

BB00.40-P-0231-00A	General gear oils		
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MODEL ALL

General

The approved transmission oils for MB vehicles are classified according to their use in:

Hypoid gear oils Sheet 235.0/.6/.7/.8/.9/.15/.20/.31/.61/.62

Transmission oils Sheet 235.1/.4/.5/.10/.11/.12/.13/ . 27/.28/.29/.41/.71/.72/.74

Automatic transmission fluids (ATF) Sheet 236.1/.2/.3/.6/.7/.8/.9/.10/.11/.12/.13/.14/15/.16/.20/.21/.25/. 26/.41/.81/.91

Frequently the transmission oils fulfill multifunctional requirements, which is why they are used in a wide variety of transmission designs and hydraulic systems. However,

where very specific technological properties of the transmission oil are required, special transmission oils had to be formulated for these major assemblies which are listed on separate sheets of the MB-Specifications for Operating Fluids and explain the large number of sheets for transmission oils.

The Mercedes-Benz standard for the corresponding lubricant quality and its area of application for assemblies installed in MB vehicles are documented in the various sheets.

The overviews on Sheets 231.1/.2/.3 provide the allocation of the respective Specifications for Operating Fluids (lubricant quality) to their use in the respective assemblies.

Requests

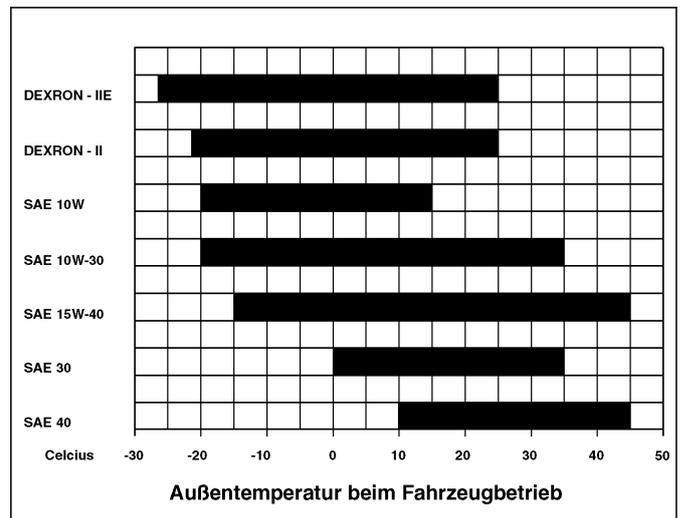
Gear oils are, like all lubricants, design-specific materials which only fulfill their task best if they are perfectly matched to the materials in tribological contact with them.

These specific material requirements can be subdivided into structural, technological and material requirements and are the primary properties that vehicle gear oils have to fulfill.

The general requirements, which are not any less important, are classified into shelf life, environmental compatibility, worldwide availability, economy and the constant quality of the guaranteed lubricant properties, which must meet the Mercedes-Benz standards worldwide.



If prior to starting the vehicle the gear oil temperature is below the critical temperature for the oil used, then either the gear oil should be prewarmed or the transmission should be warmed up while in neutral.



P00.40-0208-11

Disposal

All approved transmission oils, either fresh oil or used oil, are valuable substances which can be reused using the

appropriate recycling method for the material. The detailed disposal methods can be found in the waste guidelines for the countries.

1 Hypoid gear oils

Hypoid gear oils contain a high level of EP/AW additives (Extreme Pressure/Antiwear) and a highly viscous base oil to prevent seizure when the hypoid gears mesh (mixed and boundary friction conditions) and to ensure a high degree of protection against wear. The compatibility with radial shaft sealing rings is regarded as critical with such high concentrations of additives because the P/S additive systems become thermally unstable at temperatures from 130 °C to 140 °C and this may lead to sludging of the hypoid oil. The resultant deposits on the radial shaft sealing rings then generally lead to thermal overload and this in turn leads to leakage of this component.

The tooth engagement conditions of the hypoid gears result in a high proportion of sliding and a low hydrodynamic proportion of tooth engagement between the pinion and ring gear. Due to the high tribological load compared to adhesive wear (seizure) and pitting, the performance of hypoid gear oils must be particularly high with respect to these types of wear. The formula of the oils is therefore determined by a high concentration of EP/AW additives and a highly viscous base oil. Alternative oils, e.g. engine oils, cannot be used for these drive types. Proof of performance that an oil fulfills the requirements of Daimler AG is provided by internal tests. However, the hypoid gear oils must at least correspond to the US military specification MIL-L-2105 B/C/D and must be classed GL-5 in the quality grade according to API (American Institute of Petroleum).

1.1 Viscosity requirements

The cold flow behavior is only specified for SAE 75W-, 85W-... oils. Here, the limits according to SAE J 306 c apply, according to which the dynamic viscosity may be max. 150,000 mPa at -40 °C for 75W-oils and at -12 °C for 85W-oils. As a result of the tendency to form deposits in the transmission, the polymer content is limited to max. 1 percent by weight for pour point reducers. Polymers as VI improvers for thickening low-viscosity base oils are not permitted.

2 Transmission oils, **sheet 235.1**

The additive and viscosity properties of the transmission oils are adjusted so that they meet all the requirements placed on manual transmissions with steel/molybdenum synchronization, spur gear axles, MB and ZF transfer cases and reversing gears. Among other things, this results in the fact that the oils ensure a defined friction coefficient of the synchronizer elements, even after a high number of shift operations, without crunching noises. With gear drives and roller bearings, the

adhesive wear (seizure) and pitting in particular should be minimized as much as possible.

2.1 Viscosity requirements

The cold flow behavior is only specified for SAE 75W-, 80W, 85W-... oils. Here, the limits according to SAE J 306 c apply, according to which the dynamic viscosity may be max. 150,000 mPa at -40 °C for 75W-oils, at -26 °C for 80W-oils and at -12 °C for 85W-oils.

Due to the formation of deposits in the transmission, the polymer content is limited to max. 1 percent by weight for pour point reducers. Polymers as VI improvers for thickening low-viscosity base oils are not permitted. The kinematic viscosity at 100 °C must be at least 9.5 mm²/s. In hot zones, gear oils of SAE grade 90 are also permitted.

2.2 **Alternative transmission lubricants** for commercial vehicle synchromesh transmissions which are operated with transmission oils as per Sheet 235.1, 235.5.

If there are no gear oils according to Sheet 235.1 and 235.5 available, the following engine oils can also be used as alternatives:

In a moderate climate, engine oil of SAE-grade 30 as per Sheet 235.12

In tropical climate, engine oil of SAE-grade 40 as per Sheet 235.12

2.3 Fully synthetic transmission oil, **sheet 235.4**

The fully synthetic transmission oils are compulsory for the Unimog manual transmission UG3/40, UG3/65, UG100 and the PTO shaft transmission – as of the vehicle end no. ...179909. Older vehicles can have their oils changed from gear oils according to Sheet 235.1 to gear oils according to Sheet 235.4 when an oil change is due.

The transmission oils correspond to the ZF lubricant specifications TE-ML01 and TE-ML02 and are consequently alternatives to the transmission oils according to Sheet 235.1 in all synchronized ZF manual transmissions installed in MB vehicles, with and without intertarders. Furthermore, the approval extends to the MB transfer case VG 2400 without oil cooler.

Due to the favorable viscosity/temperature characteristics, a good cold-shifting response and, due to the composition of the transmission oil, a good thermal/oxidative stability of the oil at high transmission oil temperatures can be expected.

- 2.4 Transmission oils, **sheet 235.5**
 The transmission oils are approved for MB and ZF manual transmissions with steel/molybdenum synchronization, MB and ZF transfer cases and offset gearboxes.
 The transmission oils have a low chlorine content as well as a potential for lower oil temperatures under certain operating conditions.
- 2.5 Transmission oils, **sheet 235.10**
 The partially synthetic transmission oils are approved for the commercial vehicle manual transmission model G16/G28, the passenger car front-wheel drive manual transmission SG 150/180 and all passenger car transmissions 717.4 as of transmission serial number 7 340 241.
 Due to the favorable viscosity/temperature characteristics, a very good cold-shifting response and, due to the composition of the transmission oil, a good thermal/oxidative stability of the oil at high transmission oil temperatures can be expected.
 With regard to the use in passenger car manual transmissions, which are also installed in cross-country vehicles, the approved gear oil is usually only used in the event of repairs or for service fills.
- 2.6 Transmission oils, **sheet 235.11**

 Transmission oils in accordance with sheet 235.11 must not be used for Unimog and MB-trac transmissions.
 The fully synthetic transmission oils are approved for all MB commercial vehicle manual transmissions installed in MB vehicles with steel/molybdenum synchronization with and without oil coolers, in MB transfer cases with and without oil coolers as well as in ZF manual transmissions with steel/molybdenum synchronization.
 Due to the favorable viscosity/temperature characteristics, a good cold-shifting response and, due to the composition of the transmission oil, a good thermal/oxidative stability of the oil at a high transmission oil temperature as well as a fuel savings potential depending on the operating conditions can be expected.
- 2.7 Transmission oils, **sheet 235.12**
 The engine oils must be used with a common oil system for transmissions used in tropical countries, and for manual transmissions with a torque converter and clutch unit. These engine oils display the very high scuffing load capacity required for use in transmissions. The oils do not have to comply with the MB Specifications for Operating Fluids engine oil specifications regarding pour point.
- 2.8 Transmission oils, **sheet 235.13**
 Fully synthetic commercial vehicle transmission oil (for manual transmission)
- 2.9 Retarder oils, **sheet 235.27/28/29**
 Commercial vehicle retarder oils: The products specified in the table apply to commercial vehicle transmissions: see MB-Specifications for Operating Fluids 231.2. The engine oils are suitable for use with retarders. The oils do not have to comply with the MB-Specifications for Operating Fluids regarding pour point.
- 2.10 Transmission oils, **sheet 235.41**
- 2.11 Transmission oils, **sheet 235.71**
- 2.12 Transmission oils, **sheet 235.72**
- 2.13 Transmission oils, **sheet 235.74**

3 . Automatic transmission fluids (ATF), **Sheet 236.1/2/3/6/7/8/9/10/11/12/13/14/15/16/20/21/25/26/41/81/91**

ATFs are comparatively low-viscosity transmission oils which, due to their universal use potential as a transmission oil or a hydraulic fluid, can cover a wide spectrum of applications. The ATFs in the individual sheets differ essentially due to their inherent friction coefficients in tribological contact. This property makes these oils ideally suited for use as functional liquids for automatic transmissions, the shifting comfort of which is heavily influenced by the behavior of the friction value of the ATF, amongst other things. Therefore, to achieve optimum performance of the vehicles, only the ATF quality (sheet no.) assigned to the major assembly is to be used. The individual ATF qualities will be described in greater detail below.

3.1 Automatic transmission fluids (ATF), **sheet 236.1**

The approved ATFs correspond to the currently no longer valid GM specification Dexron II-D or the currently valid GM specification Dexron III.

The field of application of these ATFs include MB automatic transmissions without controlled torque converter lockup clutch in passenger cars, ZF Ecomat transmissions, Allison automatic transmissions, Voith-Diwa transmissions and MB automatic transmissions in commercial vehicles and buses except W4B035.

3.2 Automatic transmission fluids (ATF), **Sheet 236.2**, for MB passenger car and commercial vehicle transmissions with non-ferrous metal synchronization except A-class front-wheel drive manual transmissions (see section 2.5, sheet 235.10), Allison transmissions, commercial vehicle power steering, hydrostatic fan drive.

The ATF must meet all the requirements of the transmissions with nonferrous metal synchronization. These include, in particular, wear protection against pitting and seizure as well as a defined friction coefficient of the synchronizer components that is as constant as possible over the entire service life. As a hydraulic fluid, the ATF is used for hydraulic power transmission and as wear protection for the hydraulic unit.

The seal compatibility must be ensured with all elastomer materials installed. The approved ATFs according to Sheet 236.2 correspond to the no longer valid GM specification model A suffix A. The kinematic fresh oil viscosity at 100 °C must be at least 7.0 mm²/s, after

shearing (as per CEC- TLPG 7) at least 6.0 mm²/s.

3.3 Steering gear oil, **Sheet 236.3**, for all commercial vehicle steering systems, except vans T0 and T1N, power steering systems for cars, except S-Class W220, Power-Pack in the A-Class, and cross-country vehicles, manual steering systems L 075 Z for cars as well as manual steering systems in cross-country vehicles.

In the S-Class W220, in the Power-Pack of the A-Class as well as in vans T0 and T1N as of/ below outside temperatures of -25 °C the hydraulic fluids according to Sheet 345.0 must be used.

3.4 The Allison transmissions of the model series AT500, MT600, S1000, S2000 and the World Transmission of series 3000 and 4000 are only to be filled with oils according to Sheet 236.9/91 or TES 295.

3.5 Automatic transmission fluid (ATF), **Sheet 236.6 and 236.7**, for MB automatic transmissions without controlled torque converter lockup clutch in cars as well as in commercial vehicles and buses (W4B035 only as of major assy. end no. 005733), ZF Ecomat transmissions, Voith Diwa transmissions, commercial vehicle and cross-country vehicle power steering systems.

If the approved ATFs as per Sheet 236.2 are not available, ATFs as per Sheet 236.6 can be used in synchronized manual transmissions for cars as a makeshift measure, except GL 76/30-5 and GL 275E (ATF as per Sheet 236.2 is mandatory for the two sport transmissions).

The approved ATFs according to Sheet 236.6 and 236.7 correspond to the currently no longer valid GM specification Dexron II-D. The kinematic fresh oil viscosity at 100 °C must be at least 7.0 mm²/s, after shearing (as per CEC-TLPG 7) at least 6.0 mm²/s.

3.6 Automatic transmission fluid (ATF), **Sheet 236.8**, for ZF Ecomat transmissions, Voith-Diwa transmissions, MB automatic transmissions in commercial vehicles and buses except W4B035 and MB automatic transmissions without regulated torque converter lockup clutch in cars (only in arctic climates).

The approved ATFs correspond to the no longer valid GM specification Dexron II-E, Allison C4, Voith lubricant lists G 607 and G 1363 as well as ZF lubricant specifications TE-ML 14.

3.7 Automatic transmission fluids (ATF), **Sheet 236.9**, for MB automatic transmissions without regulated torque converter lockup clutch in cars,

- ZF Ecomat transmissions, Voith-Diwa transmissions, Allison transmissions.
- The ATFs correspond to the valid GM specification Dexron III, Voith lubricant lists G 607 and ZF lubricant specification TE-ML 14.
- 3.8 Automatic transmission fluid (ATF), **Sheet 236.10**, for MB automatic transmissions with and without regulated torque converter lockup clutch (KÜB) in cars. These ATFs are installed ex works as lifetime oil in all MB automatic transmissions 722.6 with regulated torque converter lockup clutch. For repair work, the ATF quality shown in sheet 236.10 may only be used for refilling in this new generation of automatic transmissions.
- All MB automatic transmissions without regulated torque converter lockup clutch in passenger cars can either be filled with the ATF as per Sheet 236.10 or the ATF as per Sheets 236.11/6/7/81/9.
- 3.9 Automatic transmission fluids (ATF), **Sheet 236.11**, for ZF automatic transmissions "ZF 4 HP 20" and automatic transmission oil circuit of VW automatic transmission "AG4"
- The approved ATFs are usually only used in the event of repairs or refills.
- 3.10 Automatic transmission fluids (ATF), **Sheet 236.12**, for 7-speed automatic transmission are also downwards compatible for all 5-speed automatic transmissions.
- 3.11 **Sheet 236.13**, repair solution for MB-automatic transmission without regulated torque converter lockup clutch in cars for the complaint "Jerks twice after initial engagement of gear range D".
- 3.12 Automatic transmission fluids (ATF), **Sheet 236.14**, for 5-speed automatic transmission 722.6, 7-speed automatic transmission 722.9 in combination with engine 629 irrespective of production period and the oil pan installed, 7-speed automatic transmission 722.9 up to transmission serial number 2834526 except vehicles with engine 629, 7-speed automatic transmission hybrid 724.2.
- 3.13 Automatic transmission fluids (ATF), **Sheet 236.15**, 7-speed automatic transmission 722.9 as of transmission serial number 2834527 with engine 113, 152, 156, 157, 275, 279, 7-speed automatic transmission 722.9 as of transmission serial number 2834527 except vehicles with engine 113, 152, 156, 157, 275, 279, 629.
- 3.14 Automatic transmission fluids (ATF), **Sheet 236.16**, for 9-speed automatic transmission 725.0
- 3.15 Automatic transmission fluids (ATF), **Sheet 236.20**, for CVT transmissions that are used in Mercedes-Benz A-Class and B-Class vehicles with CVT transmission, model 169, 245 with transmission 722.8
- 3.16 Transmission oils, **Sheet 236.21**, for 7-speed DCT transmission 724.0 in model 117, 156, 176, 242, 246.
- 3.17 Automatic transmission fluids (ATF), **Sheet 236.25**, for SLS hydraulic circuit
- 3.18 Automatic transmission fluids (ATF), **Sheet 236.26** SLS GL-5 hydraulic circuit (gear set)
- 3.19 Automatic transmission fluids (ATF), **Sheet 236.41**, for hybrid model 164
- 3.20 Automatic transmission fluid (ATF), **Sheet 236.81**, for MB automatic transmissions without controlled torque converter lockup clutch in cars, MB automatic transmissions in commercial vehicles and buses except W4B 035 as well as ZF Ecomat transmission, Voith-Diwa transmission.
- The approved ATFs correspond to the ZF lubricant specifications TE-ML 09, TE-ML 14 and the Voith lubricant lists G 607 and G 1363.
- 3.21 Automatic transmission fluids (ATF), **Sheet 236.91** or TES 295 for Allison automatic transmission. This oil permits much longer oil change intervals, in particular for Allison transmissions.
- Note for Allison transmissions (longer maintenance intervals): Allison offers a new, fully synthetic transmission oil "TranSynd" as per Allison specification TES 295, which must be ordered directly from Allison. This oil permits much longer oil change intervals in combination with "High-performance filters". Further information on this can be found at the Mercedes-Benz or Allison dealers or in the particular owner's manual.