Technical description of the Subject of the Order

Detailed requirements for the components and parts for vacuum deposition line are given below. The requirements should be treated as minimum requirements. The contractor can offer components and parts with higher parameters.

Vacuum unit components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Clamping bolt	2	pcs	Type KV: with ball lever, angular (serration) Type R: by clockwise rotation (drawn version) Steel, blackened Eccentrical cam and washer, case hardened Screw bolt nitrided, Tensile strength class 8.8
2	Half nipple (long)	12	pcs	* Material 304 SS * A=40mm (connecting diameter) * B=25.4mm (tube diameter) * C=40mm (length)
3	Male stud elbow	28	pcs	Connection of tubing at a 90° angle with a male thread and reduced height dimensions. - RoHS and ISO 14743. O.D. 16 mm: pressure limited to 16 bar at 20°C and 10 bar at 80°C. maximum working pressure 20bar (2MPa) working temperature -20 to 80 °C vacuum capability 755 mm Hg body TECHNICAL POLYMER sub-base NICKEL PLATED BRASS O'-rings NBR gripping ring STAINLESS STEEL pipe 12mm tread G3/8
4	Viewport	1	pcs	ISO-K-viewport, DN63, glass exchangable, for wall installation - window material: borosilicate glass (Borofloat®33) - transmission range: appr. 400...2500 nm - thickness: appr. 4 mm - flange material: stainless steel 1.4301 (304) - window mounting: FPM-O-Ring, demountable - view diameter: appr. 70 mm - He-leak rate: < 1.0E-9 mbar l/s - temperature range: up to 150°C

Substrate Holder (Drum) components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Pneumatic swing clamp cylinder	2	pcs	Pneumatic Swing Clamp Cylinder model: R : Right rotation type (from right to left) Bore size 40 - Ø40mm Stroke Ø40 - 15mm Sensor switch SB2 Sensor code (CS-9B) 2pcs

2	Servo motor	3	pcs	Driving Type - AC Servo Motor Series | Encoder Type - C (220 V / 3000 rpm) | 20 bit (Incremental type) Motor Frame Size - 60 mm Rated output power - 200W Shaft type - Keyway, No Brake No Oil Seal Standard Shaft Dimensions: S 7: 14 mm , 4: 24 mm
3	Rotary connect	1	pcs	* Union 4 PASS 3/8 BSP + centr pass * Self-supported rotation union * Flanged rotor * Stainless steel rotor * Hose connection BSP * Housing connection radial
4	Linear Guideway	2	pcs	* Square block type * Model size 20 * Medium load type * Mounting from top block mounting type * 2 blocks per rail * Mounting from top rail mounting type * Rail length 300mm * No special rail * Preload code ZA * Precision code C
5	Bellows	1	pcs	Customised item according to the drawing Pip-0124960
6	High prec. planetary reducer	3	pcs	Min. toque 200Nm, Protection class IP65, baclkash < 12 arcmin
7	Rolled Ball Screw	1	pcs	* Screw shaft diameter 15 * Lead 05 * Shaft length 150-1200mm
8	Spur Gear	1	pcs	Material - Stainless Steel Number of teeth - 84 Gear Shape - Shape A Shaft Bore Diameter - Φ16 Shaft Bore Tolerance - H7 Tooth Width - 15 mm
9	Timing pulleys	2	pcs	Belt Type - AT5 Belt Width Used - 10 mm Number of Teeth - 40 Pulley Shape - Shape B Material - Aluminum Alloy 2000 series Surface Treatment - Clear Anodized Aluminum Timing Pulleys Shaft Bore Specifications (New JIS Keyway Hole + Tap) - 16 mm

Transport system components and parts				
	Name	**Quality**	**Unit**	**Description**

1	Linear guideway	4	pcs	* Flange block type * Model size 30 * Heavy load type * Mounting from top block mounting type * 2 blocks per rail * Mounting from top rail mounting type * Rail length 840mm * No special rail * Preload code Z0 * Precision code C

Elevator components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Servo motor	20	pcs	Driving Type - AC Servo Motor Series | Encoder Type - C (220 V / 3000 rpm) | 20 bit (Incremental type) Motor Frame Size - 60 mm Rated output power - 200W Shaft type - Keyway, No Brake No Oil Seal Standard Shaft Dimensions: S 7: 14 mm , 4: 24 mm
2	Linear Guideway	20	pcs	* Square block type * Model size 20 * Heavy load type * Mounting from top block mounting type * 2 blocks per rail * Mounting from top rail mounting type * Rail length 700mm * No special rail * Preload code Z0 * Precision code H * 2 rails per axis set
3	High prec. planetary reducer	20	pcs	* Power 100-400W * Flange 7MP62A-50-A * Output shaft with a keyway * Bushing to input bore Ø6/35, Ø8, Ø10, Ø11, Ø12
4	BSSR2505-570-KLC-K14-S3	20	pcs	Type: Rolled Nut Type: Standard Nuts Flange Shape" Round Shape 2 Sides, Machined Accuracy Grade: C10 Twisting Direction: Right Axial Play: 0.10 or Less Nut Structure: 1-fach Circuit System: Tube Type Shaft Overall Length: 570mm Keyway on fixed side shaft end: KLC

Pumping system components and parts				
	Name	**Quality**	**Unit**	**Description**

1	Dry Roots Pump ACP40	3	pcs	Technical Data ACP 40, Standard, single phase, manual gas ballast Ambient temperature 12 °C | 53.6 °F | 285 K Continuous inlet pressure, max. 1,013 hPa | 759.75 Torr | 1,013 mbar Cooling Air Exhaust pressure, max. 1,200 hPa | 900 Torr | 1,200 mbar Flange (in) DN 40 ISO-KF Flange (out) DN 25 ISO-KF Helium leak rate, max. 5 · 10-7 Pa m3/s Mains requirement 110–230 (±10%) V AC 50/60 Hz Mains requirement: frequency (range) 50/60 Hz Max. pumping capacity of pure water vapor at 20°C 120 g/h Pumping speed 37 m³/h m³/h Typical ultimate pressure with gas ballast 1 · 10-1 hPa | 7.5 · 10-2 Torr | 1 · 10-1 mbar Typical ultimate pressure without gas ballast or purge 3 · 10-2 hPa | 2.25 · 10-2 Torr | 3 · 10-2 mbar
2	Turbomolecular Pump ATH 1603M	10	pcs	Technical Data ATH 1603 M, DN 200 ISO-F, External drive electronics, Water cooled, Non-heated Bearing Magnetically Levitated Compression ratio for Ar > 1 · 108 Compression ratio for H2 > 5 · 102 Compression ratio for He > 4 · 104 Compression ratio for N2 > 1 · 108 Cooling method Water Cooling water consumption 60 l/h l/h Cooling water consumption, max 60 l/h Cooling water consumption, min 60 l/h Cooling water temperature 15 °C | 59 °F | 288 K Electronic drive unit External drive electronics Flange (in) DN 200 ISO-F Flange (out) DN 40 ISO-KF Fore-vacuum max. for N2 1.7 hPa | 1.27 Torr | 1.7 mbar Gas throughput for Ar 20.3 hPa·l/s Gas throughput for H2 > 67.6 hPa·l/s Gas throughput for He > 67.6 hPa·l/s Gas throughput for N2 67.6 hPa·l/s Interfaces Via External drive electronics Mounting orientation in any orientation Operating voltage: 50/60 Hz 200 – 240 / 200 – 240, 50/60 Hz V AC V AC Power consumption at ultimate pressure 300 W Pumping speed for Ar 1280 l/s Pumping speed for H2 540 l/s Pumping speed for He 940 l/s Pumping speed for N2 1360 l/s Rotation speed ± 2 % 39,000 rpm | 39,000 min-1 Run-up time < 6 min Separate electronic drive unit YES Sound pressure level ≤ 48 dB(A) Ultimate pressure < 6 · 10-9 hPa | < 4.5 · 10-9 Torr | < 6 · 10-9 mbar Weight 34 kg | 74.96 lb

3	Active Pirani/capacitive transmitter	5	pcs	Technical Data PCR 280, 80 °C, DN 16 ISO-KF Feedthrough Glass Filament Tungsten Flange, Material Stainless steel Measurement range C 5 · 10-5 – 1.5 · 103 hPa hPa Measurement range max. 1.5 · 103 hPa | 1.12 · 103 Torr | 1.5 · 103 mbar Measurement range min. 5 · 10-5 hPa | 3.75 · 10-5 Torr | 5 · 10-5 mbar Method of measurement Pirani/Capacitance Nominal diameter DN 16 ISO-KF Output signal: Measurement range 1.2 – 8.68 V V Output signal: Minimum load 10 kΩ Pressure max. 5,000 hPa | 3,750 Torr | 5,000 mbar Repeatability: 1 · 10-3 – 1100 hPa ± 2 % Seal Metal Sensor cable length 100 m Sensor cable length max. 100 m Supply: Voltage V DC 15 – 30 V DC V DC Temperature: Operating 10 °C | 50 °F | 283 K Temperature: Storage -20 °C | -68 °F | -293 K
4	Gauge corrosion resistant	5	pcs	Technical Data PKR 360 C, low current, ceramic coated, DN 25 ISO-KF Accuracy: 1 · 10-8 – 1 · 100 hPa ± 30 % Anode Molybdenum Bakeout temperature Electronics removed, ≤ 150 °C Feature Corrosion resistant Feedthrough Glass, ceramic coated Filament Tungsten Flange, Material Stainless Steel 1.4435 Measurement range C 1 · 10-8 – 1 · 103 hPa hPa Measurement range max. 1 · 103 hPa | 7.5 · 102 Torr | 1 · 103 mbar Measurement range min. 1 · 10-8 hPa | 7.5 · 10-9 Torr | 1 · 10-8 mbar Method of measurement Pirani/Cold Cathode Nominal diameter DN 25 ISO-KF Output signal: Measurement range 2 – 8.6 V V Output signal: Minimum load 10 kΩ Pressure max. 10,000 hPa | 7,500 Torr | 10,000 mbar Repeatability: 1 · 10-8 – 100 hPa ± 5 % Sensor cable length 300 m Sensor cable length max. 300 m Supply: Voltage V DC 14.5 – 30 V DC V DC Temperature: Operating 5 °C | 41 °F | 278 K Temperature: Storage -40 °C | -104 °F | -313 K
5	High vacuum manual angle valve	7	pcs	High vacuum manual angle valve (Bellows seal) Flange size 25
6	Vacuum Valve	7	pcs	Stainless steel High Vacuum Angle/In-line Valve/Normally Closed/Bellows Seal Flange size 25 Indicator/Pilot port direction XMA Auto switch type M9PL No. of auto switches/Detecting position A—2pcs-- Valve open/closed

7	Vacuum valve	5	pcs	Stainless steel High Vacuum Angle/In-line Valve 2 Stage Control, Single Acting/Bellows, O-ring Seal Series XMD Flange size 40 Auto switch type A90 (L)-- D-A90 (L)--Solid state switch-- For 3m, “L” is added at the end of the part number No. of auto switches/Detecting position A—2 pcs--Valve open/closed
8	Poppet Check Valve	5	pcs	Stainless Steel Poppet Check Valve, Fixed Pressure, 3/4 in. Swagelok Tube Fitting, 3 psig (0.21 bar) Body Material 316 Stainless Steel Connection 1 Size 3/4 in. Connection 1 Type Swagelok® Tube Fitting Cleaning Process Standard Cleaning and Packaging (SC-10) Connection 2 Size 3/4 in. Cracking Pressure 3 psi (0.21 bar, 0.021 MPa) Feature O-rings: Fluorocarbon FKM

Heating system components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Viewport	1	pcs	KF40 flange for CT1M,2M,3M with B270 window (up to 10^-7 mbar)/ KF40 flange for CTLT with Ge window (10^-7 mbar)
2	Pyrometer	1	pcs	Temperature range: 50 - 400 st C Spectral range: 2.3 µm Optical resolution (90% energy): 60:1 Exposure time (90% signal): 1 ms

Bottom flange components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Valve with instant connection	2	pcs	* Diameter – 12mm * Maximum working pressure - 10 bar (1 MPa, 145 psi) * Working temperature - 0 to 70 °C * Material - technical polymer, nickel plated brass * O-ring - NBR * Gripping ring – stainless steel * Flow rate – 2300 (l/mm)

Technological devices components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Capacitance Diaphragm Gauges	4	pcs	* Maximum bakeout temp with no water 130° C * Maximum operating isothermal environment temperature with minimum water flow 400° C * 0.1 Torr
2	High Voltage power supply	8	pcs	* Operating power 600mA/10kV * Arccurrent limitation * ultra-fast arc management, 5ms arc recovery * three phase400V * 19", 4U

3	Programmable Controller	8	pcs	Programmable Controller. Necessary features are: magnet deflection, electron emission and pocket rotation. Must be able to be interfaced with any standard electron beam evaporator, high voltage- and filament power supply and be compatible with products of major manufacturers.PLC Connection; PLC / Deposition Controller Input for Auto Emission Set-Point; Slave RS232 Serial port to connect the Controller to a PC / PLC; Master RS232 Serial port to connect the Controller to a slave equipment; Optical Link RX; Optical Link TX; Gun Rotation Interface; Magnet Interface (X and Y); Mains input (220V);
4	Filament power supply	8	pcs	* Filament Supply: 0-50A * Filament Voltage: 0-10VDC * 0,5 m coaxial high voltage cable to HVPS * 2 m filament cable to high voltage feedthrough * Mains:1x230VAC,50/60Hz
5	4" Circular magnetron	12	pcs	* Indiract cooling * 4 inch * 3rd generation circular magnetron with gas injection and RF, DC, HIPIMS power options * DN200FL flange
6	ISO centering ring with O'ring	16	pcs	Inner diameter: 210 mm Outer diameter: 213 mm Material-C/R: Al Material-O'ring: Viton O'ring size: AS-371 Width of outer ring: 3.9 mm Width of inner ring: 8 mm
7	Micro-wave plasma source (ECR)	4	pcs	* Output power 450W * Frequency range adjustable 2400-2500MHz * Friequency resolution adjustable with 100kHz step * Power supply 7/16 connector output * Coupler with true RMS detector - linear measurement * Ripple <0,2% RMS * Reflected power adjustable from 1 - 450W * Mains 1 phase, 110V-240VAC, 50/60 Hz
8	Automatic impedance Tuner	4	pcs	Frequency of Operation - 13.56 MHz RF Power Rating - up to 1200W Tuning Capacitor - Vacuum 5-500 pF/5 kV Load Capacitor - Air 20 to 1020 pF/1.5 kV Impedance Rating, RF IN: 50 Ohms Input | Output Connector: "N" Type Female | "N" Type Female, "NH Female, DIN 716 or Ceramic Stud"
9	Generator Output to Tuner Input	4	pcs	RG213/U Type N Plug Coaxial Cable Assemblies - 50 Ohm Transmission Line with Type N Male Connectors 8 feet long. 6000 009696N-N

10	Tuner Output to Application Input	8	pcs	Connector Series 1 N Connector Gender 1 Male Connector Polarity 1 Standard Connector Angle 1 Straight Connector Mount Method 1 None Connector Impedance 1 50 Ohm Connector Series 2 HN Connector Gender 2 Male Connector Polarity 2 Standard Connector Angle 2 Straight Connector Mount Method 2 None Connector Impedance 2 50 Ohm RF Cable Part Number RG393/U RF Cable Type RG393 RF Cable Impedance 50 Ohm
11	RF Generator & Amplifier	12	pcs	Class Of Operation Class C Frequency Of Operation 13.56 MHz Frequency Stability 0.005% or better RF Power Output 1200 Watts nominal into 50 Ohms CEX Input 3Vp-p to 8Vp-p at 13.56 MHz CEX Output 3Vp-p to 8Vp-p at 13.56 MHz Internal RF Source Crystal oscillator at 13.56 MHz IN / OUT VSWR 1.2:1 max input, 3:1 max output Output VSWR Protection 250 Watts max reflected power limit (Automatic limit within 0.1 ms) Harmonic Level @ 100W ≥-50 dBc Spurious Output 50dBc RF Output Stability Unconditionally stable up to 10:1 VSWR, any angle, any load. Dynamic Power Range 1 to 1200 W, settings within +/-2W Scale 1-10V, user selectable Pulse Operation Pulse width: 1 ms – 9995 ms Controlled via front panel and GUI Ramp Operation Ramp speed: 1 W/s – 99 W/s Controlled via front panel and GUI Analog ports: SUBD-25 Digital ports: RS-232, RS-422, USB RF Power Margin ((Open Loop Max Power/Rated Power)-1)x 100): +10% - defined by AC/DC power supply settings, +50% - RF section capacity RF Connectors INPUT BNC Female OUTPUT N Female BLANKING BNC Female
12	Automatic impedance Tuner	4	pcs	Frequency Of Operation 13.56 MHz RF Power Rating up to 2400 W Tuning Capacitor Vacuum 25-250 pF/9 kV Load Capacitor Vacuum 1500pF/2.4 kV Impedance Rating, RF IN: 50 Ohms Input Connector “N” type Female Output Connector Options “N” type Female, “HN Female, DIN716 or Ceramic Stud

13	RF POWER SOURCE	4	pcs	Class Of Operation Class C Frequency Of Operation 13.56 MHzRF Power Output 2400 Watts nominal Calibration into 50 Ohm standard Dynamic Power Range ~ 1 to 2400 Watts, Operation with external signal: Output as amplifier in MGC/Burst 0 dBm IN, 10V scale at CTL IN pin 5 Input Drive Source (amplifier) Signal or function generator, analog input capable of drive 0 to 3 dBm @ 50 Ohm Internal RF Source Crystal oscillator at 13.56 MHz Stability: 0.005% or better IN / OUT VSWR 1.2:1 max input; 3:1 max output Harmonic Level @ 2000W Better than –40 dBc any harmonic RF Output Settings & Control SubD 25 Analog and Digital I/O Power Settings Accuracy >240W: within +/-1.5% of a SP, < 240W: within +/- 6W. BURST Specifications Pulse Width from 3 µs to continuous, user defined. Connectors INPUT BNC Female OUTPUT Type N Female Digital I/O: RS232, USB2.0. AC Power Connection Three Prong International connector (2P +SG for L1, N/L2, SG), INTERPOWER p/n 84132201 (blue), VDE rating 32A/200/250V, UL/CSA rating 30A/250V
14	Automatic Impedance Tuner	4	pcs	Frequency Of Operation 3.56 MHz RF Power Rating up to 600 W Tuning Capacitor Vacuum 5-500 pF/5 kV Load Capacitor Air 20 to 1720 pF/1.1 kV Impedance Rating, RF IN: 50 Ohms Input Connector “N” type Female Output Connector Options “N” type Female, “HN Female, DIN716 or Ceramic Stud
15	RF Generator & Amplif ier	4	pcs	Class Of Operation Class C/D Frequency Of Operation 13.56 MHz Frequency Stability 0.005% or better RF Power Output 300 Watts nominal into 50 Ohms Input Drive Source for CEX Input 3Vp-p to 8Vp-p at 13.56 MHz CEX Output 3Vp-p to 8Vp-p at 13.56 MHz IN / OUT VSWR 1.2:1 max - input ; 3:1 max - output Harmonic Level @ 100W ≥ -50 dBc Spurious Output 50dBc RF Output Stability Unconditionally stable up to 10:1 VSWR, any angle, any load. Dynamic Power Range 1 to 300 W, settings within +/-2W Scale 1 - 10V , user selectable Pulse Operation Pulse width: 1 ms – 9995 ms Ramp Operation Ramp speed: 1 W/s –99 W/s Analog ports: SUBD-25 Digital ports: RS-232, RS-422, USB RF Power Margin ((Open Loop Max Power/Rated Power)-1)x 100) +10% - defined by AC/DC power supply settings, +50% - RF section capacity RF Connectors INPUT BNC Female OUTPUT N Female BLANKING BNC Female

16	Magnetron Power Supply	8	pcs	* Voltage input 220V, 50/60Hz * Max output power 3kW * Max power consumption 3,4kW * Voltage output limits 65-650 * Steps of output voltage - 5V * Output avarage current limits - 0,1-4,5A * Steps of output current 0,1A * Everage output power limits 0,05-3 kW * Steps of output power 100W * LCD display
17	Bias power supply	12	pcs	* Voltage input 3*380V, 50/60Hz * Max output power 1,5kW * Max power consumption 1,8kW * Voltage output limits 10-300V * Steps of output voltage - 1-10V * Output avarage current limits - 0,01-5,0A * Steps of output current 0,01-1A * Everage output power limits 0,01-1,5 kW * Steps of output power 1-100W * LCD display
18	Spectrometer	4	pcs	* Optical Bench: ULS Symmetrical Czerny-Turner, 75 mm focal length * Wavelength range: 200-1100 nm * Resolution: 0.06-20 nm * Stray-light: 0.19-1.0% * Sensitivity: 375,000 counts/µW per ms integration time * Detector: CMOS linear Image Sensor * Signal/Noise: 300:1 * AD converter: 16 bit, 6 MHz * Integration time: 30 µs - 59s * Power supply: Default USB3 power, 500 mA / Or 12 VDC, 300 mA * Data transfer speed: 0.38 ms /scan (USB3) / 1.0 ms (ETH) * Sample speed with on-board averaging: 0.38 ms /scan
19	Plasma generator	8	pcs	* Working capacity 2500W * Input resistance 50Ohm * Operating friequency 13MHz

Cooling system components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Orientable adaptor	11	pcs	Thread designation - G1/2 Working temperature - -40°C to 100°C Body - Brass O-ring - NBR
2	Water pressure gauge	11	pcs	*Range - 0 - 100 psi (0 - 6.9 bar) *Output - 0 - 5 V *1.5 m cable termination *Compensated Temperature: -20°C to 85°C (≤ 5 psig/psia is 0 to 50°C)

3	Water temperature gauge	11	pcs	Mounting thread - 1/4 NPT Type - K Junction type - U (undergrounded) 72'' long extension leads
4	Valve	11	pcs	Size - Valve Type: 3 (8A/10A/15A - N.C.) Fluid - 2 (For Water) Body material | Port size |Orifice diameter - C37 Brass | 1/2 | Φ10 Voltage - Electrical entry: G (24 VDC - DIN terminal with surge voltage suppressor)
5	Digital flow switch for water	11	pcs	Thread type G Rated flow range 0,5-4 L/min Port size 3/8OUT1 - Flow rate 1-5V
6	Digital flow switch for water	11	pcs	* Thread type G * Rated flow range 0,5-4 L/min * Port size 3/8 *OUT1 - Flow rate 1-5V, OUT2 - temperature rate 1-5V + Temperature sensor
7	Digital flow switch for water flow valve	11	pcs	*Remote sensor unite * Valve is installed * Thread type G * Rated flow range 2-16 L/min * Port size 1/2 *OUT1 - Flow rate 1-5V

Chassis components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Adjustment pad	5	pcs	Material - Stainless Steel Diameter - 60 mm Allowable Vertical Load - 16.6 kN
2	Detent Hinges	6	pcs	Material - Acetal Copolymer Forward Torque - 1.694 nm (14.99 in-lbf) Reverse Torque - 1.694 (14.99 in-lbf) Installation - Rivet/Screw Detented Open Angle - 115° Series - Detent
3	Door edge multipoint latching system	4	pcs	Material and Finish - PC/ABS plastic black, zinc alloy and steel, zinc plated Latch Points - 2 Length - 625 mm (24.61 in) Latch installation - 672 mm (26.457 in)
4	Actuator assembly	2	pcs	Material and Finish: PC/ABS Plastic, black. Zinc alloy and steel, zinc plated Maximum working load: 100 N (22 lbs) per latch point, 500 N (112 lbs.) for entire system Flammability rating: UL94-V0 for all plastic components

Electrical system components and parts				
	Name	**Quality**	**Unit**	**Description**

1	Valve with instant connection	8	pcs	* Diameter – 12mm * Maximum working pressure - 10 bar (1 MPa, 145 psi) * Working temperature - 0 to 70 °C * Material - technical polymer, nickel plated brass * O-ring - NBR * Gripping ring – stainless steel * Flow rate – 2300 (l/mm)
2	Valve with instant connection	10	pcs	* Diameter – 6mm * Maximum working pressure - 10 bar (1 MPa, 145 psi) * Working temperature - 0 to 70 °C * Material - technical polymer, nickel plated brass * O-ring - NBR * Gripping ring – stainless steel * Flow rate – 670 (l/mm)
3	Valve with instant connection	10	pcs	* Diameter – 8mm * Maximum working pressure - 10 bar (1 MPa, 145 psi) * Working temperature - 0 to 70 °C * Material - technical polymer, nickel plated brass * O-ring - NBR * Gripping ring – stainless steel * Flow rate – 1080 (l/mm)
4	Valve with instant connection	10	pcs	* Diameter – 10mm * Maximum working pressure - 10 bar (1 MPa, 145 psi) * Working temperature - 0 to 70 °C * Material - technical polymer, nickel plated brass * O-ring - NBR * Gripping ring – stainless steel * Flow rate – 2230 (l/mm)
5	Servo drive ASD-A2-0221-M, A.1 (Design)	4	pcs	Rated Input Power - 200W Input Voltage and Phase: 220 V 1 Phase Model Type - M Continous Output Current: 1.55 Arms Max. Instantaneous output current: 4.65 A Dimensions: W x L x H - 173 x 170 x 45 mm Weight: 1.5 kg
6	Encoder Cable ASD-ABEN0003, A.1 (Design)	4	pcs	Encoder Cable; Length - 3000 mm
7	Male Clamp Coaxial Connector	4	pcs	HN Male Connector Max operating frequency: 6 GHz VSWR: 1.5:1 Operating Voltage (AC) - max 1500 Vrms Dimensions: L x D - 56.64 mm x 22.0 mm Weight: 76.66 g
8	Controller	1	pcs	* Protocol options: Modbus TCP/ IP * 80 digital inputs * 32 digital outputs * 32 analog inputs * 16 analog outputs * 4 muduls of power splitting per consumers

9	Computer	1	pcs	Intel Core i5-7400 or better; 500W min power supply; DDR4 8Gb or more; hard drive 1000Gb or better; Windows 10 OS
10	Sensor cable	3	pcs	Cable length - 3m
11	Thin Film Deposition Monitor	1	pcs	* LED indicator of cutting speed and thickness * Number of channels 2 * 2 gauge inputs, 6 calibrating inputs * Interface RS 232 * 2 analog outputs (0-10V) * 2 digital inputs * 4 relay outputs, 120V, 2,5A * Main voltage 200-240V, 20W * Main friequency 50-60Hz * OS Windows
12	Thin Film Deposition Monitor	1	pcs	* LED indicator of cutting speed and thickness * Number of channels 6 * 2 gauge inputs, 6 calibrating inputs * Interface RS 232 * 2 analog outputs (0-10V) * 2 digital inputs * 4 relay outputs, 120V, 2,5A * Main voltage 200-240V, 20W * Main friequency 50-60Hz * OS Windows
13	Sensor Head, Single Sensor, Removable From Water Lines + Cable, Microdot 30.75	3	pcs	Quartz Sensor Head * Single Sensor * Removable From Water Lines * Cable, Microdot 30.75
14	Silica Fibre Sewing Thread	1	pcs	High temperature thread which resists 1400^{o}C short term and 1000^{o}C continuous.

Gas system components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Mass flow controller	2	pcs	Input voltage = 24V; Miminum Input Pressure = 0,25 PSI; Control signal = 0 - 5V, Max flow = 50 SCCM; Gas Type = O2; Signal output = 0 - 5V
2	Mass flow controller	2	pcs	Input voltage = 24V; Miminum Input Pressure = 0,25 PSI; Control signal = 0 - 5V, Max flow = 150 SCCM; Gas Type = Ar; Signal output = 0 - 5V
3	Mass flow controller	1	pcs	Input voltage = 24V; Miminum Input Pressure = 0,25 PSI; Control signal = 0 - 5V, Max flow = 500 SCCM; Gas Type = Ar; Signal output = 0 - 5V
4	Mass flow controller	1	pcs	Input voltage = 24V; Miminum Input Pressure = 0,25 PSI; Control signal = 0 - 5V, Max flow = 50 SCCM; Gas Type = N2; Signal output = 0 - 5V
5	Mass flow controller	1	pcs	Input voltage = 24V; Miminum Input Pressure = 0,25 PSI; Control signal = 0 - 5V, Max flow = 100 SCCM; Gas Type = O2; Signal output = 0 - 5V
6	Clean gas filter	4	pcs	Type: Cartridge type Connection: TSJ 1/4 Operating fluid: Air,Nitrogen Operating Pressure: max. 0.99 MPa, Vacuum 1.3 x 10^-6 kPa Operating Temperature: 5°C to 80°C Filtration: 0.01 µm (Filtering efficiency 99.99% Rated Flow Rate: 45 l/min Filtration area: 10 cm2

7	Regulator	4	pcs	Body size: 1/4 Washing Grade: Grade A Set pressure: 0.05 to 0.7 MPa Relief mechanism: Non-relief Port size: Rc 1/4 Gauge port orientation: R Specification Ambient and fluid temperatures: 0 to 60 °C (No freezing) Fluid-contact material: Stainless steel 316 (Body is stainless steel 316L)
8	Valve	11	pcs	Valve size: Size 1 Orifice diameter: fi 2 Fitting size: 1/4 Fitting type: Compression fitting Voltage: 24 VDC Electrical entry: DIN terminal
9	Male connector	10	pcs	Body material: 316 Stainless steel Connection 1 Size \Type: 1/4 in. \ Swagelok Tube Fitting Bulkhead: No Bulkhead Connection 2 Size \ Type: #10-32 \ Male UNF Thread
10	Male elbow	8	pcs	Body material: 316 Stainless steel Connection 1 Size \Type: 1/4 in. \ Swagelok Tube Fitting Body type: Male Elbow Connection 2 Size \ Type: 1/4 in. \ Male ISO Tapered Thread
11	Union tee	7	pcs	Body material: 316 Stainless steel Connection 1 Size \ Type: 1/4 in. \ Swagelok Tube Fitting Body type: Tee Connection 2 Size\Type: 1/4 in. \ Swagelok Tube Fitting Connection 3 Size\Type: 1/4 in. \ Swagelok Tube Fitting Series: Swagelok Tube and Adapter Fittings
12	Union	2	pcs	Body material: 316 Stainless steel Connection 1 Size \ Type: 1/4 in. \ Swagelok Tube Fitting Body type: Tee Connection 2 Size\Type: 1/4 in. \ Swagelok Tube Fitting Connection 3 Size\Type: 1/4 in. \ Swagelok Tube Fitting Connection 4 Size\Type: 1/4 in. \ Swagelok Tube Fitting Series: Swagelok Tube and Adapter Fittings
13	Instrumentation ball valve	4	pcs	Body material: 316 Stainless steel Connection 1 Size \ Type: 1/4 in. \ Swagelok Tube Fitting Connection 2 Size \ Type: 1/4 in. \ Swagelok Tube Fitting Actuator Type: Manual Ball/Stem material: stainless steel Flow Pattern: 2-Way, Shutoff, Straight Handle Style: Lever Room temperature pressure rating: 206 BAR at 37°C
14	Reducing union	9	pcs	Body material: 316 Stainless steel Connection 1 Size \ Type: 6mm \ Swagelok Tube Fitting Connection 2 Size \ Type: 1/4 in. \ Swagelok Tube Fitting Body Type: Union/Reducing Union Bulkhead: No Bulkhead Series: Swagelok Tube and Adapter Fittings

Quarz coating control system components and parts				
	Name	**Quality**	**Unit**	**Description**
1	Oscillator kit	1	pcs	* OSC-100 oscillator * 15.2 cm BNC cable * 3 m BNC cable
2	Feedthrough	1	pcs	* KF40 Feedthrough * 1 Coax * 3 Tubes
3	Front load single sensor with shutter	1	pcs	* Max bakeout temp with no water 130C * Max operating environmental temp with min water flow 400C * Water tube 1/8 in (3,175 mm), stainless teel * Crystal exchange - front loading, self-contained package for ease of exchange * Mounting 2 #4-40 tapped holes on the back of the sensor body

Glovebox				
	Name	**Quality**	**Unit**	**Description**
1	Glovebox	3	pcs	Glovebox technical data: Material: Stainless steel Leak rate: < 0.05 Vol%/h Window: Glass window Glove ports: POM, 220 mm diameter, O-ring sealed Gloves: Butyl, thickness 0,4 mm Light: Fluorescent lamp Feedthroughs: 2 flanges Electrical feedthrough: 1 Dust filter: min HEPA H13 in/out Shelves: 3 shelves mounted on the rear panel Antechamber technical data: Type: Cylindrical Material: Stainless steel Leak rate: <10-4 mbar l/s Sliding tray: Stainless steel Doors: Aluminum , anodized, thickness 10 mm Door lock: Door closing mechanism with spindle handle for one hand operation Pressure gauge: Analog display Gas purification system technical data: Operation principle: Closed loop recirculation Attainable purity level: Moisture < 1 ppm, Oxygen < 1 ppm Recommended enclosure volume:.Up to 2 m^3 Number of purification lines per purifier: 1 Box pressure control Main and side piping: Stainless steel Regeneration gas: N2/H2 mix. or Ar/H2 mix. (H2 2-10 %) Working gas: Nitrogen, Argon or Helium Oxygen and moisture sensors technical data: Measurement range: 0-1000 ppm