**Product Manual**

# EIE – Oxidation stability of lubricating grease by oxygen pressure vessel method (ASTM D 942)

EIE INSTRUMENTS PVT. LTD.

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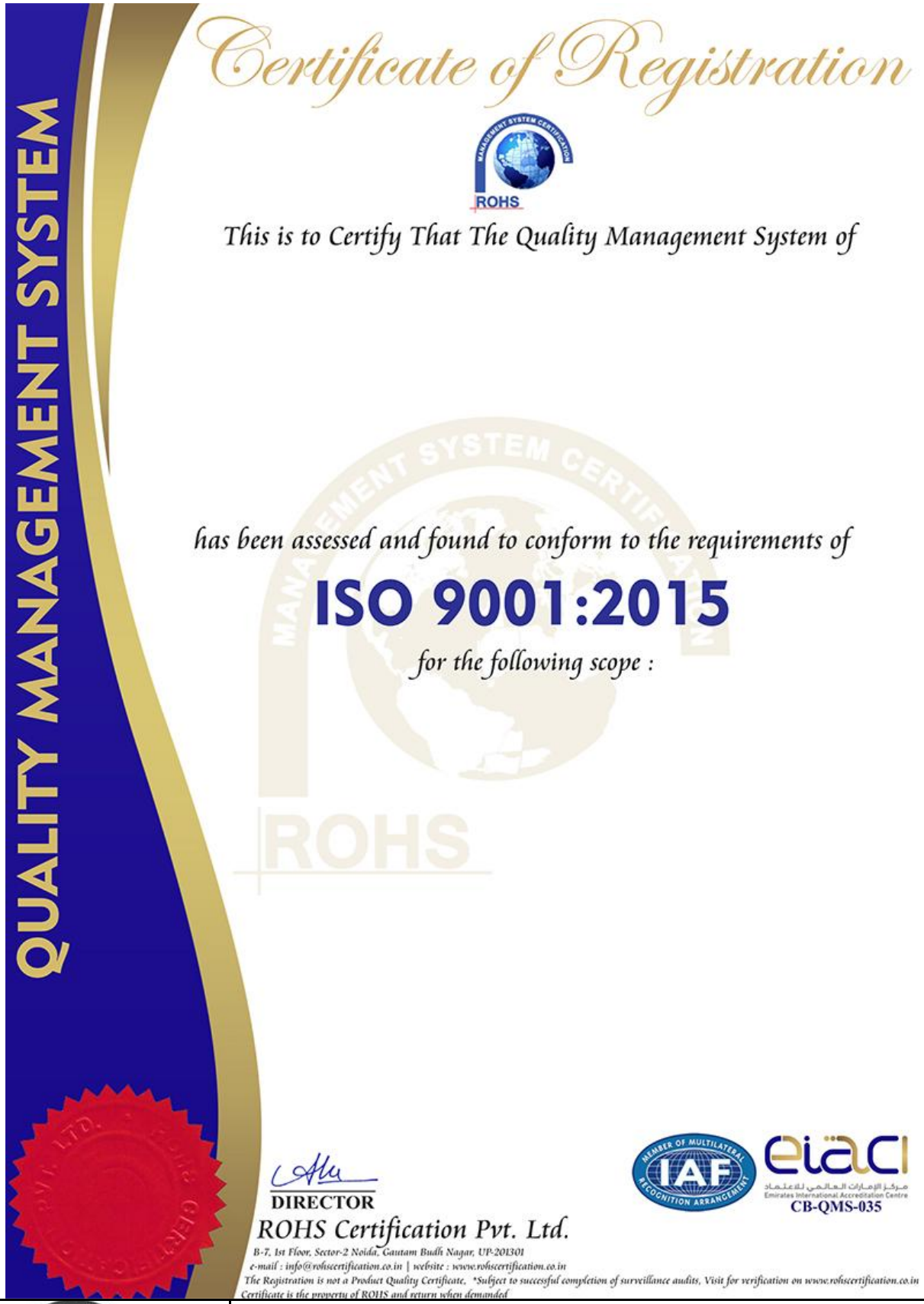
# Organization's ISO 9001:2015 Certificate



# Forward

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**We just want to take a moment out to thank you for your keen interest in our company products. We greatly appreciate your business and the opportunity you provided us to assist you. You have joined a selected group of customers who have switched to the technologically superior and quality enhanced laboratory testing product.**

**Time has changed, so do the technology. Your purchase lists you on the cutting edge of 21st century technology. The attached test report is an excellent way of expressing and maintaining your trust in EIE's - superior quality testing products. Our continued efforts and commitment is to provide you efficient sales after services, prompt attention and highest level of customer satisfaction. If for any reasons, you have questions or comments, we are delighted to hear from you. Call us on 0091-79-660406013 or send us email at info@eieinstruments.com/kunal@eieinstruments.com. You can expect us to respond to your email within 24-48 working hours.**

**Once again, thank you for your trust and kind patronage. We look forward to serve you better in future.**

**Yours sincerely,**
**EIE Instruments Private Limited**

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## 1 Introduction to Oxidation Stability

Oxidation stability is a chemical reaction that occurs with a combination of the lubricating oil and oxygen. The rate of oxidation is accelerated by high temperatures, water, acids and catalysts such as copper. The rate of oxidation increases with time. The service life of a lubricant is also reduced with increases in temperature. Oxidation will lead to an increase in the oil's viscosity and deposits of varnish and sludge.

## 2 Scope of the Test Method

This test method determines resistance of lubricating greases to oxidation when stored statically in an oxygen atmosphere in a sealed system at an elevated temperature under conditions of test.

## 3 Summary of the Test Method

The sample of grease is oxidized in a pressure vessel heated to 99°C (210°F) and filled with oxygen at 110 psi (758 kPa). Pressure is observed and recorded at stated intervals. The degree of oxidation after a given period of time is determined by the corresponding decrease in oxygen pressure. The rate of oxidation is dependent on the quality and type of base oil as well as the additive package used.

## 4 Significance and Use

This test method measures the net change in pressure resulting from consumption of oxygen by oxidation and gain in pressure due to formation of volatile oxidation by-products. This test method may be used for quality control to indicate batch-to-batch uniformity. It predicts neither the stability of greases under dynamic service conditions, nor the stability of greases stored in containers for long periods, nor the stability of films of greases on bearings and motor-parts. It should not be used to estimate the relative oxidation resistance of different grease types.

## 5 Delivery and Uncrating of Apparatus

1. Inspect equipment and shipping crate immediately upon receipt. If any damage is apparent, immediately discuss it with the delivery person and contact the transportation company immediately. Make notes of any damages on the bill of landing.
2. Retain all shipping material for later inspection.
3. Check packing slip carefully and ensure all materials have been received as indicated in packing slip.

4. Remove packing strip from surroundings of the instrument and all its accessories. Please inspect and note whether any part of the instrument is damaged or any accessory is missing according to packing slip? If it is so, then immediately make note of it and report to the manufacturer.
5. Due to the vibration incurred during shipping and handling, it is possible that mechanical connection could become loose. Inspect all connection to ensure that they are secure.
6. After visual inspection, if everything is found to be okay, transit the instrument to suitable safe place where it is intended to install. **Caution: Handle with care.**
7. Recycle the packing material. Do not throw it away for environment protection.

### 5.1 How to Make Instrument Ready for Use?

1) Keep the equipment in well ventilated place.
2) Place the equipment on a plain, even and sturdy surface leaving approximately 4”-5” inches space away from the wall.
3) Do not use the equipment in a corrosive environment. A corrosive environment may lead to poor performance and deterioration of unit.
4) Keep instrument away from draft, sunlight, water or near a place of equipment, which emits heat as well as electromagnetic conduction emission.
5) Keep standard operating manual handy while operating the apparatus.

## 6 Required Accessories to Conduct the Test

Figure 1: Required Accessories

- Oxidation pressure vessel

- Pressure gauge
- Heating bath
- Dish holder
- Sample dishes

## 7 Materials Necessary for Conducting the Test

- Oxygen cylinder
- Oxygen regulator

## 8 Main Structure and Function

### 8.1 Control Panel Frame

The control panel frame is shown in the figure 2.


Figure 2: Control Panel Frame

### 8.2 Mains Switch

To turn on the instrument, flip the mains switch such that it shows **ON** and is shown in the figure 3.


Figure 3: The Mains Switch

### 8.3 Digital Temperature Controller

- When the instrument is turned on, the screen will be displayed as shown in the figure 4.
- The temperature setting can be done with the help of up arrow key and down arrow key.


Figure 4: Digital Temperature Controller

MENU: Pressing this icon on the controller acts like a navigation button.

Down Arrow Key: Pressing this icon will help in decreasing value or going downward.

Up Arrow Key: Pressing this icon will help in increasing value or going upward.

Clockwise Arrow Key: Pressing this icon will work as OK setting.

#### 8.3.1 PAGE Menu

- Press the key set the PAGE value to 0 and press the key.
- This is the default setting and this will begin the process as shown in the figure 5.


Figure 5: PAGE Menu Screen

### 8.3.2 START Menu

- After setting PAGE 0 setting, press the key and the **Strt** Menu screen will be displayed.
- Navigate with the help of up arrow key and down arrow key.
- If you want to start the test, then set on YES as shown in figure 6. Then press the key.


Figure 6: Strt Menu 'YES'

- If you do not want to start the test, then set NO as shown in figure 7. Then press the key.


Figure 7: Strt Menu 'NO'

### 8.3.3 SOPE Menu

- Select the after the user selects to start the test by selecting **YES** in the Strt Menu Screen**.**
- Then the controller will display the SOPE menu screen. The user can set the value of the desired test time in hours and then press the key. Figure 8 shows the SOPE Menu Screen.


Figure 8: SOPE Menu Screen

## 9 Preparation of Apparatus to Prepare the Test Samples

1. Clean the sample dishes from all contamination from previous runs and from dust settling from the air by washing them with n-heptane and then with a cleaning solution. Follow the final cleaning operation by a through tap water rinse, a distilled water rinse, and drying in an oven. Handle the clean dishes only with forceps.
2. If lacquer is found after a run, clean the inside of the oxidation pressure vessel and the metal supports for the pressure vessel dishes by immersing in an appropriate solvent capable of removing the lacquer, such as gum solvent, and scrubbing with a bristle brush followed by drying. Scrub further with water and a fine scouring powder until all the lacquer deposits are removed. Follow the scouring operation by a thorough tap water rinse, a distilled water rinse, and drying in an oven. Handle the clean metal supports only with forceps.

## 10 Operating Procedure of Oxidation Stability

1. Coat Fill each of the five dishes with 4.00 ± 0.01 g of grease. Distribute the samples in the dishes in a uniform layer with a smooth level upper surface. Place the filled dishes on the five bottom shelves of the holder, leaving the top shelf to act as a cover to prevent condensing volatile products from dropping into the grease samples. When assembling the pressure vessel, place a small ball of glass wool in the bottom of the stem.
2. Place the dish holder in the pressure vessel with a sealing gasket in place, and close the pressure vessel by tightening the bolts slowly and uniformly. Clear the air from the pressure vessel by introducing oxygen slowly until a pressure of 100 psi (689 kPa) is attained, then allow the oxygen to escape slowly; repeat four times.
3. Allow the pressure vessel to stand overnight to make sure there are no leaks.
4. Place the pressure vessel in the oil bath maintained at a temperature of 99 ± 0.5°C (210 ± 1.0°F). As the pressure rises, if needed, intermittently release oxygen from the pressure vessel until a constant pressure of 110 ± 2 psi (758 ± 14 kPa) is obtained and maintained for at least 2 h. A gradual drop in pressure indicates a continuous leak in

the pressure vessel. Observe and record the pressure at least every 24 h. In case a leak develops, do not report the results but repeat the test.

5. Start timing at the moment of immersion of the pressure vessel in the oil bath, and continue the oxidation for the time period specified.

## 11 Precaution and Safety Warning

- Place the apparatus on a smooth, horizontal surface, which is free of vibration or disturbance.
- Clean the cell assembly properly before and after performance of test.
- Keep oil and grease away from oxygen at high pressure. Keep oil and grease away from all regulators, gages and control equipment.
- Use oxygen only with equipment conditioned for oxygen service by careful cleaning to remove oil and grease from area in contact with high pressure oxygen.
- Keep combustibles away from oxygen and eliminate ignition sources.
- Keep surfaces clean to prevent ignition or explosion, or both, upon contact with high pressure oxygen.
- Always use a pressure regulator to deliver oxygen. Release regulator tension before opening oxygen cylinder.
- All equipment used must be suitable and recommended for oxygen service.
- Never attempt to transfer oxygen from cylinder in which it is received to any other cylinder prior to use.
- Do not drop oxygen cylinders.
- Keep cylinder valve closed when not in use.
- Stand away from valve when opening cylinder.
- Do not breathe or use technical grade oxygen for inhalation purposes.
- n-Heptane is flammable. Harmful if inhaled. Keep away from heat, sparks, and open flame. Keep container closed. Use with adequate ventilation. Avoid breathing vapour or spray mist. Avoid prolonged or repeated contact with skin.
- Cleaning solution causes severe burns. A recognized carcinogen. Strong oxidizer; contact with organic material may cause fire. Hygroscopic.

# Warranty Certificate

Your EIE product is guaranteed to be free from defects in materials and workmanship for one (1) year under normal use from the date of purchase. This warranty does not apply to any product damaged by accident, misuse, mishandling, abuse, negligence, transit, improper line voltage, drop, fire, flood or if the products were altered or repaired by anyone other than the qualified service personnel. The liability of EIE Instruments is limited to repair or replacement and under no circumstances shall EIE be liable for any collateral consequential damages or loss. This guarantee specifically excludes the expendables and consumables. All warranty claims must be directed to your corresponding purchase organization that is responsible for the sale of this equipment. The users are responsible for shipping expense. The warranty cards which are not signed and stamped by the actual user will be treated as void. The warranty card should accompany the defective products sent for repair, without which no claims would be entertained. Please detach the below warranty card from following cut-line.

……

| Attributes | Details |
|---|---|
| Name of the company | |
| Address | |
| Telephone number | |
| Mobile number | |
| Email address | |
| Date of purchase | |
| Product model | |
| Serial Number | |
| Bill or cash memo number | |

This card should be detached, filled in properly and posted within 15 days from the date of purchase otherwise the warranty becomes invalid.

**- End of Document -**

| Any Note or Queries<br><br>Please write to us at info@eieinstruments.com, Thank you |
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