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Part 6 – Installation & Migration Planning

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Important information about today's workshop

- The ITSO z hardware team created 7 IBM z13 presentations to be delivered today
  - Part 1 – IBM z13 and zBX Model 004 – Positioning / introduction
  - Part 2 – z13 CPC Details Capacity and Performance
  - Part 3 – z13 I/O Subsystem
  - Part 4 – Native PCIe Adpters – zEDC and RoCE (what's new with z13)
  - Part 5 – HMC, CoD and RAS and zAware
  - **Part 6 – Installation Planning**
  - Part 7 – Software Support

- The main references for the presentations today are:.
  - IBM z13 Technical Guide – Redbook – SG24-8251
  - IBM z13 Technical Introduction – Redbook - SG24-8250

- **Part of the available material may not be presented..** ☹
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- **Please ask questions, make comments and share your own experiences at any time**

- **Thank You !**

z13
Physical Planning

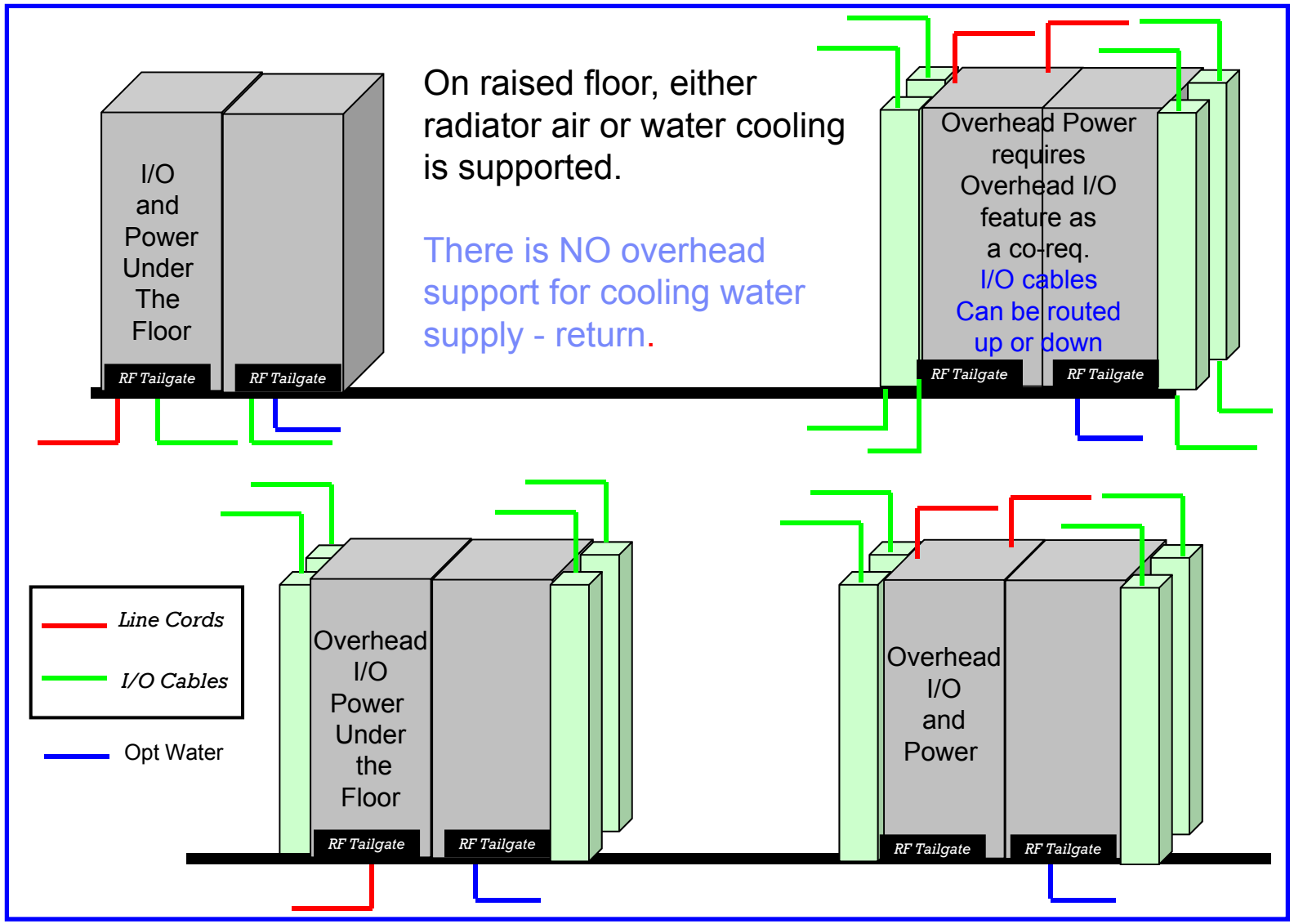
Always Refer to the Installation Manual for Physical Planning for details:

M/T 2964 – GC28-6938
M/T 2458 – GC27-2630 (Model 004)

z13 Physical Planning

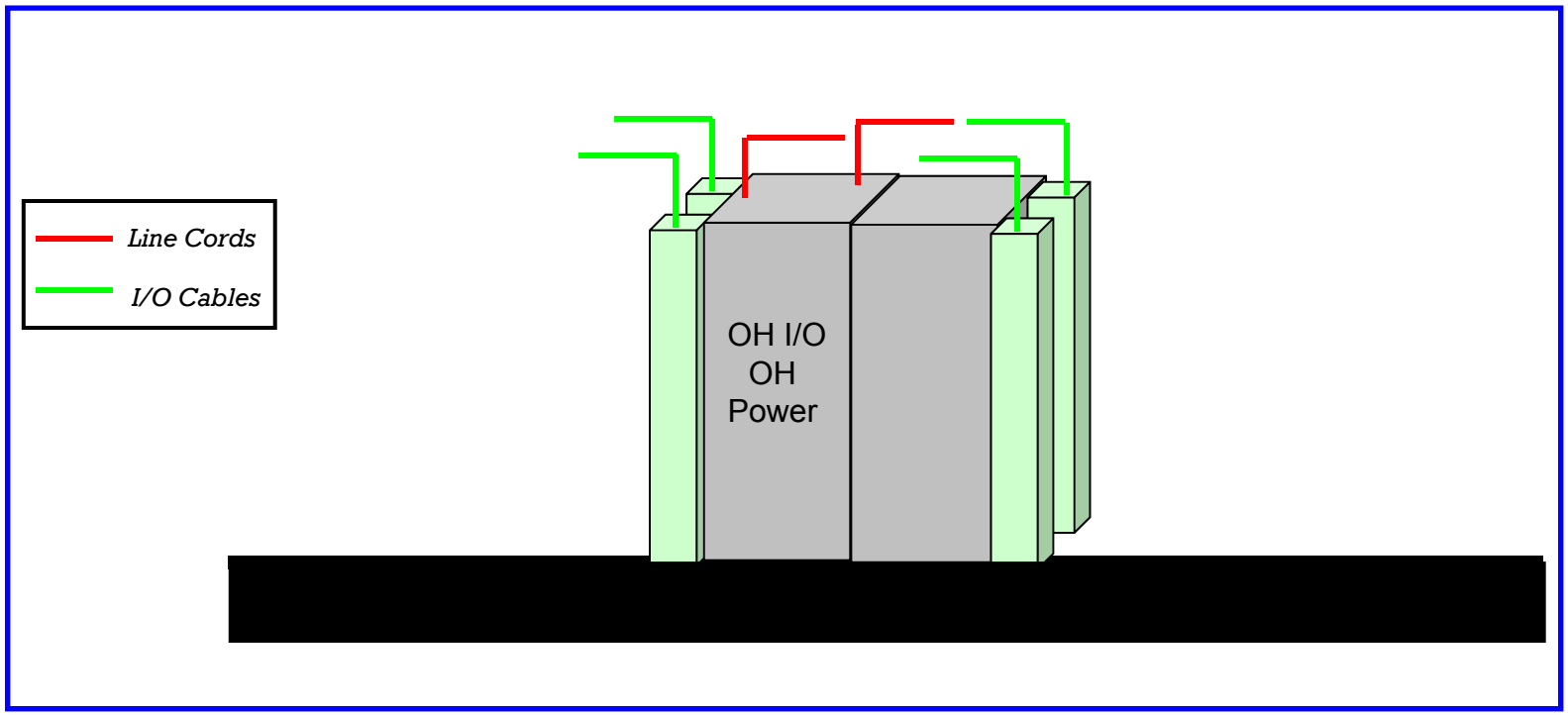
- Extend / Maintain zEC12 Datacenter Characteristics
  - 2 frame base system (CPC, I/O, service system and PP&C)
  - No significant increase in weight
  - Maintain floor tile cutouts for raised floor system (same as z10 EC, z196, and zEC12)
- Better control of energy usage and improved efficiency in your data center
  - Support for ASHRAE Class A2 datacenter (Up to 35º C and 80% relative humidity)
  - Upgraded cooling systems compared to zEC12 with N+2 pumps and blowers
  - Same number of power cords (2 or 4) as “equivalent” zEC12 configuration
  - Maintain 27.5 kW box max input power (same as z10 EC, z196, and zEC12)
  - Maintain DC input power capability, overhead I/O cabling option, add overhead power option

z13 Installation - Raised Floor options



Top Exit Power option: When selected for a raised floor the Top Exit I/O feature is a coreq. Also the diagram for this configuration should depict the I/O routing up thru the I/O chimneys and also routing thru the bottom of the frame using the raised floor tailgates.

z13 Installation – Non-Raised Floor option



If z13 is NOT installed on a raised floor, overhead I/O, overhead power, and radiator (air) cooling options are required.

Water cooling is NOT supported. NO cables may exit at floor level.

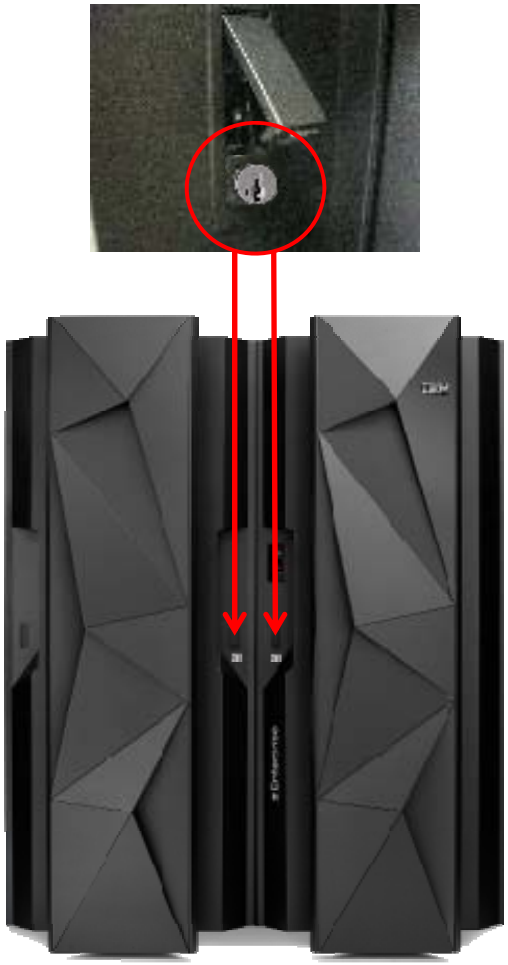
z13 Acoustic Cover Design – Planning Considerations

- z13 Cover Design Overview / Planning Considerations
  - z13 system implemented new rear door design
  - Rear door designed to allow air flow up or down
  - Ability to customize z13 exiting airflow direction provides clients more flexibility in locating EC Systems within the Data Center
  - Single cover design being used for both A- and Z-Frames delivered as part of a “rear cover-only” kit
  - z13 Design was developed to also address past data center issues
- No front cover design changes

Rear View - Up

Rear View - Down

z13 Door Locks



Picture enhanced to highlight locks, not reflective of final product

Drivers for z13 Door Locks

- Customer Compliance Requirements
  - IRS 0175, PCI 3 / PCI 2015
- Local or Internal Company Requirements
  - Security rule for all servers
  - Co-location security rule
  - External auditors

Door Lock Keys

- All 4 doors (front/rear) will arrive with the lock installed.
  - 2 keys per door, 8 keys total
- Keys will be attached via z-tie in pairs of 2 per door
- Keys to be given to customer, or placed in base of machine

- If locks are used, customer is responsible to open doors for service

1. IMPP, Systems Assurance Guide, & Installation guide will prompt to determine if customer wants locked or not.
2. Systems Assurance Guide &Installation guide will call out that it is the customer's responsibility to open the doors for service

z13 HMC Feature Code 0094, Display and Keyboard

The System unit and tray must be mounted in a customer rack in two adjacent 1U locations in the "ergonomic zone" between 21U and 26U. Three C13 power receptacles are required, two for the System Unit and one for the Display and Keyboard.

Customer Supplied Rack

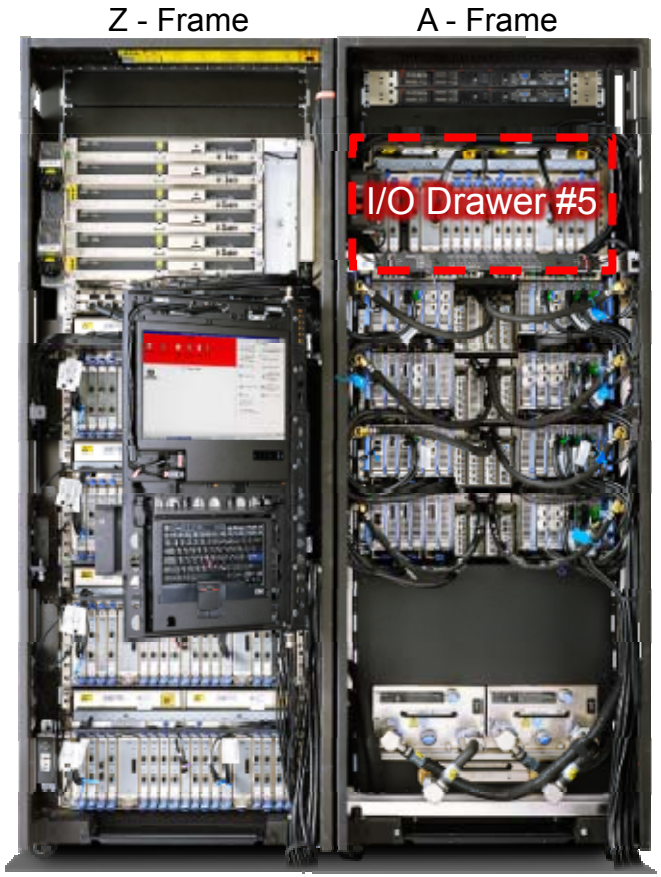
(Cannot configure or order using z System eConfig)

HMC System Unit

HMC Display and Keyboard:

IBM 1U 18.5-inch Standard Console (1723-8BX)

Cabling



Cable Installation

- Drawer location changes require careful cable planning and placement. I/O drawers that were located in the lower A-Frame may be installed in the upper Z-Frame or installation of I/O drawer 5 is in the top of the A-Frame

Configurator cable options, same as zEC12

- FTS for FICON LX
- Top Exit I/O Cabling

Cable types

- Same I/O cables as used in zEC12 for OSA and FICON
- New cable to support ICA-SR

Link Type	Fiber Core	Fiber Bandwidth	Fiber Type	Light Source	Cable	Connector	Maximum Distance	Repeated Distance
Short Distance								
Integrated Coupling Adapter (ICA SR)	50 micron	4.7 GHz-km @ 850 nm	**OM4** Multimode	SW	Single 24-fiber cable assembly	MTP (new)	**150** meters	N/A
		2 GHz-km @ 850 nm	**OM3** Multimode	SW	Single 24-fiber cable assembly	MTP (new)	**100** meters	N/A

z13 Dimensions (rounded to the nearest 0.1” or 0.1 cm)

	z13 Radiator-based Air Cooled	z13 Radiator-based Air Cooled with Top Exit cabling and power option
Number of Frames	2 Frames IBF Contained within 2 Frames	2 Frames plus Top Exit cabling IBF Contained within 2 Frames
Height (with covers) **Width (with covers)** **Depth (with covers)**	201.3 cm / 79.3in 156.3 cm / 61.6 in 186.7 cm / 73.5 in	215.3 cm / 84.8 in 184.7 cm / 72.7 in 186.7 cm / 73.5 in
Height Reduction (with covers) **Depth Reduction (with covers)**	178.5 cm / 70.3 in 156.5 cm / 61.6 in	178.5 cm / 70.3 in 156.5 cm / 61.6 in
Machine Area **Service Clearance**	2.93 Sq. Meters / 31.6 Sq. Feet 7.64 Sq. Meters / 82.3 Sq. Feet (IBF Contained within the Frame)	3.45 Sq. Meters / 37.2 Sq. Feet 7.64 Sq. Meters / 82.3 Sq. Feet (IBF Contained within the Frame)

	z13 Water Cooled	z13 Water Cooled with Top Exit cabling and power option
Number of Frames	2 Frames IBF Contained within 2 Frames	2 Frames plus Top Exit cabling IBF Contained within 2 Frames
Height (with covers) **Width (with covers)** **Depth (with covers)**	201.3 cm / 79.3in 156.5 cm / 61.6 in 196.9 cm / 77.5 in	215.3 cm / 84.8 in 184.7 cm / 72.7 in 196.9 cm / 77.5 in
Height Reduction (with covers) **Depth Reduction (with covers)**	178.5 cm / 70.3 in 156.5 cm / 61.6 in	178.5 cm / 70.3 in 156.5 cm /61.6 in
Machine Area **Service Clearance**	3.09 Sq. Meters / 33.3 Sq. Feet 7.87 Sq. Meters / 84.8 Sq. Feet (IBF Contained within the Frame)	3.64 Sq. Meters / 39.2 Sq. Feet 7.87 Sq. Meters / 84.8 Sq. Feet (IBF Contained within the Frame)

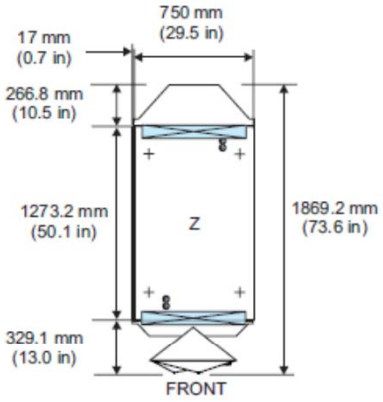
z13 System Plan Views

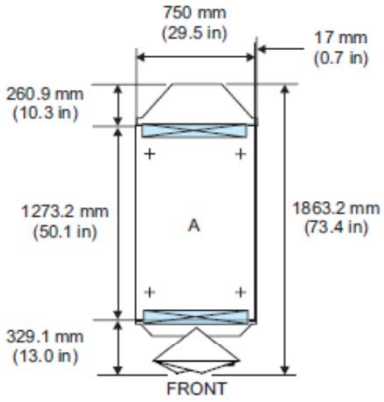
Plan views

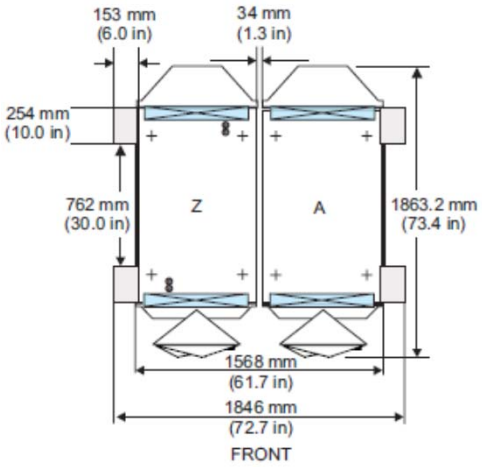
Note: In the following plan views, the I/O top exit towers (FC 7942) are shown as gray boxes at the outer corners of the A and Z frames in the bottom drawing. This is an **optional** feature.

Note: For installations planning to use top exit power cords, the frame openings for these cords are on the top of the left front and right rear corners of the Z frame.

Radiator cooling

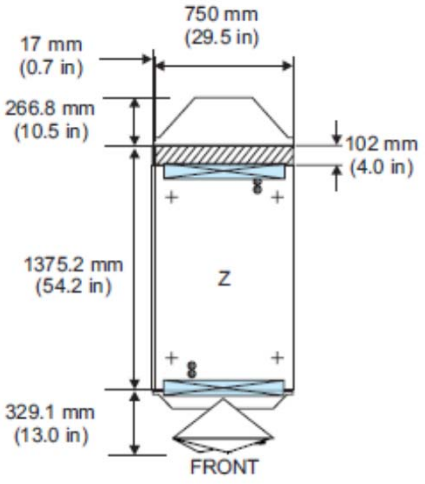


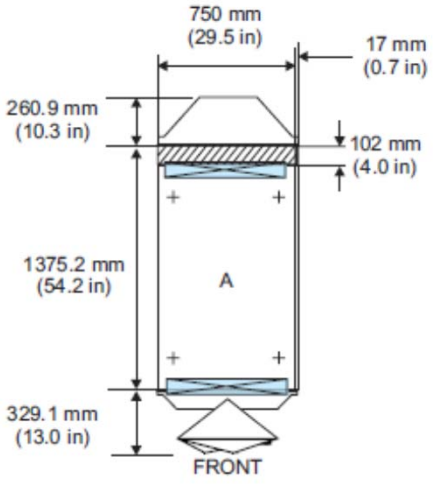


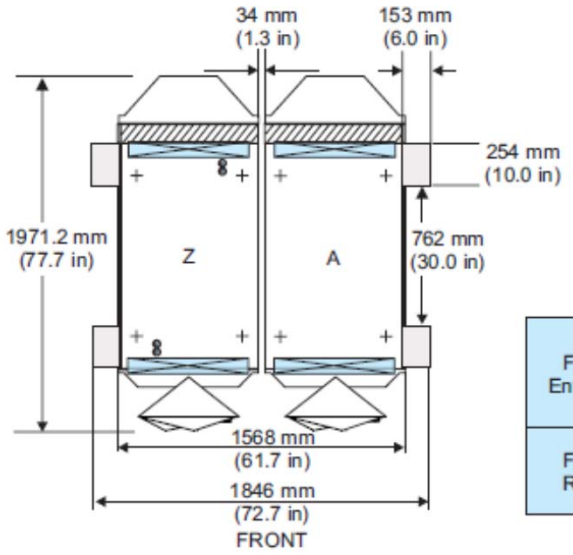


Frame Entry/Exit	Cutout dimensions for raised floor	
	(mm)	(in)
Front Rear	94 x 655 94 x 655	3.7 x 25.8 3.7 x 25.8

Chilled water cooling







Frame Entry/Exit	Cutout dimensions for raised floor	
	(mm)	(in)
Front Rear	94 x 655 94 x 655	3.7 x 25.8 3.7 x 25.8

Always refer to the Installation Manual - Physical Planning (IMPP), GC28-6938 for the latest information

z13 System weights (numbers rounded)

Weights for Radiator based air cooled system				Additional Weights for features			
Model	**Min**	**Typical**	**Max**	**Water**	**Top Exit I/O**	**Battery**	**Balanced Power**
N30	2886 lbs 1309 kg	3428 lbs 1555 kg	4136 lbs 1876 lbs	62 lbs 28 kg	120 lbs 54 kg	671 lbs 304 kg	164 lbs 74 kg
N63	3060 lbs 1388 kg	3738 lbs 1695 kg	4785 lbs 2170 kg	62 lbs 28 kg	120 lbs 54 kg	671 lbs 304 kg	110 lbs 50 kg
N96	3336 lbs 1513 kg	4269 lbs 1936 kg	5059 lbs 2295 kg	38 lbs 17 kg	120 lbs 54 kg	671 lbs 304 kg	55 lbs 25 kg
NC9/NE1	3594 lbs 1630 kg	4500 lbs 2041 kg	5312 lbs 2409 kg	38 lbs 17 kg	120 lbs 54 kg	671 lbs 304 kg	0

Note:
1. For N30 (typical and minimum) and N63 (minimum), the additional weight for the battery feature is 450 lbs.
2. All weights include all covers.
3. Minimum weights include no listed features and no I/O.
4. Maximum weight includes five PCIe I/O drawers (FC 4012) and no listed features. All slots in the PCIe I/O drawers contain an adapter.
5. Typical weights contain I/O considered typical in a balanced system for the respective model.
6. The additional weight for features are valid for the maximum system power of each configuration.
7. Actual weight will vary and can only be determined by an exact specification of content.

Example: A typical radiator-cooled N63 with batteries and balanced power = 3738 + 671 + 110 = 4519 lbs

The Power Estimator tool (available from Resource Link) has been modified to include weight data and now has the capability to provide a more accurate weight for your particular configuration

Always refer to the Installation Manual - Physical Planning (IMPP) = GC28-6938

Installation Tool Ordering (new/changes)

- New tool parts are required to successfully install a z13.
- Some existing tool kits will be eligible for upgrades.
- Tools can be used for both z13 and zEC12 once upgraded.
- Don’t order more tools than needed at a site.
- z13 Site Tool Kit
  - No longer available for ordering via eConfig
  - Integrated into ship tools with z13

z13 New Fill and Drain Tool (FDT)

New FDT: FC 3380
Or order upgrade kit FC 3379 if a zEC12 FDT
FC 3378 will remain on site

Approximate FDT unit dimensions:

- 35 inches from floor to top of handle
- 30 inches long
- 22 inches wide

System Fill Procedure

- Driven through Repair & Verify on SE
- 15-20 minute procedure
- Initial setup includes:
  - Starting R&V
  - Gathering FDT, adapter kit, and BTA water solution
  - Plugging FDT into bulk power port on system

z13 Drain and Fill Kit

For sites installing a z13 and will have a zEC12 “Fill and Drain Kit” (FC 3378) remaining onsite, only need to order the “Fill and Drain Adapter Kit” (FC 3379).

- FC 3378 still available for ordering for zEC12, not available to order on z13
- FC 3380 available to order for z13, currently not available to order under zEC12

zEC12 FC 3378 Fill and Drain Kit

FC3378 Fill and Drain Tool P/N 41T8680

Part Number	Description	Qty	Picture
41T8680	Fill/Drain Tool	1	
41U9913	Hose (HA1)	1	
41U9914	Hose (HA2)	1	
41U9915	Hose (HA3)	1	
41T8178	Safety Cover (Eaton Ball Valve Actuator)	3	
41T8441	SMC Fitting Cover	3	
41T9687	SMC Fitting Cap Filler	3	
45D3158	Spare O-Ring (Eaton Ball Valve)	3	

1. Currently supported on zEC12 servers
2. z196 Drain and Fill Kit 3377 is not supported on other servers

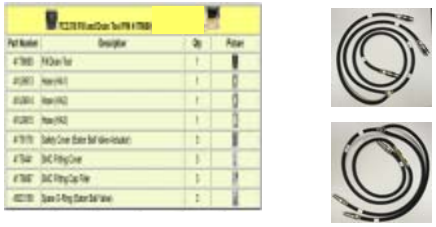
z13 FC 3379 Fill and Drain Adapter Kit

Picture not accurate, reference only

1. This feature supplies new hose attachments which are required for the service of z13 systems when carrying forward FC 3378 from zEC12 systems.

z13 FC 3380 Fill and Drain Kit

Picture not accurate, reference only



1. New for z13 replaces zEC12 FC 3378.
2. Contains new hose attachments to support z13
3. Backward compatible with older zEC12 server

z13 Universal Tool / Ladder Kit

For sites installing a z13 and will have a “Universal Tool / Ladder Kit” (FC 3759) remaining onsite, only need to order the “Lift Tool Upgrade Kit” (FC 3103).

- FC 3759 still available to order for zEC12, not available to order on z13
- FC 3105 available to order for z13, currently not available to order under zEC12

FC 3759
Universal Tool / Ladder

1. Currently supported for System z9, System z10, z196 and zEC12 servers

z13 FC 3103
Lift Tool Upgrade Kit

1. Provides additional server brackets to support z13.
2. Use of FC 3759 and FC 3103 equivalent to FC 3105

z13 FC 3105
Universal Lift / Ladder

1. New for z13, replaces FC 3759.
2. Contains new service brackets to support z13

IBM z Systems Tool Summary

	z10 EC	z196	zEC12	z13
Universal Tool / Ladder (one per site)	FC 3759	FC 3759	FC 3759 [1] or FC 3105 [3]	FC 3105 Only
Drain and Fill Kit (one per site)	NA	FC 3377 [2]	FC 3378 [4] or FC 3380	FC 3380 Only
Site Tool Kit (one per site)	FC 9968	FC 9968	FC 9968	N/A [5]

Notes

1.FC 3103 Upgrade kit - can be ordered for customers with FC3759 to be equivalent to FC3105

2.Cannot be used on zEC12 or z13, required on water cooled models only

3.Available for ordering on zEC12 only after withdrawal of feature code 3759

4.FC 3379 Upgrade kit - can be ordered for customers with FC3378 to be equivalent to FC3380

5.Included in ship group

z13
Power and Cooling

Always Refer to the Installation Manual for Physical Planning for details:

M/T 2964 – GC28-6938
M/T 2458 – GC27-2630 (Model 004)

z13 Power Supplies / Cords

Consider the need for adding additional line cords, 2 vs 4 ?

- Based upon the following table, how soon will additional cords be required
- Best time to address is during upgrades

z13 Power Cords (same as zEC12)						
CPC Drawers	0 I/O Drawer	1 I/O drawer	2 I/O drawer	3 I/O Drawer	4 I/O Drawer	5 I/O Drawer
1	2x60A	2x60A	2x60A	2x60A	2x60A	2x60A
2	2x60A	2x60A	2x60A	2x60A	2x60A	4x60A
3	2x60A	2x60A	4x60A	4x60A	4x60A	4x60A
4	4x60A	4x60A	4x60A	4x60A	4x60A	4x60A

Blue = 1 line cord pair (2 plugs), Red = 2 line cord pair (4 plugs)

1. Balanced Power Plan Ahead (FC 3003) will add two additional power cords
2. Line Cord Plan Ahead FC 2000 still available to order 4 cords verses 2 (new orders only)
3. Installation of the two additional power cords as part of an MES are designed to be concurrent
4. 60A line cords are voltage group 200-240V AC and the DC power option. For 380-415V AC (EMEA) and the 480V AC, the power cords are 30A.

z13 IBF Holdup time in minutes

z13						
CPC Drawers	0 I/O Units	1 I/O Units	2 I/O Units	3 I/O Units	4 I/O Units	5 I/O Units
1	19.9	13.7	10.3	8.9	13.9	12.4
2	8.8	12.5	10.5	9.0	7.9	7.1
3	9.6	8.3	7.4	6.6	6.1	5.0
4	6.7	6.1	5.0	4.5	4.0	3.7

Note:

1. The holdup times in this table are valid for batteries 3 years old or less that have seen normal service life (2 or less complete discharges per year) with the system input power at N+1 operation.
2. Batteries are only added up to the number of Bulk Power Regulators associated with the section 1 power cords.
3. These holdup times are estimates. Your particular battery holdup time for any given circumstance may be different.
4. Holdup times vary depending on the number of BPRs installed. As the number of BPRs increases, the holdup time also increases until the maximum number of BPRs is reached. Once six BPRs (three per side) are installed no additional batteries are added so the time decreases from that point.

z13 Overhead Power Option

Shipped separately and installed on-site to allow for door clearance

Raised Floor : Optional
Non Raised Floor : Mandatory
Co-req: Top Exit I/O option

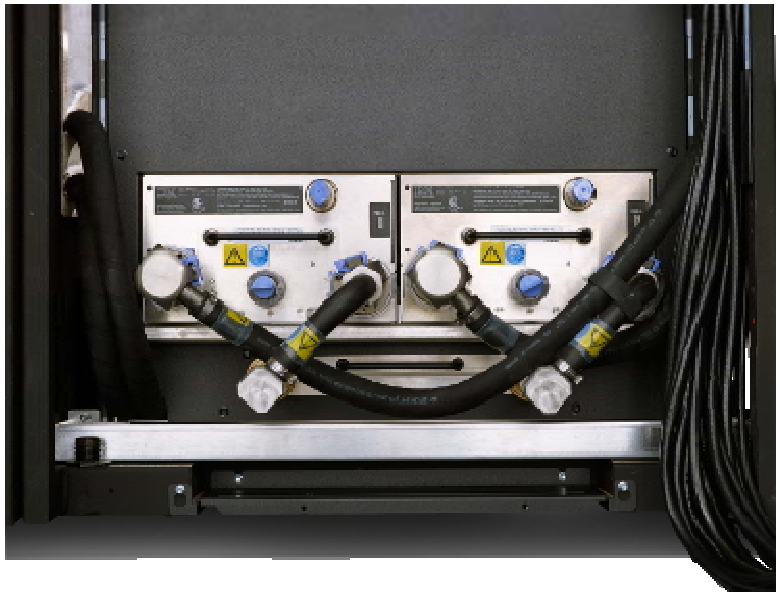
z13 Cooling

Air Cooled System

- Normal Air exhaust front to rear of frame
- Fully redundant radiator cooling, enhanced over zEC12 by adding an additional air movement device (now N+2)
- Top exit air design eliminated

External Water Cooled System

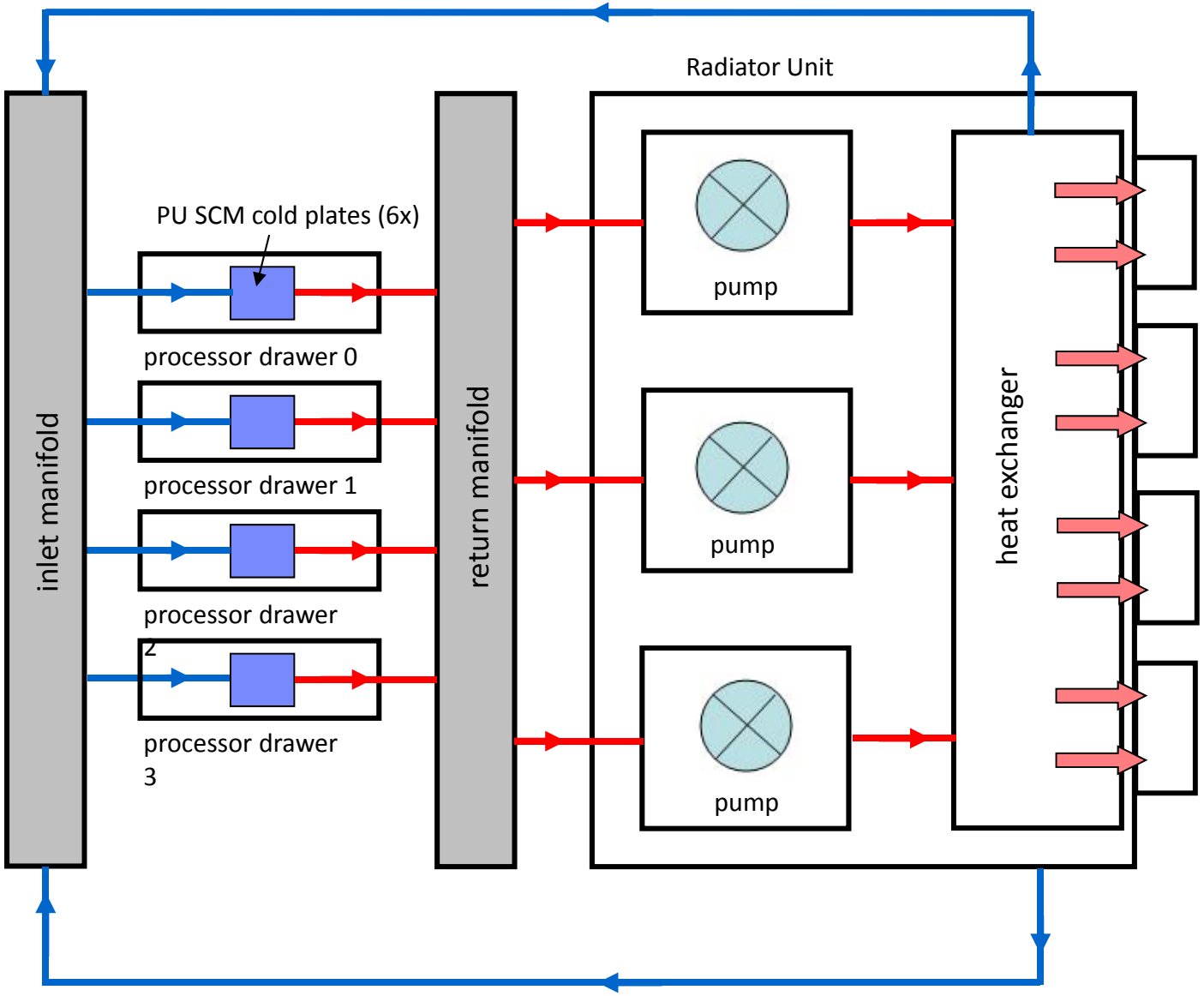
- Two Water Cooled Units (WCU), N+1 design
- Will operate with a single WCU, failure of both WCU's will result in degraded operation and possible shutdown.
- There is no backup air cooling like in previous models



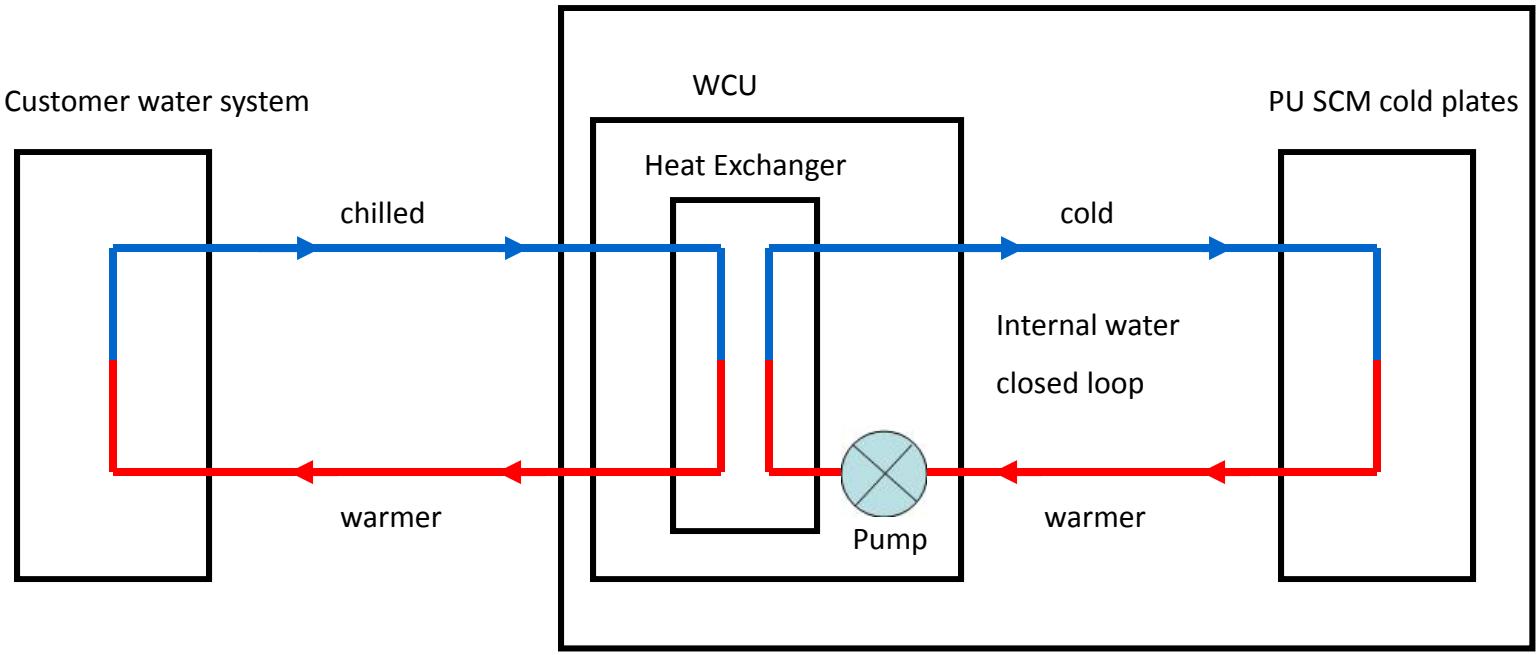
z13 Water Cooling for Water Cooled Systems

- **Chilled water requirements**
  - Allowable system inlet water temperature range is 6-20 degrees C (43-68 degrees F), using standard building chilled water (BCW).
  - Facility chilled water quality and prevention of fouling
    - In general require only standard building chilled water without any special requirements
    - Total Hardness must not exceed 200 mg/L as calcium carbonate
    - pH must be between 7 and 9
    - Turbidity must be less than 10 NTU (Nephelometric Turbidity Unit).
    - Bacteria must be less than 1000 CFUs (Colony Forming Unit)/ml
    - Water to be as free of particulate matter as feasible
  - IBM will supply and use a deionized (DI) water solution that is mixed with benzotriazole (BTA), a corrosion inhibitor, for use within the system side cooling loop of water cooled products.
    - BTA is mixed with the Deionized water to a concentration of 1000 parts per million by weight.
    - Customer must dispose of the water solution in accordance with applicable laws and regulations and product characteristics at the time of disposal
  - The BTA is part of a z13 ship group whether a new build or frame-roll MES. The BTA is never reused from one machine for any other machine
  - The Fill & Drain Kit has its own feature code and is not associated with fulfillment of the BTA.
  - Any discontinued or replaced Water Cooled System will always need to be drained of the BTA which has to be disposed by the customer.

z13 Water flow for Radiator Based Air Cooled System



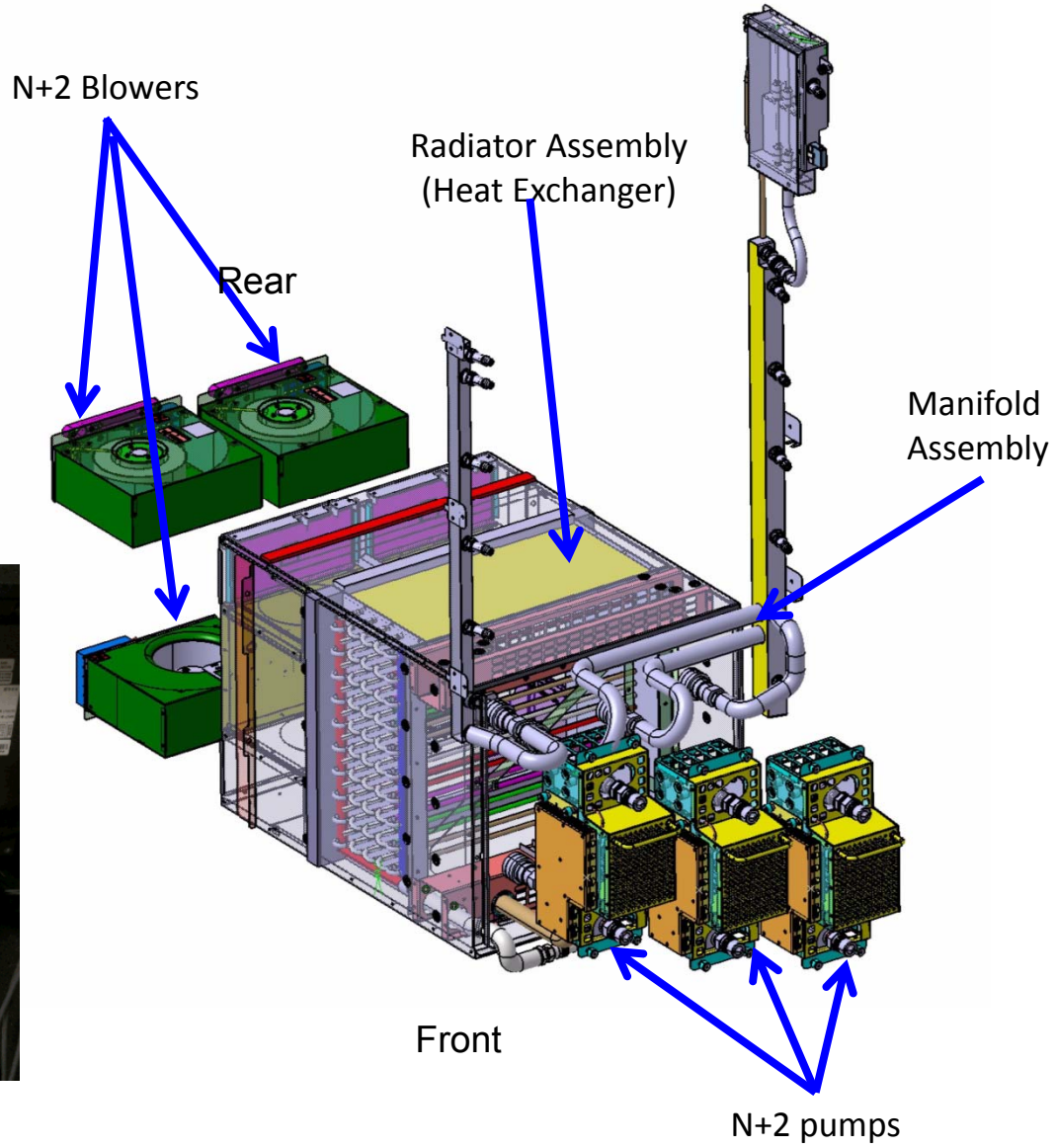
z13 Water Flow for Water Cooled System



z13 Radiator Unit (RU)

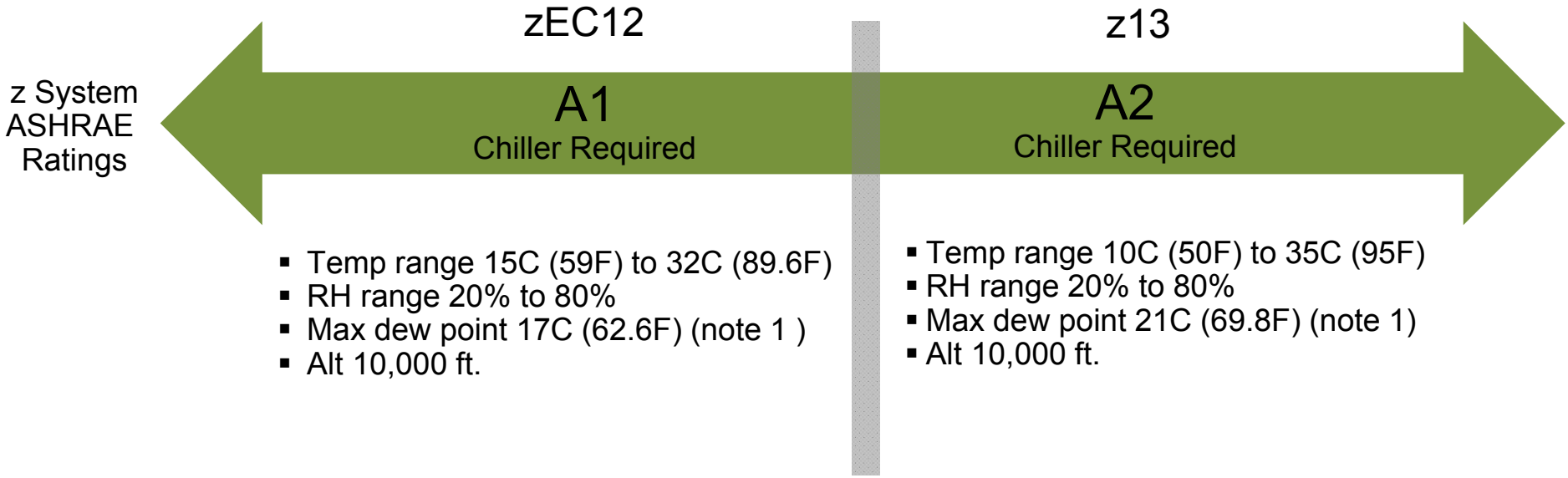
- With 1 or 2 CPC drawer(s) System, 3 RU blowers (N+2) are installed.
- With 3 or 4 CPC drawers, 4 RU blowers are installed.
- 3 or 4 CPC drawers need a minimum of 2 RU blowers.
- With 4 RU blowers, the System still has N+2 capability
- If a 1 or 2 CPC drawer System is upgraded to 3 or 4 CPC drawers, the 4th RU blower is installed as part of the upgrade

Rear View of 2 CPC Drawer System with 3 Blowers Installed



Environmental classes – New ASHARE Rating for z13

ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) is an organization devoted to the advancement of indoor-environment-control technology in the heating, ventilation, and air conditioning (HVAC) industry.



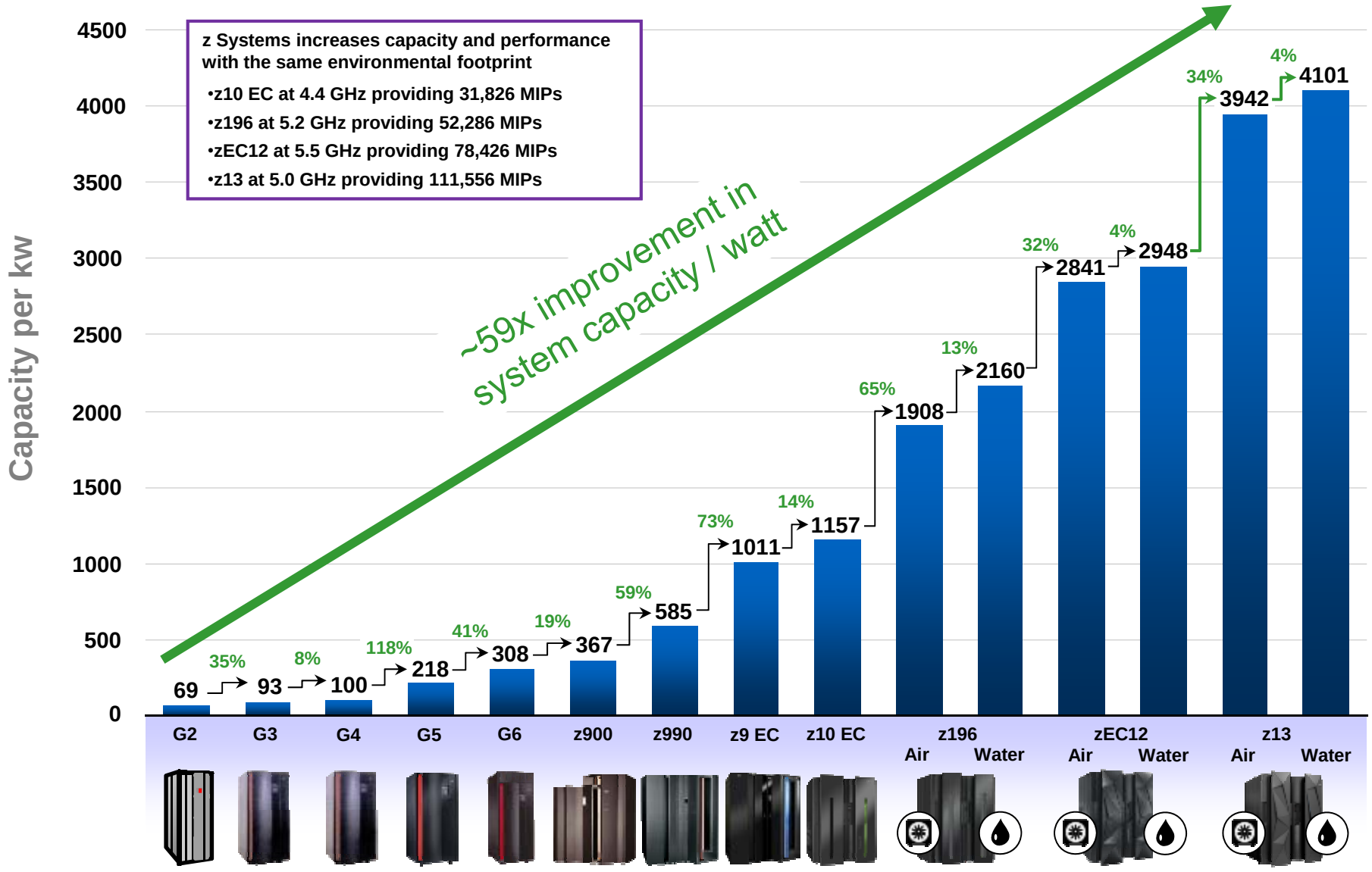
IBM recommended Temp range 18C (64.4F) to 27C (80.6F)
RH range 5.5C (41.9F) min dewpoint; up to 60%, Max dew point 15C (59F) (note 1)

Note 1: Actual inlet air moisture content range (grams moisture/Kg dry air)
A1: 2 – 12 A2: 1.5 – 16 A3: 1.5 – 19, Recommended: 6.2 - <10

z Systems capacity per watt improvements

z Systems increases capacity and performance with the same environmental footprint

- z10 EC at 4.4 GHz providing 31,826 MIPs
- z196 at 5.2 GHz providing 52,286 MIPs
- zEC12 at 5.5 GHz providing 78,426 MIPs
- z13 at 5.0 GHz providing 111,556 MIPs



Note: Max. possible power is used in all calculations: hot room, max plugged I/O power, max. memory power and all engines turned on.
Real world maximum capacity system is typically about 3/4 of this power.

System capacity numbers are as published for LSPR and power utilization numbers for maximum configuration are from the Installation Manual for Physical Planning.

Questions ?

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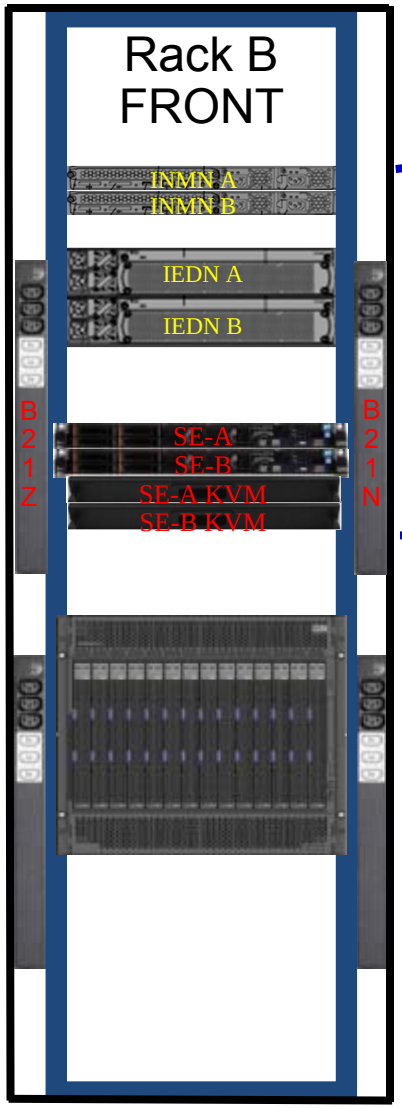
IBM z13

Reinventing enterprise IT
for digital business

Additional Slides

(available as additional material – not presented)

zBX Model 004 MES Details



zBX -004 MES Overview

- Add B21N & B21Z PDU'S
- Add 2 CUSTOMER POWER CORDS
- Add 1U KVM'S
- Add 1U SE'S
- Add 1U FILLER
- Remove 2 CPC INMN BPH CABLES
- Add 6 NEW Ethernet links for SE's