

FED. SUPPLY CLASS

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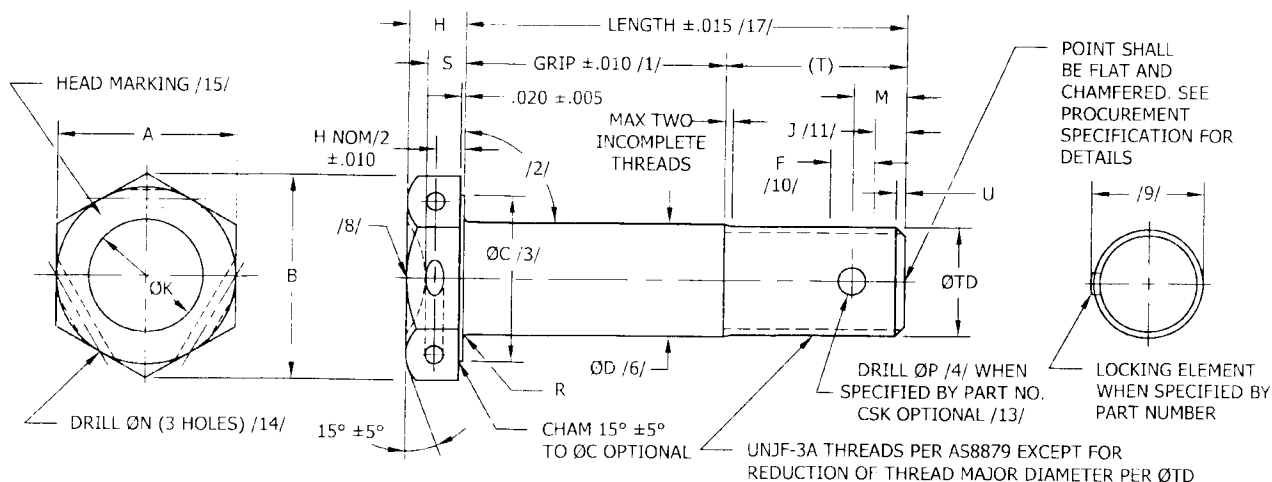


FIGURE 1 - BOLT CONFIGURATION

TABLE I - DIMENSIONS (CONTINUED ON SHEET 2)

BASIC NUMBER	THREAD UNJF-3A	A		B MIN	ØC MIN /3/	ØD		F /10/	H +.015 -.000	J /11/	ØK ±.01
		MAX	MIN			MAX	MIN				
NAS6603	.1900-32	.376	.367	.410	.335	.1895	.1885	.156	.110	.094	.19
NAS6604	.2500-28	.439	.429	.480	.398	.2495	.2485	.178	.125	.107	.25
NAS6605	.3125-24	.502	.492	.552	.460	.3120	.3110	.208	.156	.125	.31
NAS6606	.3750-24	.564	.554	.623	.523	.3745	.3735	.208	.188	.125	.38
NAS6607	.4375-20	.690	.678	.764	.648	.4370	.4360	.250	.219	.150	.44
NAS6608	.5000-20	.752	.741	.836	.710	.4995	.4985	.250	.250	.150	.50
NAS6609	.5625-18	.877	.865	.978	.835	.5615	.5605	.278	.281	.167	.56
NAS6610	.6250-18	.940	.928	1.050	.898	.6240	.6230	.278	.312	.167	.62
NAS6612	.7500-16	1.065	1.052	1.191	1.023	.7490	.7480	.312	.375	.188	.75
NAS6614	.8750-14	1.252	1.239	1.405	1.210	.8740	.8730	.357	.438	.214	.88
NAS6616	1.0000-12	1.440	1.427	1.619	1.398	.9990	.9980	.416	.500	.250	1.00
NAS6618	1.1250-12	1.627	1.614	1.832	1.585	1.1240	1.1225	.416	.562	.250	/8/
NAS6620	1.2500-12	1.814	1.801	2.046	1.772	1.2490	1.2475	.416	.625	.250	/8/

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THIRD ANGLE PROJECTION	CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE		REVISION 8
PROCUREMENT SPECIFICATION	TITLE BOLT, TENSION, HEX HEAD, CLOSE TOLERANCE, ALLOY STEEL, LONG THREAD, REDUCED MAJOR DIA., SELF-LOCKING AND NONLOCKING, 160 KSI Ft_u		CLASSIFICATION PART STANDARD
NOTED	⑧		NAS6603 THRU 6620 SHEET 1 OF 7

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TABLE I - DIMENSIONS (CONTINUED)

BASIC NUMBER	M ±.010	ØN +.010 -.000	ØP +.010 -.000 /4/	R RAD		S +.015 -.000	(T) /5/	U MAX	ØTD		INSPECTION DATA		
				MAX	MIN				MAX	MIN	X /6/	Y /6/	Z /7/
NAS6603	.164	.046	.070	.020	.010	.073	.345	.039	.184	.181	.005	.0045	.0040
NAS6604	.178	.046	.076	.020	.010	.083	.425	.045	.244	.241	.006	.0045	.0030
NAS6605	.181	.070	.076	.020	.010	.104	.469	.052	.306	.302	.008	.0045	.0030
NAS6606	.197	.070	.106	.025	.015	.125	.578	.052	.368	.364	.009	.0045	.0025
NAS6607	.201	.070	.106	.025	.015	.146	.694	.062	.431	.426	.010	.006	.0025
NAS6608	.216	.070	.106	.030	.020	.167	.735	.062	.493	.488	.011	.006	.0020
NAS6609	.218	.070	.141	.035	.020	.188	.840	.068	.555	.550	.012	.006	.0020
NAS6610	.249	.070	.141	.040	.025	.208	.902	.068	.618	.612	.015	.006	.0020
NAS6612	.252	.070	.141	.045	.030	.250	1.041	.078	.743	.737	.018	.009	.0020
NAS6614	.257	.070	.141	.050	.035	.292	1.184	.089	.868	.861	.020	.009	.0020
NAS6616	.264	.070	.141	.060	.045	.333	1.309	.104	.993	.986	.022	.009	.0020
NAS6618	.357	.070	.141	.070	.055	.8/	1.458	.104	1.118	1.111	.025	.009	.0020
NAS6620	.389	.070	.141	.075	.060	.8/	1.646	.104	1.243	1.236	.028	.009	.0020

MATERIAL: ALLOY STEEL – 4140 (UNS G41400) PER ~~MIL-S-5626~~ AMS6349 OR AMS6382, 4340 (UNS G43406) PER ~~MIL-S-5000~~ AMS6415 OR AMS6484 OR 8740 (UNS G87400) PER ~~MIL-S-6049~~ AMS6322.
LOCKING ELEMENT – NYLON OR EQUIVALENT PER MIL-DTL-18240 AND QPL-18240.

HEAT TREAT: DEVELOP BASIC MATERIAL PROPERTIES AS FOLLOWS, WITH CONTROLS PER ~~AMS-H-6875~~ OR AMS2759:
160 – 180 KSI F_{tu}

FINISH: CADMIUM PLATED BOLTS - CADMIUM PLATE PER AMS-QQ-P-416, TYPE II, CLASS 2. EMBRITTLEMENT REQUIREMENT PER NAS4002.

CHROMIUM PLATED BOLTS – CHROMIUM PLATE PER AMS-QQ-C-320, CLASS 2 ON SHANK ONLY. ALL OTHER SURFACES CADMIUM PLATED. NO CHROMIUM WITHIN .020 OF LINE OF TANGENCY OF HEAD TO SHANK FILLET. CHROMIUM IN THREAD RUNOUT PERMITTED. CHROMIUM PLATED BOLTS NOT AVAILABLE WITH GRIP DASH NUMBER 1 OR NUMBER 2.

CODE: NO FINISH CODE AFTER BASIC NUMBER FOR CADMIUM PLATED BOLTS.
ADD "C" AFTER BASIC NUMBER FOR CHROMIUM PLATED BOLTS.
ADD "D" AFTER BASIC NUMBER FOR DRILLED SHANK BOLTS. DO NOT USE WITH "L" OR "P" CODE. /13/
ADD "H" AFTER BASIC NUMBER FOR BOLT WITH DRILLED HEAD.
ADD "L" AFTER BASIC NUMBER FOR SELF-LOCKING BOLT WITH LOCKING ELEMENT TYPE OPTIONAL;
SEE PROCUREMENT SPEC BELOW. DO NOT USE "L" WITH "D" OR "P" CODE.
ADD "P" AFTER BASIC NUMBER FOR SELF-LOCKING BOLT WITH PATCH TYPE LOCKING ELEMENT ONLY;
SEE PROCUREMENT SPEC BELOW. DO NOT USE "P" WITH "D" OR "L" CODE.
GRIP DASH NUMBER INDICATES GRIP IN .0625 INCREMENTS (CONVERTED TO THREE DECIMAL PLACES PER ANSI Y14.5-1982). SEE TABLE II FOR TABULATIONS OF GRIP AND LENGTH DIMENSIONS.
/17/
CODE LETTER "X" AND "Y" FOLLOWING THE GRIP DASH NUMBER INDICATES REPLACEMENT OVERSIZE REPAIR BOLT. (SEE LAST SHEET)
IF MORE THAN ONE CODE LETTER IS USED IN SEQUENCE, ARRANGE THE LETTERS ALPHABETICALLY.

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EXAMPLE OF PART NUMBER: (SEE LAST SHEET FOR OVERSIZE BOLTS.)

NAS6604-10	=	BOLT, .2500-28 THREAD, .625 GRIP, UNDRILLED, NONLOCKING, CADMIUM PLATED.
NAS6604D10	=	BOLT, .2500-28 THREAD, .625 GRIP, DRILLED SHANK, UNDRILLED HEAD, NONLOCKING, CADMIUM PLATED.
NAS6604H10	=	BOLT, .2500-28 THREAD, .625 GRIP, DRILLED HEAD, UNDRILLED SHANK, NONLOCKING, CADMIUM PLATED.
NAS6604DH10	=	BOLT, .2500-28 THREAD, .625 GRIP, DRILLED SHANK, DRILLED HEAD, NONLOCKING, CADMIUM PLATED.
NAS6604L10	=	BOLT, .2500-28 THREAD, .625 GRIP, UNDRILLED, SELF-LOCKING (LOCKING TYPE OPTIONAL; SEE PROCUREMENT SPEC BELOW), CADMIUM PLATED.
NAS6604P10	=	BOLT, .2500-28 THREAD, .625 GRIP, UNDRILLED, SELF-LOCKING (PATCH TYPE; SEE PROCUREMENT SPEC BELOW), CADMIUM PLATED.
NAS6604C10	=	BOLT, .2500-28 THREAD, .625 GRIP, UNDRILLED, NONLOCKING, CHROMIUM PLATED.

NOTES:

- /1/ GRIP LENGTH: FROM UNDER SIDE OF HEAD TO END OF FULL CYLINDRICAL PORTION OF SHANK.
- /2/ BEARING SURFACE SQUARENESS: WITHIN .003 FIM OF "ØD".
- /3/ "ØC" MAX NOT TO EXCEED ACTUAL WIDTH ACROSS FLATS; MIN AS TABULATED IN TABLE I.
- /4/ "ØP" HOLE CENTERLINE WITHIN .010 AND NORMAL WITHIN 2° OF BOLT CENTERLINE.
- /5/ REFERENCE DIMENSIONS ARE FOR DESIGN PURPOSES ONLY AND ARE NOT AN INSPECTION REQUIREMENT.
- /6/ CONCENTRICITY: "ØC" AND "ØD" WITHIN "X" VALUES FIM. "ØD" AND MAJOR THREAD DIA WITHIN Y VALUES FIM.
- /7/ SHANK STRAIGHTNESS: WITHIN "Z" VALUES FIM PER INCH OF LENGTH.
- /8/ TOP OF HEAD SHALL BE FLAT ON THE 1.1250-12 AND 1.2500-12 SIZE BOLTS.
- /9/ PROTRUSION OF LOCKING ELEMENT SHALL BE CONTROLLED SO THAT IT WILL PASS FREELY, OR WITH FINGER PRESSURE, THROUGH A RING GAGE WITH DIAMETER OF .010 (+.001, -.000) GREATER THAN MAXIMUM MAJOR DIAMETER OF BOLT THREAD.
- /10/ "F" MIN (5 THREAD PITCHES) = REGION OF MINIMUM ENGAGEMENT WITH FEMALE THREAD REQUIRED TO MEET MIL-DTL-18240 REQUIREMENTS. LOCKING ELEMENT WITHIN "F" REGION MUST DEVELOP REQUIRED TORQUE WHEN TESTED PER MIL-DTL-18240.
- /11/ FOR EASE IN STARTING, LOCKING ELEMENT SHALL NOT BE EFFECTIVE IN "J" AREA (3 THREAD PITCHES).
- (12) PLATING THICKNESS MINIMUM TO BE .0003 PER AMS QQ-P-416, CLASS 2.
- /13/ IF REQUIRED, TENSILE TESTING OF BOLTS REQUIRING CROSS-DRILLED THREADS SHALL BE PERFORMED PRIOR TO DRILLING AND THE APPLICATION OF PLATING AND/OR COATINGS. WHEN BOLTS HAVE BEEN DRILLED, STRENGTH MAY BE VERIFIED BY SHEAR TESTING, IN LIEU OF TENSILE TESTING, IN ACCORDANCE WITH NASM1312. USERS SHOULD BE AWARE THAT FASTENERS WITH CROSS-DRILLED THREADS MAY EXHIBIT A REDUCTION IN TENSILE STRENGTH.

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- /14/ LOCKWIRE HOLES SHALL BE DRILLED WITHIN .010 OF CENTER OF HEX FLAT WHEN SPECIFIED BY PART NUMBER.
- /15/ HEAD MARKING: BASIC NUMBER PLUS GRIP DASH NUMBER PLUS "D", "L", OR "P", WHEN APPLICABLE, PLUS MANUFACTURER'S SYMBOL, RAISED OR DEPRESSED .010 MAX. ARRANGEMENT OPTIONAL.
"D" IDENTIFIES BOLT WITH DRILLED SHANK.
"L" IDENTIFIES BOLT WITH LOCKING ELEMENT (OPTIONAL TYPE).
"P" IDENTIFIES BOLT WITH PATCH TYPE LOCKING ELEMENT ONLY.
CHROMIUM PLATED CODE "C" NEED NOT APPEAR ON BOLT HEAD.
- (16) SURFACE TEXTURE: "ØD", HEAD-TO-SHANK FILLET, BEARING SURFACE OF HEAD, THREAD FLANKS AND THREAD ROOT: 32 MICROINCHES Ra; ALL OTHER SURFACES: 125 MICROINCHES Ra PER ASME B46.1.
- /17/ INTERMEDIATE OR LONGER LENGTHS MAY BE SPECIFIED BY THE USE OF WHOLE GRIP DASH NUMBERS ONLY. NOMINAL LENGTH EQUALS NOMINAL GRIP PLUS "T".
- (18) DIMENSIONS TO BE MET AFTER PLATING.
- (19) DIMENSIONS IN INCHES.
- (20) REMOVE ALL BURRS AND SHARP EDGES.
- (21) THIS STANDARD TAKES PRECEDENCE OVER DOCUMENTS REFERENCED HEREIN.
- (22) REFERENCED DOCUMENTS SHALL BE THE ISSUE IN EFFECT ON DATE OF INVITATIONS FOR BID.
- (23) UNLESS OTHERWISE SPECIFIED, PART INVENTORY MANUFACTURED TO PREVIOUS REVISIONS OF THE APPLICABLE DRAWING OR SPECIFICATION MAY BE PROCURED AND USED UNTIL STOCK IS DEPLETED.

PROCUREMENT SPECIFICATION: NAS4002, EXCEPT AS NOTED. COLD WORK OF HEAD TO SHANK FILLET RADIUS AND FATIGUE TESTING ARE NOT REQUIRED FOR NAS6603 BOLTS. LOCKING ELEMENT FOR SELF-LOCKING BOLTS: PER NASM15981 AND MIL-DTL-18240, LOCKING ELEMENT TYPE, INCLUDING PATCH TYPE, IS OPTIONAL WHEN "L" CODE IS SPECIFIED. PATCH TYPE LOCKING ELEMENT (WITH NO METAL REMOVED) IS REQUIRED WHEN "P" CODE IS SPECIFIED. LOCKING ELEMENT MUST BE SUPPLIED BY A QUALIFIED SOURCE LISTED IN QPL-18240 OR APPROVED FOR LISTING IN QPL-18240. SHIPPING NOTICE SHOULD IDENTIFY SUPPLIER OF BOLT AND LOCKING ELEMENT SEPARATELY.

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TABLE II - GRIP AND LENGTH DIMENSIONS (CONTINUED ON NEXT PAGE)

GRIP DASH NO.	GRIP ±.010	LENGTH +/- .015 /17/						
		BASIC NUMBER AND THREAD SIZE						
		NAS6603 .1900-32	NAS6604 .2500-28	NAS6605 .3125-24	NAS6606 .3750-24	NAS6607 .4375-20	NAS6608 .5000-20	NAS6609 .5625-18
1	.062	.407	.487	.531	.640	.756	.797	.902
2	.125	.470	.550	.594	.703	.819	.860	.965
3	.188	.533	.613	.657	.766	.882	.923	1.028
4	.250	.595	.675	.719	.828	.944	.985	1.090
5	.312	.657	.737	.781	.890	1.006	1.047	1.152
6	.375	.720	.800	.844	.953	1.069	1.110	1.215
7	.438	.783	.863	.907	1.016	1.132	1.173	1.278
8	.500	.845	.925	.969	1.078	1.194	1.235	1.340
9	.562	.907	.987	1.031	1.140	1.256	1.297	1.402
10	.625	.970	1.050	1.094	1.203	1.319	1.360	1.465
11	.688	1.033	1.113	1.157	1.266	1.382	1.423	1.528
12	.750	1.095	1.175	1.219	1.328	1.444	1.485	1.590
13	.812	1.157	1.237	1.281	1.390	1.506	1.547	1.652
14	.875	1.220	1.300	1.344	1.453	1.569	1.610	1.715
15	.938	1.283	1.363	1.407	1.516	1.632	1.673	1.778
16	1.000	1.345	1.425	1.469	1.578	1.694	1.735	1.840
17	1.062	1.407	1.487	1.531	1.640	1.756	1.797	1.902
18	1.125	1.470	1.550	1.594	1.703	1.819	1.860	1.965
19	1.188	1.533	1.613	1.657	1.766	1.882	1.923	2.028
20	1.250	1.595	1.675	1.719	1.828	1.944	1.985	2.090
21	1.312	1.657	1.737	1.781	1.890	2.006	2.047	2.152
22	1.375	1.720	1.800	1.844	1.953	2.069	2.110	2.215
23	1.438	1.783	1.863	1.907	2.016	2.132	2.173	2.278
24	1.500	1.845	1.925	1.969	2.078	2.194	2.235	2.340
25	1.562	1.907	1.987	2.031	2.140	2.256	2.297	2.402
26	1.625	1.970	2.050	2.094	2.203	2.319	2.360	2.465
27	1.688	2.033	2.113	2.157	2.266	2.382	2.423	2.528
28	1.750	2.095	2.175	2.219	2.328	2.444	2.485	2.590
29	1.812	2.157	2.237	2.281	2.390	2.506	2.547	2.652
30	1.875	2.220	2.300	2.344	2.453	2.569	2.610	2.715
31	1.938	2.283	2.363	2.407	2.516	2.632	2.673	2.778
32	2.000	2.345	2.425	2.469	2.578	2.694	2.735	2.840
34	2.125	2.470	2.550	2.594	2.703	2.819	2.860	2.965
36	2.250	2.595	2.675	2.719	2.828	2.944	2.985	3.090
38	2.375	2.720	2.800	2.844	2.953	3.069	3.110	3.215
40	2.500	2.845	2.925	2.969	3.078	3.194	3.235	3.340
42	2.625	2.970	3.050	3.094	3.203	3.319	3.360	3.465
44	2.750	3.095	3.175	3.219	3.328	3.444	3.485	3.590
46	2.875	3.220	3.300	3.344	3.453	3.569	3.610	3.715
48	3.000	3.345	3.425	3.469	3.578	3.694	3.735	3.840
50	3.125	3.470	3.550	3.594	3.703	3.819	3.860	3.965
52	3.250	3.595	3.675	3.719	3.828	3.944	3.985	4.090
54	3.375	3.720	3.800	3.844	3.953	4.069	4.110	4.215
56	3.500	3.845	3.925	3.969	4.078	4.194	4.235	4.340
58	3.625	3.970	4.050	4.094	4.203	4.319	4.360	4.465
60	3.750	4.095	4.175	4.219	4.328	4.444	4.485	4.590
62	3.875	4.220	4.300	4.344	4.453	4.569	4.610	4.715
64	4.000	4.345	4.425	4.469	4.578	4.694	4.735	4.840

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TABLE II - GRIP AND LENGTH DIMENSIONS (CONTINUED)

GRIP DASH NO.	GRIP ±.010	LENGTH +/- .015 /17/ BASIC NUMBER AND THREAD SIZE /25/					
		NAS6610 .6250-18	NAS6612 .7500-16	NAS6614 .8750-14	NAS6616 1.0000-12	NAS6618 1.1250-12	NAS6620 1.2500-12
1	.062	.964	1.103	1.246	1.371	1.520	1.708
2	.125	1.027	1.166	1.309	1.434	1.583	1.771
3	.188	1.090	1.229	1.372	1.497	1.646	1.834
4	.250	1.152	1.291	1.434	1.559	1.708	1.896
5	.312	1.214	1.353	1.496	1.621	1.770	1.958
6	.375	1.277	1.416	1.559	1.684	1.833	2.021
7	.438	1.340	1.479	1.622	1.747	1.896	2.084
8	.500	1.402	1.541	1.684	1.809	1.958	2.146
9	.562	1.464	1.603	1.746	1.871	2.020	2.208
10	.625	1.527	1.666	1.809	1.934	2.083	2.271
11	.688	1.590	1.729	1.872	1.997	2.146	2.334
12	.750	1.652	1.791	1.934	2.059	2.208	2.396
13	.812	1.714	1.853	1.996	2.121	2.270	2.458
14	.875	1.777	1.916	2.059	2.184	2.333	2.521
15	.938	1.840	1.979	2.122	2.247	2.396	2.584
16	1.000	1.902	2.041	2.184	2.309	2.458	2.646
17	1.062	1.964	2.103	2.246	2.371	2.520	2.708
18	1.125	2.027	2.166	2.309	2.434	2.583	2.771
19	1.188	2.090	2.229	2.372	2.497	2.646	2.834
20	1.250	2.152	2.291	2.434	2.559	2.708	2.896
21	1.312	2.214	2.353	2.496	2.621	2.770	2.958
22	1.375	2.277	2.416	2.559	2.684	2.833	3.021
23	1.438	2.340	2.479	2.622	2.747	2.896	3.084
24	1.500	2.402	2.541	2.684	2.809	2.958	3.146
25	1.562	2.464	2.603	2.746	2.871	3.020	3.208
26	1.625	2.527	2.666	2.809	2.934	3.083	3.271
27	1.688	2.590	2.729	2.872	2.997	3.146	3.334
28	1.750	2.652	2.791	2.934	3.059	3.208	3.396
29	1.812	2.714	2.853	2.996	3.121	3.270	3.458
30	1.875	2.777	2.916	3.059	3.184	3.333	3.521
31	1.938	2.840	2.979	3.122	3.247	3.396	3.584
32	2.000	2.902	3.041	3.184	3.309	3.458	3.646
34	2.125	3.027	3.166	3.309	3.434	3.583	3.771
36	2.250	3.152	3.291	3.434	3.559	3.708	3.896
38	2.375	3.277	3.416	3.559	3.684	3.833	4.021
40	2.500	3.402	3.541	3.684	3.809	3.958	4.146
42	2.625	3.527	3.666	3.809	3.934	4.083	4.271
44	2.750	3.652	3.791	3.934	4.059	4.208	4.396
46	2.875	3.777	3.916	4.059	4.184	4.333	4.521
48	3.000	3.902	4.041	4.184	4.309	4.458	4.646
50	3.125	4.027	4.166	4.309	4.434	4.583	4.771
52	3.250	4.152	4.291	4.434	4.559	4.708	4.896
54	3.375	4.277	4.416	4.559	4.684	4.833	5.021
56	3.500	4.402	4.541	4.684	4.809	4.958	5.146
58	3.625	4.527	4.666	4.809	4.934	5.083	5.271
60	3.750	4.652	4.791	4.934	5.059	5.208	5.396
62	3.875	4.777	4.916	5.059	5.184	5.333	5.521
64	4.000	4.902	5.041	5.184	5.309	5.458	5.646

⑧ COMPLETELY REVISED

REVISION

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SHEET 6

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