Designation: C 810 – 90 (Reapproved 1995)

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

Standard Test Method for Nickel on Steel for Porcelain Enameling by X-Ray Emission Spectrometry[1]

This standard is issued under the fixed designation C 810; 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 the measurement of the amount of nickel deposited on sheet steel during its preparation for porcelain enameling. It is an X-ray emission method used for testing sample panels or certain commercial parts.

NOTE 1—An alternative wet chemical method is Test Method C 715.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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.* For a specific hazards statement, see Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*

C 715 Test Method for Nickel on Steel for Porcelain Enameling by Photometric Analysis[2]

3. Summary of Test Method

3.1 Steel samples coated with a light nickel deposit are inserted in the sample position of an X-ray spectrometer. The count rate for nickel is measured and converted by means of a calibration curve to g/m^2 (g/f^2).

NOTE 2—1 m^2 = 10.75 ft^2. Industry usage is typically in mixed units, grams per square foot. For example, 0.10 g/ft^2 equals a little more than 1 g/m^2.

4. Significance and Use

4.1 This test method is an accurate and rapid means for measuring nickel deposits on steel sample plates and such parts that can be fitted into the X-ray spectrometer. Its accuracy extends over a wide range of nickel deposits.

5. Interferences

5.1 There are no interferences from other elements present. However, low values can result from absorption of the X rays by overlaying material. Grease on the sample or rust due to storage in humid areas are examples of such material. Low results are also obtained on de-enameled samples because the nickel deposit is converted to a nickel iron alloy at enameling temperatures. The presence of the iron in the alloy layer absorbs some of the X radiation and accounts for the lower result.

6. Apparatus

6.1 *Suitable X-Ray Emission Spectrometer* complete with 50-kV power supply goniometer, detector with pressure-regulated gas flow attachments, scaler-counter, lithium fluoride analyzing crystal, and 0.02° Soller slit collimator is required.[3] About a 1-in. (25.4-mm) diameter area of the sample is irradiated.

6.2 *Special Sample Holder* (Fig. 1), to permit insertion of a 2 by 2-in. (51 by 51-mm) flat corner of a large flat sample. Alternatively, the standard sample holder supplied with the equipment may be used, but the sample must be cut to 1.5 by 1.25 in. (38 by 32-mm).

6.3 *Steel Sheets* with various amounts of nickel deposits are required for calibration and standardization.

6.4 *Nickel-Base Alloy Sample*, such as 18-8 stainless steel, for routine calibration.

7. Hazards

7.1 Equipment should be periodically checked for radiation leaks to ensure against exposure to X radiation.

8. Calibration and Standardization

8.1 Prepare approximately 18 standard plates by cleaning and pickling 4 by 6 in. (102 by 152 mm) commercial enameling iron stock (any steel used in commercial enameling operations may be used) and applying nickel in the conventional manner for varying treatment times to give a range of nickel deposition from 0 to 3 g/m^2 (0 to 0.4 g/ft^2).

[1] This test method is under the jurisdiction of ASTM Committee B-8 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.12 on Materials for Porcelain Enamel and Ceramic-Metal Systems.

Current edition approved Feb. 23, 1990. Published April 1990. Originally published as C 810 – 75. Last previous edition C 810 – 75 (1981)$^{\epsilon 1}$.

[2] *Annual Book of ASTM Standards*, Vol 02.05.

[3] Available from the following: (1) Philips Electronic Instruments, 750 S. Fulton Ave., Mount Vernon, NY 10550; (2) Siemens Corp., Medical Industrial Div., 186 Wood Ave., South, Iselin, NJ 08831; and (3) Diano Corp., X-ray Div., 2 Lowell Ave., Winchester, MA 01890.