

# 1 INTRODUCTION

ADQ Engineering Projects was appointed to design and specify a new water spray deluge fire protection system for the main transformer room at the SABS Head Offices in Groenkloof, Pretoria. This document describes the technical specifications and requirements for the installation of the system. The following drawings form part of the tender and must be read in conjunction with this document.

- P23093-PD-FIR-100-REV 0 – TRANSFORMER ROOM DELUGE FIRE PROTECTION LAYOUT

The appointed contractor would be responsible for all required civil and building works required such as trenching and backfilling and pipe support structure as required to install the system and connect it to the site fire water main.



Figure 1. Aerial Site View

## 2 TECHNICAL SPECIFICATION

### 2.1 GENERAL

The Sub-contractor shall be responsible to select such equipment that will provide the performance as specified and to position it into the building spaces provided.

Where no specific kind or quality of material is mentioned in the specification, a standard article to the Engineer's approval shall be supplied. All equipment shall be new and shall be kept in "as new" condition on site until take-over.

Equipment selected shall be of high quality material, design and manufacture and shall be suitable for the type of application and shall provide a reliable and trouble-free service

### 2.2 HYDRAULICALLY OPERATED DELUGE SYSTEM

The fire sprinkler system shall be a hydraulically operated deluge system. The system shall be installed in conformance with the current Edition of N.F.P.A. 15, Standard for Installation of Sprinkler Systems. All materials installed shall adhere to the manufacturer's installation guidelines.

### 2.3 SYSTEM DEVICES

#### 2.3.1 SYSTEM CONTROL VALVE

The system control valve shall be a listed indicating type valve. The control valve shall be UL Listed and Factory Mutual Approved for fire protection installations. System control valve shall be rated for normal system pressure but in no case less than 1200 kPa

#### 2.3.2 CONTROL VALVE SUPERVISION

The system control valve shall be secured in the open position by means of a chain and lock or a valve supervisory switch connected to a constantly attended central station.

#### 2.3.3 SYSTEM DRAIN

The system main drain shall be sized according to N.F.P.A. 13, Standard for Installation of Sprinkler Systems. The system main drain shall be piped to an adequately sized drain or out an exterior wall. Drains that terminate out an exterior wall shall be equipped with a galvanized 45° elbow pointed towards an adequately sized splash-block.

#### 2.3.4 WATER CONTROL VALVE

The deluge systems shall utilize a 90° pattern or straight-through pattern type of deluge valve. The deluge valve shall be externally resettable by hydraulic means. The deluge valve shall employ a positive vent on the priming line to ensure that the deluge valve will not prematurely reset. The

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inlet and outlet connections of deluge valve can be flanged by flanged, flanged by grooved or grooved by grooved, respectively. The deluge valve shall be capable of installation in the vertical or horizontal position. The deluge valve shall be UL Listed and Factory Mutual Approved. The deluge valve shall have a rated working pressure of 1700kPa. The valve trim shall be compatible and shall be installed following the manufacturer's specifications.

### **2.3.5 WATER CONTROL VALVE TRIM**

The deluge valve trim shall incorporate a pressure operated relief valve (PORV) of the same manufacturer as the deluge valve, to provide a hydraulic means to positively vent the priming water chamber. All deluge valve trim piping and devices shall be listed for use on a deluge system. The deluge valve trim shall be rated for 1700kPa working pressure. The deluge valve trim shall be galvanized. The deluge valve trim shall be equipped with an emergency manual release enclosed in a steel box with appropriate labeling. The deluge valve trim shall be equipped with alarm connections for the electrical or mechanical activation of water flow alarms.

### **2.3.6 WATER CONTROL VALVE HYDRAULIC RELEASE SYSTEM**

The deluge valve shall utilize a hydraulic release. One of the following methods shall be incorporated in the release system:

- A. Deluge systems utilizing hydraulic release of the deluge valve prime water pressure shall employ a rate-of-rise release detector. The rate-of-rise detector shall activate release when a rise of temperature of 15°C over the period of one minute is experienced. The rate-of-rise release shall have a means of installing a 155°C fixed temperature release on the device. Rate-of-rise release shall be automatically resetting. The device shall be UL Listed and Factory Mutual Approved. Systems utilizing nitrogen as an air supply shall be factory tested for such application.
- B. Deluge systems utilizing hydraulic pilot line release systems shall incorporate a fixed temperature release device as part of the zone detection. If rate-of-rise detectors are utilized in the pilot line, a fixed temperature release shall be installed in the auxiliary release port of the rate-of-rise release detector. If the pilot line release is to utilize non-variable temperature detection, listed and approved fixed temperature releases shall be installed according to the manufacturer's specifications and installation guidelines.
- C. Deluge systems utilizing pilot line release systems shall incorporate a fixed temperature release device as part of the zone detection. If rate-of-rise detectors are utilized in the pilot line, a fixed temperature release shall be installed in the auxiliary release port of the rate-of-rise release detector. If the pilot line release is to utilize non-variable temperature detection, listed and approved fixed temperature sprinklers shall be installed according to the manufacturer's specifications and installation guidelines.

### **2.3.7 WATER FLOW ANNUNCIATION**

Water flow through the system be announced audibly by one or both of the following methods:

- A. Water flow will activate a hydraulic powered water motor alarm by way of integral valve alarm line trim piping. The water motor alarm shall be connected to a water pressure retarding chamber to limit the propensity of unnecessary alarms. The water motor alarm shall be equipped with a rear closure plate to limit the access of foreign materials or accumulation of debris. The water motor alarm shall be UL Listed and Factory Mutual Approved for the application in which it is used.
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- B. Water flow will activate an alarm by way of an alarm pressure switch. The alarm pressure switch shall be compatible with system devices. The alarm pressure enclosure shall be UL Listed and Factory Mutual Approved for the application in which it is used. The alarm pressure switch shall have the ability to be wired for Class A or Class B service.

### **2.3.8 RELEASE SYSTEM TEST LOCATION**

An auxiliary test device shall be provided if system release devices are located inaccessibly. The auxiliary test device shall be of the same type as utilized in the deluge valves release system.

## **2.4 INSTRUCTIONS FOR OPERATION AND MAINTENANCE**

A clear description of the operation of the valve installation together with a schematic indication of the positions of the shut-off valves should be available in a user friendly format at the valve installation.

A clear indication of the maintenance required should be given. Log books should be kept ready for signature as proof that the necessary maintenance has been carried out.

## **2.5 APPROVALS**

Each system component must have proper listing and/or approval from the nationally recognized agency listed below.

All equipment used shall be listed by at least two of the following agencies.

- SABS – South African Bureau of Standards.
- UL Underwriters Laboratories - USA
- FM Factory Mutual - USA
- VdS Verband der Saeliversicherer - West Germany
- AFNOR Association Francaise de Normalisation - France
- B.S. British Standards - Great Britain
- LPC Loss Prevention Council - Great Britain
- C.S.A. Canadian Standards Association - Canada
- ULC Underwriters Laboratories - Canada
- SAA Australian Standards - Australia

Any, deviation from these specifications must be approved, in writing, by the Engineer familiar with the project for which the Specification has been prepared and by the Employer

## **2.6 TEST FOR SYSTEM ACCEPTANCE**

Provide the services of a competent, factory trained engineer or technician, to technically supervise and participate during all of the adjustments and tests for the fire suppression system.

When the systems have been completed and prior to the final inspection, perform the following tests in the presence of the engineer.

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Perform the following tests again in the presence of the engineer and duly designated representative of the client at the final inspection:

- Before charging the system with water, ensure that all sections of the system have been pressure tested and flushed, and that certification for pressure testing and flushing is available. A compressed air leak test shall precede the water pressure test
- Fill the fire system with water, and pressurize the system to its working pressure.
- Test all operational functions, visual and audible indications of both deluge valve systems.
- Operate every control valve installed with a supervisory switch, and ensure that correct trouble (fault) indications are transmitted and displayed correctly on the central fire alarm control panel. Check that all control valves are returned to their correct operating open positions.
- Operate all other devices such as pressure switches and float switches to check their correct setting, and operation, and that they transmit the required system trouble (fault) signals to the central fire control panel.
- Test all mechanical water motor alarm devices.
- The Sub-contractor's material and test certificates must be completed and presented to the engineer.
- The Sub-contractor must also provide all necessary instruction manuals for the Inspection, Testing, and Maintenance of all Fire Protection Systems.

## **2.7 FINAL INSPECTION**

At the final inspection a trained representative of the Sub-contractor shall perform the tests. In addition, the representative shall demonstrate that the systems function properly in every respect. The demonstration shall be made in the presence of the engineer and duly designated representative of the client.

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