

QATOL

MANTA --- **RAY**

QATOL MARINE LUBRICANTS

MARINE AND POWER GENERATION SYSTEM



MARINE INDUSTRY OVERVIEW

CHALLENGES IN THE MARINE INDUSTRY



More Complex Engine Designs Are Being Introduced
New Engine Designs Strive To Enhance Fuel Economy And Lower Emissions



IMO Decarbonization Targets
Stricter Emission Regulations Leading To New Fuels



Innovative Lubricant Additive Solutions
Are Critical In Response To New Regulations And Engine Technology



Reliable Global Lubricant Supply
Is More Important Now Than Ever

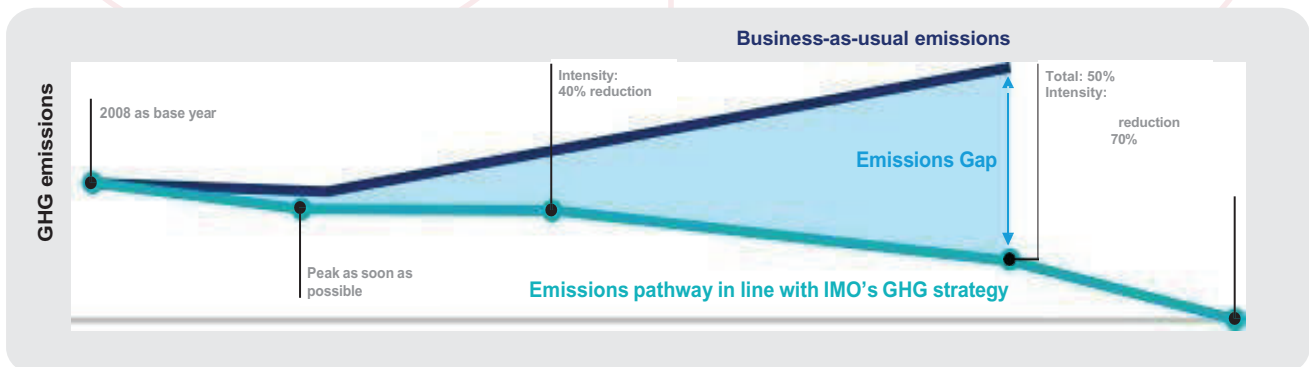
IMO'S 2050 DECARBONIZATION GOALS

The International Maritime Organization (IMO) Has adopted an initial strategy on the reduction of greenhouse gas emissions from ships, setting out a vision to reduce GHG emissions from International shipping and phase.

IMO has defined three levels of ambition, with two interim goals:

- Achieve a %40 reduction of the average carbon intensity by 2030 and a %70 reduction by 2050 compared to 2008 levels.
- The industry's total GHG emission are to be reduced by %50 by the year 2050.

IMO STRATEGY FOR MAJOR REDUCTIONS IN GHG



QATOL MARINE PRODUCT PORTFOLIO

INNOVATIVE SOLUTIONS FOR ANY APPLICATION

APPLICATION

• TPEO FOR DISTILLATE FUEL • TPEO FOR RESIDUAL FUEL • MCL FOR VLSFO • MCL FOR HSFO • MCL FOR HSFO • SYSTEM OIL • SYSTEM OIL

QATOL PRODUCT

• MANTA RAY TPEO • MANTA RAY TPEO • MANTA RAY MCL • MANTA RAY MCL • MANTA RAY MCL • MANTA RAY SO • MANTA RAY SO

TOL PRODUCT

• 12 – 20 BN • 20 – 55 BN • 40 BN • 70 BN, 100 BN, 140 BN • 200 BN • 5 – 8 BN • 5 BN

PROVEN PERFORMANCE

INNOVATIVE SOLUTIONS FOR ANY APPLICATION

Qatol Marine Oils, Uses **MAPS** Products, Which Have Been Extensively Tested Through

1. ENGINE LAB TESTING
2. FIELD TESTING

Marine and Power Generation System (MAPS)

- Approved or Validated By OEMs.
- Addresses The Entire Range of Fuel Options.
- Is Suitable for The Latest Generation of Large Marine Diesel Engines Used in Propulsion and Power Generation.



TRUNK PISTON ENGINE OIL

QATOL Manta Ray TPEO are recirculating lubricants used to lubricate medium-speed 4-stroke trunk piston engines, in propulsion engines, auxiliary engines and in power generation.

TPEOs must be able to neutralize acids to prevent corrosive wear, prevent deposit formation by keeping contaminants suspended, resist thermal and oxidative stress, handle contamination with water, and provide sufficient load carrying capacity to protect engine parts under high load.

4-STROKE MAIN ENGINE SPLIT* - 2019



OTHER OEMs AND BRANDS

- YANMAR
- DAIHATSU
- HIMSEN and others

*Oronite estimate of market share by installed power

APPLICATIONS AND ADVANTAGES

QATOL solutions are suitable for the latest generation and older engine types.

QATOL MANTA RAY TPEO 20-55 BN TPEOs are recommended for engines operating on HFO or in LNG/HFO dual fuel mode.

QATOL MANTA RAY TPEO 12-20 BN TPEOs are recommended for engines operating on distillate fuel.

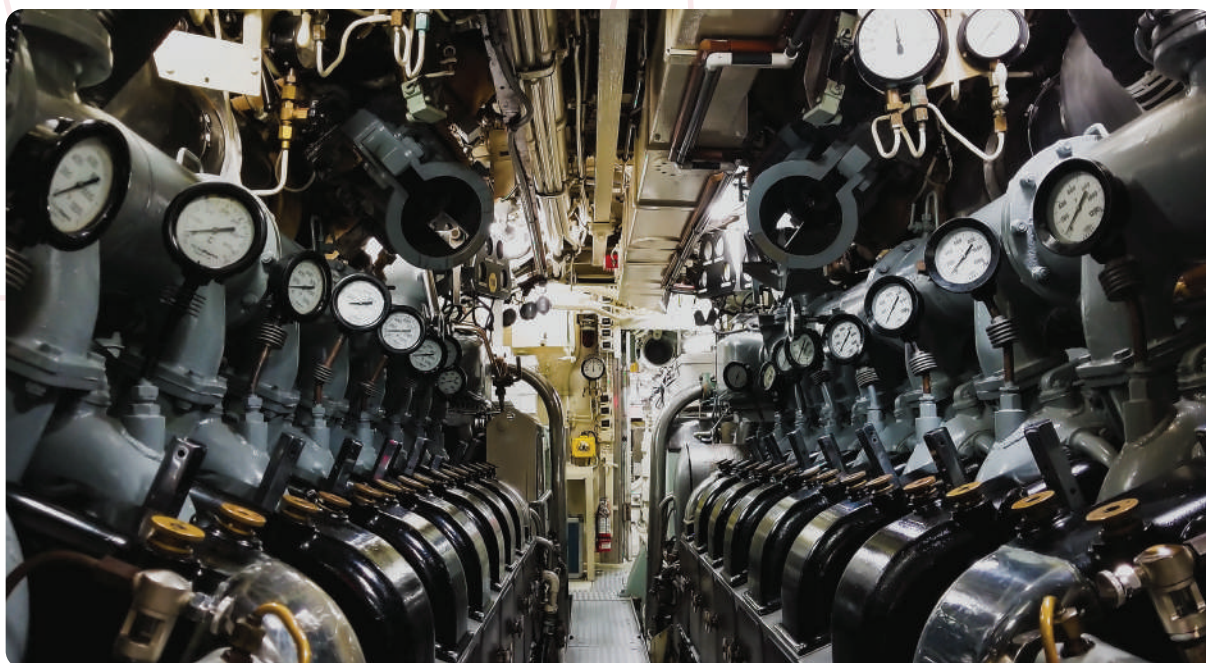
A key challenge in TPEO is asphaltene handling. The use of QATOL state-of-the-art carboxylate detergent technology in MAPS additives for TPEO ensures excellent contamination handling, deposit prevention and sludge control.

Meets API CF performance requirements and achieves failure at FZG load stage 10 or higher (BN dependent).

HIGH PERFORMANCE TRUNK PISTON ENGINE OIL

For land-based power generation applications and vessels running under very severe operating conditions QATOL has developed a high performance TPEO package.

Compared to normal trunk piston engine oils QATOL MANTA RAY TPEO TPEO will give improved engine cleanliness, a better deposit control and higher FZG performance (load stage 12).





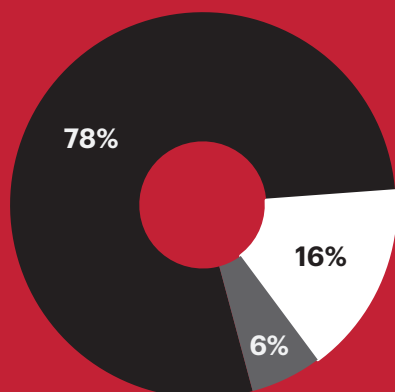
MARINE CYLINDER LUBRICANT

QATOL MANTA RAY MCL are once-through lubricants used to lubricate and protect pistons, rings and liners of low-speed 2-stroke cross-head engines.

QATOL MANTA RAY MCL provides sufficient **DETERGENCY** to prevent piston deposit formation.

QATOL MANTA RAY MCL provides sufficient **BASICITY (BN)** to neutralize acids, in fuels containing high levels of sulfur.

2-STROKE MARINE OEM SPLIT* - 2020



Major OEMs

MAN Energy Solutions

Winterthur Gas & Diesel (WinGD)

Japan Engine Corporation (J-ENG)

*Oronite estimate of market share by installed power

APPLICATIONS AND ADVANTAGES

- QATOL MANTA RAY MCL range is suitable for use in the latest generation and older engine types.
- QATOL MANTA RAY MCL range is designed for highly corrosive engines operating on HSFO, high sulfur fuel oil.
- QATOL MANTA RAY MCL range is designed for engines operating on VLSFO, very low sulfur fuel oil and ULSFO, ultra low sulfur fuel.





SYSTEM OIL

QATOL MANTA RAY SO are recirculating lubricants used to lubricate bearings, gears and guides and for cooling of the pistons of low-speed 2-stroke crosshead engines.

QATOL MANTA RAY SO range be able to handle contamination with water, fuel, drip oil (or used MCL), resist thermal and oxidative stress, protect engine parts against corrosion and prevent wear of engine parts under high load.

SOs do not come into contact with combustion products directly and require only limited acid neutralization capacity.

MAJOR OEMs

- MAN Energy Solutions
- Winterthur Gas & Diesel (WinGD)
- Japan Engine Corporation (J-ENG)

APPLICATIONS AND ADVANTAGES

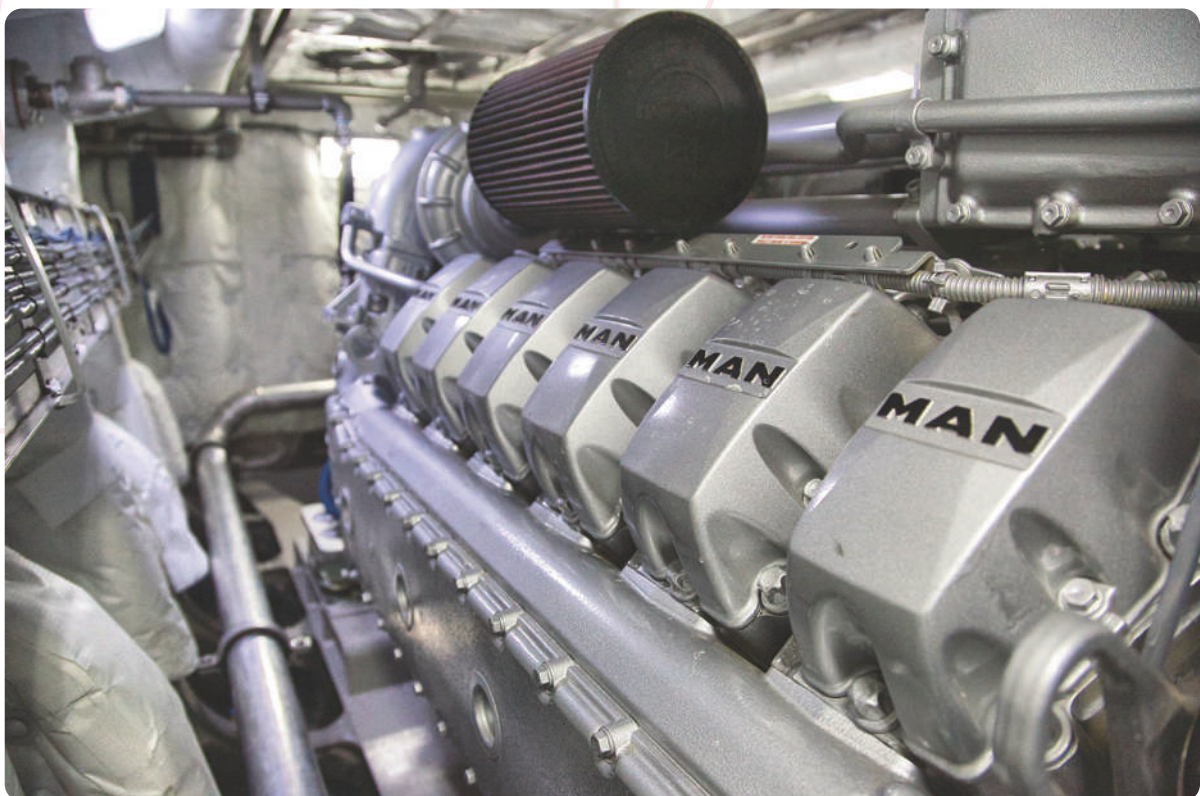


QATOL MANTA RAY SO range is suitable for use in the latest generation and older engine types.

Major OEMs recommend use of SOs with a BN of at least 5 mgKOH/g.

QATOL MANTA RAY SO, 7 or 8 BN SOs may be used if a higher base number is required.

FZG FAILURE LOAD STAGE ACHIEVED (11)

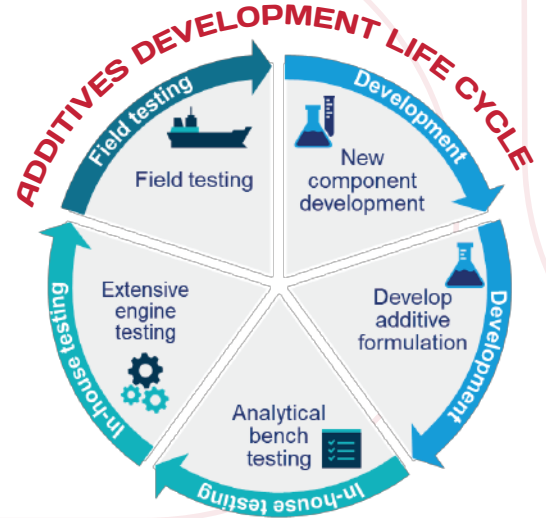


DEVELOPMENT PROCESS

- The process begins with innovative component development and the extensive use of MAPS formulation technology.
- The process continues with rigorous testing in our supplier dedicated marine bench and engine test laboratory. Test results are compared to that of reference oils from the market.
- The additive is lastly tested in the field as proof of performance to obtain OEM approvals.

QATOL PERFORMANCE ATTRIBUTES

	QATOL MANTA RAY TPEO			QATOL MANTA RAY MCL			QATOL MANTA RAY SO
	12-20 BN	20-55 BN	20-55 BN	40 BN	70-140 BN	200 BN	5-8 BN
Suitable for engines from major OEMs	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓		✓
stage achieved							
performance requirements	✓	✓	✓				



CIMAC WG7 FUELS DEFINITIONS

Ultra low sulfur fuel oil (ULSFO)	Max 0.10% S
Very low sulfur fuel oil (VLSFO)	Max 0.50% S
Low sulfur fuel oil (LSFO)	Max 1.00% S
High sulfur fuel oil (HSFO)	Above 1.00% S



SUMMARY

Reliable lubricants are important now more than ever and QATOL is ready to help you seamlessly adapt to the new fuels being introduced in the marine industry. Our solutions using MAPS technology address the entire range of fuel scenarios that ship owners and operators are using today and will be using in the future to meet IMO's 2050 decarbonization goals.

QATOL is committed and well-positioned to continue delivering innovative technology to meet the needs of the marine industry today and in the future.



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