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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 1839-2025

Replacing GB/T 1839-2008

Test method for gravimetric determination of the mass per unit area of galvanized coatings on steel products

钢产品镀锌层质量试验方法

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1 Scope

GB/T 1839-2025 is the Chinese national standard on test method for gravimetric determination of the mass per unit area of galvanized coatings on steel products, in the field of metallurgy. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 29 August 2025 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 March 2026. Classification: ICS 77.040.99, CCS H21. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This Document specifies the principles, test solutions, specimens, selection of test methods, test procedures, result calculation, reproducibility, and test reports for the method of testing the quality of galvanized coating per unit area on steel products. This Document applies to coating products including pure zinc coatings, zinc-iron alloy coatings, zinc-magnesium alloy coatings, zinc-aluminum-magnesium alloy coatings, aluminum-zinc

alloy coatings, and aluminum-zinc-magnesium alloy coatings. Other coating products, such as aluminum-silicon alloy coatings, shall refer to this Document for further details.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

3 Terms and Definitions

For the purposes of this Document, there are no terms and definitions apply.

4 Specimen

4.1 The sampling location, position, and quantity shall comply with the provisions of relevant product standards or agreements.

4.2 The test area shall be selected according to the coating thickness to ensure meeting the requirements for specimen weighing accuracy.

4.3 When cutting the specimen, care shall be taken to avoid surface scratches. Specimens with obvious local damage shall not be used.

4.4 The specimens of steel sheet and strip may be circular or square. The single-sided area of the arbitration test specimen shall be no less than 1500.0 mm^2.

4.5 The length of the steel wire specimen shall be cut according to the provisions of Table 1.

4.6 Other types of galvanized steel products or articles may be tested in round, square, or tubular shapes, or irregular shapes; and the area of the test specimen shall be no less than 2000.0 mm^2.

4.7 The total test area of irregularly shaped galvanized steel products or articles shall be measured or theoretically calculated according to Appendix A.

5 Gravimetric Method

5.1 Principle The galvanized coating on a certain surface area is dissolved in a test solution with corrosion inhibition properties. The masses of the specimen before and after dissolution are measured. The mass of the galvanized coating per unit area is calculated based on the difference in mass and the specimen area.

5.2 Test solutions

5.2.1 Cleaning solution. Chemically pure anhydrous ethanol or other solutions that do not damage the coating.

5.2.2 Galvanized coating stripping solution. Dissolve

3.5 g of chemically pure hexamethylenetetramine (C6H12N4) in 500 mL of concentrated hydrochloric acid (rho >=

1.18 g/mL); and dilute to 1000 mL with distilled or deionized water.

5.2.3 The galvanize coating stripping solution can be reused repeatedly as long as it can dissolve the galvanized coating.

5.3 Test procedure

5.3.1 Clean or wipe the specimen surface clean off oil, dust, water stains, etc. with the cleaning solution, then dry thoroughly and cool to room temperature.

5.3.2 Weigh the specimen using a balance, with an accuracy better than 1% of the expected mass of the coating. When the coating mass is no less than

0.1 g, the weighing accuracy shall be accurate to

0.001 g.

5.3.3 Immerse the specimen in the galvanized coating stripping solution. The amount of the used galvanized coating stripping solution is usually no less than 10 mL per square centimeter of sample surface area.

5.3.4 At room temperature, completely immerse the specimen in the solution; turning it occasionally, until the coating is completely dissolved. The dissolution process is considered complete when the emission of hydrogen evolution reaction (violent bubbling) clearly stops. Then take out the sample and rinse it under running water. If necessary, use a nylon brush to remove any loose adhering substances that may be attached on the specimen surface. Finally, wash with a cleaning solution, dry quickly; or use absorbent paper to remove moisture. After rapid and thorough drying, cool to room temperature.

5.3.5 Weigh the specimen using a balance with the same accuracy as in 5.3.2.

5.3.6 After weighing, measure the exposed surface area after the galvanized coating of the specimen dissolves, with the accuracy no less than 1%. The diameter or side length of the steel sheet or strip specimen shall be measured, accurate to at least

0.1 mm. The diameter of the steel wire shall be measured once at mutually perpendicular locations on the same circumference; and the average value shall be taken. When the diameter of the steel wire is greater than

0.50 mm, the diameter measurement shall be accurate to at least

0.01 mm. When the diameter of the steel wire is no greater than

0.50 mm, the diameter measurement shall be accurate to at least

0.001 mm.

5.3.7 When measuring the galvanized coating mass of a single side of a galvanized sheet, one side shall be sealed in an appropriate manner before measurement; after that, the second side shall be measured. If necessary, the thickness direction of the sample sheet can be sealed.

5.4 Calculation of results

5.4.1 The galvanized coating mass per unit area of steel products (excluding steel wire) or products is calculated according to Formula (1). Where. M - mass of the galvanized coating per unit area, in g/m2; m1 - mass of the specimen galvanized coating before dissolving, in g; m2 - mass of the specimen galvanized coating after dissolving, in g; A - exposed area of the specimen, such as steel sheet, strip, or product; or the sum of the inner and outer surface areas of the steel pipe specimen, in mm2.

5.4.2 The mass of the galvanized coating per unit area of the galvanized steel wire is calculated according to Formula (2). Where. M - mass of the galvanized coating per unit area, in g/m2; m1 - mass of the specimen galvanized coating before dissolving, in g; m2 - mass of the specimen galvanized coating after dissolving, in g; D - diameter of the specimen galvanized coating after dissolving, in mm; 1962 - constant number.

5.4.3 When it is necessary to express the approximate thickness of the galvanized coating, it shall be calculated according to Formula (3). Where. d - thickness of galvanized coating, in μm; M - mass of the galvanized coating per unit area, in g/m2; rho - Galvanized coating density, in g/cm^3. Typically, the density of pure galvanized coating and zinc-iron alloy coating is

7.1 g/cm ^3 ; the density of zinc-aluminum and zinc-aluminum- magnesium alloy coating is

5.6 g/cm^3; and the density of aluminum-zinc and aluminum-zinc- magnesium alloy coating is

3.8 g/cm^3. Special compositions will be specified separately.

5.4.4 The inspection results shall be performed in accordance with the provisions of GB/T 8170, using the rounding-off comparison method. The retain number of digits shall meet the requirements of the relevant product standards.

6.1 Principle

6.1.1 Absorption method. A steel sheet covered with a metallic coating is irradiated with