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)

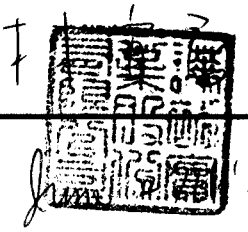
SPECIFICATION FOR APPROVAL

CUSTOMER: ***Fire tide***

PART NAME: ***RF Antenna Assembly***

PART NO.: ***REVISION:***

W. Y. P/NO.: ***C812-510010-A*** ***REV.:*** ***X1***

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :		

WHA YU GROUP

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Fax: + 86-512-63627981

Contents

RF Antenna Cable Assembly

Specification

1. Electrical Properties :

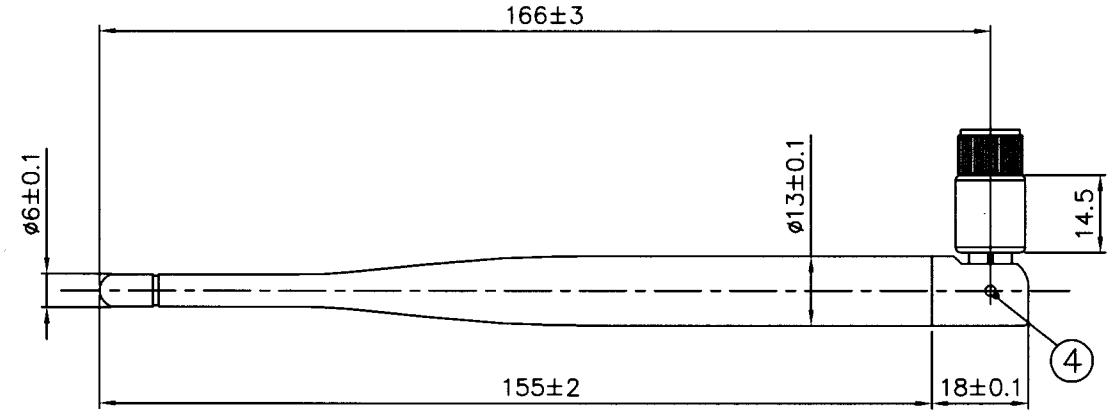
1.1	Frequency Range……	2.4GHz ~ 2.5GHz
1.2	Impedance ……	50Ω Nominal
1.3	VSWR ……	1.92 Max.
1.4	Return Loss……	-10 dB Maximum
1.5	Electrical Wave……	1/2λDipole
1.6	Gain(peak)……..……	5dBi
1.7	Admitted Power……	1W

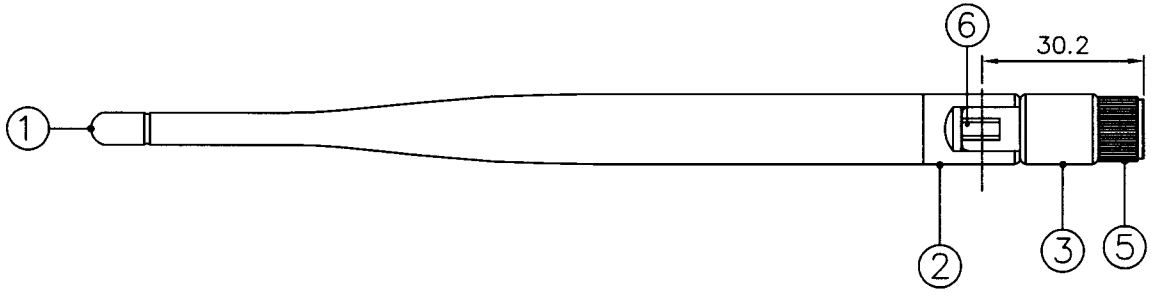
2. Physical Properties :

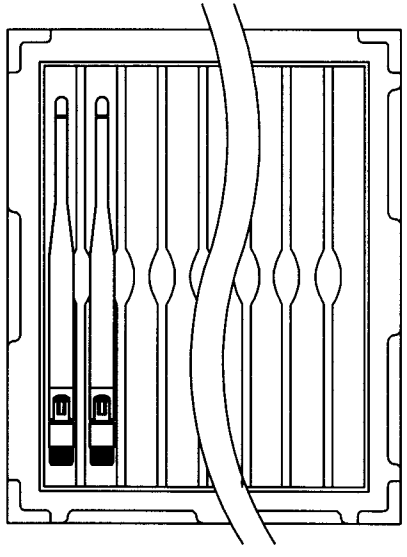
2.1	Cable……	RG-178 Coaxial Cable
2.2	Antenna Cover……	TPE
2.3	Antenna Base……	PC
2.4	Antenna Base……	PBT
2.5	Operating Temp. ……	-20℃ ~ +65℃
2.6	Storage Temp. ……	-30℃ ~ +75℃
2.7	Color ……	Black
2.8	Connector…...……	SMA Plug Reverse

CG-

REV	DATE	DESCRIPTION
X1	6/24-2005	New Issue







Packing : 20 pcs/ Tray

NO	DESCRIPTION	QTY	REMARK
6	Cable RG-178 ; 50 Ω	1	
5	Connector Big SMA Straight Plug Reverse	1	
4	Rivet POM ; Color : Black	2	
3	Antenna Base PBT Color : Black	1	
2	Antenna Base PC Color : Black	1	
1	Antenna Body TPE Color : Black	1	

CUSTOMER'S SINGATURE

XX.	±5
X.	±1.0
.X	±0.1
.XX	±0.01
.XXX	±0.005

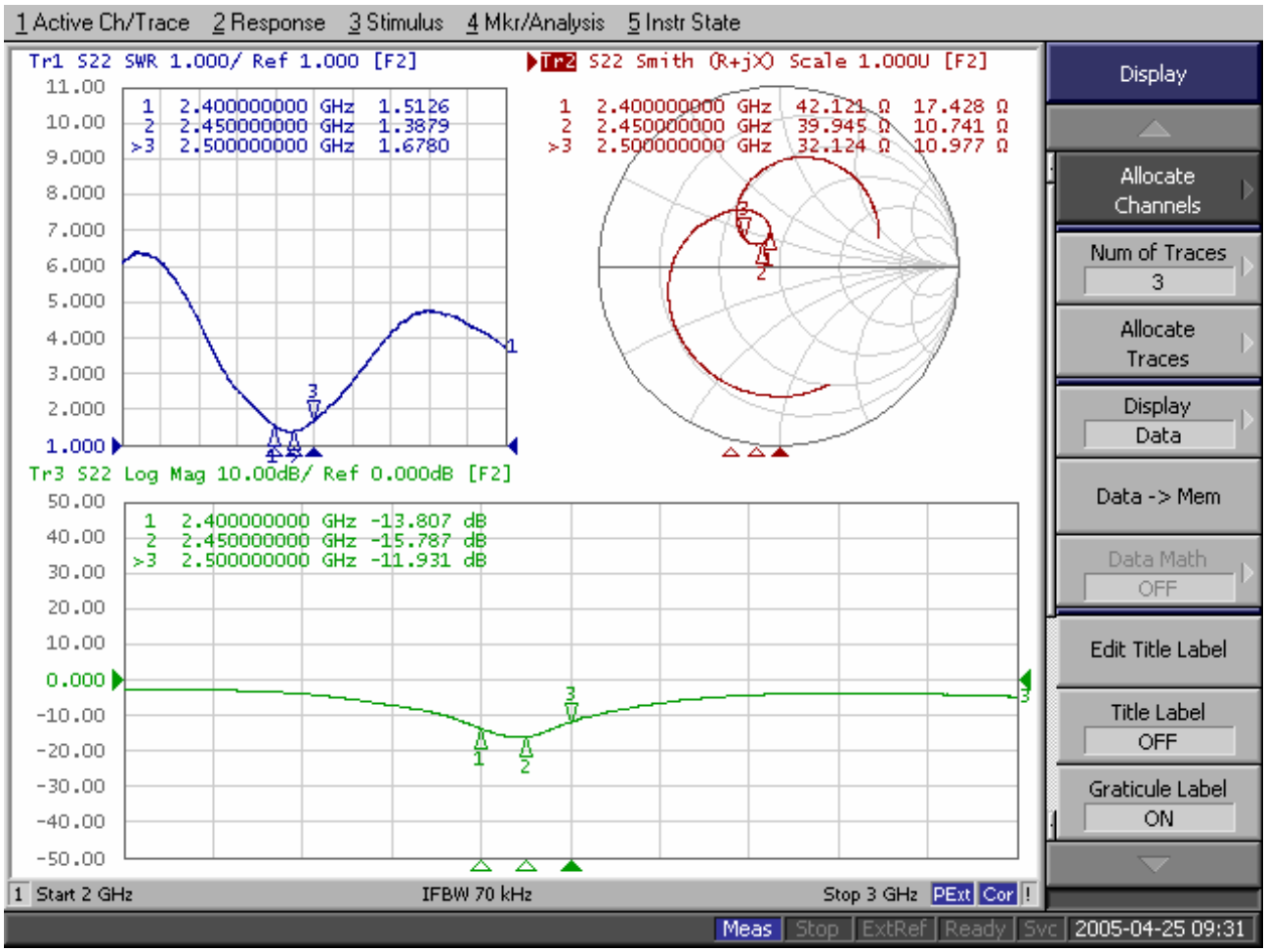
APPROVED
CHECKED
DRAWING 程淑娟

CUSTOMER:	Fire tide	
PART NO :		
PARTNAME:	RF Antenna Assembly	
W.Y P/NO :	C812-510010-A	
REV	UNIT	FILE :
X1	m/m	SHEET : 1/1

Wha Yu
INDUSTRIAL CO.,LTD.
譁裕實業股份有限公司

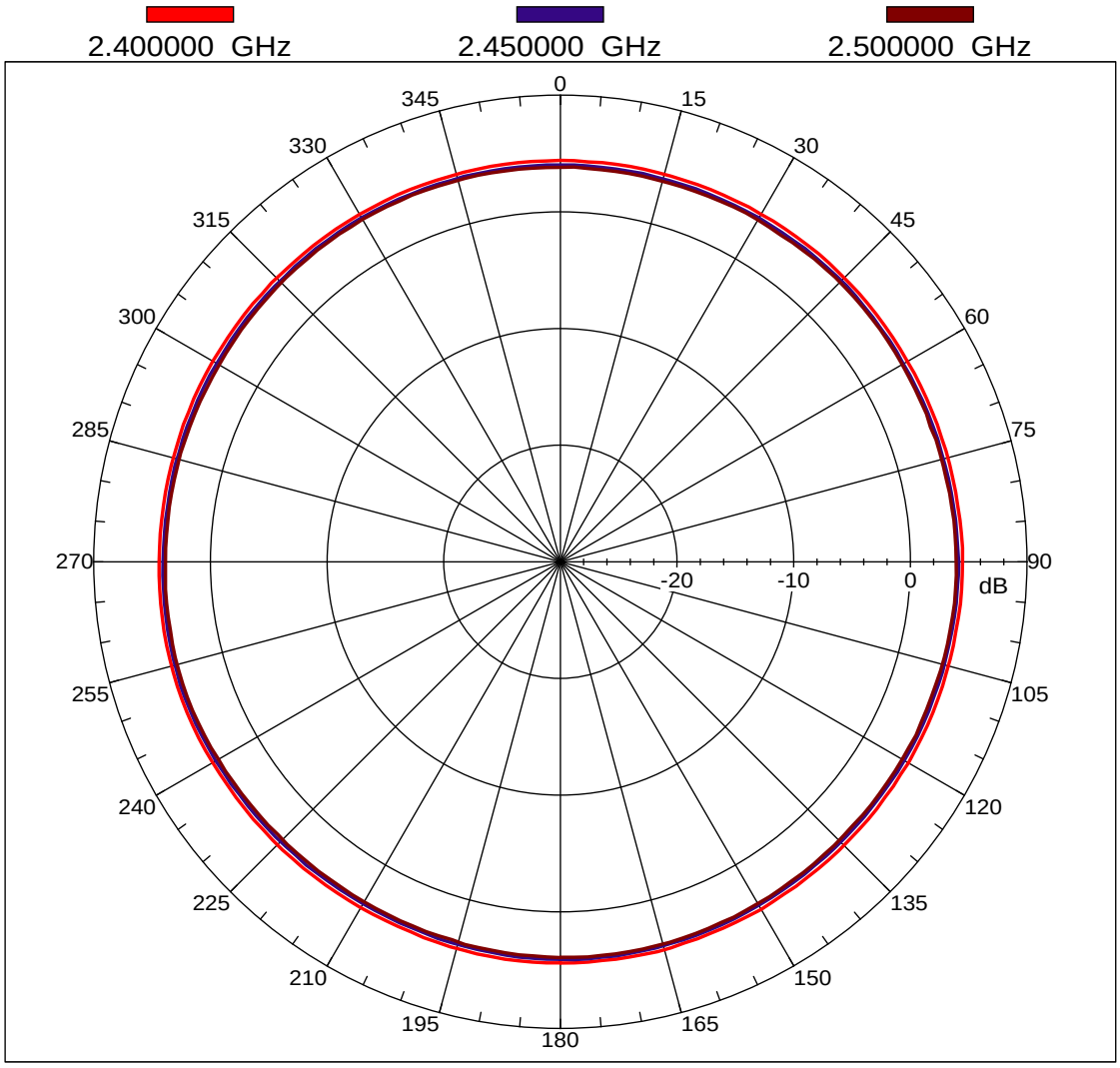
RF Antenna Assembly

P/NO :C812-510010-A SPEC : 2.4GHz



6/24/2005

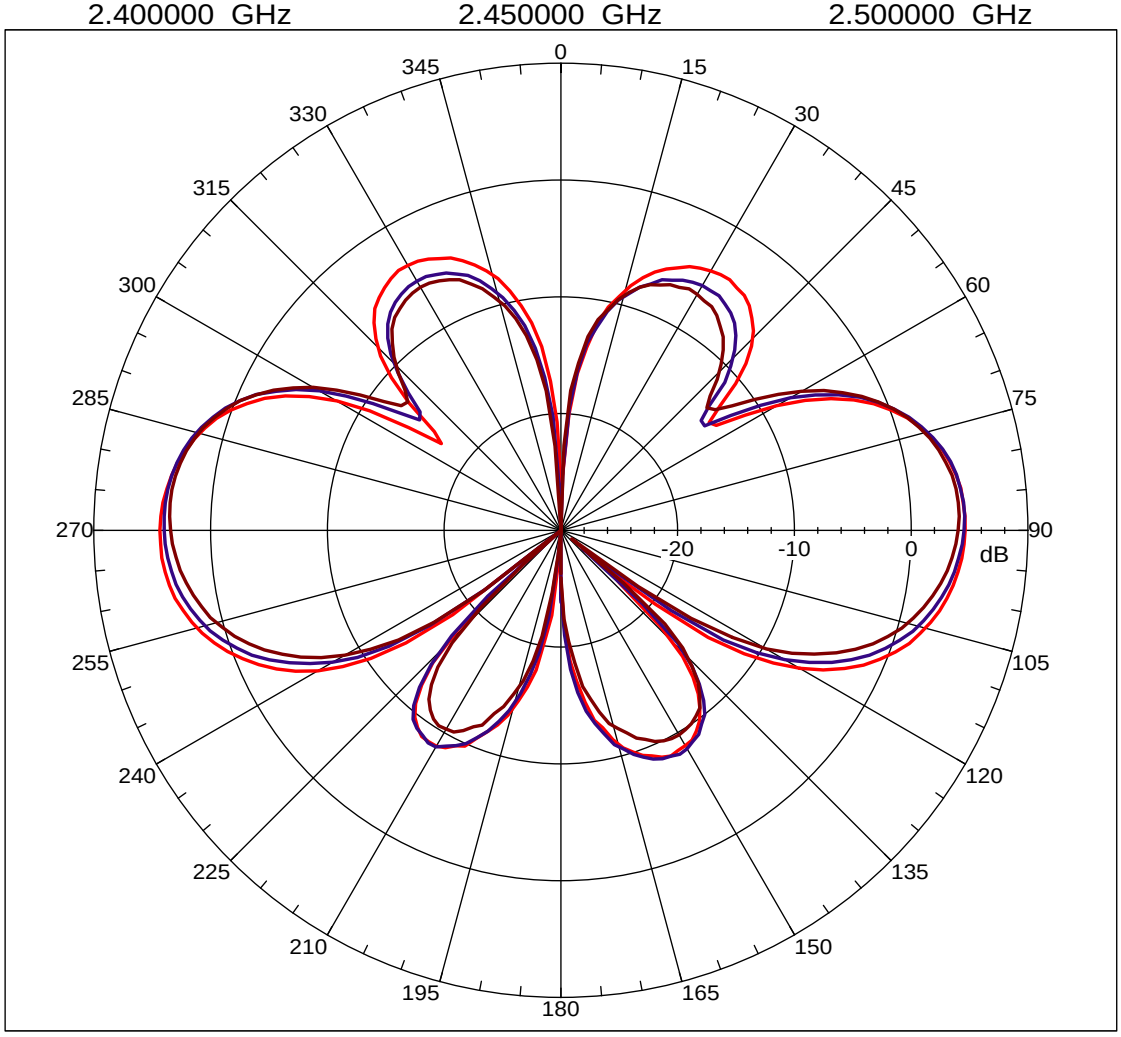
Far-field amplitude of C812-510010-A.nsi



6/24/2005

Far-field amplitude of C812-510010-A.nsi

2.400000 GHz 2.450000 GHz 2.500000 GHz



6/24/2005

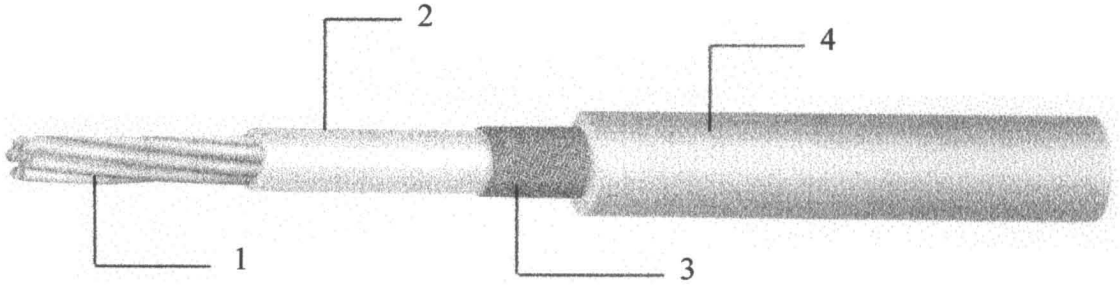
Nizing Electric Co., Ltd. 11-15 Santai Rd., Hsinchuang, Taipei Hsien, 242, Taiwan, R.O.C.
Tel: 02-29016164 Fax: 29050644 E-mail: shenbinnizing@yahoo.com.tw

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 :

MADE BY	Rocbe Liu
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

III – Characteristics

Item	Unit	Specified Value	Note
Temperature Rating	℃	-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 :

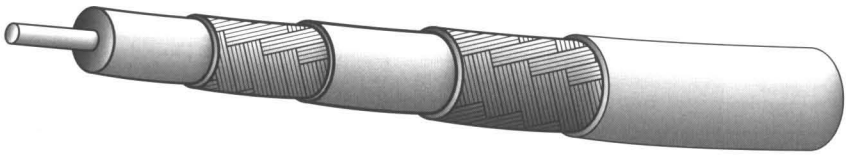
MADE BY	Phoebe Lin
APPROVALS	Shen Bin Chao

Mil-C-17 Coaxial Cable QPL Approved

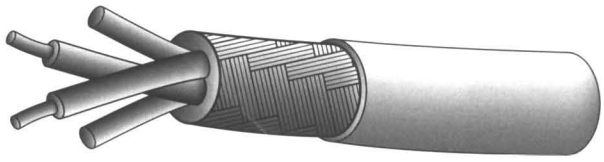
Single braid

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	Unswept M17/60-RG142
M17/169-00001	.0120"(7/.004")SCCS	.033"	SPC	FEP	.071"	0.4"	-55 +200	6.3	Unswept M17/93-RG178
M17/170-00001	.037"(SCCS	.116"	SPC	FEP	.170"	0.9"	-55 +200	39.0	Unswept M17/111-RG303
M17/172-00001	.0201"(7/.0067")SCCS	.060"	SPC	FEP	.098"	0.5"	-55 +200	11.5	Unswept M17/113-RG316
M17/174-00001	.094"(7/.0312")SCCS	.285"	SPC(2)	FEP	.390"	2.0"	-55 +200	175.0	Unswept M17/127-RG393
M17/175-00001	.0384"(19/.008")SC	.116"	SPC(2)	FEP	.390"	1.0"	-55 +200	50.0	Unswept 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	Impedence (ohms)	Capacitance (pF/ft)	Max. Operating Voltage (RMS)	Maximum attenuation (dB/100ft) @ 100 MHz	400 MHz	1 GHz	3 GHz	5 GHz	10 GHz	Max Freguency (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	15.4	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.)

Arnitel **天線桿套材質特性表**

polyether esters
polyetherester
esters de polyether

⇓

Units Einheiten Unites	EM400	EM460	EL550	EL630	EL740	PL380
	1.12	**1.16**	**1.20**	1.23	1.27	1.18
℃	195	185	202	212	221	197
μm/m.k	220	160	180	140	110	150
℃	\	\	110	115	120	\
℃	130	150	180	200	200	145
℃	\	50	85	115	150	\
%	0.30	0.30	0.20	0.20	0.15	0.40
%	0.75	0.70	0.55	0.60	0.90	7.0
*	HB	HB	HB	HB	HB	HB
Mpa	55	110	220	375	900	60
Mpa	4.0	7.1	13.2	20.2	26.9	3.5
Mpa	5.4	9.0	15.7	23	22.6	5.2
Mpa	8.4	11.4	16.6	22.0	26.3	8.5
Mpa	17	21	32	40	45	16
%	700	800	600	600	360	450
kj/㎡	NB	NB	NB	NB	NB	NB
kj/㎡	NB	NB	NB	NB	200	NB
kj/㎡	NB	NB	NB	NB	9	NB
kj/㎡	NB	NB	20	4	4	NB
	38	45	55	63	74	38
MV/m	\	\	\	\	\	\
Ω.cm	$5*10^{14}$	10^{14}	10^{14}	10^{14}	10^{12}	10^{12}
Ω	$>10^{13}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{10}$	$>10^{13}$
\	4.1	\	\	3.8	\	4.7
\	4.0	4.4	4.0	3.4	3.3	4.4
$x10^{14}$	10	\	\	3.8	\	310
$x10^{14}$	170	350	400	350	300	350
\	800	800	600	600	600	800
\	600	600	600	800	800	600

2.2 Product coding

The structure of the Arnitel productcodes is illustrated wirth the following example:

U M 55 1 - V

Thermoplastic elastomer type:
E = polyether ester; polyether = PTHF
P = polyether ester; polyether = PEO/PPO
U = polyester ester; (with extra urethane linkages)

Indication of viscosity range or processing technique
L, M = injection moulding and extrusion
B = blow moulding grade

Indication of hardness (Shore D)

Serial number

Indication of additives, perfomance
H = heat-stabilized
L = light/UV stabilized
V = flame-retardant (not V-0)
S = flame-retardant (V-0)

Figure 2.2: *Arnitel product coding*

2.3 Product portfolio

The Arnitel productrange is available with a hardness from 38 to 74 Shore D. The general Arnitel grades are shown in table 2.2. In order to enhance the flexibility of the portfolio a set of masterbatches (a.o. for heat, UV, etc) are on offer (refer to § 2.4).
Because of the development of these masterbatches heat stabilised Arnitel P is suggested for application areas where thermo-oxidative stability is an issue. For applications where colour and UV stability is required, the Arnitel E range is advised.

	Shore D					
	38	**40**	**46**	**55**	**63**	**74**
Arnitel E		EM400	EM460	EL550 EM550	EL630 EM630	EL740 EM740
Arnitel P	PL380		PL460	PL580 PM581		
Arnitel U				UM551 UM551-V UM552 UM552-V	UM622	

Table 2.2: *Arnitel productrange for general purpose*

Besides these multi-purpose grades, specialty grades can be offered for specific purposes and/or application areas. These grades are not intended for regular sales and are therefore restricted. Permission from marketing is needed before sampling is initiated.

	A'tel E	**A'tel P**	**A'tel U**
Automotive			
• CVJ boots	EB460 EB463 EB464		
• Boyplugs		PL380-M0	
Extrusion			
• Roofing foil	EM402-L		

Table 2.3: *Examples of specialty grades*

2.8.31 General:
Arnitel is the brand name of a series polyester based thermoplastic elastomers. These polymers combine excellent processability with good elastomeric properties between -40 and 200°C. Arnitel EL630 and EM630 are excellent materials for injection moulding and extrusion applications respectively.
The chemical stucture of Arnitel EL630/EM630 is shown below.

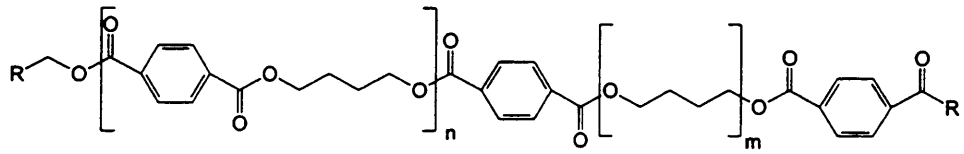


Figure 2.9: *Chemical structure of Arnitel EL630/EM630.*

Another way of writing the structure of Arnitels is shown below in Figure 2.

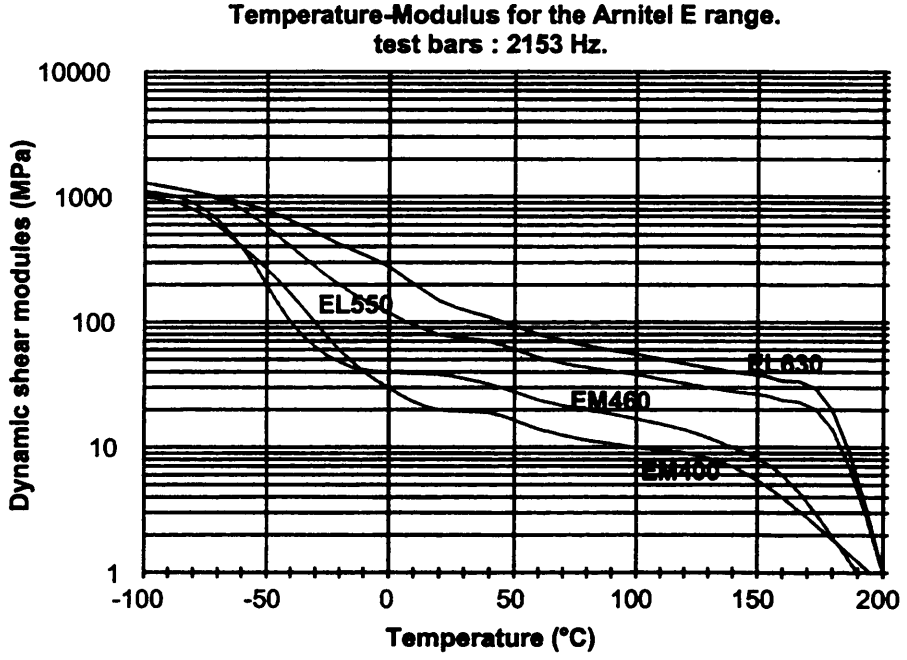
Figure 2.10: *Simplified structure of Arnitel EL630/EM630 .*

Arnitel EL630/EM630 is TOSCA registered (including DSL-Canada) under CAS 37282-12-5

2.8.32 Thermal properties:

- **Modulus-temperature behaviour:**

The materials have a glass transition at circa -40°C and a typical melting point at 213°C.
The modulus-temperature behaviour is shown in graph 2.76, for comparison, accompanied by other Arnitel E types.



Graph 2.76: *Modulus-temperature behaviour of Arnitel EL630/EM630.*

Although information on performance at higher temperatures may be extracted from the above shown graph, a Vicat or HDT are shown in table 2.29.

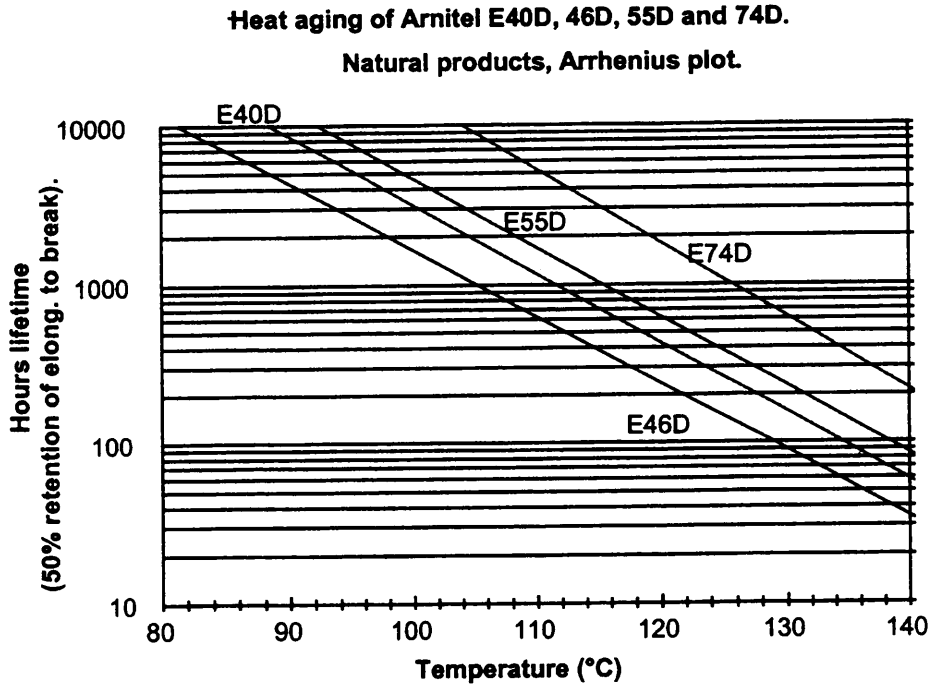
analysis	SI unit	typical data	test method
Vicat A	(°C)	200	ISO 306/A
Vicat B	(°C)	125	ISO 306/B
HDT-B	(°C)	115	ISO 75-1

Table 2.29: *Vicat and HDT data on Arnitel® EL630 and EM630*

Arnitel EL630 and EM630 have a melting point of 213°C as found in the second heating curve of a DSC. The polymer will crystallize at 155°C using a 20°C/min cooling rate.
The thermal expansion coefficient of Arnitel EL630/EM630 and is $140*10^{-4}$ µm/m.K .

- **Heat aging:**

Arnitel EL630/EM630 shows an optimum between heat resistance and colour stability. Heat aging for EL630/EM630 is under test at this moment, however the data will be between EL550 and EL740.
Arrhenius curves of thermo-oxidative heat aging are shown in graph 2.77. Criterium chosen is retention of 50% original elongation at break.



Graph 2.77: *Heat stability for Arnitel E-range.*

Heat ageing can be improve using a stabilisation masterbatch, however for heat stabilisation the P-range is preferred for it's excellence in performance. These data can be found in the Arnitel properties summary or an Arnitel P datasheet.

2.8.33 Processing and Handling:

Arnitel EL630/EM630 is a polyester with a density of 1.12 g/cm^3 according ISO 1183.
Due to the polyester nature of these materials it is of major importance to store the material dry prior to processing. Materials packaged in sealed packaging should have a moisture content lower then 500 ppm. The polymer will contain 0.12% moisture in 50% RH and 0.58% water after saturation in water. Both numbers are in equilibrium.
If samples have become wet during storage a drying step of 24 hours 120°C (or 6 hours 140°C) prior to use will prevent degradation of the material during processing combined with an eventual loss of properties. The air or nitrogen will have to have a dew point of at least -30°C.

- **Processing:**

Arnitel EL630/EM630 shows a single melting point at 195°C in DSC. Processing conditions are shown in the table below.

polymer	zone 1	zone 2	zone 3	additional	melt	mold
EL630	225	230	235	235	225-235	20-50
EM630	225	230	235	235	235	50

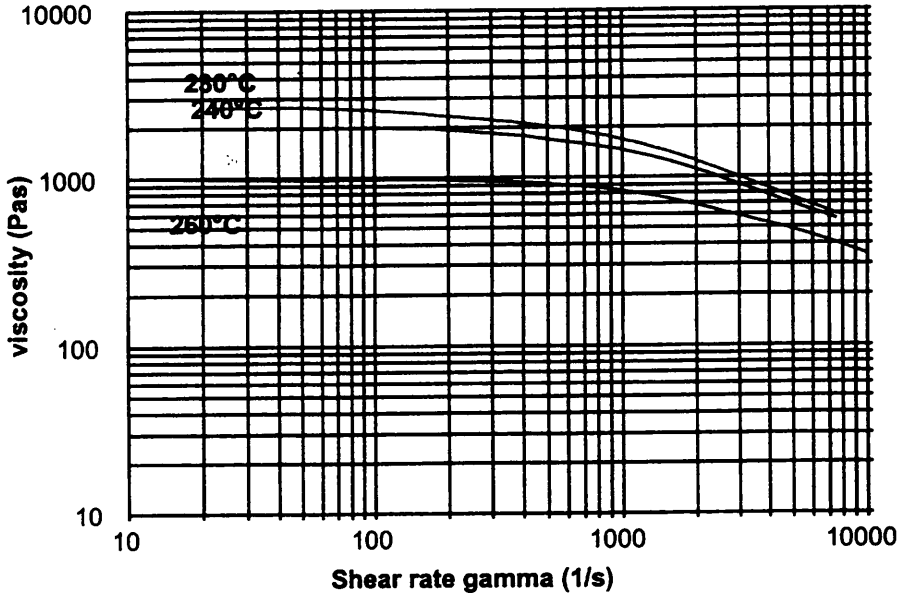
All temperatures are in °C.

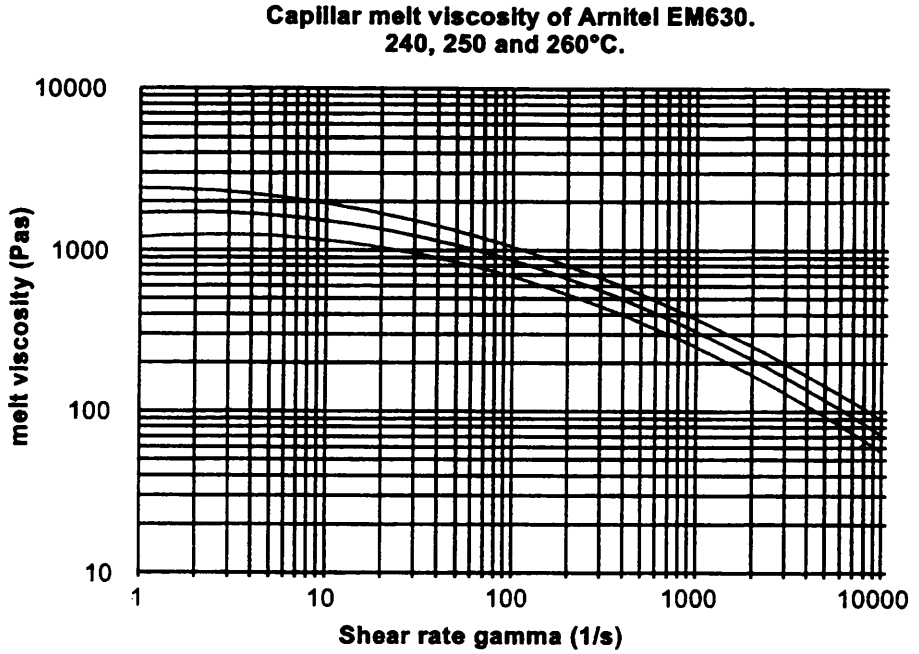
Table 2.30: *Processing conditions for Arnitel EL630 and Arnitel EM630.*

- **Rheology:**

The temperature depending melt viscosity of Arnitel EL630/EM630 and are shown below in graph 2.80 and 2.81 respectively.

Shear rate dependent of the melt viscosity of Arnitel EL630.
Effect of melt temperature.





Graph 2.80 and 2.81: *Temperature dependancy of the melt viscosity for Arnitel EL630 and EM630 .*

The MFI values are shown in table 2.31.

		EL630	EM630	
MFI 230°C	**g/10 min**		**7**	**ISO 1133**
MFI 240°C	**g/10 min**	**30**		**ISO 1133**

Table 2.31: *MFI for Arnitel EL630/EM630.*

- **Use of regrind:**

Arnitel can readily be recycled. If the MFI of the regrind is up or down to four points higher, 20% can be recycled. A difference of 2 MFI points allows up to 50% of regrind. Obviously the regrind should be dried properly before use.

2.8.34 Mechanical properties:

If Arnitel EL630 or Arnitel EM630 are processed properly the materials will have mechanical properties as shown in table 2.32.

Mechanical property	SI Unit	typica data*		test method
		EL630	EM630	
Hardness	Shore D	63	63	ISO 868
Tensile modulus (1 mm/min)	MPa	330	330	ISO 527
Tensile strength (50 mm/min)	MPa	30	30	ISO 527
Strain at break	%	350	350	ISO 527
Tensile stress at 5% strain	Mpa	11.5	11.5	
Tensile stress at 10% strain	Mpa	15.9	15.9	
Tensile stress at 50% strain	Mpa	17.3	17.3	
Tear strength Graves	KN/m	145	145	DIN53515
Izod notched 23°C (73°F)	KJ/m^2	NB	NB	ISO 180/1A
Izod notched -30°C (-22°F)	KJ/m^2	4	4	ISO 180/1A
Charpy notched 23°C (73°F)	KJ/m^2	NB	NB	ISO 179/1eA
Charpy notched -30°C (-22°F)	KJ/m^2	12	12	ISO 179/1eA

*1 Data for dry natural materials.
NB: No Break

Table 2.32: *mechanical properties of Arnitel® EL630.*

- **Abrasion:**

Arnitels show good abrasion resistance in both Taber and DIN 53516 abrasion tests. Data are shoen in the Arnitel general property overview (also included in the EPIC)

2.8.35 Flame retardancy:

Arnitel EL630 and EM630 show in an ISO1210/A flammability test a burning rate leading to a classification FH-1. Flame retardancy can be improved using a halogenated or halogen free FR masterbatch.

2.8.36 Electrical properties:

Arnitel EL630/EM630 can be used for cable jacketting applications. If the material is in permanent contact with copper a copper stabilisation package should be added. If the copper wires are coated with a tin layer, no stabilisation is necessary. The electrical properties are shown in table 33.

Electrical property	SI Unit	typica data*		test method
		EL630	EM630	
Dielectric strength	KV/mm	22	22	IEC 243-1
Relative permittivity (ε_r) at 1 kHz	-	4.4	4.4	IEC 250
Dissipation factor (tan δ) at 1kHz	-	0.019	0.019	IEC 250
Comparative tracking index	-	600	600	IEC 112
Volume resistivity	$10^{14}\Omega$.cm	1	1	IEC 93
Surface resistivity	$10^{14}\Omega$	1	1	IEC 93

Table 2.33: *Typical electrical properties of Arnitel® EL630 and EM630.*

2.8.37 Chemical resistance:

Arnitel EL630 and EM630 are sensitive to strong bases and strong acids, especially at elevated temperatures. In some halogenated hydrocarbons (like tetrachloroethane), the materials (partially) dissolves. For a full review on chemical resistance of Arnitel EL630 and EM630 request the chemical resistance brochure.

- **Hydrolysis**

Like all polyesters Arnitel are sensitive to moisture, however Arnitels are more stable to water then e.g. PET and PBT. graph 2.84 shows the hydrolytic stability of Arnitel EL630 at 100°C and in steam (120°C). For improved hydrolysis stability, using a polycarbodiimid containing masterbatch like Stabaxol® in an option. To maintain all other properties use a masterbatch based on polyester.Data on the Stabaxol stabilised grade are shown in graph 2.85.

CHIMEI-ASAHI CORPORATION

台灣省台南縣仁德鄉三甲村 59-1 號 Tel: 886-6-266-3000, Fax: 886-6-266-7983/4

WONDERLITE® PC-110 代表物性：

June 9, 2004,v2.0

特性		試驗法	單位	試驗條件	PC-110
流動係數 Melt Flow Index		ASTM D1238	g/10min	300℃, 1.2 kg	10
比重 Specific Gravity		ASTM D792	-	23/23℃	1.20
吸水率 Water Absorption (immersion)		ASTM D570	%	24hr at 23℃	0.20
全光穿透率 Light Transmission		ASTM D1003	%	3 mm thick	89
濁度 Haze		ASTM D1003	%	3.2 mm thick	< 0.8
折射率 Refractive Index		ASTM D542	-	-	1.585
引張強度，降伏點 Tensile Strength at Yield		ASTM D638	Kg/cm^2	23℃	630
延伸率 Tensile Elongation	降伏點 Yield	ASTM D638	%	23℃	6
	破斷點 Break			23℃	110
彎曲強度 Flexural Strength		ASTM D790	Kg/cm^2	23℃	920
彎曲模數 Flexural Modulus		ASTM D790	Kg/cm^2	23℃	24000
Izod 缺口衝擊強度 Izod Impact Strength (Notched)		ASTM D256	Kg. cm/cm	1/4”	14.3
				1/8”	87
洛式硬度 Rockwell Hardness		ASTM D785	M Scale	-	M-77
壓縮強度 Compressive Strength		ASTM D695	Kg/cm^2	-	780
熱變形溫度，未退火 Heat Distortion Temperature (unannealed)		ASTM D648	℃	4.6 Kg/cm^2, 120℃/hr	136
				18.6 Kg/cm^2, 120℃/hr	125
軟化點 Vicat Softening Temperature		ASTM D1525	℃	1 Kg, 50℃/hr	153
線膨脹係數 Coefficient of Linear Expansion		ASTM D696	$x10^{-5}$ cm/cm/℃	40~100℃	6~8
熱傳導率 Thermal Conductivity		ASTM C177	W/m℃	-	0.2
成型收縮率 Mold Shrinkage		ASTM D955	%	流動方向 parallel	0.5-0.7
				垂直方向 across	0.5-0.7
燃燒率 Flammability		UL 94	1/16”	-	V-2
體積電阻率 Volume Resistivity		ASTM D257	$x10^{16}\Omega$・cm	-	3
介電常數 Dielectric Constant		ASTM D150	-	60 Hz	2.95
				10^6 Hz	2.9
介電損失 Dielectric Dissipation Factor (tan δ)		ASTM D150	-	60 Hz	0.0004
				10^6 Hz	0.009
絕緣破壞強度 Dielectric Breakdown Strength		ASTM D149	kV/mm	1.6mm	30
耐電弧性 Arc Resistance (Tungsten electrode)		ASTM D495	sec	-	110
產品特性 / 主要應用 Characteristics/Principal Applications					**中黏度 Medium Viscosity**

請注意：上表數據僅供參考用。

VALOX® 310SE0 Americas: COMMERCIAL

Unreinforced. UL94V-0/5VA rated. For electrical industry; bobbins, keyboard switches and switch components, and appliance housings.

Property

TYPICAL PROPERTIES (1)			
MECHANICAL	Value	Unit	Method
Tensile Stress, yld, Type I, 50 mm/min	59	MPa	ASTM D 638
Tensile Stress, brk, Type I, 50 mm/min	59	MPa	ASTM D 638
Tensile Strain, brk, Type I, 50 mm/min	80	%	ASTM D 638
Flexural Stress, yld, 1.3 mm/min, 50 mm span	101	MPa	ASTM D 790
Flexural Stress, brk, 1.3 mm/min, 50 mm span	101	MPa	ASTM D 790
Flexural Modulus, 1.3 mm/min, 50 mm span	2620	MPa	ASTM D 790
Hardness, Rockwell R	120	-	ASTM D 785
IMPACT	Value	Unit	Method
Izod Impact, unnotched, 23 ℃	1602	J/m	ASTM D 4812
Izod Impact, notched, 23 ℃	37	J/m	ASTM D 256
Gardner, 23 ℃	34	J	ASTM D 3029
Modified Gardner, 23 ℃	34	J	ASTM D 3029
THERMAL	Value	Unit	Method
HDT, 0.45 MPa, 6.4 mm, unannealed	163	℃	ASTM D 648
HDT, 1.82 MPa, 6.4 mm, unannealed	71	℃	ASTM D 648
CTE, -40 ℃ to 40 ℃, flow	7.92E-05	1/ ℃	ASTM E 831
CTE, 60 ℃ to 138 ℃, flow	1.31E-04	1/ ℃	ASTM E 831
Relative Temp Index, Elec	120	℃	UL 746B
Relative Temp Index, Mech w/impact	120	℃	UL 746B
Relative Temp Index, Mech w/o impact	140	℃	UL 746B
PHYSICAL	Value	Unit	Method
Specific Gravity	1.39	-	ASTM D 792
Specific Volume	0.72	cm^3/g	ASTM D 792
Water Absorption, 24 hours	0.08	%	ASTM D 570
Mold Shrinkage, flow, 0.75-2.3 mm	0.9 - 1.6	%	GE Method
Mold Shrinkage, flow, 2.3-4.6 mm	1.5 - 2.3	%	GE Method
Mold Shrinkage, xflow, 0.75-2.3 mm	1 - 1.7	%	GE Method
Mold Shrinkage, xflow, 2.3-4.6 mm	1.6 - 2.4	%	GE Method
ELECTRICAL	Value	Unit	Method
Volume Resistivity	>1.6E+16	Ohm-cm	ASTM D 257
Dielectric Strength, in air, 3.2 mm	18.4	kV/mm	ASTM D 149

Dielectric Strength, in oil, 1.6 mm	22	kV/mm	ASTM D 149
Relative Permittivity, 100 Hz	3.1	-	ASTM D 150
Relative Permittivity, 1 MHz	3.1	-	ASTM D 150
Dissipation Factor, 100 Hz	0.002	-	ASTM D 150
Dissipation Factor, 1 MHz	0.02	-	ASTM D 150
Arc Resistance, Tungsten {PLC}	6	PLC Code	ASTM D 495
Hot Wire Ignition {PLC)	2	PLC Code	UL 746A
High Voltage Arc Track Rate {PLC}	4	PLC Code	UL 746A
High Ampere Arc Ign, surface {PLC}	0	PLC Code	UL 746A
Comparative Tracking Index (UL) {PLC}	3	PLC Code	UL 746A
FLAME CHARACTERISTICS	Value	Unit	Method
UL Recognized, 94V-0 Flame Class Rating (3)	0.7	mm	UL 94
UL Recognized, 94-5VA Rating (3)	3	mm	UL 94
CSA (See File for complete listing)	LS88480	File No.	CSA LISTED

Source GMD, last updated:04/14/2003

Processing

Parameter		
Injection Molding	Value	Unit
Drying Temperature	120	℃
Drying Time	3 - 4	hrs
Drying Time (Cumulative)	12	hrs
Maximum Moisture Content	0.02	%
Melt Temperature	245 - 260	℃
Nozzle Temperature	240 - 255	℃
Front - Zone 3 Temperature	245 - 260	℃
Middle - Zone 2 Temperature	240 - 255	℃
Rear - Zone 1 Temperature	230 - 250	℃
Mold Temperature	50 - 75	℃
Back Pressure	0.3 - 0.7	MPa
Screw Speed	50 - 100	rpm
Shot to Cylinder Size	40 - 80	%
Vent Depth	0.013 - 0.025	mm

Source GMD, last updated:04/14/2003

THESE PROPERTY VALUES ARE NOT INTENDED FOR SPECIFICATION PURPOSES.

PLEASE CHECK WITH YOUR (LOCAL SALES OFFICE) FOR AVAILABILITY IN YOUR REGION

(1) Typical values only. Variations within normal tolerances are possible for various colors. All values are measured after at least 48 hours storage at 23 ℃/50% relative humidity. All properties, except the melt volume and melt flow rates, are measured on injection molded samples. All samples tested under ISO test standards are prepared according to ISO 294.
(2) Only typical data for selection purposes. Not to be used for part or tool design.

(3) This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.
(4) Internal measurements according to UL standards.

宮前五金股份有限公司

檢驗報告表

編號 :911048　　91年10月31日

客　戶		立杰實業社		
品　名		FREE CUTTING BRASS ROD　六角 8.0 m/m		
規　格		JIS H3250 C3604 BD		
項目 ＼ 數據		標準值	實測值	備　註
化學成份%	Cu	57.0-61.0	58.19	
	pb	1.8 - 3.7	3.08	
	Fe	< 0.5	——	
	Sn+Fe	< 1.2	0.76	
	Zn	REMAINDER	REMAINDER	
其它				

宮前五金股份有限公司 TEL:(03)3282411

桃園縣龜山鄉頂湖一街 24 號　TEL: (03) 3283068-70

:SWISSMETAL®
BOILLAT

Joelle Haeni
Direct call : +32/4820335

INSPECTION CERTIFICATE
<<3.1.B>>
Type EN 10204 2004-12-01
EN [illegible]

WELLIDEA TRADING CO., LTD.
4F. NO. 21. ALLEY 10
LANE 245. WU LING RD
30090 HSINCHU CITY
TAIWAN

Y/order
W-4214-5

Date
04.05.17

O/delivery note
83688.0

Product
ROUND BRONZE RODS
3.000 mm L: 2500 mm

O/product
13082

Y/product

Alloy
BZ4 CuSn4Pb4Zn4

Quantity
913.6 Kg

		Standards	Guaranteed values	Sample
Cu	%	Balance	Balance	Balance
Pb	%	3.5 - 4.5	3.5 - 4.0	3.71
Fe	%	max. 0.1	max. 0.1	0.01
Sn	%	3.5 - 4.5	3.5 - 4.5	3.89
Ni	%	max. 0.2	max. 0.2	0.03
Al	%		max. 0.02	-----
P	%	0.01 - 0.4	0.01 - 0.4	0.10
Te	%	max. 0.2	max. 0.2	-----
Tot.Others	%	max. 0.2	max. 0.2	-----
Zn	%	3.5 - 4.5	3.5 - 4.5	3.92
Rm	N/mm2	760 - 830	760 - 830	783

We certify that the above described materials comply with the terms of the specifications of our order confirmation.

BVQI certificates
ISO 9001/14001
SCES 003/031

SWISSMETAL
UMS Swiss Metalworks Ltd
PLANT BOILLAT

宮前五金股份有限公司

檢驗報告表

編號：900118

客戶		宏基企業社		
品名		FREE CUTTING BRASS ROD 丸 9.5 m/m		
規格		JIS H3250 C3604 BD		
項目 ＼ 數據		標準值	實測值	備註
化學成份%	Cu	57.0 - 61.0	58.88	
	Pb	1.8 - 3.7	3.40	
	Fe	< 0.5	------	
	Sn+Fe	< 1.2	0.73	
	Zn	REMAINDER	REMAINDER	
其它				

宮前五金股份有限公司 TEL:(03)3282411-6

桃園縣龜山鄉頂湖一街 24 號 TEL: (03) 3283068-70

APPENDIX

LEO ME PTFE Rod is manufactured with virgin PTFE powder by ram extrusion or compression molding and is conformed to meet the requirement of ASTM

TABLE 1 Detail Specification for PTFE Rod.

ITEM	PROPERTY	ASTM TEST METHOD	VALUE
1	Specific gravity	D792	2.15-2.2
2	Tensile strength	D638	280-350 kg/cm^2
3	Elongation	D638	200-400%
4	Dielectric strength	D149	30KV/mm
5	Deformation under load. 6.9Mpa,50C, %	D621	3.5 - 6
6	Dissipetion factor 1 KHz	D150	Less than 0.0005
7	Dielectric constant 1 KHz	D150	2.0 - 2.1
8	Volume resistivity	D257	> 10^16
9	Surface resistivity	D257	10^17
10	Flexural modulus	D790	430-500Mpa
11	Compressibility	D1147	16-20%
12	Hardness, durometer	D2240	D53 - D60
13	Impact strength	D256	16kg-cm/cm
14	Coefficient of linear thermal expansion, per C. 30C to 80C, 10^-5C	D696	12.3 to 11.6

宮前五金.股份有限公司

檢驗報告表

93年2月20日

客　戶				
品　名		FREE CUTTING BRASS ROD		丸 2.0 , 5.5 m/m
規　格		JIS H3250 C3604 BD		
項目 ＼ 數據		標準值	實測值	備　註
化學成份%	Cu	57.0 - 61.0	58.01	
	pb	1.8 - 3.7	3.21	
	Fe	<0.5	——	
	Sn+Fe	<1.2	0.72	
	Zn	REMAINDER	REMAINDER	
其它				

宮前五金股份有限公司 TEL:(03)3283811-6

桃園縣龜山鄉頂湖一街 24號　TEL: (03) 3283068-70

萬發業

SGS Test Report

Product：RF Antenna

Contents

Result for RoHS：PASS

Test Report

Report No. : CE/2004/C1640
Date : 2004/12/16

The following merchandise was (were) submitted and identified by the client as :

Type of Product	:	RG-178 B/U SERIES
Sample Received	:	2004/12/09
Testing Date	:	2004/12/09 TO 2004/12/16

==========

Test Result : - Please see the next page -

Daniel Yeh, M.R. / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.

SGS

Test Report

Report No. : CE/2004/C1640
Date : 2004/12/16

Test Result

PART NAME NO.1 : TRANSPARENT FEP JACKET(PLEASE REFER TO THE PHOTO ATTACHED)

Test Item (s):	Unit	Method	MDL	Result			
				No.1			
PBBs(Polybrominated biphenyls)(CAS NO:059536-65-1)	%	With reference to USEPA3540 or USEPA3550. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.			
PBBEs(PBDEs)(Polybrominated biphenyl ethers)	%	With reference to USEPA3540 or USEPA3550. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.			

Test Item (s):	Unit	Method	MDL	Result			
				No.1			
Chromium VI (Cr+6)	ppm	As per US EPA 7196A and US EPA 3060A.	2	N.D.			
Cadmium (Cd)	ppm	ICP-AES after as per EN 1122, method B:2001 or other acid digestion.	2	N.D.			
Mercury (Hg)	ppm	ICP-AES after as per US EPA 3052 or other acid digestion.	2	N.D.			
Lead (Pb)	ppm	ICP-AES after as per US EPA 3050B or other acid digestion.	2	N.D.			

NOTE• •(1) N.D. = Not detected (<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit

SGS TAIWAN LIMITED | NO. 136-1, Wu Kung Road, WuKu Industrial Zone, Taipei county, Taiwan.
t(886-2) 22993939 f(886-2) 2299-3237 www.sgs.com.tw

Test Report

DSM ENGINEERING PLASTICS.

Report No. : CE/2004/C2040
Date : 2004/12/17

The following merchandise was (were) submitted and identified by the client as :

Type of Product	:	EL550
Sample Received	:	2004/12/10
Testing Date	:	2004/12/10 TO 2004/12/17

==========

Test Result : - Please see the next page -

Daniel Yeh, M.R. / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.

Test Report

DSM ENGINEERING PLASTICS.

Report No. : CE/2004/C2040
Date : 2004/12/17

Test Result

PART NAME NO.1 : WHITE PLASTIC PELLETS(PLEASE REFER TO THE PHOTO ATTACHED)

Test Item (s):	Unit	Method	MDL	Result			
				No.1			
PBBs(Polybrominated biphenyls)(CAS NO:059536-65-1)	%	With reference to USEPA3540 or USEPA3550. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.			
PBBEs(PBDEs)(Polybrominated biphenyl ethers)	%	With reference to USEPA3540 or USEPA3550. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.			

Test Item (s):	Unit	Method	MDL	Result			
				No.1			
Chromium VI (Cr+6)	ppm	As per US EPA 7196A and US EPA 3060A.	2	N.D.			
Cadmium (Cd)	ppm	ICP-AES after as per EN 1122, method B:2001 or other acid digestion.	2	N.D.			
Mercury (Hg)	ppm	ICP-AES after as per US EPA 3052 or other acid digestion.	2	N.D.			
Lead (Pb)	ppm	ICP-AES after as per US EPA 3050B or other acid digestion.	2	N.D.			

NOTE : (1) N.D. = Not detected (<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit

Test Report

DSM ENGINEERING PLASTICS.

Report No. : CE/2004/C2040
Date : 2004/12/17

SGS

Test Report

No.: GZSCR050529552/LP Date: MAY 18, 2005 Page 1 of 1

PIN SHINE ELECTRONIC & PLASTIC PRODUCTS (DONGGUAN) CO., LTD.
WEST PART OF LIU WU INDUSTRIAL AREA, SAN HENG ROAD,
NEW DISTRICT OF SHI JIE TOWN, DONG GUAN CITY,
GUANG DONG PROVINCE

Report on the submitted sample said to be PC110

SGS Ref No. : GZML05051729③
Sample Receiving Date : MAY 17, 2005
Testing Period : MAY 17, 2005 TO MAY 18, 2005

Test Requested : As specified by client, to determine the Cadmium Content in the submitted sample.

Test Method : With reference to BS EN1122 : 2001 method B.
Analysis was performed by Atomic Absorption Spectrometer.

RESULTS :

	Black plastic grains
Cadmium content (Cd)	N.D.

Note : - N.D. = Not Detected (< 2 ppm)
- ppm = mg/kg

*** End of Report ***

Signed for and on behalf of
SGS-CSTC Ltd.

He Xiaoyan, Jane
Tech. Manager

Results :

(1)

	White plastic part
Lead Content (Pb)	N.D.
Cadmium Content (Cd)	N.D.
Mercury Content (Hg)	N.D.
Hexavalent Chromium Content [Cr(VI)]	N.D.

Note : - N.D. = Not Detected (< 2 ppm)
- ppm = mg/kg

(2)

Flame Retardants	White plastic part	Detection Limit (ppm)
[illegible]		
Monobromobiphenyl	N.D.	5
Dibromobiphenyl	N.D.	5
Tribromobiphenyl	N.D.	5
Tetrabromobiphenyl	N.D.	5
Pentabromobiphenyl	N.D.	5
Hexabromobiphenyl	N.D.	5
Heptabromobiphenyl	N.D.	5
Octabromobiphenyl	N.D.	5
Nonabromodiphenyl	N.D.	5
Decabromodiphenyl	N.D.	5
[illegible]		
Monobromodiphenyl ether	N.D.	5
Dibromodiphenyl ether	N.D.	5
Tribromodiphenyl ether	N.D.	5
Tetrabromodiphenyl ether	N.D.	5
Pentabromodiphenyl ether	N.D.	5
Hexabromodiphenyl ether	N.D.	5
Heptabromodiphenyl ether	N.D.	5
Octabromodiphenyl ether	N.D.	5
Nonabromodiphenyl ether	N.D.	5
Decabromodiphenyl ether	N.D.	5

Note : - N.D. = Not Detected (< 5 ppm)
- ppm = mg/kg

*** End of Report ***

Test Report

HUEI SUN PLASTIC CO., LTD.
NO. 17, LANE 679, PIN-TUNG ROAD, PIN-CHENG CITY,
TAOYUAN HSIEN, TAIWAN

Report No. : CE/2005/30689A
Date : 2005/03/10
Page : 1 of 3

The following merchandise was (were) submitted and identified by the client as :

Type of Product	:	塑膠射出零件
Sample Received	:	2005/03/03
Testing Date	:	2005/03/03 TO 2005/03/10

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Test Result : - Please see the next page -

Daniel Yeh, M.R. / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.

Test Report

HUEI SUN PLASTIC CO., LTD.
NO. 17, LANE 679, PIN-TUNG ROAD, PIN-CHENG CITY,
TAOYUAN HSIEN, TAIWAN

Report No. : CE/2005/30689A
Date : 2005/03/10

Test Result

PART NAME NO.1 : DEEP GRAY PLASTIC (PLEASE REFER TO THE PHOTO ATTACHED)

Test Item (s):	Unit	Method	MDL	Result
				No.1
PBBs(Polybrominated biphenyls)(CAS NO:059536-65-1)	%	With reference to USEPA3540C or USEPA3550C. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.
PBBEs(PBDEs)(Polybrominated biphenyl ethers)	%	With reference to USEPA3540C or USEPA3550C. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.

Test Item (s):	Unit	Method	MDL	Result
				No.1
Chromium VI (Cr+6)	ppm	As per US EPA 7196A and US EPA 3060A.	2	N.D.
Cadmium (Cd)	ppm	ICP-AES after as per EN 1122, method B:2001 or other acid digestion.	2	N.D.
Mercury (Hg)	ppm	ICP-AES after as per US EPA 3052 or other acid digestion.	2	N.D.
Lead (Pb)	ppm	ICP-AES after as per US EPA 3050B or other acid digestion.	2	20.9

NOTE： (1) N.D. = Not detected (<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit

Test Report

HUEI SUN PLASTIC CO., LTD.
NO. 17, LANE 679, PIN-TUNG ROAD, PIN-CHENG CITY,
TAOYUAN HSIEN, TAIWAN

Report No. : CE/2005/30689A
Date : 2005/03/10

Test Report

REN-YUH ENTERPEISE CO., LTD.
NO. 3, LANE 36, DONG-SHUN ST., SHE-LIN, TAIPEI,
TAIWAN, R. O. C.

Report No. : CE/2005/50700
Date : 2005/05/12
Page : 1 of 4

The following merchandise was (were) submitted and identified by the client as :

Type of Product	:	BLACK POM
Sample Received	:	2005/5/5
Testing Date	:	2005/5/5 TO 2005/05/12

==========

Test Result : - Please see the next page -

Daniel Yeh, M.R. / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.

Test Report

REN-YUH ENTERPEISE CO., LTD.
NO. 3, LANE 36, DONG-SHUN ST., SHE-LIN, TAIPEI, TAIWAN, R. O. C.

Report No. : CE/2005/50700
Date : 2005/05/12

Test Result

PART NAME NO.1 : BLACK PLASTIC PELLETS (PLEASE REFER TO THE PHOTO ATTACHED)

Test Item (s):	Unit	Method	MDL	Result
				No.1
Monobromobiphenyl	%	With reference to USEPA3540C or USEPA3550C. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.
Dibromobiphenyl	%		0.0005	N.D.
Tribromobiphenyl	%		0.0005	N.D.
Tetrabromobiphenyl	%		0.0005	N.D.
Pentabromobiphenyl	%		0.0005	N.D.
Hexabromobiphenyl	%		0.0005	N.D.
Heptabromobiphenyl	%		0.0005	N.D.
Octabromobiphenyl	%		0.0005	N.D.
Nonabromobiphenyl	%		0.0005	N.D.
Decabromobiphenyl	%		0.0005	N.D.
Total PBBs (Polybrominated biphenyls)/Sum of above	%		-	N.D.
Monobromobiphenyl ether	%	With reference to USEPA3540C or USEPA3550C. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.
Dibromobiphenyl ether	%		0.0005	N.D.
Tribromobiphenyl ether	%		0.0005	N.D.
Tetrabromobiphenyl ether	%		0.0005	N.D.
Pentabromobiphenyl ether	%		0.0005	N.D.
Hexabromobiphenyl ether	%		0.0005	N.D.
Heptabromobiphenyl ether	%		0.0005	N.D.
Octabromobiphenyl ether	%		0.0005	N.D.
Nonabromobiphenyl ether	%		0.0005	N.D.
Decabromobiphenyl ether	%		0.0005	N.D.
Total PBBEs (PBDEs)(Polybrominated biphenyl ethers)/Sum of above	%		-	N.D.

Test Report

REN-YUH ENTERPEISE CO., LTD.
NO. 3, LANE 36, DONG-SHUN ST., SHE-LIN, TAIPEI, TAIWAN, R. O. C.

Report No. : CE/2005/50700
Date : 2005/05/12

Test Item (s):	Unit	Method	MDL	Result
				No.1
Chromium VI (Cr+6)	ppm	UV-VIS after reference to US EPA 3060A.	2	N.D.
Cadmium (Cd)	ppm	ICP-AES after reference to EN 1122, method B:2001 or other acid digestion.	2	N.D.
Mercury (Hg)	ppm	ICP-AES after reference to US EPA 3052 or other acid digestion.	2	N.D.
Lead (Pb)	ppm	ICP-AES after reference to US EPA 3050B or other acid digestion.	2	N.D.

NOTE : (1) N.D. = Not detected (<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit
(4) " - " = No Regulation

Test Report

REN-YUH ENTERPEISE CO., LTD.
NO. 3, LANE 36, DONG-SHUN ST., SHE-LIN, TAIPEI, TAIWAN, R. O. C.

Report No. : CE/2005/50700
Date : 2005/05/12

Test Report

萬晉興業有限公司
*710 台南縣永康市正南一街57巷31號

報告號碼 : CE/2004/73632
日期 : 2004/08/09
頁數 : 1 of 5

以下測試樣品乃供應廠商所提供及確認：

樣品名稱	:	100-200-1008A1
買主 / 訂單號碼	:	譁裕實業股份有限公司
收件日期	:	2004/08/02.
測試日期	:	2004/08/02 TO 2004/08/09

==========

測試結果 : - 請見下一頁 -

Daniel Yeh, M.R. / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.

Test Report

萬晉興業有限公司
*710 台南縣永康市正南一街57巷31號

報告號碼 : CE/2004/73632
日期 : 2004/08/09

測試結果

測試部位 NO.1 : 黑色金屬

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
石棉		石棉定性分析,參考Health Canada, Proudct safety Bureau Reference-Manual方法						
斜方角閃石	**	參考 NIOSH 9000 / X光繞射定性分析法(XRD)	-	Negative				
青石棉	**	參考 NIOSH 9000 / X光繞射定性分析法(XRD)	-	Negative				
棕石棉	**	參考 NIOSH 9000 / X光繞射定性分析法(XRD)	-	Negative				
透閃石	**	參考 NIOSH 9000 / X光繞射定性分析法(XRD)	-	Negative				
白石棉	**	參考 NIOSH 9000 / X光繞射定性分析法(XRD)	-	Negative				
陽起石	**	參考 NIOSH 9000 / X光繞射定性分析法(XRD)	-	Negative				

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
偶氮(AZO)		參考德國1998年1月FOODSTUFFS AND COMMODITY ARTICLES ACT B82.02-2方法						
4-氯基二苯(CAS NO. 000092-67-1)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
聯苯胺(CAS NO. 00092-87-5)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
4-氯鄰甲苯胺(CAS NO. 000097-56-3)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
2-萘胺(CAS NO. 000091-59-8)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
鄰氨基二甲基偶氮(CAS NO. 000097-56-3)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				

Test Report

萬晉興業有限公司
*710 台南縣永康市正南一街57巷31號

報告號碼 : CE/2004/73632
日期 : 2004/08/09
頁數 : 3 of 5

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
對硝基鄰甲苯胺(CAS NO. 000099-55-8)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
對氯苯胺(CAS NO. 000106-47-8)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
4-甲拼基-間苯二胺(CAS NO. 000615-05-4)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
4,4-二氨基二苯甲烷(CAS NO. 000101-77-9)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
3,3 二甲聯苯胺(CAS NO. 000091-94-1)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
3,3 二甲氧基聯苯胺(CAS NO. 000119-90-4)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
3,3 二基聯苯胺(CAS NO.000119-93-7)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
4,4-二胺基-3,3-二甲氧基聯苯(CAS NO. 000838-88-0)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
2-甲氧基-5-甲氧基聯苯(CAS NO. 000120-71-8)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
4,4-亞甲基雙(氯苯胺)(CAS NO. 000101-14-4)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
4-4-氧化雙苯胺(CAS NO. 000101-80-4)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
4,4-硫代雙苯胺(CAS NO. 000139-65-1)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
鄰甲苯胺(CAS NO. 000095-53-4)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
2,4-二胺基甲苯(CAS NO. 000095-80-7)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
2,4,5-三甲基苯胺(CAS NO. 000137-17-7)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
鄰氨基苯甲醚(CAS NO. 000090-04-0)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				
對氨基偶氮苯(CAS NO. 000060-09-3)	ppm	以氣相層析質譜儀和薄層色層等相關技術檢測分析	3	N.D.				

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
氯化石蠟(C10-C13)	%	以氣相層析質譜儀(GC/MS)檢測	0.01	N.D.				

Test Report

萬晉興業有限公司
*710 台南縣永康市正南一街57巷31號

報告號碼 : CE/2004/73632
日期 : 2004/08/09
頁數 : 4 of 5

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
滅蟻靈(Mirex)	ppm	以氣相層析質譜儀(GC/MS)檢測	4	N.D.				

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
有機錫								
三苯基錫	ppm	參考DIN38407 / 89/677/EEC方法,以氣相層析儀/火焰光度偵器(GC/FPD)檢測有機錫定量分析	0.03	N.D.				
三丁基錫	ppm	參考DIN38407 / 89/677/EEC方法,以氣相層析儀/火焰光度偵器(GC/FPD)檢測有機錫定量分析	0.03	N.D.				

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
多溴聯苯(PBBs)	%	參考83/264/EEC方法, 以氣相層析儀/電子捕捉偵測器/質譜儀(GC/ECD/MS)或高效液相層析儀/二極體陣列偵測器/質譜儀(HPLC/DAD/MS)檢測	0.0005	N.D.				
多溴聯苯醚(PBBEs/PBDEs)	%	參考83/264/EEC方法, 以氣相層析儀/電子捕捉偵測器/質譜儀(GC/ECD/MS)或高效液相層析儀/二極體陣列偵測器/質譜儀(HPLC/DAD/MS)檢測	0.0005	N.D.				

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
多氯聯苯(PCBs)	ppm	參考 USEPA 8082A方法, 以氣相層析質譜儀/電子捕捉偵測器/質譜儀(GC/ECD/MS)檢測	0.5	N.D.				

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
多氯奈(PCNs)	ppm	以氣相層析質譜儀(GC/MS)檢測	5	N.D.				

Test Report

萬晉興業有限公司
*710 台南縣永康市正南一街57巷31號

報告號碼 : CE/2004/73632
日期 : 2004/08/09
頁數 : 5 of 5

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
聚氯乙烯(PVC)	**	聚氯乙烯定性分析,以紅外線光譜分析法搭配垂直式全反射配件(FTIR/ATR)或熱裂解氣相層析質譜儀(Pyrolyzer/GC/MS)檢測	-	Negative				

測試項目:	單位	測試方法	偵測極限值	結果				
				NO.1				
六價鉻	ppm	依照US EPA 7196A及3060A方法	2	N.D.				
鎘	ppm	依照 EN1122 方法B:2001或其他酸消化方法,用感應藕合電漿原子發射光譜儀(ICP-AES)做分析	2	N.D.				
汞	ppm	依照 US EPA 3052 方法或其他酸消化方法,用感應藕合電漿原子發射光譜儀(ICP-AES)做分析	2	N.D.				
鉛	ppm	依照 US EPA 3050B 方法或其他酸消化方法,用感應藕合電漿原子發射光譜儀(ICP-AES)做分析	2	40.0				

備註：(1) N.D. = Not detected.(<MDL) / 未檢出(低於偵測極限值)
(2) ppm = mg/kg / 百萬分之一
(3) MDL= Method Detection Limit(偵測極限值)
(4) " ---" = Not Applicable / 未測項目
(5) " -" = Not Regulation / 無規格值
(6) **定性分析(無單位)
(7) Negative / 陰性(未偵測到), Positive / 陽性(已偵測到)
(8) * = 表示依法規規定調整之數據