NAVISTAR, INC.			
Material, Parts, and Process Specifications (MPAPS)		*NUMBER:* **MPAPS S-D-300.101-GS/PL**	
		Former Designation: **ESP-D-300.101-GS**	
TITLE: **Recommended Hole Sizes for Tapping Screws-English Series (Noun Code 7450)**		*CURRENT REV No.:* **1506**	*DATE:* **June 2015**
WRITTEN/EDITED BY: **Materials Engineering**	*APPROVED BY:* **Materials Engineering**	*SUPERSEDES:* **ESP-D-300.101-GS - September 2000**	

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This specification may involve hazardous materials, equipment, and procedures. This specification does not purport to address all of the safety issues associated with its use. The user is responsible to consult appropriate safety and health practices and to determine the applicability of regulatory limits prior to use.

Change Notice: **Changed to New MPAPS format.**

1.0 GENERAL: The hole sizes tabulated on subsequent pages for the various types of tapping screws in commonly used materials represent recommendations based on practical experience of screw manufacturers and users and are not to be misconstrued as being a part of the tapping screw specifications. (Performance requirements are set forth in MPAPS S-D-100.101-GS/PL)

2.0 RESTRICTED CHEMICAL SUBSTANCES: Effective January 1, 2007, all product supplied to the requirements of this specification must comply with the requirements of the MPAPS B-50 specification.

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4.0 ASSEMBLY CONSIDERATION: The finish (plain, plated or coated) on tapping screws and the material composition and hardness of the mating component are factors which often affect the facility and strength of assembly in individual applications. Although the hole sizes specified herein were originally based on the use of plain (unfinished) carbon steel screws, experience has since proven the recommended holes to be suitable for screws with most types of commercial finishes. However, it should be noted, that due to various finishes having different degrees of lubricity, some adjustment of installation torques may be necessary to suit specific applications. Also, where exceptionally heavy platings and coatings are involved or where screws are to be assembled into materials of relatively high hardness, slight deviations from the specified hole sizes

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may be required to provide optimum assembly. The advisability and the extent of such deviations can best be determined by experiment in the particular assembly environment.

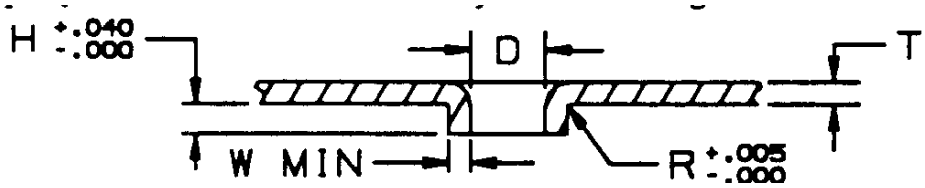
5.0 TOLERANCE: Application of a plus .004, minus .000, tolerance on the hole sizes tabulated has been found satisfactory for most general assembly conditions.

6.0 USE OF EXTRUDED HOLES: It is advisable to limit the use of extruded hole to material thicker than 1/5 the nominal diameter of the screw so there will be enough strength in the extruded hole to develop a reasonable proportion of the strength of the screw. In other words, avoid using screws larger than 5 times the material thickness. Screws in extruded holes in thin material develop twice as much fastening strength as could be developed with the unextruded plate.

At the other extreme, the full strength of the thread forming screw can normally be developed with a drilled or clean punched hole when the material thickness exceeds 75% of the screw diameter making extrusion unnecessary. Use only thread forming screws or thread forming taps with extrusions because thread cutting screws and thread cutting taps cut away so much of the thin wall of the extrusion that the strength of the fastening is impaired.

7.0 FLANGE DIMENSIONS FOR EXTRUDED HOLES: Apply to extruded holes in low carbon sheet stock .025 to .213 thick; 50-70 Rockwell B.

These dimensions are for flanged holes produced by a shoulder-type punch. First, a small hole is produced by the flat end of the punch and then this hole is enlarged to the desired size by the body of the punch. The metal flows into the die opening producing a projection with a reasonably smooth edge.



Hole Dia. D	Metal Thickness T															
	.024 thru .035		.042 thru .048		.060		.075		.090		.106		.118		.122	
	H	R	H	R	H	R	H	R	H	R	H	R	H	R	H	R
Over .08 Thru .10	.040	.005	.040	.005	.040	.006	.043	.008	.043	.010						
Over .10 Thru .13	.047	.005	.047	.005	.047	.006	.052	008	.052	.010	.054	.010				
Over .13 Thru .15	.053	.005	.053	.005	.053	.006	.060	.008	.060	.010	.063	.010	.063	.012	.072	.013
Over .15 Thru .18			.060	.005	.061	.006	.070	.008	.070	.010	.075	.010	.075	.012	.087	.013
Over .18 Thru .22			.070	.005	.070	.006	.090	008	.090	.010	.095	.010	.095	.012	.104	.013
Over .22 Thru .26					.075	.006	.100	.008	.100	.010	.105	.010	.105	.012	.120	.013
Over .26 Thru .30					.083	.006	.116	.008	.116	.010	.125	.010	.125	.012	.140	.013
Over .30 Thru .34							.130	008	.130	.010	.140	.010	.140	.012	.154	.013
Over .34 Thru .38									.140	.010	.155	.010	.155	.012	.170	.013
Over .38 Thru .43									.150	.010	.170	.010	.170	.012	.184	.013
Minium Extrusion Thickness W																
Nominal Metal Thickness	.024	.026	.030	.032	.035	.041	.048	.053	.060	.075	.090	.106	.118	.125		
Flange Thickness W Min.	.012	.013	.015	.016	.017	.020	.024	.026	.030	.037	.045	.053	.059	.062		

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In Sheet Metals

Nominal Screw Size	Metal Thickness	STEEL, STAINLESS STEEL MONEL METAL, BRASS			ALUMINUM ALLOY		
		Pierced or Extruded Hole Diameter	Drilled or Clean-Punched		Pierced or Extruded Hole Diameter	Drilled or Clean-Punched	
			Hole Dia**	Drill Size		Hole Dia**	Drill Size
2	015	-	.064	52	-	-	-
	018	-	.064	52	-		
	024	-	.067	51	-	.064	52
	030	-	.070	50	-	.064	52
	036	-	.073	49	-	.064	52
	048	-	.073	49	-	.067	51
	060	-	.076	48	-	.070	50
4	015	.086	.086	44	-	-	-
	018	.086	.086	44	-	-	-
	024	.098	.089	43	.086	-	-
	030	.098	.094	42	.086	.086	44
	036	.098	.094	42	.086	.086	44
	048	-	.096	41	.086	.086	44
	060	-	.100	39	-	.089	43
	075	-	.102	38	-	.089	43
	105	-	-	-	-	.094	42
6	015	.111	.104	37	-	-	-
	018	.111	.104	37	-	-	-
	024	.111	.106	36	.111	-	-
	030	.111	.106	36	.111	.104	37
	036	.111	.110	35	.111	.104.	37
	048	-	.111	34	.111	.104	37
	060	-	.116	32	-	.106	36
	075	-	.120	31	-	.110	35
	105	-	.128	30	-	.111	34
	.128 to .250	-	-	-	-	.120	31
7	018	.120	.116	32	-	-	-
	024	.120	.116	32	.120	-	-
	030	.120	.116	32	.120	.113	33
	036	.120	.116	32	.120	.113	33
	048	.120	.120	31	.120	.116	32
	060	-	.128	30	-	.120	31
	075	-	.136	29	-	.128	30
	105	-	.140	28	-	.136	29
	.128 to .250					.136	29
8	018	.136	-	-	-	-	-
	024	.136	.125	1/8	.136	-	-
	030	.136	.125	1/8	.136	.116	32
	036	.136	.125	1/8	.136	.120	31
	048	.136	.128	30	.136	.128	30
	060	-	.136	29	-	.136	29
	075	-	.140	28	-	.140	28
	105	-	.150	25	-	.147	26
	125	-	.150	25	-	.147	26
	135	-	.152	24	-	.149	25
	.162 to .375	-	-	-	-	.152	24
10	018	.157				-	-
	024	.157	.144	27	.157	-	-
	030	.157	.144	27	.157	-	-
	036	.157	.147	26	.157	.144	27
	048	.157	.152	24	.157	.144	27
	060	-	.152	24	-	.144	27
	075	-	.157	22	-	.147	26
	105	-	.161	20	-	.147	26
	125	-	.170	18	-	.154	23
	135	-	.170	18	-	.154	23
	164	-	.173	17	-	.159	21
	.200 to .375	-	-	-		.166	19
12	024	.185	.166	19	-	-	-
	030	.185	.166	19	-	-	-
	.036	.185	.166	19	-	-	-
	.048	.185	.170	18	-	.161	20
	.060	-	.177	16	-	.166	19
	.075	-	.182	14	-	.173	17
	105	-	.185	13	-	.180	i5
	125	-	.196	9	-	.182	14
	135	-	.196	9	-	.182	14
	164	-	.201	7	-	.189	12
	.200 to .375			-	-	.196	9
1/4	030	209	194	10	-	-	-
	036	209	194	10	-	-	-
	048	209	194	10	-	-	-
	060	-	199	8	-	199	8
	075	-	204	6	-	201	7
	105	=	209	4	-	204	6
	125		228	1	-	209	4
	135	-	228	1	-	209	4
	164	-	234	15/64	-	213	3
	187	-	234	15/64	-	213	3
	194	-	234	15/64	-	221	2
	.200 to .375					.228	1

In Resin Impregnated Plywoods

Nominal Screw Size	Hole Dia. * #	Drill Size	Material Thickness	Penetration in Blind Holes ††	
			Min	Min	Max
2	.073	49	.125	.188	.500
4	.100	39	.188	.250	.625
6	.125	1/8	.188	.250	.625
7	.136	29	.188	.250	.750
8	.144	27	.188	.250	.750
10	.173	17	.250	.312	1.000
12	.194	10	.312	.375	1.000
1/4	.228	1	.312	.375	1.000

In Asbestos Compositions

Nominal Screw Size	Hole Dia. **	Drill Size	Material Thickness	Penetration in Blind Holes ††	
			Min	Min	Max
2	.076	48	.125	.188	.500
4	.101	38	.188	.250	.625
6	.120	31	.188	.250	.625
7	.136	29	.250	.312	.750
8	.147	26	.312	.375	.750
10	.166	19	.312	.375	1.000
12	.196	9	.312	.375	1.000
1/4	.228	1	.438	.500	1.000

In Aluminum, Magnesium, Zinc, & Brass Castings

Nominal Screw Size	Hole Dia. **	Drill Size	Material Thickness	Penetration in Blind Holes††	
			Min	Min	Max
2	.076	48	.125	.188	.500
4	.101	38	.188	.250	.625
6	.120	31	.188	.250	.625
7	.136	29	.250	.312	.750
8	.147	26	.312	.375	.750
10	.166	19	.312	.375	1.000
12	.196	9	.312	.375	1.000
1/4	.228	1	.438	.500	1.000

In Plastics

Nominal Screw Size	PHENOL FORMALDEHYDE		CEL ACETATE, CEL NITRATE ACRYLIC RESIN STYRENE RESIN		Minimum Penetration in Bline Holes ††
	Hole Dia. * *	Drill Size	Hole Dia. * *	Drill Size	
2	.078	47	.078	47	.188-
4	.100	39	.094	42	.250
6	.128	30	.120	31	.250
7	.136	29	.128	30	.250
8	.150	25	.144	27	.312
10	.177	16	.170	18	.312
12	.199	8	.191	11	.375
1/4	.234	15/64	.221	2	.375

* Hole sizes shown for wrought metals, resin impregnated plywoods, and asbestos compositions are applicable to Type AB screws except those for sheet metal thicknesses of .105 or greater, which apply to Types B and BP only.

* * Decimal values shown are standard drill sizes rounded-off to the nearest .001 inch.

† Based on full thread engagement of Type B Screw through entire material with tapered portion of screw projecting completely.

†† Total length of thread in engagement.

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