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Ref rf1002

Trailing Suction Hopper Dredger

Year: 2009

General

Type and function

This vessel is a self-propelled trailing suction hopper dredger of full steel welded, streamline and round-bilge hull with twin screw, double rake, single deck,bulb bow and double skegs. It can navigate in unrestricted navigation area and operate in coastal area.

sea condition and dredging material

Environmental condition of operation area：

wave height:	3.0m
ambient air temperature：	-15～40
sea water temperature：	0～32
relative humidity:	90%～95%。
max flowrate：	2m / sec
max wind speed：	20 m / sec
dredging material：	silt,mild clay,sandy soil of medium density, medium fine sand
checked condition of sandy soil：	DN50=0.25mm medium sand

Basic setting and function

The suction pipes will be of suspending type on the three points of fore, middle and aft. The loading time will be no more than 45minutes when the double suction pipes opearte at the same time.

Equiped with two dredgeheads of new type.

Self-empty pipe is installed in the front of hopper for bow blowing and spouting.The distance of bow spouting capacity should be 100m.It can pump all hopper loading to land with a distance of 1500m within 65minutes.

Capable to dump the spoil to the sea-bed through two rows of eight bottom open, conical hopper doors.The hopper door can be opened /closed in groups or together. Each bottom door is operated by a hydraulic cylinder, remote controlled from the wheel house

High pressure jet water piping system is provided to loose and diluting mud during discharging.

Hopper is of open type with hatch coaming of 3.0m height and splash plate of 1.0m height.

Two cylinder type overflows which can be continuously adjust is set in hopper with stroke of 4000mm and can be remote controlled in bridge house.

Two discharging baffle boxes are set, one in the middle part and one in aft part.

One crane of 12tX12.6m and another set of 8tX15m are installed for maintenance and changing fittings.

Install two sets of nonadjustable propeller with propeller nozzle,which are drived by two sets of 2795kW X8320ZC2B/3B diesel engine through reduction gear box.

Install two sets of 1471kW G6300ZC17B diesel engine for driving two dredge pumps through reduction gear box.

Install two sets of 900kW Z12V190BC$_{10}$ diesel engines, each driving one high pressure jet water pump.

Install four sets of sealing water pump of dredge pump, one set of flushing pump of gate valve and one set of standby sealing water pump of dredge pump.

Install four diesel generator sets: 400kWx3 sets and emergency generator set: 120kWx1 set.

Install bow thruster driven by jet pump for improving the manoeuvrability .

Dredging control post in the bridge house, in front of the navigation console located in the lower middle position, which is operated by one person with broade sight.

Main particulars

main dimension

length of overall:	105.00m
length between perpendiculars:	95.20m
breadth,moulded:	19.00m
depth,moulded:	8.00m
design draft:	5.20m
operating draft(under dredging condition):	7.24m
deadweight at operating draft(dredging condition):	7891.4t
max dredging depth(below light draft):	27m
complement:	30P
power of main engine:	2×2795KW
navigation speed:	12kn

height between decks：

main deck —poop deck: 3.00m

poop deck—accommodation deck: 2.70m

accommodation deck—boat deck 2.70m

boat deck —navigation deck 2.70m

navigation deck —compass deck 3.00m

main deck —forecastle deck 3.00m

height of hopper hatch coaming 3.00m

power equipment

Use diesel engine of individual driving propeller,dredge pump and high pressure jet water pump.The power equipments are as follows：

power equipment	Qty	model	Power (MCR)	speed	fuel type
main propulsion engine	2	X8320ZC2B/3B	2795 kW	600rpm	Heavy oil
diesel engine of dredge pump	2	G6300ZC17B	1471 kW	600rpm	MDO
diesel engine of high pressure jet water pump	2	$Z12V190BC_{10}$	900 kW	1450rpm	MDO
diesel engine of generator set	3	CCFJ396J-M10	400 kW	1000rpm	MDO
diesel engine of emergency generator set	1	CCFJ120Y	120 kW	1500rpm	MDO

parameters of dredge pump

Dredge pump particulars as follows：

type: centrifugal type with single wall case

capacity: $10000m^3/h$

head: 21.5 m

shaft power:	1000kw

high pressure jet water pump

There are two sets of high pressure jet water pump with the follwing parameters for high pressure jetting water of draghead during dredging and dilution jetting water of soil hopper during hopper suction：

capacity	3543m^3/h
total head	77m
shaft power	857KW
design loading capacity	
mud loading capacity	7150t
light diesel oil	230t
heavy oil	310t (max446.1t)
lubricating oil	15t (max72t)
fresh water	150t
supply and stores	20t
crew and baggage	5t
food	3.4t
slop	8t
total	~7891.4t

Dredging performance

max dredging depth

The dredging depth is 27.0m below waterline on the condition of light load when the angle between dredge pipe and water level is 45^o.

loading time

The loading time is about 45min when dredging medium fine sand of hardness below middle level and two racks operate together and the dredging depth is 27m.(to be final confirmed by the pump efficiency.)

dumping time

The dumping time is not more than 5min using high pressure jet water.

hopper capacity

Max hopper capacity is 5500m^3,and max mud loading capacity is 7150t.The distance from liquid level to upper edge of hatch coaming is 600mm(the highest position of overflow ladle).

General performance

5.1 speed

Do the sea trial under the condition of wind power not exceed Beaufort scale 3,seacondtionnotexceed grade 2,deep water and clean bottom.

design speed	12kn
speed during dredging(relative calm water)	7kn

vessel type

The main dimensions are compact considering about economy.The ratio of ship breadth and draft is large for wide vessel type because of big loading capacity, low draft and arrangement requirements in order to reduce vessel dimension and cost.Install poop in stern and short forecastle in bow because of low freeboard and considering about navigability of sea trip. Use double tail fin, bulb stern and linear type in stern.Use ducted propeller to make propeller be the best thrust. Use small bulb bow for reducing running resistance.

stability and freeboard

Stability of all loading conditions meets CCS stability regulations of sea-going vessel,while freeboard meets the CCS “Statutory Survey Regulation of Ship and Marine Facility-- Statutory Survey Technical Regulation of International Navigation Sea-going Vessel”.The navigation is of unrestricted navigation area,while the operation is of offshore navigation area.

endurance and self supportability

The endurance is of 16 days. Calculate fuel oil and fresh water according to navigation and operation of 24 hours per day.

maneuverability

It is of good maneuverability with twin screw and double rudder.Use bow thrust to jetting water propell on bow side direction for enchancing maneuverability of leaving and reaching dock as well as gyration.

general arrangement

Install forecastle in bow,while install deck house in stern.Install five decks of poop deck,accommodation deck,boat deck,navigation deck and compass deck within small range considering about the navigation sight and reducing superstructure.

Install poop in stern, and ensure enough freeboard for stern deck house and relevant equipments while operation.

Install passageways with laying chequered plate on it on both sides of hopper top for safety and convenience so that operators can directly go to forecastle deck from stern via it.

belowdecks

Stern ~ #3 is rudder engine room,while #3 ~ #9 is void tank. #9 ~ #37 is engine room area,and install engine room platform with engine control room on it in engine room. #37 ~ #120 is hopper with 16 conical hopper doors of piston type. #108 is overflow sleeve.Install freshwater tank,heavy oil tank and light oil tank below hopper of both shipboards.Install void tank in the upper prat of hopper with hydraulic piping through it to separate freshwater tank and light oil tank.There is longitudinally joined triangle tank installing seawater manifold in the bottom of hopper middle part. #120 ~ #151 are dredge pump and pump engine room with platform, on which install electric welding machine room. There are left and right chain lockers in #151 bulkhead. #151 ~ bow is bow ballast water tank.

main deck

Stern ~ #37 is poop,which mainly is poop accommodation area except stern ~ #3 port as rudder engine room.There are mess room,grain stores,galley,toilet,office room,double room,changing room,tool room,emergency generator room,CO_2room,electrician room,cable gallery and opening bulkhead of engine room,among which there are upstairs and downstairs passageways.Install slinging opening of engine room on port of #35 ~ #37.

＃37～＃120 is hopper area.Install hatch coaming in ＃39～＃120,on which there are hydraulic hopper door outfit,and before and after which there are discharge pipelines and deck passageways.Install splash plate in hatch coaming.

＃120～＃138 is dredge pipe path area for installing dredging pipes,in the middle of which is dredge pump room opening with watertight hatch cover on it.

＃138～bow is forecastle,in the middle of which there is pump engine room hatch,and before which there is chain locker.On port there are acetylene bottle room,oxygen bottle room and tool room,while on starboard there are painting room and rigging room. #151—bow is bow ballast water tank.

poop deck

Install eight double rooms, hospital, toilet,air conditioning room and engine room casing,etc,among which there are upstairs and downstairs passageways and cable galleries. There are gangways on both shipboards.

forecastle deck

nstall pump room funnel, foremast, bow flagstaff and mooring equipment,etc.

accommodation deck

Install seven double rooms,meeting room,washroom and toilet in ＃10～＃35 deck house,among which there are upstairs and downstairs passageways.

boat deck

Install lifeboats on both shipboards.Install two single rooms with washroom in ＃26～＃35 deck house,whose right side is captain room and left side is chief engineer room. ＃19～＃26 after deck house are funnels.

navigation deck

Install navigation control console, chart room,radio room and toilet in navigation room,where install navigation control console in the middle place and operation console on both sides.

compass deck

Mainly install navigation, signal, lighting and lamp house of vessel name,etc.

passageway and hatch

There are corridors and stairs between each deck for ensuring safety during operation and navigation.Install necessary fireproof walls and fire doors between each deck in the whole superstructure according to regulation requirements.Install emergency escape paths in engine room and dredge pump engine room directly to weather deck.

details in general arrangement(SHG203—100—02)。

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