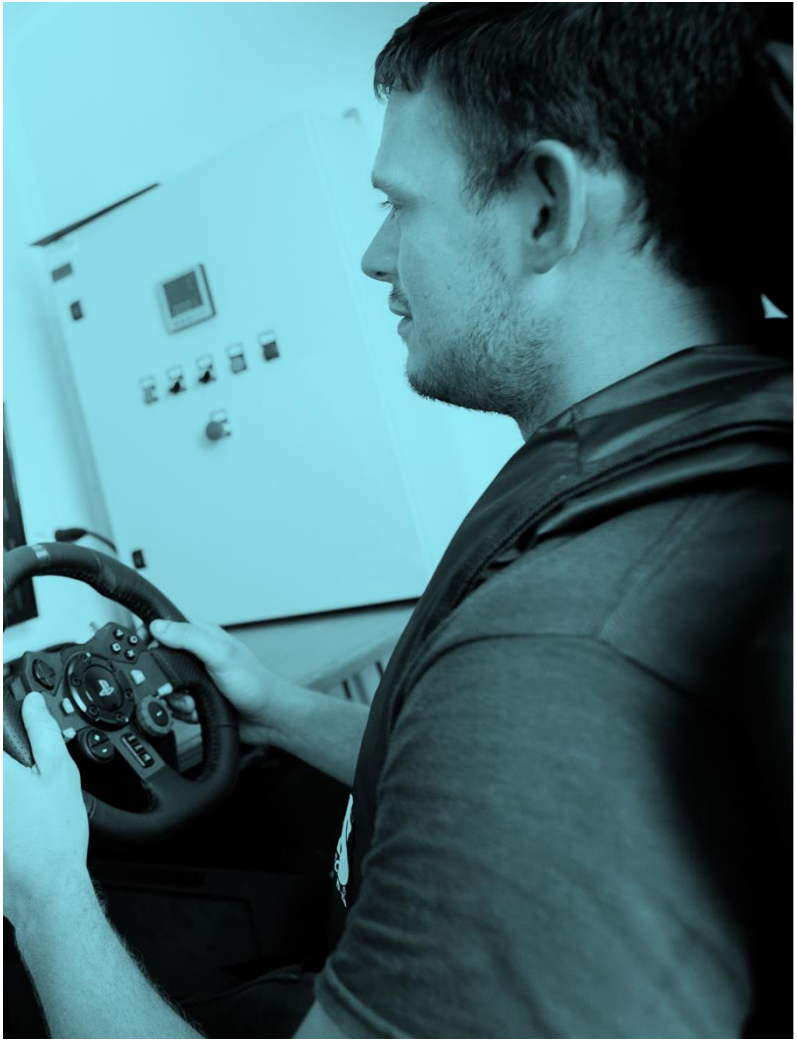


HULLWIPER

General Specifications

1. Features

- Variable cleaning speed with auto functions dependent on biofouling encountered and the coating condition.
- Significantly kinder to the vessels coating utilising variable pressure water jets.
- Seawater is the cleaning medium for a smoother surface finish extending cleaning interval requirements.
- Extremely good power and stability.
- Faster onsite mobilisation and demobilisation.
- Capable of continuous 24/7 operations.
- Made in Norway according to Norwegian offshore standards.

2. Technical Specifications

1.	Dimensions	330 cm (L) x 170 cm (W) x 85 cm (H)
2.	Frame	Stainless steel, tube structure
3.	Weight	1,275 kg
4.	Max. Depth	40m
5.	Buoyancy	Solid cell structure
6.	Power Input	690 Vac, 3 phase, 60 Hz, 37 kW
7.	Oil Reservoir	40 litres
8.	Hydraulic Power	Flow 195 l/min 130 bar compensated with an overpressure of 0.5 bar
9.	Hydraulic Oil	Standard is 32 hydraulic oil but the system can use all types of hydraulic oil
10.	Thrusters	8 hydraulic thrusters 3 Hp
11.	Water Pump	Capacity up to 635 l/min
12.	Water Pressure	50-450 bar 80 l/min
13.	Speed	• Horizontal: 2.0 knot • Vertical: 0.7 knot • Turn xyz: 360 deg
14.	Light	• 2 x 250W LED light • 1 x 36 W LED light • 3 x channel light dimmer
15.	Sensors	• 4 bar depth sensors • 160 bar oil pressure sensors • Magnetic 5 level oil sensor with automatic shutdown (with 25% oil level) • 600 bar high water pressure sensor

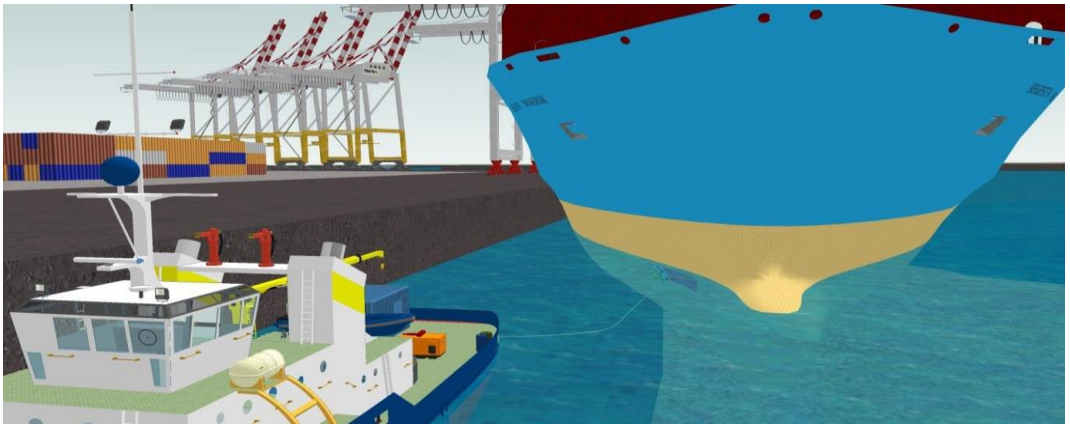
16.	Camera	• CMOS Sensor in 1280 X 800 resolution • Removable IR-cut filter for day & night function • Built-in IR Illuminators, effective up to 15 metres • Real-time H.264, MPEG-4 and MJPEG Compression (Triple Codec) • Multiple Simultaneous Streams • Activity Adaptive Streaming for Dynamic Frame Rate Control • Tamper detection for unauthorised changes • Built-in 802.3af Compliant PoE • Built-in MicroSD/SDHC Card Slot for Onboard Storage
17.	Others	• Auto depth • Auto heading • Digital control of thrusters • Speed sqm/ hour

2. Surface Equipment

1.	Power Control Cabinet	• Power input of 220 V 50 Hz 3 phase, 12 kW • Digital instruments for, Volts, Amps and Hz • Fuses and ground fault system • Connections for umbilical
2.	Surface Viewing	• 60 cm (L) x 54 cm (W) x 64 cm (H) • PC rack with 2" x 32" monitors • Idcon overlay system and data presentations • Depth, date, time, heading, twist counter, video grabber and screen writer • Online recording
3.	Umbilical	Kevlar armoured cable length 350m Outer diameter 24 mm • 4 x 8 AWG • 4 x 12 AWG • 8 x Single Mode Fibers • Auto altitude • Lighting • ¾" HP water hose 300 bar
4.	High Pressure Pump	CD100 135 l/min • Working pressure 230 bar 3336 Psi • Maximum pressure 350 bar – 5076 Psi • Pump triplex ceramic plunger • Remote operated start-stop • Remote operated pressure adjustment

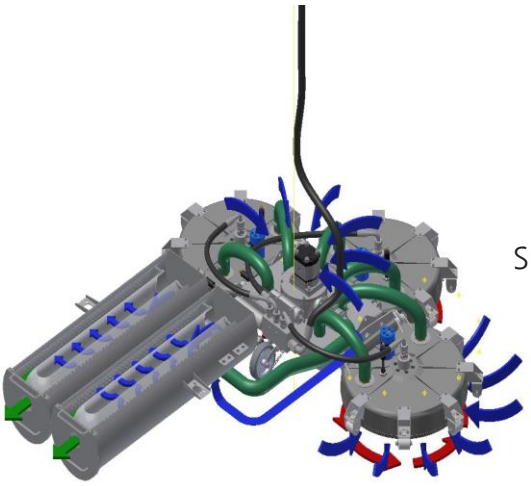
5.	Cleaning Unit	• 3x cleaning discs, each disc 480mm diameter, cleaning width 1,460mm • 4 nozzles on each disc, 12 in total • Waste collection system • Waste suction pump 38 m² / hour
6.	Generator	Diesel driven 60Hz/400V Super Silence • Standby power (ESP) 144 KVA / 115kW • Prime power (PRP) 152 KVA / 122kW

4. Filter and recovery design



Inlet flow pressure between
50-400 bar

Filter bag 10>25my
PN 0038-25

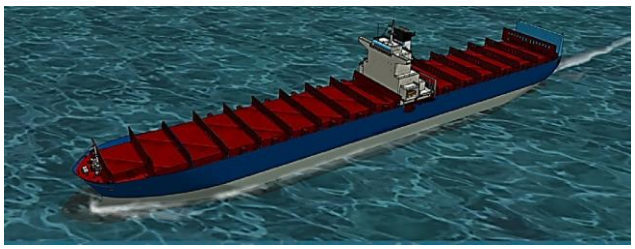


Surrounding harbour water
(reference point mg/L)

Outlet flow approximately
635 l/min - 38 m³/hour

5. The Legislative Position Key Points Summary IMO 2000 vs IMO 2008

According to IMO 2000 vs IMO 2008 directives, ships sailing in international waters with SPC antifouling are subject to a daily maximum leakage of copper of approximately 55µg/cm2/day. This produces a daily leakage of approximately 5.5kg of pure copper oxide on a ship with underwater areas of 10,000 m² within the current legislation.



A ship that is berthed can have the same daily migration of copper oxide release because of the design SPC paint.

A port with 3000 ship calls per year can have an environmental impact of approximately 16 x tons of pure copper oxide released in the inner Harbour water column.

6. Documentation

- Anti-fouling, The Legislative Position Key Points Summary IMO 2000
- Anti-fouling, The Legislative Position Key Points Summary IMO 2008
- NIVA Memo 3rd Update
- AMT, EIA Report
- AMTP0028 - Resubmission 24/02/2013
- Water Samples

Water sample EIL- 3K-26934			NYK TENJUN	Attachment 1
Water pressure	220	bar		
Operation time	4,62	hour		
Cleaning Area	3573	m2		
Flow 80l/min	4800			
Allowed Cu lekage according to IMO 2000 55µg/cm2/day	0,55	g/m2		
Allowed Cu lekage according to IMO 2008 200µg/cm2/day	2	g/m2		

		Copper µg/l	Zink µg/l	Total suspended matter mg/l	Total organic Carbon mg/l
Reference (1)	<	250	50	2,3	3,9
ROV (2)	<	250	50	2,3	3,91
Filter Inlet during cleaning (3)	<	250	50	4	2,86
Filter Outet during cleaning (4)	<	250	50	3	1,71
Total Cu pr cleaning		5,5	g		
Allowed Cu lekage according to IMO 2000		378,0	g		
Allowed Cu lekage according to IMO 2008		1374,6	g		

Water sample EIL- 3K-27181			HOEGH OSLO	Attachment 2
Water pressure	220	bar		
Operation time	6,60	hour		
Cleaning Area	4268	m2		
Flow 80l/min	4800			
Allowed Cu lekage according to IMO 2000 55µg/cm2/day	0,55	g/m2		
Allowed Cu lekage according to IMO 2008 200µg/cm2/day	2	g/m2		

		Copper µg/l	Zink µg/l	Total suspended matter mg/l	Total organic Carbon mg/l
Reference (1)	<	63	<50	<5	
ROV (2)	<	34	<50	<5	
Filter Inlet during cleaning (3)	<	0	<50	<5	
Filter Outet during cleaning (4)	<	39	<55	<5	
Total Cu pr cleaning		1,2	g		
Allowed Cu lekage according to IMO 2000		645,5	g		
Allowed Cu lekage according to IMO 2008		2347,4	g		

Water sample AR/ELC/1233-1241/11			Nysted Maersk	Attachment 3
Water pressure	220	bar		
Operation time	5,17	hour		
Cleaning Area	3800	m2		
Flow 80l/min	4800			
Allowed Cu lekage according to IMO 2000 55µg/cm2/day	0,55	g/m2		
Allowed Cu lekage according to IMO 2008 200µg/cm2/day	2	g/m2		

		Copper µg/l	Zink µg/l	Total suspended matter mg/l	Total organic Carbon mg/l
Reference (1)	<	90	140	2,3	3,9
ROV (2)	<	20	50	2,3	3,91
Filter Inlet during cleaning (3)	<	20	50	4	2,86
Filter Outet during cleaning (4)	<	10	40	3	1,71
Total Cu pr cleaning		0,2	g		
Allowed Cu lekage according to IMO 2000		449,9	g		
Allowed Cu lekage according to IMO 2008		1636,1	g		

Water sample AR/ELC/098-101/12			MSC Kreta	Attachment 4
Water pressure	220	bar		
Operation time	3,50	hour		
Cleaning Area	1937	m2		
Flow 80l/min	4800			
Allowed Cu lekage according to IMO 2000 55µg/cm2/day	0,55	g/m2		
Allowed Cu lekage according to IMO 2008 200µg/cm2/day	2	g/m2		

		Copper µg/l	Zink µg/l	Total suspended matter mg/l	Total organic Carbon mg/l
Reference (1)	<	70	20	<5	
ROV (2)	<	20	70	<5	
Filter Inlet during cleaning (3)	<	0	3520	<5	
Filter Outet during cleaning (4)	<	39	940	<5	
Total Cu pr cleaning		0,7	g		
Allowed Cu lekage according to IMO 2000		155,4	g		
Allowed Cu lekage according to IMO 2008		565,0	g		

Water sample CLR/12/1131/02			ER CAEN	Attachment 5+6
Water pressure	220	bar		
Operation time	5,58	hour		
Cleaning Area	3570	m2		
Flow 80l/min	4800			
Allowed Cu lekage according to IMO 2000 55µg/cm2/day	0,55	g/m2		
Allowed Cu lekage according to IMO 2008 200µg/cm2/day	2	g/m2		

		Copper µg/l	Zink µg/l	Total suspended matter mg/l	Total organic Carbon mg/l
Reference (1)	<	5	5		
ROV (2)	<	5	5		
Filter Inlet during cleaning (3)	<	5	5		
Filter Outet during cleaning (4)	<	5	5	16	
Total Cu pr cleaning		0,1	g		
Allowed Cu lekage according to IMO 2000		456,8	g		
Allowed Cu lekage according to IMO 2008		1661,0	g		

Water sample AR/ELC/344/13			Nedloyd Europa	Attachment 7
Water pressure	220	bar		
Operation time	7,32	hour		
Cleaning Area	6435	m2		
Flow 80l/min	4800			
Allowed Cu lekage according to IMO 2000 55µg/cm2/day	0,55	g/m2		
Allowed Cu lekage according to IMO 2008 200µg/cm2/day	2	g/m2		

		Copper µg/l	Zink µg/l	Total suspended matter mg/l	Total organic Carbon mg/l
Reference (1)	<				
ROV (2)	<				
Filter Inlet during cleaning (3)	<				
Inside Filter bags (4)	<	4020	691	49	1,71
Total Cu pr cleaning		141,2	g		
Allowed Cu lekage according to IMO 2000		1079,0	g		
Allowed Cu lekage according to IMO 2008		3923,6	g		

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