

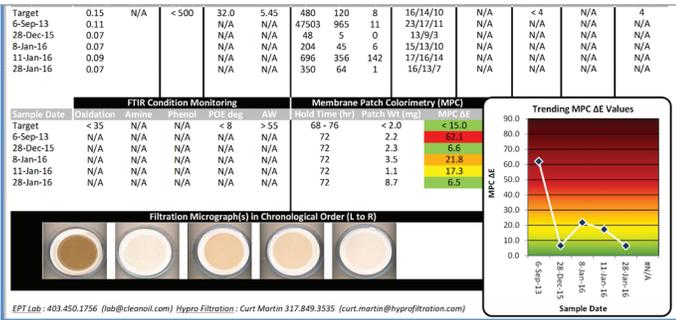
# OA-TO

## Turbine Oil Analysis

Hy-Pro offers two levels of analysis for turbine oils to provide insight into system conditions and to help predict and prevent fluid contamination related issues.



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### Comprehensive analysis

Newer generation group II based turbine oils typically have an anti-oxidant additive package made up of sacrificial amines and/or phenols that are depleted as oxidation and oil degradation occurs. The RULER (Remaining Useful Life Evaluation Routine) test compares remaining levels of anti-oxidant additive versus the levels found in new oil to give you the big picture of exactly how your oil is holding up.

Testing

### MPC

ASTM developed standard (ASTM D7843-12) for quantifying the amount of oil degradation by-products in the oil that can lead to the formation of varnish deposits. We recommend monitoring MPC monthly on older fluids that may have depleted anti-oxidant levels and quarterly for new fluids.



### Trending

OA-TO is an invaluable tool to establish a baseline for condition based recommendations to eliminate servo valve deposits, high acid number, water, or high ISO Codes. And once a Hy-Pro contamination solution has been implemented, OA-TO trends your progress toward success and trouble free operation.

# Analysis Specifications

Oil Analysis Testing

OA-MPC601311

OA-TO601368

Description

**MPC varnish potential test includes:**  
MPC colorimetry patch test and photo

**Full analysis package includes:**  
TAN  
Metals analysis ppm  
Water % Karl Fischer  
Viscosity at 40°C  
MPC varnish potential  
MPC patch weight  
ISO particle count  
RULER

Recommended Frequency

Monthly for varnish potential and ICB element condition monitoring

Bi-annually for overall lube oil condition monitoring

Testing Standards

MPC/Patch Weight: ASTM D7843

TAN: ASTM D664  
Metals: ASTM D5185  
Water: ASTM D7546  
Viscosity: ASTM D445  
ISO Codes: ISO 11500/4406  
MPC/Patch Weight: ASTM D7843

Sample Size Required

100mL (sample bottle included)

350mL (sample bottle included)

Fluid Compatibility

Mineral oils and turbine oils

Mineral oils and turbine oils

Sample Report

**Customer:** EPT  
**Site:** Unit:  
**Reservoir:** 24 Oil Type: Sh

**PO/SO #:** HY-PRO  
**Contact:**

**Customer:** EPT  
**Site:** Unit:  
**Reservoir:** 24605 Liters / 6501 Gal Oil Type: Shell Turbo CC 32

**PO/SO #:** HY-PRO  
**Contact:** HY-PRO FILTRATION  
**Latest Sample Date:** 28-Jan-16  
**Received Date:** 3-Feb-16

**Recommendations & Notes**  
The sample taken on 28-Jan-16 has an acid number that is within target. The fluid's ISO particle count is also within target. The MPC ΔE is in the good range (<15) indicating that a low level of degradation by-products is present in the fluid (see filter micrographs below). This level of varnish precursors will not likely become a problem within the system in the immediate or near future.

Sample Date	AN	SAN	H2O	Viscosity (cSt)		ISO (particles / mL)			ISO Code	Resistivity	Chloride	Mineral Oil	Air Release
	(mgKOH/g)	(ppm)	(ppm)	40 °C	100 °C	4 μm	6 μm	14 μm	4/6/14 μm	(G ohm-cm)	(ppm)	Cont. (%)	(min)
Target	0.15	N/A	< 500	32.0	5.45	480	120	8	16/14/10	N/A	< 4	N/A	4
6-Sep-13	0.11	N/A	N/A	N/A	N/A	47503	965	11	23/17/11	N/A	N/A	N/A	N/A
28-Dec-15	0.07	N/A	N/A	N/A	N/A	48	5	0	13/9/3	N/A	N/A	N/A	N/A
8-Jan-16	0.07	N/A	N/A	N/A	N/A	204	45	6	15/13/10	N/A	N/A	N/A	N/A
11-Jan-16	0.09	N/A	N/A	N/A	N/A	696	356	142	17/16/14	N/A	N/A	N/A	N/A
28-Jan-16	0.07	N/A	N/A	N/A	N/A	350	64	1	16/13/7	N/A	N/A	N/A	N/A

Sample Date	FTIR Condition Monitoring				Membrane Patch Colorimetry (MPC)			
	Oxidation	Amine	Phenol	POE deg	AW	Hold Time (hr)	Patch Wt (mg)	MPC ΔE
Target	< 35	N/A	N/A	< 8	> 55	68 - 76	< 2.0	< 15.0
6-Sep-13	N/A	N/A	N/A	N/A	N/A	72	2.2	62.1
28-Dec-15	N/A	N/A	N/A	N/A	N/A	72	2.3	6.6
8-Jan-16	N/A	N/A	N/A	N/A	N/A	72	3.5	21.8
11-Jan-16	N/A	N/A	N/A	N/A	N/A	72	1.1	17.3
28-Jan-16	N/A	N/A	N/A	N/A	N/A	72	8.7	6.5

**Relative Moisture (ppm)**  
AN and V  
6-Sep-13 0.05  
28-Dec-15 0.04  
8-Jan-16 0.03  
11-Jan-16 0.02  
28-Jan-16 0.01

**ISO Co**  
ISO Code (particles/mL)  
4 μm 100000  
6 μm 10000  
14 μm 100  
6-Sep-13 10000  
28-Dec-15 100  
8-Jan-16 10  
11-Jan-16 10  
28-Jan-16 10

**Trending MPC ΔE Values**  
MPC ΔE  
90.0  
80.0  
70.0  
60.0  
50.0  
40.0  
30.0  
20.0  
10.0  
0.0  
6-Sep-13 62.1  
28-Dec-15 6.6  
8-Jan-16 21.8  
11-Jan-16 17.3  
28-Jan-16 6.5

**Filtration Micrograph(s) in Chronological Order (L to R)**

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Testing

