

AIRCRAFT MAINTENANCE MANUAL
STANDARD TORQUE VALUES - MAINTENANCE PRACTICES

1. General

A. This procedure has one task:

(1) Standard Torque Values

TASK 20-11-00-910-801

2. Standard Torque Values

(Figure 201, Figure 202, Figure 203, Figure 204, Figure 205, Figure 206, Figure 207, Figure 208, Figure 209)

A. General

(1) Refer to the figures that follow for the torque data:

- (a) (Figure 201): Torque Wrench Adapter
- (b) (Figure 202): Nuts and Bolts
- (c) (Figure 203): Self-Locking Nuts
- (d) (Figure 204): Reduced-Head Bolts
- (e) (Figure 205): Rigid Tube Coupling Connectors
- (f) (Figure 206): Pipe Thread Fittings
- (g) (Figure 207): Low Pressure and Return Line Fittings
- (h) (Figure 208): Flareless Tube Fittings
- (i) (Figure 209): Clamps, V-Band, and Channel-Band

B. Consumable Materials

Reference	Description	Specification
C00308	Compound - Corrosion Preventive, Petrolatum Hot Application	MIL-C-11796
D00010	Compound - Thread Antiseize, High Temperature	MIL-PRF-907
D00013	Grease - Aircraft And Instrument Grease	MIL-PRF-23827 (NATO G-354) (Supersedes MIL-G-23827)

C. Procedure

SUBTASK 20-11-00-420-001

(1) Tighten the bolt, nut, fitting, clamps, or connector ((Figure 201, Figure 202, Figure 203, Figure 204, Figure 205, Figure 206, Figure 207, Figure 208, Figure 209)).

(a) Lubricate the threads with one of these materials if necessary:

- 1) corrosion preventive compound, C00308
- 2) grease, D00013, or
- 3) compound, D00010.

(b) Tighten the bolts, nuts, fitting, clamps, or connectors to the correct torque.

(c) Make sure that one male tread (minimum), plus the chamfer of the male tread, extends above the top of the nut.

NOTE: If the male thread does not have a chamfer, the male thread must extend one and one-half treads (minimum) above the top of the nut.

----- END OF TASK -----

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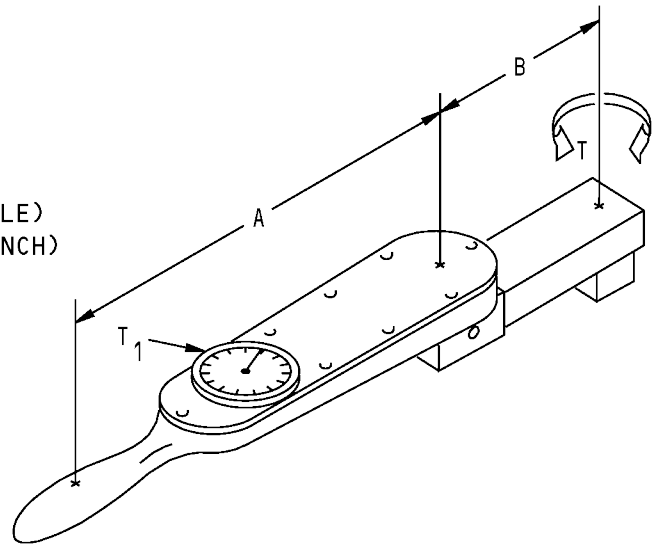
$$T_1 = \frac{TA}{A+B}$$

A = LENGTH OF THE TORQUE WRENCH
 B = EFFECTIVE LENGTH OF THE ADAPTER
 T = APPROVED TORQUE (SHOWN IN TORQUE TABLE)
 T₁ = ADJUSTED TORQUE (SHOWN ON TORQUE WRENCH)

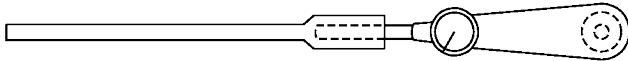
EXAMPLE: A = 12 INCHES
 B = 3 INCHES
 T = 160 POUND-INCHES

$$T_1 = \frac{160 \times 12}{12+3}$$

T₁ = 128 POUND-INCHES

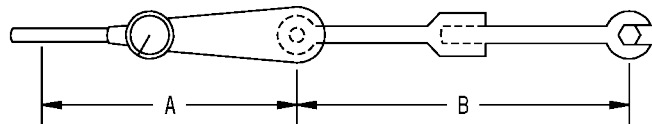


METHOD 1



HANDLE EXTENSION ONLY.
 NO CORRECTION NECESSARY.

METHOD 2



ADAPTER WITH THE EXTENSION BETWEEN THE ADAPTER AND THE WRENCH. BOTH ARE IN LINE WITH THE WRENCH. INDICATED TORQUE T₁:

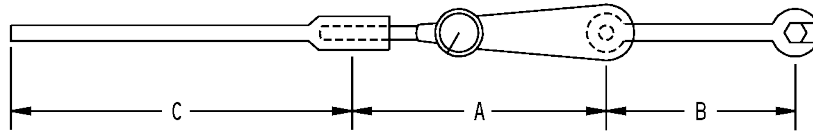
$$T_1 = \frac{TA}{A+B}$$

METHOD 3

Finding Torque Values for a Torque Wrench with an Adapter
 Figure 201 (Sheet 1 of 2)/20-11-00-990-801

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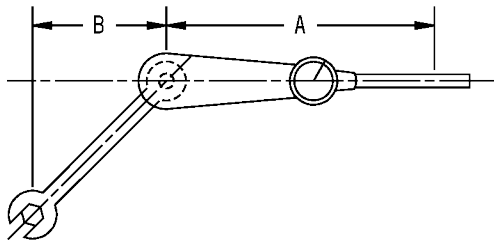
BOTH HANDLE EXTENSION AND ADAPTER,
INDICATED TORQUE T_1 :

$$T_1 = \frac{T(A+C)}{A+B+C}$$

METHOD 4

IF POSSIBLE, METHODS 5 AND 6 SHOULD NOT BE USED. WHEN IT IS NECESSARY TO USE THESE METHODS, THE FOLLOWING CONDITIONS MUST BE APPLICABLE.

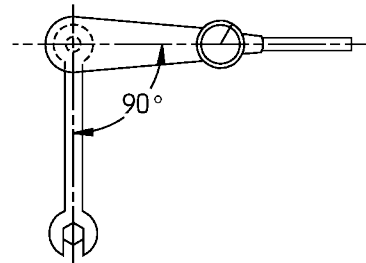
1. THE ADAPTER PLUS ANY EXTENSIONS USED BETWEEN THE WRENCH AND THE ADAPTER MUST NOT BE MORE THAN THE LENGTH OF THE WRENCH.
2. WHEN A FORCE IS APPLIED AT 90 ± 3 DEGREES TO THE HANDLE OF THE WRENCH, IT IS RECOMMENDED THAT A STIRRUP-TYPE HANDLE WITH A POINTER (INDICATING ANGLE OF LOADING) BE USED TO MAKE SURE LOADING IS AT THE CORRECT ANGLE.



ADAPTER AT ANGLE OTHER THAN
 90° . INDICATED TORQUE T_1 :

$$T_1 = \frac{TA}{A+B}$$

METHOD 5





ADAPTER AT RIGHT ANGLE TO THE
WRENCH. NO CORRECTION NECESSARY.

METHOD 6

Finding Torque Values for a Torque Wrench with an Adapter
Figure 201 (Sheet 2 of 2)/20-11-00-990-801

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

NUT TIGHTENING TORQUE 		
N U T	PART NUMBER AND STYLE	COARSE THREADED NUTS, INSERTS AND TAPPED HOLES
B O L T	STYLE	ALL COARSE BOLTS AND SCREWS
	PART NUMBER	ALL
TORQUE (POUND-INCHES)		
THREAD SIZE	DRY BOLT	MAXIMUM 
---	---	---
---	---	---
---	---	---
---	---	---
10-24 1/4-20 5/16-18 3/8-16	13.5-14.5 29-31 49-52 97-103	21 45 100 170
7/16-14 1/2-13 9/16-12 5/8-11	146 262-278 349-371 466-494	280 520 650 900
3/4-10 7/8-9 1-8 1-1/8-7	800-850 1500-1590 2520-2670 3540-3760	1500 2700 4500 7200
1-1/4-7 --- ---	4360-4630 --- ---	10,000 --- ---

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

Torque Values for Most Bolts and Nuts
Figure 202 (Sheet 2 of 3)/20-11-00-990-802

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THREAD SIZE	DIAMETER DASH NO.	NAS1423 AND NAS509 JAM NUTS 			ALL OTHER NONSELF-LOCKING JAM NUTS 		
		TORQUE, INCH-POUNDS			TORQUE, INCH-POUNDS		
		MINIMUM	TARGET	MAXIMUM	MINIMUM	TARGET	MAXIMUM
0.1900-32	-3	13	13	15	18	19	20
0.2500-28	-4	18	18	20	24	25	26
0.3125-24	-5	34	35	36	49	50	52
0.3750-24	-6	40	45	46	63	65	67
0.4375-20	-7	63	65	67	97	100	103
0.5000-20	-8	78	80	82	112	115	118
0.5625-18	-9	87	90	93	130	135	140
0.6250-18	-10	97	100	103	146	150	155
0.7500-16	-12	155	160	165	233	240	247
0.8750-14	-14	213	220	227	320	330	340
1.0000-12	-16	272	280	288	407	420	433
1.1250-12	-18	359	370	380	534	550	567
1.2500-12	-20	437	450	464	655	675	695

JAM NUTS

-  LOCKWIRED JAM NUTS
-  NON-LOCKWIRED JAM NUTS

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Torque Values for Most Bolts and Nuts
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LOCKING TORQUE - SELF-LOCKING NUTS ▶ 1						
SIZE	FINE THREADS (REF BPS-N-70)			SIZE	COARSE THREADS (REF MIL-N-25027)	
	TORQUE (POUND-INCHES)				TORQUE (POUND-INCHES)	
	USED NUT		NEW NUT		MINIMUM LOCKING	MAXIMUM LOCKING
	MINIMUM BREAKAWAY	MAXIMUM LOCKING	MINIMUM 1ST CYCLE BREAKAWAY			
4-48		-	-	2-56	0.2	2.5
6-40	1.0	10	-	4-40	0.5	5
8-36	1.5	15	-	6-32	1.0	10
10-32	2.0	18	-	8-32	1.5	15
1/4-28	3.5	30	7	10-24	2.0	18
5/16-24	6.5	60	12	1/4-20	4.5	30
3/8-24	9.5	80	18	5/16-18	7.5	60
7/16-20	14.0	100	26	3/8-16	12.0	80
1/2-20	18.0	150	34	7/16-14	16.5	100
9/16-18	24.0	200	46	1/2-13	24.0	150
5/8-18	32.0	300	60	9/16-12	30.0	200
3/4-16	50.0	400	90	5/8-11	40.0	300
7/8-14	70.0	600	135	3/4-10	60.0	400
1-14	90.0	800	180	7/8-9	82.0	600
1-12	90.0	800	180	1-8	110.0	800
1-1/8-12	117.0	900	234	1-1/8-7	137.0	900
1-1/4-12	143.0	1000	285	1-1/4-7	165.0	1000
1-3/8-12	165.0	1100	330	1-3/8-6	200.0	1200
1-1/2-12	195.0	1250	386	1-1/2-6	230.0	1400
1-3/4-12	245.0	1450	490	1-3/4-5	300.0	1800
2-12	300.0	1700	600	2-4.5	360.0	2200
				2-1/4-4.5	430.0	2600
				2-1/2-4.5	500.0	3000

▶ THE FOLLOWING CONDITIONS MUST BE USED FOR TORQUES (REF BPS-N-70):

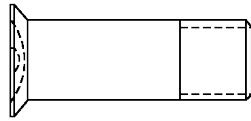
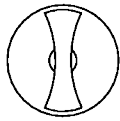
- A. THE MINIMUM-TO-MAXIMUM LOCKING TORQUE RANGE IS USED TO FIND THE CONDITION OF A USED SELF-LOCKING NUT AND BOLT SET.
- B. ALL NUT THREADS SHALL BE NEW OR UNDAMAGED. A NUT IS CONSIDERED INSTALLED WHEN A MINIMUM OF ONE THREAD PLUS THE CHAMFER OF THE MALE THREAD EXTENDS BEYOND THE TOP OF THE NUT. IF THE MALE THREAD DOES NOT HAVE A CHAMFER, THE MALE THREAD MUST EXTEND ONE AND ONE-HALF THREADS (MINIMUM) ABOVE THE TOP OF THE NUT.
- C. THE REMOVAL WILL BE COMPLETE WHEN THE LOCKING DEVICE IS DISENGAGED.
- D. THE MINIMUM BREAKAWAY TORQUE IS THE TORQUE REQUIRED TO TURN A NUT OR BOLT FROM AN INSTALLED POSITION. THIS CONDITION IS FOR BOLT THREADS WITH NO LOAD ON THE BASE OF THE NUT.
- E. THE MAXIMUM LOCKING TORQUE IS THE MAXIMUM TORQUE DURING INSTALLATION OR REMOVAL OF NUTS WITH NO LOAD ON THE BASE OF THE NUT.

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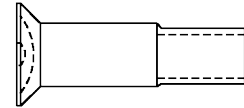
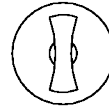
Locking Torque Values for Self-Locking Nuts
Figure 203/20-11-00-990-803

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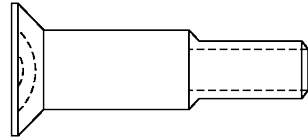
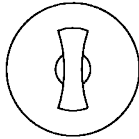
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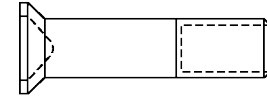
BACB30DP (CRES)
BACB30EL (STEEL)
NAS1581 (CRES)



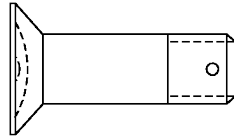
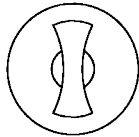
BACB30FB (STEEL)
BACB30RF (STEEL)
BACB30UW (STEEL)



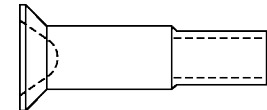
BACB30NU (TITANIUM)



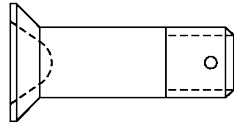
BACB30UR (TITANIUM)



BACB30LL (CRES)



BACB30VF (TITANIUM)
BACB30XD (TITANIUM)



BACB30ZE (CRES)

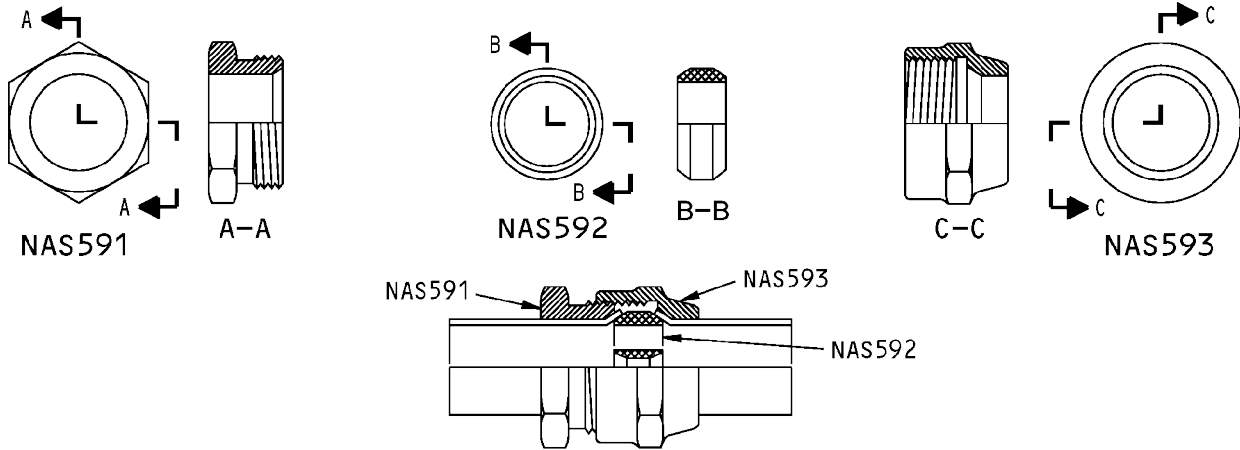
BACB30DP, BACB30EL, BACB30FB, BACB30LL, BACB30RF, BACB30NU, BACB30UR, BACB30UW, BACB30VF, BACB30XD, BACB30ZE, NAS1581	
BOLT SIZE	TORQUE RANGE POUND -INCHES (Nm)
1/4-28	38-40 (4.29-4.52)
5/16-24	92-98 (10.39-11.07)
3/8-24	97-103 (10.96-11.64)
7/16-20	155-165 (17.51-18.64)
1/2-20	223-237 (25.20-26.78)
9/16-18	300-320 (33.90-36.15)
5/8-18	407-433 (45.98-48.92)
3/4-16	660-700 (74.57-79.09)
7/8-14	1070-1130 (120.89-127.67)
1-12 OR 1-14	1600-1700 (180.77-192.07)

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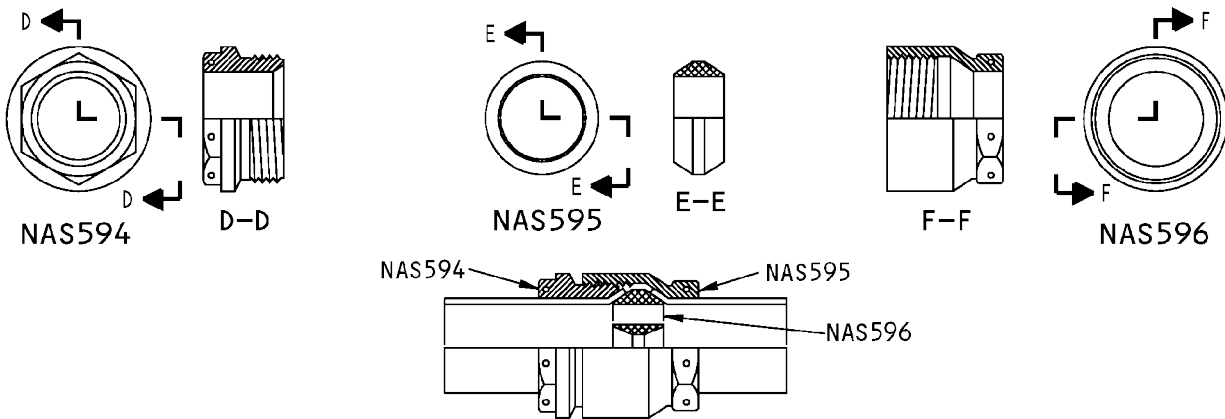
Torque Values for Reduced-Head Bolts
Figure 204/20-11-00-990-804

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**CONNECTION ASSEMBLY FOR ALUMINUM ALLOY FITTINGS
NAS591-NAS593**



**CONNECTION ASSEMBLY FOR STAINLESS STEEL FITTINGS
NAS594-NAS596**

TUBE OD (INCHES)	TORQUE VALUE (POUND-INCHES)			
	ALUMINUM ALLOY FITTINGS NAS591-NAS593		STAINLESS STEEL FITTINGS NAS594-NAS596	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
1	480	720	480	720
1-1/4	600	900	600	900
1-1/2	600	900	600	900
2	900	1200	900	1200
2-1/2	1500	1800	1800	2100
3			1800	2100
4			2400	2700

Standard Torque Values for Rigid Tube Coupling Connectors
Figure 205/20-11-00-990-805

AIRCRAFT MAINTENANCE MANUAL

PIPE THREAD SIZE (INCHES)	TORQUE VALUE (POUND-INCHES)			
	ALL PIPE EXCEPT STAINLESS STEEL TO STAINLESS STEEL		STAINLESS STEEL TO STAINLESS STEEL PIPE FITTINGS	
	WORKING	MAX	MIN	MAX
1/8	100	175	100	150
1/4	150	300	100	275
3/8	225	450	100	400
1/2			100	500
3/4			150	600
1			200	800

Standard Torque Values for Pipe Thread Fittings
Figure 206/20-11-00-990-806

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AIRCRAFT MAINTENANCE MANUAL

TUBE OD (INCHES)	FITTING NUT SIZE	TORQUE VALUE (POUND-INCHES)	
		1	2
1/4	-4	110	65
5/16	-5	140	90
3/8	-6	170	130
1/2	-8	280	260
5/8	-10	360	360
3/4	-12	450	500
1	-16	750	700
1-1/4	-20	900	900
1-1/2	-24	900	900
2	-32		2000

NOTE: THE TORQUE VALUES ARE APPLICABLE TO ALL WALL THICKNESSES FOR A GIVEN DIAMETER TUBE. AND THE TORQUE VALUES HAVE A $\pm 5\%$ TOLERANCE.

- 1 THESE TORQUE VALUES ARE APPLICABLE TO:
- (1) FLARED ALUMINUM TUBE ENDS
 - (2) FLARELESS ALUMINUM TUBE ENDS WITH BACS13BD SWAGED SLEEVES
 - (3) FLARELESS TYPE HOSE END FITTINGS WITH ALUMINUM INSERTS
 - (4) STANDARD MS FLARELESS TUBE ENDS ON 6061-T6 ALUMINUM TUBING AND ON ANNEALED CRES TUBING. ANNEALED CRES TUBING IS IDENTIFIED BY A WIDE YELLOW BAND ADJACENT TO THE TUBING-USE IDENTIFICATION CODE MARKINGS.
- 2 THESE TORQUE VALUES ARE APPLICABLE TO FLARED HOSE END FITTINGS WITH ALUMINUM INSERTS.

Standard Torque Values for Low Pressure and Return Line Fittings
Figure 207/20-11-00-990-807

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AIRCRAFT MAINTENANCE MANUAL

TUBING		INSTALLATION TORQUE ON FLARELESS TUBING FITTINGS (POUND-INCHES, ±5%) 1 2	
OD SIZE (INCHES)	TUBE DASH NO.	STEEL AND TITANIUM TUBES 3	ALUMINUM AND ANNEALED CRES TUBES 4
3/16	-3	100	80
1/4	-4	140	110
5/16	-5	190	140
3/8	-6	270	170
1/2	-8	500	280
5/8	-10	700	360
3/4	-12	900	450
1	-16	1200	750
1-1/4	-20	1600	900
1-1/2	-24	2000	900
2	-32	2000	---

- NOTE:**
1. TO USE ALUMINUM TUBE TORQUE VALUES FOR ALUMINUM, STEEL, OR TITANIUM FITTINGS IN ALUMINUM BOSSES.
 2. TO USE STEEL TUBE TORQUE VALUE FOR STEEL OR TITANIUM FITTINGS INSTALLED IN STEEL OR TITANIUM BOSSES.

NOTE: YOU MUST USE CARE WHEN YOU SELECT THE CORRECT TORQUE FOR REDUCER FITTINGS. YOU MUST FIND THE CORRECT FITTINGS INSTALLATION TORQUE FOR THE SIZE OF THE BOSS OR BULKHEAD.

1 YOU MUST USE CARE WHEN YOU SELECT THE CORRECT TORQUE FOR REDUCER FITTINGS. YOU MUST FIND THE CORRECT FITTINGS INSTALLATION TORQUE FOR THE SIZE OF THE BOSS OR BULKHEAD.

- 2 TUBE MATERIAL SPECIFICATIONS:
- A. 6061-T6 ALUMINUM - MIL-T-7081, WW-T-700/6
 - B. ANNEALED CRES - MIL-T-8504, MIL-T-8606, MIL-T-8808
 - C. 1/8 HARD CRES - MIL-T-6845
 - D. 21-6-9 CRES - BMS 7-185
 - E. TI-3AL-2.5V - BMS 7-234

- 3 THESE TORQUE VALUES ARE APPLICABLE TO THESE TUBE ENDS:
- A. 21-6-9 STEEL WITH BACS13BDX SWAGED SLEEVE
 - B. CRES STEEL WITH BACS13BDX SWAGED SLEEVE
 - C. MIL-T-6845 CRES WITH BACS13AP PRESET SLEEVE 5
 - D. HOSE END FITTINGS WITH STEEL INSERTS (NIPPLES)
 - E. ALL TITANIUM TUBE ENDS

- 4 THESE TORQUE VALUES ARE APPLICABLE TO THESE TUBE ENDS:
- A. ALUMINUM WITH BACS13BD AND BACS13BX SWAGED SLEEVES
 - B. 6061-T6 ALUMINUM WITH PRESET BACS13AP SLEEVES 6
 - C. ANNEALED CRES WITH PRESET BACS13AP SLEEVES 6
 - D. HOSE END FITTINGS WITH ALUMINUM INSERTS (NIPPLES)

Installation Torque for Flareless Tubing Fittings
Figure 208 (Sheet 1 of 2)/20-11-00-990-808

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5 > THESE TORQUE VALUES ARE APPLICABLE TO STANDARD MS FLARELESS TUBE ENDS (BACS13AP SLEEVES) ON MIL-T-6845 (304-1/8 HARD) TUBING WITH THE MINIMUM WALL THICKNESS BELOW:

SIZE	-4	-5	-6	-8	-10	-12
WALL THICKNESS	0.020	0.020	0.028	0.034	0.049	0.049

USE THESE TORQUE VALUES FOR SPECIAL THIN WALL MIL-T-6845 (304-1/8h) TUBING:

SIZE	-8	-10	-12
WALL THICKNESS	0.028	0.035	0.042
TORQUE (POUND-INCHES)	375	575	725

6 > USE THESE TORQUE VALUES FOR STANDARD MS FLARELESS TUBE ENDS (BACS13AP SLEEVES) ON 6061-T6 ALUMINUM AND ANNEALED CRES TUBING WITH THE MINIMUM WALL THICKNESS BELOW:

SIZE	-3	-4	-5	-6	-8	-10	-12	-16
WALL THICKNESS	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.035

USE THESE TORQUE VALUES FOR SPECIAL THIN WALL ANNEALED CRES TUBING:

SIZE	-8	-10	-12
WALL THICKNESS	0.020	0.020	0.020
TORQUE (POUND-INCHES)	160	250	325

Installation Torque for Flareless Tubing Fittings
Figure 208 (Sheet 2 of 2)/20-11-00-990-808

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AIRCRAFT MAINTENANCE MANUAL

BOEING PART NUMBER	DASH NUMBER ()	TORQUE (INCH- POUNDS)	TORQUE (NEWTON- METERS)
BACC10AC	150-200	40-50	4.52-5.65
	225-300	60-70	6.78-7.91
	315-550	120-140	14.01-15.81
BACC10AUU()	250-275	70	7.91
	300-500	100	11.30
	550-600		
BACC10BR8()	100-900	100	11.30
BACC10CT2()	100-600		
BACC10DP()A	150-250	50	5.65
BACC10DP()B	300		
BACC10DP()AB	350-400		
	450-600	70	7.91
BACC10DU()AB	100-175	50	5.65
	200-275	55	6.21
	300-450	60	6.78
	500-600	65	7.34
	700-1000	75	8.47
BACC10EY()B	150-800	105	11.86
	425-800		
BACC10EZ()B	150-400	75	8.47
	125-275	105	11.86
	300		
BACC10GY()	125-300		
	150-175	40	4.52
	200-275	45	5.08
	300-450	50	5.65
	475-600	55	6.21
BACC10HX()	650-900	65	7.34
	100-300	10	1.13
	325-500	15	1.69
	550-800	20	2.26

**COUPLING CLAMPS, V-BAND,
AND CHANNEL-BAND 1**
TABLE A

BOEING PART NUMBER	DASH NUMBER ()	TORQUE (INCH- POUNDS)	TORQUE (NEWTON- METERS)
BACC10KH	200-275	45	5.08
	300-475	55	6.21
	500-550	60	6.78
	600-650	65	7.34
	700	70	7.91
BACC10LE()	500-600	55	6.21
	650-900	65	7.34
NUCO (U430453)	125	55-65	6.21-7.34

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
THE RECOMMENDED TIGHTENING
PROCEDURE IS AS FOLLOWS:

1. APPLY THE INSTALLATION TORQUE AS GIVEN IN THE TABLE.
2. HIT THE ENTIRE CIRCUMFERENCE OF THE CLAMP LIGHTLY WITH A WOOD, LEATHER, OR SOFT PLASTIC Mallet.
3. DO STEPS 1 AND 2 UNTIL THE TORQUE WILL STAY CONSTANT.

Standard Torque Values for Clamps
Figure 209 (Sheet 1 of 3)/20-11-00-990-809

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AIRCRAFT MAINTENANCE MANUAL

TYPE	DUCT OD INCHES (mm)	TORQUE INCH-POUNDS (NEWTON-METERS)
BACC10CT	1.00-6.00 (25.4-152.40)	102.5 ±2.5 (11.6 ±0.3) 

CHANNEL BAND CLAMPS

TYPE	DUCT OD INCHES (mm)	TORQUE INCH-POUNDS (NEWTON-METERS)
BACC10AD	2.00-8.00 (50.8-203.20)	22.5 ±2.5 (2.5 ±0.3)

DUCT-SUPPORT CLAMPS

TYPE	STRUCTURE OD INCHES (mm)	TORQUE INCH-POUNDS (NEWTON-METERS)
BACC10FY	1.20 (30.48)	32.5 ±1.5 (3.7 ±0.2)

BAND CLAMPS

TYPE	DUCT OD INCHES (mm)	TORQUE INCH-POUNDS (NEWTON-METERS)
BACC10ET	4.00 AND LARGER (101.6 AND LARGER)	35.0 ±5.0 (4.0 ±0.6)

BRACKET MOUNTING CLAMPS

 INSIDE OF COUPLING IS NOT LUBRICATED

F16253 S0006402601_V3

Standard Torque Values for Clamps
Figure 209 (Sheet 2 of 3)/20-11-00-990-809

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TYPE	HOSE OD INCHES (mm)	TORQUE INCH-POUNDS (NEWTON-METERS)
BACC10BN	1.75-20.00 (44.45-508)	20 (2)

HOSE CLAMPS

TYPE	DUCT OD INCHES (mm)/MATERIAL	TORQUE INCH-POUNDS (NEWTON-METERS)
BACR12H	1.50 (38.10)/5052-0	800 ±200 (90 ±23)
	1.50 (38.10)/STAINLESS	1050 ±150 (119 ±17)
	1.75 (44.45)/5052-0	1050 ±150 (119 ±17)
	2.00 (50.80)/5052-0	1400 ±1100 (158 ±124)
	2.50 (63.50)/5052-0	2500 ±500 (282 ±57)

ROYLYN COUPLING

Standard Torque Values for Clamps
Figure 209 (Sheet 3 of 3)/20-11-00-990-809

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AIRCRAFT MAINTENANCE MANUAL

WRENCH ARC METHOD TIGHTENING TECHNIQUES - MAINTENANCE PRACTICES

1. General

A. This procedure contains one task:

(1) The wrench arc method.

B. This procedure gives the instructions to tighten ball-nose tube fittings.

C. Torque is the turn force that you apply to the fastener to install a part.

TASK 20-11-10-910-802-001

2. Wrench Arc Method

(Figure 201)

A. General

(1) The wrench arc method is used to tighten all ball-nose fittings on the engine-mounted components and tubing. The purpose is to obtain a total angle displacement of 30 degrees. The wrench arc method is done by a visual measurement of the angular displacement instead of a torque measurement. There are two methods of the wrench arc method:

(a) The turn of the B-nut method (use of an open end wrench, crowfoot or tubing wrench)

(b) The line of sight method (use a 15 degree offset open end wrench).

B. Procedure

SUBTASK 20-11-10-420-004-001

(1) Prepare to tighten the ball-nose fitting:

(a) Clean the threads and the mating surfaces of the fitting.

(b) Make sure there is no nicks, burrs, and scratches on the fitting threads.

SUBTASK 20-11-10-420-005-001

(2) Use the turn of the B-nut method to tighten the ball-nose fitting:

NOTE: No lubricant is necessary for the ball-nose fitting.

(a) Put the open end wrench, crowfoot or tubing wrench on the B-nut.

(b) Turn the B-nut until you feel a sharp increase in the resistance.

NOTE: The sharp increase indicates that the mating surfaces touched.

(c) Make sure the ball-nose fitting is correctly installed (not cross-threaded).

(d) Make sure there is no looseness between the mating parts of the ball-nose fitting.

(e) Set a reference point on the B-nut coupling.

NOTE: The reference point is always between the B-nut flat and the coupling.

(f) Tighten the B-nut with an open end wrench through an arc 30 degrees.

NOTE: 1/2 flat turn of the B-nut is 30 degrees of a complete arc.

(g) If this is new hardware, loosen the B-nut and then tighten it again to a complete arc of 30 degrees.

SUBTASK 20-11-10-420-006-001

(3) Use the line of sight method to tighten the ball-nose fitting:

NOTE: No lubricant is necessary for the ball-nose fitting.

(a) Put the open end wrench on the B-nut.

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AIRCRAFT MAINTENANCE MANUAL

- (b) Turn the B-nut until you feel a sharp increase in the resistance.

NOTE: The sharp increase indicates that the mating surfaces touched.

- (c) Make sure the ball-nose fitting is correctly installed (not cross-threaded).
- (d) Make sure there is no looseness between the mating parts of the ball-nose fitting.
- (e) Look at the position of the 15 degree open end wrench handle.
- (f) Set a reference point on the B-nut in line with the handle.

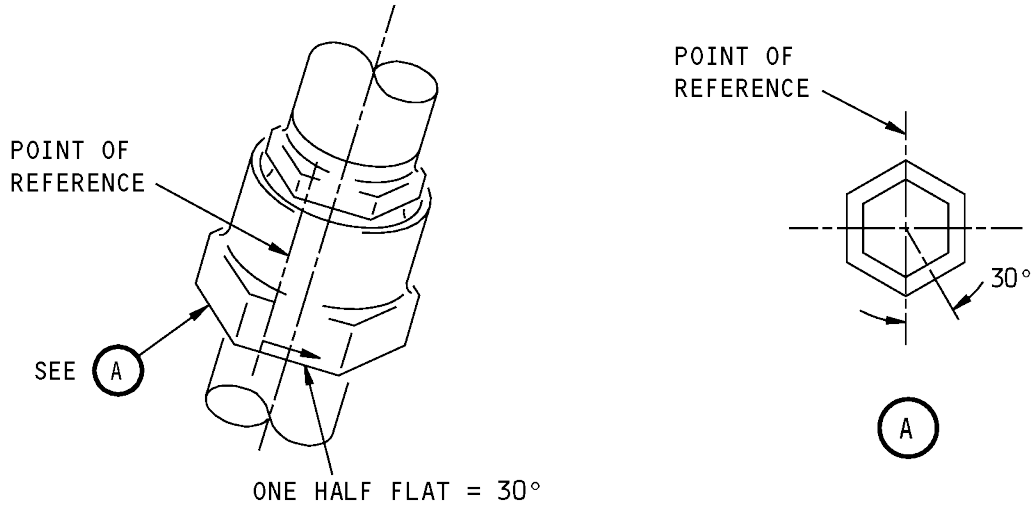
NOTE: The reference point is always between the B-nut flats and the wrench handle.

- (g) Tighten the B-nut 15 degrees.
- (h) Turn the wrench over.
- (i) Put the wrench on the same B-nut flats.
- (j) Tighten the B-nut an additional 15 degrees which aligns the wrench back to the original start position.

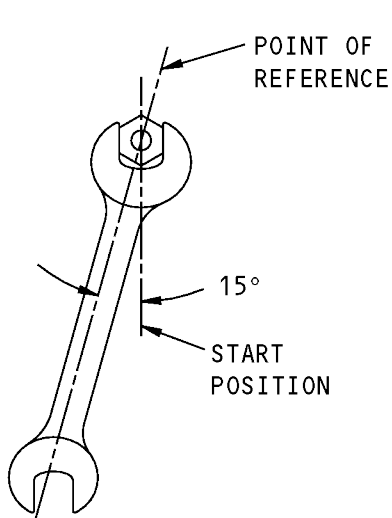
NOTE: If this is new hardware, loosen the new B-nut and then do the above procedure to tighten it again to a complete arc of 30 degrees.

----- END OF TASK -----

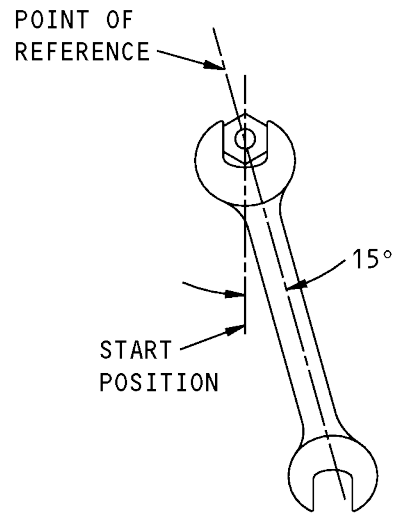
AIRCRAFT MAINTENANCE MANUAL



TURN OF THE B-NUT METHOD



TURN NUT 15° FROM
THE START POSITION



TURN WRENCH OVER (INVERT)
TURN NUT 15° BACK TO THE
START POSITION

LINE OF SIGHT METHOD

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Tighten Ball-Nose Fittings with the Wrench Arc Method
Figure 201/20-11-10-990-802-001

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