



Standard Practice for Lubrication and Hydraulic Filter Debris Analysis (FDA) for Condition Monitoring of Machinery¹

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INTRODUCTION

The purpose of this practice is to describe best practice methods for the analysis of filter debris from machinery lubrication or hydraulic systems primarily for the purpose of machinery condition monitoring. The purpose of Filter Debris Analysis (FDA) is to determine the health of oil-wetted machinery by analyzing the size, quantity, morphology, and composition of debris trapped by the system filter. FDA is emerging as an important condition monitoring technique as fine filtration becomes more common and the associated reduction of metallic particulates makes traditional elemental analysis of the lubricant less effective. System filters have an added advantage over traditional sample-based techniques in that they capture a high percentage of the total system debris (metallic, non-metallic, and organic particulate contamination) within the size range useful for machinery condition monitoring.

1. Scope

1.1 This practice is intended to cover the extraction, analysis, and information management pertaining to visible wear debris collected from oil system filters or debris retention screens. Further, it is intended that this practice be a practical reference for those involved in FDA.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D7684 Guide for Microscopic Characterization of Particles from In-Service Lubricants

D7685 Practice for In-Line, Full Flow, Inductive Sensor for Ferromagnetic and Non-ferromagnetic Wear Debris Determination and Diagnostics for Aero-Derivative and Aircraft Gas Turbine Engine Bearings

D7720 Guide for Statistically Evaluating Measurand Alarm Limits when Using Oil Analysis to Monitor Equipment and Oil for Fitness and Contamination

D7690 Practice for Microscopic Characterization of Particles from In-Service Lubricants by Analytical Ferrography

F316 Test Methods for Pore Size Characteristics of Membrane Filters by Bubble Point and Mean Flow Pore Test

G40 Terminology Relating to Wear and Erosion

D4175 Terminology Relating to Petroleum, Petroleum Products, and Lubricants

2.2 Other Standards:

TTCP-AER-TP3-TR01-2010 Guide for Filter Debris Analysis³

3. Terminology

3.1 Definitions:

3.1.1 *abrasive wear*—wear due to hard particles or hard protuberances forced against and moving along a solid surface.

D4175

3.1.1.1 *Discussion*—Also called cutting wear in some instances such as machining swarf.

¹ This practice is under the jurisdiction of ASTM Committee **D02** on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee **D02.96** on In-Service Lubricant Testing and Condition Monitoring Services. Current edition approved Jan. 15, 2014. Published February 2014. DOI: 10.1520/D7898-14.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Published by the Technical Co-operation Program (TTCP), July 2010.