



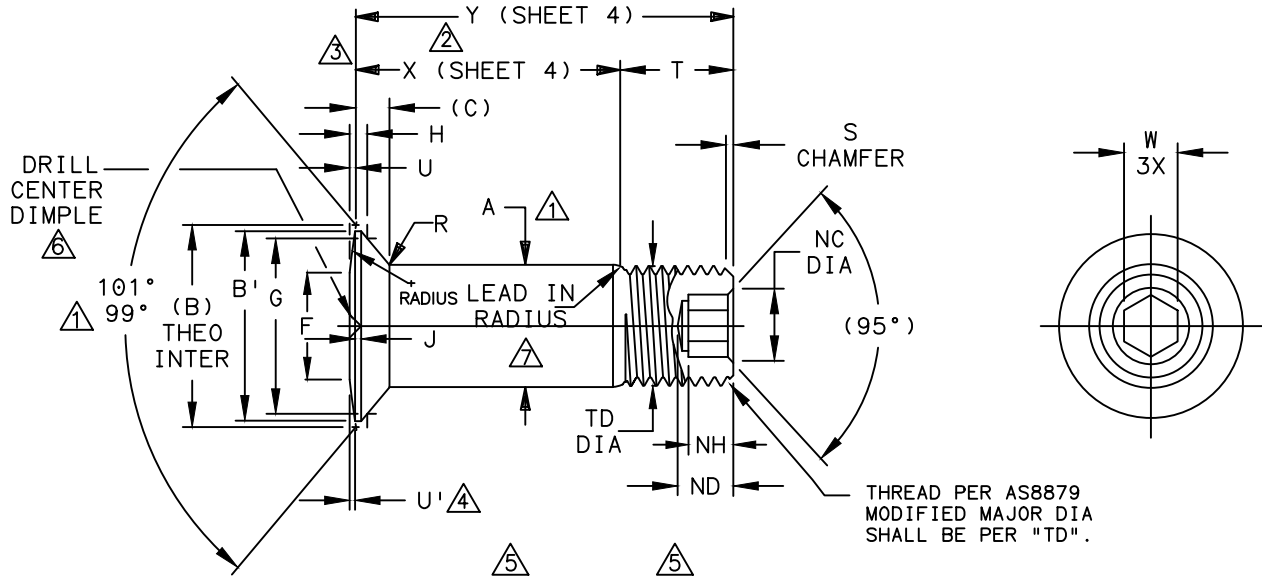
Howmet Fastening Systems  
 Carson Operations  
 900 E. Watson Center Road  
 Carson, California 90745 U.S.A.

AERO-LITE®  
 ENGINEERING  
 STANDARD

HOWMET  
 AEROSPACE

Phone (310) 830-8200  
 HFS\_Carson\_Engineering@howmet.com

THIS DRAWING, THE STRUCTURAL DESIGN DISCLOSED THEREIN AND THE TECHNICAL DATA AND ENGINEERING SERVICE REPRESENTED THEREBY ARE THE EXCLUSIVE PROPERTY OF HUCK INTERNATIONAL INCORPORATED.



AL PIN FAMILY NUMBER	NOM SIZE	THREAD (MODIFIED)	A SHANK DIA BARE +.0005 -.0000	A SHANK DIA COATED ±.0005	(B) THEO INTER NOM	B' HEAD DIA ±.0025	(C) HEAD HEIGHT NOM	F FLAT DIA ±.005	G GAGE DIA ±.0001	H GAGE HEIGHT	J	NC CHAMFER DIA	ND DRILL DEPTH MAX	NH HEX DEPTH	R RAD ±.005
AL331()-5-()	.1640	.1640-32 UNJC-3A	.1630	.1630	.2569	.2435	.0394	.125	.2027	.0286 .0256	.010 MAX	.104 .094	.135	.100 .080	.020
AL331()-6-()	.1900	.1900-32 UNJF-3A	.1890	.1890	.2974	.2840	.0455	.156	.2440	.0282 .0252		.119 .104	.135	.100 .080	.025
AL331()-8-()	.2500	.2500-28 UNJF-3A	.2490	.2490	.3908	.3770	.0595	.190	.3314	.0316 .0286		.142 .122	.160	.110 .090	.025
AL331()-10-()	.3125	.3125-24 UNJF-3A	.3115	.3115	.4695	.4525	.0663	.250	.4046	.0346 .0316	.012 MAX	.180 .160	.200	.130 .110	.035
AL331()-12-()	.3750	.3750-24 UNJF-3A	.3740	.3740	.5556	.5390	.0762	.312	.4853	.0385 .0355		.217 .197	.235	.160 .140	.035
AL331()-14-()	.4375	.4375-20 UNJF-3A	.4365	.4365	.6626	.6460	.0949	.375	.5697	.0495 .0465		.253 .233	.275	.190 .170	.045
AL331()-16-()	.5000	.5000-20 UNJF-3A	.4990	.4990	.7485	.7320	.1047	.438	.6499	.0529 .0499	.289 .269	.315	.220 .200	.045	

AL PIN FAMILY NUMBER	NOM SIZE	S CHAMFER	T REF	TD DIA	U ±.0010	U' REF	W HEX 3X	DOUBLE SHEAR LBS MIN	TENSION LBS MIN
AL331()-5-()	.1640	1/32"	.280	.1595 .1570	.0043	.0035	.0806 .0791	4010	1650
AL331()-6-()	.1900	1/32"	.290	.1840 .1810	.0043	.0035	.0806 .0791	5380	2000
AL331()-8-()	.2500	1/32"	.320	.2440 .2410	.0052	.0045	.0967 .0947	9300	3700
AL331()-10-()	.3125	3/64"	.380	.3060 .3020	.0059	.0050	.1295 .1270	14600	5000
AL331()-12-()	.3750	3/64"	.420	.3680 .3640	.0075	.0065	.1617 .1582	21000	7200
AL331()-14-()	.4375	3/64"	.485	.4310 .4260	.0090	.0080	.1930 .1895	28600	10000
AL331()-16-()	.5000	3/64"	.525	.4930 .4880	.0100	.0090	.2242 .2207	37300	13500

DIMENSIONS IN INCHES  
 AFTER FINISH

PROCUREMENT SPECIFICATION: C380

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CHECKED BY	MM	

B<sub>11</sub> REMOVE HI-KOTE I AND K62242 REFERENCES ON PAGE 2. (REF. ECR 2906)

ISSUED	08/15/95	PIN, AERO-LITE® LIGHTWEIGHT 100° CLOSE TOLERANCE CROWN COUNTERSUNK SHEAR HEAD, 6AL-4V TITANIUM. (95 KSI SHEAR)	AL331()-()-()
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- ① CONCENTRICITY: CONICAL SURFACE OF COUNTERSUNK HEAD TO "A" SHANK DIAMETER TO BE WITHIN .003 TIR.
- ② GRIP LENGTH IS MEASURED FROM THE THEORETICAL INTERSECTION OF THE CROWN RADIUS AND HEAD ANGLE TO THE MAXIMUM GRIP PLANE. TRANSITION AREA AND THREAD FORM WILL ALLOW MATING COLLAR TO ACHIEVE MINIMUM GRIP CONDITION WITHOUT INTERFERENCE. (SEE DESIGN GRIP RANGE AND DIMENSION "X" SHEET 4).
- ③ DIMENSIONS B, C, U, X AND Y ARE MEASURED FROM THE THEORETICAL INTERSECTION OF THE CROWN RADIUS AND HEAD ANGLE.
- ④ DIMENSION U' IS MEASURED AT TOP OF "J" LAND.
- ⑤ DIMENSIONS B, C AND U' ARE FOR ENGINEERING REFERENCE ONLY AND ARE NOT TO BE USED FOR INSPECTION PURPOSES.
- ⑥ DRILL CENTER DIMPLE IN TOP OF HEAD .035 MAX DIA., .010 MAX DEPTH AND CONCENTRIC TO A WITHIN .008.
- ⑦ MAXIMUM "A" DIAMETER MAY BE INCREASED BY .0002 TO ALLOW FOR DRY FILM LUBE (SUFFIX "RS" FINISH ONLY).

MATERIAL: 6AL-4V TITANIUM ALLOY PER AMS4967 OR AMS4928.  
 MINIMUM SHEAR STRENGTH: 95 KSI.  
 SURFACE TEXTURE: Ra MAX PER ANSI-B46.1 BEFORE COATING. BEARING SURFACE OF HEAD, HEAD TO SHANK FILLET RADIUS, SHANK AND LEAD-IN RADIUS, -32, OTHER SURFACES -125.

FINISH: SUFFIX "AG" = ALUMINUM COATING PER NAS4006 WITH ORANGE COLOR ON THREAD END PLUS CETYL ALCOHOL LUBE PER MIL-L-87132.  
 SUFFIX "AP" = ALUMINUM COATING PER NAS4006 PLUS CETYL ALCOHOL LUBE PER MIL-L-87132.  
 SUFFIX "BJ" = ION VAPOR DEPOSITED ALUMINUM COATING PER MIL-C-83488 TYPE II CLASS 3 PLUS CETYL ALCOHOL LUBE PER MIL-L-87132.  
 SUFFIX "BL" = ION VAPOR DEPOSITED ALUMINUM COATING PER MIL-C-83488 TYPE II CLASS 3 WITH BLACK COLOR ON THREAD END PLUS CETYL ALCOHOL LUBE PER MIL-L-87132.  
 SUFFIX "HY" = ALUMINUM COATING PER NAS4006 WITH ORANGE COLOR ON THREAD END PLUS APPLY SEALANT UNDER HEAD PER BMS 5-95 AND CETYL ALCOHOL LUBE PER MIL-L-87132.  
 SUFFIX "RP" = PHOSPHATE FLUORIDE TREAT PER AMS2486 WITH ORANGE COLOR ON THREAD END PLUS CETYL ALCOHOL LUBE PER MIL-L-87132.  
 SUFFIX "RS" = PHOSPHATE FLUORIDE TREAT PER AMS2486 AND DRY FILM LUBE PER AS5272 WITH ORANGE COLOR ON THREAD END.  
 SUFFIX "SU" = ALUMINUM COATING PER NAS4006 WITH LIGHT BLUE COLOR ON THREAD END PLUS CETYL ALCOHOL LUBE PER MIL-L-87132.  
 SUFFIX "WF" = SULFURIC ACID ANODIZE (BLUE) PER ISO 8080 WITH BLACK COLOR ON THREAD END PLUS CETYL ALCOHOL LUBE PER MIL-L-87132.  
 NO LETTER = UNCOATED PIN PLUS CETYL ALCOHOL LUBE PER MIL-L-87132.

DIMENSIONS IN INCHES  
 AFTER FINISH

ISSUED	08/15/95	PIN, AERO-LITE <sup>®</sup> LIGHTWEIGHT 100° CLOSE TOLERANCE CROWN COUNTERSUNK SHEAR HEAD, 6AL-4V TITANIUM.(95 KSI SHEAR)	
	09/12/2022		AL331()-()-()
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REMOVE HI-KOTE I AND KG2242 REFERENCES ON PAGE 2. (REF. ECR 2906)			

B<sub>11</sub>



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HEAD MARKING: HEADS SHALL BE MARKED WITH THE MANUFACTURER'S SYMBOL, THE BASIC NUMBER (AL331) AND DASH NUMBER DESIGNATING DIAMETER, DEPRESSED .006 MAX DEPTH ARRANGEMENT OPTIONAL.

CODING: THE FIRST SET OF LETTERS DESIGNATE THE FAMILY OF LIGHTWEIGHT AERO-LITE<sup>®</sup> PINS FOR AEROSPACE APPLICATIONS  
 THE NEXT SET OF NUMBERS DESIGNATE HEAD SIZE, STYLE, MATERIAL AND LOAD APPLICATION (331).  
 THE NEXT SET OF LETTERS DESIGNATE FINISH (SEE FINISH CODE FOR SUFFIX INFORMATION).  
 THE FOLLOWING NUMBERS DESIGNATE THE NOMINAL PIN SHANK DIAMETER IN .03125 INCH INCREMENTS.  
 THE FINAL NUMBERS DESIGNATE THE GRIP LENGTH NUMBER OR THE NOMINAL PIN SHANK LENGTH IN .0625 INCH INCREMENTS.

EXAMPLE: AL331()-10-6

- GRIP LENGTH IN .0625 INCH INCREMENTS.
- SHANK DIA IN .03125 INCH INCREMENTS.
- FINISH SUFFIX (SEE FINISH CODE).
- TITANIUM 100° CLOSE TOLERANCE CROWN COUNTERSUNK HEAD FOR SHEAR APPLICATIONS.
- AL FAMILY OF AERO-LITE<sup>®</sup> LIGHTWEIGHT PINS FOR AEROSPACE APPLICATIONS.

DIMENSIONS IN INCHES  
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B 11		REMOVE HI-KOTE I AND KG2242 REFERENCES ON PAGE 2. (REF. ECR 2906)		
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GRIP NUMBER TABULATION										
GRIP DASH NO.	DESIGN GRIP RANGE		X  ±.005	05	06	08	10	12	14	16
	MIN.	MAX.		Y	Y	Y	Y	Y	Y	Y
				±.010	±.010	±.010	±.010	±.010	±.010	±.010
2	.063	.125	.125	.405	.415	—	—	—	—	—
3	.126	.188	.188	.468	.478	.508	.568	—	—	—
4	.189	.250	.250	.530	.540	.570	.630	.670	.735	—
5	.251	.312	.312	.592	.602	.632	.692	.732	.797	.837
6	.313	.375	.375	.655	.665	.695	.755	.795	.860	.900
7	.376	.438	.438	.718	.728	.758	.818	.858	.923	.963
8	.439	.500	.500	.780	.790	.820	.880	.920	.985	1.025
9	.501	.562	.562	.842	.852	.882	.942	.982	1.047	1.087
10	.563	.625	.625	.905	.915	.945	1.005	1.045	1.110	1.150
11	.626	.688	.688	.968	.978	1.008	1.068	1.108	1.173	1.213
12	.689	.750	.750	1.030	1.040	1.070	1.130	1.170	1.235	1.275
13	.751	.812	.812	1.092	1.102	1.132	1.192	1.232	1.297	1.337
14	.813	.875	.875	1.155	1.165	1.195	1.255	1.295	1.360	1.400
15	.876	.938	.938	1.218	1.228	1.258	1.318	1.358	1.423	1.463
16	.939	1.000	1.000	1.280	1.290	1.320	1.380	1.420	1.485	1.525
17	1.001	1.062	1.062	1.342	1.352	1.382	1.442	1.482	1.547	1.587
18	1.063	1.125	1.125	1.405	1.415	1.445	1.505	1.545	1.610	1.650
19	1.126	1.188	1.188	1.468	1.478	1.508	1.568	1.608	1.673	1.713
20	1.189	1.250	1.250	1.530	1.540	1.570	1.630	1.670	1.735	1.775
21	1.251	1.312	1.312	1.592	1.602	1.632	1.692	1.732	1.797	1.837
22	1.313	1.375	1.375	1.655	1.665	1.695	1.755	1.795	1.860	1.900
23	1.376	1.438	1.438	1.718	1.728	1.758	1.818	1.858	1.923	1.963
24	1.439	1.500	1.500	1.780	1.790	1.820	1.880	1.920	1.985	2.025
25	1.501	1.562	1.562	1.842	1.852	1.882	1.942	1.982	2.047	2.087
26	1.563	1.625	1.625	1.905	1.915	1.945	2.005	2.045	2.110	2.150
27	1.626	1.688	1.688	1.968	1.978	2.008	2.068	2.108	2.173	2.213
28	1.689	1.750	1.750	2.030	2.040	2.070	2.130	2.170	2.235	2.275
29	1.751	1.812	1.812	2.092	2.102	2.132	2.192	2.232	2.297	2.337
30	1.813	1.875	1.875	2.155	2.165	2.195	2.255	2.295	2.360	2.400
31	1.876	1.938	1.938	2.218	2.228	2.258	2.318	2.358	2.423	2.463
32	1.939	2.000	2.000	2.280	2.290	2.320	2.380	2.420	2.485	2.525

DIMENSIONS IN INCHES  
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