GUARDED STATUS INFORMATION and REQUIREMENTS
for
OWNERS AND OPERATORS
of
STEAM PLANTS

[Third Revised Edition]
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Issued by:

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Travail et Immigration Manitoba

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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.

This information booklet has the following main sections:

PART A: QUESTIONS AND ANSWERS

1) 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.

2) 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, or
- **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.
- **d)** leave the operating area of a high pressure plants in an unoccupied building for greater than twenty-four hours and the plant has an approved audio-visual read-out system.

3) 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 horse power in capacity, but not over 50 boiler horsepower in capacity.

The Mechanical and Engineering Branch calculates boiler horsepower using the following five methods:

1) Maximum heat output of the boiler, in Btuh, divided by 33,500, or
2) Maximum steaming capacity of the boiler in pounds per hour, divided by 34.5, or
3) Maximum firing rate input of the boiler, in Btuh, divided by 42000, or
4) Heating surface of the boiler, in square feet, divided by 10, or
5) Nameplate kilowatt rating divided by 10.

The boiler horsepower, then, is the largest calculated value.

4) ARE THERE ALTERNATIVES TO GAURDED 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, and is 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 "clock down" or "de-rate" an individual boiler's horsepower rating by reducing its firing rate input from the manufacturer's nameplate designation.

5) WHO CAN PERFORM THE REGULAR GAURDED STATUS CHECKS?

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

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

6) 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 make a request in writing to the Director of the Department of Labour Mechanical and Engineering Branch, stating that the plant will be well maintained and its safety limit controls tested regularly by a power engineer of the required class, in accordance with the guidelines set out in this booklet, the current Act and Regulations as well as all pertinent safety codes,

- The plant will then be surveyed by a Department of Labour 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 the Mechanical and Engineering Branch, upon the advice of the inspector, will, in writing, grant permission to operate the plant without continuous supervision. A guarded status "*label*" will be affixed to the equipment at this time.

When the plant is labeled, it is then considered in compliance with the acceptable minimum guarded status requirements, and is being officially recognized as Guarded Status.

PART B: 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.

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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 lock-out, 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 a 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 a Manitoba Department of Labour "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.

PART C: 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.

It is the owner's responsibility to ensure:

- That an 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.

- That the 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; and
  (d) Any order given respecting the operation of the plant and the time and date thereof;
  (e) And that the entries for each shift are signed by the shift engineer.

- That records of all maintenance work performed on the plant are maintained.

- That all records are made available to a provincial inspector on request.

    - That the Department of Labour 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.

    - That the Power Engineer responsible for the plant is present during the time of the annual 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 Department of Labour 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.

PART D: DEFINITIONS AND INTERPRETATIONS

IN THIS BOOKLET:

- ***Act*** means The Power Engineers Act.

- ***Regulation*** means The Power Engineers Regulations.

- ***Approved*** means accepted or approved by the Minister of Labour.

- ***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 of Labour 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.

- ***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.

- ***Visual Read-Out System*** means a combination of electronic and/or telecommunication device that is connected to a printer so that its signal, in the events of a malfunction in the plant will activate an alarm either

  (a) To a power engineer having in possession, another alarm responding device such as a pager or a cellular telephone or,
  (b) To a central control power station for the direct attention of the supervising power engineer or a responsible personnel in charge and on duty. The printer, in question, must register all alarm signals, and is a requirements for all guarded status plants with an occupied building requiring plant supervision

PART E: REFERENCES

These guidelines refer to the most current editions or their latest updates as published from time to time of the following codes and publications:

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

Gas Notices, published by the Mechanical and Engineering Branch, Manitoba Department of Labour and Immigration.

Controls and Safety Devices for Automatically Fired Boilers, an American National Standard, ASME CSD-1.

ASME Boiler and Pressure Vessel Codes, Sections 1, 4,6, and 7, including addenda.

Boiler Owner and Operator's Guide, a booklet published by The National Board of Boiler and Pressure Vessel Inspectors, 1994. The National Board, 1055 Crupper Ave., Columbus, Ohio 43229, (ph. (614) 888-8320).

William H. Axtman. **"Boiler Logs can Reduce Accidents,"** National Board Bulletin, Winter 1995, pp. 2-5. . The National Board, 1055 Crupper Ave., Columbus, Ohio 43229.

TABLE 1: MINIMUM SCHEDULE OF PERIODIC TESTING AND MAINTENANCE for GUARDED STATUS (All items to be logged)

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.	
FREQUENCY	ITEM
Daily, and when switching fuel	• Both low water cut-off controls.
	• Flame failure response.
	• Operating steam pressure control. ("Pressuretrol")
	• High steam pressure cutoff.
	• Combustion air proving switch.
	• Test of all audio-visual and remote monitoring signals.
	• Visual check of control settings.
Monthly, and when switching fuel	• Safety relief valve try-lever test.
	• Low fuel pressure cut-off.
	• High fuel pressure cut-off
	• Main fuel valve leakage and operation test.
Annually, and when switching fuel	• Low atomizing air (or steam) pressure cut-off switch
	• Safety relief valve pressure accumulation test.
	• A general overhaul, cleaning, and inspection of the boiler, burner, and controls.
	• 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.

Notes:

Testing of limit controls and other operating steam plant equipment must only be done by a power engineer of the class to which the plant is certified. 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 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.

Table 2: Manitoba Department of Labour Boiler Guarded Status Log

Month/Year:
Building Name:
Address:
Boiler Number:
Manitoba Unit 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	Combustion air switch	Operating pressure	High pressure cut-off	Safety valve try lever	Fuel valve leak test	Low fuel pressure	High fuel pressure	
													❑
													❑
													❑
													❑
													❑
													❑
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													❑
													❑
													❑
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Table 3:

Incident Report

Date:	**Manitoba Unit Number:**
Incident: **Reported By: _____**	
Action Taken by Engineering/Maintenance Department	
Action Taken By:_____	**Date**:_____

Form 1: Inspectors Report

Date:_____ MB Unit Number:_____

Owner:_____ Address:_____

Owner Number	Manufacturer	Serial Number	Boiler HP	Fired by			MAWP	Type of Inspection		
				gas	oil	other		Int.	Ext.	Oper.

Operating Engineers Employed:			Total Horse Power of Plant is:		
Name	Certificate Number	Expires	Name	Certificate Number	Expires

RE: Your application for Guarded Status on the above is listed steam plant section _____ of Manitoba Regulation 40/92
The Power Engineers Act

This Plant is to be equipped with the following mandatory controls:

1. **LOW WATER CUT-OFF CONTROLS:**

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

2. **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.

3. **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

4. **PRESSURETROL/HI-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.

5. **HIGH-FIRE REQUIREMENT FOR OVER-RIDE SWITCHES:**

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

6. **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 lock-out, requiring manual reset. In addition to these normal functions, the air-proving switch, on failure of air supply, shall initiate an audio-visual alarm.

7. **MAIN BURNER FUEL SAFETY SHUT-OFF VALVES:**

Each fuel train shall be equipped with redundant main 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.

8. FUEL TRAIN GAUGES:

- 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 all fuel train configurations (including "double-block and bleed" applications), an additional pressure gauge shall be mounted between the two main safety shut-off valves.
- For all fuel train configurations, 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 all fuel train configurations, 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.
- Any alterations to the fuel train, may only proceed after an application for a Manitoba Department of Labour "Special Acceptance" has been made. Any fuel train alterations shall be made by a certified, qualified, and licensed tradesperson.

9. 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.

10. 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.

11. 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.

12. PIPING OF SAFETY VALVES:

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

13. GUARDED STATUS CONTROL PANELS:

All audio-visual readouts and momentary contact switches as itemized above shall be combined at a single "Guarded Status Panel," to be located in sight of the controls being tested. 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).

14. **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

15. **A REMOTE ALARM TO BE LOCATED AT** _____.

16. OTHER ITEMS REQUIRING UPGRADE OR MODIFICATION:

_____

_____

_____

For further information and final certification, testing, and labeling, contact 1 (204) 945-3373 or notify in writing.

INSPECTOR:_____PHONE:_____

APPENDIX "A":
APPROVED DRIP-PAN ELBOW FOR SAFETY RELIEF VALVE DISCHARGE

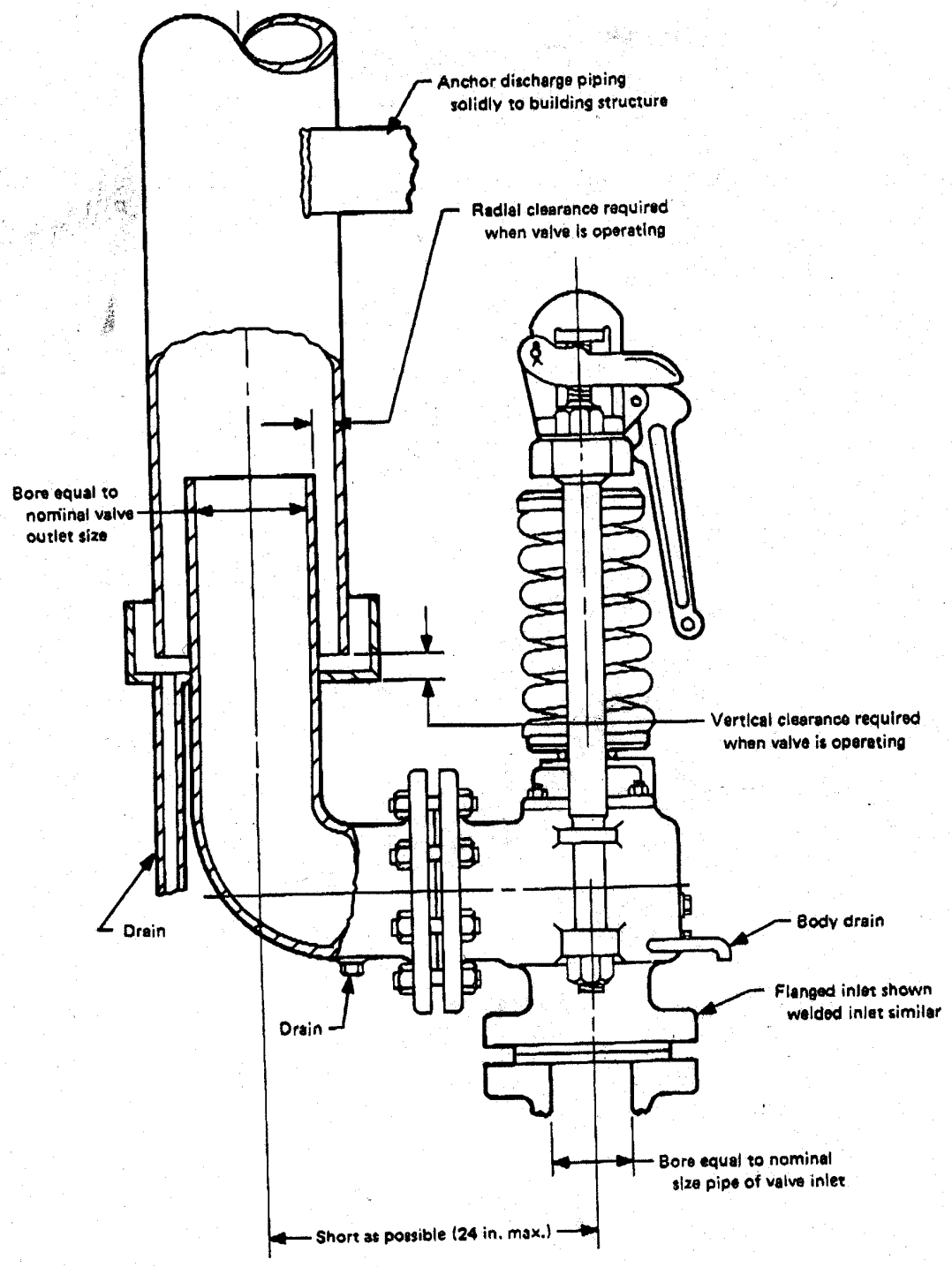
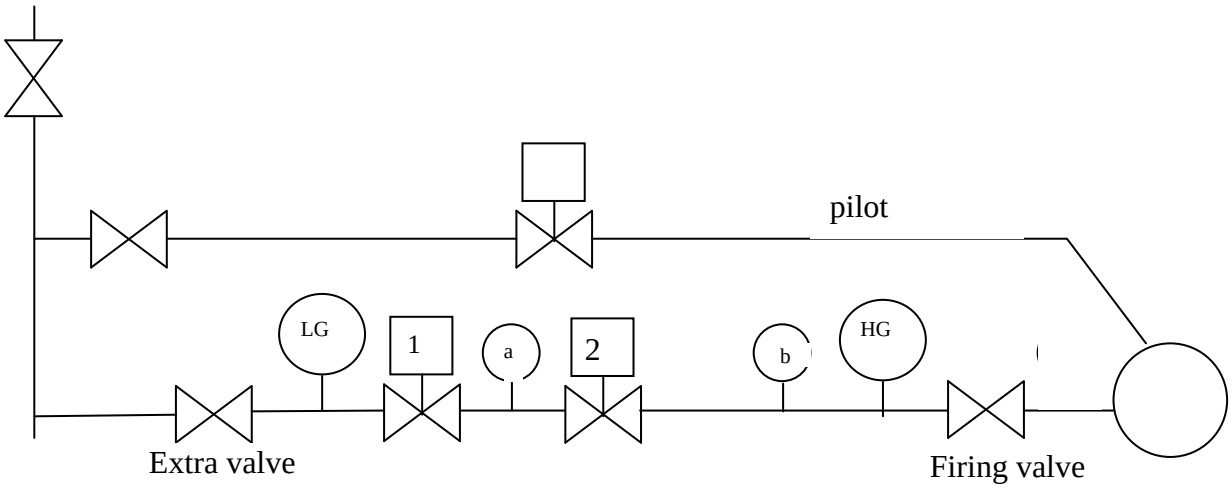


FIG. C4.1-3 RECOMMENDED SAFETY VALVE INSTALLATION
(Courtesy of Dresser Industries)

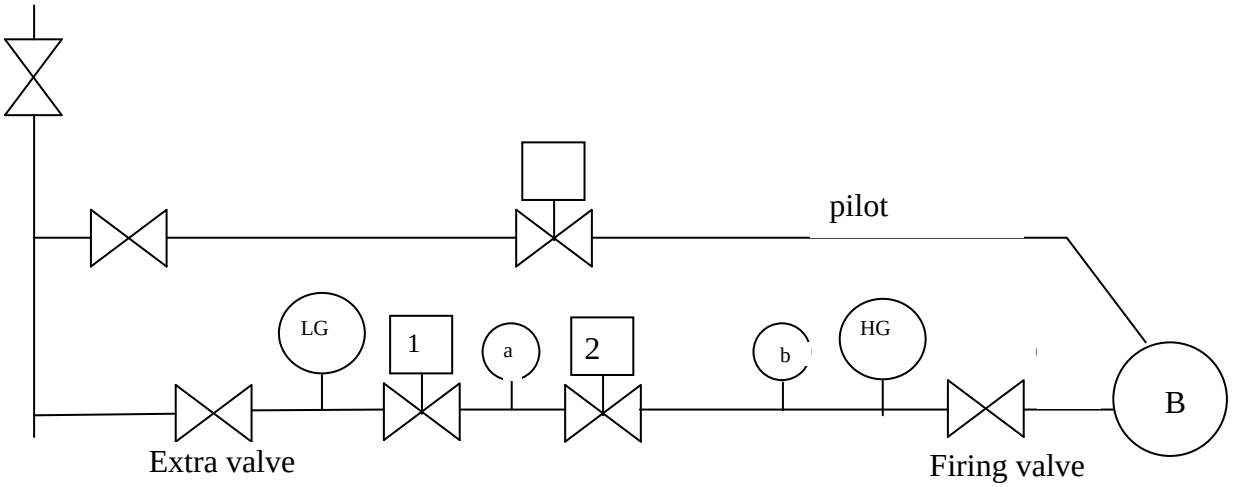
APPENDIX "B":
PROCEDURES FOR TESTING INTEGRITY OF SAFETY SHUT-OFF VALVES, GUARDED STATUS WITH STANDING PILOT:



Procedure for testing integrity of safety shut-off valves, guarded status with standing pilot:

1. TEST THE LEAK TIGHTNESS OF THE FIRING VALVE:
   1.1. With boiler operating, shut firing valve. This should trip the HGPCO and shut the safety shut-off valves immediately.
   1.2. Record the gas pressure of gage "b." If gage "b" pressure decreases, then the firing valve leaks.
2. TEST THE LEAK TIGHTNESS OF THE SECOND SAFETY SHUT-OFF VALVE (SSOV2):
   2.1. If gas gage "b" pressure is steady, open firing valve to release latched-up pressure, and then re-close firing valve.
   2.2. If gas gage "b" shows increasing pressure, and/or gage "a" shows a pressure drop, then suspect SSOV "2" is leaking gas.
   2.3. If gas gage "b" maintains zero pressure and gas gage "a" shows steady pressure, SSOV "2" is not leaking.
3. TEST THE LEAK TIGHTNESS OF THE FIRST SAFETY SHUT-OFF VALVE (SSOV1):
   3.1. Re-start boiler.
   3.2. With boiler running, shut "extra valve." This should trip the LGPCO and shut the safety shut-off valves immediately.
   3.3. Gages "a" and "b" should show zero pressure.
   3.4. Open the "extra valve." If the pressure on gage "a" increases, suspect that SSOV "1" is leaking gas.
4. Note: Integrity of firing valve and SSOV2 must be proven before testing SSOV1.

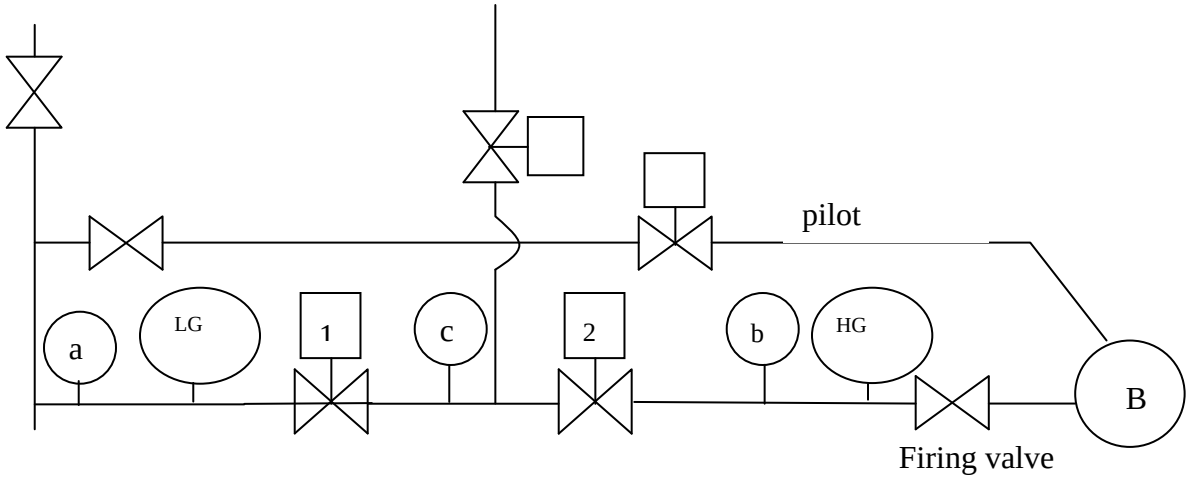
APPENDIX "C":
PROCEDURE FOR TESTING INTEGRITY OF SAFETY SHUT-OFF VALVES GUARDED STATUS WITH INTERRUPTED PILOT



1. TEST THE LEAK TIGHTNESS OF THE FIRING VALVE:
   1.1. With boiler operating, shut firing valve. This should trip the HGPCO and shut the safety shut-off valves immediately.
   1.2. Record the gas pressure of gage "b." If gage "b" pressure decreases, then the firing valve leaks.
2. TEST THE LEAK TIGHTNESS OF THE SECOND SAFETY SHUT-OFF VALVE (SSOV2):
   2.1. If gas gage "b" pressure is steady, open firing valve to release latched-up pressure, and then re-close firing valve.
   2.2. If gas gage "b" shows increasing pressure, and/or gage "a" shows a pressure drop, then suspect SSOV "2" is leaking gas.
   2.3. If gas gage "b" maintains zero pressure and gas gage "a" shows steady pressure, SSOV "2" is not leaking.
3. TEST THE LEAK TIGHTNESS OF THE FIRST SAFETY SHUT-OFF VALVE (SSOV1):
   3.1. Re-start boiler.
   3.2. With boiler running, shut gas valve on the drop. This should trip the LGPCO and shut the safety shut-off valves immediately.
   3.3. Gages "a" and "b" should show zero pressure.
   3.4. Open the "extra valve." If the pressure on gage "a" increases, suspect that SSOV "1" is leaking gas.
4. Note: Integrity of firing valve and SSOV2 must be proven before testing SSOV1.

APPENDIX "D":

PROCEDURE FOR TESTING INTEGRITY OF SAFETY SHUT-OFF VALVES, GUARDED STATUS WITH INTERRUPTED PILOT AND DOUBLE BLOCK & BLEED



Procedure for testing integrity of safety shut-off valves, guarded status with interrupted pilot and double block & bleed:

1. TEST THE LEAK TIGHTNESS OF THE SECOND SAFETY SHUT-OFF VALVE (SSOV2) AND THE FIRING VALVE:
   1.1. With boiler operating, shut firing valve. This should trip the HGPCO and shut the safety shut-off valves immediately.
   1.2. Record the gas pressure of gage "b." If gage "b" pressure decreases, then the firing valve leaks, or SSOV "2" leaks.
2. TEST THE LEAK TIGHTNESS OF THE FIRST SAFETY SHUT-OFF VALVE (SSOV1):
   2.1. Re-start boiler.
   2.2. With boiler operating, shut gas valve on the drop. This should trip the LGPCO and shut the safety shut-off valves immediately.
   2.3. Gage "a" should show close to zero pressure, gage "b" and "c" should show zero pressure.
   2.4. Open the gas valve on the drop to pressurize the gas line up to SSOV "1," and then shut it again. If the pressure on gage "a" decreases, suspect that SSOV "1" is leaking gas.