UNCLASSIFIED

AECD-4164

0

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission

A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission to the extent that such employee or contractor prepares, handles or distributes, or provides access to, any information pursuant to his employment or contract with the Commission.

UNITED STATES ATOMIC ENERGY COMMISSION

SPECIFICATION FOR CLEANING ZIRCALOY
FUEL ROD COMPONENTS

By
R. L. Fischer

Photostat Price \$ 1.80
Microfilm Price \$ 1.80

Available from the
Office of Technical Services
Department of Commerce
Washington 25, D. C.

March 6, 1956

Westinghouse Electric Corp.
Atomic Power Division, Pittsburgh

Technical Information Service Extension, Oak Ridge, Tenn.

UNCLASSIFIED

459-1

~~CONFIDENTIAL~~

AE 10-4164
AP-292539

UNCLASSIFIED

SPECIFICATION FOR CLEANING ZIRCALOY FUEL ROD COMPONENTS

R. L. Fischer

MAR 6 1956

INFORMATION CATEGORY

CLASSIFICATION CANCELLED

DATE MAR 18 1957 *for*

For The Atomic Energy Commission

H. R. Canale
Chief, Declassification Branch

Confidential Restricted Data

J. C. Chivers
Authorized Classifier

2-28-56
Date

RESTRICTED DATA

This document contains restricted data as defined in the Atomic Energy Act of 1954. Its transmittal or disclosure of its contents in any manner to an unauthorized person is prohibited.

NOTE
This document is an internal reference and does not represent a
policy for external reference and does not represent a
final expression of the opinion of Westinghouse. When
this memorandum is distributed externally, it is with
the express understanding that Westinghouse makes no
representation as to completeness, accuracy, or validity
of information contained therein.

~~CONFIDENTIAL~~

UNCLASSIFIED
459 2

SPECIFICATION FOR CLEANING ZIRCALOY FUEL ROD COMPONENTSI. Scope

This specification covers the cleaning of Zircaloy-2 components of PWR fuel rods and such tools, gauges, or other devices as may be required in subsequent handling, welding and inspection per Fuel Rod Specification AP-292545, Section II-A-4 and Section II-B-3.

II. Safety

1. The acid solutions specified are extremely corrosive to human tissue.
Refer to Westinghouse Safe Practice Sheets for detailed safety precautions.
2. The solvents specified are toxic and must be used only in well ventilated areas.

III. Reference Specifications

1. AP-292545 - UO₂ Fuel Rod Product Specification.

IV. Material

1. Tubing per AP-292545, Section II-A-3.
2. End caps per AP-292545, Section II-B-2.

V. Cleaning

This section is divided into three parts, covering: Fuel Tubes; End Caps; and Tools and Surfaces Which Rods or Components Contact.

Part A. Fuel Tubes

1. Precaution shall be exercised during all cleaning and subsequent operations to avoid damage to tube ends.

2. Degreasing - Vapor degrease for four minutes in Blakeslee perchlorethylene degreaser. Follow with flush with liquid solvent degreaser spray approximately one minute before removal from vapor phase.

- a. Parts shall be arranged in the degreaser to permit free drainage and to prevent entrapment of the liquid solvent.
- b. Parts being removed from the degreaser shall be held a sufficient length of time to permit solvent to evaporate completely from the surface of the object before handling.
- c. After degreasing, parts must be handled only with approved clean cotton gloves, clean rubber gloves, or such tools as have been cleaned according to Section V, Part C.

NOTE: Parts which have been machined with water soluble cutting fluids must be scrubbed with a stiff non-metallic bristle brush in a warm (120°F) solution of alconox, and thoroughly rinsed and dried before degreasing.

3. Etching

- a. Immerse and agitate tubes in a 60% H₂O, 35% HNO₃, 5% HF solution* to remove 0.0008 in. per surface nominal**. Effective acid bath life is limited to 100 reference length tubes per liter.
- b. Rinse in flowing tap water for 2-3 min.
- c. Re-rinse in second tank in flowing tap water for 1/2 - 1 min. Check residual water on tubes for acidity with litmus paper.

NOTE: Care must be taken to insure that no acid or rinse water dried on tube surfaces.

- d. Immerse in hot (180-200°F) Grade A water*** for a sufficient period of time to raise the temperature of the parts to the temperature of the bath. The Grade A water must be checked a number of times per day. The actual number of checks will be determined by the load factor.

*Volume percents, tap water, technical 52% HF, and 70% HNO₃ as noted.

**Etch time for this removal shall be checked by measurements on a 1"x1" flat Zircaloy-2 test coupon for each 100 tubes.

***Grade A water shall have a pH of 7.0±1.0 and a minimum resistivity of 500,000 ohm-cm.

4. Drying - Dry in warm circulating cleaned air, free from dust and acid fumes.
5. Inspection
 - a. Measure tubing per AP-292545, Section II-A-5.
 - b. Examine under bright diffused lighting for freedom from fissures, striations and other obvious defects. Any tubes containing such defects shall be rejected.
6. Storage - Components should be assembled (See AP-292545, Section III-B-2) and placed in welding box with a minimum delay. If this is not possible, store in clean, closed containers.

Part B. Zircaloy End Caps

End caps shall be processed as in IV, Part A, steps 2, 3, 4 and 6, except that the etching time shall be 30 sec. Clean handling procedures apply. Precautions shall be taken to prevent damage to the machined surfaces.

Part C. Tools and Surfaces Which Rods or Components Contact

This section applies to all tools, gauges, clamps and jigs as may be required for assembly, welding, inspection or handling between operations and to all surfaces with which the parts come in contact during these operations.

1. Small, Non-Precision Tools and Parts

Vapor degrease and clean per Section IV, Part A, Item 2. Store in clean, closed containers when not in use.

2. Precision Tools

Wipe contact areas with clean, lint-free cloths and methanol or acetone.

3. Large Surfaces

Wipe with clean, lint-free cloths and methanol or acetone. If impractical, cover surface with clean, lint-free cloths.