



• 4119 White Bear Parkway, St. Paul, MN 55110 USA
• Phone: (651) 429-1100, Fax: (651) 429-1122
• Toll Free: (800) 4-CORTEC, E-mail: info@cortecvci.com
cortecvci.com • corteclaboratories.com



Evaluation of Hangsterfer's Metalworking Fluid

To: Matt Drew

From: Cortec Corporation Laboratories
4119 White Bear Parkway
St. Paul, MN 55110

cc: Boris Miksic
Anna Vignetti
Cliff Cracauer

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Test conducted by: *Brian Benduha*
Brian Benduha
Lab Technician

Approved by: *M. Kharshan*
Margarita Kharshan
Laboratory Director

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Background: Customer has submitted their coolant fluid, Hangsterfer's S-1001, and has asked for an additive that is compatible without affecting the properties except for increased corrosion protection.

Purpose: To find an additive that is compatible with Hangsterfer's S-1001 metalworking fluid, which would improve corrosion protection.

Samples Received: 1 quart of Hangsterfer's S-1001 fluid

Method: Compatibility Test
ASTM D-1748 (Humidity Cabinet Test)-100% humidity, 120°F

Materials: Carbon Steel Panels- SAE 1010
M-238 (batch #04491)
M-250 (batch #91580)
M-251 (batch #10550)
M-370 (batch #21030)
M-435 (batch #17880)

Procedure: The following procedure was followed for the compatibility test:

- 1) Prepare the samples of Hangsterfer's S-1001 fluid at 10% concentration, and then add 2% inhibitor to the prepared samples.
- 2) Mix the samples thoroughly, and then place in a refrigerator set at a temperature of 7°C +/- 3°C for 8 hours.
- 3) Remove from the fridge, inspect for compatibility, and then place the sample in an oven set at 50°C +/- 2°C for 16 hours.
- 4) After 16 hours the samples are removed from the oven and again inspected for compatibility. The 24 hours constitutes as one cycle and the samples are cycled three times for this test.
- 5) The samples are considered to be compatible if there is no precipitation, separation, gelling, cloudiness, or any other incompatibilities.

The following procedure was followed for the ASTM-D1478:

- 1) Dip, or coat carbon steel panels with the samples to be tested.
- 2) Hang the panels to drip/dry overnight.
- 3) Place the panels in the humidity cabinet and inspect them for corrosion on a regular basis.
- 4) Record the number of hours for the panels to fail. Failure is determined by observing one spec of corrosion that is 1-3mm in diameter, or three specs of corrosion at least 1mm in diameter.
- 5) After 350 hours, the panels were removed from the humidity cabinet, hung to dry, and then photographed.

Results: The following results were found for the **compatibility testing**:

Sample	Compatibility
10% Hangsterfer's S-1001 + 2% M-238	not compatible
10% Hangsterfer's S-1001 + 2% M-250	not compatible
10% Hangsterfer's S-1001 + 2% M-251	not compatible
10% Hangsterfer's S-1001 + 2% M-370	not compatible
10% Hangsterfer's S-1001 + 2% M-435	Compatible

The following results were found for the **humidity testing (ATM D-1748)**:

Product	Time to Failure
10% Hangsterfer's S-1001 (control)	190 hours
10% Hangsterfer's S-1001 + 2% M-435	350 hours

Interpretations: M-435 is compatible with Hangsterfer's S-1001 metalworking fluid, and also provides very good corrosion protection.

Pictures:

ASTM-D1748 (humidity cabinet)
After 350 hours of testing



10% Hangsterfer's S-1001 fluid (control)



10% Hangsterfer's S-1001 fluid + 2% M-435