

# **Requirements for Reduced Supervision of Power Plants, Thermal Liquid Heating Systems, and Heating Plants**

**AB-528**

Edition 3, Revision 1 – Issued 2020-02-18

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## FOREWORD

The Administrator in the pressure equipment discipline has established that this ABSA document *Requirements for Reduced Supervision of Power Plants, Thermal Liquid Heating Systems, and Heating Plants* (AB-528, Edition 3, Revision 1), specifies the technical and supervision requirements that must be met by an owner to operate a power plant, thermal liquid heating system, or heating plant with reduced supervision as permitted respectively under Sections 2.1, 3.1 and 4.1 of the *Power Engineers Regulation*.

## 1.0 INTRODUCTION

The Power Engineers Regulation AR 85/2003 (hereunder referred to as “**PER**”), with amendments up to and including AR 84/2014, establishes provisions for operating certain plants under reduced supervision.

This document, **AB-528**, describes the requirements for operation under a reduced level of supervision established by the Administrator in accordance with the provisions of the PER. It was developed following wide consultation and is endorsed by the Pressure Equipment Sub-Council of the Safety Codes Council.

“Reduced supervision” in this document, and in the PER, refers to a reduced physical presence of competent personnel at certain types of plants. Reduced supervision was permitted in recognition that an equal or greater degree of safety is expected and has been made possible as a result of technological changes that have taken place since the original requirements were established decades ago.

The owner of a **power plant, thermal liquid heating system, or heating plant** may operate the plant with reduced supervision, provided that

- the owner has reviewed the operating hazards of the installation in order to determine that the necessary safety objectives can be achieved
- all the requirements set forth in this document are met

This document is scheduled to be reviewed and reaffirmed by February 28, 2022.

**Note:** Nothing in this document provides any exemption from, nor supersedes, the requirements described in the PER or in the PEEO.

## 2.0 DEFINITIONS

**Administrator** - means the Administrator in the pressure equipment discipline appointed under the Act. [PESR 1(1)(b)]

**Competent** - in relation to a person, means possessing the appropriate qualifications, knowledge, skills, and experience to perform the work safely and in accordance with the Act. [PER 1(1)(i)]

**Instrumentation Alternative** - means a technology designed to ensure the safe operation of pressure equipment without the level of supervision by a power engineer or other competent operator that would otherwise be required, specifically,

- (i) a power plant or thermal liquid heating system designed to operate with reduced supervision, or
- (ii) a remote monitoring system for heating plants. [PER 1(k.2)]

**Pressure Equipment Integrity Management (PEIM)** - a PEIM is a quality management system that meets the requirements of AB-512 and for which the owner holds a Certificate of Authorization Permit in accordance with Section 11(3) of the Pressure Equipment Safety Regulations.

**Power Engineer** - means a person who holds a certificate of competency referred to in Section 7 of the Power Engineers Regulation. [PER 1(n)]

**Remotely located facility** - means a facility at which any danger to persons possibly affected by a failure of pressure equipment is significantly reduced because of the distance of the facility from other areas of human habitation or use. [PER 1(p.1)]

**Thermal liquid heating system** - means one or more thermal liquid heaters, and any connected piping system or vessel, in which a thermal liquid that is not pressurized by the application of a heat source is used as the heat transfer medium. [PESR 1(1)(ff.1)]



### **3.0 REFERENCED CODES AND STANDARDS AND OTHER PROVISIONS**

ASME Boiler and Pressure Vessel Code, Section VI, *Recommended Rules for the Care and Operation of Heating Boilers*

ASME Boiler and Pressure Vessel Code, Section VII, *Recommended Guidelines for the Care of Power Boilers*

ASME CSD-1 *Controls and Safety Devices for Automatically Fired Boilers*

NFPA 85: *Boiler and Combustion Systems Hazards Code*

AB-512 *Owner-User Pressure Equipment Integrity Management Requirements*

This document specifies quality management system requirements for owners who hold a certificate of authorization permit under Section 11(3) of the Pressure Equipment Safety Regulation.

## 4.0 POWER PLANTS

The PER permits specific types of power plants to operate under reduced supervision from the requirements described in **Section 2** of the PER. The requirements for reduced supervision of power plants are described below in 4.1, 4.2, and 4.3.

When an owner elects to operate a facility under reduced supervision, the owner must report the change in supervision status to ABSA's E&C department so that they may update the plant registry.

### 4.1 Power Plants Containing Thermal Liquid Under Pressure

A plant containing thermal liquid where a blanketing gas is not prevented from exceeding 103 kPa and has a rated operating temperature exceeding 121°C is classed as a power plant. This type of power plant may be eligible to be operated under reduced supervision if the blanketing gas pressure imposed on the system does not exceed 700 kPa.

#### Normal Supervision

**Section 2.1(1)** of the PER establishes that this type of power plant must have the same supervision requirements as a thermal liquid heating system as defined in **Section 3** and **Table 5** of the PER.

#### Reduced Supervision – Remotely Located Plant

**Section 2.1(2)** of the PER specifies the reduced supervision requirements for a remotely located power plant that does not produce steam and uses a thermal liquid under pressure of a blanketing gas not exceeding 700 kPa.

The reduced supervision permitted allows the owner to

- suspend general, continuous, and overall supervision

Operation under reduced supervision is permitted only if **all** the following technical, supervision, and integrity management system requirements are satisfied.

#### 4.1.1 Technical and Supervision Requirements

- No personnel are allowed on the plant site while it is in operation unless the plant is under the on-site supervision of a competent person who holds a Certificate of Competency as listed in Row 1,2,3,4 or 7 in Table 1 of the Schedule in the PER.
- When on-site supervision is suspended, the plant operation must be monitored by instrumentation on a continuous basis, and an automated callout system, or a person remotely

monitoring the plant is required to contact a competent on-call power engineer to respond to abnormal conditions. The power engineer on call must also confirm a response to the call-out whenever the plant is not under on-site supervision.

- Any loss of remote monitoring must trigger an alarm condition, and supervision must revert to the supervision requirements of **Section 2.1(1)** or **Section 2(1)** of the PER, as applicable.
- The plant must be equipped with instrumentation and control logic that has been designed for unattended operation, which conforms to the requirements of CSD-1 or an appropriate alternative (such as NFPA 85).
- Automatic shutdowns are required for all critical control parameters.
- Automatic shutdowns must switch to a lockout condition with no possibility of an unattended or remote restarting.
- The owner shall ensure that all controls, safety devices, and burners are installed in accordance with the manufacturer's instructions. Safety control functions shall be installed in such a way as to prevent a bypass.
- There must be a shift engineer of record for each shift that is covered by continuous or general supervision.
- A plant log book must be maintained as per Section 6 of the PER, with entries signed by the shift engineer of record for that shift.
- Any time the plant is not under the on-site supervision of a competent, adequately certified power engineer, a locked perimeter fence must prevent access to the site.

#### 4.1.2 Integrity Management System Requirements

The plant owner must have a Pressure Equipment Integrity Management System (PEIM) with a valid certificate of authorization permit. The following requirements must also be addressed in the *Operations* element of the PEIM documentation for each plant operating under reduced supervision.

The PEIM documentation must

- specify the duties and responsibilities of the owner and the power engineers with respect to supervision of the pressure equipment in the plant
- specify the maximum allowable period between on-site physical checks of power plant equipment
- include details of the required training for power engineers who provide supervision for the plant, as well as the requirements for retention of training records



- require the owner to set, follow, and document an inspection, cleaning, and maintenance schedule for all controls, burners, and safety devices in accordance with the manufacturer-suggested intervals or, at minimum, on an annual basis
- require periodic testing of controls and protective devices to verify functionality and set-points
- require that the competent individual performing maintenance, inspection, and testing is trained and familiar with all operating procedures, as well as equipment functions, and is capable of determining if the equipment is in an as-designed operating condition
- require the quality of the heat medium to be regularly tested and maintained
- contain a summary of the analysis that has determined the facility is remotely located, as well as a determination of risk to public safety

**Note:** The PEIM is subject to periodic audits conducted by ABSA.

#### 4.2 Power Plants Using Water-Glycol Mixture

**Section 2.1(2)** of the PER specifies the reduced supervision requirements for remotely located power plants that do not produce steam and use a water-glycol mixture with a minimum of 40% glycol.

The reduced supervision permitted allows the owner to

- suspend general, continuous and overall supervision
- have an operator holding a Certificate of Competency as listed in Row 1,2,3,4 or 7 in Table 1 of the Schedule in the PER to provide supervision.

Operation under reduced supervision is permitted only if **all** the technical, supervision, and integrity management system requirements specified in **4.1.1** and **4.1.2** of this document are satisfied.

#### 4.3 Power Plant Recovering Energy from Waste Heat

**Section 2.1(3)** of the PER specifies the reduced supervision requirements for remotely located power plants that use a water-glycol or other organic fluid mixture that has a reduced degree of expansion, whereby the mixture is heated by waste heat with no secondary fuel input.

The reduced supervision permitted allows the owner to:

- suspend general, continuous, and overall supervision

- have supervision provided by a competent operator who does not hold a certificate of competency issued under the PER

Operation under reduced supervision is permitted only if **all** the following technical, supervision, and integrity management system requirements are satisfied.

### **Technical and Supervision Requirements**

- The plant must be under supervision by a competent operator at all times while the plant is in operation and other personnel are on site.
- All competent operators responsible for supervision of pressure equipment must be fully trained on all of the power plant's operating procedures.
- The plant must be monitored on a continuous basis, and the individual monitoring is required to contact a competent on-call operator if abnormal conditions arise. The competent operator on call must also confirm a response to the call-out whenever the plant is not under on-site supervision.
- Any loss of remote monitoring must trigger an alarm condition, and supervision must revert to the continuous supervision provided by a competent operator.
- The power plant must be equipped with instrumentation and control logic that has been designed for unattended operation, which conforms to the requirements of CSD-1 or an appropriate alternative (such as NFPA 85).
- Automatic shutdowns are required for all critical control parameters.
- The automatic shutdowns must enter a lockout condition with no possibility of an unattended or remote restarting.
- The owner shall ensure that all controls, safety devices, and burners are installed in accordance with the manufacturer's instructions. Safety control functions shall be installed in such a way as to prevent a bypass.
- There must be a competent operator of record for each shift that is covered by on-site supervision.
- A plant log book must be maintained as per Section 6 of the PER, with entries signed by the competent operator of record for that shift.
- Any time the plant is not under the supervision of a competent operator, a locked perimeter fence must prevent access to the site.

### **Integrity Management System Requirements**

The plant owner must have a Pressure Equipment Integrity Management System (PEIM) with a valid certificate of authorization permit. The following requirements must be addressed in the "Operations" element of the PEIM documentation for each plant operating under reduced supervision.

The PEIM documentation must

- specify the duties and responsibilities of the owner and the competent operators with respect to supervision of the pressure equipment in the plant
- specify the maximum allowable period between on-site physical checks of power plant equipment
- include details of the required training for competent operators who provide supervision for the plant, as well as the requirements for the retention of training records
- require the owner to set, follow, and document an inspection, cleaning, and maintenance schedule for all controls, sources of waste heat, and safety devices in accordance with the manufacturer-suggested intervals or, at a minimum, on an annual basis
- require periodic testing of controls and protective devices to verify functionality and set-points
- require that the competent individual performing maintenance, inspection, and testing is trained and familiar with all operating procedures, as well as equipment functions, and is capable of determining if the equipment is in an as-designed operating condition
- require the quality of the heat medium to be regularly tested and maintained
- specify how the owner will satisfy the regulatory responsibilities normally assigned to the chief power engineer
- contain a summary of the analysis that has determined the facility is remotely located, as well as a determination of risk to public safety

**Note:** The PEIM is subject to periodic audits conducted by ABSA.

## 5.0 THERMAL LIQUID HEATING SYSTEMS

### 5.1 Definition

As defined by the PER, “thermal liquid heating system” means one or more thermal liquid heaters in which a thermal liquid that is not pressurized by the application of a heat source is used as the heat transfer medium, and includes any connected piping system or vessel.

### 5.2 The Pressure Equipment Exemption Order

The Pressure Equipment Exemption Order AR 56/2006 **Section 2.2(1)** states:

The *Power Engineers Regulation* (AR 85/2003) does not apply to a thermal liquid heating system in a chemical processing plant, natural gas processing plant or oil refinery.

### 5.3 Determining Requirements for Thermal Liquid Heating Systems

The AB-537 provides guidance on determining requirements for thermal liquid heating systems

**Note:** Plants that use thermal liquid under pressure of a blanketing gas that exceeds 103 kPa are subject to part *4.1 Power Plants Containing Thermal Liquid Under Pressure*.

**Section 3.1** of the PER specifies the reduced supervision requirements for a thermal liquid heating system at a remotely located facility if it is not exempt under provisions of the PEEO.

The reduced supervision permitted allows the owner to

- suspend general, continuous, and overall supervision

When an owner elects to operate a facility under reduced supervision the owner must report the change in supervision status to ABSA’s E&C department to update the plant registry.

Operation under reduced supervision is permitted only if **all** the following technical, supervision, and integrity management system requirements are satisfied.

## Technical and Supervision Requirements

- No personnel are allowed on the plant site while it is in operation, unless the plant is under the on-site supervision of a competent power engineer who holds at minimum, a certificate of competency listed in rows 3, 4 or 7 of Table 5 of the Schedule in the PER.
- When on-site supervision is suspended, the plant operation must be monitored by instrumentation on a continuous basis, and an automated callout system, or a person remotely monitoring the plant is required to contact a competent on-call power engineer to respond to abnormal conditions. The power engineer on call is also required to confirm a response to the call-out whenever the plant is not under on-site supervision.
- Any loss of remote monitoring must trigger an alarm condition, and supervision must revert to the general supervision requirements of **Section 3(4)** of the PER.
- The thermal liquid heating system must be equipped with instrumentation and control logic that has been designed for unattended operation, which conforms to the requirements of CSD-1 or an appropriate alternative (such as NFPA 85).
- Automatic shutdowns are required for all critical control parameters.
- The automatic shutdowns must enter a lockout condition with no possibility of unattended or remote restarting.
- The owner shall ensure that all controls, safety devices, and burners are installed in accordance with the manufacturer's instructions. Safety control functions shall be installed in such a way as to prevent a bypass.
- A plant log book must be maintained as per Section 6 of the PER.
- Any time the plant is not under the supervision of a competent, adequately certified power engineer, a locked perimeter fence must prevent access to the site.

## Integrity Management System Requirements

The plant owner must have a Pressure Equipment Integrity Management System (PEIM) with a valid certificate of authorization permit. The following requirements must be addressed in the "Operations" element of the PEIM documentation for each plant operating under reduced supervision.

The PEIM documentation must

- specify the duties and responsibilities of the owner and the power engineers with respect to supervision of the pressure equipment in the plant
- specify the maximum allowable period between on-site physical checks of the thermal liquid heating system
- include details of the required training for power engineers who provide supervision for the plant as well as the requirements for retention of training records

- require the owner to set, follow, and document an inspection, cleaning, and maintenance schedule for all controls, burners, and safety devices in accordance with the manufacturer-suggested intervals or, at minimum, on an annual basis
- require periodic testing of controls and protective devices to verify functionality and set-points
- require that the competent individual performing maintenance, inspection, and testing is trained and familiar with all operating procedures, as well as equipment functions, and is capable of determining if the equipment is in an as-designed operating condition
- require the quality of the heat medium to be regularly tested and maintained
- contain a summary of the analysis that has determined the facility is remotely located as well as a determination of risk to public safety

**Note:** The PEIM is subject to periodic audits conducted by ABSA.

## 6.0 HEATING PLANTS

Section 4 of the PER governs requirements for supervision of heating plants. A heating plant that has a capacity exceeding 750 kW and 0.085 m<sup>3</sup> must be under general supervision. This means the power engineer in charge of the plant must conduct checks of the heating plant's equipment **twice** within each 24-hour period, at least 7 hours apart, while the heating plant is in operation. The power engineer in charge may provide supervision to **not more** than **two** heating plants, unless authorized to do so by the Administrator.

**Section 4(4)** of the PER allows for suspension of the heating plant checks, provided the buildings served by the heating plant are unoccupied. Furthermore, **Section 4.1** of the PER permits a reduction to the level of supervision outside normal Monday to Friday working hours.

**Note:** Refer to **Section 4.1** of the PER for the specific reduced supervision requirements defined by the PER.

The reduced supervision permitted allows the owner to

- have a power engineer in charge who must conduct checks of the heating plant equipment once within each 24-hour period
- have a power engineer supervise no more than **five** hot-water heating plants or **two** steam-heating plants during the period of reduced supervision, who is responsible for conducting an operational check on each heating plant at least once daily

When an owner elects to operate a facility under reduced supervision, the owner must report the change in supervision status to ABSA's E&C department so that they may update the plant registry.

Operation under reduce supervision is permitted only if **all** the following technical and supervision requirements are satisfied:

- The period of reduced supervision falls on a Saturday, Sunday, or a holiday that is observed in the community where the heating plant is located.
- The heating plant under reduced supervision must be monitored on a continuous basis from a remotely located centre using a Supervisory Control and Data Acquisition (SCADA) system.
- There must be a competent power engineer on call during all periods of reduced supervision. The power engineer must be available to respond immediately when abnormal conditions are detected at the remote monitoring centre.
- The SCADA system must not allow for remote re-starts of a heating plant that has shut down to a lockout condition.
- The owner must set, follow, and document an inspection, cleaning, and maintenance schedule for all controls, burners, and safety devices in accordance with the manufacturer-suggested intervals or, at a minimum, on an annual basis.
- Safety control(s) that can electronically reset without local manual intervention, such as when power or control input to the device is interrupted and then restored, shall not be permitted.
- Each heating plant operating under reduced supervision must have, at minimum, functional shutdown-to-lockout protection against conditions of low-water level and/or flow, high temperature, and flame failure.
- The owner must provide appropriate training and retain training records for the power engineers responsible for supervision of the heating plant(s).

## 7.0 OPERATING EXPERIENCE UNDER REDUCED SUPERVISION

Credit may be granted for two-thirds of the time worked in a reduced supervision power plant towards the experience required for a higher level of certification, except that no credit shall be granted toward the experience required for first class certification. Regardless of the job title, the experience credit granted and required shall be as shift engineer for the next level of certification based on the kilowatt rating of plant under reduced supervision.

Example: Reduced supervision power plant using water-glycol mixture in accordance with section 4.2 of this document. Plant capacity is 6000kW (Second class plant per Power Engineers Regulation Table 1, row 2).

5 <sup>th</sup> class engineer	Experience required for 4th	6 months ÷ 2/3 = 9 months
4 <sup>th</sup> class engineer	Experience required for 3rd	12 months ÷ 2/3 = 18 months
3 <sup>rd</sup> class engineer	Experience required for 2nd	24 months ÷ 2/3 = 36 months
2 <sup>nd</sup> class engineer	Experience required for 1 <sup>st</sup>	Not permitted in reduced supervision plants

Experience credit for time worked in a reduced supervision heating plant may be granted for all of the time worked.



## 8.0 REVISION LOG

<b>Edition</b>	<b>Rev #</b>	<b>Date</b>	<b>Description</b>
1	0	2014-05-21	Initial Issue
1	2	2015-03-17	Editorial Updates
1	1	2015-10-06	Correction made to Rev #'s
2	0	2016-07-15	Editorial Rewrite
2	1	2016-09-12	Added Foreword and Editorial Correction: Replaced “power engineer” with “competent operator” in two places in section 4.3
3	0	2018-12-21	Owners must report to E&C when operating a plant under reduced supervision; new section 7 added; clarification on which rows within a table applies to supervision.
3	1	2020-02-18	Revisions made for clarity and to address with the TLHS exemption amendment to the PEEO.