



# DATACENTER DESIGN CONSIDERATIONS

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## Overview

There are many factors to be considered when capacity planning a datacenter. The upfront design effort is the most critical phase, given the potential complexities of expansion to existing construction. The following items represent guidelines to support an average datacenter of three (3) 42U rack enclosures with room for one (1) future rack expansion. Computer Works presents this information as a generalized guide. Always consult subcontractors with subject matter expertise for final design and local code requirements.

## Structural

- Dimensions of Rack Equipment (3) 42U Enclosures + (1) Future
  - 2.5' W x 3.5' L x 6.5' H x 4 = 10' W x 3.5' L x 6.5' H
- Recommended Minimum Room Dimension
  - 20' W x 15' L x 8' H (10' high ceilings are ideal for extra hot air capacity before air handler return ducting)
- Physical security with entry mechanism.
  - I.E. Magnetic Key Card, Biometric, Key Switch, Electric Strike, Combination Block, Mortise Lock.
- Entry by office space or 'man-trap' entrance with air exchange to avoid shop air entry.
- Raised forced air flooring, or anti-static moisture barrier epoxy sealed concrete with moisture barrier properties.
- Building code may dictate fire board wall construction and/or fire door to office space.

## Fire Suppression

- Electrical burn (smolder) smoke detection
- Waterless Chemical/Gas Agent: HALON, HALOTRON, Aero-K Aerosol, CO2, Inergen, FE-227, or FM-200.
- Building code may dictate requirements by room dimension and contents.

## HVAC

- Ideal ambient air is 68° F with a relative humidity level of 45% maintained 24x7.
- Formula for calculating BTUs
  - A standard PowerEdge server configuration with redundant power supplies can dissipate between 800 and 1,300 BTU per hour. Formula = Max Watts x 3.413
- Formula for calculating cooling capacity
  - 1 watt requires .00028 tons of cooling.
  - Each server pulls 2A of power at 110V.
  - Each server uses 240 watts at rest (watts=volts x amps).
  - Each server needs .0672 tons of cooling at rest
  - Other equipment includes: Switches, Firewall, Router, PBX, APCs, KVM, and LCD Displays.
- At 80% efficiency, you should start with a minimum 5-Ton unit by Liebert, for example.
- Do not underestimate cooling capacity as it is difficult to scale up. Equipment performance and lifespan are directly impacted. Expect ~45% of your ongoing datacenter cost to be electrical/cooling expense.
- Dehumidifier water should automatically drain by mechanical or gravity means at safe distance if not evaporated by cooling unit.
- Warm exhaust air ducting should not radiate heat back to structure by proximity.
- Rack cabinets are most heat-dissipation efficient when closed with cold through the front and heat capture from high behind.
- Air filtration in manufacturing environments is advisable due to metallic or other air particulates.

## Electrical

- Separate 110v 20 or 30 amp circuit per battery backup unit for breaker isolation.
- Some battery backup units require special NEMA connectors at the wall outlet like a L5-30P, for example.
- Building code may dictate Emergency Power Off breaker requirement inside and/or outside the datacenter. (EPO)
- Fluorescent lighting must allow for network cable path without interference by proximity.