

Open Rack

Mechanical Specification V1.8

Steve Mills stevem@fb.com

Define all of Facebook Mechanical requirements for Open Rack Suppliers

Open Rack

Contents

Open Rack	2
1 Introduction	3
1.1 Goal	3
1.2 Confidentiality	3
1.3 Reference Documents	3
2 Rack	3
2.1 Geometry	3
2.2 Structure	4
2.3 Movement	5
2.4 Expected Life	6
2.5 IT “L” support brackets	6
2.6 Cables	6
2.7 Color	7
2.8 Electrical	7
2.9 Regulatory	7
3 Revision History	8

1 Introduction

1.1 Goal

This document will provide the detailed product specification that a rack supplier can use to develop the Open Rack.

1.2 Confidentiality

This rights and confidentiality of this document will be controlled by Open Compute Project.

1.3 Reference Documents

06-00050 Facebook Mechanical drawing of the rack

07-00379 Mechanical Drawing of the Facebook Fusion Lug Cable

2 Rack

2.1 Geometry

Height: 2100 mm max

Width: 600mm nominal

Depth: 1067mm nominal

OpenU Height: 48mm

Tolerances for the rack are defined by Facebook drawing 06-00050.

Rack shall provide a method of retaining the Bloodhound management appliance. Retention will not require tools to assemble or remove the unit.

The Bloodhound appliance shall be located on the top of the rack. Access for installation and removal will be from the front surface of the rack.

AC and DC PDUs shall be installed and removed from the rack without tools.

All of the busbar subassemblies including the busbars, busbar cages and insulating supports for the busbars inside the cage should be considered a single field replaceable unit (FRU). Tools may be used to remove the busbar subassemblies from the rack.

2.2 Structure

Support 950 kg max of equipment. This includes any power shelves, switches, PDUs and excludes the rack itself.

Designed for Seismic Zone 2 per GR-63 @ max weight. Racks may be ganged together to pass this requirement.

Rack shall provide an optional method to gang racks together that is accessible from the front and rear surfaces of the rack. Tools may be used for assembly and removal of ganging hardware.

Rack should provide leveling feet to support the rack during seismic zone 4 per GR-63 when the rack is deployed at maximum weight.

Rack shall pass Seismic Zone 4 per GR63 at max weight with the addition of an optional bracing as approved by Facebook and ganging the racks together.

Rack should have 4 x 19.05mm inch diameter holes to bolt the rack to the floor per the figure1. These locations should be capable of withstanding GR-63 zone 4 with the rack at maximum weight.

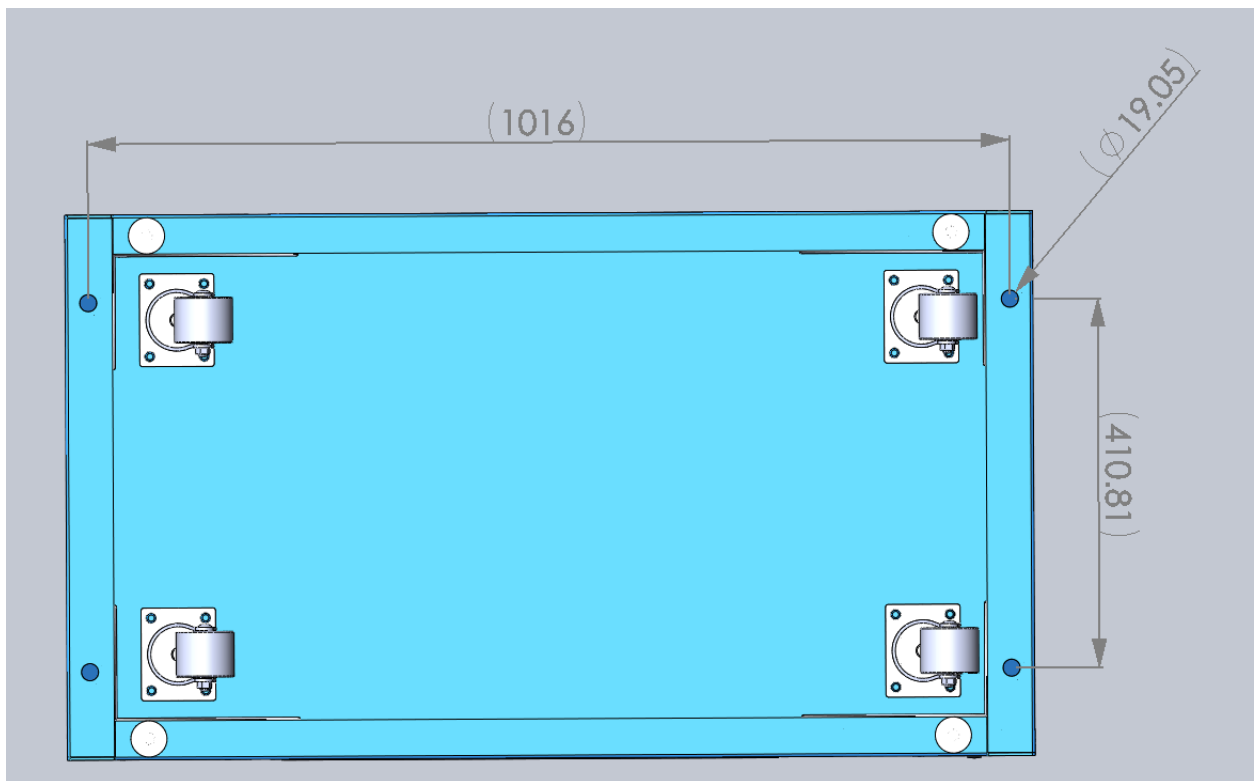


Figure 1. Clearance Holes for Seismic Support

Rack shall pass transport test ASTM D4169-09, Assurance Level II, Mechanized handling, truck, no stacking, distribution cycle 2. This will be fully-loaded with the load evenly distributed.

The rear surface of the rack shall provide three horizontal M12 nuts for optional seismic support per Figure 2. The nuts shall be capable of retaining the rack during a GR-63 zone 4 test at max weight.

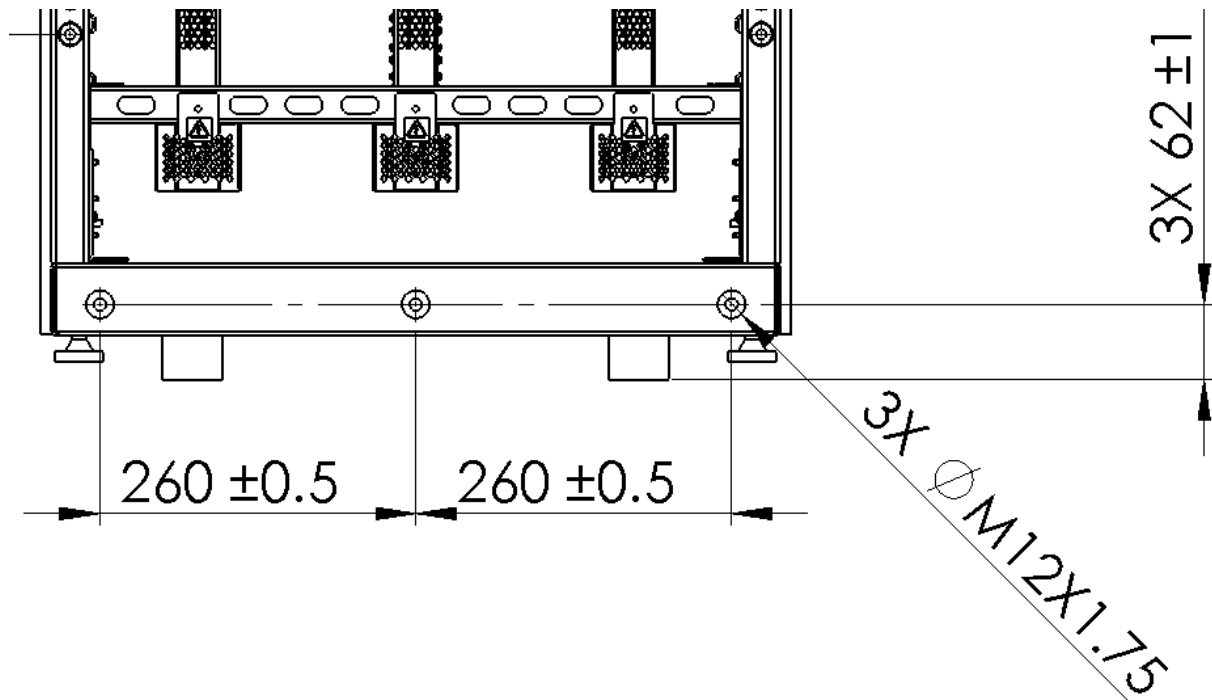


Figure 2. Nuts for horizontal seismic screws

2.3 Movement

Each caster must be capable of rolling over a 6mm vertical step independently or as a pair at a speed of 0.2 m/s while fully loaded.

Rack must be capable of transitioning a 1" wide gap in the floor while fully loaded.

All of the casters will swivel.

Rack must be capable of transitioning a 10 degree ramp while fully loaded.

If the four vertical holes for seismic support are used from Figure 1 for transport, the screws used to attach the rack to the shipping pallet must be removable using a 25 degree 12MM ball point hex power bit such as McMaster [5492A89](#). The screws must be tall enough that the head protrudes out of the rack so it can be grabbed by the user to remove. Screw must be short

enough that it does not require fingers or additional tools to remove the screw due to obstructions. No components from the rack to access the shipping screws.

If the three holes for horizontal seismic screws (see Figure 2) on the rear wall of the rack are used for transport, then M12 cap screws should be used in all positions.

2.4 Expected Life

Rack should be designed for an expected life of 10 years under the following environmental conditions:

Temperature: 65F to 85F

Humidity: 85%max, 42F dew point minimum

All rack ground points should pass rust grade 6 per ASTM D610-01 after 48 hours of salt spray per ASTM B117-07.

2.5 IT “L” support brackets

Support 70kg per set under dynamic load as defined in [section 2.2](#)

Rack must support 50kg static load applied to the leading 25mm of the support brackets.

The user must be able to install and remove the “L” brackets from the rack without tools.

The “L” brackets must be configurable inside of the rack so that IT gear of differing heights can be supported. The “L” brackets must be adjustable every ½ OpenU and support IT gear as small as 1.5xOpenU tall. Installation and removal of the “L” brackets must be accomplished within a 1.5x OpenU height.

2.6 Cables

Cables should be retained out of the path of the equipment bay so equipment will not damage cables during installation and removal.

Cables can be added and removed from the cable retention without tools.

No sharp edges around cable routing areas to prevent damage.

Hole where the power WIP exits the rack should have a hemmed edge or grommet to protect the power WIP.

Path should be provided for 20x8mm diameter data cables in the front to exit from the side of the rack for cross-cabling between racks on either side. This path should not have any sharp edges that would damage the cables.

Path should be provided for data 4x RJ45 cables to pass from the top of the rack in the front to the front of the switches. This path should not have any sharp edges that would damage the cables.

AC and DC power cords from the PDUs to the power shelves shall be attached to the lances on the power shelf support brackets using tie-wraps.

All unconnected cable ends shall be constrained in a protected area within the rack during shipment. For example, the DC power cords for the switches will be bound in a protected location inside the rack so the cords are not damaged during transport.

2.7 Color

Rack will be painted with a black powder coat except where needed to provide a ground path per [2.8](#).

2.8 Electrical

Provide 2XM5 nut features as an electrical ground to mate with McMaster-Carr [6926K211](#) lug or equivalent. Provide 1xM5 nut features for DC PDU ground. Ground path should be plated or protected so that the conductivity of the ground path is protected from rust and corrosion over the life of the product.

Rack shall provide an electrically conductive path from the IT equipment in the rack to the rack grounding lug on the top of the rack. This path cannot pass through any surfaces that are not protected from rust and corrosion such as un-plated surfaces.

Rack shall provide an exit hole in the top of the rack directly above the PDU to allow the WIP connector IEC60309-2, 5 pin, Type 4 to pass while connected to the PDU.

Busbars shall provide an electrical interface approved by Facebook to the fusion lug cable (FB Part Number 07-00379). All hardware used to create an electrical connection to the busbar, such as screws, washers, studs and nuts, shall be made of stainless steel.

Busbars will provide an electrical interface to the DC busbar clip that meets Facebook's voltage drop requirements after 100 cycles of the DC busbar clip.

2.9 Regulatory

Comply with UL 60950-1 / EN60950-1:2006 / IEC60950-1 and RoHS directive 2002/95/EC

3 Revision History

Author	Revision		Date
Steve Mills	1.0	Initial Release	30 APR 12
Steve Mills	1.1	Update	10 MAY 12
Steve Mills	1.2	Add bloodhound to 2.1 & 2.6; bolt holes to 2.2; add cable retention to 2.6; Changed Anti-tip call-out 2.3	17 May 12
Steve Mills	1.3	Change rack width to 538-0/+2mm 2.1; Delete thermal divider 2.1; add tool-less install and removal of PDUs 2.1; busbar sub-assemblies are a FRU 2.1; CHG anchor bolt to metric in 2.2; non-swivel casters in the back 2.3; add pallet screw detail 2.3; delete air containment holes; delete optional side panels; max weight 850 kg of gear; added cable ties 2.6;2.9 add UL specs	20 JUL 12
Steve Mills	1.4	2.5 add detail for "L" brackets	9AUG12
Steve Mills	1.5	1.2 change to OCP 2.3 add 1" gap and transport screw detail 2.2 Add hole definition for 2.4 add temperature 2.8 added detail to ground path	27SEP12
Steve Mills	1.6	2.4 ADD ground path per ASTM specification	19OCT12
Steve Mills	1.7	2.3 Change casters to all rotating	15NOV12
Steve Mills	1.8	2.2 Add ASTM transport details 2.3 All movement tests while fully loaded 2.4 Add Corrosion requirement 2.8 Add SS hardware;	16MAR13