

**1.0 PURPOSE**

This document establishes MSHA's Standard Test Procedure (STP) for the Determination of Water in Hydraulic Fluid Using the Karl Fischer Titration Method.

**2.0 SCOPE**

This document applies to MSHA approved Fire-Resistant Hydraulic Fluids (FRHF), audits of MSHA approved FRHFs, and accident investigations involving MSHA approved FRHFs. This document also applies to other materials/products that may need titrated to determine their water content.

**3.0 REFERENCES**

- 3.1. This document supersedes CDS document ASTP4008 (undated).
- 3.2. 30 CFR, Part 35, Subpart A
- 3.3. Mettler Toledo Operating Instructions for the DL18 Karl Fischer Titrator
- 3.4. Mettler Toledo DL18 Karl Fischer Maintenance and Support Manual, dated June, 1994.

**4.0 DEFINITIONS**

- 4.1. Fire-resistant hydraulic fluid - means a fluid of such chemical composition and physical characteristics that it will resist the propagation of flame.
- 4.2. Note: Review the "Glossary" of titration terms in the DL18 Karl Fischer Maintenance and Support Manual

**5.0 TEST EQUIPMENT**

- a. Mettler Toledo DL18 Karl Fischer Titrator
- b. Mettler Toledo AG245 Balance

## 6.0 TEST SAMPLES

Three samples of each hydraulic fluid are tested. The size of the samples is defined in the Mettler Toledo Operating Instructions for the DL18 Karl Fischer Titrator.

## 7.0 PROCEDURES

7.1. The DL18 Operating Instructions provides detailed instructions for the determination of water content.

7.2. If the DL18 Titrator has not been operated for many days or weeks, the "Drift" and "Titrant" Concentration values should be determined in order to insure accurate results (see Operating Instructions Manual: pages 15 through 17).

7.3. Typically the drift value should be less than 25 g/min. If the drift value is greater than 25 g/min, perform the corrective actions as described in the DL18 Operating Instructions (page 17). If the drift value cannot be reduced (to less than 25 g/min), review and follow the maintenance procedures outlined in the DL18 Maintenance and Support Manual.

7.4. Two potential problems caused by the titrant are:

- a. If the DL18 is not used for many days or weeks, it is normal for the titrant to outgas causing bubbles to form in the lines;
- b. and the titrant concentration value decreases with the titrant's exposure to light and the passage of time.

Corrective actions for the above conditions are outlined in the DL18 Maintenance and Support Manual.

7.5. To begin the titration process, follow the manufacture's instructions as outlined in the Operating Instructions (pages 14 and 15). A pre-titration always precedes a titration.

### 7.6. Maintenance

7.6.1. The procedures for the care and maintenance of the titrator are described in the DL18 Maintenance and Support Manual. Regularly scheduled maintenance is recommended as described in the standard maintenance

schedules of this manual. Performing regularly scheduled maintenance will reduce down time, costs, and optimize test accuracy.

#### 7.7. Test Modifications

Since all possible materials/products, compositions, physical properties, and applicable methods cannot be foreseen, MSHA reserves the right to modify the above test procedures.

### 8.0 TEST DATA

Typically titration results are reported as the percent water based on the average of 3 samples that do not vary more than one percent ( $\pm 1\%$ ).

### 9.0 PASS/FAIL CRITERIA

Generally the titration results should be within  $\pm 1\%$  percent of the water content specified on the company's application for approval of Fire Resistant Hydraulic Fluid According to the Code of Federal Regulations, Title 30, Part 35.