

I. SCOPE:

THIS SPECIFICATION COVERS DIMENSIONS AND TOLERANCES, MATERIAL, AND PHYSICAL REQUIREMENTS FOR HEX SOCKET HEAD BOLTS WITH METRIC THREADS.

II. DIMENSIONS:

- A. HEAD DIAMETER - HEADS MAY BE PLAIN OR KNURLED AT THE OPTION OF THE MANUFACTURER. FOR KNURLED BOLTS THE MAXIMUM HEAD DIAMETER, A, SHALL BE MEASURED ACROSS THE TOPS OF THE KNURL AND THE MINIMUM HEAD DIAMETER SHALL BE THE DIAMETER OF THE UNKNURLED PORTION JUST ABOVE THE RADIUS OR CHAMFER AT THE BOTTOM EDGE OF THE HEAD.
 - 1. THE EDGE AT JUNCTION OF THE HEX SOCKET MAY BE ROUNDED OR CHAMFERED TO A MAXIMUM DEPTH OF 7.5 PERCENT OF HEX WIDTH, J, IN FIGURE 3.
 - 2. GAGING OF THE HEX SOCKET SHALL CONFORM TO ANSI/ASME B18.3.1M REQUIREMENTS.
- B. FILLET - FOR ALL LENGTHS OF BOLTS THE FORM OF THE UNDERHEAD FILLET SHALL BE OPTIONAL AS SHOWN IN FIGURE 3, PROVIDED IT IS A SMOOTH AND CONTINUOUS CONCAVE CURVE FAIRING INTO THE BEARING SURFACE OF THE HEAD AND THE BOLT SHANK WITHIN THE ENVELOPE ESTABLISHED BY THE LIMITS FOR FILLET EXTENSION, LENGTH, AND JUNCTURE RADIUS SPECIFIED IN FIGURE 3.
- C. GEOMETRIC RELATIONSHIPS - FOR GEOMETRIC TOLERANCE INTERPRETATION SEE ANSI Y14.3.
 - 1. THE HEAD DIAMETER, HEAD BEARING SURFACE, AND HEX SOCKET GEOMETRIC RELATIONSHIP TO THE BODY DIAMETER ARE LISTED IN FIGURE 3.
 - 2. RUNOUT OF THREAD IN RELATION TO BODY SHALL BE MEASURED IN A BARREL TYPE GAGE THAT PROVIDES A FUNCTIONAL CHECK SIMULATING ACTUAL ASSEMBLY CONDITIONS.
 - a. BOLTS UP TO AND INCLUDING M20 SIZE MUST PASS THROUGH A CLEARANCE HOLE 0.8mm LARGER THAN THE

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NOMINAL THREAD DIAMETER OF THE BOLT. THE BOLT MUST THEN SCREW FREELY THROUGH A CLASS 6H MAXIMUM (BASIC) PITCH DIAMETER THIN RING GAGE (ANSI B1.16M), MOUNTED AT THE BOTTOM OF AND CONCENTRIC WITH THE CLEARANCE HOLE. AFTER THE BOLT HAS ENGAGED THE RING GAGE COMPLETELY, THE CLEARANCE HOLE SHALL ENCASE THE BODY TO WITHIN 12 mm OR LESS OF THE WASHER FACE ON BOLT LENGTHS UP THROUGH 150 mm AND TO WITHIN 25 mm OR LESS ON LENGTHS OVER 150 mm.

- b. FOR BOLTS OVER M20 SIZE, THE CLEARANCE HOLE SHALL BE 1.5 mm LARGER THAN THE NOMINAL THREAD DIAMETER. ALL OTHER CONDITIONS ARE THE SAME AS IN PART a.

D. LENGTH - THE LENGTH OF THE BOLTS SHALL BE MEASURED PARALLEL TO THE BOLT AXIS FROM THE PLANE OF THE BEARING SURFACE UNDER THE HEAD TO THE END OF THE BOLT. THE TOLERANCE ON THE LENGTH OF BOLTS IS SPECIFIED IN FIGURE 1.

NOMINAL SCREW LENGTH	THREAD SIZE		
	M1.6 THRU M10	M12 THRU M20	OVER M20
	TOLERANCE ON LENGTH		
UP TO 16 mm, INCL	±0.3	±0.3	---
OVER 16 TO 50 mm, INCL	±0.4	±0.4	±0.7
OVER 50 TO 120 mm, INCL	±0.7	±1.0	±1.5
OVER 120 TO 200 mm, INCL	±1.0	±1.5	±2.0
OVER 200 mm	±2.0	±2.5	±3.0

FIGURE 1 - LENGTH TOLERANCE - HEX SOCKET HEAD BOLT (mm)

E. GRIP LENGTH - GRIP LENGTH IS MEASURED FROM THE HEAD BEARING SURFACE TO THE FIRST COMPLETE THREAD UNDER THE HEAD.

THE TOLERANCE ON GRIP LENGTH IS LISTED IN FIGURE 2. THE GRIP LENGTH TOLERANCE INCLUDES THE LENGTH FROM THE GRIP LENGTH SPECIFIED ON THE DRAWING TO THE BEGINNING OF THE BODY DIAMETER.

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THREAD SIZE	GRIP LENGTH
METRIC	TOLERANCE
M1.6 X 0.35	-1.75
M2 X 0.4	-2.00
M2.5 X 0.45	-2.25
M3 X 0.5	-2.50
M4 X 0.7	-3.50
M5 X 0.8	-4.00
M6 X 1	-5.00
M8 X 1.25	-6.25
M10 X 1.5	-7.50
M12 X 1.75	-8.75
M14 X 2	-10.00
M16 X 2	-10.00
M20 X 2.5	-12.50
M24 X 3	-15.00
M30 X 3.5	-17.50

FIGURE 2 - THREAD GRIP LENGTH TOLERANCE

BOLTS WITH SPECIFIED GRIP LENGTHS EQUAL TO OR LESS THAN FIVE THREADS MAY BE MADE FROM PITCH DIAMETER WIRE.

- F. THREADS - THREADS SHALL BE IN ACCORDANCE WITH ANSI B1.13M, B1.22M CLASS 4g6g.
- G. POINT - POINTS SHALL BE CHAMFERED FROM APPROXIMATELY 0.4 mm BELOW THE THREAD MINOR DIAMETER. THE LENGTH OF THE CHAMFER SHALL BE FROM 1/2 TO 1 1/2 PITCHES. CHAMFERING OF SIZES UP TO AND INCLUDING M4 SHALL BE OPTIONAL.

III. MATERIAL AND HARDNESS:

- A. STEEL BOLTS SHALL BE FABRICATED FROM AN ALLOY STEEL HAVING ONE OR MORE OF THE FOLLOWING ALLOYING ELEMENTS: CHROMIUM, NICKEL, MOLYBDENUM, OR VANADIUM, IN SUFFICIENT QUANTITY TO ASSURE THAT THE SPECIFIED HARDNESS RANGE OF ROCKWELL C 38 TO 44 AT THE SURFACE FOR SIZES UP TO AND INCLUDING M5 AND ROCKWELL C 38 TO 45 FOR SIZES OVER M5 IS

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MET WHEN BOLTS ARE HARDENED BY QUENCHING FROM THE AUSTENITIZING TEMPERATURE AND TEMPERED NOT LOWER THAN 345 °C. NON-DIMENSIONAL PROPERTIES OF SCREWS SHALL CONFORM TO ASTM SPECIFICATION A574M, ALLOY STEEL SOCKET HEAD CAP SCREWS.

IV. REFERENCES:**SOCIETY AND INDUSTRY SPECIFICATIONS:**

ANSI/ASME: B18.3.1M, B1.16M, Y14.3, B1.13M, B1.22M
AMERICAN NATIONAL STANDARDS INSTITUTE, INC.
1430 BROADWAY
NEW YORK, NY 10018

ASTM: A574M
AMERICAN SOCIETY FOR TESTING AND MATERIALS
1916 RACE STREET
PHILADELPHIA, PA 19103

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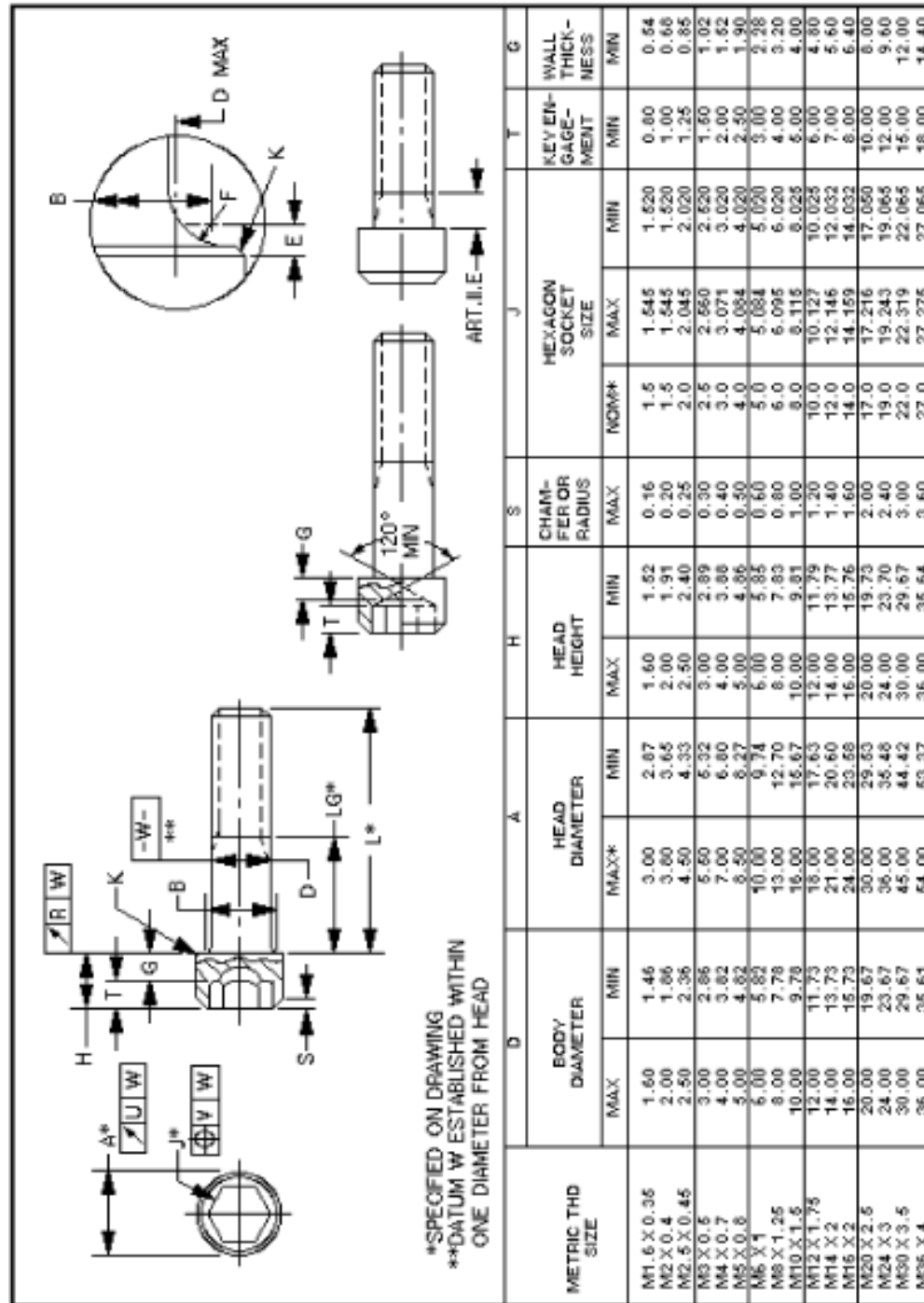


Figure 3 – HEX SOCKET HEAD BOLT DIMENSIONS (mm)
(CONTINUED ON NEXT PAGE)

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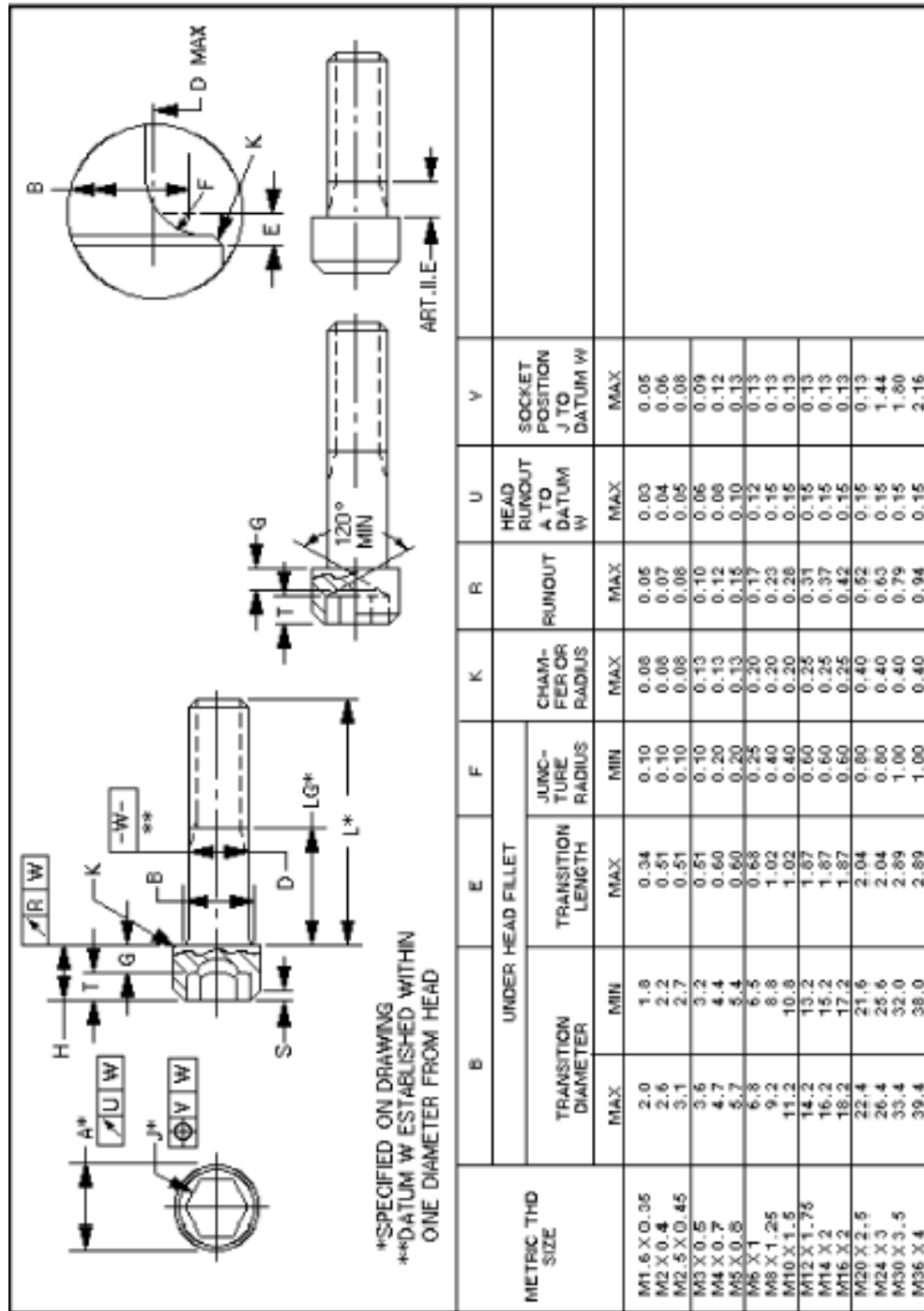


Figure 3 – HEX SOCKET HEAD BOLT DIMENSIONS (mm)
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REVISION HISTORY

CHANGE	DESCRIPTION
01	Added Figure 3.
2	Updated to new format and changed from Dekalb to Jackson Operations.

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