

QQ-Z-301c

April 30, 1964

SUPERSEDING

Fed. Spec. QQ-Z-301b

July 24, 1957

FEDERAL SPECIFICATION**ZINC SHEET AND STRIP**

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers wrought zinc.

1.2 Classification.

1.2.1 Types. Zinc sheet and strip shall be of the following types, as specified (see 6.2):

Type I—Rolls or sheet cut from strip (ribbon) rolled zinc.

Type II—Pack rolled zinc.

1.2.2 Tempers. Zinc sheet and strip shall be furnished in one of the following tempers, as specified (see 6.2):

Dead soft

Soft

Half hard

Hard

2. APPLICABLE SPECIFICATIONS, STANDARDS, AND OTHER PUBLICATIONS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, forms a part of this specification to the extent specified herein:

Federal Specifications:

PPP-B-566—Boxes, Folding, Paperboard.

PPP-B-576—Box, Wood, Cleated, Veneer, Paper-Overlaid.

PPP-B-585—Boxes, Wood, Wirebound

PPP-B-591—Boxes, Fiberboard, Wood-Cleated.

PPP-B-601—Boxes, Wood, Cleated-Plywood.

PPP-B-621—Boxes, Wood, Nailed and Lock-Corner.

PPP-B-636—Box, Fiberboard.

PPP-B-676—Boxes, Set-Up, Paperboard.

PPP-T-76—Tape, Pressure-Sensitive Adhesive, Paper, Water Resistant, (for Carton Sealing).

Federal Standards:

Fed. Std. No. 102—Preservation, Packaging, and Packing Levels.

Fed. Std. No. 123—Marking for Domestic Shipment (Civilian Agencies).

Fed. Test Method Std. No. 151—Metals; Test Methods.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

(Single copies of this specification and other

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product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D. C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, and Seattle, Washington.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specifications:

MIL-C-132—Crate, Wood, Open, Maximum Capacity 2,500 Pounds.

MIL-C-3774 — Crates, Wood, Open (2,000 to 16,000 Pounds).

MIL-L-10547—Liners, Case, and Sheet, Overwrap, Watervaporproof or Waterproof, Flexible.

Military Standards:

MIL-STD-105—Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129—Marking for Shipment and Storage.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society For Testing And Materials:

Designation: B 69—Rolled Zinc

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Chemical composition. Rolled zinc shall be made only from virgin metal, of suitable grade, or from virgin metal and scrap of known composition and cleanliness.

3.2 Bending. Unless otherwise specified in the contract or order, rolled zinc shall withstand being bent transversely, as shown in table I, without fracture on the outside of the bent portion, when tested as specified in 4.7.1.

TABLE I.—*Bending requirements*

Thickness of material	Bending	
	Degrees	Radius of bend (inside)
Inch		
0.002 to 0.036, inclusive	180	2T ¹
Over .036 to .090, inclusive	120	2T ¹
Over .090	45	0.50-inch

¹T = thickness of material

3.3 Dynamic ductility and temper requirements. When specified (see 6.2), zinc sheet and strip shall meet the dynamic ductility and temper requirements specified in table II and table III.

TABLE II.—*Dynamic ductility and temper, type I rolled zinc*

American zinc gage No.	Thick-ness, inch	Dead soft		Soft		Half hard		Hard	
		Dynamic ductility, minimum, inch	Temper, maximum, percent	Dynamic ductility, minimum, inch	Temper, maximum, percent	Dynamic ductility, minimum, inch	Temper, maximum, percent	Dynamic ductility, minimum, inch	Temper, maximum, percent
3	0.006	.275	70	0.255	76	0.215	80	0.165	86
4	.008	.280	65	.260	72	.220	75	.170	83
5	.010	.285	60	.265	66	.225	70	.175	80
6	.012	.290	55½	.270	62	.230	65	.180	77
7	.014	.295	52	.275	58	.235	61	.185	74
8	.016	.300	48½	.280	54	.240	58	.190	72
9	.018	.305	46	.285	51	.245	54	.195	69
10	.020	.310	43½	.290	48	.250	51	.200	68
	.022	.315	41½	.295	45	.255	48	.205	65
11	.024	.320	40	.300	43	.260	45	.210	63
	.026	.325	39	.305	40	.265	43½	.215	61
12	.028	.330	37½	.310	37	.270	42½	.220	59
	.030	.335	37	.315	37	.275	42	.225	58
13	.032	.340	36½	.320	36½	.280	41	.230	57
	.034	.345	36	.324	36	.285	40½	.235	56
14	.036	.347	—	.326	—	.290	—	.240	—
	.038	.349	—	.328	—	.295	—	.245	—
15	.040	.350	—	.329	—	.300	—	.250	—
	.042	.352	—	.330	—	.300	—	.250	—
	.045	.353	—	.331	—	.305	—	.255	—
	.048	.355	—	.333	—	.310	—	.260	—
17	.050	.356	—	.334	—	.310	—	.260	—

TABLE III.—*Dynamic ductility and temper, type II rolled zinc*

American zinc gage No.	Thick-ness, inch	Dynamic ductility, minimum, inch	Temper, maximum, percent	American zinc gage No.	Thick-ness, inch	Dynamic ductility, minimum, inch	Temper, maximum, percent
3	0.006	.0165	83	12	0.028	0.220	51
4	.008	.170	77½		.030	.225	49
5	.010	.175	73	13	.032	.230	48
6	.012	.180	69		.034	.235	47
7	.014	.185	65	14	.036	.240	—
8	.016	.190	62		.038	.245	—
9	.018	.195	58½	15	.040	.250	—
10	.020	.200	57		.042	.250	—
	.022	.205	55½		.045	.255	—
11	.024	.210	54		.048	.260	—
	.026	.215	52½	17	.050	.260	—

3.4 Rolls. Rolls shall consist of a length of a flat-rolled product wound into a cylindrical spiral.

3.5 Dimensional tolerances.

3.5.1 *Thickness.* The material shall not vary from the specified thickness by more than the amounts shown in table IV.

TABLE IV.—*Permissible variations in thickness*

Type	Specified thickness, inch	Permissible variation (plus and minus)
I	Up to and including 0.020	0.001-inch
	Over 0.020	5 percent ¹
II	Up to and including 0.032	0.002-inch
	Over 0.032	6 percent ¹

¹ Specified (nominal) thickness.

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3.5.2 *Width.* The material shall not vary from the specified width by more than the amounts shown in table V.

TABLE V.—Permissible variations in width

Thickness, inch	Permissible variation in width (plus and minus), inch	
	Widths up to 18 inches, inclusive	Widths over 18 inches
Up to 0.125 inclusive	0.031	0.063
Over 0.125 to 0.250, inclusive	.063	.063
Over 0.250 to 0.375, inclusive	.125	.125

3.5.3 *Length.*

3.5.3.1 *Exact lengths.* Sheet and strip may be ordered to exact lengths up to 12 feet. When so ordered, the variations from the specified length shall not exceed those shown in table VI.

TABLE VI.—Permissible variations in exact lengths

Thickness, inch	Permissible variation in length (plus and minus), inch
Up to 0.375, inclusive	0.125

3.5.3.2 *Stock lengths.* When sheet and strip are ordered in stock lengths, the pieces shall be cut to the nominal or stock length plus or minus 1/2 inch. The shortest acceptable lengths, the maximum permissible percentage by weight of short lengths, and the required percentage by weight of stock lengths in any one shipment shall be as shown in table VII.

TABLE VII.—Permissible variations in length of sheet and strip ordered in stock lengths

Nominal or stock length, feet	Required percentage, by weight of stock lengths	Maximum permissible percentage, by weight of short lengths				
		Over 8 to 10 feet, inclusive	Over 6 to 8 feet, inclusive	Over 4 to 6 feet, inclusive	Over 2 to 4 feet, inclusive	Under 2 feet
10	60	40	30	20	10	0
8	70	—	30	20	10	0
6	80	—	—	20	10	0

3.5.4 *Bend or curvature.* Type I rolled zinc in lengths over 10 feet shall not exhibit sidewise bend or curvature in excess of 1 inch in any length of 10 feet.

3.6 Finished (rolled) edges.

3.6.1 When finished (rolled) edges of sheet and strip are specified (see 6.2), the following descriptions shall apply:

3.6.1.1 Square-edge material shall be supplied with finished edge, with sharp, square corners, without bevel or rounding of any sort.

3.6.1.2 Round-edge material shall be supplied with finished edge, semi-circular in form, the diameter of the circle forming the edge being equal to the thickness of the material.

3.6.1.3 Round-corner material shall be supplied with square finished edge, and corners rounded to a definite radius which, unless otherwise specified in the contract or order, may be any radius less than one-half the thickness of the material.

3.6.2 When no description of any required form of edge for sheet and strip is given, edges such as would result from slitting, sawing, or shearing will be accepted.

3.7 *Workmanship.* Material shall be uniform in quality, clean, sound, smooth, commercially straight or flat, and free from pipes, slivers, laps, cracks, twists, seams, scale, scratches, damaged ends or edges, buckles, and other injurious defects.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 *Responsibility for inspection.* Unless otherwise specified in the contract or purchase order, the supplier is responsible for

the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Lot. For purposes of sampling a lot shall consist of not more than 5,000 pounds of zinc in the form of sheet, strip, or rolls, of the same type, temper, and same nominal width and thickness.

4.3 Sampling.

4.3.1 Sampling for bending test. From each lot five representative sheets or strips shall be selected to provide specimens for the bending test specified in 4.7.1.

4.3.2 Sampling for dynamic ductility and temper tests. When required, one sample for each test shall be selected at random from each lot and shall be subjected to the dynamic ductility and temper tests specified in 4.5.2 and 4.5.3.

4.3.3 Sampling for examination.

4.3.3.1 Visual examination. From each inspection lot, a representative sample of zinc sheet or strip shall be selected for examination specified in 4.4.1 in accordance with MIL-STD-105 at Inspection Level II. The Acceptable Quality Level shall equal 1.5 percent defective.

4.3.3.2 Dimensional examination. From each inspection lot, a representative sample of zinc sheet or strip shall be selected for examination specified in 4.4.2 in accordance with MIL-STD-105 at Inspection Level II. The Acceptable Quality Level shall equal 1.5 percent defective.

4.4 Examination.

4.4.1 Visual. Each sample sheet or strip selected in accordance with 4.3.3.1 shall be visually examined to verify conformance with the requirements of 3.6 and 3.7.

4.4.2 Dimensional. Each sample sheet or strip selected in accordance with 4.3.3.2 shall be measured to verify conformance with this specification.

4.4.2.1 Determination of sidewise bend or curvature (ribbon). The roll shall be supported on a reel at one end of a table and the ribbon drawn along a 10-foot straightedge keeping both ends of the straightedge touching the edge of the ribbon. No point on the straightedge shall then be more than 1 inch from the edge of the ribbon.

4.4.2.2 Gaging (ribbon). Type I rolled zinc shall be gaged with a micrometer caliper which has previously been checked with precision blocks. The average of five measurements, taken at least 1 foot apart along the roll, shall be used to determine conformance with 3.5.1.

4.4.3 Preparation for shipment. Examination of the preservation, packaging, packing, and marking for shipment shall be made for conformance with the requirements of section 5.

4.5 Test procedures.

4.5.1 Bending test. From each sample selected in accordance with 4.3 a transverse test specimen shall be prepared in accordance with method No. 231 of Fed. Test Method Std. No. 151. The longitudinal axis of the specimen shall be taken perpendicular to the direction of rolling. Specimens shall be bent transversely to determine conformance with 3.2, pressure being applied as rapidly as practicable.

4.5.2 Dynamic ductility test, when required (see 3.3). The dynamic ductility test shall be performed at the place of manufacture in accordance with ASTM B69.

4.5.3 Temper test, when required (see 3.3). The temper test shall be performed at the place of manufacture in accordance with ASTM B69.

4.6 Rejection

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4.6.1 *Examination.* Any sample unit containing one or more visual defects shall be rejected. If the number of defective units in any sample exceeds the acceptance number specified in 4.3.3 for that sample size, the entire lot represented by the sample shall be rejected, subject to the resubmittal paragraph of MIL-STD-105.

4.6.2 *Tests.* A lot shall be rejected for failure to meet any of the test requirements when tested in accordance with 4.7, subject to the retest provisions of Fed. Test Method Std. No. 151.

5. PREPARATION FOR DELIVERY

(For civil agency procurement, the definitions and application of the levels of packaging and packing shall be in accordance with Fed. Std. No. 102.)

5.1 *Packaging.* Packaging shall be level A or C as specified (see 6.2).

5.1.1 *Level A.*

5.1.1.1 *Rolls.* When specified in the contract or order (see 6.2) rolls 1-13/16 inches or less in width shall be individually packaged in folding cartons or set-up boxes in accordance with PPP-B-566, PPP-B-636, or PPP-B-676. Closures shall be in accordance with the applicable box specification and the appendix thereto. Gross weight shall not exceed the weight limitations of the applicable box specification. Rolls over 1-13/16 inches in width, and, unless otherwise specified in the contract or order (see 6.2), rolls 1-13/16 inches or less in width, shall be secured around the circumference with one or more ties of tension strapping, twine, or filament tape.

5.1.1.2 *Flat sheet.* When specified in the contract or order, flat sheet shall be interleaved with a draft paper or similar media to prevent abrasion and scoring of the finished surfaces.

5.1.2 *Level C.* Rolls and flat sheet shall be packaged in accordance with good commercial practice.

5.2 *Packing.* Packing shall be level A, B or C as specified (see 6.2).

5.2.1 *Levels A and B.* Flat sheet shall be packed in overseas type cleated plywood or nailed wood boxes conforming to PPP-B-601 or PPP-B-621 (class 2), respectively. The gross weight of the boxes shall not exceed 1,000 pounds. Boxes exceeding 500 pounds gross weight shall be modified by the addition of nominal 2 by 4-inch wood skids placed flat. Additionally, sheet may be packed in unsheathed crates conforming to MIL-C-132 and MIL-C-3774, as applicable.

5.2.1.1 *Level A.* Rolls, packaged as specified (see 6.2), shall be packed in containers conforming to PPP-B-585, class 3, PPP-B-591, overseas type, PPP-B-601, overseas type, PPP-B-621, class 2, or PPP-B-636, class 2. Unless otherwise specified (see 6.2), shipping containers shall have case liners conforming to MIL-L-10547. Case liners for class 2 fiberboard boxes conforming to PPP-B-636 may be omitted provided all corners and edge seams and manufacturer's joints are sealed with minimum 1-1/2 inch wide tape conforming to PPP-T-76. Boxes shall be closed and banded in accordance with the applicable box specification or appendix thereto. The gross weight of wood or wood-cleated boxes shall not exceed 200 pounds.

5.2.1.2 *Level B.* Rolls, packaged as specified (see 6.2), shall be packed in boxes conforming to PPP-B-585, class 1 or 2, PPP-B-591, domestic type, PPP-B-621, class 1, or PPP-B-636, class 1 or 2. Box closures shall be as specified in the applicable box specification or appendix thereto. The gross weight of wood cleated boxes shall not exceed 200 pounds.

5.2.2 *Level C.* Zinc rolls and flat sheet shall be packed for shipment in compliance with common carrier regulations applicable to that mode of transportation to ensure safe delivery at destination at lowest transportation cost without assessment of penalty charges for improper packing.

5.3 Marking

5.3.1 *Civil agencies.* In addition to any special marking required in the contract or order, marking of the shipping containers shall be in accordance with Fed. Std. No. 123.

5.3.2 *Military activities.* In addition to any special marking required in the contract or order, marking of the shipping containers shall be in accordance with MIL-STD-129.

6. NOTES

6.1 **Intended use.** Zinc sheet and strip are intended for uses other than as protective anodes.

6.2 **Ordering data.** Purchasers should exercise any desired options offered herein and procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type, temper (see 1.2), and dimensions of zinc required.
- (c) Any special requirements as to ductility or temper or both (see 3.3).
- (d) The thickness of sheet and strip in decimals of an inch (see 3.5.1).
- (e) Special finish of the edges of sheet and strip if required (see 3.6.1).
- (f) The intended use. This should include the fabrication involved, the depth of drawing, sharpness of bends, stiffness required in finished part, and whether uniformity of temper is necessary to facilitate handling in automatic machinery.
- (g) Whether the zinc sheet and strip shall be packaged in accordance with level A or C, and packed in accordance with level A, B, or C (see 5.1 and 5.2).

6.3 The properties of the material covered by this specification are similar to the properties of ASTM B69.

6.4 General information.

6.4.1 When material is ordered in the form of "sheet" or "strip", it is to be understood that these terms refer merely to the general form and dimensions of the material, and do not have any technical significance as to the methods of manufacture.

6.4.2 Sheet and strip should be ordered in as narrow widths as can be used.

6.4.3 Strip in narrow widths for use in automatic machines may be ordered to closer tolerances than those given herein, which are a matter of agreement between the contractor and the bureau or agency concerned.

6.5 **Transportation description.** Transportation descriptions and minimum weights applicable to this commodity are:

Rail:

Zinc, sheet or strip, not otherwise indexed by name.

Carload minimum weight 36,000 pounds.

Motor:

Zinc, sheet or strip, not otherwise indexed.

Truckload minimum weight 36,000 pounds, subject to Rule 115, National Motor Freight Classification.

CUSTODIANS:

Army—MR

Navy—WEPs

Air Force MOA