

Expected DEF Consumption and Calculations

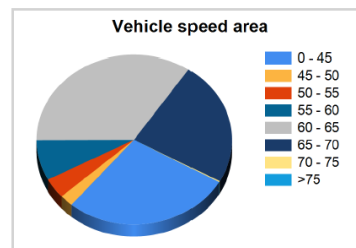
If a customer has a concern that their truck is using too much DEF, the consumption can be calculated by using values found on the trip recorder. This article will guide you in calculating the total consumption based upon fuel usage.

While there is no spec for this, the maximum *expected* DEF consumption is 7% of fuel usage. Typically, the consumption will fall between 5-7% for MX engine-equipped trucks, however values of up to ~10% are considered acceptable. Extreme temperatures and operating conditions can require higher amounts of DEF to control NOx output.

- 1) You will need to first retrieve the trip recorder from the PMCI/PCI via DAVIE4. If this is your first time finding this, [click here](#) for instructions.
- 2) On the trip recorder, locate the values shown for 'Trip DEF used' and 'Trip fuel used by engine and aftertreatment'.

Vehicle speed area

0 - 45 mph	710.9	hours
45 - 50 mph	58.0	hours
50 - 55 mph	99.5	hours
55 - 60 mph	197.2	hours
60 - 65 mph	884.1	hours
65 - 70 mph	607.0	hours
70 - 75 mph	5.6	hours
>75 mph	0.0	hours



Fuel consumption information

Trip fuel used while idling	354.12	galUS
Trip fuel used during PTO usage	0.00	galUS
Trip fuel used while driving	18,178.74	galUS
Trip fuel used by aftertreatment	37.25	galUS
Trip DEF used	706.84	galUS
Trip fuel used by engine and aftertreatment	18,570.11	galUS
Trip driving efficiency	8.53	galUS/h
Trip total efficiency	7.44	galUS/h



Trip PTO efficiency	0.00	galUS/h
Trip mileage	6.59	mi/galUS

3) Calculate the DEF consumption with the following formula:

$$\left(\frac{\text{Trip DEF used}}{\text{Trip fuel used by engine and aftertreatment}} \right) * 100 = \text{DEF consumption (as a percentage)}$$

a. An example using the values from the trip recorder above:

$$\left(\frac{706.84}{18570.11} \right) * 100 = 3.806\%$$

b. In this example the DEF consumption is ~ 3.81% of fuel usage, and the truck is using roughly 3.8 gallons of DEF for every 100 gallons of fuel.

- 4) If the calculated consumption is falling above or below this expected 5-7% range, excessive DEF consumption is most often caused by an SCR efficiency issue. This includes a faulty sensor, damaged SCR catalyst, or other failure in the engine and aftertreatment systems. DEF usage can also be significantly influenced by idle time, engine load factors, engine condition, average driving speed, terrain, and ambient temperature conditions. Perform preliminary diagnosis of any related fault codes and visual inspection of the DEF & SCR system to identify a possible root cause.
- 5) Note that if the DEF doser is leaking, it will not show up in the DEF consumption equation. The “Trip DEF used” value is the amount of DEF that the aftertreatment system has *commanded* the DEF doser to inject into the exhaust stream. The aftertreatment modules also do not have the capability to detect a leaking DEF doser.
- 6) Be aware that if the trip meter has not been reset recently, it will not properly reflect a recent DEF consumption concern. It may be necessary to reset the trip meter, have the customer operate the truck for a period of time, and review these values again at a later date.
- 7) If a root cause cannot be found, create or update your MX Engine Support case on SupportLink with your findings. The Engine Support Center will further investigate the operating conditions and data to determine if there is failure present.