



Material Specifications

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Date Issued:	B-DEC04

ZINC PLATING (Superseded)

This specification has been superseded by CNH Material Specification, MAT0310, (87303277) Zinc Plating.

The controlled versions of CNH specifications and standards are published on the CNH Intranet site.

The documents are also available on the CNH electronic viewing system (e.g. eViewer). Suppliers are able to access these documents on CSCN (CNH Supplier Communications Network).

The superseded specification remains available for viewing following this page if needed.

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1. SCOPE

- 1.1 This specification covers Case Corporation requirements for zinc plated finishes. They are used primarily as a protective coating on ferrous based materials and are intended to extend the corrosion resistance of the substrate.
- 1.2 Where applicable, requirements are stated in both metric (SI) and US customary (pound-inch) units. Values in one system are not exact equivalents of values in the other. Therefore, each system must be used independently and each set of values regarded as a separate set of requirements. In determining conformance to this specification, no mixing of system values is permissible.
- 1.3 This specification may involve hazardous materials, apparatus, and procedures. This specification does not claim to address all of the safety issues associated with its use and application. Specification users bear responsibility for consulting appropriate safety or health practices and determining the applicability of regulatory limitations prior to use.

2. REQUIREMENTS

2.1 Surface Preparation

Parts to be plated shall be thoroughly cleaned and free of tool marks, rust, scale, oil, pits, foreign matter, and surface conditions detrimental to plating finish or adhesion. Cleaning operations must be controlled to prevent hydrogen embrittlement, particularly on parts that are hardened, cold worked, and/or highly stressed in service.

2.2 Plating Classes

Three different passivating treatments coupled with six standard thicknesses of zinc plating are defined in this specification, as shown in the following table. The degree of corrosion protection needed and the aesthetics of the application will govern the class selected. The requirements apply only to significant surfaces. Significant surfaces are those surfaces on which the plating is functionally necessary; generally, it is that portion of the visible surface on the part which can be contacted by 20 mm (0.75 inch) diameter sphere. However, all surfaces must be visibly plated.

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2.2 Plating Classes (continued)

Class	Obsolete Designation	Description
25A	-	Zinc plated and passivated by a colored chromate treatment; appearance is iridescent bronze to brown, including yellow; exhibits greatest corrosion resistance.
13A	-	
8A	Type II	
5A	-	
4A	-	
3A	-	
25B	-	Zinc plated and passivated by a clear treatment or a colored chromate treatment leached clear; appearance is bright silvery; exhibits intermediate corrosion resistance.
13B	AC	
8B	-	
5B	BC	
4B	CC	
3B	-	
25	-	Zinc plated and passivated by a single dip treatment; appearance is bright silvery; exhibits least corrosion resistance.
13	A	
8	-	
5	B	
4	C, Types I IA, IB	
3	-	

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2.3 Properties

2.3.1 Plating Thickness

Class	Thickness of Plating after Passivation	
	µm, min	inches, min
25, 25A, 25B	25	0.00100
13, 13A, 13B	13	0.00050
8, 8A, 8B	8	0.00030
5, 5A, 5B	5	0.00020
4, 4A, 4B	4	0.00015
3, 3A, 3B	3	0.00010

2.3.2 Additional Requirements for Zinc Plated Threaded Fasteners

Case has standardized on the gold to bronze colored chromate treatment for its zinc plated fasteners, as denoted by the A suffix used in this specification, because it provides enhanced corrosion resistance. All fasteners in the Case Standard Parts Book specified to be zinc plated per Case MS201 shall be colored chromate treated (suffix A) unless a clear chromate finish (suffix B) is explicitly specified.

The required plating class per this specification and the maximum permissible plating thickness for zinc plated metric fasteners with Class 6g (external) and Class 6G (internal) thread fits and zinc plated US customary (inch) fasteners with Class 2A (external) and Class 2B (internal) thread fits are shown in the following tables.

Metric Fasteners Classes 6g & 6G Thread Fits		
Thread Pitch	Required Plating Class	Plating Thickness on Threads, µm, max.
1.0 mm and finer	3A	14
1.25 mm through 1.75 mm	5A	17
2.0 mm through 2.5 mm	8A	21
3.0 mm through 4.0 mm	13A	26

US Customary (inch) Fasteners Classes 2A & 2B Thread Fits		
Threads per Inch	Required Plating Class	Plating Thickness on Threads, inches, max.
18 and finer	4A	0.00060
13 through 16	5A	0.00070
8 through 12	8A	0.00080
6 through 7	13A	0.00100



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2.3.3 Corrosion Resistance

After the specified number of hours of neutral salt spray testing, there shall be no white corrosion products visible to the unaided eye on significant surfaces (sharp edges excepted).

After the specified number of hours of neutral salt spray testing, there shall be visible to the unaided eye no more than one red corrosion spot per 650 square millimeters (one spot per square inch) of significant surface. On pieces having less than 650 square millimeters (1 square inch) of significant surface, a maximum of one red corrosion spot is permissible. No individual red corrosion spot larger than 1.5 mm (0.060 inches) in diameter is permissible.

Class	Hours of Neutral Salt Spray Testing	
	White Corrosion	Red Corrosion
25A	48	272
13A		168
8A		120
5A		80
4A		72
3A		64
25B	8	232
13B		120
8B		72
5B		40
4B		32
3B		24
25	2	184
13		96
8		56
5		32
4		24
3		16

2.3.4 Adhesion

For all classes, the plating shall demonstrate satisfactory adhesion to the substrate by passing the adhesion test shown in Methods of Test.

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2.4 Quality

The plating shall be dense, uniform, continuous, and free of porosity, pinholes, blisters, flaking, cracks, and stains. The plating shall also be free of other discontinuities that affect appearance or corrosion resistance. The plating shall not exhibit grey or burned areas.

2.5 Hydrogen Embrittlement and Baking Requirements

2.5.1 All steel parts subsequently zinc electroplated having a measured surface hardness above 34 HRC or equivalent and all highly stressed cold worked parts can experience hydrogen embrittlement. This encompasses all standard fasteners specified Class 10.9 (metric) or specified Grade 8 (inch) and greater. Baking such parts immediately after electroplating helps relieve this condition.

2.5.2 Exempted Parts: Class 10 nuts meeting ISO 898/2 and Grade 8 nuts meeting SAE J995 and all standard fasteners specified Class 8.8 (metric) and specified Grade 5 (inch) and lower are exempted from the baking requirement in section 2.5.3 of this specification. ISO and SAE documents are available over the Internet respectively from the International Organization for Standardization at www.iso.ch and the Society of Automotive Engineers at www.sae.org.

2.5.3 Baking Requirement: Unless exempted (see Section 2.5.2) or otherwise specified on the drawing, the zinc electroplated parts described in Section 2.5.1 must be relieved (baked) immediately after electroplating and before other chemical treatment (i.e. chromate) by heating to 175°C (350°F) minimum for at least 4 hours. Treatment at higher temperatures and for longer times may be found necessary to ensure freedom from hydrogen embrittlement. Hardened parts that are tempered at less than 175°C (350°F) shall be heated to 150°C (300°F) for at least 8 hours. A constant load test to determine if parts have been affected by hydrogen embrittlement may be required by agreement between the purchaser and supplier.

3. METHODS OF TEST

3.1 All test designations are latest issue unless otherwise specified. Suppliers are not required to perform the specific test procedures cited but must ascertain that their products will conform to the specification limits when tested by the specified methods. The specified methods will be used to reconcile disputed results.

3.2 ASTM test methods are available from ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428 or over the Internet at www.astm.org.

3.3 Chromate Passivation

Determine the presence of clear chromate by conducting the portion of ASTM B201 that defines the test for colorless (clear) coatings.

3.4 Plating Thickness

Plating thickness shall be measured on significant surfaces using one of the following methods: microscopic method per ASTM B487, magnetic method per ASTM B499, or coulometric method per ASTM B504. Plating thickness on threaded fasteners shall be determined on the shank or other smooth surface.

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3.5 Corrosion Resistance

- 3.5.1 For testing corrosion resistance, the complete part is the preferred size of test specimen. When necessary, parts may be cut into smaller test specimens; however, cut test specimens shall not be less than 150 mm (6 inches) in length.
- 3.5.2 Unplated surfaces on test specimens shall be sealed with tape, paint, or other protective coatings to prevent rust migration to the test surfaces during salt spray testing. Sealing of plated surfaces with any material prior to testing is prohibited.
- 3.5.3 Clean the test specimens by dipping or wiping them with a mixture of 25% acetone-75% xylene, and then drying with a clean towel.
- 3.5.4 The test specimens shall be placed in the salt spray test chamber within 24 hours after cleaning. Salt spray testing shall be done according to ASTM B117. Proceed with salt spray exposure for the number of hours specified in the table for resistance to white corrosion.
- 3.5.5 Upon completion of the specified number of exposure hours for resistance to white corrosion, examine the plated surfaces of the test specimens with the unaided eye (20/20 vision) at a distance of approximately 30 cm (12 inches). If all significant surfaces are completely free of white corrosion products, the plating has passed that portion of the corrosion resistance requirement.
- 3.5.6 Replace the test specimens in the salt spray test chamber and continue testing according to ASTM B117 for the additional time required to reach the number of hours specified in the table for resistance to red corrosion.
- 3.5.7 Upon completion of the specified number of exposure hours for resistance to red corrosion, again examine the plated surfaces of the test specimens with the unaided eye (20/20 vision) at a distance of approximately 30 cm (12 inches). The plating passes the red corrosion resistance requirement if there is no more than one spot of rust per 650 mm² (1 square inch) of significant surface, and if none of the rust spots exceed 1.5 mm (0.06 inches) in diameter. For parts with less than 650 mm² (1 square inch) of significant surface, the plating passes this portion of the corrosion resistance requirement if there is no more than one red rust spot and if that spot does not exceed 1.5 mm (0.06 inches) in diameter.

3.6 Adhesion

Plating shall pass the burnishing test and the grind-saw test defined in ASTM B571. Blistering, lifting, or peeling of the plating is evidence of unsatisfactory adhesion (failure to meet the adhesion requirement). Other tests for adhesion that are appropriate for zinc plating are detailed in ASTM B571. Depending on the end use of the plated part or its method of fabrication, passing one or more of these tests, such as a bend test, may also be required. In those instances, the purchaser shall specify the additional adhesion tests that the plating must pass.

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4. DESIGNATION ON DRAWINGS AND PURCHASE ORDERS

Material designations on drawings and purchase orders shall include the generic name, the Case material specification number, class, and any additional adhesion tests if required. Significant surfaces shall be identified when necessary. For steel parts having a measured surface hardness above 34 HRC or equivalent and all highly stressed cold worked parts to be subsequently electroplated, the wording "No baking required" must be added to the drawing and the purchase order if baking is not desired.

Example: Zinc plating, Case MS201, Class 8A

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