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.

Designation: B614 – 16 (Reapproved 2021)

Standard Practice for Descaling and Cleaning Zirconium and Zirconium Alloy Surfaces[1]

This standard is issued under the fixed designation B614; 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 practice covers a cleaning and descaling procedure useful to producers, users, and fabricators of zirconium and zirconium alloys for the removal of ordinary shop soils, oxides, and scales resulting from heat treatment operations and foreign substances present as surface contaminants.

1.2 It is not intended that these procedures become mandatory for removal of any of the indicated soils but rather serve as a guide when zirconium and zirconium alloys are being processed in the wrought, cast, or fabricated form.

1.3 It is the intent that these soils be removed prior to chemical milling, joining, plating, welding, fabrication, and in any situation where foreign substances interfere with the corrosion resistance, stability, and quality of the finished product.

1.4 Unless a single unit is used, for example, solution concentrations in g/l, the values stated in either inch-pound or SI units are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. SI values cannot be mixed with inch-pound values.

1.5 *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.* For specific hazard statements, see Sections 3 and 7.

1.6 *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. Referenced Documents

2.1 *NFPA Standard:*
NFPA 484 Standard for Combustible Metals[2]

3. Processing Soil Removal

3.1 Grease, oil, and lubricants employed in machining, forming, and fabricating operations on zirconium and zirconium alloys should be removed by employing one of the methods or a combination of methods as listed: (*1*) alkaline or emulsion soak-type cleaners, (*2*) ultrasonic cleaning, (*3*) acetone, citrus based cleaners, or safety solvent immersion washing or vapor degreasing, or (*4*) electrolytic alkaline cleaning system. In the electrolytic system, the work can be either anodic or cathodic polarity provided voltage and current density are controlled to avoid anodizing. Removal of these soils is recommended prior to heat treatment or application of acid treatment designated in Section 5. When electrolytic systems are employed, the voltage should be controlled to prevent the occurrence of spark discharge and subsequent pitting. The use of trichloroethylene is not prohibited and can be used; however its use is hazardous enough to preclude it as a recommended solvent in this standard. Care must be exercised when using chemical solvents. There are hazards associated with their use, such as flammability, carcinogenicity, and ozone depletion (see 7.1).

4. Blast Cleaning

4.1 Mechanical descaling methods such as sandblasting, shot blasting, and vapor blasting may be used to remove hot work scales and lubricants from zirconium surfaces if followed by thorough conditioning and cleaning as described in Section 5.

4.2 Aluminum oxide, silicon carbide, silica sand, zircon sand, and steel grit are acceptable media for mechanical descaling. Periodic replacement of used media may be required to avoid excessive working of the metal surface by dull particulate.

[1] This practice is under the jurisdiction of ASTM Committee B10 on Reactive and Refractory Metals and Alloys and is the direct responsibility of Subcommittee B10.02 on Zirconium and Hafnium.

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[2] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269, http://www.nfpa.org.

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