

FLAT WASHERS – HEAT TREATED BORON

A. GENERAL

1. To reduce complexity and increase production volumes of specific flat washers a series of cross-over washers has been created.
2. Dimensions for the ID, OD, and thickness have been established to work for both inch and metric bolt sizes.
3. Dimensioning of washers meets stress requirements for all sizes under maximum clamp loads.
4. All washers will be heat treated to reduce complexity of common sized soft and hard washers.
5. Use of Boron material allows required heat treatment under special forming operation.
6. Optional HR or CR steel may be used with standard stamping process under specific approval from CNH Engineering.

B. MATERIAL SPECIFICATIONS

1. Steel chemistry per SAE J403, Grade 10B21 Boron HTS.
2. Alternative steel specification requires prior CNH Engineering approval – hot rolled or cold rolled sheet or strip per ASTM A586 or ASTM A 682, Grades 1035-1055.

C. HEAT TREATMENT

1. Through harden and temper per CNH MAT4050 to 36-42 HRC.

D. FINISH

1. Finish per MAT0310 ZNM YCR Class 8 except Tri-valent plating. (ZNM = mechanical plating)
2. Black plating finish per MAT0320, HCRC-3A, SPCL: Geoblack 137.

E. IDENTIFICATION

1. For identification purposes, washers will have two flats located 180° opposite from one another as specified in table 1.

F. DIMENSIONS

1. Inside and outside diameters shall be concentric within a full indicator movement (FIM) equivalent to 10.80/10.50 ID.
2. Inside diameter dimensions and tolerances apply only to the smallest hole size and not to the tapered breakout area.
3. The tapered breakout area and permissible breakout tolerance shall not exceed 25% of thickness.
4. Rounded corners on the ID and OD for both sides of washer are permissible as part of the forming process with Grade 10B21 Boron steel.
5. ID and OD to be measured from center of washer thickness and not the bearing surface.
6. Washer shall be flat within a full indicator movement (FIM) of 0.14 mm.
7. All tolerances to be per STPF520.

G. RESTRICTIONS

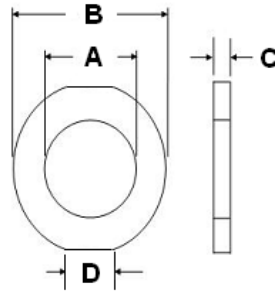
1. Temperature – Do not use in applications where subjected to temperatures above 232° C (450° F).
2. Washers are not suitable for welding.

H. PART SUPERCESSIONS

1. Before superceding current washers with the common Boron parts the specific application must be reviewed and validated for acceptability.

ISSUED BY TAB 15 Oct 2007	ECN NO. 35079472	NAME FLAT WASHERS – HEAT TREATED BORON	
APPROVED BY CDB 17 Apr 2009	REV. J	PAGE 1 OF 8	CNH NUMBER 84210862

TABLE 1 – BORON WASHER SPECIFICATIONS



Nominal Bolt or Screw Sizes	A			B			C			D	Finish	Part Number
	Inside Diameter			Outside Diameter			Thickness			Flats		
	Nominal	Max.	Min.	Nominal	Max.	Min.	Nominal	Max.	Min.	Nominal		
M6 1/4"	6.85	7.0	6.7	12.75	13.5	12.5	1.8	2.0	1.6	4	ZNM Black	87655041 87713130
M8 5/16"	8.80	8.95	8.65	17.5	18.0	17.0	2.2	2.4	2.0	4	ZNM Black	87655042 87713131
M10 3/8"	10.65	10.8	10.5	23.0	23.5	22.5	2.2	2.4	2.0	5	ZNM Black	87655046 87713132
M10 3/8"	10.65	10.8	10.5	31.0	31.5	30.5	3.0	3.3	2.8	6	ZNM Black	87687101 87714965
M12 1/2"	13.65	13.9	13.5	24.9	25.4	24.5	3.2	3.4	3.0	5	ZNM Black	87655043 87714966
M16 5/8"	17.75	18.0	17.5	31.5	32.0	31.0	4.2	4.4	4.0	6	ZNM Black	87655044 87713133
M20 3/4"	21.25	21.5	21.0	38.1	38.6	37.6	4.2	4.4	4.0	7	ZNM Black	87655047 87713134



TABLE 2 – BURLINGTON WASHER SUPERCESSIONS

<u>M6</u>	<u>1/4"</u>	<u>87655041 (ZNM)</u>	<u>ID</u>	<u>OD</u>	<u>THICKNESS</u>	<u>HEAT TREAT</u>	<u>OTHER</u>
		495-11028	INCH	0.281	0.625	0.065	NO
		495-21031	INCH	0.312	0.734	0.065	NO
		495-61020	INCH	0.203	0.75	0.054	NO
		895-11006	METRIC	6.6	12.5	1.6	NO
		895-15006	METRIC	6.6	25.0	1.6	NO
M6	1/4	87713130					
		396-41028	INCH	0.281	0.875	0.098	YES PHC PER MS-91
M8	5/16"	87655042 (ZNM)					
		A15672	INCH	0.344	0.688	0.0598	YES
		495-11034	INCH	0.344	0.688	0.965	NO
		495-21038	INCH	0.375	0.875	0.083	NO
		895-11008	METRIC	9.0	16.0	1.6	NO
		895-15008	METRIC	9.0	20.0	1.6	NO
		896-11008	METRIC	9.0	17.0	2.0	YES
		896-15008	METRIC	9.0	21.0	2.5	YES
		86625263	METRIC	9.0	20	1.6	NO
M8	5/16	87713131					
		86981722	METRIC	9.0	20.0	1.6	NO POLY SEAL BLACK E COAT
M10	3/8"	87655046 (ZNM)					
		495-11041	INCH	0.406	0.812	0.065	NO
		495-11047	INCH	0.469	0.922	0.065	NO
		495-21044	INCH	0.438	1.00	0.083	NO
		495-81153	INCH	0.468	0.750	0.054	NO
		496-11041	INCH	0.406	0.812	0.065	YES
		496-21041	INCH	0.406	0.812	0.089	YES
		496-81010	INCH	0.469	1.00	0.090	YES
		895-11010	METRIC	11.0	20.0	2.0	NO
		* 895-15010	METRIC	11.0	24.0	2.0	NO
		896-11010	METRIC	11.0	21.0	2.5	YES
		896-15010	METRIC	11.0	24.0	3.0	YES
		895-18010	METRIC	10.5	18.0	1.6	NO



TABLE 2 – BURLINGTON WASHER SUPERCESSIONS - CONTINUED

M10 3/8" 87687101 (ZNM)

495-81001	INCH	0.375	1.125	0.065	NO
495-81002	INCH	0.438	1.375	0.083	NO
495-81267	INCH	0.469	1.500	.108	NO
496-41041	INCH	0.406	1.125	0.134	YES
496-81028	INCH	0.406	1.25	0.108	YES
K691987	METRIC	10.5	30.0	3.0	NO

M10 3/8 87713132

87423817	METRIC	11.0	40.0	2.0	NO	MAGNIGARD BLACK 23
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M12 1/2" 87655043 (ZNM)

495-11053	INCH	0.531	1.062	0.095	NO
495-81025	INCH	0.531	1.25	0.179	NO
496-21053	INCH	0.531	1.062	0.134	YES
895-15012	METRIC	13.5	28.0	2.5	NO
895-18012	METRIC	13.5	20.0	2.0	NO
896-11012	METRIC	13.5	24.0	3.0	YES
896-15012	METRIC	13.5	28.0	4.0	YES

M16 5/8" 87655044 (ZNM)

895-11016	METRIC	17.5	30.0	3.0	NO
896-11016	METRIC	17.5	30.0	4.0	YES

M16 5/8" 87713133

896-16016	METRIC	17.5	34.0	5.0	YES	PHC PER MS-91
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M20 3/4" 87655047 (ZNM)

496-41081	INCH	0.812	1.75	0.219	YES
495-81261	INCH	0.812	1.5	0.080	NO
896-11020	METRIC	22.0	37.0	4.0	YES

M20 3/4 87713134 (ZNM)

896-12020	METRIC	22.0	37.0	4.0	YES	PHC PER MS-91
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TABLE 3 – WICHITA WASHER SUPERCESSIONS

M6 1/4" 87655041 (ZNM)

87016587	INCH	0.266	0.625	0.049	NO
895-25006	METRIC	6.6	18.0	1.6	
896-16006	METRIC	6.6	14.0	2.5	YES
9824259	METRIC	6.4	12.0	1.6	
86592710	METRIC	6.4	17	3.0	NO
86624181	METRIC	6.6	12.5	1.0	NO

M8 5/16" 87655042 (ZNM)

252687	INCH	0.344	0.75	0.1	YES
495-11034	INCH	0.344	0.66		NO
87362	INCH	0.344	0.66	0.067	NO
86511315	METRIC	8.4	16.0	1.6	
87015284	METRIC	8.8	21.0	2.5	YES
86624184	METRIC	9.0	16.0	1.6	NO
895-15008	METRIC	9.0	20.0	1.6	NO
896-11008	METRIC	9.0	17.0	2.0	YES

M10 3/8" 87655046 (ZNM)

495-11041	INCH	0.406	0.778	0.067	NO
86624144	INCH	0.406	0.720	0.134	NO
86625241	INCH	0.406	0.781	0.091	YES
9790712	INCH	0.406	0.661	0.063	YES
9618968	INCH	0.406	0.750	0.106	YES
285072	INCH	0.406	0.841	0.106	YES
86625253	METRIC	11.0	24.0	2.0	NO

M10 3/8" 87687101 (ZNM)

9827956	INCH	0.406	0.961	0.106	YES
86624186	INCH	0.406	1.08	0.134	YES



TABLE 3 – WICHITA WASHER SUPERCESSIONS - CONTINUED

M12 1/2" 87655043 (ZNM)

87364	INCH	0.531	1.02	0.094	NO
86632589	INCH	0.531	1.02	0.094	YES
496-21053	INCH	0.531	1.02	0.134	YES
140018	METRIC	13.5	24.0	2.5	NO
86625255	METRIC	13.3	24.5	3.0	YES
86625254	METRIC	13.5	28.0	2.5	NO
896-15012	METRIC	13.5	28.0	4.0	YES

M16 5/8" 87655044 (ZNM)

86625266	METRIC	17.5	30.0	4.0	YES
86639326	METRIC	17.5	34.0	5.0	YES
86625258	METRIC	17.5	34.0	5.0	YES

M20 3/4" 87655047 (ZNM)

86512328	INCH	0.766	1.375	0.135	YES
249100	INCH	0.781	1.250	0.063	NO
86629891	METRIC	20.0	41.0	5.0	YES
87381	INCH	0.813	1.41	0.134	NO
86625260	METRIC	22.0	37.0	4.0	YES



TABLE 4 – FARGO WASHER SUPERCESSIONS

M6 1/4" 87655041 (ZNM)

195-81029	INCH	0.219	0.438	0.049	NO	
495-31022	INCH	0.219	0.50	0.049	NO	
297865A1	METRIC	6.60	12.0	1.6	NO	FZG25257
896-12036	METRIC	6.6	12.0	1.6	NO	
895-11006	METRIC	6.6	12.5	1.6	NO	
896-11006	METRIC	6.6	12.5	2.0	YES	ZNM

M8 5/16" 87655042 (ZNM)

225913A1	INCH	0.281	0.625	0.06	NO	FZG25257
495-11028	INCH	0.281	0.625	0.06	NO	
495-11034	INCH	0.344	0.688	0.06	NO	
895-10008	METRIC	9.0	17.0	1.6	NO	PHC
895-11008	METRIC	9.0	17.0	1.6	NO	
896-10008	METRIC	9.0	17.0	2.0	NO	

M10 3/8" 87655046 (ZNM)

495-51041	INCH	0.406	0.734	0.063	NO	
495-11041	INCH	0.406	0.812	0.065	NO	
496-21041	INCH	0.406	0.734	0.098	YES	
895-15008	METRIC	9.0	21.0	1.6	NO	
896-15008	METRIC	9.0	21.0	2.5	YES	
895-18010	METRIC	11.0	18.0	1.6	NO	
326365A1	METRIC	11.0	20.0	2.0	NO	FZG25257
896-11010	METRIC	11.0	21.0	2.5	YES	

M10 3/8" 87687101 (ZNM)

496-41041	INCH	0.406	1.125	0.134	YES	
86012639	METRIC	10.3	31.8	3.2	NO	
895-25010	METRIC	11.0	30.0	2.5	NO	



TABLE 4 – FARGO WASHER SUPERCESSIONS - CONTINUED

M12 1/2" 87655043 (ZNM)

495-21044	INCH	0.438	1.0	0.083	NO
496-81010	INCH	0.469	1.0	0.105	NO
495-11047	INCH	0.469	0.922	0.065	NO
495-11053	INCH	0.531	1.062	0.095	NO
496-21053	INCH	0.531	1.062	0.134	YES
895-18012	METRIC	13.5	20.0	2.0	NO
895-11012	METRIC	13.5	24.0	2.5	NO
896-12012	METRIC	13.5	24.0	3.0	YES
896-11012	METRIC	13.5	20.0	2.0	YES

M16 5/8" 87655044 (ZNM)

87016615	METRIC	15.3	28.5	3.0	YES	
895-11014	METRIC	15.5	28.0	2.0	NO	
896-11014	METRIC	15.5	28.0	3.0	YES	
87307708	METRIC	16.0	32.0	3.5	NO	
895-11016	METRIC	17.5	30.0	3.0	NO	
896-12016	METRIC	17.5	30.0	4.0	NO	PHC
896-11016	METRIC	17.5	30.0	4.0	NO	
895-15016	METRIC	17.5	34.0	3.0	NO	
896-15016	METRIC	17.5	34.0	5.0	YES	
896-16016	METRIC	17.5	34.0	5.0	YES	PHC

M20 3/4" 87655047 (ZNM)

495-11081	INCH	0.812	1.469	0.134	NO	
496-21081	INCH	0.812	1.50	0.179	YES	
896-15018	METRIC	20.0	41.0	5.0	NO	
896-16018	METRIC	20.0	41.0	5.0	YES	PHC