

SULZER BURCKHARDT

Adresse postale
Dornacherstrasse 210
CH-4002 Bâle
Telex 62785 mbbst.ch
Télégrammes
Motor Bâle
Téléphone 061 35 00 20

ELF LUB
B. P. 70

F - 92133 ISSY LES MOULINEAUX

à l'attention de Monsieur B. Liégeois

Vos références	Votre lettre du	Nos références	D.No	4002 Bâle
THQ/EDI No 84318 BL/im	12.7.84	Hartmann/aa	917	31 juillet 1984

Lubrifiants pour le graissage des cylindres des hypercompresseurs d'éthylène


Messieurs,

Nous vous confirmons que plusieurs de nos clients utilisent l'huile "Orites 270 DS" pour le graissage des cylindres des hypercompresseurs.

Le produit "Orites 270 DS", ainsi que d'autres produits synthétiques similaires à base de polyglycol, apportent de bonnes durées de vie aux pièces soumises à usure des cylindres HP, telles que garnitures, plongeurs et soupapes. Pour ces raisons, nous pouvons recommander l'utilisation de ce produit pour le graissage des cylindres des hypercompresseurs.

Nous vous prions d'agréer, Messieurs, nos meilleures salutations.

Ateliers de Construction
SULZER-BURCKHARDT SA
Département Service
Conseiller technique



R. Hartmann

Reg. Nr.

**SULZER
BURCKHARDT**

Secondary Compressors Type F.H.K.

Compressor Lubricants

Hörsloger

4. Sulzer-Burckhardt Recommendation

- Our clients use different oil makes and oil types for our secondary compressors. These tested cylinder lubrication oils show good lifes of the parts subject to wear such as sealing elements of H.P. cylinder, plungers and valves.
- For new kinds of oil - or such products which have not been tested/we have no experience with - intended to be used, we can not give any guarantee for the life of wear parts in new machines to be commissioned.

Sometimes guarantee for lifes is given under the condition that certain kinds of oil are used and, therefore, a change of the oil make is not possible.

- If a new oil is used, we can only check the physical data (as described in § 1) which will allow the use of the oil. However, since the wear behaviour of an untested oil is not known to us, we can not make any statement on it.
The client himself has to decide whether he can and wants to use a new kind of oil because of the process conditions.

5. List of Suppliers with Suitable Oil Qualities

(alphabetically arranged, without any distinction of rank)

5.1 Mineral Oil mixed with Polybutene

ELF - Orites TW 230
 ESSO - EZL 440
 FINA - Eolan MSH 250
 WITCO-CHEMICAL - Sonneborn 1200

5.2 Polyethylene-Glycol

AUSCHEM-ENIMONT - Nixolen VS40
 BP - Breox CL 1400
 ELF - Orites 270 DS
 HOECHST - B11/150
 UNION-CARBIDE - Ucon 75H 1400
 SHELL - Corena -E

Ausgabe:

Datum

0

1 30.1.91

2 13.3.92

3

4

488 609/2-2

TOTAL P.02

**SULZER
BURCKHARDT**

Secondary Compressors Type F.H.K.

Compressor Lubricants

4. Sulzer-Burckhardt Recommendation

- Our clients use different oil makes and oil types for our secondary compressors. These tested cylinder lubrication oils show good lifes of the parts subject to wear such as sealing elements of H.P. cylinder, plungers and valves.
- For new kinds of oil - or such products which have not been tested/we have no experience with - intended to be used, we can not give any guarantee for the life of wear parts in new machines to be commissioned.

Sometimes guarantee for lifes is given under the condition that certain kinds of oil are used and, therefore, a change of the oil make is not possible.

- If a new oil is used, we can only check the physical data (as described in § 1) which will allow the use of the oil. However, since the wear behaviour of an untested oil is not known to us, we can not make any statement on it.

The client himself has to decide whether he can and wants to use a new kind of oil because of the process conditions.

5. List of Suppliers with Suitable Oil Qualities

(alphabetically arranged, without any distinction of rank)

5.1 Mineral Oil mixed with Polybutene

ELF - Orites TW 230
 ESSO - EZL 440
 FINA - Eolan MSH 250
 WITCO-CHEMICAL - Sonneborn 1200

5.2 Polyethylene-Glycol

AUSCHEM-ENIMONT - Nixolen VS40
 BP - Breox CL 1400
 ELF - Orites 270 DS
 HOECHST - B11/150
 UNION-CARBIDE - Ucon 75H 1400
 SHELL - Corena -E

Ausgabe:

Datum

0

1

30.1.91

2

13.3.92

3

4

488 609/2-2

TOTAL P. 02

**SULZER
BURCKHARDT**

Secondary Compressors Type F.H.K.
Compressor Lubricants

This note concerns the lubrication of compression cylinders of secondary compressors used in the manufacture of LDPE.

In order to operate the secondary compressor economically, a suitable lubricant has to be chosen for the H.P. cylinder lubrication.

This lubricant has to fulfill 2 purposes:

- good lubrication of compression cylinders
- compatibility with the existing polyethylene process

1. Good lubrication of compression cylinders

The design of the high pressure compressor cylinders is a packed-plunger cylinder with combined suction/discharge valve located in the cylinder head. The oil is brought by special H.P. pumps directly on the plunger surface through drilled passageways at several points within the packing cups.

The plunger is of solid T.C. (or T.C. plated). The cylinder lubrication oil can be preheated in the day tank as well as in the lines to a temperature of 40 to 60 °C.

Requirements

- high oil film strength
- viscosity range of 220-320 cSt at 40 °C (1000-1500 SVS at 100 °F)
- very high viscosity index (V.I. 100)
- flash point min. 200 °C
- chemical and physical stability under high pressure; chemical and heat stability
- free from foreign materials
- no harmful effect on metals (stress corrosion cracking, corrosion fatigue)

2. Compatibility with the existing polyethylene-process

The lubricant has to be compatible with the H.P. polymerization process or with the product to be manufactured respectively. Selection of lubricants currently used in the secondary compressors has largely been an evolutionary process. In addition, the selection of lubricants has been restricted by the "FDA". The polyethylene manufacturer has entrusted the "FDA" approval to the lubricant suppliers. Moisture in the lubricant is also detrimental. Moisture can cause corrosion and subsequent fatigue failures of pressure containing cylinder components.

3. The cylinder lubricants currently being used include:

- a) Mineral Oil, usually mixed with various percentages of polybutene.
- b) Polyglycol

Regardless of the lubricant used, it is extremely important that the proper lubricant rate be maintained. Lubricant rates are usually determined by the manufacturer of compressors and/or experience.

SULZER BURCKHARDT

Lubricating Oil Recommendation for LPG-Compressors Type "K"

<i>Cargo / Gas</i>	Methane	Propylene	Vynil Chloride (VCM)
	Ethane	Butane	Ammonia
	Ethylene	Butylene	Inert gas (dry)
	Propane	Butadiene	

<i>Polyglycol oils suitable for the listed cargoes</i>	
<i>Manufacturer</i>	<i>Type of oil</i>
AGIP	DICREA S 150
BP	ENERSYN GCS 180
CALTEX	SYNLUBE 140
CASTROL	AIRCOL PG 185
CHEVRON	LPG COMPRESSOR OIL
ELF	PRIMERIA LPG 150
EXXON	EXXCOLUB LG
FINA	LPG COMPRESSOR OIL
MOBIL	GAS COMPRESSOR OIL
SHELL	MADRELA OIL T
TEXACO	SYNLUBE 140
UCON	COMPRESSOR LUBRICANT R-1

Important

The above mentioned polyglycol oils are hygroscopic i.e. they are mixing with water in any ratio. Contact with the atmosphere should therefore be limited to a minimum.

Mixing of polyglycol oil with mineral oil has to be avoided.

SULZER BURCKHARDT does not accept any liability as to the quality and performance of the oil in use.

TECHNICAL INFORMATION

Subject : PRIMERIA LPG 150

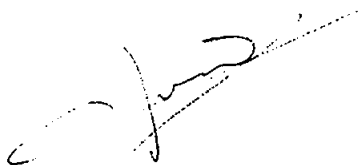
You will find inclosed the recommendation list of SULZER Buckhardt for their gas compressors type K.

PRIMERIA LPG 150 is definitively approved for all chemical gas.

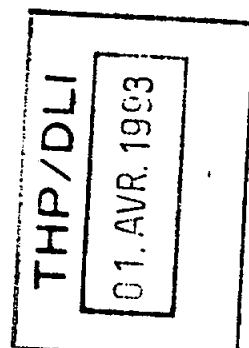
This quality is already used on board some LPG, LNG tankers.

The Marine Technical Department remains at your entire disposal for any further information.

Yours faithfully.



Daniel GIRAUX
Marine Technical Dept.



**SULZER
BURCKHARDT****LUBRICANTS FOR AIR
COMPRESSORS (up to 200 mm stroke)****➔ Use of synthetic oils on Diester base**

On the grounds of good lubrication properties and the favourable viscosity / temperature characteristics we recommend for critical service conditions (service with cooling air temperatures above 30°C or compressor installed in a canopy) and high compression temperatures the use of:

MOBIL Rarus 829 (VD-L 150)

(For the use of further brands please contact our technical dept. giving details of the technical specification of the desired oil.)

➔ Change over from mineral to synthetic oil

Even though MOBIL Rarus 829 is mixable with mineral oils, we recommend, in order to benefit of all the properties of the product, to rinse the compressor according to the following procedure:

- Release the pressure from the compressor
- Empty mineral oil in warm condition
- Fill in synthetic oil (up to the minimum oil level plus 2 litres)
- Remove gas pipes, cylinder heads and valves
- Run compressor for approx. 20 minutes and check oil rise in the cylinders
- Turn compressor off and drain oil mixture
- Clean motion work housing and change oil filter
- Remount valves, cylinder heads and gas pipes
- Fill in synthetic oil up to the maximum oil level
- Start compressor acc. to instruction

Remark: This procedure has to be applied also for new compressors since the test run has been carried out with mineral oil.

➔ Responsibility: **SULZER BURCKHARDT takes no responsibility for the quality or the properties of the mentioned oils!**

ORIGINAL

Rev. Index	A		B		C		D		
erstellt / prepared	26.01.87	Hartmann	11.01.88	Hartmann	01.04.93	Romanens			4-122.449.820
überprüft / reviewed	26.01.87	Hartmann	11.01.88	Hartmann	01.04.93	Romanens			
genehmigt / approved									Seite page 2 / 2 e

**SULZER
BURCKHARDT**

**LUBRICANTS FOR AIR
COMPRESSORS (up to 200 mm stroke)**

This lubrication chart is valid for air compressors, the cylinder and motion work of which are lubricated with the same oil quality.
The chosen oil has determining influence on the formation of coke and the deposits in the valves and in the accessories.

➔ **Use of mineral oil**

Requirements

Slightly alloyed refined mineral oil with close boiling limits, with additives to increase resistance to ageing, corrosion protection as well as reduction of wear.

Viscosity: acc. ISO classification ISO VG 100
i.e. 90-100 cSt (mm²/s) at 40°C
(corresponding to 55-70 cSt or 7-9° E at 50 °C)

Viscosity-index: min. 80

Flush point: min. 200°C

Stock point: max.-12°C resp. Pour point: max.-9°C

Conradson after ageing: max. 3% weight (Pneurop Oxydationstest)

These conditions are fulfilled by oil qualities which have been especially prepared for air compressors: (DIN 51506 - VDL / July 1977)

List of suppliers with suitable oil qualities

(in alphabetical order, without any distinction of rank)

AGIP	Dicrea 100	(* Dicrea 150)
ASEOL	Copress 16-313	(* Copress 16-314)
BLASER	Blasol 176	(* Blasol 177)
BP	Energol RC 100	(* Energol RC 150)
CALTEX	RPM Compressor Oil 100	(* RPM Compressor Oil 150)
CASTROL	Aircol PD 100	(* Aircol PD 150)
ELF	Dacnis P 100	(* Dacnis P 150)
ESSO	Verdichteroel 3021 N	(* Verdichteroel 3022 N)
SHELL	Corena P 100	(* Corena P 150)
TEXACO	Compressor Oil EPVDL 100	(* Compressor Oil EP VDL 150)
VALVOLINE	Compressor Oil 100	(* Compressor Oil 150)
WINTERSHALL	Wiolan CD 100	(* Wiolan CD 150)

(* In case of frequent operation with cooling air temperatures above 30°C or if the compressor is installed in a canopy, we recommend these qualities.)

ORIGINAL

Rev. Index	A		B		C		D		4-122.449.820
erstellt / prepared	26.01.87	Hartmann	11.01.88	Hartmann	01.04.93	Romanens			
überprüft / reviewed	26.01.87	Hartmann	11.01.88	Hartmann	01.04.93	Romanens			
genehmigt / approved									Seite page 1 / 2 e

SULZER

**Lubrifiants recommandés
Schmierstoffempfehlung
Recommended Lubricants**

T3

**Pompes centrifuges / Turbines à vapeur
Kreiselumpen / Dampfturbinen
Centrifugal Pumps / Steam Turbines**

**Accouplements à denture
Zahnkupplungen
Gear Couplings**

**Produit
Fabrikat
Product**

Roulements
Wälzlager
Antifriction bearings

Paliers lisses
Gleitlager
Plain bearings

Lubrification
par immersion
Ol-Tauchschmierung
Splash lubrication

Lubrification à la graisse
Fettschmierung
Grease lubrication

Lubrification à l'huile par bague ou par circulation
Ol-Ring- oder Umlaufschmierung
Oil ring lubrication or circulation system

Lubrification par injection
Einspritzschmierung
Injection lubrication

Remplissage de huile
Ölfüllung
Oil filling

Remplissage de graisse
Fettfüllung
Grease filling

Kin. Visc. 40° C
min. 41,4 mm²/s
max. 50,6 mm²/s
ISO VG 46

NLGI 3

Kin. Visc. 40° C
min. 61,2 mm²/s
max. 74,8 mm²/s
ISO VG 68

Kin. Visc. 40° C
min. 414 mm²/s
max. 506 mm²/s
ISO VG 460

NLGI 0

AGIP

AGIP OTE 45

AGIP GR MU 3

AGIP OTE 55 EP
AGIP OTE 55

AGIP BLASIA 307

AGIP GR SLL

ARAL

ARAL Vitam GF 46

ARAL Fett HL 3

ARAL Kosmol TL 68

ARAL Degol BG 460

ARAL Fett FDP 0

BP

BP ENERGOL HLP 46

BP ENERGREASE LS 3

BP ENERGOL THB 68

BP ENERGOL
GR-XP 460BP ENERGREASE
HT-EP 00**Castrol**CASTROL
HYSPIIN VG 46CASTROL
SPHEEROL AP 3CASTROL
HYSPIIN AWS 68CASTROL
ALPHA SP 460CASTROL
IMPERVIA MMO**CALTEX**Rando Oil 46
Rando Oil HD 46Regal Starfak
Premium 3

Regal Oil R & O 68

Meropa
Lubricant 460

Multifak EP 0

CHEVRONChevron
EP Hydraulic Oil 46Chevron
Dura-Lith Grease 3Chevron
OC Turbine Oil 68Chevron
Gear Compound 460Chevron
Dura-Lith Grease EP 0**ELF**

ELF OLNA 46

ELF EPEXA 3

TURBELF SA 68

REDUCTELF SP 460

ELF EPEXA 0

ESSO

NUTO H 46

BEACON 3

TERESSO 68

SPARTAN EP 460

EP GREASE 350
(TACKE)
FIBRAX EP 370
(Sonstige)**MOBIL OIL**

MOBIL D.T.E. 25

MOBILUX 3

MOBIL D.T.E. Oil
Heavy MediumMOBILGEAR 634
MOBIL D.T.E. HHMOBILUX EP 0
MOBILPLEX 44**SHELL**

Shell Tellus Oel 46

Shell Alvania Fett R 3

Shell Turbo Oel T 68

Shell Omala Oel 460

Shell
Spezial-Getriebefett H
Grease S 3655**SUNOCO**

SUNVIS 821

SUN
MULTI DUTY GREASE 3

SUNVIS 931

SUNEP 1090

SUNAPLEX 992 EP

TEXACORando Oil 46
Rando Oil HD B-46Regal Starfak
Premium 3
Multifak 30Regal Oil R & O 68
Eterna R & O 68

Meropa 460

Multifak EP 0

WINTERSHALLWiolan CA 46
Wiolan HS 46

Wiolub LFK 3

Wiolan DW 68

Wiolan IT 460

Wiolub GFW

Une propre lubrification est particulièrement importante pour la sécurité de service de pompes centrifuges, turbines à vapeur et accouplements à dents.

Si des lubrifiants appropriés sont appliqués proprement, un rendement optimum est atteint, et des troubles et leurs conséquences sont évités. En complément des instructions de service, le tableau de l'autre côté indique les lubrifiants qui sont recommandés pour le graissage de pompes centrifuges, turbines à vapeur et accouplements à dents, et qui sont appropriés pour une température ambiante de 0° à 40° C. L'ordre des lubrifiants est alphabétique et ne dit rien au sujet de leur qualité.

Eine sachgemäße Schmierung ist für die Betriebssicherheit von Kreiselpumpen, Dampfturbinen und Zahnkupplungen besonders wichtig.

Bei richtiger Anwendung geeigneter Schmierstoffe werden höchste Leistungen erzielt sowie Störungen und deren Folgen vermieden. In Ergänzung der Betriebsanleitung sind in umseitiger Tabelle diejenigen Schmierstoffe zusammengestellt, die zur Schmierung von Kreiselpumpen, Dampfturbinen und Zahnkupplungen empfohlen werden, und die für eine Umgebungstemperatur von 0° C bis 40° C geeignet sind. Die Reihenfolge der Schmierstoffe ist alphabetisch und besagt nichts über deren Qualität.

Proper lubrication is particularly important for the operational safety of centrifugal pumps, steam turbines and gear couplings.

If suitable lubricants are correctly applied, an optimum performance is obtained and trouble and its consequences are avoided. Supplementing the operating instructions, the table on the other page gives the lubricants which are recommended for the lubrication of centrifugal pumps, steam turbines and gear couplings and which are suitable for an ambient temperature between 0° and 40° C. The lubricants have been listed in alphabetical order which does not say anything about their quality.

SULZER BURCKHARDT ENGINEERING WORKS LTD. WINTERTHUR GROUP

```

=====
:POSTAL ADDRESS: : DATE: 03.05.93 MESSAGE NO: :
:Hegifeldstrasse 10/Postfach : :
:CH-8404 WINTERTHUR : Dossier: elf PAGES: 1 of 1 :
=====
:TELEFAX: 052/262 00 53 : PLEASE DELIVER TO: 0033 1 47 44 40 81:
: : ELF LUB: :
:TELEX: 89606062 : NAME: M. Lasne :
:PHONE: 052/262 55 00 : LOCATION: Paris :
=====
:FROM: : CONCERNING:
: R.Arztmann 0507 : Compressor lubricant "NEVASTANE"
: Direct dial 262 5994 : Our telcom 30.04.1993
=====

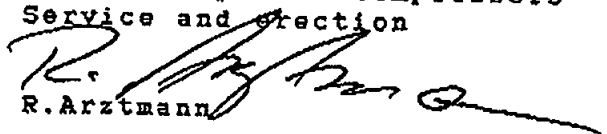
```

Dear Mr. Lasne

The lube oil sample "NEVASTANE 30 AW" received from elf has been tested and compared with other products (White Oil, Fomblin, Klüber, Tribol) in our laboratory. For food compatible lubricants we could now propose to apply NEVASTANE 30 AW in the trunk piston labyrinth compressors on the testbed or in the field to get the final approval. If this is of interest, will show the future as the market for that particular application is limited.

Thank you again for your kind cooperation.

Yours faithfully
Sulzer Burckhardt Ltd.
Labyrinth piston compressors
Service and erection



R. Arztmann