





NGSS Facilities Multiple Energy Source (MES)  
Equipment Lockout Tagout (LOTO) Procedure  
Development/Installation Requirements For New or Modified  
Installations

1. This requirement is for identifying and labeling both hazardous energy isolation devices (disconnects) and creating/installing equipment LOTO placards for Multiple Energy Source (MES) Facilities Infrastructure equipment that require lockout/block out/tag out. The contractor is required to provide labels for disconnects and to install a lockout tag out orientation placard on the equipment. Primary, secondary, residual and stored energy disconnects are to be labeled. The equipment orientation placard will identify the location of the hazardous energy disconnects relative to the position of the equipment. A systems approach is to be used in developing LOTO procedures and when installing LOTO hazardous energy labels. Any Variable Frequency Drives (VFD's) and pumps relative to the piece of equipment are required to be included in the LOTO procedure. Equipment labels shall be appropriate and able to withstand the effects of the operating environment for the equipment. Completed and approved LOTO procedures for equipment that are continuously exposed to the elements shall be placed into the existing LOTO binders that are at the access points to the exposed areas. The NGSS LOTO procedure approval team shall consist of a LOTO knowledgeable ESHM representative, a FRIO representative, the Facilities FPE, a Facilities Trades Lead, a Facilities Maintenance Supervisor and the installing Contractor.
2. All energy isolation devices shall be capable of being locked out, including valves. This includes any system that contains primary, secondary, residual or stored hazardous energy, including, but is not limited to:
  - a) Electrical
  - b) Mechanical
  - c) Thermal
  - d) Pneumatic
  - e) Hydraulic
  - f) Natural gas
  - g) Chemical
  - h) Other sources of energy that can cause injury if not controlled
  - i) Energy isolation controls shall be readily accessible preferably within line of sight of controlled equipment
3. Examples of Facilities MES equipment systems include Boilers, Chillers, Cooling Towers, Compressors, HVAC Units, Humidifiers, Elevators, Scrubbers, etc.






4. The LOTO procedures shall include at a minimum:
    - a) A specific statement of the intended use of the procedure
    - b) Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy
    - c) Specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them
    - d) Specific requirements for testing a machine or equipment to determine and verify the effectiveness
- Example of lockout devices, tagout devices and other control measures.

## 5. Example Procedure: Boiler





BRYAN STEAM BOILER # 1			
LOCATION: SPACE PARK: BLDG D1 ROOM 1886			
SCOPE/USE: This Lockout procedure is required whenever machine guards or other safety devices are removed or bypassed or any hazardous exposure to a point of operation or an associated danger zone takes place.			
PURPOSE: This Lockout procedure will bring this equipment (or section) to a fully de-energized condition.			
EQUIPMENT OVERVIEW PHOTOS		SPECIAL PRECAUTIONS	
		<ul style="list-style-type: none"> <li>THERMAL HEAT POTENTIAL WAIT TO COOL BEFORE WORKING.</li> <li>USE SOP TO DEPRESSURIZE/DRAIN PRIOR TO SERVICING.</li> </ul>	
LOCKOUT DEVICES USED: Padlock = 6, Ball Valve Device = 1, Gate Valve Device = 3, Chain = 1			
LOCKOUT APPLICATION PROCESS (Apply in Order, Top to Bottom)			
<ol style="list-style-type: none"> <li>1. Notify all affected personnel before starting to apply this LOCK OUT procedure.</li> <li>2. Turn off machinery using normal operating controls and standard shutdown procedures.</li> <li>3. Isolate energy sources at control points in the order shown below and apply lockout devices and locks.</li> <li>4. Locks applied to isolation points must be personally identified and in the "secured" position.</li> <li>5. Authorized personnel must maintain possession of the key(s) for each personal lock applied.</li> <li>6. Do not work under the protection of a lock you have not personally applied.</li> </ol>			
ENERGY TYPE	ENERGY ISOLATION POINT OR STEP	APPLICATION METHOD	VISUAL REFERENCE
CONTROL PANEL	HMI: On front of boiler.	Use SOP to shutdown equipment at HMI.	
ELECTRICAL 480V	Electrical Disconnect: STEAM BOILER #1 to the left of control panel.	Move disconnect to the OFF position and apply a lockout padlock through the built-in securement hole.	
NATURAL GAS	Ball Valve: UNLABELED on backside above boiler.	Turn valve to CLOSED position and secure with a lockout device.	

**Master Lock**

Sheet 1 of 2

LOCKOUT PROCEDURE			ID#: LP1043 EQ#: 29488
BRYAN STEAM BOILER # 1			
LOCATION: SPACE PARK: BLDG D1 ROOM 1886			
WATER IN	Gate Valve: W02185 on backside of boiler.	Turn valve to CLOSED position and secure with a lockout device.	
STEAM	Gate Valve: S00403 above boiler.	Turn valve to CLOSED position and secure with a lockout device.	
SURFACE BLOWDOWN	Gate Valve: W0020 on top backside of boiler.	Turn valve to CLOSED position and secure with a lockout device.	
BOILER BLOWDOWN	Gate Valve: W0021 on bottom backside of boiler.	Turn valve to CLOSED position and secure with a lockout device.	
STORED PRESSURE STEAM	Pressure Gauge: On front top of boiler.	Verify system is at zero pressure at the gauge. If not at zero pressure, use the bleed valve to release stored pressure or perform a line break.	
<b>TESTING / VERIFICATION REQUIREMENTS</b> (If contact with exposed electrical conductors could occur, a qualified person must perform voltage testing to verify zero energy condition) <ol style="list-style-type: none"> <li>1. Test for full de-energization by turning normal operational controls to the on (or neutral) position and verifying that no machine function or movement occurs.</li> <li>2. Return all controls to the off position and complete all necessary adjustments or repair work.</li> <li>3. During testing and adjustment, Lockout must be re-applied when contact with hazardous area(s) is required.</li> </ol>			
<b>LOCKOUT REMOVAL PROCESS</b> (Use this Procedure to be sure each locking device has been removed and that each energy source has been restored according to the normal startup procedure) <ol style="list-style-type: none"> <li>1. Ensure all tools and items have been removed.</li> <li>2. Confirm that all employees are safely located.</li> <li>3. Ensure all safety guarding has been replaced.</li> <li>4. Verify that controls are in off position.</li> <li>5. Remove lockout devices and reenergize machine.</li> <li>6. Notify affected employees that servicing is completed.</li> </ol>			
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## a. Example Procedure: Compressor





LOCKOUT PROCEDURE		ID#: LP1594 EQ#: 25072	
AIR COMPRESSOR			
LOCATION: BLDG E1: ROOM B131			
SCOPE/USE: This Lockout procedure is required whenever machine guards or other safety devices are removed or bypassed or any hazardous exposure to a point of operation or an associated danger zone takes place.			
PURPOSE: This Lockout procedure will bring this equipment (or section) to a fully de-energized condition.			
EQUIPMENT OVERVIEW PHOTOS		SPECIAL PRECAUTIONS	
		<ul style="list-style-type: none"> <li>• THERMAL HEAT POTENTIAL WAIT TO COOL BEFORE WORKING.</li> <li>• WAIT UNTIL ROTATION COMES TO A COMPLETE STOP BEFORE WORKING.</li> </ul>	
LOCKOUT DEVICES USED: Padlock = 2, Ball Valve Device = 1			
LOCKOUT APPLICATION PROCESS (Apply in Order, Top to Bottom)			
<ol style="list-style-type: none"> <li>1. Notify all affected personnel before starting to apply this LOCK OUT procedure.</li> <li>2. Turn off machinery using normal operating controls and standard shutdown procedures.</li> <li>3. Isolate energy sources at control points in the order shown below and apply lockout devices and locks.</li> <li>4. Locks applied to isolation points must be personally identified and in the "secured" position.</li> <li>5. Authorized personnel must maintain possession of the key(s) for each personal lock applied.</li> <li>6. Do not work under the protection of a lock you have not personally applied.</li> </ol>			
ENERGY TYPE	ENERGY ISOLATION POINT OR STEP	APPLICATION METHOD	VISUAL REFERENCE
CONTROL PANEL	Control Switch: On side of air compressor.	Move the control switch to the OFF position.	
ELECTRICAL 480V	MCC Breaker: PNEUMATIC AIR COMPRESSOR on MCC 1 section D bucket #2 in room to the right of air compressor.	Move the breaker to the OFF position and apply a lockout padlock through the built-in securement hole.	
PNEUMATIC 120 PSI	Ball Valve: P06838 on end of compressor.	Turn valve to CLOSED position and secure with a lockout device.	

Master Lock

Sheet 1 of 2

LOCKOUT PROCEDURE		ID#: LP1594 EQ#: 25072
AIR COMPRESSOR		
LOCATION: BLDG E1: ROOM B131		
STORED PRESSURE PNEUMATIC	Pressure Gauge: On side of air compressor tank.	Verify system is at zero pressure at the gauge. If not at zero pressure, use the bleed valve to release stored pressure or perform a line break.
TESTING / VERIFICATION REQUIREMENTS (If contact with exposed electrical conductors could occur, a qualified person must perform voltage testing to verify zero energy condition)		
<ol style="list-style-type: none"> <li>1. Test for full de-energization by turning normal operational controls to the on (or neutral) position and verifying that no machine function or movement occurs.</li> <li>2. Return all controls to the off position and complete all necessary adjustments or repair work.</li> <li>3. During testing and adjustment, Lockout must be re-applied when contact with hazardous area(s) is required.</li> </ol>		
LOCKOUT REMOVAL PROCESS (Use this Procedure to be sure each locking device has been removed and that each energy source has been restored according to the normal startup procedure)		
<ol style="list-style-type: none"> <li>1. Ensure all tools and items have been removed.</li> <li>2. Confirm that all employees are safely located.</li> <li>3. Ensure all safety guarding has been replaced.</li> <li>4. Verify that controls are in off position.</li> <li>5. Remove lockout devices and reenergize machine.</li> <li>6. Notify affected employees that servicing is completed.</li> </ol>		
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## b. Example Procedure: Chillers

LOCKOUT PROCEDURE		ID#: LP1126 EQ#: 17890	
TRANE AIR COOLED CHILLER # 1			
LOCATION: BLDG 66: ROOF			
SCOPE/USE: This Lockout procedure is required whenever machine guards or other safety devices are removed or bypassed or any hazardous exposure to a point of operation or an associated danger zone takes place.			
PURPOSE: This Lockout procedure will bring this equipment (or section) to a fully de-energized condition.			
EQUIPMENT OVERVIEW PHOTOS		SPECIAL PRECAUTIONS	
		<ul style="list-style-type: none"> <li>• USE SOP TO DEPRESSURIZE/DRAIN PRIOR TO SERVICING.</li> <li>• THERMAL HEAT POTENTIAL WAIT TO COOL BEFORE WORKING.</li> </ul>	
LOCKOUT DEVICES USED: Padlock = 3, Butterfly Valve Device = 2			
LOCKOUT APPLICATION PROCESS (Apply in Order, Top to Bottom)			
<ol style="list-style-type: none"> <li>1. Notify all affected personnel before starting to apply this LOCK OUT procedure.</li> <li>2. Turn off machinery using normal operating controls and standard shutdown procedures.</li> <li>3. Isolate energy sources at control points in the order shown below and apply lockout devices and locks.</li> <li>4. Locks applied to isolation points must be personally identified and in the "secured" position.</li> <li>5. Authorized personnel must maintain possession of the key(s) for each personal lock applied.</li> <li>6. Do not work under the protection of a lock you have not personally applied.</li> </ol>			
ENERGY TYPE	ENERGY ISOLATION POINT OR STEP	APPLICATION METHOD	VISUAL REFERENCE
ELECTRICAL 480V	Electrical Disconnect: E-TCC1-#1 on side of chiller.	Move disconnect to the OFF position and apply a lockout padlock through the built-in securement hole.	
WATER CHILLED IN	Butterfly Valve: W05494 on supply to chiller.	Turn valve to CLOSED position and secure with a lockout device.	
WATER CHILLED OUT	Butterfly Valve: W05495 on discharge from chiller.	Turn valve to CLOSED position and secure with a lockout device.	

Master Lock

Sheet 1 of 2

LOCKOUT PROCEDURE		ID#: LP1126 EQ#: 17890
TRANE AIR COOLED CHILLER # 1		
LOCATION: BLDG 66: ROOF		
TESTING / VERIFICATION REQUIREMENTS (If contact with exposed electrical conductors could occur, a qualified person must perform voltage testing to verify zero energy condition)		
<ol style="list-style-type: none"> <li>1. Test for full de-energization by turning normal operational controls to the on (or neutral) position and verifying that no machine function or movement occurs.</li> <li>2. Return all controls to the off position and complete all necessary adjustments or repair work.</li> <li>3. During testing and adjustment, Lockout must be re-applied when contact with hazardous area(s) is required.</li> </ol>		
LOCKOUT REMOVAL PROCESS (Use this Procedure to be sure each locking device has been removed and that each energy source has been restored according to the normal startup procedure)		
<ol style="list-style-type: none"> <li>1. Ensure all tools and items have been removed.</li> <li>2. Confirm that all employees are safely located.</li> <li>3. Ensure all safety guarding has been replaced.</li> <li>4. Verify that controls are in off position.</li> <li>5. Remove lockout devices and reenergize machine.</li> <li>6. Notify affected employees that servicing is completed.</li> </ol>		
DOCUMENT CONTROL	Written or Updated: 09/02/2021	By: _____ Version: 1.0

Master Lock

Sheet 2 of 2

## C. Blank Equipment LOTO Template

LOCATION: SPACE PARK: BLDG

**SCOPE/USE:** This Lockout procedure is required whenever machine guards or other safety devices are removed or bypassed or any hazardous exposure to a point of operation or an associated danger zone takes place.

**PURPOSE:** This Lockout procedure will bring this equipment (or section) to a fully de-energized condition.

EQUIPMENT OVERVIEW PHOTOS		SPECIAL PRECAUTIONS

**LOCKOUT DEVICES USED:** Padlock =, Ball Valve Device =1, Gate Valve Device =, Chain =

**LOCKOUT APPLICATION PROCESS (Apply in Order, Top to Bottom)**

1. Notify all affected personnel before starting to apply this LOCK OUT procedure.
2. Turn off machinery using normal operating controls and standard shutdown procedures.
3. Isolate energy sources at control points in the order shown below and apply lockout devices and locks.
4. Locks applied to isolation points must be personally identified and in the "secured" position.
5. Authorized personnel must maintain possession of the key(s) for each personal lock applied.
6. Do not work under the protection of a lock you have not personally applied.

ENERGY TYPE	ENERGY ISOLATION POINT OR STEP	APPLICATION METHOD	VISUAL REFERENCE
CONTROL PANEL			
ELECTRICAL V			
NATURAL GAS			

**Master Lock**

Sheet 1 of 2

## LOCKOUT PROCEDURE

ID#: EQ#:

LOCATION: SPACE PARK: BLDG

WATER IN			
STEAM			
SURFACE BLOWDOWN			
BOILER BLOWDOWN			
STORED PRESSURE STEAM			I

**TESTING / VERIFICATION REQUIREMENTS** (If contact with exposed electrical conductors could occur, a qualified person must perform voltage testing to verify zero energy condition)

1. Test for full de-energization by turning normal operational controls to the on (or neutral) position and verifying that no machine function or movement occurs.
2. Return all controls to the off position and complete all necessary adjustments or repair work.
3. During testing and adjustment, Lockout must be re-applied when contact with hazardous area(s) is required.

**LOCKOUT REMOVAL PROCESS** (Use this Procedure to be sure each locking device has been removed and that each energy source has been restored according to the normal startup procedure)

1. Ensure all tools and items have been removed.
2. Confirm that all employees are safely located.
3. Ensure all safety guarding has been replaced.
4. Verify that controls are in off position.
5. Remove lockout devices and reenergize machine.
6. Notify affected employees that servicing is completed.

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## LOTO Equipment Energy Isolation Tags

The equipment energy isolation tags shall be installed on each primary and stored energy isolation device. The tags shall be made from material that is appropriate for the environment that they are installed. The equipment asset number will be used on each tag. Each tag will include the asset number and then a number signifier starting with the number one for the first listed energy source down to the last listed energy source; for example, 99999-1 electrical, 99999-2 pneumatic, 99999-3 hydraulic, etc. for each energy source belonging to the equipment being assessed.