SHAFT NUT AND KEYWASHER
INSTALLATION DIMENSIONS FOR

1. **SCOPE:** The purpose of this standard is to provide installation dimensions for shaft nuts and their companion keywasher. The standard deals specifically with the design shown on MS9951 and MS9952 but is also suitable for parts which are dimensionally equivalent.

2. **DESCRIPTION:**

2.1 **Retaining Nuts:** Retaining nuts are usually used to retain and secure a part or parts, such as a bearing or seal, to a shaft or housing.

2.2 **Keywashers (Cup Washers):** Keywashers are used to lock the retaining nut to the shaft or housing. Such washers incorporate an integral key (tang or tab) which is held in a keyway on the shaft or housing. The washer's external cylindrical shell shrouding the nut is, after torqueing, indented locally into the spherical scallops on the periphery of the nut, see AS567 for installation.

3. **INSTALLATION DIMENSIONS:** The installation dimensions for the nut and keywasher in Table I are based on the following:-

3.1 **Keyway:**

3.1.1 **Width and Depth of Keyway:** Minimum width and depth of keyway is based on the formulas below, tolerance should be selected to suit design.

$$A_{min} = G_{max} + \text{True Position Tolerance of Key} + \text{True Position Tolerance of Slot}$$

$$B_{max} = \frac{1}{2}\sqrt{H^2_{min} - G^2_{max}} - D + \frac{L}{2} \quad \text{(applicable to sizes -02 and -03)}$$

$$B_{max} = \sqrt{H^2_{min} - G^2_{max}} - 2D \quad \text{(applicable to sizes -04 thru -41)}$$

$$C_{min} = \frac{1}{2}\left[\sqrt{L^2 - A^2_{max}} - \sqrt{H^2_{min} - G^2_{max}} + 2D\right] \quad \text{(applicable to sizes -02 and -03)}$$

$$C_{min} = \frac{1}{2}\left[\sqrt{L^2 - A^2_{max}} - B_{max}\right] \quad \text{(applicable to sizes -04 thru -41)}$$
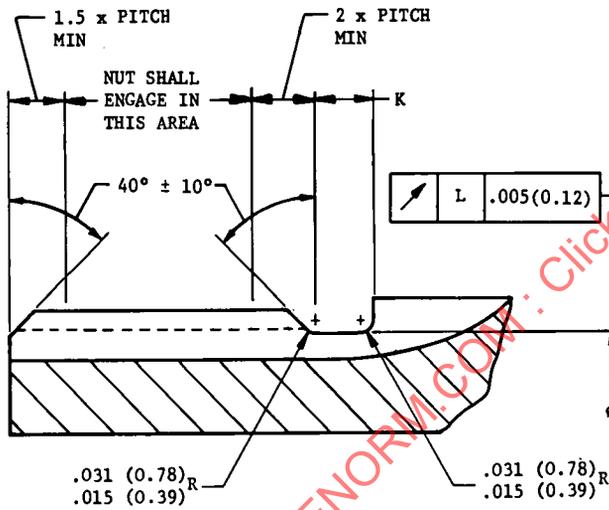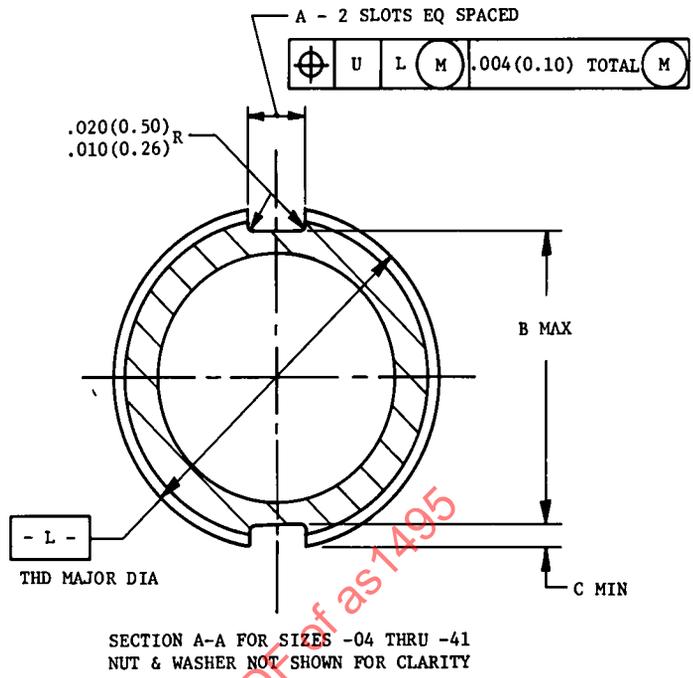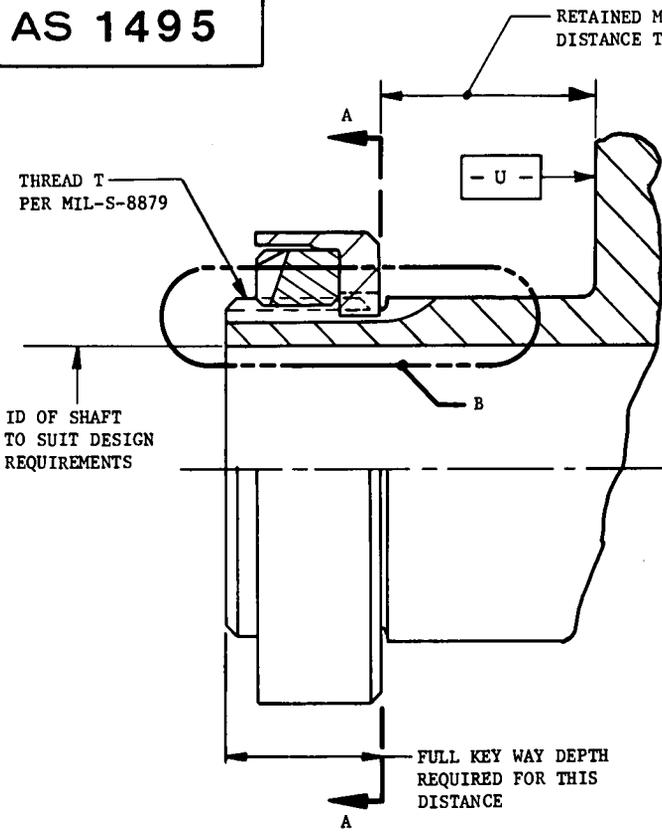
where:

A = Keyway width in shaft - see Figure 1
B = Height to bottom of keyway - see Figure 1
C = Shoulder height of keyway - see Figure 1
D = Max. keyway radial clearance - see Figure 1 - .010 in. (0.25 mm) applied
G = Key width on washer - ref. MS9952
H = Diameter between keys on the washer - ref. MS9952
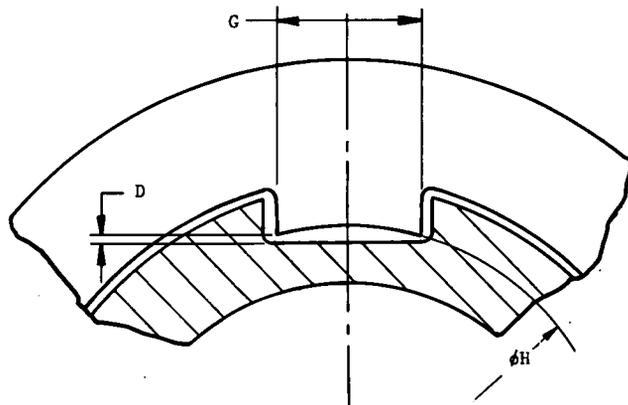L = Thread minimum major diameter of external thread

REAFFIRMED

MAY 1995

RETAINED MEMBERS IN THIS AREA
DISTANCE TO SUIT DESIGN

THREAD T
PER MIL-S-8879

ID OF SHAFT
TO SUIT DESIGN
REQUIREMENTS

– U –

B

FULL KEY WAY DEPTH
REQUIRED FOR THIS
DISTANCE

A

A - 2 SLOTS EQ SPACED

⊕ | U | L Ⓜ | .004(0.10) TOTAL Ⓜ

.020(0.50)
.010(0.26) R

B MAX

– L –
THD MAJOR DIA

C MIN

SECTION A-A FOR SIZES -04 THRU -41
NUT & WASHER NOT SHOWN FOR CLARITY

1.5 x PITCH
MIN

2 x PITCH
MIN

NUT SHALL
ENGAGE IN
THIS AREA

K

40° ± 10°

↗ | L | .005(0.12)

øN

.031 (0.78) R
.015 (0.39)

.031 (0.78) R
.015 (0.39)

VIEW B
VIEW OF SHAFT END TO
SHOW REQUIRED THREAD
LENGTH

A

⊕ | U | L Ⓜ | .004(0.10) TOTAL Ⓜ

.020 (0.50)
.010 (0.26) R

C MIN

B MAX

– L –
THD MAJOR DIA

SECTION A-A FOR SIZES -02 AND -03.
NUT & WASHER NOT SHOWN FOR CLARITY

G

D

øH
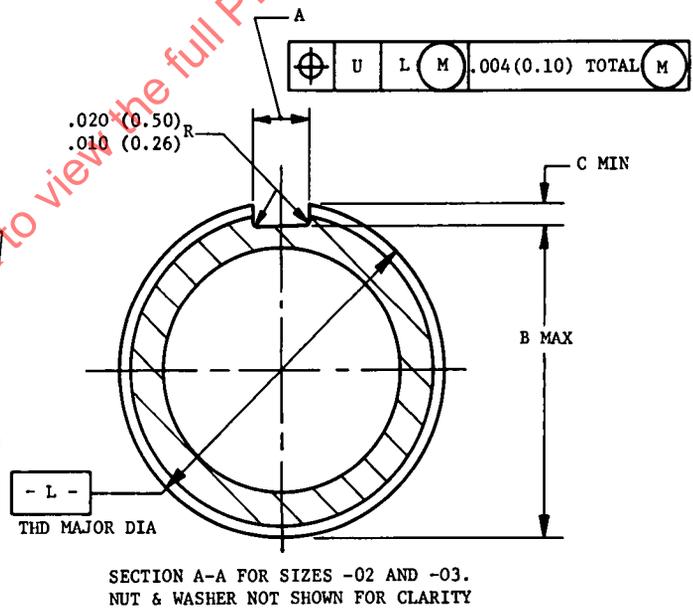
PARTIAL SECTION A-A TO ILLUSTRATE
DIMENSIONS APPLIED IN CALCULATIONS
FOR KEYWAY DIMENSIONS
SCALE: 2/1

THIRD ANGLE PROJECTION

⊕

FIGURE 1

AS 1495

TABLE I - INCHES

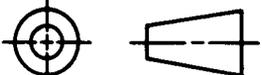| Size Number	T Thread	A	B Max	C Min	K	øN
AS1495-02	.375 -32UNJEF-3A	.144-.146	.2986	.055	.063-.078	.319- .329
AS1495-03	.4375-28UNJEF-3A	.144-.146	.3617	.057	.063-.078	.374- .384
AS1495-04	.500 -28UNJEF-3A	.144-.146	.3517	.059	.063-.078	.437- .447
AS1495-05	.5625-24UNJEF-3A	.144-.146	.4169	.059	.063-.078	.488- .498
AS1495-06	.625 -24UNJEF-3A	.144-.146	.4814	.059	.063-.078	.550- .560
AS1495-07	.6875-24UNJEF-3A	.144-.146	.5455	.059	.063-.078	.602- .612
AS1495-08	.750 -24UNJEF-3A	.144-.146	.6093	.059	.075-.090	.664- .674
AS1495-09	.8125-20UNJEF-3A	.144-.146	.6728	.059	.075-.090	.726- .736
AS1495-10	.875 -20UNJEF-3A	.174-.176	.7308	.059	.075-.090	.789- .799
AS1495-11	.9375-20UNJEF-3A	.174-.176	.7944	.059	.075-.090	.851- .861
AS1495-12	1.000 -20UNJEF-3A	.174-.176	.8579	.059	.075-.090	.914- .924
AS1495-13	1.0625-18UNJEF-3A	.174-.176	.9212	.059	.083-.098	.968- .978
AS1495-14	1.125 -18UNJEF-3A	.174-.176	.9845	.059	.083-.098	1.031-1.041
AS1495-15	1.1875-18UNJEF-3A	.174-.176	1.0314	.067	.083-.098	1.094-1.104
AS1495-16	1.250 -18UNJEF-3A	.204-.206	1.0956	.064	.083-.098	1.156-1.166
AS1495-17	1.3125-18UNJEF-3A	.204-.206	1.1563	.066	.083-.098	1.218-1.228
AS1495-18	1.375 -18UNJEF-3A	.204-.206	1.2170	.067	.083-.098	1.281-1.291
AS1495-19	1.4375-18UNJEF-3A	.204-.206	1.2826	.066	.083-.098	1.344-1.354
AS1495-20	1.500 -18UNJEF-3A	.204-.206	1.3432	.067	.083-.098	1.397-1.407
AS1495-21	1.5625-16UNJ -3A	.204-.206	1.4087	.065	.094-.109	1.460-1.470
AS1495-22	1.625 -16UNJ -3A	.204-.206	1.4692	.067	.094-.109	1.522-1.532
AS1495-23	1.6875-16UNJ -3A	.204-.206	1.5296	.068	.094-.109	1.584-1.594
AS1495-24	1.750 -16UNJ -3A	.269-.271	1.5915	.064	.094-.109	1.647-1.657
AS1495-25	1.8125-16UNJ -3A	.269-.271	1.6572	.063	.094-.109	1.710-1.720
AS1495-26	1.875 -16UNJ -3A	.269-.271	1.7178	.065	.094-.109	1.772-1.782
AS1495-27	1.9375-16UNJ -3A	.269-.271	1.7834	.063	.094-.109	1.834-1.844
AS1495-28	2.000 -16UNJ -3A	.269-.271	1.8288	.072	.094-.109	1.897-1.907
AS1495-29	2.0625-16UNJS -3A	.269-.271	1.8944	.070	.094-.109	1.960-1.970
AS1495-30	2.125 -16UNJ -3A	.269-.271	1.9549	.072	.094-.109	2.022-2.032
AS1495-31	2.1875-16UNJS -3A	.269-.271	2.0203	.070	.094-.109	2.084-2.094
AS1495-32	2.250 -16UNJ -3A	.269-.271	2.0808	.072	.094-.109	2.147-2.157
AS1495-33	2.3125-16UNJS -3A	.269-.271	2.1462	.070	.094-.109	2.210-2.220
AS1495-34	2.375 -16UNJ -3A	.269-.271	2.2066	.072	.094-.109	2.272-2.282
AS1495-35	2.4375-16UNJS -3A	.269-.271	2.2669	.073	.094-.109	2.334-2.344
AS1495-36	2.500 -16UNJ -3A	.269-.271	2.3323	.072	.094-.109	2.397-2.407
AS1495-37	2.5625-16UNJS -3A	.269-.271	2.3926	.073	.094-.109	2.460-2.470
AS1495-38	2.625 -16UNJ -3A	.269-.271	2.4328	.084	.094-.109	2.522-2.532
AS1495-39	2.750 -16UNJ -3A	.269-.271	2.5584	.084	.094-.109	2.647-2.657
AS1495-40	2.875 -16UNJ -3A	.269-.271	2.6839	.084	.094-.109	2.772-2.782
AS1495-41	3.000 -16UNJ -3A	.269-.271	2.8044	.087	.094-.109	2.897-2.907

TABLE I (SI) – MILLIMETRES

Size Number	T Thread	A	B Max	C Min	K	⌀N
AS1495-02	.375 -32UNJEF-3A	3.658-3.708	7.584	1.40	1.61-1.98	8.11- 8.35
AS1495-03	.4375-28UNJEF-3A	3.658-3.708	9.187	1.45	1.61-1.98	9.50- 9.75
AS1495-04	.500 -28UNJEF-3A	3.658-3.708	8.933	1.50	1.61-1.98	11.10-11.35
AS1495-05	.5625-24UNJEF-3A	3.658-3.708	10.589	1.50	1.61-1.98	12.40-12.64
AS1495-06	.625 -24UNJEF-3A	3.658-3.708	12.227	1.50	1.61-1.98	13.97-14.22
AS1495-07	.6875-24UNJEF-3A	3.658-3.708	13.855	1.50	16.1-1.98	15.30-15.54
AS1495-08	.750 -20UNJEF-3A	3.658-3.708	15.476	1.50	1.91-2.28	16.87-17.11
AS1495-09	.8125-20UNJEF-3A	3.658-3.708	17.089	1.50	1.91-2.28	18.45-18.69
AS1495-10	.875 -20UNJEF-3A	4.420-4.470	18.562	1.50	1.91-2.28	20.05-20.29
AS1495-11	.9375-20UNJEF-3A	4.420-4.470	20.177	1.50	1.91-2.28	21.62-21.86
AS1495-12	1.000 -20UNJEF-3A	4.420-4.470	21.790	1.50	1.91-2.28	23.22-23.46
AS1495-13	1.0625-18UNJEF-3A	4.420-4.470	23.398	1.50	2.11-2.48	24.59-24.84
AS1495-14	1.125 -18UNJEF-3A	4.420-4.470	25.006	1.50	2.11-2.48	26.19-26.44
AS1495-15	1.1875-18UNJEF-3A	4.420-4.470	26.197	1.71	2.11-2.48	27.79-28.04
AS1495-16	1.250 -18UNJEF-3A	5.187-5.232	27.828	1.63	2.11-2.48	29.37-29.61
AS1495-17	1.3125-18UNJEF-3A	5.187-5.232	29.370	1.68	2.11-2.48	30.94-31.19
AS1495-18	1.375 -18UNJEF-3A	5.187-5.232	30.911	1.71	2.11-2.48	32.54-32.79
AS1495-19	1.4375-18UNJEF-3A	5.187-5.232	32.578	1.68	2.11-2.48	34.14-34.39
AS1495-20	1.500 -18UNJEF-3A	5.187-5.232	33.117	1.71	2.11-2.48	35.49-35.73
AS1495-21	1.5625-16UNJ -3A	5.187-5.232	35.780	1.66	2.39-2.76	37.09-37.33
AS1495-22	1.625 -16UNJ -3A	5.187-5.232	37.317	1.71	2.39-2.76	38.66-38.91
AS1495-23	1.6875-16UNJ -3A	5.187-5.232	38.851	1.73	2.39-2.76	40.24-40.48
AS1495-24	1.750 -16UNJ -3A	6.833-6.883	40.424	1.63	2.39-2.76	41.84-42.08
AS1495-25	1.8125-16UNJ -3A	6.833-6.883	42.092	1.61	2.39-2.76	43.44-43.68
AS1495-26	1.875 -16UNJ -3A	6.833-6.883	43.632	1.66	2.39-2.76	45.01-45.26
AS1495-27	1.9375-16UNJ -3A	6.833-6.883	45.298	1.61	2.39-2.76	46.59-46.83
AS1495-28	2.000 -16UNJ -3A	6.833-6.883	46.451	1.83	2.39-2.76	48.19-48.43
AS1495-29	2.0625-16UNJS -3A	6.833-6.883	48.117	1.78	2.39-2.76	49.79-50.03
AS1495-30	2.125 -16UNJ -3A	6.833-6.883	49.654	1.83	2.39-2.76	51.36-51.61
AS1495-31	2.1875-16UNJS -3A	6.833-6.883	51.315	1.78	2.39-2.76	52.94-53.18
AS1495-32	2.250 -16UNJ -3A	6.833-6.883	52.852	1.83	2.39-2.76	54.54-54.78
AS1495-33	2.3125-16UNJS -3A	6.833-6.883	54.513	1.78	2.39-2.76	56.14-56.38
AS1495-34	2.375 -16UNJ -3A	6.833-6.883	56.047	1.83	2.39-2.76	57.71-57.96
AS1495-35	2.4375-16UNJS -3A	6.833-6.883	57.579	1.86	2.39-2.76	59.29-59.53
AS1495-36	2.500 -16UNJ -3A	6.833-6.883	59.240	1.83	2.39-2.76	60.89-61.13
AS1495-37	2.5625-16UNJS -3A	6.833-6.883	60.772	1.86	2.39-2.76	62.49-62.73
AS1495-38	2.625 -16UNJ -3A	6.833-6.883	61.793	2.14	2.39-2.76	64.06-64.31
AS1495-39	2.750 -16UNJ -3A	6.833-6.883	64.983	2.14	2.39-2.76	67.24-67.48
AS1495-40	2.875 -16UNJ -3A	6.833-6.883	68.171	2.14	2.39-2.76	70.41-70.66
AS1495-41	3.000 -16UNJ -3A	6.833-6.883	71.231	2.21	2.39-2.76	73.59-73.83