



S E R V I C E

**AIR CONDITIONING  
COMPRESSOR OIL**



**PAG, PAO AND POE OILS**

# THERE ARE LOTS OF OILS AVAILABLE, WHICH ONE IS RECOMMENDED?

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## **Oil plays an important role in the air-conditioning system,**

no matter whether it's required when the compressor is replaced or for refilling during the air-conditioning service. Like blood in the human body, the oil fulfills vital tasks in the air-conditioning system.

The use of high-grade compressor oil is therefore critical for the reliable and continuous operation of the system. The use of low-quality or even the wrong oil – just like with the engine – leads to increased wear, premature compressor failure, and loss of warranty/guarantee.

### **Note:**

Using the wrong oil can cause damage. Vehicle and manufacturer-specific information must therefore be observed accordingly.

## PAG OIL

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### Product characteristics

- Fully synthetic, hygroscopic oils based on polyalkylene glycol
- Used by many vehicle and compressor manufacturers for air-conditioning systems intended for the refrigerant R134a, this oil is available in a variety of viscosities
- New special PAG oils 46 YF and 100 YF, both suitable for refrigerants R1234yf or 134a

### Advantages/Effect

- PAG oils are highly miscible with R134a (PAG oils 46 YF and 100 YF also with R1234yf) and are suitable for lubricating the air conditioning systems of most passenger and commercial vehicles.
- The choice of the right viscosity is crucial when using PAG oils (PAG 46, PAG 100, PAG 150). The vehicle manufacturer's specifications and approved products should be observed.



### Additional details

The disadvantage of PAG oils is that they are hygroscopic, i.e. they absorb and bind moisture from the ambient air. This is why opened oil containers must be resealed immediately and the residual oil only has a limited shelf life. This is particularly important for the fresh oil containers at the air conditioning service unit.



### Now also available

New PAG Oil SP-A2 from SANDEN for special, electrical SANDEN compressors.  
Article number 8FX 351 213-141.

# PAO OIL 68 AND PAO OIL 68 PLUS UV

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## Product characteristics

- Not hygroscopic: unlike other oils they do not absorb moisture from the air
- Can also replace the different PAG oils currently used (observe usage overview!): You now only need to stockpile one oil instead of three
- Has already been successfully used for over 15 years
- Contributes to an increase in air conditioning performance
- No adverse effects on components of the air conditioning cycle (also applies to use in air conditioning service stations / confirmed by manufacturer using the sealed tube test compliant with the ASHRAE 97 standard)
- This oil is available with (PAO oil 68 Plus UV) or without (PAO oil 68) an added contrast agent
- Using PAO oil 68 and PAO oil 68 Plus UV in compressors from Behr Hella Service maintains your full warranty entitlement.

## Advantages/Effect

### PAO Oil 68

- Only a little oil circulates in the system because it combines only slightly with the refrigerant
- As much as possible remains in the compressor – where the oil is needed
- The oil film inside the components makes for a better seal and reduces friction between the moving parts of the compressor
- Lower operating temperature and wear
- This increases operational reliability and reduces noise, cycle times and the compressor's energy consumption

### PAO Oil 68 Plus UV

- The same positive characteristics as PAO oil 68
- In addition, it incorporates a highly effective contrast agent for UV leak detection
- Low percentage volume concentration of the contrast agent with the following advantages: preserves the oil's positive properties and avoids negative effects on system components or servicing equipment
- Suitable for use as the sole oil for filling the entire system, with no negative effects

## Additional details

### Is PAO Oil 68 compatible with other oils?

- PAO Oil 68 doesn't have any harmful effects on fluoroelastomer materials, such as hoses.
- Since PAO Oil 68 is compatible with many other lubricants and refrigerants, PAO Oil 68 can be used both for refilling and to replace the whole system oil capacity. Due to the independent molecular structure and density, PAO Oil 68 mixes to a certain extent with other oils, but separates from them again when it "comes to rest", and does not enter into a longer-term compound.
- This guarantees that the necessary viscosity of the oils is maintained and there is no change in the overall viscosity (see Figs 1 and 2).

**The clear version of PAO oil 68 (without leak detecting agent) is also suitable for use with R1234yf and approved for use in electrical compressors in hybrid vehicles.**



#### How was PAO Oil 68 Plus UV tested?

- PAO oil 68 Plus UV has been tested by the manufacturer and by independent institutes. For example, its chemical stability was established using the “sealed tube test” in compliance with the ASHRAE 97 standard. This test evaluates the interaction between the refrigerant, the refrigerant oil, the various O-ring materials and the metals that are used in air conditioning systems.
- All the tests showed a positive result, confirming that negative effects on components in the vehicle air-conditioning system or the air-conditioning service station can be excluded. PAO oil 68 Plus UV can thus be filled directly into a component such as a compressor, or introduced into the refrigerant circuit by the air-conditioning service station.

#### Can PAO Oil 68 be used where there are humidity problems?

- PAO-Oil 68 is not hygroscopic, i.e. unlike other oils, it does not absorb moisture from the ambient air. This means that humidity-related problems, e.g. icing on components or the formation of acids, can be combated simply by using PAO Oil 68. The range of possible applications and the storage stability of PAO Oil 68 are both much greater than for conventional oils.

#### Special features and properties?

- No risk of oil collecting in the evaporator and the associated deterioration in cooling performance
- An oil film in the components improves the seal
- Reduction of the friction between the components
- Reduced energy consumption of the compressor
- Unique combination of highly refined, synthetic oil and special performance-enhancing additives
- Very large operating temperature range (–68 to 315°C)
- Low Vol %-concentration of the highly active contrast agent PAO Oil 68 Plus UV, which means protection and reduced wear of the system components and service units

PAG and PAO Oil 68 mixed



PAG and PAO Oil 68 separated



# POE OILS

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## Product characteristics

Electric air conditioning compressors in hybrid vehicles are powered by an internal electric motor that operates in the high voltage range. The compressor oil in these compressors comes into contact with the electric motor coil, amongst other things. As such, it has to satisfy particular requirements:

- It must not have any adverse effect on the materials used in the compressor.
- It must be resistant to electrical short circuits to a certain degree.

The POE Oil offered by Behr Hella Service satisfies these requirements.

## Advantages/Effect

- Can be used on all hybrid vehicles with electrical compressor that are filled with POE Oil at the factory.
- Bottled in "spotgun" cartridges, which gives it maximum protection against moisture (Problem: POE Oil is hygroscopic).



## Additional details

- Using the spotgun (cartridge press), it can either be filled directly into the system (with the aid of an adapter hose with low-pressure connection) or into the oil tank on the air-conditioning service unit
- Spotgun cartridge 120 ml
- Each individual cartridge is sealed in an aluminium sachet
- The aluminium bag also contains a smaller bag with desiccant (drying pellets) to optimally protect the oil against moisture.



## THE OILS IN COMPARISON

Type of oil	Application	Remark
<b>PAG Oils</b> for refrigerant R134a	Different grades of PAG Oil with different flow properties (viscosities) are available for use with refrigerant R134a. As PAG Oils are hygroscopic, cans do not have a long shelf life once opened.	Standard PAG Oils are not suitable for refrigerant R1234yf or for electrically powered air conditioning compressors
<b>PAG Oil YF</b> for refrigerant R1234yf	Different PAG oils with different flow properties (viscosities) are still available for use with refrigerant R1234yf. What makes these PAG oils from Behr Hella Service so special, is that they are not only suitable for use with R1234yf, but can also be used with the refrigerant R134a. As PAG Oils are hygroscopic, cans do not have a long shelf life once opened.	PAG oil YF is suitable for both of the refrigerants R1234yf and R134a
<b>PAG Oil SP-A2</b> for refrigerant R1234yf and R134a	For use in electrical compressors, e.g. those manufactured by SANDEN, VISTEON and HANON.	
<b>PAO Oil</b> for refrigerant R134a, to some extent for refrigerant <b>R1234yf</b> and other refrigerants	Can be used as an alternative to the various PAG oils that are offered for R134a (has the advantage of not being hygroscopic, i.e. unlike other oils, it does not absorb moisture from the ambient air). The 2 different grades of PAO Oil that Behr Hella Service offers (AA1 and AA3) can be used in conjunction with numerous different refrigerants (see product overview).	<b>PAO oil AA1 clear version (without leak detecting agent) can also be used with the new refrigerant R1234yf and also in electrically-driven compressors in hybrid vehicles.</b>
<b>POE Oils</b> for refrigerant R134a	Can be used on all hybrid vehicles with electrical compressor that are filled with POE Oil at the factory (some electrically powered compressors for hybrid vehicles are also filled with special PAG Oil at the factory).	Not suitable for refrigerant R1234yf

# FROM OIL TYPE TO COMPRESSOR TYPE

Part number	Product	Viscosity Class	Contents	Can be used for refrigerant	Can be used for	Can be used for compressor types
<b>8FX 351 213-031</b>	PAG Oil	ISO 46	240 ml	R134a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types except electrically driven compressors
<b>8FX 351 213-041</b>	PAG Oil	ISO 150	240 ml	R134a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types except electrically driven compressors
<b>8FX 351 213-051</b>	PAG Oil	ISO 100	240 ml	R134a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types except electrically driven compressors
<b>8FX 351 213-061</b>	PAG oil Spotgun cartridge	ISO 46	240 ml	R134a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types except electrically driven compressors
<b>8FX 351 213-071</b>	PAG oil Spotgun cartridge	ISO 150	240 ml	R134a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types except electrically driven compressors
<b>8FX 351 213-081</b>	PAG oil Spotgun cartridge	ISO 100	240 ml	R134a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types except electrically driven compressors
<b>8FX 351 213-111</b>	POE Oil spotgun cartridge	ISO 46	120 ml	R134a	Air conditioning systems in hybrid vehicles	Electrically driven compressors
<b>8FX 351 213-121</b>	PAG Oil YF	ISO 46	240 ml	R1234yf; R134a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types except electrically driven compressors
<b>8FX 351 213-131</b>	PAG Oil YF	ISO 100	240 ml	R1234yf; R134a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types except electrically driven compressors



Part number	Product	Viscosity Class	Contents	Can be used for refrigerant	Can be used for	Can be used for compressor types
8FX 351 213-141	PAG Oil SP-A2	ISO 46	250 ml	R1234yf; R134a	Air-conditioning systems in vehicles with hybrid drive or fully electric vehicles	Electrical compressors e.g. manufactured by SANDEN, VISTEON and HANON.
8FX 351 214-021	PAO AA1 clear version	ISO 68	1,000 ml	R1234yf; R134a; R413a; R22; R12; R507a; R500; R502	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types (including electrically driven compressors) except vane compressors
8FX 351 214-031	PAO AA1 clear version	ISO 68	500 ml		Air conditioning systems in hybrid vehicles	
8FX 351 214-101	PAO AA1 clear version	ISO 68	5,000 ml		Air-conditioning systems in refrigerated trucks	
8FX 351 214-201	PAO AA1 PLUS UV	ISO 68	500 ml	R134a; R413a; R22; R12; R507a; R500; R502	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	All compressor types except vane compressors
8FX 351 214-211	PAO AA1 PLUS UV	ISO 68	1,000ml		Air-conditioning systems in refrigerated trucks	
8FX 351 214-221	PAO AA1 PLUS UV	ISO 68	5,000 ml			
8FX 351 214-081	PAO AA3 clear version	ISO 100	1,000ml	R1234yf; R134a; R413a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	Especially for vane compressors
8FX 351 214-281	PAO AA3 PLUS UV	ISO 100	1,000ml	R134a; R413a	Air-conditioning systems in vehicles with conventional gasoline or diesel engines (passenger cars, trucks, agricultural and construction vehicles)	Especially for vane compressors

# PRODUCT OVERVIEW

Product	Application	Compressor type	Refrigerant	Viscosity Class	Contents	Part number
<b>PAG Oil (can)</b>	Vehicle air conditioning systems*	All types**	R134a	PAG I (ISO 46)	240 ml	<b>8FX 351 213-031</b>
	Vehicle air conditioning systems*	All types**	R134a	PAG II (ISO 100)	240 ml	<b>8FX 351 213-051</b>
	Vehicle air conditioning systems*	All types**	R134a	PAG III (ISO 150)	240 ml	<b>8FX 351 213-041</b>
<b>PAG Oil (spotgun cartridge)</b>	Vehicle air conditioning systems*	All types**	R134a	PAG I (ISO 46)	240 ml	<b>8FX 351 213-061</b>
	Vehicle air conditioning systems*	All types**	R134a	PAG II (ISO 100)	240 ml	<b>8FX 351 213-081</b>
	Vehicle air conditioning systems*	All types**	R134a	PAG III (ISO 150)	240 ml	<b>8FX 351 213-071</b>
<b>PAG Oil YF</b>	Vehicle air conditioning systems*	All types**	R1234yf, R134a	PAG I (ISO 46)	240 ml	<b>8FX 351 213-121</b>
	Vehicle air conditioning systems*	All types**	R1234yf, R134a	PAG II (ISO 100)	240 ml	<b>8FX 351 213-131</b>
<b>PAG Oil SP-A2</b>	Hybrid vehicles / electric vehicles	Electric compressors	R1234yf; R134a	PAG (ISO 46)	250 ml	<b>8FX 351 213-141</b>
<b>PAO Oil 68</b>	Vehicle air conditioning systems*	All types (except impeller type)	R1234yf, R134a, R413a, R22	AA1 (ISO 68) AA1 (ISO 68) AA1 (ISO 68)	500 ml 1.0 l 5.0 l	<b>8FX 351 214-031</b> <b>8FX 351 214-021</b> <b>8FX 351 214-101</b>
	Hybrid vehicles	Electric compressors	R1234yf, R134a			
	Refrigerator trucks (fresh product vehicles)	Piston compressors**	R1234yf, R134a, R507a, R500			
	Refrigerator trucks (frozen product vehicles)	Piston compressors**	R507a, R502, R22			
	Vehicle air conditioning systems*	Impeller-type compressors**	R134a, R413a	AA3 (ISO 100)	1.0 l	<b>8FX 351 214-081</b>
<b>PAO Oil 68 Plus UV</b>	Vehicle air conditioning systems*	All types** (except impeller type)	R134a, R413a, R22	AA1 (ISO 68) AA1 (ISO 68) AA1 (ISO 68)	500 ml 1.0 l 5.0 l	<b>8FX 351 214-201</b> <b>8FX 351 214-211</b> <b>8FX 351 214-221</b>
	Refrigerator trucks (fresh product vehicles)	Piston compressors**	R134a, R507a, R500			
	Refrigerator trucks (frozen product vehicles)	Piston compressors**	R507a, R502, R22			
	Vehicle air conditioning systems*	Impeller-type compressors**	R134a, R413a	AA3 (ISO 100)	1,0 l	<b>8FX 351 214-281</b>
<b>POE Oils</b>	Hybrid vehicles	Electric compressors	R134a		120 ml	<b>8FX 351 213-111</b>

\* Passenger cars, trucks, agricultural and construction machinery

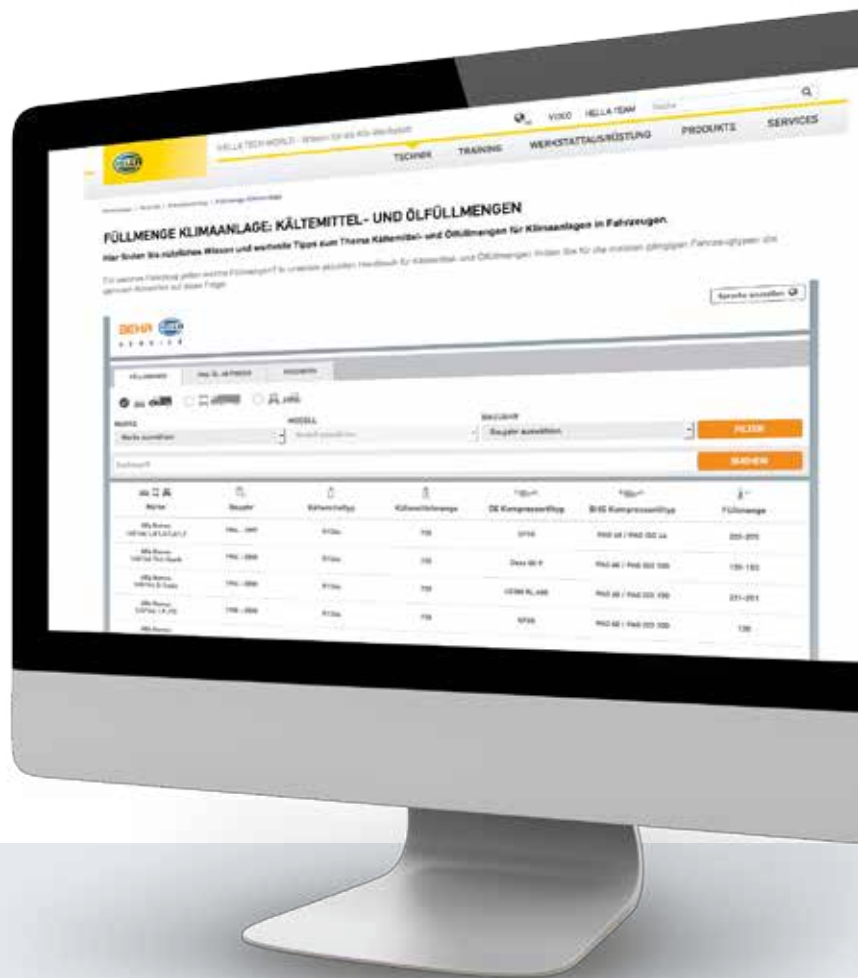
\*\* Except electric compressors

# FINDING THE RIGHT OIL QUICKLY AND SIMPLY

Find out more about our oils and which oil goes with which compressor in our compressor app or in the HELLA TECH WORLD.



HELLA TECH WORLD



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