requirement during shift or personnel changes?
    A. Provision for the orderly transfer of lockout or tagout device(s).
    B. Transfer of physical locks from person to person.
    C. Signature of consent forms.

23. Interaction with contractors will be IAW?
    A. AFI 91-202.
    B. DoDI 6055.01
    C. All the above.

24. IAW OSHA HEC regulation, how often must periodic inspections of HEC procedures be conducted?
    A. Monthly
    B. Never
    C. At least annually.

25. What must be reviewed during the HEC program periodic inspections?
    A. Employee’s responsibilities under the program.
    B. Previous monthly inspections.
    C. The job safety training outlined.

26. Who ensures an adequate supply of energy-isolation devices if available?
    A. Functional Manager
    B. Commander
    C. Supply Custodian

27. True or False: Devices shall be singularly keyed, with only authorized employees retaining the key(s) when in use?
    A. True
    B. False

28. What is the AF Form 981?
    A. Out of Order Tag.
    B. Warning Tag.
    C. Danger Tag: Do Not Start.

29. Which tag is reserved for immediate hazards (RAC 1 through 3) requiring specific precautions for personnel or property protection?
    A. AF Form 979 Danger Tag.
    B. AF Form 980 Caution Tag.
    C. AF Form 982, Do Not Start Tag.

30. A Lockout Device is a device used to:
    A. prevent the energizing of a machine or equipment.
    B. hold an energy isolating device in a safe position.
    C. Both A&B

KNOWLEDGE CHECK – ANSWER KEY

1. What Department of the Air Force publication covers Hazardous Energy Control program requirements?
   A. DAFI 91-204
   B. DAFMAN 91-203 (pg. 4)
   C. AFMAN 99-205

2. What OSHA publication covers the control of Hazardous Energy (Lockout/Tagout)?
   A. 29 CFR 1926. 147
   B. 29 CFR 1910.147 (pg. 4)
   C. DAFMAN 91-203

3. True or False: Common hazardous energy categories include Pressurized Liquids and Gases?
   A. True (pg. 7)
   B. False

4. True or False: It is imperative that the tagout program demonstrates a DIFFERENT level of safety to that achieved through a lockout program?
   A. False (pg. 7)
   B. True

5. If an energy isolating device is not capable of being locked out, what can be utilized?
   A. Nothing, a lock out must be used no matter what.
   B. Anything approved by the Commander.
   C. The tagout system. (pg. 9)

6. True or False: There are NO exceptions to the development, documentation, and utilization of energy control procedures?
   A. True
   B. False (pg. 10)

7. True or False: Hot tap operations involve transmission and distribution systems for substances such as gas, steam, water, or petroleum products?
   A. True (pg. 10)
   B. False

8. What should HEC procedures document?
   A. Emergency numbers.
   B. Projected incoming equipment.
   C. Specific procedures for each piece of equipment identified. (pg. 11)

9. What is Step 1 of the Eight-Step HEC Procedure checklist?
   A. Shutdown
   B. Preparation (pg. 12)
   C. Device Application

10. From the “Verification” step within the Eight-Step HEC Procedure Checklist, what is one way the worker can ensure the equipment is properly isolated?
    A. Physically attempt to operate and restart the equipment. (pg. 13)
    B. Verifying a lock is attached to the junction box.
    C. Notifying their supervisor.

11. From the “Preparation and Notification” step within the Three-Step Release from Hazardous Energy Control Procedure Checklist, what must be done before a lock and tag are removed?
    A. Notify all affected employees the system is ready for return to service. (pg. 13)
    B. Notify the supervisor.
    C. Annotate the lock being removed.

12. What National Fire Protection Association (NFPA) establishes standard for Electrical Safety in the workplace?
    A. NFPA 70E (pg. 15)
    B. NFPA 30B
    C. NFPA 13D

13. Who is held accountable for safe execution of the Complex Lockout/Tagout?
    A. The employer
    B. The supervisor
    C. The person(s) in charge. (pg. 15)

14. What is a requirement when conducting complex lockout/tagout procedures?
    A. Supervisor approval.
    B. A written plan of execution. (pg. 15)
    C. Secure multiple locks and tags.

15. IAW the OSHA HEC regulation, who provides training to each authorized employees on the purpose and function of the energy control program?
    A. The Employer (pg. 16)
    B. The Commander
    C. The equipment operator.

16. Who requires HEC training?
    A. Authorized Employees
    B. Affected Employees
    C. All the Above (pg. 16)

17. What is a limitation of tags?
    A. Tags may evoke a false sense of security.
    B. Tags are essentially warning devices.
    C. Both A&B (pg. 16)

18. What is/are reason(s) to provide energy control program retraining to all authorized and affected employees?
    A. Alterations in machinery, equipment, processes. (pg. 16)
    B. Shift Change.
    D. When directed by the supervisor.

19. What is NOT a way to document HEC training?
    A. AF Form 55 Employee Safety and Health Record
    B. AFFORMs/MAF 42.
    C. Job Safety Training Outline (JSTO.) (pg. 17)

20. For Group Lockout or Tagout, each authorized employee shall attach a personal lockout or tagout device?
    A. True (pg. 18)
    B. False

21. When is it acceptable to remove a lockout/tagout device by an employee who DID NOT apply the device?
    A. Anytime you know that another employee will be working the job.
    B. When the specific procedures and training for such removal have been developed, documented, and incorporated into the employer's energy control program. (pg. 19)
    C. Never, this is a serious violation.

22. What is a HEC program requirement during shift or personnel changes?
    A. Provision for the orderly transfer of lockout or tagout device(s). (pg. 19)
    B. Transfer of physical locks from person to person.
    C. Signature of consent forms.

23. Interaction with contractors will be IAW?
    A. AFI 91-202.
    B. DoDI 6055.01
    C. All the above. (pg. 19)

24. IAW OSHA HEC regulation, how often must periodic inspections of HEC procedures be conducted?
    A. Monthly
    B. Never
    C. At least annually. (pg. 20)

25. What must be reviewed during the HEC program periodic inspections?
    A. Employee's responsibilities under the program. (pg. 20)
    B. Previous monthly inspections.
    C. The job safety training outlined.

26. Who ensures an adequate supply of energy-isolation devices if available?
    A. Functional Manager (pg. 22)
    B. Commander
    C. Supply Custodian

27. True or False: Devices shall be singularly keyed, with only authorized employees retaining the key(s) when in use?
    A. True (pg. 22)
    B. False

28. What is the AF Form 981?
    A. Out of Order Tag. (pg. 24)
    B. Warning Tag.
    C. Danger Tag: Do Not Start.

29. Which tag is reserved for immediate hazards (RAC 1 through 3) requiring specific precautions for personnel or property protection?
    A. AF Form 979 Danger Tag. (pg. 24)
    B. AF Form 980 Caution Tag.
    C. AF Form 982, Do Not Start Tag.

30. A Lockout Device is a device used to:
    A. prevent the energizing of a machine or equipment.
    B. hold an energy isolating device in a safe position.
    C. Both A&B (Terms)