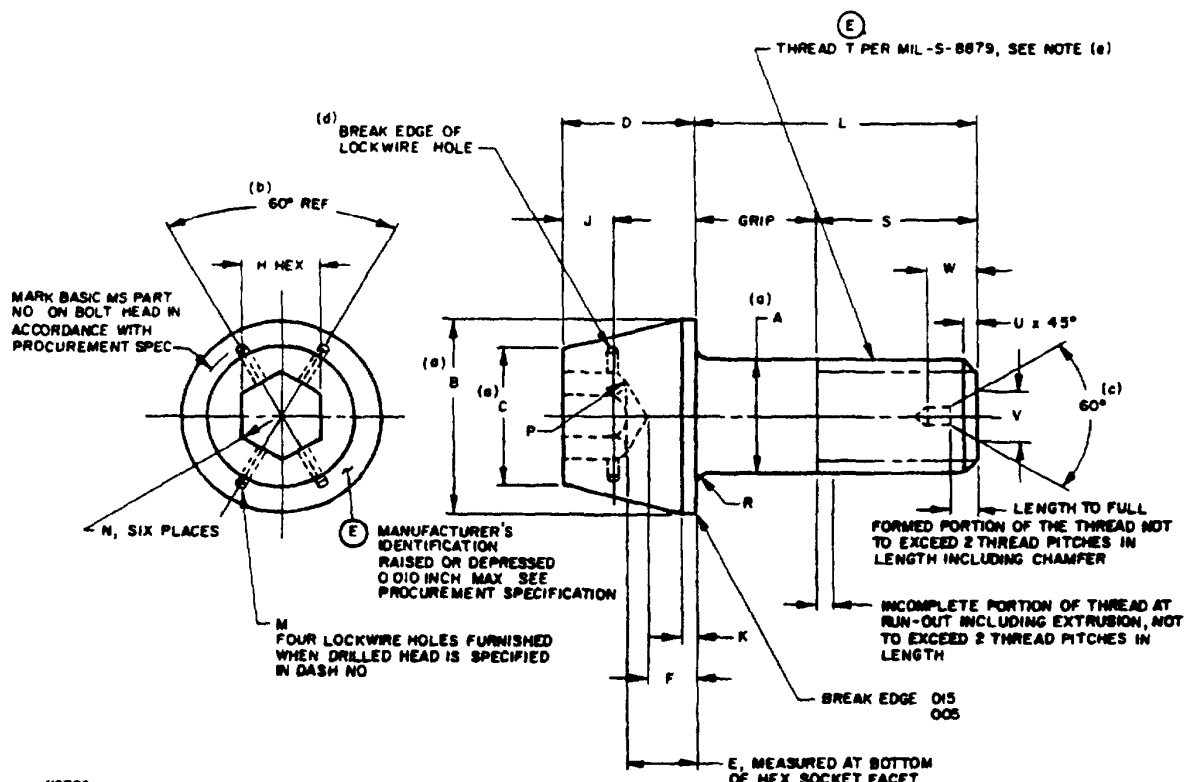


THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DOORS SPECIFIED IN THE SOLICITATION MIL-B-7838



NOTES

- (a) DIMENSIONS A, B AND C SHALL BE CONCENTRIC TO EACH OTHER WITHIN VALUES SPECIFIED FOR X TOTAL INDICATOR READING. DIMENSIONS SHALL BE H AND C SHALL BE CONCENTRIC TO EACH OTHER WITHIN VALUES SPECIFIED FOR Y TOTAL INDICATOR READING. DIMENSION A AND THREAD PITCH DIAMETER SHALL BE CONCENTRIC TO EACH OTHER WITHIN VALUES SPECIFIED FOR Z TOTAL INDICATOR READING.
- (b) REFERENCE DIMENSIONS ARE FOR DESIGN PURPOSES AND TO PROVIDE INFORMATION ONLY. THESE DIMENSIONS ARE NOT INSPECTION OR MANUFACTURING REQUIREMENTS. S MIN REF = (L MIN) - (GRIP MAX).
- (c) ON MS20012 THRU MS20024 CENTER DRILLING OF SHANK IS OPTIONAL FOR BOLT MANUFACTURER.
- (d) COUNTERSINKING OF DRILLED HOLES IS OPTIONAL.
- (e) MS20016 (SEE TABLE 1), 1-14MS-3A IS INACTIVE FOR NEW DESIGN MS20016 THREADS ARE NOTED AS AN EXCEPTION IN MIL-B-7838
- (f) MS20012A IS CANCELLED AFTER 13 JANUARY 1990

REQUIREMENTS

- (1) MATERIAL ALLOY STEEL - UNS G43400, UNS G43406, UNS G41400, UNS G87400, UNS G87350
- (2) FINISH CADMIUM PLATING PER QQ-P-416, TYPE II, CLASS 2 PARTS WITH CLASS 3 PLATING MAY BE FURNISHED FROM SUPPLIER'S STOCK UNTIL 1 JANUARY 1975.
- (3) HARDNESS 34-40 HRC
- (4) DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED, TOLERANCES DECIMALS - 0.10, ANGLES ±1°
- (5) DIMENSIONS TO BE MET AFTER PLATING INTERCHANGEABILITY RELATIONSHIP BOLTS WITH TYPE II PLATING CAN BE USED TO REPLACE BOLTS WITH TYPE I PLATING IN ALL APPLICATIONS BOLTS WITH TYPE I PLATING CAN BE USED IN PLACE OF BOLTS WITH TYPE II PLATING UNTIL PRESENT STOCKS ARE DEPLETED, BUT BOLTS WITH TYPE I PLATING SHALL NOT BE USED AFTER 1 JANUARY 1964

FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATIONS FOR BID

(E) DENOTES CHANGES

PREPARING ACTIVITY NAVY - AS CUSTODIANS ARMY-AR NAVY- AIR FORCE-99 DLA- REVIEW ARMY - ER, ME, MI DLA - IS AF-R? USER ARMY - AV PROJECT NUMBER 5306-123E	MILITARY SPECIFICATION SHEET TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU AND 50 KSI FSL	SPECIFICATION SHEET NUMBER 30 MAY 1989 MS20004E THRU 20024E SUPERSEDING MS20004D THRU 20024D 10 AUGUST 1981 AMSC- N/A FSC 5306
DISTRIBUTION STATEMENT A Approved for public release distribution is unlimited		Page 1 of 4

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(E)

TABLE I BOLT DIMENSIONS AND TENSILE STRENGTH

BASIC MS PART NO	(a) THREAD T	(a) A DIA		(a) B DIA		(a) C DIA	D	E	F MIN	(a) H HEX		J	K	M +.005 -.000 DIA	N MAX RAD
		MAX	MIN	MAX	MIN					MAX	MIN				
MS20004	1/4-28 UNJF-3A	.2492	.2477	.438	.428	.342	.250	.112	.068	.1900	.1880	.078		.037	.010
MS20005	5/16-24 UNJF-3A	.3117	.3102	.531	.521	.394	.312	.144	.094	.2210	.2190	.094			
MS20006	3/8-24 UNJF-3A	.3742	.3727	.649	.639	.520	.375	.183	.116	.3150	.3130	.125			.011
MS20007	7/16-20 UNJF-3A	.4367	.4347	.750	.740	.534	.438	.208	.141			.156			
MS20008	1/2-20 UNJF-3A	.4991	.4971	.828	.818	.625	.500	.247	.169	.3785	.3755	.172			
MS20009	9/16-18 UNJF-3A	.5616	.5596	.938	.928	.723	.562	.279	.190	.4410	.4380	.203			.019
MS20010	5/8-18 UNJF-3A	.6240	.6220	1.050	1.040	.826	.625	.317	.216	.5035	.5005	.234			
MS20012	3/4-16 UNJF-3A	.7488	.7468	1.230	1.220	.921	.750	.385	.273	.5660	.5630	.281			
MS20014	7/8-14 UNJF-3A	.8737	.8707	1.438	1.428	1.083	.875	.450	.327	.6295	.6257	.344			
MS20016 *	1-14 NS-3A											.391			
MS20017	1-12 UNJF-3A	.9985	.9955	1.625	1.615	1.249	1.000	.527	.381	.7547	.7507	.453			.022
MS20018	1-1/8-12 UNJF-3A	1.124	1.121	1.875	1.865	1.275	1.125	.589	.443			.500			
MS20020	1-1/4-12 UNJF-3A	1.249	1.246	2.125	2.115	1.598	1.250	.667	.475	1.005	1.001	.547	.125		
MS20022	1-3/8-12 UNJF-3A	1.374	1.370	2.313	2.303	1.768	1.375	.746	.531	1.131	1.126	.594			
MS20024	1-1/2-12 UNJF-3A	1.499	1.495	2.500	2.490	1.931	1.500	.823	.586	1.256	1.251	.694			
MS20012A	3/4-16 UNJF-3A	.7488	.7468	1.230	1.220	.921	.750	.385	.273	.5660	.5630	.281			.094

(E) SEE NOTE (f)

TABLE I (CONTINUED)

BASIC MS PART NO	P RAD		P RAD		(b) S MIN REF	U ±.016	(c) V MAX	(c) W MAX	(b) (c) CENTER DRILL SIZE REF	TENSILE STRENGTH LB MIN	(a) CONCENTRICITY				
	MAX	MIN	MAX	MIN							X	Y	Z		
MS20004	020	010	.041	.031	.475	.031				6,190	.005	.007	.0045		
MS20005					.537				9,820	.006	.008				
MS20006					.662		.047		15,200	.008	.010				
MS20007					.787			20,400	.009	.011					
MS20008								27,400	.010	.012					
MS20009					.850			34,800	.011	.014					
MS20010	030	015	.057	.047	.912	.062				43,600	.012	.016	.006		
MS20012					1.037		187	200	2	63,200	.015	.018			
MS20014					1.162					86,100	.018	.022			
MS20016 *					1.287		.078			112,000	.020	.025		.009	
MS20017					1.475			250	260	3	144,000	.022			.026
MS20018					1.600						180,000	.025			.032
MS20020	1.725	.312	320	4	219,000	.028		.035	.012						
MS20022	1.850				263,000	.030	.039								
MS20024	1.930				187	200	2	323,200		.035	.040	.006			

(E) SEE NOTE (f)

* SEE NOTE (a)

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PREPARING ACTIVITY NAVY - AS
CUSTODIANS ARMY - AP NAVY -
AIR FORCE - 99 DLA -
REVIEW ARMY - EP, ME, MI DLA - IS AF - HC
USER ARMY - AV
PROJECT NUMBER 5306-1233

MILITARY SPECIFICATION SHEET
TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU
AND 96 KSI FSL

SPECIFICATION SHEET NUMBER 30 MAY 1989
MS20004E THRU 20024E
SUPERSEDING
MS20004D THRU 20024D 10 AUGUST 1981
AMSC - N/A FSC 5306

DISTRIBUTION STATEMENT A Approved for public release, distribution is unlimited

Page 2 of 4

DD FORM 672 MAY 1988

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TABLE 11. DASH NOS., GRIP LENGTHS AND BOLT LENGTH.

DASH NO		GRIP		LENGTH = 015													
: 010		MS20004	MS20005	MS20006	MS20007	MS20008	MS20009	MS20010	MS20012	MS20014	MS20016	MS20017	MS20018	MS20020	MS20022	MS20024	
		1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1	1-1/8	1-1/4	1-3/8	1-1/2	
4	.250	.750															
6	.375	.875	938	1 062													
8	500	1.000	1 062	1 188	1 312	1 312											
10	.625	1.125	1 188	1.312	1 438	1 438	1.500	1.562	1.625								
12	.750	1.250	1.312	1 438	1.562	1 562	1 625	1.688	1 812								
14	.875	1.375	1.438	1 562	1 688	1 688	1 750	1 812	1 938	2 062							
16	1.000	1.500	1.562	1 688	1 812	1 812	1.875	1 938	2 062	2 188	2 312	2 312					
18	1.125	1.625	1.688	1 812	1 938	1 938	2 000	2 062	2 188	2 312	2 312	2 438	2 438	2 562			
20	1.250	1.750	1 812	1 938	2 062	2 062	2 125	2 188	2 312	2 438	2 562	2 562	2 750	2 875			
22	.375	1 875	1 938	2 062	2 188	2 188	2 250	2 312	2 438	2 562	2.688	2 688	2 875	3.000	3 125		
24	1.500	2.000	2.062	2 188	2.312	2 312	2 375	2 438	2.562	2.688	2.812	2.812	3.000	3 125	3 250	3.375	
26	1.625	2.125	2.188	2.312	2 438	2 438	2.500	2.562	2.688	2.812	2.938	2.938	3 125	3 250	3 375	3.500	
28	1.750	2.250	2.312	2 438	2.562	2 562	2.625	2.688	2.812	2.938	3 062	3 062	3 250	3.375	3 500	3.625	
30	1.875	2.375	2.438	2 562	2.688	2 688	2 750	2.812	2.938	3 062	3 188	3 188	3.375	3 500	3 625	3.750	
32	2.000	2.500	2.562	2.688	2.812	2 812	2.875	2.938	3.062	3 188	3 312	3 312	3.500	3 675	3 750	3.875	
34	2.125	2.625	2.688	2.812	2 938	2 938	3 000	3 062	3 188	3 312	3 438	3 438	3.625	3 750	3.875	4.000	
36	2.250	2.750	2.812	2 938	3 062	3 062	3 125	3 188	3 312	3 438	3 562	3.562	3.750	3 875	4.000	4.125	
38	2.375	2.875	2.938	3.062	3 188	3 188	3.250	3 312	3 438	3 562	3.688	3.688	3.875	4.000	4.125	4.250	
40	2.500	3.000	3 062	3 188	3 312	3.312	3.375	3 438	3 562	3.688	3 812	3 812	4.000	4.125	4.250	4.375	
42	2.625	3.125	3.188	3.312	3 438	3 438	3 500	3 562	3.688	3 812	3.938	3.938	4.125	4.250	4.375	4.500	
44	2.750	3.250	3.312	3 438	3.562	3 562	3.625	3.688	3.812	3.938	4 062	4 062	4.250	4.375	4.500	4.625	
46	2.875	3.375	3.438	3.562	3.688	3.688	3.750	3.812	3.938	4 062	4 188	4.188	4.375	4.500	4.625	4.750	
48	3.000	3.500	3.562	3.688	3.812	3.812	3.875	3.938	4 062	4 188	4 312	4.312	4.500	4.625	4.750	4.875	
50	3.125	3.625	3.688	3.812	3.938	3.938	4.000	4 062	4 188	4.312	4 438	4.438	4.625	4.750	4.875	5.000	
52	3.250	3.750	3.812	3.938	4.062	4 062	4.125	4.188	4.312	4.438	4.562	4.562	4.750	4.875	5.000	5.125	
54	3.375	3.875	3.938	4.062	4.188	4 188	4.250	4.312	4.438	4.562	4.688	4.688	4.875	5.000	5.125	5.250	
56	3.500	4.000	4 062	4.188	4.312	4.312	4.375	4.438	4.562	4.688	4.812	4.812	5.000	5.125	5.250	5.375	
58	3.625	4.125	4.188	4.312	4.438	4 438	4.500	4.562	4.688	4.812	4.938	4.938	5.125	5.250	5.375	5.500	
60	3.750	4.250	4.312	4.438	4.562	4 562	4.625	4.688	4.812	4.938	5.062	5.062	5.250	5.375	5.500	5.625	
62	3.875	4.375	4.438	4.562	4.688	4 688	4.750	4.812	4.938	5.062	5.188	5.188	5.375	5.500	5.625	5.750	
64	4.000	4.500	4.562	4.688	4.812	4 812	4.875	4.938	5.062	5.188	5.312	5.312	5.500	5.625	5.750	5.875	
66	4.125	4.625	4.688	4.812	4.938	4 938	5.000	5.062	5.188	5.312	5.438	5.438	5.625	5.750	5.875	6.000	
68	4.250	4.750	4.812	4.938	5.062	5 062	5.125	5.188	5.312	5.438	5.562	5.562	5.750	5.875	6.000	6.125	
70	4.375	4.875	4.938	5.062	5.188	5 188	5.250	5.312	5.438	5.562	5.688	5.688	5.875	6.000	6.125	6.250	
72	4.500	5.000	5 062	5.188	5.312	5 312	5.375	5.438	5.562	5.688	5.812	5.812	6.000	6.125	6.250	6.375	
74	4.625	5.125	5.188	5.312	5.438	5.438	5.500	5.562	5.688	5.812	5.938	5.938	6.125	6.250	6.375	6.500	
76	4.750	5.250	5.312	5.438	5.562	5 562	5.625	5.688	5.812	5.938	6 062	6.062	6.250	6.375	6.500	6.625	
78	4.875	5.375	5.438	5.562	5.688	5.688	5.750	5.812	5.938	6 062	6.188	6.188	6.375	6.500	6.625	6.750	
80	5.000	5.500	5.562	5.688	5.812	5 812	5.875	5.938	6.062	6.188	6.312	6.312	6.500	6.625	6.750	6.875	
82	5.125	5.625	5.688	5.812	5.938	5 938	6.000	6.062	6.188	6.312	6.438	6.438	6.625	6.750	6.875	7.000	
84	5.250	5.750	5.812	5.938	6 062	6 062	6.125	6.188	6.312	6.438	6.562	6.562	6.750	6.875	7.000	7.125	
86	5.375	5.875	5.938	6 062	6.188	6 188	6.250	6.312	6.438	6.562	6.688	6.688	6.875	7.000	7.125	7.250	
88	5.500	6.000	6 062	6.188	6.312	6 312	6.375	6.438	6.562	6.688	6.812	6.812	7.000	7.125	7.250	7.375	
90	5.625	6.125	6.188	6.312	6.438	6 438	6.500	6.562	6.688	6.812	6.938	6.938	7.125	7.250	7.375	7.500	
92	5.750	6.250	6.312	6.438	6.562	6 562	6.625	6.688	6.812	6.938	7.062	7.062	7.250	7.375	7.500	7.625	
94	5.875	6.375	6.438	6.562	6.688	6.688	6.750	6.812	6.938	7 062	7.188	7.188	7.375	7.500	7.625	7.750	
96	6.000	6.500	6.562	6.688	6.812	6 812	6.875	6.938	7 062	7.188	7.312	7.312	7.500	7.625	7.750	7.875	
98	6.125						7 000	7 062	7.188	7.312	7.438	7.438	7.625	7.750	7.875	8.000	
100	6.250						7.125	7.188	7.312	7.438	7.562	7.562	7.750	7.875	8.000	8.125	
102	6.375						7.250	7.312	7.438	7.562	7.688	7.688	7.875	8.000	8.125	8.250	
104	6.500						7.375	7.438	7.562	7.688	7.812	7.812	8.000	8.125	8.250	8.375	
106	6.625						7.500	7.562	7.688	7.812	7.938	7.938	8.125	8.250	8.375	8.500	
108	6.750						7.625	7.688	7.812	7.938	8.062	8.062	8.250	8.375	8.500	8.625	
110	6.875						7.750	7.812	7.938	8.062	8.188	8.188	8.375	8.500	8.625	8.750	
112	7.000						7.875	7.938	8.062	8.188	8.312	8.312	8.500	8.625	8.750	8.875	
114	7.125												8.625	8.750	8.875	9.000	
116	7.250												8.750	8.875	9.000	9.125	
118	7.375												8.875	9.000	9.125	9.250	
120	7.500												9.000	9.125	9.250	9.375	
122	7.625												9.125	9.250	9.375	9.500	
124	7.750												9.250	9.375	9.500	9.625	
126	7.875												9.375	9.500	9.625	9.750	
128	8.000												9.500	9.625	9.750	9.875	

(E) • APPLIES TO MS20012A ONLY.

PREPARING ACTIVITY NAVY - AS

CUSTODIANS ARMY-AP

NAVY-

AIR FORCE-99

DLA-

REVIEW ARMY - EP, ME, MI DLA - IS AF-8?

REVIEW AMY - ST
USER APMY - AV

PROJECT NUMBER 5306-123E

MILITARY SPECIFICATION SHEET

TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU
AND 90 KSI FSL

SPECIFICATION SHEET NUMBER 30 MAY 1989

MS20004E THRU 20024E

SUPERSEDING

MS20004D THRU 20024D

10 AUGUST 1981

AMSC- N/A

FSC 5306

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DD FORM 672 MAY 1988

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THIS SPECIFICATION IS APPROVED FOR USE
BY ALL DEPARTMENTS AND AGENCIES OF THE
DEPARTMENT OF DEFENSE

1500000 4500000 10000000 15000000 20000000 25000000 30000000 35000000 40000000 45000000 50000000 55000000 60000000 65000000 70000000 75000000 80000000 85000000 90000000 95000000 100000000

THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DODIGS SPECIFIED IN THE SOLICITATION MIL-B-7838

THIS SPECIFICATION IS APPROVED FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

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UNASSIGNED DASH NUMBERS SHALL NOT BE USED, EXCEPT THOSE DASH NUMBERS COVERED BY THE FOLLOWING CODING NOTE

DASH NUMBERS INDICATE PREFERRED GRIP LENGTHS IN .125 INCREMENTS. INTERMEDIATE GRIP LENGTHS BETWEEN THOSE LENGTHS LISTED, MAY BE SPECIFIED IN .062 INCREMENTS BY INTERMEDIATE DASH NUMBERS. LENGTH AND GRIP OF A BOLT WITH AN ODD NUMBER FOR THE DASH NUMBER WILL BE .062 GREATER THAN SHOWN FOR THE BOLTS WITH THE PRECEDING EVEN DASH NUMBER. ONLY BOLT DIAMETER FOR WHICH THERE ARE QUALIFIED PRODUCTS LISTED ON QPL-7838 SHALL BE USED FOR DESIGN.

FOR EACH BOLT DIAMETER GRIP LENGTHS GREATER OR LESS THAN THOSE DESIGNATED BY ASSIGNED DASH NUMBERS ON TABLE II ARE INACTIVE FOR DESIGN.

ADD "H" BEFORE DASH NUMBER FOR BOLT WITH DRILLED HEAD

EXAMPLES OF PART NUMBERS MS20017-18 = 1-12 BOLT, 2.438 INCH LONG, 1.125 INCH GRIP, UNDRILLED HEAD
MS20017H18 = 1-12 BOLT, 2.438 INCH LONG, 1.125 INCH GRIP, DRILLED HEAD.

PREPARING ACTIVITY NAVY - AS
CUSTODIANS ARMY - AR NAVY -
AIR FORCE - 99 DLA -
REVIEW ARMY - ER, ME, MI DLA - JS AF - 62
USER ARMY - AV
PROJECT NUMBER 5306-1234

MILITARY SPECIFICATION SHEET
TITLE BOLT - INTERNAL WRENCHING, 160 KS; FTU
AND 96 KS; FSL

SPECIFICATION SHEET NUMBER 30 MAY 1989

MS20004E THRU 20024E

SUPERSEDING
MS20004D THRU 20024D 10 AUGUST 1981

AWSC- N/A FSC 5306

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