



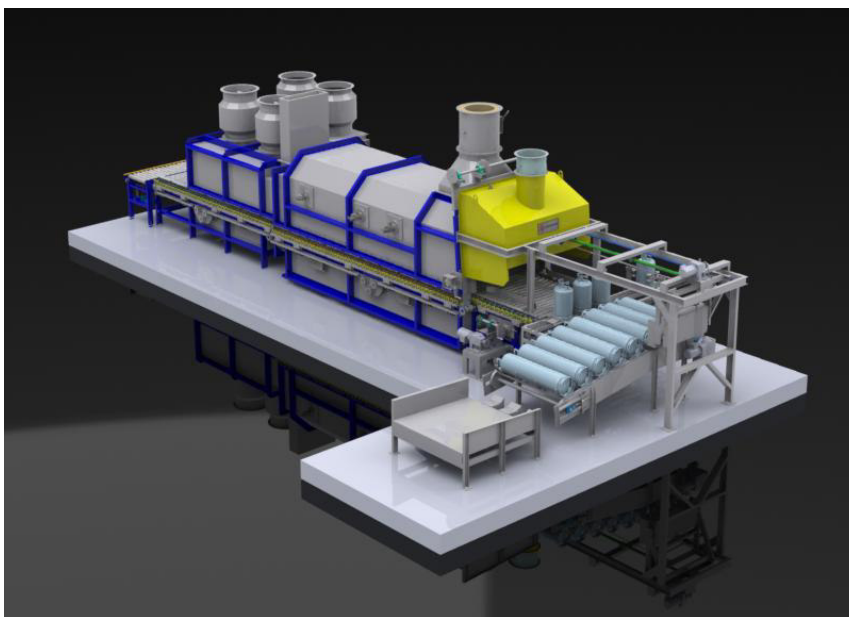
## NG HEATED, ROLLER CONVEYOR LPG CYLINDER ANNEALING FURNACE

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### 1 SUBJECT:

The technical and commercial specifications for NG Heated, Roller Conveyor LPG Cylinder Annealing Furnace.





## 1. DESCRIPTION:



- This type of furnace is capable to anneal any type of cylinder including industries sizes.
- 2Diameter:  $\varnothing 303$ mm and Height: 592 mm cylinders are transferred in vertical loading on rollers.
- Advantage of this furnace is low energy consumption and this design suitable for automations.
- The cylinders till the height of 592mm will be loaded and unloaded from the customer chain conveyor automatically, without any worker.
- Longer sizes can be loaded semi-automatically with the assistance of the operator.

### 1.1. TECHNICAL SPECIFICATIONS: 3.1. Main Data:

- Capacity : 200units/h for
- $\varnothing = 303$  mm, H = 592 mm, Weight = 10 - 13kg
- Type of loading : 3 units/row of  $\varnothing = 303$  mm
- Conveyor : Rollers with 76 mm external diameter and 101 mm pitch
- Furnace internal dimensions : Width 1400 mm x Height 620 mm Maximum height of the cylinders : 600 mm
- Loading Unit 2400 mm
- Loading zone 1400 mm
- Preheating zone 1500 mm
- Heating zone 2250 mm
- Hot holding zone 2650 mm
  
- Interface to cooling zone 1300 mm
- Direct cooling zone 3800 mm



- Unloading zone 600 mm
- Exit conveyor 800 mm
- **Total length 16.700 mm**
- Furnace outer dimensions : W 2.100 mm x L 16.700 mm x H 2.200 mm
- **Furnace loading height** : 900 mm
- Cylinder loading pitch : 320 mm for  $\varnothing = 303$  mm, H = 592 mm, Cylinder heating an:  
13 min approx.
- hot holding time
- Cylinder cooling time : 10,5 min approx.
- Nominal Conveyor speed : 0.35 m/min (adjustable between 0.2-1 m/min,  
stepless adjustable)
- Max. Furnace temperature : 1000 °C
- Furnace heating capacity : 1.186.800 kcal/h (max.)
- Burner type : Krom Schroder burners
- NG consumption : 150 Nm<sup>3</sup>/h (max)
- NG calorific value : 8.250kcal/Nm<sup>3</sup>

### 1.2. Time and Temperature of the Process:

Preheating zone

Time / Temperature : 2 min/ ambient.-300°C Heating zone

Time / Temperature : 6 min/200-860°C Hot holding zone

Time / Temperature : 6 min/860-920-860°C Pre-cooling zone

Time / Temperature : 2.5 min/860-680°C Cooling zone

Time / Temperature : 10 min/680-150°C

### 1.3. Motor List:

Combustion air fan : 18.5 kW

Direct cooling exhaust fan : 3 x 4 kW

Direct cooling fan : 3 x 4 kW

Conveyor motor : 2.2 kW

Furnace connected power : 45 kW, 380 V, 50 Hz

Motor powers could change during final engineering.

### 1.4. Steel Construction:

The furnace casing consists of heavy gauge steel reinforced by NPU-NPI profiles which provide structural rigidity. The steel plate will be 5mm St-37 material.

Furnace steel construction will be constructed to compensate thermal expansions.

Furnace will be constructed on the straight floor.

Furnace outer construction will be painted by RAL-5023 blue paint.



### 1.5. Insulation:

Furnace bottom and side walls lined with 1.8 gr/cm<sup>3</sup> density, % 40-45 Al<sub>2</sub>O<sub>3</sub> and % 22 porosity A1 fire bricks and low thermal mass isolation bricks. Nominal thickness of isolation is 350 mm.

Furnace roof lined with low thermal mass 160 kg/m<sup>3</sup> density ceramic fiber and 150 kg/m<sup>3</sup> density mineral wool. Nominal thickness of isolation is 325mm.

Nominal heat loss of the furnace from outer shell will not be more than 450kcal/m<sup>2</sup>h.

Side walls temperature will be less than 70°C except roller bearing exits and burner back sides.

### 1.6. Heating System



Burners will be located reciprocally to the side walls of the furnace for each zone.

Burners are located above of the cylinders so cylinders are not subjected to direct flame.

Burners operate in impulse mode to generate good temperature distribution all over the furnace.



### 1.7. Cooling System



The cooling of the cylinders will be provided by 2 axial fans having 15.000m<sup>3</sup>/h each which are direct blowing air to the cylinders from the top. There will be 2 exhaust fans at the bottom to regulate the air pressure in the chamber.

### 1.8. Conveyor System



- Transfer of the cylinders will be realized by rollers those are actuated from outside of the furnace.
- The advantage of roller design is during material transfer outside of the furnace to save energy.
- Furnace rollers will be made from DIN 1.4841 high grade stainless



steel with 76mm outer diameter and 101mm pitch. Rollers, outside of the furnace will be made from St-42 material. Except 1m at the entrance of the direct cooling zone. In this part the rollers will be produced from AISI 321 quality stainless steel.

- In case of electrical brake down there will be manual drive for driving the roller conveyor to get the material out and safety turns.

## 2. Loading and Unloading of LPG Cylinders



- Up to 12 kg cylinders furnace is designed to operate automatically according to the cylinders that are coming from production on a conveyor. The cylinders are stopped and aligned by a stopper and loaded to the furnace automatically.
- Cylinders are collected by loading pusher one by one and then according to the proximity switch 3 of cylinders are fed to the furnace.
- The bigger cylinders that are loaded horizontally are transferred to the furnace by a chain conveyor and fed through the furnace by the same pusher.
- Vertically loaded cylinders up to 12 kg are unloaded automatically through a vertical conveyor at the outlet and transferred to your transport conveyor.
- Horizontally loaded cylinders are collected manually at the unloading section.
- The different shape of LPG tanks like auto gas tanks can also be feed manually to the furnace.

### 2.1. Temperature Control System:

- Furnace temperature control system operates on three heating control zones. (1st and 2nd heating zones and Hot holding zone)
- Furnace temperature will be measured by IEC 584 K-type Ni-CrNi thermocouples.
- All temperature controls, movement controls and alarms will be controlled by SIEMENS S7 PLC and visualised on OP.
- ENDA limit temperature control instrument operates as high temperature limit alarm. In case of malfunction at primary control system; limit controllers shut-off gas supply and gives audio visual alarm.
- The burners are equipped with "the flame supervisor system" including and flame rod and control relays.
- Furnace control panel meets all the requirements of EN 60204.



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## 2.2. Equipment Brand Names:

- Electric Motors: Siemens, ABB, WATT, Gamak
- Gear Box: Flender, Nord-Remas, Yılmaz, Polat
- Electrical Equipment: Telemecaque, Siemens, Merlin-Gerin, Omron
- PLC: SIEMENS
- Servomotors: Honeywell or equivalent
- Temperature Controller: Eurotherm
- Fans: Edvan, Pitsan, Fevi, Taşkın
- Bearings: SKF, FAG, ASAHI, JIB
- Burners: Krom Schröder
- Gas Control Equipment: Krom Schröder, Florentini, Elster, Honeywell, Dungs