



Inspection and Technical Services

ITS BPV Guide 07,
Guarded Status Information & Requirements
for Owners & Operators of Steam Plants

(March 6, 2023)

Contents

Preamble	3
Summary of Changes.....	3
Disclaimer.....	3
Frequently Asked Questions	4
What is Guarded Status?.....	4
What are the advantages to Guarded Status?.....	4
What plants are eligible for Guarded Status?.....	4
How to calculate boiler horsepower?	4
Are there alternatives to Guarded Status?	4
Who can perform the regular Guarded Status checks?.....	5
How do I request Guarded Status?	5
Minimum Mandatory Requirements to Qualify for Guarded Status	7
Two Low Water Cut-Off Controls:.....	7
Flame Safeguard Control:.....	7
High Steam Pressure Cut-Off Limit Control:.....	7
Pressuretrol/High Limit Over-Ride Switches:.....	7
Combustion Air Proving Switch (where applicable):.....	7
Main Burner Fuel Safety Shut-Off Valves:.....	7
Low Fuel Pressure Cut-Off Switch (where applicable):.....	8
High Fuel Pressure Cut-Off Switch (where applicable):	8
Low Atomizing Air Pressure/Low Atomizing Steam Pressure Cut- Off Switch (where applicable):.....	8
Piping Of Safety Valves:.....	8
Guarded Status Control Panels:	8
Training and Procedures:	8
Testing and Maintenance Requirements	9
Owners Responsibility	9
Notes:	10
Definitions and Interpretations.....	11
Referenced Codes and Standards	13
Annex A	14
Inspection Technical Services Boiler Guarded Status Log.....	14
Annex B	15
Inspection Technical Services Incident Report.....	15

Annex C	16
Approved Drip-Pan Elbow for Safety Relief Valve Discharge	16

Preamble

In Manitoba, many heating, manufacturing, and processing plants utilizing steam boilers require constant supervision under the Manitoba Power Engineers' Act and Regulations. By "constant supervision," the Act means that a Power Engineer, of the required class for the plant, must be in the operating area of the steam plant 24 hours per day, 7 days a week, when the steam plant is in operation.

The purpose of this manual is to assist owners in determining whether these constant supervision requirements apply to their plant, and to inform the owners of their options regarding constant supervision.

Summary of Changes

This guide has undergone technical revisions since the previous edition. In order to align with the Manitoba Power Engineers Act and Regulation, the following change(s) have been made:

- Revision to '*How to calculate boiler horsepower*'.

Disclaimer

If there is a contradiction between the contents of this booklet and the Manitoba Acts and Regulations, the Manitoba Acts and Regulations prevail. The intended use of this booklet is to act as a guide for the application, installation and maintenance of Guarded Status Steam Plants.

Frequently Asked Questions

What is Guarded Status?

Guarded Status allows the Power Engineer on duty to leave the operating area of the steam plants that require constant supervision, for periods greater than twenty minutes at a time, if the owner desires. The privilege of Guarded Status is only granted if the owner of the steam plant undertakes extra measures to ensure the safety of the plant during the period of time it is unattended.

What are the advantages to Guarded Status?

If a steam plant is an approved Guarded Status Plant, Power Engineers employed by the owner may:

- a) Leave the operating area for up to twenty-four hours;
- b) Leave the operating area for greater than twenty-four hours, if the plant is located in an unoccupied building and the plant has an approved audio-visual read-out system;
- c) Leave the operating area of a high-pressure plant where nobody resides; or
- d) Leave the operating area of a high-pressure plant in an unoccupied building for greater than twenty-four hours and the plant has an approved audio-visual read-out system.

What plants are eligible for Guarded Status?

Guarded Status may apply to any steam plant:

- a) With safety relief valves set to 15 psig or lower, and greater than 50 boiler horsepower in capacity, or,
- b) With safety relief valves set to greater than 15 psig, and less than 150 psig, over 5 boiler horsepower in capacity, but not over 100 boiler horsepower in capacity.

Note: 1st, 2nd, and 3rd class steam plants are not eligible under any circumstance.

How to calculate boiler horsepower?

Inspection Technical Services (ITS) calculates boiler horsepower as defined in the Power Engineers regulation:

- 1) Maximum steaming capacity of the boiler in pounds per hour, divided by 34.5;

Information on the boilers nameplate will be used to verify the steaming capacity and calculate the boiler horsepower.

Are there alternatives to Guarded Status?

Steam plants can, under certain circumstances, be re-rated. A re-rating may reduce a classification of plant to allow for guarded status, or it may allow a plant to operate with an exemption under the Power Engineers Regulations.

According to the regulations, the capacity of a plant does not include a non-operating boiler that is isolated from the main plant by a blank flange or isolating switch, used only for standby purposes. Therefore, if a multiple-boiler plant can operate successfully with less horsepower than its aggregate boiler horsepower capacity, then the plant may be de-rated by isolating one or more “stand-by” boilers. This de-rating may drop

the classification of the plant to allow the Guarded Status provisions to apply to a plant formerly requiring constant supervision, or it may leave a plant entirely exempt from the provisions of the Power Engineers Regulation.

It is not permissible to de-rate an individual boiler's horsepower rating by reducing its firing rate input from the manufacturer's nameplate designation.

The owner must notify ITS, in writing, if they want to re-rate the classification of their plant. A formal request must be made at which time an inspector will need to verify the plant complies with the Power Engineers Regulation.

Who can perform the regular Guarded Status checks?

A Power Engineer of the "required class" of the plant in question must perform Guarded Status checks. Therefore, a 4th Class plant, under Guarded Status, must have the plant checks performed by at least a 4th Class Power Engineer and similarly a 5th Class plant, under Guarded Status, must have the plant checks performed by at least a 5th Class Power Engineer. An exception may be granted in a 4th Class Plant, where a 4th Class Chief Engineer may choose to delegate the checks to a 5th Class Shift Engineer. In this situation, though, The 4th Class Chief Engineer will still assume full responsibility for the checks.

Several private firms, who provide Power Engineers to perform the regular Guarded Status checks on a daily basis, also offer Guarded Status services. These services are an option to the steam plant owner who chooses to not have a Power Engineer on staff.

How do I request Guarded Status?

In accordance with the Power Engineers' Act and Regulations, the following procedure applies in all cases where requests for guarded status are made:

- First, the owner of the power plant must email a written request to the Director of ITS, stating that the plant will be well maintained and its safety limit controls tested regularly by a power engineer of the required class. In addition, the plant operates in accordance with the guidelines set out in this booklet, the current Act and Regulations as well as all pertinent safety codes. Email shall be sent to bpvintake@gov.mb.ca.
- The plant will then be surveyed by an ITS Boiler and Pressure Vessel Inspector to determine whether it meets the minimum safety code standards and other stipulated regulatory requirements. The assigned inspector will detail the necessary safety controls and mechanical room improvements required for that plant, and give a copy of this report to the owner of the plant.
- Following the completion of the work by the owner, the plant must be inspected to determine if the completed work is satisfactory. At this time, the inspector will test the system to verify that the system functions properly.

- Finally, the Director of ITS, upon the advice of the Boiler and Pressure Vessel Inspector, will issue a letter, granting permission to operate the plant without continuous supervision. The Guarded Status letter shall be posted in the vicinity of the equipment.

When the plant is issued a Guarded Status approval letter, it is then considered in compliance with the minimum guarded status requirements, and officially recognized as Guarded Status.

Note: Any change to the configuration, equipment or ownership of the plant must be made immediately to ITS, at which time Guarded Status will be re-evaluated.

Minimum Mandatory Requirements to Qualify for Guarded Status

The following lists, as a minimum, the mandatory requirements for steam guarded status plants. Depending on the configuration of the plant, additional controls and equipment may be necessary.

Two Low Water Cut-Off Controls:

One of the low water cut-off devices, when operated, shall cause a safety shut down. The other low water cut-off device, when operated, shall cause a safety shut down and lockout, requiring manual reset, and shall initiate an audio-visual alarm.

Flame Safeguard Control:

A flame failure detection system shall be provided with appropriate means of testing. A flame failure shall cause a safety shut down and lockout, requiring manual reset, and shall initiate an audio-visual alarm.

High Steam Pressure Cut-Off Limit Control:

The high pressure cut-off limit control shall cause a safety shutdown and lockout, requiring manual reset, and shall also initiate an audio-visual alarm.

Pressuretrol/High Limit Over-Ride Switches:

A momentary contact switch shall be installed to override the function of the operating pressure control, and another momentary contact switch shall be installed to override the function of the high-pressure cut-off limit control. When these switches are operated, a Power Engineer can:

- Cause the boiler pressure to be raised above the set point of the operating pressure control, to test the high pressure cut-off limit control, and
- Cause the boiler pressure to be raised above the set point of the high pressure cut-off limit control, to enable the safety relief valve or valves to be tested.

Activation of either switch shall also place the firing rate control of the boiler in its “high fire” position (only while the momentary contact switch is activated).

Combustion Air Proving Switch (where applicable):

A three-way valve shall be installed in the airline feeding the air-proving switch. Operation of the valve will simulate a combustion air failure, causing a safety shutdown and lockout, requiring manual reset. In addition to these normal functions, the air-proving switch, on failure of air supply, shall initiate an audio-visual alarm.

Main Burner Fuel Safety Shut-Off Valves:

The locations of safety shut-off valves, gauges, hand-operated valves, control devices, and other fuel train fittings shall conform to the applicable sections of the CSA B149.3 code for field approval of gas appliances, CSA B139 code for oil-fired appliances, and ASME CSD-1 code for automatically-fired boilers.

An addition to these code requirements, further fuel-train alterations may be required.

- For standing-pilot applications, an additional hand-operated valve shall be located in the gas train upstream of the first main-fuel safety shut-off valve and downstream of the pilot gas take-off connection.

- For each fuel train configuration, including “double-block and bleed” applications, there shall be an additional pressure gauge mounted between the two main safety shut-off valves.
- For each fuel train configuration, there shall be a fuel pressure gauge mounted downstream of the main fuel safety shut-off valves and upstream of the hand-firing valve.
- For each fuel train configuration, there shall be a fuel pressure gauge mounted upstream of the main fuel safety shut-off valves and downstream of the appliance fuel pressure regulator. The additional fuel pressure gauges allow the integrity of the hand-firing valve, and the main fuel safety shut-off valves to be tested.
- For each fuel train configuration, there shall be at least two fuel safety shut-off valves. The use of a single fuel safety shut-off valve with “Proof of Closure” is unacceptable.

Any alterations to the fuel train, if required, may only proceed after an application for an ITS “Special Acceptance” has been made. Any fuel train alterations shall be made by a certified, qualified, and licensed tradesperson.

Low Fuel Pressure Cut-Off Switch (where applicable):

A low fuel pressure switch shall cause a safety shut down and lockout, requiring manual reset, and shall initiate an audio-visual alarm.

High Fuel Pressure Cut-Off Switch (where applicable):

A high fuel pressure switch shall cause a safety shut down and lockout, requiring manual reset, and shall initiate an audio-visual alarm.

Low Atomizing Air Pressure/Low Atomizing Steam Pressure Cut- Off Switch (where applicable):

A low atomizing air/steam pressure switch shall cause a safety shut down and lockout, requiring manual reset, and shall initiate an audio-visual alarm.

Piping Of Safety Valves:

The safety valves shall be piped to discharge at a safe outdoor location, using approved drip-pan elbows.

Guarded Status Control Panels:

All audio-visual readouts and momentary contact switches as itemized above shall be combined at a single location, known as a “Guarded Status Panel.” All guarded status panels shall be certified by an approved testing lab, or shall have a Manitoba Special Acceptance Label for electrical equipment, in accordance with CSA-C22.2 Code (No.3). Wherever practical, the guarded status panel shall be located in sight of the controls being tested.

Training and Procedures:

Operators shall be trained on how to operate the guarded status panel and on how to conduct the Guarded Status tests. There shall be a documented training program. Refresher classes must be provided as necessary. The plant engineers must be capable of performing the guarded status checks, if the inspector desires to witness the tests.

Testing and Maintenance Requirements

Once a Steam Plant is an approved Guarded Status Plant, periodic testing of all controls and safety devices is necessary to determine that the controls are operating as designed.

Owners Responsibility

- Inspection and testing plan is developed and followed.
- That, in the event of malfunction of any control or plant equipment, prompt corrective action is taken.
- Shift engineers maintain a written log showing, for each day of operation
 - a) Each check of the plant carried out by him or her and the time and date thereof;
 - b) The results of any tests of automatic safety controls;
 - c) Any abnormal condition in the plant, and the time and date when it is first observed;
 - d) Any order given respecting the operation of the plant and the time and date thereof; and
 - e) That the shift engineer signs the entries for each shift.
- Records of all maintenance work performed on the plant are maintained.
- All records are made available to a provincial inspector on request.
- Maintain two log books, one for the guarded status checks and the main plant log book.
- ITS is notified, in writing, with a current and up-dated list of the names and classification of the power engineers who will be supervising the plant, at a given location and for designated classification of the plant.
- The Power Engineer responsible for the plant is present during the time of the recurring inspection.

The intent of the above requirements is for owners to develop and implement a “preventative maintenance program” of their own. The exact structure of a program of this type cannot be made mandatory due to the many variations of plants. Nevertheless, a guideline can be developed to facilitate and document testing and maintenance, vital for the reduction of the likelihood of failures, accidents, explosions, etc.

The following Table contains a schedule prepared to suit a general situation. It is strongly recommended that owners (or contractors) draw up their own detailed check lists/schedules as suggested by the unit manufacturer’s instructions and these requirements. Consultation with the ITS inspection staff should be considered as well.

Please note that boilers operating with multiple fuel inputs system must be qualified for guarded status for each fuel system.

Frequency	Item
Daily and when switching fuel	<ul style="list-style-type: none"> • Both low water cut-off controls.
	<ul style="list-style-type: none"> • Flame failure response.
	<ul style="list-style-type: none"> • Operating steam pressure control (“pressuretrol”)
	<ul style="list-style-type: none"> • High pressure cutoff.
	<ul style="list-style-type: none"> • Combustion air proving switch.
	<ul style="list-style-type: none"> • Test all audio –visual and remote monitoring signals.
	<ul style="list-style-type: none"> • Visual check of control settings.
Monthly and when switching fuel	<ul style="list-style-type: none"> • Safety relief valve try-lever test.
	<ul style="list-style-type: none"> • Low fuel pressure cut-off.
	<ul style="list-style-type: none"> • High fuel pressure cut-off.
	<ul style="list-style-type: none"> • Main fuel valve leakage and operation test.
Annually and when switching fuel	<ul style="list-style-type: none"> • Low atomizing air (or steam) pressure cut-off switch
	<ul style="list-style-type: none"> • Safety relief valve pressure accumulation test.
	<ul style="list-style-type: none"> • A general overhaul, cleaning, and inspection of the boiler, burner, and controls.
	<ul style="list-style-type: none"> • A full combustion analysis and set-up by a qualified tradesperson (“A” Gas Fitter and/or Oil Fitter, as applicable). The fitter tests shall also test the controls, interlocks, and flame safeguard systems for correct operation.
All controls to be checked and tested in accordance with the inspector’s recommendation. The owner shall log the results of all tests, and provide verification of the tests to the inspector at his or her request.	

Table 1: Minimum Schedule of Periodic Testing and Maintenance for Guarded Status (All items to be logged)

Notes:

A power engineer of the class to which the plant is certified shall only do testing of limit controls and other operating steam plant equipment. The details of the supervision are given in Section 6 of The Power Engineers Regulation.

It is very important that the boiler logs be kept in a consistent format, in order for trends to be perceived and followed with preventive action. Standard forms are suggested in this booklet; however, the log may be more useful if the log form is customized for the particular installation. A separate log sheet is suggested for each period. The log sheets can be filed in a loose-leaf binder, and should be retained as a permanent maintenance record. The log sheets can be used as a handy check-off system when establishing a plant facility maintenance program. It is always advisable that the equipment manufacturer’s recommendations are followed.

A well thought-out operation and maintenance log program designed to address the requirements of the power plant facility will reduce accidents, downtime, and equipment loss. Such a program, properly carried out, will focus attention of both management and operating personnel on the often-overlooked plant, thereby addressing small problems before they become large ones. Management must stress the need for complete accurate logs, and must also explain the need for analysis and its benefits.

Definitions and Interpretations

The following definitions and interpretations of words are related to the words found in this booklet:

- **“Act”** means The Power Engineers Act.
- **“Alarm Annunciator”** means an audio and visual warning system, known as a “Guarded Status Panel”, to alert operators of alarm conditions in the plant.

Guarded Status Panels shall have warning lights paired with the name of a potential alarm condition (high temperature, low pressure, etc.). Warning lights are controlled by hard-wired switches in the plant, arranged to alert operators of alarm conditions.

In the event of a malfunction in the plant, a light will flash and an audible sound (bell, horn, etc.) will emit to attract the operator’s attention. The operator can silence the alarm with a button, and the light will remain lit until the malfunction is rectified. When the condition returns to normal, the light will turn off.

Note: Guarded Status Panels are not limited to the above style, different styles can be installed however, it shall incorporate the same visual and alarm functions.

- **“Approved”** means accepted or approved by the Minister.
- **“Audio-Visual Alarm”** means an audio and visual alarm annunciation equipment as in the “Alarm Annunciation” noted above.
- **“Audio-Visual Read-Out System”** means alarm annunciation equipment, with the addition of an electronic telecommunication device that is connected to a printer so that, in the events of a malfunction in the plant, it signals an alarm either:
 - a) To the on-call Power Engineer having in possession another alarm-responding device such as a cellular telephone, or
 - b) To a Central Control Station for the direct attention of the supervising Power Engineer or a responsible person in charge and on duty.

The printer shall register all alarm signals, and is a requirement for all extended *Guarded Status Plants*. An “Audio-visual read-out system” is compulsory for extended *Guarded Status Plants* (exceeding 24 hours).

- **Central Control Station”** means the area in a plant containing an approved visual read-out system through which the systems being monitored are controlled.
- **“Constant Supervision”** means the supervision that requires a power engineer to be present continuously in or near an operating area.
- **“Guarded Status Plant”** means a plant equipped with automatic safety controls that is

permitted by the Minister to operate under Section 7 of the latest edition of The Power Engineers Regulations.

- **“Operating Area”** means
 - a) The major area of a plant where steam is produced or air, another gas or a refrigeration or any combination thereof is compressed, or
 - b) A *Central Control Station* of a high-pressure industrial occupancy plant that is equipped with a full set of automatic safety and an approved visual read-out system.
- **“Plant Supervision”** means the supervision that requires a power engineer to be present continuously on the premises.
- **“Regulation”** means The Power Engineers Regulations.
- **“Unoccupied”** means that the building in which the plant is located is not being used for its usual and normal purposes involving the presence of one or more persons or that there are no persons present in the building in which the plant is located.

Referenced Codes and Standards

Boiler, Pressure Vessel, and Pressure Piping Code, CAN/CSA-B-51, National Standard of Canada, published by Canadian Standards Association, 178 Rexdale Boulevard, Rexdale (Toronto), Ontario, Canada, M9W 1R3

Canadian Electrical Code, Part 1, 22.1-1994 and its Revision, National Standard of Canada, published by Canadian Standards Association; Appendix B, page. 495, Notes on Rules 26-804, CSA Standard C22.2, No. 3.

Natural Gas and Propane Installation Code, CSA B149.1, National Standard of Canada, published by Canadian Standards Association, 178 Rexdale Blvd., Rexdale (Toronto) Ontario, Canada, M9W 1R3.

Controls and Safety Devices for Automatically Fired Boilers, A.S.M.E. CSD-1, An American National Standard, The American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990

ASME Boiler and Pressure Vessel Codes, A.S.M.E. Sections I, IV, VI, and VII, including addenda, An American National Standard, The American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990

Annex A

Inspection Technical Services Boiler Guarded Status Log

_____ (Month / Year)

Building Name: _____

Address: _____

Manitoba Unit Number: _____ Boiler Number: _____

Date	Time	Checked By	DAILY					MONTHLY				For detailed remarks fill out incident report and check report box.			
			Low Water cut-off (Primary)	Low Water cut-off (Secondary)	Flame Failure	Compositional air switch	Operating Pressure	High pressure cut-off	Safety valve try lever	Fuel valve leak test	Low fuel pressure		High fuel pressure		
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>
															<input type="checkbox"/>



Annex B

Inspection Technical Services Incident Report

_____ (Month / Day / Year)

Building Name: _____

Address: _____

Manitoba Unit Number: _____ Boiler Number: _____

Incident:

Reported By: _____

Action Taken by Engineering/Maintenance Department:

Action Taken By: _____ Date: _____

Annex C

Approved Drip-Pan Elbow for Safety Relief Valve Discharge

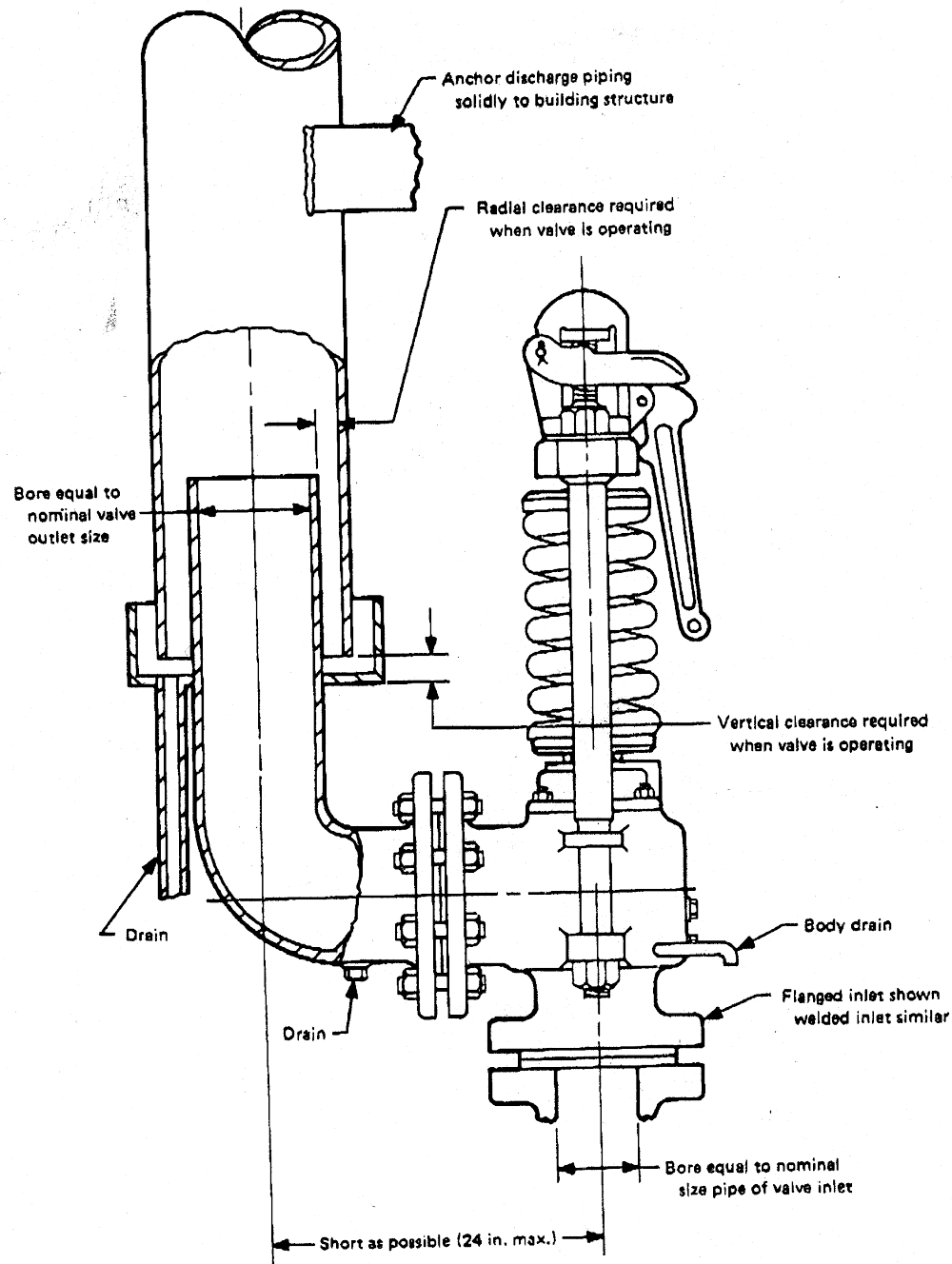


FIG. C4.1-3 RECOMMENDED SAFETY VALVE INSTALLATION
(Courtesy of Dresser Industries)