Trailing Suction Hopper Dredger

Scope of Application: Projects, Sea States & Soil Types

Core Application Scenarios for TSHDs :

"Long transport distances + Large volumes + Medium-soft soil + Open waters"

— This is the "golden combination" where Trailing Suction Hopper Dredgers (TSHDs) achieve maximum economic efficiency.

For projects involving hard rock, narrow channels, or high-precision dredging, Cutter Suction Dredgers (CSDs), Grab Dredgers, or Backhoe Dredgers are recommended instead.

TSHDs should undertake the following dredging and reclamation works:

1. Offshore works with strong wind and waves.

2. Dredging works for open bays, harbors, rivers and long-distance waterways.

3. Large-scale projects with large quantities and long transportation distance.

4. Pipe trench excavation and beach maintenance.

5. Offshore sand reclamation works.

6. Organic soil, peat, silt, muddy soil, soft clay, loose sand and other substrates.

TSHDs shall not undertake the following dredging works:

1. Works near hydraulic structures with restricted plane dimensions, at the end and corner of the wharf, and with short trenching length.

2. Extremely hard cohesive soil and rock.

3. Areas where debris and garbage gather in large quantities.

4. Areas that are particularly sensitive to dredged suspended solids. The adaptability of the trailing suction hopper dredger to natural conditions shall be determined according to the specific performance of the ship.

Adaptability of Trailing Suction Hopper Dredger to Natural Environment

Ship type		Wind scale		Effective wave height in favorable current (m) (Wave period < 8 seconds)		Vertical flow velocity visibility (m/s)	(m)
		Inland river	Coastal	Construction limit wave height	Safety limit wave height		
Barge dredger's hull volume (m^3)	9000	—	7	3.0	—	2.0	1000
	4000 - 9000	7	6	2.0	—	2.0	1000
	2000 - 4000	7	6	1.5	3.0	2.0	1000
	2000	7	6	1.2	2.5	2.0	1000

Main Dimensions of Trailing Suction Hopper Dredger and Required Water Area Conditions:

Types of dredging equipment		Main dimensions (m)				Maximum excavation depth (m)	Water conditions required for construction (m)	
		Long	Wide	Draught				
				Empty load	Overload		Water depth	Width
Barge dredger tank capacity (m^3)	500	70	fourteen	2.4	3.2	10	3.6	—
	1500	85 - 87	13 - 15	2.6	4.5	15 - 18	5.0	—
	4500	102 - 129	17 - 19	3.0 - 5.00	6.8 - 7.5	20 - 27	8.1	—
	5000	113	18	4.5	7.3	30	7.9	—
	7000	114	20	—	7.8	35	8.5	—
	10000	128	25	7.5	8.8	39	9.5	—
	13500	150	27	—	9.5	42	10.2	—
	18000	159	30	—	11.0	99	12.0	—
	33000	201	36	—	14.6	140	16.0	—
	46000	223	41	—	15.2	155	16.5	—

Excavability of Trailing Suction Hopper Dredger to Dredged Rock and Soil

Soil and Rock type / class / Dredger hold	Organic soil, peat, and silt types	Silt soil type	Clayey soil type			Sand type			gravel type	
	1	2	3	4	5	6	7	8	9	10
≥9000	easy	easy	easier	difficult	difficult	easy	easier	moderate	moderate	difficult
4000-9000	easy	easy	easier	difficult	difficult	easy	easier	difficult	difficult	difficult
≤4000	easy	easy	moderate	difficult	difficult	easy	moderate	difficult	difficult	unsuitable

When pipeline transportation is used, the transportation capacity of the trailing suction hopper dredger shall be calculated, the pipeline transportation capacity shall match the excavation capacity of the dredging equipment, the minimum flow rate of the pipeline slurry shall be greater than critical flow rate, and the maximum flow rate shall be within the allowable range of the cavitation performance of the dredge pump.

Main dimensions and required water area conditions of trailing suction hopper dredger

Rock type	Soil and Rock Name	Classification characteristics	The suitability of pipeline transportation
silt-like	silt	e>1.0, W>36%	very good
Clayey soil type	clay	Ip>17	After fragmentation, it is better.
	sandy clay	10<p17	After fragmentation, it is better.
Sandy soil type	Clayey silt soil	Particles smaller than 0.075mm account for more than 50% of the total mass. Ip≤10, 10≤Mc<15%	very good
	Sandy silt soil	Particles with a diameter less than 0.075mm account for more than 50% of the total mass. Ip≤10, 3≤Mc<10%	very good
Sandy soil type	silt	Particles with a diameter greater than 0.075mm account for more than 50% of the total mass.	very good
	Fine sand	Particles with a diameter greater than 0.075mm account for more than 85% of the total mass.	very good
	Medium sand	Particles with a diameter greater than 0.25mm account for more than 50% of the total mass.	better
	Coarse sand	Particles larger than 0.5mm account for more than 50% of the total mass.	better
	Gravel sand	Particles larger than 2.0mm account for more than 25-50% of the total mass.	better
Gravel soil	Gravel and rounded gravel	Particles larger than 2.0mm account for more than 50% of the total mass.	Pretty good ~ Excellent
	Gravel and pebbles	Particles larger than 20mm account for more than 50% of the total mass.	Pretty good ~ Poor
	Boulder boulder	Particles larger than 200mm account for more than 50% of the total mass.	not suitable