Chapter-1 Design Specifications

1) Model M-0415J2

2) Title)

3) Outlines

This is an automatic stripping machine where two robots automatically feed the wafer carrier placed on the loader to the unloaded section after going through given stripping processes. Works to be stripped are manually placed or picked up.

4) Specifications of the System

Work to be stripped	MR Head
Material	ALTIC
Dimension	6" x t2
Conveyance	Automatic/Manual (For operation box)
Conveying Direction	Left to Right (from front)
Process Time	Changeable
Operating Time	24 Hours/day
	7 Days/Week
	365 Days/ Year

5) System Components

Body	Stainless-welder assembly (#400)
	(Including casters & adjustment legs)
Coating Color	Muncell 2.5Y 8/2
Control box	Stainless-welder assembly (#400)
Operation Panel	Touch panel, switches for each operation
Process Procedure	NMP→NMP→IPA→IPA→IPA/VP
Safety Device	IPA gas detector, fume sensor
Shutter	Installed to all tanks
Down Flow	Clean filter (2sets), ULPA filter
Fire Suppression System	Automatic fire extinguisher/ CO2 (45.4Kg) x 2
Monitor	IPA gas sensor, fume sensor, leak sensor,
	exhaust pressure monitoring sensor
US Equipment	Ultrasonic vibration generator & oscillating board (8 sets)
Inlet/Outlet	Loader & unloader (1 set each)
Exhaust Duct	O.D. ϕ –7/8" pipe
Cassette	Max. 12 cassettes can be placed (Electropolished)

6) System Dimension (Inch)

Body	214.57" x 78.7" x 82.7" (W x D x H)
Control box	17.7" x 78.7" x 82.7" (W x D x H)
Weight	Approx.10227lbs (including total solvent volume to be used for operation)

7) Utilities

Electric Power Input	3φ 220V 60Hz Approx. 64KVA (Approx. 197Amp.) * 200Amp breaker is to be used
Power Source for backup	1φ 110V 60Hz - 1 0A x 1
Cooling Water	3600L/hour 18 degree C or below (0.1 – 0.15MPa)
Clean Dry Air-1	Approx. 1600 NL/min. (Max. 0.7MPa)
Clean Dry Air-2	Approx. 2550 NL/min. (Max. 0.7MPa)
N2	Approx. 80 NL/min - (Max. 0.4MPa)

Drainage & Circulation Volume

1> Heated water Drain	Indefinite L/hour Max. 50 degree C – Pressurized drainage
2> Solvent Drain	Indefinite L/hour Max. 50 degree C - gravity drain
3> Cooling Water Flow	Between chiller and LIO-2.

Solvent Level for use

NMP	Indefinite L/hour (Max. 0.1MPa)
IPA	Indefinite L/hour (Max. 0.1MPa)

Exhausting Level	(For the System) 180Pa * Installed a static pressure gauge that will turn off the system when the exhausting level is insufficient.
Machine Pan Drain	Normally closed - SUS pipe 1/2"

8) Process Time

Stripping Time	Changeable
Feeding Time	Changeable

9) Cassette

Dimension	Refer to the attached sheet. J-001
Number of Cassettes	10
Spare	4 cassettes

10) Details of the System

1- Lift-Off Machine

1> Frame Material	SUS304 (#400)
2> Panel Material	SUS304 (#400)
3> Exhaust Duct Material	SUS304 (Acid-cleaned)

2 – Processing Tank

Tank Material	SUS316L (Electropolished)
Pipe Material	SUS316L/EP pipe (Electropolished)
Sealing Material	PTFE

3 – Filtering Circulation Unit

Tank Material	SUS316L (Electropolishied)
Pipe Material	SUS316L/EP pipe (Electropolished)
Sealing Material	PTFE

4 - Conveyance

Conveyance System	Horizontal Chucking
Drive	Servomotor
Contact portion with work	SUS316L (Electropolished)

5 – Oscillator

Driving System	Ball-screw
Drive	Motor
Stroke	40 mm (Changeable)
Contact portion with solvent	SUS316L (Electropolished)

6 – Pull-up

Driving System	Vertical elevator
Drive	Servomotor
Contact portion with work	SUS316L (Electropolished)

7 – Loader

Driving System	Turn table (90 degree index)
Drive	Index + motor
Contact portion with work	SUS316L (Electropolished)

8 – Unloder

Driving System	Turn table (90 degree index)
Drive	Index + motor
Contact portion with work	SUS316L (Electropolished)

9 – Electric Panel for the System

Material (Body)	SUS304 (#400)
Inner board	SS400 / SPCC
Sequencer	MITSUBISHI (PLC)
Touch Panel	Digital (Color LCD)

11) Safety Equipment

1> Inside the System	Leak sensor * When the leak sensor is turned ON, it will shutdown the heater and supply valve immediately.
2> Maintenance Panel	Door sensor (for alarm and operation stop)

12) Stripping Process

Pos	Solvent	Method	Temperature (Degree C)	Ultrasonic	Pump	Filter	Tank Upper/Lower	Heater	Cooling Water
1	NMP	Ultrasonic	Max. 80±1	600w + 26KHz (Left) 600w + 38KHz (Right) 1200w + 26KHz (Bottom)	Bellows	5μ+1μ	70L 19.1 Gal.	10kw	Needed
2	NMP	Ultrasonic	Max. 80±1	600w + 26KHz (Left) 1290w + 200KHz (Right) 1200w + 26KHz (Bottom)	Bellows	5μ+1.2μ	70L 19.1 Gal	10kw	Needed
3	IPA	Ultrasonic	Indefinite	600w + 26KHz (Bottom)	Bellows	0.2μ+ 0.1μ	40L 10.6 Gal.		Needed
4	IPA	Ultrasonic+ QDR +Shower	Indefinite	600w + 26KHz (Right)	Bellows	0.05μ	45L 13.4 Gal		Needed
5	IPA	Steam Dry	Boiling Point		Bellows	0.05μ	Drain Tank: 2 G. VP Bath: 4.4 G Total: 6.4 Gal.	9kw	Needed

1) Tank No.1 – No.4: Vertical oscillating stroke – 1.57" - 10 times/min.

2) Tank No.1 & No.2: Valid dimension - 14.96" x 15.94" x 11.8" (W x D x H), No.3 - Valid dimension: 8.07" x 15.74" x 8.84" (W x D x H)

3) N2 supply circuit is equipped with 0.3μm filter.

4) Tank No.4: Equipped with shower system in order to prevent a wafer from being dried. (Shutters are closed during shower process)

5) Ultrasonic in the Tank No.1 & No.2 has selection mode to choose alternate or simultaneous oscillation.

13) Electric Panel / Operation Touch Panel

Switch Function	Control Circuit	Backup Circuit	Switch Type	QYT.	Remarks
Main Power			No-fuse breaker	1	
Operation Power		Installed	Electromagnetic pushbutton	2	
Operation Ready		Installed	Electromagnetic pushbutton	1	
Pump		Installed	Equipped with touch switch function	1 set	
Heater	Temperature control	Installed			
Ultrasonic		Installed			Ultrasonic On/Off Continuous → Stop → Automatic
Operation		Installed			Automatic Start / Cycle Stop / For manual operation
Clean Unit		Installed			AC110V x 3
Alarm					Buzzer stop / Reset
Emergency Stop			Manual pushbutton	4	1 on the operation box and 3 on other portions
Indication Lights				1 set	
Components of Backup battery				1 set	
* Intrinsically safe barrier devices are to be used as contact equipment.					

Note: A transformer is to be used for the equipment with AC100V or 200V.

14) Electrical equipment - 14-1: For safety functions

	Item	Function to be provided	Remarks
1	Main Motor Circuit	No-fuse earth leakage breaker	Equipped with an operation handle. When the breaker is turned off, the door is closed or opened
2	Motors	Earth leakage breaker	
3	Pumps	Low-level and overcurrent protection	
4	Heater	1: Low-solvent-level protection 2: Overheat protection	1: Using fiber-type level sensor. 2: Protected with thermometer and high-cut.
5	Motor for each operation	1: Overload protection and over-running sensor 2: Cycle-time monitoring	
6	Air-driven Motor	1: Alarm for low air or low N2 2: Cycle-time monitoring	
7	US Generator	1: Trouble will be displayed on the operation panel. 2: Generator output monitoring	
8	Explosion-protector	1: Automatic fire extinguisher and gas sensor. 2: Fire-protection damper in exhaust duct. 3: Motor cover on dangerous portion and air purge for relay box. 4: Using air-driven pumps 5: Contact switch is converted to barrier relay to be input. 6: Placing a carrier from outside the machine. Switch is installed near the exit door.	Need to provide power source for backup. In case of fire, the damper is closed.

9	Others	1: Emergency stop	Motors and operation circuits are shutdown.
		2: Signal tower (Red, yellow, green & white) 3: Alarm for no-more- space for cassettes on unloder.	

14) Electrical equipment - 14-2: Model and Manufacture

	Item	Model	Manufacturer	Remarks
1	Breaker	SA, EG type	Fuji Denki	
2	Electromagnetic Switch	SW, SC series	Fuji Denki	
3	Inverter	FVR-E11 series	Fuji Denki	
4	Sequencer	Q series	Mitsubishi Denki	
5	Touch Panel	GP series	Digital Co.	
6	Temperature Controller	E5CN type	OMRON	
7	Operation Switch	HW series (Φ22)	IDEC	
8	Sensor	EE-SX type	OMRON	

- All the equipment conforms to the UL approval.
- We might use equipment of other manufactures for certain reasons.

14) Electrical equipment - 14-3: Wiring

1) Motor Circuit – R-phase (black), S-phase (black), T-phase (black), Ground (green)
   Operation Circuit – AC circuit; R-phase (black) S-phase (white) DC circuit (blue)
2) Wires to be used:
   Motor Circuit – AWG wire (2 mm2 or equivalent)
   Operation Circuit – AWG wire
   (AC circuit – 0.75 mm2 or equivalent, DC circuit – 0.5 mm2 or equivalent)

15) Others

1- Muramatsu shall enforce electrical works in accordance with the Muramatsu exclusive operation standard unless there are specifications from Headway.

2- Be sure to connect the primary conductor directly to the main circuit breaker terminal. (Upper portion of the control box)

3- In case of fire, the automatic fire extinguisher runs and the motor circuit and operation circuit are shutdown.

4- In case the gas sensor runs, t he motor circuit and operation circuit are shutdown.

16) Safety Equipment

Item			Specifications
Sensors/Alarms	1	IPA gas sensor	In case of trouble, the whole operations are shutdown. Gas sensor runs in current and audible alarm sounds.
	2	Fume sensor inside the system.	In case of trouble, the automatic fire extinguisher runs by infrared fume sensor. The whole operations are shutdown.
	3	Fire-prevention damper temperature sensor	Temperature sensor interlocking enclosed type When a trouble occurs (high pitch sound), the whole operations are shutdown.
	4	Alarm for lower liquid level	Heater and pump are turned off by low-level signal. Alarm reason is displayed on the screen. Audible and visual alarms.
	5	Alarm for low-level in the steam tank	Heater and pump are turned off by low-level signal. Alarm reason is displayed on the screen. Audible and visual alarms.
	6	Alarm for overheat	Heater is turned off by temperature sensor. Alarm reason is displayed on the screen. Audible and visual alarms.
	7	Temperature rise in the steam tank	Heater is turned off by thermostat. Alarm reason is displayed on the screen. Audible and visual alarms.
	8	Cooling water disconnected in the steam tank. (Included cooling water in each process tank)	Each heater is turned off. Alarm reason is displayed on the screen. Audible and visual alarms.
	9	Lower level of N2 or air pressure (Included air purge)	Motors and air-driven pumps stop. Alarm reason is displayed on the screen. Audible and visual alarms.
	10	Alarms	Equipped with interlocks. Alarm reason is displayed on the screen. Audible and visual alarms.

	11	Emergency Stop Switch 1 on the electric cabinet, 1 on the right side and each 1 on the rear side. Total 4 switches	Red-mushroom shape. It restarts after manually reset. Equipped with a protection guard ring. When the emergency stop switch is turned on, the whole operations are shutdown.
Fire Extinguishing System	12	Fire Suppression System	Monitoring by fume sensor inside the system. Fire extinguisher : CO_2 In case of trouble: Exhaust damper is closed.
Heater	13	Heating method	Aluminum plate heater system. Equipped with an overheat-prevention system along with temperature control.
Control Box	14	Control box	Intrinsically safe barrier devices are to be used as contact equipment.
Others	15	Exterior material (Doors)	Cross-wired glass
	16	Bottom of inside the Machine	Installed oil-leak pan at the bottom of the machine inside. Ventilation is to conducted from the bottom of the machine inside.

16-2 Others

1- Each temperature control monitor shall have a function to select Centigrade or Fahrenheit

2- Each motor shall be equipped with a cover, and air-purge shall be enforced.

3- Air-driven valves are to be used as an automatic valve for solvent Standard solenoid valves are to be installed outside the system.

4- Pipes for primary shall be double-contained, and connected on the point of 6 inch inside the system.

5-As a ESD measure, grounding shall be conducted to the plumbed portions.

6- Drain pan shall be installed at the bottom inside the machine, and a leak sensor is attached. Each NMP or IPA pan shall have capability of 110% of maximum volume of solvent.

7- Emergency cooling circuit of the tank No.5 (IPA/VP) will be turned ON by the operation power being turned OFF.

8- A static pressure gauge is installed into the exhaust duct, and when the pressure is lowered, the system will stop.

9- A flow meter with contact for N2 is installed to each heater, and when the pressure is lowered, the system will stop.

10- Air-purge is enforced to the equipment with driving systems (ex: motors).

[Note] Regarding the lights inside the system, further discussion is needed between HWT and Muramatsu.

17) Others

1- Warm-up time for the operation shall be 1 hour or less.

2- Need to provide filters for inspections.

17-2 Filter

Manufacturer: Nihon Entegris K.K.

POS.	Filter Model	Quantity	Note
F-1	CJ05F1C3S (5μm)	30 filters/case	Spare: 26 filters provided
F-2	CJ01F1C3S (1μm)	30 filters/case	Spare: 24 filters provided
F-3	PG50010T1 (5μm)	1 filter/case	
F-4	PG12010T1 (1.2μm)	1 filter/case	
F-5	CWEG010T1 (0.2μm)	1 filter/case	
F-6	RGCV01P01 (0.1μm)	1 filter/case	
F-7	RGCZ01P01 (0.05μm)	1 filter/case	
F-8	CTFZ01TPE (0.05μm)	1 filter/case	
F-9	EHM11R10A (50μm)	1 filter/case	Spare: 1 filters of SMC provided
	YY16012PE	2 ring/pack	O-ring (TEV HOG) for filter housing.

18) Revision Report

No.	Date	Revised Contents	Made by	Approved
1				
2				
3				
4				
5				

Name of the System: **Lift-Off Machine**

Model Number: M-0415J2

Drawings to be submitted

No.	Item	Drawing No.	Date	Revision	Sheet
1	Plumbing diagram	P-001	2010.10.13		A1
2	Plumbing drawing for primary	P-002	2010.10.13		A3
3	Carrier drawing	J-001	2010.10.13		A3
4	Schematic drawing (1/3)	F-001	2010.10.13		A1
5	Schematic drawing (2/3)	F-002	2010.10.13		A1
6	Schematic drawing (3/3)	F-003	2010.10.13		A1

Drawing list of oscillating board

No.	Applied for	Drawing No.	Output	Hz	Remarks
1	Tank No.1 (Left)	M-0415J-U003	600W	26KHz	
2	Tank No.1 (Right)	M-0415J-U003	600W	38KHz	
3	Tank No.1 (Bottom)	M-0415J-U005	1200W	26KHz	
4	Tank No.2 (Left))	M-0415J-U003	600W	26KHz	
5	Tank No.2 (Right)	M-0415J-U003	1290W	200KHz	
6	Tank No.2 (Bottom)	M-0415J-U005	1200W	26KHz	
7	Tank No.3 (Bottom)	M-0415J-U001	600W	26KHz	
8	Tank No.4 (Right)	M-0415J-U003	600W	26KHz	

Note: All the oscillating boards in the tank No.1 and No.2 have been processed with 100μm hard-chrome plating.