

# UNDERSTANDING AUTOMATIC TRANSMISSION FLUIDS

## SPECIAL PROPERTIES FOR AUTOMATIC TRANSMISSION FLUIDS

- They're a power transition fluid for the torque converter.
- Act as a hydraulic fluid for hydraulic (and electronic) control systems.
- They must transmit sliding friction energy in bands and clutches. This property varies between transmission makes and is why there are so many different ATFs on the market. Friction is the key.
- They transmit this energy in such a way that the shift is always smooth.

## HOW DOES AN AUTOMATIC TRANSMISSION WORK?

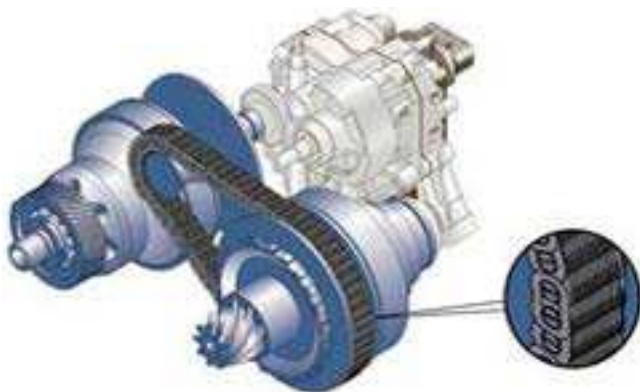
Automatic transmissions do not have a solid style conventional clutch like manual transmissions. Instead, they use a fluid coupling called a torque converter to transmit power from the engine to the transmission.

The changes in the ratios by the planetary gear sets (as distinct from hypoid or bevel type used in differentials or manual gearboxes), are done through the combined use of multiple disc clutches, one-way clutches and bands. These are the friction elements.

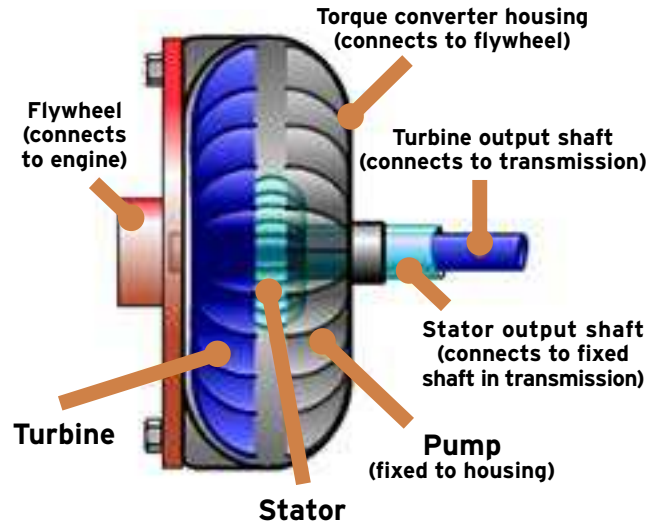
The shift points are now electronically controlled (instead of simple hydraulic pressure) and these electronics in the valve bodies are also reliant on the correct oil.

## HOW DOES A CVT WORK?

A CVT (continuously variable transmission) is different again. There are two types of CVT. They both work on the basis of keeping the engine at the most efficient rev range for power and economy.



Traditional automatic transmissions use gears. CVT's don't have a gearbox but they operate on a pulley system that allows an infinite variability between highest and lowest gears with no discrete feeling of gear change.



Most CVTs only have three basic components:

- A high-power metal or rubber belt.
- A variable-input "driving" pulley.
- An output "driven" pulley.

The variable-diameter pulleys are the heart of a CVT. Each pulley is made of two 20-degree cones facing each other. A belt rides in the groove between the two cones. V-belts are preferred if the belt is made of rubber.

When the two cones of the pulley are far apart (when the diameter increases), the belt rides lower in the groove, and the radius of the belt loop going around the pulley gets smaller. When the cones are close together (when the diameter decreases), the belt rides higher in the groove, and the radius of the belt loop going around the pulley gets larger. This is how it "changes gear". CVTs may use hydraulic pressure, centrifugal force or spring tension to create the force necessary to adjust the pulley halves.

Variable-diameter pulleys must always come in pairs. One of the pulleys, known as the drive pulley (or driving pulley), is connected to the crankshaft of the engine. The driving pulley is also called the input pulley because it's where the energy from the engine enters the transmission. The second pulley is called the driven pulley because the first pulley is turning it. As an output pulley, the driven pulley transfers energy to the driveshaft. Both types put specific strains on the oil and it must be very shear stable.





## WHAT IS A DUAL CLUTCH TRANSMISSION?

A Dual Clutch Transmission (DCT) is effectively two gearboxes in one. Two clutches to eliminate shift shock - one closes as the other opens. Sophisticated electronics and hydraulics control the clutches, just as they do in a standard automatic transmission.

In a DCT, however, the clutches operate independently. One clutch controls the “odd” gears, while the other controls the “even” gears. Using this arrangement, gears can be changed without interrupting the power flow from the engine to the transmission. The gear shafts have constantly meshed gears and synchronisers, so the driving style is very much like a conventional automatic transmission.

Some DCTs use a wet clutch system and some use a dry clutch system - so slightly different oils are required.

### Advantages:

- No torque loss or limitation.
- Overcomes “shift shock” associated with the more conventional automated manual transmissions.
- Fuel efficiency: +15% vs 5-speed stepped automatic transmissions.
- Uses existing manual transmission manufacturing facilities.
- Better acceleration than a manual transmission.
- Handles higher torque loads than CVTs.
- Size.

The most common DCT at the time of writing is a six speed unit used by the Volkswagen group. They call it a DSG transmission. VW also have a seven speed DSG and all are now called S-Tronic.

It is felt that these will become widely used and across a wide range of vehicles. High performance vehicles made by Ferrari, Mercedes Benz, Nissan and BMW (large capacity, high output engines) also have DCTs.

## AUTOMATIC TRANSMISSION OEM FLUID SPECIFICATIONS

### GENERAL MOTORS:

**TYPE A & TYPE A SUFFIX A:** The original fluids. They came out in 1949 & 1957 respectively and are obsolete.

**DEXRON®-IID:** Now obsolete, it was the closest we had to an industry specification. Indeed, it formed the basis of many other OEM (Original Equipment Manufacturer) ATFs specifications. It is still used by GM Europe up until recently and by other European and some Japanese OEMs.

**DEXRON®-IIE:** A development that had better low temperature properties than IID. Now superseded.

**DEXRON®-III:** For many years it was in “F” & “G” specifications, which had the same low temperature characteristics as the -IIE version, but with modifications to antioxidancy and friction material. The 2003 -IIH specification was for 160,000km drain intervals and extended durability and superceded “G”. This specification became obsolete at the end of 2006 and was replaced by DEXRON®-VI.

**DEXRON®-VI:** Initially released in 2005, this is a special low viscosity fluid which replaced DEXRON®-III in all GM manufactured automatic transmissions. It has a very long oil drain capability of up to 400,000km.

**DEX-CVT®:** Special specification for CVTs.

### FORD:

**M2C33-F & M2C33-G:** F came out for the USA and G for Europe. These are non-friction modified fluids and as such cannot be used in most transmissions. F is commonly known as Type F.

**M2C138-CJ & M2C166-H:** Introduced to deal with problems with the C-6 and C-5 transmissions, these are satisfied by DEXRON®-IID.

**MERCON®:** The original MERCON® fluids were again satisfied by DEXRON®-IID and the revised MERCON®-IV fluids by DEXRON®-IID/E & DEXRON®-III (now obsolete).



Visit our website at [www.penriteoil.com](http://www.penriteoil.com)

**MERCON®-C:** Special specification for CVTs.

**MERCON®-V:** This is the first MERCON® fluid not satisfied by a standard DEXRON® type fluid. Usually semi or full synthetic, it has more severe requirements on friction, fluidity, shear loss and oil drain. While fluids meeting MERCON®-V must pass DEXRON®-III initially, they are then subjected to many other tests. Updated in mid 2008.

**MERCON®-SP & MERCON®-LV:** Both fluids are low viscosity fluids. MERCON®-SP was based around a ZF specification and was used in six speed automatic transmissions, for both front and rear wheel drive. LV was introduced in 2007 and Ford plan to make it backwards compatible.

**BTR 5M-52:** Special fluid for Ford Australia that uses the BTR 4 speed automatic models, 85/91/95LE. Modified DEXRON®-IID type.

#### CHRYSLER:

**ATF+3® (MS-7176F/MS-7176E):** Satisfied by modified DEXRON®-IID/IE type fluids such as MM SP and MM SP2.

**ATF+4® (MS-9602):** Synthetic or semi synthetic product with special shift requirements.

#### MERCEDES BENZ:

They have the 236.x series of approvals. Some are DEXRON®-IID/III type and some are not. With some of the newer transmissions, highly specific products are used. Their sheet numbers also may be indicative of a transmission from a supplier such as ZF. The more common ones are shown below.

**236.1:** For MB, Allison and ZF transmissions.

**236.2:** Older specification used in power steering and manual transmissions, although it is also used in some MAN automatics and in the Differential Lock in UNIMOG.

**236.6,236.7:** Most common ones used, and satisfied by DEXRON®-IID.

**236.9:** Long drain fluid usually a DEXRON®-III type with more severe shear stability limits.

**236.10:** For 5 speed Mercedes EC3 transmissions (NAG-1).

**236.11:** For 5 speed ZF automatics used by Mercedes.

**236.12:** For 7 speed Mercedes automatics (NAG-2) (now replaced).

**236.13:** Issued as an in-service 'fix' oil for transmissions specifying 236.12

**236.14:** New initial and service fill specification for NAG-2 transmissions.

**236.15:** Very low viscosity initial and service fill specification.

**236.20:** For CVTs.

#### MITSUBISHI:

**MM SP & MM SP2:** DEXRON®-III fluidity but with different frictional characteristics.

**MM SP3:** A more developed version with better low temperature properties and longer drain life and shift durability. Semi-synthetic at minimum.

#### ALLISON:

**C-4:** Designed for heavy-duty transmissions in off-highway vehicles. ATFs and special fluids are qualified against it. Supersedes C-3.

**TES295:** Special formulation-specific, PAO based fluid for heavy duty applications.

**TES389:** Introduced in 2006 to cover DEXRON®-III applications. Now required for all on-highway transmissions instead of C-4.

#### CATERPILLAR:

**TO-4:** Specialised fluid for Caterpillar units. Oils meeting TO-4 & C-4 find wide application in heavy-duty construction equipment manufactured by many OEMs such as Komatsu. Also used in manual transmissions.

#### OTHER OEM SPECIFICATIONS WORTH NOTING:

- **Honda:** ATF 96, Z1
- **Nissan:** Nissanmatic C, D, J, K, S
- **Mazda:** MIII, MIV, MV
- **Toyota:** TII, TIII, TIV, WS



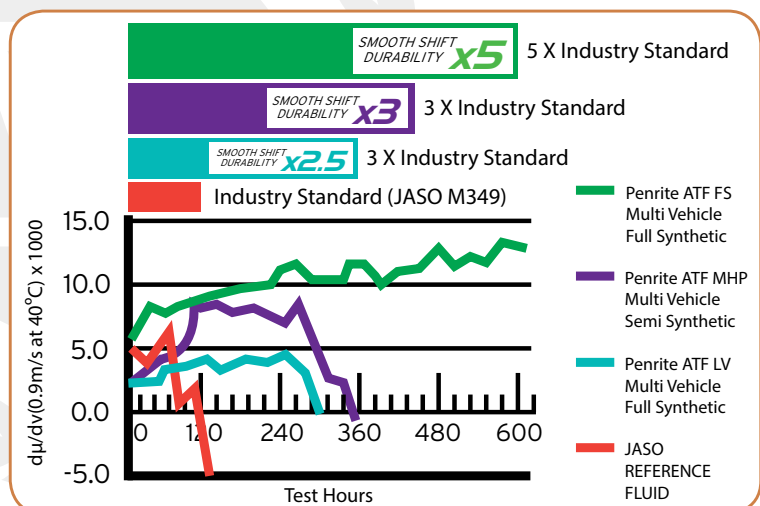


# AUTOMATIC TRANSMISSION FLUIDS

Penrite manufacture a range of automatic transmission fluids (ATFs) that can be used in passenger, light and heavy duty vehicles. They may also be used as compressor fluids or as power steering fluids where ATFs are specified.

## Smooth Shift Chart

Smooth shift durability is a measure of performance in automatic transmissions. Penrite's ATF FS is a Full Synthetic fluid which provides smooth shift durability 5 times longer than the industry standard. Our ATF MHP is a Semi Synthetic fluid offering smooth shift performance that is 3 times longer than the industry standard. The industry standard test method is the JASO M349 - Anti-Shudder test. This means you will experience a smooth shift with ultimate high torque power in your transmissions for longer.



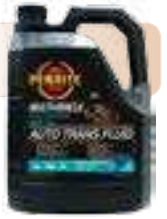
Visit our website at [www.penriteoil.com](http://www.penriteoil.com)

## ATF LV (Multi Vehicle)

Product Code	Pack Size	Carton Qty
ATFLV001	1 Litre	6
ATFLV004	4 Litres	4
ATFLV020	20 Litres	1
ATFLV060	60 Litres	1
ATFLV205	205 Litres	1

**Base Oil:** Full Synthetic

**Colour:** Red



**ATF LV REPLACES  
ATF DX-VI**

**Industry & Manufacturer's Specifications:** Ford MERCON®-LV, GM DEXRON®-VI, Toyota WS, Ford M2C922-A1/M2C924-A, JASO 1A/2A-02, Kia/Hyundai/Mitsubishi SP-IV, Honda DW-1, Mitsubishi Dia Queen J2/J3/PA, Nissan/Infiniti Matic S

Penrite ATF LV is the latest generation technology, full synthetic, multi vehicle, low viscosity automatic transmission fluid meeting the requirements of Ford MERCON®-LV & GM DEXRON®-VI, as well as many other low viscosity manufacturer specifications. It is an advanced formulation automatic transmission fluid designed for optimum performance and outstanding high temperature resistance. ATF LV is suitable for long drain use in 4, 5 & 6 + speed automatic transmissions in passenger cars, 4WDs and light duty commercial vehicles. It is particularly suitable for use in GM Hydra-Matic transmissions, requiring GM DEXRON®-VI from MY 2006 onwards, such as Holden VE Series as well as in late model Ford transmissions requiring Ford MERCON®-LV, as used in Ford Kuga petrol 1.6 4WD, Territory SZ diesels and Ford Ranger PX models.

## ATF FS (Multi Vehicle)

Product Code	Pack Size	Carton Qty
ATFFS001	1 Litre	6
ATFFS004	4 Litres	4
ATFFS020	20 Litres	1
ATFFS060	60 Litres	1
ATFFS205	205 Litres	1

**Base Oil:** Full Synthetic

**Colour:** Red



**Industry & Manufacturer's Specifications:** GM DEXRON®-II/III/VI\*, BTR 91LE/95LE, Ford MERCON®-V, Mitsubishi MM SP2/SP3, Chrysler MS-9602 (ATF+4), Toyota WS\*/T-II/III/IV, LT 71141, JASO 1A, MB 236.1/236.10/236.11/236.5, Nissan/Infiniti Matic C/D/J/K/S\*, Subaru, Mazda MV/M-III  
\*Meets the frictional characteristics

Penrite ATF FS is a full synthetic, highly shear stable, multi vehicle, automatic transmission fluid that exceeds the requirements of Ford MERCON®-V & GM DEXRON®-IIIH as well as many other manufacturer requirements. It is an advanced formula designed for optimum performance and outstanding high temperature performance.

## ATF MHP (Multi Vehicle)

Product Code	Pack Size	Carton Qty
ATFMHP001	1 Litre	6
ATFMHP004	4 Litres	4
ATFMHP020	20 Litres	1
ATFMHP060	60 Litres	1
ATFMHP205	205 Litres	1

**Base Oil:** Semi Synthetic

**Colour:** Red




**Industry & Manufacturer's Specifications:** Mitsubishi MM SP2/SP3, Toyota T-II/III/IV, Nissan/Infiniti Matic C/D/J/K, LT 71141, BTR 91LE/95LE, Chrysler ATF+3/ATF+4, MB 236.1/236.10/236.11/236.5, JASO 1A, Holden HN 2287, GM DEXRON®-IIIH/G/F, Honda ATF 89/96/Z1, VW 052990, Ford MERCON®-LV

Penrite ATF MHP is a semi synthetic, multi vehicle, automatic transmission fluid that exceeds the requirements of Mitsubishi SP2/SP3, DEXRON®-IIIH & Ford MERCON®-LV as well as many other manufacturer specifications. It is an advanced formula designed for optimum performance and outstanding high temperature resistance.



## ATF DX-III (Multi Vehicle)

Product Code	Pack Size	Carton Qty	Base Oil: Premium Mineral	Colour: Red
ATFDX3001	1 Litre	6	<b>Industry &amp; Manufacturer's Specifications:</b> GM DEXRON®-IIIH/G/F, GM DEXRON®-IIE/IID/II, Ford MERCON®/MERCON®-IV, LT 71141, Volvo 97341, BTR 91LE/95LE, MB 236.1/236.10/236.11/236.5, Ford M2C166-H, Toyota T-II/D2	
ATFDX3004	4 Litres	4		
ATFDX3020	20 Litres	1		
ATFDX3060	60 Litres	1		
ATFDX3205	205 Litres	1		


Penrite ATF DX-III is an advanced technology, premium mineral, multi vehicle, automatic transmission fluid that exceeds the requirements of GM DEXRON®-IIIH. It is manufactured from the latest additive technology and advanced hydrocracked base oils along with a viscosity modifier to minimize shear loss and provide outstanding performance throughout the life of the fluid.

## DCT Fluid (Multi Vehicle)

Product Code	Pack Size	Carton Qty	Base Oil: Full Synthetic	Colour: Amber
DCTF001	1 Litre	1	<b>Industry &amp; Manufacturer's Specifications:</b> Ford M2C936-A, Porsche Oil No. 999.917.080.00, BMW 83 22 2 148 578/579, BMW 83 22 0 440 214, BMW 83 22 2 147 477, Mitsubishi SSTF-1, MB 236.21, Peugeot/Citroen 9734.S2, VW TL 052 182/052 529, Volvo 1161838/39	
DCTF004	4 Litres	1		
DCTF020	20 Litres	1		


Penrite DCT Fluid is a highly advanced, full synthetic, multi vehicle, dual clutch transmission (DCT) fluid suitable for DCTs that use a wet clutch system. It is manufactured with advanced synthetic base oils and utilising the latest additive technology for applications in many modern types of wet DCT transmissions, including selected VW & Skoda DSG (Direct Shift Gearbox) and Audi S-Tronic transmissions.

## CVT Fluid V (Multi Vehicle)

Product Code	Pack Size	Carton Qty	Base Oil: Full Synthetic	Colour: Red
CVTV004	4 Litres	4	<b>Industry &amp; Manufacturer's Specifications:</b> Nissan NS-1/NS-2, Mini Cooper EZL 799, Mopar CVT Fluid +4, Honda HCF2/HMMF, Volvo 4959, MB 236.20, Toyota CVTF FE/TC, Mitsubishi CVTF-J1	
CVTV020	20 Litres	1		

Penrite CVT Fluid V is a highly advanced, full synthetic, long drain, automatic transmission fluid manufactured with advanced synthetic and ultra-pure hydrocracked base oils and utilising state of the art additive technology for applications in many modern types of Continuously Variable Transmissions (CVT). Its new and improved formulation means more applications are now possible. Not suitable for use in Luk type CVT systems and where low viscosity CVT fluids are required.

## ATF 33 (Type F)

Product Code	Pack Size	Carton Qty	Base Oil: Premium Mineral	Colour: Red
ATF33004	4 Litres	4	<b>Industry &amp; Manufacturer's Specifications:</b> Ford M2C33-F/G, Ford SQM-2C9007-AA	
ATF33020	20 Litres	1		
ATF33205	205 Litres	1		

Penrite ATF 33 is special purpose, premium mineral, non-friction modified, automatic transmission fluid designed for Type F transmissions that specify M2C33-F/G or Ford SQM-2C9007-AA specifications. ATF 33 is designed for use in older Ford transmissions and power steering systems wherever a Ford Type F or G fluid is recommended. It can also be used in manual transmissions that specify this type of fluid.



## Classic ATF

Product Code	Pack Size	Carton Qty	Base Oil: Premium Mineral	Colour: Red
CLASATF005	5 Litre	4	<p><b>Industry &amp; Manufacturer's Specifications:</b> DEXRON®-IID, MERCON®-IV, Allison C-4, MB 236.6/7, ZF TE-ML11/TE-ML 14, Ford ESR-M2C163-A, Ford M2C166-H, Ford M2C138-CJ, Vickers 35VQ25, Voith Diwa, Denison T5D/P-46/HF-2, Toyota T-II/D2, Sundstrand 22-213L, Mitsubishi SP/SP2, BTR 5M-52, BTR 81LE/91LE</p>	



Penrite Classic ATF is premium mineral, multi vehicle, DEXRON®-IID automatic transmission fluid for classic and older transmissions that required Type A/Suffix A or GM DEXRON®/DEXRON®-II fluids. It is manufactured with modern additive technology and premium base oils to provide better shift performance and protection than original type automatic transmission fluids.

## ATF Top Up

Product Code	Pack Size	Carton Qty	Base Oil: Premium Mineral	Colour: Dark Red
ATFTU001	1 Litre	6	<p><b>Industry &amp; Manufacturer's Specifications:</b> DEXRON®-IID/IIIE, MERCON®-IV, Allison C-4, MB 236.1, Nissanmatic C/D, Toyota T-II, Ford ESR-M2C163-A/M2C166-H/M2C138C-J, Mazda M-II, ZF TE-ML11 Mitsubishi SP2, Chrysler ATF+3, BTR 91LE/95LE,</p>	



Penrite ATF Top Up is a multi vehicle, special purpose, heavier viscosity, transmission fluid designed for topping up many Automatic Transmissions and Power Steering systems. ATF Top Up meets the basic frictional and anti-wear requirements of DEXRON®-IIIE and many other manufacturer specifications. It is designed for the top up of most car and truck automatic transmissions to 20% maximum, that require conventional transmission fluids.

PENRITE PRODUCT	Litres					
	1	4	5	20	60	205
ATF LV (Multi Vehicle)	⊙	⊙	-	⊙	⊙	⊙
ATF FS (Multi Vehicle)	⊙	⊙	-	⊙	⊙	⊙
ATF MHP (Multi Vehicle)	⊙	⊙	-	⊙	⊙	⊙
ATF DX-III (Multi Vehicle)	⊙	⊙	-	⊙	⊙	⊙
DCT Fluid (Multi Vehicle)	⊙	⊙	-	⊙	-	-
CVT Fluid V (Multi Vehicle)	-	⊙	-	⊙	-	-
ATF 33 (Type F)	-	⊙	-	⊙	-	⊙
Classic ATF	-	-	⊙	-	-	-
ATF Top Up	⊙	-	-	-	-	-

(All products are available in 1000L Pods, on request)

### Key Features & Benefits of the Automatic Transmission Fluids range:

- > Multi Vehicle application means the same fluid can be used across multiple vehicles. Full synthetic (ATF LV and ATF FS) as well as Semi synthetic (ATF MHP) covers a majority of the Australian vehicle market. Penrite also makes a Multi Vehicle mineral product (ATF DX-III).
- > A complete range of fluids covering most vehicles.
- > Extended long drain periods.
- > Smooth shift durability (ATF FS, ATF MHP & ATF LV).
- > Specialist fluids (ATF 33, CVT Fluid V and DCT Fluid).
- > Passenger car, 4WD and heavy vehicle applications.



**Expert Tip:** "Red" is a specification colour used by GM for their transmission fluids. This has been adopted by the industry as a standard colour for ATF's. Apart from that, the colour is just a dye and it has no relevance to the performance of the transmission fluid.



Visit our website at [www.penriteoil.com](http://www.penriteoil.com)