

**PALO VERDE
NUCLEAR GENERATING STATION**

Mechanical Maintenance Training

Classroom Lesson



Mechanical Maintenance Training	Date: 10/12/2009
LP Number: NMF35C000202	Rev Author: CURT CLUFF
Title: Components of Fire Protection Systems	Technical Review:
Duration : 5 HOURS	Teaching Approval:

INITIATING DOCUMENTS

Task Analysis of Tasks

REQUIRED TOPICS

None

CONTENT REFERENCES

M650-928 Instruction manual/parts catalog

Systems Training Manual Volume 64, Fire Protection

LESSON PLAN REVISION DATA

Oct 12, 2009 Curt Cluff

Added EO05 to lesson to include reworking the Alarm Check Valve - inadvertently deleted in a previous revision [Ref TCSAI 3322558]

Tasks and Topics Covered

The following tasks are covered in Components of Fire Protection Systems :

Task or Topic Number*	Task Statement
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Lesson: Components of Fire Protection Systems

FPM003	Rework Fire Protection Valves
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Total task or topics: 1

TERMINAL OBJECTIVE:

- 1 Given a maintenance situation, the Maintenance Mechanic will describe the rework of Fire Protection System components. Mastery will be demonstrated by obtaining a score of 80% or better on a written examination.
 - 1.1 Describe the function of individual components in Fire Protection Systems.
 - 1.2 Describe the rework process of the pressure operated relief valve (P.O.R.V.).
 - 1.3 Describe the process of changing desiccant in the pre action system.
 - 1.4 Describe the rework process of the deluge valve.
 - 1.5 Describe the rework process for the alarm check valve

CONTENT

METHODS & ACTIVITIES

I. Motivation

Focus student attention on
“What’s In It For Me”.

A. Major component maintenance

B. Need to understand purpose and how to perform the maintenance tasks

1. Ensures operability of system is maintained
2. Ensures time spent out of service is minimal
3. Ensures maintenance is highest quality

II. Lesson Objectives

A. Lesson Terminal Objective

Read and/or discuss the lesson objectives

Given a maintenance situation,, the Maintenance Mechanic will describe the rework of Fire Protection System components. Mastery will be demonstrated by obtaining a score of 80% or better on a written examination.

B. Lesson Enabling Objectives

- EO01 Describe the function of individual components in Fire Protection Systems.
- EO02 Describe the rework process of the pressure operated relief valve (P.O.R.V.).
- EO03 Describe the process of changing desiccant in the pre action system.
- EO04 Describe the rework process of the deluge valve.
- EO05 Describe the rework process for the alarm check valve

TO: 1 Given a maintenance situation, , the Maintenance Mechanic will describe the rework of Fire Protection System components. Mastery will be demonstrated by obtaining a score of 80% or better on a written examination.

EO: 1.1 Describe the function of individual components in Fire Protection Systems.

CONTENT**METHODS & ACTIVITIES**

- | | |
|---|---------------------------------------|
| I. Alarm check valve | <i>Show TP-02 "Alarm check valve"</i> |
| A. Integral part of wet-pipe sprinkler system | |
| B. Provides for proper functioning of | |
| 1. Water motor alarm | |
| 2. Electric alarm | |
| II. Deluge valve | <i>Show TP-03 "Deluge valve trim"</i> |
| A. Quick-opening | |
| 1. One moving part | |
| 2. Rubber and brass clapper assembly | |
| B. Kept closed by water pressure differential | |
| C. Actuated by | |
| 1. Manual hydraulic system | |
| 2. Automatic detection system | |
| D. Piping remains dry until the solenoid valve or manual hydraulic release is activated | |
| III. Pressure operated relief valve (P.O.R.V.) | |
| A. When tripped | |
| B. Maintains positive vent | |

CONTENT

METHODS & ACTIVITIES

- C. Prevents the deluge valve from automatically resetting prematurely
- D. Automatically resets when pressure is removed from control

EO: 1.2 Describe the rework process of the pressure operated relief valve (P.O.R.V.).

CONTENT

METHODS & ACTIVITIES

- I. Rework pressure operated relief valve (P.O.R.V.)
 - A. Ensure deluge system and release system are tagged out of service
 - B. Remove PORV from deluge valve trim
 - C. Separate body assembly from cover assembly
 - 1. Unscrew
 - 2. Spring will fall free
 - 3. Replace upper diaphragm assembly
 - 4. Remove screws
- II. Reassembly
 - A. Ensure metal plate of diaphragm faces the schrader valve
 - B. Replace spring and lower diaphragm assembly
 - C. Remove screws
 - D. Replace seal
 - E. Unscrew schrader core assembly
 - F. Replace schrader valve core

CONTENT**METHODS & ACTIVITIES**

- G. Special tool required
- H. Screw body assembly to cover assembly

EO: 1.3 Describe the process of changing desiccant in the pre action system.

CONTENT**METHODS & ACTIVITIES****I. CAUTION:**

When replacing desiccant, do not allow dry pipe or deluge sprinkler system air pressure to drop below system service minimums

II. Process for changing desiccant

- A. Close globe valve on system side of dehydrator
- B. Close main air supply valve
- C. Vent trapped pressure from dehydrator
 - 1. Open moisture trap
 - 2. Close when pressure is expelled
- D. Remove container
- E. Press in retainer latch on dehydrator housing and hold
 - 1. Exert a downward pull
 - 2. Replace used desiccant with dry blue crystals
 - 3. Replace desiccant container and twist until latch locks
 - 4. Open main air supply valve to pressurize dehydrator
 - 5. Check for leaks

CONTENT**METHODS & ACTIVITIES**

- F. Open globe valve on system side

EO: 1.4 Describe the rework process of the deluge valve.**CONTENT****METHODS & ACTIVITIES****I. CAUTION**

Prior to disassembly of deluge valve depressurize and drain all three chambers of the valve. Then remove the by-pass and release trim piping.

*Show TP-07 "2 inch deluge valve
Point out that the only difference
is the shape and size*

II. Remove cover

*Show TP-06 "3-6 inch deluge
valve"*

A. Remove hex-head cap screws

*Show TP-07 "2 inch deluge valve
Point out that the only difference
is the shape and size*

B. Lift cover**III. Remove clapper assembly****A. Lift out****B. If body seat requires replacement –**

1. It cannot be done

2. It is recommended that the valve be returned to the factory

IV. Remove diaphragm rubber**A. Remove circle of hex-socket screws****B. Remove clamp ring**

CONTENT

METHODS & ACTIVITIES

- C. Prior to installing the new clapper rubber –
 - 1. Make certain that all surfaces contacting the clapper rubber are clean and free of foreign material

- V. Remove seat rubber/ring
 - A. Remove circle of screws
 - B. Remove rubber/ring

- VI. Install seat rubber/ring
 - A. Install rubber/ring
 - B. Install circle of screws

- VII. Install diaphragm rubber
 - A. Install hex-head cap screws

EO: 1.5 Describe the rework process for the alarm check valve

CONTENT

METHODS & ACTIVITIES

- I. Disassembly
 - A. Establish conditions
 - 1. Close the main supply valve
 - 2. Drain system
 - B. Disassemble alarm check valve
 - 1. Remove hand hole cover and gasket
 - 2. Remove valve member assembly
 - 3. Unscrew pivot shafts or remove clapper arm shaft

Slide

CONTENT**METHODS & ACTIVITIES**

4. Remove clapper assembly from clapper arm
 - a. Remove cotter pin
 - b. Unscrew slotted hex nut
 - c. Remove washer
 - d. Pull clapper assembly free
5. Remove clamp plate and clapper rubber
6. Remove nylok hex-head cap screw
7. Remove auxiliary valve assembly from clapper arm
 - a. Remove socket set screw
 - b. Remove auxiliary valve cap
 - c. Remove spring and auxiliary valve clapper
 - d. Remove auxiliary valve sleeve
 - e. Press out nylon ball

C. Remaining Assemblies not disassembled

1. **Body insert** is not removable, if replacement is required return valve to factory
2. **Valve seat** is not removable, if replacement is required return valve to factory

II. Reassembly**A. Reassemble and reinstall auxiliary valve assembly to clapper arm**

1. Install nylon ball, auxiliary valve sleeve, spring and auxiliary valve clapper, aux valve cap and socket setscrew
2. Install clamp plate and clapper rubber with nylok hex-head capscrew

CONTENT**METHODS & ACTIVITIES**

- B. Place the clapper assembly into the clapper arm clapper assembly
 - 1. Install washer and screw on slotted hex nut
 - 2. Add cotter pin
 - 3. Install valve member assembly
- C. Screw in pivot shafts or install clapper arm shaft
 - 1. Lift clapper assembly to ensure freedom of movement
 - 2. Install hand hole cover and gasket

III. Adjustment of Auxiliary Valve

- A. Set up for adjustment
 - 1. Remove handhole cover
 - 2. Loosen socket setscrew
 - 3. Remove auxiliary valve cap and verify main valve clapper is closed
 - 4. With the use of special setting tool (#02039B) turn setting tool screw clockwise until it makes contact with top of auxiliary valve clapper
- B. Adjustment control
 - 1. The tool for setting the travel of the auxiliary valve clapper uses a 32-pitch thread so that one complete turn of the screw (as observed by noting the position of the pointer pin) will be equal to .031" movement
 - 2. Valves are set at factory with a special dial indicator gauge that measures the gap in .001" increments

Slide

CONTENT

METHODS & ACTIVITIES

- C. Adjust the Valve
 - 1. Using a light touch, raise the main clapper and hold
 - 2. Move the setting tool one full turn clockwise
 - 3. Turn counterclockwise and adjust the auxiliary valve sleeve
 - 4. Make the required setting as per technical manual sensitivity setting **Slide**
 - 5. When adjustment is correct, tighten the cup point screw to hold the adjustment
- D. Remove the adjusting tool and replace the auxiliary valve cap

SUMMARY OF MAIN PRINCIPLES

The following items are things to consider in your lesson summary. They are not mandatory.

Objectives Review

Restate the main principles or ideas covered in the lesson. Relate key points to the objectives. Use a question and answer session with the objectives.

Questions and Answers

Ask questions that implement the objectives. Discuss students answers as needed to ensure the objectives are being met.

Problem Areas

Review any problem areas discovered during the oral questioning, quiz, or previous tests, if applicable.

Concluding Statement

If not done in the previous step, review the motivational points that apply this lesson to students needs. End with a statement leading to the next lesson.