Recyclability assessment *

Date: December 3, 2019

Base of the system Base of the system Product weight = 23.65 kg Part/Sub-Assembly Mass (g) Qty Mass (g)/System Recyclability rate** Recyclability rate** Part/Sub-Assembly 197.4 197.4 97% 197.4 Fan Bulkhead 197.4 1 197.4 97% 197.4 Fan Bulkhead 272.5 1 272.5 90% 243 Power Supply Baffle 47.2 1 47.2 97% 44 USB Bracket 23.9 1 23.9 97% 22 USB Cable 24.3 1 24.3 97% 22 USB Cable 24.3 1 24.3 97% 22 USB Cable 24.3 1 24.3 97% 22 ISRDIMM(dual in-line memory module) 18.8 32 601.6 97% 584 Circuit board W/Hardware 89.6 1 89.6 100% 89.1 IDM Mini SAS Cable 15.8 1 15.8	IBM Power Server 8335 GCA					
Part/Sub-Assembly Mass (g) Qty Mass (g)/System Recyclability rate** Recyclability rate*** Recyclability rate** Recycla	Brand name =					
Central Processing Unit Bulkhead 197.4 197.4 197.4 97% 197.5 Fan Bulkhead 272.5 1 272.5 90% 244 Power Supply Baffle 47.2 1 47.2 97% 44 USB Bracket 23.9 1 23.9 97% 22 USB Cable 24.3 1 24.3 97% 22 USB Cable 24.3 1 24.3 97% 24 Circuit board W/Hardware 307.8 8 2462.4 100% 2462.4 Circuit board W/Hardware 81.9 1 81.9 100% 81.1 Circuit board W/Hardware 89.6 1 89.6 100% 89.6 Dower Cable 15.8 1 15.8 97% 193 Graphics Processing Unit 999.1 2 1992.8 97% 193 Graphics Processing Unit 999.1 2 191.7 97% 182 K80 Graphics Processing Unit 999.1 2 <th>Model name =</th> <th>8335 GCA</th> <th></th> <th>Product weight =</th> <th>23.65 kg</th> <th></th>	Model name =	8335 GCA		Product weight =	23.65 kg	
Central Processing Unit Bulkhead 197.4 197.4 197.4 97% 197.5 Fan Bulkhead 272.5 1 272.5 90% 244 Power Supply Baffle 47.2 1 47.2 97% 44 USB Bracket 23.9 1 23.9 97% 22 USB Cable 24.3 1 24.3 97% 22 USB Cable 24.3 1 24.3 97% 24 Circuit board W/Hardware 307.8 8 2462.4 100% 2462.4 Circuit board W/Hardware 81.9 1 81.9 100% 81.1 Circuit board W/Hardware 89.6 1 89.6 100% 89.6 Dower Cable 15.8 1 15.8 97% 193 Graphics Processing Unit 999.1 2 1992.8 97% 193 Graphics Processing Unit 999.1 2 191.7 97% 182 K80 Graphics Processing Unit 999.1 2 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>						
Fan Bulkhead 272.5 1 272.5 90% 243 Power Supply Baffle 47.2 1 47.2 97% 44 USB Bracket 23.9 1 23.9 97% 64 USB Bracket 23.9 1 23.9 97% 62 USB Cable 24.3 1 24.3 97% 62 USR Cable 24.3 1 24.3 97% 62 USB Cable 24.3 1 24.3 97% 584 Circuit board W/Hardware 307.8 8 2462.4 100% 846.2 Circuit board W/Hardware 89.6 100% 88.9 100% 88.9 Circuit board W/Hardware 89.6 1 89.6 100% 89.9 I Stodard W/Hardware 99.6 1 59.6 97% 193 Graphics processing unit (GPU) assembly w/o 611.9 2 1223.8 97% 1183 Graphics Processing Unit 999.1 2 1998.2	Part/Sub-Assembly	Mass (g)	Qty	Mass (g)/System	Recyclability rate**	Recyclable mass (g)
Power Supply Baffle 47.2 97% 44 USB Bracket 23.9 1 23.9 97% 22 USB Cable 23.9 1 24.3 97% 22 USB Cable 24.3 1 24.3 97% 22 USB Cable 307.8 8 2462.4 100% 84.0 Circuit board W/Hardware 81.9 1 89.6 100% 89.0 Circuit board W/Hardware 89.6 1 59.6 97% 153 Power Cable 59.6 1 59.6 97% 153 Graphics processing unit (GPU) assembly w/o 611.9 2 1223.8 97% 1183 Graphics Processing Unit 999.1 2 1998.2 97% 1933	Central Processing Unit Bulkhead	197.4	1	197.4	97%	191
USB Bracket 23.9 1 23.9 97% 22 USB Cable 24.3 1 24.3 97% 22 ISRDIMM(dual in-line memory module) 18.8 32 601.6 97% 58 Circuit board W/Hardware 307.8 8 2462.4 100% 2462.4 Circuit board W/Hardware 81.9 1 81.9 100% 88.4 Circuit board W/Hardware 89.6 1 89.6 100% 89.6 Circuit board W/Hardware 89.6 1 89.6 100% 89.6 Power Cable 59.6 1 59.6 97% 53 300W Power Supply 996.4 1992.8 97% 193 Graphics processing unit (GPU) assembly w/o 611.9 2 1223.8 97% 193 K80 Graphics Processing Unit 999.1 2 851.4 93% 79 262 Circuit board W/ Hardware 2910.7 1 2910.7 97% 282 28 275 <t< td=""><td>Fan Bulkhead</td><td>272.5</td><td>1</td><td>272.5</td><td>90%</td><td>245</td></t<>	Fan Bulkhead	272.5	1	272.5	90%	245
USB Cable 24.3 1 24.3 97% 24 USB Cable 18.8 32 601.6 97% 588 Circuit board W/Hardware 307.8 8 2462.4 100% 2462.4 Circuit board W/Hardware 81.9 1 81.9 100% 88.1.9 Circuit board W/Hardware 89.6 1 89.6 100% 89.6 HD Mini SAS Cable 15.8 1 15.8 97% 11 Power Cable 59.6 1 59.6 97% 53 300W Power Supply 996.4 2 1992.8 97% 1933 Graphics processing unit (GPU) assembly w/o 611.9 2 1223.8 97% 1188 K80 Graphics Processing Unit 999.1 2 851.4 93% 799 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2822 Fan Assembly 734.4 4 2937.6 97% 2824 Chasis Assembly 504.9	Power Supply Baffle	47.2	1	47.2	97%	46
ISRDIMM(dual in-line memory module) 18.8 32 601.6 97% 584 Circuit board W/Hardware 307.8 8 2462.4 100% 2462.4 Circuit board W/Hardware 81.9 1 81.9 100% 88.6 Circuit board W/Hardware 89.6 1 89.6 100% 88.9 HD Mini SAS Cable 15.8 1 15.8 97% 12 Power Cable 59.6 1 59.6 97% 193 Graphics processing unit (GPU) assembly w/o 611.9 2 1223.8 97% 1183 Graphics Processing Unit 999.1 2 1299.2 97% 1933 Heatsink 425.7 2 851.4 93% 793 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2822 Fan Assembly 734.4 4 2937.6 97% 2849 Chasis Assembly 5094.9 1 5094.9 97% 2424 Lid (cover - steel) </td <td>USB Bracket</td> <td>23.9</td> <td>1</td> <td>23.9</td> <td>97%</td> <td>23</td>	USB Bracket	23.9	1	23.9	97%	23
Circuit board W/Hardware 307.8 8 2462.4 100% 2462.4 Circuit board W/Hardware 81.9 1 81.9 100% 81.9 Circuit board W/Hardware 81.9 1 81.9 100% 81.9 Circuit board W/Hardware 89.6 1 89.6 100% 89.4 LD Mini SAS Cable 15.8 1 15.8 97% 193 Power Cable 59.6 1 59.6 97% 53 1300W Power Supply 996.4 2 1992.8 97% 1933 Graphics processing unit (GPU) assembly w/o 611.9 2 1223.8 97% 1183 K80 Graphics Processing Unit 999.1 2 1998.2 97% 1933 Heatsink 425.7 2 851.4 93% 793 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2842 Fan Assembly 734.4 4 2937.6 97% 2844 Chassis Assembly	USB Cable	24.3	1	24.3	97%	24
Circuit board W/Hardware 81.9 1 81.9 100% 81.5 Circuit board W/Hardware 89.6 1 89.6 100% 89.6 Circuit board W/Hardware 89.6 1 89.6 100% 89.6 HD Mini SAS Cable 15.8 1 15.8 97% 19 Power Cable 59.6 1 59.6 97% 58 300W Power Supply 996.4 2 1992.8 97% 1933 Graphics processing unit (GPU) assembly w/o 611.9 2 1223.8 97% 1183 K80 Graphics Processing Unit 999.1 2 1998.2 97% 1933 K80 Graphics Processing Unit 425.7 2 851.4 93% 793 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2823 Fan Assembly 734.4 4 2937.6 97% 2844 Chassis Assembly 5094.9 1 5094.9 97% 4244 Lid (cover - steel	ISRDIMM(dual in-line memory module)	18.8	32	601.6	97%	584
Circuit board W/Hardware 89.6 1 89.6 100% 89.6 HD Mini SAS Cable 15.8 1 15.8 97% 15 Power Cable 59.6 1 59.6 97% 193 Graphics processing unit (GPU) assembly w/o 996.4 2 1992.8 97% 193 Graphics processing Unit 999.1 2 1223.8 97% 1183 K80 Graphics Processing Unit 999.1 2 1998.2 97% 1933 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2823 Fan Assembly 734.4 4 2937.6 97% 2844 Chasis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 100% 2278.4 10% 2278.4	Circuit board W/Hardware	307.8	8	2462.4	100%	2462.4
HD Mini SAS Cable 15.8 1 15.8 97% 15.8 Power Cable 59.6 1 59.6 97% 55.3 1300W Power Supply 996.4 2 1992.8 97% 1933 Graphics processing unit (GPU) assembly w/o 611.9 2 1223.8 97% 1183 GPU 611.9 2 1298.2 97% 1183 K80 Graphics Processing Unit 999.1 2 1998.2 97% 1933 Heatsink 425.7 2 851.4 93% 793 2822 Circuit board W/ Hardware 2910.7 2910.7 97% 2824 Fan Assembly 734.4 4 2937.6 97% 2844 Chassis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 100% 2278.4 444	Circuit board W/Hardware	81.9	1	81.9	100%	81.9
Power Cable 59.6 97% 53.6 1300W Power Supply 996.4 2 1992.8 97% 1933 Graphics processing unit (GPU) assembly w/o U 1992.8 97% 1933 GPU 611.9 2 1998.2 97% 1183 K80 Graphics Processing Unit 999.1 2 1998.2 97% 1933 Heatsink 425.7 2 851.4 93% 793 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2823 Fan Assembly 734.4 4 2937.6 97% 2844 Chassis Assembly 5094.9 1 5094.9 97% 4944 Chassis Assembly 2278.4 1 2278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 444	Circuit board W/Hardware	89.6	1	89.6	100%	89.6
1300W Power Supply 996.4 2 1992.8 97% 1933 Graphics processing unit (GPU) assembly w/o 1223.8 97% 1183 GPU 611.9 2 1223.8 97% 1183 K80 Graphics Processing Unit 999.1 2 1998.2 97% 1933 Heatsink 425.7 2 851.4 93% 759 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2823 Fan Assembly 734.4 4 2937.6 97% 4844 Chassis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 100% 2278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 444	HD Mini SAS Cable	15.8	1	15.8	97%	15
Graphics processing unit (GPU) assembly w/o 611.9 2 1223.8 97% 118 K80 Graphics Processing Unit 999.1 2 1998.2 97% 1938 K80 Graphics Processing Unit 999.1 2 1998.2 97% 1938 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2823 Fan Assembly 734.4 4 2937.6 97% 2844 Chassis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 1 2278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 444	Power Cable	59.6	1	59.6	97%	58
GPU 611.9 2 1223.8 97% 1183 K80 Graphics Processing Unit 999.1 2 1998.2 97% 1933 Heatsink 425.7 2 851.4 93% 793 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2822 Fan Assembly 734.4 4 2937.6 97% 2844 Chassis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 1 2278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 444	1300W Power Supply	996.4	2	1992.8	97%	1933
K80 Graphics Processing Unit 999.1 2 1998.2 97% 1933 Heatsink 425.7 2 851.4 93% 792 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2822 Fan Assembly 734.4 4 2937.6 97% 2843 Chassis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 12278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 444	Graphics processing unit (GPU) assembly w/o					
Heatsink 425.7 2 851.4 93% 792 Circuit board W/ Hardware 2910.7 1 2910.7 97% 2823 Fan Assembly 734.4 4 2937.6 97% 2844 Chassis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 1 2278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 444	GPU	611.9	2	1223.8	97%	1187
Circuit board W/ Hardware 2910.7 1 2910.7 97% 2822 Fan Assembly 734.4 4 2937.6 97% 2844 Chassis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 1 2278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 444	K80 Graphics Processing Unit	999.1	2	1998.2	97%	1938
Fan Assembly 734.4 4 2937.6 97% 2844 Chassis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 1 2278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 444	Heatsink	425.7	2	851.4	93%	792
Chassis Assembly 5094.9 1 5094.9 97% 4944 Lid (cover - steel) 2278.4 1 2278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 445	Circuit board W/ Hardware	2910.7	1	2910.7	97%	2823
Lid (cover - steel) 2278.4 1 2278.4 100% 2278.4 Hard Disk Drive Assembly 242.1 2 484.2 92% 445	Fan Assembly	734.4	4	2937.6	97%	2849
Hard Disk Drive Assembly 242.1 2 484.2 92% 445	Chassis Assembly	5094.9	1	5094.9	97%	4942
	Lid (cover - steel)	2278.4	1	2278.4	100%	2278.4
Sum *** 23648.2 g 23007.3	Hard Disk Drive Assembly	242.1	2	484.2	92%	445
	Sum ***			23648.2 g		23007.3

Recyclability rate: R rcy =

Σ(m_(i) x RCR_(i)/ m_{EEE} x 100% = 97 %

Symbols and definitions

 $m_{(i)}$ = Mass of i^{th} part

 $RCR_{(i)}$ = Recycling rate of the ith part in the corresponding end-of-life treatment scenario

R _{rcy} = Recyclability rate

m_{EEE} = 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 2016 results for IBM product end-of-life management are attached to the right. The IBM and the Environment 2016 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, publically available references sources for recyclability of materials (see references below) and on the overall results of IBM's product endof-life management venders. Where there is a publically 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 publically available recyclability rate, the overall rate of 97% is the 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 recyclabile 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.

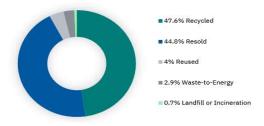
**** References: IEC/TR 62635, "Technical Report IEC/TR 62635. Guidelines for End of Life information provision from manufacturers and recyclers, and for recyclability rate calculation of Electrical and Electronic Equipment." The International Electrotechnical Commission (IEC), 2012

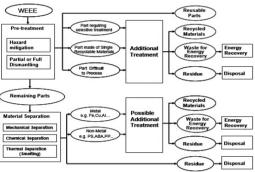
P. Chancerel and M. Marwede, JRC Technical Reports, Feasibility study for setting-up reference values to support the calculation of recyclability / recoverability rates of electr(on)ic products August 2016 and NSF/ANSI 426 - 2018 Environmental Leadership and Corporate Social Responsibility Assessment of Servers

End of life treatment methodology - The methodology for recycling technologies and practices for this product generally follow the end-oflife treatement 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