

# Preventing Cooling System Problems in Light-Duty Diesels

Category: Coolants  
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## Introduction:

Many customers have expressed a desire for information and recommendations regarding the recommendation of manufacturers for the maintenance of cooling systems of light duty diesel engines (i.e. Ford® / Navistar® 7.3, GM® 6.5 diesels, VM Motori®).

## Penray's Recommendation:

Using and maintaining a properly formulated coolant is one of the most important aspects of engine maintenance. The intent of this bulletin is to provide the information required to help light-duty diesel engine operators avoid cooling system problems.

Coolant used must meet the following basic requirements:

- Provide an adequate heat transfer medium.
- Protect against cavitation damage.
- Provide a corrosion-resistant environment.
- Prevent formation of scale and deposits.

To achieve these requirements, coolants must be of good quality. Demineralized or deionized water mixed with "fully-formulated" antifreeze is the best choice.

One appropriate coolant for light-duty applications would be "fully-formulated", phosphate-free extended service interval (ESI) coolant. EG base coolants should meet the specifications in TMC RP-329, PG coolants should meet TMC RP-330.

Note: Extended-life, carboxylic acid inhibited coolant such as "Peak® Extended Life" antifreeze/coolant is installed in some light-duty vehicles. These coolants are dyed orange. NEVER MIX orange coolants with other types. Engine damage may result. Consult and follow the recommendations of the coolant manufacturer.

## "Fully-Formulated" Antifreeze is Preferred :

Antifreeze is used to provide freeze protection for the coolant. It contains chemicals that provide protection against corrosion. Use antifreeze or coolant that meets TMC RP-329 or 330 "Type A" requirements. The maintenance procedures described below for "antifreeze" or "coolant", apply equally to PG and EG. Coolant recycled by reverse osmosis, distillation, or ion exchange, properly re-inhibited to meet RP-329 or 330 requirements has been demonstrated to provide service equivalent to virgin antifreeze. Recycled antifreeze or coolants of these types are preferred. For best overall performance, use a coolant consisting of 50% "fully-formulated" antifreeze in water. "Fully-formulated" antifreeze should be used without the addition of any additional coolant additive. If a pre-diluted "fully-formulated" coolant is purchased, simply fill the clean cooling system. Always verify that both the freeze point and nitrite concentration are both correct with a Penray TS 100 or TS 102 test strip, to insure engine protection.

## Supplemental Coolant Additive (SCA):

"Fully-formulated" coolants do not require, and should not receive, an initial charge of Pencool® 3000. Other conventional (green) coolants do need to be pre-treated. The proper dosage for initial-fill ASTM D 4985 specification coolant is 3.0 percent by volume (1 pint to 4 gallons). Check the nitrite concentration at regular intervals (3 months, 20,000 miles or 250 hours, whichever comes first) with a Penray test strip. Additional Pencool must be added to the coolant if it becomes diluted, as indicated by a nitrite concentration less than or equal to 1,200 PPM. If the nitrite concentration is greater than 1,200 PPM, do not add additional Pencool SCA. Pencool replenishes protection for the cooling system components. The coolant must be maintained with the proper concentration of Pencool. The proper use of Pencool will:

- Provide pH control.
- Restore Inhibitor levels to prevent corrosion.
- Prevent the formation of mineral deposits.
- Prevent cavitation of engine blocks and failure of aluminum radiators. (Pencool is equivalent to Ford part number FW 15 in complying with Ford Bulletin 93-8-11 requiring the use of supplemental coolant additive, also equivalent to GM part number 12346224 in complying with bulletin 46-62-01 and recommended for use in V. M. Motori diesel engines).

## Summary of Light-Duty Coolant Recommendations:

1. Always maintain the engine coolant to meet engine manufacturer's specifications.
2. Only use water that meets ASTM D 4985 water quality specifications
3. For topping-up and initial-fill use 50% "fully-formulated" antifreeze, and 50% plain water that meets ASTM water quality standards. Addition of SCA is not required in "fully-formulated" antifreeze.
4. Every six months, test the nitrite concentration with a Penray Test Strip. Add Pencool only if the nitrite concentration is below 1200 ppm.