

Measurement of Maximum Permissible Exposure

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

2. Description of EUT

FCC ID	:	MSQWLHDD25
Product name	:	Wireless Hard Drive Box
Model name	:	WL-HDD2.5
Classification	:	Mobile Device (i) Under normal use condition, the antenna is at least 20cm away from the user; (ii) Warning statement for keeping 20cm separation distance and the prohibition of operating next to the person has been printed in the user's manual
Frequency Range	:	2.412 GHz ~ 2.462GHz
Supported Channel	:	11 Channels
Modulation Skill	:	DBPSK, DQPSK, CCK, OFDM
Power Type	:	Powered by the adapter, Model: ADP-15GH B Mfg.: DELTA Electronics, Inc. I/P: 100-240VAC, 50-60Hz, 0.5A; O/P: 5VDC, 3A 188cm length, non-shielded, no ferrite core

3. Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately. The following shows only our observation have the greatest emissions.]

According to OET BULLETIN 56 Fourth Edition/August 1999, Equation for Predicting RF Fields:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4\pi R^2} = \frac{67.45 \times 1.452}{4\pi(20)^2} = 0.01949 \text{ mW/cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{67.45 \times 1.452}{4\pi}} = 2.792 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 4.512 cm."

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dB antenna gain} / 10)$$

$$G = \text{Log}^{-1} (1.62 / 10) = 1.452$$

Appendix

Antenna Specification



WHA YU INDUSTRIAL CO., LTD. (HEAD OFFICE)
TAI HWA ELECTRONIC CO., LTD.(CHINA)
SHANGHAI HUA YU ELECTRONIC CO., LTD.(CHINA)
AEON TECH CO., LTD. (CHINA)

SPECIFICATION FOR APPROVAL

CUSTOMER: 華碩科技股份有限公司

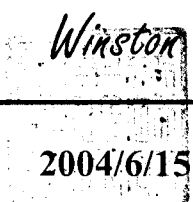
PART NAME: RF Antenna Assembly

PART NO.:

REVISION:

W. Y. P/NO.: C660-510012-A

REV.: X1

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :	2004/6/15	

WHA YU GROUP

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蘇州華廣電通有限公司

Address:Limin North Road, LiLi Town,LiLi Industrial Park,LinHu Economic Zone

Wujiang City,Jiangsu Province,China

Tel: + 86-512-63627980

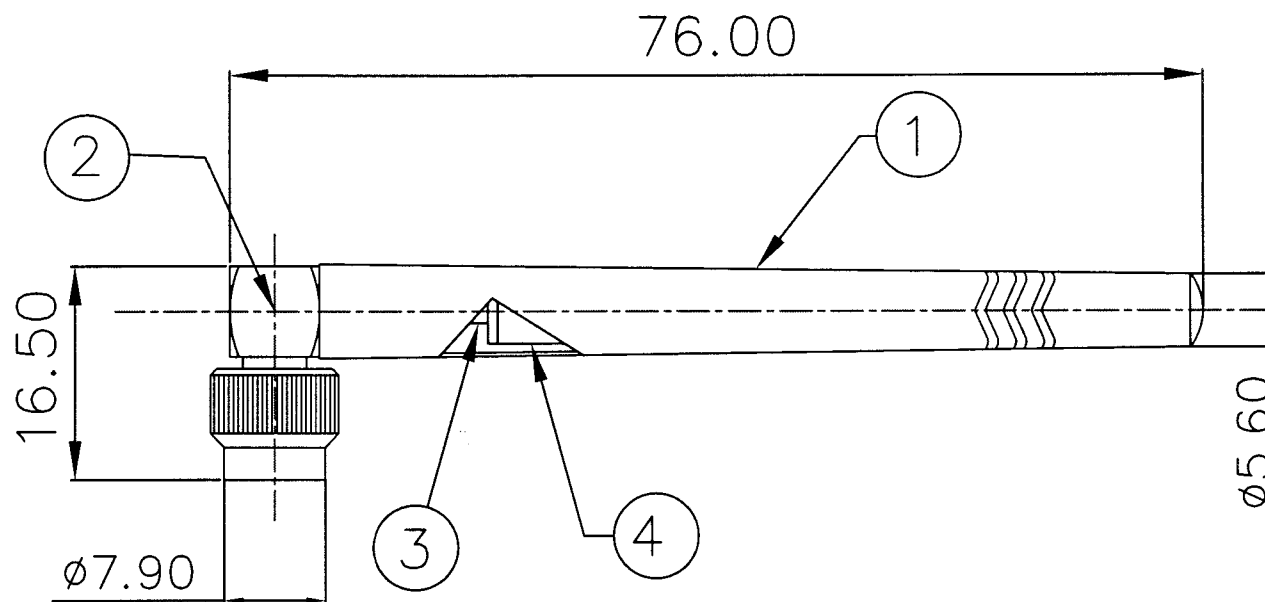
Fax: + 86-512-63627981

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CG-

REV	DATE	DESCRIPTION
X1	06/15-2004	New Issue



4	Ground Tube	Brass ,Ni Plated	1	
3	Cable	RG-178 ,50Ω ,Translucent Brown	1	
2	Connector	SMA Plug R/A Reverse ,Ni Plated	1	
1	Antenna Body	TPR TS-95 ; Color : Black	1	
NO	DESCRIPTION		QTY	REMARK

CUSTOMER'S SINGATURE

XX.	±3.0
X.	±2.0
.X	±1.0
.XX	±0.5
.XXX	±0.1
⊙	

APPROVED

W. Y. P. 6/18

CHECKED

+

DRAWING

昆宏 4/15

CUSTOMER: 華碩科技股份有限公司

PART NO :

PARTNAME: SMA RF Antenna

W.Y P/NO : C660-510012-A

REV UNIT FILE :

X1 m/m SHEET : 1/1

Wha Yu
INDUSTRIAL CO.,LTD.

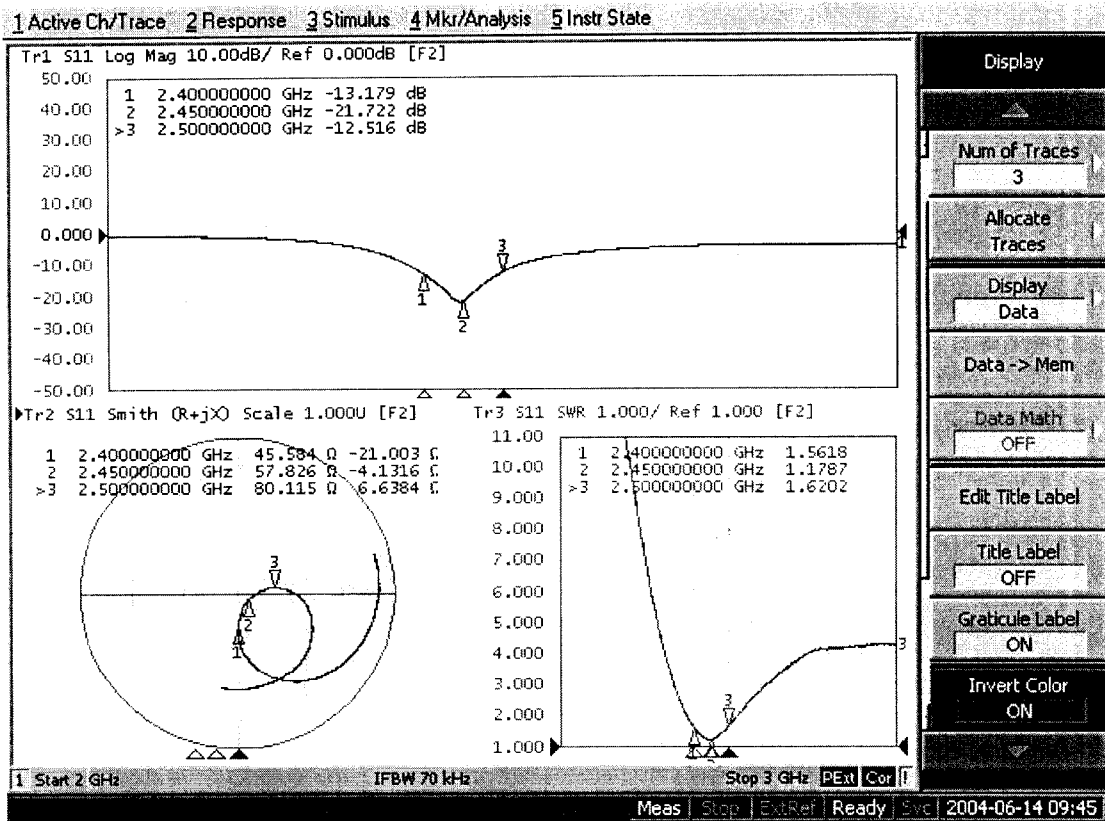
譚裕實業股份有限公司

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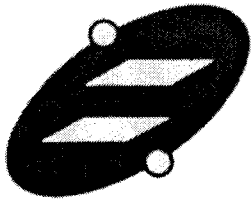


華裕實業股份有限公司
WHA YU INDUSTRIAL CO., LTD

RF Antenna Assembly
P/NO : C660-510012-A SPEC : 2.4 GHz



6/14/2004

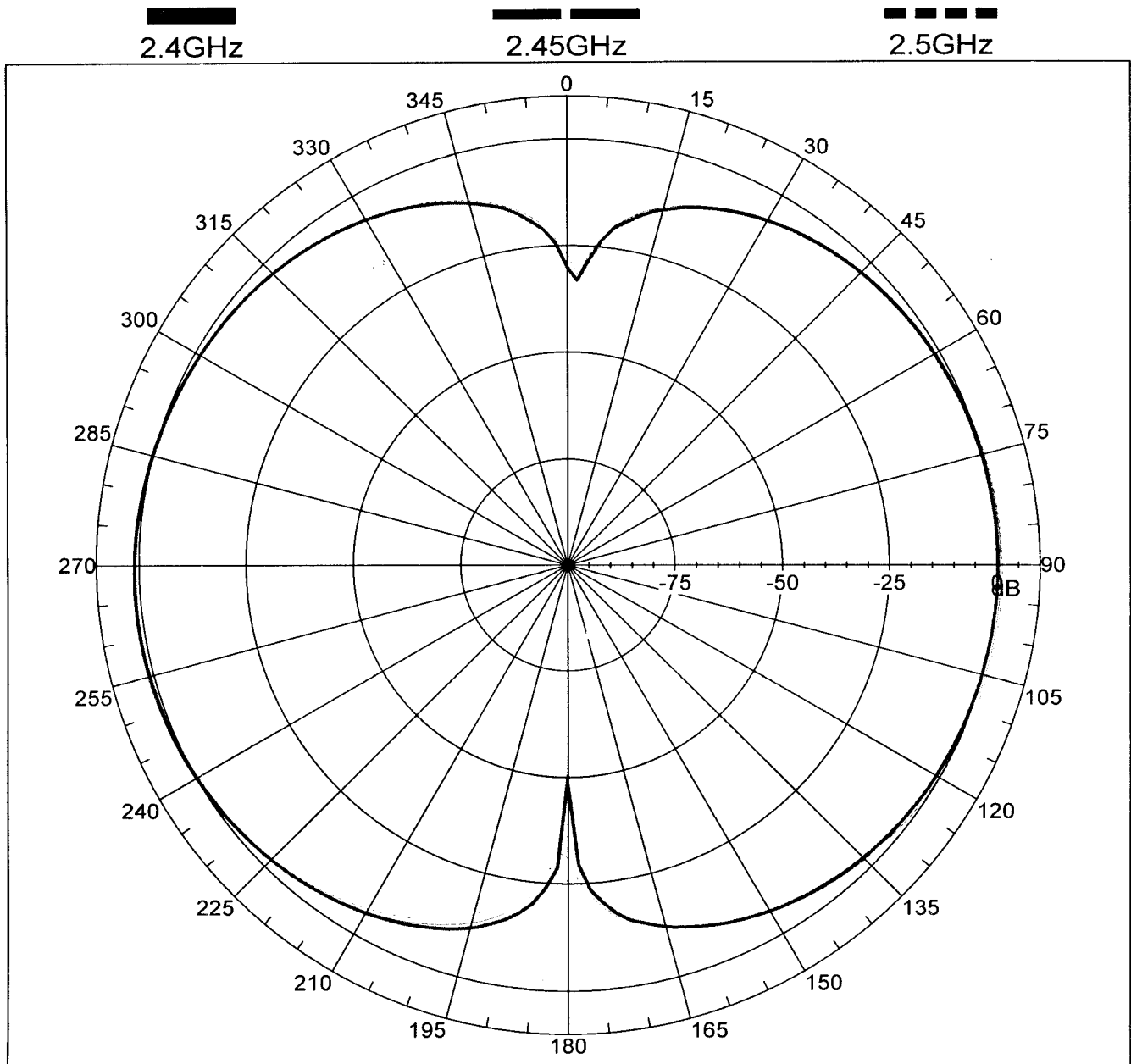


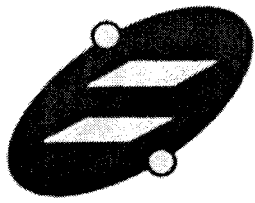
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WHA YU INDUSTRIAL CO., LTD

C660-510012-A

Far-field amplitude of 2.4GHz small dipole antenna-E-plane.nsi



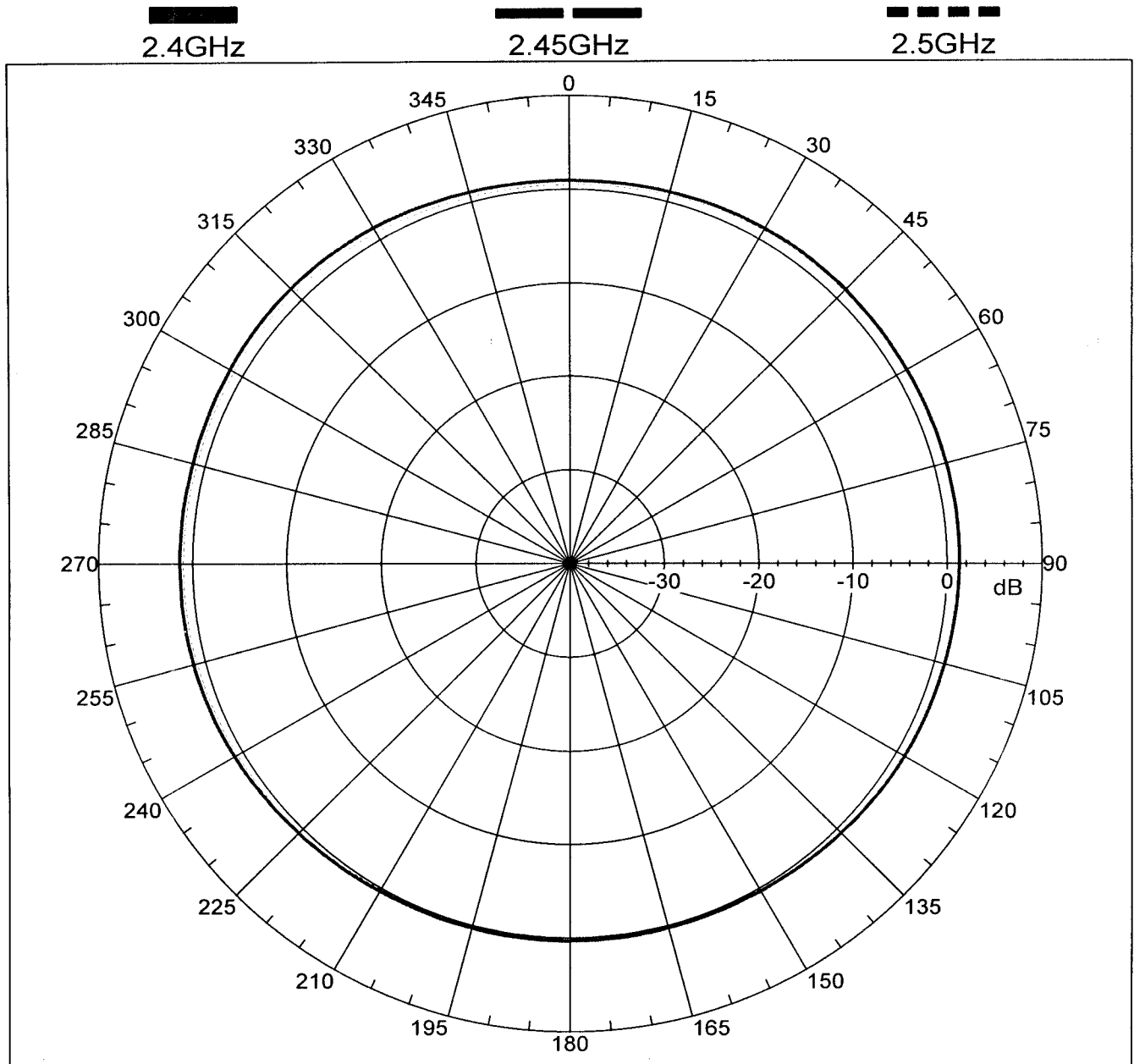


譚裕實業股份有限公司

WHA YU INDUSTRIAL CO., LTD

C660-510012-A

Far-field amplitude of 2.4GHz small dipole antenna-H-plane.nsi

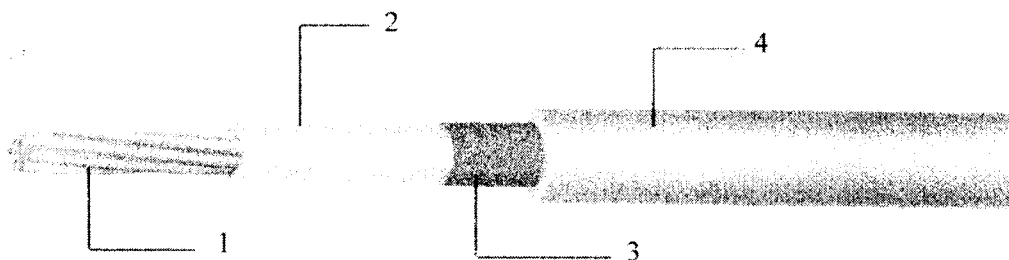


Nizing Electric Co., Ltd.11-15 Santai Rd., Hsinchuang, Taipei Hsien, 242, Taiwan, R.O.C
Tel: 02-29016164 Fax: 29050644 E-mail: shenbinnizing@yahoo.com.tw

RG 178 B/U	FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE	PAGE	1 / 2
PRODUCT STANDARD		ISSUED	21. Oct. 2003
		REVISED	

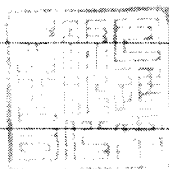
I - Scope

This specification presents a FEP insulated high-frequency coaxial cable AWG 30, 1.8 mm O.D. for internal wiring of electronic equipment, such as Computer / Notebook with wireless communication systems.

II - Construction

Item		Unit	Details
1. Inner Conductor	Material	—	CP-AG
	Composition	No./mm	AWG 30 or 7 × 0.1
	Dia. (approx.)	mm	0.305
2. Dielectric	Material	—	Extruded FEP
	Nom. O.D.	mm	0.84 ± 0.05
	Color	—	Natural
3. Outer Conductor	Material	—	Silver coated copper
	Composition	—	Braided (16 / 3 / 0.1)
	Dia. (approx.)	mm	1.29 ± 0.07
4. Jacket	Material	—	Extruded FEP
	Dia.	mm	1.80 ± 0.08
	Color	—	Standard color is Light Orange

Note :



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APPROVALS

Shen Bin Chao

Nizing Electric Co., Ltd.

11-15 Santai Rd., Hsinchuang, Taipei Hsien, 242, Taiwan, R.O.C.

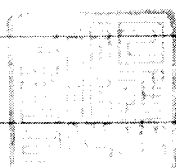
Tel: 02-29016164 Fax: 29050644 E-mail: shenbinnizing@yahoo.com.tw

RG 178 B/U	FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE	PAGE	2 / 2
PRODUCT		ISSUED	21. Oct. 2003
STANDARD		REVISED	

III – Characteristics

Item	Unit	Specified Value	Note
Temperature Rating	°C	-55 ~ +200	
Voltage Lasting	V	1000	
Dielectric strength	—	Dielectric core: No breakdown at AC 3 kv for 0.2 sec.	Spark test
		Jacket: No breakdown at AC 3 kv for 0.2 sec.	Spark test
Characteristic Impedance	Ω	50 ± 2	TDR method
Capacitance	pF / ft	29.4	
Attenuation. (Max.)	dB/100ft	16.0	100.0 MHz
		33.0	400.0 MHz
		52.0	1.0 GHz
		94.0	3.0 GHz
Approx. Weight	g / m	7.68	

Note :



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Cable Specification

Cable : Mil-C-17 Coaxial Cable RG-178

1. Construction :

- 1 Conductor..... 30AWG 7/38 SCCS
- 2 Dielectric..... PTFE OD : 0.033"±0.002"
- 3 Shielded.....38AWG SPC OD : 0.051" Nominal
- 4 Jacket.....FEP OD : 0.071"±0.004"

2. Physical Properties :

- 1 Weight per 1000ft..... 6.3 lbs Maximum
- 2 Bend Radius.....0.35" Minimum
- 3 Operating Temperature Range -55°C ~ 200°C

3. Electrical Properties:

- 1 Impedance..... 50±2 ohms
- 2 Capacitance..... 32 pF/ft Maximum
- 3 Cut off Frequency..... 116 GHz
- 4 Attenuation.....45.0 dB/100ft @ 1GHz
64.4 dB/100ft @ 2GHz
79.7 dB/100ft @ 3GHz
92.7 dB/100ft @ 4GHz
104.3 dB/100ft @ 5GHz
115.0 dB/100ft @ 6GHz

Mil-C-17 Coaxial Cable

QPL Approved

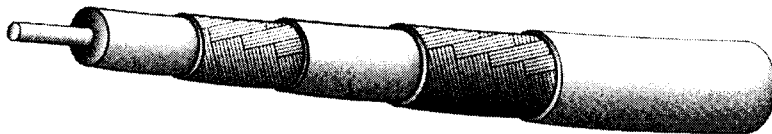
Single braid



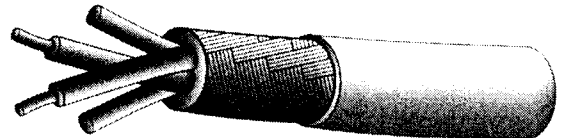
Double braid



Triax



Twinax



Harbour supplies a complete line of high temperature, high performance QPL approved MIL-C-17 coax cables for the military, commercial and industrial applications. The specific M17 constructions referenced are manufactured in accordance with the most recent revision of the MIL-C-17 specification. The MIL-C-17 specification defines complete physical and electrical characteristics for each M17 part number, including dimensional parameters, dielectric materials, shield construction, maximum attenuation, and VSWR levels.

VSWR Sweep Testing

When selecting a 50 ohm coaxial cable, constructions with VSWR requirements are recommended. Manufacturing and sweep testing cables with concern for VSWR ensures a quality cable free of spikes over the referenced frequency range. (Note the test frequencies specified in the electrical characteristics section.)

Precision PTFE Dielectrics

All of the high temperature, high performance coax cables listed have PTFE dielectrics with high dielectric strength and low capacitance in proportion to the dielectric constant. All PTFE dielectrics are manufactured with tolerances tighter than the MIL-C-17 specification to ensure uniformity of electrical characteristics, especially impedance, attenuation and VSWR.

Tape wrapped PTFE Constructions

Harbour also manufactures PTFE tape wrapped cables to a previous revision of the MIL-C-17 specification. These constructions can withstand operating temperatures up to 250° C. versus 200° C. for FEP jacketed cables. Also, PTFE tape wrapped cables are generally more flexible than their FEP jacketed counterparts.

UL Approvals

All of Harbour's M17 part numbers manufactured to the MIL-C-17 specification may be ordered with UL and FT4 approvals.

Mil-C-17 Coaxial Cables

Physical Characteristics:

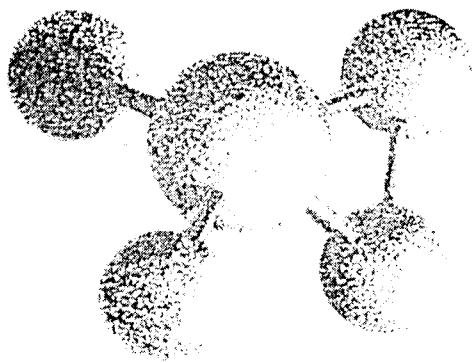
M17 Number	Center Conductor	PTFE Dielectric Diameter	Shield	Jacket	Overall Diameter	Minimum Recommended Bend Radius	Operating Temp. (%C)	Weight (lbs./MFT)	Comments
M17/60-RG142	.037" SCCS	.116"	SPC(2)	FEP	.195"	1.0"	-55 +200	43.0	
M17/93-RG178	.0120"(7/.004")SCCS	.033"	SPC	FEP	.071"	0.4"	-55 +200	6.3	
M17/93-00001	.0120"(7/.004")SCCS	.033"	SPC	PFA	.071"	0.4"	-55 +230	6.3	M17/93-RG178 w/ extended temp. range
M17/94-RG179	.0120"(7/.004")SCCS	.063"	SPC	FEP	.100"	0.4"	-55 +200	10.8	
M17/95-RG180	.0120"(7/.004")SCCS	.102"	SPC	FEP	.141"	0.7"	-55 +200	19.8	
M17/110-RG302	.0253"SCCS	.146"	SPC	FEP	.202"	1.0"	-55 +200	40.0	
M17/111-RG303	.037"SCCS	.116"	SPC	FEP	.170"	0.9"	-55 +200	31.0	
M17/112-RG304	.059"SCCS	.185"	SPC(2)	FEP	.280"	1.4"	-55 +200	94.0	
M17/113-RG316	.0201"(7/.0067")SCCS	.060"	SPC	FEP	.098"	0.5"	-55 +200	12.2	
M17/127-RG393	.094"(7/.0312")SC	.285"	SPC(2)	FEP	.390"	2.0"	-55 +200	165.0	
M17/128-RG400	.0384"(19/.008")SC	.116"	SPC(2)	FEP	.195"	1.0"	-55 +200	50.0	
M17/131-RG403	.0120"(7/.004")SCCS	.033"	SPC(2)	FEP(2)	.116"	0.6"	-55 +200	15.0	Triaxial M17/93-RG178
M17/152-00001	.0201"(7/.0067")SCCS	.060"	SPC(2)	FEP	.114"	0.6"	-55 +200	18.5	Double shielded M17/113-RG316
M17/158-00001	.037"SCCS	.116"	SPC(2)	FEP	.195"	1.0"	-55 +200	56.0	Unswpt M17/60-RG142
M17/169-00001	.0120"(7/.004")SCCS	.033"	SPC	FEP	.071"	0.4"	-55 +200	6.3	Unswpt M17/93-RG178
M17/170-00001	.037"SCCS	.116"	SPC	FEP	.170"	0.9"	-55 +200	39.0	Unswpt M17/111-RG303
M17/172-00001	.0201"(7/.0067")SCCS	.060"	SPC	FEP	.098"	0.5"	-55 +200	11.5	Unswpt M17/113-RG316
M17/174-00001	.094"(7/.0312")SCCS	.285"	SPC(2)	FEP	.390"	2.0"	-55 +200	175.0	Unswpt M17/127-RG393
M17/175-00001	.0384"(19/.008")SC	.116"	SPC(2)	FEP	.390"	1.0"	-55 +200	50.0	Unswpt M17/128-RG400
M17/176-00002	.0235"(19/.005")SPA(2)	.042"	SPA	PFA	.129"	0.6"	-55 +230	18.0	Controlled impedance twinax
PTFE Tape Wrap Jacketed RG Cables									
RG 187 A/U	.0120"(7/.004")SCCS	.063	SPC	PTFE	.100"	0.5"	-55 +250	10.0	Flexible, 250° C. rated
RG 188 A/U	.0201"(7/.0067")SCCS	.060	SPC	PTFE	.100"	0.5"	-55 +250	11.0	Flexible, 250° C. rated
RG 195 A/U	.0120"(7/.004")SCCS	.102	SPC	PTFE	.141"	0.7"	-55 +250	18.0	Flexible, 250° C. rated
RG 196 A/U	.0120"(7/.004")SCCS	.034	SPC	PTFE	.067"	0.4"	-55 +250	6.0	Flexible, 250° C. rated

Electrical Characteristics:

M17 Number	Impedance (ohms)	Capacitance (pF/ft)	Max. Operating Voltage (RMS)	Maximum attenuation (dB/100ft) @						Max Frequency (GHz)
				100 MHz	400 MHz	1 GHz	3 GHz	5 GHz	10 GHz	
M17/60-RG142	50 +/- 2	29.4	1900	5.5	11.7	19.0	35.0	48.0	-	17.4
M17/93-RG178	50 +/- 2	29.4	1000	16.0	33.0	52.0	94.0	-	-	3.0
M17/93-00001	50 +/- 2	29.4	1000	16.0	33.0	52.0	94.0	-	-	3.0
M17/94-RG179	75 +/- 3	19.4	1200	-	21.0	-	-	-	-	-
M17/95-RG180	95 +/- 5	16.4	1500	-	17.0	-	-	-	-	-
M17/110-RG302	75 +/- 3	19.4	2300	-	8.0	-	26.0	-	-	-
M17/111-RG303	50 +/- 2	29.4	1900	3.9	8.0	15.0	28.0	-	-	-
M17/112-RG304	50 +/- 3	29.4	3000	2.7	6.4	11.1	22.0	30.0	-	8.0
M17/113-RG316	50 +/- 2	29.4	1200	11.0	21.0	38.0	58.0	-	-	3.0
M17/127-RG393	50 +/- 2	29.4	2500	2.4	5.0	8.8	18.0	24.6	37.0	11.0
M17/128-RG400	50 +/- 2	29.4	1900	4.5	10.5	17.0	38.0	50.0	78.0	12.4
M17/131-RG403	50 +/- 2	29.4	1000	-	37.0	-	-	-	-	10.0
M17/152-00001	50 +/- 2	29.4	1200	11.5	24.0	40.0	75.0	110.0	170.0	12.4
M17/158-00001	50 +/- 2	29.4	1900	-	9.5	-	-	-	-	-
M17/169-00001	50 +/- 2	29.4	1000	-	29.0	-	-	-	-	-
M17/170-00001	50 +/- 2	29.4	1900	-	8.6	-	-	-	-	-
M17/172-00001	50 +/- 2	29.4	1200	-	21.0	-	-	-	-	-
M17/174-00001	50 +/- 2	29.4	2500	-	5.0	-	-	-	-	-
M17/175-00001	50 +/- 2	29.4	1900	-	10.5	-	-	-	-	-
M17/176-00001	77 +/- 7	19.0	1000	-	-	-	-	-	-	-
PTFE Tape Wrap Jacketed RG Cables										
RG 187 A/U	75 +/- 3	19.4	1200	-	21.0	-	-	-	-	3
RG 188 A/U	50 +/- 2	29.4	1200	11.0	21.0	38.0	58.0	-	-	3
RG 195 A/U	95 +/- 5	16.4	1500	-	17.0	-	-	-	-	3
RG 196 A/U	50 +/- 2	29.4	1000	-	29.0	-	-	-	-	-

"Maximum frequencies" are those as referenced on individual slant sheets of the Mil-C-17 specification. No values are given for unswept constructions as the specification recommends these cables should not be used above 400 MHz. (All figures referenced above are nominal unless otherwise specified.)

Two-part adhesive		1590	High Super 5	EP-330 (HighSuper30)	EP-331	1500	Super
Feature		curing for 5 min type		curing for 30 min type	curing for 30min type Low- viscosity	Standard type	
Appearance	Base	Clear, blue	Translucent, blue	Translucent, pink	Clear, light yellow	Clear, light yellow	Translucent
	Hardener	Clear ight yellow	Translucent, light yellow	Translucent, milk white	Clear, light yellow	Clear, light brown	Light yellow
Viscosity (Pa · S/20°C)	Base	8	120	80	7	25	100
	Hardener	12	70	170	7	60	50
Specific gravity (g/cm ²)	Base	1.17	1.17	1.17	1.16	1.16	1.14
	Hardener	1.11	1.15	1.14	1.16	0.97	0.99
Mixing ratio(Base : Hardener)		1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1
Pot life		Within 5 min	Within 5 min	Within 30 min	Within 30 min	Within 1 hr	Within 1 hr
Tensile shear stength(N/mm ²)		19.0	18.0	17.5	17.6	15.7	15.1
T-Formed peeling adhesion (N/mm)		2.71	0.31	0.47		0.40	
Hardness(shore D)		77	77	82	71	82	
Coefficient of linear expansion (× 10 ⁻⁵)		8.6	10.7	6.7	4.1	7.1	
Tg(°C)			47	43		53.7	
Volume resistivity(Ω · cm)			4.9 × 10 ¹⁵	3.8 × 10 ¹¹	3.6 × 10 ¹¹	1.1 × 10 ¹⁶	
Coefficient of water absorption(%)			2.5	2.3		0.8	
Capacity standards		Base 1 kg Hardener 1 kg	6 g set 15 g set 25 g set 80 g set	320 ml set Base 3 kg Hardener 3 kg 6 g set, 15 g set, 80 g set	Base 1 kg Hardener 1 kg	Base 500 g, 1 kg, 3 kg, 15 kg Hardener 500 g, 1 kg, 3 kg, 15 kg	15 g set 40 g set 110 g set



施敏打硬 CEMEDINE 1500

〔一般性質〕

	主 劑	硬 化 劑
主 要 成 分	環氧 (Epoxy) 樹脂 的中間體淺黃色透明 液體	聚醯胺 (Poly- Amido) 樹脂棕 色透明液體
顏 色 常 態		
不揮發率 (%)	99.6	99.4
黏度(9/20°C)	350	600
比重(20/20°C)	1.16	0.97
溶 劑	無	
硬化劑混合比例phr	60~110	
保持粘度時間	參照混合硬化劑後的粘度變化表	
膠 化 時 間	3小時	
硬化所需時間	6小時10分鐘	
可保存時間 (20°C)	2年	

〔特性〕

由兩種液體混合而成的環氧 (Epoxy) 樹脂系粘着劑，能在常溫下硬化，應用範圍至為廣泛，可穩定粘着金屬、塑膠以及其他各種物質。而由於此粘着劑，通常以聚醯胺 (Poly-Amido) 樹脂為其硬化劑，具有下列各優點：

1. 能在常溫下硬化。
2. 縱使所使用的硬化劑份量不同，也不影響其特性。
3. 由於能產生比一般粘着劑富有彈曲性的粘着層，即使粘着不同材質的物品，也能以粘着層緩和熱膨脹的差別所引起之兩物品彎曲，對機械學的衝擊也能顯示較為良好的性能。
4. 由於能形成透明的粘着層，可以粘着透明的物質，如玻璃等等。

〔用 途〕

由於能強力粘着各種物質，諸如金屬、熱硬化塑膠、玻璃、飛機黏配以及一般家庭器具等等，應用範圍至為廣泛。

縱然是複合乙烯 (Polyethylene)，聚酯 (Polyester)，天然以及人造橡膠等，以一般的粘着根本無法粘着的物質，如果加以適當的表面處理，即可強力粘着。

〔實 例〕

汽車、火車、船隻、飛機……（將金屬把手粘着於玻璃窗／可以粘着鋁製品，三聚環胺 (Melamine) 裝飾板等，於內部以增加強度／不同金屬間為兼防止電偶且加黏之／當作防銹塗料亦可）。

電器製品……（由於是一種優秀的粘着劑，使用於高級擴音器、音響機頭的粘着／電磁器或外殼的粘着／無線電的粘着／收音機的粘着／馬達轉動的粘着等等）。

建築……（於牆、壓克力門或將文字板黏於屏風黏注把手／窗明設備以及其造型裝飾品的加黏以及欄杆／不銹鋼製品、鋁製建材、陶器或大理石等需要強力粘着劑的品之加黏）。

高級裝飾品，玻璃以及塑膠製工藝品，精密機械……（照像機，攝影距離儀／分光儀等等的固定），其他諸如鐘頭，運動器材，公路標誌等等的加黏。除上述各種加黏外，也可以使用作填充劑，鑄模用，敷層用以及填塞用。

溫度 (°C)	時間 (分鐘)	黏度 (cP)
20	10	1000
30	10	600
40	10	300
50	10	150
60	10	75
70	10	37.5
80	10	18.75
90	10	9.375
100	10	4.6875
110	10	2.34375
120	10	1.171875
130	10	0.5859375
140	10	0.29296875
150	10	0.146484375
160	10	0.0732421875
170	10	0.03662109375
180	10	0.018310546875
190	10	0.0091552734375
200	10	0.00457763671875
210	10	0.002288818359375
220	10	0.0011444091796875
230	10	0.00057220458984375
240	10	0.000286102294921875
250	10	0.0001430511474609375
260	10	0.00007152557373046875
270	10	0.000035762786865234375
280	10	0.0000178813934326171875
290	10	0.00000894069671630859375
300	10	0.000004470348358154296875
310	10	0.0000022351741790771484375
320	10	0.00000111758708953857421875
330	10	0.000000558793544769287109375
340	10	0.0000002793967723846435546875
350	10	0.00000013969838619232177734375
360	10	0.000000069849193096160888671875
370	10	0.0000000349245965480804443359375
380	10	0.00000001746229827404022216796875
390	10	0.000000008731149137020111083984375
400	10	0.0000000043655745685100555419921875
410	10	0.00000000218278728425502777099609375
420	10	0.000000001091393642127513885498046875
430	10	0.0000000005456968210637569427490234375
440	10	0.00000000027284841053187847137451171875
450	10	0.000000000136424205265939235687255859375
460	10	0.0000000000682121026329696178436279296875
470	10	0.00000000003410605131648480892181396484375
480	10	0.000000000017053025658242404460906982421875
490	10	0.0000000000085265128291212022304534912109375
500	10	0.00000000000426325641456060111522674560546875
510	10	0.000000000002131628207280300557613372802734375
520	10	0.0000000000010658141036401502788066864013671875
530	10	0.00000000000053290705182007513940334320068359375
540	10	0.000000000000266453525910037569701671600341796875
550	10	0.0000000000001332267629550187848508358001708984375
560	10	0.00000000000006661338147750939242541790008544921875
570	10	0.000000000000033306690738754696212708950042724609375
580	10	0.0000000000000166533453693773481063544750213623046875
590	10	0.00000000000000832667268468867405317722375106815234375
600	10	0.000000000000004163336342344337026588611875534076171875
610	10	0.0000000000000020816681711721685132943059377670380859375
620	10	0.00000000000000104083408558608425664715296888351904296875
630	10	0.000000000000000520417042793042128323576483441759521484375
640	10	0.0000000000000002602085213965210641617882417208797607421875
650	10	0.00000000000000013010426069826053208089412086043988037109375
660	10	0.00000000000000006505213034913026604044706043021994018546875
670	10	0.000000000000000032526065174565133020223530215109970092734375
680	10	0.0000000000000000162630325872825665101117651075549850463671875
690	10	0.00000000000000000813151629364128325505588255377749252318359375
700	10	0.000000000000000004065758146820641627527941276888746261591796875
710	10	0.0000000000000000020328790734103208137639706384443731307958984375
720	10	0.00000000000000000101643953670516040688198531922218656539794921875
730	10	0.000000000000000000508219768352580203440992659611093282698974609375
740	10	0.0000000000000000002541098841762901017204963298055466413494873046875
750	10	0.00000000000000000012705494208814505086024816490277332067474365234375
760	10	0.000000000000000000063527471044072525430124082451386660337371826171875
770	10	0.0000000000000000000317637355220362627150620412256933301686859130859375
780	10	0.00000000000000000001588186776101813135753102061284666508434295654296875
790	10	0.000000000000000000007940933880509065678765510306423332542171478271484375
800	10	0.00000000000000000000397046694025453283938275515321166627108573913571875
810	10	0.00000000000000000000198523347012726641969137757660583313554286956784375
820	10	0.000000000000000000000992616735063633209845688788302916567771434783921875
830	10	0.0000000000000000000004963083675318166049228443941514582838857173919609375
840	10	0.00000000000000000000024815418376590830246142219707572914194285869598046875
850	10	0.000000000000000000000124077091882954151230711098537864570971429347990234375
860	10	0.0000000000000000000000620385459414770756153555492689322854857146739951171875
870	10	0.00000000000000000000003101927297073853780767777463446614274285733699755859375
880	10	0.000000000000000000000015509636485369268903838887317233071371428668498779296875
890	10	0.0000000000000000000000077548182426846344519169436586165356857143342493896484375
900	10	0.00000000000000000000000387740912134231722595847182930826784285716712469482421875
910	10	0.000000000000000000000001938704560671158612979235914654133921428583562347412109375
920	10	0.00000000000000000000000096935228033557930648961795732706696071429178117370546875
930	10	0.000000000000000000000000484676140167789653244808978663533480357145890586852734375
940	10	0.000000000000000000000000242338070083894826622404489331766740178572945292426171875
950	10	0.0000000000000000000000001211690350419474133112022446658833700892864726462126459375
960	10	0.00000000000000000000000006058451752097370665560112233294168504464323632310632296875
970	10	0.000000000000000000000000030292258760486853327800561166470842522321618161553161484375
980	10	0.0000000000000000000000000151461293802434266639002805832354212611608090807765807421875
990	10	0.00000000000000000000000000757306469012217133305001402661771063058040454038829037109375
1000	10	0.00000000000000000000000000378653234506108566652500701330885531529020227019414518546875

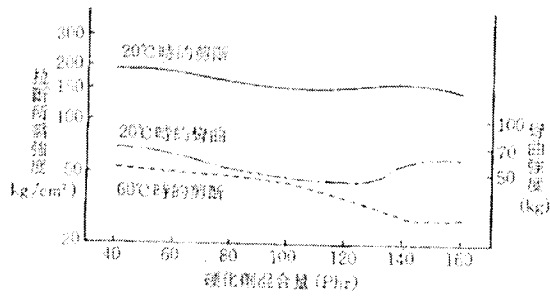


圖 II 2.1
硬化劑混合量と粘着力強度
(在20°C七天の硬化)
試験片: 軟鋼板 (25×100×1.6mm)
(Over-lap)12.5mm

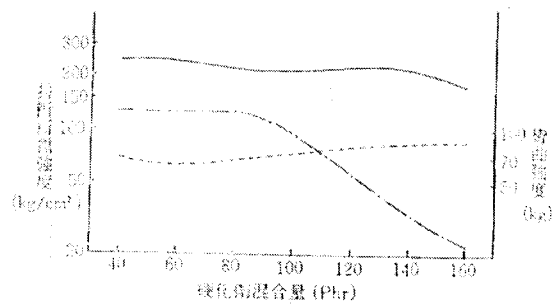


圖 II 2.2
硬化劑混合量と粘着力強度
(在80°C一小時の硬化)
試験片: 以及其他同圖 II 2.1

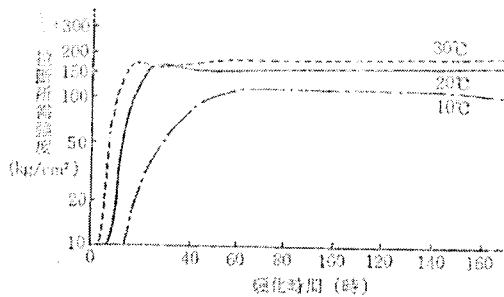


圖 II 2.3
常溫時の硬化特性 硬化劑混合率 100phr

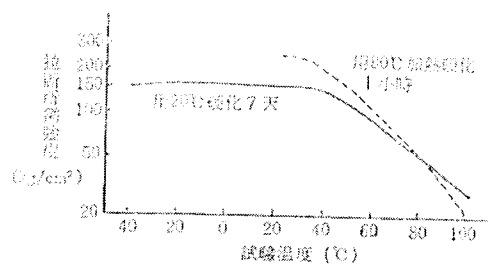


圖 II 2.5
耐熱特性 硬化劑混合率為 100phr

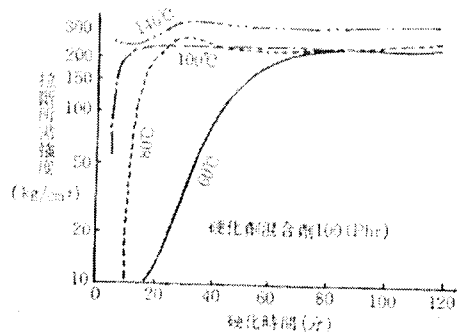


圖 II 2.4
加熱硬化特性 硬化劑混合率為 100phr

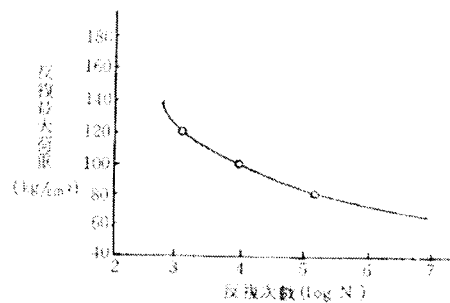


圖 II 2.6
疲労特性

表 II 2.1 物理特性

抗張力 (kg/mm ²)	5.01	硬度 { ロックウェル M	63
抗折力 (kg/mm ²)	7.40	{ ハードネス	67
伸び率 (kg/mm ²)	214	{ ショアー D	82
耐張強度 (kg/mm ²)	11.6	表面固定電阻 (Ω)	5.6×10 ¹³
耐腐蝕度 (kg/mm ²)	15.10(6.41)(°)	體積固有電阻 (Ω·cm)	10.5×10 ¹³
熱變形溫度 (°C)	47	誘電率 (10 ³ cycle)	2.94
		電線破損 (kv/mm)	19

表II 2.2 拉斷所需強度

被 粘 體	拉 斷 所 需 強 度	被 粘 體	拉 斷 所 需 強 度 (20°C)
橡 膠 封	83	多 元 焦 炭	22
馬 來 西 亞 杉 木	106 *	苯 乙 烯 樹 脂	19
針 葉 樹 木	99 < *	聚 氯 乙 烯 樹 脂	30
杉 木	66	硬 質 鹽 漆 樹 脂	36
楓	158	三 聚 氰 胺 裝 飾 板 (表 面)	55
松	61	三 聚 氰 胺 裝 飾 板 (背 面)	45
黃 銅	80		
鋼	80		
鋁 電 鍍	71	F R P	125
鋁 電 鍍	50		

【註】1. 粘着條件：20°C，硬化7天，硬化劑混合比 100phr(接合部over-lap)12.5mm。

2. *記號者表示材料拉斷。

表II 2.3 促進劣化特性

試 驗	未試驗前的粘力 強度 (kg/cm ²)	比較調整試驗片的 粘力強度(t) (1個 月) (kg/cm ²)	經過各試驗1個月 後的粘力強度 (kg/cm ²)	經過各試驗1,000 小時後的粘力強度 (kg/cm ²)
利用測候儀所做的耐濕試驗	143	150	—	166
利用噴射鹽水的促進試驗	143	150	100	—
利用高溫高濕的促進試驗(2)	143	150	143	—
利用反覆冷卻的促進試驗(3)	143	150	183	—

【註】(1) 20±1°C, 65±5%RH 各保持1個月的試驗片；(2) 50°C100%RH；(3) -5°C8小時~50°C16小時。

表II 2.4 耐 候 性

拉斷所需強度 (kg/cm²)

暴 露 前 的 粘 力 強 度				147
比較調整試驗片的粘力強度 (6個月)	※	156	在戶外暴露6個月的粘力強度	147
" (1年)	※	138	" 1年 "	152
" (2年)	※	130	" 2年 "	133
" (3年)	※	123	" 3年 "	137
" (10年)	※	111	" 10年 "	139

【註】※20±1°C, 65±5%RH 保持各期間的試驗片。

表II 2.5 耐水性 (20°C, 7天硬化)

拉斷所需強度 (kg/cm²)

時間	0	3個月	6個月	1年
常態試驗	120	106	123	120
耐水試驗		100	117	109

【註】硬化劑混合比為 100phr
試驗片：丁腈膠 (100×25×1.5mm)
(接合部Over-lap)12.5mm。

表II 2.6 耐水性 (50°C, 2小時硬化)

拉斷所需強度 (kg/cm²)

時間	0	3個月	6個月	1年
常態試驗	157	150	169	163
耐水試驗		133	108	116

【註】同表II 2.5

表II 2.7 耐油性

拉斷所需強度 (kg/cm²)

放置日數	1天	3天	5天	10天	20天	1個月
放置於20°C室溫	—	—	—	80.0	—	79.0
0°C油中	—	—	77.5	87.5	—	80.0
20°C油中	—	—	82.5	77.6	—	89.5
70°C油中	77.6	75.3	80.0	74.3	—	71.0
循環油中 (cycle)	—	—	79.0	78.0	89.0	76.0

放置日數	40天	2個月	3個月	6個月	1年	10年
放置於20°C室溫	—	—	73.0	65.9	76.3	95.4
0°C油中	—	86.5	71.5	80.5	80.2	—
20°C油中	—	70.5	79.5	78.7	79.7	—
70°C油中	—	75.5	—	75.4	68.3	—
循環油中 (cycle)	71.5	—	—	—	—	—

[註] 1. 硬化劑混合比為80phr，試驗片電木片 (100×25×3mm)接合部(Over-lap)12.5mm 2. 油為變壓器油。
3. 試驗片全部破裂。

表II 2.8 耐溶劑、耐藥品性

種 類		浸漬7天後的黏力保持率 (%)		浸漬1個月後的黏力保持率 (%)	
		以20°C硬化7天 的試驗片	以80°C硬化1小 時的試驗片	以20°C硬化7天 的試驗片	以80°C硬化1小 時的試驗片
溶 劑	已 烷	107.0	80.6	94.1	78.8
	乙 醇	85.5	63.8	51.7	66.8
	丙 酮	88.8	69.5	93.4	70.8
	四 氫 呋 喃	89.5	71.3	97.4	68.7
	三 氯 乙 烯	90.2	64.7	101.3	69.1
	三 氯 化 碳	91.5	72.7	65.0	69.5
油	植 物 油	102.7	90.8	107.3	90.3
	礦 物 油	96.2	87.8	98.1	84.2
藥 品	蒸 餾 水	93.4	72.3	96.3	69.3
	10% 硝酸溶液	93.4	72.8	79.8	69.8
	10% 硫酸溶液	74.7	67.8	70.8	57.2
	10% 苛性氫鈉溶液	97.2	74.3	83.8	71.3
	10% 食鹽水溶液	89.6	71.8	91.0	69.8
	10% 醋酸溶液	91.2	77.8	78.4	64.2

[註] 黏劑混合率=1:1，試驗片：電木片 (25×100×1.6mm) 但是耐藥試驗時使用了SUS-27，接合部 (Over-lap) 為12.5mm。

容量規格—(主)、(硬) 110g、1kg、15kg (組)



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