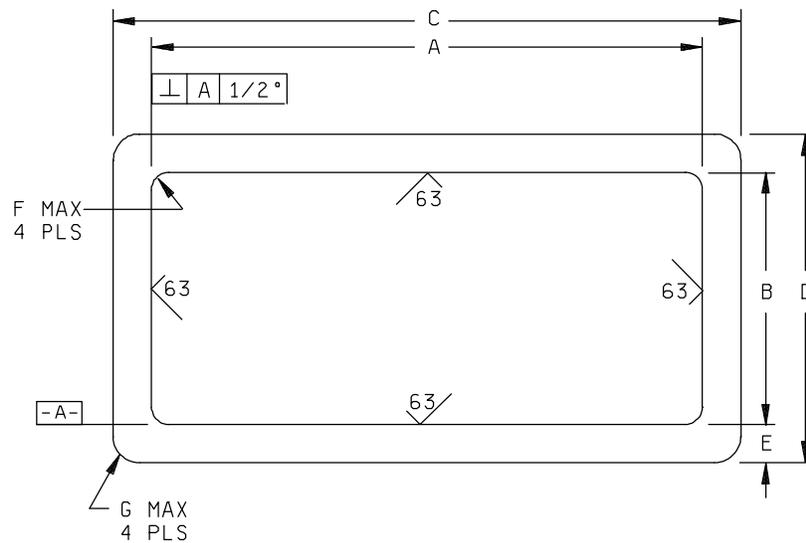


DETAIL SPECIFICATION SHEET

WAVEGUIDES, RIGID, RECTANGULAR (HEAVY WALL)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the waveguides described herein shall consist of this document and the latest issue of MIL-DTL-85.



NOTE: Eccentricity shall be .010 inch (0.25 mm) maximum for Part or Identifying Numbers (PINs) M85/2-001 through M85/2-005 and .004 inch (0.10 mm) maximum for PINs M85/2-006 through M85/2-009. The eccentricity of the waveguide is defined as one-half the difference between opposite wall thicknesses as measured at any cross-section perpendicular to the longitudinal axis.

FIGURE 1. Waveguide, rigid, rectangular, heavy wall.

REQUIREMENTS:

Design and construction: See figure 1.

Physical dimensions: See table I

Closure and coating:

All surfaces of the waveguide shall be coated with noncorrosive oil in accordance with MIL-PRF-3150. The ends of the waveguide shall be sealed with plastic caps.

Length: Unless otherwise specified in the contract, 240 +12, -0 inches (6096 + 304.8, -0 mm).

MIL-DTL-85/2D

Bow: In accordance with MIL-DTL-85, except the bow, for any orientation, shall be no more than .015 inch (0.38 mm) edgewise and .020 inch (0.51 mm) flatwise between any two points 2 feet apart on the concave external surface of the waveguide.

PIN: See table I.

Material: See table II.

NOTES:

Resistivity and conductivity of materials: See table II.

Frequency range and engineering information: See table III.

TABLE I. Physical dimensions.

PIN 1/ M85/2-	Dimensions						
	Inside		Outside		Nominal wall thickness (E)	Max. inner corner radius (F)	Max. outer corner radius (G)
	Width (A)	Height (B)	Width (C)	Height (D)			
001, 002, 004	2.840 ± .005 (72.14) (0.13)	1.340 ± .005 (34.04) (0.13)	3.238 ± .004 (82.25) (0.10)	1.738 ± .005 (44.15) (0.13)	.199 (5.05)	.0468 (1.19)	.125 (3.18)
003, 005	1.872 ± .005 (47.54) (0.13)	.872 ± .005 (22.14) (0.13)	2.172 ± .005 (55.16) (0.13)	1.172 ± .005 (29.76) (0.13)	.150 (3.81)	.0310 (0.79)	.125 (3.18)
006	1.872 ± .003 (47.54) (0.07)	.872 ± .003 (22.14) (0.07)	2.122 ± .005 (53.90) (0.13)	1.122 ± .005 (28.50) (0.13)	.125 (3.18)	.030 (0.76)	.031 (0.79)
007	1.122 ± .003 (28.50) (0.07)	.497 ± .003 (12.62) (0.07)	1.378 ± .005 (35.00) (0.13)	.753 ± .005 (19.12) (0.13)	.128 (3.25)	.030 (0.76)	.031 (0.79)
008	.900 ± .003 (22.86) (0.07)	.400 ± .003 (10.16) (0.07)	1.100 ± .005 (27.94) (0.13)	.600 ± .005 (15.24) (0.13)	.100 (25.4)	.030 (0.76)	.031 (0.79)
009	.900 ± .003 (22.86) (0.07)	.400 ± .003 (10.16) (0.07)	1.300 ± .005 (33.01) (0.13)	.800 ± .005 (20.32) (0.13)	.200 (5.08)	.030 (0.76)	.031 (0.79)

1/ The complete PIN shall be the number shown and a three-digit number indicating length in inches (e.g. M85/2-001-240).

2/ Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm. Metric equivalents are given in parentheses.

TABLE II. Typical resistivity and conductivity of materials.

PIN M85/2-	Material	Resistivity (microhm-cm) max at 20°C)	Conductivity
001-xxx	Aluminum		
002-xxx	Alloy 1100	2.90	57 percent
003-xxx	Alloy 6061	4.00	40 to 45 percent
004-xxx	Alloy 1100 1/	2.90	57 percent
005-xxx	Alloy 6063	3.40	50 percent
006-xxx	Alloy 6063	3.40	50 percent
007-xxx	OF-DLP copper in accordance with ASTM B372	1.77	101 percent
008-xxx			
009-xxx			

1/ Temper shall be H112 with a minimum tensile strength of 11,000 pound-force per square inch (lb/in²)(75.842 MPa).

TABLE III. Cross index and engineering information.

PIN M85/2-	AN type designation	Frequency range (GHz) TE ₁₀ mode	Cutoff for TE ₁₀ mode (GHz)	Theoretical attenuation lowest to highest frequency (dB/100 ft)	Theoretical CW <u>1/</u> power rating lowest to highest frequency (kilowatts)	Theoretical peak power <u>2/</u> rating lowest to highest frequency (megawatts)
001-xxx	RG-375/U	2.60 - 3.95	2.08	.950 - 0.651	14.56 - 21.25	7.645 - 10.85
002-xxx	---	2.60 - 3.95	2.08	1.116 - 0.764	12.39 - 18.08	7.645 - 10.85
003-xxx	---	3.95 - 5.85	3.155	1.785 - 1.238	5.637 - 8.127	3.296 - 4.697
004-xxx	---	2.60 - 3.95	2.08	1.028 - 0.705	13.48 - 19.63	7.645 - 10.85
005-xxx	---	3.95 - 5.85	3.155	1.933 - 1.340	5.206 - 7.506	3.296 - 4.697
006-xxx	---	3.95 - 5.85	3.155	1.399 - 0.970	6.961 - 0.05	3.296 - 4.697
007-xxx	---	7.05 - 10.0	5.780	2.779 - 2.159	3.066 - 2.382	1.284 - 1.702
008-xxx	---	8.20 - 12.40	6.560	4.339 - 3.003	4.788 - 3.314	0.758 - 1.124
009-xxx	---	8.20 - 12.40	6.560	4.339 - 3.003	4.788 - 3.314	0.758 - 1.124

1/ Based on H. E. King, "Rectangular Waveguide Theoretical CW Average Power Rating", IRE Transactions PGMTT-9, pp. 349-357, July 1961. Assumes 1:1 VSWR, 30°C ambient air and 71°C waveguide temperature (governed by personnel safety requirements). To calculate for other situations, see H. E. King.

2/ Based on considerations of breakdown varying with frequency and waveguide size as outlined in Gould and Gilden's "Handbook of High Power Capabilities of Waveguide Systems" (available from Microwave Associates, Burlington, MA). For practical applications, these values should be reduced by a factor of 5.

SAMPLING AND INSPECTION:

All waveguides of the same material and same cross section offered for delivery at one time shall be considered a lot:
N - pieces (lengths).

Inspection of dimensions and visual inspection of surface shall be performed on a sample of $n = \sqrt{2N}$ (e.g., If N = 200 pieces, the sample $n = \sqrt{2 \times 200} = 20$ pieces.)

The sample for profilometer measurement of surface roughness and eccentricity shall be 1 foot in length, cut from either end of a selected length.

The lot shall be accepted or rejected in accordance with a zero defective sampling plan. Lots that fail shall be 100 percent inspected for the defect identified and then resampled.

Custodians:
Army - CR
Navy - EC
Air Force - 85

Preparing activity:
DLA - CC
(Project 5985-1122)

Review activities:
Army - AR
Navy - AS, MC, OS
Air Force - 99