

CERTIFICATE OF CALIBRATION

ISSUED BY **THE PSL CALIBRATION LABORATORY**

DATE OF ISSUE 27 February 1996 SERIAL NUMBER 8396



CALIBRATION
No. 0247



POULTEN SELFE & LEE LTD

WICKFORD
ESSEX SS11 8BJ
ENGLAND

Telephone + 44 1268 733324 Fax + 44 1268 560049

PAGE 1 OF 2 PAGES

APPROVED SIGNATORY

A.D. Gosling
A.D. Gosling

Supplied to : INSTITUTO CIENCIA APLICADA E TECNOLOGIA DA F C U L.
Campo Grande, 1700 Lisboa, Portugal.

Labelled : PSL calibrated reference oil for viscosity No. 2720/06
Batch No. 9392
Date of calibration : 26 February 1996
Expiry date : 25 February 1997

The kinematic viscosity of a sample taken from this calibrated reference oil was measured against traceable standards held at the Laboratory and the following values were determined.

CERTIFIED VALUES

Temperature °C	Kinematic viscosity mm ² /s	Dynamic viscosity mPa.s	Density g/cm ³
20.00	3616	-/-	-/-

UNCERTAINTIES

Kinematic viscosity mm ² /s	Dynamic viscosity mPa.s	Uncertainty %
1	1	+/- 0.30
10	10	+/- 0.35
100	100	+/- 0.40
1000	1000	+/- 0.65
10000 and over	10000 and over	+/- 2.15

These uncertainties are largely random in nature.

The uncertainties are for a confidence probability of not less than 95%.

Rev : OIL2

This certificate is issued in accordance with the requirements of the United Kingdom Accreditation Service as specified in the NAMAS Accreditation Standard and NAMAS Regulations. It provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

ISSUED BY THE PSL CALIBRATION LABORATORY

PAGE 2 OF 2 PAGES

NOTES

1

The SI unit of **kinematic viscosity** is the metre squared per second (m^2/s). The recommended sub-multiple is the mm^2/s , where

$$1 \text{ mm}^2/s = 1 \text{ cSt (centistokes)} = 10^{-6} m^2/s.$$

The SI unit of **dynamic viscosity** is the pascal second (Pa.s). The recommended sub-multiple is the mPa.s, where

$$1 \text{ mPa.s} = 1 \text{ cP (centipoise)} = 10^{-3} \text{ Pa.s.}$$

2

The values of viscosity are based upon a value for the kinematic viscosity of freshly distilled water at 20.00°C of 1.0035 mm^2/s . The uncertainty in this value is unlikely to exceed +/- 0.25% (OIML-DI No. 17, subject to ITS 90). The uncertainties on page 1 do not take into account this uncertainty.

3 Measurement of Kinematic Viscosity

The kinematic viscosity of the PSL calibrated reference oils are determined using traceable glass capillary viscometers. Temperatures are determined with traceable reference thermometers. Descriptions of the use of viscometers and reference oils are to be found in BS188, IP Method 71, ASTM Method D445 and ISO 3104.

4 Dynamic Viscosity

The dynamic viscosity values given in this certificate have been calculated from the measured values of kinematic viscosity and density, at the same temperature. The following relationship is used :

$$\text{dynamic viscosity} = \text{kinematic viscosity multiplied by density}$$

5 Sample life

Provided that the container is kept closed, in the dark until the day of use and not subjected to extreme temperatures, the stated viscosity values are expected to remain within the uncertainty bands for four months from the date of this certificate. The sample should not be filtered before use nor should it be re-used.

6 Temperature

As the viscosity of a liquid is always strongly dependent upon temperature, very precise measurement and control of temperature is required to make full use of this calibrated reference oil.

HEALTH AND SAFETY DATA SHEET

PRODUCT: Viscosity oil standard - Polybutene based
Batch No. 4392

SUPPLIER: Poulten Selfe & Lee Ltd

WARNING STATEMENT: NOT CLASSIFIED AS HAZARDOUS

HANDLING: Adequate ventilation should be provided if material is handled at elevated temperatures. High temperature heat sources should not be used to heat the oil standards: containers should be vented during the heating operation.

RECOMMENDED PROTECTION: Chemical goggles. PVC or rubber gloves.

COMPOSITION: Polybutene oil

FIRST AID:

Skin: Wash skin with soap and water. Proprietary hand cleansers or liquid paraffin, slightly warmed if necessary, may be used to remove high viscosity oils. Obtain medical attention if irritation persists.

Eyes: Immediately flood the eye with plenty of water for at least 10 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.

Ingestion: Wash out mouth with water. Obtain medical attention. Do not induce vomiting because of the risk of aspiration.

Inhalation: Remove from exposure

REACTION HAZARD

Stability: Chemically stable. Rapid depolymerisation can occur above 275°C producing low flash point hydrocarbons

Incompatibility: None

Hazardous Decomposition and Combustion Products: None unusual: combustion will produce carbon monoxide and/or carbon dioxide.

FIRE HAZARD: Flash point > 110°C

In case of fire extinguish with water spray, foam, dry chemical or carbon dioxide. Keep containers cool with water spray. In fire conditions, rapid depolymerisation can occur producing low molecular weight hydrocarbons of low flash point

SPILLAGE/DISPOSAL: Try to prevent spillage from entering drains, sewers or water courses. Contain and absorb spillages with earth or sand and transfer to suitable containers for disposal. Wash down affected area with non-flammable solvent or detergent. Recommended method of disposal is by incineration.

HEALTH HAZARD INFORMATION

Occupational Exposure Limits: Not assigned

Health Effects

On Eyes: Liquid is unlikely to cause more than a mild, transient irritation

On Skin: Brief contact will have little or no effect but prolonged contact may cause slight irritation and will cause defatting which will render the skin more susceptible to damage by other substances. Expected to be practically non-toxic by skin absorption.

By Ingestion: Practically non-toxic. Swallowing of significant amounts may give rise to gastrointestinal disturbance

When Inhaled: The vapour pressure is such that there is no inhalation hazard at ambient temperature. Vapour or fume from heated products may cause slight irritation of nose, throat and air passages. Prolonged exposure to high levels of mists or aerosols can cause lung damage. Thermal decomposition of polybutenes produces low molecular weight hydrocarbons which, if ventilation is inadequate, could cause symptoms of CNS depression such as dizziness and headaches.

This information is believed to be correct, but no warranty is supplied or given. Further information or assistance will be given, where possible, on request.

Issue 1: February 1993
HSDPBVS



Poulten Selfe & Lee Ltd - A member of the Poulten Selfe & Lee Group

Directors: A. David Gosling, E. Margaret Gosling, Stephen J. Gosling B.A. (Hons.)
Registered in England No 517382 at 10 Orange Street, Haymarket, London WC2H 7DD