Pollution of sea water by garbage.

Pollution of sea water by sewage.

Pollution of sea water by oil.

Pollution of air by exhaust gasses.

Pollution of air by CFK’s.

Pollution of sea water by ballast water.

Pollution of sea water by oil.

Pollution of sea water by sewage.
Engine power operating time

- PS main engine
- SB main engine
Slow sailing ASD Tug:
- Engines at idle speed
- Clutches engaged
- Rudder propellers to the side
- Loss of energy
MTU 16V4000 diesel propulsion engines:
- 16 Cylinder V-type engine
- Common rail fuel system
- Emissions compliant with IMO Tier 2
- Maximum power 1840 kW at 1600 rpm

Rolls Royce US 205 FP rudder propellers:
- Straight shaft line with bow teeth coupling
- Built in on/off clutch
- CuNiAl five bladed FPP with 2400 mm propeller
- TK nozzle with stainless steel inner plate
MTU 12V2000 generator/fifi set engine:
- 12 Cylinder V-type engine
- Common rail fuel system
- Exhaust gas after treatment system
- Emissions compliant with IMO Tier 3
- Maximum power 695 kW at 1800 rpm

ABB Electric propulsion engines/generators:
- Jacket water cooled 440 V – 60 Hz AC
- Rotor shaft and bearings designed to transfer the maximum torque diesel propulsion engine.
- Maximum power 230 kW at 900 rpm
Exhaust gas after treatment system MTU 12V2000:
- Selective Catalytic Reduction system (SCR)
- Diesel Oxidation Catalyst (DOC)
- Diesel Particulate Filter (DPF)
- Fuel according to EN590 required
ASD TUG 2810 HYBRID

TUGS

HYBRID PROPULSION SYSTEM

Main Engine (IMO Tier 2 compliant)

Generator set (IMO Tier 3 compliant)

Main Engine (IMO Tier 2 compliant)

Electric motor /generator propulsion

Propulsion switchboard

Electric motor (s) Winch(es)

Battery set (100 kW)

Battery set (100 kW)

Battery set (100 kW)

(120 kWh)

(120 kWh)

(120 kWh)

Rudder propeller

Rudder propeller

Propeller

Propeller

Hotel switchboard
Free sailing mode (batteries):
Diesel electric propulsion up to 4 knots and no diesel engines running.
(One battery pack feeds the propulsion switchboard, one battery pack feeds the hotel switchboard.)
Free sailing mode (generator set):
Diesel electric propulsion up to 8 knots and only the IMO Tier 3 compliant generator/fifi set engine running. (One battery pack is loaded by the propulsion switchboard, one battery pack feeds the hotel switchboard.)
**Towing mode:**
Diesel direct propulsion up to 13 knots or 60 tons bollard pull, only two main engines running.  
(One battery pack is loaded by the propulsion switchboard, one battery pack feeds the hotel switchboard.)
Fire fighting mode:
Diesel direct propulsion up to 13 knots or 60 tons bollard pull and 1200 m3/hr fire fighting capacity. Two main engines and one generator/fifi set engine running. (One battery set is loaded by the propulsion switchboard, one battery set feeds the hotel switchboard.)