

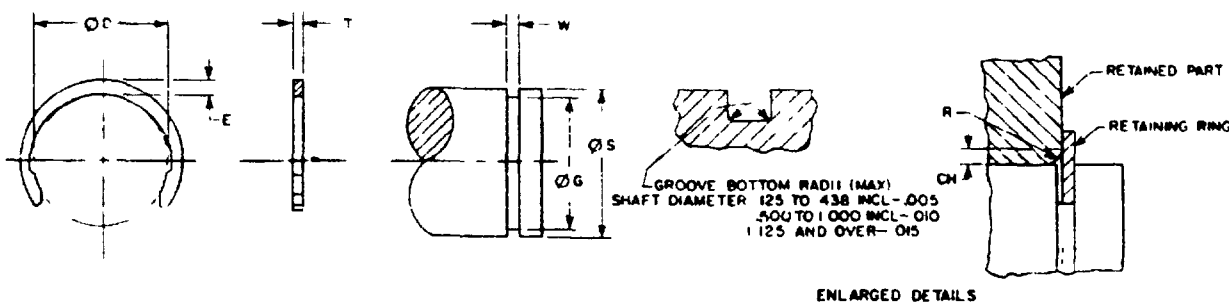


TABLE I. DIMENSIONS

| Ø S<br>SHAFT<br>(REF) |      | Ø D<br>PIECE |        | E<br>LARGE<br>SECTION<br>HEIGHT |        | T<br>THICKNESS |        | Ø G<br>RECOMMENDED GROOVE<br>(REF) |         | W<br>WIDTH<br>(REF) |        | R 3/<br>CH 3/<br>OF<br>RETAINED<br>PART (REF) |      |
|-----------------------|------|--------------|--------|---------------------------------|--------|----------------|--------|------------------------------------|---------|---------------------|--------|-----------------------------------------------|------|
| INCH                  | MM   | BASIC        | TOL    | BASIC                           | TOL    | BASIC          | TOL    | BASIC                              | TOL     | BASIC               | TOL    | MAX                                           | MAX  |
| .125                  | 3.2  | .102         | + .002 | .031                            |        | .015           |        | .106                               | + .0015 | .020                | + .002 | .014                                          | .011 |
| .156                  | 4.0  | .131         | - .004 | .037                            | + .003 | .015           |        | .135                               | - .0015 | .020                | - .000 | .018                                          | .014 |
| .188                  | 4.8  | .161         |        | .042                            |        | .015           |        | .165                               | FIM 2/  | .020                |        | .021                                          | .016 |
| .219                  | 5.6  | .187         |        | .044                            |        | .025           |        | .193                               |         | .030                |        | .021                                          | .016 |
| .236                  | 6.0  | .203         |        | .046                            |        | .025           |        | .208                               |         | .030                |        | .022                                          | .017 |
| .250                  | 6.4  | .211         |        | .050                            |        | .025           |        | .220                               |         | .030                |        | .023                                          | .018 |
| .281                  | 7.1  | .242         |        | .052                            |        | .025           |        | .247                               | + .002  | .030                |        | .021                                          | .016 |
| .312                  | 7.9  | .270         | + .003 | .053                            | + .004 | .025           |        | .276                               | .002    | .030                |        | .024                                          | .018 |
| .375                  | 9.5  | .328         | - .005 | .060                            |        | .025           |        | .335                               | FIM 2/  | .030                |        | .026                                          | .020 |
| .406                  | 10.3 | .359         |        | .063                            |        | .025           |        | .364                               |         | .030                |        | .027                                          | .021 |
| .438                  | 11.1 | .386         |        | .065                            |        | .025           | + .002 | .393                               |         | .030                |        | .029                                          | .022 |
| .500                  | 12.7 | .441         |        | .070                            |        | .035           |        | .450                               |         | .040                | + .003 | .030                                          | .023 |
| .562                  | 14.3 | .497         | + .006 | .078                            |        | .035           |        | .507                               |         | .040                | - .000 | .033                                          | .025 |
| .625                  | 15.9 | .553         |        | .081                            |        | .035           |        | .563                               |         | .040                |        | .033                                          | .025 |
| .688                  | 17.5 | .608         |        | .086                            |        | .042           |        | .619                               | + .003  | .047                |        | .034                                          | .026 |
| .750                  | 19.0 | .665         |        | .090                            |        | .042           |        | .676                               | .004    | .047                |        | .036                                          | .027 |
| .812                  | 20.6 | .721         | + .007 | .097                            |        | .042           |        | .732                               | FIM 2/  | .047                |        | .038                                          | .029 |
| .875                  | 22.2 | .777         |        | .105                            |        | .042           |        | .789                               |         | .047                |        | .040                                          | .031 |
| .938                  | 23.8 | .830         |        | .112                            |        | .042           |        | .843                               |         | .047                |        | .043                                          | .033 |
| 1.000                 | 25.4 | .887         |        | .120                            |        | .042           |        | .900                               |         | .047                |        | .046                                          | .035 |
| 1.125                 | 28.6 | .997         |        | .135                            |        | .050           |        | 1.013                              |         | .056                |        | .052                                          | .040 |
| 1.250                 | 31.7 | 1.110        | + .008 | .150                            |        | .050           |        | 1.126                              | + .004  | .056                | + .004 | .057                                          | .044 |
| 1.375                 | 34.9 | 1.220        |        | .165                            | + .007 | .050           |        | 1.237                              | .005    | .056                | - .000 | .062                                          | .048 |
| 1.500                 | 38.1 | 1.331        |        | .180                            |        | .050           |        | 1.350                              | FIM 2/  | .056                |        | .069                                          | .053 |
| 1.750                 | 44.4 | 1.555        | + .010 | .210                            |        | .062           | + .003 | 1.576                              | + .005  | .068                |        | .081                                          | .062 |
| 2.000                 | 50.8 | 1.777        |        | .240                            |        | .062           |        | 1.800                              | .005    | .068                |        | .091                                          | .070 |

- 1/ THICKNESS "T" APPLIES TO UNPLATED RINGS. FOR CORROSION RESISTANT STEEL AND PLATED RINGS, +.002 SHOULD BE ADDED TO THE MAXIMUM TOLERANCE, i.e. +.002 SHOULD BE +.004/- .002
- 2/ FIM = (FULL INDICATOR MOVEMENT) IS THE MAXIMUM ALLOWABLE DEVIATION OF CONCENTRICITY BETWEEN THE GROOVE AND THE SHAFT
- 3/ R AND CH = RADIUS OR CHAMFERS ALLOWABLE ON PARTS TO BE RETAINED BY THE RING. THRUST LOADS OF RINGS, RETAINING PARTS WITH CORNER RADIUS OR CHAMFERS AS LISTED ABOVE ARE TABULATED ON PAGE 6

(®) ENTIRE STANDARD REVISED

|                                                        |                           |                                                                        |                              |
|--------------------------------------------------------|---------------------------|------------------------------------------------------------------------|------------------------------|
| PA<br>NAVY-OS<br>Other Cust<br>ARMY-AR<br>AIR FORCE-99 | INTERNATIONAL<br>INTEREST | TITLE<br>RING, RETAINING, EXTERNAL, CRESCENT<br>(REDUCED SECTION TYPE) | MILITARY STANDARD<br>MS16632 |
| PROCUREMENT SPECIFICATION<br>MIL-R-21248               | SUPERSEDES                | PAGE<br>1                                                              | OF<br>6                      |

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DLA-IS

APPROVED 11 DEC 1958 REVISED 30 APRIL 1990

# REQUIREMENTS

1. CLASSIFICATION. RETAINING RINGS FURNISHED UNDER THIS STANDARD SHALL BE TYPE I, CLASS 6 OF THE PROCUREMENT SPECIFICATION
2. MATERIAL:
  - (a) CARBON SPRING STEEL, GRADE 1060 THRU 1095 (UNS G10600 THRU G10950) IN ACCORDANCE WITH ASTM A568 OR ASTM A682.
  - (b) CORROSION RESISTANT STEEL IN ACCORDANCE WITH AMS 5520 (UNS S15700)
  - (c) BERYLLIUM COPPER ALLOY NUMBER 170 (UNS C17000) OR ALLOY NUMBER 172 (UNS C17200) IN ACCORDANCE WITH ASTM B194
3. HARDNESS

TABLE II HARDNESS

| Ø SHAFT<br>(REF)    | CARBON<br>STEEL    | CORROSION<br>RESISTANT<br>STEEL | BERYLLIUM<br>COPPER |
|---------------------|--------------------|---------------------------------|---------------------|
| .125 TO .438 INCL   | 84 5-87.0 HR15N 1/ | 82 5-86 HR15N 1/                | 77-82 HR15N 1/      |
| .500 TO .625 INCL   | 66 5-71 5 HR30N 1/ | 67-69 5 HR30N 1/                | 54-62 HR30N 1/      |
| .688 TO 1.000 INCL  | 52 5-58 5 HR45N 1/ | 48-56 HR45N 1/                  | 36-47 HR45N 1/      |
| 1.125 TO 2.000 INCL | 48-53 HRC          | 44-51 HRC                       | 34-43 HRC           |

1/ USE HIGHEST SCALE TO PROVIDE SECTION WIDTH EQUAL TO OR GREATER THAN 5 TIMES THE BRAILE IMPRESSION DIAMETER

## 4. PROTECTIVE FINISH OR SURFACE TREATMENT:

- (a) CARBON STEEL - SHALL BE AS SPECIFIED (SEE TABLE III OR IV)
  - (1) CADMIUM PLATE IN ACCORDANCE WITH QQ-P-416, TYPE I., CLASS 3 OR ASTM B696, TYPE II, CLASS 5
  - (2) ZINC COAT IN ACCORDANCE WITH ASTM B633, TYPE 1., CLASS Fe, Zn5, OR ASTM B695, TYPE II, CLASS 5
  - (3) PHOSPHATE COAT IN ACCORDANCE WITH DOD-P-16232, TYPE 2, 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 OR IV

EXAMPLE MS16632-1100 IS THE PART NUMBER FOR A CARBON STEEL CADMIUM PLATE, EXTERNAL, CRESCENT RETAINING RING FOR USE ON A 1.000 DIAMETER SHAFT.

## NOTES:

1. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES
2. IN THE EVENT OF A CONFLICT BETWEEN THE TEXT OF THIS STANDARD AND THE REFERENCES CITED HEREIN, THE TEXT OF THIS STANDARD SHALL TAKE PRECEDENCE
3. REFERENCED GOVERNMENT (OR NON-GOVERNMENT) DOCUMENTS OF THE ISSUE LISTED IN THAT ISSUE OF THE DEPARTMENT OF DEFENSE INDEX OF SPECIFICATIONS AND STANDARDS (DDISS) SPECIFIED IN THE SOLICITATION FORM A PART OF THIS STANDARD TO THE EXTENT SPECIFIED HEREIN

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TABLE III DASH NUMBERS FOR MS16632

| Ø S<br>SHAFT<br>(REF) | CARBON STEEL $\frac{1}{2}$ /<br>CADMIUM PLATE | CARBON STEEL $\frac{1}{2}$ /<br>ZINC COAT | CARBON STEEL $\frac{1}{2}$ /<br>PHOSPHATE COAT | STEEL CORROSION<br>RESISTANT | BERYLLIUM<br>COPPER $\frac{1}{2}$ |
|-----------------------|-----------------------------------------------|-------------------------------------------|------------------------------------------------|------------------------------|-----------------------------------|
|                       | DASH NO                                       | DASH NO                                   | DASH NO                                        | DASH NO                      | DASH NO                           |
| .125                  | -1012                                         | -2012                                     | -3012                                          | -4012                        | -5012                             |
| .156                  | -1015                                         | -2015                                     | -3015                                          | -4015                        | -5015                             |
| .188                  | -1016                                         | -2018                                     | -3018                                          | -4016                        | -5016                             |
| .219                  | -1021                                         | -2021                                     | -3021                                          | -4021                        | -5021                             |
| .236                  | -1023                                         | -2023                                     | -3023                                          | -4023                        | -5023                             |
| .250                  | -1025                                         | -2025                                     | -3025                                          | -4025                        | -5025                             |
| .281                  | -1028                                         | -2028                                     | -3028                                          | -4028                        | -5028                             |
| .312                  | -1031                                         | -2031                                     | -3031                                          | -4031                        | -5031                             |
| .375                  | -1037                                         | -2037                                     | -3037                                          | -4037                        | -5037                             |
| .406                  | -1040                                         | -2040                                     | -3040                                          | -4040                        | -5040                             |
| .438                  | -1043                                         | -2043                                     | -3043                                          | -4043                        | -5043                             |
| .500                  | -1050                                         | -2050                                     | -3050                                          | -4050                        | -5050                             |
| .562                  | -1056                                         | -2056                                     | -3056                                          | -4056                        | -5056                             |
| .625                  | -1062                                         | -2062                                     | -3062                                          | -4062                        | -5062                             |
| .688                  | -1068                                         | -2068                                     | -3068                                          | -4068                        | -5068                             |
| .750                  | -1075                                         | -2075                                     | -3075                                          | -4075                        | -5075                             |
| .812                  | -1081                                         | -2081                                     | -3081                                          | -4081                        | -5081                             |
| .875                  | -1087                                         | -2087                                     | -3087                                          | -4087                        | -5087                             |
| .936                  | -1093                                         | -2093                                     | -3093                                          | -4093                        | -5093                             |
| 1.000                 | -1100                                         | -2100                                     | -3100                                          | -4100                        | -5100                             |
| 1 125                 | -1112                                         | -2112                                     | -3112                                          | -4112                        | -5112                             |
| 1 250                 | -1125                                         | -2125                                     | -3125                                          | -4125                        | -5125                             |
| 1 375                 | -1137                                         | -2137                                     | -3137                                          | -4137                        | -5137                             |
| 1 500                 | -1150                                         | -2150                                     | -3150                                          | -4150                        | -5150                             |
| 1 750                 | -1175                                         | -2175                                     | -3175                                          | -4175                        | -5175                             |
| 2 000                 | -1200                                         | -2200                                     | -3200                                          | -4200                        | -5200                             |

• SUBSTITUTED CORROSION RESISTANT STILL WHEN USED IN FOOD PROCESSING MACHINERY, OR IN FUEL OR LUBRICATION SYSTEMS, OR WHEN USED AT TEMPERATURES OVER 450°F (233°C).

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**RING, RETAINING, EXTERNAL, CRESCENT  
(REDUCED SECTION TYPE)**

**MILITARY STANDARD**  
**MS16632**

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TABLE IV. SUBSTITUTION TABLE (CROSS REFERENCE OF PART NUMBERS)

| Q S<br>SHAFT<br>(REF) | INACTIVE        | SUBSTITUTE                             | SUBSTITUTE                         | SUBSTITUTE                              |
|-----------------------|-----------------|----------------------------------------|------------------------------------|-----------------------------------------|
|                       | CARBON<br>STEEL | CARBON<br>STEEL 1/<br>CADMIUM<br>PLATE | CARBON<br>STEEL 1/<br>ZIN.<br>COAT | CARBON<br>STEEL 1/<br>PHOSPHATE<br>COAT |
|                       | MS16632         | MS16632                                | MS16632                            | MS16632                                 |
| .25                   | -12             | -1012                                  | -2012                              | -3012                                   |
| .156                  | -15             | -1015                                  | -2015                              | -3015                                   |
| .188                  | -18             | -1018                                  | -2018                              | -3018                                   |
| .219                  | -21             | -1021                                  | -2021                              | -3021                                   |
| .236                  | -23             | -1023                                  | -2023                              | -3023                                   |
| .250                  | -25             | -1025                                  | -2025                              | -3025                                   |
| .281                  | -28             | -1028                                  | -2028                              | -3028                                   |
| .312                  | -31             | -1031                                  | -2031                              | -3031                                   |
| .375                  | -37             | -1037                                  | -2037                              | -3037                                   |
| .406                  | -40             | -1040                                  | -2040                              | -3040                                   |
| .438                  | -43             | -1043                                  | -2043                              | -3043                                   |
| .500                  | -50             | -1050                                  | -2050                              | -3050                                   |
| .562                  | -56             | -1056                                  | -2056                              | -3056                                   |
| .625                  | -62             | -1062                                  | -2062                              | -3062                                   |
| .688                  | -68             | -1068                                  | -2068                              | -3068                                   |
| .750                  | -75             | -1075                                  | -2075                              | -3075                                   |
| .812                  | -81             | -1081                                  | -2081                              | -3081                                   |
| .875                  | -87             | -1087                                  | -2087                              | -3087                                   |
| .938                  | -93             | -1093                                  | -2093                              | -3093                                   |
| 1.000                 | -100            | -1100                                  | -2100                              | -3100                                   |
| 1.25                  | -125            | -1125                                  | -2125                              | -3125                                   |
| 1.250                 | -125            | -1125                                  | -2125                              | -3125                                   |
| 1.375                 | -137            | -1137                                  | -2137                              | -3137                                   |
| 1.500                 | -150            | -1150                                  | -2150                              | -3150                                   |
| 1.750                 | -175            | -1175                                  | -2175                              | -3175                                   |
| 2.000                 | -200            | -1200                                  | -2200                              | -3200                                   |

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

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PROCUREMENT SPECIFICATION  
MIL-R-21248

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RING, RETAINING, EXTERNAL, CRESCENT  
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MS16632

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RECOMMENDED DESIGN LIMITATIONS AND USAGE

- (a) INTENDED USE - TO PROVIDE SHOULDERS FOR POSITIONING AND MAINTAINING MACHINE PARTS ON SHAFTS WHICH ARE AXIALLY INACCESSIBLE IN ASSEMBLY. THEY ARE APPLIED RADIALLY AND BECAUSE OF DEEP GROOVES, HAVE HIGH THRUST CAPACITY. THEY ARE OF ADVANTAGE WHERE FAST ASSEMBLY FOR MASS PRODUCTION LINES IS ESSENTIAL AND WHERE COMPATIVELY SMALL CLEARANCE DIAMETERS ARE DESIRABLE. 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. IF RING HAS PLAY BETWEEN THE GROOVE DIAMETER AND THE INSIDE RING DIAMETER THIS INDICATES THAT THE RING HAS BEEN OVER EXPANDED, (PROVIDING GROOVE HAS BEEN MACHINED TO RECOMMENDED DIMENSIONS)

FOR APPROXIMATE SAFETY RPM LIMITS SEE TABLE V.

TABLE V APPROXIMATE SAFETY RPM LIMITS

| Ø SHAFT (INCHES)                           |           | .250   | 500    | 1.000  | 2.000 |
|--------------------------------------------|-----------|--------|--------|--------|-------|
| CARBON STEEL AND CORROSION RESISTANT STEEL | RPM LIMIT | 60,000 | 25,000 | 12,500 | 6,000 |
| BERYLLIUM COPPER                           | RPM LIMIT | 30,000 | 16,000 |        |       |

- (b) ALLOWABLE THRUST LOAD CAPACITY OF THE RING. (ASUTING COMPONENTS TO HAVE SHARP CORNERS) =

$$P = \frac{WSTX}{2F}$$

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 = 4, IS RECOMMENDED, SINCE THE RING UNDER LOAD IS SUBJECTED NOT ONLY TO PURE SHEAR STRESSES, BUT ALSO TO BENDING STRESSES

- (c) ALLOWABLE LOAD CAPACITY OF GROOVE WALL =

$$P = \frac{YGdY}{2F}$$

WHERE

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

TO INSURE A SAFE WORKING LOAD, A SAFETY FACTOR, F = 2, IS RECOMMENDED

- (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 =

THE CONDITIONS UNDER WHICH A RETAINING RING MAY BE USED WHEN ADJACENT PARTS ROTATE RELATIVE TO IT FALL INTO TWO CATEGORIES

- WHERE NO THRUST IS EXERTED BY ADJACENT PART, IN THIS CASE, DIFFERENTIAL ROTATION OF RING AND ADJACENT PART CREATES NO ELEMENT OF RISK IN THE APPLICATION OF THE RINGS BECAUSE NO FUNCTIONAL TORQUE IS EXERTED BY THE MACHINE PART ON THE RING.
- CONSIDERATION MUST BE GIVEN TO THE MAGNITUDE OF THE THRUST INVOLVED. THE FRICTION MOMENT MAY NOT EXCEED THE BENDING MOMENT, WHICH THE RING CAN TOLLERATE WITHOUT RELEASING ITS PRESSURE AGAINST THE BOTTOM OF THE GROOVE, FORMULATED AS FOLLOWS

$$FPM \leq \frac{STL^2}{18} \quad \text{OR} \quad P \leq \frac{S \cdot d^2}{f18N}$$

WHERE

P = ALLOWABLE THRUST LOAD EXERTED BY ADJACENT PART (POUNDS)  
f = COEFFICIENT OF FRICTION  
S = WORKING STRESS OF RING UNDER MAXIMUM EXPANSION (PSI) 2/  
T = RING THICKNESS (INCHES)  
L = LARGEST WIDTH SECTION OF RING (INCHES)  
N = INTERNAL RING DIAMETER (INCHES) + FREE DIAMETER PLUS 1/2 L DIMENSION

IN ALL CASES WHERE DIFFERENTIAL ROTATION OCCURS, THE CALCULATION SHOULD BE BASED ON THE MAXIMUM POSSIBLE VALUE OF THE COEFFICIENT OF FRICTION

- 1/ X = 120,000 PSI ULTIMATE SHEAR STRENGTH FOR RINGS UP TO AND INCLUDING .625 INCH SHAFT DIAMETER OF CARBON STEEL OR CORROSION RESISTANT STEEL.
- X = 150,000 PSI ULTIMATE SHEAR STRENGTH FOR RINGS .688 INCH AND OVER SHAFT DIAMETER OF CARBON STEEL OR CORROSION RESISTANT STEEL.
- X = 110,000 PSI ULTIMATE SHEAR STRENGTH FOR RINGS OF ALL SHAFT DIAMETERS AND OF BERYLLIUM COPPER
- S = 250,000 PSI WORKING STRESS FOR RINGS OF CARBON STEEL OR CORROSION RESISTANT STEEL
- S = 180,000 PSI WORKING STRESS FOR RINGS OF BERYLLIUM COPPER

|                                                        |                           |                                                                        |                              |
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| PROCURMENT SPECIFICATION<br>MIL-R-21248                | SUPPLIES OF               | FIG 5                                                                  | 6                            |

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## (E) IMPACT CAPACITY OF RING OR GROOVE WALL -

$$I_R = \frac{PT}{2} - \text{FOR THE RING (INCH POUNDS) (ABUTTING COMPONENTS TO HAVE SHARP CORNERS)}$$

$$I_G = \frac{Pd}{2} - \text{FOR THE GROOVE (INCH POUNDS)}$$

WHERE:

P = ALLOWABLE THRUST LOAD OF RING OR GROOVE (POUNDS)

T = RING THICKNESS (INCHES)

I<sub>G</sub> = IMPACT CAPACITY OF GROOVE WALL (INCH POUNDS)

d = GROOVE DEPTH (INCHES)

I<sub>R</sub> = IMPACT CAPACITY OF RING (INCH POUNDS)

## (g) LOAD CAPACITY WITH THE RETAINED PART RADIUS OR CHAMFERED -

WHEN THE RADIUS OR CHAMFER OF THE RETAINED PART DOES NOT EXCEED THE MAXIMUM RADIUS ALLOWED FOR THE BOTTOM OF THE RING GROOVE, THE LESSER LOAD CAPACITY COMPUTED FROM THE FORMULA ON PAGE 5 WILL APPLY. THE CORNER RADIUS AND CHAMFERS LISTED ON PAGE 1 WERE CHOSEN AS LARGE AS POSSIBLE FOR THE RING SIZES INVOLVED AND ARE RELATED TO THE MAXIMUM THRUST LOADS LISTED IN TABLE VI. IF THE CORNER RADIUS OR CHAMFERS ARE SMALLER THAN THOSE LISTED, THEN THE THRUST LOADS INCREASE PROPORTIONALLY IN ACCORDANCE WITH THE FOLLOWING FORMULAS:

$$P^1 = \frac{P \cdot CH}{CH^1} \quad \text{OR}$$

WHERE:

P<sup>1</sup> = NEW ALLOWABLE THRUST LOAD

P = LISTED ALLOWABLE THRUST LOAD

CH<sup>1</sup> = NEW (SMALLER) CHAMFER

CH = LISTED CHAMFER

R<sup>1</sup> = NEW (SMALLER) CORNER RADIUS

R = LISTED CORNER RADIUS

$$P^1 = \frac{P \cdot R}{R^1}$$

LIMIT LOADS LISTED IN TABLE VI ARE BASED ON RINGS OF CARBON STEEL OR CORROSION RESISTANT STEEL (WORKING STRESS 250,000 PSI). IF THE ALLOWABLE GROOVE CAPACITY LOADS AS CALCULATED BY USING THE FORMULA ON PAGE 5 ARE LESS, THEN THEY SHOULD BE USED.

TABLE VI LIMIT LOADS

| NOMINAL RING SIZE |       | ALLOWABLE THRUST LOAD FOR RING ASSEMBLIES WITH PARTS HAVING MAXIMUM CORNER RADIUS OR CHAMFERS |                  |
|-------------------|-------|-----------------------------------------------------------------------------------------------|------------------|
| FROM              | TO    | CARBON STEEL OR CORROSION RESISTANT STEEL                                                     | BERYLLIUM COPPER |
| 125               |       | 90 LB                                                                                         | 65 LB            |
| 156               |       | 105 LB                                                                                        | 75 LB            |
| 188               |       | 110 LB                                                                                        | 80 LB            |
| 219               |       | 260 LB                                                                                        | 185 LB           |
| 236               |       | 275 LB                                                                                        | 200 LB           |
| 250               |       | 290 LB                                                                                        | 210 LB           |
| 281               | 438   | 310 LB                                                                                        | 220 LB           |
| 500               | 625   | 610 LB                                                                                        | 440 LB           |
| 668               | 1 000 | 880 LB                                                                                        |                  |
| 1 125             | 1 500 | 1250 LB                                                                                       |                  |
| 1 750             | 2 000 | 1920 LB                                                                                       |                  |

REVIEWER ACTIVITIES  
ARMY - M1  
NAVY - AS  
AIR FORCE - B2  
DLA - IS

USER ACTIVITIES  
ARMY - ER, GL  
NAVY - MC, SH, YD

PA  
NAVY-OS  
Other: C  
ARMY-AR  
AIR FORCE-99

INTERNATIONAL  
INTEREST

TITLE

RING, RETAINING, EXTERNAL, CRESCENT  
(REDUCED SECTION TYPE)

MILITARY STANDARD

MS16632

PROCUREMENT SPECIFICATION  
MIL-R-21248

SUPERSEDES

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APPROVED 11 DEC 1958 REVISED 11 DEC 1958 (B) FOR CHANGES SEE PAGES 1 THRU 6