

BAROMFI-COOP Kft
Att. Mr. Bárány
Petofi u. 41
4537 Nyírkércs,
HUNGARY

Order. nr : T178335 / A16-1357-04
Ref : Chicken litter dryer

Date: 21-12-2017

Dear Sirs,

Following our meeting at your offices at 14 December we herewith confirm your order for a shaking fluid bed dryer/cooler for drying/cooling of poultry manure according the following delivery terms and described scope of supply:

A drying system with an evaporation capacity of ~2,4 T/h (depending on throughput, initial moisture content and the drying air temperature) and an integrated cooling part at the end of the fluid bed system to prevent condensation in the further processing steps. The shaking fluid bed drying/cooling system has a total area of 16,5 m² divided in 14 m² drying area and 2,5 m² cooling area. The re-circulated drying air with 75-85 °C temperature will be heated to 150-180 °C using a direct gas fired air heater.

The scope of work includes engineering, manufacturing and delivery of a fluid bed dryer/cooler, air supply system, exhaust air system and product crushing/conveying. Supervision of installation, commissioning and start-up are on a lump sum base and actual expenses for lodging.

Tema Process has already build several fluid bed dryer/coolers for drying (chicken) manure and digestate with large capacities and has extensive experience with the issues involved with this material during drying and further processing.

The complete system: contact parts of the fluid bed, the exhaust air system and air recycle as well as product conveying system are manufactured in stainless steel AISI 316L. Insulation: where required because of the high temperatures, the process (to avoid condensation) or for safety issues insulation is installed. The filter installation limits dust emissions (<10 mg/Nm³) to ambient or to the ammonia/odour scrubber(s). The scrubber(s) will not clog up with dust. The ammonia and odour is reduced using a double scrubbing system (acidic + base/oxidizing scrubber).

A separate ventilation filter for the suction air of product handling equipment with a capacity of 25.000 m³/h. This filtered air is also treated in the enlarged scrubber after the dryer. Control of the filter and fan by Multimix.

The scope of supply and pricing of the equipment:

- Item 1 Continuous shaking fluid bed unit 16,5 m²
- Item 2 Air supply system with direct gas fired air heater
- Item 3 Exhaust air system with filter, exhaust fan and ducting
- Item 4 Acidic and oxidizing scrubber unit and associated ducting
- Item 5 Product paddle lump breaker/conveyor + outlet conveyor in AISI-316L
- Item 7 Spark detection and extinguishing system
- Item 8 Instrumentation and control cabinet (MCC/PLC)
field cabling is excluded (by customer)
Instrumentation and MCC/PLC extension scrubbers
- Item 9 Documentation and engineering in the above prices
- Item 11: Price for installation supervisor 5 weeks
excluding costs for hotel and lodging
- Item 12: Price for start-up 5 man weeks (process or electrical),
excluding costs for hotel and lodging
- Item 12: Price for start-up (burner) max. 5 days, excluding costs
For hotel and lodging

Price above items.....€ 1.225.000,--

Item 6 : Additional price for equipment suction filter in AISI-304L,
filter fan and scrubber enlargement with 30.000 kg/h extra,
incl. mechanical installation..... € 216.000,--

Total price.....€ 1.441.000,--

Discount.....€ -/- 141.010,--

Agreed contract price.....€ 1.299.990,--

All prices are in EURO's (€) excluding taxes, levies or duties

Item 10: Transport (EXW Tema Process Netherlands).....€ excluded

Mechanical 12 months after commissioning but 18 months after delivery
Guarantee: at the latest, whichever is earlier.
Normal wear and tear is excluded.

Limited Liability:	Consequential Damages are accepted only as far as they are covered by our liability insurance. Loss of production and profit as well as liquidated damages for late delivery are generally excluded	
Scope of supply:	Included within the scope of supply is only the equipment mentioned in this offer. All further material as piping, tubes, cables, electrical components and distribution, are not included and have to be supplied and installed by the Buyer. Necessary technical specifications will be supplied by Tema Process BV. The offered equipment is built according to the laws, norms and regulations of the EU. Exceptions hereof only apply if they are mentioned explicitly in our offer.	
Commercial Terms:	Article 47 of Orgalime S2012 : to be changed into the following: The Contract shall be governed by the substantive law of the Buyer's country (Hungary) As far as they do not deviate from the aforesaid, the General Conditions of Delivery for the Mechanical, Electrical and Associated Electronic Products (Orgalime S2012) will govern our supply.	
Terms of Delivery:	EXW Wapenveld, Netherlands, according to Incoterms 2010, excluding packing	
Terms of Payment:	30% down payment before 31 January 2018. 60% after FAT before delivery against invoice but no later than 3 months after notice of equipment ready if delay is not caused by Tema Process. 10% 15 days after installation against invoice but no later than 3 months after delivery if delay is not caused by Tema Process.	
Delivery time:	EXW delivery of goods latest 31 July 2018 for contract signed before 23 December 2017.	
Agreed between:	TEMA Process BV	BAROMFI-COOP Kft
Mr. Henk Dijkman		Mr. László Bárány

Place :

Date :

PROCESS SPECIFICATION.

Product

Name

Chicken manure (free of foreign materials)

Particle size

1 – 100 mm before de-lumping



0,1-15 mm after de-lumping

Bulk density wet

350 – 600 kg/m³

Specific heat

1,25 kJ/kg °C

Design specifications

Product at dryer inlet

12.000 kg/h

Product at dryer outlet

9.600 kg/h

Water evaporation

2.400 kg/h

Initial moisture content

~30 % (23-30 %)

Final moisture content

≤ 12-13 %

Dryer sizing and air quantities

Dryer size and area

8,5 x 1,65 = 14 m²

Cooler size and area

1,5 x 1,65 = 2,5 m²

Total size and area

10 x 1,65 = 16,5 m²

Drying air quantity

54.000 kg/h

Combustion air

6.000 kg/h

Cooling air quantity

9.000 kg/h

Exhaust air quantity

~17.500 kg/h @ 70-80°C - 200-250 g/kg

Product and air temperatures

Ambient temperature	design: 20 °C / 80 %RH, range 5 - 35°C
Drying air temperature	nom. 175 °C range 150 - 200 °C
Cooling air temperature	design 20°C / 80% RH
Exhaust air temperature dryer/cooler	~ 70-80 °C
Product temperature at inlet	design: 25 °C
Product temperature at outlet dryer	± 80 - 90 °C
Product temperature at outlet cooler	≤ 50-60 °C @ 20 °C / 80% RH.

Required utilities and usage

Electrical	3 x 400 V/50 Hz 1 x 230 V/50Hz
Electrical motors	IP 55 – Efficiency in accordance with EU guideline EuP 2019/125/EG: IE2 (in combination with VFD) en IE3 on motors without VFD between 0,75-375 kW
Electrical installed	310 kW (including scrubber)
Electrical usage	180-215 kW/h (including scrubber)
Compressed air	6 bar(g) free of oil and water ISO 8573-1 Class 4 for bag filters and dryer ISO 8573-1, Class 2 for Firefly
Compressed air	< 140 Nm ³ /h
<u>Energy usage</u>	
Natural gas	300 mbar(g)
LHV	34 MJ/Nm ³
Energy usage natural gas	2.400 kW (max. 255 Nm ³ /h) 2.160 kW (nom. 230 Nm ³ /h)
Dust emission	≤ 10 mg/Nm ³ (measured acc to. VDI 2066)

ATEX Normative

The equipment design described in this quotation is compliant with the ATEX directive 94/9/EC, as per TEMA Process expertise from the delivery of 4 chicken litter dryers in the past whereby the following measures were taken into account:

- Antistatic design
- Limitation of product temperature
- Drying process under low oxygen

Under consideration of the following design assumptions :

- Zone location : No Zone Risk Area NZRA
- Zone classification 22-21-20 not applicable
- Equipment placed in a safe area
- Firefighting equipment fire extinguish duct connection on safe and accessible distance of risk area (minimum 5 meters)

In the case additional measures are requested it has to be determined if system stays suitable or perhaps changes are to be foreseen, these are not included.

Item 1: Fluid bed dryer/cooler with drive unit, 10 x 1,65 = 16,5 m²

- Fluid bed wind box 10.000 mm length, 1.650 mm width and 900 mm height manufactured in stainless steel AISI 316L. The wind box dryer part is insulated and clad with aluminium cladding.
- Fluid bed suction hood 10.000 mm length, 1.650 mm width expanding to 1.950 mm and 1.800 mm height manufactured in stainless steel AISI 316L. The suction hood is insulated and clad with aluminium cladding.
- Air distribution plate with supports manufactured in stainless steel AISI 316L.
- Throttle plate in the drying section to create a pre-drying section, throttle plate is adjustable from the outside during operation.
- Dividing plate between the drying section and the cooling section.
- Hot air bypass to locally heat up the exhaust gas by 3-5 °C to prevent condensation in the 1st part of the suction hood.
- Inspection hatches and manholes:
 - Three hatches ø 450 mm in the wind box
 - Two hatches ø 450 mm in the suction hood
 - One hinged door at the rear wall 500 x 800 mm
- Flanges and measuring nozzles:
 - Drying air inlet on the front side of the wind box complete with flexible connection
 - Cooling air supply on the side wall of the wind box complete with flexible connection
 - Exhaust air outlets on top of the suction hood with flexible connections
 - Product inlet connection with flexible
 - Product outlet connection with flexible
 - Drain underneath the wind box
 - All required instrument nozzles
- Electrical operated weir. Weir is placed at the end of the cooling section, layer thickness is adjustable between 0-200 mm by adjusting the weir height (during production). Sufficient space between the rear wall and the threshold in case of any large chunks.
- Crankshaft drive mechanism with pneumatic springs/dampers. Drive manufactured in mild steel in epoxy coated. Shaking frequency variable between 2,5-4Hz using a frequency converter (converter included in the control panel pricing). Installed motor 7,5 kW, usage <5 kW.



Chicken litter dryer at Fermofeed

Item 2: Air supply system dryer/cooler

- Air supply fan drying section/recirculation fan. Single side suction coupling or belt driven centrifugal fan manufactured in stainless steel AISI 316L, motor support frame in steel coated with a primer and finish coating. Capacity: 64.000 - 66.000 kg/h air @ 70 - 80 °C and 250-275 g/kg dry air moisture content, installed power: 200 kW, electrical consumption 120 - 150 kW. Fan complete with insulation, drain and inspection opening. The fan is frequency controlled (the frequency control is included in the scope of the MCC/PLC). Fan is designed as a non-sparking fan.
- Ducting from the recirculation fan to the process air inlet on the burner, from the burner to the fluid bed air inlet, length 3 meter, in stainless steel AISI 316L and including insulation.
- The system uses a separate combustion supply air fan. Combustion air fan, Single side suction direct driven centrifugal fan manufactured in mild steel hot dip galvanized. Capacity 6.000 kg/h air @ 5-30°C. Installed power: 15 kW, electrical consumption 10 kW. Fan complete with drain and inspection opening.
- A noise attenuator on the suction side of the combustion air fan.
- Natural gas air heater (direct fired) for heating max 54.000 kg/h air from 65-75°C temperature to max. 200 °C. Installed thermal capacity: 2.500 kW, nominal usage 2.040-2.160 kW. Combustion chamber in stainless steel with 100 mm external insulation with aluminium cladding. Support structure in mild steel. Burner Management System mounted at the burner.
- Burner complete with spark igniter and flame rod, ignition gas: natural gas.
- Fuel gas pipe train in accordance with EN-746-2 consisting of: inlet cock, gas filter, pressure controller with internal relief valve, double block safety shut off valve with leak tester, full modulating control valve with servo motor and position feedback, pressure switches for high and low fuel gas pressure and local pressure gauges with isolating valves. All electrical components of the gas line are pre-wired to the local control panel. Standard is the IP protection class IP54.
- Connecting ducting between combustion air fan and the burner in mild steel hot dip galvanized.



- Cooling air fan, Single side suction direct driven centrifugal fan manufactured in mild steel hot dip galvanized. Capacity 9.000 kg/h @ 5-30°C temperature. Installed power: 15 kW, electrical consumption 10 kW. Fan complete with drain and inspection opening. Fan is designed as a non-sparking fan.
- Noise attenuator on suction side of the cooling air fan, ducting between the fan and the cooling section manufactured in mild steel hot-dip galvanized, length 2 meter.
- Hand-operated throttle shutter mounted directly on pressure side of fan

Item 3: Exhaust air system with a filter unit, exhaust air fan.

- Pulse-jet filter with ~670 m² filtration area. Filter compartments arrangement 2 x 12 x 13, L= 4.500 mm bag length.
- Filter material poly-acrylic needle felt (peak temperature = 130°C, PAN-homopolymer), support bag cages in stainless steel AISI 316L. The filter top part is completely insulated and constructed of double walled stainless steel AISI 316L with insulation in between installed in our workshop. The filter top plate, bag house and dust hopper are manufactured in stainless steel AISI 316L. Support structures etc. in mild steel hot dip galvanised.
- Special points of attention of the filter:
 - Insulation of the support structure to prevent thermal bridges
 - Insulated lids on top of the filter for exchange of the filter sleeves.
 - Anti-static design
 - Electrical tracing on the dust hopper
 - Local control panel, cable between control panel and air shots are not included in the scope.
- One screw conveyor in the dust hopper manufactured in stainless steel AISI 316L. Gear motor SEW 2,2 kW.
- A large suction hood above the dryer, sized approx. 0,75 x 7,5 x 5 meter. Manufactured in stainless steel AISI 316L complete with insulation and support structure.
- Ducting from the suction hood above the fluid bed up to the filter unit, length approx. 2 - 3 meter insulated. Ducting from the filter unit to the recirculation fan, ducting length approx. 15 meter. Ducting in stainless steel AISI 316L and foreseen with insulation.
- Split for exhaust duct on the pressure side of the fan

Item 4: Acidic and oxidising gas scrubber with associated air ducting

A single stage process in which the NH_3 , the R-NH_2 , other ammonia derivatives and the VOC that can be hydrolyzed in an acid medium are absorbed.

In the optional second stage the H_2S and R-SH are absorbed, as well as any other sulphur derivatives, and the VOC that can be hydrolyzed in an alkaline medium.

In this process, the absorption of the polluting gas is carried out in counter flow inside of 2 scrubbers in series, and within spaces which are stuffed with large specific areas contact elements. This is combined in order to obtain an optimal contact of the gas/liquid stages and a constant distribution of both fluids throughout the process, where the washing liquid is dispersed and uniformly distributed by means of high-output full-cone nozzles, easily removable for revision or change. These contact elements are supported by dismountable grates with a large pitch area and a low-of-head. Retention of drops originated by the liquid distribution system is to be carried out within the tower itself by means of a high-efficiency low-pressure-drop vertical-flow demister, that prevents the carryover and emission of drops to the atmosphere, as well as any loss of washing solution.

The washing liquid contained in the scrubber's bottom is recirculated through high performance (chemical as well as mechanical) centrifugal pumps.

The level of the washing liquid is kept constant by means of a water input through an electro valve controlled by a 3-contact level indicator. Reagent dosage is controlled by a pH meter for H_2SO_4 and NaOH , and a Red Ox meter for NaClO , reagents being kept in separated tanks.

Scrubber and associated equipment are for indoor application and any frost protection is not included.

Acidic scrubber:

- Column scrubber, size \varnothing 2.000 height 6.000/7.000 mm, manufactured in vinyl ester resin/ glass fibre.
- Removal efficiency > 95% on NH_3 .
- Acid usage approx. 1,5 litre 95% H_2SO_4 per kg (removed) NH_3
- Waste water- $(\text{NH}_3)_2\text{SO}_4$ tank is not included in the scope
- Polypropylene demister in the top of the scrubber to capture and remove droplets from the gas stream.
- Integrated recycle water tank. System complete with recirculation pump, recirculation piping, nozzles and accessories. Installed power recirculation pump 11 kW.
- Acid (40% H_2SO_4) storage vessel 8.000 L content (diam. 2 m x 2,9 m), dosing pump en piping (tubing).
- Ducting from air recycle ducting (pressure side of the recirculation fan), with motor actuated stainless steel exhaust air valve. Air volume 17.500 kg/h @ 65-70 °C, to the acidic scrubber inlet. Length ca. 3 meter.

Oxidizing gas scrubber

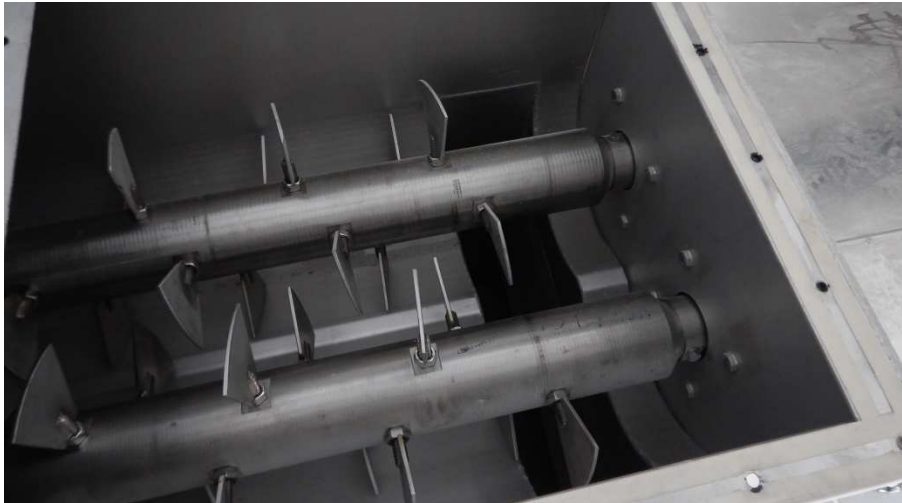
- Column scrubber, size \varnothing 2.000 height 6.000/7.000 mm, manufactured in vinyl ester resin/ glass fibre.
- Removal efficiency > 95% on H_2S and 90% on the rest of water soluble odour components
- Oxidizing reagent: NaClO and NaOH.
- Waste water tank is not included in the scope
- Polypropylene demister in the top of the scrubber to capture and remove droplets from the gas stream.
- Integrated recycle water tank. System complete with recirculation pump, recirculation piping, nozzles and accessories. Installed power recirculation pump 11 kW.
- Reagent (25% NaOH) storage vessel 1.500 L , dosing pump en piping (tubing). Reagent (15% NaClO) storage vessel 5.000 L , dosing pump en piping (tubing).
- Ducting from the acid scrubber outlet to the oxidizing scrubber inlet. Ducting manufactured in GRP, length 6 meter.
- Exhaust air stack installed directly on top of the oxidizing scrubber (\pm 2 meter), not free standing supported from the building.



Example Acidic and oxidizing gas scrubber

Item 5: Product mixing / de-lumping system

- A double shaft paddle mixer (1x 30 kW) for de-lumping / mixing / conveying the chicken manure into the fluid bed. Manufactured in stainless steel AISI 316L.
- Paddles will be adjustable and made in stainless steel AISI-316 with reinforced design on the lump inlet, paddle edges cutting.



- Screw conveyer placed at the dryer outlet. Screw conveyer manufactured in stainless steel AISI 316L. Installed power 3 kW electrical usage < 2,4 kW.

Item 6: Suction filter with fan for equipment ventilation and enlarged scrubber

- Pulse-jet filter for air capacity of 25.000 m³/h with ~220 m² filtration area. Filter compartment arrangement 13 x 8, L= 4.500 mm bag length.
- Filter material poly-ester needle felt (peak temperature = 130°C, , support bag cages in stainless steel AISI 304L. The filter top part is completely insulated and constructed of double walled stainless steel AISI 304L with insulation in between installed in our workshop. The filter top plate, bag house and dust hopper are manufactured in AISI-304L not insulated. Support structures etc. in mild steel hot dip galvanised.
- Special points of attention of the filter:
 - Insulated lids on top of the filter for exchange of the filter sleeves.
 - Local control panel,
 - cable between control panel and air shots are not included in the scope.
- One screw conveyor in the dust hopper manufactured in stainless steel AISI 304L. Gear motor SEW 2,2 kW.
- Suction air fan: Single side suction coupling or belt driven centrifugal fan manufactured in stainless steel AISI 304L, motor support frame in steel coated with a primer and finish coating. Capacity: 30.000 kg/h air @ 35 - 45 °C and 40-50 g/kg dry air moisture content, installed power: 45 kW, electrical consumption 25-35 kW. Fan complete with drain and inspection opening. The fan is frequency controlled (the frequency control is included in the scope of the MCC/PLC of customer).
- Motor actuated stainless steel exhaust air valve in AISI-304L after the fan.
- ***Control of the filter components and fan in scope Multimix electrical work***
- Scrubber described in item 4) enlarged with 30.000 kg/h air treatment, enlarged diameter 2.500 mm, pumps installed power 15 kW.

Item 7 Spark detection and extinguishing system.

Principle of the fire detection and extinguishing.

- 1.) If there is insufficient water pressure on the extinguishing water supply the installation cannot start-up or if the water pressure is dropping during production the unit will go into controlled shut down. These actions can be overruled by the operator if required.
- 2.) On the drying air temperature, exhaust air temperature and product temperature we will program an additional offset. If any of these temperatures will go over this temperature the burner will be forced down and an alarm signal will be given. In principle the unit will increase the temperature again and continue the normal operation, the operator has time to judge if there is an abnormal situation and take the appropriate action.
- 3.) **If the spark signal from the sensors exceeds a certain level the fire extinguishing system is activated**, at the same time the unit goes into emergency shut-down.
- 4.) The level of spark signal is continuously stored and can be traced back.

Tema Process will supply and install three installation flanges for mounting spark sensors on the suction hood of the dryer/cooler.

- Supply and installation of **three** spark sensors (from Firefly) with compressed air cooling of the sensor.
- Control unit for the spark sensors
- Three water spray nozzles in the suction hood, connected to one pipe (on top of the suction hood) and a flexible hose.
- Electric actuated open/close valve. Two hand operated open/close valve, one in parallel and one in series with the electric actuated valve.
- Pressure indication and alarm on the water pressure, if insufficient water pressure is present the installation stops (controlled shut down procedure) or will not start-up (changes in the fluid bed dryer/cooler PLC software)
- Pressure indication and alarm on the compressed air pressure, if insufficient compressed air pressure is present the installation stops (controlled shut down procedure) or will not start-up (changes in the fluid bed dryer/cooler PLC software)
- Two water spray nozzle in the filter, pipe along the filter structure near to connection of the dryer pipe.
- Electric actuated open/close valve. Two hand operated open/close valve, one in parallel and one in series with the electric actuated valve.

Instrumentation (in accordance with flow sheet A16-1357-0002):

- QICA 9510 (Spark detection) mounted on air-inlet channel dryer
- QICA 9511 (Spark detection) mounted on the suction hood of the dryer
- QICA 9512 (Spark detection) mounted on the suction hood of the dryer
- PSA_L 9215 on spark detectors
- PSA_L-9210 mounted on the piping of the fire water supply to the dryer

Third party - BAROMFI delivery (= not included in the Tema Process scope)

- Cabling between the spark sensors and the (Firefly) control panel.
- Main cable (220 V - 1 ph) to the (Firefly) control panel.
- Water piping and compressed air up to 1 meter from the connection at the fluidbed (1 meter distance from suction hoods).



Independent control panel

Regarding the cooling air used for the detectors it has to be a compressor unit specified according to below:

Compressed air: Pressure: 6 – 8 bar

Quality: According to ISO 8573-1

Max. particle size: Class 2

Max. particle concentration: Class 2

Max. oil content: Class 2

Max. pressure dew point: Lower than the lowest ambient temperature.

Consumption, air cleaning unit ACN1: typically 6 NI/cleaning period and detector.

As you are aware of the cooling air has to be of the right quality, also the supply piping to be cleaned out before detector units are placed.

Item 8 Standard Instrumentation and MCC/PLC Control cabinet description

Instrumentation according to flow sheet A16-1357-0002.

Dryer:

- PI-1200 on drive unit compressed air supply
- PSA^H_L-1201 on drive unit compressed air supply
- PIA^H_L-1208 on supply air pressure
- TICA^H_L-1101 on supply air temperature
- TSA^{HH}-1102 on supply air temperature
- TICA^H_L-1113 on the product temperature after drying
- TIA^H_L-1114 on the product temperature after cooling
- PICA^H_L-1210 on dryer suction hood
- ES-1800 on hinged door at rear wall
- TICA^H_L-1126 on the exhaust air temperature
- TSA^{HH}-3110 on the exhaust air temperature

Filter dryer:

- PDIC^H-3200 pressure difference in filter bags
- PSA_L-3201 on the filter compressed air supply
- LA^H-3312 level alarm in the filter hopper
- LA^H-3313 level alarm in the filter hopper

Scrubbers:

Acidic scrubber:

- LSA-4300 on acidic scrubber level
- QICA^{pH}-4510 on acidic scrubber
- LISA_L-4301 on Acid storage tank

Oxidizing scrubber: (optional)

- LSA-4303 on acidic scrubber level
- QICA^{pH}-4520 on acidic scrubber
- QICA^{redox}-4521 on acidic scrubber
- LISA_L-4304/06 on storage tanks

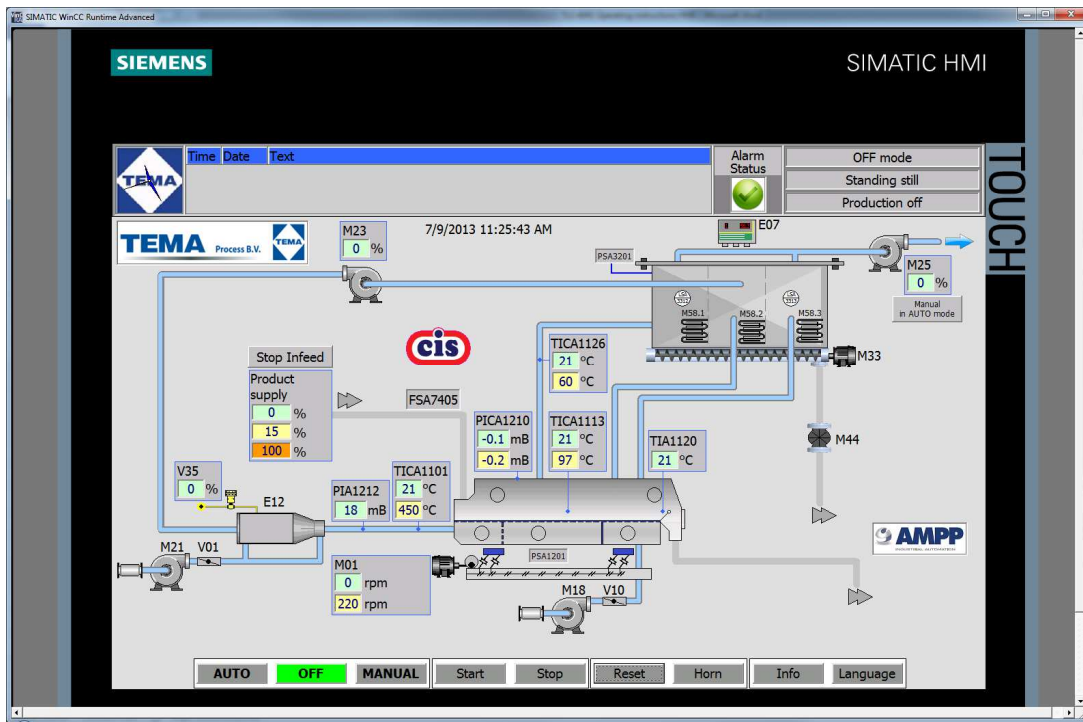
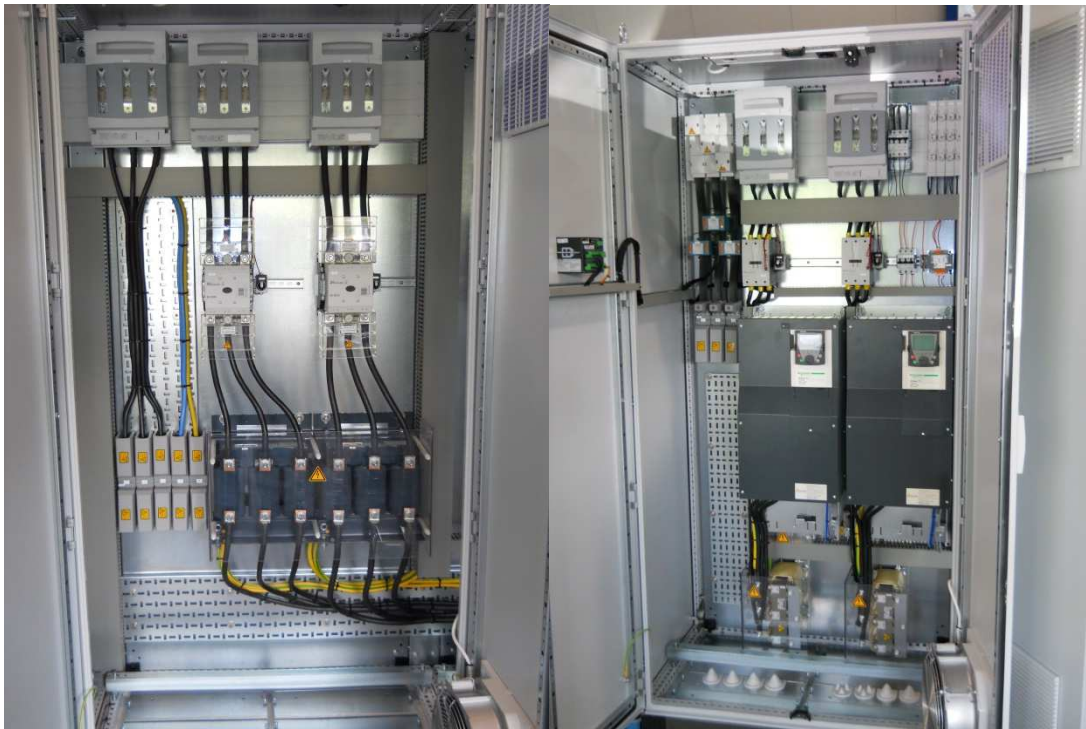
Control system

- MCC/PLC panel (to be installed in a safe area).
- PLC based (Siemens S7-300 series) control system.
- The process set point are adjustable from visualization.
- All relevant information is available on the PLC for the visualisation by customer (data - blocks) through ethernet (or profibus)
- Temperature and pressure controllers integrated in the PLC program
- Motor starter and motor safety switches
- VFD's installed inside the MCC panel, VFD's make Siemens or equal.
- Graphic Display (HMI unit) mounted on the control panel door.
- Electrical engineering and documentation: PLC parts list, PLC software and programming, electrical diagrams and definition list.
- Cabling between the field components and the panel is excluded. Cable list with recommend cable size is included in the scope.

Main switch	<input checked="" type="checkbox"/> Socomec
Selectors	<input checked="" type="checkbox"/> Eaton
Push Buttons	<input checked="" type="checkbox"/> Moeller
Signal fixtures	<input checked="" type="checkbox"/> Moeller
Current protection switches	<input checked="" type="checkbox"/> Siemens
Motor protection switches	<input checked="" type="checkbox"/> Siemens
Emergency stop relay	<input checked="" type="checkbox"/> Moeller
Contactors	<input checked="" type="checkbox"/> Siemens
Auxiliary relay	<input checked="" type="checkbox"/> Siemens
Control current/interface relay	<input checked="" type="checkbox"/> Phoenix
Auxiliary relay Burner switch	<input checked="" type="checkbox"/> Siemens
Contactor Valves	<input checked="" type="checkbox"/> Siemens Sirius
Time relay	<input checked="" type="checkbox"/> Siemens
Control current transformers	<input checked="" type="checkbox"/> Legrand
Supply 24 Vdc	<input checked="" type="checkbox"/> Murr
Supply 10 Vdc	<input checked="" type="checkbox"/> Murr
Terminals	<input checked="" type="checkbox"/> Phoenix
Cable entry	<input checked="" type="checkbox"/> klemband
Frequency converters	<input checked="" type="checkbox"/> Siemens G120 / G120C
Control cabinet	<input checked="" type="checkbox"/> Rittal
PLC system	<input checked="" type="checkbox"/> Siemens 1512
Human Machine Interface	<input checked="" type="checkbox"/> Siemens TP1200 (12" TFT wide)

Applied Software

PLC software	<input checked="" type="checkbox"/> Siemens TIA Portal V13
HMI software	<input checked="" type="checkbox"/> Siemens TIA Portal V13



Motor list

Fluid bed:

M01	Drive fluid bed dryer/cooler	7,5 kW	< 5 kW	VFD
M23	Recirculation fan	200 kW	120-150 kW	VFD
M21	Combustion air fan	15 kW	10 kW	Star/delta
M18	Cooling air fan	15 kW	10 kW	Star/Delta

Filter unit:

M33	Screw conveyor	2,2 kW	2 kW	Star/Delta
M..	Tracing filter	3 kW	1 kW	DOL
M..	Tracing filter	3 kW	1 kW	DOL

Product conveying:

M39	Paddle screw conveyor	22 kW	15 kW	VFD
M40	Screw conveyor outlet	3 kW	2,5 kW	DOL

Scrubbers:

M76	Pump acidic scrubber	15 kW	11 kW	DOL
M77	Dosing pump acid	0,12 kW	0,1 kW	DOL
M78	Pump oxidizing scrubber	15 kW	11 kW	DOL
M79	Dosing pump NaOH	0,12 kW	0,1 kW	DOL
M80	Dosing pump NaClO	0,12 kW	0,1 kW	DOL

Item 9 Documentation en engineering.

Engineering and Documentation:

Control-description, layout and design of the dryer unit as well as two hard copy and one soft copy of the instruction and maintenance manual. Layout drawing and foundation plan. Documentation in the English language.

Item 10 Transport

Transport

Transport is EXW (Incoterms 2010), Tema Process BV, the Netherlands, excluding packing

Item. 11 Installation:

Installation supervisor. Quoted is a lump sum base based on 8-10 working hours per day. Hotel and lodging are excluded. Estimated total 30-35 days in two-three periods.

Item. 12 Start-up and commissioning:

Start-up and process start-up would be done from our process engineer and electrical engineer and for a shorter period a burner engineer. Quoted is a lump sum base based on 8-10 working hours per day. Hotel and lodging are excluded. Estimated total 15-20 days in two periods.

Within the start-up time your operating personnel will be instructed in the operation and maintenance of the equipment. Any materials required for the start-up such as utilities, lubricants, raw materials, etc. shall be provided by the client free of charge.