

1. MAIN OPERATING CHARACTERISTICS OF FURNACE

1.1. Dimensions :

- Internal width: mm 12.800
- Roll to roll axis length mm 19.000
- See also enclosed drawings.

1.2. Material to be heated :

square section billets having side mm 130 or 150 and length mm 12.000 mm Dimensional tolerances:

- Side: plus/minus 3%
- Diagonal: plus/minus 4%
- Twist: 1°/m (max 6° on whole length)
- Straightness : 5 mm/m (max 40 mm on 12 m length)

1.3. Steel quality to be heated

- Low and medium carbon steel for civil construction application according to DIN/EN standards and low/medium alloyed steel

1.4. Nominal production with cold charging

- 65-70 T/h of cold billets section mm 130/150 introduced into the furnace

130x12.000 or 130x6.000 in two rows	Kg. 1.590	M2 228	310 kg/m ² /h	70 tph
150x12.000 or 150x6.000 in two rows	Kg. 2.100	M2 228	290 kg/m ² /h	65 tph

1.5. Course of material

- in single row billets having length mm 12.000

- on two rows billets having length mm 6.000

1.6.Charging

- by side via rollers way inside the furnace and kick-in

1.7.Discharging:

- by side via rollers way inside the furnace via kick-off with sensor probes

1.8. Feeding fuel:

FLUIDS	Vanadium PPM	Sulphur Wt. Pct.	Water %	Viscosity (Engler) @ 80°C	Specific Weight Kg/Nm3	PCI Kcal/Nm3 o Kcal/l
Air	-	-	-	-	1,293	-
Natural gas	-	-	-	-	0,7 (*)	abt.8.400 (*)

(*) this data will have to be confirmed by Final User

1.9.Specific consumption:

- with cold charge and low carbon material discharged at 1.150 °C, in industrial continuous running, at the nominal production, with combustion air preheated at 470°C, hearth refractory insulation at 100%, we expect a consumption of 260.000 kcal/charged Ton of billets with a tolerance of plus or minus 5%. This value will be tested utilizing VDEH German rules.

The specific consumption value over mentioned can be approximately transformed in average weekly or monthly consumption adopting following corrections:

- With one shift working : increase of about 20 %, considering heat losses and subsequent return in temperature
- With two shifts working : increase of about 12 %, considering heat losses and subsequent return in temperature



- With three shifts working : increase of about 8 %.

1.10. Scale loss

- at nominal production, in industrial running, when regulation instruments are working properly, the scale loss, meant as weight difference of the billets before being charged and after the first passage at rolling mill, should be 0,7 % plus or minus 5 %,for 1.150°C discharging temperature
- This value will be tested utilizing VDEH German rules.

1.11. Charging temperature

- Ambient

1.12. Discharging temperature (possible) :

- Normal discharging temperature 1.150°C
- Max discharging temperature: 1.220 °C

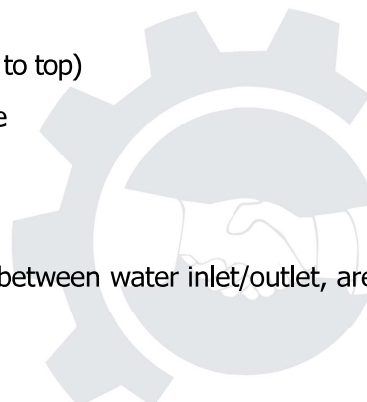
1.13. Billets temperature uniformity:

- For billets mm 130/150 we can consider:
 - ✓ Across the section 30 °C (from bottom to top)
 - ✓ Across the length 20 °C on top surface

1.14. Water availability :

Considering a temperature difference of 15°C between water inlet/outlet, are necessary:

- Supply of Soft water abt. 40 m3/h i.e:
 - Charging rollers way: abt 12 m3/h of soft water
 - Discharging rollers way: abt 18 m3/h of soft water
 - TVCC: abt 0,5 m3/h of soft water
 - Kick-off and sensor probes IF ANY: abt 10 m3/h of soft water





- Charging stopper: abt 2 m³/h of soft water

- Supply of industrial filtered water
 - Industrial filtered water abt. 30 m³/h
 - Seal hearth joints: abt 25 m³/h of industrial filtered water
 - Hydraulic unit exchanger : abt 5 m³/h

- Emergency water ,i.e:
 - Industrial filtered water abt. 45 m³/h@2,5 bar; temp. 30 °C

1.15. Heating power installed :

- abt 23.000.000 kcal/h corresponding to abt. 2.770 m³/h of NG having a calorific value of abt. 8.400 Kcal/m³ Pressure at Furnace TOP for natural gas : adjustable from 700 to 900 mm wc.
- The above installed power represent abt 20 % higher thermal power respect the necessary in regular production, necessary for an quick temperature restore after stoppages or at Saturday morning.



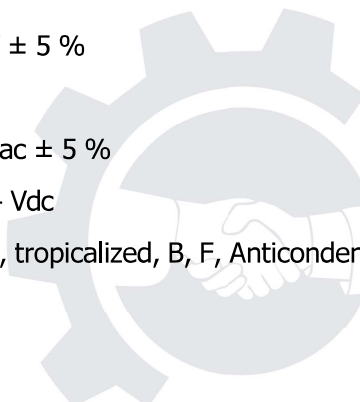


1.16. Connected electric power for furnace, combustion equipment, chimney and machines as follows – not exhaustive:

MACHINE	Q.ty	KW (installed)	EPS V/H z
Combustion air Fan	1	132	400/50
Recuperator's protection fan	1	11	400/50
Automatic regulation power board	1	5	400/50
Stack Fan	1	90	400/50
Lightning system air Fan	1	5,5	400/50
Main hydraulic for walking hearth, doors, kick-off, Kick-in	1 package	180 about	400/50
Hydraulic unit heater	1	5	400/50
Charging rollers way	9	27	400/50
Discharging rollers way	9	27	400/50
TVCC feeder	2	0.5	230/50
UPS Feeder	1	7.5	230/50
Emergency	1	30	400/50
Grease pump	1+1	0,75 each	400/50

Connections:

- Main supply: 400 V \pm 5 %
- Frequency: 50 Hz
- Control voltage for auxiliary loads: 230 Vac \pm 5 %
- Control voltage for solenoids valves and lamps: 24 Vdc
- Protection : IP 55, tropicalized, B, F, Anticondensate heater





1.17. Walking hearth cycle:

- Total lifting stroke: 220 mm (-100+120mm)
- Step length: 250 mm
- Total normal cycle time: 110 sec to reach 65 Tph with 2.100 kg/each billet square 150mm
- Cycle steps (sec):
 - Horizontal head: 5
 - Vertical down: 12
 - Horizontal backward: 5
 - Vertical up: 13
- Minimum cycle time: 35 sec

1.18. Compressed Air:

- Gas Valves actuators @ 7 bar

1.19. Nitrogen for NG

- Flow: 100 Nm³/h (peak. Max for 10 min), temp. ambient @ 0,3 bar
- As alternative compressed air can be used.

1.20. Mill roll axis : (to be confirmed)

- + 5.800 mm

1.21. Hearth charging level : (to be confirmed)

- + 5.715 mm

1.22. Hearth discharging level : (to be confirmed)

- + 5.715 mm



1.23. Site Conditions

AMBIENT CONDITIONS	°C	°F
Ambient Temperature	-10+50	
HUMIDITY		
Relative Humidity	60-80 %	
CLIMATE		
Climate	Continental	
ALTITUDE		
Altitude above sea level	1250 m	
POLLUTION		
Main pollution agent	Agents produced by metallurgical plant	
WIND CODE		
Wind code	120	
QUAKER CODE		
Quaker/Seismic code (*)	3S	

(*) The Standards Iranian Code of Practice for Seismic Resistant Design of Buildings also known as Iran national Standard No. 2800 is used

1.24. Emissions pollution values :

- Max waste gases volume emissions from stack: 24,000 Nm³/h having temperature about 250 °C , arriving from natural gas combustion
- Sulphur Oxide SO Emissions: 35 mg/Nm³ (referred to 3% O₂ on waste gases)
- Nitrogen Oxides NO_x emissions: 250 mg/Nm³ (referred to 3% O₂ on waste gases)
- Carbonic anhydride CO₂ emissions: 1,84 kg/m³ of burnt gas (referred to 3% O₂ on waste gases)
- Carbon Oxide CO : 100 mg/Nm³ (referred to 3% O₂ on waste gases)
- Powders total: less than 5 mg/Nm³

1.25. Engineering Norms adopted

NORMS and LAWS to be TAKE UNDER REFERENCE IN PROJECT DEVELOPMENT	
Design	IEC
Construction	IEC
Materials	CE
Noise level	ISO / IEC
Safety	EN
Measuring system	Metric
Quality control	FORSYST Srl standards

The equipment regarding the following standards are marked EC:

- Electromagnetic compatibility (89/336 - 92/31 - 93/68)
- Low voltage (73/23 - 93/68)
- Machines (89/392 - 91/368 - 93/44 - 93/68)
- Natural gas NORMA UNI 8827 –EN 746-2

1.26. Working conditions of furnace (Running conditions resume):

Description	Unit of measure	Normal value	MIN/MAX value
Combustion air pressure	daPa	600	300-900
Natural gas pressure	daPa	500	300-900
Cooling water pressure (direct water)	bar	2,5	1,5-4
Cooling water pressure (indirect water)	bar	4,5	3-5,5
Furnace pressure	daPa	+ 1	-2/+5
Waste gas temperature at recuperator entry	°C	775	700-825
Continuous running			
Air temperature at recuperator exit Continuous running	°C	480	350- 520