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

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 DODISS SPECIFIED IN THE SOLICITATION MIL-R-21248

DD Form 672, MAY 88 (Reverse) (Previous editions are obsolete)

PREPARING ACTIVITY DLA-IS
CUSTODIANS ARMY AR NAVY
AIR FORCE 99 DLA-
REVIEW ACTIVITIES MC ME MI 82
USER
PROJECT NUMBER 5365-0214
DISTRIBUTION STATEMENT A Approved for public release; distribution unlimited

(B) DENOTES CHANGES

MILITARY SPECIFICATION SHEET

TITLE
RING RETAINING EXTERNAL PHONG LOCK (REDUCED SECTION TYPE)

SPECIFICATION SHEET NUMBER
MS3216
28 JUNE 95 REV B

SUPERSEDING
MS3215A 28 APR 89
AMSC N/A FSC 5365

INCH-POUND

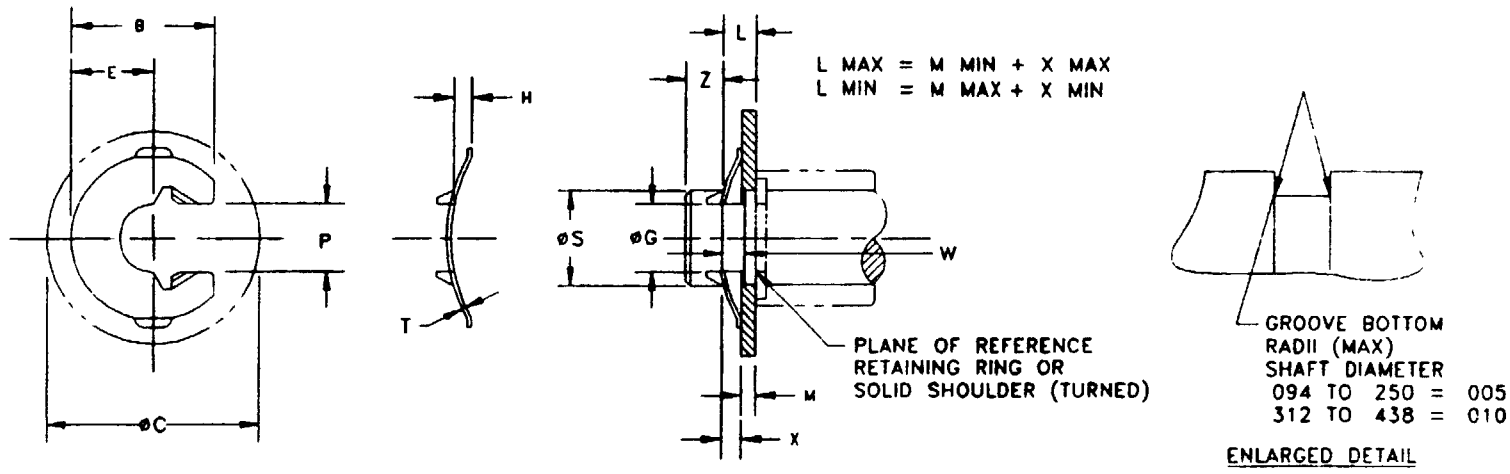

TABLE I. DIMENSIONS

øS SHAFT (REF)		øF FREE GAP		B OVERALL HEIGHT		E	H BOW HEIGHT	T V THICKNESS		øG RECOMMENDED GROOVE (REF)		W WIDTH	øC CLEARANCE	X DISTANCE FROM OUTER GROOVE WALL TO FACE OF RETAINED PART		RESILIENT TAKE-UP OF TOLERANCES OF L AND M	APPROX AVERAGE RESISTANCE (LB) WITHIN X MAX & X MIN				APPROX FORCE TO FLATTEN	
																	RINGS OF				RINGS OF	
																	CARBON STEEL AND CRES	BERYL-LIUM COPPER	CARBON STEEL AND CRES	BERYL-LIUM COPPER	CARBON STEEL AND CRES	BERYL-LIUM COPPER
INCH	MM	BASIC	TOL	BASIC	TOL	(REF)	± 010	BASIC	TOL	BASIC	TOL	+ 005 - 000	INCH	MIN	MAX	X MAX X MIN	AS INSTALLED		AFTER FLATTENING		LB	LB
094	2 4	063		307		166	050	010		081	± 001 003 FIM 2/	035	370	030	038	008	9	6 5	3 5	2 5	30	20
125	3 2	086	± 004	307		166	050	010	± 001	082	± 0015 003 FIM 2/	035	370	030	040	010	8	5	3	2 5	30	20
156	4 0	108		330	± 010	184	055	010		104	± 002 804 FIM 2/	040	410	035	045	010	8	5	4	2 5	30	20
188	4 8	130		390		213	060	015		124		045	480	039	049	010	20	13	5.5	4 5	60	40
250	6 3	172		500		280	070	015		165		055	620	045	060	015	15	10 5	7	5	60	40
			± 005						± 002													
312	7 9	234		620		380	085	015		228	± 003 005 FIM 2/	080	790	070	085	015	6	5	4	3 5	60	40
375	9 5	280		740		427	130	020		270		095	940	080	105	025	19	14	7	5 5	80	50
438	11 1	340	± 010	820	± 020	475	130	020		327		105	1 030	095	120	025	12	9	6	5	60	40

Form Approved OMB No. 0704-0188

Form Approved
OMB No 0704-0188

REQUIREMENTS

1 CLASSIFICATION RETAINING RINGS FURNISHED UNDER THIS STANDARD SHALL BE TYPE II CLASS 4 OF THE PROCUREMENT SPECIFICATION

2 MATERIAL
(a) CARBON SPRING STEEL GRADE 1060 THRU 1095 (UNS G10600 THRU G10950) IN ACCORDANCE WITH ASTM A682 AS APPLICABLE OR A568/A568M
(b) CORROSION RESISTANT STEEL IN ACCORDANCE WITH AMS 5520 (UNS S15700)
(c) BERYLLIUM COPPER ALLOY NUMBR 170 (UNS C17000) OR ALLOY NUMBER 172 (UNS C17200) IN ACCORDANCE WITH ASTM B194

3 HARDNESS

TABLE II HARDNESS

ØSHAFT (REF)	CARBON STEEL	CORROSION RESISTANT STEEL	BERYLLIUM COPPER
094 TO 250 INCL 094 TO 312 INCL 094 TO 438 INCL	B3 5-B6HR15N	B2 5-B6HR15N	77-82HR 5N
312 TO 438 INCL 375 AND 438	65-69 5HR3ON	63-69 5HR3ON	

4 PROTECTIVE FINISH OR SURFACE TREATMENT
(a) CARBON STEEL - SHALL BE AS SPECIFIED (SEE TABLE III)
(B)(1) CADMIUM PLATE IN ACCORDANCE WITH QQ-P-416, TYPE II CLASS 3 OR ASTM B696 TYPE II CLASS 5 OR ZINC-NICKEL PLATE IN ACCORDANCE WITH AMS 2417 TYPE 2
(2) ZINC COAT IN ACCORDANCE WITH ASTM B633 TYPE II CLASS Fe/Zn5 OR ASTM B695, TYPE II
(3) PHOSPHATE COAT IN ACCORDANCE WITH DOD-P-16232, TYPE Z, CLASS 2
(b) CORROSION RESISTANT STEEL - SHALL BE CLEANED DESCALED AND PASSIVATED IN ACCORDANCE WITH QQ-P-35

5 PART NUMBER THE BASIC MS PART NUMBER IS FOLLOWED BY A DASH NUMBER TAKEN FROM TABLE III

EXAMPLE MS3216-1025 IS THE PART NUMBER FOR A CARBON STEEL CADMIUM PLATE EXTERNAL PRONG-LOCK RETAINING RING FOR USE ON A 250 DIAMETER SHAFT

NOTES
1 UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES
2 IN THE EVENT OF A CONFLICT BETWEEN THE TEXT OF THIS DOCUMENT AND THE REFERENCES CITED HEREIN THE TEXT OF THIS DOCUMENT SHALL TAKE PRECEDENCE
3 UNLESS OTHERWISE SPECIFIED, ISSUES OF REFERENCED DOCUMENTS ARE THOSE IN EFFECT AT THE TIME OF SOLICITATION

TABLE III DASH NUMBERS FOR MS3216

ØS SHAFT (REF)	CARBON STEEL 1/ CADMIUM PLATE OR ZINC-NICKEL (B)	CARBON STEEL 1/ ZINC-COAT	CARBON STEEL 1/ PHOSPHATE COAT	STEEL CORROSION RESISTANT	BERYLLIUM 1/ COPPER
	DASH NO	DASH NO	DASH NO	DASH NO	DASH NO
094	-1009	-2009	-3009	-4009	-5009
125	-1012	-2012	-3012	-4012	-5012
156	-1015	-2015	-3015	-4015	-5015
188	-1018	-2018	-3018	-4018	-5018
219	-1021	-2021	-3025	-4025	-5025
312	-1031	-2031	-3031	-4031	-5031
375	-1037	-2037	-3037	-4037	-5037
438	-1043	-2043	-3043	-4043	-5043

1/ SUBSTITUTE CORROSION RESISTANT STEEL WHEN USED IN FOOD PROCESSING MACHINERY OR IN FUEL, OR LUBRICATION SYSTEMS OR WHEN USED AT TEMPERATURES OVER 450F (233C)

PREPARING ACTIVITY DLA-IS
CUSTODIANS ARMY - AR NAVY -
AIR FORCE - 99 DLA-
REVIEW AT,MC ME MI 82
USER
PROJECT NUMBER 5365-0214

MILITARY SPECIFICATION SHEET
TITLE
RING, RETAINING EXTERNAL, PRONG-LOCK (REDUCED SECTION TYPE)

SPECIFICATION SHEET NUMBER
MS3216 28 JUNE 95 REV B
SUPERSEDING
MS3216A 28 APR 89
AMSC - N/A FSC -5365

DISTRIBUTION STATEMENT
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RECOMMENDED DESIGN LIMITATIONS AND USAGE

(a) INTENDED USE - TO PROVIDE LARGE SHOULDERS FOR POSITIONING AND MAINTAINING MACHINE PARTS. THEY ARE APPLIED RADIALLY AND ARE LOCKED POSITIVELY IN THEIR GROOVE BY MEANS OF TWO PRONGS EXTENDING FROM THE INNER CIRCUMFERENCE TO THE OPEN END. THEY WITHSTAND HIGH THRUST LOADS AND RELATIVE ROTATION BETWEEN THE RETAINED PARTS. THEIR BOWED CONSTRUCTION PROVIDES RESILIENT END-PLAY TAKE-UP IN AXIAL DIRECTION. THEY MAY BE ASSEMBLED AND DISASSEMBLED WITH A SCREW DRIVER OR WITH THE PRONG-LOCK APPLICATOR. SIZES 125 TO 312 ARE AVAILABLE ROD-STACKED FOR HIGH SPEED APPLICATION. THE USE OF THE FOLLOWING FORMULAS ARE BASED ON THE FACT THAT THE RING MATERIAL WILL NOT FAIL IN COMPRESSION.
LIMITATION ON USE - THE FOLLOWING FORMULAS ARE NOT TO BE USED FOR BRITTLE MATERIALS SUCH AS CAST IRON, ETC.

WARNING - RINGS SHALL NOT BE OVER EXPANDED DURING INSTALLATION SINCE THIS WILL LEAD TO RING FAILURE.

(b) ALLOWABLE THRUST LOAD CAPACITY OF THE RINGS. ABUTTING COMPONENTS TO HAVE SHARP CORNERS =

$$P = \frac{\pi STX}{1.75\,F}$$

WHERE
P = ALLOWABLE THRUST LOAD (POUNDS)
S = SHAFT DIAMETER (INCHES)
T = RING THICKNESS (INCHES)
X = ULTIMATE SHEAR STRENGTH OF THE RING MATERIAL (PSI) 1/
F = FACTOR OF SAFETY

A SAFETY FACTOR, F = 3, IS RECOMMENDED, SINCE THE RING AFTER FLATTENING UNDER LOAD IS SUBJECTED NOT ONLY TO PURE SHEAR STRESSES BUT ALSO TO BENDING STRESSES.

(c) ALLOWABLE LOAD CAPACITY OF GROOVE WALL =

$$P = \frac{\pi SdY}{2F}$$

WHERE
P = ALLOWABLE COMPRESSION LOAD (POUNDS)
S = GROOVE DIAMETER (INCHES)
d = GROOVE DEPTH (INCHES)
Y = YIELD STRENGTH IN COMPRESSION OF THE GROOVE MATERIAL (PSI)
F = FACTOR OF SAFETY

TO INSURE A SAFE WORKING LOAD A SAFETY FACTOR, F = 3, IS RECOMMENDED. SINCE THE WORKING STRESS IN THE GROOVE SECTION IS RAISED CONSIDERABLY THE NOTCH EFFECT OF THE DEEP GROOVE.

(d) MINIMUM DISTANCE BETWEEN OUTER GROOVE WALL AND END OF SHAFT =

$$Z = 2d$$

WHERE
Z = MINIMUM DISTANCE BETWEEN OUTER GROOVE WALL AND END OF SHAFT (INCHES)
d = GROOVE DEPTH (INCHES)

(e) DIFFERENTIAL ROTATION =

DIFFERENTIAL ROTATION OF RING AND ADJACENT PART CREATES NO ELEMENT OF RISK, BECAUSE THE RING IS LOCKED IN ITS GROOVE BY TWO LOCKING PRONGS.

1/ X = 130,000 PSI ULTIMATE SHEAR STRENGTH FOR RINGS OF CARBON STEEL OR CORROSION RESISTANT STEEL
X = 110,000 PSI ULTIMATE SHEAR STRENGTH FOR RINGS OF BERYLLIUM COPPER

PREPARING ACTIVITY DLA-IS CUSTODIANS ARMY- AR NAVY- AIR FORCE- 99 DLA- REVIEW AT,MC ME MI,82 USER PROJECT NUMBER 5365-0214	MILITARY SPECIFICATION SHEET TITLE RING RETAINING EXTERNAL PRONG-LOCK (REDUCED SECTION TYPE)	SPECIFICATION SHEET NUMBER MS3216 — 28 JUNE 95 REV B SUPERSEDING MS3216A — 28 APR 89 AMSC N/A — FSC 5365
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