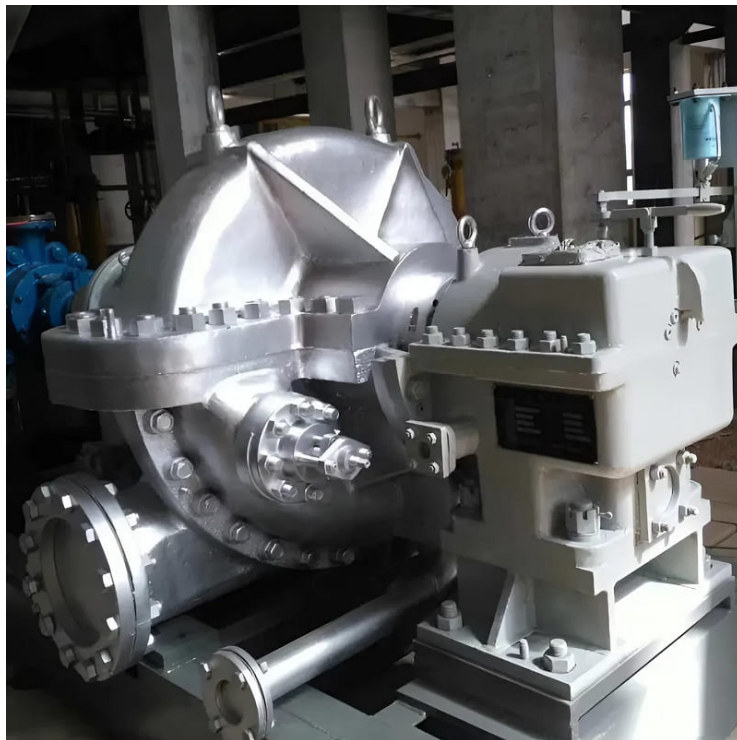


Steam differential pressure power generation project



Technical Solutions

1. Technical parameters of steam turbine

Project	Unit	Parameter	Notes
Quantity		1	
Turbine type		B0.4-1.4/0.2	CD60
Steam turbine rated power	KW	400	
Rated speed	r/min	5000: 1500	
Rated steam inlet pressure	MPa (a)	1.4	
Rated steam inlet temperature	°C	225	
Exhaust pressure	MPa (a)	0.2	
Exhaust temperature	°C	120	
Intake capacity	T/H	9	
Body total weight	kg	6000	
Blade form/material		1Cr13	
Speed Range	r/min	1000-5500	
Type of emergency interrupter			
Shaft end seal type		Comb labyrinth	
Inlet pipe diameter	mm	DN150	
Diameter of exhaust port	mm	DN250	
Bearing		Forced	

Lubrication mode		lubrication	
Overspeed protection action speed	r/min	6500-5600	
Steam turbine vibration value	mm	≤ 0.03	
Speed control system		S7-200smart+DEH	

2. Specification for technical parameters of thin oil station

Gas station type:	XYZ-350L
Fuel supply:	350 L/mins
Oil supply pressure:	1.0 MPa
Tank volume:	2.5 m ³
Oil supply temperature:	35 °C
Cooling water temperature:	≤ 30 °C
Amount of cooling water used:	25 T/H
Cooling water pressure:	≤ 0.2 MPa
Filtering accuracy:	5 μ
Filter area:	0.8 m ²
Cooling area:	20 m ²
refrigerant:	46
AC motor:	2×5.5 kW,
3、Steam seal heater:	2.2kW,
Models:	QFL-20
Heat transfer area:	20 m ²
Cooling water pressure:	≤ 0.3 MPa
Amount of cooling water:	36t/h
Fan:	0.37 kw

4. List of electrical and thermal electric generator for back pressure steam turbines

Technical parameters of generator

The generator is self-excited, brushless and three-phase synchronous alternator with internal exciter and automatic Voltage regulator.

Electrical	• Three-phase four-wire system Y-type
Ambient temperature	40°C
Relative humidity	0–100%
nameplate capacity	500kVA
Rated voltage	10500V
rated current	27.49A
Rated power factor	0.8
Rated speed	1500rpm
Rated frequency	50Hz
Load conditions	Normal load
Operation Status	Long-term parallel operation
Use occasion	Land use
Insulation grade	F
Temperature Rise	F
Level of radio immunity	N (VDE)
Protection grade of generator	IP23
Protection level of junction box	IP44

2.3.2 Main terminal

The outlet busbar of the generator must be clearly marked with U, V, W, N terminal marks.

2.3.3 Winding temperature sensor 2 sets, of which 1 set spare (each set of 3 PT100) . The

temperature of the windings shall not exceed the temperature used for insulation class F (155 ° C) unless otherwise specified.

2.3.4 Bearing temperature measurement. PT100 temperature sensor is used to measure the temperature at both ends of the bearing.

2.3.5 Automatic Voltage regulator (AVR) and setting potentiometers.

The generator automatic Voltage regulator AVR is ABB UN1010 and is installed in the generator outlet knapsack.

2.3.6 Anti-condensation heater.

The terminal number of the anti-condensation heating unit must be marked according to the wiring diagram. The nameplate must be installed in an obvious position, and shows the voltage and power consumption. Heating unit voltage 220VAC, power 2X630W.

2.3.8 Nameplate

Installed on the side of the generator, the protection level of the generator and junction box should be marked.

2.3.9 Overload current. The alternator allows continuous operation for 120s at 150% of the rated current without damaging the insulation.

2.3.10 Speeding

The alternator allows 120 seconds of continuous operation at 120% of rated speed without damage.

Steam turbine structure

1.Steam turbine:

The upper half of the cylinder is made of ZG230-450 alloy steel and the lower half of the cylinder is made of ZG230-450 alloy steel. The front end of the steam turbine rotor should be equipped with speed transmitter, through the speed sensor speed signal to speed governor and digital tachometer. The steam seal of steam turbine is a labyrinth type steel strip seal, which is composed of front and back steam seals. There are 6 seal rings in front seal and 6 seal rings in back seal.

2.Regulating system:

The speed control system adopts Siemens Controller + electro-hydraulic control system. The speed or load of steam turbine can be adjusted and controlled automatically. It can be connected to DCS system by 4 -20 Ma electric signal.

Main technical indicators:

(1) Rated power requirements: within a given parameter range of fluctuation, to meet the safe operation of the output

(2) The vibration of bearing bush is less than 0.05 mm. (3) Turbine interlock protection is complete and reliable (mechanical and electrical overspeed protection, low oil pressure protection, bearing temperature protection) . (4) Seal heater should meet the requirements of steam leakage seal to prevent serious water in the oil.

(5) Smooth bearing oil back, to avoid low oil temperature back oil is not smooth, serious oil leakage from the bearing outside.

(6) Set up 6 speed probe.

(7) The speed regulating system of steam turbine meets the requirement of speed adjusting precision

Speed control range:

Punch around 0~8000 r/min

Speed control accuracy: ± 5 r/min

Load control accuracy: $\pm 0.2\%$

Slow rate of control system: $< 0.1\%$

Maximum lift speed for load rejection $< 7\%$

(8) Main technical specifications for steam turbine oil stations:

① AC oil pump one-use one, the oil supply can meet the turbine and synchronous motor oil requirements

② Set up a double filter, filter accuracy of 5μ . (9) Technical requirements for electrical thermal control instruments:

Set up two sets of unit tachometer (including local tachometer) . 2 units equipped with mechanical overspeed and electrical overspeed protection. The important parameters of steam turbine control enter party A's DCS system, and the important parameters of steam turbine and lean oil station have DCS interface. 4 equipment testing points include: turbine oil temperature, oil pressure, speed, the bearing temperature.

(10) Main material requirements:

Name	Material	Name	Material	Name	Material
Cylinder	ZG230-450	Impeller	35crMoA	Front and rear bearings	Babbitt
Leaves	1Cr13	Spindle	35crMoA	Main valve	ZG230-450
Housing	HT250	Stem	38CrMoAl	Nozzle	1Cr13
Steam seal teeth	1Cr18Ni9Ti				

(11) The axis alignment error between the unit and the synchronous motor is ≤ 0.05 mm, and the vibration amplitude is ≤ 0.05 mm

(12) The connection form adopts the diaphragm coupling connection

(13) The design service life of the steam turbine is more than 30 years, and the design service life of the steam turbine parts (excluding the vulnerable parts) is not less than 25 years.

Turbine Electric Generator range:

1. Supply list of steam turbines

Serial number	Name	Code name	Quantity	Notes
1	Cylinder		1	
2	Nozzle group		1	

3	Double-speed stage impeller blades		1	
4	Front steam seal		1	
5	Rear steam seal		1	
6	Front housing		1	
7	Rear housing		1	
8	Support thrust front bearing		1	
9	Rear bearing		1	
10	Front seat frame		1	
11	Chassis		1	
12	Oil engine bracket		1	
13	Spindle Assembly		1	
14	Steam valve assembly		1	
15	Critical Block Throttle		1	
16	Regulating steam valve connecting rod		1	
17	Turning		1	

	device			
18	Travel switch bracket		1	
19	Magnetic circuit breaker		1	

2.

Serial numbe r	Name	Each	Notes
1	Speed control system	1	Oil engine
2	Gearbox	1	5000/1500, 400KW
3	Thin Oil stations	1	The flow rate is 350L/min, one way high pressure oil 1.0 mpa, one way lubricating oil 0.15 MPA, two AC oil pumps, one DC oil pump, oil cooler, dual oil filter, electric heater
4	Miter iron	32	
5	Anchor Bolt Assembly	8	
6	Synchronous generator	1	400KW 10.5kV

7	A complete set of generator control and protection system	1	Protect (microcomputer) (earthing, back-up) cabinet one side control, simultaneous cabinet one side outlet cabinet one side
---	---	---	--

3、List of instrument materials

Serial number	Name	Specifications	Quantity	Notes
1	PT100Dual resistor remote PT100	WTYY2-1021	1	Thrust pad temperature
2			1	Front bush temperature
3			1	Rear Bush temperature
4			4	Temperature of gearbox bush
5	Magneto-resistive speed sensor	SZCB-01	6	Speed
6	Trip switch		1	
7	Control cabinet body	2000×1000×600	1	Control Cabinet
8	Tachometer	HZS-04	2	Turbine speed

9	Axial displacement	HZW-A1	1	Axial displacement of steam turbine
10	Vibration table	HZD-W/L-A3	2	Bearing Vibration
11	Digital display table		6	
12	Programmable controller	6ES7 288-1SR60-0AA0	1	Siemens
13	Digital Input Extension Module	6ES7 288-2DE08-0AA0	1	Siemens

4、List

The electric generator system

Serial number	Name	Specifications and models	Quantity	Unit	Place of origin, brand
Control section					
1	Turbine Controller		1		
2	OPC components	HB-OPC	1		
3	Standard cabinet	2200X800X600mm-M-RAL7035	1		
4	Power Module	DC24V 10A	2		
5	Deh PC software		1		

6	Deh configuration software	Studio V1.0	1		
7	External system communication interface	TCP/IP、Modbus RTU、Profibus DP	1		
8	Switch	EDS-205A/5	2		MOXA
9	Engineer station	G4560/2G/1T	1		Dyer
10	Monitor	22-inch monitor	1		Dyer
11	Network accessories	Network cable, Crystal Head, etc.	1		Made in China
Hydraulic part (oil supply device)					
1	Oil pump	Plunger pump	2		Siemens
2	Motor	3KW	2		Siemens
3	Fuel tank assembly	Stainless steel; 100L;	1		
4	Main pump control block group	HB-ZDS/MPC-002	1		
5	Accumulator assembly	HB-ZDS/ACC-002	1		

6	Accumulators	NXQA-16	1		
7	Cooler assembly	HB-ZDS/COAB-002	1		
8	Oil filter	RFB-63*10-C	1		
9	Transmitter	SYPT-A-250-WG1/4-A-T	1		
10	Relief valve	DBDS6P31.5	1		
11	Safety valve	DBDS6P10B/315	1		
12	Pressure gauge	YB-60NF (0-25Mpa)	1		
13	Control tank of gas station	HB-ZDS/KZX-002	1		
Hydraulic part (servo control oil motor) set					
1	Control block component	HB-ZDS/CBM-002		1	
2	Combination block	HB-ZDS/CB-002		1	
3	Electro-hydraulic servo valve	SYPDV-06E/30-24V		1	
4	OPC solenoid valve	SYSV-A06D/220DC		1	
5	Matching valves	HB-ZDS/VAL-002		1	
6	LVDT	Size according to		1	

		actual requirements			
7	Supporting piping and accessories	HB-ZDS/MPA-002		1	

5、 Random file list

Serial	Name	Quantity	Notes
1	Basic layout diagram	1	
2	Thermal soda system diagram	1	
3	Unit diagram of auxiliary equipment	1	
4	Wiring diagram of instrument cabinet	1	
5	Product instructions	1	
6	Product Inspection Certificate	1	
7	Product Certificate	1	

Quality Assurance

(4)

(1) the manufactured products comply with the relevant international and national standards and fulfill all the terms of the technical documents. (2) products are developed, designed, manufactured, inspected, delivered and serviced in strict accordance with JB/T6764“Technical conditions for general purpose industrial steam turbines”. (3) ensure that the performance parameters of the steam turbine unit meet the technical requirements, and the products have good safety, reliability, economy and timely delivery during operation. (4) the quality guarantee period of the steam turbine is 12 months from the date of the equipment leaving the factory.