

VON ARDENNE



**Coatings
for
Solar Absorber
Applications**



Solar Absorber Application on Metal Strip and Tubes

1. Vacuum coating for Metal Strip
2. Vacuum coating for Tubes

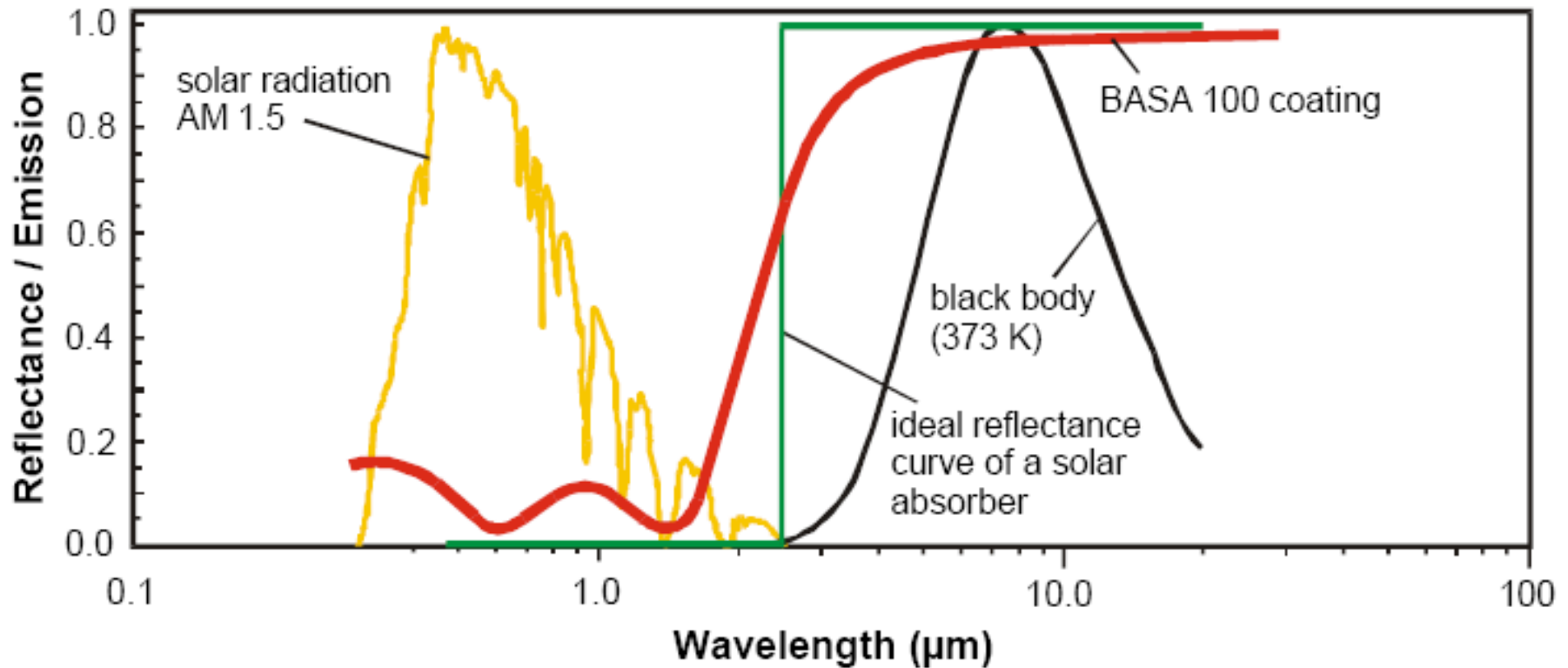


Solar Absorber Application on Metal Strip and Tubes

1. Vacuum coating for Metal Strip

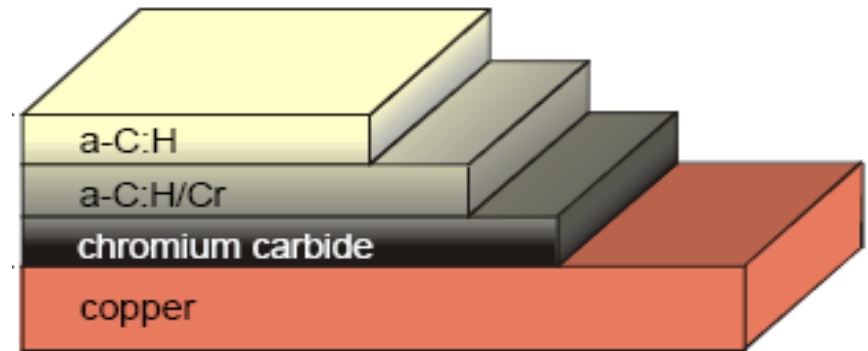
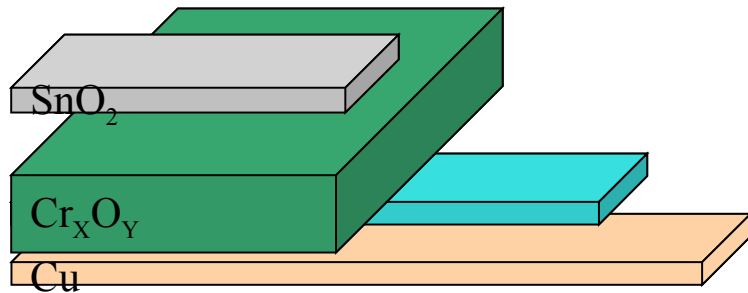
Solar Absorber Application

Reflectance Spectrum of Coating Layer



Solar Absorber Application

Absorber Layer Stack



Different layer stack base on different process and know-how

Solar Absorber Application

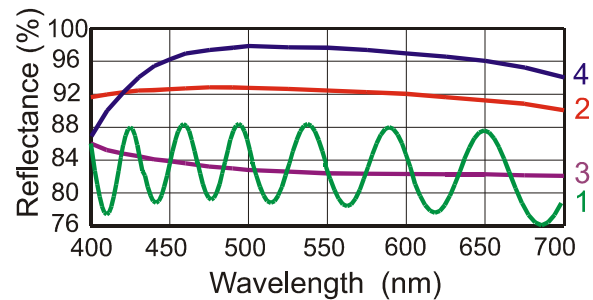
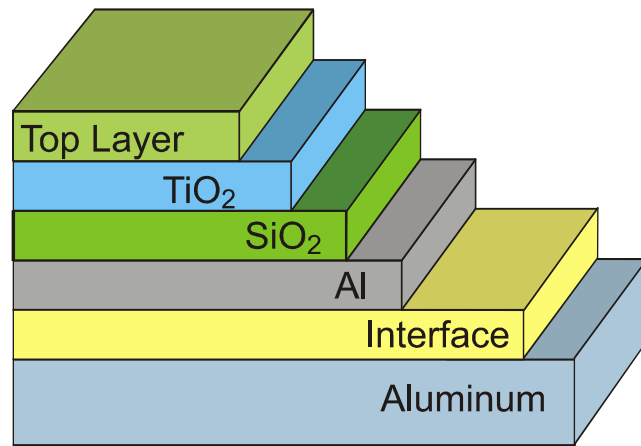
further Absorber Layer Stack Development

Cr(VI)-free multi layer stack

layer thickness:	160 – 200 nm
expected absorption:	95%
expected emmissivity:	5%

Solar Absorber Application

High reflective Mirror Layer Stack



- 1 anodized aluminum strip
- 2 aluminum layer
- 3 aluminum layer + SiO₂ layer
- 4 aluminum layer + SiO₂ layer + TiO₂ layer

Solar Absorber Application

Details of MSC 1200 Metal Strip Coater



VAAT_Concept for Absorber Coating (A2A)

05/03/08

MSC 1200

Basic Data

Kind of Coater:	Air-to-Air
Substrate:	Aluminum Strip
Strip width:	1200 – 1250 mm
Strip thickness:	0,3 – 0,7 mm
Strip speed:	5 m/min
Kind of process:	continuous coating
Campaign:	120 h, uninterrupted
Number of campaigns:	appr. 48/year
Productivity:	appr. 2,25 Mio m ²

MSC 1200

Coater Design (Vacuum Equipment)

The vacuum equipment consists of:

- Entry lock system
- Pre-treatment chamber (glowing devices)
- Sputter chambers (10 pcs. expected)
- Chambers for gas separation between sputtering
- Electron beam evaporation (1 pc. expected)
- Exit lock chamber

Optional: Measurement devices

MSC 1200

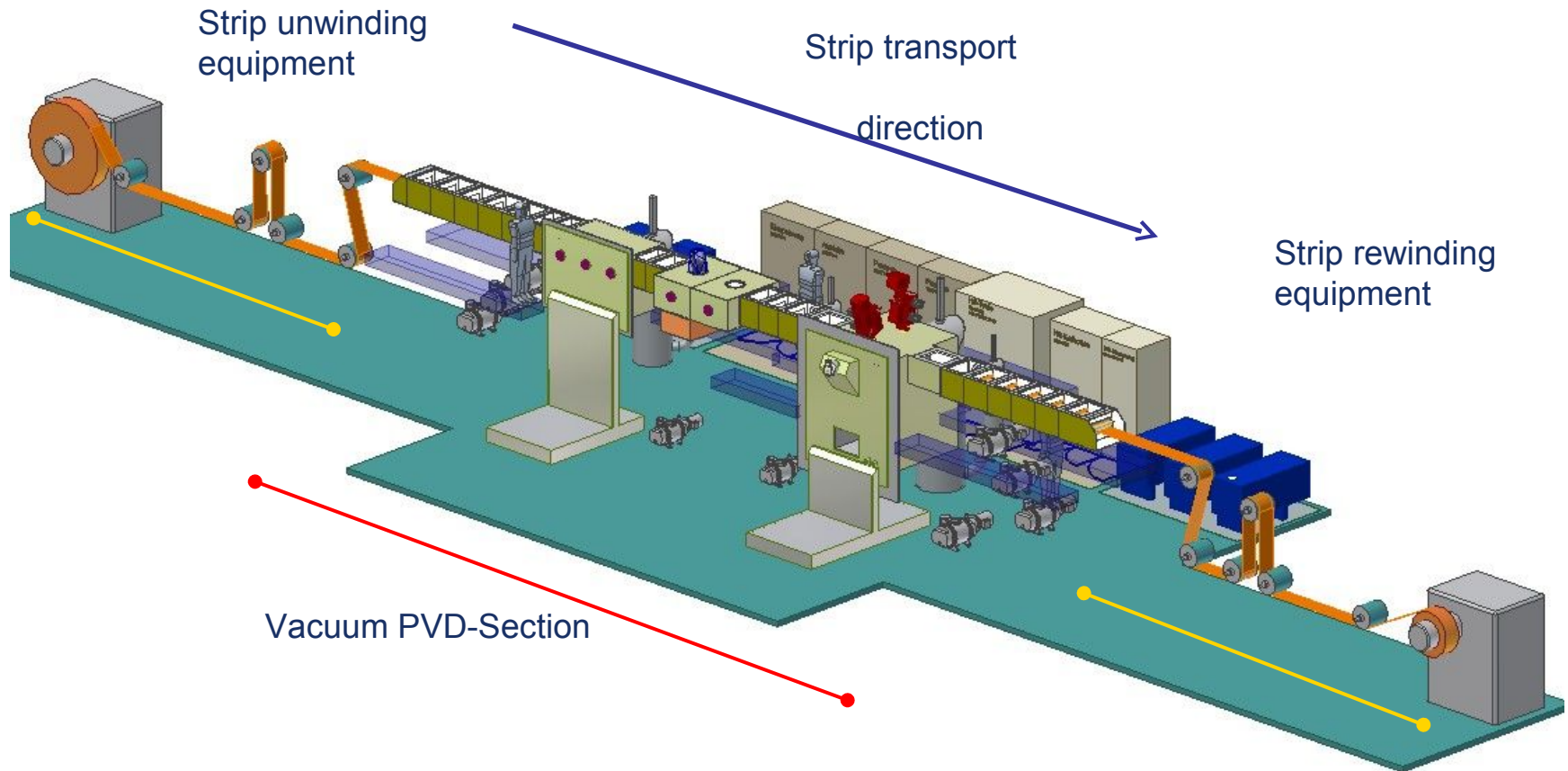
Technological Equipment

Pre-treatment:	Glowing devices Magnetic glowing devices
Magnetrons:	Rotatable Dual Magnetrons
EB guns:	EH 100V or EH 200V

All technological equipments are made by VAAT
(VON ARDENNE Anlagentechnik GmbH)

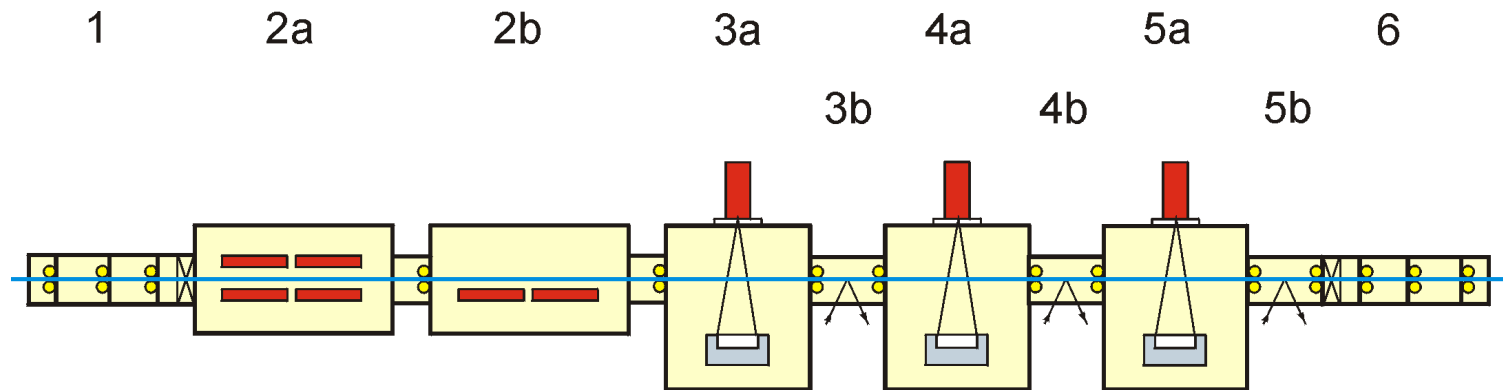
MSC 1200

Air - to - Air Coater with EB PVD Technology



MSC 1200

Air-to-Air Coater for highly reflecting Layer

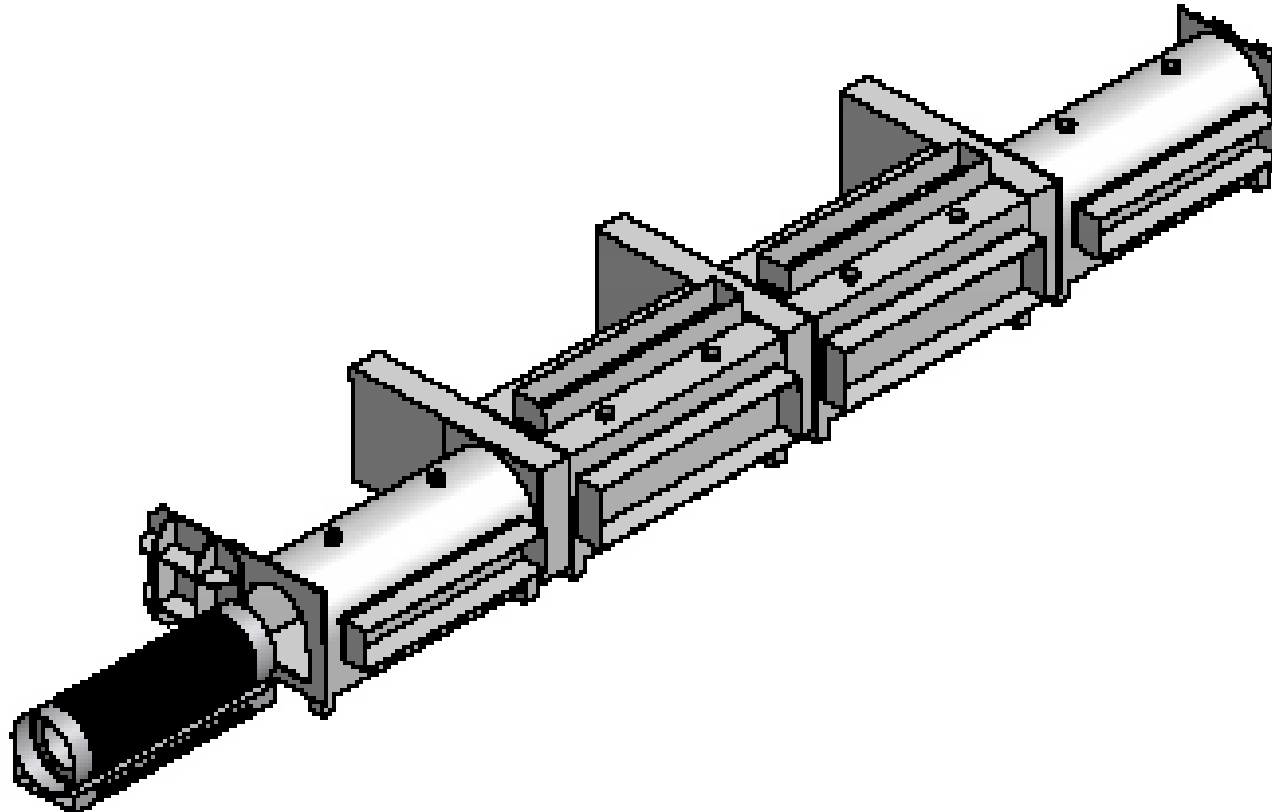


- 1** Entrance Lock
- 2a;2b** MF Plasma Pretreatment
- 3a** Aluminum EB-PVD
- 4a** SiO₂ Reactive EB-PVD
- 5a** TiO₂ Reactive EB-PVD
- 3b;4b;5b** Ellipsometrical Measurement
- 6** Exit Lock

Solar Absorber Application on Metal Strip and Tubes

1. Vacuum coating for Tubes

Solar Absorber Application Scheme of TSS 4000 Tube Steel Coater



TSS 4000

Technology and Equipment

Chamber 1	<u>Carousel loading</u> <u>Pre-treatment</u>	Space for pre-treatment devices
Valve		Process decoupling
Chamber 2	<u>Process Chamber</u>	Space for integration of process equipments in four positions
Valve		Process decoupling
Chamber 3	<u>Process Chamber</u>	Space for integration of process equipments in four positions
Valve		Process decoupling
Chamber 4	<u>Carousel unloading</u>	

TSS 4000

Dimension

- LoA (incl. transfer area): 42,0 m
- High: 4,5 m
- Foot print area: 42,0 x 20,0 m

TSS 4000 Productivity

- 3 shift system
- 6 days per week
- 52 weeks per year
- app. 130.000 pcs. / year

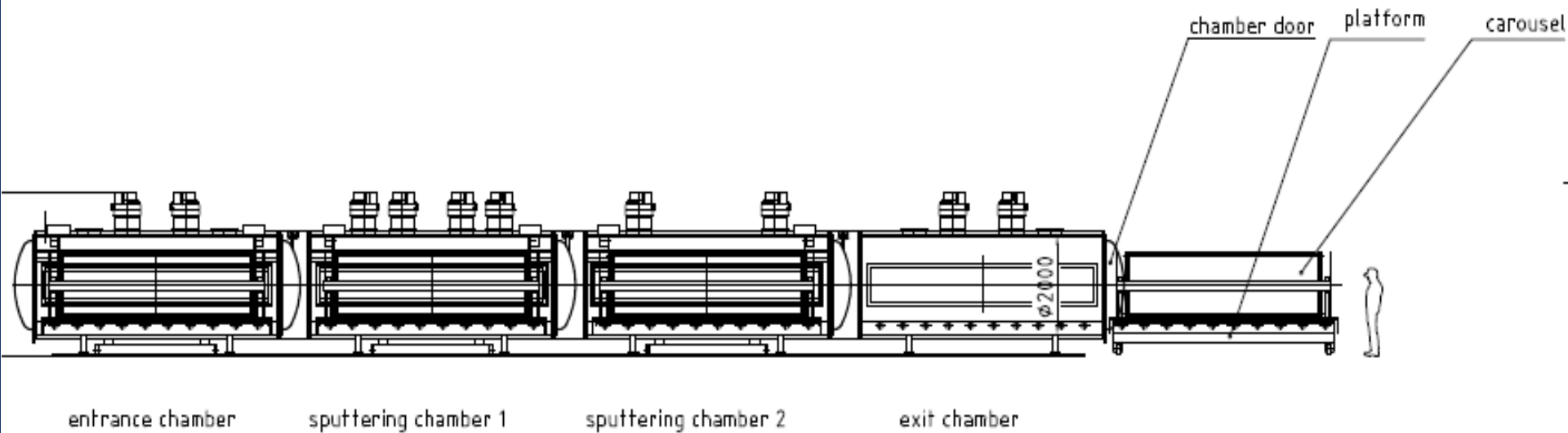
TSS 4000

Price Information

Coater: appr. 7,5 Mill. EUR

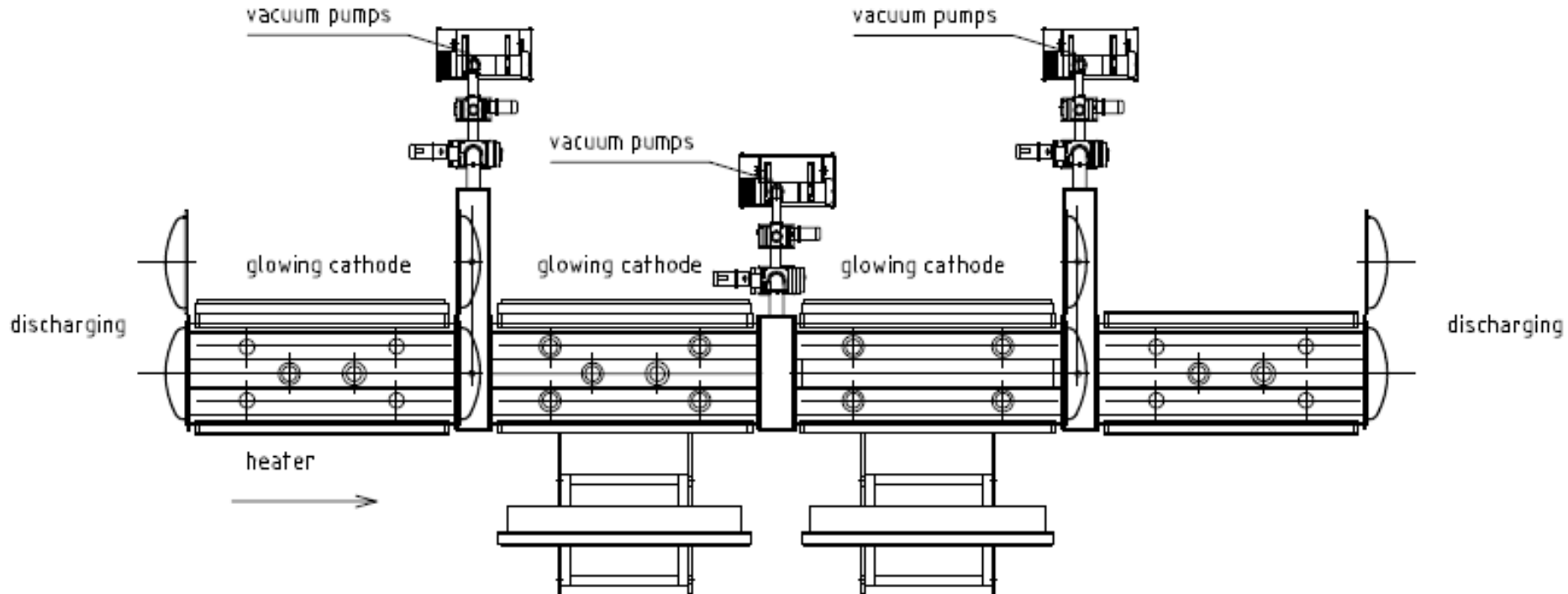
Prices: EXW Dresden according Incoterms 2000

Solar Absorber Application on Tubes



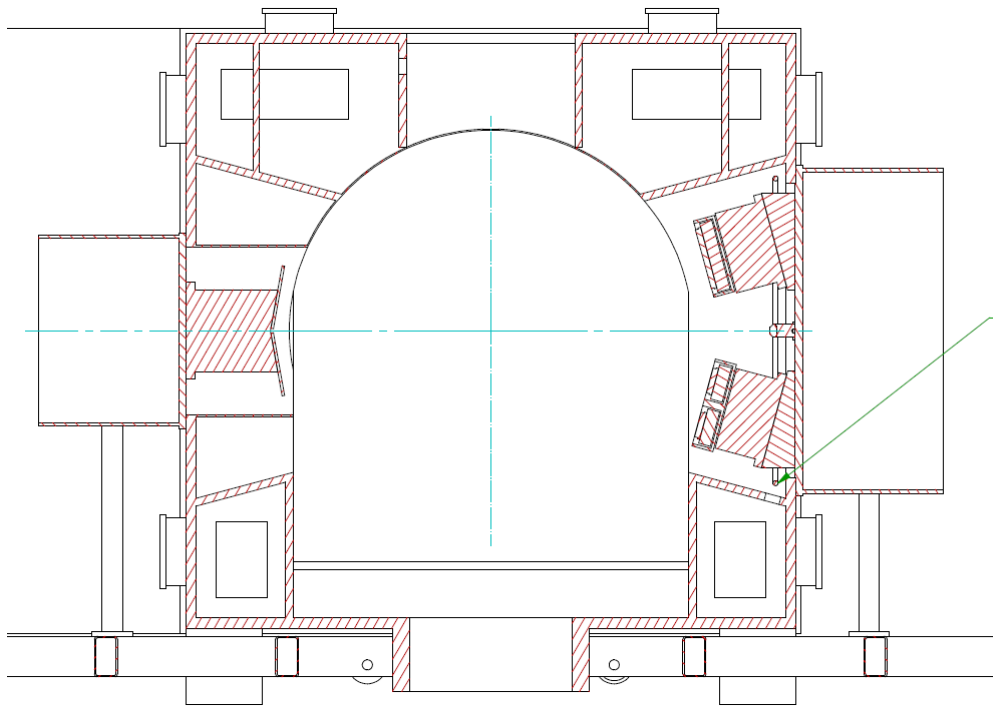
TSS4000 Machine layout

Solar Absorber Application on Tubes



TSS4000 Machine

Solar Absorber Application on Tubes

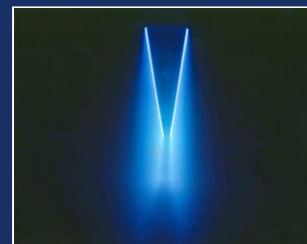
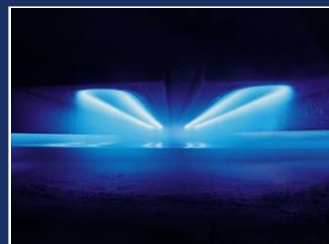
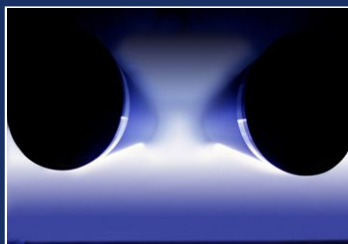


Technological devices can be mounted on 3', 6', 9' and 12 o'clock position

Devices on 3' and 9' o'clock position are movable with aid of an undercarriage and rail-wheel-system

Example for Chamber design

Thank You !



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VA-

03/2008



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