



Designation: D4627 – 12 (Reapproved 2017)

Standard Test Method for Iron Chip Corrosion for Water–Miscible Metalworking Fluids¹

This standard is issued under the fixed designation D4627; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers evaluation of the ferrous corrosion control characteristics of water–miscible metalworking fluids.

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

1.2.1 *Exception—Note 1* contains inch-pound units since the drill sizes and feed rates do not have readily available metric equivalents.

1.2.2 *Exception—U.S.* Standard sieve sizes include mesh values.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Terminology

2.1 Definitions:

2.1.1 *rust, n*—corrosion product consisting primarily of hydrated iron oxides.

2.2 Definitions of Terms Specific to This Standard:

2.2.1 *breakpoint, n*—weakest concentration of the water-miscible metalworking fluid tested that leaves no rust stain on the filter paper.

3. Summary of Test Method

3.1 Cast iron chips are placed in a petri dish containing a filter paper and diluted metalworking fluid. The dish is covered

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and allowed to stand overnight. The amount of rust stain on the filter paper is an indication of the corrosion control provided by the fluid.

4. Significance and Use

4.1 The results obtained by this test are a useful guideline in determining the ability of water-miscible metalworking fluids to prevent or minimize rust under specific conditions. There is usually a relationship between the results of this test and a similar ability of the subject coolant to prevent rust on nested parts or in drilled holes containing chips, etc. It must be understood, however, that conditions, metal types, etc. found in practice will not correlate quantitatively with these controlled laboratory conditions. The procedure may not be able to differentiate between two products with poor rust control due to the wide spacing between test dilutions.

5. Apparatus

5.1 *Disposable Petri Dishes*, 35 mm by 10 mm plastic, with lids.

5.2 *Glass-Fiber Filter Paper*, 1.5 μm particle retention rating, 3.2 cm diameter.

5.3 *Glass Stirring Rod*.

5.4 *Spatula*.

5.5 *Pipettes*, 5 mL.

5.6 *Glass Bottle*, 4 oz with cap.

5.7 *Balance*, accurate to 1 mg.

5.8 *Graduated Cylinder*, 50 mL.

5.9 *Volumetric Flask*, 1 L.

5.10 *Forceps*.

5.11 *U.S. Standard Sieve*, 18 mesh (1.0 mm sieve openings), stainless steel.

6. Reagents and Materials

6.1 *Gray Cast Iron Drilling Chips*.²

NOTE 1—The chips are made from Class 30 gray cast iron (UNS

² Iron chips produced and packaged according to the directions given in Note 1 are commercially available.