



Varnish Testing by Colour Evaluation – Membrane Patch Colorimetry (MPC)

1. What is Varnish?

Varnish starts as a high molecular weight soft contaminant that remains soluble in the oil when at system temperature. When an excessive amount of these soft contaminant are present, they will agglomerate and adhere to cooler internal surfaces, low flow areas where more agglomeration can take place, and tight clearance areas where these varnish precursors are trapped becoming an insoluble, amber coloured, sticky substance called varnish. Varnish is created due to oxidative and thermal degradation of the oil.

The effect of varnish in a system are numerous:

- Adheres to cool areas, low flow, and low clearance areas
- Impedes proper cooling of the oil by coating heat exchangers and other cool surfaces
- Excessive varnish will cause filter clogging
- Clogging of oil flow lines
- Can trap hard contaminants on surfaces creating abrasive wear
- Cause premature bearing and gear wear
- Cause sticking servo control valves, causing a system to trip off-line, or a no-start situation
- Cost of potential downtime
- Cost of manpower
- Cost of system flushing and cleaning

2. Why do a Membrane Patch Colorimetry (MPC)?

To save money! Machinery is expensive. Membrane patch colorimetry (MPC) varnish potential testing (ASTM D7843) is an essential analytical test to determine the propensity for a lubricant to form varnish deposits.

The MPC method is quite simple. Fifty millilitres (mL) of oil are mixed with fifty milliliters of solvent (usually petroleum ether) and filtered through a 0.45mm nitrocellulose patch. The colour of the patch is determined by spectrophotometer and the results are reported in CIE LAB DE Value, representing the total amount of colour on the patch. In general the darker the colour stain on the patch, the higher the fluid's varnish potential. Additive floc, oxide-insolubles, carbon resins and similar soft contaminants all contribute to the MPC reading.

3. Which machinery components can MPC test be performed?

MPC is especially suited to Turbines, compressor, and hydraulic systems. Turbines components such as gas and steam turbines in power plant are most commonly analyzed.

Contact ALS Malaysia for further information about having a Membrane Patch Colorimetry (MPC) performed on your oil.

CONTACT DETAILS

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Figure 1: Varnish Formation on Valve



Figure 2: Membrane Patch Colorimetry (MPC) Spectrophotometer

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