

MIL-G-18014B(SHIPS)
15 March 1967

SUPERSEDING
MIL-G-18014A(SHIPS)
15 January 1958
(See 6.2 and 6.3)

MILITARY SPECIFICATION
GRATINGS, METAL, BAR TYPE FLOORING,
NAVAL SHIPBOARD

1. SCOPE

- 1.1 Scope. - This specification covers open, bar-type gratings, (flooring), for shipboard use.
- 1.2 Classification. - Gratings shall be of the following types, classes, and styles, as specified, (see 6.1).

Type A - Steel, heavy duty, galvanized.

Class a - Lightweight.

Class b - Heavyweight.

Type B - Aluminum alloy, light duty.

Class a - Lightweight.

Style 1 - Riveted.

Style 2 - Interlocked.

- 1.2.1 When the style of type B, class a, gratings is not specified, style 1 shall be furnished (see 6.1).

2. APPLICABLE DOCUMENTS

- 2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

- QQ-A-200/4 - Aluminum Alloy Bar, Rod, Shapes and Tube, Extruded, 5083.
- QQ-A-200/5 - Aluminum Alloy Bar, Rod, Shapes and Tube, Extruded, 5086.
- QQ-A-200/6 - Aluminum Alloy Bar, Rod, Shapes and Tube, Extruded, 5454.
- QQ-A-200/7 - Aluminum Alloy Bar, Rod, Shapes and Tube, Extruded, 5456.
- QQ-A-200/8 - Aluminum Alloy Bar, Rod, Shapes and Tube, Extruded, 6061 and 6062.
- QQ-A-200/9 - Aluminum Alloy Bar, Rod, Shapes and Tube, Extruded, 6063.
- QQ-A-225/7 - Aluminum Alloy Bar, Rod and Wire; Rolled, Drawn or Cold Finished, 5052.
- QQ-A-225/8 - Aluminum Alloy Bar, Rod, Wire and Special Shapes; Rolled, Drawn, or Cold Finished, 6061.
- QQ-A-250/6 - Aluminum Alloy, 5083, Plate and Sheet.
- QQ-A-250/7 - Aluminum Alloy, 5086, Plate and Sheet.
- QQ-A-250/8 - Aluminum Alloy, 5052, Plate and Sheet.
- QQ-A-250/9 - Aluminum Alloy, 5456, Plate and Sheet.
- QQ-A-250/10 - Aluminum Alloy, 5454, Plate and Sheet.
- QQ-A-250/11 - Aluminum Alloy, 6061, Plate and Sheet.

MILITARY

- MIL-Z-17871 - Zinc-Coating (Hot-Dip Galvanizing).

STANDARDS

MILITARY

- MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-163 - Steel Mill Products Preparation for Shipment and Storage.

MIL-G-18014B(SHIPS)

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

3. REQUIREMENTS

3.1 Material. -

3.1.1 Type A. - Type A gratings shall be made of either carbon steel rolled or drawn, or high tensile alloy steel, rolled or drawn.

3.1.2 Type B. - Type B gratings shall be made of aluminum alloy conforming to the chemical requirements of the applicable specification (see 2.1). When the material is not specified, the manufacturer may furnish any of these materials (see 3.2.1).

3.2 General. -

3.2.1 The grating panel sizes shall be as specified (see 6.1). Where nonrectangular shapes, or cutouts in rectangular panels are required, they shall be as shown on the drawings as specified, (see 6.1). In general, the edges of nonrectangular shapes and cutouts where more than four bearing bars are included, shall be finished with banding bars of the same depth as the bearing bars. The banding bars shall be welded to the bearing bars of the grating at least every other bearing bar and in every corner. Intervening bearing bars shall be tack welded. Where banding bars are for general appearance or finish only, welding to every fourth bearing bar will be permitted. The ends of 6000 series aluminum grating panels shall be finished or banded by means of spacers or bridges to preclude welding. The 5000 series aluminum may be welded.

3.2.2 Clamps or other fastenings shall be provided when specified (see 6.1). Such clamps or fastenings shall be of the same material and be finished in the same manner as the gratings, shall not extend above the surface of the gratings, and shall be of such construction as to provide means for holding and securing the gratings to the supporting structure, with adequate simplicity of installation and for removal and replacement in service.

3.2.3 The thickness and spacing of all bearing bars, and the depth, thickness, and spacing of all cross or reticuline bars shall be adequate to support the loads specified in 3.5 without deflection due to bending, and without lateral displacement, warping or distortion of any of the parts greater than 0.2 inch and without permanent set greater than 0.008 inch (see 4.3.5).

3.3 Construction. -

3.3.1 Reticular. - Gratings shall be reticular, flush topped, and constructed of straight parallel bearing bars, placed edgewise and joined by reticuline bars, or cross bars. For steel gratings, reticuline bars or cross bars shall be secured to the bearing bars by riveting, welding, or interlocking joint construction (see table I); for aluminum gratings, style 1, securing shall be by riveting only (see table I); for aluminum gratings, style 2, securing shall be by interlocking only (see table I).

3.3.2 Spacing of bearing bars. - The spacing between the bearing bars shall not exceed 1-7/8 inches from center to center of adjacent bars. For gratings of the type where the reticuline bars are not parallel cross bars and bent or crimped to contact the latter bars at intervals at which they are fastened to the bearing bars by rivets or welding, the spacing of rivets or welds shall not exceed 7 inches; for gratings of the type where the reticuline bars are parallel cross bars secured to the bearing bars by clamping, welding, or interlocking joint construction, the spacing of the cross bars shall not exceed 4 inches.

3.3.3 Tolerances. - Tolerances will be permitted as follows:

Length of bearing bars - plus or minus 1/16 inch in 6 feet.

Depth of bearing bars - plus or minus 1/32 inch. (When measured from bottom of serrations when present.)

Width of grating panels - plus or minus 1/8 inch.

A tolerance of plus 10 percent will be permitted on the maximum weight of any individual grating when bearing bars or fasteners, or both, form a part of the grating.

MIL-G-18014B(SHIPS)

3.4 Dimensions. - The depth of the bearing bars shall be 1 inch within the tolerance specified in 3.3.3. The depth of cross bars or reticuline bars shall not exceed 1 inch.

3.4.1 Class a. - The thickness of bearing bars for class a gratings shall be not less than 1/8 inch.

3.4.2 Class b. - The thickness of bearing bars for class b gratings shall be not less than 3/16 inch.

3.5 Load. - The load requirements of the gratings shall be as shown in table I.

Table I - Load requirements.

Type, class and style	Design loading per square foot	Test load concentrated midway between supports on a 2-foot long 3-foot span (see 4.3.5)	Maximum allowed weight per square foot, finished unbanded, including painting or zinc-coating (galvanized)
	Pounds	Pounds	Pounds
Type A, class a - welded, interlocked or riveted	300	900	5.00
Type A, class b - welded, interlocked or riveted	300	900	8.45
Type B, class a, style 1 or 2	175	525	3.50

3.6 Zinc-coating (galvanizing). - Unless otherwise specified in the contract or order, steel gratings shall be completely and evenly zinc-coated (galvanized) by the hot-dip process in accordance with MIL-Z-17871 after fabrication.

3.6.1 The coating shall not flake off when tested as specified in 4.3.4.

3.7 Workmanship. - Gratings shall be accurately fabricated and free from warps, twists, or other defects affecting the appearance of serviceability. The bars from which the gratings are fabricated shall be sound, of uniform quality and condition, and free from harmful nonmetallic inclusions, segregations, pipes, laps, cracks, twists, seams, damaged ends and other injurious defects. The workmanship shall be first class in every respect.

4. QUALITY ASSURANCE PROVISIONS

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 supplies and services conform to prescribed requirements.

4.2 Sampling for quality conformance inspection. -

4.2.1 Lot. - For purposes of sampling, a lot shall consist of all gratings of the same type, class, size and style offered for delivery at the same time.

4.2.1.1 Gratings shall be selected in accordance with table II or III, as applicable, for the inspection of 4.3.1 through 4.3.5. Any sample grating having one or more defects shall be subject to rejection. If the number of gratings rejected exceeds the acceptance number shown in table II or III, as applicable, this shall be cause for rejection of the entire lot. A rejected lot may be resubmitted for examination and tests after the manufacturer has repaired the entire lot and corrected all non-conforming gratings.

MIL-G-18014B(SHIPS)

Table II - Sampling for visual, weight, dimensional, and zinc adherence (regular shapes).

Lot size number of gratings or square feet	Sample size ^{1/} number of gratings or square feet	Acceptance number (defective)	Rejection number (defective)
1 to 9	All	--	--
10 to 25	8	0	1
26 to 62	13	1	2
63 to 160	20	2	3
161 to 410	32	3	4
411 to 1000	50	5	6
1001 to 2560	80	7	8
2561 to 6250	125	10	11
6251 to 16000	200	14	15

^{1/} When ordered by square feet, no more than 5 square feet of the sample shall be in any one grating.

Table III - Sampling for visual, weight, dimensional, and zinc adherence (irregular shapes and cutouts).

Lot size number of gratings or square feet	Sample size ^{1/} number of gratings or square feet	Acceptance number (defective)	Rejection number (defective)
1 to 9	All	--	--
10 to 25	13	1	2
26 to 62	20	2	3
63 to 160	32	3	4
161 to 410	50	5	6
411 to 1000	80	7	8
1001 to 2560	125	10	11
2561 to 6250	200	14	15
6251 to 16000	315	21	22

^{1/} When ordered by square feet, no more than 5 square feet of the sample shall be in any one grating.

4.2.1.2 Sampling for load test. - Sample gratings shall be selected from the lot in accordance with table IV and subjected to the deflection and permanent set tests of 4.3.5. If any lot is rejected for excessive deflection or permanent set, corrective action shall apply to all gratings in the lot.

Table IV - Sampling for test of deflection under load, and permanent set.

Lot size Pieces or square feet	Regular shapes		Irregular shapes and cutouts	
	Sample, ^{1/} pieces or square feet	Acceptance ^{2/} constant (k)	Sample ^{1/} pieces or square feet	Acceptance ^{2/} constant (k)
3 to 40	3	1.45	3	1.45
41 to 65	3	1.45	4	1.45
66 to 110	3	1.45	5	1.53
111 to 180	4	1.45	7	1.62
181 to 300	5	1.53	10	1.72
301 to 500	7	1.62	15	1.79

MIL-G-18014B(SHIPS)

Table IV - Sampling for test of deflection under load, and permanent set (cont'd.).

Lot size	Regular shapes		Irregular shapes and cutouts	
	Sample, $\frac{1}{2}$ / pieces or square feet	Acceptance $\frac{2}{2}$ / constant (k)	Sample $\frac{1}{2}$ / pieces or square feet	Acceptance $\frac{2}{2}$ / constant (k)
501 to 800	10	1.72	20	1.82
801 to 1,300	15	1.79	25	1.85
1,301 to 3,200	20	1.82	30	1.86
3,201 to 8,000	25	1.85	40	1.89
8,001 to 22,000	30	1.86	50	1.93
22,001 to 110,000	35	1.89	75	1.98
110,001 to 550,000	35	1.89	100	2.00
550,001 and over	35	1.89	150	2.03

- $\frac{1}{2}$ / When ordered by square feet, no more than 5 square feet of the sample shall be in any one unit.
- $\frac{2}{2}$ / Acceptability criterion: The lot shall be accepted if $(U-\bar{X})/s$ is greater than (k) the acceptance constant. U is the specification upper limits (see 3.2.3 and table I). \bar{X} is the sum of the measurements like $(\sum X)$ divided by the number of samples (n) or $\bar{X} = \sum X/n$. The lot standard deviation(s) is equal to the following formula:

$$s = \sqrt{\frac{\sum X^2 - (\sum X)^2}{n - 1}}$$

Where:

$\sum X^2$ is the sum of squared measurements.
 $(\sum X)^2$ is the sum of measurements squared.

4.3 Examination and tests. -

4.3.1 Each sample grating shall be examined to determine conformance with this specification. Particular attention shall be given to dimensions, squareness, flatness, and clamps and fastenings.

4.3.2 Each sample zinc-coated grating shall be surface examined after galvanizing to determine conformance with 3.6.

4.3.3 Weight. - Each of the sample gratings selected in accordance with 4.2.1.1 shall be weighed to determine conformance with table I.

4.3.4 Each of the sample gratings selected in accordance with 4.2.1.1 shall be struck a hard glancing blow with a straight peen or scaling hammer having all edges ground to a radius of not less than 3/64 inch and weighing approximately one pound.

4.3.5 Load test. - The sample gratings selected in accordance with 4.2.1.2 shall be supported by two supports with bearing width not to exceed 1 inch. These supports shall be placed 3 feet apart. The gratings shall be tested with the load specified for the type and class in accordance with table I, suspended from a bar placed midway between the supports. The bar shall not have a bearing width on the grating greater than 2 inches. Deflection and permanent set shall be determined by gages.

4.4 Possible test failures. - Possible test failures are defined as follows:

- (a) Weight test:
 - (1) Weight of finished grating not within maximum allowed.
- (b) Load test:
 - (1) Deflection and permanent set not within allowable limits when grating is subjected to load test.
- (c) Impact test:
 - (1) Grating does not withstand prescribed impact test.

MIL-G-18014B(SHIPS)

5. PREPARATION FOR DELIVERY

5.1 Packing. -

5.1.1 Levels A and B. - Gratings, separated for type, class, size and style, shall be packed for shipment in secured lifts on nominal 2 by 4 inch skids. Skidding and strapping shall be in accordance with MIL-STD-163. The maximum gross weight per lift shall not exceed 6,000 pounds for steel grating and 3,000 pounds for aluminum grating.

5.1.2 Level C. - The gratings shall be prepared for shipment in accordance with commercial practice to insure carrier acceptance and safe delivery at destination, and shall meet, as a minimum the requirements of carrier rules and regulations applicable to the mode of transportation.

5.2 Marking for shipment. - Unless otherwise specified in the contract or order, marking for shipment shall be in accordance with MIL-STD-129. Nomenclature shall be the exact nomenclature for the part or item that has been approved under the contract or order.

6. NOTES

6.1 Ordering data. - Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type and class of gratings required (see 1.2).
- (c) When type B, class a, gratings are ordered, the style required (see 1.2.1).
- (d) Size of grating panels and drawings required (see 3.2.1).
- (e) Whether clamps or fastenings are required (see 3.2.2). Welding is not allowed on 6000 series aluminum.
- (f) Level of packing required (see 5.1.1).

6.2 When other than bar type gratings are required, MIL-G-18015 should be used. When the intended use does not restrict the type of grating, either MIL-G-18015 or this specification should be used.

6.3 CHANGES FROM PREVIOUS ISSUE. THE EXTENT OF CHANGES (DELETIONS, ADDITIONS, ETC.) PRECLUDE THE ANNOTATION OF THE INDIVIDUAL CHANGES FROM THE PREVIOUS ISSUE OF THIS DOCUMENT.

Preparing activity:
Navy - SH
(Project 5670-N005Sh)

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 119-R004
<p align="center"><u>INSTRUCTIONS</u></p> <p>This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).</p>		
SPECIFICATION		
ORGANIZATION (of submitter)		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT \$
MATERIAL PROCURED UNDER A		
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES", IN WHAT WAY?		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity)		DATE

FOLD

DEPARTMENT OF THE NAVY
NAVAL SHIP ENGINEERING CENTER
WASHINGTON, D. C. 20360

POSTAGE AND FEES PAID
NAVY DEPARTMENT

OFFICIAL BUSINESS

COMMANDER, NAVAL SHIP ENGINEERING CENTER
FEDERAL & MILITARY DOCUMENTS & DOD STANDARDIZATION BRANCH
DEPARTMENT OF THE NAVY
WASHINGTON, D. C. 20360

FOLD