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Aleris Recycling (Swansea) Ltd.
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project no.	47-7939
quotation no.	AN004105
date	17.11.2011
responsible	se

Quotation

Dear Sir,

thank you very much for your inquiry. Please find our quotation on the basis of our General Conditions of Payment and Delivery with subject to alteration as follows:

item	quantity	description	price/piece	total amount
1	1	Tiltable testing furnace with capacity of 1,5 tons liquid aluminium	262.000,00 €	262.000,00 €
			total	262.000,00 €

General description

The tiltable testing rotary furnace is configured for re-melting of dry and small sized aluminium scrap in the form of dross, dross from presses, oxides, cans, foils, bulk and briquetted chips, baled scrap, casts in one piece and shredded or alloy-forming elements. The purpose of the testing furnace is to determine the alloying constituents of the existing groups of scrap, dross, UBC's and swarf.

After analysing the results it is possible to blend the different kinds of basic material to yield the desired result.



Mechanics and Steel construction

The complete steelwork of the tiltable testing furnace is proper designed to assure a long lifetime. All necessary maintenance works are structured rather easily so that the costs can be kept low.

- The furnace body (drum) is made of one dished end, a tubular section and a conical section which forms the furnace opening. The connection flange for the central bearing is located in the centre of the dished end.
- The tilting frame is made of hollow sections and is fixed to the base frame with heavy-duty bearing pins.
- This frame contains the oversized ball bearing slewing ring, the connectors for the tilting cylinders and the direct-drive gear motor.
- Driving is effected by means of a pinion and the gear rim which is integrated in the slewing ring.
- The frame is a very stiff and torsion resistant construction with long life expectancy.
- The dross is hold back with a special cast iron device at one door wing while pouring the metal from the furnace.
- The door is directly mounted at the tilting frame of the furnace, so it can be opened and closed in every tilting position.
- The door covers the whole furnace opening. With the upper part of the door, designed like an exhaust channel, the flue gas is drained into the above mounted exhaust hood.
- The tiltable burner holder is integrated into the door, the dross rake is assembled separately at the tilting frame. Hydraulic cylinders which are mounted on the tilting frame, drive the door and the dross rake.
- The tiltable burner holder can be moved in vertical direction by a hand crank in a quick and easy way.
- During the charging process the door is pivoted about 90° in order to provide the complete furnace opening for easy charging.
- During the tapping the door is opened and the dross (slag) is kept inside by the dross rake. For the salt slag tapping the door and the dross rake are swivelled-out in the end position and the furnace is tilted until it's empty.
- At run time all occurring emissions are let to the door extraction hood, which is enclosed by the main extraction hood.
- The purpose of this main hood is to collect all exhaust fumes escaping from the open furnace as well as dust from charging actions.
- The oxygen flow system with all valves and instrument mountings is installed in a cabinet beside the furnace to ensure a maximum protection.
- The base frame is an integrated structure made of double T-girders and is designed to absorb all mechanical forces which may occur during furnace operation. It is directly fixed on the floor with anchor bolts, that means no further foundation is necessary.

Function

Charging

Charging is easy to manage by an ordinary fork lift equipped with a shovel-shaped tool. The corresponding fork lift is not included in our scope of delivery.



Tapping

When the complete sample is melt an adequate mould is located in front of the furnace. After the door is opened and the dross rake is swiveled in front of the furnace opening, tapping can start. For this the drum should rotate slowly and the furnace has to be tilted in a sensitive way.

Then the mould has to be replaced by a dross container, the dross rake swivels out and the furnace chamber is emptied out completely.

After the furnace is tilted back into its start position, the system is ready for the next batch.

Combustion burner system

The tiltable testing furnace is assembled with an efficient combustion oxyfuel burner system.

- Nominal power 1 MW
- High availability
- Flame failure devices rated for intermittent use in accordance with EN 746-2
- Melting capacity about one ton per hour
- The correct function of the burner system is monitored by a UV-Scanner.

Different operation modes are available. We generally distinguish between:

1. 4-step-control
 - Low load
 - Middle load
 - High load
 - Extra oxygen: low load with increased oxygen content
1. Infinitely variable control

In the infinitely variable control mode the burner power can be changed in steps by 10 kW up or down. The current burner power is shown in the general display.

The ignition and the correct work of the burner are controlled by a burner control unit. If the burner doesn't start within a defined time period, or the flame is not stable the burner is turned off and on the Operators Panel a message is displayed, which describes the kind of failure which occurred.

In case of any failure the gas valves and the oxygen valves are closed automatically.

A leak test run is performed before every burner start.

The operator can see the running test on the display. To pass this test is obligatory to start the burner. During the test all valves are checked for their tightness.

The Gaseous Oxygen flow control train incorporates all valves, regulators, filters, flow meter, gauges and flow control necessary to provide a metered flowrate of oxygen that is in stoichiometric ratio with the fuel throughout the range of firing rates. The flowtrain will also be designed so as to accommodate supplemental Oxygen requirements, which is an added function of the Combustion Technology. This skid will also be supplied functionally checked and earth bonded in accordance with EU regulations and EMC Directives.



Refractory lining

The thickness of the refractory lining depends on the thermal and mechanical stress at the different furnace zones:

Layer 1:	Ceramic fibre plates	= 5 mm
Layer 2:	Insulation Aludur 43	= 65 mm
Layer 3:	Refractory Elobax 88	= 152 mm

The door is insulated with Sital-Cast 172 (manufacturer LWB). The lifetime of the refractory lining is approx. 12 up to 24 month depending on the charged materials.

We have foreseen to do the refractory work at our site in Mayen/Germany before delivery

Hydraulics

All hydraulic functions are supported by the central hydraulic unit.

- Hydraulic aggregate P= 5,5 kW, Q= 30 l/min, accumulator pressure p= 100 bar
- With oilpan, return filter, pressure control valve, circulation valve, pressure indicator, drain valve, valve block design for two tilting cylinders and one door cylinder, with complete tubing and varnished

Electrical control

All operating functions of the furnace can be controlled by a central control panel. The control panel is equipped with illuminated pushbuttons for all essential operating functions (tilting back/forward the furnace, open/close the door, rotation on/off, burner on/off).

- Electric main cabinet with integrated operation panel for controlling all functions of the furnace and the burner device. The cabinet will be floor standing and should be located in a position where the ambient temperature is between 0°C and 40°C.
- Control performed by Siemens S7-300 PLC, with all necessary isolation, fusing, relays, etc.
- Panel designed and supplied in accordance with European Standards EN 60204 and EU Directives relating to Machinery and EMC
- Remote Operator console at the side of the furnace for controlling the combustion system and the furnace through a series of push buttons, which consist of:
 - Emergency Stop and System Reset
 - Combustion system Start and Stop
 - Firing Rate (Low, Medium and High)
 - Tipping and Re-tipping of furnace drum
 - Opening and closing of furnace door
- Control panel complete with the burner controls with automatic or manual operation. Flows are adjusted by linear control valves and set point free programmable offering greater flexibility across the full range of operation.
- Audible and visible alarm system to indicate a fault condition
- Lamp test function
- Complete units, wired with control systems and burner
- Electric cabling for all furnace and burner functions



Technical data tiltable testing furnace

Process data furnace	
Load capacity Aluminium and salt	1.500 kg
average scrap density	scrap ca. 300 – 600 kg/m ³ dross ca. 1.400 kg/m ³
Temperature of liquid Aluminium	700 – 750° C
Tilting angle furnace	-18° – 37°
Tilting angle burner	-9° – 9°
Rotary speed	2 – 12 r/min

The total weight of the refractory lining of the furnace is roundabout 7.5 tons. (incl. door lining) and is comprised of:

Furnace dimension incl. Refractory lining	
furnace opening dia.	950 mm
furnace drum inner dia.	1.535 mm
furnace drum outer dia.	2.000 mm
Outer length furnace drum	2.000 mm

Hydraulics	
Typ	Assfalg Hd-Aggregate 12339
power	4 kW
Pressure max.	140 bar
Delivery volume	15 l/min
Tank capacity	100 litre

Hydraulic cylinder	
Tilting cylinder	Piston dia. 120 mm stroke: 1.100 mm
Door cylinder	Piston dia.: 80 mm stroke: 400 mm

Rotary drive	
power	11 kW
Speed control	Frequency inverter
torque	3.010 Nm (50 Hz)
Gear drive ratio	41,87:1
Total gear ratio	164,68:1



Combustion burner system	
Type	BGO2-1000
power max.	1.000 kW
power min.	200 kW
fuel	Natural gas
Consumption gas max.	ca. 100 m _N ³ /h
Consumption gas min.	ca. 20 m _N ³ /h
Consumption oxygen max.	ca. 200 - 250 m _N ³ /h
Consumption oxygen min.	ca. 40 m _N ³ /h
ignition	electrical
monitoring	UV-Scanner with display (0 - 100 µA);

Natural gas	
Heating value	H _u ca. 10 kWh/m _N ³
Nominal diameter	DN 50
Inlet pressure min.	240 mbar
Inlet pressure max.	4 bar
Pressure reduction	200 mbar

Oxygen	
Nominal diameter	DN40
Inlet pressure min.	5 bar
Inlet pressure max.	16,5 bar

Electric	
input 400V	400 V, 50 Hz, 50 A, 5 x 16 mm ²
Digital I/O	64/32

Documentation

- Operating and Maintenance manual
- Declaration of Conformity
- Complete component drawings
- Description of all components
- Recommended Spares List
- Interconnecting wiring schedule
- SPS-program



Exclusions from scope of delivery

Excluded and not part of our scope of delivery are

- foundation workings
- statics of concrete construction
- electric main connection
- Natural Gas main connection
- Oxygen main connection
- Compressed air supply
- Pipework from furnace hood to filter system
- Provision of mobile crane (if needed)
- unloading at site

and all other not explicitly mentioned deliveries and services

Provision of Material

- Overhead crane and forklift

Supply of Services and Utilities

- Room or location suitable for the installation of the electric main cabinet (within the boundareas of 0°C to +40°C)
- Electrical main connection at the main cabinet
- Natural gas main connection in the near of the furnace
 - Net Cv of about 36 MJ/m³
 - Maximum flowrate 180 Nm³/hr
 - Assumed supply pressure >1,3 barg at inlet to flowskid & constant at full flow
 - Temperature ambient (+20°C typical)
- Oxygen main connection
 - Maximum flowrate 360 Nm³/hr
 - Supply pressure (min.) 10 barg at inlet to the flowskid & constant at full flow
 - Supply pressure (max.) 20 barg
 - Temperature ambient (ranged -10°C to +38°)
- Compressed Air main connection
 - Supply pressure 5 barg

Assembly

- Assembly costs at site are included in quoted price

Assembly work

Prerequisite for assembly /assembly work is the guarantee of undisturbed working without any interruption and impediment during complete assembly time.

Building site current, water, compressed air, lighting, fork lift truck and hall crane as well as washing and changing facilities to be provided free of charge.



Additional mounting works will be charged on the basis of the following rating per hour:

foreman: 65,00 € / h

mechanics: 62,00 € / h

Assembly and assembly service costs to be understood free works, including additional costs, but without extra charge of extra hours

extra charge for extra hours (basis: 8 hours / day):

for the first 3 extra hours / day 25 %

for any further extra hour / day 50 %

for Sundays and Holidays 100 %

Time of delivery

- 6 months after receipt of written order and clarification of all technical details.
- Time of assembly amounts to approx. 3 weeks

Terms of payment

- 30% of total purchase value as down-payment upon order, after receipt of confirmation of order
- 30% of total purchase value at advice of completion
- 30% of total purchase value after arrival of the equipment on site
- 10% of total purchase value after assembly and overtaking of the device, but latest 8 weeks after delivery

Payment

30 days net

Price to be understood as guiding price free works Swansea, Great Britain. All later modifications will be charged according to expenses and corresponding agreement. Delivery is exclusively subject to our General Terms of Delivery and Payment.

Testing, Start-Up, Commissioning and Training

Costs for Testing, Start-Up, Commissioning and Training on site are not included in quoted price. Nevertheless we are able to offer trained and skilled personnel to assist with Commissioning and Training of the equipment at site. This may also incorporate training for operators covering safety, process and maintenance issues. Costs for these services can be billed according to time sheet under the terms of a separate Agreement, which has to be taken.

We hope that our quotation will be favourable for you and would be very glad to receive your order.

With best regards

A handwritten signature in black ink, appearing to be 'Hans-Jürgen Bartz', written over a horizontal line.

Bartz Maschinen- und Anlagenbau GmbH