

Jenis Dokumen: WORK INSTRUCTION	No. Revisi: 1
Judul Dokumen: PEMILIHAN PELUMAS PRODUK	Tanggal Revisi: 10 Mei 2010
No. Dokumen: ALP-WIS-TES-001	

Bagian yang direvisi:

- Work Instruction ini merupakan pengganti LITSUS SUSPECT yang dapat dipakai sebagai acuan pemilihan produk pelumas
- Judul dokumen
- No dokumen

Originator:	Disetujui Oleh:
Technical Support Supt.	Customer Service Manager
Daftar Distribusi	
Factory General Manager	
Customer Service Manager	
Technical Support Supt.	
Technical Support Supv.	
DCC File	

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1. Lakukan saran spesifikasi dengan mempertimbangkan faktor berikut :
 - 1.1. Untuk memilih pelumas dalam rangka menggantikan tipe/jenis dan atau brand/merk pelumas :
 - 1.1.1. Lakukan pendataan mesin/peralatan, seperti :
 - Tipe/Jenis mesin/peralatan
 - Spesifikasi utama : HP/KW, rpm, torque, pressure/temperatur dll.
 - Volume tank/sump dan toping up ratenya
 - Potensial Problem dari proses/sistem.
 - 1.1.2. Lakukan pendataan pelumas, seperti :
 - Tipe/Jenis pelumas (manual dan terpasang)
 - Spesifikasi (Viscosity, tipe/jenis aplikasi dan grade)
 - Volume dan toping up rate aktualnya.
 - Detil problem, histori dan lakukan sampling (jika memungkinkan) (sesuai ALP-WIS-TES-004).
 - 1.1.3. Lakukan pemilihan dengan :
 - Jika pelumas terpasang tidak bermasalah, lakukan ekivalensi pelumas terpasang dengan pelumas AGIP.
 - Jika pelumas terpasang bermasalah, lakukan pemilihan pelumas dengan tipe/jenis lain yang berbeda dari pelumas terpasang, yang disesuaikan dengan tipe/jenis aplikasi dan atau gradenya.
 - 1.2. Untuk memilih pelumas dalam rangka mengisi pertama dari suatu mesin/peralatan yang baru atau lama dimana manualnya tidak tersedia.
 - 1.2.1. Lakukan pendataan mesin/peralatan, seperti :
 - Tipe/Jenis mesin/peralatan
 - Spesifikasi utama : HP/KW, rpm, torque, pressure/temperatur dll.
 - Volume tank/sump dan toping up ratenya
 - Potensial Problem dari proses/sistem.
 - 1.2.2. Mencari referensi tipe/jenis pelumas dari mesin/peralatan sejenis dan lakukan sampling (jika memungkinkan) (sesuai ALP-WIS-TES-004).
 - 1.2.3. Memilih pelumas berdasar referensi tersebut (1.2.2.) dan atau pengalaman Technical Support tentang mesin/peralatan tersebut.
2. Berikut panduan Klasifikasi Grade / Kinerja pelumas cair (oil)
 - 2.1. Jenis aplikasi automotive :

Tabel 1

No	Tipe / Jenis & Kelas Grade (Kinerja) Pelumas	Tipe/Jenis Aplikasi
1.	Gasoline Engine (API)	
	1.01. SA	Straight Mineral Oil
	1.02. SB	Inhibited Oil only
	1.03. SC	1964 Models
	1.04. SD	1968 Models
	1.05. SE	1972 Models

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	1.06. SF 1.07. SG 1.08. SH 1.09. SJ 1.10 SL	1980 Models 1989 Models 1994 Models 1997 Models 2001 Models
2.	Diesel Engine (API) 1.01. CA 1.02. CB 1.03. CC 1.04. CD 1.05. CD-II 1.06. CE 1.07. CF-4 1.08. CF 1.09. CF-2 1.10. CG-4 1.11. CH-4 1.12. CI-4	No wear & deposits protection With wear & deposit protection Turbo & Supercharged (Mod - Heavy) Turbo & Supercharged (High S Fuel) Two stroke 1983 Models 1990 Models Indirect Injection (High S Fuel) Two stroke with Heavy Duty 1994 Models (Fuel < 0.5% S) 1998 Models (Fuel ≤ 0.5% S) 2002 Models (Fuel ≤ 0.05% S & EGR)
3.	Two stroke small engine (JASO & ISO) 3.01. FA 3.02. FB – GB 3.03. FC – GC 3.04. GD	Normal Smoke Normal Smoke & Normal Piston Varnish Low Smoke & Medium Piston Varnish Low Smoke & Excellent Piston Varnish
4.	Water-cooled outboard engines (NMMA) 4.01. (BIA) TC-W 4.02. TC-WII 4.03. TC-W3 4.04. Recertified TC-W3	Obsolete Obsolete Obsolete After 1994
5.	Four stroke motorcycle engine (OEM) 5.01. MA 5.02. MB	High Friction Index Low Friction Index
6.	Railroad Diesel Engine API - CD with the level : • TBN : 4–5 • TBN : 7 • TBN : 10 • TBN : 13 • TBN : ≥ 13	Generation 1 Generation 2 Generation 3 Generation 4 Generation 5
7.	Marine Diesel Engine API-CD with the spec : • SAE 50 TBN : 70 • SAE 30 TBN : 5–10	Cylinder of 2 stroke slow speed crosshead

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8.	<ul style="list-style-type: none"> SAE 30/40 TBN : 12–40 <p>Stationary gas engine API – CC or CD SAE 30/40 with ash content :</p> <ul style="list-style-type: none"> < 0.1 (Ashless) 0.4 – 0.6 (Low Ash) 0.7 – 1.0 (Medium Ash) > 1.0 (High Ash) 	<p>System of 2 stroke slow speed crosshead 4 stroke medium speed trunk piston</p> <ul style="list-style-type: none"> Low pressure spark-ignition High Pressure pilot fuel-ignition Low pressure pilot fuel-ignition <ul style="list-style-type: none"> 2 Stroke 4 Stroke Landfill, sour, sewage gases <p>Phosporus Content limited by OEM</p>
9.	<p>Automatic Transmission Fluids specify by OEM like :</p> <ul style="list-style-type: none"> Dexron - General Motor Mercon - Ford 	<ul style="list-style-type: none"> Powershift transmission : construction, agricultural & mining. Automotive power steering industrial/mobile/marine hydraulic Rotary screw compressor
10.	<p>Automotive Gear (API) :</p> <p>10.01. GL-1 10.02. GL-2 10.03. GL-3 10.04. GL-4 10.05. GL-5 10.06. GL-6 10.07. MT-1</p>	<ul style="list-style-type: none"> Straight mineral oil Contains fatty material (industrial gear) Contains mild EP (spiral bevel gear) 50% GL-5 Additive (hypoid gear) Heavy Duty hypoid gear High Offset hypoid gear (obsolete) Nonsynchronized transmission
11.	<p>Tractor Fluids</p> <p>11.01. UTTO (North America) 11.02. STOU (Europe & Other)</p>	<p>Transmission/Wet Brakes + Hydraulic</p> <p>11.01. + Engine</p>

2.2. Jenis aplikasi industri :

Tabel 2

No	Tipe / Jenis & Kelas Performans Pelumas	Fungsi Peruntukan / Aplikasi
12.	<p>Hydraulic/Hydrostatic System (ISO 6743/4)</p> <p>11.01. HH 11.02. HL 11.03. HM 11.04. HR 11.05. HV 11.06. HS 11.07. HG</p>	<p>Mineral Oil Antirust oxidation Antiwear HL oil with improved visco/temp properties High viscosity index & Antiwear Synthetic fluids HM oil possessing antistick-slip properties</p>

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13.	<p>Fire Resistant Hydraulic System (ISO 6743/4)</p> <p>12.01. HFAE 12.02. HFAS 12.03. HFB 12.04. HFC 12.05. HFDR 12.06. HFDS 12.07. HFDT 12.08. HFDV</p>	<p>Oil water emulsions Aqueous chemical solutions Water in oil emulsions Aqueous solutions of polymers Phosphoric esters Clorinated hydrocarbons Mix of HFDR & HFDS Other types of synthetic fluids</p>
14.	<p>Hydrokinetic System (ISO 6743/4)</p> <p>13.01. HA 13.02. HN</p>	<p>Automatic transmissions Hydraulic couplings & torque converters</p>
15.	<p>Industrial Gears (ISO 6743/6)</p> <p>14.01. CKB (Mo load) 14.02. CKC (Hi load) 14.03. CKD (Hi load-temp) 14.04. CKE (Worm gears) 14.05. CKS (Mo load-temp) 14.06. CKT (Hi load-temp) 14.07. CKG (Open gears) 14.08. CKH (Open air) 14.09. CKJ (Open - Hi load) 14.10. CKK (Greases) 14.11. CKM (Occasional)</p>	<p>Oils with anti-rust&oxidant CKB oils with EP & antiwear CKC oils with mild thermal stability CKB oils with friction modifier Synthetic oils Synthetic oils with EP Greases with EP & antirust Bituminous products with antiwear CKH products with EP & antiwear Greases with EP & anti-wear&oxidant Pastes with anti-seizure&oxidant&rust</p>
16.	<p>Industrial Enclosed Gears (AGMA 250.04)</p> <p>15.01. 1 – 15.02. 2 EP 15.03. 3 EP 15.04. 4 EP 15.05. 5 EP 15.06. 6 EP 15.07. 7 EP 15.08. 8 EP 15.09. 8A EP</p>	<p>Note : R&O oils code without EP</p> <p>ISO VG 46 ISO VG 68 ISO VG 100 ISO VG 150 ISO VG 220 ISO VG 320 ISO VG 460 ISO VG 680 ISO VG 1000</p>
17.	<p>Industrial Open Gears (AGMA 251.02)</p> <p>16.01. 4 EP 16.02. 5 EP 16.03. 6 EP 16.04. 7 EP 16.05. 8 EP 16.06. 9 EP</p>	<p>Note : R&O oils code without EP</p> <p>ISO VG 150 ISO VG 220 ISO VG 320 ISO VG 460 ISO VG 680 ISO VG 1500</p>

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	16.07. 10 EP 16.08. 11 EP 16.09. 12 EP 16.10. 13 EP 16.11. 14 R 16.12. 15 R	2880 – 3520 cSt (40°C) 4140 – 5060 cSt (40°C) 6120 – 7480 cSt (40°C) 25600 – 38400 cSt (40°C) 428.5 – 857.0 cSt (100°C) 857.0 – 1714.0 cSt (100°C)
18.	Air Compressor (DIN 51506) 17.01. VDL (+ antioxidant) 17.02. VC (str) / VCL (HD) 17.03. VB (str) / VBL (HD)	Note : M : Moving ; S : Stationary M = 220 °C (max) & S = 220 °C (max) M = 220 °C (max) & S = 160 °C (max) M = 140 °C (max) & S = 140 °C (max)
19.	Refrigerating Compressor (DIN 51503 teil 1) 18.01. KA 18.02. KC	Ammonia Compressor Oil Freon Compressor Oil
20.	Turbine 19.01. DIN 51515 / BS 489 / GEK 32568A 19.02. MIL-L-17331H / OEP 80 / HTGD 90117	Non EP oils EP oils

3. Berikut panduan Klasifikasi Grade (Kinerja) pelumas semi padat (grease)

3.1. Jenis aplikasi automotive :

Tabel 3.

No	Tipe / Jenis & Grade (Kinerja) Pelumas	Tipe/jenis Aplikasi
21.	ASTM D 4950 21.01. LA (mild duty) 21.02. LB (mild - severe) 21.03. 4A (mild duty) 21.04. 4B (mild - moderate) 21.05. 4C (mild - severe)	Chassis (Suspension) Chassis (Steering & drive line) Wheel Bearings Wheel Bearings (Most vehicle) Wheel Bearings (High temp - stop & go)
22.	NLGI : 22.01. LB 22.02. GC 22.03. GC-LB	Chassis Wheel bearings Wheel bearings & Chassis

3.2. Jenis aplikasi industri :

Tabel 4.

No	Tipe / Jenis & Grade (Kinerja) Pelumas	Tipe/jenis Aplikasi
23.	Grease ISO Class : "L"	

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	ISO – L – X – Simbol 1 – Simbol 2 – Simbol 3 – Simbol 4 – NLGI number	Tabel 5, 6
24.	Bearing DIN Class : “K” DIN 51825 – K – Ket. 1 – Ket. 2 – Ket. 3	Tabel 7, 8, 9
25.	Gear DIN Class : “G” DIN 51826 – G – NLGI number	

Tabel 5. Tingkatan Antirust protection

Environmental cond. (1)	Antirust protection (2)	Simbol
L	L	A
L	M	B
L	H	C
M	L	D
M	M	E
M	H	F
H	L	G
H	M	H
H	H	I

(1) L:dry - M:static moisture - H:water wash

(2) L:no protect - M:protect fresh water - H:protect salt water

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Tabel 6. Classification of Greases

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Code	Gen appl	Operating Temperature Range				H2O Cont	S3	Load	S4	NLGI No	ISO L
		T1	S1	T2	S2						
X	Lub require grease	0	A	60 90 120 140 160 180 > 180	A B C D E F G	Lihat Tabel	A B C D E F G	A = Not	A B	000 00 0 1 2 3 4 5 6	ISO L
		-20	B	60 90 120 140 160 180 > 180	A B C D E F G		H I				
		-30	C	60 90 120 140 160 180 > 180	A B C D E F G						
		-40	D	60 90 120 140 160 180 > 180	A B C D E F G						
		< -40	E	60 90 120 140 160 180 > 180	A B C D E F G						

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Tabel 7. Classification of “K” greases & NLGI

Clasification		NLGI Grades	
K	Grease for bearings	0	Work Penetration : 355 – 385
KP	+ antiwear &/ EP additives	1	WP : 310 – 340
KF	+ solid lubricants	2	WP : 265 – 295
KPF	KP + solid lubricants	3	WP : 220 – 250
-	-	4	WP : 175 – 205

Tabel 8. Supplementary identification letter of “K” greases

Supplementary letter according DIN 51502	Highest continuous temp of use	Water compatibility according DIN 51807
C	+ 60 °C	0 – 40 or 1 – 40
D	+ 60 °C	2 – 40 or 3 – 40
E	+ 80 °C	0 – 40 or 1 – 40
F	+ 80 °C	2 – 40 or 3 – 40
G	+ 100 °C	0 – 90 or 1 – 90
H	+ 100 °C	2 – 90 or 3 – 90
H	+ 100 °C	0 – 90 or 1 – 90
K	+ 120 °C	2 – 90 or 3 – 90
M	+ 120 °C	To be agree
N	+ 140 °C	To be agree
P	+ 160 °C	To be agree
R	+ 180 °C	To be agree
S	+ 200 °C	To be agree
T	+ 220 °C	To be agree
U	> + 220 °C	To be agree

Tabel 9. Supplementary reference number of “K” greases

Reference number according DIN 51502	Lowest temperature of use °C
-10	-10 °C
-20	-20 °C
-30	-30 °C
-40	-40 °C
-50	-50 °C
-60	-60 °C