# Motorized Sampling Hand Pump

Electric Sampling Pump

## Features

- Oil extraction by applying a certain vacuum in the container with an automatic vacuum pump
- Convenient sampling compared to manual type
- Sturdy and one-handed grip
- Adopts standardized clamping standards for clean vacuum sample bottles
- One-touch operation switch
- Sample collection possible without external contamination

## Summary

Oil sampling is the most important in analysis. In order to increase the reliability of data, uniformity and representativeness should be maintained, and contamination should be protected from airborne.

For accurate sampling,

1. Sampling Location: location, quantity (representativeness, persistence)
2. Sampling Procedure: Standardized so that all team members perform the same at any time
3. Sampling Device: It should not disturb the quality of the sample, and it should be easy to use, clean, and economical.
4. Sampling Bottle: The shape and cleanliness are very important.
5. Sampling at least 30 minutes after the operation (Enough stirring effect needed)
6. In the case of sampling when the equipment is stopped, it is carried out immediately after the equipment stopped.

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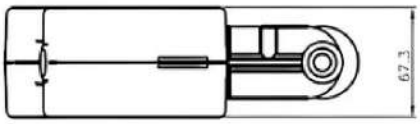
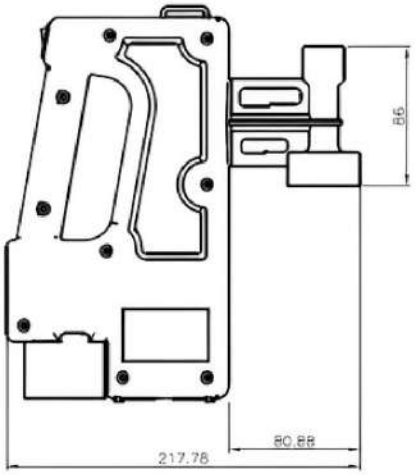
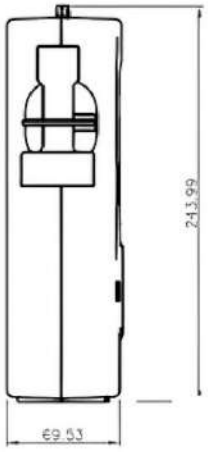
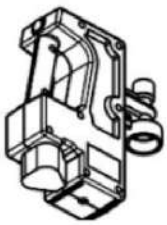
## Specification

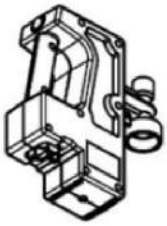


Installed Battery



Uninstalled Battery

| Specification | Detail |
|---|---|
| Size(mm) | (W) 216 mm x (D) 67.5 mm x (H) 243 mm |
| Weight (Kg) | 700g / 875g (including battery) |
| Power | Rechargeable battery (removable) |
| Charging (input) power | 12.6 VDC 1A (Input power: 100~240V) |
| Capacity | 2500 mAh |
| Charging time | 3.5 Hours |
| Battery life | 3 Hours |
| Operating temperature (℃) | Ambient 50℃ ( Temperature may differ per bottle) |
| Allowed viscosity (cSt) | Up to 320 cSt |
| Allowed fluid | Depends on the sample bottle used as a non-contact type. |
| Pumping capacity | 1cSt 1,300ml/min |
| Pumping pressure | Max Vacuum -6.95psid |
| Mounting Bottle Neck Size | NA (Request to Solge, Adaptor in development) |
| Tube Mounting Part size | Outer diameter Ø8 ~ Ø10 |
| Main material | Body : ABS / Bottle Joint : PA6 |

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# Vartector

The World's first automatic MPC Tester conforming to ASTM D7843 Standards for laboratory use

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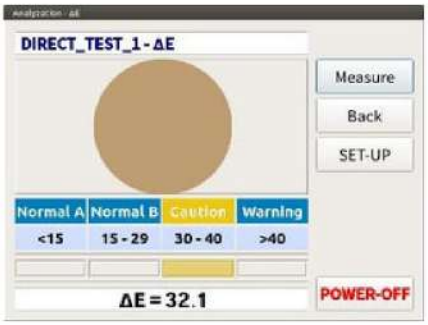
Lubrication Plus® QUMENSUS

Awarded Certificate of "Excellent R&D Innovation Product" from the Korean Government on the 24thDec 2021

Innovation Product

Public Procurement Service


## Description

Vartectoris an MPC (Membrane Patch Colorimetry) Tester that quantifies the state of degraded by-products (sludge, varnish, carbide, etc.) generated as a lubricant/hydraulic oil degradation. VarTectorwas developed and manufactured by Solgefor for the first time in the world according to ASTM D7843 Standard.

MPC value is a representative value that indicates the degree of the potential risk of varnish that has a fatal effect on th.e equipment. MPC value management is specified by the ASTM Standard and turbine and rotating machinery manufacturers.

MPC Tester is a device that is developed and manufactured to MPC (Membrane Patch Colorimetry) method (ASTM D7843), a test method that quantitatively indicates the varnish risk of turbine oil, EHC oil, and hydraulic oil. It measures CIE LAB delta E value (measuring range : 1 ~ 100) and provides the results.

▪ Judging Criteria in the past : Recommendation criteria in ASTM D02.C0.01 WK13070 (Committee D02.C0.01 on Turbine Oil Monitoring, Problems and Systems)

| MPC △E ConditionScale | | | |
|---|---|---|---|
| Normal | Normal | Abnormal | Critical |
| <15 | 15 - 29 | 30 - 40 | >40 |

▪ Latest Judging Criteria (Newly added to the 2020 ASTM D Revisions)

①Mineraloilsuchasturbineoil : : ASTM D4378-20 (Standard Practice for In-Service Monitoring of Mineral Turbine Oils for Steam, Gas, and Combined Cycle Turbines)

②Phosphate ester based EHC Control Oil : ASTM D8323-20 (Standard Guide for Management of In-Service Phosphate Ester-based Fluids for Steam Turbine Electro-Hydraulic Control (EHC)Systems

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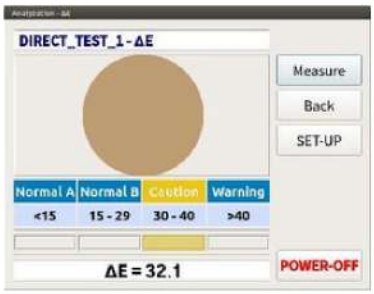
## Features

Vartectoris self-developed product of Solgewhich has served in the lubrication management and oil analysis/diagnosis sector over two decades. It is a product made in Korea and has the following advantages.

- Automatic loading system and self-diagnosis and verification of samples
- Output : Delta E, L, a+b(Delta L is carbide diagnosis of EHC Oil)
- Diagnosis by distinguishing between degraded by-products and carbide
- Unique calibration function
- Automatic saving and export of measured result values, and USB storage
- Automatic diagnosis evaluation report function (optional : printer)

## Specifications

| Features | Specification |
|---|---|
| Appearance | |
| Size | 214(W) x 306 (L) x 254 (H) / 5.5kg |
| Power | DC 220V with 24V, 5A |
| Measuring Principle | |
| Measuring Geometry | 0°/45° measuring geometry (in full compliance with ASTM D7843) |
| Measurement Condition | Observer: CIE 10° Standard Observer |
| Light Source | LED Light |
| Receiver | Spectrum scan |
| Detector | Spectrophotometer |
| Measuring Time | 3 Seconds |
| Operating Temperature | 0° C ~ 50° C |
| Output Value | CIE delta E, delta L, a, b |
| Patch Color Image Display | YES |
| Interface | |
| OS | Linux |
| Moving | Stepping motor |
| Analog Peripherals | 7" Capacitive Touch Screen LCD, |



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## Related Specification and Standards

ASTM D7843
MPC Tester Equipment Specifications

Designation: D7843 – 18

Standard Test Method for
**Measurement of Lubricant Generated Insoluble Color Bodies in In-Service Turbine Oils using Membrane Patch Colorimetry**[1]

This standard is issued under the fixed designation D7843; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method extracts insoluble contaminants from a sample of in-service turbine oil onto a patch and the color of the membrane patch is analyzed by a spectrophotometer. The results are reported as a ΔE value, within the CIE LAB scale.

1.2 This test method is not appropriate for turbine oils with dyes.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

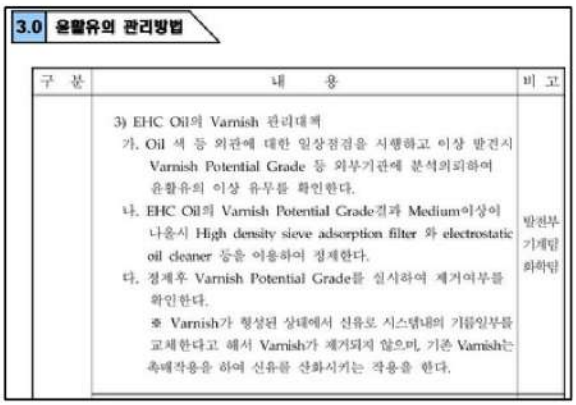
E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods
E284 Terminology of Appearance
E308 Practice for Computing the Colors of Objects by Using the CIE System
E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 *Definitions:*

3.1.1 *CIELAB color scales,* a—CIE 1976 $L^*$, $a^*$, $b^*$ opponent-color scales, in which $a^*$ is positive in the red direction and negative in the green direction; $b^*$ is positive in the yellow direction and negative in the blue direction; and $L^*$ is positive in the lightness direction and negative in the darkness direction. E308

Domestic public power plant lubricant test specification

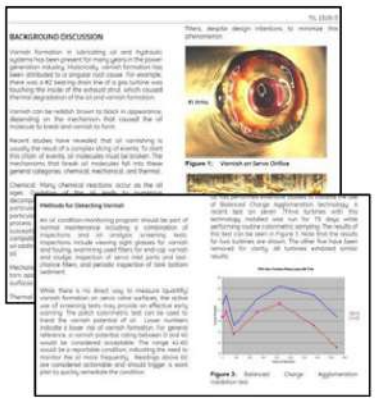


**3.0 윤활유의 관리방법**

| 구 분 | 내 용 | 비 고 |
|---|---|---|
| | 3) EHC Oil의 Varnish 관리대책<br>가. Oil 색 등 외관에 대한 일상점검을 시행하고 이상 발견시 Varnish Potential Grade 등 외부기관에 분석의뢰하여 윤활유의 이상 유무를 확인한다.<br>나. EHC Oil의 Varnish Potential Grade결과 Medium이상이 나올시 High density sieve adsorption filter 와 electrostatic oil cleaner 등을 이용하여 정제한다.<br>다. 정제후 Varnish Potential Grade를 실시하여 제거여부를 확인한다.<br>※ Varnish가 형성된 상태에서 신유로 시스템내의 기름일부를 교체한다고 해서 Varnish가 제거되지 않으며, 기존 Varnish는 촉매작용을 하여 신유를 산화시키는 작용을 한다. | 발전부<br>기계팀<br>화학팀 |

**▪ Data from overseas specialized organizations and suppliers :**
**Data on presence of varnish /damage of varnish /necessity for management**

| Source | Summary of Survey Results |
|---|---|
| GE | GE TIL-1528-3, Published in 2005<br>"While the issue of oil varnishing typically does not lead to extended forced outages, the availability and reliability of the units can be greatly affected."<br>"A recent study of gas turbines suggest that 1/3 of all gas turbines show some signs of oil varnishing." |
| ExxonMobil | 2007 GE Gas Turbine Survey of 192 Plants<br>Results: "Out of 626 gas turbines, 40% have experienced operational issues due to varnish." |
| Fluitec, Power Plants | 2008 Survey of Gas & Steam Turbines<br>"Out of 182 power plants, 76% of gas turbines had elevated varnish levels." |
| AnsaldoThomassen | 2010 Technical Paper by Murat Görür<br>"Globally, 70-80 % of all heavy-duty gas turbines suffer to a certain extent from sludge and varnish contaminants in turbine oil (Ansaldo Thomassen- Technical Library, 2010)." |
| Noria | Results of 2011 Industry Survey<br>Have oil degradation products such as oxidation and varnish caused problems for your plant's machines?<br>Yes 81.3%<br>No 18.8% |
| Fluitec, Compressors | 2012 Fluid Assessment Report from Compressors used in Large Air Separation Plants.<br>"Out of 200 compressors, 51% had elevated varnish levels that were above normal on the MPC severity classification scale." |



**▪ Management recommendation in GE O&M manual**

GEK 32568f
Revised February 2005

GE Power Systems
Gas Turbine

Lubricating Oil Recommendations for Gas Turbines with Bearing Ambients Above 800°F (204°C) — GER-3569g

C. Synthetic Oils

Synthetic oils are currently being successfully utilized in many different kinds of equipment, including heavy-duty gas turbines. Due to the very specific nature of synthetic formulations, it may be possible that the recommended values shown in Table 1 are not consistent with the values of synthetic oil being considered for use in a GE gas turbine. As tests stated previously, the values in Table 1 are only recommended values. Oil that has been shown to perform successfully in the field may still be used even if all values in Table 1 have not been satisfied.

XI. USE LIMITS- GROUP I OILS WITH CONVENTIONAL ANTIOXIDANT ADDITIVES

The lubricant supplier will have recommended use limits. However, the General Electric Company also has recommendations that are stated in this section. The object of the use limits is to prompt action before turbine operational problems develop because of the condition of the oil.

Recommended use limits are given in Table 2 and discussed below.

Table 2. Recommended Use Limits- Group I Oils with Conventional Antioxidant Additives

| | |
|---|---|
| ASTM D445 -Viscosity at 40°C (104°F) | ±12.5 centistokes (max.)<br>±8.8 centistokes (min.) |
| ASTM D974 -Total Acid Number | 0.2-0.3 rise from initial (see table 1) Max not to exceed 0.4 mg KOH/gm |
| ASTM D6971 Measurement of Hindered Phenolic and Aromatic Amine Antioxidant Content in Non-zinc Turbine Oils by Linear Sweep Voltammetry | 75% (min.) of new oil value |
| ASTM D2272 -Rotating Pressure Vessel Oxidation Test (RPVOT) | 25% (min.) of new oil value (see table 1) |
| *Membrane Patch Colorimetry (MPC) | Trend |

*Currently undergoing ASTM approval

With any one of these measurements out of limits (if applicable), the lubricating oil needs to be changed, the steps for such a change include draining the old oil, manually scrapping out the tanks, filling and displacement flush (see section VII), draining flush oil, manually scrapping out the tank, and filling with the new charge of oil.

**▪ Management recommendation in Siemens O&M manual**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No. of Certificate : 2021-490

Ministry of SMEs and Startups

# Certificate

01 Company SOLGE Corporation

Business license 503-81-41718

02 Address 11, Secheonbuk-ro 8 gil, Dasa eup, Dalseong gun, Daegu

03 Product VARTECTOR

04 Valid until 2021. 12. 24. ~ 2024. 12. 23.

Vartector is based on innovatory developed technology and is assessed as having superior quality performance. This certification is in accordance with Article 33 of ENFORCEMENT DECREE OF THE GOVERNMENT PROCUREMENT ACT

2021. 12. 24.

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