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BREOX CL 1400

During the production of low-density polyethylene, the ethylene gas feedstock is compressed at pressures up to 3500 bar. The final stage compression is carried out in high speed reciprocating compressors known as hyper-compressors. A number of different lubricants have been used as lubricants for hyper-compressors. However, for the reasons described below, polyalkylene glycols are generally the most cost effective.

1. Polyalkylene glycols are much less soluble in ethylene than are white oils or polyisobutylenes. Therefore a two fold advantage is observed:

   a. viscosity reduction due to ethylene dissolving in the lubricant is minimised.
   b. lubricant is much less likely to be removed, or washed, from the plunger running zone.

   Thus overall lubricant consumption and compressor maintenance requirements are reduced. The consumption of polyalkylene glycol is usually less than half the corresponding consumption of white oil or polyisobutylenes in the same conditions.

2. Polyalkylene glycols have superior load carrying and lubricant performance compared to white oils and polyisobutylenes, thus minimising wear on plungers and packings. Typical life time figures for packings reported by end-users are in the range of 20,000 – 40,000 hours.

3. Polyalkylene glycols have relatively flat pressure-viscosity characteristics compared to white oil, polyisobutylenes and mixtures thereof. This means that they flow more readily in the high pressure lubricant lines of the compressor and are much less likely to solidify in the lines at lower temperatures – see figures 1, 2, 3.

For these reasons, polyalkylene glycol based ethylene compressor lubricants offer the best possible lubricant performance with outstanding economy. **BREOX** CL1400 is a well-recognised standard for the industry.

Typical Properties

	Breox CL 1400
Specific gravity 20:20 °C	1.096
Viscosity 40 °C, cSt	272
Viscosity index	225
Flash point COC °C (ASTM D92)	259
Pour point °C (ASTM D97)	-7

BREOX Compressor Lube 1400 is a stable, non-corrosive, high flash-point liquid, which can be stored in mild steel tanks under air or nitrogen. However, the product can absorb moisture, and appropriate measures to avoid this should be observed.

Comparison with Polyisobutylene / white oil blends

This lubricant is widely used, and generally preferred to lubricants containing either of the single components. Typically, it must be heated to 40 °C before entering the cylinder, otherwise problems can been encountered since the lubricant may poses too high a viscosity. The consumptions of PIB/White oils lubricants are typically substantially higher than with PAG type lubricant, and the packing life significantly lower. Problems can also be encountered with interaction with the additives in the PIB / white oil lubricants. The carry over of small quantities of PAG lubricants also appears to have a positive benefit on film strength, compared to where PIB / white oil has been used, during the manufacture of polyethylene film.

In favour of the PIB / white oil is its lower unit cost, though this is more than off set by higher consumption compared with PAG. Additionally, PIB / white oil should be used for polyethylene which is to be used for high tension cable grades, as it has less effect on the dielectric constant of polyethylene. In most cases, therefore, polyalkylene glycols are considered the lubricant of choice.

Consumption comparison

Lubricant	**CL 1400**	**White oil / PIB**
Consumption	0.7 - 1.5 litres / Te	> 2 litres / Te
Relative consumption	1	2 - 3
Packing life	20 - 75 000 hours	10 000 hours

Figure 1 Viscosity and temperature curves for polyethylene compressor lubes

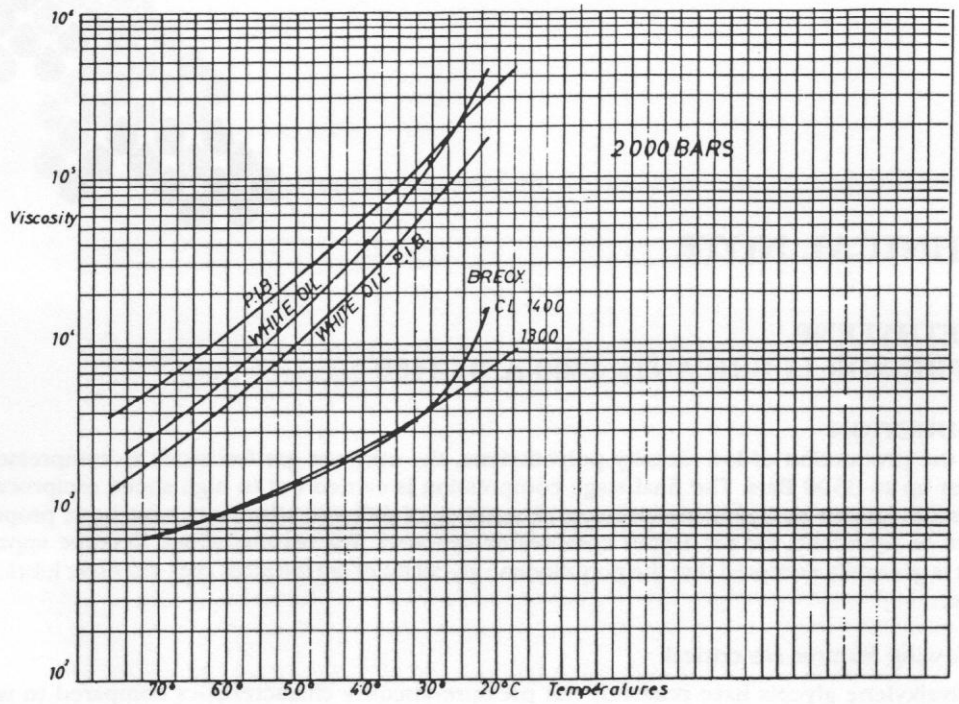


Figure 2 Viscosity and pressure curves for polyethylene compressor lubes

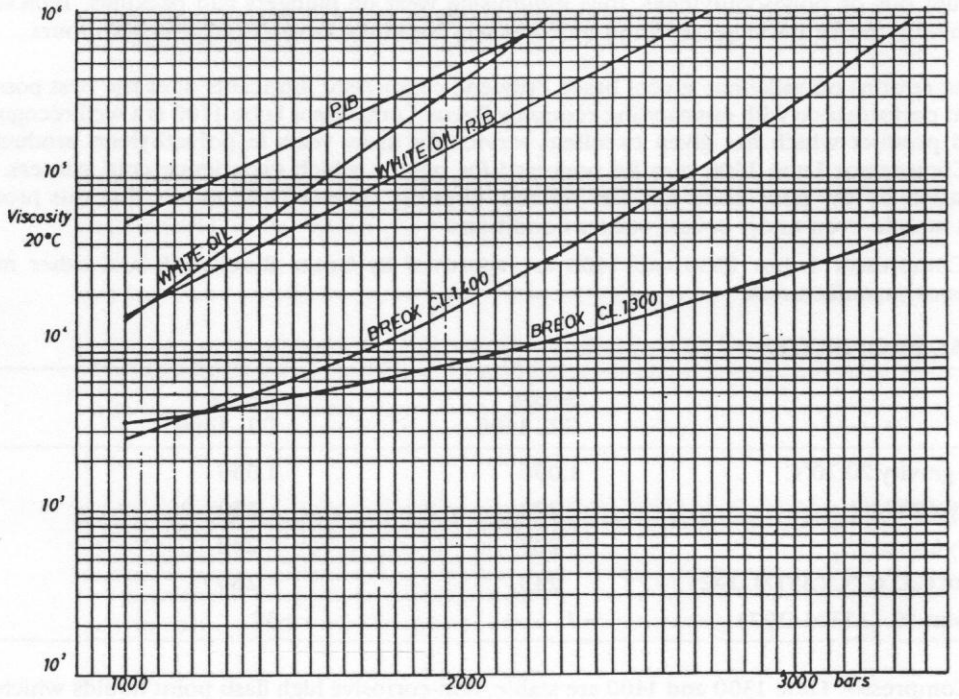
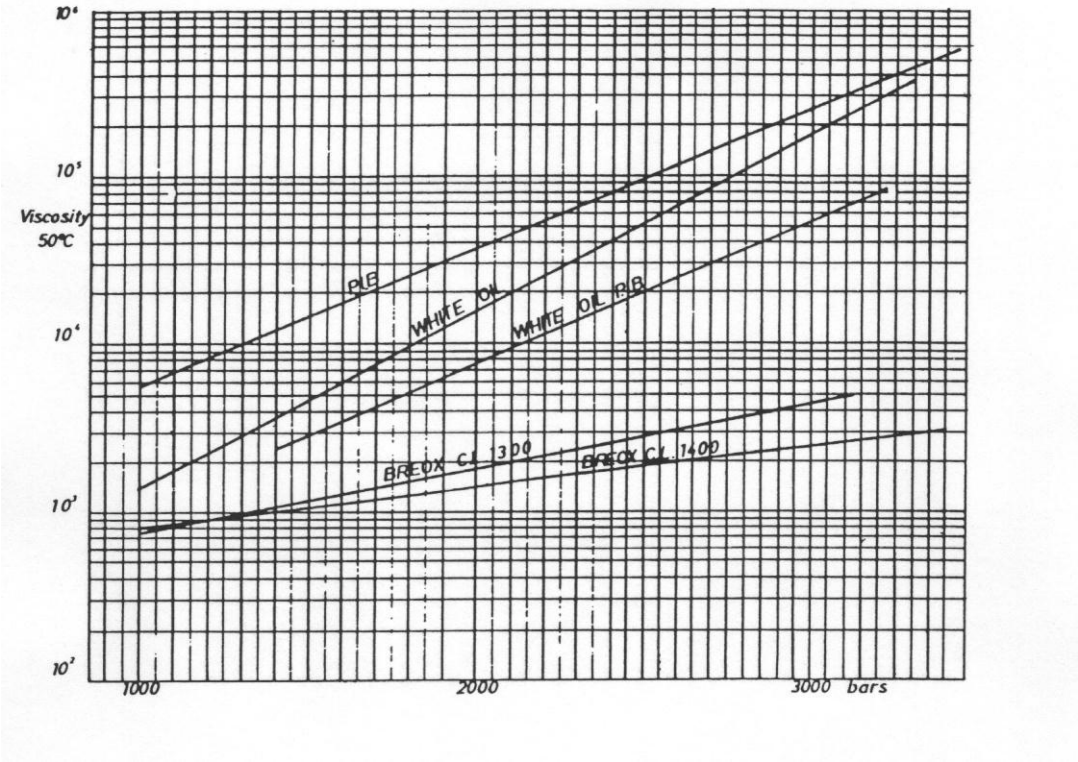


Figure 3 Viscosity and pressure curves for polyethylene compressor lubes



FDA Compliance

Breox CL grades are composed exclusively of regulated food additives intended for use in a lubricant with incidental food contact, and are in compliance with the food additive provisions of the Federal Food, Drug and Cosmetic Act, citation 21 CFR 178.3570. As such the Breox CL grades are NSF registered as FDA compliant products (former USDA H1 regulations).

BREOX CL1400 and 1400S are produced exclusively from components listed as additives in Synoptic Document N.7, Draft of Provisional list of monomers and additives used in the manufacture of plastics and coatings intended to come into contact with foodstuffs. The Commission of the European Communities – Directorate General III – Industry – Industrial Affairs III: Consumer goods industries. Foodstuffs – Legislation and Scientific and Technical Aspects, Ref CS/PM/2356.

Remarks

Handling & Safety: Material Safety Data sheets have been issued describing the health, safety and environmental characteristics of these products together with advice on handling precautions and emergency procedures. These must be consulted and fully understood before handling, storage and use.

Storage:

Revision-No. 2.2-08.2004 Effective August 17, 2004

The product can be stored for at least 2 years at ambient storage conditions and temperature without any deterioration.

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