



CONVERSION AND ROUNDING

The conversion of inch-pound units to metric is an important part of the metrication process. But conversion can seem deceptively simple because most measurements have implied, not expressed, tolerances and many products (like 2-by-4s) are designated in rounded, easy-to-use "nominal" sizes, not actual ones. People working in a particular profession or trade gain an intuitive feel for the allowable tolerances of the measurements and products they use and learn the difference between nominal and actual sizes. It is this knowledge that must be relied upon when converting to metric measures.

For instance, if anchor bolts are to be imbedded in masonry to a depth of 8 inches, what should this depth be in millimeters? A strict conversion (using 1 inch = 25.4 mm) results in an exact dimension of 203.2 mm. But this implies an accuracy of 0.1 mm (1/254 inch) and a tolerance of ± 0.05 mm (1/508 inch), far beyond any reasonable measure for field use. Similarly, 203 mm is overly precise, implying an accuracy of 1 mm (about 1/25 inch) and a tolerance of ± 0.5 mm (about 1/50 inch). As a practical matter, an acceptable tolerance for setting anchor bolts is at least $\pm 1/4$ inch or 6 mm. Applying this tolerance to 203.2 mm, the converted dimension should be in the range of 197 mm to 209 mm (actually, the range is 197 mm and higher since 8 inches is only a minimum dimension). Metric measuring devices emphasize 10 mm increments and masons work in a 100 mm module, so the selection of 200 mm would be a convenient dimension for masons to use in the field. Thus, a reasonable metric conversion for 8 inches, *in this case*, is 200 mm.

This example may sound complicated but in fact we mentally round to easy-to-use numbers all the time and think nothing of it. What the example does illustrate is the need for experience, common sense, and consideration of how measures are used. Much has been written about conversion but the basic points to remember are these:

- ! Use experienced professionals to perform conversions, not clerical staff with calculators, and use automated conversion programs with care.
- ! Understand the allowable tolerances for the measurements you are converting.
- ! Convert with the end application or use in mind, remembering that it is easiest for field personnel to measure in 10 mm increments.
- ! Practice—soon you will get the "feel" for conversion and gain confidence and speed.

HIGHWAY UPDATE

When Congress canceled the Federal Highway Administration's October 2000 deadline for the metrication of federally funded highway projects last year, it left the state highway departments in the position of implementing an unmandated measurement change. So far, seventeen of the 44 states with active highway metrication programs, under pressure from metric opponents, have decided to return to inch-pound measures (see back page), despite the fact that the transition has gone smoothly and in most states is nearly complete (see the 2nd and 3rd Quarter 1998 issues of this newsletter).

It will take several years until these states' backlogs of current metric projects are constructed, so Congress and the highway industry still have time to rectify the situation. With 94 percent of the world's population using the metric system and with most major U.S. industries partially or completely metricated, are we witnessing a great leap backward?

CONSTRUCTION METRICATION COUNCIL

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Construction Metrication is a quarterly newsletter published by the Construction Metrication Council to disseminate information about construction metrication activities. The National Institute of Building Sciences created the Council in 1992 to provide industry-wide, public and private sector support for the metrication of federal construction and to promote the adoption and use of the metric system of measurement as a means of increasing the international competitiveness, productivity, and quality of the U.S. construction industry.

The National Institute of Building Sciences is a non-profit, nongovernmental organization authorized by Congress to serve as an authoritative source on issues of building science and technology.

The Council is an outgrowth of the Construction Subcommittee of the Metrication Operating Committee of the federal Interagency Council on Metric Policy. The Construction Subcommittee was formed in 1988 to further the objectives of the 1975 *Metric Conversion Act*, as amended by the 1988 *Omnibus Trade and Competitiveness Act*. To foster effective private sector participation, the activities of the Subcommittee were transferred to the Council in April 1992.

Membership in the Council is open to all public and private organizations and individuals with a substantial interest in and commitment to the Council's purposes. The Council publishes the *Metric Guide for Federal Construction* and this newsletter. It is funded primarily by contributions from federal agencies but also receives private sector support.

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ROUNDING TABLE, 1/32 TO 4 INCHES

Underline denotes exact conversion.
Shaded figures are too exact for most uses.

Inches	Nearest 0.1 mm (1/254")	Nearest 1 mm (1/25")	Nearest 5 mm (1/5")
1/32"	0.8	1	
1/16"	1.6	2	
3/32"	2.4	2	
1/8"	3.2	3	
3/16"	4.8	5	
1/4"	6.4	6	
5/16"	7.9	8	
3/8"	9.5	10	
7/16"	11.1	11	
1/2"	<u>12.7</u>	13	
9/16"	14.3	14	
5/8"	15.9	16	
3/4"	19.0	19	
7/8"	22.2	22	
1"	<u>25.4</u>	25	25
1-1/4"	31.8	32	30
1-1/2"	<u>38.1</u>	38	40
1-3/4"	44.4	44	45
2"	<u>50.8</u>	51	50
2-1/4"	57.2	57	55
2-1/2"	<u>63.5</u>	64	65
2-3/4"	69.8	70	70
3"	<u>76.2</u>	76	75
3-1/4"	82.6	83	85
3-1/2"	<u>88.9</u>	89	90
3-3/4"	95.2	95	95

ROUNDING TABLE, 4 INCHES TO 100 FEET

Underline denotes exact conversion
Shaded figures are too exact for most uses

Inches and Feet	Nearest 0.1 mm (1/254")	Nearest 1 mm (1/25")	Nearest 5 mm (1/5")	Nearest 10 mm (2/5")	Nearest 50 mm (2")	Nearest 100 mm (4")	1" = 25 mm exactly
4"	<u>101.6</u>	102	100	100			100
5"	<u>127</u>	127	125	130			125
6"	<u>152.4</u>	152	150	150			150
7"	<u>177.8</u>	178	180	180			175
8"	<u>203.2</u>	203	205	200			200
9"	<u>228.6</u>	229	230	230			225
10"	<u>254</u>	254	255	250			250
11"	<u>279.4</u>	279	280	280			275
1'-0"	<u>304.8</u>	305	305	300	300		300
2'-0"	<u>609.6</u>	610	610	610	600		600
3'-0"	<u>914.4</u>	914	915	910	900		900
4'-0"	<u>1219.2</u>	1219	1220	1220	1200		1200
5'-0"		<u>1524</u>	1525	1520	1500		1500
6'-0"		1829	1830	1830	1850		1800
7'-0"		2134	2135	2130	2150		2100
8'-0"		2438	2440	2440	2450		2400
9'-0"		2743	2745	2740	2750		2700
10'-0"		<u>3048</u>	3050	3050	3050	3000	3000
15'-0"		<u>4572</u>	4570	4570	4550	4600	4500
20'-0"		6096	6095	6100	6100	6100	6000
25'-0"		<u>7620</u>	7620	7620	7600	7600	7500
30'-0"		9144	9145	9140	9150	9100	9000
40'-0"		<u>12 192</u>	12 190	12 190	12 200	12 200	12 000
50'-0"		<u>15 240</u>	15 240	15 240	15 250	15 200	15 000
75'-0"		<u>22 860</u>	22 860	22 860	22 850	22 900	22 500
100'-0"		<u>30 480</u>	30 480	30 480	30 500	30 500	30 000

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**English is the international language of business.
Metric is the international language of measurement.**

STATE HIGHWAY METRICATION

According to the Federal Highway Administration, here are the metric and non-metric state highway departments as of March 1999:

Metric:			Non-metric:	
Alaska	Massachusetts	Oregon	Alabama	Mississippi
Arkansas	Maine	Pennsylvania	Arizona	
California	Michigan	Utah	Colorado	
Connecticut	Missouri	Virginia	Florida	
Delaware	Montana	Vermont	Georgia	
Idaho	New Hampshire	Washington	Hawaii	
Illinois	New Jersey		Iowa	
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