

I.1: Commissioning of new Data Centre Hall in IT Building-A as per ANSI/TIA-942 Rated-2/Tier-2 Data Centre specifications

Centralized Data Centre Hall (DCH) is an essential and critical infrastructure of every modern day organization, including scientific organizations. For efficient conduction of any IT driven business, Data Centre is a critical component in midsize to large organizations. There are two models of data centre usage, the first one is the colocation services data centre model and the second one is the self-owned & hosted services data centre model. Colocation services data centre model involves high risk of data leakage, hence self-owned and hosted services data centres are preferred by data security conscious organizations. At RRCAT, one such data centre has been commissioned recently in IT Building-A. It conforms to Rated-2/Tier-2 level of ANSI/TIA-942 data centre standard. The data centre has been built by revamping/replacing the existing CPU hall and the associated capacity components.

The meticulous planning and execution of various tasks involved in this process ensured near zero downtime of IT services hosted in the then existing CPU hall. Various tasks were executed through in-sync coordinated working of various sections and external agencies. Main internal sections involved in the task were Civil Section, Electrical Section, Fire and Safety Section and Computer Division. External agencies involved in the process were PAC supplier, UPS supplier, PDU supplier, Racks supplier, Video surveillance and Biometric access control suppliers. This article describes in brief the complete setup and the steps followed to achieve the goal. The data centre has been named as Data Centre Hall IT Building-A and is nick named as DCH-A.

Design Goal & Major Technical Specifications of DCH-A

The design goal of DCH-A was to have a state of the art, self-owned and hosted services model based data centre, commissioned in already existing space in IT Building-A in RRCAT, capable of serving IT requirements of the centre for a period of at least next 5-7 years.

It has been designed using redundant capacity components, conforming to the ANSI/TIA-942 Rated-2/Tier-2 standards of data centre design. The data centre can accommodate 200 kVA of server load, distributed in 32 number of racks, with each rack of 42U size, capable of bearing 1200 Kgs of physical server loads. Each rack has also been equipped with metered Power Distribution Units (PDUs) for individual rack-wise load capacity monitoring and planning.

The cooling of data centre has been achieved using five

numbers of 15 TR Precision Air Conditioners (PACs), delivering cool air @110 Cubic Feet per Minute (CFM) per kW and operating in N+1 redundant mode. Two numbers of cold aisle containments have been created to house 16 numbers of racks per containment with cooling temperature of 20 ± 2 degrees centigrade maintained inside it. The input power supply to the PAC setup is provided using auto changeover setup connecting mains and the diesel generator power sources.

The uninterrupted power supply to the server racks have been achieved using three numbers of 120 kVA UPS systems, working in N+1 redundant mode, with each UPS having a separate battery bank of 10 minutes backup time at full load. The input power supply to the UPS setup is provided using the auto changeover setup connecting mains and the diesel generator power sources.

Very Early Smoke Detection Apparatus (VESDA) and Novec 1230 (FK-5-1-12 agent) gas based fire suppression systems have also been integrated in the data centre. Video surveillance and biometric access control setup has also been integrated in DCH-A for monitored access control of the servers hosted inside the data centre.

Component wise Footprint Plan and Room Layout

As per the design goal, DCH-A was to be built on the floor space used by the existing data centre components. There are two separate enclosed sections/rooms which have been used for housing different components of the DCH-A. The Electrical, UPS, Battery and Power related components have been housed in the Electrical Equipment Room. Figure I.1.1, is a layout of the Electrical Equipment Room depicting the footprint details of the UPS and battery components. It also depicts the cooling arrangement of the Electrical Equipment Room, using nine numbers of industrial grade exhaust fans and four numbers of industrial grade wall mounted fans, operating alternately using timer controlled circuit. Layout of the trenches in the Electrical Equipment Room, used for concealing various interconnections between UPS, battery and electrical panels, have also been indicated using thick red coloured thick lines.

Figure I.1.2, depicts the component wise footprint of the various components in the Containment Room of data centre hall. As depicted in the figure, there are two numbers of cold aisle containments, each hosting sixteen numbers of 42U size racks. The placement of the five numbers of PAC indoor units, PAC electrical panel, Fire suppression cylinders is shown in the figure. All dimensions in the figure are in millimeters. The concrete hard foundation block is used for housing the outdoor units of the PAC systems.

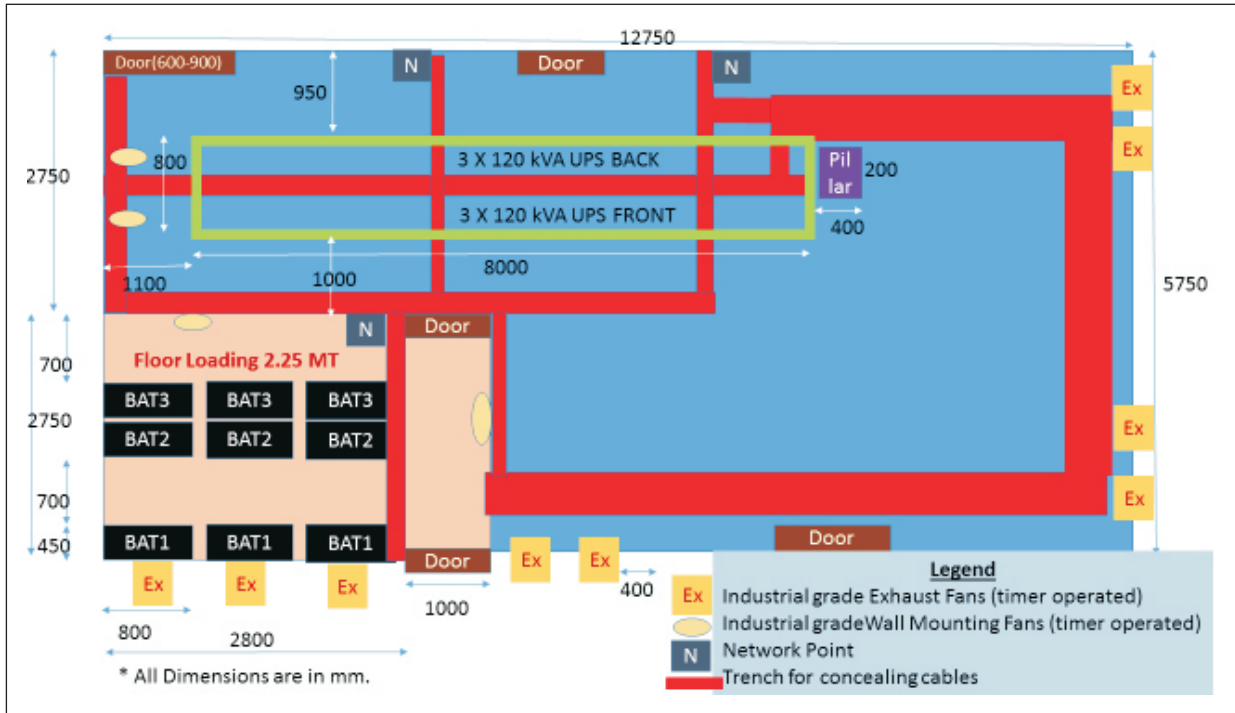


Figure I.1.1: Component wise footprint plan with dimensions in the Electrical Equipment Room.

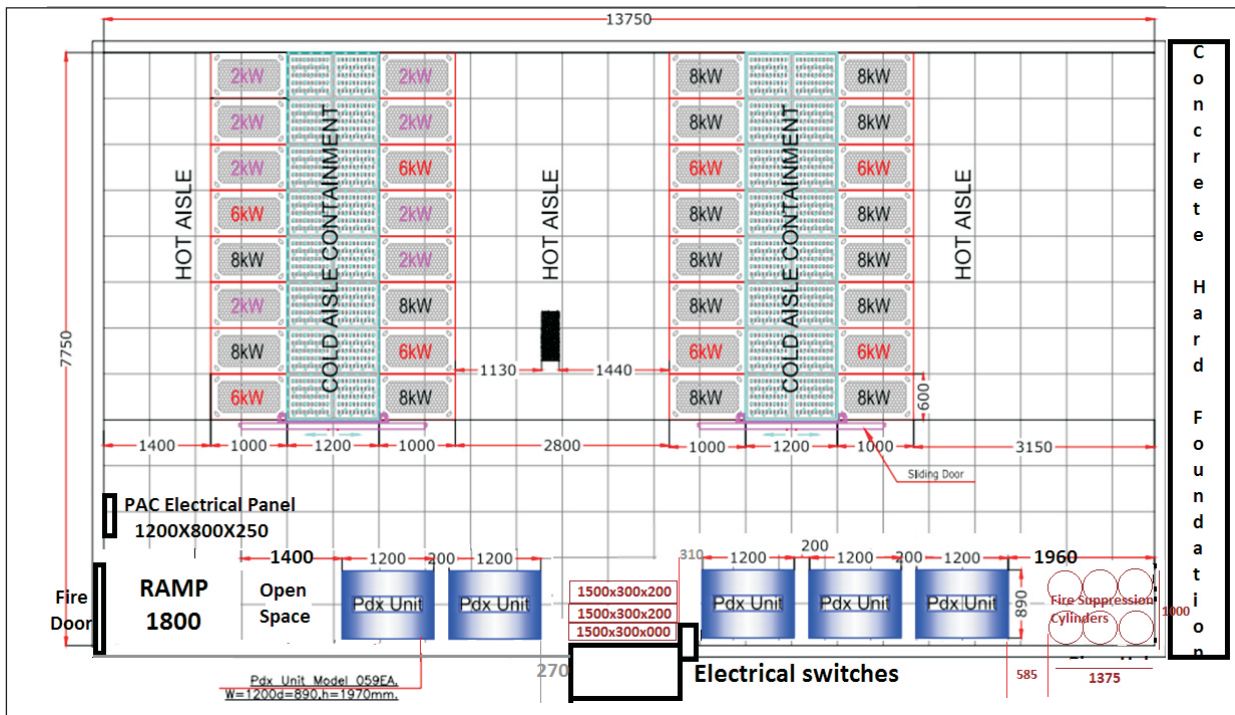


Figure I.1.2: Component wise footprint plan and layout with dimensions in the Containment Room.

The Containment Room has a false floor of 600 mm depth and a false ceiling of 350 mm depth. Electric Bus Trunk system has been commissioned inside the room for distribution of power to the server racks.

Results:

The actual deployment of various components in Data Centre Hall in IT Building-A are shown in Pictures I.1.3 and I.1.4.



Picture I.1.3: View of Data Centre Hall – A.



Picture I.1.4: View of UPS and Battery Setup for DCH-A.

Acknowledgements:

We sincerely acknowledge the efforts of our colleagues especially from Civil Section, Electrical Section and Fire & Safety Section, who have provided vital inputs in the design phase of the project and worked with us hand in hand to complete the commissioning of DCH-A.

Conclusion:

A state of the art data centre conforming to ANSI/TIA-942 Rated-2/Tier-2 standards of data centre design has been commissioned at RRCAT. It is capable of accommodating servers and equipment with total input electrical loads up to 200kVA. Support of all capacity components have been ensured to be available for next 10 years by the respective

OEMs. Critical servers hosted in DCH-A will work in tandem with their counterparts hosted in DCH-B, thereby ensuring data centre level redundancy for the critical services.

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I.2: Roof Top Solar PV systems for common area Lighting

In continuation of the renewable energy initiatives, new solar photovoltaic generating systems have been commissioned on the roof top of Diamond Jubilee Guest House and multi storey building named 'Vindhya Tower', in off-grid configuration. Solar lighting systems have two basic advantages, firstly they contribute in conservation of fossil fuel based energy and secondly they also act as emergency lighting systems in case of power failures.



Picture I.2.1: DJ Guest House Solar PV modules



Picture I.2.2: Vindhya Tower Solar PV modules