

Requirements for Telecom Rooms within Qatar

Version 1.0

Table of Revisions

Rev.	Reviewed By	Approved By	Date
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INDEX

- 1. General Requirements.**
- 2. Detailed Specifications for Fire Alarm & Fire Fighting System.**
- 3. Detailed Specifications for Air-conditioning System.**

Section 1

Telecom Room General Requirements

1. The room shall be of a sufficient size to accommodate the proposed Telecom equipments. After the site visit, a layout drawing shall be prepared.
2. The room shall have proper access for personnel & for shifting equipments and tools. Operation & maintenance staff shall have 24 hour access to the room.
3. The entrance door shall be fire rated of steel / aluminum with Operator master lock. (Lock will be supplied by the operator).
4. The room shall have no windows.
5. **No water, drain services, chilled water pipes shall pass in the ceiling or floor of the room.**
6. The room shall have a minimum clear height of 3 mtrs.
7. The flooring shall be of antistatic Vinyl tiles or raised floor.
8. A 125 Amp 3 phase DB shall be provided inside the room. The feeding to the room shall be from a UPS or a Generator backed up source.
9. 2 Nos. 63 Amp TP isolator shall be provided inside the room as indicated in the layout drawing.

10. Lighting fixtures shall be provided to have a Lux level of 500 at least 1 light fixture shall be with a 3 hour emergency backup kit.
11. At least two 13 Amp convenient sockets shall be provided for use of tools and other equipments.
12. A 6 way Master Earth bar (as FURSE LK 045) shall be provided inside the room in a suitable location nearby MDF. All Telecom Equipments including MDF should be connected to this master earth bar.
The earth should be connected by using 1 cx70 Sq.M. PVC/ECC cable to an external Earth Pit which has a 20 mm dia. solid copper rod up to summer water level.
Note that the reading of the earth resistance should be less than 1 ohm.
13. 2 Nos. floor standing air conditioning DX units (Direct Expansion) of sufficient cooling capacity for the room and equipments (Average Heat Dissipation is 10 KW). The Units shall be provided with an Automatic Change over panel to have one A/C unit running and 1 unit on standby. FCU of the building HVAC system shall not be extended into the room.
N.B.: For a small telecom room, 2 Nos. wall mounted split units of sufficient capacity can be installed instead of the Floor Standing Type; along with a changeover panel with the same working sequence and specifications.
(See attached Section 3 for detailed specifications of Air Conditioning system).
14. The room shall be provided with Fire Alarm and FM 200 Fire Fighting System. No sprinkler system shall be extended into the room. Provision for A/C Shut Down during the event of any fire alarm shall be provided (See attached Section 2 for detailed specifications of FA/FF system).
Location of the Cylinder & FA Panel shall be as per the civil defense standards & requirements.
15. Install 1 No. 300 x 50mm GI Cable Tray as per the site conditions.

Section 2

Standard FA-FF Specifications for a Telecom Room Fire System Installation

1.0 GENERAL

The Fire System shall be designed to protect the risk area within the premises by giving warning of a fire condition when detected by an automatic detector or by the operation of a break glass call point.

NOTE:

The Contractor shall submit the Material Status Report including the delivery period of the Extinguishing media in their bid. During the execution of works, the contractor shall install and connect the extinguishing media cylinder as confirmed in their bid. Failing to honor the delivery date will be liable for penalty as per the delay penalty clause in the contract.

All the Manufacturer's equipment and components (FEP, Smoke Detector, Extinguishing Gas, container, accessories etc.) shall be certified by LPC/UL for design, construction and reliable operation. The supplier shall furnish copies of certificates issued including serial numbers of the particular product complying fully with National and International standards and code of practice. All the certificates shall be submitted to Q-Tel prior to the installation of the system on site.

1.1 SCOPE OF WORKS

The scope of work for this contract shall include, but shall not necessarily be limited to the following items:

1. To prepare a complete computer aided design calculation based on relevant codes and regulations for an electronic fire protection and detection system in the subject building.
2. The Contractor shall supply, install, test and commission a comprehensive fire alarm and fire fighting system.
3. Testing and commissioning of the newly installed system to the engineer's approval.
4. 400 days maintenance period with minimum 4 Nos. maintenance visits.

1.2 DESIGN STANDARDS

1. The fire system shall be supplied and installed in complete compliance with the recommendations of the International Standards.
2. The fire system shall fully comply with the National Fire Protection Association (NFPA) standard provided it is installed to comply with the limitations established by the list of Factory Mutual Research Corporation or Underwriters Laboratory Inc. The proposed

system and extinguishing media shall also comply to NFPA-12, NFPA-12A wherever applicable.

3. The proposed extinguishing media shall also comply in all aspects to Montreal protocol for the Ozone Depletion precautions.
4. The proposed fire extinguishing media is also to be accepted and approved by the local civil defense authority.

2.0 TECHNICAL SPECIFICATION

2.1 DESCRIPTION OF THE SUPPLIED AND INSTALLED SYSTEM

1. The system shall be designed and maintained in full compliance with International Standard. The system shall be functioning on the basis of double knock type in areas covered by extinguishing media and two-stage alarm system.
2. Operation of an individual detector shall be displayed by an LED indicator fitted into the base or body of the detector. The indicator shall illuminate when the detector goes into alarm. User control switches for evacuate and reset shall be provided, and to be operable only when enabled by a key switch.
3. The system shall operate on nominal 24 Volt DC with necessary rechargeable stand-by batteries. The rechargeable batteries shall be Nickel Cadmium of adequate capacity to operate the whole system for 6 hours duration, without fail. The battery set shall be able to run the sounders either bell or siren for 1 hour continuously without fail, after maintaining the system healthy for the 6 hours duration.
4. The supplied fire system shall guarantee the following facilities as a minimum requirement:
 - Auto detection of fire accompanied by local audible and visual warning facility.
 - Providing of audible and visual warning in case of operation of manual call point.
 - Providing A/C and Exhaust. Fan shut down facility via heavy-duty relays.
 - Activating and control of automatic fire fighting and extinguishing system.
 - Providing remote alarming facility to Q-Tel central OMC room at Doha.
5. Upon receipt of an alarm, the control unit shall perform the following actions:
 - Illuminate Fire Zone Indicator
 - Activate Local Alarm Warning Devices
 - Activate Internal fire sounder
 - Activate A/C shutdown.
 - Control and operate fire fighting and extinguishing system.

2.2 MATERIALS, EQUIPMENT AND ACCESSORIES TECHNICAL SPECIFICATIONS

2.2.1 FIRE SYSTEM ALARM AND EXTINGUISHING PANEL (FAP)

1. The RLU area shall be protected and covered by Fire extinguishing media shall be having its own individual FIRE SYSTEM ALARM AND EXTINGUISHING PANEL with

its built-in controls and signals indicators. The Fire system accessories within this area shall be connected to this FAP panel. The FAP control panel shall be of a modular design as per International Standard. The FAP shall be activated by the activation of any of the installed system devices and accessories shall which shall include but not necessarily limited to the following accessories:

2. Smoke detectors, 1st stage alarm bell, 2nd stage alarm siren (sounder), door keep contact, extinguishing release actuator, pressure switches, etc. The fire extinguishing panel shall be installed in a location which is to be identified in co-ordination with the client representative. The FAP function is to control and lock-off the extinguishing media release in case anybody is inside the protected area. The panel shall be connected to the door keep contact which shall change the status from auto/manual to manual in case the door lock is opened. The FAP shall be equipped with the built-in keys to enable and disable the controls buttons access, to change from auto/manual to manual and to open the panel front door for access to the internal components.
3. The control panel shall be of a modular design and fully comply to International Standard and include but not necessarily limited to the following facilities:
 - a. Detection zone modules, with zone outputs rated as per manufacturer's line of production. On board of selectable auto/manual/test feature, and selectable delayed, isolate response to each detection zone.
 - b. Integral battery charger for a supply of 240 V AC. $\pm 10\%$ at 50 Hz. The battery charger shall be adequate to recharge the fully drained battery set within 12 hours duration.
 - c. Single control for evacuate, silence sounders, reset and lamp test, all but the latter being operated via push buttons on the front of the control panel which are enabled by a key switch on the front cover.
 - d. Monitoring of all circuits for fault condition.
 - e. Nos. volt-free alarm contacts and 1-No. volt-free fault contact.
 - f. Relay modules, each consisting of 4 Nos. heavy-duty type relays rated at 250 V ac / 24 V dc for fan & A/C shut down and alarms relaying to Q-Tel's OMC Room.
 - g. Choice of sounder output mode of test, continuous or pulsed. Twin monitored sounder outputs.
 - h. Built in buzzer, to be activated in case of system fault, power failure or in case of sounders or bells mute.
 - i. The cabinet trim and door assembly shall have Allen screw fixing to prevent unauthorized opening.
 - j. Visual indicators via long life LED indicators.
 - k. Blank legend strips for specific identification of zones.

2.2.2 FIRE SYSTEM STATUS INDICATOR PANEL (FSSP)

This unit shall be provided at the entrance to indicate the status of fire extinguishing. The 6-lamp unit (FSSP) shall be in weatherproof transparent enclosure. The status indicator panel

(FSSP) shall be incorporating a set of **ultra bright and heavy-duty type LED's**. The LED's shall be adequate and suitable to operate on 24V DC.

2.2.3 OPTICAL SMOKE DETECTOR

1. Optical smoke detectors shall operate on a two-wire circuit and shall meet the requirements International Standard wherever applicable.
2. Optical smoke detectors shall operate on photo-optical principle and shall consist of an asymmetrical sampling chamber, which shall allow easy entry for slow moving smoke whilst greatly reducing the possibility of unwanted alarms caused by dust contamination.
3. The detector shall be activated in case the percentage of smoke volume to the room volume is between 3-5%.

2.2.4 MANUAL FIRE ALARM CALL POINTS

1. Manual call point shall be of the surface mounting type, suitable for 24 V dc operations and shall be of the open circuit / closed circuit break glass type, housed within modified polycarbonate oxide housing, with a plastic coated glass element and key operated test facility with integral LED, as per International standard wherever applicable.
2. Manual fire alarm call points shall have two sets of contacts, one normally open and one normally closed.

2.2.5 ALARM SOUNDERS

A. ALARM BELLS (FIRST STAGE ALARM)

1. The alarm bell shall be 230mm (9 inches) diameter under dome type gong cover and shall be surface mounted for fixing on to a standard electrical conduit box (with pressed steel alloy gong and finished in red stove enamel paint) and suitable for 24 V dc operation.
2. The sound pressure decibel rating of the bell shall be at least 96 dB at 1 M distance.

B. ALARM SIREN (2ND STAGE OR PRE-DISCHARGE ALARM)

1. The sounder shall be a 24 V DC continuous rated electronic sounder designed to be mounted directly onto a standard electrical conduit box, with an easily selected choice of distinctly different sounds, with a high sound output of 103 dB (A) at 1 meter distance.
2. The second stage sounder shall be activated only if it receives the signal from the fire-extinguishing panel and the door of the related area is closed.

2.2.6 Door lock assembly (Dead lock type) / Door Keep Contact

1. The door lock assembly and / or door keep contact shall consist of door mounted lock incorporating an individual door handle to release the dead lock (latch) from the inner side of the door (inside the building or area), so as not to trap personnel inside the area.
2. The lock assembly shall also incorporate a micro switch to be fixed at the doorframe to operate and activate the fire extinguishing control panel to be changed from automatic mode to manual mode in case the door is opened by individuals.
3. The door lock assembly shall be provided to control automatic operation of fire extinguishing system and to provide remote indication at the (FSSP) unit related to the same area.
4. The door keep contact shall be of the heavy-duty type and of a suitable size to match the doorframe.
5. This key contact (micro switch) shall follow and comply to the description given elsewhere in this specification. The internal micro-switch shall be of 5A rating and shall have two contacts (NO contact and NC contact).
6. The door keep contact shall be provided for the main entrance door. The door keep contact shall be connected to the status indicating panel for Auto/manual operation of the system. Signals from door keep contacts shall be connected to Q-Tel Alarm junction box for extending the signals to the monitoring station.

2.2.7 FIRE ALARM WARNING LIGHTS (XENON FLASHER)

1. The fire alarm warning lights shall be a surface mounted xenon flashing beacon, featuring a fully sealed all solid state driver.
2. The unit shall be constructed from white polycarbonate or ABS, with red polycarbonate dome and fully weatherproofed to IP 54.
3. Power consumption should not exceed 3 watts at 24 V dc and shall be continuously rated with a flash rate of approximately 1 Hz. The Xenon flasher unit shall be activated only in case the fire suppression agent has been released.

2.2.8 ACTUATING CONTROLS / ELECTRICAL SOLENOID

1. The solenoid valve shall be specially designed for use with the proposed extinguishing media. The valve shall be normally closed, and opens upon electrical energy being supplied, thus relieving the pressure above the main piston to atmosphere and causing the container valve to open.
2. The detachable solenoid valve shall be fitted with a swivel union nut for mechanical connection to and from the cylinder valves which have a solenoid valve connection port with built in check valve. Electrical connection shall be made using flexible conduit to allow convenient removal of the solenoid valve from the attachment to the cylinder valve when the cylinder is serviced or recharged. Necessary safety precautions are to be taken into consideration not to allow the gas to be released while servicing the extinguishing container or refilling the same.

3. The release solenoid shall be connected to the fire extinguishing panel (FEP) and control equipment compatible with and listed by UL and FM for the use with the proposed fire extinguishing systems. The entire electrical system shall be under constant supervision.
4. The automatic actuation of the extinguishing system shall be accompanied by activating two separate zones of detectors (cross-zoning) in order to eliminate fire extinguishing release actuation by a transient condition which may cause a single detector to operate or by false alarming case.
5. Any break in the solenoid circuit will result in fault signal at FAP. The FAP shall operate upon actuation of any of the following types of accessories or combinations of:
 - Optical smoke detector (double knock from two different zones)
 - Manual call point.
 - Manual release provision at the SIP, where applicable.

2.2.9 PRESSURE SWITCH

1. The pressure switch shall be used to perform interlock function, such as sounding discharge alarms or shutting down electric motors or other equipment in case the extinguishing discharge is activated through the system piping. The setting of the pressure switch shall be as per the system manufacturer's/supplier's recommendations.
2. The pressure switch shall be pneumatically or electrically operated by the gas release action where applicable.
3. The pressure switch shall also be activating the Xenon flasher at the area entrance.

2.2.10 FIRE FIGHTING AGENT(EXTINGUISHING GAS)

1. The agent shall be a liquefied gas / chemical extinguishing that interferes with the combustion process by breaking the chain reaction which propagates fire and flame. The system covered by this specification is for the "Total Flood" type. The extinguishing media - which shall be stored in steel containers - shall be injected into the protected area in black steel pipe work and nozzles to establish an extinguishing concentration throughout the serviced area.
2. Extinguishing media shall be released within 8-10 seconds as per the International Standard in this aspect to make re-ignition unlikely takes place provided that the initial concentration is maintained for a short period, enough and adequate to suppress fire.
3. The extinguishing shall be super-pressurized with oxygen free nitrogen to certain pre-calculated pressure to provide quick discharge via the system pipe work nozzles. The operating temperature range shall be between 0°C to +54.4°C. The internal pressure of the agent container shall not be more than 25 bars at 22°C.
4. The proposed agent shall be zero ozone depletion as per Montreal protocol for the environment protection. The agent shall fully comply with NFPA-12 & NFPA-12A wherever applicable.

2.2.11 CONTAINERS & VALVES

1. The extinguishing agent shall be contained in one (or more) high strength steel alloy cylinders. Containers shall be manufactured, tested and marked in accordance with DOT standard 4 BW 500 and shall be fitted with 1" size valves, as applicable.
2. Valves shall be of the pressure seated type of a brass body, a stainless steel piston with seal and pressure releasing pilot check assembly and facilities for manual and / or electrical operated by solenoid valve. A safety disc assembly and a pressure gauge shall be included.
3. Actuation of the pilot check assembly or electric solenoid valve to relieve the pressure above the piston and to permit the piston to travel upwards, thus fully opening the value and permitting extinguishing agent to discharge through the outlet into the distribution pipe. Pipe work shall comply in all aspects with International Standard.

2.2.12 DISCHARGE PIPE AND FITTINGS

1. Black steel pipe work (to be painted in red as approved), heavy duty and galvanized malleable steel of 300 pound class fitting shall be used. For $\frac{3}{4}$ " or smaller pipe sized 150 pound class fittings may be acceptable. The pipes and fittings shall conform to schedule 40 in all aspects (diameter, material, wall thickness, etc.).
2. The discharge piping system must be balanced under the following circumstances, cases and conditions:-
 - a. The actual pipe length from the container to each nozzle is equal to (within $\pm 10\%$) the longest pipe length.
 - b. The equivalent pipe length from the container to each nozzle is equal to (within $\pm 10\%$).
 - c. The same number elbows are used in each branch.
 - d. The above mentioned factors and results are to be accurately calculated by the system supplier/manufacturer and to be submitted for the engineer's approval prior to order.

2.2.13 DISCHARGE NOZZLES

1. Nozzles type choice, coverage and locations shall be as per the system manufacturers/suppliers computer aided design calculation.
2. Sizes and location are to be determined according to the individual computer calculation to each area and to be submitted for engineers approval prior to order.
3. The discharge nozzle material shall be of brass.

2.3 ANCILLARIES

2.3.1 WIRING AND CABLING OF FIRE SYSTEM

1. The contractor shall supply and install the complete wiring required for the fire system integration. The supplied wiring and cabling shall be of the mineral insulated, PVC sheathed cables or Fire proof cables in trunking either single core or multi-core cables as applicable. The supplied and installed cabling shall comply in full to NFPA standard for mineral insulated cables and the termination shall comply International Standard for the cold screw on pot wedge type seals termination for the same.
2. The contractor shall recruit a specialized person to carry out such professional wiring and installation for such works. Sample of MICS cabling termination shall be submitted to the engineer for approval.
3. It has to be noted that all the cabling and wiring used for such installation shall be of medium duty type (400 - 750 volts) although it shall be used for 24v DC supply from the FAP as well as FEP. On completion of installation of MICS cables, the contractor shall carryout the insulation test (with 500v test instrument) as well as continuity test.

2.3.2 INTERLOCKING OF A/C UNITS.

1. A/C units shall be interlocked to the fire alarm and fire fighting system to be shut down in case of fire incident.
2. The magnetic coil of the contactor shall be looped through a heavy duty relay inside the FAP (NC contact) which shall be of 10A rating to be activated via the fire alarm panel itself.
3. The relays shall be complete with its base and to have at least two contacts (NO and NC) volt -free contacts.

2.3.3 FLEXIBLE DISCHARGE HOSE

1. A flexible discharge hose shall be used to connect the agent container valve to the system discharge piping. The allowable maximum and minimum pressure values shall comply with NFPA, and manufacturer's/suppliers' recommendation.
2. The flexible discharge hose shall be of steel reinforced flexible rubber hose of at least 50-mm diameter to match the cylinder valves and the discharge piping system diameter.
3. The flexible discharge hose shall be of adequate construction to withstand a release pressure of at least 20 bar or as per the computer-aided design, or as per the system supplier recommendations.

2.3.4 NOZZLE PROTECTIVE BLOW OFF CAPS

1. Ploy vinyl chloride red colour blow off caps to protect the nozzle orifice from the entry of foreign matter shall be provided to each nozzle in the system. The PVC cap shall suit and match with the nozzle size and shape.

2.3.5 CONTAINER BRACKETING / FIXING

1. Fire extinguishing media container(s) shall be normally mounted in the more usual upright position with the wall mounting bracket which shall consist of a mounting channel and a container strap.
2. The wall-mounting bracket shall be solidly fixed to the adjacent wall with the necessary steel channels and anchors to ensure that the cylinders shall not be moved from their place/location in case the gas is released.
3. The size of fixation bolts shall not be less than 8 mm Dia to withstand the release vibration.

2.4 SAFETY PRECAUTIONS / MEASURES

2.4.1 AUDIBLE AND VISUAL ALARMS

1. An audible evacuation alarm shall be provided within the risk area to sound prior to operation of the system. A visual indication shall be provided outside the protected area at the entrance.
2. Audible pre-discharge evacuation alarm shall be in the form of pre-discharge siren the visual alarm shall be in the form of Xenon flasher as s. The visual alarm (Xenon flasher) shall be activated only in case that the fire extinguishing gas/media is released.
3. In addition to the above, a status indicator panel shall be provided, supplied and installed adjacent to each area (preferably on the right hand side) at a level of 180 mm from the FFL. The status indicator panel (SIP) shall be integrated with built in long life ultra bright LED's to indicate the status of the system (Auto/manual, manual and gas release). The LED's colour shall be as follow:-
 - Manual Green
 - Auto/manual Yellow/amber
 - Gas release Red

2.4.2 WARNING LABELS

1. Warning labels/signs shall be prominently displayed at the entrances to the area protected by the fire extinguishing media as well as the main entrance door to the building itself.
2. The warning labels/signs shall be type written on self adhesive stickers and to be in double languages (Arabic/English). Samples to be submitted for the Engineer's approval.

2.4.3 Structural Openings Closing / Sealant

1. The contractor shall close all cable entry openings between the battery room, equipment room and MDF with a fire resistant material of at least 1.5 Hr. fire rating in order to avoid the fire and/or gas escaping through the openings in the event of fire and during extinguishing process.

2. The specification and technical detail for such material shall be as indicated in the respective specification clause.

2.4.4 Fire Prevention Materials

1. Fire prevention materials shall be provided in all services openings for PVC ducts, extinguishing pipes and cables either through walls or floor slabs to provide complete isolation of each and every area within the building. The fire prevention material shall be of materials approved by the engineer prior to order, and to be able to withstand 1.5 hours of fire prevention as well as to prevent smoke spreading within the different area.
2. The fire prevention material shall be similar to the following or equivalent and approved:-
Intumex - Intumex L, KS-2 or KS-3.
Nulfire System "B-90" or Nulfire System - B "Bags".
3. The prevention materials shall be submitted for the engineer's approval prior to any order is placed.

2.4.5 LABELING

1. All equipment like status indicator panel (SIP) extinguishing containers, Fire System panel (FAP), pressure switch etc. shall be fitted with external labels made of rectangular pieces of ivorine, perspex or laminate. The character shall be reverse engraved, coloured black against white background with beveled edges and fixed by means of 3 mm chrome bolts/screws nuts and washers, or stuck with necessary glue to each and every item.
2. Details of proposed labels to be submitted to the Engineer at the same time as the project submittals are submitted for approval.
3. The contractor shall include for the provision of an approved metal plate of fire accident instruction sheet in each of the sites both in Arabic and English.
4. The supplied system shall be complete with an appropriate zonal chart clearly detailing the following:
 - Area number
 - Accessory number
 - Zone number
 - Cylinder size/capacity
 - Extinguishing release nozzle size.
 - Extinguishing release pipe sizes.

2.5 SYSTEM TESTING AND COMMISSIONING

1. The contractor on completion of the installations shall perform testing and commissioning to be whole electrical installations in this job as per International Standard where applicable

2. The full installation shall be tested and commissioned by a specialist Engineer. A minimum of two testing/commissioning visits shall be allowed for the step by step testing of the installations
3. A full test of all system components and functions shall be performed by the installation contractor and supplier's specialist in the presence of the engineer. This test shall include testing all detectors, manual controls, abort controls, audible and visual indicators, and auxiliary functions.
4. The following tests shall be carried out in accordance with the regulations of KHARMAA and shall include, but not necessarily be limited to the following tests:
 - a. Wires and cables continuity test, recorded and tabulated.
 - b. Insulation resistance tests, core to core and core to shield on all circuits and equipment, using 500 volt megger. The megger reading shall be not less than one Mega ohm.
 - c. Operational tests of all apparatus, smoke detectors, manual call points, bells, sirens, indication LED's control panel, etc.
 - d. Earth continuity tests: not more than one ohm
 - e. Operation and response tests of the fire fighting system, including the timing of the pre-discharge siren and the gas release timing, solenoid valve actuator, etc.
 - f. Polarity test for all accessories.
 - g. Operation tests for A/C shut down facility.
 - h. Operational test for Q-Tel remote alarming facility to Q-Tel central OMC room at Doha.
5. The system piping shall be prepared for testing with test pressure equivalent to 150% of the extinguishing media release pressure. The pressure test shall be carried out by nitrogen gas at 25 bars at least for a minimum of 1.0 hour duration.
6. The test shall not include discharge of the fire extinguishing media.

2.6 SUNDRIES

2.6.1 SUBMITTALS

1. The contractor shall formally submit within one week time each and every material and item he intends to use to be installed, for the engineer's approval prior to order.
2. Each submittal shall be triplicate, numbered, dated, and accompanied by manufacturer's catalogues clearly marked and indicating the actual item to be used.

2.6.2 WORKSHOP DRAWING

1. The contractor shall be responsible for any discrepancies, errors or omission in the drawings and other particulars supplied by him whether such drawings and other particulars have been approved by the Engineer or not.

2. The contractor shall prepare and submit for approval detailed workshop drawing for all equipment or distribution services. Such drawings will include:
 - The physical dimensions of the equipment and its operating weight.
 - Position of controls, control panels, control accessories, etc.
 - Detailed wiring diagrams of all electrical and control systems.
 - Detailed detectors, nozzle and other services co-ordinated ceiling layout.
 - Detailed conduit and cable route with high levels.
 - Any other drawing found necessary or requested by the Engineer

2.6.3 MANUAL OF OPERATION (AS-BUILT MANUAL)

1. Documents forming the manual of operation and maintenance shall be bound into a single or a set of specific documents. The size should be DIN A4 at least.
2. On completion of the installation, the contractor shall submit 2 copies of the draft documents for final approval of the Engineer. Upon approval, the contractor shall submit 3 copies of the manual of operation before issue of the Completion Certificate. An additional set of originals including reproducible drawing negatives shall be submitted as a part of the As-built documentation/operation and maintenance manual. (All drawings shall be produced using AutoCAD System (CAD v 2000).
3. The as-built manual shall incorporate and include but not necessarily limited to the following set of documentation:-
 - a. Complete list of all items, equipment, controls and accessories as actually supplied and installed including serial numbers and all name plate details and suppliers.
 - b. Set of "as-built Drawings".
 - c. Set of manufactures catalogues, wiring diagrams and installation drawings relevant only to the particular items of equipment concerned.
 - d. Manufacturer's printed spare parts list for all items and equipment.
 - e. Planned Preventive Maintenance requirements at monthly and yearly intervals with maintenance procedure for all plants and equipment.
 - f. Planned Preventive maintenance schedule during the 400 days maintenance period.
 - g. Written instruction charts in both Arabic and English language as to the method of operation of the equipment and the routine maintenance work. One copy of such instruction charts shall be framed and fixed to the wall of each of the Q-Tel units.
 - h. Test certificates, readings and results, tabulated.
 - i. Any other information required by the Engineer.

2.6.4 LOCATION PLAN

1. Adjacent to the Fire System Control Panel (FAP), a "Location Plan" shall be provided, showing layout of the area and fire zones with marking of detectors in block diagram. The location map shall be 1:50 scale; and shall be made of Trafolite, 2 mm thick, with white background and red lines and letters.
2. The location plan shall be framed with minimum profiles and fixed onto wall adjacent to fire alarm panel, or as instructed by the Engineer.
3. A set of safety instructions and security procedures, all as instructed by the Engineer during the course of execution shall be hanged adjacent to the zonal chart. All identifications and instructions shall be in Arabic and English.

2.6.5 PLANNED PREVENTIVE MAINTENANCE (PPM)

1. During the 400 days maintenance period the contractor shall carry out preventive routine maintenance of the installed fire systems on quarterly basis. The 400 days maintenance period shall commence immediately after the successful testing and commissioning of the installed fire systems. The preventive routine maintenance shall be carried out as follows:-
 - a. Removal of the system detector - cleaning and reinstalling them in place.
 - b. Cleaning of the break glass units/manual call points.
 - c. Cleaning of the bells and sirens.
 - d. Cleaning of the FAP, FEP as well as SIP.
 - e. Cleaning of the cylinder heads/actuators.
 - f. Activation of the fault incidents and check the consequential actions (without any extinguishing release).
 - g. Cleaning of stand-by batteries with its termination.
 - h. Measuring the charging voltage as well as the charging currents of the built in battery chargers.
2. All the above mentioned actions shall be carried out in the attendance of the engineer's representative.
3. The planned preventive Maintenance (PPM) visits shall be logged in a custom made table. The PPM tables shall be hanged inside the main fire alarm panel and shall be filled by the contractor's representative/maintenance technician and shall be duly signed by him as well as the engineer's representative.

SCHEDULE OF RECOMMENDED MANUFACTURERS

1.	Cables (single or multi core)	BICC	UK
		Pirelli	UK
		or equal and approved	
2.	Labels and markers	BICC	UK
		Kirtchly	UK
		or equal and approved	
3.	FIRE SYSTEM (Fire Alarm & Fire Fighting)	Chubb	UK
		Kidde	UK
		Notifier	US/UK
		FIKE	US
		Thorn	UK
		Gent	UK
		or equal and approved	
4.	Fire Suppression System Pipes & Accessories	Nippon	JAPAN
		or equal and approved	
5.	Fire Resistant Materials	Intumex	UK
		Nullfire	UK
		or equal and approved	

Section 3

Standard Detailed A/C Specifications for a Telecom Room **Air-conditioning Requirements**

1.0 GENERAL SPECIFICATIONS

THE SUPPLIER SHALL SUPPLY INSTALL AND COMMISSION, 2 NOS. SPLIT TYPE AIR CONDITIONERS (FLOOR STANDING UNIT) OF SUFFICIENT CAPACITY FOR THE ROOM AREA AND THE EQUIPMENTS.

1.1 SCOPE OF WORK

2 Nos. of split air-conditioning units (Floor Standing Type) shall be installed at the Telecom Room; one unit as duty and one as standby with Auto-changeover control panel fitted inside the room. The Panel will allow 1 unit to be selected as duty unit & 1 Unit to be selected as standby with automatic changeover to standby on high room temperature and must include standard run and fail lamps, a pair of no-volts contacts for remote Alarm and the ability to shutdown the complete Air conditioning system on receipt of a signal from the fire alarm system. The high limit thermostat to be located local to the equipment fitted in the room as required.

The Air-conditioning work shall include all necessary electrical control wiring and civil works. Concrete plinth for outdoors condensing units and condensate drainage will be identified by the engineer as per site conditions and wall openings.

Each system shall consist of units from the proprietary range of standards equipment by a recognized manufacturer. The matching performances of the outdoor and indoor units shall be guaranteed by manufacturer. Each system shall include all interconnecting (Refrigeration-Grade) Copper pipes between the indoor and outdoor units.

The indoor A/C units shall be of floor standing on the steel stand (Upright) with top Horizontal airflow and adjustable louvers. Refrigerant pipe run inside the room shall be through PVC trunking.

Outdoor condensing units shall be installed either on Concrete Plinth, refrigerant pipe work between indoor and outdoor units with all control wiring shall run through GI Trunking on the outside wall.

Due to the limited available space in the equipment room, the dimensions of the indoor units shall not exceed more that which are specified below: -

- Height - 2000 mm
- Width - 1200 mm
- Depth - 600 mm

Site visit must be arranged in order to determine the exact location of A/C indoor and outdoor units, installation routing of refrigerant piping, drainage, electrical control wiring etc., for each site.

2.0 SPECIFICATION

2.1 OUTDOOR CONDENSING UNIT

The outdoor unit shall comprise a ONE-PIECE Air-cooled condensing unit. The unit shall have been designed to operate in ambient temperatures of up to 50°C.

The framework and casing shall be of galvanized steel with a baked enamel, synthetic resin paint or plastic.

The Compressor shall be a hermetically sealed Reciprocating or Scroll type only, mounted on vibration Isolators.

The compressor motor shall be suction gas cooled and shall have thermal overload protection.

The air-cooled condenser coil shall be constructed from seamless copper tubes with mechanically bonded aluminum fins, pressure tested to a minimum of 1.5 times the maximum working pressure. The coil shall be factory cleaned and dehydrated.

The condenser fan shall be of the direct driven propeller type, with a steel wire safety guard and permanently lubricated bearings.

Each outdoor unit shall be provided with its own control panel and its own pre-wired power and control systems, electrical components shall be built in during manufacture. Control panel shall be weatherproof. The electrical supply to the outdoor unit shall be 415 Volts, Three Phase 50 Hz.

2.2 INDOOR FAN COIL UNIT

The indoor unit shall be floor standing on the steel stand with top horizontal airflow. The air louvers shall be adjustable type for changing air direction.

The cabinet shall be constructed from galvanized steel with baked enamel or synthetic resin paint finish. Internal cabinet surfaces shall be insulated with mat-faced fiberglass (or equivalent) having a minimum thickness of 25mm. Each unit shall contain a permanent washable air filter.

The cooling coil shall be constructed from seamless copper tubes with mechanically bonded aluminum fins. The coil shall be fed by a liquid distributor with expansion valve and the entire

assembly shall be pressure tested to 1550 kpa. The coil shall be factory cleaned and dehydrated.

Each unit shall be provided with a drain pan, which shall extend under the cooling Coil and shall be of sufficient size to collect all the condensation produced by the unit. The drain pan shall be constructed from heavy gauge galvanized steel or aluminum alloy sheets and shall be coated on the inside to prevent condensation forming on the external surfaces.

Fans shall be of the double inlet centrifugal type with forward curved impellers directly mounted on the motor shafts. The fans shall be statically and dynamically balanced. The multi-speed, permanently lubricated, split-capacitor motor shall be resiliently mounted and shall have built-in thermal overload protection with automatic reset.

The electric supply to the indoor unit shall be 240 volts, 1 phase 50 Hz. The unit shall have facility to restart automatically on power interruption.

2.3 AUTO CHANGEOVER A/C CONTROL PANEL

Electric power to the Split type A/C units of the equipment room to be controlled through a changeover panel wall mounted type.

Both A/C units shall be capable to act either as duty or as standby. The changeover panel shall be built of heavy gauge steel with baked enameled finish and shall have hinged panel door interlocked with the isolating device to de-energize the system when the door is opened. The panel shall house the contactors, relays, switch buttons, timer and pilot lamps.

A space thermostat, independent from the thermostat of the A/C units and set at a limit temperature (such as 32°C) and shall close (energize) the second unit in case of rise of the space temperature due to a failure or fault of the operation of the first unit. Auxiliary contacts shall be provided at the panel terminals as volt free contact for possibility of remote signaling facility and the ability to shutdown the complete Air-conditioning System on receipt of a signal from the Fire Alarm System.

3.0 CODES AND STANDARDS

Work and materials shall conform to the latest edition of the QGEWC regulations and recommendations for Air-conditioning equipment and installation. British standards and Codes of Practice, and with all prevailing rules and regulations pertaining to adequate protection of all moving parts, or otherwise hazardous conditions. Nothing in this Specification shall be construed to permit work not conforming to the most stringent of the applicable codes.

The following standards are accepted for ACHVR services provided that necessary corrections and provisions are made to suit Qatar climatologically and design conditions, power supply system and other required codes.

- ASHRAE : American Society of Heating Refrigeration and Air-conditioning Engineers (U.S.A)
- IHVE : The Institute of Heating and Ventilation Engineers (U.K)

- ASME : American Society of Mechanical Engineers
- ARI : Air conditioning Refrigeration Institute (USA)
- ASTM : American Society for Testing and Materials.
- AWS : American Welding Society.
- UL : Underwriter Laboratories (U.S.A)
- SMACNA : Sheet Metal and Air-conditioning Contractors National Association, Vienna.
- HVCA : Heating and Ventilation Contractor's Association, U.K

Other International Standards may be considered provided to meet with the above standards as minimum.

The codes and Standards mentioned above are hereby made part of the Contract drawings and Specification for the project, and the contractor accepts full liability for ensuring compliance with the same.

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4.0 CO-ORDINATION WITH OTHER TRADES

The Contractor shall co-ordinate his works with other trades and if so directed by the Engineer, the contractor shall prepare composite working drawings sections at 1:50 or 1:20 scale clearly showing how his work is to be installed in relation to the work of other trades.

4.1 SUBMITTALS

The contractor shall submit for approval on prescribed proforma the detailed information for all equipment he proposes to install.

4.2 WORKING DRAWINGS

Following the award of the Contract the contractor shall provide for approval working drawings of the whole works.

4.3 ERRORS IN INFORMATION

The Contractor shall be responsible and held liable for any discrepancies, errors or omissions in the working drawings whether said drawings are approved or not.

4.4 SKILLED LABOUR

The contractor shall submit C.V's of his qualified personnel responsible for execution of work for Engineer's approval.

4.5 LICENSE AND REGISTRATION

The Contractor shall have a valid QGEWC license for the class of work he is undertaking and shall provide a copy with English translation to the Engineer upon demand.

5.0 AS BUILT DRAWINGS

Prior to the issue of the Practical Completion Certificate the contractor shall supply two sets of "As Built" drawing prints for the Engineer's inspection and comment. Upon inclusion of any comment from the Engineer, the Contractor shall supply to the Engineer one set of reproducible (negatives) and four sets of prints. The certificate of practical completion shall not be issued prior to the approval of the "As Built" drawings.

5.1 OPERATION AND MAINTENANCE MANUALS & AS INSTALLED DRAWING

Prior to issue of the Practical Completion Certificate the contractor shall submit for the Engineer's approval two draft copies of the proposed manual for comment. Following receipt of the Engineer's approval of the proposed manual, the Contractor shall supply four hardbound loose leaf copies of the approved manual to the Engineer. The Certificate of Practical completion shall not be issued until the manual is submitted in draft form for approval.

5.2 PAINTING AND FINISHING

All steel work in connection with pipe supports exposed to the elements is to be painted with two coats of a rust preventive paint approved by the Engineer, preferably Zinc Rich primer, followed by one undercoat and one topcoat.

All exposed metal surfaces of air conditioning and electrical apparatus, motors, guards, pipe work, hangers etc. must be painted with one coat of under-coat and two coats of enamel paint finish to a color approved by the Engineer.

After completion of the installation, the entire work shall be checked for finish and appearance, any portion of work found damaged, unpainted or not finished to the satisfaction of the Engineer shall be rectified.

5.3 SITE CLEARANCE

At the completion of the Contract, all unused materials, equipment and plant shall be removed from the site and the work left in a tidy and clean condition, including the cleaning down of all equipment and the removal of all marks and stains. If required by the Engineer, equipment shall be repainted.

5.4 SPARES

The contractor shall guarantee holding a full set of spare parts for all of the equipment he intends to install for a minimum of 2 years. In addition, the contractor shall include for the

supply of spare parts as per the attached list, prior to the issue of the Practical Completion Certificate.

5.5 INSPECTION, TESTING AND COMMISSIONING

All works shall be inspected at any stage during the progress of work and after the completion of works.

All works shall be tested and commissioned in accordance with the relevant British Standards, Specifications and Codes of practice to the entire satisfaction of the Engineer.

The contractor shall carry out all the performance tests initially before requesting the Engineer to witness the test.

It shall be ensured that the system is free from any dirt, welding snag or any other foreign matters before the system is finally filled with working fluid. The system shall be properly vented for bringing it to operating conditions.

During the tests, all the readings of refrigerant pressures, temperature, current consumption of A/C compressors, evaporator/condenser motors shall be tabulated and at least two copies submitted to the Engineer.

5.6 WARRANTY/GUARANTEE

The contractor shall guarantee for a period of 400 days after the Practical Completion of the installation that all plant and equipment shall operate free of any defects due to defective material or bad workmanship and that any part found defective during this period shall be replaced free of cost by the Contractor.

All compressors shall be guaranteed for a period of five years from the date of Practical Completion.

If the defects are not rectified within a reasonable period, the Client may proceed to rectify these defects by another agency at the Contractor's entire risk and expense without prejudice to any rights of the Client.

5.7 STORAGE OF MATERIALS AND EQUIPMENT

All materials and equipment must be stored properly and generally in accordance with manufactures recommendation so as to prevent damage, corrosion, deterioration or dirt penetration.

All pipe and duct openings must be adequately closed to prevent dust and direct penetration during the course of installation.

5.8 ORDER OF EQUIPMENTS & MATERIALS

Prior to ordering and/or bringing any material equipment to the site, the Contractor shall submit for approval to the Engineer the following data and technical information:-

- a. Make and model number of equipment
- b. Literature showing the physical dimension of the equipment.
- c. Technical specifications
- d. Country of origin

Prior to commencing works at site, the Contractor shall submit to the Engineer for approval, the complete working drawings showing:-

- a. Position of equipment
- b. Position of ducts, pipes, conduits etc.
- c. Electrical Layout
- d. Position of condensate drain pipes

The Engineer shall check if he so requires all parts of the installation and materials. Any part rejected shall be immediately dismantled, removed from site and replaced or repaired to conform to the specification and to the full satisfaction of the Engineer.

Any part requiring realignment or repositioning in co-ordination with the decoration, false ceiling, carpentry or finishing works as required by the Engineer shall be carried out without delay.

Any interim approval given by the Engineer does not relieve the Contractor of his obligations under this contract.

SPLIT AIRCONDITIONING UNIT
SPARE PARTS LIST

S/NO.	DESCRIPTION	QTY
1	Outdoor Motor	1 No.
2	Compressor Contactor	1 No.
3	Condenser Fan Propeller	1 No.
4	Fan Contactor	1 No.
5	Selector Switch or PC Board	1 No.
6	Thermostat or PC Board	1 No.
7	LP Switch	1 No.
8	HP Switch	1 No.
9	Relay	1 No.
10	Capacitors Each type	1 No.
11	Air Filters	1 Set

