Converting Fleetguard DCA Units to Pencool Equivalent

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PENRAY®

Introduction:

A number of customers have inquired regarding the conversion of recommended SCA levels from Pencool to Fleetguard DCA units and vice-versa. The inquiries have provided the motivation to closely examine the existing recommendations of the major engine manufacturers, Fleetguard, Penray (Pencool), and TMC. As a result of this investigation, a conversion factor has been developed. The purpose of establishing a recommended inhibitor level is to provide cost-effective protection for the cooling system components. The two dominant technologies are Pencool 3000 and Fleetguard DCA-4. Pencool-type technology is used by Caterpillar® and Detroit Diesel®, while DCA-4 is the SCA used by Cummins®, which owns Fleetguard.

Conversion Factor:

1 DCA unit is equivalent to 2.0 vol% Pencool (measured as 800 ppm Nitrite)

Support:

Pencool 3000 is recommended for use at an initial concentration of 3.0% in ASTM D-4985 specification antifreeze. For convenience, the overall concentration of Pencool is estimated by measuring the nitrite concentration in parts per million (ppm). Nitrite concentration is important because it is the primary inhibitor that protects wet sleeve liners from cavitation and it can be easily measured in the field. Nitrite is a reasonable indicator of the concentration of Pencool in a coolant solution.

Fleetguard DCA-4 is recommended for use at a concentration of 1.5 to 3.0 DCA units per gallon. The DCA unit was developed by Fleetguard to establish those levels of their product required to protect cooling systems. A different system from the Pencool system is required because Fleetguard chemistry is different from Pencool chemistry. In particular, DCA-4 has less nitrite, but a Fleetguard/Cummins study supports the theory that a synergy results from the use of molybdate and nitrite in the coolant, reducing the need for nitrite. Recommendations of the two companies and the TMC compare as follows:

Pencool	Fleetguard	TMC
Minimum 3.0 vol. %	1.5 DCA Units	1200 ppm Nitrite
Maximum 6.0 vol. %	3.0 DCA Units	

In an effort to provide a simple and functional conversion factor, penray has determined the equivalence of 1.5 DCA units to 3.0 vol % Pencool. 3.0 vol. vol% Pencool would provide a nominal nitrite concentration of 1200 ppm. Therefore, the calculation of the conversion factor is:

3.0 vol. % Pencool (measured as a 1200 ppm Nitrite) = 1.5 DCA units

which is simplified, mathematically, to obtain the conversion factor:

2.0 vol. % Pencool (measured as a 800 ppm Nitrite) = 1.0 DCA units

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