

Recyclability assessment *

Date: January 8, 2020

IBM Power Server 9040 MR9

Brand name =	IBM	Product weight =	74.62 kg		
Model name =	9040 MR9				
Part/Sub-Assembly	Mass (kg)	Qty	Mass/System(kg)	Recyclability rate**	Recyclable mass (kg)
Cassette	0.4	11	4.4	97%	4.27
Peripheral Component Interconnect express (PCIe) card	0.16	1	0.16	100%	0.16
PCIe card	0.3	4	1.2	100%	1.2
PCIe card	0.26	4	1.04	100%	1.04
PCIe card	0.32	2	0.64	100%	0.64
Hybrid Serial Attached SCSI (SAS) cable	0.46	1	0.46	97%	0.45
Circuit card with Cassette	0.65	1	0.65	97%	0.63
Memory Voltage Regulator Module (VRM)	0.52	4	2.08	97%	2.02
Input/output (I/O) and Standby VRM	0.14	2	0.28	97%	0.27
Card with connectors	4.76	1	4.76	100%	4.76
Stiffener for card	7.16	1	7.16	97%	6.95
Circuit card with bus bars	0.64	2	1.28	100%	1.28
I/O card	1.2	8	9.6	100%	9.6
IS Dual in-line memory modules (DIMM)	0.03	128	3.84	97%	3.72
Heatsink	0.845	4	3.38	93%	3.14
Dual Chip Module (DCM)	0.1	4	0.4	97%	0.39
CP Core Cache VRM	0.3	4	1.2	97%	1.16
Bezel	0.28	1	0.28	62%	0.17
Power supply	1.2	4	4.8	97%	4.66
Chassis	10.72	1	10.72	97%	10.4
Chassis stiffening bar	0.56	1	0.56	97%	0.54
Chassis cover	2.36	1	2.36	100%	2.36
Fan, 92 mm	1.04	4	4.16	90%	3.74
Circuit card	0.652	1	0.652	100%	0.652
Front drive sheetmetal assembly	4.66	1	4.66	97%	4.52
Hard disk drives (HDDs)	0.26	8	2.08	92%	1.91
Non-volatile Memory Express (NVMe) drives	0.11	4	0.44	97%	0.43
Operator panel	0.18	1	0.18	97%	0.18
Lift Handles	0.2	6	1.2	97%	1.16
Sum ***			74.62kg		72.40kg

Recyclability rate: $R_{rev} = \frac{\sum m_{ij} \times RCR_{ij}}{m_{TEE}} \times 100\% = 97\%$

Symbols and definitions

m_{ij} = Mass of i^{th} part

RCR_{ij} = Recycling rate of the i^{th} part in the corresponding end-of-life treatment scenario

R_{rev} = Recyclability rate

m_{TEE} = Total product mass

* This recyclability assessment is based on the format in the International Electrotechnical Commission (IEC) 62635 Standard Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment. Recyclability is defined by the standard to be "ability of waste product to be recycled, based on actual practices." The recyclability rate calculation equation is defined by this standard. Products were assessed based on the results of reuse, recycling and/or disposal at IBM's Product End-of-Life Management suppliers. The 2018 results for IBM product end-of-life management are attached to the right. The IBM and the Environment 2018 Annual report is located at <https://www.ibm.com/ibm/environment/annual/reporting.shtml>

** Assumptions - Recyclability rates projected for this product and parts are based on knowledge of the product material composition, publicly available reference sources for recyclability of materials (see references below) and on the overall results of IBM's product end-of-life management vendors. Where there is a publicly available recyclability rate for a commodity or assembly, such as those in the JRC Technical Report below, that rate is used. Where there is not a publicly available recyclability rate, the overall rate of 97% was chosen because that is the documented and actual recycling rates from IBM Product End of Life Management vendors. The 97% is the actual recyclability of IBM products as reported from IBM PELM vendors and the available infrastructure. According to NSF/ANSI 426-2018 - Printed circuit board substrate material, included in printed circuit boards that will be sent to a smelter for metals recycling, shall be considered recyclable for the purpose of the calculation.

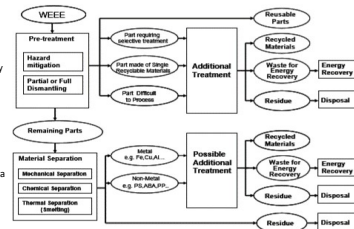
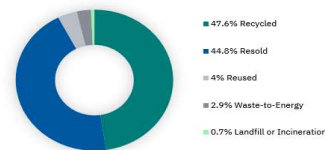
*** This POWER server is unique in content based on customer ordering. The weight will vary based on content of the server. The bill of material provided here is an example for this product and that which is used for the installation Planning manual.

**** References: IEC/TR 62635, "Technical Report IEC/TR 62635. Guidelines for End of Life information provision from manufacturers and recyclers, and for recyclability rate calculation of Electrical and Electronic Equipment." The International Electrotechnical Commission (IEC), 2012; P. Chancerel and M. Marwede, JRC Technical Reports, Feasibility study for setting-up reference values to support the calculation of recyclability / recoverability rates of electronic products August 2016; and NSF/ANSI 426 - 2018 Environmental Leadership and Corporate Social Responsibility Assessment of Servers

End of life treatment methodology - The methodology for recycling technologies and practices for this product generally follow the end-of-life treatment process as outlined by IEC/TR62635. See the process flow diagram to the right. Disassembly of the product is required to sort into recycling streams based on the infrastructure available to the dismantler. Generally circuit cards, backplanes, processors, etc. would go to a precious metal recycler. Metal covers, chassis, brackets, screws, etc to a metal smelter. Plastic parts such as the bezel, covers, etc. would go to a plastic recycler.

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Product end-of-life processing methods



End-of-life treatment processes from IEC/TR 62635