

Specification:
<b>1. Main system:</b>
<b>1.1. Process vacuum chamber</b>
<ul style="list-style-type: none"> <li>• five (5) CARC cathodes: two banks each with two cathodes and one bank with one cathode.</li> </ul>
<ul style="list-style-type: none"> <li>• One (1) rotating substrate table with vacuum feed through (roll in - roll out)</li> </ul>
<ul style="list-style-type: none"> <li>• Set of 10 x Cr targets</li> </ul>
<ul style="list-style-type: none"> <li>• Two (2) stationary thermocouples</li> </ul>
<ul style="list-style-type: none"> <li>• One (1) complete set of inner wall covers</li> </ul>
<ul style="list-style-type: none"> <li>• One (1) table trolley</li> </ul>
<b>1.2. Vacuum pumping</b>
<ul style="list-style-type: none"> <li>• One (1) roughing pump</li> </ul>
<ul style="list-style-type: none"> <li>• One (1) diffusion pump</li> </ul>
<ul style="list-style-type: none"> <li>• One (1) high vacuum butterfly valve</li> </ul>
<b>1.3. Process gasses</b>
<ul style="list-style-type: none"> <li>• Three (3) gas lines with individual mass flow controllers</li> </ul>
<b>1.4. Closed loop water distribution system</b>
<ul style="list-style-type: none"> <li>• Water circulation pump</li> </ul>
<ul style="list-style-type: none"> <li>• Heat exchanger connected to external cooling system</li> </ul>
<ul style="list-style-type: none"> <li>• PLC monitored</li> </ul>
<b>1.5. Control system</b>
<ul style="list-style-type: none"> <li>• PLC system control</li> </ul>
<b>1.6. Power supplies</b>
<ul style="list-style-type: none"> <li>• Bias power supply</li> </ul>
<ul style="list-style-type: none"> <li>• Arc cathode power supplies</li> </ul>
<b>1.7. Spare parts</b>
<ul style="list-style-type: none"> <li>• One (1) set of inner-wall shielding</li> </ul>
<b>1.8. Documentation</b>
<ul style="list-style-type: none"> <li>• Two (2) sets, containing</li> </ul>
<ul style="list-style-type: none"> <li>• Operating manual</li> </ul>
<ul style="list-style-type: none"> <li>• Recommended spare parts list</li> </ul>
<ul style="list-style-type: none"> <li>• Mechanical and electrical drawings, parts lists</li> </ul>
<b>1.9. Site engineering</b>
<ul style="list-style-type: none"> <li>• Installation and commissioning 1-2 weeks</li> </ul>
<b>1.10. Utilities to be prepared by customer before commissioning</b>
<ul style="list-style-type: none"> <li>• Mains power connection</li> </ul>
<ul style="list-style-type: none"> <li>• Mains water</li> </ul>
<ul style="list-style-type: none"> <li>• Process Gases including technical grade nitrogen for gas ballast (option)</li> </ul>
<ul style="list-style-type: none"> <li>• Compressed air</li> </ul>
<ul style="list-style-type: none"> <li>• Water chilling facility</li> </ul>
<ul style="list-style-type: none"> <li>• Water drain</li> </ul>
<b>2. TECHNICAL SPECIFICATIONS</b>
<b>2.1. Vacuum system</b>
<b>2.1.1. Process chamber</b>

- Material : Stainless steel
- Internal : Mechanically polished
- Cross section : 500x500mm
- Inner height : 600 mm.
- Access doors : One (1), 600 × 500 mm
- View ports : One (1), with shutter and protective glass window
- Cooling : cooling pipe on the wall

### **2.1.2.Pumping system**

- Roughing pump (rotary vane) : 40 m<sup>3</sup>/h
- One roots pump: 150 m<sup>3</sup>/h
- One (1) diffusion pump : 1500 l/s, high compression ratio, water cooled
- Gate valve

### **2.1.3.Pressure monitoring**

- Pirani gauge
- Capacitance Manometer gauge for high accuracy control during process
- Penning gauge for ultimate vacuum measurement

### **2.1.4.Vacuum characteristics With clean and empty chamber**

- Ultimate vacuum : < 5 × 10<sup>-6</sup> mbar

## **2.2.Deposition**

### **2.2.1.Cathodes**

- CARC cathodes
- Target :75mm
- Number Ten (10) , divided over three side walls

### **2.2.2.Power supplies**

- Bias power supply standard
- DC Power 18kW
- Arc power supplies
- Standard 10
- Power supplies in cabinet with heat extraction

### **2.2.3.Process gas system**

- Number of lines : Three (3)
- Mass flow control : Three (3), for Ar, N<sub>2</sub> , O<sub>2</sub>
- Option extra two (2)
- Ratio of Oxygen to Nitrogen flow will be limited to 25 % in the -software.

### **2.2.4.Loading / fixturing**

- Maximum coating area: 300 × 300 mm
- Substrate table (roll in roll out): Diameter of table 350 mm
- Rotation speed 0.5-3 rpm
- Drive: direct with torque limiter
- Maximum load on table 150 kg
- Rotary feed through cooled by system cooling water
- Product temperature monitoring by wall mounted thermo couples
- By thermo couples mounted on the substrate table for accurate temperature control
- Mass flow controllers below side of chamber

### **2.2.5.Product heating and cooling**

- Heating of products
- Heating power: appr 15 kW are located in door and rear wall.
- Monitoring by two (2) thermocouples fixed to wall.

- Maximum process temperature 500.C
- Cooling :Standard cooling of rings is by passive nitrogen venting up to 800 mbar.

### **2.3. Water system**

- The water system consists of a water pump, heat exchanger, valves and instrumentation. It provides cooling of chamber walls, the turbo pump, baffle, rotary feed through and the cathodes. During deposition the water system will be operated in cold water mode (approx. 15°C). During pumping, venting and open doors the water system is operated in 'warm' water mode (25-28°C). The temperature is controlled by bypass valve over the heat exchanger. The cathodes are set parallel in 3 circuits, with cathodes per side panel in series and flow switch in the return line. Automatic refill and emergency drain are integrated in the system.

### **2.4. Process control system**

The YNS process control system is extremely comprehensive and offers following key features:

- Operation monitored by PLC
- Total protection from operator error

## **3. Utilities (to be supplied by customer)**

### **3.1. Mains power**

- Voltage :  $3 \times 400 \text{ V} \pm 10\%$
- Frequency : 50 or 60 Hz
- Maximum power requirement: 120 kVA

### **3.2. Process gases**

- Gas pressure: 1.5 bar
- Type and purity of gases: Ar (5.0), N2 (5.0), O2
- Technical grade nitrogen gas Application: venting of chamber, flushing of fore pump