**Skeljungur**
**Fyrirtækjasvið**
**Smurolíur, smurefni og þjónusta**


**Þröstur Arnarson**

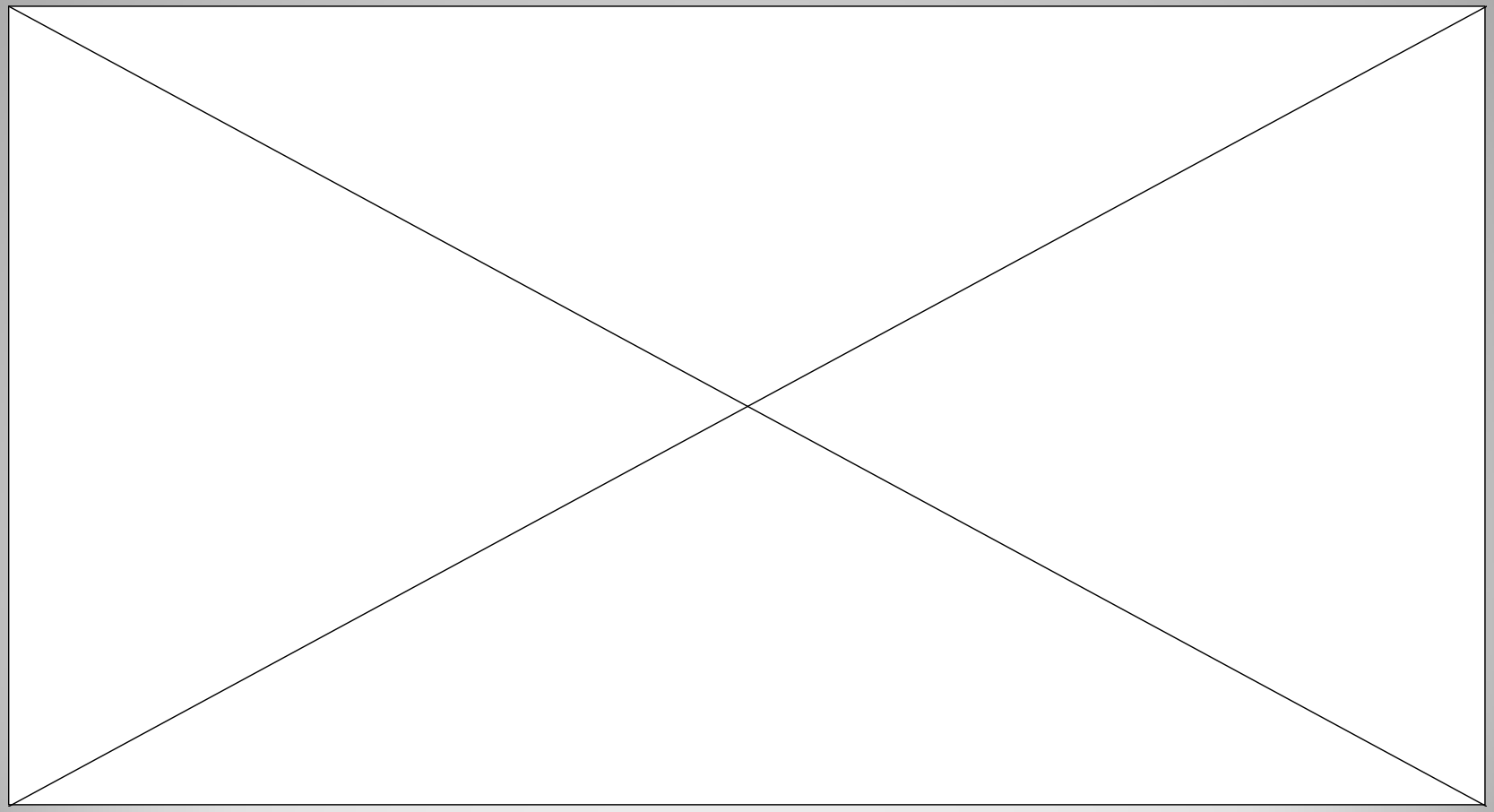
Skeljungur

# Fyrirtækjasvið

- Eldsneyti
- Smurolíur og smurefni
- Áburður
- Efnavörur

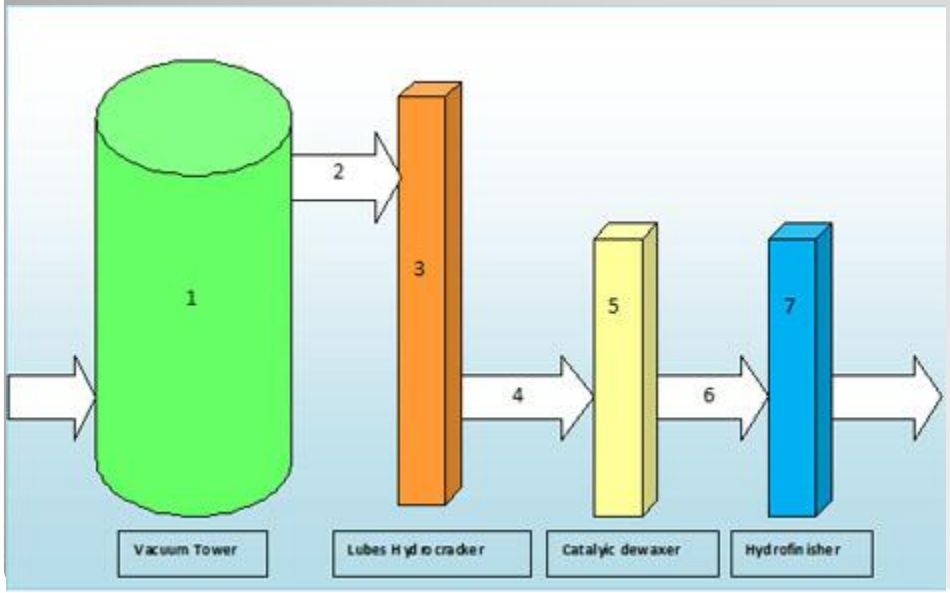
Skeljungur

# Framleiðsluferli  jarðolíu ( Crude oil )



# Base oil

Petroleum-base oil = Grunnolía sem er unnin úr jarðolíu ( crude oil )




1. Olían leidd í undirþrýstings gasfyltan eimara
2. Vaxkend gös og olía flæðir yfir í vetnisbrjót
3. Vetnisatóm metta olíuna, þannig er hægt að aðskilja súrefni, köfnunarefni,þungmálma og brennistein.
4. Olían leidd í frekari niðurbrot við mikin hita og þrýsting, mólekúl mettuð af parafini
5. Olían hreinsuð, verður ljósari.
6. Langar mólikúl keðjur brotnar niður í stuttar ísoparafine keðjur til að hindra kekki og seigju eiginleika.
7. Lokahreinsun , önnur óæskileg efni dregin úr olíuni.

Vinnsla á Base oil

Skeljungur

# Base oil

Alment eru seldir 5 flokkar af Base olíu
Flokkar: I, II, III, IV, V

Mineral: Naphthenic hráolía - LVI & MVI, Paraffinic hráolía – HVI

Synþetísk XHVI, PAO & Ester – VHVI

.

| | I | II | III | IV | V |
|---|---|---|---|---|---|
| Mettun<br>Brennisteinn<br>Seigjutala | <90%<br>>0,03%<br>≥80>120 | >90%<br><0,03%<br>>80<120 | >90%<br>>0,03%<br>>120 | PaOs | Öll grunnolía sem ekki er flokkuð í 1-4 |
| | Δ<br>Allar almennar HVI base stock olíur | Δ<br>Severely Hydroprocessed ( SHP ) HVI base stock (Há seigjutala) | Δ<br>Shell XHVI® synthetic technology | Δ<br>Sérstakur flokkur frekari *vinnsla Atiel* | Δ<br>Önnur smurefni ef seigjutala VI er <80 |

Grunnolía ( base oil) 70-99 % í smurolíu

Skeljungur

5 flokkar af Base olíu
Flokkar: I, II, III, IV, V

.

Flokkur 1 og 2

MINERAL BASE ( HVI )

/ NÁTTÚRULEG GRUNNOLÍA / JARÐEFNAOLÍA

FREKARI VINNSLA

Flokkur 3

SYNTHETIC ( XHVI )

/ SINÞETÍSK / GERFIEFNAOLÍA

Skeljungur

# Flokkur 3

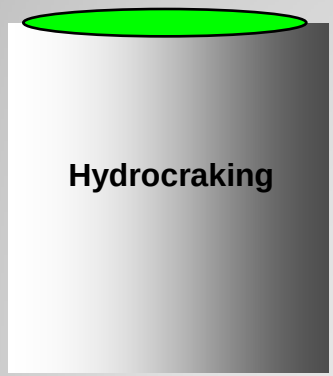
## SYNTHETIC ( XHVI )

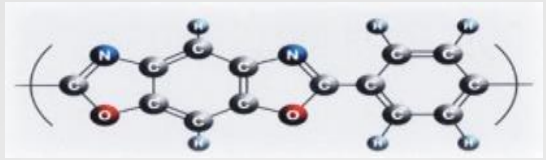
/ SINÞETÍSK / GERFIEFNAOLÍA

XHVI= Extra high viscosity index

Há seigjutala

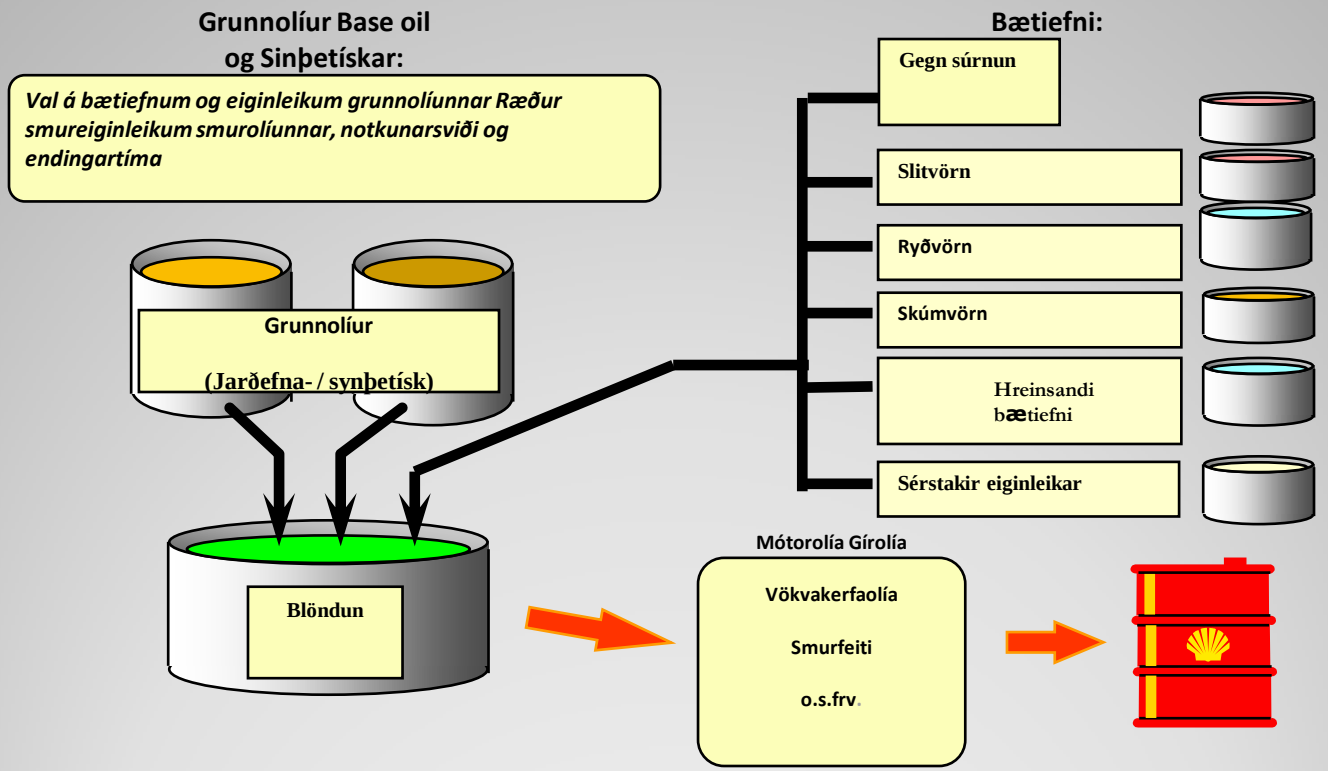
Shell XHVI@



Skeljungur

# Frekar vinnsla á smurolíu




Skeljungur

## Efnainnihald í  Shell Rimula Super 15W40

Origin : UK
Date : 17/06/2005

| Analysis | Min. (LQS) | Test data | Max. (LQS) | Remarks |
|---|---|---|---|---|
| **Viscosity at 100 °C** (cSt) | | 16.1 | | |
| **Viscosity at 40 °C** (cSt) | | | | |
| **TAN** (mgKOH/g) **(Total Acid Number)** | | 2.05 | | |
| **TBN** (mgKOH/g) **(Total Base Number)** | | 10.6 | | |
| **Spectrometry** | | | | |
| **Phosphorus P (%)** | | **0.12** | | |
| **Zinc Zn (%)** | | **0.14** | | |
| **Calcium Ca (%)** | | **0.32** | | |
| Baryum Ba (%) | | 0.00 | | |
| **Magnesium Mg (ppm)** | | **1** | | |
| **Molybdenum Mo (ppm)** | | **2** | | |
| **Silicon Si (ppm)** | | **11** | | |
| Sodium Na (ppm) | | 0 | | |
| **Boron B (ppm)** | | **2** | | |
| **Potassium K (ppm)** | | **1** | | |

Skeljungur

# Smurolíur 3 flokkar

**Synþetísk olía**
**t.d**
**Helix Ultra ( allar )**
**Rimula R 6**

**½ Synþetísk olía**
**t.d**
**Helix Plus = Helix HX7**
**Helix F = Helix AF**
**Helix Diesel Plus**
**Rimula R 5**

**Mineral olía**
**t.d**
**Helix Super= Helix HX 5**
**Rimula R 3, 4**

- Kostir / Gallar

Skeljungur

Sinþetísk

Minna viðnám

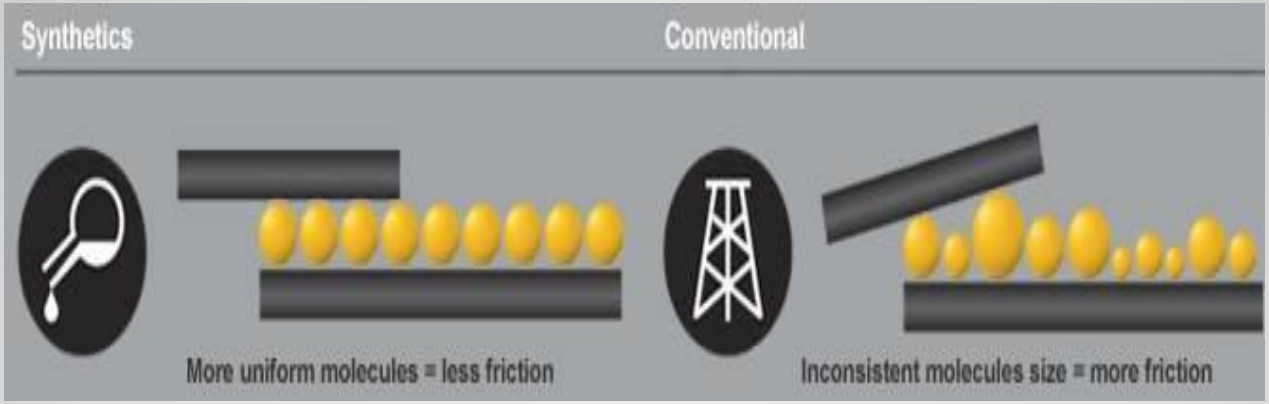
Hærra hitaþol

Hærri seigjutala

Mineral

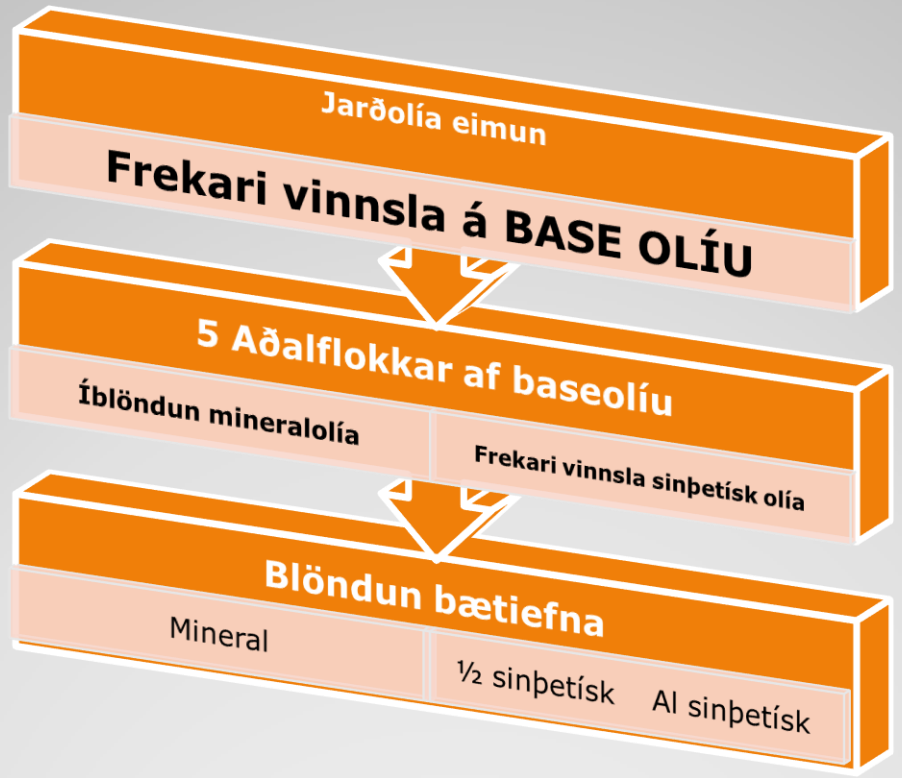
Ódýr

Mikil og löng þróun




Skeljungur

# Smurolíur framleiðsla / flokkar




Skeljungur

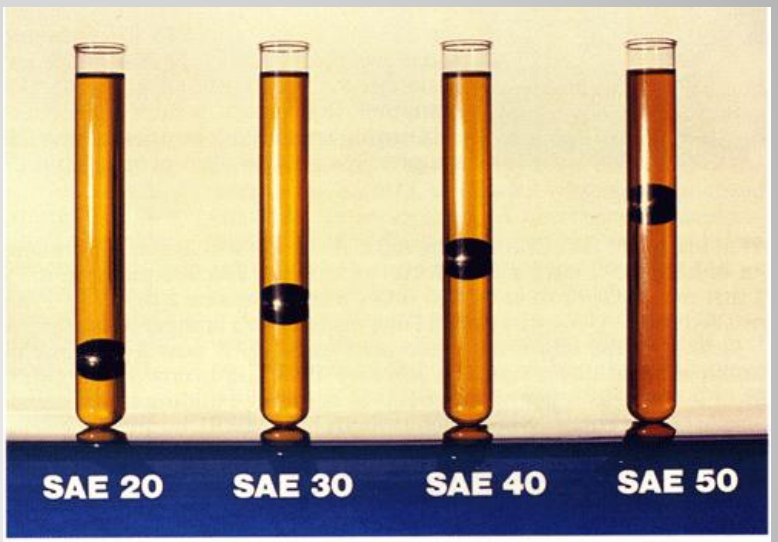
# 2. Seigja /helstu flokkunarkerfin


Seigjan er mælikvarði á þykkt , hún er einn mikilvægasti eiginleikin í smurolíu þar sem smurolían myndar fleytingu milli tveggja flatna

Skeljungur

**Seigja :** Ákveðið magn af vökva er látið renna undan þyngdarkrafti sínum um pípu við þekktan hita og tíminn mældur sem það tekur vökvan að renna milli kvarða á pípunni.

Þykkt olíu er mæld í centstoke cSt og er þá gefið upp við hvaða hitastig, hún er mæld ( smurolía 40°C og 100°C ) (fermillimetrarm á sek )


*Steel balls of equal weight dropped into test tubes filled with motor oils fall at different rates. Their rate of fall depends on the viscosity of the oil. The ball travelling through the light SAE 20 oil has travelled farthest, while the ball in the heavy SAE 50 has travelled least.*

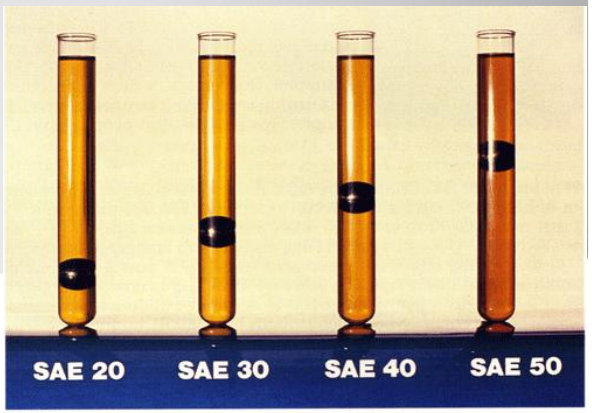
Skeljungur

## Seigja

**Flokkunarkerfi**

**Fyri mótor og gírolíur SAE**

**Fyrir iðnaðarolíur ISO VG**


*Steel balls of equal weight dropped into test tubes filled with motor oils fall at different rates. Their rate of fall depends on the viscosity of the oil. The ball travelling through the light SAE 20 oil has travelled farthest, while the ball in the heavy SAE 50 has travelled least.*

Seigja olíu

Skeljungur

- SAE
- Society of Automotive Engineers
- Fagleg stofnun sem voru stofnuð af bílaframleiðendum í USA
- Notað fyrir bifreiðaolíur (mótor-, gír- og drifolíur)

- Mótorolíur: 0W, 5W, 10W, 15W, 20W, 25W, 20, 30, 40, 50 og 60

- Gírolíur: 75W, 80W, 85W, 90 og 140



- Seigja SAE

Skeljungur

# SAE

**Fjölþyktarolía: ( Multi grade ) tvær tölur** t.d Rimula R 6 LME 5W-30

Fjölþykktar olía 5W-30. Talan 5 W táknar að þessi olía ræður við lágt hitastig án þess að verða of þykk til að gangsetja vélina í kulda og hún sé nægilega þykk 30 við vinnuhita 100°C ( SAE 30 )

**Einþykkt ( single-grade ) ein tala** t.d Rimula X 30 ( SAE 30 )

0W, 5W, 10W, 15W, 20W, 25W eru vetrargildi fyrir mótorolíur.
Samsvarandi vetrargildi fyrir gír- og drifolíur eru 75W, 80W og 85W, 20, 30, 40, 50 og 60 eru sumargildi.
Því hærri sem SAE tala olíunnar er, þeim mun meiri segju hefur olían við venjulegan vinnuhita (100°C). 90 og 140 eru samsvarandi sumargildi fyrir gír- og drifolíur.

- Seigja

Skeljungur

# Seigja

Seigja : Mælikvarði á þykkt olíunar og rennslishæfni við mismunandi hitastig.

Almennt, þykk olía há seigja, þunn olía lág seigja.

**0W-30**

**5W-30**

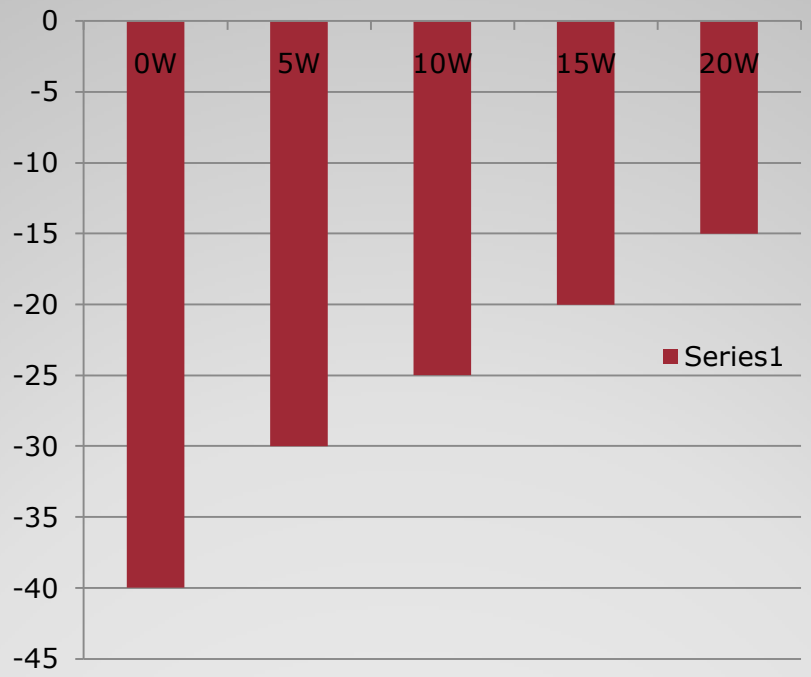
**10W-40**

Seigja við **lágt** hitastig (W = Vetur)

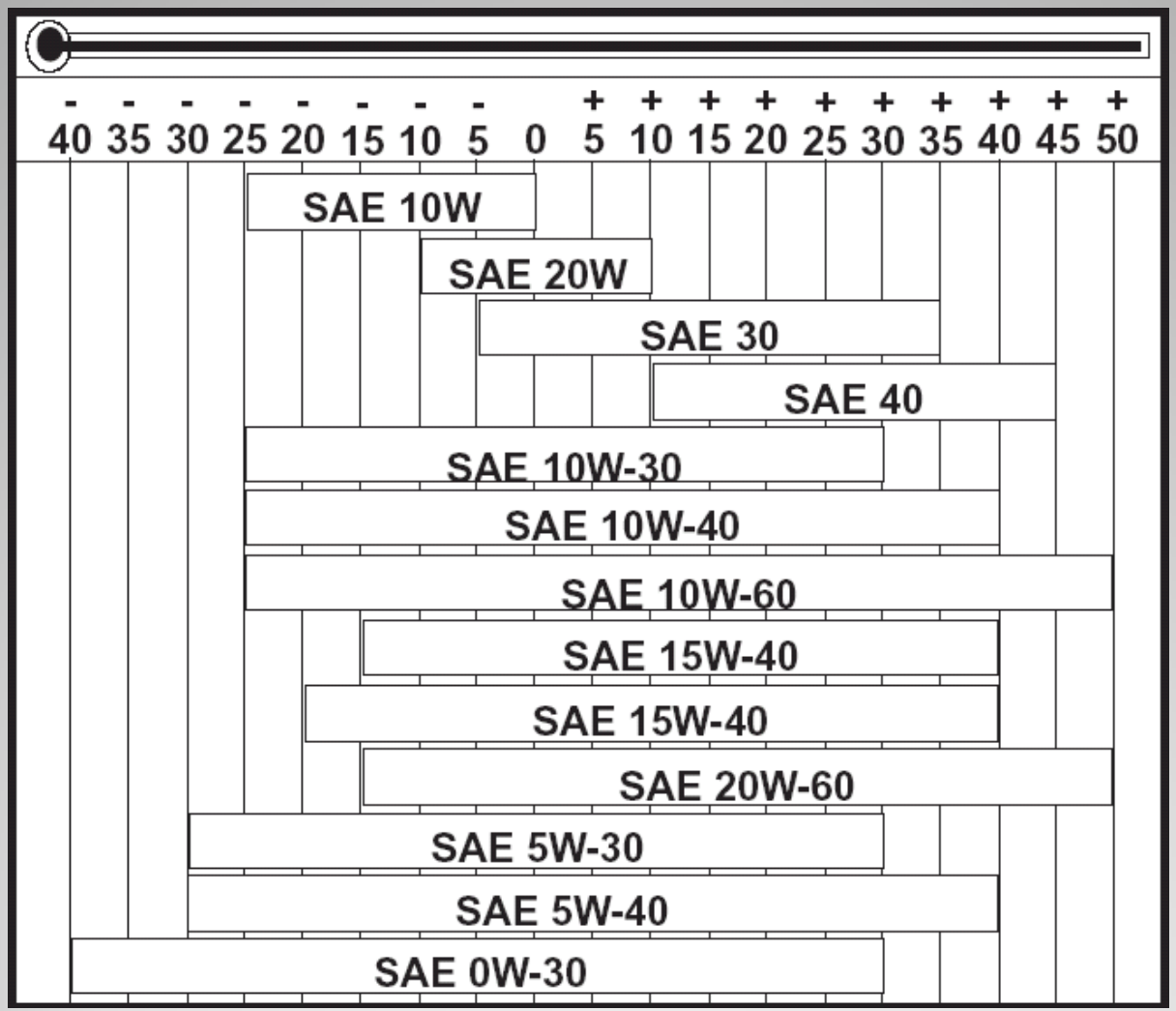
Seigja við **hátt** hitastig

Skeljungur

# Vetrargildi smurolíu SAE




Skeljungur




- Seigja

Skeljungur

# ISO : International organization for standardization

Notað um iðnaðarolíur (vökvakerfa-, gír-, loftþjöppuolíur, o.fl.)
Flokkarnir eru: 15, 22, 32, 46, 68, 100, 220, 320, 460, 680, 800 og 1000.
Seigja olíunnar við 40°C segir til um í hvaða flokk hún fellur, t.d. er Shell Tellus 46 vökvakerfaolía með þykktina 46 centistoke við 40°C.
Því hærri ISO VG flokkun olíunnar, þeim mun þykkari er hún.

VISCOSITY CLASSES ACCORDING TO ISO – INDUSTRIAL LUBRICATING OILS

| ISO VG nr | mm²/s at 40°C mean value | min | max | ISO VG nr | mm²/s at 40°C mean value | min | max |
|---|---|---|---|---|---|---|---|
| 2 | 2.2 | 1.98 | 2.42 | 68 | 68 | 61.2 | 74.8 |
| 3 | 3.2 | 2.88 | 3.52 | 100 | 100 | 90.0 | 110 |
| 5 | 4.6 | 4.14 | 5.06 | 150 | 150 | 135 | 165 |
| 7 | 6.8 | 6.12 | 7.48 | 220 | 220 | 198 | 242 |
| 10 | 10 | 9.0 | 11.0 | 320 | 320 | 288 | 352 |
| 15 | 15 | 13.5 | 16.5 | 460 | 460 | 414 | 506 |
| 22 | 22 | 19.8 | 24.2 | 680 | 680 | 612 | 748 |
| 32 | 32 | 28.8 | 35.2 | 1000 | 1000 | 900 | 1100 |
| 46 | 46 | 41.4 | 50.6 | 1500 | 1500 | 1350 | 1650 |

- Seigja ISO VG

Skeljungur

- SAE
- Gírolíur og mótorolíur  SAMANBURÐUR

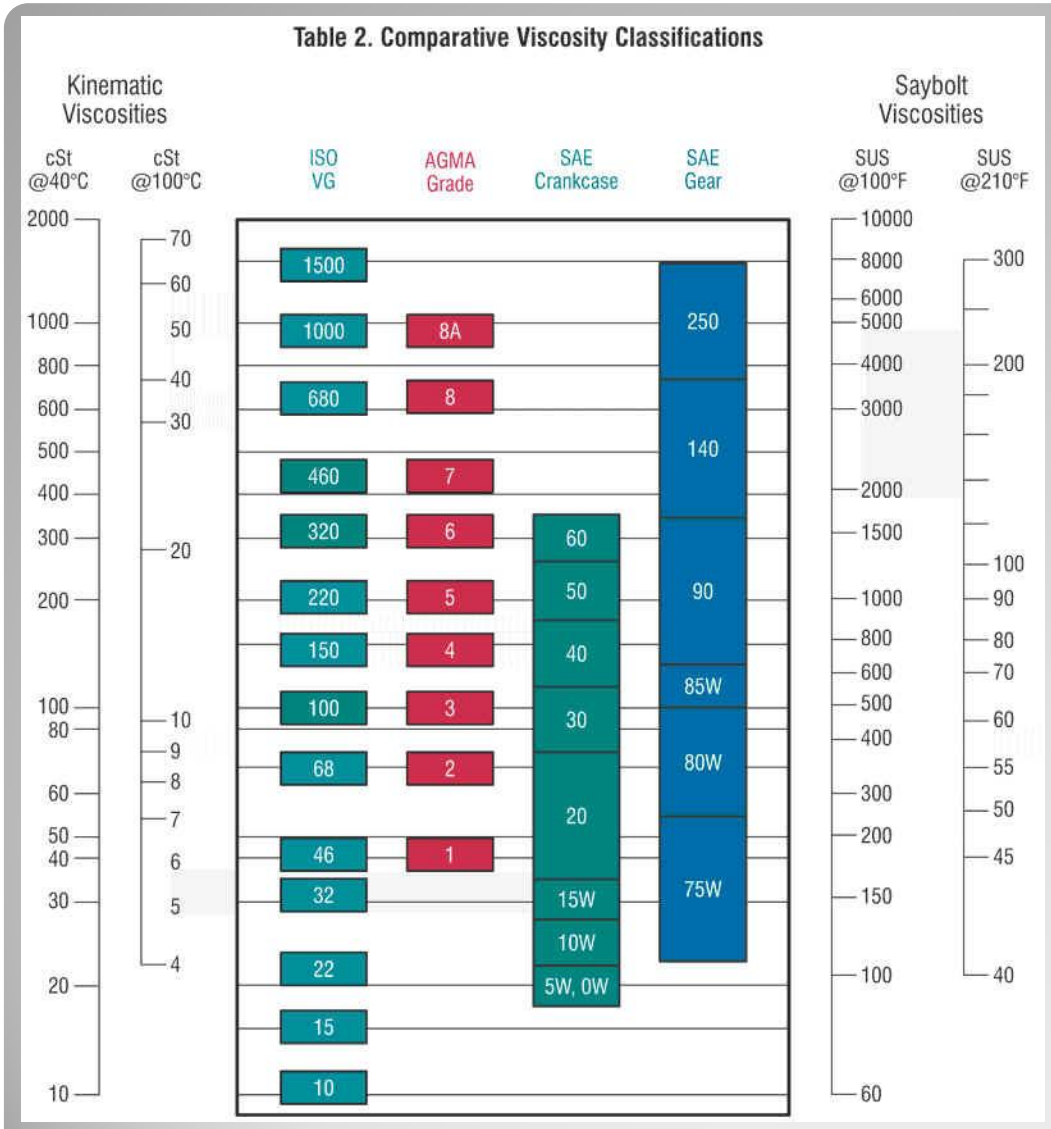
- Mótorolíur:  0W, 5W, 10W, 15W, 20W, 25W, 20, 30, 40, 50 og 60

- Gírolíur:  75W, 80W, 85W, 90 og 140



- Seigja  SAE

Skeljungur



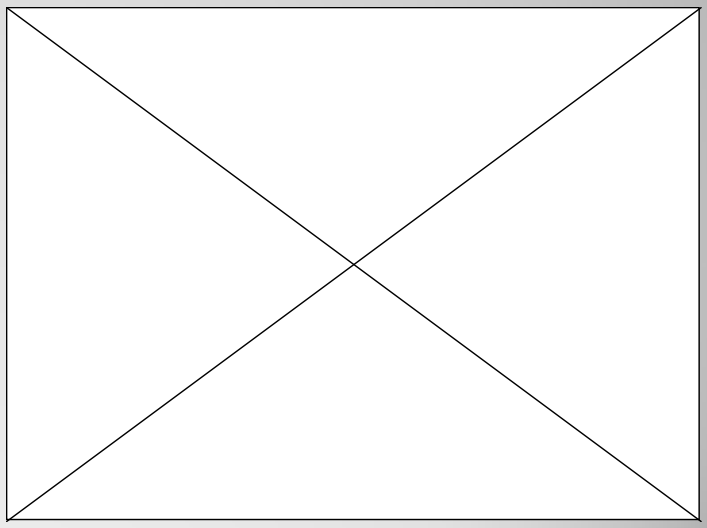

# Samanburður á seigju

Skeljungur

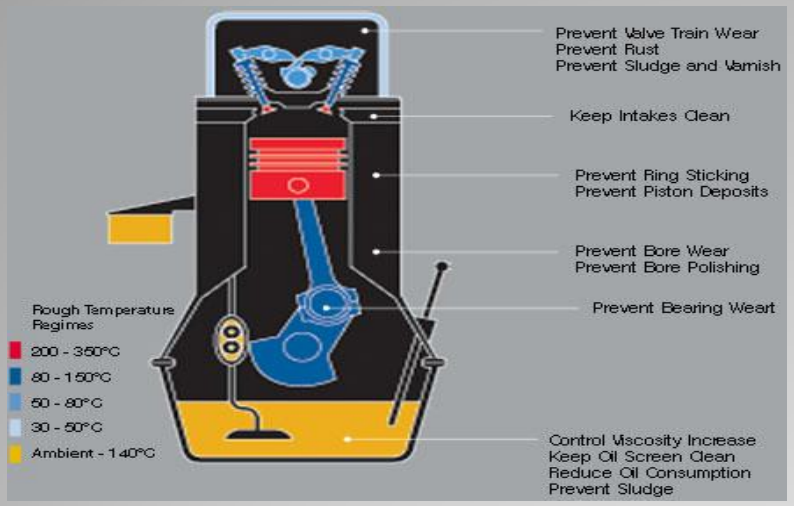
- 3. Hlutverk smurolíu

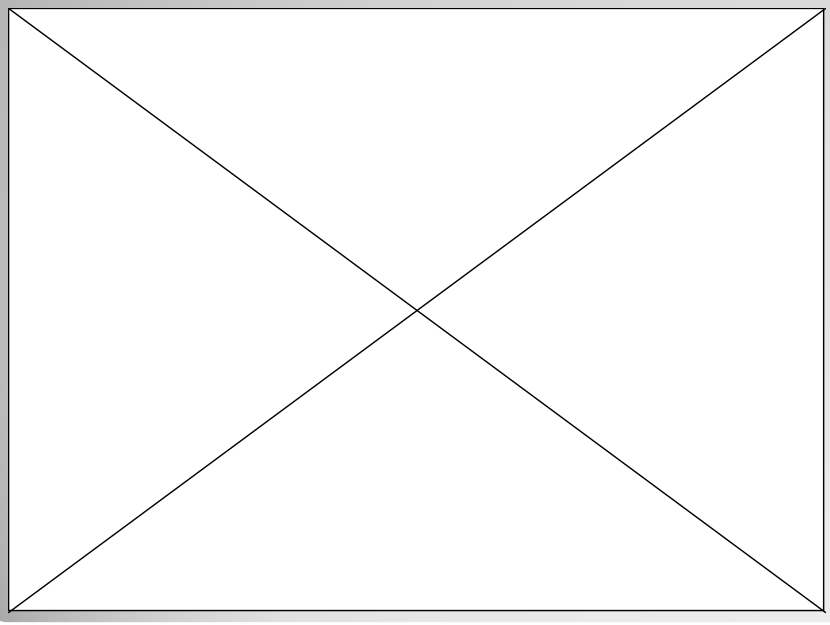

- Smurolían hefur 5 hlutverk

- Smyrja
- Kæla
- Hreinsa
- Verja
- Þétta



Skeljungur



**Smurning:**
Takmarka slit og draga úr núningi

**Kæling:**
Olían annast 35% af kælingu vélarinnar

**Hreinsun:**
Hindra útfellingar og halda óhreinindum uppleystum

**Þétting:**
Þétta með stimpilhringjum svo bruninn þrýsti stimplunum niður

**Vörn:**
Vægar sýrur myndast við brunann, því þarf að verja vélina gegn ætingu og tæringu.

Skeljungur

# HNIGNUN SMUROLÍUNNAR

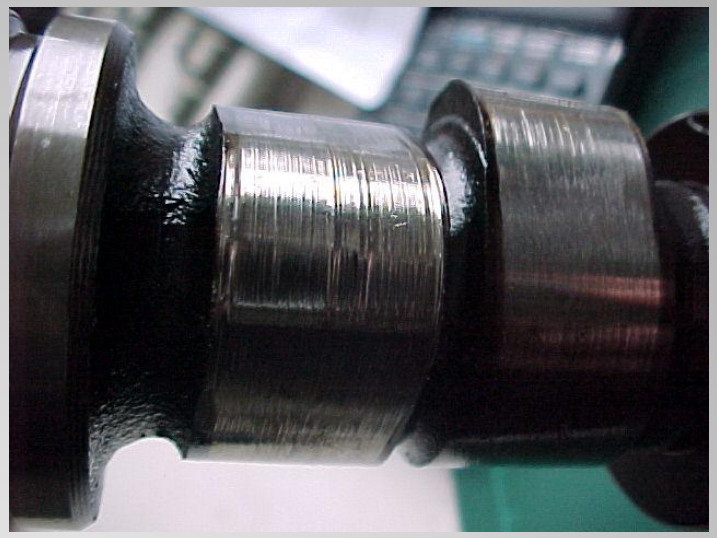
1. **Sýring:** blöndun á súrefni > seigja eykst, veikar sýrur, kvöða myndast
2. **Óhreinindi** Sót > eldsneyti, vatn> froða, rið
3. **Eyðing bætiefna** Ýmis gös > sýra >slit

Skeljungur

# Bætiefni í smurolíu

Hlutverk Bætiefna

- Vernda málm yfirborð
- Auka slit og þrýstivörn
- Minka mótstöðu
- Stilla seigjuna ( aukið frostþol)
- Hlutleisa sýrur-basa
- Hreinsa

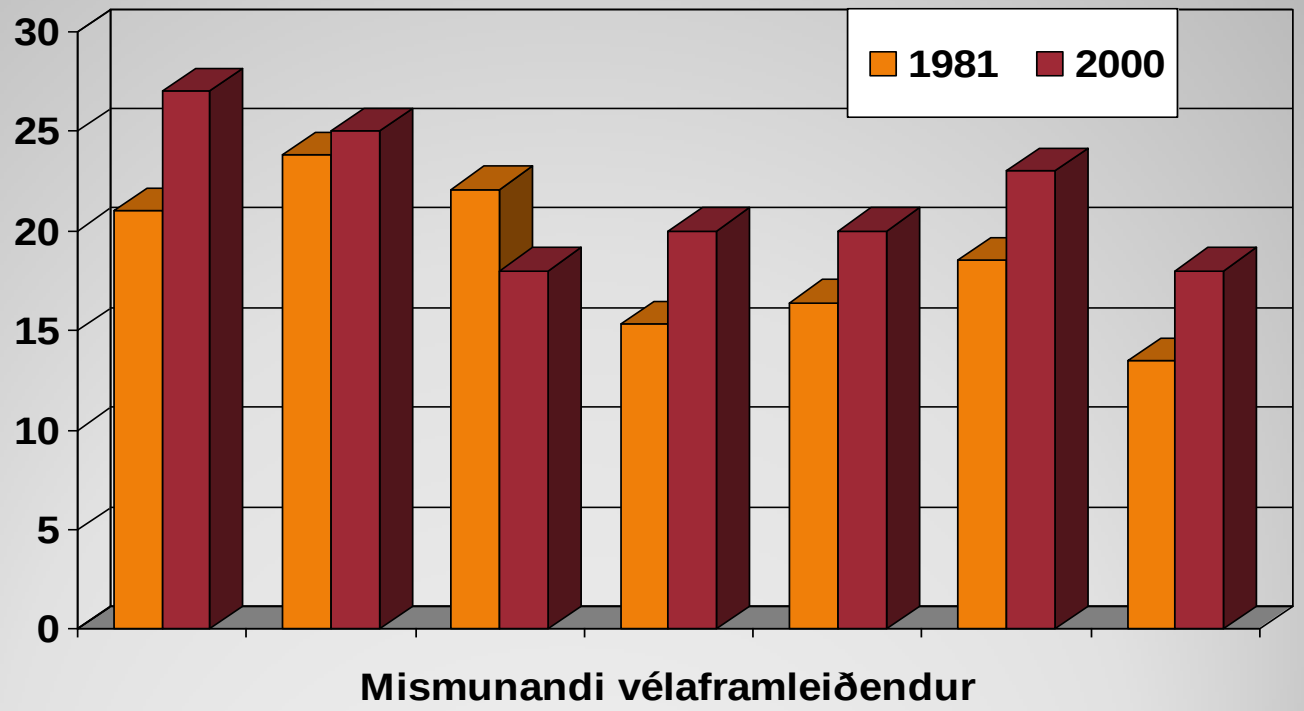


Helstu bætiefni

- Zinc dithiophosphates (oft kallað ZDDP
- Organic phosphates ($H_3PO_4$)
- *Acid phosphatase*
- calcium and magnesium phenolates,

Skeljungur

# KW á hvern smurolíu líter




Skeljungur

# Hvenær á að skipta um olíu

- Reynsla vélarframleiðenda
- Álag
- Útlit (ef vatn er í olíunni verður hún mjólkurkennd)
- Ef olían freyðir
- Lykt, sýrutala
- Smurolíurannsóknir
- Agnatalning

Skeljungur

# 4. Skýringar úr smurbók

Skeljungur

# Skýringar úr smurolíubók Skeljungs

**Rennslismark:** Pour Point. Eftir hitun er olíusýni kælt með ákveðnum hætti og athugað á 3°C fresti hvort olían rennur. Síðasta skipti sem hún rennur er rennslismark


Skeljungur

# Skýringar úr smurolíubók Skeljungs

**Blossamark**: Eldsneyti er komið fyrir í bolla, hitað og hrært. Með ákveðnu hitabili er hræring stöðvuð og loga beint í bollann eða þar til kviknar í lofttegundum sem stíga frá sýninu.


Skeljungur

# Skýringar úr smurolíubók Skeljungs

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**Seigjutala:** (Viscosity index, skammst.: VI)
Seigjutalan er mælikvarði á hve mikið seigja olíunnar breytist með hitastiginu
Seigjutalan segir einnig til um gæði olíunar
Því hærri sem seigjutalan er, þeim mun minna breytist seigjan með hitastiginu.
Há seigjutala, VI, er gæðamerki.

Reikniregla: VI=100X(L-U)/(L-H)

Fyrir olíu sem hefur seigju 10.0 centistokes (cSt) við 100 C, þá gefur taflan ASTM D, að L gildið = 147.7 and H gildið = 82.87. Og ef olían er við 40 C með seigjuna 110 cSt. Þá fáum við út að seigjutalan VI sé 58 með því að nota þessa formulu

VI= 100*(L-U) / ( L-H = > **VI = 100 × (147.7-110)/ (147.7-82.87) = 58**

http://www.mehf.com/2.c.4.e.1.htm

Skeljungur

# 5. Gæðastaðlar

Skeljungur

# Upplýsingar úr smurbók Skeljungs

| Helix mótorolía fólksbílar, sendibílar og jeppar | SAE | Seigja cSt 40°c | 100°c | Seigju tala | Blossamark CoC°c | Rennslismark °C |
|---|---|---|---|---|---|---|
| **Helix Ultra**<br>Alsyntetísk hágæða smurolía fyrir bensín og dieselvélar sem gera miklar kröfur.Olían tryggir létta gangsetningu og skjóta smurningu við lágt hitastig, eins öfluga smurningu við hátt hitastig. Mikill hreinsieiginleiki, formúla 1 gæði sem fara langt fram úr kröfum vélaframleiðenda. | | | | | | |
| Helix Ultra 0W-40, 5W-40<br>*Gæðastaðlar: API SM/CF, ACEA A3/B3/B4, 505.00/502.00/503.01**<br>*MB 229.5, PSA E-98 Level 2, BMW LL -01, Fiat 9.55535 Z2, Renault RN 0710/RN0700.*<br>*Viðurkennd af Ferrari, Porsche og japönskum bílaframleiðendum* | 0W-40 | 75,2 | 13,6 | 187 | 215 | -42 |
| | 5W-40 | 76,3 | 13,3 | 187 | 206 | -42 |
| Helix Ultra Racing 10W-60<br>*Gæðastaðlar: API SM/CF, ACEA A3/B4, VW 505.00/501.1, MB 229.1, Fiat 9.55535 H3, Ferrari Approved.* | 10W-60 | 151 | 22,8 | 184 | 215 | -39 |

Gæðastaðlar

Skeljungur

# Helstu gæðastaðlar

**ACEA** ***(European Automobile Manufacturers Association)***

**API** **( American petroleum Institut )**

**JASO** **(Japanese automobile standard Organizasion )**

http://www.lubrizol.com/EuropeanEngineOils/RelativePerformanceToolIntro.html

Skeljungur

# Gæðastaðlar

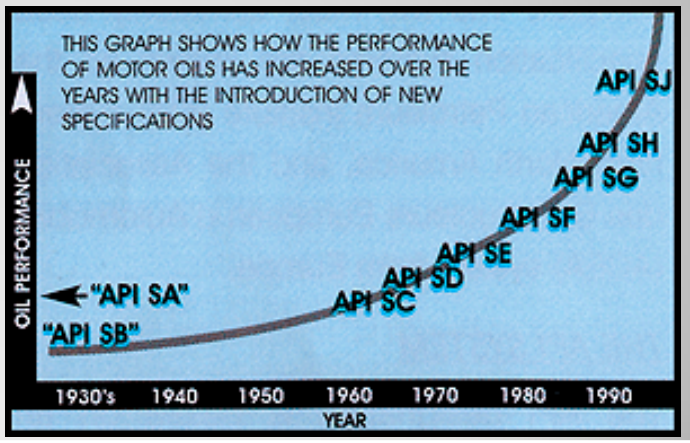
API: Amreíska flokkunarkerfið ( American petroleum Institut )

**S= Bensínvélar, C = Dieselvélar**

Dæmi bensínvélar SM / SL
Diesel CH-4 / Cj-4 sjá nánar English_Oil_Guide.pdf
ILSAC GF -

API Gírolíuflokkanir: GL sjá nánar

Publications




Skeljungur

# Which oil is right for you?


| GUIDE TO SAE VISCOSITY GRADES OF ENGINE OIL FOR PASSENGER CARS | |
|---|---|
| Multigrade oils such as SAE 5W-30 and 10W-30 are widely used because, under all but extremely hot or cold conditions, they are thin enough to flow at low temperatures and thick enough to perform satisfactorily at high temperatures. Note that vehicle requirements may vary. **Follow your vehicle manufacturer's recommendations on SAE oil viscosity grade.** | |
| **If lowest expected outdoor temperature is** | **Typical SAE Viscosity Grades for Passenger Cars** |
| 0°C (32°F) | 5W-20, 5W-30, 10W-30, 10W-40, 20W-50 |
| −18°C (0°F) | 5W-20, 5W-30, 10W-30, 10W-40 |
| Below −18°C (0°F) | 5W-20, 5W-30 |

The current and previous API Service Categories are listed below. Vehicle owners should refer to their owner's manuals before consulting these charts. Oils may have more than one performance level.

For automotive gasoline engines, the latest engine oil service category includes the performance properties of each earlier category. If an automotive owner's manual calls for an API SJ or SL oil, an API SM oil will provide full protection. For diesel engines, the latest category usually – but not always – includes the performance properties of an earlier category.

| GASOLINE ENGINES | | |
|---|---|---|
| **Category** | **Status** | **Service** |
| **SM** | **Current** | For all automotive engines currently in use. Introduced in 2004, SM oils are designed to provide improved oxidation resistance, improved deposit protection, better wear protection, and better low-temperature performance over the life of the oil. Some SM oils may also meet the latest ILSAC specification and/or qualify as Energy Conserving. |
| **SL** | **Current** | For 2004 and older automotive engines. |
| **SJ** | **Current** | For 2001 and older automotive engines. |
| **SH** | **Obsolete** | For 1996 and older engines. |
| **SG** | **Obsolete** | For 1993 and older engines. |
| **SF** | **Obsolete** | For 1988 and older engines. |
| **SE** | **Obsolete** | **CAUTION:** Not suitable for use in gasoline-powered automotive engines built after 1979. |
| **SD** | **Obsolete** | **CAUTION:** Not suitable for use in gasoline-powered automotive engines built after 1971. Use in more modern engines may cause unsatisfactory performance or equipment harm. |
| **SC** | **Obsolete** | **CAUTION:** Not suitable for use in gasoline-powered automotive engines built after 1967. Use in more modern engines may cause unsatisfactory performance or equipment harm. |
| **SB** | **Obsolete** | **CAUTION:** Not suitable for use in gasoline-powered automotive engines built after 1951. Use in more modern engines may cause unsatisfactory performance or equipment harm. |
| **SA** | **Obsolete** | **CAUTION:** Contains no additives. Not suitable for use in gasoline-powered automotive engines built after 1930. Use in more modern engines may cause unsatisfactory performance or equipment harm. |

**Note: API intentionally omitted "SI" and "SK" from the sequence of categories.**

# Gæðastaðlar

**ACEA:** Evrópska flokkunarkerfið fyrir smurolíur, meðlimir eru bílaframleiðendur í Evrópu.

*(European Automobile Manufacturers Association)*

Táknin

**A=bensínvélar ( 1,2,3,4,5 )**

**B= Dieselvélar ( 1,2**

**C= nýrri vélar 1,2,3 4**

**E= Stærri dieselvélar Euro**

ACEA A1/B1-08
ACEA A3/B4-98
ACEA A3/B3-08
ACEA A5/B5-08

ACEA C1-08
ACEA C2-08
ACEA C3-08
ACEA C4-08

ACEA E4-08
ACEA E6-08
ACEA E7-08

ACEA E9-08

http://www.lubrizol.com/EuropeanEngineOils/E908.html

Skeljungur

# JASO ( Japanese automobile standard Organizasion )

**DH 1 Stærri dieselvélar = Euro 2 og Euro 3**

**DH 2 Stærri dieselvélar = Euro 4 og Euro 5**

**DL 1 Fólksbifreiðar = Euro 4 og Euro 5**

**MA, MA 2 MB Bensínvélar**


Skeljungur

# Gear oils Performance Classification

| Classification | Application | Comments |
|---|---|---|
| **GL-1** | Manual Transmissions<br>Mild Conditions | Straight mineral oil (Inactive) |
| **GL-2** | Worm Gear Drives | Antiwear or very mild EP (inactive) |
| **GL-3** | Manual transmissions and spiral-bevel axles, mild to moderate conditions | Contains mild EP additives (inactive) |
| **GL-4** | Manual transmissions, selected transaxles, spiral-bevel axles and hypoid gears, moderate speeds and loads | Usually satisfied by 50% GL-5 additive treatment level |
| **GL-5** | Hypoid and other gears, moderate to severe conditions (high speed and/or low speed, high-torque conditions) | MIL-L2105D qualified lubes satisfy GL-5 |
| **GL-6** | | **obsolete** |
| **MT-1** | Non-synchronised manual transmissions, buses and heavy duty trucks | Protects against thermal degradation, component wear and seal damage |

# Aðrir gæðastaðlar

**Allison, CAT, BMW, Chrysler, Ford, Cummins, Fiat, DAF, GM, Case, Massey Ferguson, New Holland Honda, Komatsu, Mercedes, MAN, Mitsubishi, MTU, , Nissan, Opel, Peugeot, Citroen, SAAB, Steyr, Volvo, Scania, Renault, Volkswagen,Toyota,Mack, Deutz, ZF og fl of fl**

**Hvers vegna þurfum við alla þessa staðla ?**

Skeljungur

# 6. Auknar umhverfiskröfur

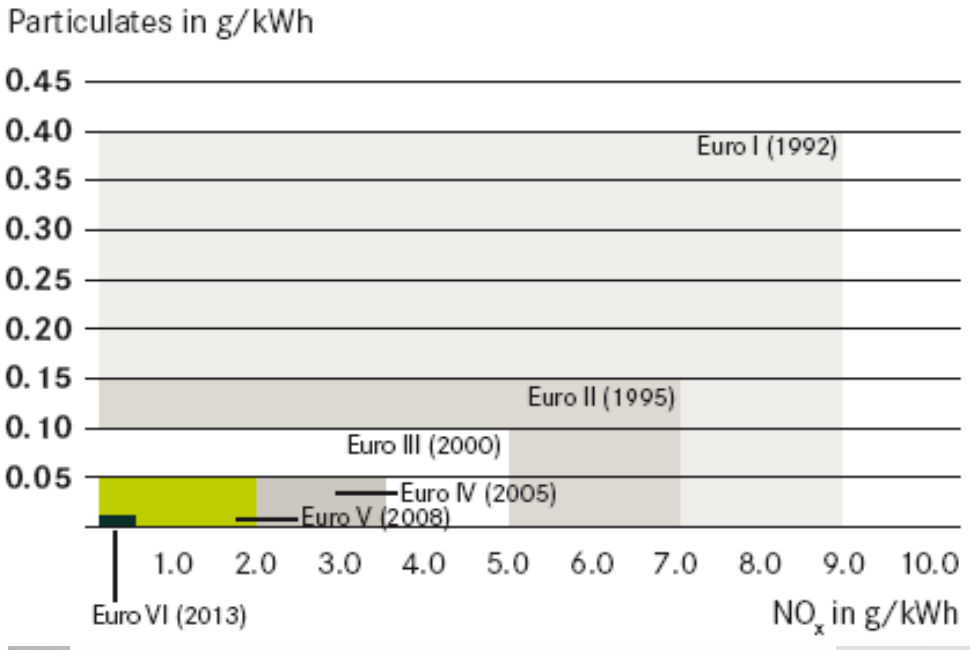
Skeljungur


1992 árgerð
Má skila 132 grömmum út í umhverfið


2009 árgerð
Má skila 14,7 grömmum út í umhverfið

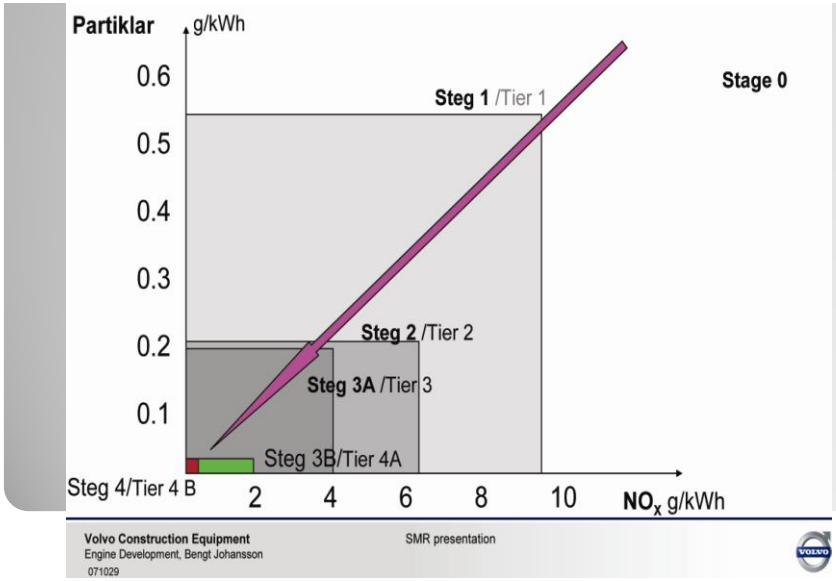
- Euro 5 staðlal. Leifð mörk
- Kolsýrlingur CO 500mg/km
- Sótagnir PM 5 mg/km
- Köfnunarefnisoxíð NOX 180 mg/km

- Skyldur vélaframleiðanda að vélar uppfylli þesi mörk og að búnaður endist 160.000 km ( eftirlit með búnaði eftir hverja 100.000 km )
-




## Auknar umhverfiskröfur
## Sérhæfðari smurolíur

NOx= Köfnunarefnisoxíð
HC = Óbrunnið kolvetni
CO= Kolsýrlingur
PM= Brunaagnir

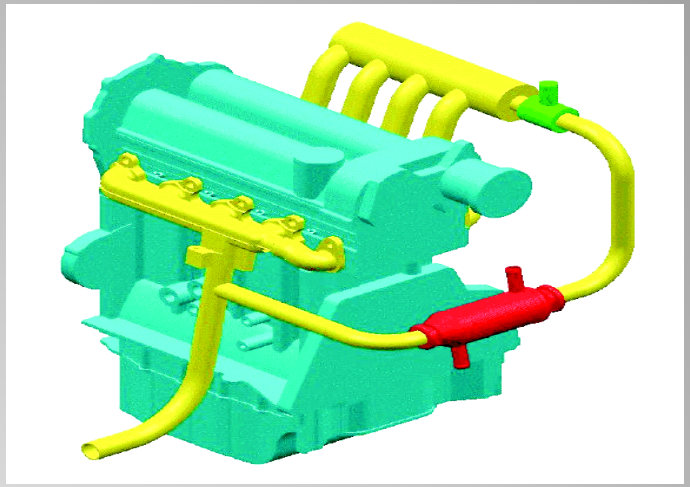



Skeljungur

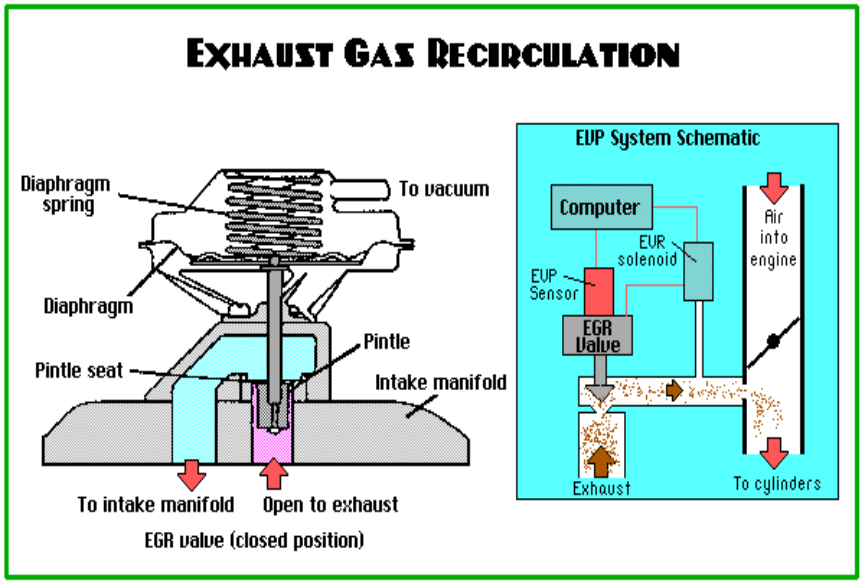
# • Lausnir vélaframleiðanda


Skeljungur

# EGR

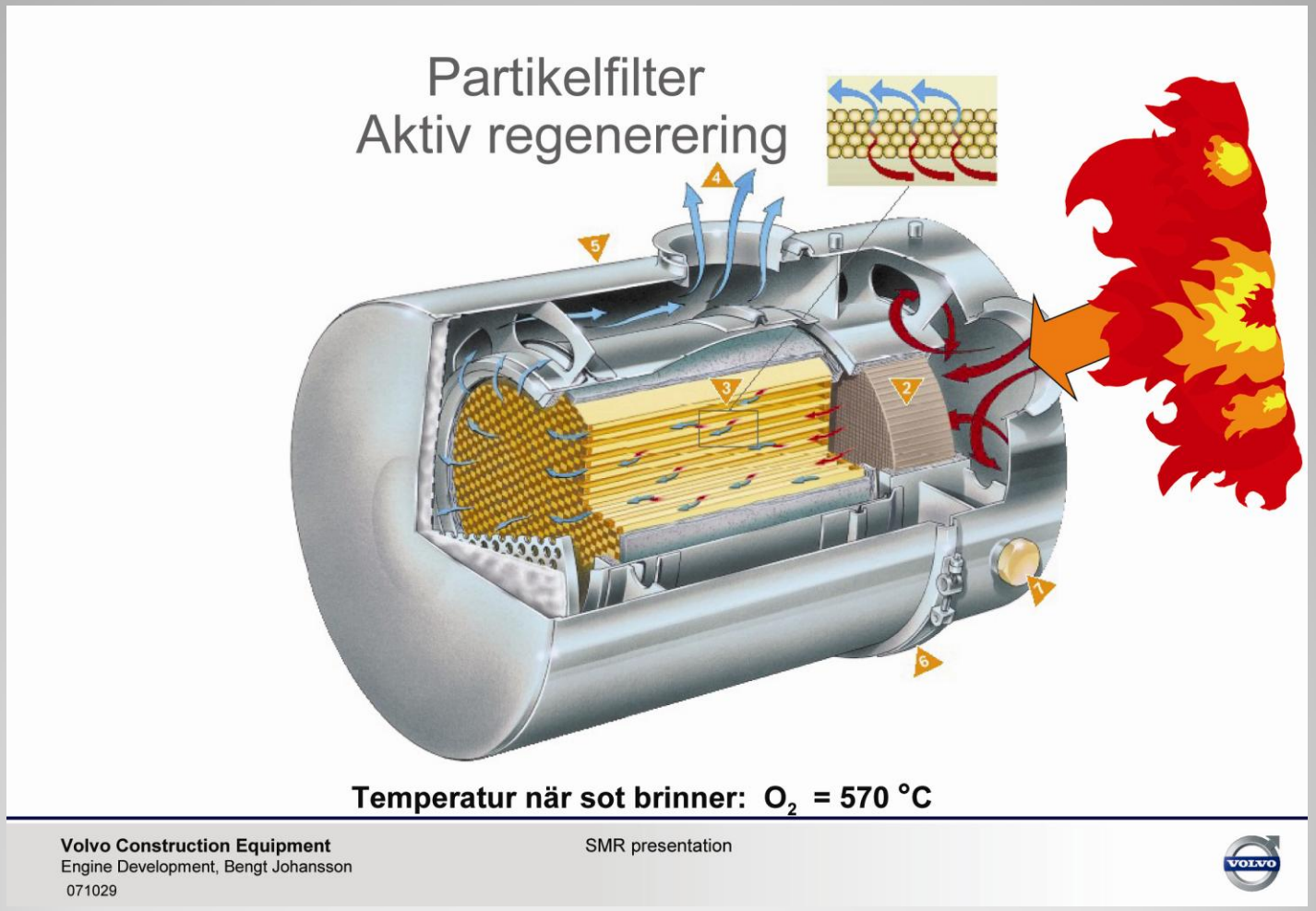


- **Hvað er EGR?**
  Skammstöfunin stendur fyrir "Exhaust Gas Recirculation“
- Afgashringrás ; mengunarvarnarbúnaður (bæði í bensín- og dísilvélum); sjálfvirkur búnaður sem veitir ákveðnu magni af afgasi, við ákveðið ástand, aftur inn í brunahólf og gerir það með stýrðum loka.
- Þar sem afgasið inniheldur lítið sem ekkert súrefni virkar það eins og veik blanda en við það lækkar hitastig í brunahólfinu.
- Við hverja gráðu sem brunahiti lækkar myndast minna af eitruðu nituroxíði (NOx).
- Með EGR og hvarfakút er unnt að eyða um 99% nituroxíða.
- Fram að þessu hefur EGR-búnaðurinn dregið úr afli véla því hann hefur ekki virkað nema samhliða seinkun kveikjutíma í bensínvél og seinkun innspraututíma olíuverks í dísilvél.
- Nýjustu vélar eru lausar við þennan ókost og skila fullu afli með EGR loka. Tæknin er m.a. fólgin í því að forkæla útblásturinn áður en honum er veitt inn í brunahólfin.




Skeljungur

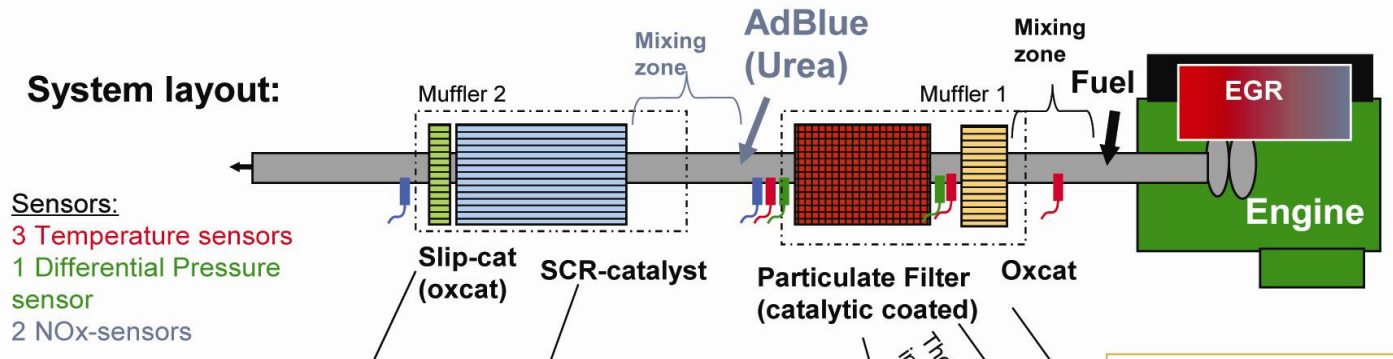
# Partikelfilter




Skeljungur

# Steg 4 från ett ingenjörsperspektiv

## Aktivt regenerarat partikelfilter + SCR




The "slip" catalyst (or "clean up" catalyst) oxidize any remaining ammonia:

$4NH_3 + 3O_2 \Rightarrow 2N_2 + 6H_2O$

The oxidation catalyst creates heat for active regeneration of the DPF by oxidizing diesel fuel:

$HC + O_2 \Rightarrow CO_2 + H_2O$ +HEAT

The oxidation catalyst oxidize NO to $NO_2$ for passive regeneration of the DPF and for optimised SCR-function:

$2NO + O_2 \Rightarrow 2NO_2$

There are three important reactions that can take place in the SCR catalyst:

"Standard SCR": $4NH_3 + 4NO + O_2 \Rightarrow 4N_2 + 6H_2O$

"Fast SCR": $4NH_3 + 2NO + 2NO_2 \Rightarrow 4N_2 + 6H_2O$

"Slow SCR": $4NH_3 + 3NO_2 \Rightarrow 3½N_2 + 6H_2O$

The filter collects and oxidize soot (carbon):

250-450°C:

$C + 2NO_2 \Rightarrow CO_2 + 2NO$ (slow reaction)

>600°C:

$C + O_2 \Rightarrow CO_2$ (fast reaction)

# Dæmi Shell Rimula Merkingar

OVERVIEW


## PERFORMANCE FEATURES & BENEFITS

**Shell Rimula R4 L Energised Protection oils**

Uses latest "Lo-SAPS" additive and low-S base oil technology

**Significantly improved protection** against wear, deposits and oxidation* for greater real-world engine protection.

Emissions system compatible: reduced blocking of diesel particulate filters**

| Protective Power | Acid/ Corrosion | Dirt & Deposits | Wear | Exhaust Filters |
|---|---|---|---|---|
| | ✓✓ | ✓✓✓ | ✓✓✓ | ✓✓ |

**Specifications & Approvals**

**API CJ-4, CI-4, CG-4, CF-4, CF; ACEA E7, E5; CAT ECF-3, ECF-2; Cummins CES 20081, 77, 72, 71; Deutz DQC-III; Mack EO-O Premium Plus; DDC93K218; MAN M3275; MB Approval 228.31, 228.3; MTU Category 2; Renault Trucks RLD-3; Volvo VDS-4, VDS-3**

**Applications:**

- High power severe duty
- EGR, turbo & intercooled engines
- Low emissions Euro 2 to 5 + DPF

**ENERGISED PROTECTION**
*Adapting to your engine's changing needs*

Skeljungur

**(+) Meets all available requirements**
**(**) Compared to API CI-4/ACEA E7 type quality oils**
**(***) Compared to conventional higher ash oils**

# Shell Rimula L, M, E útskýringar

## Útskýring á heitinu L, M eða E

**LOW EMISSIONS**

minni brennisteinn /fosfór betri samhæfni í efnahvata Minni aska sem situr eftir í hvarfakút Olíur merktar L eru Low saps

Low Emissions: Minni öskumyndun, verndar hvarfakúta og agnagildrur í afgaskerfum véla, tryggir hreinleika og virki afgaskerfis vélarinnar.

**MAINTENANCE SAVING**

Grúp II grunn olíur fyrir aukna tæringarvörn
Betra niðurbrot sótagna

Maintenace Saving: Lengri smurolíuskipta tíðni, sparnaður á viðhaldskostnaði


**ENERGY SAVING**

Aukin slitvörn, minni mótstaða

Bætiefnin í smurolíunni gefa minna viðnám, betri kaldræsingu og almennt minni eldsneytisnotkun.

Skeljungur

# Nafnabreyting á smurolíum

| Var | Verður |
|---|---|
| Rimula Ultra 5W-30 | Rimula R6 LME 5W-30 |
| Rimula Signia 10W-40 | Rimula R6 LM 10W-40 |
| Rimula Ultra 10W-40 | Rimula R6 M 10W-40 |
| Rimula Super FE 10W-40 | Rimula R5 E 10W-40 |
| Rimula Super 15W-40 | Rimula R4 L 15W-40 |
| Rimula X 10W-30 | Rimula R3 Multi 10W-30 |
| Universal 10W-30 | Rimula R3 Multi 10W-30 |
| Rimula X 10W | Rimula R3 10W |
| Rimula X 30W | Rimula R3+30 |

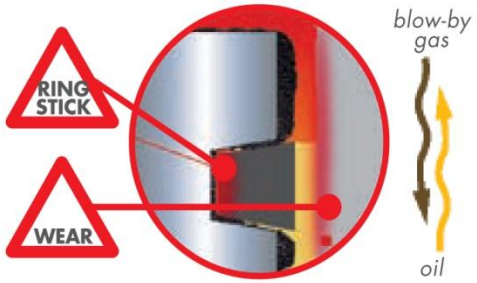
Skeljungur

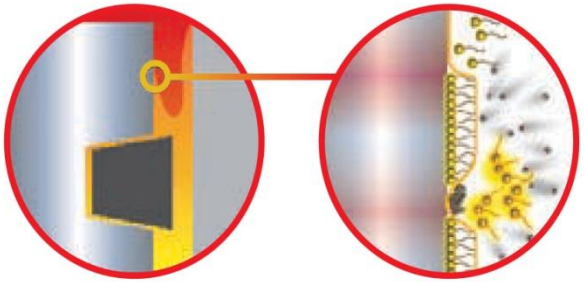
# Low Saps

SAPS =Sulfated Ash, Phosphorus and Sulfur

**Low SAPS smurolíur eru hannaðar fyrir álag sem olían verður fyrir vegna aukinnar kröfu um minni mengun, t.d þar sem hluti af afgasinu er leitt aftur inn í brunahólf vélarinnar til eftir- brennslu. ( EGR loki ) og í frekari meðhöndlun í hvarfakút.**

**Smurolían þarf að meðhöndla meira af brennisteinssöltun, ösku, fosfór og brennisteini .**



Skeljungur

# NÝ NÖFN Á HELIX SMUROLÍUM

| VAR | VERÐUR |
|---|---|
| Shell Helix *Ultra* | Shell Helix *ULTRA* |
| HELIX ULTRA 0W-40 | ÓBREYTT |
| HELIX ULTRA 5W-40 | ÓBREYTT |
| HELIX ULTRA VX 5W-30 | HELIX ULTRA EXTRA 5W-30 |
| HELIX ULTRA X 0W-30 | HELIX ULTRA AV 0W-30 |
| Shell Helix *Plus* | Shell Helix *HX7* |
| HELIX PLUS 10W-40 | HELIX HX 7 10W-40 |
| HELIX F 5W-30 | HELIX HX 7 AF 5W-30 |
| HELIX DIESEL PLUS 10W-40 | HELIX DIESEL HX 7 10W-40 |
| Shell Helix *Super* | Shell Helix *HX5* |
| HELIX SUPER 10W-40 | HELIX HX 5 10W-40 |
| SLÁTTURVÉLAOLÍA | HELIX HX 5 10W-40 EÐA HELIX HX 7 10W-40 |




Skeljungur

Shell Lubricants

JUNÍ 2010 ÞA

# Nafnabreyting á smurolíum

Skeljungur

# 7. Samanburður á stöðlum

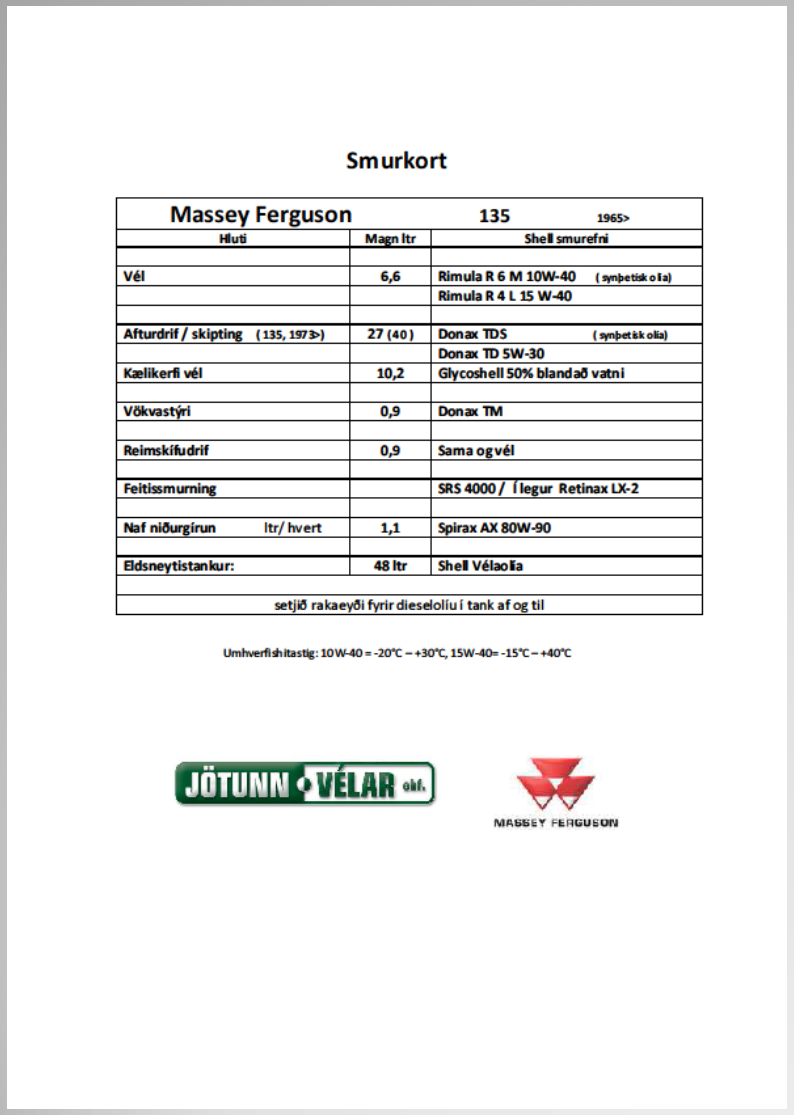
http://www.lubrizol.com/EuropeanEngineOils/RelativePerformanceToolIntro.html

Skeljungur

# Smurkort

Gerum smurkort fyrir allan tækjabúnað

Einnig hægt að gera smurkort á netinu í LUBEMATCH



Smurkort

| Massey Ferguson | | 135 1965> |
|---|---|---|
| Hluti | Magn ltr | Shell smurefni |
| | | |
| Vél | 6,6 | Rimula R 6 M 10W-40 ( synþetisk olía) |
| | | Rimula R 4 L 15 W-40 |
| | | |
| Afturdrif / skipting (135, 1973>) | 27 (40) | Donax TDS ( synþetísk olía) |
| | | Donax TD 5W-30 |
| Kælikerfi vél | 10,2 | Glycoshell 50% blandað vatni |
| | | |
| Vökvastýri | 0,9 | Donax TM |
| | | |
| Reimskífudrif | 0,9 | Sama og vél |
| | | |
| Feitissmurning | | SRS 4000 / Í legur Retinax LX-2 |
| | | |
| Naf niðurgírun ltr/ hvert | 1,1 | Spirax AX 80W-90 |
| | | |
| Eldsneytistankur: | 48 ltr | Shell Vélaolía |
| | | |
| setjið rakaeyði fyrir dieselolíu í tank af og til | | |

Umhverfishitastig: 10W-40 = -20°C – +30°C, 15W-40= -15°C – +40°C

JÖTUNN VÉLAR ehf.

MASSEY FERGUSON

Skeljungur

LubeMatch

Svenska Shell
Hem
Om Shell
Privatkunder
- Shells kort
- Stationer
- Shell V-Power
- Villaolja och värme
- LubeMatch service
- Shell Helix motoroljor

Företagskunder
Sök station
Drivmedelspriser
Shells kort
Shell Motorsport
Produkter & tjänster

## Välkommen till LubeMatch service

Detta verktyg är till för att hjälpa dig med att välja rätt olja till ditt fordon. Genom att besvara några enkla frågor får du detaljerad information för ditt användningsområde.

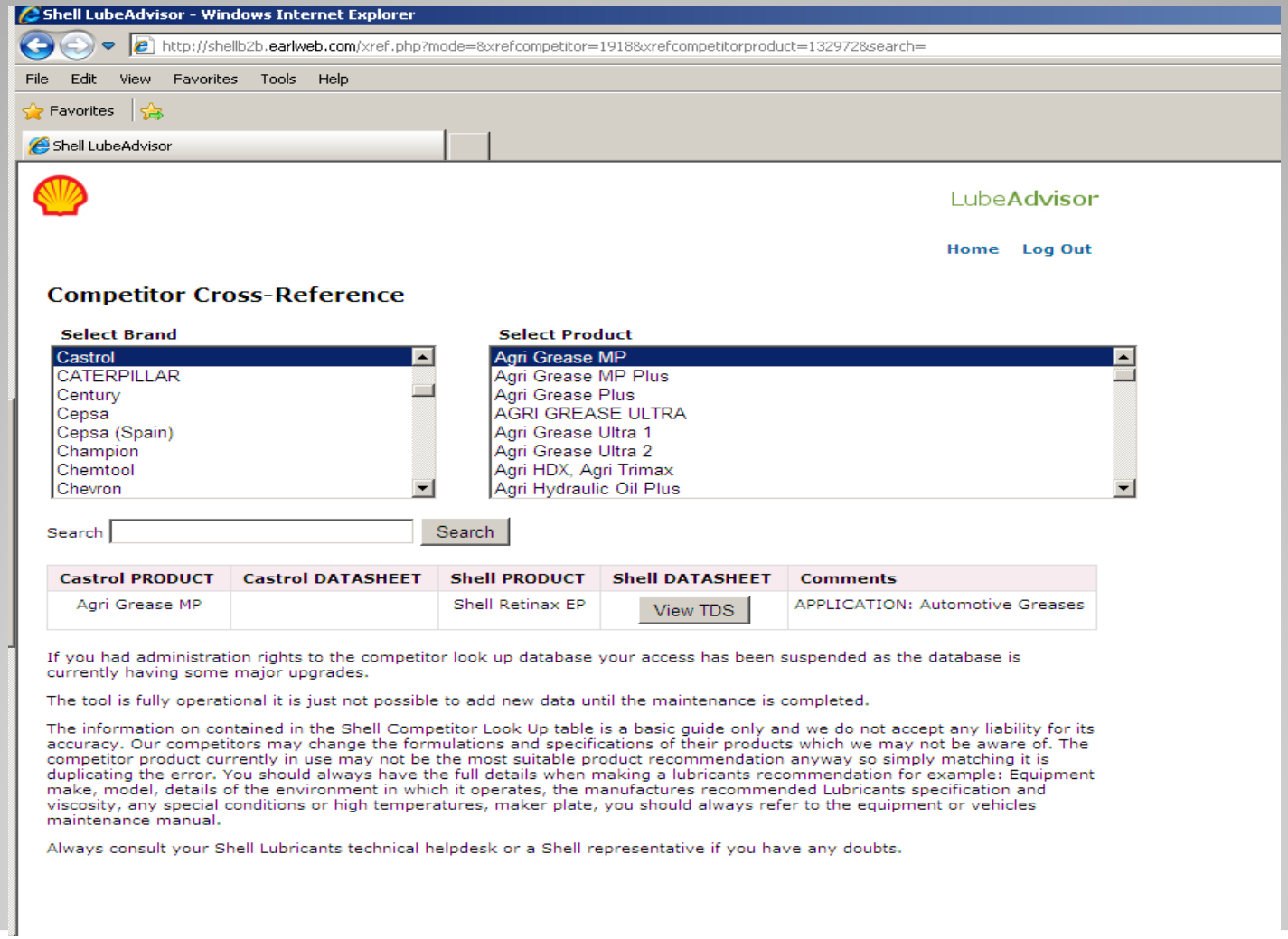
Vänligen välj "land" – därefter "språk" och välj sedan ikonen för det fordon du söker.

Business members **click here** to login.

Iceland

English (UK)

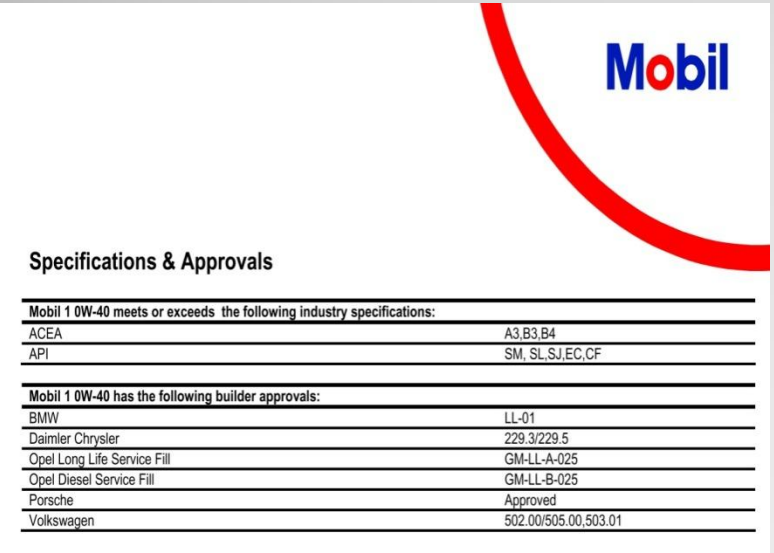
# Shell samanburðar kerfi




Skeljungur

# Smurolíur og efni
# Samanburður á mill framleiðanda

1. Sama seigja ( 5W-30)
2. Sömu staðlar: API / ACEA



Mobil

**Specifications & Approvals**

| Mobil 1 0W-40 meets or exceeds the following industry specifications: | |
|---|---|
| ACEA | A3,B3,B4 |
| API | SM, SL,SJ,EC,CF |

| Mobil 1 0W-40 has the following builder approvals: | |
|---|---|
| BMW | LL-01 |
| Daimler Chrysler | 229.3/229.5 |
| Opel Long Life Service Fill | GM-LL-A-025 |
| Opel Diesel Service Fill | GM-LL-B-025 |
| Porsche | Approved |
| Volkswagen | 502.00/505.00,503.01 |

**Specifications and approvals**

| *Shell Helix Ultra* | 0W-40 | 5W-30 | 5W-40 |
|---|---|---|---|
| API | SM/CF | SH/CF | SM/CF |
| ACEA | A3/B3/B4 | A3/B3/B4 | A3/B3/B4 |
| VW | 502.00<br>505.00 | 502.00<br>505.00<br>503.01 | 502.00<br>505.00<br>503.01 |
| Mercedes Benz | 229.5 | 229.5 | 229.5 |
| BMW | LL-01 | LL-01 | LL-01 |
| Other approvals / registrations | Porche A40 | | Porche A40<br>Ferrari |
| Fiat (meets the requirements of) | | | 9.55535 Z2 |
| Renault | RN 0700 & 0710 | | RN 0700 & 0710 |

Shell Helix Ultra 5W-30 meets the engine test requirements of API SM.

Skeljungur

# Smurolíurannsóknir

**Shell RLA (Rapid Lubricants´ Analysis)**

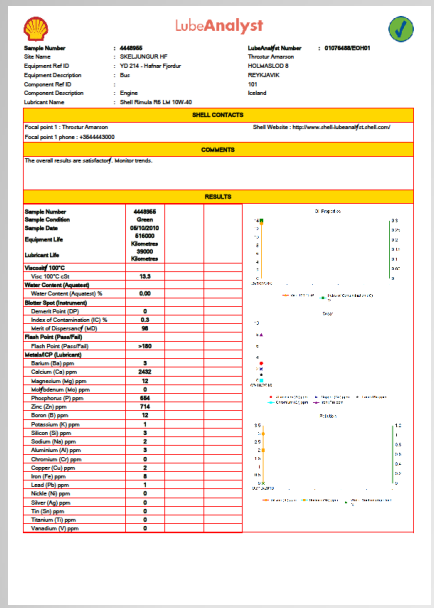
**Fjölver hf.**

**Shell e-quip**

Skeljungur

# Smurþjónusta efnagreining

Shell e-Quip



LubeAnalyst

| | | | |
|---|---|---|---|
| Sample Number | : 4448966 | LubeAnalyst Number | : 0107648/ECH01 |
| Site Name | : SKELJUNGUR HF | | Throstur Amarson |
| Equipment Ref ID | : YD 214 - Hafnar Fjordur | | HOLMASLOD 8 |
| Equipment Description | : Bus | | REYKJAVIK |
| Component Ref ID | : | | 101 |
| Component Description | : Engine | | Iceland |
| Lubricant Name | : Shell Rimula R6 LM 10W-40 | | |

**SHELL CONTACTS**

Focal point 1 : Throstur Amarson — Shell Website : http://www.shell.lubeanalyst.shell.com/

Focal point 1 phone : +3864443000

**COMMENTS**

The overall results are satisfactory. Monitor trends.

**RESULTS**

| | | | | |
|---|---|---|---|---|
| Sample Number | 4448966 | | | |
| Sample Condition | Green | | | |
| Sample Date | 05/10/2010 | | | |
| Equipment Life | 616000 Kilometres | | | |
| Lubricant Life | 39000 Kilometres | | | |
| Viscosity 100°C | | | | |
| Visc 100°C cSt | 15.3 | | | |
| Water Content (Aquatest) | | | | |
| Water Content (Aquatest) % | 0.00 | | | |
| Blotter Spot (Instrument) | | | | |
| Demerit Point (DP) | 0 | | | |
| Index of Contamination (IC) % | 0.3 | | | |
| Merit of Dispersancy (MD) | 98 | | | |
| Flash Point (Pass/Fail) | | | | |
| Flash Point (Pass/Fail) | >180 | | | |
| Metals/ICP (Lubricant) | | | | |
| Barium (Ba) ppm | 3 | | | |
| Calcium (Ca) ppm | 2432 | | | |
| Magnesium (Mg) ppm | 12 | | | |
| Molybdenum (Mo) ppm | 0 | | | |
| Phosphorus (P) ppm | 654 | | | |
| Zinc (Zn) ppm | 714 | | | |
| Boron (B) ppm | 12 | | | |
| Potassium (K) ppm | 1 | | | |
| Silicon (Si) ppm | 3 | | | |
| Sodium (Na) ppm | 2 | | | |
| Aluminium (Al) ppm | 3 | | | |
| Chromium (Cr) ppm | 0 | | | |
| Copper (Cu) ppm | 2 | | | |
| Iron (Fe) ppm | 8 | | | |
| Lead (Pb) ppm | 1 | | | |
| Nickle (Ni) ppm | 0 | | | |
| Silver (Ag) ppm | 0 | | | |
| Tin (Sn) ppm | 0 | | | |
| Titanium (Ti) ppm | 0 | | | |
| Vanadium (V) ppm | 0 | | | |

Skeljungur

LubeAnalyst

| | | | |
|---|---|---|---|
| **Sample Number** | : 4448955 | **LubeAnalyst Number** | : 01076488/EOH01 |
| Site Name | : SKELJUNGUR HF | Throstur Arnarson | |
| Equipment Ref ID | : YD 214 - Hafnar Fjordur | HOLMASLOD 8 | |
| Equipment Description | : Bus | REYKJAVIK | |
| Component Ref ID | : | 101 | |
| Component Description | : Engine | Iceland | |
| Lubricant Name | : Shell Rimula R6 LM 10W-40 | | |

**SHELL CONTACTS**

Focal point 1 : Throstur Arnarson — Shell Website : http://www.shell-lubeanalyst.shell.com/

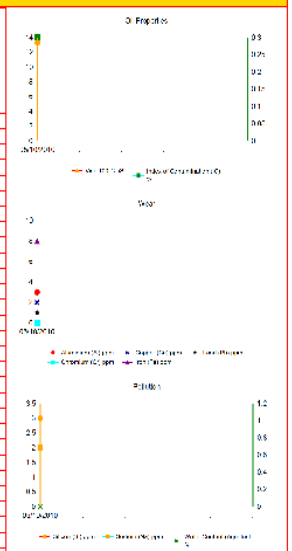
Focal point 1 phone : +3544443000

**COMMENTS**

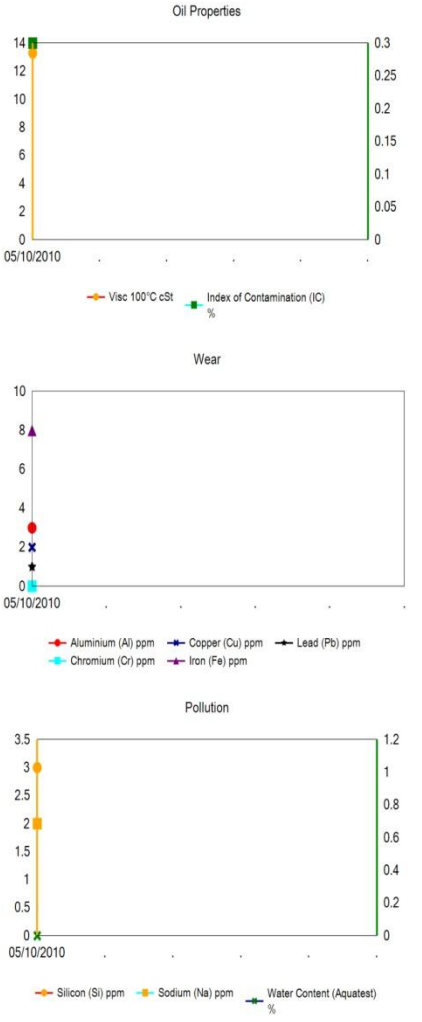
The overall results are satisfactory. Monitor trends.

**RESULTS**

| | | | |
|---|---|---|---|
| **Sample Number** | **4448955** | | |
| **Sample Condition** | **Green** | | |
| **Sample Date** | **05/10/2010** | | |
| **Equipment Life** | **516000 Kilometres** | | |
| **Lubricant Life** | **39000 Kilometres** | | |
| **Viscosity 100°C** | | | |
| Visc 100°C cSt | **13.3** | | |
| **Water Content (Aquatest)** | | | |
| Water Content (Aquatest) % | **0.00** | | |
| **Blotter Spot (Instrument)** | | | |
| Demerit Point (DP) | **0** | | |
| Index of Contamination (IC) % | **0.3** | | |
| Merit of Dispersancy (MD) | **98** | | |
| **Flash Point (Pass/Fail)** | | | |
| Flash Point (Pass/Fail) | **>180** | | |
| **Metals/ICP (Lubricant)** | | | |
| Barium (Ba) ppm | **3** | | |
| Calcium (Ca) ppm | **2432** | | |
| Magnesium (Mg) ppm | **12** | | |
| Molybdenum (Mo) ppm | **0** | | |
| Phosphorus (P) ppm | **654** | | |
| Zinc (Zn) ppm | **714** | | |
| Boron (B) ppm | **12** | | |
| Potassium (K) ppm | **1** | | |
| Silicon (Si) ppm | **3** | | |
| Sodium (Na) ppm | **2** | | |
| Aluminium (Al) ppm | **3** | | |
| Chromium (Cr) ppm | **0** | | |
| Copper (Cu) ppm | **2** | | |
| Iron (Fe) ppm | **8** | | |
| Lead (Pb) ppm | **1** | | |
| Nickle (Ni) ppm | **0** | | |
| Silver (Ag) ppm | **0** | | |
| Tin (Sn) ppm | **0** | | |
| Titanium (Ti) ppm | **0** | | |
| Vanadium (V) ppm | **0** | | |




| | | | |
|---|---|---|---|
| **Sample Number** | **4448955** | | |
| **Sample Condition** | **Green** | | |
| **Sample Date** | **05/10/2010** | | |
| **Equipment Life** | **516000 Kilometres** | | |
| **Lubricant Life** | **39000 Kilometres** | | |
| **Viscosity 100°C** | | | |
| Visc 100°C cSt | **13.3** | | |
| **Water Content (Aquatest)** | | | |
| Water Content (Aquatest) % | **0.00** | | |
| **Blotter Spot (Instrument)** | | | |
| Demerit Point (DP) | **0** | | |
| Index of Contamination (IC) % | **0.3** | | |
| Merit of Dispersancy (MD) | **98** | | |
| **Flash Point (Pass/Fail)** | | | |
| Flash Point (Pass/Fail) | **>180** | | |
| **Metals/ICP (Lubricant)** | | | |
| Barium (Ba) ppm | **3** | | |
| Calcium (Ca) ppm | **2432** | | |
| Magnesium (Mg) ppm | **12** | | |
| Molybdenum (Mo) ppm | **0** | | |
| Phosphorus (P) ppm | **654** | | |
| Zinc (Zn) ppm | **714** | | |
| Boron (B) ppm | **12** | | |
| Potassium (K) ppm | **1** | | |
| Silicon (Si) ppm | **3** | | |
| Sodium (Na) ppm | **2** | | |
| Aluminium (Al) ppm | **3** | | |
| Chromium (Cr) ppm | **0** | | |
| Copper (Cu) ppm | **2** | | |
| Iron (Fe) ppm | **8** | | |
| Lead (Pb) ppm | **1** | | |
| Nickle (Ni) ppm | **0** | | |
| Silver (Ag) ppm | **0** | | |
| Tin (Sn) ppm | **0** | | |
| Titanium (Ti) ppm | **0** | | |
| Vanadium (V) ppm | **0** | | |


Skeljungur

# Frostlögur

MEG
Mono Ethylene Glycol

Glycoshell og Glycoshell SF
Snowtop blár og rauður

MPG
Mono Própýlen Glýkol

Frostlögur NON Toxit
Mónóprópelín Glýkol

Frostvari í neysluvatnskerfi

Calcium Chloride 30%
Frostvari

Rotvörn

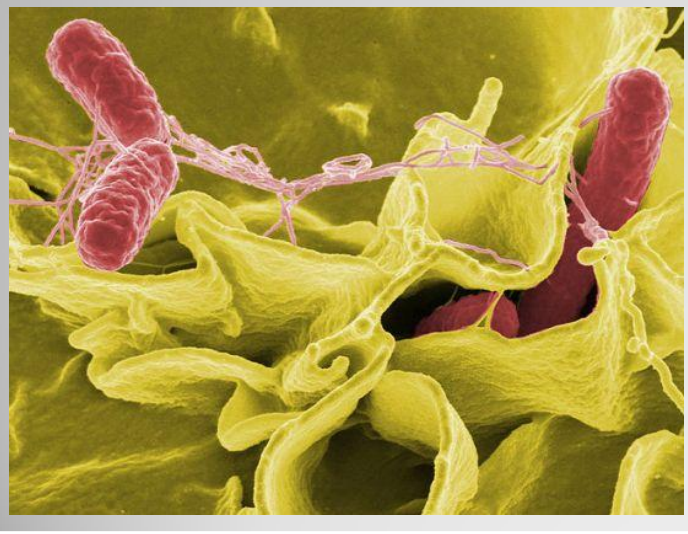
Bíocontrol MAR 71

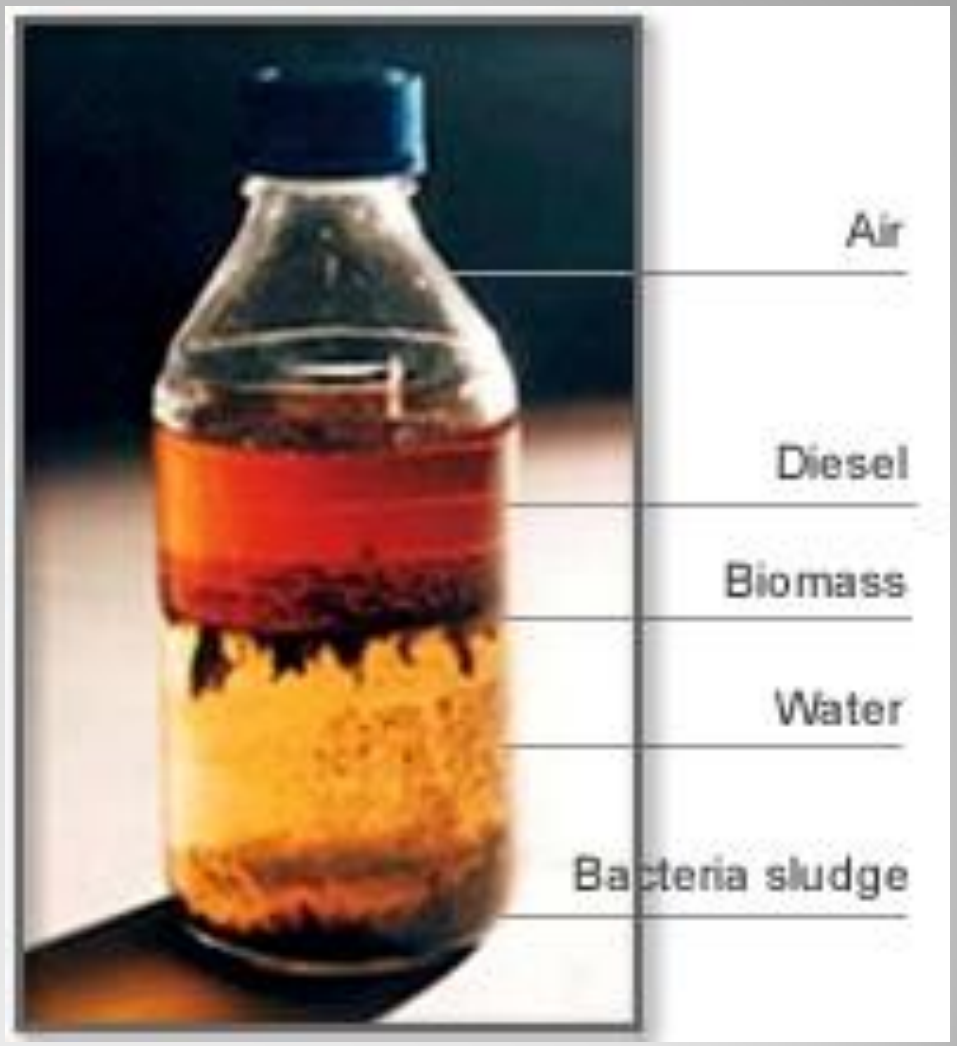
Skeljungur

## Dieselolía / Vélaolía

Bacteria vaknar ef

Vatn + hiti 15-20°C





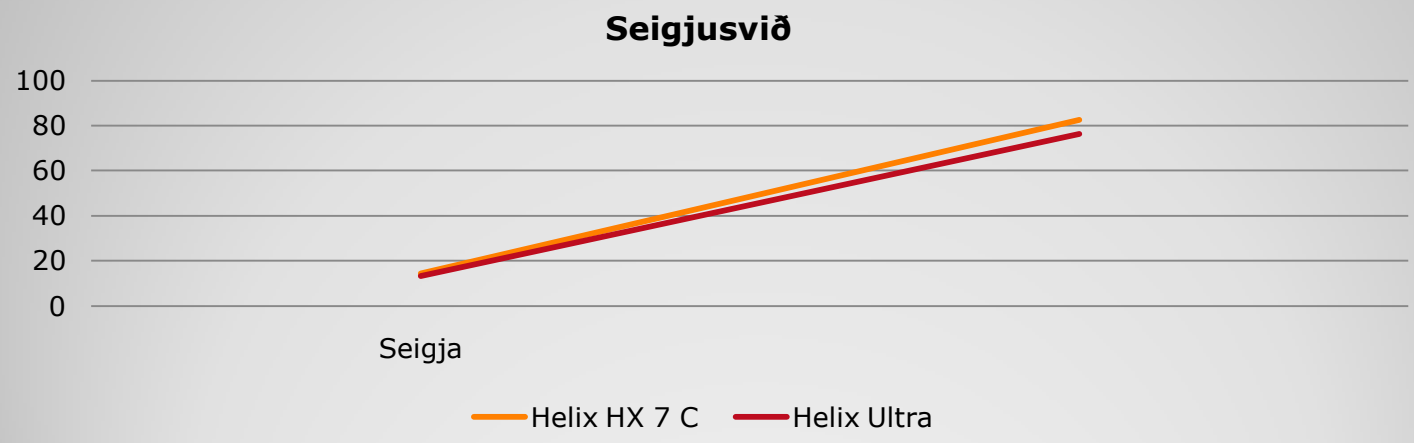

Skeljungur


# Endir

Skeljungur

# Samanburður

| Nafn | SAE | 40°C | 100°C | Seigju Tala | Blossa mark | Rennsl ismark | API | | |
|---|---|---|---|---|---|---|---|---|---|
| Helix Ultra | 5W-40 | 76,3 | 13,3 | 187 | 206 | -42 | SM/CF | SM =2005 og nýrra<br>CF= 1994 og nýrra | |
| Helix HX 7 C | 5W-40 | 82,5 | 14,4 | | 220 | -42 | SL/CF | SL=2004 og eldra<br>CF= 1994 og nýrra | |




- Seigja

Skeljungur