

ASME B107.17M-1997
[Revision of ANSI/ASME B107.17M-1985 (R1991)]

GAGES, WRENCH OPENINGS, REFERENCE

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers



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Mechanical Engineers

A N A M E R I C A N N A T I O N A L S T A N D A R D

GAGES, WRENCH OPENINGS, REFERENCE

ASME B107.17M-1997
[Revision of ANSI/ASME B107.17M-1985 (R1991)]

Date of Issuance: December 31, 1998

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The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

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FOREWORD¹

(This Foreword is not part of ASME B107.17M-1997.)

The American National Standards Committee B107, Sockets Wrenches and Drives, under sponsorship by the American Society of Mechanical Engineers, held its organizational meeting on June 28, 1967. Subsequently, the Committee was reorganized as an ASME Standards Committee and its title was changed to Hand Tools and Accessories.

During 1994, 1995, and 1996 the B107 Committee reviewed the "Go" and "No Go" gage sizes and agreed on changes to certain sizes.

After Standards Committee and ASME approval, and public review, this ASME B107.17M-1997, Gages, Wrench Openings, Reference, was approved as an American National Standard by ANSI on February 6, 1997.

¹This is a reprint of B107.17M-1997 with revisions.

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Hand Tools and Accessories

(The following is the roster of the Committee at the time of approval of this Standard.)

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GAGES, WRENCH OPENINGS, REFERENCE

1 SCOPE

This Standard establishes final inspection gage sizes for wrench openings, and spark plug wrench openings for inch and metric sizes. This Standard does not cover every available size, but only those most commonly manufactured.

2 APPLICATION

The gages covered by this Standard shall be used to ensure the manufacture of conforming product in inch and metric sizes.

3 NORMATIVE REFERENCES

The following documents form a part of this Standard to the extent specified herein.

ASTM E 18-94, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

Publisher: American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428

ISO 691-1983 (E), Wrench and Socket Openings—Metric Series—Tolerances for General Use

ISO 11168:1995 (E), Socket Wrenches for Spark- and Glow-Plugs

Publisher: International Organization for Standardization
1 rue de Varembe, Case postale 56, CH-1121 Genève
20, Switzerland/Suisse

4 REQUIREMENTS

4.1 Illustrations

The gages shall be similar to those shown in Fig. 1 for hex gages and Fig. 2 for square gages.

4.2 Material

The gages shall be made of steel, suitable for the purpose intended and hardened to 60 HRC minimum. The hardness shall be tested using procedures outlined in ASTM E 18.

4.3 Gage Use And Design

The gages shall be of the sizes and tolerances given in Tables 1A, 2A, and 3A. Formulas are provided for sizes not listed.

The gages shall be used in accordance with accepted practices. Manufacturers may use gages with tighter dimensions than those shown herein.

The size for all limits ("Go" and "No Go") gages shall not exceed the extreme limits specified herein. All variations (manufacturing tolerance, calibration error, wear allowance, etc.) in the gages, whatever their cause or purpose, shall bring these gages within the extreme limits of this gage size specified within this Standard. Thus a gage which represents a minimum limit may be larger, but never smaller, than the minimum size specified; likewise the gage which represents a maximum limit may be smaller, but never larger, than the maximum size specified.

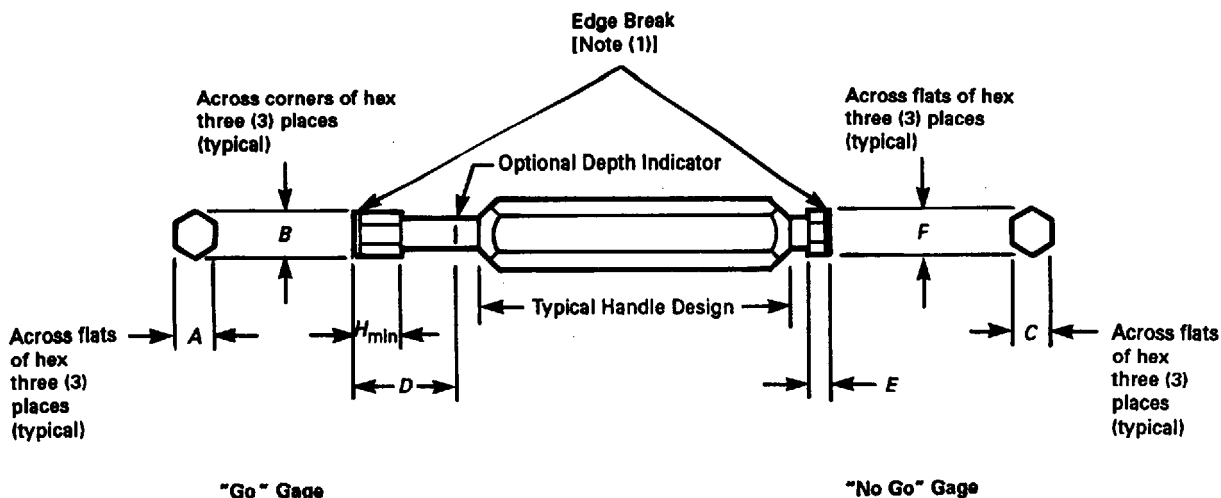
4.3.1 Rounding Method. To be used for determining dimensions for gages. When the next digit beyond the last digit to be retained is:

(a) less than 5, the last digit to be retained is not changed;

(b) 5 or more, the last digit to be retained is increased by one.

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- W = nominal size of wrench (see Tables 1A, 2A, and 3A)
- B = $1.1550 W$ tolerance = $+0.0002$ in. or $+0.006$ mm
 -0.0000 in. or -0.000 mm
- D = a minimum dimension tolerance = $+0.008$ in. or $+0.20$ mm
 -0.000 in. or -0.00 mm
- D is an optional indicator for the minimum wrench opening depth from product specification or standard.
- E = a minimum dimension = $0.167 C$
for C less than or equal to 1 in. or 25 mm
= 0.167 in. or 4.18 mm
for C greater than 1 in. or 25 mm
- F = $1.1550 W$ tolerance = $+0.0000$ in. or $+0.00$ mm
 -1% (percent) of F in. or -1% (percent) of F mm
- G = $1.4142 W$ tolerance = $+0.0000$ in. or $+0.00$ mm
 -1% (percent) of G in. or -1% (percent) of G mm
- H_{min} = a minimum dimension = $0.333 A$
for A less than or equal to 1 in. or 25 mm
= 0.333 in. or 8.33 mm
for A greater than 1 in. or 25 mm

If H_{min} is made equal to D , then H_{min} can be used as the optional depth indicator.

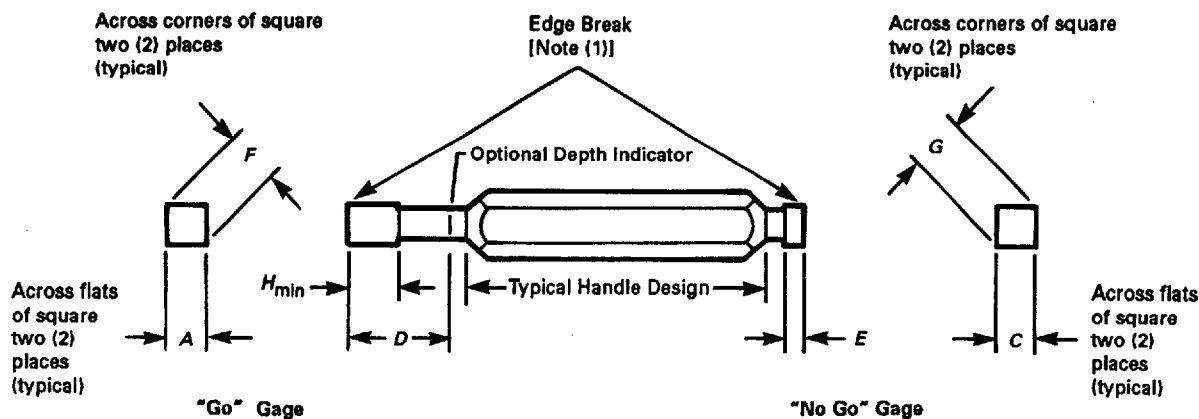
NOTE:

- (1) Do not include the length of the edge break as part of the "No Go" gaging procedure. If edge break is more than 0.010 in. or 0.25 mm, the difference must be added to D .

FIG. 1 HEX GAGE DIMENSIONS

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W = nominal size of wrench (see Tables 1A and 2A)

D = a minimum dimension tolerance = $\begin{matrix} +0.008 \\ -0.000 \end{matrix}$ in. or $\begin{matrix} +0.20 \\ -0.00 \end{matrix}$ mm

D is an optional indicator for the minimum wrench opening depth from product specification or standard.

E = a minimum dimension = $0.167 C$
for C less than or equal to 1 in. or 25 mm

= 0.167 in. or 4.18 mm
for C greater than 1 in. or 25 mm

F = $1.4142 W$ tolerance = $\begin{matrix} +0.0002 \\ -0.0000 \end{matrix}$ in. or $\begin{matrix} +0.006 \\ -0.000 \end{matrix}$ mm

G = $1.4142 W$ tolerance = $\begin{matrix} +0.0000 \\ -1\% \text{ (percent) of } G \end{matrix}$ in. or $\begin{matrix} +0.00 \\ -1\% \text{ (percent) of } G \end{matrix}$ mm

H_{\min} = a minimum dimension = $0.333 A$
for A less than or equal to 1 in. or 25 mm

= 0.333 in. or 8.33 mm
for A greater than 1 in. or 25 mm

If H_{\min} is made equal to D , then H_{\min} can be used as the optional depth indicator.

NOTE:

(1) Do not include the length of the edge break as part of the "No Go" gaging procedure. If edge break is more than 0.010 in. or 0.25 mm, the difference must be added to D .

FIG. 2 SQUARE GAGE DIMENSIONS

TABLE 1A HEXAGON OR SQUARE (INCH SERIES)
see Table 3A for spark plug hexagon

W Nominal Size in.	"Go" Gage A Tol.: +0.0002 -0.0000 in.	"No Go" Gage C Tol.: +0.0000 -0.0002 in.	W Nominal Size in.	"Go" Gage A Tol.: +0.0002 -0.0000 in.	"No Go" Gage C Tol.: +0.0000 -0.0002 in.
5/64	0.0789	0.0853	2 1/8	2.1285	2.1525
3/32	0.0945	0.1013	2 3/16	2.1910	2.2155
7/64	0.1100	0.1163	2 1/4	2.2535	2.2775
1/8	0.1258	0.1323	2 5/16	2.3160	2.3425
5/32	0.1570	0.1633	2 3/8	2.3785	2.4045
3/16	0.1883	0.1953	2 7/16	2.4410	2.4675
13/64	0.2039	0.2103	2 1/2	2.5040	2.5315
7/32	0.2195	0.2263	2 9/16	2.5665	2.5935
15/64	0.2350	0.2413	2 5/8	2.6290	2.6565
1/4	0.2510	0.2573	2 11/16	2.6915	2.7195
17/64	0.2666	0.2733	2 3/4	2.7540	2.7835
9/32	0.2820	0.2883	2 13/16	2.8165	2.8455
19/64	0.2978	0.3043	2 7/8	2.8790	2.9085
5/16	0.3135	0.3223	2 15/16	2.9415	2.9735
11/32	0.3447	0.3533	3	3.0050	3.0355
3/8	0.3762	0.3843	3 1/16	3.0675	3.0985
13/32	0.4074	0.4153	3 1/8	3.1300	3.1625
7/16	0.4387	0.4463	3 3/16	3.1925	3.2255
1/2	0.5015	0.5103	3 1/4	3.2550	3.2875
17/32	0.5327	0.5423	3 5/16	3.3175	3.3525
9/16	0.5640	0.5733	3 3/8	3.3800	3.4145
19/32	0.5952	0.6053	3 7/16	3.4425	3.4775
5/8	0.6265	0.6363	3 1/2	3.5060	3.5405
21/32	0.6577	0.6673	3 9/16	3.5685	3.6045
11/16	0.6895	0.6993	3 5/8	3.6310	3.6665
3/4	0.7520	0.7633	3 3/4	3.7560	3.7935
25/32	0.7832	0.7943	3 11/16	3.8185	3.8565
13/16	0.8145	0.8263	3 7/8	3.8810	3.9185
7/8	0.8770	0.8883	3 15/16	3.9435	3.9835
15/16	0.9395	0.9533	4	4.0070	4.0455
1	1.0025	1.0153	4 1/16	4.0695	4.1085
1 1/16	1.0650	1.0775	4 1/8	4.1320	4.1725
1 1/8	1.1275	1.1425	4 3/16	4.1945	4.2355
1 3/16	1.1900	1.2045	4 1/4	4.2570	4.2975
1 1/4	1.2525	1.2675	4 5/16	4.3195	4.3625
1 5/16	1.3150	1.3315	4 3/8	4.3820	4.4245
1 3/8	1.3775	1.3945	4 7/16	4.4445	4.4875
1 7/16	1.4400	1.4575	4 1/2	4.5070	4.5505
1 1/2	1.5030	1.5205	4 5/8	4.6320	4.6765
1 9/16	1.5655	1.5845	4 3/4	4.7570	4.8035
1 5/8	1.6280	1.6465	5	5.0070	5.0555
1 11/16	1.6905	1.7085	5 1/4	5.2580	5.3075
1 3/4	1.7530	1.7735	5 3/8	5.3830	5.4345
1 13/16	1.8155	1.8355	5 7/16	5.4455	5.4975
1 7/8	1.8780	1.8985	5 1/2	5.5080	5.5615
1 15/16	1.9405	1.9635	5 5/8	5.6330	5.6865
2	2.0035	2.0255	5 3/4	5.7580	5.8135
2 1/16	2.0660	2.0885	6 1/8	6.1340	6.1925

GENERAL NOTES:

- (a) Minimum wrench opening = "Go" Gage A extreme limit minimum size.
 (b) Wrench opening tolerance = "No Go" maximum Gage C - "Go" minimum Gage A.
 (c) Maximum wrench opening = "No Go" Gage C extreme limit maximum size.

NOTES FOR ADDITIONAL SIZES NOT LISTED IN TABLE 1A:

- (1) To determine "Go" Gage A dimensions for W nominal sizes (all calculations must be in inches).
 "Go" Gage A = W (value to 4 decimal places, not rounded) + incremental amount from Table 1B.
 Round "Go" Gage A value to 4 decimal places. Use rounding method outlined in para. 4.3.1.

TABLE 1B
INCREMENTAL AMOUNT (INCH SERIES)

W in.	Incremental Amount Added to W in.
$\frac{5}{64}$ to less than $\frac{1}{4}$	0.0008
$\frac{1}{4}$ to less than $\frac{3}{8}$	0.0010
$\frac{3}{8}$ to less than $\frac{1}{2}$	0.0012
$\frac{1}{2}$ to less than $1\frac{1}{16}$	0.0015
$1\frac{1}{16}$ to less than 1	0.0020
1 to less than $1\frac{1}{2}$	0.0025
$1\frac{1}{2}$ to less than 2	0.0030
2 to less than $2\frac{1}{2}$	0.0035
$2\frac{1}{2}$ to less than 3	0.0040
3 to less than $3\frac{1}{2}$	0.0050
$3\frac{1}{2}$ to less than 4	0.0060
4 to less than $5\frac{1}{16}$	0.0070
$5\frac{1}{16}$ to less than $6\frac{1}{8}$	0.0080
$6\frac{1}{8}$ to less than $7\frac{3}{16}$	0.0090
$7\frac{3}{16}$ to less than $8\frac{1}{4}$	0.0100
$8\frac{1}{4}$ to less than $9\frac{1}{4}$	0.0110
$9\frac{1}{4}$ to less than or equal to $10\frac{1}{4}$	0.0120

GENERAL NOTES:

- (a) Incremental amounts for ($\frac{1}{4}$ to less than $\frac{3}{8}$) and ($1\frac{1}{16}$ to less than 1) correspond to table in Annex for minimum deviations for machined wrench and socket openings of ISO 691-1983 (E).

- (b) To determine inch series: "No Go" Gage C dimension for W nominal size. Use the following formulas where applicable (all calculations must be in inches).

"No Go" Gage

$$C = W + (0.005W + 0.001) + (0.005W - 0.004) + 0.0003$$

tolerance +0.0000
 -0.0002

for W equal to or less than 1 inch

or

$$C = W + (0.005W + 0.001) + (0.005W + 0.004) + 0.0005$$

tolerance +0.0000
 -0.0002

for W greater than 1 inch

Rounding and determination of the "No Go" Gage C value for inch series shall be as follows: W is rounded to three decimal places for all calculations, numbers within parentheses are rounded to three decimal places before adding to formula, and W is added to the numbers within the parentheses before adding the last value in the "No Go" formula, with the gage dimension left as four-place decimal. Use rounding method outlined in para. 4.3.1.

TABLE 2A HEXAGON OR SQUARE (METRIC SERIES)
see Table 3A for spark plug hexagon

W Nominal Size mm	"Go" Gage A		"No Go" Gage C		W Nominal Size mm	"Go" Gage A		"No Go" Gage C	
	Tol.: +0.006 (+0.0002) -0.000 (-0.0000)	(in.)	Tol.: +0.000 (+0.0000) -0.006 (-0.0002)	(in.)		Tol.: +0.006 (+0.0002) -0.000 (-0.0000)	(in.)	Tol.: +0.000 (+0.0000) -0.006 (-0.0002)	(in.)
2	2.01	(0.0791)	2.155	(0.0848)	38	38.10	(1.5000)	38.520	(1.5165)
2.5	2.51	(0.0988)	2.661	(0.1048)	39	39.10	(1.5394)	39.530	(1.5563)
3	3.015	(0.1187)	3.165	(0.1246)	40	40.10	(1.5787)	40.540	(1.5961)
3.2	3.216	(0.1266)	3.367	(0.1326)	41	41.10	(1.6181)	41.550	(1.6358)
4	4.02	(0.1583)	4.175	(0.1644)	42	42.10	(1.6575)	42.560	(1.6756)
4.5	4.52	(0.1780)	4.681	(0.1843)	43	43.10	(1.6969)	43.570	(1.7154)
5	5.02	(0.1976)	5.185	(0.2041)	44	44.10	(1.7362)	44.580	(1.7551)
5.5	5.52	(0.2173)	5.690	(0.2240)	45	45.10	(1.7756)	45.590	(1.7949)
6	6.03	(0.2374)	6.195	(0.2439)	46	46.10	(1.8150)	46.600	(1.8346)
6.3	6.33	(0.2492)	6.498	(0.2558)	47	47.10	(1.8543)	47.610	(1.8744)
7	7.03	(0.2768)	7.205	(0.2837)	48	48.10	(1.8937)	48.620	(1.9142)
8	8.03	(0.3161)	8.215	(0.3234)	49	49.10	(1.9331)	49.630	(1.9539)
9	9.03	(0.3555)	9.225	(0.3632)	50	50.10	(1.9724)	50.640	(1.9937)
10	10.04	(0.3953)	10.235	(0.4030)	52	52.10	(2.0512)	52.660	(2.0732)
11	11.04	(0.4346)	11.245	(0.4427)	54	54.10	(2.1299)	54.680	(2.1528)
12	12.04	(0.4740)	12.255	(0.4825)	55	55.12	(2.1701)	55.690	(2.1925)
13	13.04	(0.5134)	13.265	(0.5222)	60	60.12	(2.3669)	60.740	(2.3913)
14	14.05	(0.5531)	14.275	(0.5620)	65	65.12	(2.5638)	65.790	(2.5902)
15	15.05	(0.5925)	15.285	(0.6018)	70	70.12	(2.7606)	70.840	(2.7890)
16	16.05	(0.6319)	16.295	(0.6415)	74	74.12	(2.9181)	74.880	(2.9480)
17	17.05	(0.6713)	17.305	(0.6813)	75	75.15	(2.9587)	75.890	(2.9878)
18	18.05	(0.7106)	18.315	(0.7211)	80	80.15	(3.1555)	80.940	(3.1866)
19	19.06	(0.7504)	19.325	(0.7608)	85	85.15	(3.3524)	85.990	(3.3854)
20	20.00	(0.7898)	20.335	(0.8006)	90	90.15	(3.5492)	91.040	(3.5843)
20.6	20.66	(0.8134)	20.941	(0.8244)	95	95.15	(3.7461)	96.090	(3.7831)
21	21.06	(0.8291)	21.345	(0.8404)	100	100.15	(3.9429)	101.140	(3.9819)
22	22.06	(0.8685)	22.355	(0.8801)	105	105.20	(4.1417)	106.190	(4.1807)
23	23.06	(0.9079)	23.365	(0.9199)	110	110.20	(4.3386)	111.240	(4.3795)
24	24.06	(0.9472)	24.375	(0.9596)	115	115.20	(4.5354)	116.290	(4.5783)
25	25.06	(0.9866)	25.385	(0.9994)	120	120.20	(4.7323)	121.340	(4.7772)
26	26.08	(1.0268)	26.400	(1.0394)	130	130.20	(5.1260)	131.440	(5.1748)
27	27.08	(1.0661)	27.410	(1.0791)	135	135.20	(5.3228)	136.490	(5.3736)
28	28.08	(1.1055)	28.420	(1.1189)	145	145.20	(5.7165)	146.590	(5.7713)
29	29.08	(1.1449)	29.430	(1.1587)	150	150.25	(5.9154)	151.640	(5.9701)
30	30.08	(1.1843)	30.440	(1.1984)	155	155.25	(6.1122)	156.690	(6.1689)
31	31.08	(1.2236)	31.450	(1.2382)	165	165.25	(6.5059)	166.790	(6.5665)
32	32.08	(1.2630)	32.460	(1.2780)	170	170.25	(6.7028)	171.840	(6.7654)
33	33.08	(1.3024)	33.470	(1.3177)	180	180.25	(7.0965)	181.940	(7.1630)
34	34.10	(1.3425)	34.480	(1.3575)	185	185.25	(7.2933)	186.990	(7.3618)
35	35.10	(1.3819)	35.490	(1.3972)	200	200.25	(7.8839)	202.140	(7.9583)
36	36.10	(1.4213)	36.500	(1.4370)	210	210.25	(8.2776)	212.240	(8.3559)
37	37.10	(1.4606)	37.510	(1.4768)					

GENERAL NOTES:

- (a) Minimum wrench opening = "Go" Gage A extreme limit minimum size.
- (b) Wrench opening tolerance = "No Go" maximum Gage C - "Go" minimum Gage A.
- (c) Maximum wrench opening = "No Go" Gage C extreme limit maximum size.
- (d) Conversion to inches given in parentheses.

NOTES FOR ADDITIONAL SIZES NOT LISTED IN TABLE 2A:

- (1) To determine "Go" Gage A dimensions for W nominal sizes (all calculations must be in millimeters).

"Go" Gage A = W (not rounded) + incremental amount from Table 2B.

Round "Go" Gage A value to 2 decimal places (see [Note (1)] from Table 2B). Use rounding method outlined in para. 4.3.1.

TABLE 2B
INCREMENTAL AMOUNT (METRIC SERIES)

W mm	Incremental Amount Added to W mm
2 to less than 3	0.01
3 to less than 3.2	0.015
3.2 to less than 6	0.02
6 to less than 10	0.03
10 to less than 14	0.04
14 to less than 19	0.05
19 to less than 26	0.06
26 to less than 34	0.08
34 to less than 55	0.10
55 to less than 75	0.12
75 to less than 105	0.15
105 to less than 150	0.20
150 to less than or equal to 210	0.25

GENERAL NOTES:

- (a) Round "Go" Gage A to 3 decimal places when using 0.015 mm incremental amount.
- (b) Incremental amounts correspond to table in Annex for minimum deviations for machined wrench and socket openings of ISO 691-1983 (E) for W nominal sizes 3.2 mm to 210 mm.
- (c) To determine metric series "No Go" Gage C dimension for W nominal size. Use the following formulas where applicable (all calculations must be in millimeters).

"No Go" Gage

$$C = W + (0.005W + 0.025) + (0.005W + 0.102) + 0.008$$

tolerance $\begin{matrix} +0.000 \\ -0.006 \end{matrix}$

for W equal to or less than 25 mm

or

$$C = W + (0.005W + 0.025) + (0.005W + 0.102) + 0.013$$

tolerance $\begin{matrix} +0.000 \\ -0.006 \end{matrix}$

for W greater than 25 mm

Rounding and determination of the "No Go" Gage C value for metric series shall be as follows: All numbers within parentheses are rounded to three decimal places before adding to formula and W is added to the numbers within parentheses before adding the last value in the "No Go" formula, with the gage dimension left as three-place decimal. Use rounding method outlined in para. 4.3.1.

TABLE 3A SPARK PLUG HEXAGON

W Nominal Size mm	W Nominal Size in.	"Go" Gage A Tol.: +0.006(+0.0002) -0.000(-0.0000)		"No Go" Gage C Tol.: +0.000(+0.0000) -0.006(-0.0002)	
		mm	(in.)	mm	(in.)
12 [Note (1)]		12.04	(0.4740)	12.255	(0.4825)
14 [Note (1)]		14.05	(0.5531)	14.275	(0.5620)
16	$\frac{5}{8}$	15.977	(0.6290)	16.187	(0.6373)
17.5	$\frac{11}{16}$ [Note (2)]	17.513	(0.6895)	17.762	(0.6993)
18 [Note (1)]		18.05	(0.7106)	18.315	(0.7211)
19 [Note (1)]	$\frac{3}{4}$	19.06	(0.7504)	19.325	(0.7608)
20.8	$\frac{13}{16}$	20.828	(0.8200)	21.064	(0.8293)
22.2	$\frac{7}{8}$	22.327	(0.8790)	22.563	(0.8883)
25.5 [Note (3)]		25.56	(1.0063)	25.86	(1.0181)

GENERAL NOTES:

- (a) Minimum wrench opening = "Go" Gage A extreme limit minimum size.
- (b) Wrench opening tolerance = "No Go" maximum Gage C - "Go" minimum Gage A.
- (c) Maximum wrench opening = "No Go" Gage C extreme limit maximum size.
- (d) Conversion to inches given in parentheses.

NOTES:

- (1) Values correspond to TABLE 2A HEXAGON OR SQUARE (METRIC SERIES).
- (2) Values correspond to TABLE 1A HEXAGON OR SQUARE (INCH SERIES).
- (3) Values correspond to Table 1—Wrench dimensions of ISO 11168:1995 (E).