

DZL4-1.25-AII
TAISHAN BRAND
BOILER DESIGN SCHEME
----Single Drum Chain Grate Steam Boiler



Taishan Group Boao International
2013

I . BOILER SPECIFICATIONS

Model	Unit	DZL4-1.25-A II
Brand		TAISHAN , China
Rated Steam Capacity	T/h	4
Rated Steam Pressure	Mpa	1.25
Rated Steam Temperature	°C	193.3
Feeding Water Temperature	°C	20
Radiate Heating Area	m ²	10.24
Convection Heating Area	m ²	87.66
Economizer Heating Area	m ²	16.56
Grate Efficient Area	m ²	5.18
Suited Coal		A II ,size 1—40mm
Design Heat Efficiency	%	79.32
Temperature of Drain Smoke	°C	180
Coal Consumption	kg/h	693.7
Weight of Max Transport Part	T	27.21
Dimension of Max Transport Part	mm	6740×2820×3568
Installation Dimentions	mm	6740×3738×5013
consignment Manner		Packed

II . GENERAL

This boiler is steam boiler of horizontal type, single drum with traveling chain grate. The threaded gas pipe is inside the boiler drum, and both side water-cooling wall rounds thumb flue in drum's belly. This structure protects effectively the boiler drum and avoids the belly directly radiated by fire. Boiler drum connects the two headers by two side water cooling wall. Four downcast pipes are foreside and rearward of boiler drum, and every pipe is led from drum to header. By this design, the drum and headers becomes a circulation loop together with the two sides water-cooling walls.

During running, high temperature gas and ash come into soot separator from smokestack of rear arch blocking-smoke wall, then from thumb flue to front smoke chamber, then to threaded gas pipe passing single pass scour flue, finally through rear smoke box to tail flue.

Boiler heat surface includes four parts: boiler furnace radiation heat surface (right and left water-cooling wall), first bank of tubes convection heat surface, second bank of tubes convection heat surface, tail heat surface (economizer)

NO	Method	Function	Aim
1	Single Pass Threaded Gas Tube	Remove welding thermal stress of tube end from double pass	Prevent breakage of tube-plate
		Improve flexibility	Prevent breakage of tube-plate
		The tube water side scale-forming is easy to drop, improve gas disturbance, strengthen heat transmission	Improve heat efficiency
		No fouling, no need soot blowing	Improve heat efficiency
2	Thumb gas duct	Reduce inlet gas temperature of high-temp tube-plate Reduce welding thermal stress of tube-plate	Prevent the breakage of front tube-plate
		Reduce heat loading of drum bottom, strengthen disturbance of drum bottom, prevent accumulation of dust	Prevent drum protruding
3	Arch Tube-plate	Improve flexibility, Remove welding thermal stress of tube end	Prevent breakage of tube-plate
4	Big size down comer	Reduce resistance of downcomer, improver water speed of ascending pipe, the water circulation is more reliable.	Prevent breakage of tubes
5	Gas and dust separation in	Separate gas and dust	Reduce smoke concentration

	boiler		
6	Independent air chamber, send air from two sides	Send air evenly	Improve heat efficiency and prevent partial burning
7	Rolling wheel device under chain grate	Change sliding friction to rolling friction	Reduce resistance and improve life of chain grate.
8	New type chain plate	With better tensile fatigue strength, more flexibility for coal and better burning effect.	Improve reliability
9	Single drum water and fire tube drum	Reduce dimension of the boiler, improve water volume in boiler comparing with other type same capacity boiler	Improve reliability of boiler and flexibility of loading change

III. MAIN CHARACTER

1. Reasonable heat surface and burning device, heat efficiency is 4~5% higher than national standard.
2. Reasonable flue speed design, heating surface without scattered ash and no abrasion. The boilers can work full load, high efficiently and safely in long term.
3. The big and tall boiler furnace can be easily designed according to the different fuel to improve the burning rate of fuel and reduce black smoke.
4. Adopt single return design and injected circulation design for the hot water boilers, the medium speed in return of heat surface is higher than national standard.
5. Adopt big and high strength grate(below 20T), adopt squama type or beam type of traveling grate(above 20T), improve the boilers' safety and lessen the leaked coal and adjust burning conveniently.
6. scoot idiomatically separated at the exit of boiler furnace which can reduce dust content and lessen abrasion of back heat surface.

7. compact structure, 3~5meters lower than other style boilers' installation height, which shorten the installation period and reduce the cost of boiler house.
8. closed scot cleaning avoid the second pollution and save time and labor. big volume benefits power-off protection , high ability suitable for load waving.

IV. DESIGN AND MANUFACTURE STANDARD

The boilers' every press part is counted according to GB9222-88, GB/T16508-96, and counted the safety valve outlet according to "supervision regulation of steam boiler's safety technique" for guarantee the safety of boiler body.

1. Counting heat power according to JB/DQ1060-82, this can make the boiler run effectively and save steel.
2. Counting boiler's air power according to "counting standard way of boiler's equipment air power", and choose appropriate fan in order to fuel well-balanced and safely burn.
3. To design, manufacture, check and accept the boiler's parts according to "supervision regulation of steam boiler's safety technique". To install the boiler according to GB50273-98.
4. Manufacture is according to ISO9001.

V. CONSTRUCTION

1. Drum and Tubes

Tubes:

Water-cooling Wall $\phi 51 \times 3$

Threaded Gas Tubes $\phi 57 \times 3.5$

Total length 5138mm

Header Tubes $\phi 159 \times 6$

Total length 4880mm

Material China Tube Standard No.20 (ASTM A106-B)

Drum:

$\phi 1600 \times 16$

Length 5132mm

Material China Steel Standard 20g (ASTM A515-60)

(1) Access Doors

Each fire, furnace access and cleanout door, shall be of a fast operating type and suitable for balanced draught operation.

(2) Valve and Instruments

The boiler would be fitted out with a complete set of valves and instruments generally as shown in the drawing to meet the requirements of boiler code and to conform to the best standard practice.

The valve includes safety valve, blow-down valve, gate valve, blocking valve and adjust valve.

The valve and instruments are Chinese first class brand.

(4) I. D. Fan and F. D. Fan

The I. D. Fan and F. D. Fan are made by Prettech, the sub-company of Taishan Group.

I. D. Fan

Model Y6-41-11\U+21166.4C L 45%%D

Capacity 6742-13796m³/h

Full Pressure 3338-4212Pa

Motor Model Y160L-2B

Motor Power 22kw

Motor Speed 1480rpm

F. D. Fan

Model	G6-41-11\U+21166.4A R 225%%D
Capacity	3596-7358m ³ /h
Full Pressure	1436-1811Pa
Motor Model	Y132S-4B
Motor Power	5.5KW
Motor Speed	1480rpm

(5) Refractory and Brickwork

A full set of refractory fire brick and cement would be supplied with due allowance for expansion.

(6) Chimney

One self-supporting, mild steel chimney would be provided to disperse the combustion products of the boiler when burning the specified fuel.

Height	35meter
Diameter	450mm
Thickness	4mm
Material	Mild Steel

(7) Feed Water Pumps

Each boiler would be equipped with an electrically operated feed water pump and a steam operated pump piped in such fashion that it may be selected to operate with any pump, all as shown in the schematic diagram.

Feed Water Pump

Type	Motor driven, direct coupled, multi stage centrifugal pump
Quantity	1 set per boiler
Model	QDL4.8-8×18
Capacity	4.8m ³ /h

Head 144m
Brand BOSHAN Or Equal Chinese top brand
Motor Power 4kw

Steam Pump

Type	Single stage steam turbine, direct couple to pump
Quantity	1 set per boiler
Model	QB-3
Steam Temperature	184.07°C
Steam Capacity	4m ³ /h
Steam Pressure	1.7MP

(8) Control System

A control panel is supplied to guarantee the safety running of the boiler.

Model GDK-4T

Electric Resource Electric triple four lines、380V ± 10% , 50HZ ± 2%

By the principle of central control and central show, the start up and stop circumstances of every auxiliary are centrally shown on the console. Electric source, pressure direction and electric current direction of big motor are placed on this product. The reasonable structure, automatic protection and program control make the boiler run safely. And these characters make the boiler run with automatic adjustment.

1)This equipment can well control the ID fan, FD fan, grate, feeding coal, removing slag and so on..

2)This product has interlock releasing conversion switch. When it interlocks, the start-upping process of auxiliary is ID fan---FD fan---grate; the automation stopping process is grate---FD fan--- ID fan. If the single boiler need to run, it must be in releasing place.

3)The bigger power electric motor adopts the stepped down way to start up to reduce the electric net's undulation to protect the electric motor and the contact implement.

4)Grate electric motor adopts the alternative timing to get the smooth timing feature.

5)This device has the electric contact point pressure meter, when the boiler's actual pressure is over the enactment pressure in operation(enactment pressure \cong rating working pressure), the electric control box will send out sound-light warning and automatic boiler outage.

6)Water Feeding System

Water feeding System

There are hand control and automatic control for it. The water level's regulation range is $\pm 30\text{mm}$ (can be regulated) and the water level warning range is $\pm 50\text{mm}$, when the water feeding system is in the state of hand control, the fireman can feed water to the boiler according to the actual situations; When it is in the state of the automatic control, it will realize the self-control. When the water level rises to $+30\text{mm}$ form 0mm , the water inlet pump will power off automatically, and it will send out the high frequency cry if it rises continuously to the -50mm . When the water level decreases to -70mm , the water level is dangerous low and it will realize boiler outage automatically. When it happens, the user can regulate it on the actual situations.

(9) Dust Collector

A dust collector is provided to reduce particle emission in the flue gas.

It is characterized with such advantages as eroding resistance, high temperature resistance, no jam, long operation life, run and manage simply, no charges and no re-pollution.

It is whirlwind type filter, when the gas with dust enter into the filter via the pottery guider, it will be circumrotated in a high speed, and dust and gas will be separated, the dust will be collected in the dust case and can be put out by the dust excluding valve, the purified gas will go upward and enter into the gas collecting case, and then be let out from the chimney.

Type	Multi-cyclone
Quantity	1 set per boiler
Model	XD-4
Exhaust Gas Volume	12000m ³ /h
Filtering Efficiency	95%

Resistance 81-92mm H₂O

Consistency of Disposed Gas (max) 180

(10) Slag Remover

The GBC series dragging slag remover is the same with 1—20T steam hot water boiler's unit slag removal or multi-boilers' together slag removal.

This product adopts chain feeding structure and its feature is wearable, hydraulic seal, the wet slag removal and good reliability.

When it is working, the reduction gear machine is run by electric motor, and it drives the front spindle by chain and makes the drag chain run by the front spindle's hexagram chain wheel, which will remove the slag out of the boiler.

(11) Flue and Air Ducts

Each boiler would be supplied with a complete set of boiler flue and air duct with necessary dampers. All flues shall be provided with expansion joints and supports.

(12) Coal Feeder

Each boiler would be supplied with a complete set of coal feeder.

The structure of TGS coal-feeder includes three parts:

1)Actuating system:

Electric motor, moderator and beading drum are placed on the top of coal feeder, and are fixed on the beam to join the orbital abut.

2)Coal bin:

The four chain blocks of coal bin are placed in the middle of orbital about. Coal bin runs up and down with the running of chain blocks in the orbital.

3)Beam orbital:

Beam orbital is soldered with channel steel and is fixed the front of boiler door as an abut.

Work theory: Firstly, turning on the switch of the electric source, then putting the lifting button, while the motor starts up and beading drum runs forward direction and lifts along the beam orbital. When it lifts certain height, the two front chain

blocks of coal bin enter the flush orbital, then coal bin begins to bevel and the rear chain blocks continue to lift. So the mouth of coal bin begins downward, and all coal is put into the coal silo. At this moment, stopping the button, the motor stops. After cleaning the coal, putting on down-button, motor begins to reverse. The coal bin lands into the pit. Then putting the stop-button, the next cycle operation of filling coal can begin again.

Model	TGS-4
Coal Scuttle Volume	0.2 m ³
Reduction Gear Machine	Model SGC1.6
Electric Motor Power	1.1kw
Lifting Height	2900-3000MM

(13) Divided Cylinder

Each boiler would be equipped with a divided cylinder which diameter is 500mm.

(14) Water Treatment System

Each boiler would be equipped with a water treatment system.

Model	NNF-750
Capacity	9m ³ /h
Inlet dimension	φ 750
Total height	3710mm

Character:

(1) NNF series full automatic water-treatment equipment uses U.S.A. Flack control system and is widely used in China and overseas.

(2) Characters:

1)The hardness of equipment after softening is $\leq 0.03\text{mmol/l}$

2)The equipment is highly automatic. The main parts are from American Fleck. The process of automatic circulation, manufacturing, washing, second birth and absorbing salt works automatically.

(15) Spare Parts and Tools

No.	Name	Quantity
1	Chain Grate Flake 1#	8
2	Chain Grate Flake 2#	6
2	Chain Grate Flake 3#	6
3	Chain Grate Pin	4
4	Sealing Knot	4
5	Backing Strip No.1	1
6	Backing Strip No.2	4
7	Slag Shovel	1
8	Harrow	1
9	Hook No.1	1
10	Hook No.2	1
11	Gas Duct Brush	1
12	Ash Shovel	1
13	Fire Hook	1
14	Spanner	2

VI. Inspection Machinery for the Boiler in Factory

No.	Name	Model	Qty
1	Digital Carbon & Sulfur Analysis Meter	HV-4B	1set
2	High Speed Self-Ignition Furnace	HB-2H	1set
3	Electric Scale	JA1003	1set
4	Photometer	723	1set
5	Metallography Scale	XJB-2A	1set
6	Hydraulic Multipurpose Test Machinery	WE-100	1set
7		WE-600A	1set
8	Concussion Testing Machine	JB-30	1set
9	Projective Meter	JS	1set
10	X Ray Crack Detector	XXH3005	1set
11		XXXH23005	2sets
12		XY2515	2sets
13	Ultrasonic Crack Detector	CTS-22	2sets

VII. Enterprise Introduction

Taishan Group Co. Ltd is located in Shandong Province, China the foot of world-famous Mountain Tai. The Group covers an area of 300,00 square meters with a staff of 3100 an investment capital of 800 million RMB(USD 100 million). It is a major industrial boiler manufacturer and a A class boiler manufacturer approved by the National Quality Inspection Bureau (NQIB) and the vice chief council member of Industrial Boiler Trade Association (IBTA) of China. IT is recognized among “the 500 largest machinery industrial enterprises”, “the 500 most profitable industrial enterprises” and “the 500 creditable enterprises” in China.

Affiliated to Taishan Group are 10 manufacture companies, two research centers and one import and export Trade Company. Taishan Group is always engaged in designing and developing the products, which are highly-efficient, energy-saving and environment-protecting. The major products are steel boilers, cast-iron boilers, pressure containers, light machinery, engineering plastic and solar-energy facilities, etc. The boiler products are as below:

The circulating fluidized bed boiler has 24 types of steam boiler from 35 to 480 t/h and 8 types of hot water boiler from 14 to 116 MW.

The new type DZL water-fire tube shell boiler has 26 type of steam boiler from 1 to 80 t/h and 30 types of hot water boiler from 0.7 to 58 MW.

The SZL water tube boiler has 18 types of steam boiler from 2 to 20 t/h and 16 types of hot water boiler from 1.4 to 14 Mw.

The WNS fully-automatic oil and gas fired steel steam boiler has 15 types from 1 to 20 t/h and 13 types of hot water boiler from 0.7 to 14 MW.

Various capacity oil and gas fired hot water/steam boilers based on the introduced technology from Noviter, which is a Finnish famous boiler company. The output range of hot water boilers is 1MW~116MW, which has 40 series. The output range of steam boilers is 1.5t/h~200 t/h, which has 40 series.

The fully-automatic oil and gas fired cast-iron boiler hot water has 40 types from 20,000 to 2,400,000 Kcal/h and 6 types of steam boiler from 0.16 to 0.52 t/h.

Taishan Group is equipped with perfectly advanced CAD system and is acknowledged as “National Model Enterprise for CAD Application” by National Science and Technology Department (NSTD). And has got “ISO9001” Certification.

Taishan Group Taian Boao International Trade Ltd. is the sub-company of Taishan Group Co., Ltd., Which sells the products manufactured by Taishan Group in various countries especially in Southeast Asia.

VIII. Enterprise Main Honor

---1996, Taishan boiler was named “Top Ten Famous Boiler Brands in China”

---2002, Taishan Group was named Vice Director of “China Industrial Boiler Association”

---2003, Taishan Group was named “AAA Class Good Credit Enterprise”

---2004, Taishan Group was named “Shandong Province Top 50 Best Enterprise”

9 User List for Ref

年份	锅炉型号	用户名称	数量(台)
2004	DHL10-1.25	THERMOTEK EQUIPMENT PTD LTD	1
	DHL15-1.25	THERMOTEK EQUIPMENT PTD LTD	2
	DHL30-1.6	THERMOTEK EQUIPMENT PTD LTD	3
2005	DHL10-1.25	THERMOTEK EQUIPMENT PTD LTD	5
	DZL8-1.25	PT. ZUG	3
	DZL6-1.25	PT. ZUG	4
	DZL10-1.25	PT. ZUG	2
	DZL10-1.25	PT. PINDO DELI PULP AND PAPER MILLS	1
2006	WNS8-1.0/Q		1
	DZL15-1.25	BEST GROUP	1
	DZL4-1.25	BEST GROUP	1
	DZL4-1.25		1
	DZL10-1.25		1
	DZL2-1.0		1
	DZL6 底座	CHEEMA BOILERS	1
	导热油炉 400 万大卡	BEST GROUP	1
	导热油炉 120 万大卡	BEST GROUP	1
	WNS1-1.0/Q	ABU DHABI FERTILLIZER INDUSTRILES CO.	1

	WNS2-1.25/Q	AL AMOUDI	1
	WNS2-1.0/Q	EL SANHORY CO. FOR CHEMICAL	1
	WNS4-1.6	GLOBAL PACKING	1
2007	SZL10-1.25	THAI LILY TOWER CO., LTD	1
	DZL20-1.25	CP GROUP	1
	DZL8-1.25	AMPOL FOOD PROCESSING LTD.	2
	DZL6-1.25		2
	DZL4-1.0	THAI VINYLON CANVAS INDUSTRIES	1
	DZL10-1.25	BEST GROUP	1
	DZL20-1.25	PT. PINDO DELI PULP AND PAPER MILLS	1
	DZL2-1.25		1
	WNS8-1.6/Y	AL-MONAIRY FOR CORN PRODUCTS	3
	WNS1-1.0/Y	Abu Dhabi fertilizer Co.,LLC	1
	WNS10-1.25Q/Y		1
2008.1-9 月	DZL6-1.25	BEST GROUP	1
	DZL20-1.25	CP GROUP	1
	DZL2-1.0		2
	DZL4-1.0	SAHA FARMS	2
	DZL8-1.25		1
	DZL20-1.25	THAI AGRI FOODS PURLIC COMPANY	1
	DZL6-1.25		3
	DZL6-1.25	CP GROUP	1
	DZL10-1.25		1
	D 系列底座	THAI K. BOILER	8
	DZL15-1.25W	ACECOOK VIETNAM JSC	1
	导热油炉 200 万大卡	BEST GROUP	1

	WNS6-1.6/Q		1
	WNS4-1.25		1
2009	DZL20-1.25W	ACECOOK VIETNAM JSC	3
	DZL6-1.25W	THAI AGRI FOODS PURLIC COMPANY	1
	DZL6-1.25	CP GROUP	1
	导热油炉 400 万大卡	BEST GROUP	1
	D 系列底座	CHEEMA BOILERS	3
	CFBC TG170-9.8	VIETNAM COAL GROUP	2
	DHS38-3.0	THACHANA PALM OIL CO., LTD	1
2010	DZL8.4	CP GROUP	1
	WNS10-1.0Q		1
	DZL8-1.25		1
	DZL20-1.25	ACECOOK VIETNAM JSC	1
	WNS6-1.6/Q	HB FOR FOOD INDUSTRIES	3
	WNS2-1.0/Y	ALIAH FACTORY FOR CHEMICAL MATERIALS	1
	DHW15-3.82	A2Z ENGINEERING	10
	DHW50-6.7	A2Z ENGINEERING	12
	WNS3-1.0/Q		1
2011	DZL30-1.25	ACECOOK VIETNAM JSC	2
	DZL20-1.25	ACECOOK VIETNAM JSC	2
	DZL15-1.25	PT. SINAR PANGJAYA MULIA TEXTILE INDUSTRY	2
	DZL6-1.25		1
	DZL8-1.25		1
	DZL10-1.25		1
	DHW29-2.5	ENCO	1
	DZL2-1.25		1

	DZL29MW		3
	CFBC TG170-9.8	VIETNAM COAL GROUP	2
2012	SZL15-1.25	AZHAR COMPANY	1
	SZL8-1.25	DIAMOND TEXTILE	1
	SZL10-1.25	SAMIRA FABRIC	1
	YWL-6000MA	DIAMOND TEXTILE	1
	SZL10-1.25	AALA TEXTILE	1
	DZL20-1.25	BEST GROUP	2
	YWL-3000MA	BEST GROUP	2
	WNS15-1.25Q	MASHATEX RESOURCES	1
	WNS8-1.6Q/Y	AL MONAIRY FOR CORN PRODUCTS	1
	WNS6-1.25/Y	PLASTICHEM COMPANY	1
	YYW-3500Y	PLASTICHEM COMPANY	1
	WNS2-1.0Y	代理	1
	DZL20-1.25		1
	DZL4-1.25		1
	YWL-6000MA	Orient Coating	
	SZL10-1.25	Rashid Textile	
	DZL6-1.25	Alkaram Towel	
	DZL6-1.25	Soorty Textile	
	DZL10-1.25	S.M Food Maker	
	WNS15-1.25-Q	Base Papers Ltd	
	SZL10-1.25	Orient Coating	1