



Section: Continual Improvement

Task 16: We have set operations and maintenance criteria for our SEUs, operate them accordingly, and communicate these controls to relevant personnel

Getting It Done

- Complete the [Significant Energy Use Operating Criteria Worksheet](#) and the [Operational Controls Checklist](#) to determine and set the required criteria and controls for each significant energy use. Ensure critical factors affecting energy performance are known, communicated to responsible personnel, and used.
- Operate and maintain facilities, equipment, systems, or processes associated with your SEUs to meet the determined criteria.

Task Overview

Operational and maintenance controls ensure that critical equipment, systems, processes, and facilities are operated and maintained to achieve required output and efficient performance. Properly defined controls promote the efficient and uninterrupted functioning of critical equipment.

Determining operational and maintenance controls involves identifying and planning activities to ensure that critical factors affecting energy performance are known, used, and communicated to responsible personnel. Operational and maintenance controls must be identified and planned for all significant energy uses (SEUs).

Operational and maintenance controls can take a variety of forms. They can include, for example, procedures and work instructions, physical controls, use of licensed or other qualified personnel, or combinations of these.

At the completion of this task, you will have...

- Set operating and maintenance criteria
- Ensured major equipment, systems, processes, and facilities are operated and maintained in accordance with criteria
- Communicated controls to personnel

This guidance is relevant to Section 4.5.5 of the ISO 50001:2011 standard.

Associated Resources

Short Description



SEU Control Chart	A template spreadsheet form to track, record, and validate the implementation process for SEUs.
SEU Control Chart Example	An example of what an SEU control chart can look like and may be used to track/record/document/validate the PDCA process.
Significant Energy Use Operating Criteria Worksheet	This document provides guidance in developing criteria for SEUs, helping to define operating criteria specifications for an equipment related significant energy use.
Operational Controls Checklist	This checklist provides guidance on SEU operational controls.
ENERGY STAR Guidelines for Energy Management	ENERGY STAR Guidelines for Energy Management guidance document.

Full Description

Set operating and maintenance criteria

Your organization should have effective operating and maintenance criteria in place for all your major facilities, equipment, systems, and processes. Your major systems and significant energy uses (SEUs) have optimum running conditions and maintenance practices that maximize their operational efficiency and allow them to achieve their design service life.

Operating criteria are set points where your SEUs should operate to most efficiently satisfy the conditions required by a process.

Learn More: **Example operating criteria**

Example operating criteria include:

- Occupancy timer settings
- HVAC temperature settings
- Air compressor operating pressure
- Furnace and oven temperature set point
- Steam boiler pressure
- Freezer and cooler temperature set point
- Water temperature generated by chillers
- Line speeds



Operating criteria are implemented through operational controls that work to ensure SEUs are operated within identified criteria. Some examples of operational controls are:

- Physical limits
- Mechanical and electrical controllers
- Measuring equipment and indicators
- Labeling and signage
- Documented procedures
- Operator competence and training

Your organization must also address maintenance criteria and associated controls. Examples of relevant maintenance practices can include:

- Filter replacement
- Lubrication
- Tension adjustment
- Leak repair
- Cleaning
- Fluid levels
- Vibration analysis
- Tuning

Many organizations use a preventive maintenance (PM) system which can be a component of the maintenance criteria and controls for an EnMS. A PM system is an organized process for maintaining SEUs by systematic inspection to detect and correct anomalies to prevent failure and/or maintain peak operating condition. Both operating and maintenance criteria and associated controls influence the performance and efficiency of energy-consuming equipment.

The ISO 50001 standard requires that you develop operating and maintenance criterion for your SEUs “where their absence could lead to a significant deviation from effective energy performance.” Significant deviation is discussed in detail in [Corrective Actions](#) with respect to monitoring and measuring the key characteristics of operations that determine energy performance. Consult that section for additional background about significant deviations. Your organization must determine what controls are critical to avoid a significant deviation related to the SEUs’ operating and maintenance criteria. Examples of significant deviations that could be due to, at least partly, operational and maintenance control issues include:

- Outside of control limits
- Energy consumption variation
- Change in efficiency
- Increased maintenance requirements
- Increased downtime



- Additional equipment requirements
- Longer run times
- Need to change settings
- Product changes (e.g., over- or under-cooked food)

Learn More: **Sources to help identify operating and maintenance criteria**

A variety of sources can be helpful in identifying operating and maintenance criteria for your SEUs and other processes that can impact energy performance. These include:

- Manufacturer's recommendation
- System personnel who measure performance
- Minimum process or system requirements
- Service personnel's suggested operating settings and maintenance intervals
- Statistical process control
- Benchmarking performance of similar equipment
- Industry standards

Keep in mind that you likely have some operating and maintenance criteria already in place within your organization, especially as related to efficient equipment operation. This is certainly true for organizations that have implemented an ISO 9001 quality management system or an ISO 14001 environmental management system. Part of determining operational and maintenance controls is examining what is already there, and incorporating it into your EnMS as it relates to energy performance. You should take stock of what's in place and take a fresh look at what else is needed for controlling operations and maintenance activities related to the SEUs. The [Significant Energy Use Operating Criteria Worksheet](#) is one example of how you can organize and record information on operating and maintenance criteria.

You may want to consider developing additional operating and maintenance criteria to address other factors related to energy performance, such as the effectiveness of your action plans in achieving the energy objectives and targets, controls needed to sustain past energy performance improvements, and the maintenance of non-SEU energy systems.

Operational and maintenance controls may also be physical devices (e.g., building automation system (BAS), occupancy sensors for lights, air compressor sequence controllers), as well as the use of certified or other specialty qualified personnel (e.g., licensed electrician, licensed boiler operator, licensed waste treatment operator).

Learn More: **Evaluation of operating and maintenance criteria**



To evaluate the operating and maintenance criteria you might need, bring together the appropriate personnel and information described above and discuss the following:

- What operating and maintenance criteria have been established for the SEUs?
- What controls are needed to operate and maintain SEUs within appropriate criteria?
- What are the operating and maintenance criteria that would indicate a significant deviation?
- Are operational and maintenance controls in place?
- Are the operational and maintenance controls effective in maintaining performance with the identified criteria?
- Are other controls needed to maintain the SEU within identified operating and maintenance criteria?
- Are other controls needed to detect or avoid a significant deviation?

Use the [Operational Controls Checklist](#) to help determine the required criteria and controls.

Once the appropriate operating and maintenance criteria are determined, implement them as the targeted operating and maintenance state.

Ensure major equipment, systems, processes and facilities are operated and maintained in accordance with criteria

Once the appropriate operational and maintenance controls and criteria are determined, you must operate and maintain the facilities, equipment, systems, or processes associated with your SEUs so they meet the criteria. If the criteria and controls are new or have changed you will have to communicate this information to appropriate personnel. If the controls are not functioning or are bypassed you will have to implement inspections to confirm that the operational and maintenance controls are being implemented or maintained and the criteria are being met.

Learn More: Example of not operating equipment in accordance with criteria

An example is that disabling the speed control of a fan's variable frequency drive (VFD) would allow the fan to operate at full speed all the time. The VFD would not be able to reduce the fan motor speed, and consequently consumption, during periods when the fan is lightly loaded and would not achieve the expected energy performance improvement.

The [SEU Control Chart](#), first introduced in [Significant Energy Uses \(SEUs\)](#) and [Performance Indicators \(EnPIs\)](#), can be used to document references to operational controls by entering them in column 4 of the chart. An [SEU Control Chart Example](#) with the operational controls (column 4) filled in is included to show how this form can be used. Note that the Example SEU Control Chart includes



information on records associated with specific operational controls (see column 8).

Communicate controls to personnel

For the facilities, equipment, systems, and processes associated with your SEUs to be operated and maintained using the established controls, you must ensure they are communicated to the appropriate personnel. This includes on-site contractors or suppliers performing work associated with your SEUs. Robust processes for communicating the required controls ensures that expectations with regard to performing and following those controls are known and understood by the appropriate personnel. You can provide the controls and criteria information through training, documentation, or other communication processes as appropriate, such as:

- Demonstrations
- E-mails
- Staff meetings
- Equipment markings
- Supplier meetings
- Contractor briefings

For complicated processes, you may need to provide training supported by appropriate documentation. Personnel who are new to the organization, or processes that require a licensed operator or maintenance technician should be included in such training. Training may also be a convenient form of informing large numbers of personnel about operation or maintenance activities. Training can involve:

- On-the-job training
- Shift training
- Classroom training
- Supplier training
- Peer mentoring
- On-line training
- Training from certified bodies
- Technical training

Learn More: Documenting your operating and maintenance controls

Documenting your operational and maintenance controls is not an explicit ISO 50001 requirement, but is a best practice because documents can be an effective medium for communication or reminder. You can easily control documents and update them as required to ensure the information



is relevant and accurate. Documents could include:

- Work instructions
- Equipment logbooks
- Equipment operating procedures
- Contractor/supplier handbooks
- Instruction sheets
- Checklists
- Work area postings
- Bulletin boards
- Computer terminals
- Brochures

Use the method(s) of communication most effective for your organization. What is important is that the operating and maintenance criteria are clear and accurate, and that you make appropriate employees and contractors aware of them.