

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: 深圳市普聯技術有限公司

PART NAME: RF Antenna Assembly

PART NO.: 31010001

REVISION:

W. Y. P/NO.: C636-510003-A

REV.: A

SSR-00302

| | MANUFACTURER SIGNATURE | CUSTOMER SIGNATURE |
|------------------|---------------------------|-----------------------|
| APPROVED BY : | | |
| DATE : | | |

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RF Antenna Cable Assembly

Specification

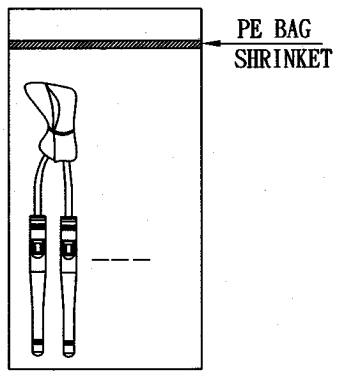
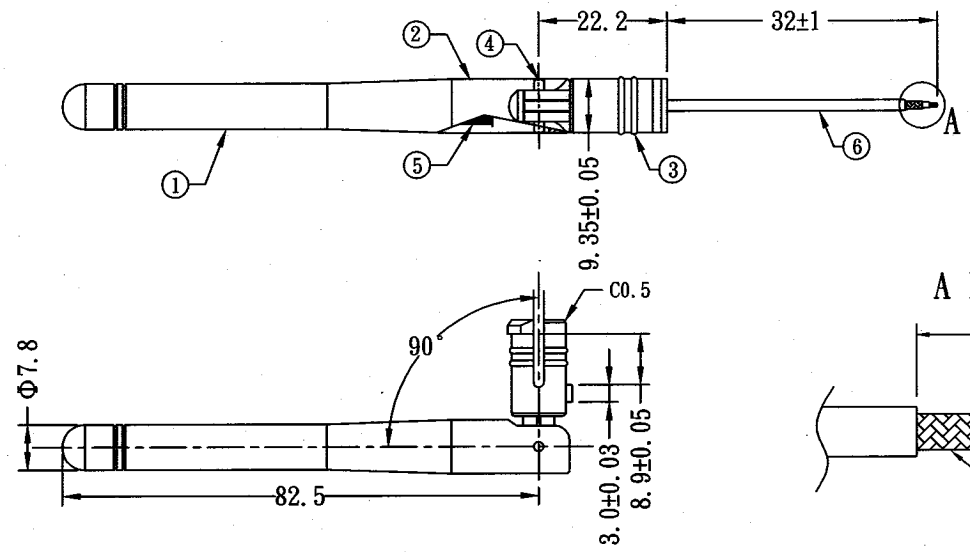
1. Electrical Properties :

- 1.1 Frequency Rang.....2.4GHz ~ 2.5GHz**
- 1.2 Impedance 50 Ω Nominal**
- 1.3 VSWR 1.92 Max.**
- 1.4 Return Loss..... -10dB Maximum**
- 1.5 Electrical Wave.....1/2 λ Dipole**
- 1.6 Gain..... 1.8 dBi**
- 1.7 Admitted Power..... 1W**

2. Physical Properties :

- 2.1 Cable.....RG-178 Cable**
- 2.2 Antenna Cover..... TPE**
- 2.3 Antenna Base..... PC**
- 2.4 Operating Temp. -20 $^{\circ}$ C ~ +65 $^{\circ}$ C**
- 2.5 Storage Temp. -30 $^{\circ}$ C ~ +75 $^{\circ}$ C**
- 2.6 Color Black**

| | |
|------|-------------|
| 5 | 6 |
| REV. | DATE |
| | DESCRIPTION |



PACKING: 20PCS/BAG
5PCS/珍珠棉袋

| | | | | |
|-----|--------------|---------------------------------|---|------------|
| 6 | CABLE | RG-178; TRANSLUCENT BROWN; 50Ω. | 1 | EQUIVALENT |
| 5 | GROUND TUBE | BRASS; Ni-PLATED | 1 | EQUIVALENT |
| 4 | RIVET | BRASS; CR-PLATED; COLOR: BLACK | 2 | EQUIVALENT |
| 3 | ANTENNA BASE | PC; COLOR: BLACK | 1 | EQUIVALENT |
| 2 | ANTENNA BASE | PC; COLOR: BLACK | 1 | EQUIVALENT |
| 1 | ANTENNA BODY | TPE; COLOR: BLACK | 1 | EQUIVALENT |
| NO. | DESCRIPTION | | | Q' TY |
| | | | | REMARK |

| | | |
|----------|--------------------|--------------------------------|
| XX±3.0 | APPROVED | CUSTOMER: 深圳市普聯技術有限公司 |
| X±2.0 | <i>[Signature]</i> | W. Y. P/N: C636-510003-A |
| .X±1.0 | CHECKED | PART NAME: RF ANTENNA ASSEMBLY |
| .XX±0.5 | <i>[Signature]</i> | PART NO.: 31010001 |
| .XXX±0.1 | DRAWN | REV. UNIT PAGE FILE: SSR-00302 |
| | <i>[Signature]</i> | A mm 1/2 DATE: 2004. 07. 17 |

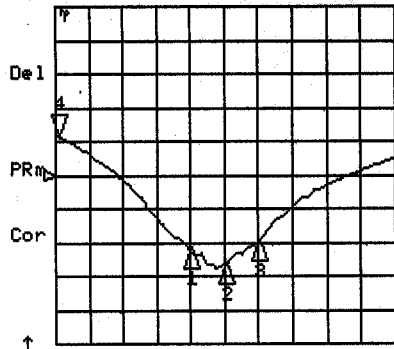


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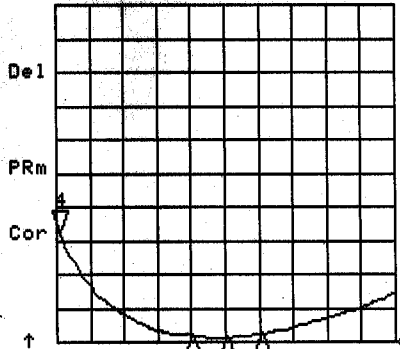
14 Jul 2004 15:23:07

CH1 LOG 5 dB/REF -10 dB
S11 4: -4.1488 dB 2 203.050 000 MHz

CH2 SWR 1 / REF 1
S11 4: 4.2570 2 203.050 000 MHz



CH1 Markers
 1: -20.961 dB
 2.40000 GHz
 2: -23.244 dB
 2.45000 GHz
 3: -19.787 dB
 2.50000 GHz



CH2 Markers
 1: 1.1957
 2.40000 GHz
 2: 1.1478
 2.45000 GHz
 3: 1.2283
 2.50000 GHz

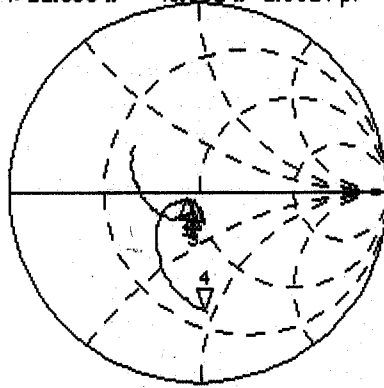
START 2200.000 MHz STOP 2700.000 MHz

START 2200.000 MHz STOP 2700.000 MHz

CH3 S11 1 U FS 4: 22.666 Ω -45.682 Ω 1.5814 pF 2 203.050 000 MHz

Del

Cor



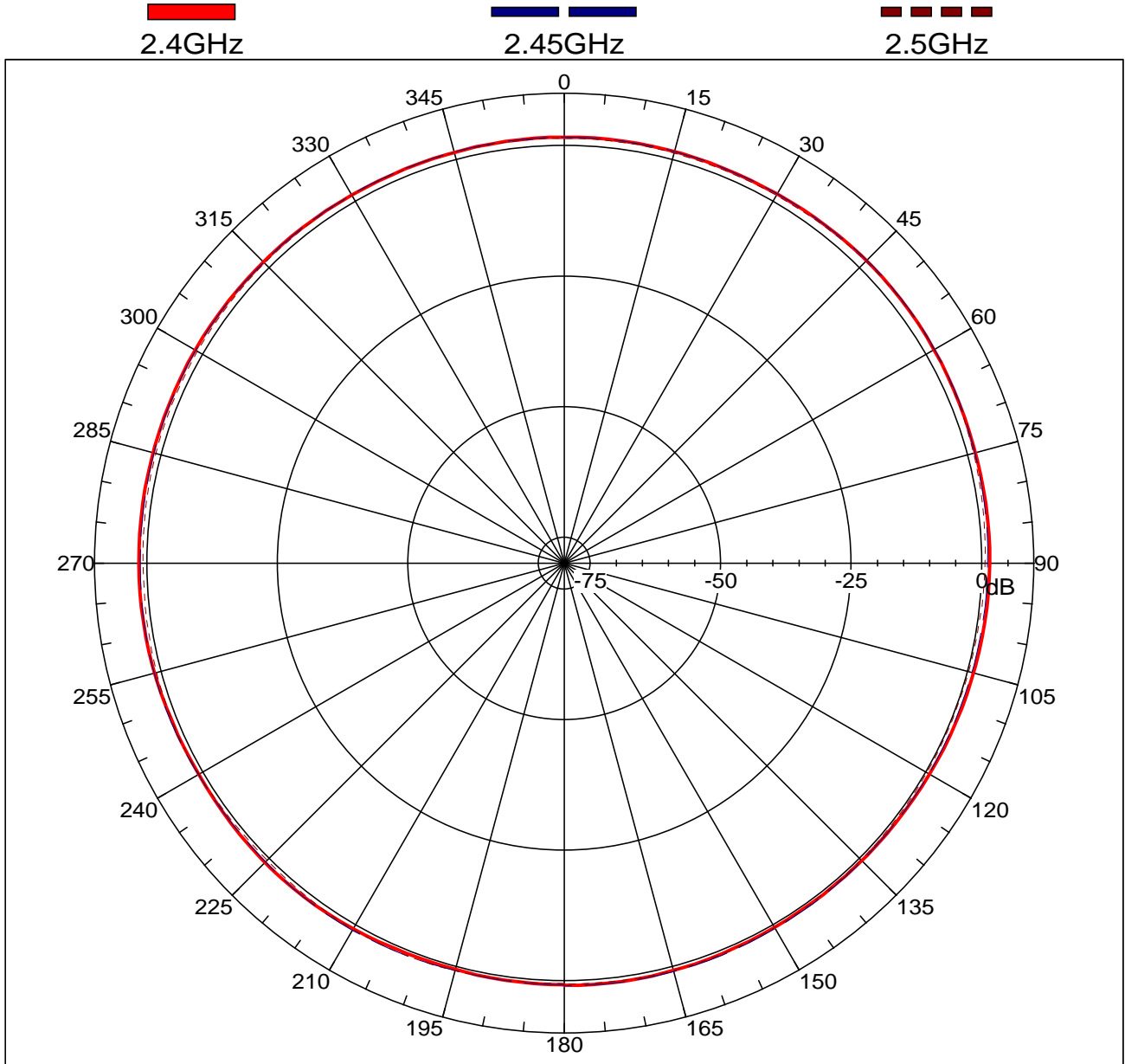
CH3 Markers
 1: 42.441 Ω
 -3.3848 Ω
 2.40000 GHz
 2: 45.719 Ω
 -5.0215 Ω
 2.45000 GHz
 3: 44.920 Ω
 -8.3378 Ω
 2.50000 GHz

START 2 200.000 000 MHz

STOP 2 700.000 000 MHz

RF Antenna Assembly
SPEC : 2.4 ~ 2.5GHz

Far-field amplitude of antenna-5-h.nsi





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RF Antenna Assembly

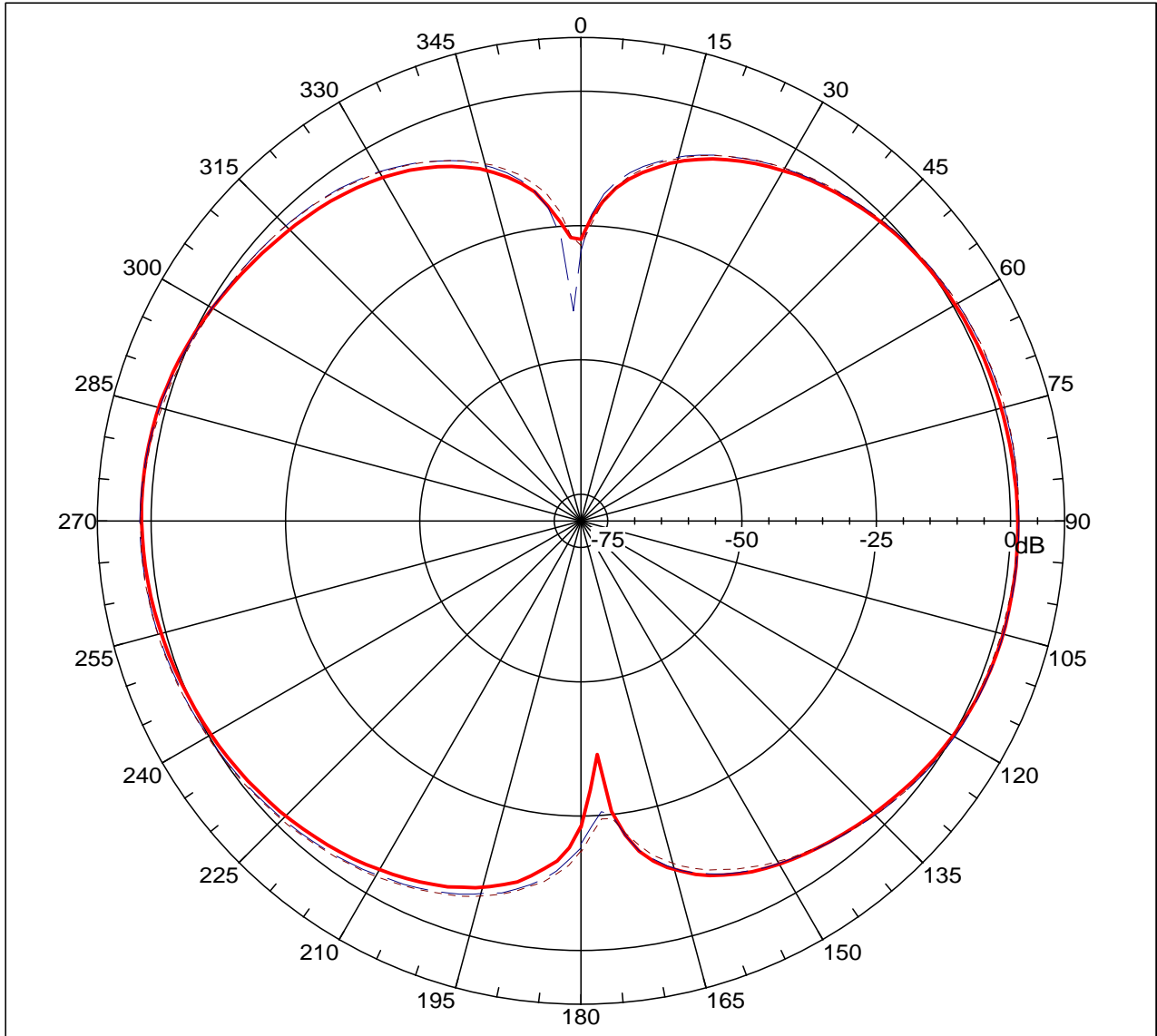
SPEC : 2.4 ~ 2.5GHz

Far-field amplitude of antenna-6-e.nsi

2.4GHz

2.45GHz

2.5GHz

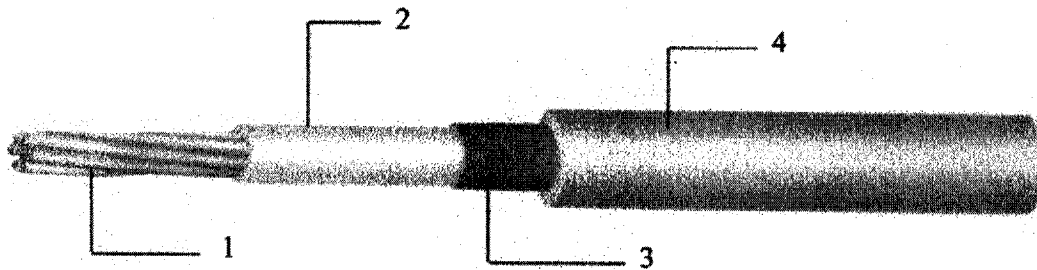


| | | | |
|------------------|---|---------|---------------|
| RG 178 B/U | FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE | PAGE | 1 / 2 |
| PRODUCT STANDARD | | ISSUED | 21. Oct. 2003 |
| | | REVISED | |

I - Scope

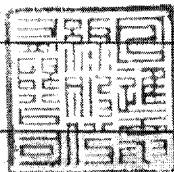
This specification presents a FEP insulated high-frequency coaxial cable AWG 30, 1.8 mm O.D. for internal wiring of electronic equipment, such as Computer / Notebook with wireless communication systems.

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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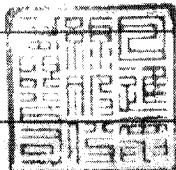
Shen Bin Chao
Shen Bin Chao

| | | | |
|---------------------|--|---------|---------------|
| RG 178 B/U | FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE | PAGE | 2 / 2 |
| PRODUCT STANDARD | | ISSUED | 21. Oct. 2003 |
| | | 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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Robin Lin
Shen Bin Chao

Arnitel
polyether esters
polyetherester
esters de polyether

天線桿套材質特性表



| Units Einheiten Unites | EM400 | EM460 | EL550 | EL630 | EL740 | PL380 |
|------------------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | 1.12 | 1.16 | 1.20 | 1.23 | 1.27 | 1.18 |
| °C | 195 | 185 | 202 | 212 | 221 | 197 |
| μm/m.k | 220 | 160 | 180 | 140 | 110 | 150 |
| °C | \ | \ | 110 | 115 | 120 | \ |
| °C | 130 | 150 | 180 | 200 | 200 | 145 |
| °C | \ | 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/m ² | NB | NB | NB | NB | NB | NB |
| kJ/m ² | NB | NB | NB | NB | 200 | NB |
| kJ/m ² | NB | NB | NB | NB | 9 | NB |
| kJ/m ² | 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 |

Arnitel

2.2 Product coding

The structure of the Arnitel productcodes is illustrated with 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, performance

- 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.

| | Arnitel E | Arnitel P | Arnitel U |
|-------------------|-------------------------|-----------|-----------|
| Automotive | | | |
| • CVJ boots | EB460 EB463 EB464 | | |
| • Boyplugs | | PL380-M0 | |
| Extrusion | | | |
| • Roofing foil | EM402-L | | |

Table 2.3: Examples of specialty grades

Amitel® EL630/EM630

2.8.31 General:

Amitel 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. Amitel EL630 and EM630 are excellent materials for injection moulding and extrusion applications respectively. The chemical structure of Amitel EL630/EM630 is shown below.

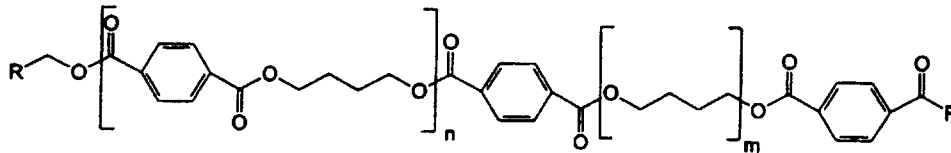


Figure 2.9: Chemical structure of Amitel EL630/EM630.

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



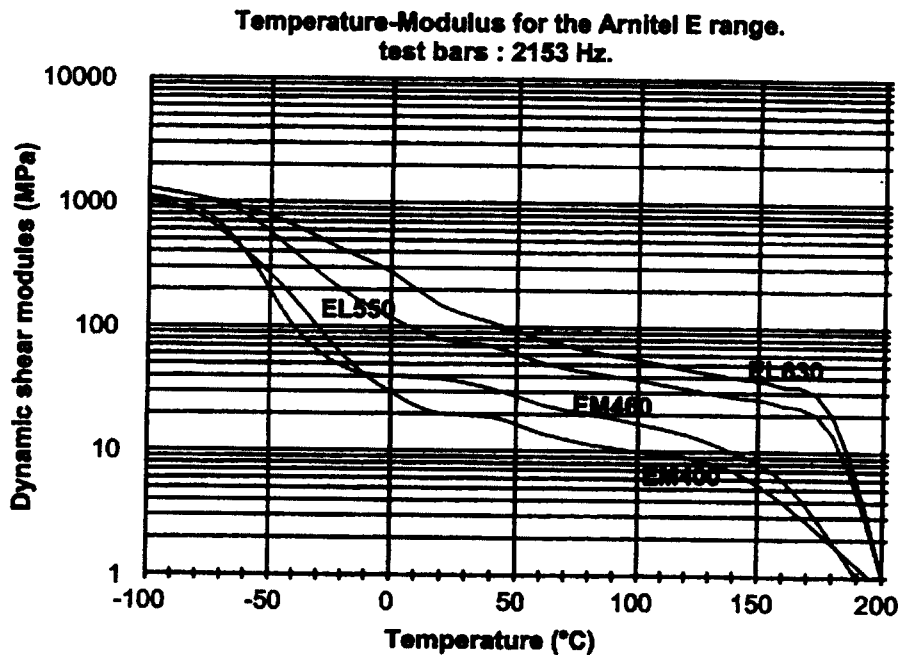
Figure 2.10: Simplified structure of Amitel EL630/EM630 .

Amitel 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 Amitel E types.



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

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

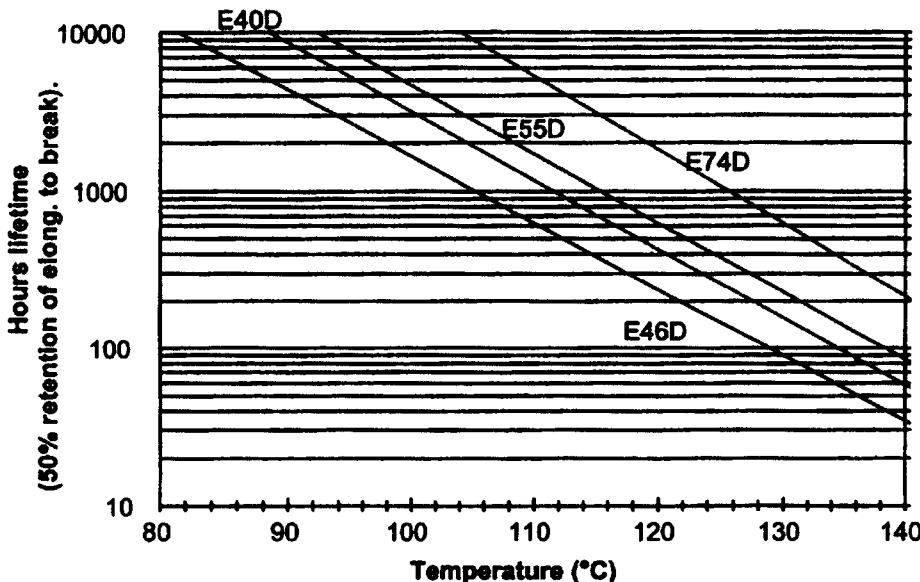
Arnitel EL630 and EM630 have a melting point of 213°C as found in the second heating curve of a DSC. The polymer will crystallize at 155°C using a 20°C/min cooling rate. The thermal expansion coefficient of Arnitel EL630/EM630 and is $140 \cdot 10^{-4} \mu\text{m/m.K}$.

• **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.

Heat aging of Arnitel E40D, 46D, 55D and 74D.

Natural products, Arrhenius plot.



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/cm³ 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.

Arnitel[®] EL630/EM630

• **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 |

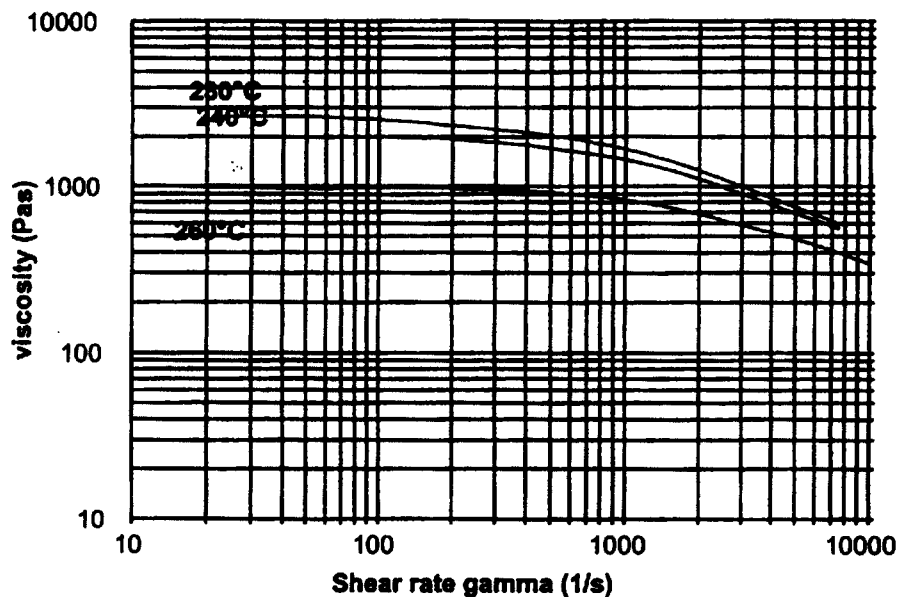
All temperatures are in °C.

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

• **Rheology:**

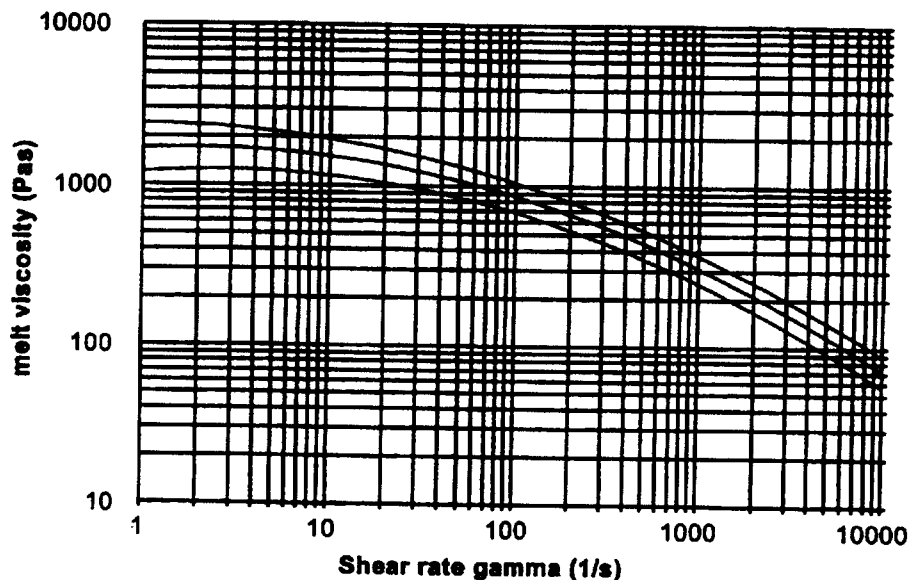
The temperature depending melt viscosity of Arnitel EL630/EM630 and are shown below in graph 2.80 and 2.81 respectively.

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



Amitel[®] EL630/EM630

Capillar melt viscosity of Amitel EM630.
240, 250 and 260°C.



Graph 2.80 and 2.81: Temperature dependancy of the melt viscosity for Amitel 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 Amitel EL630/EM630.

• Use of regrind:

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

| Mechanical property | SI Unit | typical 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 |

Data for dry natural materials.

NB: No Break

Table 2.32: mechanical properties of Amitel[®] EL630.

Arnitel® EL630/EM630

• **Abrasion:**

Arnitels show good abrasion resistance in both Taber and DIN 53516 abrasion tests. Data are shown 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 jacketing 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 | typical 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 ($\tan \delta$) at 1kHz | - | 0.019 | 0.019 | IEC 250 |
| Comparative tracking index | - | 600 | 600 | IEC 112 |
| Volume resistivity | $10^{14} \Omega \cdot \text{cm}$ | 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) dissolve. 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 than 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.

■ Panlite L-1250Z

| Category | Unit | Test Method | Condition | L-1250Z 100 |
|---------------------------------|------------------------|-------------------------------|--------------------|--------------------------|
| Melt volume flow rate | cm ³ /10min | ISO 1133 | 300°C load 1.2kg | 8 |
| Density | kg/m ³ | ISO 1183 | — | 1200 |
| Water absorption rate | % | ISO 62 | in water 23°C24h | 0.2 |
| Light transmission | % | ASTM D 1003 | thickness 3mm | 88 |
| Refractive index | — | ASTM D 542 | — | 1.585 |
| Tensile modulus | MPa | ISO 527-1 and ISO 527-2 | 1mm/min | 2400 |
| Tensile stress at yield | MPa | | 50mm/min | 61 |
| Tensile strain at yield | % | | 50mm/min | 6 |
| Nominal tensile strain at break | % | | 50mm/min | >50 |
| Flexural modulus | MPa | ISO 178 | 2mm/min | 2350 |
| Flexural strength | MPa | | 2mm/min | 93 |
| Charpy impact strength | KJ/m ² | ISO 179 | unnotched | NB |
| | | | notched | 76 |
| Heat deflection temperature | °C | ISO 75-1 and ISO 75-2 | 1.80MPa | 129 |
| | | | 0.45MPa | 142 |
| Vicat softening temperature | °C | ISO 306 | 50°C/h 50N | 149 |
| Mold shrinkage | % | In-house method | parallel | 0.5~0.7 |
| | | | vertical | 0.5~0.7 |
| Coefficient of linear expansion | × 10 ⁻⁴ /°C | ISO 11359-2 | parallel | 0.7 |
| | | | vertical | 0.7 |
| Specific inductive capacity | — | IEC 60250 | 100Hz | 3.1 |
| | — | | 1MHz | 3 |
| Dielectric loss tangent | × 10 ⁻⁴ | IEC 60250 | 100Hz | 10 |
| | × 10 ⁻⁴ | | 1MHz | 90 |
| Volume resistivity | Ω·m | IEC 60093 | — | >1 × 10 ¹³ |
| Surface resistivity | Ω | IEC 60093 | — | >1 × 10 ¹⁵ |
| Withstand voltage | MV/m | IEC 60243-1 | short time test | 30 |
| Tracking resistance | — | IEC 60112 | — | 250 |
| Flammability | — | UL 94 | — | V-2(0.40mm) HB(1.5mm) |
| Temperature index | °C | UL 746B | electric 1.47mmt | 125 |
| | | | impact 1.47mmt | 115 |
| | | | non-impact 1.47mmt | 125 |

※The values listed are specification values, not certified values.

■ Molding

1. Predrying

The water content of Parlite is about 0.2% at room temperature. In order to obtain good molding results, reduce the product moisture content to 0.02% or below. This will also avoid problems with deterioration in physical properties, foaming and silver streaking caused by hydrolysis.

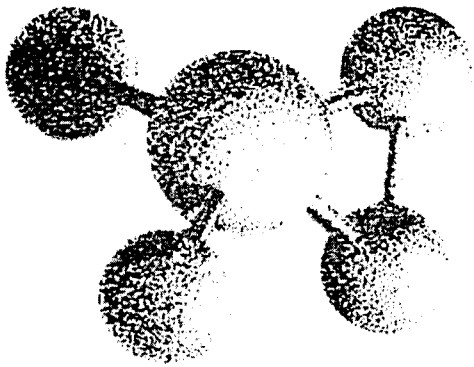
Predrying conditions

| Type of drying machine | Box type hot blast drying machine | Hopper dryer |
|------------------------|--|--|
| Drying temperature | 120°C | 120°C |
| Drying time | 5 hours or more | 5 hours or more |
| Remark | The thickness of pellet layer should be 3 cm or less. The hopper of the molding machine should be heated to maintain the pellet temperature between 100°C and 120°C, and to avoid moisture absorption. | For continuous molding, use a machine with a continuous molding capacity of 5 hours or more. If a dehumidifying type machine is used, more efficient drying will be performed. |

■ Injection Molding

Table of Standard injection conditions

| | | |
|---------------------------|---------------------|---|
| Predrying | | 120°C × 5 hours or more. Ensure thorough drying to reduce the moisture content to 0.02% or below. |
| Injection Molding machine | | Select a molding machine with a shot capacity of 1.5–3 times as that of the weight of the molded product. |
| Molding Condition | Molding Temperature | 270–320°C |
| | Mold Temperature | 80–120°C |
| | Screw Revolution | 40–100rpm |
| | Injection Speed | medium–high |
| | Injection Pressure | 98.1MPa–147.1MPa |
| | Back Pressure | 10MPa or less |



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) 樹脂系黏着劑，能在常溫下硬化，應用範圍至為廣泛，可穩定黏着金屬，塑膠以及其他各種物質。而由於此黏着劑，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. 由於能產生比一般黏着劑富有彎曲性的黏着層，縱使黏着不同材質的物品，也能以黏着層緩和熱膨脹的差別所引起的兩物品彎曲，對機械學的衝擊也能顯示較為良好的性能。
4. 由於能形成透明的黏着層，可以黏着透明的物質，如玻璃等等。

〔用 途〕

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

縱然是複聚乙稀 (Polyethylene)，聚酯 (Polyester)，天然以及人造橡膠等，以一般的黏着根本無法黏着的物質，如果加以適當的表面處理，即可強力黏着。

〔實 例〕

汽車、火車、船隻、飛機……。(將金屬把手黏着於玻璃窗/可以黏着鋁製品，三聚氫胺 (Melamine) 裝飾板等，於內部以增加強度/不同金屬間為兼防止電傷且加黏之/當作防腐塗料亦可)。

電器製品……。(由於是一種優秀的黏着劑，使用於高級擴音器、音響線圈的黏着/電磁器或外殼的黏着/線圈框的黏着/鐵粉芯的黏着/馬達線圈的黏着等等)。

建築……(玻璃、壓克力門或將文字板黏於屏風黏住把手/照明設備以及其他塑膠裝飾品的加黏以及組立/不銹鋼製品、鋁製建材、陶器或大理石等需要強力黏劑物品的加黏)

高級裝飾品，玻璃以及塑膠製工藝品，精密機械……

(照像機，調整距離儀/分光儀等等的固定)。

其他諸如罐頭，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，敷醫用以及襯裏用。

| 加 熱 溫 度 | 加 熱 時 間 |
|---------|---------|
| 50 °C | 120分以上 |
| 80 °C | 60-90分 |
| 100 °C | 40-60分 |
| 120 °C | 30-40分 |

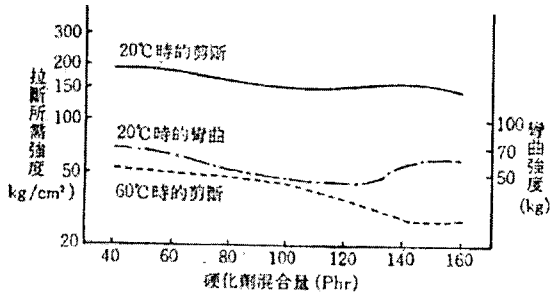


圖 II 2.1
硬化劑混合量和黏力強度
(在20°C七天的硬化)
試驗片：軟鋼板 (25×100×1.6mm)
(Over-lap)12.5mm

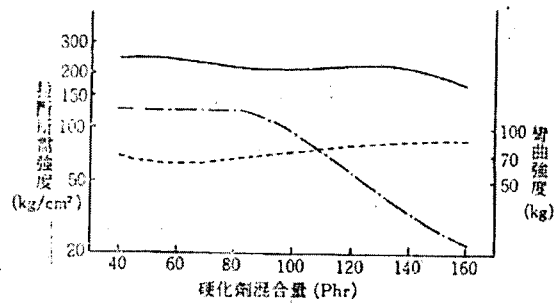


圖 II 2.2
硬化劑混合量和黏力強度
(在80°C一小時的硬化)
試驗片：以及其他同圖 II 2.1

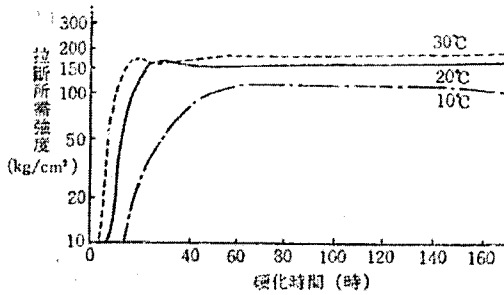


圖 II 2.3
常溫時的硬化特性 硬化劑混合率 100phr

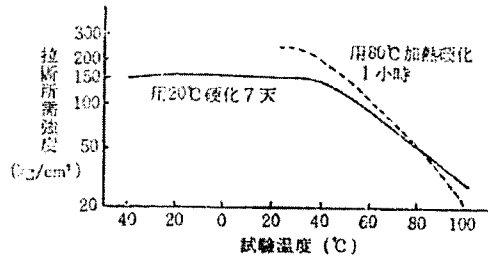


圖 II 2.5
耐熱特性 硬化劑混合率為 100phr

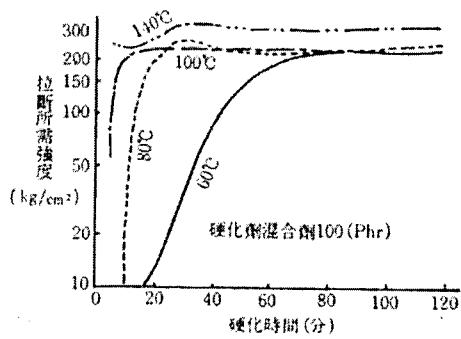


圖 II 2.4
加熱硬化特性 硬化劑混合率為 100phr

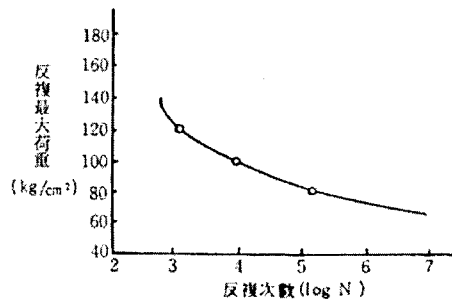


圖 II 2.6
老化特性

表 II 2.1 物理特性

| | | | |
|-----------------------------|-----------------------------|-----------------------------|-----------------------|
| 抗張力 (kg/mm ²) | 5.04 | 硬度 { | 68 |
| 抗折力 (kg/mm ²) | 7.40 | { ロソクセルM | 67 |
| 彎曲彈性率 (kg/mm ²) | 214 | { パーコル | 82 |
| 衝擊強度 (kg/mm ²) | 11.6 | { ショアーD | 5.6×10 ¹³ |
| 壓縮強度 (kg/mm ²) | 15.10(6.41)(¹) | 表面固定電阻 (Ω) | 10.5×10 ¹³ |
| 熱變形溫度 (°C) | 47 | 體積固有電阻 (Ω-Cm) | 2.94 |
| | | 誘電率 (10 ⁶ cycle) | 19 |
| | | 電壓破壞 (kv/mm) | |

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) |
|-------------|-------------|---------------------|--------------------|
| 樟 樹 材 | 83 | 多 元 焦 炭 | 22 |
| 馬 來 西 亞 杉 材 | 106 * | 苯 乙 烯 樹 脂 | 19 |
| 針 葉 樹 材 | 99 < * | 壓 克 力 樹 脂 | 30 |
| 杉 材 | 66 | 硬 質 鹽 烯 樹 脂 | 36 |
| 鐵 | 158 | 三 聚 氰 胺 裝 飾 板 (表 面) | 55 |
| 鋁 | 61 | 三 聚 氰 胺 裝 飾 板 (背 面) | 45 |
| 黃 銅 | 60 | F | R |
| 鋼 | 80 | P | 125 |
| 鍍 電 鍍 | 71 | | |
| 銲 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(1) (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候試驗 | 143 | 150 | — | 166 |
| 利用噴射熱水的促進試驗 | 143 | 150 | 100 | — |
| 利用高溫高濕的促進試驗(2) | 143 | 150 | 143 | — |
| 利用反復冷卻的促進試驗(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

| 暴露前的粘力強度 | | | 拉斷所需強度 (kg/cm ²) |
|----------------------|-----|---------------|------------------------------|
| | | | 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 " | 138 |
| " (3年) ※ | 123 | " 3年 " | 137 |
| " (10年) ※ | 111 | " 10年 " | 130 |

[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)

| 試驗 | 拉斷所需強度 (kg/cm ²) | | | |
|------|------------------------------|-----|-----|-----|
| | 時間 0 | 3個月 | 6個月 | 1年 |
| 常態試驗 | 120 | 106 | 123 | 120 |
| 耐水試驗 | | 109 | 117 | 109 |

[註] 硬化劑混合比為 100phr
試驗片: 不銹鋼 (100×25×1.5mm)
(接合部Over-lap)12.5mm。

表II 2.6 耐水性 (60°C, 2小時硬化)

| 試驗 | 拉斷所需強度 (kg/cm ²) | | | |
|------|------------------------------|-----|-----|-----|
| | 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 | 75.9 |
| 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 |
| | | 85.5 | 63.8 | 51.7 | 66.8 |
| | | 88.8 | 69.5 | 93.4 | 70.8 |
| | | 89.5 | 71.3 | 97.4 | 68.7 |
| | | 90.2 | 64.7 | 101.3 | 69.1 |
| | 三 氯 化 矽 | 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% 苛性蘇打溶液 | 97.2 | 74.3 | 83.8 | 74.3 |
| | 10% 食鹽水溶液 | 89.6 | 71.8 | 91.0 | 69.8 |
| | 10% 醋酸溶液 | 94.2 | 77.8 | 78.4 | 64.2 |

[註] 黏劑混合率=1:1，試驗片：軟鋼片(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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