

Standard Quality Specification for

Fire Protection



1.1 DEFINITIONS

According to the manufacturer's instructions: The manufacturer's instructions at the time of tender.

Approval: Approval by the Department in writing and is limited to visual appearance of the work, material or components. Approval does not relieve the Contractor from compliance with the specification.

ASIB: Automatic Sprinkler Inspection Bureau

BS: British Standard.

Department: The chief engineer of the Gauteng Provincial Department of Infrastructure Development or his duly authorized representative/agent.

Drawings: Drawings forming part of the contract documents and any modification thereof or additions thereto delivered by the Department to the contractor during the execution of the works.

FDIA: Fire Detection Installers Association

FM: Factory Mutual

F.O.C: Fire Officers Committee; United Kingdom

Particular Specification: A specification that is drawn up as a supplement to the Project Specification to specify items for a particular contract not covered by the Project Specification. The Particular Specification has preference over the Project Specification.

NBR: National Building Regulations.

SANS: South African National Standards

SABS: South African Bureau of Standards.

SABS-CKS: Specifications prepared by the SABS mainly for the procurement of products for the use of government departments.

Specified: As specified in the Project Specification, Particular Specification, drawings, Bill of Quantities or in any other contract document.

Standard Specification: The latest edition (as revised) of the standard quality specification of the Department.

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1.2 APPLICABLE STANDARD

SANS 10400	: Code of Practice : The application of the National Building Regulations
SANS 10400-A	: The application of the National Building Regulations – Part A: General Principles and Requirements.
SANS 10400-T	: The application of the National Building Regulations – Part T: Fire Protection
SANS 10400-W	: The application of the National Building Regulations – Part W: Fire Installation.
SANS 2001-DP1	Construction works – Part DP1: General Installations.
SANS 2001-DP2	Construction works – Part DP2: Medium Pressure pipelines.
SANS 2001-DP6	Construction works – Part DP6: Below-ground water installations.
SANS 10252-1	Water supply and drainage for buildings – Part 1: Water supply installations for buildings.
SANS 1910	: Portable rechargeable fire extinguishers – Dry Powder type extinguishers
SANS 1567	: Portable rechargeable fire extinguishers – CO ₂ type extinguishers
SANS 1475-1 and 2	: The production of reconditioned fire-fighting equipment Part 1 : Portable rechargeable fire extinguishers Part 2 : Fire hose reels
SANS 543	: Fire Hose Reels (with Hose)
SANS 988	: Braided reinforced rubber hose for air and water
SANS 1086	: Flexible polyvinyl chloride (PVC) pressure hose
SANS 1128-1	: Fire Fighting Equipment : Part I: Components of underground and above-ground Hydrant Systems
SANS 1128-2	: Fire Fighting Equipment : Part II: Hose Couplings, Connectors and Branch Pipe and Nozzle Connections
SANS 1456-1 to -4	: Collapsible delivery hoses for fire-fighting purposes Part I : General requirements and methods of test Part II : Percolating fire hose Part III : Uncoated non-percolating fire hose Part IV : Coated non-percolating fire hose
SANS 62-1	: Steel Pipes Part I : Steel pipes of NB not exceeding 150mm
SANS 62-2	Steel Pipes Part II: Pipes and pipe fittings of NB not exceeding 150mm, made from steel pipe
SANS 815-1 and 2	: Shoulder-end pipes and fittings, and couplings
SANS 14	: Malleable cast iron fittings threaded to ISO 7-1
SANS 776	: Copper alloy gate valves

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SANS 191	: Cast steel gate valves
SANS 665	: Cast iron gate valves for general purposes
SANS 664	: Cast iron gate valves for water works
SANS 14	: Malleable cast iron pipe fittings
SANS 1056-1	: Ball valves : Part 1 : Fire safe valves
SANS 1551-1	: Check valves (flanged and wafer types : Part I PN series)
SANS 1808-10	: Check valves (flanged and wafer types : Part II Class series)
SANS 1808-58	: Water supply and distribution system components Part 58: In-line strainers
SANS 752	: Float valves
SANS 1062	: Pressure and vacuum gauges
SANS1091	: National color standards for paintwork.
SABS 0140-1	Identification color markings Part 1: General
SABS 0140-2	Identification color markings Part 1: General
SABS 0140-3	Identification color markings Part 1: General
SANS 10064	: The preparation of steel surfaces for coating
SANS 1200 HC	: Corrosion protection of structural steelwork
SANS 12944-4	: Paints and Varnishes –Corrosion protection of steel structures by protective paint system Part 4. Types of surface and surface preparation.
SANS 121	: Hot-dip (galvanized) zinc coatings (other than on continuously zinc – coated sheet and wire).
SANS 14713	: The design, fabrication and inspection of articles for hot-dip galvanizing
SANS 1186-1	: Symbolic safety signs Parts I: Standard signs and general requirements
SANS 0105-2	: The classification, use and control of fire-fighting equipment – Parts I & II
SANS 1963-3	Development of dolomitic land Part 3 – Design and construction of buildings, structures and infrastructure.
OHS Act	: The Occupational Health and Safety Act, Act 85 of 1993
General	: The Bylaws and Regulations of the local authority for the particular area in which the building site falls.

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LIST OF ADDENDUMS

Addendum A – List of Standard Drawings applicable to the Standard Quality Specification for Fire Protection.

Addendum B – Service and Maintenance Schedule for Fire Protection.

Addendum C – Service and Maintenance Test Sheet for Fire Protection.

Addendum C – Identification Color and Markings.

1. SCOPE

This specification describe the standard to be followed for the installation and maintenance of the following fire services in buildings:

- Portable Fire Extinguishers
- Hose Reels
- Hydrants
- Booster Pumps and Equipment
- Piping Installation

1.1 GENERAL

In general equipment, pipe positions and sizes are indicated on the project drawings however where these form part of a standardized solution, information related to these will be on the standard drawings. Project drawing will make reference to standard drawings where applicable.

The scope for new works includes the complete manufacture, supply, delivery, rigging, installation, testing, commissioning and handing-over in working order of the installation as described in the Project Specification.

All labor, scaffolding, material and apparatus required for the completion of the works, whether specified, indicated on drawings or obviously required to be included in the contracts must be allowed for.

The scope for maintenance work relates to services may include all of the above and the removal, repair, servicing, restoration and refitting of existing equipment with the purpose of attaining the original functionality and appeal of these.

No service or maintenance work may be performed without the approval of the school Principal. Any temporary shutdown of services must be scheduled with his/her full knowledge.

Each installation must comply with the standards and regulations as contained in this Standard Quality Specification.

1.2 CONSTRUCTION

The construction of fire protection installations must be done by a specialist who can prove that they have done similar installations before.

2. PORTABLE FIRE EXTINGUISHERS - FE

Install portable fire extinguishers in the positions indicated on the project drawings.

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Portable fire extinguishers must be in accordance with the following:

Dry Chemical Powder (DCP) Type	:	SANS 1910
CO ₂ Type	:	SANS 1567

2.1 FIXING

Install fire extinguishers at a maximum handle height of 1200mm from finished floor level.

For installations combined with hose reels install at a minimum of 1000mm.

Irrespective of the enclosure used each fire extinguisher must be provided with a suitable sized **Meranti** backing board, complete with mounting bracket and suitable wall anchors as support.

Backing boards must be painted "Signal Red".

Note: Portable fire extinguishers may not be exposed to vandalism and as such should always be installed inside a fire cupboard or cabinet. No exposed installations will be accepted.

See Section 4 – Fire Cupboards and Cabinets for enclosure details.

For identification color and markings see Addendum D.

2.2 SERVICING

Service portable fire extinguishers in accordance with the requirements defined in Addendum B - Service and Maintenance Schedule for Fire Protection.

Replace unserviceable units with matching units similar or equal to original.

Hand all removed or obsolete equipment and spares to departmental representative.

Complete related service and maintenance test sheet attached as Addendum C to this document.

3. HOSE REELS - HR

Install fire hose reels in the positions as indicated on the project drawings.

The fire hose reels must be of the non-swinging, rotary pattern type complete with 30 m long, 20 mm diameter hose, hose run-out guide, clamps, nozzle

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bracket, fixing brackets and bolts, nozzle-cock and 25 mm stop valve all to conform to SANS 543. Fit rotary type cocks to the hose reels.

Provide hose reel bases with four bolt holes spaced and orientated as per SANS 543.

Provide one (1) 100 mm dial pressure gauges with range 0 to 2500 kPa before stop valve on the hose reel furthest from the pressure source.

Hose reel components must be manufactured from the following components:

- Stop valves : In accordance with SANS 543
- Water seal housing and spindle : In accordance with SANS 543
- Reel discs : Cold rolled mild steel
- Fire hose : In accordance with SANS 543
- Nozzle cock : Plastic
- Hose run out guide : Chromium plated steel
- Nozzle bracket : Mild steel
- Base : Mild steel

Note: Fire Hose Reels may not be exposed to vandalism and as such should always be installed inside a fire cupboard or cabinet. No exposed installations will be accepted.

See Section 4 – Fire Cupboards and Cabinets for enclosure details.

3.1 FIXING

Install hose reels with center line at 1600 mm from finished floor level.

Install hose reels with center line at 1500mm from finished floor level to the center of valve in “Fire Cupboard” installations.

Use bolts of at least 10 mm diameter and of a length and design suitable for the material of the wall to fix the hose reel to the wall.

3.2 SERVICING

Service fire hose reels in accordance with the requirements defined in Addendum B - Service and Maintenance Schedule for Fire Protection.

Replace unserviceable units with matching units similar or equal to original.

For installations where no pressure gauges are fitted provide one (1)

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100 mm dial pressure gauge with range 0 to 2500 kPa below the stop valve on the hose reel furthest from the pressure source.

Hand all removed or obsolete equipment and spares to departmental representative.

Complete related service and maintenance test sheet attached as Addendum C to this document.

4. FIRE CUPBOARDS AND CABINETS

Install fire cupboards and cabinets in the positions indicated on the project drawings. .

In general Fire Cupboards are preferred however where these are not available fire cabinets are to be provided.

4.1 FIRE CUPBOARDS - FC

Provide wood or steel pressed doors complete with "Night Latch" type spring-loaded lock for fire cupboards. Lock should be openable with keys only from the outside.

Lock to form part of institution "Master Key" system used on the institution.

Fit door with 500 x 500mm opaque 'break glass' unit to give emergency access to "Night latch" handle. Pre score glass diagonally across to aid ease of breaking.

Fire cupboard doors and door frames must be painted "Signal Red".

For identification color and markings see Addendum D.

4.2 PLASTIC CABINETS - FCa

Extinguisher cabinets must be of the glass fiber type with clear polycarbonate lids complete with tamper proof seals securely anchored to walls with anchors suitable for the material of the wall.

Plastic cabinets are for indoor use only.

4.3 STEEL CABINETS - FCb

Steel fire extinguisher cabinets must be tamper proof complete with break glass units and keys securely anchored to walls with anchors suitable for the material of the wall.

4.4 STEEL CABINETS - FCc

Steel fire hose reel cabinets must be tamper proof complete with break glass units and keys securely anchored to walls with anchors suitable for the material of the wall.

The cabinets must be open back units sized to cover both the hose reel and valve.

4.5 SERVICING

Service fire cupboards and cabinets in accordance with the requirements defined in Addendum B - Service and Maintenance Schedule for Fire Protection.

Replace unserviceable units with matching units similar or equal to original.

Hand all removed or obsolete equipment and spares to departmental representative.

Complete related service and maintenance test sheet attached as Addendum C to this document.

5. FIRE HYDRANTS

Install fire hydrants on permanently charged fire mains in position as indicated on project drawing.

All fire hydrants must conform to SANS 1128 – Part I.

Hydrant hose couplings, connectors and branch pipe and nozzle connections must conform to SANS 1128 – Part II.

Hydrants valves must be cast iron, right angled, single lug tamper proof valves with non-protruding sheathed spindles suitable for tamper proof keys.

No brass hydrants valves are allowed.

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Provide all hydrants with purpose made vandal proof covers, caps or plugs complete with chains to secure to valves.

Install hydrants valves, fire pump connections and booster points at approximately 1200 mm above natural ground level.

Install hydrant valves on mild steel metal riser with 1 meter mild steel offset and 90° long radius bend.

Provide 15MPa concrete anchors to each hydrant.

Provide Type B anchors for hydrants exposed to damage by vehicles.

5.1 FIRE HYDRANT - FH

Provide each hydrant with an 80mm riser pipe complete with an 80mm x 65mm hydrant valve.

Provide one (1) hydrant valve on the fire outlet pipe from the plant room for pump flow and pressure testing purposes.

Irrespective of the fire requirements each block must be provided with a unit. Where units are placed in close proximity to the small service blocks these will suffice for both.

In general all hydrants must be installed at ground level no less than 3 meters from any building.

5.2 FIRE PUMP HYDRANT - FPH

Provide a fire pump hydrant on the school premises, as indicated on the main drawing, in close proximity to the main entrance of the facility. Care should be given to the placement of unit and direction of valve to facilitate accessibility.

Provide a 100 mm riser pipe pedestal complete with a 100mm hydrant valve.

Provide a 100 mm pressure gauge, range 0 -2500kPa. Provide a 3mm steel protection strip around the gauge for protection providing sufficient space for removal.

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The designer must determine which one of the two adaptors is preferred by the local authority.

As determined by the relevant local authority, provide either a 110 mm “Stortz” adaptor or a 65mm double lug instantaneous adaptor.

5.3 FIRE PUMP SUCTION POINT - FPS

Fire pump suction points are required for sites where the council supply is either not available or unreliable.

Provide a fire pump suction point, as indicated on the main drawing, in close proximity to fire storage tanks.

Provide a 100 mm riser pipe pedestal complete with a 100mm hydrant valve.

Provide a 100mm connection directly to the storage tank complete with 100m tank isolation valve.

Paint fire suction point “Fire-Man’s Yellow” and provide steel etched signage indicating purpose and storage water capacity.

Note: Fire suction point must be placed in close proximity to the fire pump hydrant (FPH) and fire pump connection (FPC) points.

For identification color and markings see Addendum D.

5.4 FIRE PUMP CONNECTION - FPC (BOOSTER POINTS)

Provide a twin fire pump connection (booster points) on the school premises, as indicated on the main drawing, in close proximity to the main entrance of the facility. It is preferred that the fire pump connection is installed right next to the fire pump hydrant facing the same direction.

Provide an 80mm riser pipe pedestal and header with two (2) of 65mm one way male instantaneous adaptor units.

Provide a 100 mm pressure gauge, range 0 -2500kPa. Provide a 3mm steel protection strip around the gauge for protection providing sufficient space for removal.

5.5 SERVICING

Service fire hydrants in accordance with the requirements defined in ADDENDUM B - Service and Maintenance Schedule for Fire Protection.

Replace unserviceable units with units as specified.

For installations where no pressure gauges are fitted to the Fire Pump Hydrant (FPH) and Fire Pump Connection (Booster Points), provide a 100 mm pressure gauge range 0 -2500kPa to each. Provide a 3mm steel protection strip around the gauges for protection providing sufficient space for removal.

Where concrete anchors are in place minor cracks should be filled with appropriate filler and repainted as per Addendum D requirements.

Hand all removed or obsolete equipment and spares to departmental representative.

Complete related service and maintenance test sheet attached as Addendum C to this document.

6. WATER SUPPLY

Connections and isolation would be determined by site conditions.

Provide a 100mm council connection as supply for both fire and domestic requirements.

Reduced connection sizes would require the approval of the Chief Engineer.

Provide a 100mm supply (communication line) to the plant room or underground supply (valve chamber) whichever is applicable.

Provide a 100mm fire isolation valve within 1.5m of the fence in the plant room or valve chamber whichever is applicable.

6.1 UNDERGROUND SUPPLY (VALVE CHAMBER)

Supply a suitably sized water proof valve chamber complete with manhole cover/s and visible leakage detection drainage points.

All joints and connections between piping and equipment must be made inside the valve chamber. All pipe penetrations must be made water tight.

Piping inside valve chamber must be painted in full.

For identification color and markings see Addendum D.

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6.2 PLANT ROOM

The need for plant rooms are determined by council supply not meeting the minimum fire water supply requirements.

The designer must ensure the placement of such a plant room is in close proximity to the main supply on or close to the perimeter fence.

All plant rooms should be fitted with floor drains connected to the storm water drainage system.

Plant rooms are provided for protection of pumps and ancillary equipment for backup water supplies to site. In general these house centralized isolation of supplies to site.

Install pipe sleeves for pipe penetrations through the building walls and floors.

For painting of plant room and color identification marking of plant and piping see Section 11.

For identification color and markings see Addendum D.

6.2.1 PLANT ROOM SIGNAGE

Provide signage for all main and emergency by-pass or isolation valves naming the valve and its normal state ie. NO (Normally Open) or NC (Normally Closed).

Name plates are to be 200mm x 200mm x 2mm thick metal plate with as large as possible text mounted to piping with suitable brackets to the upstream position of the valve.

Provide a laminated A1 sized diagrammatic layout of the plant room installation and an A4 operating procedure document mounted to wall in the most assessable position or as indicated by the Department.

Provide a laminated A1 sized diagrammatic layout of the site reticulation.

Number all hydrants starting at the fire pump connection and hose reels starting at Block A following the alphabetical order of the buildings.

Diagrams must contain all pressure set points in a logical legible tabular format.

Provide laminated wiring diagrams of both the plant room electrics and control board layout for storage inside relevant control boxes.

Mount in picture frames complete with perspex front.

6.3 SERVICING

Service council supply (communication line), underground supply (valve chamber) and plant room in accordance with the requirements defined in Addendum B - Service and Maintenance Schedule for Fire Protection.

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Replace unserviceable units with matching units similar or equal to original.

Hand all removed or obsolete equipment and spares to departmental representative.

Complete related service and maintenance test sheet attached as Addendum C to this document.

7. PUMPS

The need for pump installations are determined by council supply not meeting the minimum fire water supply requirements.

Pump requirements are to satisfy "First Aid" fire-fighting needs only.

Calculate pressure head in accordance with the requirements of SANS 10400 Part W.

Note: Flow rates should be based on the sum of hose reels in the largest fire zone at 0.5l/s per hose reel.

For purposes of this department this number would rarely exceed 2 and as such the anticipated flow rate is 1.0l/s per pump.

7.1 PUMP INSTALLATION

Install booster pumps and pumping equipment inside plant room provided.

Mount pumps on angle iron or channel framed base 150mm in height.

Provide suitable covered protection to the satisfaction of the Department for pump installations where no plant room is available.

7.2 PUMP CONSTRUCTION

- Provide pumps with electric motors.
- Provide pumps of the non-overloading, centrifugal, volute type.
- Pumps may be of the vertically split, single suction type and may be of the close coupled type in which the impeller is overhung on the motor shaft or of the bracket mounted type in which the casing is overhung from the bearing bracket.
- Pumps must operate at speeds not exceeding 3 000 rpm.

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- High points of pump casings must be provided with air vent cocks. Low points of casings shall be provided with valve drains and inlet and outlet connections shall be provided with properly located gauge tapping's.
- Provide pumps with balanced bronze impellers, stainless steel shafts and mechanical seals.
- Bearings for all pumps shall be either ball or roller bearings.

Thrust bearings shall be of the ball type. Bearings shall be effectively sealed to prevent loss of oil and entrance of dirt or water.

- Provide all pumps other than close-coupled pumps with suitable flexible couplings. Couplings shall impose no restriction on normal end play or expansion.
- Each flexible coupled pump shall be provided with a cast iron or fabricated steel bedplate of ample size to hold both pump and motor in correct alignment.

Pump and motor must be accurately aligned when running at normal temperature. Bedplates of horizontally split pumps must have raised lips and drain connections. Install a drain pipe from each drain connection and terminate with an approved air gap over the nearest drip funnel or floor drain.

7.3 PRESSURE TANK (Captive Air)

Fit a sufficiently sized self-supporting bottom outlet hydro pneumatic pressure tank connected to pump header with a 32mm Line. Fit a 32mm ball type bleed-off/test valve complete with threaded end drain piping to outside.

Tank preset pressure to be as per manufacturers detail or 15kPa lower than the cut in pressure of the pump.

Tank must be of the replaceable bladder type and must be fitted with an air charge valve "Schrader Valve".

Note: Tank to be sized to ensure a minimum drawdown time of 1 minute for pump motors 1.5kW and smaller and 2 minutes for larger motors at maximum design flow rate.

With a draw down factor of 0.2 a 300l tank is estimated per 1 minute of draw down time.

See Section 10 "Commissioning and Testing" for pressure settings.

7.4 PUMP CONTROLS

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Fit a suitable pressure operated micro switches with a range of 2 to 6 bar for each pump to the delivery header of the booster pumps to initiate and control the operation of the pumps.

Pump control boards to be fitted with on/off/auto selector switches for each pump.

Provide an alternating control configuration, or flip flop relay, to ensure equal run time on pumps.

Provide a lead and lag configuration for demand support.

Provide phase failure, over and under voltage, phase rotation and run dry protection for pumps and pump motors.

Provide a 0 to 10 minute timer on the shut off control.

7.5 SERVICING

Prior to servicing ensure council pressure is sufficient to maintain supply to school if not schedule the service outside of normal school hours.

Service pumps, pressure tanks and controls in accordance with the requirements defined in Addendum B - Service and Maintenance Schedule for Fire Protection.

Replace unserviceable units with matching units similar or equal to original.

Motors that run outside of amperage and or temperature ranges must be repaired or replaced.

Hand all removed or obsolete equipment and spares to departmental representative.

Complete related service and maintenance test sheet attached as Addendum C to this document.

Note: For pump installation tests requirements see Section 10 "Commissioning and Testing" below.

8. STORAGE TANKS

Provide backup storage sized to hold at least 2 hours of water at maximum design flow rate.

The need for storage tanks are determined by council supply not

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meeting the minimum fire water supply requirements.

Note: Anticipated design flow rates of 1.0l/s equates to 3.6m³ per hour or 7.2m³ in total.

In general fire water storage should be combined with domestic water storage. A physical fire water reserve must be provided.

8.1 TANK INSTALLATION

Provide plastic tanks impervious to sunlight or with black inner linings, with all apertures and fittings as indicated on standard drawings.

Provide a concrete platform for the tank or tanks, 200mm larger than the radius of the tank in close proximity to the plant room. Tanks are not allowed to overhang the platforms.

Provide platform with a bunt wall and 100mm full bore drainage point connected to storm water drainage system for dolomitic sites.

The platform must be 500mm higher than the finished floor level of the plant room.

Tanks are to be placed so as to ensure free movement around each tank and enable maintenance to fittings and piping.

Tanks must be fenced in complete with lockable gates.

8.2 SERVICING

Prior to servicing ensure council pressure is sufficient to maintain supply to school if not schedule the service outside of normal school hours.

Service tanks in accordance with the requirements defined in Addendum B - Service and Maintenance Schedule for Fire Protection.

Disinfect tank as per SANS 10252-1 if required.

Replace unserviceable parts with matching units similar or equal to original.

Hand all removed or obsolete equipment and spares to departmental representative.

Complete related service and maintenance test sheet attached as Addendum C to this document.

9. PIPING

Install fire protection piping in accordance with the routes and sizes indicated on the project drawings.

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All piping and equipment related to the fire-fighting system must be rated at a minimum of 1250 kPa.

For site rated as D3 dolomitic all underground piping should be rated at 1600kPa.

9.1 PIPE INSTALLATIONS

9.1.1 Aboveground Piping

Above ground piping must be galvanized steel and must be at least of medium wall thickness in accordance with SANS 62 Part I.

Long pipe runs can be screwed, flanged or joined with pipe couplings. Pipe couplings must be in accordance with SANS 815. No welded joints on galvanized pipes will be allowed.

All galvanizing must be in accordance with SABS 121 and SANS 10214.

Make all threaded pipe joints with approved cold water pipe jointing compound or Teflon tape. Provide flanged joints with gaskets. Flanges must be in accordance with BS10, Table F. Ream ends of pipes before fitting. Install pipework at a slight slope to avoid air entrapment. Install pipes in a neat and symmetrical manner.

9.1.2 Underground Piping – Normal Soil Conditions

Underground piping must preferably be plastic piping although galvanized mild steel is allowed.

Wrap underground galvanized piping with a bitumen tape. Long pipe lengths must be factory protected with bitumen with only the joints and fittings wrapped on site.

Ring main lines may not be less than 1 meter deep and not be less than 1.5m away from any building foundation.

Prepare trenches and do backfilling and compacting in accordance with SANS 2001 – DP6.

The Department must carry out the following inspections:

1. Completed trenches and trench work.
2. Completed pipe installations before backfilling takes place.
3. Samples of back filling and compacting.

9.1.3 Underground Piping – Dolomitic Soil Conditions

The piping installation must comply with the requirements of SANS 1963-3.

Ring main lines may not be less than 1 meter deep and not be less than 5m away from any building foundation.

Piping 75mm and larger may be HDPE with butt welded joints or PVC-M with sealing rings or grooves with clamps.

Piping smaller than 75mm may be HDPE. Pipe joints to be electro-fusion or butt-fusion welds.

Prepare trenches and do backfilling and compacting in accordance with SANS 2001 – DP6. Backfill material to be imported, less permeable, material than original.

The Department must carry out the following inspections:

1. Completed trenches and trench work.
2. Completed pipe installations before backfilling takes place.
3. Samples of back filling and compacting.

9.1.4 Joints to Service Outlets– Dolomitic Soil Conditions

HDPE supplies to hose reels must rise to 200mm above finished skirt or paving level on the outside of the building footprint complete with 400mm offset prior to connection to galvanized mild steel supply pipe running in ceiling space to hose reel. Continue supply to hose reels in close proximity.

Hydrant valve risers must be plastic to above the concrete anchors to which mild steel risers must be connected.

For underground supply and isolation (valve chamber) see Section 6.1

“UNDERGROUND SUPPLY (VALVE CHAMBER)” above.

Plant room feed and supply underground piping must rise to at least 500mm above finished skirt or paving level on the outside of the building footprint and offset 2m horizontally prior to penetration through wall to inside.

All piping between plant room and storage tanks must be done in galvanized mild steel above ground complete with concrete pillar type supports to the size of the “Type A” anchors used on Fire Hydrants in distances as detailed in section 9.2.

9.2 PIPE SUPPORTS AND SLEEVES

Although supports are not indicated on the drawings, the contractor must allow for all pipe supports and sleeves. Submit samples of supports for approval.

Support piping from the building structure at the following maximum spacing:

<u>Nominal Pipe Size (mm)</u>	<u>Span (m)</u>
15 – 32	2,50
40 – 65	3,00
80 – 90	3,50
100 – 150	4,00

Support vertical pipes at intervals not greater than 2m.

Provide metal sleeves where fire protection piping passes through building structure components and position the sleeves for building in by the builder. In existing buildings, the breaking, core drilling (where required) and making good forms part of this contract.

Seal all openings between pipes and sleeves and sleeves and walls where pipes pass through fire walls or fire partitions. Use only non-combustible sealing material.

Where installations must have FM approval, use only FM approved pipe supports.

9.3 PIPE FITTINGS

Provide and install isolating valves, check valves, strainers, pressure reducing valves, pressure relieve valves and pressure gauges in accordance with the project and relevant standard drawings. Fittings must be in accordance with the following SANS Specifications.

Pipe fittings i.e. elbows, T's, valves etc. must be in accordance with SANS 62 – Part 2, SANS 815 and SANS 14.

Isolating Valves	:	SANS 509, SANS 191, SANS 1056-1. SANS 776, SANS 665, SANS 664
Check Valves	:	SANS 1551-1 and 2, SANS 1808-10
Float operated valves	:	SANS 752
Pressure switches	:	F.O.C approval
Strainers	:	SANS 1808-58
Gauges	:	SANS 1062

STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

In general use pressure gauges of the “Bourdon Type”. Unless specified otherwise use 100 mm diameter dial pressure gauges. Install gauges as required or in positions indicated on the project and relevant standard drawings complete with syphon tubes.

9.4 SERVICING

Service piping in accordance with the requirements defined in Addendum B - Service and Maintenance Schedule.

Replace unserviceable parts with matching units similar or equal to original.

Hand all removed or obsolete equipment and spares to departmental representative.

Complete related service and maintenance test sheet attached as Addendum C to this document.

Note: For pipe installation tests requirements see Section 10 “Commissioning and Testing” below. Perform tests outside of normal school hours.

10. COMMISSIONING AND TESTING

The following procedures and tests are to be performed for the commissioning of new and or serviced water based fire-fighting installations.

Please note unless otherwise defined all the requirements apply to existing installations.

All tests must be witnessed by a Departmental representative.

Issue a commissioning and testing certificate after completion.

10.1 WATER INSTALLATION

10.1.1 INSPECTION

Inspect the system for general defects, quality of installation and quality of materials as well as compliance with drawings and specifications.

For existing installations perform service requirements as detailed under relevant section.

10.1.2 FILLING

Slowly fill piping with water and purge air from system by opening all hydrants and hose reels.

STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

After full pressurization has been reached physically inspect the system for defects and leaks and ensure all equipment is functioning properly.

Leave system pressurized for 24 hours and re inspect.

10.1.3 SYSTEM PRESSURE TEST

Where applicable isolate the booster pumps from the system.

Isolate the fire system from the pressure source and vent all pressure from upstream of the non-return valve with test point valve provided. Check non-return valve for leakage.

Connect a pressure pump to the Fire Pump Connection (Booster Point).

Slowly pressurize the system to 1500 kPa remove pressure pump and leave under pressure for one hour.

For existing installations pressurize system to normal working pressure plus 25%.

Physically inspect all hydrants and hose reels for leaks.

Record pressure reading from hose reel and Fire Pump Connection (FPC) pressure gauges to the maintenance/test sheets at 15 minute intervals.

Release pressure and reinstate the system.

10.1.4 FLOW TEST – HOSE REEL

Where applicable isolate booster pumps from system.

Record system static pressure readings (all outlets closed) from hose reel and Fire Pump Connection (FPC) pressure gauges to the maintenance/test sheets.

Open both the hose reel where the pressure gauge is installed and a second hose reel closest to it and leave open.

Record the pressures readings from the hose reel and Fire Pump Connection (FPC) gauges with both hose reels open to the maintenance/test sheets.

Measure the flow rate of each of the hose reels and record to the maintenance /test sheets.

Note: Minimum flow rate allowed per hose reel is 0.5l/s. At this flow rate a 5 liter bucket should fill up in 10 second.

Close the hose reels.

10.1.5 FLOW TEST – HYDRANT

Where applicable isolate booster pumps from system.

Record system static pressures in the same manner as with the hose reel flow test to maintenance/test sheets.

Using the hydrant flow tester as detailed under “Tools” measure the flow of the furthest hydrant from the pressure source and record.

Note: Minimum flow rate allowed per hydrant is 20l/s. At this flow rate a 200 liter drum should fill up in 10 second.

Record the pressure from flow tester during the flow test to service and maintenance test sheet for Fire Protection.

Close hydrant valve.

10.2 BOOSTER PUMPS

10.2.1 INSPECTION

For new installation inspect the system for general defects, quality of installation and quality of materials as well as compliance with drawings and specifications.

For existing installations perform service requirements as detailed under Section 7.5.

10.2.2 PRESSURE PERFORMANCE TEST

Close main fire isolation valve to isolate council supply from system.

Set lead pump cut-in pressure to 300kPa, lag pump cut-in pressure to 250 kPa and cut-out pressure to 400kPa.

Bring air pressure in pressure tank to 285 kPa. (15kPa lower than cut-in pressure)

Start pumps and purge the system from any and all air.

Open both hose reels to furthest fire zone and record pressure.

Alter cut-out pressure to pump in order to get 300 kPa gauge pressure at flow on hose reel pressure gauge.

Manually alternate pumps and repeat test on second pump.

Record pressure at pump as “Normal Working Pressure”. (NWP) to service and maintenance test sheet for Fire Protection.

Close hose reels.

10.2.3 PRESSURE SETTINGS

Set pressure switches for pumps to the following settings:

Lead Pump Cut-in:	NWP minus 100 kPa
Lead Pump Cut-out:	NWP plus 50kPa
Lag Pump Cut-in:	NWP minus 150kPa
Lag Pump Cut-out:	NWP plus 50 kPa

Record set pressure to service and maintenance test sheet for Fire Protection.

10.2.4 PRESSURE TANK AIR PRESSURE SETTING

Release all water pressure from pressure tank.

Pressurize air chamber to 15kPa below lead pump cut-in pressure.

Record set pressure to service and maintenance test sheet for Fire Protection.

10.2.5 PUMP FLOW PERFORMANCE TESTS

Pump flow tests must be performed after pressure tests.

To begin test close main fire isolation valve to isolate council supply from system.

Switch on pumps and pressurize system.

Perform a hose reel flow test as defined under 10.1.4 above with pumps as pressure source.

Record test data to service and maintenance test sheet for Fire Protection.

Note: A failed flow test may require upward alteration of the “Normal Working Pressure” and as such a redo of the pressure performance test.

10.2.6 PRESSURE TANK DRAW DOWN TEST

Isolate pump installation from fire system.

Connect test hose and nozzle to pressure tank drain point.

STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

Close nozzle and open pressure tank drain valve. Open nozzle until a flow of 0,5l/s is measured. Close pressure tank drain valve. Ensure both pumps are in the OFF position.

Open pressure tank drain valve and measure the time it takes to get to pump cut-in pressure.

Record the draw down time to the service and maintenance test sheet for Fire Protection.

Note: At a flow rate of 0.5l/s this should take approximately 2 minutes.

10.2.7 PUMP CONTROLS AND SEFETY TESTS

For these tests the pump must be isolated from the fire system.

Switch on pumps and check the following by releasing pressure from the test valve on pressure tank and record on test sheet.

Pump alternation (Flip flop)

Release pressure from tank until pump starts and then close valve.

Repeat to process and see if the second pump comes on as lead.

Pump lead and lag operation.

Release pressure from tank until lead and lag pump starts.

Pump run-dry protection.

With pumps running remove run-dry control floater from tank and rotate to see if pumps stop.

10.3 Special Requirements

- Test instruments shall be tested for accuracy by an approved laboratory if so required and certificates showing accuracy shall be delivered to the Department on request.
- If gauges, thermostats, etc. which will be permanently installed, are to be used for testing purposes, then such instruments shall only be installed shortly before tests take place to ensure correct calibration.
- Amplitude and vibration tests on rotating equipment shall be executed by the contractor when such equipment appears to be out of balance.

Amplitude tests shall be executed by specialists and reports shall be submitted to the Department.

11. IDENTIFICATION COLOR MARKINGS AND CORROSION PROTECTION

STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

Apply identification color and markings to the entire installation in line with requirements as detailed in Addendum D.

Corrosion protection must be applied to all steel portions of the installation.

Prepare and paint all piping and equipment in accordance with SANS 064, SANS 1091 and SANS ISO 12944-4.

Paint all piping inside plant room and or valve chamber in full from the downstream side of the main shut-off valve of the particular service.

Paint pump plant room floor, walls, grilles, windows and doors prior to start of equipment installation and make good at completion.

Paint all visible piping in full. Paint all visible portions of concrete anchors on hydrants.

Apply identification color and markings to underground piping with a continuous red line of at least 10mm wide to the top of the pipe.

Wrap all underground galvanized mild steel piping in bitumen tape.

Apply identification color and markings to pipework in ceiling voids, shafts and building services ducts in accordance with Addendum D.

Make good all damage to paintwork caused during the construction process.

12. TOOLS

Provide a lockable wall mounted cabinet in the plant room for tools and testing equipment. For sites where no plant room is provided one of the service area store rooms will suffice.

Provide the following tools with the tool box:

- Two (2) of hydrant cross keys with 12mm, 16mm, 19mm and 21mm lugs.
- One (1) Hydrant pressure and flow tester consisting of a 63mm threaded quick coupler complete with 15mm full bore ball valve and 0 to 2500 kPa pressure gauge screwed together with 15mm galvanized mild steel piping.
- A 10m long 20mm plastic hose complete with fire hose reel nozzle and 32mm BSP to 20mm swaged adaptor and stainless steel clamps.
- Two (2) standard panel keys.

ADDENDUM A

LIST OF STANDARD DRAWINGS APPLICABLE TO THE STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

Number	Rev	Description

SERVICE AND MAINTENANCE SCHEDULE FOR FIRE PROTECTION

ITEM NO.	SERVICE REQUIREMENT DATA	MONTHLY INTERVALS				
		1	3	6	9	12
	PORTABLE FIRE EXTINGUISHER (FE) -					
1.	4.5kg Dry Chemical Powder (DCP)					
	➤ Service FE in accordance with SANS 1475-1					X
	➤ Check general condition backing board. Replace if damaged.					X
	➤ Check anchoring of backing board and re-secure if needed.					X
	➤ Check identification colour markings and paintwork and repair where required.					X
2.	9.0kg Dry Chemical Powder (DCP)					
	➤ Service FE in accordance with SANS 1475-1					X
	➤ Check general condition backing board. Replace if damaged.					X
	➤ Check anchoring of backing plate and re-secure if needed.					X
	➤ Check identification colour markings and paintwork and repair where required.					X
3.	5.0kg Carbon Dioxide (CO ²)					
	➤ Service FE in accordance with SANS 1475-1					X
	➤ Check general condition backing board. Replace if damaged.					X
	➤ Check anchoring of backing plate and re-secure if needed.					X
	➤ Check identification colour markings and paintwork and repair where required.					X
	FIRE HOSE REELS (HR)					
4.	Non Swing type Fire Hose Reel (HR)					
	➤ Service HR in accordance with SANS 1475-2					X
	➤ Check anchoring and re-secure where applicable.					X
	➤ Check general condition of pipework and repair leaks where required.					X
	➤ Check identification colour markings and paintwork and repair where required.					X
	➤ Check pressure gauge where applicable and replace where required.					X
	FIRE CUPBOARDS AND CABINETS (FC, FCa, FCb and FCc)					
5.	Fire Cupboard (FC)					
	➤ Inspect door, hinges and lock and repair where necessary.					X
	➤ Inspect break glass unit. Replace where necessary.					X
	➤ Repair paintwork where required.					X
	➤ Clean out all debris from cupboard. Generally clean equipment from all dust and droppings.					X

6.	Fire Cabinet (FCa) (FE - Plastic)					
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Side notes are for the attention of the Engineer and do not form part of the contract

STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

	➤ Inspect unit for damage and correct operation. Repair and or replace where required.					X
	➤ Check tamper proof locking device and replace where required.					X
7.	Fire Cabinet (FCb) (FE - Steel)					
	➤ Check anchoring and re-secure where applicable.					X
	➤ Inspect door, hinges and lock and repair where necessary.					X
	➤ Inspect break glass. Replace where necessary.					X
	➤ Replace lock key where applicable.					X
	➤ Repair paintwork where required.					X
8.	Fire Cabinet (FCc) (HR - Steel)					
	➤ Check anchoring and re-secure where applicable.					X
	➤ Inspect door, hinges and lock and repair where necessary.					X
	➤ Inspect break glass. Replace where necessary.					X
	➤ Replace lock key where applicable.					X
	➤ Repair paintwork where required.					X
	FIRE HYDRANTS (FH, FPH, FPC and FPS)					
9.	Fire Hydrant (FH)					
	➤ Service FH to comply with requirements as detailed in SANS 1128-2.					X
	➤ Check hydrant valve for operation and leaks.					X
	➤ Check seals and covers and replace where applicable.					X
	➤ Check general condition of pipework and repair leaks where required.					X
	➤ Check surrounding area for underground leaks and repair where required.					X
	➤ Check concrete anchor for damage and repair or replace.					X
	➤ Check identification colour markings and paintwork and repair where required.					X
10.	Fire Pump Hydrant (FPH)					
	➤ Service FPH to comply with requirements as detailed in SANS 1128-2.					X
	➤ Check hydrant valve for operation and leaks.					X
	➤ Check seals and covers and replace where applicable.					X
	➤ Check pressure gauge and replace where required.					X
	➤ Check general condition of pipework and repair leaks where required.					X
	➤ Check surrounding area for underground leaks and repair where required.					X
	➤ Check concrete anchor for damage and repair or replace.					X
	➤ Check identification colour markings and paintwork and repair where required.					X
11.	Fire Pump Connection (FPC)					

STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

	➤ Service FPC to comply with requirements as detailed in SANS 1128-2.					X
	➤ Check instantaneous adaptors for operation and leaks.					X
	➤ Check seals and covers and replace where applicable.					X
	➤ Check pressure gauge and replace where required.					X
	➤ Check general condition of pipework and repair leaks where required.					X
	➤ Check surrounding area for underground leaks and repair where required.					X
	➤ Check concrete anchor for damage and repair or replace.					X
	➤ Check identification colour markings and paintwork and repair where required.					X
11.	Fire Pump Suction Point (FPS)					
	➤ Service FPS to comply with requirements as detailed in SANS 1128-2.					X
	➤ Check hydrant valve for operation and leaks.					X
	➤ Check seals and covers and replace where applicable.					X
	➤ Check general condition of pipework and repair leaks where required.					X
	➤ Check concrete anchor for damage and repair or replace.					X
	➤ Check identification colour markings and paintwork and repair where required. (Fireman's Yellow)					X
	WATER SUPPLY					
12.	Council Supply					
	➤ Check council isolation valve and water meter for damage and or leaks and report to school principal.					
	➤ Check communication piping after meter for general conditions and leaks and repair if required.					
	➤ Check underground piping (communication line) between water meter and underground supply (valve chamber and plant room for leaks and repair if required.					
13.	Underground Supply (Valve Chamber)					
	➤ Check all valves for general condition and operation. Repair if required.					
	➤ Check piping installation for leaks and repair if required.					
	➤ Open strainer and clean.					
	➤ Check non-return valve for operation and repair if required.					
	➤ Check pressure gauges and replace if required.					
	➤ Check identification colour markings and paintwork and repair where required.					
	➤ Check valve chamber for condition and water tightness.					
	➤ Inspect leakage indicator. Clean out chamber and drain pipe.					
14.	Plant Room					
	➤ Inspect door, hinges and lock. Repair where necessary.					

STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

	➤ Clean out all debris from plant room. Generally clean plant room floor and equipment from all dust and droppings.					
	➤ Inspect general condition of plant room and paintwork. Repair where required.					
	➤ Isolate booster pumps from system.					
	➤ Check all valves for general condition and operation. Repair if required.					
	➤ Check piping installation for leaks and repair if required.					
	➤ Open strainer and clean.					
	➤ Check non-return valve for operation and repair if required.					
	➤ Check pressure gauges and replace if required.					
	➤ Check identification colour markings and paintwork and repair where required.					
	<u>PUMPS</u>					
15.	Pump Installation					
	➤ Check pumps and piping for leakages and rectify as required.					
	➤ Check pressure gauges and replace if required.					
	➤ Open and clean strainers.					
	➤ Open isolation valves and check water flow from tank.					
	➤ Listen for, and note any abnormal noise, such as rubbing, cavitation and loose solids.					
	➤ Check pump and motor bearings, lubricate as necessary.					
	➤ Inspect motor and pump couplings for wear.					
	➤ Check and adjust pump and motor alignment.					
	➤ Inspect pressure tank for general condition and pressure. Replace bladder if ruptured.					
	➤ Check identification colour markings and paintwork and repair where required.					
	➤ Inspect drain pipes and clean if necessary.					
	➤ Measure and record motor temperature.					
	➤ Measure and record motor amperage. Compare with nameplate rating.					
	➤ Perform tests as detailed under Section 10.2 - BOOSTER PUMPS. Record test results to service and maintenance test sheet.					

16.	Pump Controls					
	➤ Inspect the electrical installation for physical and electrical damage. Repair where required.					

STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

	➤ Check controls, adjust as required.					
	➤ Perform tests as detailed under Section 10.2 - BOOSTER PUMPS. Record test results to service and maintenance test sheet.					
	STORAGE TANKS					
17.	Tank Installation					
	➤ Check tanks inside for debris or algae. Disinfect if required.					
	➤ Inspect tank for damage and leaks. Repair if required.					
	➤ Check tank lid for sealing. Repair or replace if required.					
	➤ Check for water leaks on tanks and piping installation and repair if required.					
	➤ Check piping installation for damage or support issues and repair if required.					
	➤ Check valve and strainers for operation and leaks. Repair if required					
	➤ Check filler or ball valve for operation and leaks. Repair if required.					
	➤ Reset tank level if required.					
	➤ Check all electrical controls and switches for damage and repair or replace.					
	➤ Check identification colour markings and paintwork and repair where required.					
	➤ Check drainage points and lines and clean if required.					
	PIPING					
	Pipe Installations, Supports, Sleeves and Fittings					
	➤ Check visible piping installation for leaks and repair if required.					
	➤ For dolomitic sites check all riser piping and connections to aboveground piping for structural damage and or movement. Repair where applicable.					
	➤ Trace underground piping and check for visible leaks and repair where required.					
	➤ Check all manholes for water leaks and repair where required.					
	➤ Check identification colour markings and paintwork and repair where required.					
	➤ Perform tests as detailed under Section 10.1 – WATER INSTALLATION. Record test results to service and maintenance test sheet.					

SERVICE AND MAINTENANCE TEST SHEET FOR FIRE PROTECTION

INSTITUTION:

SITE / BUILDING:

FILE NUMBER:

Test results and pressure readings as required from "SECTION 10 – COMMISSIONING AND TESTING"

10.1 WATER INSTALLATION

10.1.3 SYSTEM PRESSURE TEST				
Note: Test Pressure New – 1500kPa Existing – NWP x 1.25	PRESSURE GAUGE READING(kPa) (Measured at increments of 15 minutes)			
	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
HOSE REEL				
FIRE PUMP CONNECTION (FPC)				

10.1.4 FLOW TEST – HOSE REEL		
	PRESSURE GAUGE READING(kPa)	
	STATIC (NO FLOW)	DYNAMIC (FULL FLOW)
HOSE REEL		
FIRE PUMP CONNECTION (FPC)		
	FLOW (l/s)	
HOSE REEL		

10.1.5 FLOW TEST – HYDRANT		
	PRESSURE GAUGE READING(kPa)	
	STATIC (NO FLOW)	DYNAMIC (FULL FLOW)
HYDRANT		
FIRE PUMP CONNECTION (FPC)		
	FLOW (l/s)	
HYDRANT		

10.2 BOOSTER PUMPS

10.2.2 PRESSURE PERFORMANCE TEST		
	NORMAL WORKING PRESSURE (NWP) (kPa)	
	STATIC (NO FLOW)	DYNAMIC (FULL FLOW)
SYSTEM NWP		

10.2.3 PRESSURE SETTINGS		
	PRESSURE GUAGE READING(kPa)	
	CUT-IN PRESSURE (kPa)	CUT-OUT PRESSURE (kPa)
LEAD PUMP		
LAG PUMP		

10.2.4 PRESSURE TANK AIR PRESSURE SETTINGS		
Note: Set Pressure 15kPa below lead pump cut-in pressure.	PRESSURE GUAGE READING(kPa) (Air gauge on tank)	
	NO SYSTEM PRESSURE (kPa)	SYSTEM PRESSURIZED (kPa)
PRESSURE TANK		

10.2.5 PUMP FLOW PERFORMANCE TEST	
	FLOW (l/s)
HOSE REEL	

10.2.6 PRESSURE TANK DRAWDOWN TEST	
	FLOW (l/s)
PRESSURE TANK	

STANDARD QUALITY SPECIFICATION FOR FIRE PROTECTION

10.2.7 PUMP CONTROLS AND SAFETY TESTS		
PUMP ALTERATION (FLIP FLOP)		
PUMP LEAD LAG		
RUN DRY		

1. I hereby certified that I tested the mentioned installation in the presence of the Departmental Representative and his or her agent on _____ (Date) _____ (Time).

The tests were done in accordance with Section 10 of the Standard Quality Specification for Fire Protection.

CONTRACTOR (NAME OF COMPANY):

REPRESENTATIVE : POSITION :

SIGNATURE : DATE :

2. It is hereby certified that the results of the tests and readings, as represented by the information in this sheet, is correct, and were done in accordance with the requirements of the relevant documents prescribed by the Department.

DEPARTMENT OF INFRASTRUCTURE DEVELOPMENT

REPRESENTATIVE : POSITION :

SIGNATURE : DATE :

Distribution List:

Original Document – IPM/ CPM

Copies – Contractor, Departmental Representative and Agent.

IDENTIFICATION COLOR AND MARKINGS

PLANT ITEM	BASIC COLOR (300mm Wide)	COLOR CODE INDICATOR	Additional Requirements
		FIRST BAND (100mm Wide Centered on Basic Color)	
<u>Fire Protection</u>			
Fire piping	Signal red (A11)	-	Paint visible pipe in full. Provide a 10mm wide continuous line to top of under-ground pipe.
Fire Pump Suction Point	Fireman's Yellow	-	Paint visible pipe and anchor in full.
Fire Hydrant Anchor Block	Signal red (A11)	White	50mm Wide bands at 30° angle 50mm apart.
<u>Domestic Water</u>			
Cold	Cornflower (F29)	-	Provide a 10mm wide continuous line to top of under-ground pipe.
Hot	Cornflower (F29)	Crimson (A03)	
<u>Flushing and Irrigation(Non-potable Water)</u> (Borehole or harvested Rain water)			
Cold	Brilliant Green (H10)	-	Provide a 10mm wide continuous line to top of under-ground pipe.
<u>Drainage</u>			
Soil pipes	-	-	Pipes may be painted in institution colors or Black if required. Paint visible pipe in full.
Soil Vents	-	-	
Waste pipes	-	-	
Waste Vents	-	-	
<u>Central Heating</u>			
Supply	Verdigris green (E22)	-	
Return	Light Brunswick green (H07)	-	
<u>Compressed Gas Lines</u>			
Compressed air	Arctic Blue (F28)	-	
LPG	Light stone (C37)	-	Mark: LPG
Acetylene	Light stone (C37)	Maroon (A01)	
<u>Air Conditioning/Ventilation Ducting</u>			
Conditioned air	Arctic Blue (F28)	-	
Fresh Air	Arctic Blue (F28)	-	
Exhaust and Extract air	Mountain Mist (G57)	-	
Outside air	Pastel Green (H65)	-	
Warm air	Pastel Yellow (C75)	-	
<u>Refrigeration</u>			
Liquid Line	Black	-	
Gas Line	Black	-	
<u>Oils</u>			
Diesel fuel	Golden brown (B13)	White	

IDENTIFICATION COLOR AND MARKINGS

PLANT ITEM	BASIC COLOR (300mm Wide)	COLOR CODE INDICATOR	Additional Requirements
		FIRST BAND (100mm Wide Centered on Basic Color)	
Miscellaneous			
Water pumps, pressure and storage tanks, geysers, air compressors, air conditioning units, heat pumps, refrigeration condensers and evaporators, etc.	Standard Manufacturers colors	-	
Brackets, supports, bases, base plates, pipe hangers	Black	-	
Pump and fan drive guards.	Signal Red (A11)	-	
Hot Water Boilers			
Boiler: coal-fired	Black	-	
Boiler cladding	-	-	Galvanized steel cladding
Stokers and hoppers. (coal and ash)	Black	-	
Hot metal ducting	Aluminum	-	Heat resistant
Flues and stack.	Aluminum	-	Top 2 meters of Stack. Heat resistant paint.
1. Mild steel stack	Matt black	-	Heat resistant
2. Stainless steel stack	-	-	
Hot surface of boiler controls and valves	Golden yellow (B49)	-	
	Signal red Handles (A11)		
Plant Rooms			
Doors & Walls (internal)	Light Grey (G29)	-	
Steel roof trusses	Aluminum	-	
Floors	Light Brunswick Green (H07)	-	
Ceilings	White	-	
Electrical Services			
Electrical and control panels	Light orange (B26)	-	
Electrical panels fed with standby/UPS power	Signal red (A11)	-	
Electric duct heaters in plant rooms	Signal red (A11)	-	
Cable trays	-	-	Galvanized
Electric motors	Light orange (B26)	-	

Note:

1. This document defines the general requirements for service definition by means of color coding.
2. Deviations from these requirements are specifically defined in this document and or in the Project Specification.
3. Color coding will be applied to piping on either side of any building penetration, at positions where piping emerges from below ground level, at all junctures and on straight runs at intervals of no less than 6m apart.