

GGG-P-463C
AMENDMENT - 1
June 15, 1977

FEDERAL SPECIFICATION

PLATE, SURFACE, (GRANITE)
(Inch and Metric)

This amendment, which forms a part of Federal Specification GGG-P-463C, dated September 12, 1973, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal Services.

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Upper right corner, document reference: Change September 12, 1973 to August 3, 1961

Add to title: (Inch and Metric)

Paragraph 2.1 Add: National Bureau of Standards Publications

NBS Special Publication 330 - The International System of Units (SI)

Screw-Thread Standards for Federal Services, Handbook H28

(Application for copies should be addressed to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.)

FSC 5220

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Table 1 Add:

TABLE I. (Metric) Standard sizes for granite surface plates					
	Width	Length	Thickness	Calculated Diagonal	Area (meter ²)
	mm	mm	mm	mm	
Rectangular	300	300	Specify thickness only if essential	424	0.090
	300	450		541	0.135
	450	450		636	0.202
	450	600		750	0.270
	600	600	See Appendix 30 and Tables XI (Metric) and XII (Metric)	849	0.360
	600	900		1082	0.540
	600	1200		1342	0.720
	900	900		1273	0.810
	900	1200		1500	1.080
	900	1500		1749	1.350
	900	1800		2012	1.620
	1200	1200		1697	1.440
	1200	1500		1921	1.800
	1200	1800		2163	2.160
	1200	2400	2683	2.880	
	1200	3000	3231	3.600	
	1500	3000	3304	4.500	
1800	2400	3000	4.320		
1800	3600	4025	6.480		
Round				Diameter	
				300	0.071
				450	0.159
				600	0.283
				900	0.636
			1200	1.131	

Table II. Add:

TABLE II.(Metric) Tolerances for repeat reading of measurement

Diagonal or diameter range mm	Grade AA	Grade A	Grade B	Obtained
	Full indicator movement (FIM) micrometers			
Thru 800	0.9	1.5	2.8	When not specified
Over 800 thru 1500	1.2	1.8	3.0	
Over 1500 thru 2200	1.5	2.0	4.0	
Over 2200 thru 3000	1.9	2.5	5.0	
Over 3000 thru 3800	2.3	3.0	6.0	
Over 3800	2.5	3.5	7.0	
All sizes	0.6	1.3	2.5	When specified

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Table III. Add:

<u>TABLE III.(Metric)</u>		<u>Total flatness tolerance in micrometers</u>		
<u>Rectangular plates</u>		<u>Grade</u>	<u>Grade</u>	<u>Grade</u>
<u>Width</u>	<u>Length</u>	<u>AA</u>	<u>A</u>	<u>B</u>
<u>mm</u>		<u>Ex</u>	<u>Ex</u>	<u>Ex</u>
300	300	1.3	2.6	5.2
300	450	1.5	2.9	5.9
450	450	1.6	3.3	6.6
450	600	1.9	3.8	7.6
600	600	2.2	4.3	8.6
600	900	2.9	5.7	11.5
600	1200	3.9	7.8	15.5
900	900	3.6	7.2	14.4
900	1200	4.6	9.2	18.4
900	1500	5.9	11.8	23.6
1500	1800	7.5	15.0	29.9
1200	1200	5.6	11.2	22.4
1200	1500	6.9	13.8	27.6
1200	1800	8.5	17.0	33.9
1200	2400	12.5	25.0	50.0
1200	3000	17.7	35.4	70.8
1500	3000	18.5	36.9	73.9
1800	2400	15.4	30.8	61.6
1800	3600	26.9	53.8	107.7
<u>Round plates</u>				
<u>diameter</u>				
	300	1.1	2.3	4.6
	450	1.3	2.5	5.3
	600	1.6	3.2	6.3
	900	2.3	4.6	9.2
	1200	3.3	6.6	13.2

PAGE 7 (Con.)

Add paragraph:

3.3.4.1.1 Flatness tolerances for metric surface plate sizes.
The flatness tolerances for metric grade AA plates listed in Table III (metric) are obtained from the following formula:

$$\text{Total flatness tolerance in micrometers} = 1 + 1.6D^2 \times 10^{-6}$$

where D = diagonal or diameter of the plate in millimeters.
The tolerances on the A and B grade plates are 2 and 4 times, respectively, those for grade AA.

Add paragraph:

3.3.4.1.2 Applicable total flatness tolerance. The flatness tolerances in microinches in Table III may apply to metric size plates also only when purchase agrees to the use of an inch measuring system.

Table IV. Add:

TABLE IV.(Metric) Restrictions on surface area for flatness tolerance - all values in millimeters

Diameter or diagonal of plate	Distance in from edges All grades
300 thru 1200	25
over 1200	38

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Table VII. Add:

TABLE VII.(Metric) Thermal gradient in granite

Grade	Degree Celsius per mm of thickness of plate
AA	0.0011
A	0.0022
B	0.0044

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Paragraph 4.5.5 Portion of last sentence should read:

"10 microinches or 1/5 of the FIR value"

Add paragraph:

4.5.5.1 When the repeat reading gage is used with the tolerances specified in paragraph 3.3.3, the fixed feet configuration shown in Figure 7 may be reversed by placing one fixed foot on left side of Figure 7 and the two fixed feet in the mid-position.

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Section 5: Delete paragraphs 5.1.1 through 5.2.3 and replace as follows.

5.1.1 Plates shall be packaged, cushioned, and blocked in accordance with manufacturer's commercial practice and comply with the requirements of the Uniform Freight Classification and National Motor Freight Classification. See paragraph 2.1 on references for packaging guidelines.

5.1.2 Barrier materials shall be applied to prevent marring of the surfaces.

5.1.3 Skids are required for weights exceeding 150 pounds (70 kilograms).

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Paragraph 6.2 Add:

- (o) Microinch flatness tolerance on metric size plates, if acceptable.

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Paragraph 6.3 Add:

- (aa) Micrometer. The micrometer unit of length is equal to 0.000001 meter.
- (bb) Newton. The newton is the unit of force equal to one kilogram-meter per second per second.

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Table XI. Add:

TABLE XI. (Metric) Recommended minimum thickness for normal loading at 244 kilograms per square meter on rectangular granite surface plates on three supports.

Size mm			Area square meters	Total load W kg	Granite Thickness in Millimeters (2)								
Width w	Length L	Diagonal			AA Grade			A Grade			B Grade		
					a	b	c	a	b	c	a	b	c
300	300	424	0.090	22	50	50	75	50	50	50	50	50	50
300	450	541	.135	33	75	75	100	75	75	75	50	50	50
450	450	636	.202	49	75	100	100	75	75	75	50	50	50
450	600	750	.270	66	100	100	125	75	75	100	50	75	75
600	600	849	.360	88	100	100	125	75	75	100	75	75	100
600	900	1082	.540	132	125	150	180	100	150	150	75	100	125
600	1200	1342	.720	176	150	205	230	125	150	180	100	125	150
900	900	1273	.810	198	125	150	180	100	125	150	75	100	100
900	1200	1500	1.080	264	150	180	230	125	150	180	100	125	150
900	1500	1749	1.350	330	180	230	280	150	180	205	125	150	180
900	1800	2012	1.620	395	230	255	330	180	205	255	150	180	205
1200	1200	1697	1.440	352	180	205	230	125	150	205	100	125	150
1200	1500	1921	1.800	439	180	230	255	150	180	205	125	125	180
1200	1800	2163	2.160	527	205	255	305	180	205	255	125	150	205
1200	2400	2683	2.880	703	280	330	380	230	255	305	180	205	230
1200	3000	3231	3.600	879	330	380	455	255	305	355	205	230	280
1500	3000	3304	4.500	1099	330	380	455	255	305	355	205	230	280
1800	2400	3000	4.320	1055	255	305	380	205	255	305	150	180	230
1800	3600	4025	6.480	1582	355	430	510	280	330	405	230	255	305

Column a based on $E = 62.05 \times 10^9 \text{ N/m}^2$
 Column b based on $E = 37.92 \times 10^9 \text{ N/m}^2$
 Column c based on $E = 20.68 \times 10^9 \text{ N/m}^2$
 where E is Young's Modulus of Elasticity

(2) An Ad Hoc surface plate committee made these minimum thickness recommendations in line with present manufacturing practice, therefore, some thicknesses are greater than the values calculated with the equation given in section 30.

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Table XII. Add:

TABLE XII. (Metric) Recommended minimum thickness for abnormal loading at 488 kg per square meter for rectangular granite surface plates on three supports.

Size mm			Area square meters	Total load W kg	Granite Thickness in Millimeters (2)								
Width w	Length L	Diagonal			AA Grade			A Grade			B Grade		
					a	b	c	a	b	c	a	b	c
300	300	424	0.090	44	75	75	75	75	75	75	75	75	75
300	450	541	.135	66	100	100	125	100	100	100	100	100	75
450	450	636	.202	99	100	100	125	100	100	100	75	100	75
450	600	750	.270	132	100	125	150	100	100	125	100	100	100
600	600	849	.360	176	125	150	150	100	125	125	75	100	100
600	900	1082	.540	264	150	180	230	125	150	180	100	125	150
600	1200	1342	.720	352	205	230	305	150	205	230	125	150	180
900	900	1273	.810	395	150	180	230	125	150	180	125	125	150
900	1200	1500	1.080	527	205	230	280	150	180	230	150	150	180
900	1500	1749	1.350	659	255	280	330	205	230	280	150	180	205
900	1800	2012	1.620	791	305	330	405	255	255	330	205	205	255
1200	1200	1697	1.440	703	205	255	305	150	205	255	150	150	205
1200	1500	1921	1.800	879	255	280	330	205	230	255	150	180	205
1200	1800	2163	2.160	1055	305	305	380	255	255	305	205	205	230
1200	2400	2683	2.880	1406	355	405	485	305	330	380	255	255	305
1200	3000	3231	3.600	1758	405	455	585	355	380	455	305	305	355
1500	3000	3304	4.500	2197	405	455	585	355	380	455	305	305	355
1800	2400	3000	4.320	2109	355	380	485	305	305	380	255	255	305
1800	3600	4025	6.480	3164	455	535	635	405	430	510	355	355	405

Column a based on $E = 62.05 \times 10^9 \text{ N/m}^2$

Column b based on $E = 37.92 \times 10^9 \text{ N/m}^2$

Column c based on $E = 20.68 \times 10^9 \text{ N/m}^2$

where E is Young's Modulus of Elasticity

(2) An Ad Hoc surface plate committee made these minimum thickness recommendations in line with present manufacturing practice, therefore, some thicknesses are greater than the values calculated with the equation given in section 30.

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Table XIII. Add:

TABLE XIII.(Metric) Permissible torque clamping on threaded inserts.

<u>Thread size</u>	<u>Torque</u>
M6x1	10 newton meter
M8x1	20 Nm
M10x1.25	27 Nm
M12x1.25	34 Nm
M16x1.5	42 Nm