

Project Title:

Turbine and boiler island for energy production from biomass

Type of deal:

Legal Entity Deal and Asset Deal

Project specification: New stock equipment !!!

1) Turbine island:

Turbine module TG with oil management, condensation system and generator

2) Boiler island:

Pressure unit and auxiliaries

Pressure unit and sootblowers

Auxiliaries (flue gas cleaning)

Sootblowers

Flue gas cleaning

Sector:

Energy

Seller Agent:

Netbid CZ, s.r.o. – Czech Republic



ECO modules 1-6 + steel structure

Short business description:

Turbine Island details :

Turbine type TG 5.4 - 4.0 / 0.3 / 0.009.

Parameters	unit	AND.	II.
Steam			
Pressure	bar (a)	40	40
Temperature	Deñ: 32 ° C	420	420
Flow	t / h	23.9	24.1
Consumption			
Pressure	bar (a)	3.0	3.0
Temperature	Deñ: 32 ° C	0	160-220
Flow (steam from the turbine)	t / hr	0	3.3) *
Heat output	kW t	0	2300
Back pressure at turbine outlet			
pressure	bar (° C)	0.085	0.085
Temperature		42.7	42.7
Power to consumption ratio			
Power on clamps	kW _e	5,411	5,119
Own consumption *)	kW _e	803	751
Power to the network	kW _e	4,608	4,368
Enthalpy of steam	kJ / kg	14.1	14.1
Expected fuel consumption	t / h	5.17	5.22

Machine data comply with data sheets and are without guarantee!

The steam turbine is designed as an axial single shaft installed at +0.0 m. The turbine has an axial steam outlet to the condenser / steam-water exchanger. The turbine is designed as a high-speed, equipped with a gearbox mounted on an oil tank. The turbine, gearbox and generator are mounted on a concrete foundation.

The steam enters the turbine through a filter, a quick-release valve and a series control valve. The turbine is equipped with regulated steam extraction for degassing of feed water and heat exchanger.

The turbine casing consists of an upper and a lower part with a horizontal dividing plane. The stator and the rotor of the turbine are equipped with external seals packed with steam. The steam enters the turbine through a control valve that is used to control the turbine power. From the control valve, the steam passes through the distribution stage and the distribution wheel to the next stages with reaction vane.

The turbine casing is perfectly insulated with textile insulation.

Generator

The synchronous generator is installed on the base plate . It is equipped with air - water coolers. The cooling water is supplied to the turbine steam condenser. The capacity of the coolers is 2x 67% of the heat output. The generator is equipped with an atmospheric moisture separator.

Lubrication and hydraulic system

The main lubrication pump is driven by the gearbox shaft. The auxiliary pump is an electric 3x400V 50Hz and supplies lubricating oil when starting and shutting down the turbine. The emergency pump is direct current, electric and is battery operated (UPS). It serves for emergency shutdown of the turbine in case of voltage loss. The oil tank is double-walled. The turbine control valves are controlled by a 200 bar high pressure hydraulic unit .

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Gearbox

The gearbox provides a reduction speed from 9.050 to 1.500 min⁻¹ generator. It is installed on the oil tank together with lubrication pumps, coolers and filters

Condensation system

a) Condenser

Condenser with 615 m² heat exchanger, horizontal four-way without enclosure compensator and integrated steam-air cooler. The condenser tube can be replaced on site. Tubesheet forming tubes Ø23x1.0 Ø23x1.5 mm and made of sltiny CuZn20Al2As R340 rolled into fronts výměníku. Kapacita condensate collector 180 to operate condensate pumps (min.amount below the lower limit is 1.25 m³). The inner surface is treated with a 500 µm paint (Thortex). The outer surfaces are treated with a paint thickness of 18 0 µm (3x60 µm, HEMPEL).

State	Water flow		Inlet water temperature	Outlet water temperature	Vapor pressure	Enthalpy of steam	Condensate flow	
	(t / h)	(kg / sec)	(° C)	(° C)	(bar (a))	(kJ / kg)	(kg / sec)	(t / h)
Steam extraction t / h	1012.0	281.111	29.8	40.3	0.0850	2404.3	0.429	1.544
Steam extraction 4.04 bpm	1012.0	281.111	31.6	40.3	0.0826	2404.8	0.312	1.123
110% power	1012.0	281.111	28.7	40.3	0.0866	2414.5	0.468	1.685

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State	Condensate pressure	Condensate temperature	Make-up water flow	Make-up water temperature	Steam flow	
					(kg / sec)	(t / h)
	(bar (a))	(° C)	(t / h)	(° C)		
Steam extraction t / h	0.77	53.8	1.0	20.0	5.567	20.040
Steam extraction 4.04 bpm	0.63	50.6	1.0	20.0	4.581	16.493
110% power	0.85	55.1	1.0	20.0	6.120	22.034

b) Gland steam

Gland steam system consists of

- Gland Steam Reduction Station 40 bar (a) / 1.15bar (a)
- Extraction of gland steam

Gland steam is taken through the reduction station from the turbine take-off. The steam outlet pressure is 1,5 bar (a). The safety valve is set to 1,4 bar (a)

GSC is located on a steel floor at +4,15m. The mixture of superheated steam and air is sucked by a vacuum pump from the seals into the gland steam condenser with a heat output of 112kW. The vacuum depth is controlled by a manual valve. The condensate is drained into the condensate tank.

c) Vacuum system

The vacuum system is designed to exit the steam mix from the turbine condenser. The vacuum is maintained at 90100 mbar (a). Equip The solution consists of two vacuum pumps 2 x 100% equipped with a common separator and separate coolers of the working medium (demineralized water).

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Boiler Island details :

Subject of the quotation consist of design and manufacture of mechanical equipment which is necessary for boiler performance. Supplies are defined below. In the scope is also delivery of technical documentation, quality documentation and other necessary documentation.

Not included in the quotation:

- Design of the civil part
- Design for building permit or previous design degree
- Complete deliveries in civil part
- Storage hall for woodchips with grab manipulator
- Feed water tank, feed water pumps, thermal water treatment
- All deliveries not mentioned in the quotation

Battery limit:

- Wood chips – inlet: feeding hopper of the walking floor
- Flue gas – outlet of stack
- Bottom ash – the conveyor outlet dust hopper
- Fly ash – the conveyor outlet dust hopper
- Steam – main closing valve at the boiler outlet
- Feeding water – inlet of feed water control valve on boiler
- Field instrumentation – inlet of control system
- Electro – inlet of switchgears
- Control system – outlet switch gears

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Technical description

Steam boiler

Boiler and its accessories are designed for indoor location and operation. Boiler is self-supporting. Its pressure and non-pressure parts as well as the grate are located on steel structure frames anchored into the concrete foundations.

In the second pass, the combustion chamber is empty. In the third pass, there are superheaters. In other passes there will be a superheater and a multi-part economizer. The last parts of the economizer will be installed in steel sheet gas-tight duct.

Boiler pressure parts

Steam generating unit consists:

- Evaporator system with steam drum – membrane-walls of the furnace, completed by downcomers and risers properly sized for natural circulation
- Three-stage convective superheater located in third and partly in fourth boiler pass, completed by two spray type attenuators between the superheater stages for control of steam temperature
- Multi-stage economizer (ECO) placed in separate vertical steel ducts (fourth boiler and fifth boiler pass)
- All interconnected piping
- Boiler mountings, valves and accessories including all necessary drain, vent and blowdown pipes including valves connected at valve, feedwater shut-off valve, check valve and feedwater control valve with actuator, complete drum blowdown control valve group, drum emergency drain valve with actuator, local and remote water level indicator, all necessary safety valves to protect all pressure parts, including silencers, start-up control valve and stop valve with actuators, live steam stop gate valve with actuator, sampling system for boiler water and live steam with sampling coolers.

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Soot-blowers

The boiler is equipped with sootblowing retractable system for cleaning the convective heating surfaces. Superheated steam extracted from the boiler is used for tubular bundle cleaning.

Heating surfaces of the superheater are cleaned by long retractable sootblowers, short retractable sootblowers are used for economizer and tubular air heater cleaning. All sootblowers are provided with electric drivers and they will be operated automatically from the control room.

Flue gas cleaning

Flue gas cleaning and handling equipment consists of:

- Fabric filter;
Fabric filter is located behind the cyclone outlets. It serves for final cleaning of solid particles from flue gas. Fabric filter creates filter housing with all necessary ducting dampers, access doors and openings, dust collection hoppers etc. Fabric filter bags are automatic sequential cleaned with compressed air pulse-jet off line system.
- Induced draft fan;
One radial fan for suction of flue gas from boiler is located behind the fabric outlet.
- Flue gas ducting;
Complete flue gas ducts with stiffeners and substructure, dampers with actuators, expansion joints and access doors connect the boiler outlet with the stack inlet.
- Slaked lime silo
- Big bags for activated charcoal
- Feeding fan for slaked lime and activated charcoal in the big bags

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Location and additional information

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NETBID
Angermann Machinery & Equipment

The Location:

The machinery is located in Velká Bíteš, Czech Republic (1 hour and 45 minutes from Vienna airport and 1 hour and 45 min from Prague airport).

Additional information:

Viewing:

Viewing is possible at any time. Please schedule your visit at: antonin@netbid.cz

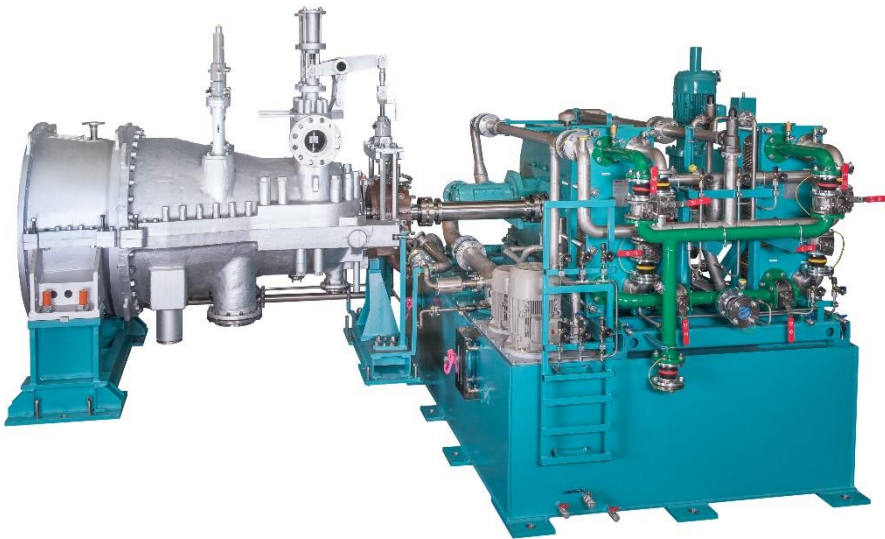
Documentation and permissions:

All the necessary documentation and permissions are available. By agreement, the documentation will be available for review.





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