

## LINN HIGH THERM GMBH

Heinrich-Hertz-Platz 1 · D-92275 Eschenfelden · Tel. ++49-9665/9140-0 · Fax. ++49-9665/1720

Internet: <http://www.linn.de> E-mail: [info@linn.de](mailto:info@linn.de)

### QUESTIONNAIRE FOR TUBULAR – AND ROTARY TUBULAR FURNACES

CUSTOMER : Company: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Department: \_\_\_\_\_  
 Street: \_\_\_\_\_  
 City: \_\_\_\_\_  
 Country: \_\_\_\_\_  
 phone.: \_\_\_\_\_ fax: \_\_\_\_\_  
 www. \_\_\_\_\_ e-mail: \_\_\_\_\_

#### 1. GENERALS TO THE TUBULAR FURNACE

operation temperature: cont. \_\_\_\_\_ °C max. (short time) \_\_\_\_\_ °C  
 heating chamber dimensions: dia \_\_\_\_\_ mm heated length \_\_\_\_\_ mm  
 max outside dimensions of furnace: W \_\_\_\_\_ mm H \_\_\_\_\_ mm D \_\_\_\_\_ mm  
 number of heating zones: \_\_\_\_\_  
 operation:  horizontal  vertical  convertible horizontal- vertical  
 split type casing  with insert tube (see point 3.)  
 furnace moveable: speed: min. \_\_\_\_\_ mm/min max. \_\_\_\_\_ mm/min  
 rotary tubular furnace rotary speed min. \_\_\_\_\_ rpm max. \_\_\_\_\_ rpm  
 furnace tiltable \_\_\_\_\_ degrees  
 loading: particle size (grain- Ø) \_\_\_\_\_ mm  
 behaviour of floating, viscosity \_\_\_\_\_ cST  
 Furnace process:  continuous over \_\_\_\_\_ days \_\_\_\_\_ weeks  
 batch operation \_\_\_\_\_ cycles over \_\_\_\_\_ hours/week  
 temp. accuracy  ± 10°C (standard) length of const. temp. zone: \_\_\_\_\_ mm  
 ± 5°C max. wall temp. outside: \_\_\_\_\_ °C

#### 2. FURNACE LOAD

Kind of load: material \_\_\_\_\_ shape \_\_\_\_\_ chem. formula \_\_\_\_\_  
 specific weight \_\_\_\_\_ g/cm<sup>3</sup> spec. heat capacity: \_\_\_\_\_ kJ/kg°K  
 radioactive  toxic  explosive  hazardous  no  
 Dimensions of load: W \_\_\_\_\_ mm H \_\_\_\_\_ mm D \_\_\_\_\_ mm  
 per piece \_\_\_\_\_ mm<sup>3</sup> total \_\_\_\_\_ mm<sup>3</sup>  
 Weight of load: per piece \_\_\_\_\_ kg total \_\_\_\_\_ kg  
 Charging device/setters: material \_\_\_\_\_ shape \_\_\_\_\_ weight total \_\_\_\_\_

Burn out:  yes  no  condensing at temp \_\_\_\_\_ °C  combustable at temp. \_\_\_\_\_ °C  
 weight loss \_\_\_\_\_ %  dangerous \_\_\_\_\_  
 waste gases \_\_\_\_\_

### 3. EQUIPMENT:

#### 3.1 INSERT TUBE

internal dia \_\_\_\_\_ mm external dia \_\_\_\_\_ mm length \_\_\_\_\_  
 open at one end  open at both ends end plugs \_\_\_\_\_ qty.  
 endplug 1 feedthrough: gas dia \_\_\_\_\_ mm vac dia \_\_\_\_\_ mm thermocouple \_\_\_\_\_ qty.  
 endplug 2 feedthrough: gas dia \_\_\_\_\_ mm vac dia \_\_\_\_\_ mm thermocouple \_\_\_\_\_ qty.  
 gas dia \_\_\_\_\_ mm vac dia \_\_\_\_\_ mm thermocouple \_\_\_\_\_ qty.

#### Tube material:

Quartz for 1100° C  Inconel for 1200° C  
 Sillimantın for 1300° C (not gastight)  Alu-Oxide 99,7% for 1700° C  
 Sapphire for 1900° C  other: \_\_\_\_\_

#### 3.2 Additional for Rotary Tubular Furnace

with inner screw conveyor  with barrel in operation

#### feeding equipment:

entrance sluice  
 filling device with rocker  
 dosing unit with agitator and conveying screw  
 flap shutter  
 segmental slider

#### discharging equipment:

discharge vessel  
 condense deduction  
 waste gas exhausting

### 4. FURNACE ATMOSPHERE:

Air  Hydrogen\*(H<sub>2</sub>) (dew point \_\_\_\_\_)  
 Oxigen (O<sub>2</sub> % \_\_\_\_\_)  H<sub>2</sub>/N<sub>2</sub>(Ar)- Mixture \*\* (\_\_\_\_\_% H<sub>2</sub> \_\_\_\_\_% N<sub>2</sub>)  
 Nitrogen (N<sub>2</sub>)  Exogas \* (10% CO<sub>2</sub>, 5% CO, 15% H<sub>2</sub>)  
 Argon (Ar)  Endogas\* (40% H<sub>2</sub>, 20% CO)  
 Helium (He)  cracked Ammonia\* (H<sub>2</sub> 8%)  
 Others \_\_\_\_\_

\*burn off device necessary \*\*H<sub>2</sub> >10% burn off device necessary

gas channels \_\_\_\_\_ qty. flowmeters \_\_\_\_\_ qty. mass-flow-controllers \_\_\_\_\_ qty  
 gas flow: \_\_\_\_\_ l/min \_\_\_\_\_ m<sup>3</sup>/h  
 gas overpressure: \_\_\_\_\_ mbar  
 partial pressure: \_\_\_\_\_ mbar - \_\_\_\_\_ mbar

vacuum in cold furnace:  10<sup>-1</sup>mbar  10<sup>-3</sup>mbar  10<sup>-5</sup>mbar  
 other: \_\_\_\_\_ mbar

vacuum in warm furnace under \_\_\_\_\_ °C:

10<sup>-1</sup>mbar  10<sup>-3</sup>mbar  10<sup>-5</sup>mbar  
 other: \_\_\_\_\_ mbar

**5. CONTROLLER / PROGRAMMCONTROLLER**

Control unit for multizone Furnaces  master-slave  individually controlled  
Control unit with Power supply  distance from furnace\_\_\_\_m  not separate  
ramps\_\_\_\_ dwells\_\_\_\_ programs\_\_\_\_  
Safety controller:  yes  no  
Sensor:  optical pyrometer  thermocouple\_\_\_\_\_ type\_\_\_\_\_qty.  
 Typ K NiCr/Ni <1200°C  
 Typ S Pt10%Rh/Pt <1600°C  
 Typ B Pt6%Rh/Pt30%Rh <1750°C  
 Pt20%Rh/Pt40%Rh <1820°C  
 Typ C W5%Re/W26%Re <1950°C  
Interface controller:  RS 232  RS 422/485

**6. INSTALLATION**

Power supply:  1 phase \_\_\_\_Volt \_\_\_\_Hz  ground  neutral  
 3 phase \_\_\_\_Volt  
Instability of power supply: ± \_\_\_\_%  
Water cooling for furnace housing:  not necessary  necessary  
Circulation cooling unit:  not necessary  necessary  
Water supply: pressure\_\_\_\_bar temp\_\_\_\_°C hardness of water\_\_\_\_mmol/l

**7. SPECIAL REQUIREMENTS:**

Environment:  clean room class\_\_\_\_  glove box  ex class\_\_\_\_

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any other information available ( graph for heating temperature/time or drawings ) ? Please add!

date: \_\_\_\_\_

signature: \_\_\_\_\_