

NetShelter CX Performance Guide

The Netshelter CX is a soundproofed 'Server Room in a Box' which allows for IT deployment wherever and whenever it is needed, saving space, cost and deployment time. Here is one example of how:



Model AR4038A & AR4038IA

- > Physical capacity: **38 Rack spaces**
- > Integrated APC PDU: **11 outlets NAM**
12 outlets EMEA
- > Max thermal load recommended: **3.6kW**
- > Noise reduction: **18.5dB**
- > Power consumption: **101 watts**
- > Weight: **200kg / 439 lbs**
- > Equipment weight max: **250kgs / 550 lbs**
- > Dimensions HxWxD: **1950x750x1130mm**
77 x 30 x 44 in



Model AR4024A & AR4024IA

- > Physical capacity: **24 Rack spaces**
- > Integrated APC PDU: **12 outlets NAM**
13 outlets EMEA
- > Max thermal load recommended: **2.4kW**
- > Noise reduction: **18.5dB**
- > Power consumption: **68 watts**
- > Weight: **170kg / 373 lbs**
- > Equipment weight max: **280kgs / 615 lbs**
- > Dimensions HxWxD: **1285x750x1130mm**
50.6 x 30 x 44 in



Model AR4018A & AR4018IA

- > Physical capacity: **18 Rack spaces**
- > Integrated APC PDU: **13 outlets NAM**
14 outlets EMEA
- > Max thermal load recommended: **1.2kW**
- > Noise reduction: **18.5dB**
- > Power consumption: **39 watts**
- > Weight: **138kg / 304 lbs**
- > Equipment weight max: **310kgs / 680 lbs**
- > Dimensions HxWxD: **1015x750x1130mm**
40.4 x 30 x 44 in

Standard Features

Floor space requirements:

Enclosures are designed to be placed with their back directly against a wall. Clearance of 200mm / 8" on both sides of the cabinet is essential for normal operation.

Ventilation system:

Each ultra-low-noise exhaust fan module has a 1.2 kW maximum recommended total thermal load (or 4,100 BTU / hr). The 38U CX has 3 of these. The 24U Cabinet has 2 and the 18U Cabinet has 1.

Noise reduction:

18.5 dB broadband noise reduction, measured 1.0 m / 39" in front of the enclosure (*HP and Dell servers were used as noise source in noise reduction measurements*)

Mobility:

4 x heavy duty castor-type wheels
Front wheels have 360° rotation for manoeuvrability and rear wheels have fixed front-to-back motion for stability

Rear and side access:

Hinging rear side panels, left and right, for equipment installation and maintenance access
Hinging & Detachable rear fan modules gives completely open rear rack access

Cable management:

75 mm / 3" width full-height vertical 0U accessory channels located on each side at the front and rear of the rack

Grounding:

All equipment installed within a NetShelter CX should have conventional grounding via power cables. Unlike conventional metal-case cabinets, the CX has no requirement for strapping or pipe earthing etc. The enclosure shell is constructed entirely from non-conductive materials and the rack is completely isolated from outside contact.

Locking:

Front doors & side panels: key operated lock.
Fan Units: Hidden-bolt to main structure.

Warranty:

2 year warranty



NetShelter CX Technical Specifications

Noise reduction performance

The NetShelter CX enclosure provides 18.5 decibel (dBA) broadband noise reduction representing the elimination of 98.5% of server noise.

Note: This measurement was performed 1 m (39 in) from the front of the enclosure.

Noise reduction performance measurement

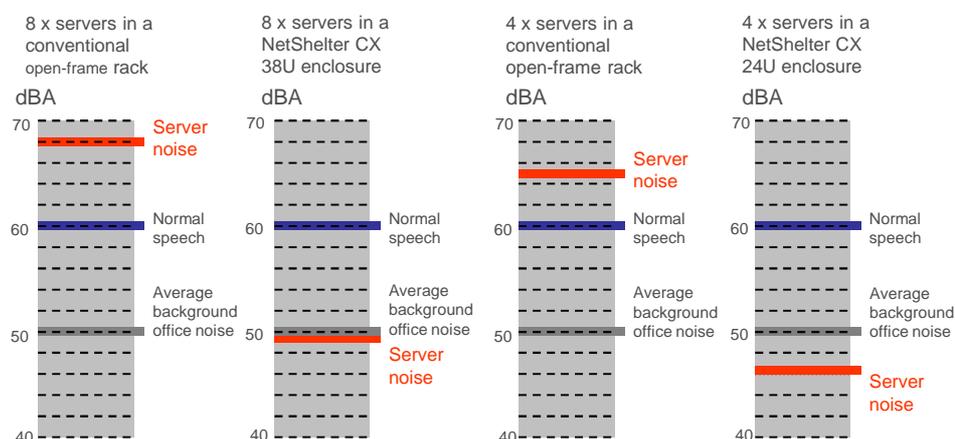
The following guidelines are provided for understanding the measurement performed to provide the noise reduction performance specification.

These are some widely-accepted examples of SPL ratings that are relevant when installing servers in the workplace:

- 50 dBA background noise in an average office, without speech
- 55 dBA background noise in a busy office, without speech
- 60 dBA normal conversational speech
- 45 to 50 dBA Typical noise from fully integrated or cassette-type building air conditioning
- 55 dBA + typical noise from portable air conditioners
- 62 dBA typical noise from 2 x low form factor servers with average CPU loads
- 65 dBA typical noise from 4 x low form factor servers with average CPU loads
- 68 dBA typical noise from 8 x low form factor servers with average CPU loads

Note: Every doubling of the number of servers leads to a 3 dBA increase in the total noise level.

In order for an installation to become unobtrusive in an office environment, the noise from the servers and other hardware in the installation must be reduced to the level of general office background noise. At such reduced levels, the human brain perceives the noise from the servers as part of the overall background noise, and it will go unnoticed on a day-to-day basis. The following tables provide a guide to how this is achieved by the use of the NetShelter CX Enclosure



NetShelter CX Technical Specifications

Thermal performance

To understand how effective the NetShelter CX thermal management system is, please consider the following example of a 18U NetShelter CX enclosure's impact on server CPU temperatures, under normal office environmental conditions, compared to operation of those same servers in open space.

Test conditions:

Equipment used:

- NetShelter CX 18U:, maximum recommended thermal load 1.2 kW
- Server 1: HP Proliant DL380 G4 2U rack-mount server with 2 x 3.2 GHz Intel Xeon processors
- Server 2: HP Proliant DL380 G4 2U rack-mount server with 2 x 3.2 GHz Intel Xeon processors
- Server 3: HP Proliant ML370 G4 5U rack-converted server with 2 x 3.2 Intel Xeon GHz processors
- Incidental hardware also present in NetShelter CX during example test:
 - APC Smart-UPS 3000 VA 3U rack-mount UPS
 - 3 x Netgear network switches
 - 2 x 1U temperature monitoring devices

Test and measurement method

CPU temperature measurements were taken using HP Systems Insight Manager software.

Continuous CPU loads were generated using BurnInTest software by Passmark.

Room ambient temperature measurements were taken by recording the average reading of two digital thermometers.

Room ambient air temperature

The test room air temperature was maintained at a constant 24°C / 75°F (+/-0.5°C) throughout the test period (equivalent to a moderately warm office).

Procedure used in example tests:

1. In the first instance the entire outer shell of the enclosure was removed, and the CPU temperatures were recorded at "idle" (running but not processing client tasks) in free air space. Removing the enclosure's casing created thermal conditions identical to those in a conventional open-frame rack, or with servers not rack-mounted but resting on surfaces.

NetShelter CX Technical Specifications

Thermal performance

2. Identical and continuous processing loads, generated by the test software, were applied to all six CPUs simultaneously, such that utilization in all CPUs was increased in steps from "idle" to 20%, 40%, 60%, 80% and 100%. After each step change in CPU loading, CPU temperatures were allowed to stabilize for one hour, and then the operating temperature of each of the six CPUs was measured/recorded using the server manufacturer's own software.

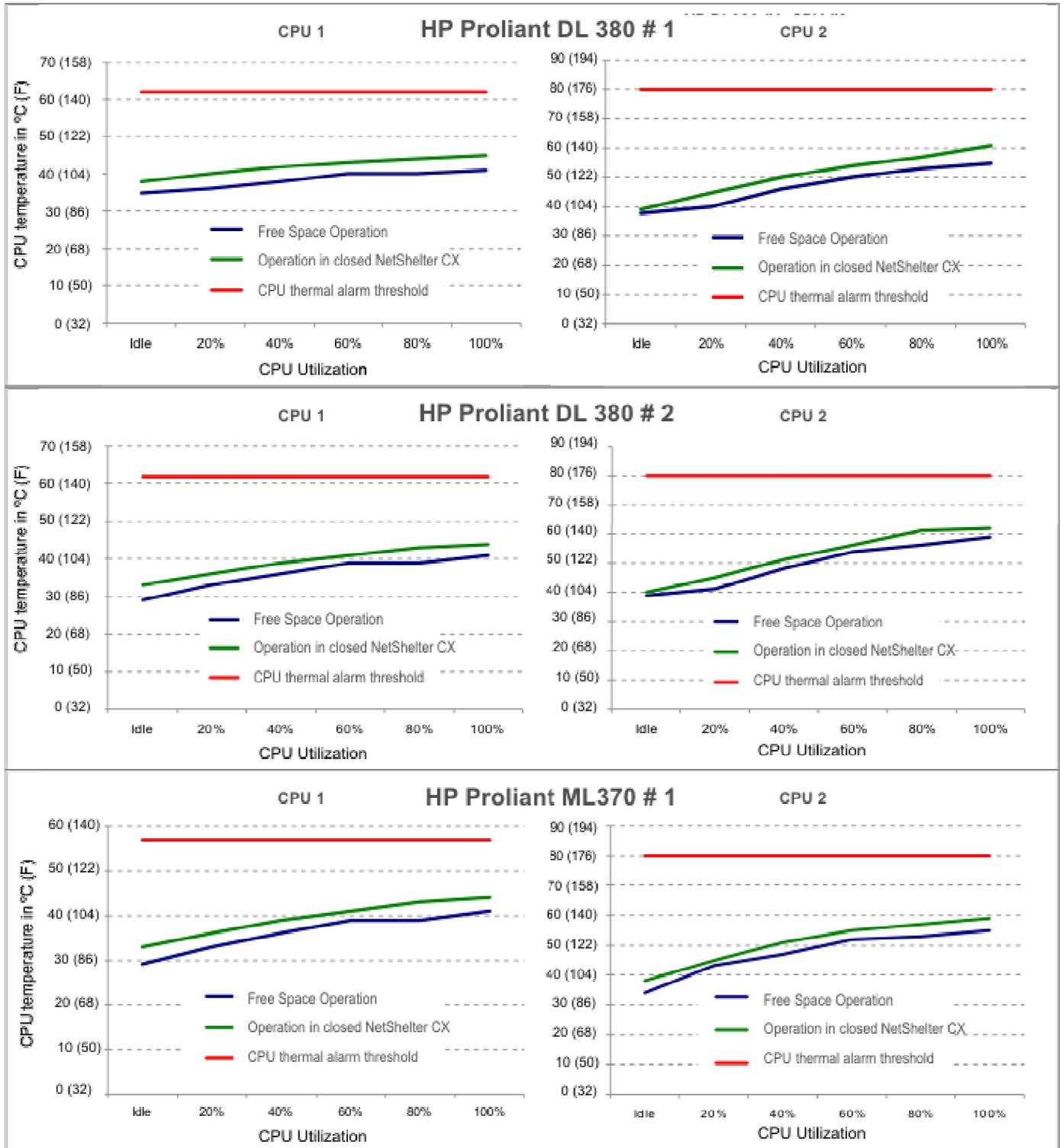
3. The outer shell of the enclosure was then fully reinstated, and the above test procedure was replicated.

The following results were recorded:

- The average increase in CPU temperature attributable to the enclosure, versus free space operation, was +3.2°Celsius
- The electrical consumption of the combined systems, with all CPUs at 100% utilization continuously, was 1.076kW.

NetShelter CX Technical Specifications

Thermal performance test data



NetShelter CX Technical Specifications

Airflow performance

The overall maximum volumetric flowrate of the NetShelter CX enclosure is within the range of 330-350 SCFM

Equipment used:

Test 1:

- NetShelter CX 38U:
- 6000 CFM Test station with pressure tap hoses, baffle with tuned nozzle, and exit air fan with adjustable damper

Test 2:

- NetShelter CX 38U: (right side only)
- 6000 CFM test station with pressure tap hoses, baffle with tuned nozzle, and exit air fan with adjustable damper

Test 3:

- NetShelter CX: Single Fan Module (contains three fans)
- 1000 CFM test station with makeup fan and adjustable damper

Test procedure

The NetShelter CX was first connected to the test station with ducting to minimize nonstandard flow turbulence as well as direct air flow through the test station without excessive leakage to ambient. Values of barometric pressure, ambient temperature, and relative humidity were recorded. Manometers for static pressure and differential pressure (across the nozzle) were then leveled, calibrated, and attached to the pressure taps in the test station ductwork. The ventilation fans in the cabinet and the makeup air and/or exhaust air were then turned on and the damper adjusted until a static pressure of 0.00 in H²O was achieved. Data acquisition followed with each following data point being recorded with the damper actuated slightly more towards the closed position.

Conclusion

The maximum volumetric flow rate of the entire cabinet in optimum conditions is approximately 333 SCFM. The volumetric flow rates of half of the cabinet and on one fan module can be extrapolated to approximate maximum flow rate of the entire cabinet to be approximately 346 SCFM and 345 SCFM respectively. Therefore, the overall maximum flowrate of the cabinet is within the range of 330-350 SCFM.

Model	kW rating	SCFM
18U	1.2	110-116
24U	2.4	220-232
38U	3.6	330-350