Secure I.T. Environments Ltd

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RM16 2PX

Project 10341

Date: 6th January 2014

RECEIVED
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Support Services

Dear David

Re: New External Data Centre for Rochford Hospital

Further to our recent meeting and subsequent discussions for a new external modular data centre as previously supplied to South Essex NHS Hospital in Greys, South Essex I have pleasure in submitting budgetary costs for another external data centre and its infrastructure to be located in the existing grounds of Rochford Hospital, South Essex.

The project is for the installation of a modular external data centre to accommodate 14 x 19" server / communications cabinets, a separate UPS room and its full infrastructure as outlined below in the document.

It has also been advised that certain elements of the infrastructure works will be carried out by the Trusts approved contractors. This will be outlined in the exclusions section within this document.

Partnering with Secure I.T. Environments Ltd

1 Proven Excellence and Experience

Secure I.T. Environments Ltd is delighted once again to respond to South Essex NHS request for a proposal for the provision of a new external modular data centre.

Undoubtedly if Secure I.T. Environments Ltd is once again the successful partner for this delivery we will continue to demonstrate our depth of proven data centre / communications room experience with the deployment of a scalable, modern solution that fully exploits appropriate innovative technologies and methodologies to the South Essex NHS Trust, whilst providing an end to end service over the short, medium and long term. We believe we have the credentials, knowledge, expertise and a partner focused orientation to achieve this.

2. Partnering with Secure I.T.

Secure I.T. Environments Ltd is a UK based international provider of data centre and communications rooms solutions. Our history of delivering high quality, innovative solutions provides a powerful combination for delivery excellence, management and expertise. Our strategy has always been having a "partner" relationship with our clients as we believe this long term relationship is the key to our growth and success. This means understanding the clients business and the unique challenges they face and working with them to provide appropriate solutions whilst fostering and maintaining personal relationships between our companies. We constantly find achieving this ethic, our customers receive creative and practical solutions, excellent service and real value for money.

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1.3 Our Solution

The key considerations for IPL regarding this room build are:

- Capital Expenditure
- Operational Expenditure
- Energy Efficiency
- Speed of Deployment
- Operational resilience
- Design Life

2. Outline Requirements

2.1 External Data Centre, Build Room, Lobby and UPS / Switch Room Specification

The proposal is predicated on the following "Total Quantity" of Cabinets

Quantity of Cabinets: 14 No: server / Communications cabinets

The following scope has been defined for the installation of the modular room and associated works:

- External 90 minute fire rated injected moulded Phenolic Resin (Pyrofoam) modular room meeting BS/EN1047 standards regarded as the bench mark standard for all Data Centre`s currently being installed today.
- Main Entrance door (1200mm clear opening).
- Emergency Exit door (900mm).
- Heavy Duty Raised Access Floor with a finished floor level of 600mm.
- Floor Brush Strips & Grommets.
- Electrical infrastructure including under floor containment
- N+1 UPS System.
- N+1 Air Conditioning
- High wall air conditioning within the UPS / service room
- VESDA, Fire Detection and Novec Suppression system for the Main Data Centre.
- Novec fire suppression and optical detection for the UPS room
- Fire Extract & Fresh Air System for the main data centre
- Fire extract only for the UPS room
- Environmental Monitoring including water detection within the room.
- 19" Server Cabinets.
- 19" Cabinet intelligent Vertical PDU`s.
- Room Clean.

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Price is as follows:

1. External Modular Secure Data Centre

We will supply and install a 6 sided external modular Data Centre complete with one main entrance door(1200mm clear opening) with EL560 electronic locking system for connection to any access control system and 1 x emergency exit door with push out bar. Within the data centre we have also allowed for in this proposal a Lobby area and UPS / switchgear room.

1. Interlocking wall panels around the entire perimeter of the existing space will be fixed into steel channels fixed to the concrete slab. Each panel has a high thermal protection of injection moulded phenolic pyro foam with white pre-finished steel facing sheets inside and grey steel face external steel sheets . Panels interlock with 'tongue and groove' profiles and fixed together by a cam lock system from the secure side and then sealed with silicone sealant

2. Ceiling panels are manufactured of the same specification as the walls. They are then fixed and sealed to the wall panels. Ceiling panels are to be further suspended from the RSJ steel beams and pillars using a fire tested 'top hat' support system. Please refer to the PDF outlined "Top Hat Section" above.

3. Base floor panels will be overlaid on the existing concrete base are manufactured to a standard specification and are fixed and sealed to the wall panels to form a sealed 6-sided enclosure. The base panel is then overlaid with 2mm sheet steel.

4. A DPC membrane will be layered over the concrete. The base panels that are the same specification as the walls and ceilings are then overlaid on top of the membrane to ensure no moisture content breaches the room.

5. All subdividing internal walls will be manufactured from 90 minute fire rated standard modular room panel to form the lobby area and UPS / Switch room.

6. A external profile sheet cladded roof will be installed along with side soffits, trims , guttering and water downpipes

Doors

To provide access and egress routes into and out of the various areas of the facility, doors to the Data Centre , Lobby Area, Build room ,UPS Room / Switch room will be provided to the following specification: -

Main Entrance Door

- The main entrance door will be of a single leaf design providing 1200mm clear entrance opening. It will be a double rebated door to provide fire integrity and insulation protection with heavy duty dog bolts.

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We will provide a high security electronic point locking system. All fixings for locking devices for the main entrance door will be protected by anti-drill magnesium steel and are able to be connected up to access control systems.

Emergency Exit Door

- The emergency exit door will be double rebated with a 900mm clear opening. The door will provide fire integrity and insulation protection and comes with heavy duty dog bolts and exit is via a push bar to exit rail.

Internal Doors

- All internal doors will be of a Single leaf design providing 1200mm clear entrance opening. It will be a double rebated door to provide fire integrity and insulation protection with heavy duty dog bolts. We will provide a high security electronic point locking system.

Door Dimensions

- Main External Entrance Door: 1200mm x 2.3m clear opening
- Emergency Exit Door: 900mm x 2.1m clear opening
- UPS / Switch Room Entrance Door: 1200mm x 2.3m clear opening
- Internal Door to the Main Data Centre 1200mm x 2.3m clear opening

2. Raised Access Floor

We will supply and install a heavy grade computer raised access floor in the data centre and electrical plant room by using fully encapsulated steel 600mm x 600mm panels bonded with an anti-static vinyl tile, these would sit on a heavy duty pedestal s **(Finished Floor Void will be 600mm)** and would be fixed to the sub-floor using epoxy resin. The floor tiles are designed to support an evenly distributed load of 12kNm² and a concentrated load of 4.5kN per 25mm². Around the perimeter of the room an allowance has been made for neoprene edging and black PVC lipped skirting.

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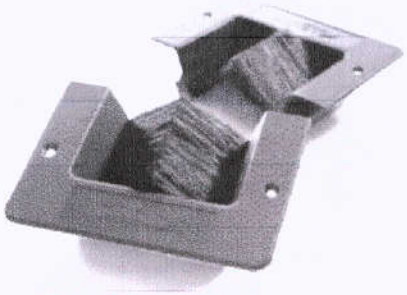
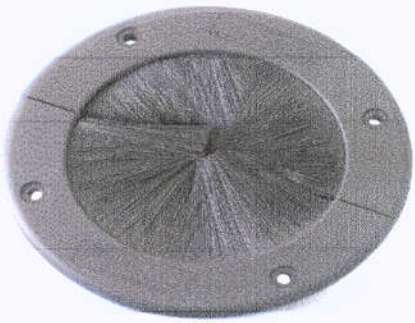
2. Brush Strips and Grommets

Raised Access Floor Cable openings waste a huge part of installed airflow in a typical server room. Therefore we are proposing to supply and install brush strips and cable entry grommets within the cabinet footplate to eliminate leakage of airflow. This assists in energy efficiency as unsealed cable opening allow 50-80% of air to escape.

To accommodate the requirement of 14 x cabinets we will supply and install the following:

Quantity: 14 x Brush Strips
14 x Round Grommets





3. Raised Access Floor Grilles

We have designed the layout of the computer room on a hot / cold aisle principle. The removable floor grilles will be positioned at the front of the cabinets to enable the pressurised air to dissipate to the front of the cabinets through the grilles. The hardware draws the air through the cabinets and out the rear. The hot air is then returned into the top of the air conditioning systems. Using this design eliminates the mixture of hot / cold air and ensures the air conditioning operates efficiently (less power usage)

a) To supply and install 20 raised access floor air grilles **without** volume control dampers.

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4. Air Conditioning

We will supply, deliver and install 4 No. Multi Denco down flow close control direct expansion air handling system complete with Denco ***VRF energy saving system*** and 4 No. Denco air cooled condensers which can be mounted either with horizontal or vertical air

We are proposing an energy efficient DX system which will be closely comparable with a free cool system on energy efficiency but without the cost penalty or having water present in the room.

The Multi Denco range operates with refrigerant R410A and under typical conditions operates with a sensible heat ratio (SRH) of 1. This means that the air conditioning systems can cool the air without at the same time dehumidifying it. In recirculating air mode the units control air conditions at a stable level of ± 1K temperature and ± 5% relative humidity.

The enhanced **"energy efficiency"** in the multi Denco precision climate control systems is achieved first by an optimised configuration of heat exchangers and fans as primary components for which the circulating air will encounter less air resistance in the unit. In addition to this the heat exchanger has greater dimensions and the resulting large air volume leads to greater stability of temperature control.

The inverter drive which controls (see more information below) the refrigeration compressor variably and steplessly adapts the units output to the cooling demand and results in "high energy efficiency" especially in partial load operation.

A typical unit running at 80% design cooling capacity will **require only 50% of the energy input** and running at 50% design cooling capacity this **falls to a mere 10% of energy input.**

Cooling PUE values of around 1.1 can be achieved but was always thought not possible with a direct expansion (DX) system. This is all now quite achievable without the risk of contamination from large quantities of outdoor air or evaporating water or even the need for particularly large spaces to accommodate a bespoke cooling plant

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Energy efficient features are:-

- Plug fan with EC motor in indoor units
- Inverter driven compressors
- Electronic Expansion Valve
- EC owlet low energy / low noise condenser fans

Plug Fan with EC Motor

"Energy Efficient" EC motors are now fitted as standard to all Denco air conditioning systems

The EC motor is an electronically commutated permanent magnet, direct-current motor with efficiency of over 90 %.

The infinitely variable speed control of the EC motor takes place electronically, by semiconductors. As a result, **it is not subject to wear**. All motor-protection functions are integrated and contribute to a reliable and especially long motor life cycle. The motor fulfils all regulations for electromagnetic compatibility.

The efficiency of the EC fan is over 90 % and enables energy-savings of up to 45 % with respect to equipment with conventional asynchronous motors (AC).

The microprocessor control system offers additional energy savings: this is because, for example, operation of several units (including a redundant unit) is possible with reduced airflow and speed under normal conditions. If, for example, one unit is shut down for maintenance, the airflow of the remaining units in operation will be automatically increased.
Additional possibilities of savings arise by reduction of the airflow under low heat loads. The airflow is infinitely variably controlled within the freely selected upper and lower limits of airflow.

Air Conditioning Data Centre Design to Suite Cold Aisle Closure

Air inlet temperature	-	28°C db
Relative humidity	-	30%
Ambient	-	32°C
Cold Aisle temperature	**-**	**21°C**
Cold Aisle relative humidity	**-**	**45%**

1 server cab @ 15kW	= 15kW
13 server cabs @ 5kW	= 65kW
Room total load	**= 80kW**

We have chosen 4 x DMA030D units.

Each unit is capable of 36kW in boost speed thus 108kW cooling available with N + 1.

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Included in the cost is the following:

Indoor Units (4) (Model Ref. DMA030D)

- Down flow configuration
- Microprocessor controls (C5-12)
- Filters G4
- 1 No. DX cooling coil
- **1 No. circuit with inverter compressor technology**
- Open top return
- Front full height panels
- **1 No Plug fan with EC motor**
- No Electric heating
- **No humidification**
- 1 No Inverter compressor / 1 No Fixed compressor with optimised efficiency
- R410a compatible (unit(s) not pre-charged)
- 2 No. volt free contacts for BMS links (Critical & Maintenance)
- Door interlocked isolator
- 1 No. fire shut down link
- Networking capability
- Touch screen display
- White laminate, RAL 9002
- 1 No. Vertical / Horizontal Discharge Condenser Unit per AHU
- **Front service connections**
- **Run Status VFC**
- **Water Detection**
- **Ethernet interface card**

Outdoor Units (4) (Model Ref: DMOUC 32 -EC)

- Vertical or Horizontal air discharge
- **1 x EC owlet low energy / low noise residential fan motors**
- Aluzink or sheet steel casing epoxy powder coated.
- Door interlocked isolator

Energy Saving Benefits

We recommend running all 4 No units in Energy Efficient Mode 80kW load / 4 units = 20kW per unit.

Unit Nett sensible cooling	20.7kW	x 4 units =	82.8kW
Indoor unit fan gain	0.5kW		2.0kW
Compressor power input	2.8kW		11.2kW
Outdoor fan seasonal average	0.1kW		0.4kW

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System Energy Efficient Ratio (EER)

$$\frac{\text{Cooling load}}{\text{Cooling input power}} = \frac{82.8}{2.0 + 11.2 + 0.4} = \frac{82.8}{13.6}$$

EER = 6.09

Data Centre Power Usage Efficiency (PUE)

PUE for 82.8kW room load

$$PUE = \frac{\text{Server load + Cooling input + UPS losses @ 5\%}}{\text{Server load}}$$

$$\frac{82.8kW + 13.6kW + 4.1kW}{82.8kW}$$

PUE = 1.21

Estimated Annual Cooling Running Costs

82.8kW room load

Input power kW x 8760 hrs/annum x £0.10 kW/hr

13.6kW x 8760 hrs/annum x £0.10 kW/hr

= £11,914.00 per annum

5. High Wall air Conditioning for the UPS / Switch Room

Supply, install and commission 2 x Daikin 8Kw high wall air conditioning systems including the outside condensers to cool the UPS battery cabinets

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6. Power Supply

We supply and install the following power installation:

ATS Panel

Supply and install an ATS panel to provide automatic control / manual control of the mains and generator incoming supplies. Suitable shrouding and protection will be provide to allow connection of the new proposed generator cabling whilst the mains supply is live and connected.

The incoming supply to the data centre will be connected to the ATS via a suitable rated Main isolator.

Generator connection will be via direct connection to the 4 pole contactor within the ATS panel.

The output from the ATS will feed the Main Panel Board (MPB 1)

Main Panel Board (MPB 1)

Supply and install a 6 way MPB complete with a Multi-Function Power Meter serving circuits as follows:

- Circuit to UPS A.
- Circuit to UPS B
- Circuit to DB 1
- 4 x circuits to AHU's

Under floor Containment

Cable trays will be fitted to serve cabinet layout and positions of UPS and AHU equipment

4 x AHU Circuits

- Install individual sub main circuits to each AHU. Circuits will be wired in HO7 cabling supported on under floor cable trays

UPS Installation

- Install UPS input and output cabling to 2 x UPS systems
- Install UPS output Sub Mains to UPS DB A & B.
- Mount UPS bypass panel

Essential Circuits to Cabinets

Each cabinet position will be served by 2 radial circuits. The circuits will be derived from UPS DB A and UPS DB B respectively therefore providing redundancy in supply.

- Supply and install 2 x 12 way complete with a Multi-Function Power Meter's TP DB's to serve A & B supplies to cabinet positions.

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- Install 4 x 32 A radial circuits to each cabinet position terminating into BS4343 fixed commando sockets.
- Circuits will be wired using HO7 cabling supported on under floor cable trays.
- Label and identify circuits.

Distribution Board 1

A 6way TPN DB complete with a Multi-Function Power Meter's will be provided supplied from the MPB serving the following circuits

- Data Centre Lighting
- Cleaners sockets
- Security Cameras (6)
- Fire alarm supply
- External fire alarm status unit supply
- Door entry system supply
- Gas extract systems supplies

LED Data Centre Lighting

LED Lighting will be installed to achieve an average 400 - 500 Lux lighting level at floor level throughout the room area. Circuits will be wired with LSF single cables contained in heavy duty white plastic conduits.

Lighting control will be achieved with suitably positioned occupancy sensors with override key switches fitted for maintenance / repair activities.

LED Emergency Lighting

LED Emergency lighting modules will be installed in each of the room cabinet aisles to provide a minimum of 1 Lux lighting level at floor level along all exit routes. The lighting units are complete with an integral self-test function.

Earthing

- All cable trays and extraneous metal work will be bonded back to a main earth bar (MEB) located alongside / below MPB 1.
- Every 6th floor pedestal will be cross bonded and connected back to the MEB
- To ensure compliance with chapter 54 of BS7671 for equipment likely to have earth leakage currents exceeding 10ma in normal use a separate 10mm earth conductor will be installed to each cabinet position via two cabinet earth bars (CEB). Each CEB will be connected to the MEB.

Certification

Testing and inspection in compliance with BS7671 will be conducted and certification issued on completion of the project.

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7. UPS Systems (N+1)

We have allowed for an N + 100kVA UPS Solution. We are proposing a Transformer Free B8000FXS Series 100kVA UPS system, with batteries providing autonomy of 30 minutes at 80kWload per UPS.

The BORRI products will provide you will the following:

- 3 Years UPS Warranty.
- ECO UPS.
- High energy efficiency & scalable IGBT rectifier UPS.
- 3% Input THD with 0.99 power factor. No Harmonic or p.f. correction filters required maximising efficiency.
- Reduced Generator power requirements.
- Reduced point of failure.
- Solid state design UPS.

BORRI B8000FXS UPS Series

- True Online Double Conversion Topology
- 3 YEAR PARTS Warranty
- 0.9PF Output as standard
- Transformer free design
- Input IGBT Rectifier and advanced Power Factor Control
- High Efficiency Online (<96%)
- ECO-MODE Function (Efficiency 98%)
- Excellent Output voltage without De-rating
- Digital Control
- Simplified and Distrusted Parallel System
- High Power Density and Small Footprint
- Predictive Diagnosis for Battery Status
- Comprehensive Option Range

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Low THDi and Advanced Power Factor Control

The BORRI B8000FXS UPS uses a new input IGBT Rectifier and an advanced PFC (Power Factor Control) capable of keeping input current Total Harmonic Distortion (THDi) at a low level (<3%), as well as the input power factor very close to unity (>0.99)

Key benefits are that the UPS is compatible with the upstream source, the mains or any kind of generator. The transfer of power between the load and the source is more efficient. This results in a saving in terms of sources – cables and protective devices.

High Efficiency – Reducing overall cost of ownership

The B8000FXS Series operates at a high efficiency of up to 96% in on-line mode. This reduces utility costs. Moreover higher system efficiency reduces facility air-conditioning costs and increases reliability. Because of the technology used – no additional losses are generated to get low input harmonics or increased input power factor.

Double Conversion Topology

True Online Double conversion topology (VFI – Voltage and Frequency independent). The B8000 is designed to maintain very tight control over the output voltage and will comfortably handle 100% load shifts. Unbalanced non-linear loads or IT Systems with a leading power factor will not require that the unit is upgraded.

Advanced Technology

The B8000 is a flexible and reliable UPS System offering advanced state-of-the-art total digital control. The design ensures that auxiliary power supplies and processors are no longer single points of failure that would compromise high availability of clean power to the load.

The status of the most critical components is constantly monitored allowing for predictive maintenance and avoid unexpected breakdowns.

Parallel System for Redundancy of Capacity Increasing (Scalable)

The Parallel UPS configuration is provided with control for operation of both redundant and capacity increase. The parallel control is fully digital and acts on both active and reactive power on each output phase, allowing for accurate load current sharing among the UPS's. The parallel control is extremely simple and interconnections make installations and on-field upgrading simple.

UPS Technical Overview:

UPS Model	B8033 -100 -30
Country of Manufacture	Italy
UPS Size	100kVA / 90kW
Input	400 VAC 3 Phase + N
Output	400 VAC 3 Phase + N
Frequency	50 Hz
Technology	Online Double Conversion
Configuration	N+1
Rectifier	IGBT (THDi<3%)
Input Power Factor	> 0.99
IP rating	20
Display type	LCD

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Software Interface	RS232 + USB
Efficiency (SOL-MODE)	up to 99%
Efficiency (ONLINE)	< 95%

Mechanical per UPS System

UPS Dimensions	460W x 880D x 1690H
UPS Weight	400KG
Battery Enclosure Dimensions	1690W x 725D x 2000H
Battery Enclosure Weight	2,352KG Laden
Battery Enclosure Colour	RAL7016 (to match UPS)

Battery

Type	VRLA 12 Year Design Life
Battery Type	FLC350 - 90Ah
Battery Strings	1(60 Batteries)
Autonomy	30 minutes at 80kw full load

Project Design Specification

Qty	Description
2	B8033FXS Series 100kVA UPS System Includes 2no Battery Cabinets as per above specification 2no Parallel Kit All Batteries, Links & shrouds
1	100kVA Parallel Wall Mount Bypass Switch
2	SNMP Card for monitoring/shutdown applications
2	8 x Volt Free Contacts
Warranty	Parts & Battery Warranty – **3 Years Included**
Delivery	2 no UPS Systems, Based on ground floor easy access No obstacles. Battery cabinets to be delivered fully populated
Commissioning	By factory trained engineers.

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8. Fire Suppression & VESDA Detection

We are proposing the Novec fire suppression system with Vesda early warning detection in the main data centre. This suppression and detection system will cover the main date centre including the raised access floor void.

We will supply and install a Novec fire suppression system with optical detection within the new UPS room / Switch room. Again this will protect the room and floor void.

In the entrance lobby and build room optical detectors will be provided only. 1 x CO2 fire extinguisher will be provided for manual operation in this area should incidents occur.

Main Data Centre Design

Fire Suppression:
The suppression system will comprise of a NOVEC Extinguishant Gas and comes complete with the necessary, sounders, beacons, bells internal and external of the new data centre plus manual/auto release.

As Novec has an Ozone Depletion Potential of 0 and a Global Warming Potential of 1 equal to that of CO2 and has an Atmospheric Lifespan of just 5 days or less, normal procedure is to release the gas into the atmosphere.

When the gas is discharged it works by reducing the oxygen within a room or enclosure to below 15% (normal air 21% oxygen). Below 15% most combustible materials will not burn (Class A, B and C Fires).

At this level of oxygen life is sustainable and people would not notice any adverse effects. This system has also been approved for use in normally occupied areas.

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On second stage activation, a 30 second count down to gas release will begin. All testing and commissioning of the detection system will be in accordance with standard and regulatory criteria, and specialised manufacturers standard procedures, and to the satisfaction of the Contract. Following a discharge, a gas extract system will be operated to provide 1 air change an hour. This will be operated via a key switch installed next to the main panel.

Secure I.T. recommends that no shut downs occur in the event of a gas release. However the ICL is to advise on preferred protocol to take place in the event of gas release.

System Operation

Manual Mode: 1st stage alarm (bells only)
This alarm will be initiated by zone 1 or 2 or both zones being activated when the system is operating in manual mode. System event is as follows:

- General Fire Output is activated
- Bells are activated
- Panel indicators are activated i.e.: Panel buzzer, Zone LED indicator, and general fire LED indicator.

Automatic Mode: 2nd stage alarm (bells and sounders)

This alarm will be initiated with the 1st zone being activated, the following events will occur when the 2nd zone is activated:

- Gas release indicator is activated
- Sounder / Strobes are activated (Gas discharge is imminent, sounder and visual xenon indication)
- Panel indicators are activated (others will provide Volt free contact for connection.
- 32 seconds from activation the agent will be released.

Manual Operation
Normally the system is switched to automatic mode. However, subject to local regulations, it may be necessary for the system to be switched to manual mode when the area is occupied and this facility is available within our design.

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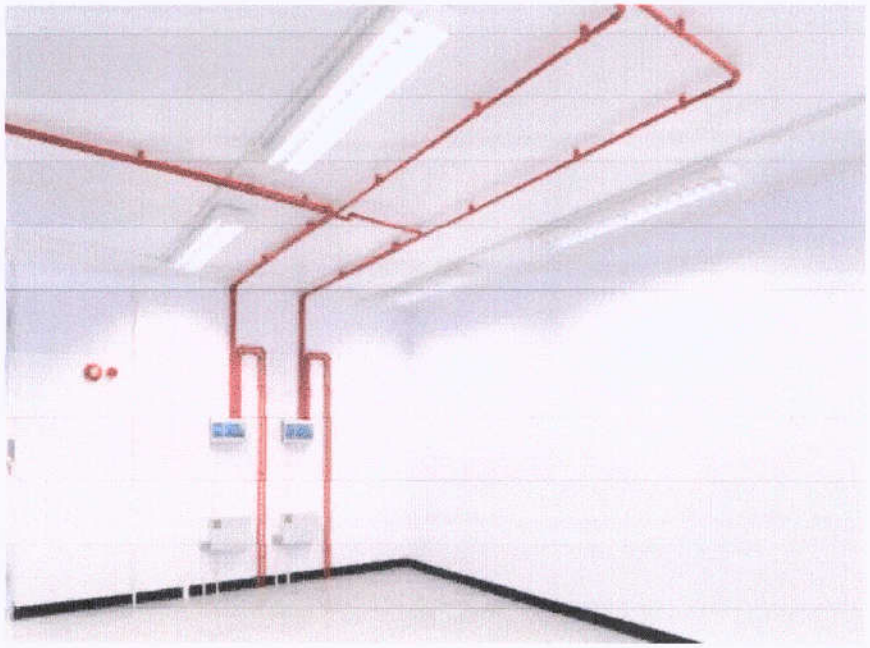
Main Data Centre Early Warning VESDA Detection



A VESDA unit will be installed to provide a very early warning smoke detection solution with continuous air sampling to provide the earliest possible warning of an impending fire hazard. VESDA buys time to investigate an alarm and initiate an appropriate response to prevent injury, property damage or business disruption. And because VESDA has the industry's widest sensitivity range and multi-level warnings, even minute levels of smoke can be detected before a fire has time to escalate

Fire Detection:
The proposed detection system will comprise of point detection complete with sounders and beacons. An interface will be provided for connection to the house alarm, but it remains the responsibility of the client to connect the house alarms to the output relays.

The fire panel will be energized from the relevant SLV but will contain an integral battery to support the panel for 24 hours without the mains present.

All testing and commissioning of the detection system will be in accordance with standard and regulatory criteria, to specialised manufacturers standard procedures, and to the satisfaction of the client.

UPS / Switch Room Fire Suppression & Detection Design

We are proposing a separate fire suppression and detection system within this area. The suppression system will comprise of NOVEC Extinguishant Gas and come complete with the necessary sounders, beacons, bells for this area plus manual/auto release on the fire activation panel. Detection within this area will be via "zoned" optical detectors positioned in the room and in the floor void. The system operation will be exactly as per the main data centre but **without VESDA.**

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Entrance Lobby & Build Room Fire Detection Design

Optical detectors will be installed for these two areas but not suppression as we are confident the area is not a high risk.

9. Gas Extract & Fresh Air System

Gas Extract and Fresh Air Make up for the Main Data Centre and UPS / Switch room

We will supply and install a fire extract and fresh air system for the new Data Centre and UPS / Switchgear Room

We have included:

- Permanent (Trickle) Ventilation Fresh Air System
- **Fire** Extinguishant Extract (Boost) Ventilation.

NORMAL OPERATION - Person/s enter room - PIR detects movement send signal to PUMA Control Panel (PCP), both Unit run in 'Trickle' Vent mode for 30 minutes, each subsequent movement will ensure continuous operation.

FIRE DETECTED - The Fire Detection Control Panel (FDCP) sends a 24V or 240V signal to the Shutdown Relay inside the PUMA Control Panel. After the Gaseous Extinguishant is released, a timer in the FDCP will send a 24V or 240V signal to the Changeover Relay in the PCP, the PUMA Units will then both run at 'Boost' Ventilation mode

Extract of Gas

To extract the gas once discharge has taken place an extract panel is installed and is linked into the extract system located within the room. By pushing the extract button it and a signal to the extract system to open the fire rated vent and release the gas into the atmosphere.

Extract Vent:

During non-operational mode the extract system will be in the closed position to ensure the integrity of the room is not breached. To obtain the **SR3** security bars will be positioned on the internal side of the vents to ensure no access can be gained by personnel.

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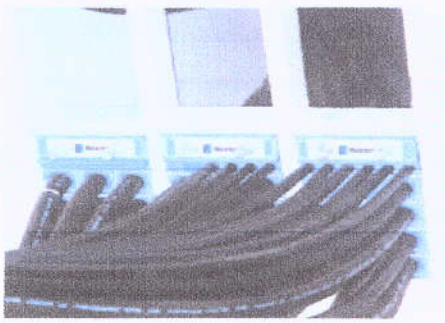
10. Fire Stopping

Service Entry Ducts
On completion of the installation all service entry ducts will be fire stopped to ensure the integrity of the room is not breached. We will install Roxtec cable ducts as required. These cable entry ducts will also be fire intumescent sealed once all services have been installed.



Location of Service Ducts
The majority of the entrance ducts will be via the concrete base. This will be confirmed once a final project meeting has been carried out and all service entry ducts will be outlined on drawings for sign off. All cable ducts will incorporate draw strings and are water resistant as well as providing protection against fire, acrid gases, and smoke;

11. Environmental Monitoring System (EMS)

We will supply and install an EMS system to provide basic alerts. The EMS is the missing link that integrates your existing environmental and power installation into a comprehensive monitoring, alarm and control system.

Flexible, configurable, expandable/
The EMS is modular in design, and easy configurable to your requirements. New modules are regularly introduced in response to Industry needs. You are able to start with the modules you require now, and expand the system later.

Integrates with your existing hardware
The EMS integrates easily into your existing environmental and power installation, or into an `**Existing** Building **Management System**`. Interface modules include:

Air conditioning alarms.
UPS alarm interface.
Universal interface module (customisable for special requirements).

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To complete the environmental monitoring coverage, you are able **to add** other sensor modules as required.

These include:
Temperature sensor (separate `high and critical high` outputs).
Humidity sensor (separate `high and critical high` outputs).
Smoke sensors (Ionization, optical and carbon monoxide).
Water leak sensor.

Versatile Alarms and Communications

Speech dialler module, programmable to call any telephone or tone pager, with up to four recordable messages per module. Alphanumeric Pager module, software programmable SNMP modules, scalable up to 128 ports, software programmable to send SNMP traps to a network management station anywhere on the LAN or WAN. Local audio / visual alarm module. Remote audio/visual Annunciator panel

EMS SPECIFICATION

To monitor:

- Temperature and Humidity
- Water detection
- Air Conditioning
- UPS Systems

12. Deep Clean

On completion of the project we will carry out a deep clean to the satisfaction of the client. This clean includes the following:

- All walls, ceilings and doors
- All raised access floor tiles
- Under floor within the room area
- Clean all raised access floor tiles

13. Project Manager

A dedicated Project Manager is allocated to the client for the duration of the project. The Project Manager is responsible for the entire delivery process and will run the project using a number of documents.

Project Managers are responsible for the following:

- Produce the Project Initiation Document (PID) and Action Log prior to the initial Project kick off meeting
- Program of works
- Project risk management
- Tracking and reporting progress

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- Regular project meetings with the client's nominated project board (duration to be discussed prior to the project commencing)
- Responsible for the day to day running of the project delivery
- Liaison with the clients Project Manager, Facilities and IT personnel.

14. CDMC

We will provide our own in-house CDMC for this project. Our CDMC will forward a pre-construction pack outlining the site specific risks associated to this project along with all Risk & Method Statements for approval. He will regularly attend site to ensure all H&S is adhered to.

15. Testing

Once the Data Centre has been constructed, Secure I.T. Environments will complete both individual component testing and full room environmental testing to ensure correct functioning of the Data Centre environment in both normal and fault conditions.

16. Training

Secure I.T. Environments will provide the client with a 1 day on-site training session on the installed components, completed by qualified engineers. The training will be completed during normal working hours upon completion of the final test plan detailed above. Secure I.T. Environments reserve the right to charge for additional training days should they be required by the client.

17. Documentation

The following documentation will be delivered throughout various stages of the project:

- Full Design Document.
- A1 CAD Drawings.
- Electrical Schematic.
- Method Statements & Risk Assessments (MSRA□s).
- Project Initiation Document.
- Timetable of the project to define the order duration, dependencies of each activity.
- Final O&M documentation.
- As built CAD drawings

18. Preliminaries

Our preliminary costs for the duration of the project to include the following:

- Fork lift
- Task lighting including power leads
- Scaffold towers
- Waste Skips

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Exclusions:

1. No structured cabling has been allowed for.
2. No ground works or trenching has been allowed for.
3. No concrete foundation has been allowed for.
4. No generator has been allowed for.
5. No 19" Server / Communications cabinets has been allowed for.
6. No cold aisle containment has been allowed for.
7. No access ramp or emergency exit steps have been allowed for.
8. No cabinet vertical power distribution units have been allowed for.
9. Water supply is to be provided by the client.
10. Main power incoming supply is to be provided by the client to the new facility.
11. No access control or CCTV has been allowed for.

Infrastructure Items.

Plesae note that we are able to also provide the following:

1. Structured Cabling
2. 19" server / Communications Cabinets
3. Intelligent Cabinet Vertical Power Distribution Units (PDU`s)
4. Fire Suppression & Detection
5. Cabinet Blanking Panels
6. Concrete foundation
7. Trenching for services
8. Generators
9. Access Control / CCTV / Intruder Alarms
10. Planning
11. Bulding Control
12. Architect design

Should you wish to discuss any of the above then please contact me?

I trust this meets with your favourable approval and I look forward to receiving your instructions in due course

In the meantime should you have any further questions then please do not hesitate to contact me

Best regards

Chris Wellfair

Chris Wellfair

Projects Director

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