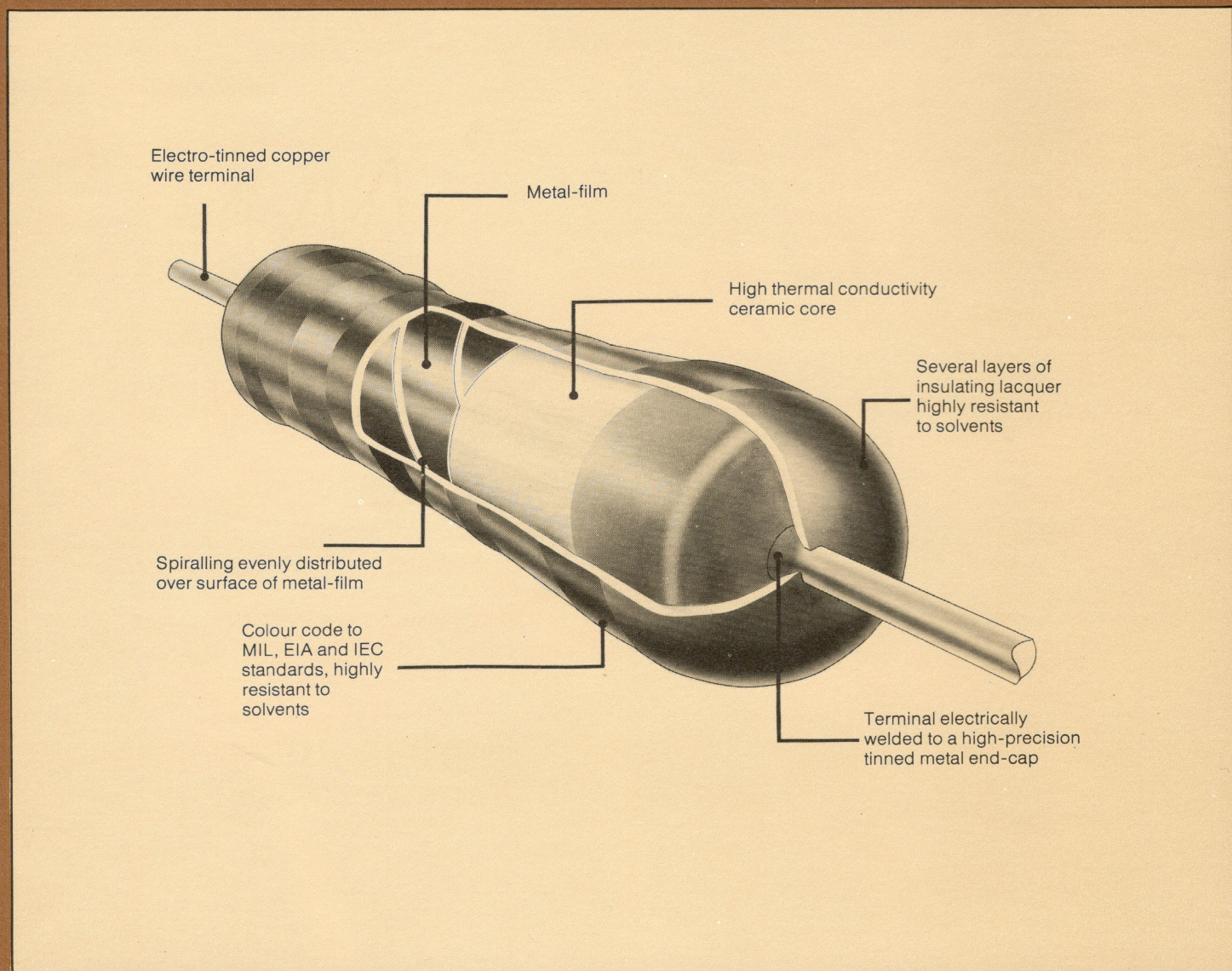


Introduction

For 35 years PIHER has established itself as one of the world's leading manufacturers of high quality passive components, including Carbon Film Resistors and Potentiometers.

The development over the past five years of the METAL FILM RESISTOR expands the PIHER range of products manufactured in Europe to cover applications requiring 50ppm/°C and 100ppm/°C temperature coefficients with 1% and 2% tolerances on nominal value.

PIHER – a name synonymous with precision, stability and reliability, continues to meet the stringent requirements of the electronic equipment manufacturer.



GENERAL CHARACTERISTICS

RELIABILITY

Established from life tests of 20×10^6 component hours, the failure rate exceeds 0.0005%/1,000 hours. (Confidence level 60%.)

NON-EXISTENCE OF EARLY FAILURES

Early failures have been eliminated by employing an overload test on every resistor and by monitoring third harmonic levels.

RUGGED CONSTRUCTION

High quality ceramic cores, close tolerance end-caps, welded leads and several layers of insulating lacquer give the components a mechanical strength which makes them ideal for high speed automatic insertion.

DURABLE LACQUER AND COLOUR CODE BANDS

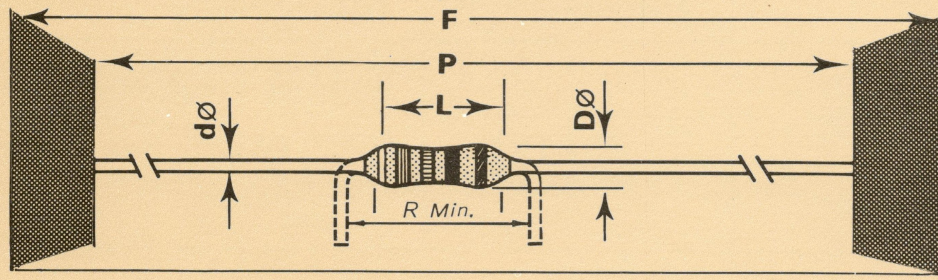
Both the insulating lacquer and colour bands are highly resistant to solvents.

Lake-View Electronics Corp. 1054 Pioneer Rd. Grafton, WI Ph: 262-377-8250 Fax: 262-375-0109

www.lvelectronics.com

Email: sales@lvelectronics.com

PM25



| | L (IEC 294) | DØ | P | dØ | Rmin | F |
|-----|----------------|-----------|----------|------------|---------|----------|
| mm | 6,0 ± 0,4 | 2,3 ± 0,2 | 52 ± 0,5 | 0,6 ± 0,02 | 10 | 65 ± 0,5 |
| in. | (0,236) | (0,091) | (2,047) | (0,024) | (0,394) | (2,559) |

Electrical Characteristics

| | |
|----------------------------|---|
| Maximum power dissipation | 1/4W (70°C) 1/8W (125°C) |
| Maximum voltage (R.C.W.V.) | 250 volts dc/ac rms |
| Resistance range | 10Ω to 1MΩ |
| Tolerance/Series | ± 1% series E24, E48, E96 ± 2% series E24 (E48 on request) |
| Climatic category | 55/155/56 (IEC-68); EHF (DIN 44040) |
| Temperature coefficient | +100 ppm/°C, ±50 ppm/°C |
| Noise level Up to 270K | ≤ 0.1 μV/V |
| >270K | ≤ 0.5 μV/V |
| Failure rate | ≤ 5 × 10 ⁻⁹ failures per component hour. |

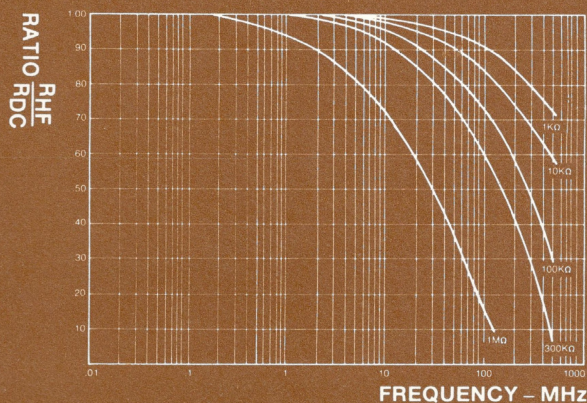
ΔR Tests

PM25 resistors conform to many International Standards of Performance, MIL-R-10509 was chosen to give the following concise representation of the broad spectrum of applicable ΔR tests.

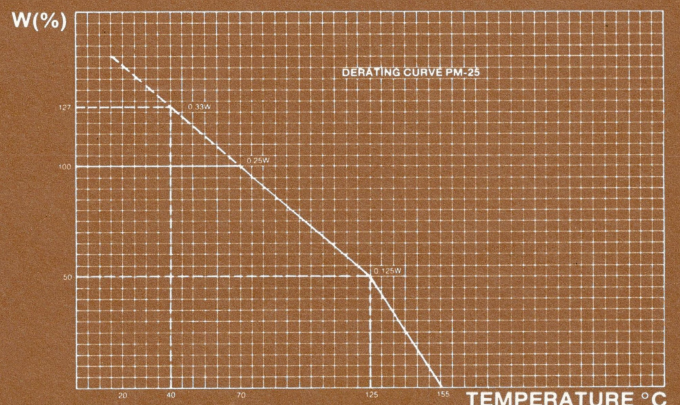
| TEST CONDITION | PM25 | MIL-R-10509 |
|---------------------------------|------|-------------|
| Dielectric Withstanding Voltage | 0,2% | 0,5% |
| Moisture Resistance | 0,4% | 1,5% |
| Damp Heat (56 days) | 0,4% | 1,5% |
| Temperature Cycling | 0,2% | 0,5% |
| Short-Time Overload | 0,2% | 0,5% |
| Load Test | 0,5% | 1,0% |
| Low Temperature Operation | 0,2% | 0,5% |
| Resistance to Soldering heat | 0,2% | 0,5% |
| Shock | 0,2% | 0,5% |
| Vibration | 0,2% | 0,5% |
| Traction | 0,1% | 0,2% |

Many International Standards overlap or duplicate these tests. Some MIL-202 and IEC-115 Test Conditions are outlined opposite.

High Frequency Behaviour



Derating Curve

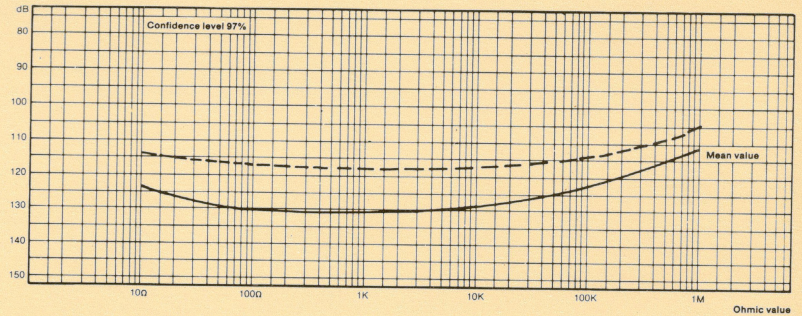


| Characteristic | Specification | Test Method | | | | | | | | | | | | | | | |
|--|---|--|---------------------------|-----------------------------|------|----|---------------|---------|--------------------|-------|---------------|-----|-------|---------|---|-------|---------------|
| | | (All resistance measurements should be performed after Stabilisation or Conditioning periods). | | | | | | | | | | | | | | | |
| DC RESISTANCE MIL-STD-202 Method 303 IEC-PUB-115-1 Clause 8 | Tolerances available: 1% in series E24, E48, E96 2% in series E24, E48 | <table border="0"> <tr> <td>Nominal resistance</td> <td>Max. DC Test Voltage</td> </tr> <tr> <td>≤99Ω</td> <td>1v</td> </tr> <tr> <td>100Ω to 9999Ω</td> <td>3v</td> </tr> <tr> <td>10,000Ω to 99,999Ω</td> <td>10v</td> </tr> <tr> <td>≥100,000Ω</td> <td>25v</td> </tr> </table> | Nominal resistance | Max. DC Test Voltage | ≤99Ω | 1v | 100Ω to 9999Ω | 3v | 10,000Ω to 99,999Ω | 10v | ≥100,000Ω | 25v | | | | | |
| Nominal resistance | Max. DC Test Voltage | | | | | | | | | | | | | | | | |
| ≤99Ω | 1v | | | | | | | | | | | | | | | | |
| 100Ω to 9999Ω | 3v | | | | | | | | | | | | | | | | |
| 10,000Ω to 99,999Ω | 10v | | | | | | | | | | | | | | | | |
| ≥100,000Ω | 25v | | | | | | | | | | | | | | | | |
| TEMPERATURE COEFFICIENT* MIL-STD-202 Method 304 IEC-PUB-115-1 Clause 11 | <100 ppm/°C <50 ppm/°C (Stabilisation period, 30 minutes at each temperature) | $TCR = \frac{R_2 - R_1}{R(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)}$ <p>R₁ = Resistance @ temperature (t₁) R₂ = Resistance @ temperature (t₂) Temperature sequence °C: +25, -55, +25, +155, +25°C</p> | | | | | | | | | | | | | | | |
| DIELECTRIC STRENGTH MIL-STD-202 Method 301 IEC-PUB-115-1 Clause 10 | 500 volts RMS ΔR : 0.2% (dV/dt ≤ 100 Volts/Sec) No visible damage. | Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested for 60 ± 5 seconds. | | | | | | | | | | | | | | | |
| INSULATION RESISTANCE MIL-STD-202 Method 301 IEC-PUB-115-1 Clause 9 | >10 ⁹ ohms | Resistors shall be clamped in the trough of a 90° metallic V-block and shall be measured at 100 V.D.C. | | | | | | | | | | | | | | | |
| MOISTURE RESISTANCE MIL-STD-202 Method 106 | ΔR ≤ 0.7% (Stabilisation period 1-2 hours) | 10 days at 0.25W subject to cycling as below: 1) 2½ hours at 95% R.H. warming from 25°C to 65°C. 2) 3 hours at 95% R.H. and 65°C. 3) 2½ hours cooling from 65°C to 25°C at 80% R.H. | | | | | | | | | | | | | | | |
| DAMP HEAT (Steady State)* ICE-68-2-3 | ΔR ≤ 1.0% (Stabilisation period 1-2 hours) | 56 days (1,344 hours) operating at the lesser of 2.5mW or 0.1 RCWV in a chamber, controlled at 40° ± 2°C and 90 to 95% R.H. | | | | | | | | | | | | | | | |
| TEMPERATURE CYCLING* MIL-STD-202 Method 102 | ΔR ≤ 0.5% | 5 consecutive cycles as below: (Final resistance value measured after 24 hours at 25°C) | | | | | | | | | | | | | | | |
| | | <table border="0"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+155°C</td> <td>3 hours</td> </tr> <tr> <td>2</td> <td>+25°C</td> <td>10/15 minutes</td> </tr> <tr> <td>3</td> <td>-60°C</td> <td>3 hours</td> </tr> <tr> <td>4</td> <td>+25°C</td> <td>10/15 minutes</td> </tr> </tbody> </table> | Step | Temperature | Time | 1 | +155°C | 3 hours | 2 | +25°C | 10/15 minutes | 3 | -60°C | 3 hours | 4 | +25°C | 10/15 minutes |
| Step | Temperature | Time | | | | | | | | | | | | | | | |
| 1 | +155°C | 3 hours | | | | | | | | | | | | | | | |
| 2 | +25°C | 10/15 minutes | | | | | | | | | | | | | | | |
| 3 | -60°C | 3 hours | | | | | | | | | | | | | | | |
| 4 | +25°C | 10/15 minutes | | | | | | | | | | | | | | | |
| SHORT-TIME OVERLOAD* IEC-PUB-115-1 Clause 15 | ΔR ≤ 0.2% No visible damage (Stabilisation period 1-2 hours) | Application of 2,5 times Nominal Voltage for 5 seconds. | | | | | | | | | | | | | | | |
| POWER CONDITIONING | ΔR ≤ 0.5% | 24 hours at 25°C ambient operating at 1.5 times rated power, or maximum RCWV, whichever is less. | | | | | | | | | | | | | | | |
| LOAD TEST* IEC-PUB-115-1 Clause 26 | ΔR ≤ 0.5% (Stabilisation period 4 hours under normal atmospheric conditions) | 1,000 hours at 70°C operating at 0.25W or RCWV whichever is less with duty cycle 1,5 hours "on", 0,5 hours "off". | | | | | | | | | | | | | | | |
| LOW TEMPERATURE OPERATION MIL-R-10509 | ΔR ≤ 0,2% (Stabilisation period 24 hours under normal temperature) | Resistor gradually cooled to -65°C. After 1 hour stabilisation 0,25W is dissipated or RCWV is applied, (whichever is less) for 45 minutes. | | | | | | | | | | | | | | | |
| RESISTANCE TO SOLDERING HEAT* MIL-STD-202 Method 210 IEC-PUB-115-1 | ΔR ≤ 0,2% no visible damage (Stabilisation period 3 hours) | Leads further than 3mm from Resistor body immersed in solder @ 350°C ± 10°C for 3 ± seconds. | | | | | | | | | | | | | | | |
| SOLDERABILITY* IEC 115-A Clause 19 | | After 5 seconds in a 25% colophony based flux and 5 seconds immersion in 60/40 Sn/Pb solder at 235°C, there should be 95% coverage of the tested area to within 1,5mm of Resistor body. The area covered should show a new, clean, smooth surface free from concentrated pin holes. | | | | | | | | | | | | | | | |
| RESISTANCE TO SOLVENTS* | | Isopropyl alcohol, Trichloroethylene, Arklone, Trichloroethane, Freon TF & TMC, Xylene, etc. tested in liquid and gas form will neither render marking illegible nor cause other significant effects. | | | | | | | | | | | | | | | |
| TERMINAL STRENGTH IEC 115-1 Clause 18 | | Direct load (traction): 3kg direct load for 10 seconds along longitudinal axis of the terminal leads. Bend Test: Terminal leads shall be bent through 90° twice at 6mm from the body of the resistor with 0,5kg load applied. | | | | | | | | | | | | | | | |
| FAILURE RATE | 5 x 10 ⁻⁹ Failures/Component Hour | 20,000 resistors operated at 70°C for 10,000 hours dissipating 0,25W in cycles of 1,5 hours "on" and 0,5 hours "off". | | | | | | | | | | | | | | | |

PM25

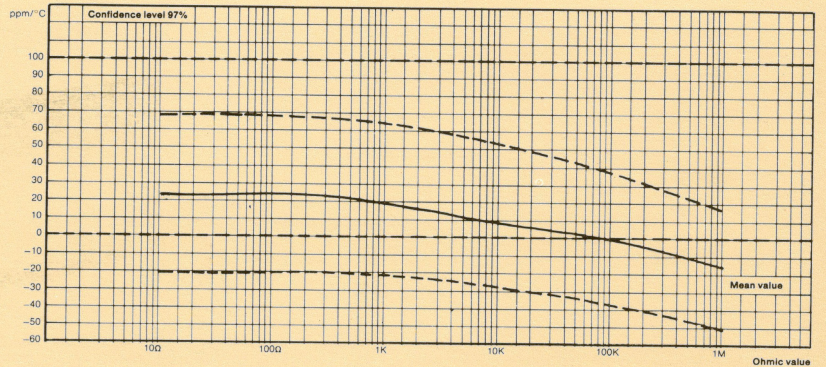
LINEARITY CHARACTERISTICS

The presence of any non-linearity in the metal-film will cause distortion in the voltage across the resistor when a pure sinusoidal current is flowing. The distorted voltage can be considered the sum of a fundamental frequency voltage and a number of voltages at harmonic frequencies. The magnitude of these harmonic voltages can serve as a measure of the non-linearity present in the resistor. For convenience, the third harmonic is usually chosen since it has the largest magnitude and therefore is easiest to measure.



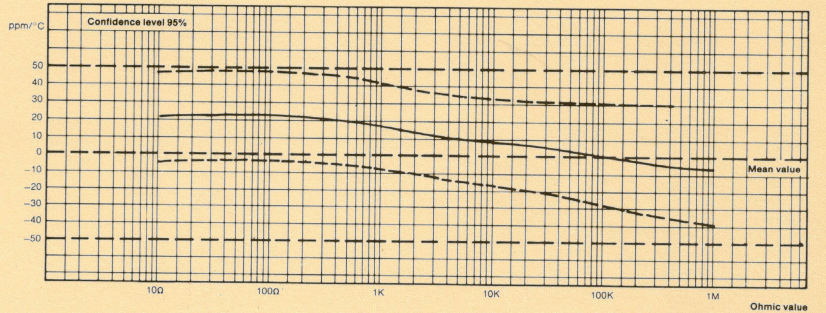
TEMPERATURE COEFFICIENT

100ppm/°C



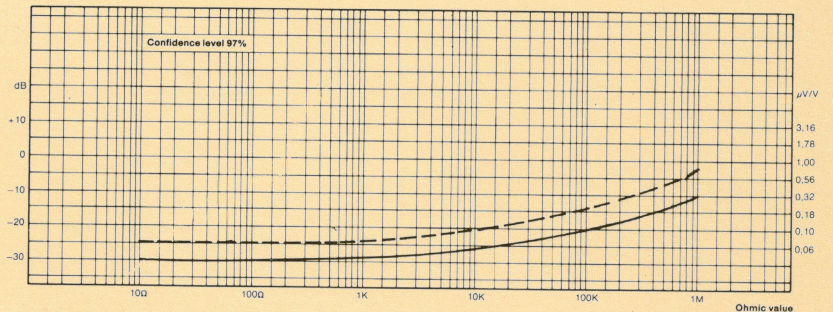
TEMPERATURE COEFFICIENT

50ppm/°C



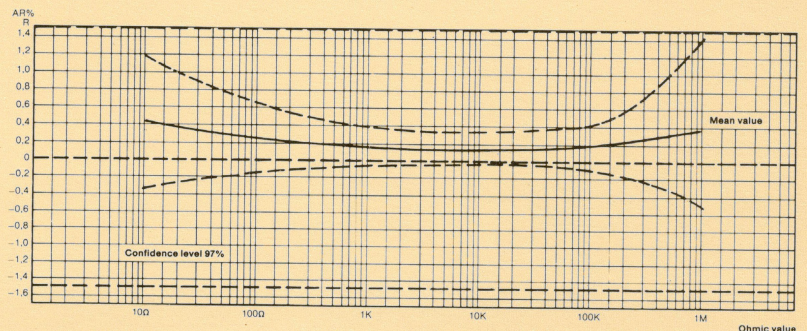
NOISE LEVEL

(dB/μV/V)



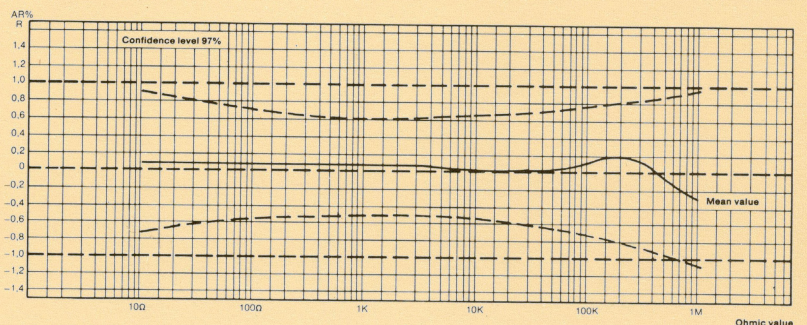
LONG TERM DAMP HEAT

(0.01W_n for 56 days at 40°C, 95% R.H.)

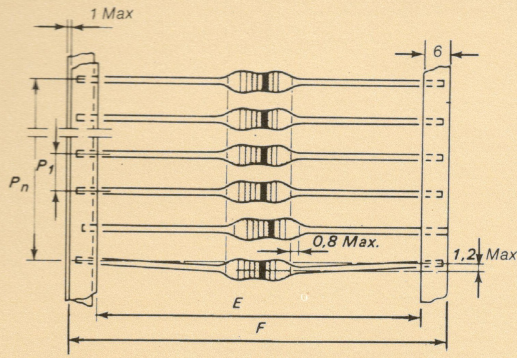


LOAD LIFE

(W_n for 1,000 hours at 70°C)



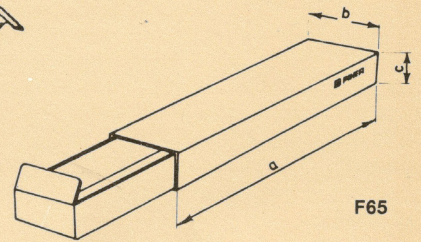
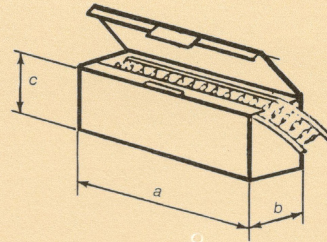
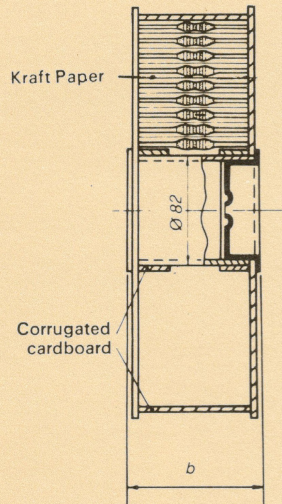
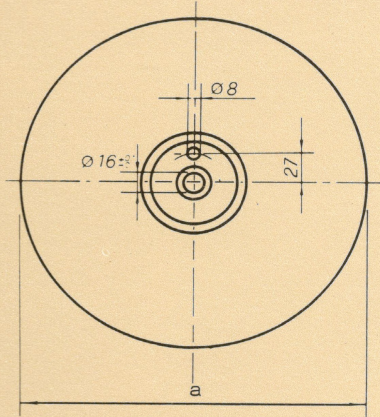
AXIAL BANDOLIERING F26 AND F65



| | F-65 | F-26 |
|----------------|--------------|---------------|
| E | 52 ± 1,5 | 26 ± 1,5 0 |
| F | 65 ± 1,5 | 39 ± 1,5 |
| P ₁ | 5,08 ± 0,4 | |
| P _n | 500 ± 4 | |
| n | = 100 spaces | |

REELS

BOXES



| | F-65 | F-26 |
|----------|-------|-------|
| a | 305 | 305 |
| b | 73 | 42 |
| Quantity | 5,000 | 5,000 |

| | F-65 | F-26 |
|---|------|------|
| a | 260 | 255 |
| b | 85 | 52 |
| c | 52 | 95 |

F26/F65 BOXES AND REELS

- For tape splicing there are no metal links and a maximum of 4 layers of tape not exceeding 0.8 mm in thickness is employed. The distance between splices is a minimum of 1 m.
- The tape, including splices, will withstand a force of at least 4.5 kg.
- For reeled bandoliers there is a minimum of 300 mm of tape without components at each end of the reel. Kraft paper of width similar to the bandolier is used for protection between each component layer. Each reel is further protected by an outer layer of single sided corrugated paper.

BOX/REEL MARKING (ALL TYPES)

- Resistor type
- Wattage, value, tolerance and temperature coefficient
- Quantity
- Batch number and date of manufacture.
- Customer part number (only on request)

HOW TO ORDER:

