

ENGLISH TO METRIC CONVERSION TABLE					
MULTIPLY	BY	TO GET	MULTIPLY	BY	TO GET
acres	0.404 687 3	hectares	ounce(force)	0.278 013 9	newtons=N
board feet	0.002 359 74	cubic meter	pint(liq.)	0.473 176	liters=l
cubic ft.	0.028 316 85	cubic meter	pint(dry)	0.550 61	liters=l
cubic yd.	0.764 554 9	cubic meter	pound(wt.)	0.453 592 37	kilogram
feet	0.304 8	meters	pound(force)	4.448 222	newtons=N
footcandles	10.763 91	lux=lumens/m ²	pound/sq.ft	47.880 26	pascal=N/m ²
ft.-lb _f	1.355 818	N·m=joule	pound/sq.in	6.894 757	kilopascals
gallon (US)	3.785 412	liters	quart(liq.)	0.946 352 9	liters
horsepower*	745.699 9	watt=J/sec	sq. feet	0.092 903 04	sq. meter
* horsepower=550 ft-lb _f /sec			sq. in.	645.16	sq. mm
inch	25.4	millimeters	sq. mile	258.998 8	hectares
inch-pound _f	0.112 984 8	N·m=joule	sq. mile	2.589 988	sq. km
kips	4.448 222	kilonewton	sq. yard	0.836 127 4	sq. meter
kips/in ²	6.894 757	megapascal	ton(short)	0.907 184 7	metric ton
miles (US)	1.609 347	kilometer	ton(short)	907.184 7	kilogram=kg
ounce (wt.)	28.349 52	grams	ton(short)	8896.444	newtons=N
ounce(liq.)	29.573 53	ml	yards	0.914 4	meters=m

FOR TEMPERATURE CONVERSION USE °C= 5/9(°F - 32)

METRIC TO ENGLISH CONVERSION TABLE					
MULTIPLY	BY	TO GET	MULTIPLY	BY	TO GET
cubic meter	1.308 0	cubic yard	liter	0.264 17	gallon
	35.314 7	cubic foot		1.056 7	quart
	61,024	cubic inch		2.113 4	pint
	264.172	gallon		33.814	fl.ounce
gram	0.035 274	ounce(wt)	milliliter	0.033 814	fl.ounce
	0.002 204 6	pound(wt)	liter/m	0.080 52	gal/ft
kilogram	35.274	ounce(wt)	liter/m ²	0.220 88	gal/sq.yd
	2.204 623	pound(wt)	lux	0.092 902	ft-candle
	0.002 204 6	kip	meter	1.093 6	yard
	0.001 102 3	ton		3.280 84	foot
megagram	1.102 3	ton	millimeter	0.039 370	inch
(metric ton)			kilometer	0.621 37	mile
hectare	2.471 04	acre	micrometer	0.039 370 1	mil
	107,639	square feet	Newton	0.224 81	pound(f)
	11,959.9	square yard	kilonewton	0.224 81	kip(f)
	0.003 861 02	square mile	Pascal	0.020 885	lb/sq. feet
microare	0.155 00	square inch	kilopascal	0.145 04	lb/sq. inch
joule	0.737 56	foot pound	megapascal	0.145 04	kips/sq. inch
	8.849 5	inch pound	square meter	1.195 99	square yard
kg/m³	1.685 55	lbs./cubic yards		10.763 9	square feet
	0.062 428	lbs./cubic feet	square millimeter	0.001 55	square inch
km/hr	0.621 37	miles per hour	square kilometer	0.386 102	square mile
			watt (J/second)	0.001 341	horsepower
				0.737 56	ft-lb/second

FOR TEMPERATURE CONVERSION USE °F = 9/5 °C + 32

METRIC/ ENGLISH BOLT SUBSTITUTION TABLE

EQUIVALENT BOLT SIZES		HOLE DIAM (MM)	METRIC – ASTM GRADE SPECIFIED							
			F - 568 CLASS 4.6	F - 568 CLASS 8.8	F - 588 CLASS 8.8.3	F - 568 CLASS 9.8	F - 568 CLASS 10.9	A - 325M TYPE 1 OR 2	A - 325M TYPE 3	
METRIC (MM)	ENGLISH (INCHES)		ENGLISH BOLT SUBSTITUTION - ASTM GRADE							
M6	1/4	7	A - 307 GRADE A	NOT REQ'D	NOT REQ'D	A - 449 TYPE 1	A - 354 GRADE BD	NOT REQ'D	NOT REQ'D	
M8	5/16	9		A - 325 TYPE 1 OR 3	OR A - 449 TYPE 1	A - 325 TYPE 3	A - 325 TYPE 1,3	A - 354 GRADE BD	A - 325 TYPE 1 OR 3	A - 325 TYPE 3
M10	7/16	12					N O T R E Q U I R E D			
M12	1/2	14		N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3				
M14	9/16	16					N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3	
M16	5/8	18		N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3				
M20	3/4	22					N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3	
M22	7/8	24		N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3				
M24	1	27					N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3	
M27	1 1/8	30		N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3				
M30	1 1/4	34					N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3	
M36	1 1/2	40		N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3				
M42	1 3/4	46					N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3	
M48	2	53		N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3				
M56	2 1/4	62	N O T R E Q U I R E D				OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3		
M64	2 1/2	70		N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3				
M72	2 3/4	76	N O T R E Q U I R E D				OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3		
M80	3 1/4	86		N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3				
M90	3 1/2	95	N O T R E Q U I R E D				OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3		
M100	4	107		N O T R E Q U I R E D	OR A - 490 TYPES 1 OR 3	A - 325 TYPE 1 OR 3				

ENGLISH BOLT	APPROPRIATE NUTS
A-307 GRADE A DIAM < 1.5" DIAM > 1.5"	A 563 GRADE A** HEX A 563 GRADE A** HEAVY HEX
A-325 TYPE 1	A 563 - C, C3, D, DH*, DH3 A 194-2, 2H*
A-325 TYPE 3	A 563-C, DH3
A-449 TYPE 1 DIAM < 1.5" DIAM > 1.5"	A 563 GRADE DH* HEAVY HEX A 563 GRADE B HEX A 563 GRADE A HEAVY HEX
A-354 GRADE BD	A 563 GRADE DH** HEAVY HEX
A-490 TYPE 1	A 563 GRADE DH or DH3 or A194 GRADE 2H

Unless otherwise shown in the contract documents, appropriate English (inch) bolt and nut substitutions will be allowed in accordance with these tables.

No substitution will be allowed for any A325M bolts supplied under §715-14 and used for structural connections on bridges, unless approved by the DCES.

*ZINC COATED AS PER ASTM A153

**PLAIN OR ZINC COATED

WASHERS SHALL BE F-436 WITH SAME FINISH (PLAIN OR ZINC COATED) AS THE BOLT.