

NAVISTAR, INC.		
TMS (TRUCK MATERIAL SPECIFICATION)		NUMBER: TMS-9502
TITLE: Cleanliness Of Radiator Assemblies		CURRENT REV No.: 1012
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WRITTEN/EDITED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES: Rev. D-1 – August 2001
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<i>This specification may involve hazardous materials, equipment, and procedures. This specification does not purport to address all of the safety issues associated with its use. The user is responsible to consult appropriate safety and health practices and to determine the applicability of regulatory limits prior to use.</i>		
Change Notice: Replaced “International Truck and Engine Corp.” with “Navistar, Inc.” per corporate directive; added CEMS B-50 requirement; added Table I; added Section 9.0; editorial changes.		
Reference: File 09-1	Keywords: Radiator Cleanliness	

1.0 APPLICATION

This specification covers cleanliness requirements for all radiator assemblies containing soldered, brazed, and welded joints.

2.0 SCOPE

This specification covers requirements for cleanliness, freedom from contaminants, methods of test, certification, receiving plant inspection, and designation on drawings.

2.1 Restricted Chemical Substances

Effective January 1, 2007, all product supplied to the requirements of this specification must comply with the requirements of the CEMS B-50 specification.

3.0 REFERENCE DOCUMENTS

Unless otherwise specified, the latest issue of all referenced standards shall apply. The following standards, specifications and regulations are referenced in this specification.

Quality System Standard <i>ISO 9001 or TS-16949</i>	CEMS B-50
NAVISTAR Manufacturing Standard MS-D-13	ASTM D 857
CFR Title 29, Part 1910	ASTM D 1179
ASTM D 512	ASTM D 1246
ASTM D 4192	

4.0 REQUIREMENTS

The radiators shall be manufactured so that all surfaces, both inside and outside, are free from contaminating chemical elements, particularly from flux or flux residues, which are or might be corrosive to any material in the radiator, engine assembly, or other parts in the coolant passages. Chemical testing is described in section 4.3.2. The concentration of chlorides, bromides, or other corrosive chemicals shall not exceed 75 parts per million (ppm) for testing performed according to Method A. Refer to Table I for concentration limits for Method B.

4.1 In addition, radiators purchased to this specification shall be free from visible residues, powders, dirt, paste, or other foreign materials that might tend to clog the passages of the radiator or engine.

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4.2 The radiator manufacturer shall protect the radiator interior by securely sealing all openings to prevent powder, dirt, moisture, corrosive vapors, or sprays from entering the radiator prior to assembly on the vehicle, unless this requirement is specifically waived by Navistar.

4.3 Methods Of Test

4.3.1 Visual Examination

Inspect visually the external and internal surfaces to determine if visual residues, powder, dirt, paste, or other foreign materials are present. It may be necessary to remove paint with chemical paint removers or to disassemble bolted assemblies to facilitate inspection. Reassemble per radiator assembly drawings.

4.3.2 Chemical Testing

4.3.2.1 Method A: Soldered Radiator

When the radiator is at ambient room temperature, fill with warm water at a temperature of 49-60°C (120-140°F), noting the amount of water added. Retain a sample of the water used for filling. Place the radiator in the normal operating position, and after thirty minutes, invert the radiator to an upside-down position. After an additional thirty minutes, place the radiator back to the normal operating position. Withdraw 4 liters (1.05 gallons) of water from a bottom drain plug into a clean vessel. When the radiator is filled with water, there should be no water leaking from openings. Mix the solution with a glass stir rod to suspend any sediment.

Analyze the sample of filler water and the 4 liter (1.05 gallon) sample withdrawn from the radiator by the method described in Table I or a method mutually agreed upon between the radiator manufacturer and Navistar Materials Engineering. The content of chlorides and bromides in the filler water sample shall be subtracted from the content in the withdrawn sample. The difference, which should be zero or a positive value, shall not exceed the limits stated above. If the difference is a negative value, then the test must be repeated on a different radiator. Also, there shall not be a pH change greater than 1 between the withdrawn sample and filler water sample.

4.3.2.2 Method B: CAB Radiator

The CAB radiator outlet port needs to be plugged before adding water to the radiator core. Be sure to clean the rubber stopper with deionized water prior to plugging the outlet port. Once the rubber stopper is plugged in the outlet port fill the radiator half full with deionized water from the tap with no temperature added. Tip the radiator back and forth to work any air out of the inlet port. Continue to add DI water until radiator is full. Note the volume of water used to completely fill the radiator core and tank assembly. Once the radiator is full, plug the inlet port with a clean rubber stopper. Let the radiator stand at room temperature for 8 hours. At the conclusion of eight hours, the radiator should be drained into a clean vessel large enough to hold the volume of solution. Mix the solution with a glass stir rod to suspend any sediment. After mixing fill a clean sample bottle with the solution from the vessel for analysis.

Analyze the sample for aluminum, fluoride, and potassium concentrations using a method described in Table I. The concentration of aluminum, fluoride, and potassium should not exceed those outlined in Table I.

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