

# Fuel, lubricants and fluids

**00:16-15**

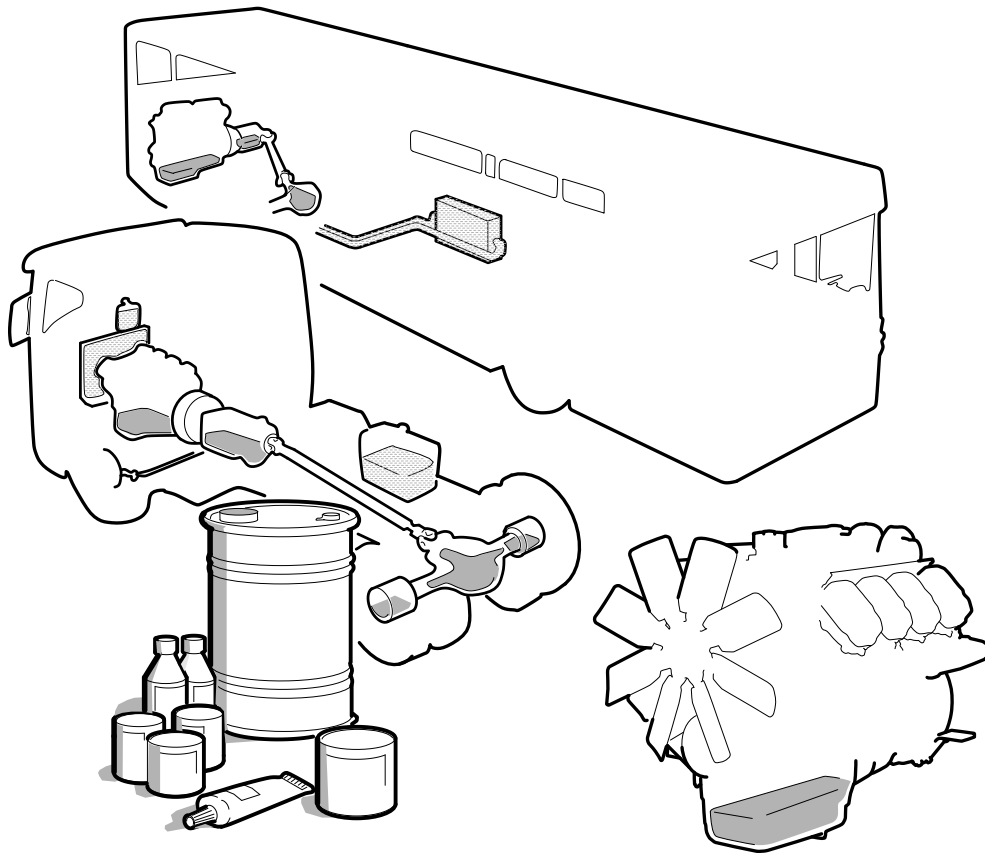
**P, G, R and T series**

**L, P, G, R and S series**

**F, K and N series**

**E2011 series**

**C and K series**





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## Changes since the previous issue

<b>Engine</b>	Updated factory-filled oil quality to LDF-3 is now introduced for Euro 3, 4 and 5 DC11/DC13 engines with a rocker cover.
<b>Cooling system</b>	
<b>Transmission</b>	<p>A series of illustrations has now been introduced that complements the table on the power take-off and electric machine MG32xx. The illustration provides a clear overview of the different rotation angles and degrees.</p> <p>A new series of power take-offs has been added together with the gearbox series GXX. The power take-offs have the model designations EG18T DCW and EG22T DBW.</p>
<b>Warnings and advisories</b>	



# Warnings and advisories

## Oils and lubricating greases

### Risks

- Oils and lubricants may be **allergenic**.
- Used oils and lubricating greases are classified as **carcinogenic** and may contain substances that are otherwise **allergenic**.
- Oils and lubricating greases may cause **dry skin or cracks in the skin** in the event of repeated contact with the skin.

**Avoid injury by always following the specified safety measures.**

### Precautionary measures

#### Overall requirements

- Make sure that the ventilation is active\* when working with oils and lubricating greases.
- Do not handle oil above 50°C, hot oil emits more steam/smoke/mist compared to oil at a lower temperature.
- Avoid open handling of oil.
- Wipe up spillage immediately.

*\*If there is forced ventilation or a spot extractor, it is important that these are maintained and checked regularly.*

#### Personal protective equipment requirements

- Use nitrile gloves, change gloves often.
- Use thicker nitrile gloves (TEGERA 7 361) in situations where a lot of oil is handled, e.g. when cleaning up spillages or leaks.
- Use respiratory protective equipment (Brown A filter + P3) where there is a risk of oil mist, e.g. when cleaning up spillages or leaks.
- Wear eye protection if there is a risk of splashing in your eyes.
- Wear a long sleeved sweater and long trousers to protect your skin from contact with harmful substances.
- Change clothes if they have been splashed with oil.
- If the skin has come into contact with oil or lubricating grease, wash the skin with soap and water.

In addition to these requirements, there may also be special safety information for different work operations.

**To avoid personal injury, always make sure to read the instructions for the work to be carried out.**

**If a personal injury occurs, immediately stop work and contact medical care services.**



# Engine

## Volumes

All volumes are approximate and shown in litres. Check the levels and fill as necessary.

### ☰ P, G, R and T series

### ☰ L, P, G, R and S series

Vehicle	Engine	Maximum level, l <sup>1</sup>	Difference, Max. – Min. (oil dipstick)	Maximum level <sup>2</sup>	Oil filter volume, l
Truck	DC07	24.5	1.9	23	0.9
	DC9, PDE	37	8	33	2
	DC9E 02	37	8	33	2
	DC9, XPI	34	5	31	1
	OC9/OC09	34	5	31	1
	DC11/D12	38	7.5	33	2
	DC11 With one rocker cover	42	5	40	1
	DC13 With one rocker cover	45	9	43	1
	DC13 With six rocker covers	43.5	8	40	1
	OC13	43.5	8	40	1
	DC16	36	6	30	1.6
	DC16 104	46	6	40	1.6
	DC16, XPI	47	8	43	1.6
DC16, adapted oil volume (HD)	57 <sup>3</sup>	10	53	1.6	

1. The oil volume that should be added when an engine has never been filled with oil, e.g. after reconditioning.

2. The oil volume that is added when changing oil without renewing the oil filter. Please note: When an oil filter is renewed, the oil filter volume must be included.

3. In comparison with standard DC16 engines, the oil volume is 10 litres greater in DC16 engines with so-called adapted oil volume. Proceed as follows to find out whether the engine has an adapted oil volume: Check Technical Information, group 1, "Oil dipstick oil volume adaptation: Increased oil volume".



**i NOTE:**

Note: All values are approximate as there is a lot of variation between different engines. There can be a difference of up to 2-3 litres for the same engine type. The values are on the low side since it is preferable to fill with engine oil rather than drain it out.

**i NOTE:**

Turn the oil dipstick so that it goes down into the correct position.

**F, K and N series**

Vehicle	Engine	Maximum level <sup>1</sup>	Difference, Max.-Min. (oil dipstick)	Maximum level <sup>2</sup>	Oil filter volume
Bus, K	DC07	29	2	26	1
	DC9, PDE	36	7	33	2
	DC9E 02	36	7	33	2
	DC9, XPI	34	5	31	1
	OC9/OC09	34	5	31	1
	DC12	26.7	9	20	2
	DC13	43.5	8	40	1
Bus, N	OC13	43.5	8	40	1
	DC07	29	2	26	1
	DC9, PDE	32	7	27	2
	DC9E 02	32	7	27	2
	DC9, XPI	34	5	31	1
Bus, F	OC9/OC09	34	5	31	1
	DC9, PDE	38	8	33	2

1. The oil volume that should be added when an engine has never been filled with oil, e.g. after overhaul.

2. The oil volume that is added when changing oil without renewing the oil filter. Note: When an oil filter is renewed, the oil filter volume must be included.

**i NOTE:**

All values are approximate as there is a lot of variation between different engines. There can be a difference of up to 2-3 litres for the same engine type. The values are on the low side since it is preferable to fill with engine oil rather than drain it out.

**i NOTE:**

Turn the oil dipstick so that it goes down into the correct position.



**C and K series**

Vehicle	Engine	Maximum level <sup>1</sup>	Difference, Max.-Min. (oil dipstick)	Maximum level <sup>2</sup>	Oil filter volume
<b>Bus C series</b>	DC07	24.5	1.9	23	0.9
	DC09	34	5	31	1
	OC09	34	5	31	1
<b>Bus K series</b>	DC09	34	5	31	1
	DC13	43.5	8	40	2
	OC09	34	5	31	1
	OC13	43.5	8	40	1

1. The oil volume that should be added when an engine has never been filled with oil, e.g. after reconditioning.

2. The oil volume that is added when changing oil without renewing the oil filter. NB! When an oil filter is renewed, the oil filter volume must be included.

***i* NOTE:**

All values are approximate as there is a lot of variation between different engines. There can be a difference of up to 2-3 litres for the same engine type. The values are on the low side since it is preferable to fill with engine oil rather than drain it out.

***i* NOTE:**

Turn the oil dipstick so that it goes down into the correct position.



## Industrial and marine engines

### Industrial engines

Displacement	Oil sump	Minimum level in litres	Maximum level in litres
DC9	Deep front, without ladder frame	31	36
DC9	Low, without ladder frame	28	35
DC13	Deep front, with ladder frame	33	39
DC13	Deep front, without ladder frame	30	36
DC13	With deep centre part	33	39
DC13 330 A DC13 331 A DC13 332 A DC13 333 A With Increased oil volume	With deep centre part	35	48
DC13	Low, with ladder frame	28	34
DC13	Extra depth	75	80
DC16, E2011	Deep front, without ladder frame	40	48
DC16, P96	Deep front, without ladder frame	35	40
DC16	Low, with ladder frame	29	37

### DC13, with 1 rocker cover

Oil sump	Minimum level in litres	Maximum level in litres
Deep front	28	38
Deep front, in plastic	34	43
Low, base	38	48
Medium, base	54	64
Deep, base	70	80



**Marine engines**

Displacement	Oil sump	Minimum level in litres	Maximum level in litres
DI9	Deep front, without ladder frame	32	38
DI9	Low, without ladder frame	25	32
DI13	Deep front, with ladder frame	39	45
DI13	Deep front, without ladder frame	30	36
DI13	Low with ladder frame	28	34
DI13	Extra low, without ladder frame	25	30
DI16	Deep front, with ladder frame	40	48
DI16	Low, with ladder frame	29	37



## Factory filling

The following list shows the oil grade that each engine is filled with during production. The oil grade applies to the current issue of this preface 00:16-15.

The tables in the *Preface to periodic maintenance, 00:17-30*, specify the grades of engine oil approved for an engine type. It is therefore not necessary to continue using the specific oil grade used during factory filling.

The choice of oil grade for factory filling is made to provide the engine with the conditions for the best possible fuel economy and related low CO<sub>2</sub> emissions. Choosing a different oil grade can affect these factors.

### **IMPORTANT!**

If the oil grade is to be changed, the engine oil must be completely changed, and the oil filter must be renewed. Mixing different grades of engine oil is not permitted.

### **IMPORTANT!**

When Scania LDF-4 or LDF-5 engine oil is used, the sulphur content of the fuel must be no more than 10 ppm.

Gas engines	Scania LDF-4
Ethanol engines	Scania BEO-2
Engines with particulate filter EEV/Euro 5	Scania LDF-3
Euro 6 engines DC07 (101)	Scania ACEA E9
Euro 6 engines DC07 (111, 112 and 113)	Scania LDF-4
Euro 6 engines DC09	Scania LDF-4
Euro 6 engines DC13, six rocker covers	Scania LDF-4
Euro 6 engines DC11/13, one rocker cover	Scania LDF-5
Euro 3/4/5 engines DC11/13, one rocker cover	Scania LDF-3
DC16 engines up to and including engine type 107	Scania LDF-3
DC16 engines from engine type 108 and higher	Scania LDF-4
Industrial and marine engines	The grade is largely determined by Scania but also by the customer. <sup>1</sup>
Other engines SEU	Scania LDF-3
Other engines SLA	Scania LDF-3

1. The oil grade and oil quantity are specified in the Operator's manual for the engine in question.



## Oil change intervals

The oil change interval is determined by engine type and type of operation. See the relevant preface for trucks and for buses.



## Sulphur content in fuel

Information on the sulphur content in the fuel for bus and truck applications can be found in the preface for the relevant product.

The table lists regulations regarding sulphur content in the fuel for engines with fuel system PDE and XPI.

### Industrial and marine engines

Engine type	Max. sulphur content in fuel for an ordinary oil change interval	Note
Engines without EGR and SCR systems	Up to 4 000 ppm (0.4%)	If the sulphur content is higher than 2 000 ppm, the oil change intervals must be cut in half.  A higher sulphur content than 4 000 ppm is not permitted, because this will result in engine damage.
Engines with SCR system only	Up to 500 ppm (0.05%)	A higher sulphur content than 10 ppm (0.0010 %) for Europe or 15 ppm (0.0015 %) for the USA may only be used where EU Stage III A/US Tier 3 or less restrictive emission legislation applies.
Engines with both EGR and SCR systems	Up to 350 ppm (0.035%)	A higher sulphur content than 10 ppm (0.0010 %) for Europe or 15 ppm (0.0015 %) for the USA may only be used where EU Stage III A/US Tier 3 or less restrictive emission legislation applies.
Engines with EGR only	Up to 350 ppm (0.035%)  <b>Note:</b> For EGR systems with a low mixing ratio, a sulphur content of 500 ppm (0.05%), China III applies.	A higher sulphur content than 350 ppm (0.035%) is not permitted. A higher sulphur content causes engine damage.
Engines with DPF system	15 ppm (0.0015%)	If the sulphur content is higher, this can lead to problems with the exhaust gas aftertreatment. This can in turn lead to a shortened service life of the engine and DPF system.



## Basic requirements

### ! IMPORTANT!

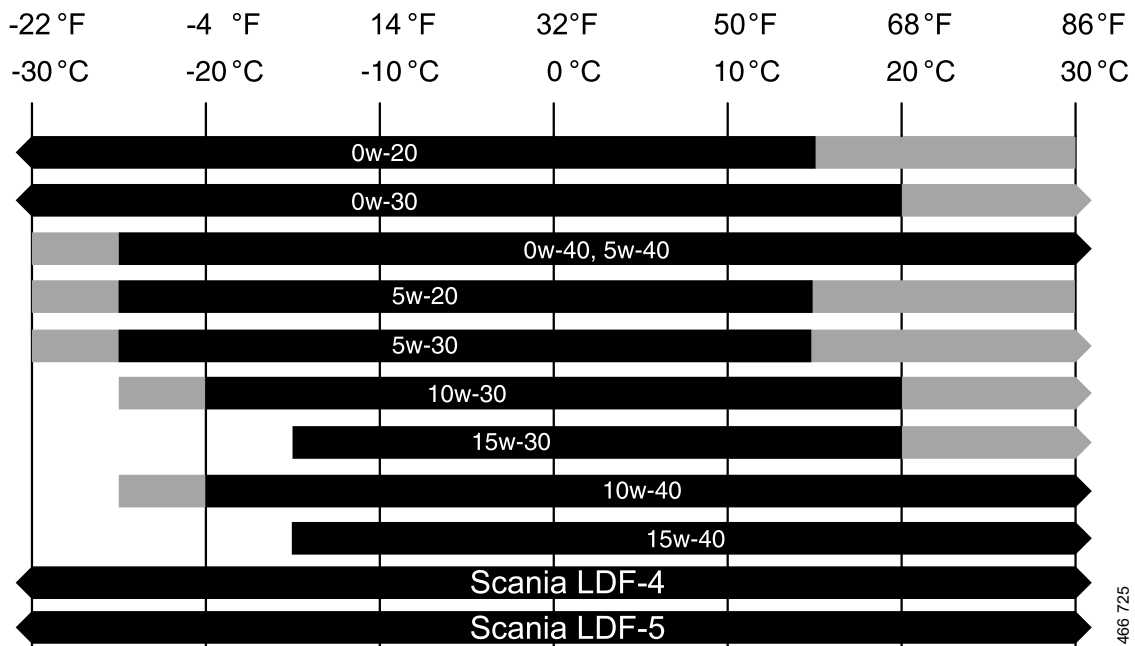
Do not mix additives with the oil.

Check that the oil is suitable for all variations in ambient temperature that are likely to occur before the next oil change. Heat the engine prior to start if the ambient temperature is colder than the oil is specified for.

Check the oil grade for which the engine in question is approved. See the preface for trucks and buses, Engine oil section.

## Viscosity class requirements for 7, 9, 11, 12 and 13 litre engines

Check the oil grade for which the engine in question is approved. See the preface for trucks and buses, Engine oil section.



The illustration describes which ambient temperature in °C the viscosity class can handle for Scania-approved and market-approved oil grades.

Note that the Scania-approved oil grades have a greater temperature range than market approved oil grades.



The temperature range which the market approved oil grades, for example ACEA Exx and API Cxx, can handle.



The temperature range that the Scania-approved oil grades, for example the Scania LDF oils, Scania Low Ash and Scania BEO-2, can handle beside the market approved oils.



## Viscosity class requirements for 16 litre engines

Check the oil grade for which the engine in question is approved. See the preface for trucks and buses, Engine oil section.

Engine types with numbering DC16 107 and lower must use approved oil grades that comply with viscosity class xW-40.

## Truck and bus engines with or without particulate filter

### **IMPORTANT!**

When changing the engine oil grade is required, replacing the particle filter should also be done at the same time.

The reason for this is that the particulate filter renewal interval should be correct.

For these engine types, the approved oil grades are now specified together with the oil change intervals. See the prefaces for trucks and buses, section Intervals for components and systems, engine oil.

## Industrial and marine engines

### **IMPORTANT!**

The sulphur content of diesel fuel must not exceed 50 ppm if the fuel is used together with engine oils with the quality designations:

- Scania LDF-5
- Scania LDF-4
- ACEA E6, E8, E9, E11
- API CJ-4/CK-4

The oil grades listed are associated with the technical limitations for permitted sulphur content. However, local legal requirements may be less stringent than the above technical requirements for a maximum of 50 ppm sulphur in the fuel.

Emission class	Reduced and normal oil change intervals	Extended oil change intervals based on oil analysis results
Without emission class	ACEA E5 ACEA E7 API CI-4, API CI-4+	Scania LDF, Scania LDF-2, Scania LDF-3
Stage 2/Tier 2	ACEA E5 ACEA E7 API CI-4, API CI-4+	
Stage 3a/Tier 3	ACEA E5 ACEA E7 API CI-4, API CI-4+	Scania LDF-2, Scania LDF-3
Stage 3a/Tier 3 without EGR and SCR	ACEA E5 ACEA E7 API CI-4, API CI-4+	Scania LDF, Scania LDF-2, Scania LDF-3
Stage 3b/Tier 4i	ACEA E5 ACEA E7 API CI-4, API CI-4+	Scania LDF-2, Scania LDF-3
Stage 4/Tier 4F	ACEA E5 ACEA E7 API CI-4, API CI-4+	



Emission class	Reduced and normal oil change intervals	Extended oil change intervals based on oil analysis results
Step 5	ACEA E6, E8, E9, E11. API CK-4	Scania LDF-4
Tier 2M	ACEA E5 ACEA E7 API CI-4, API CI-4+	Scania LDF, Scania LDF-2, Scania LDF-3
Tier 3M	ACEA E5 ACEA E7 API CI-4, API CI-4+	
Without emission class (OC16).	ACEA E6, E8, E9, E11. API CJ-4, API CK-4, Scania Low Ash, Scania LDF-4	-
DC13 engines with 1 rocker cover. Step 5	ACEA E8, E11 API CK-4, FA-4	LDF-5

### ☰ Industrial and marine engines with retrofitted particulate filter

#### ! IMPORTANT!

The sulphur content of diesel fuel must not exceed 50 ppm if the fuel is used together with engine oils with the quality designations:

- Scania LDF-5
- Scania LDF-4
- ACEA E6, E8, E9, E11
- API CJ-4/CK-4

The oil grades listed are associated with the technical limitations for permitted sulphur content. However, local legal requirements may be less stringent than the above technical requirements for a maximum of 50 ppm sulphur in the fuel.

#### ! IMPORTANT!

If the vehicle has a diesel particulate filter aftertreatment management system with SCR, the sulphur content in the fuel must not exceed 10 ppm

#### ! IMPORTANT!

When changing the engine oil grade is required, replacing the particle filter should also be done at the same time.

The reason for this is that the particulate filter renewal interval should be correct.



## Engine

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Emission class	Reduced and normal oil change intervals	Extended oil change intervals based on oil analysis results
Stage 3b/Tier 4i	ACEA E6, ACEA E9, API CJ-4, API CK-4	Scania LDF-4
Stage 4/Tier 4F	ACEA E6, ACEA E9, API CJ-4, API CK-4	Scania LDF-4



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## Oil analysis, industrial and marine engines

Oil companies can offer analysis of the engine oil.

Such analysis measures the oil's TBN (Total Base Number), TAN (Total Acid Number), fuel dilution, water content, viscosity and the quantity of particles and soot in the oil.

The results of a series of analyses serve as the basis for an oil change interval.

If conditions change, a new series of analyses must be conducted, to determine new change intervals.

### Diesel engines

To be able to extend the oil change intervals using an oil analysis, Scania LDF oils must be used.

**The following requirements must be satisfied when the oil is changed:**

- Viscosity at 100°C (212°F): max.  $\pm$  20% of original value of the fresh oil.
- TBN (in accordance with ASTM D4739): > 3.5
- TBN (in accordance with ASTM D4739): > TAN (in accordance with ASTM D664).
- Soot (DIN 51 452): < 3%

### Gas engines

**The following requirements must be satisfied when the oil is changed:**

- Viscosity at 100°C (212°F): max.  $\pm$  20% of original value of the fresh oil.
- TBN (in accordance with ASTM D4739): > 3.5
- TBN (in accordance with ASTM D4739): > TAN (in accordance with ASTM D664).
- Max. oxidation: 10 A/cm according to DIN51453



# Cooling system

## Volumes

All volumes are approximate. Check the levels and fill as necessary.

### ☰ Volumes for trucks and buses – combustion engines

Component	Type	Volume in litres
Coolant Note: The coolant volume increases when components are connected to the coolant system: – retarder +12 litres – oil cooler and hose – Webasto auxiliary heater– hydraulic cooling fan + 10 litres	7 litre engines	approx. 30
	9 litre engines	approx. 30
	11 litre engines	approx. 40
	12 litre engine	approx. 40
	13 litre engines	approx. 40
	16 litre engine, PDE	approx. 80
	16 litre engines, XPI	approx. 45

### ☰ Volumes for industrial and marine engines – combustion engines

Component	Type	Volume in litres
Coolant  Note: Coolant volumes vary depending on installation types and hose lengths.	9 litre engines	approx. 15
	13 litre engines	approx. 16
	16 litre engines:	approx. 24
	Radiator 1.1 m <sup>2</sup>	approx. 24
	Radiator 1.3 m <sup>2</sup>	approx. 30
	Radiator 1.5 m <sup>2</sup>	approx. 44

### ☰ Volumes for hybrid bus

Component	System	Volume in litres
Coolant	Cooling circuit for hybrid battery	13-13.5
	Cooling circuit for the inverter and direct current converter, 12 m bus	21-22
	Cooling circuit for the inverter and direct current converter, 14.8 m bus	24-25

**☰ Volumes for hybrid truck**

Component	System	Volume in litres
Coolant	Cooling circuit for hybrid battery	approx. 14
	Cooling circuit for inverter and direct current converter	approx. 4

**☰ Volumes for electric drive (Battery electric vehicles, BEV)**

The same coolant grade is used for cooling the electric drive equipment as for cooling vehicles with combustion engines.

The *Antifreeze and corrosion protection concentration table* also applies to coolant in the event of electric drive.

The change interval is described in the relevant preface.

**☰ Truck with electric drive**

Type	Component	System	Volume in litres
Battery electric vehicles	Coolant	Integrated cooling system for electric machine, propulsion batteries and power electronics.	84-100

**☰ Bus with electric drive**

Total volume for coolant: Approximately 77 litres.

Component	System	Volume in litres
Coolant	Cooling the battery circuit	Approximately 62
Coolant	Cooling the power electronics	Approximately 15



## The properties of the coolant.

### **WARNING!**

Avoid skin contact with coolant; it may cause irritation. Hot coolant can cause burns. Use protective equipment. Ethylene glycol can be fatal if ingested.

**The coolant recommended by Scania is a mixture of water with antifreeze (ethylene glycol) and corrosion protection. The coolant has several properties which are important for the function of the cooling system:**

- Corrosion protection
- Antifreeze
- Increases the boiling point

The coolant should always contain 50 to 60 percent by volume of antifreeze and corrosion protection so that the coolant properties ensure that the coolant works correctly.

### **IMPORTANT!**

Too high a dose of antifreeze and corrosion protection will increase the amount of sludge and blockages accumulating in the radiator. Therefore, do not have more than a 60% mixture of coolant concentrate.

Too low a concentration can lead to corrosion of the cooling system and ice formation at low temperatures.

### **IMPORTANT!**

For vehicles with LNG fuel, there must be at least a 50% mixture of coolant concentrate with corrosion protection.

This mixture corresponds to a freezing point of minus 38 degrees Celsius or lower. Otherwise, there is a risk that the heat exchanger for the fuel will freeze.

### **IMPORTANT!**

For vehicles with propulsion batteries, there must be a 50 percent admixture of coolant concentrate with corrosion protection.

This mixture corresponds to a freezing point of minus 38 degrees Celsius or lower.

With a lower concentration of coolant concentrate, there is a high risk that the batteries' cooling system will freeze.

## Driving at high altitude

When driving at high altitude, the coolant must have an admixture of mint 50% by volume antifreeze and corrosion protection.



## Cooling system

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This concentration reduces the risk of cavitation and the accompanying damage to the engine. There is also less risk of the engine boiling.

The term *High altitude* means driving at an altitude of 2,000 metres above sea level, or higher.

### **Driving in hot climate**

The antifreeze (ethylene glycol), corrosion inhibitor, and water must be combined to make the coolant. This retains the corrosion protection and the higher boiling point.

In order for the coolant to have the right properties, the antifreeze and corrosion protection content must always be between 50 and 60 percent by volume.

This also applies in countries with a warm climate, where the temperature never drops below 0° Celsius.



## Coolant quality requirements

### Water

Use only pure fresh water that is free from particles, sludge and other impurities.

If unsure about water quality, use Scania Ready Mix 50/50. See the relevant part number in the following tables.

### Antifreeze and corrosion protection

The antifreeze and corrosion protection used in Scania engines should be of the antifreeze (ethylene glycol) and corrosion protection type.

Only the product *Scania coolant*, or other products tested as antifreeze and corrosion protection for Scania, may be used in Scania engines.

Damage may occur to both the engine and cooling system if the product does not meet these requirements.

This may lead to the invalidation of Scania's warranty for faults and damage caused by the use of unsuitable coolant.

*Scania Ready Mix 50/50 coolant* is a pre-mixed coolant consisting of water, antifreeze (ethylene glycol) and corrosion protection.

See the following table for the part number for *Scania Ready Mix 50/50*.

### Scania concentrate

Designation	Contents	Part no.	Volume
Coolant	Antifreeze and corrosion protection (concentrate)	1 894 323	5 L
Coolant	Antifreeze and corrosion protection (concentrate)	1 894 324	20 L
Coolant	Antifreeze and corrosion protection (concentrate)	1 894 325	210 L
Coolant	Antifreeze and corrosion protection (concentrate)	1 894 326	1,000 L

**☰ Scania Ready Mix 50/50**

Designation	Contents	Part no.	Volume
Coolant	Antifreeze and corrosion protection (50/50)	1 921 955	5 L
Coolant	Antifreeze and corrosion protection (50/50)	1 921 956	20 L
Coolant	Antifreeze and corrosion protection (50/50)	1 921 957	210 L
Coolant	Antifreeze and corrosion protection (50/50)	1 896 695	1,000 L

**Topping up**

Coolant must only be topped up with pre-mixed coolant. The pre-mixed coolant can either be concentrate mixed with clean freshwater or pre-mixed coolant from the factory.

**! IMPORTANT!**

Containers used for mixing coolant must be intended for the purpose and free from any dirt or contaminants. When not in use, they must be kept closed to avoid collecting dirt and dust.

Use only pure fresh water that is free from particles, sludge and other impurities.

**i NOTE:**

Within the coolant change interval, coolant may only be reused if it has been cleaned of dirt, sludge and particles. If the coolant is contaminated with oil or fuel, it must not be reused.

**Admixture of Scania antifreeze and corrosion protection in water**

The coolant should contain 50 to 60 percent by volume Scania antifreeze (ethylene glycol) and corrosion protection. The percentage varies depending on the need for antifreeze.

A minimum of 50% by volume of Scania antifreeze and corrosion protection is needed to provide sufficient corrosion protection.

Measure the content of ethylene glycol (antifreeze and corrosion protection) using one of the following instruments:

Part no.	Designation
588 981	Refractometer
588 226	Refractometer



## Risk of freezing

### ! IMPORTANT!

The engine should not be subjected to heavy loads when ice starts to build up in the cooling system.

As the coolant starts to freeze, the water in the coolant starts to crystallise and the percentage of ethylene glycol in the coolant rises. If freezing produces a great increase in the amount of ice, circulation problems could arise.

This can result in damage to the engine and damage to components.

### ☰ Antifreeze and corrosion protection concentration table

Freezing point °C	-38	-45	-55	Cooling system volume
Ethylene glycol (vol. %)	50	55	60	Litres
Ethylene glycol (litres)	15	17	18	30
	18	19	21	35
	20	22	24	40
	23	25	27	45
	25	28	30	50
	28	30	33	55
	30	33	36	60
	33	36	39	65
	35	39	42	70
	38	41	45	75
	40	44	48	80
	43	47	51	85
	45	50	54	90
	48	52	57	95
	50	55	60	100
	53	58	63	105
	55	61	66	110
58	63	69	115	
60	66	72	120	
63	69	75	125	



## Oil quality requirements for hydraulic cooling fan

Viscosity class	Ambient temperature	Volume (litres)	Oil grade	Factory filling
SAE 0W-30	<-30°C to +30°C	9-13	Engine oil with specification ACEA class A, B or E	Engine oil 5W-40
SAE 5W-30	<-30°C to +30°C			
SAE 5W-40	<-30°C to >+40°C			
SAE 10W-40	0°C to >+40°C			
SAE 15W-40	0°C to >+40°C			

< = less than

> = greater than



# Air conditioning

## Refrigerant

### **IMPORTANT!**

No other refrigerant than R134a or R1234yf may be used.

### **WARNING!**

Welding, smoking and heating are prohibited if refrigerant is in the air.

R1234yf is flammable and the refrigerant forms a highly toxic gas when heated.

### **WARNING!**

The refrigerant may cause frostbite on contact with skin. Always use protective equipment when handling refrigerant.

### **IMPORTANT!**

Work on the cooling system must be carried out in compliance with the legislation of the country in question.

### **NOTE:**

Always use the requisite special equipment when working on the air conditioning.

Vehicles with refrigerant R134a or R1234yf must use Scania drier filters.

For the crew cab with additional A/C there is an additional receiver dryer.

On the sticker on the vehicle climate system, the amount and type of refrigerant are listed..



## Refrigerant oil

### Truck

For refrigerant R134a, use PAG oil

For compressors with refrigerant R1234yf, lubricating oil Sanden SP-A2 (Scania part no. 2721906) must be used

### Bus

POE oil must be used for Bock and Bitzer brand compressors.

PAG oil must used for Zexel TM-31 model compressors.

The evaporation cooling compressor for the propulsion batteries must use lubricating oil Sanden SP-A2 This oil type applies to compressors that use refrigerant R1234yf



### IMPORTANT!

An opened package of refrigerant oil must be disposed of correctly after use. It must not be saved.

For information about oil volumes, *the service manual group 18.*

Manufacturer	Oil type
<b>Bock</b> Note: The recommended oil type for this manufacturer also applies to the electrical compressor for the A/C unit.	POE oil
<b>Bitzer</b>	POE oil
<b>Zexel</b>	PAG oil
<b>Other compressor manufacturers</b>	Contact the relevant manufacturer



# Fuel

## Diesel



### WARNING!

Diesel is harmful to the skin and eyes. Wear protective gloves and eye protection when handling diesel.

The quality of the diesel is very important for the operation and service life of the engine and the fuel system, and also for the engine performance.

## Quality requirements

If the engines are to attain their stated performance characteristics and comply with the emission requirements of the authorities, the diesel used should comply with one of the following specifications:

- European standard EN 590 or equivalent
- Diesel complying with Swedish environmental classification SS155435

EN 590 and SS155435 stipulate a maximum of 7% biodiesel EN 14214.

The diesel standards EN 590 and SS155435 specify a maximum of 10 ppm sulphur (ultra-low sulphur diesel). Older versions of the standards permit higher sulphur content. For more information on permitted sulphur content, see the preface to the relevant maintenance programme.

## Sulphur content

Engines with an EGR system are more sensitive to high sulphur contents in fuel than engines with an SCR system. Use of fuel with a high sulphur content in engines with an EGR system leads to permanent engine damage. This is because sulphur is led back into the system via the exhaust gases and then cools and forms sulphuric acid.

Even a single tank of diesel with high sulphur content will cause permanent engine damage.



### IMPORTANT!

If the vehicle has a diesel particulate filter aftertreatment management system with SCR/EGR system, the sulphur content of the fuel must not exceed 10 ppm.



### IMPORTANT!

Idle vehicles with engines with an EGR system that have mistakenly been filled up with fuel that has a higher sulphur content than they can handle. Let the engine idle for 60 seconds before switching off the engine. This reduces the risk of engine damage. Refill the vehicle with low sulphur fuel as soon as possible.



For more information on the sulphur contents that are permitted, see the preface to the relevant maintenance programme.

## Admixture of Biodiesel EN 14214

Contact your distributor for more information.

Further information on Biodiesel EN 14214 can be found in the Biodiesel section.

## Temperature dependent

Diesel is usually supplied in different grades depending on the expected ambient temperature, i.e. summer or winter diesel. At temperatures lower than those specified for the diesel, paraffin wax may precipitate from the fuel and clog filters and pipes. If this happens, the engine cannot be started and malfunctions may occur. Depending on the quality of the diesel, this could happen at temperatures as high as  $\pm 0^{\circ}\text{C}$ . National requirements can result in the fuel having different low temperature characteristics in different markets. Mixing in biofuel increases the risk of paraffin precipitation.

Refuelling with the right fuel quality is essential, but it is often hard to know the quality of the fuel. One recommendation is to refuel in the same climate zone that the vehicle will be cold starting in. Unfortunately, this does not always help. Paraffin precipitation can be seen under the filler cap as a thin caking in the surface layer. The engine may start, but will stop fairly soon because the filter will become clogged.

If the vehicle is driven in a climate which is colder than it is normally driven in, contact your distributor for information about the fuel.

If the current fuel is not suitable for the expected temperature, and diesel that satisfies the temperature requirements is not available, an electric fuel heater may be installed **as a precaution**. The fuel heater may raise the temperature by approx.  $5^{\circ}\text{C}$ . This is not always enough if the tank is full of diesel intended for a hotter climate. If the filter becomes clogged, it must be renewed since the fuel heater is not able to dissolve paraffin that builds up there.

## Use of kerosene

For one-off acute cases, the low temperature characteristics of the diesel can be improved by adding kerosene to the diesel as a precaution. Max. 20% by volume may be added. When refuelling, add the kerosene first, so that it mixes thoroughly with the diesel.

Note that a mixture of kerosene with low sulphur diesel has no effect on low-temperature properties.



### IMPORTANT!

Kerosene may only be used on individual occasions. Additives other than kerosene are forbidden. This is because using additives or repeatedly using kerosene causes damage to the engine.



## Petrol and alcohol

Mixing petrol or alcohol with the diesel is not permitted. Use of petrol and alcohol causes wear to the engines. In the worst cases, a single refuelling can lead to engine damage.



### IMPORTANT!

With a mixture of diesel and petrol, the risk of the fuel tank exploding quickly increases.

## Water and micro-organisms

Only small amounts of water are permitted in fuel. For diesel (EN 590) max. 0.02% and for biofuels (EN 14214) max. 0.05%. These amounts of water do not affect engine function. Prolonged and unsuitable storage of fuel results in more water collecting. This can cause the growth of microorganisms (bacteria and fungus).

The micro-organisms grow in the interface between water and fuel. They may form a brown or black slimy film and discolour the fuel.

This is called diesel bacteria.

Micro-organisms can clog the fuel filter so that the engine runs unevenly or stops. They can also pass through the filter and form damaging coatings on other parts of the injection system.

Water separating fuel filters are a major customer requirement in markets with fuel quality problems. A water separating filter is an option for PDE and HPI engines. The filter is standard equipment for engines with XPI. Furthermore, water separating filters for vehicles with PDE and HPI engines are also fitted with a drain tap. XPI engines have no drain tap. In these engines, the water is channelled back to the fuel tank.

However, water separating filters are no guarantee that there will not be water in the fuel. The small amount of water that can precipitate in diesel (< 0.02%) passes through the filter, but is relatively harmless. Large amounts of water are separated up to a certain point. If the fuel pick-up unit sucks in pure water at the bottom of the tank, the filter will collapse. As a result, water and dirt may pass into the engine. Over time, this can cause engine damage.

Check the fuel tank during maintenance. If the fuel tank contains water, it must be removed. Otherwise, water may be transported through the fuel system, which can cause engine damage.



## Action if there are problems with diesel bacteria

The vehicle fuel system must be completely cleaned of fuel and water. The tanks must be drained and cleaned, mechanically and by steam or high-pressure washing, and then dried.

Lines and other components in the fuel system must be flushed and blown dry. It is important that no liquid is left in the system after cleaning.

Always renew the fuel filter. If there have been problems with diesel bacteria for a long period of time, the injectors and fuel pump may also need to be renewed.

Find out what is causing diesel bacteria and take the necessary action so that the problem does not recur. It is usually fuel that has been stored for a long time, with little movement, without draining the condensation. Examples of such storage are in a container, barrel or auxiliary tank.

Diagnostics agents and fuel additives are available on the market to prevent diesel bacteria. When the fuel system has been thoroughly cleaned, a preparation for diesel bacteria can be added during the first refuelling, as a precaution. Continuous use of these preparations is not recommended. They can damage the fuel system.



### IMPORTANT!

Fuel additives may contain substances that are harmful to the environment and health. Take care to follow the manufacturer's instructions for handling and dosing.

## Fuel properties

Permitted limits for e.g. density, viscosity, cetane rating and filtration ability of diesel are indicated in the European standard EN 590.

### Density

Fuel density is measured in kg/m<sup>3</sup>.

Hot fuel has a lower density than cold fuel. This means that engine power falls as the fuel temperature rises. Winter fuel sometimes has a lower density than summer fuel. The lower density of winter fuel may also cause a reduction in engine power.

### Viscosity

The viscosity is a measurement of how viscous or fluid the fuel is. The density and viscosity normally correspond to one another.

### Cetane rating

The cetane rating is a measure of the ability of the diesel to ignite. If the cetane rating is below the recommended values according to EN 590, the vehicle may be difficult to start. In extreme cases, engine damage may occur.

### Filtration ability

This refers to the lowest temperature at which the diesel can be used without clogging the fuel filter and fuel lines.



### Calculating engine power

The engines are tested in the factory using fuel with a density of 840 kg/m<sup>3</sup>.

If fuel of a different density is used, the change in power can be calculated using the following formula:

$$N_{e\text{korr}} = N_e \times \frac{P}{840} \quad 115\ 260$$

$N_{e\text{korr}}$	=	Power with fuel in question
$N_e$	=	Specified power
$P$	=	Density of the fuel in question in kg/m <sup>3</sup> at +15°C
840	=	Density of the fuel used in factory tests

Example: Density of the fuel in question: 810 kg/m<sup>3</sup>. Specified engine power: 500 hp.

$$N_{e\text{korr}} = 500 \times \frac{810}{840} = 482 \text{ hk} \quad 115\ 261$$

This formula does not take viscosity into account, which also has a minor effect on engine power.



## Special applications for Industrial and Marine engines

### Use of fuel oil in stand-by generator sets

Long-term storage of diesel, where the diesel comes into contact with water, may lead to the growth of micro organisms (bacteria and fungus). To avoid this in fuel used in stand-by generator sets, Scania permits the use of fuel oil according to DIN 51603-1 and ÖNORM C 1109.

Use of fuel oil is only permitted for stand-by generator sets and under the following conditions:

- The fuel must not be stored or used in temperatures below -10°C (14°F).
- The engine must not be equipped with an SCR system.

### DMX and DMA diesel

#### **IMPORTANT!**

Use of DMX and DMA diesel is not permitted for engines with SCR systems.

DMX and DMA diesels normally cause increased wear on the injection system. As a result of the high sulphur content in these types of diesel, the engine oil is also affected. The engine oil must have as high a Total Base Number (TBN) as possible.

When the engine is taken into operation the engine oil must be analysed every 50 hours to determine the correct oil change interval. The oil analysis must be carried out according to the instructions in the Oil analysis section in OPM 250.

Bear in mind that the emission limit for the current engine type may limit the maximum permitted sulphur content of the diesel.

#### **REQUIREMENT!**

For engines running on DMX and DMA diesels, the engine oil must have a TBN of at least 12.



## **Biodiesel**

Scania currently approves 2 types of biodiesel:

- FAME in accordance with EN 14214
- HVO in accordance with EN 15940



## FAME EN 14214

The designation RME is also used for FAME EN 14214.

### Use of FAME EN 14214 in Scania engines

Scania permits up to 100% FAME EN 14214, depending on engine type. For more information about the FAME EN 14214 quantities approved for different engines, see the preface for each type of vehicle.

Normal diesel in accordance with EN 590 can at present contain up to 7% FAME EN 14214 from the diesel supplier.

There are grades of diesel that comply with EN 590 but contain a higher blend of FAME EN 14214. More information on diesel quality requirements can be found in the Diesel section.

If a higher blend of FAME EN 14214 is described in the relevant preface, this results in the same maintenance intervals as for 100% FAME EN 14214.

It is possible to use fuel with up to 20% FAME in almost all engines. However, please see what is stipulated in the relevant preface.

Users in each market have the best knowledge of the most advantageous FAME blend.



#### IMPORTANT!

Be aware that the maintenance intervals are different for operation with EN 590 diesel to those for FAME EN 14214.

For more information about maintenance intervals, see the preface to maintenance programme.

#### The following 2 options for FAME operation have been approved:

- FAME in accordance with EN 14214
- A mixture of diesel EN 590 and FAME EN 14214

With the **exception** of the following vehicles and engines:

#### Exceptions from FAME use

The following vehicles and engines must **not** use diesel with a higher FAME EN 14214 blend than stated in EN 590 (max. 7% FAME EN 14214):

- Emergency vehicles.
- Vehicles with downtimes longer than 2 months.
- Industrial engines with XPI.
- Buses with HPI engines.
- XPI engines that are not prepared/approved for biodiesel.



## Requirements for operation with FAME EN 14214

The following requirements must be satisfied if Scania diesel engines are to be run on more of an admixture than according to EN 590.

1. Some types of **Euro 6 engine** are approved for blends higher than 7%. These are described in the preface to maintenance programme.
2. All **Euro 5 engines** and engines in lower emission classes are approved for blends higher than 7%. This is conditional on their having been adapted for FAME EN 14214. This adaptation means using appropriate fuel filters and maintenance intervals.
3. **Biodiesel that is used as an admixture or as a 100% product must conform to EN 14214.**

The customer must cover costs related to fuel quality if the fuel does not conform to EN 14214.

4. For **Euro 6 engines** approved for biodiesel, the following limitations apply to 100% FAME EN 14214:

The fuel must conform to EN 14214 with the following additional requirements:

- Max. 4 mg/kg ash constituents.
- Max. 1 mg/kg phosphorus.

Maintenance intervals for exhaust gas aftertreatment are calculated based on Biodiesel EN 14214 with additional requirements.

The customer must cover costs related to fuel quality if the fuel does not conform to EN 14214 with additional requirements.

### 5. Shorter oil change intervals for engine oil.

The boiling point of FAME EN 14214 is higher than for diesel, which means that the fuel does not evaporate if it gets into the oil sump. To avoid the risk of running on thin oil, the oil changes must be carried out more frequently. Extended oil change intervals are not possible.

For more information about engine oil change intervals and engine oil filter and fuel filter renewal intervals, refer to the preface for the relevant vehicle type:

### 6. Engine oil viscosity class and level.

For PDE and HPI engines, the oil viscosity class must be xW-40.

The engine oil level must be checked regularly.

If the oil level exceeds the maximum level, the oil must be changed.

## Properties of FAME EN 14214

### General

The properties of FAME EN 14214 differ from the properties of diesel. It is important to cooperate with an experienced fuel supplier when FAME EN 14214 is used.

### High temperatures

#### NOTE:

At temperatures above +38°C, FAME EN 14214 fuel together with flammable materials can auto-ignite.



## Low temperatures

FAME EN 14214 has poorer low-temperature characteristics than diesel. National requirements for FAME EN 14214 can result in the fuel having different low temperature characteristics in different markets.

The properties of FAME EN 14214 often start to deteriorate at +10°C. The fuel is more sensitive to extended periods of cold weather than it is to an occasional reduction in temperature. The fuel may exhibit precipitation that clogs filters and fuel systems. Scania recommends switching to diesel that complies with standard EN 590 when temperatures are about  $\pm 0^\circ\text{C}$ . If biodiesel is to be used at lower temperatures, please consult the relevant fuel supplier.

Scania recommends the installation of an engine and fuel type-customised fuel heater to improve the starting characteristics. Mixing in diesel EN 590 also improves cold-start properties.

## Contaminants

FAME EN 14214 may contain contaminants, that block particulate filters and poison catalytic converters. The European biodiesel standard FAME EN 14214 stipulates the requirements on concentrations of contaminants for biodiesel. For a Euro 6 engine, the amount of contaminants in FAME EN 14214 must be less than the level permitted according to the standard. Good quality FAME EN 14214 conforms to the supplementary requirements set out by Scania without any problems:

- Max. 4 mg/kg ash constituents.
- Max. 1 mg/kg phosphorus.

## Storage of FAME EN 14214

FAME EN 14214 has a maximum storage life of 6 months from the date of production to the expiry date. The fuel is affected by light, temperature, water, etc. during storage, which affects its properties and service life. FAME EN 14214 also has lower stability against oxidation than diesel EN 590. This may result in a thickening of the fuel and clogging of parts of the fuel system, e.g. the fuel filter. Bacterial growth may occur during storage in a tank under unfavourable conditions. Avoid storage in barrels or auxiliary tanks, except when fuel turnover rates are high. Check that the tank is clean whenever refuelling takes place.

If the vehicle has been refuelled with FAME EN 14214 and is stationary for a long period, condensation water can form in the fuel tank and result in bacterial growth.

## Consumption, performance and emissions

FAME EN 14214 has a lower energy content than diesel EN 590. This can affect performance and fuel consumption. The different chemistry of FAME EN 14214 also produces different exhaust gases to diesel EN 590. Measurements have shown that FAME EN 14214 can have the following effect:

- Emissions of nitrogen oxides are increased. For Euro 6 engines, however, these are just as low as for diesel
- Emissions of hydrocarbons, carbon monoxide and particles are reduced



- Fuel consumption is increased, typically by approx. 8%
- Engine efficiency is the same as for diesel EN 590

## **Other things that can be affected by running the engine on FAME EN 14214**

### **Optional equipment**

It is important that bodywork auxiliary equipment can also be run on FAME EN 14214 if it runs on the same fuel as the vehicle engine. Certain types of accessory, such as Eberspächer and Webasto engine heaters, cannot be run on FAME EN 14214 and consequently need a separate fuel tank.

### **Bodies**

In order for the vehicle to be run on FAME EN 14214, the bus bodybuilder or bodybuilder must use materials that are resistant to FAME EN 14214 in the fuel system.

### **FAME EN 14214 fumes**

FAME EN 14214 fumes can impact the surrounding environment. The materials in e.g. side skirts and panels above the refuelling point may degrade.

### **Deviations**

If deviations occur when running the vehicle on FAME EN 14214 rather than diesel, these must be reported to a Scania distributor so that they can be reported to the factory.

## **Switching between diesel EN 590 and FAME EN 14214.**

### **NOTE:**

When switching between EN 590 diesel and FAME EN 14214, the variant family for fuel adjustment in the SOPS file needs to be changed. This must be done for the parts in the technical package to be correct.

### **Switching from FAME EN 14214 to diesel EN 590**

Renew the fuel filter when switching from FAME EN 14214 to diesel EN 590.

Retrieve data from the Workshop Manual to obtain the correct filter, adapted to the engine type.

If the vehicle is run alternately on FAME EN 14214 and EN 590 diesel, follow the maintenance intervals for FAME EN 14214.



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## **Performing maintenance of the centrifugal oil cleaner when switching from diesel EN 590 to FAME EN 14214**

FAME EN 14214 has cleansing properties and can dissolve deposits from diesel in the fuel system. This requires extra steps when switching from diesel EN 590 to FAME EN 14214 as follows:

- Change the engine oil, renew the oil filter and perform maintenance of the centrifugal oil cleaner when switching between diesel EN 590 and FAME EN 14214. This must be repeated after 1,000 km.

Then perform maintenance of the centrifugal oil cleaner according to the operating intervals for FAME EN 14214.

- Renew the fuel filter when changing the oil at the time of the switch and twice every 1,000 km.
- Some XPI engines require a fuel filter adapted for FAME EN 14214. Retrieve data from the Workshop Manual to obtain the correct filter.

The fuel filter must then be renewed as specified in the tables in the preface for the relevant vehicle type.



## HVO EN 15940

Hydrotreated Vegetable Oil (HVO) is a paraffinic diesel, produced by hydrotreatment, which is extracted from vegetable oils and fats.

Hydrotreated fuels are free of sulphur and aromatics.

For all industrial and marine engines, Scania approves up to 100% HVO EN 15940 as a fuel.

Scania approves HVO EN 15940 as a fuel in its Euro 3, Euro 4, Euro 5 and Euro 6 diesel engines for trucks and buses. The table below shows from which chassis serial numbers Scania approves HVO EN 15940.

See the table of the approved vehicles. These and vehicles with higher chassis serial numbers are approved.

Production site	Engine type	Chassis serial number, Truck	Chassis serial number, Bus
Angers	DC9, DC12, DC13	9172513	
	DC16	9172445	
Södertälje	DC9, DC12, DC13	2082023	1883515
	DC16	2081940	
Zwolle	DC9, DC12, DC13	5307129	
	DC16	5306936	

Vehicles with lower chassis serial numbers than those in the table may not be run on HVO.

### Switching between various fuels

Switching between fuel types should be approached with caution. When switching **to or from** FAME EN 14214, the vehicle SOPS file must be updated to get the correct maintenance intervals and parts. This makes it the right maintenance interval and the correct parts.

The fuel filter **must be renewed** when changing diesel EN 590 or HVO EN 15940 fuels - **to or from** FAME EN 14214.

However, the fuel filter **does not need to be renewed** when changing between diesel EN 590 and HVO EN 15940 fuels.

### Properties of HVO EN 15940

- HVO must comply with EN 15940 requirements.
- During operation with HVO EN 15940, use the same maintenance programme as for vehicles that use EN 590 diesel. The intervals for periodic maintenance can be found in the preface for each product.
- Examples of marketing names for HVO are BioMax, C.A.R.E or NEXBTL.
- HVO has similar thermal properties to diesel EN 590. The turbidity point is closer to -40°C, which means that it is fine to use HVO EN 15940 in colder climates.
- **Auxiliary heater in truck:** HVO works well to use as fuel in auxiliary heaters.



- **Auxiliary heater in buses:** Regarding HVO as a fuel - see the recommendations from the manufacturer for the auxiliary heater in question.
- HVO has a lower energy content per unit of volume compared to Diesel EN 590. This leads to the fuel consumption increasing and reducing the power output by 3–5 %.
- HVO can be stored in the same conditions as diesel EN 590.
- HVO has lower density than diesel EN 590 (780 kg/m<sup>3</sup> compared to 800-845 kg/m<sup>3</sup> for diesel EN 590).
- Scania recommends not mixing fuels from different markets. A fuel that is not mixed by a fuel manufacturer, may not have the same guaranteed quality compared to Scania standards. If there is a switch from e.g. FAME to HVO or fossil diesel, run the tank until it is empty before filling with the new fuel type.
- HVO has less environmental impact compared to fossil diesel.



## Ethanol

According to Swedish standard SS 155437:2015, Scania only approves ED95 ethanol as fuel for ethanol engines.

### Ethanol in hot climates

There may be problems starting in hot climates. Starting problems are caused by the fuel boiling in the fuel system when the engine is switched off. If the vehicle is fitted with a booster pump, this is used when starting.

### Ethanol in cold climates

Starting the vehicle in colder climates, below -20°C, increases the amount of white smoke and condensed moisture significantly. Always use the engine heater in cold conditions. The engine heater counteracts engine wear when starting the vehicle from cold and therefore increases the engine service life.

### Quality requirements for ethanol

The fuel must be of the type ED95. For both technical and environmental reasons, no other type of ethanol is recommended.

The fuel consists of approximately 95% azeotropic denatured ethanol and 5% ignition improver. Azeotropic means that the ethanol is at such a high concentration that it is not possible to remove any more water.

#### Content of ethanol fuel:

- Ethanol (E95)
- Ignition improver (Beraid 3 555)
- Lubrication improver (Ethomen)
- Colourant (only in Sweden)
- Corrosion protection
- Denaturant.

Comply with local regulations when using denaturant.



#### **NOTE:**

Do not use methanol or methylene as they will clog the nozzle holes.



## Gas

Vehicle gases such as natural gas and biogas are 85-99% methane. The gas is colourless and odourless. However, odorants are added so that any gas leakage can be detected more easily. The quality of the gas is important to engine operation, service life and performance.

Vehicle gas can be stored compressed (CNG) or cooled in liquid form (LNG).

The engine is fitted with lambda control which means that the engine management system adapts automatically to different types of gas and grades of gas within the approved range. Natural gas and biogas can be mixed without a manual setting being made.

In case of large differences in gas quality, automatic adaptation takes place with a slight delay. The engine should therefore be used through its entire driving cycle in order for the adaptation to be fully completed.

### Gas quality requirements, trucks and buses

The gas must comply with EN 16723-2, have a Wobbe index between 39.1 and 54.7 and a methane number of at least 70.

If the gas quality does not comply with the specification above, Scania cannot guarantee that the engine will work and produce the right performance and emission level.

The engine can be run with any mixture of biogas and natural gas.

The engines adjust automatically to the gas quality in question.

### Quality requirements for natural gas, industrial engines

#### **IMPORTANT!**

The operator is responsible for using the correct type of gas to ensure that local laws are complied with.



### Methane amount and calorific value per power level

The requirements for the lowest permitted methane amount and calorific value vary depending on the engine power as shown in the table below.

The methane number is calculated according to the MWM method in EN 16726. Use the calculator on the Euromot website or similar.

The calorific value is calculated according to standard ISO 6976. Use the Natural gas calorific value calculator on the Unitrovers website or similar. This calculator can also be used for biogas.

Engine power 1,500/1,800 rpm	Power class	Type of fuel	Lowest methane number	Lowest heat value (MJ/Nm <sup>3</sup> ) <sup>1</sup>
333/372 kW	PRP	Natural gas	70	23.5
372/411 kW	PRP	Natural gas	72	24.5
407/426 kW	PRP	Natural gas	75	26.5
360/360 kW	PRP	Pure biogas	70	21
330/350 kW	COP	Natural gas	70	23.5
320/320 kW	COP	Pure biogas	70	21

1. Lower calorific value at the reference state of 15°C (59°F) and 101.325 kPa.



## Other quality requirements

Requirements	Value	
	Natural gas	Biogas
Supply pressure to gas regulator <sup>1</sup>	20-35 mbar (0.3-0.5 psi)	15-35 mbar (0.2-0.5 psi)
Fuel temperature	10-40°C (50-104°F)	
Max. water content	Max. 80% relative humidity at the lowest fuel temperature. There is no water, other visible impurities or condensation.	
Max. sulphur content (H <sub>2</sub> S)	20 mg/Nm <sup>3</sup>	
Max. sulphur content (total)	350 mg/Nm <sup>3</sup>	
Max. ammonia content	20 mg/Nm <sup>3</sup>	
Max. level of halogenide compounds	65 mg/Nm <sup>3</sup>	
Max. hydrogen content	12% (w/v)	
Max. siloxane content	1 mg/Nm <sup>3</sup>	5 mg/Nm <sup>3</sup>
Max. particle quantity	10 mg/Nm <sup>3</sup>	
Max. particle size	5 μ (filtration with 99% cleaning above 5 μ is recommended)	
Max. fluctuation speed in gas pressure	5 mbar/30 s (0.07 psi/30 s)	
Max fluctuation speed in calorific value	1% Ch <sub>4</sub> /30 s	0.5% Ch <sub>4</sub> /30 s

3

1. The values apply even at full load. Lower values may be permitted if they have first been approved by Scania. If a lower value is used, the maximum output is reduced.

With normal cubic meter (Nm<sup>3</sup>), gas is assessed at the following temperature and pressure: Tu = 273.15K, Pu = 101.325 kPa.



# Exhaust system

## Reductant for SCR

### IMPORTANT!

The operator is responsible for using the correct type of reductant to ensure that local laws are complied with.

### Reductant 32.5% by weight of urea

Reductant is a solution consisting of urea and water, and is usually called AdBlue®, DEF, ARLA 32 or AUS 32, depending on the market. For SCR, the reductant is added to the exhaust gases upstream of the catalytic converter. As a result, the emissions of nitrogen oxides are reduced.

### REQUIREMENT!

If the SCR system should be operated with 32.5% by weight of urea, the reductant should be specified in accordance with ISO 22241 in order to comply with the emission requirements set by the public authorities.

## Volume

For the filling volume and the total volume for different tank sizes, see Workshop Manual section 00-26 Reductant tank.

## Properties

Reductant in accordance with ISO 22241 is a solution consisting of urea and water containing 32.5% by weight of urea. The solution will freeze at approx. -11°C. When the solution freezes, ice and liquid always maintain the same concentration. Always store reductant at a temperature between -11°C and 30°C.

The recommended % by weight of urea	Limit value according to ISO 22241
32.5%	31.8-33.2%

Reductant is normally colourless if no dye has been added. Reductant is not harmful to the skin. Nor is it toxic in small quantities, but it tastes very unpleasant.

Reductant is extremely corrosive, especially to aluminium and copper. Reductant has a low surface tension and rapidly spreads over large areas, which then become very slippery. For this reason, wash off any spillages on metal and electrical connections as soon as possible. Water works very well for cleaning purposes. Please use hot water.

If reductant seeps into electrical connections or electrical cables, these must be renewed.



Reductant can dry out and form white or greyish brown crystals or deposits. Dense deposits which have been formed as a result of heat may need to be scraped off or heated to more than 500°C.

Further information about reductant is provided in the Workshop Manual, main group 03.

### Reductant 40 per cent by weight of urea

#### **IMPORTANT!**

Reductant with a 40 per cent urea mixture can only be used in exhaust gas aftertreatment management systems for certain marine engines.

#### **REQUIREMENT!**

If the SCR system should be operated with 40 per cent by weight of urea, the reductant should be specified in accordance with ISO 18611 in order to comply with the emission requirements set by the public authorities.

### Properties according to ISO 18611

Reductant in accordance with ISO 18611 is a solution consisting of urea and water containing 40% by weight of urea. The solution will freeze at approx. 0°C. Always store reductant at a temperature between 0°C and 30°C. Reductant that complies with ISO 18611 also has the same properties as reductant that complies with ISO 22241.

The recommended % by weight of urea	Limit value according to ISO 18611
40%	39-41%



# Transmission

## Oil grades

The table below describes the Scania quality requirements for transmission oil.

Oil grade	Explanation
STO 1:0	Scania's basic requirements for oil for use in axle gears.
STO 1:1 G	Scania's basic requirements for oil for use in gearboxes with type designations GR/S/OXXX.
STO 2:0 A <sup>1</sup>	Scania's requirements for high performance oil for use in axle gears.
STO 2:0 G <sup>1</sup>	Scania's requirements for high performance oil for use in gearboxes with type designations GR/S/OXXX.
STO MTF	Scania's requirements for oil for use in gearboxes with type designations GXX and GR/S/OXXX.

1. STO 2:0 A and STO 2:0 G have been developed to provide the option for extended oil change intervals and good fuel economy. They have been specially tested in field tests at Scania, which issues the approvals. STO 2:0 A and STO 2:0 G also satisfy the requirements for STO 1:0 and STO 1:1 G.



## Oil change intervals

The required interval between oil changes depends on the operation type and the grade of oil used; see the preface for trucks and buses.



## Manual gearboxes

### Oil volumes

All volumes are approximate and apply to a dry gearbox. The volume for an oil change may be approximately 1 litre less.



#### NOTE:

If the vehicle is fitted with power take-offs, the oil volume must be increased. See the section *Power take-off*.

Type	Volume (litres)	Comment
G670 ZF, Ecolite 6 S 1200 TD	7	
G701 ZF, Classic Line S6-1550	13	
GR801	10	For water oil cooling add 1 litre. For air oil cooling add 2 litres.
GR801 in K/N buses	10	
GR801R	11	
GR900, GRS890/900, GRSO900	16	
GR900R, GRS890R/900R, GRSO900R	17	
GRS920	16	
GRS920R	17	
GR875/R, GRS895/R, GRSO895/R	13-15	
GR905/R, GRS905/R, GRSO905/R, GRSO925/R	14.5-17.5	
GRSO935/R	19	
<b>Transfer gearbox</b>		
GT800/900	7.1	
GTD800/900	6.5	
GT901	9	
GTD901	8.4	
GT950	12.5	
GTD950	10	
GT902	6	
GTD902	5.3	
GT903	6.6	
GTD903	5.9	
<b>Gearbox type designation GXX</b>		



Type	Volume (litres)	Comment
G25CH	9.6	For liquid-cooled oil coolers, add 0.7 litres. For air-cooled oil coolers, add 1.5 litres. For gearboxes with retarders, add 2 litres.
G25CM	9.4	For liquid-cooled oil coolers, add 0.7 litres. For air-cooled oil coolers, add 1.5 litres. For gearboxes with retarders, add 2 litres.
G33CH/ G38CH	10.8	For liquid-cooled oil coolers, add 0.7 litres. For air-cooled oil coolers, add 1.5 litres. For gearboxes with retarders, add 2 litres.
G33CM/ G38CM	10.6	For liquid-cooled oil coolers, add 0.7 litres. For air-cooled oil coolers, add 1.5 litres. For gearboxes with retarders, add 2 litres.
<b>Components</b>		
GRSOH901R, ZF Transmatic – Gearbox – Torque converter with gear-changing clutch – Retarder	When changing oil: approx. 30 Total volume: 43	
Opticruise, stroke damper for GR875, GRS895, GRS905, GRSO905, with or without retarder.	0.09	
Opticruise, stroke damper for GR801, GRS890, GRS900, GRSO920, with or without retarder.	0.27	
Range damper (bus) GR875, GRS895	0.045	
Range damper (bus) GR801	0.1	



## ☰ Factory filling

Gearbox type	Oil grade	Comments
G670 ZF, Ecolite 6 S 1200 TD <sup>1</sup>		
G701 ZF, Classic Line S6-1550 <sup>1</sup>	ZF TE-ML 02 02E	From January 2017 onwards
G25CM/R G33 CM/R G38CM1/CH1	STO MTF	
GR875, GR875R, GRS895, GRS895R, GRSO895, GRSO895R	STO 2:0 G STO MTF	
GR905, GRS905, GRSO905, GRSO925, GR905R, GRS905R, GRSO905R, GRSO925R, GSRO935R	STO 2:0 G STO MTF	
GT800/900/901/950/902/903	ZF TE-ML 19C	ZF's list of lubricants can be downloaded from the ZF website. Search for the web address: <a href="https://aftermarket.zf.com/en/aftermarket-portal/">https://aftermarket.zf.com/en/aftermarket-portal/</a> .  The current data sheet from ZF is called TE-ML 19 or 13.
GTD800/900/901/950/902/903	ZF TE-ML 19C	ZF's list of lubricants can be downloaded from the ZF website. Search for the web address: <a href="https://aftermarket.zf.com/en/aftermarket-portal/">https://aftermarket.zf.com/en/aftermarket-portal/</a> .  The current data sheet from ZF is called TE-ML 19 or 13.
GRSOH901R, ZF Transmatic <sup>1</sup>	ZF TE-ML 02H	Same oil system for gearboxes, retarders and torque converters with gear-changing clutches.
Opticruise, longitudinal stroke damper	ATF oil	Also applies to low range dampers on buses.

## Viscosity class requirements

### GRSOH901R, ZF Transmatic

ZF's list of lubricants can be downloaded from the ZF website. Search for the web address: <https://aftermarket.zf.com/en/aftermarket-portal/>.

Select the product and download the associated datasheet with information about the recommended oil grade.



## Other manual gearboxes

### **!** IMPORTANT!

Check that the oil is suitable for all variations in ambient temperature that are likely to occur before the next oil change.

Viscosity – all operation types	Ambient temperature
SAE 75W-80	From -40°C to >+30°C
SAE 75W-90	-35°C to >+30°C
SAE 80W-90	-20°C to >+30°C
SAE 85W-90	-5°C to >+30°C

The viscosity and temperature table above applies to manual gearboxes with the type designations "GR/S/OXXX".

Viscosity – all operation types	Ambient temperature
SAE 75W-80	From -40°C to > +30°C

The table above gives viscosity and temperature for manual gearboxes with the type designations "GXX".



## Automatic gearboxes

### ☰ Allison

#### Oil volumes

All volumes are approximate. Check the levels and fill as necessary.

Add approx. 0.9 litres of oil if the vehicle is fitted with a retarder.

Type	Volume (litres)	Factory filling
GA750/MD3060 GA751/ MD3066 GA765/MD3000 GA766/MD3200 GA767/ MD3500	In case of oil change incl. filter: approx. 20  Total volume: approx. 30	ATF TES 295/ATF TES 668
GA851/HD4060 GA852/ HD4560 GA866/HD4000 GA867/HD4500 GA868/ HD4500 (F Bus)	In case of oil change incl. filter: approx. 34  Total volume: approx. 50	

For more information about lubricants, see: <https://www.allisontransmission.com/parts-service/approved-fluids>.

### Voith

#### Oil volumes

Type	Volume (litres)	Factory filling
DIWA.5	During oil change incl. filter: approx. 24	Synthetic oil, see document H55.633644 <sup>1</sup>

1. For oils with change intervals of up to 60,000 km, download the document on the Voith website, [www.voith.com](http://www.voith.com). Also refer to other information about oil change intervals and oil grades.

For more information about lubricants refer to [www.voith.com](http://www.voith.com).



## ZF

### Oil volumes and oil grades

ZF's list of lubricants can be downloaded from the manufacturer's website. The commercial designations can be found on the ZF website in the documents "List of lubricants-TE-ML 14" (for Ecomat) and "List of lubricants-TE-ML 20" (for Ecolife).

All volumes are approximate. Check the levels and fill as necessary.

- Ecomat: The ZF type designation begins with 6HP.
- Ecolife: The ZF type designation begins with 6AP.

Type	Volume (litres)	Factory filling
Automatic gearbox ZF, Ecomat	During oil change incl. filter: 15	According to the information in ZF data sheet "TE-ML 14E"
Automatic gearbox ZF, Ecomat. Vehicles with emission class Euro 3 and higher in hot climates, never cold <sup>1</sup> and very hot <sup>2</sup> .	Total volume: 30	
Automatic gearbox ZF, Ecomat, in N buses with gas engine of operation type 3.		
Automatic gearbox ZF, Ecolife	During oil change incl. filter: 24 Total volume: 42	According to the information in ZF data sheet "ZF TE-ML 20G"

1. Temperatures according to Scania operational factors: Sometimes colder than +5°C, never colder than ±0°C, seldom hotter than +40°C.

2. Temperatures according to Scania operational factors: Seldom colder than +15°C, never colder than ±0°C, sometimes hotter than +45°C.



## Electric machine – electric vehicles

### Type designation for electric machines and gearboxes. Oil grades and oil volumes.

**Note that** all volumes are approximate. Check the levels and fill as necessary.

Vehicle type	Component designation/ Market designation	Type designation on gearbox	Oil grade	Total system oil volume (litres)
Truck	MG4115-1 EM 230 C1-2	GE21S21	STO EV	approx. 13
Bus	MG4115-1 EM 230 C1-2	GE21S21	STO EV	approx. 13-14
Truck	MG4115-1 EM 230 C1-2	GE21S22	STO EV	approx. 13
Bus	MG4115-1 EM 230 C1-2	GE21S22	STO EV	approx. 13-14

Component designation/ Market designation	Type designation on gearbox	Oil grade	Volume (litres)
MG4130-3 EM 400 C3-6 EM 450 C3-6  In this configuration, the electric machines and gearbox have separate oil systems, but the same oil grade for both systems.	GE281	STO EV	approx. 17  This volume is divided into:  Electric machine: approx. 7  Gearbox: approx. 10
MG4107-1  Electric machine - hybrid.  The electric machine and gearbox have separate oil systems.	GRS895  The oil volume and oil grade can be found in the chapter <i>Transmission/Manual gearboxes</i> .	STO EV	approx. 4.5
MG4115-2 EM 230 C2-6  Electric machine - hybrid	GE281	STO EV	approx. 13
MG3214-1	GE12S21	STO EV	16-17
MG3218-1 MG3222-1	GE14M1	STO EV	16-17



## Electrical air compressor for hybrid/electric vehicles



### Tip:

Filter by chassis serial number in Multi. The associated technical information shows the type of compressor.

Type	Volume (litres)	Oil grade
EACS <sup>1</sup> , EACS 2	1.3	Castrol Alphasyn T46 Chevron Cetus PAO 46 Chevron Cetus PAO 68
EACS 3	1.9	Castrol Alphasyn T46 Chevron Cetus PAO 46 Chevron Cetus PAO 68

1. The designation "EACS 1" is not specified in Multi. "EACS" and "EACS 1" are the designations of the same equipment.



## Clutch

### Oil volumes and oil grades

All volumes are approximate. Check the levels and fill as necessary.

Component	Applies to	Volume (litres)	Comment
Clutch control	Manual	0.4	SAE J 1703 (D.O.T. 3 or 4 Brake Fluid)
Clutch control	Opticruise, fully automatic	0.3	SAE J 1703 (D.O.T. 3 or 4 Brake Fluid)



## **Power take-off**

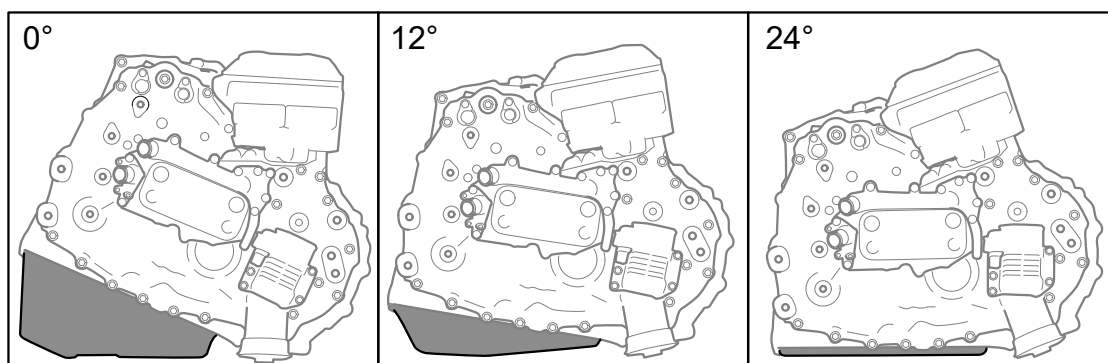
### **Oil volumes and oil grades**

All volumes are approximate.

Carry out a test drive in connection with maintenance. Check the oil level and fill as necessary.



Type of PTO.	Additional oil volume for current power take-off (litres).	Oil grade	
EG500P, EG500F, EG501P, EG501F, EG501F, EG502P, EG502F, EG503P, EG503F	0.7	The power take-off and the gearbox have a common oil system. The oil grade is the same as for manual gearboxes with the relevant type designation G/R/S/O/XXX	
EG640P, EG640F, EG641P, EG641F, EG642P, EG642F, EG643P, EG643F.	0.4		
EG650P, EG651P, EG652P, EG653P, EG660F, EG661F, EG662F, EG663F	0		
EG670PF, EG670PP, EG671PF, EG672PF, EG672PP	0.7		
EG670F, EG671F, EG671PP, EG672F, EG673PP	1.1		
EG730P, EG740F	2.9		
EG18T DCW EG22T DBW	0.2		The power take-off and the gearbox have a common oil system. The oil grade is the same as for manual gearboxes with the relevant type designation GXX.
EG35T DAW EG26T DBW EG21T DCW EG19T DCW	0.5		
EG25R DAP1	0.9		
EG6R DCP1 EG8R DCP1 EG9R DCP1 EG10R DBP1 EG10R DCP1P1 EG12R DCP1P1 EG13R DCP1P1 EG16R DBP1P1	1.4		
EG6R MDP1 EG8R MBP1 EG8R MCP1 EG9R MCP1 EG10R MCP1	2.1		
EK630/640	2.0	Same as for corresponding gearbox.	
EK730P EK740F EK750F	2.9		
EK750F: the clutch unit	0.2		


**Power take-off and electric machine MG32xx**


<b>Factory-filled oil volume 100%</b>			
When changing oil, fill with 80% of the specified factory-filled volume. See below.			
<b>Oil volume electric machine MG32xx</b>			
<b>Oil grade STO EV</b>			
Rotation angle	0%	12°	24°
Oil capacity (litres)	16.2	17.3	16.6
<b>Additional oil volume added for the relevant electric machine type (litres)</b>			
Electric machine MG3218	0.25		
Electric machine MG3214	0.50		
<b>Additional oil volume that is added for current power take-off (litres).</b>			
Double power take-off: EC15RDW DAWW EC20RDW DAWW	2.20	2.15	1.80
Single power take-off, upper: EC15RS DAWT EC20RS DAWT	2.90	3.0	2.50
Single power take-off, lower: EC15RS DAWB EC20RS DAWB	2.35	2.30	1.90
Single power take-off, without gear ratio: EC10RS DBW	0.90	0.85	0.70



### **Fill volume at oil change**

When changing oil, 80% of the factory-filled volume must be filled.

Example calculation:

Factory-filled oil volume:

Rotation angle: 24°, Basic volume: 16.6 litres + Additional oil volume,  
Double power take-off: 1.80 litres + Additional oil volume, regardless of  
installation, Length of electric machine 180 mm: 0.25 litres.

$16.6 + 1.80 + 0.25 = 18.65 =$  Factory-filled oil volume:

80% of factory-filled oil volume:

$18,65 \times 0,80 = 14,92$ . The unit must be filled with 14.92 litres.



## Retarder, Scania

### Oil volumes and oil grades

All volumes are approximate. Check the levels and fill as necessary.

Information about retarders for ZF and Allison is available along with the specification for each gearbox.

It is permitted to mix engine oil and STO Retarder oil. It is then the oil with the shortest change interval that determines when the oil should be changed.

It is *not* recommended to mix oil grade ATF (Automatic transmission fluid) with oil grade STO Retarder or engine oil.

#### **IMPORTANT!**

ATF or engine oil that does not comply with the oil grade requirements can disrupt the operation of the retarder.

The ducts can become clogged with sludge.

Type	Volume (litres)	Factory filling
Scania Retarder type 1	During oil change incl. filter: 5 Total volume: 7.5	-
Scania Retarder type 2 (R3500, R4100, R4100D, R4700D)	During oil change incl. filter: 7.7 Total volume: 7.9	STO Retarder



## Axles and hubs

### ☰ Oil volumes and oil grades

All volumes are approximate. Check the levels and fill as necessary.

Component	Type	Volume in litres	Factory filling
Central gear	R560/660/665/780/782	12.5	STO 2:0 A
	R753/885	13.0	
	RP731	13.5	
	RP735	9.0	
	RP736	10.5	
	R756 Flat axle housing	10.5	
	R716/R756 Round axle housing	11.7	
	RP835	9.3	
	RP900	11.0	
Central gear	RB660/662	14.0	STO 2:0 A
	RB756 Flat axle housing	16.4	
	RB756 Round axle housing	17.6	
	RBP731	17.0	
	RBP735	11.7	
	RBP736/835	12.0	
	RB885	16.5	
	RBP900	14.0	
Hub reduction gears	RH731	0.8	STO 2:0 A
	H7HF	0.6	
	RH735/835/835i/H9SR H7HR/H7SR/H8HR/ H8SR	2.0	
Powered front axle	AMD601	11.2	STO 2:0 A



Component	Type	Volume in litres	Factory filling
Portal axle ZF <sup>1,2</sup>	AD 450 SA (Scania) / AV 133 EP (with efficiency package) (ZF)	See type plate	ZF EcoFluid XL SAE 75W-85
	ADA 1250/ 1251 (Scania) / AV series (ZF)	See type plate	ZF EcoFluid X SAE 80W-90

1. ZF's list of lubricants can be downloaded from the ZF website. Search for the web address: <https://aftermarket.zf.com/en/aftermarket-portal/>. The current data sheet from ZF is called TE-ML 12.

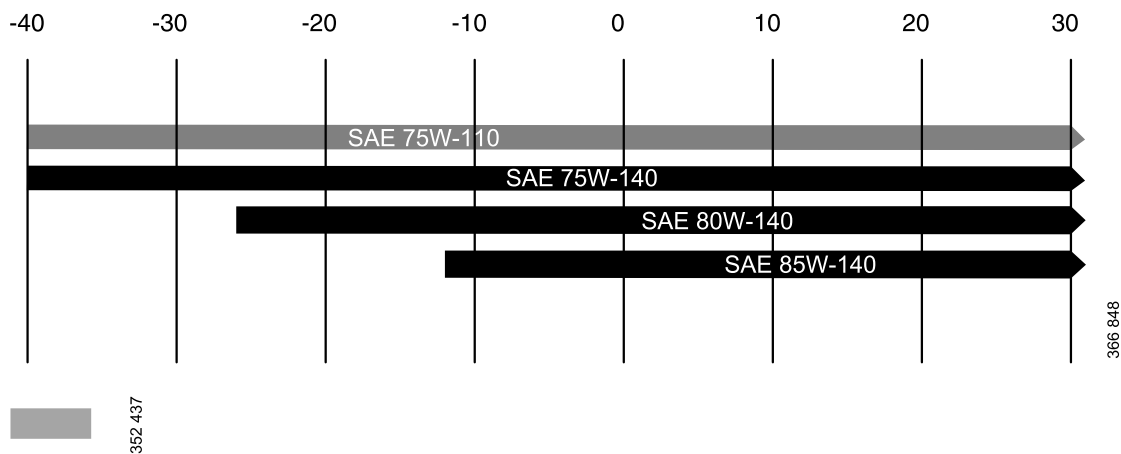
2. Oil must be used for shaft ADA 450 SA according to classification 12F. This classification is specified in ZF documentation, document TE-ML 12. Use the ZF web address in note 1.

## ☰ Viscosity class requirements, all operation types

### ! IMPORTANT!

Check that the oil is suitable for all variations in ambient temperature that are likely to occur before the next oil change.

The viscosity classes in the figure below may be used in all operation types.



Only applies to oils approved in accordance with STO 2:0 A.

## Permitted viscosity classes, operation type 0:0, 0 and 1

### ! IMPORTANT!

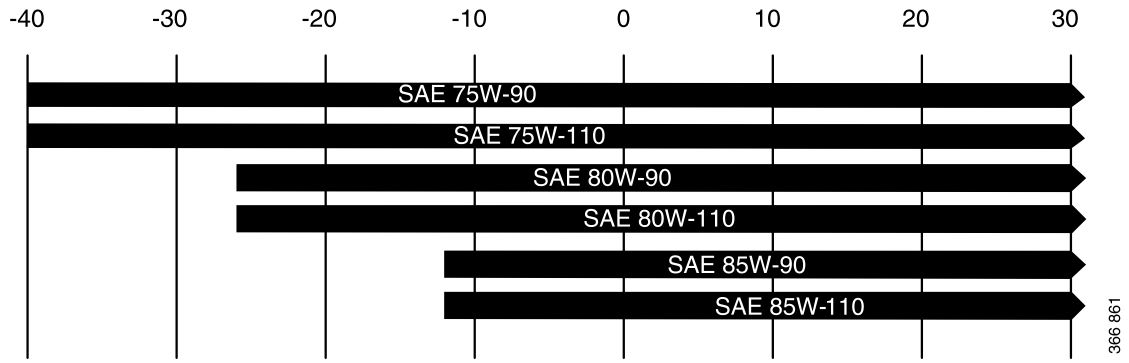
Check that the oil is suitable for all variations in ambient temperature that are likely to occur before the next oil change.

The viscosity classes in the figure below must only be used in operation types 0:0, 0 and 1 for trucks and in operation type 1 for buses.

Check the oil grade for which the axle in question is approved. See the preface for trucks and buses, Transmission section.



# Transmission



366 861



# Chassis

## Oil grade for components

Component: Type	Volume	Oil grade
Power steering		ATF Dexron II, Dexron III
Tag axle steering		ATF Dexron III
Tag axle lift		At temperatures > -20°C: Hydraulic oil ISO VG 22/32 or automatic transmission fluid type Dexron II, Dexron III or Dexron VI. At temperatures < -20°C: Hydraulic oil with max. 1,500 cSt at -40°C.
Cab tilt pump, mechanical: P, G, R and T series		At temperatures > -20°C: Hydraulic oil ISO VG 22/32 or automatic transmission fluid type Dexron II, Dexron III or Dexron VI. At temperatures < -20°C: Hydraulic oil with max. 1,500 cSt at -40°C.
Cab tilt pump, mechanical and electric: P, G, R and S series		Pentosin CHF202
Hydraulic system: Tail-lift		ISO VG 22 and VG 32, ISO 11158 HV and DIN 51524 HVLP.
Hydraulic system for tractor	180 L	
Hydraulic system: 2-way tipper truck, LOHR (10.5 <sup>3</sup> )	approx. 47 L	HV 46 DIN 51 524 HVLP
Hydraulic system: 2-way tipper truck, CIF (10.5 <sup>3</sup> )	approx. 55 L	HV 46 DIN 51 524 HVLP
Hydraulic system: Rear tipper truck (15 m <sup>3</sup> , 16 m <sup>3</sup> , 20 m <sup>3</sup> )	6x4 and 6x6: approx. 52 L. 8x4: approx. 79 L	ISO VG 15 (-40°C to -10°C) ISO VG 22 (Northern Europe) ISO VG 32 (Southern Europe) ISO VG 46 (+40°C to +50°C)
Hydraulic system: Rear tipper truck (18 m <sup>3</sup> )	approx. 79 L	ISO VG 15 (-40°C to -10°C) ISO VG 22 (Northern Europe) ISO VG 32 (Southern Europe) ISO VG 46 (+40°C to +50°C)
Hydraulic system: Rear tipper truck (12m <sup>3</sup> )	approx. 100 L	ISO VG 15 (-40°C to -10°C) ISO VG 22 (Northern Europe) ISO VG 32 (Southern Europe) ISO VG 46 (+40°C to +50°C)



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## Washer fluid

Component - fluid	Liquid	Comment
Washer container	Ethanol (maximum 40 per cent)	During sub-zero periods, max. 40% of ethanol should be added to the washer container. Higher concentrations may damage the paint finish.



## Lubricant for components

### ! IMPORTANT!

use grease of the quality level and type defined by Scania.

Incorrect grease, or poorer quality grease, can lead to damage to components.

Because lubricating grease is not a liquid, its viscosity class cannot be stated in the same way as that of oils. Grease has therefore been given a separate classification by the American NLGI (National Lubrication Grease Institute) which categorises grease into different classes, covering semi-fluid to the almost totally solid.

Type of equipment.	Lubricant	Comment
Chassis lubrication, Tail lift, Bus body	Vehicles with ACL: Lithium grease with consistency of NLGI 0-2 Vehicles without ACL: Lithium grease with a consistency of NLGI 2	see in the chapter <i>Lubricating grease for chassis</i> for more information on fat quality.
Box truck	Lithium grease	
Wheel hubs	Lithium complex grease with a consistency of NLGI 2	See in the chapter <i>Grease for wheel bearings</i> for more information on fat quality.
Wheel hub, BPW axle	Grease that meets the specification for wheel bearing grease. Scania standard 8371W	
brake system	Special grease part no. 1 547 556	Grease for the brake shoe anchor bolt bearings.
Propeller shaft	See the recommended product in Scania SWS under the heading <i>00 General/00-00 Vehicle, assembly – Chemicals</i> Scania part. no. (depending on size of package) 2428584, 2428600 or 2428595	for the lubrication of things like sliding joints and pivot bearings.
2-way tipper truck: LOHR, CIF	Lithium grease	
Rear tipper truck: 12 m <sup>3</sup> , 15 m <sup>3</sup> , 16 m <sup>3</sup> , 18 m <sup>3</sup> , 20 m <sup>3</sup>	Lithium grease	See in the chapter <i>Lubricating grease for chassis</i> Lubricating grease for chassis
Concrete mixer truck	Lithium grease with a consistency of NLGI 2	
<b>Grease grade for specified equipment</b>		
<i>Windscreen wipers</i> OmniExpress	Lithium grease with a consistency of NLGI 2	See Chassis lubricating grease for further information on grease quality
<i>Fuel filter</i> New DC13 engine (One rocker cover)	Grease, Scania part. no. 2675379	Selecting the wrong grease grade can lead to a risk of leakage.



## Chassis

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Type of equipment.	Lubricant	Comment
<i>Cylinder liner O-ring</i>	Grease, Scania part. no. 2884923	If the O-ring is greased with the wrong grease grade, this may lead to corrosion on the cylinder.
<i>Gearbox type designation GXX (latest series)</i> Upkeep of the rear and front valve actuator.	Grease, Scania part. no. 2858762	Incorrect grease, or poorer quality grease, can lead to damage to components.
Components in different brake systems: <i>Input shaft brake, layshaft brake and planetary brake</i>	Grease, Scania part. no. 2858762	Incorrect grease, or poorer quality grease, can lead to damage to components.



## Specifications for lubricating grease

### Chassis lubricating grease

Lubricating grease 8371C in accordance with this standard is used for various lubrication points on the chassis. The grease must not contain any lumps or solid particles that could affect its use.

Temperature range: -30°C to +100°C.

### Requirements and testing standards

Characteristics	Requirement	Testing method	Remarks
Thickening agent	Lithium	Thickening agents other than lithium are permitted provided that all other stipulated requirements of the standard are satisfied. Relevant information should be provided by the supplier to prevent grease with different thickening agents from being mixed together.	
Base oil viscosity at +40°C	Min. 150 mm <sup>2</sup> /s	ISO 3104/ASTM D445	1 mm <sup>2</sup> /s = 1 cSt
Penetration at +25°C, worked 60 times	265-295 <sup>1</sup>	ISO 2137/ASTM D217	Complies with NLGI class 2
Penetration at +25°C, worked 100,000 times	Max. + 60°C	ISO 2137/ASTM D217	
Corrosion protection (SKF Emscor Test), distilled water	0-0	IP 220/ISO 11007/DIN 51802	
Water content	Max. 0.1 g/100 g	ISO 3733/ASTM D95	

1. Grease with a looser consistency (NLGI 0-2) can also be used for ACL units. Check that the grease meets all other requirements from the ACL unit manufacturer.

Characteristics	Requirement	Testing method	Remarks
Melting point	Min. 180°C	ISO 2176/ASTM D566	
Oil separation 168 h/ 40°C	1-5% by weight	IP 121/ASTM D1742/ DIN 51817	
EP performance: 4-ball test, weld load	Min. 2,500 N	DIN 51350-4	
EP performance: 4-ball test, wear mark 1h/400 N	Max. 0.8 mm	DIN 51350-5	
Water wash-out 1 h/80° C	Max. 10% by weight	ASTM D1264	
Flow pressure at lowest usage temperature	Max. 1,400 mbar	DIN 51805	Requirement only applies to lubricating grease for ACL units.



### **Testing standards for ACL**

Lubrication points receive a greater amount of washing action when lubricating grease of NLGI class 0, 00 and 000 is used.

Such grease should therefore only be used when absolutely necessary, for instance when temperatures are unfavourable.



## Wheel bearing lubricating grease

According to this standard, lubricating grease 8371W is used as rolling bearing grease, e.g. when lubricating wheel bearings.

The grease must not contain any lumps or solid particles that could affect its use.

Temperature range: -30°C to +140°C

Properties/ Parameters	Requirement	Test methods	Remarks
Thickening agent	Lithium complex	Thickening agents other than lithium complex are permitted provided that all other stipulated requirements of the standard are met. Relevant information should be provided by the supplier to prevent grease with different thickening agents from being mixed together.	
Base oil viscosity at +40°C	Min. 150 mm <sup>2</sup> /s	ISO 3104/ASTM D445	1 mm <sup>2</sup> /s = 1 cSt
Penetration at +25°C, worked 60 times	265-295 or 245-275	ISO 2137/ASTM D217	Complies with NLGI class 2 or 2.5
Shell Roll stability 50 h/ 80°C	Max. +70	ASTM D1831	
Corrosion protection (SKF Emscor Test), distilled water	0-0	IP 220/ISO 11007/DIN 51802	
Roller bearing lubrication <sup>1</sup>	APPROVED	SKF R2F, test A and test B (140°C)	Alternative to DIN 51819-2 See note <sup>1</sup> .
FE8, 750 rpm, 30 kN, 160°C, taper roller bearing <sup>1</sup>  wear roller (mw) wear bearing retainer (mk)	  mw < 50 mg mk < 100 mg	DIN 51819-2 (FAG test rig FE8)	Alternative to SKF R2F, see note <sup>1</sup> .

1. Only one of the two test methods needs to be carried out.

Properties/ Parameters	Requirement	Test methods	Remarks
Water content	Max. 0.1 g/100 g	ISO 3733/ASTM D95	
Melting point	Min 250°C	ISO 2176/ASTM D566	
Oil separation 168 h/ 40°C	1-5% by weight	IP 121/ASTM D1742/ DIN 51817	
Water wash-out 1 h/80° C	Max. 10% by weight	ASTM D1264	
EP performance: 4-ball test, weld load	Min. 2,500 N	DIN 51350-4	



## Chassis

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Properties/ Parameters	Requirement	Test methods	Remarks
EP performance: 4-ball test, wear mark 1h/ 400 N	Max 0.8 mm	DIN 51350-5	
Low temperature performance, torque at -40°C	Max. 15.5 Nm	ASTM D4693	