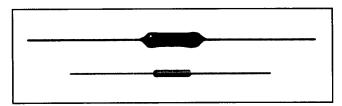
## MODEL G Wirewound Resistors

## Military, MIL-R-26 Qualified, Type RW Precision Power, Silicone Coated and Molded





#### **FEATURES**

- From 1.4 to 4 times higher power ratings than conventional resistors of equivalent size
- Completely welded construction
- High temperature silicone coated and molded
- Available in non-inductive styles (Type GN)
- Covered by U.S. Patent 3,295,090

		DALE R	ATING		RESISTANCE			MUM *	MAXIMUM WEIGHT	
DALE	MIL-R-26	U .05%	V 3% &		MIL. Range sh	own in bold fac	.5%,1%,	WORKING VOLTAGE		
MODEL	TYPE	thru 5%	5%	.05%	.1%	.25%	3%, 5%	U	V	(Grams)
G-1-80	-	1.0 W		1-1k	.499-1k	.499-3.4k	.1-3.4k	33	_	.20
_	RW81	1.0 W		_	.499-1k	.499-1k	.1-1k	33		.20
G-2	_	1.5 W		1-1.3k	.499-1.3k	.499-4.9k	.1-4.9k	42	_	.21
G-3-80	<del>-</del>	2.0 W	_	1-2.74k	.499-2.74k	.499-10.4k	.1-10.4k	80	_	.34
_	RW80	2.0 W		_	.499-2.74k	.499-2.74k	.1-2.74k	80	_	.34
G-5		4.0 W	5.0 W	.499-6.5k	.499-6.5k	.1-24.5k	.1-24.5k	162	184	.80
G-5C	_	5.0 W	7.0 W	.499-8.6k	.499-8.6k	.1-32.3k	.1-32.3k	194	230	1.20
G-10	_	7.0 W	10.0 W	.499-25.7k	.499-25.7k	.1-95.2k	.1-95.2k	425	508	3.60

Maximum working voltage determined at .0008" diameter wire resistance values.
 NOTE: All resistance ranges shown conform to military specifications unless otherwise indicated.

#### **ELECTRICAL SPECIFICATIONS**

**Resistance Tolerance:**  $\pm$  5%,  $\pm$  3%,  $\pm$  1%,  $\pm$  .5%,  $\pm$  .25%,  $\pm$  .10%,  $\pm$  .05%.

**Temperature Coefficient:** ± 90PPM/°C, below 1 ohm. ± 50PPM/°C, 1 ohm - 9.9 ohm. ± 20PPM/°C, 10 ohm and above. Consult factory for special T.C. requirements.

Dielectric Strength: 500 VAC for G-1-80, G-2, G-3-80 models. 1000 VAC for all others.

**Insulation Resistance:** 1000 Megohm minimum dry, 100 Megohm minimum after moisture test.

**Short Time Overload**: 5 seconds at 5 times rated power = G-1-80 thru G-5C (Characteristic U). 5 seconds at 10 times rated power = all others.

#### **MECHANICAL SPECIFICATIONS**

**Terminal Strength:** 5 pound pull test = G-1-80, G-2 and G-3-80. 10 pound pull test = all others.

**Solderability:** MIL-R-26 Type - Meets requirements of MIL-STD-202, Method 208. Standard G (Non-MIL Models) - 60/40 electro tin plated terminals to facilitate soldering.

**Termination:** When G resistors will be operated at full rated power, resistance welding or high temperature solder are the recommended termination methods. Termination should be made within 1/2 inch from end of resistor body.

#### **MATERIAL SPECIFICATIONS**

**Core:** Beryllium oxide or alumina depending on power requirements.

**Element:** Copper-nickel alloy or nickel-chrome alloy, depending on resistance value.

End Caps: Stainless steel.

Coating: Special high temperature silicone. Standard Terminals: Tinned Copperweld<sup>®</sup>.

**Weldable Leads:** The following weldable lead materials are available from Dale<sup>®</sup> on a standard stocking basis and can be specified by adding the dash number shown below to the standard part number.

С

.078 ± .015

 $[1.98 \pm .381]$ 

.078 ± .015

 $[1.98 \pm .381]$ 

.110 ± .015

[2.79 ± .381]

 $.188 \pm .032$ 

[4.78 ± .813]

.218 ± .032

 $[5.54 \pm .813]$ 

 $.312 \pm .032$ 

[7.92 ± .813]

D

.020

[.508]

.020

[.508]

020

[.508]

.032

[.813]

.040

[1.02]

.040

[1.02]

Grade "A" Nickel, untinned -53. Gold-plated Dumet (50 microinch) -52. (Example: G-1-53 or G-1-52.)

DIMENSIONAL C	ONFIGURATIONS [Numbers in brackets indi	ate	millimete	ırs]		
Molded Model	1.50		MODEL	A	B (Max.)	
morada model	[38.10] MIN.		G-1-80	.250 ± .015 [6.35 ± .381]	_	
	<del>*</del>	MOLDED	G-2	.312 ± .015 [7.92 ± .381]	_	[
	D ± .002 [.051] C 1.50	Σ	G-3-80	.422 ± .015 [10.72 ± .381]	<del></del>	
Coated Model	(38.10) MIN.		G-5	.562 ± .062 [14.27 ± 1.57]	.640 [16.26]	!
		COATED	G-5C	.500 ± .062 [12.70 ± 1.57]	.593 [15.06]	
	→ B MAX. → ↑ D ± .002 [.051]	ŏ	G-10	.875 ± .062 [22.23 ± 1.57]	1.0 [25.40]	[

#### **MODEL G**

#### **APPLICABLE MIL-SPECIFICATIONS**

**MIL-R-26E:** This is a military specification designed especially for precision and non-precision power wirewound resistors. The G models meet the requirements of this specification as well as the older MIL-R-26C and MIL-R-23379 specifications.

#### SPECIAL MODIFICATIONS

- Terminals can be supplied in any commercial material with several type finishes.
- 2. Terminal lengths and diameters can be varied.
- 3. Various elements available for special T.C.
- 4. Special configuration available on request.
- 5. Tolerances available to .01% on most types.
- 6. Special matching available (T.C. and tolerance).

### GN - NON-INDUCTIVE

Models of equivalent physical and electrical specifications are available with non-inductive (Aryton-Perry) winding. They are identified by adding the letter N to the letter G in the part number (GN-5, for example). Three conditions apply:

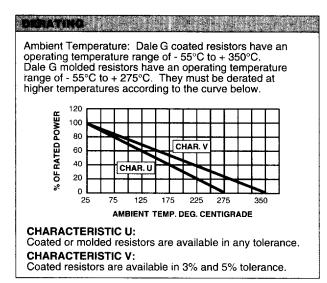
- 1. For GN Types, divide maximum resistance values by two.
- 2. For GN Types, multiply maximum working voltage by .707.
- 3. For GN Types, maximum weights may slightly exceed those shown on low values.

GN-1-80	GN-5
GN-2	GN-5C*
GN-3-80	GN-10

<sup>\*</sup> Body O.D. may exceed that of the G-5C by .010" [.254].

	MIL-R-26E	
TEST	REQUIREMENT	DALE MAXIMUM
Moisture Resistance	$\pm$ (.2% + .05 $\Omega$ ) $\Delta$ R	± (.2% + .05Ω) ΔR
Load Life	$\pm$ (.5% + .05 $\Omega$ ) $\Delta R$	$\pm$ (.5% + .05 $\Omega$ ) $\Delta$ R
Temperature Coefficient	30-90PPM/°C Max.	See Elec. Specs.
Thermal Shock	$\pm$ (.2% + .05 $\Omega$ ) $\Delta$ R	$\pm$ (.2% + .05 $\Omega$ ) $\Delta$ R
Short Time Overload	$\pm$ (.2% + .05 $\Omega$ ) $\Delta$ R	± (.2% + .05Ω) ΔR
Dielectric	$\pm$ (.1% + .05 $\Omega$ ) $\Delta$ R	$\pm$ (.1% + .05 $\Omega$ ) $\Delta$ R
Low Temperature Storage	$\pm$ (.2% + .05 $\Omega$ ) $\Delta$ R	$\pm$ (.2% + .05 $\Omega$ ) $\Delta$ R
High Temperature Exposure	$\pm$ (.5% + .05 $\Omega$ ) $\Delta$ R	± (.5% + .05Ω) ΔR
Shock	± (.1% + .05Ω) ΔR	± (.1% + .05Ω) ΔR
Vibration	± (.1% + .05Ω) ΔR	± (.1% + .05Ω) ΔR
Terminal Strength	± (.1% + .05Ω) ΔR	± (.1% + .05Ω) ΔR

<sup>\*</sup> All  $\Delta R$  figures shown are maximum, based on units with an initial tolerance of 1% and maximum operating temperature of 275°C.



#### **POWER RATING**

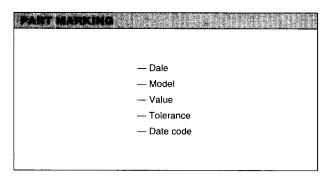
Power ratings of Dale G resistors are 1.4 to 4 times higher than those of conventional wirewound resistors of equivalent size. At the higher ratings, Dale G resistors will meet the same environmental and life stability requirements of the lower rated conventional resistors.

#### **CHARACTERISTIC U:**

- 1. 275°C maximum hotspot temperature.
- 2. .5% maximum  $\Delta R$  in 2000 hour load life.

#### **CHARACTERISTIC V:**

- 1. 350°C maximum hotspot temperature.
- 2. 3% maximum  $\Delta R$  in 2000 hour load life.



MENA OF MASS CO.				
	G-3-80	10	1%	
	MODEL	RESISTANCE	TOLERANCE	

# CHECKLIST FOR ORDERING FILM RESISTORS



#### ORDERS MUST HAVE COMPLETE INFORMATION INCLUDING THE FOLLOWING:

- 1. Resistor type and model number
- 2. Resistor wattage rating
- 3. Resistor value
- 4. Resistor tolerance
- 5. Temperature Coefficient
- 6. Special quantity of each item
- 7. Specify routing
- 8. Desired delivery

- 9. If you have a drawing covering the part, specify your part number and drawing number and supply a copy with the order. Including the Dale® specification number on your drawings will assure you of exact duplication on all future orders.
- 10. Priority rating under DMS regulations and contract number (if applicable).
- 11. Specify if Letter of Certification is required.
- 12. Prices on specific items and quantities will be quoted on request. Quantity of each item ordered at one time determines unit price for manufacturers' orders.

### STANDARD DECADE RESISTANCE VALUES

The following table lists four established number series which are used as preferred values in electronic design. Each series is shown under an associated value of tolerance %. The number series under the 10% column is known as the E12 Series because there are 12 standard values within a decade range. 2% and 5% utilize the E24 Series, 1% uses E96 and .1%, .25% and .5% use E192. Successive values within a decade series are related (approximately) by a factor of  $^{12}\sqrt{10}$  for the E12 Series,  $^{24}\sqrt{10}$  for the E24 Series,  $^{96}\sqrt{10}$  for the E96 Series and  $^{192}\sqrt{10}$  for the E192 Series.

Use of standard values is encouraged because stocking programs are designed around them. However, intermediate values can be special ordered where permitted. Consult factory.

.1%, .25	%,	.1%, .25	%,	.1%, .25	%,	.1%, .25	%,	.1%, .25	%,	.1%, .25	%,	.1%, .25	%,	.1%, .25	%,		
.5%	1%	.5%	1%	.5%	1%	.5%	1%	.5%	1%	.5%	1%	.5%	1%	.5%	1%	2%, 5%	10%
10.0	10.0	13.3	13.3	17.8	17.8	23.7	23.7	31.6	31.6	42.2	42.2	56.2	56.2	75.0	75.0	10	10
10.1		13.5		18.0		24.0		32.0		42.7		56.9		75.9		11	_
10.2	10.2	13.7	13.7	18.2	18.2	24.3	24.3	32.4	32.4	43.2	43.2	57.6	57.6	76.8	76.8	12	12
10.4		13.8		18.4		24.6		32.8		43.7		58.3		77.7		13	_
10.5	10.5	14.0	14.0	18.7	18.7	24.9	24.9	33.2	33.2	44.2	44.2	59.0	59.0	78.7	78.7	15	15
10.6		14.2		18.9		25.2		33.6		44.8		59.7		79.6		16	—
10.7	10.7	14.3	14.3	19.1	19.1	25.5	25.5	34.0	34.0	45.3	45.3	60.4	60.4	80.6	80.6	18	18
10.9		14.5		19.3		25.8		34.4		45.9		61.2		81.6		20	_
11.0	11.0	14.7	14.7	19.6	19.6	26.1	26.1	34.8	34.8	46.4	46.4	61.9	61.9	82.5	82.5	22	22
11.1		14.9		19.8		26.4		35.2		47.0		62.6		83.5		24	
11.3	11.3	15.0	15.0	20.0	20.0	26.7	26.7	35.7	35.7	47.5	47.5	63.4	63.4	84.5	84.5	27	27
11.4		15.2		20.3		27.1		36.1		48.1		64.2		85.6		30	_
11.5	11.5	15.4	15.4	20.5	20.5	27.4	27.4	36.5	36.5	48.7	48.7	64.9	64.9	86.6	86.6	33	33
11.7		15.6		20.8		27.7		37.0		49.3		65.7		87.6		36	_
11.8	11.8	15.8	15.8	21.0	21.0	28.0	28.0	37.4	37.4	49.9	49.9	66.5	66.5	88.7	88.7	39	39
12.0		16.0		21.3		28.4		37.9		50.5		67.3		89.8		43	_
12.1	12.1	16.2	16.2		21.5	28.7	28.7	38.3	38.3	51.1	51.1	68.1	68.1	90.9	90.9	47	47
12.3		16.4		21.8		29.1		38.8		51.7		69.0		92.0		51	-
12.4	12.4	16.5	16.5		22.1	29.4	29.4	39.2	39.2	52.3	52.3	69.8	69.8	93.1	93.1	56	56
12.6		16.7		22.3		29.8		39.7		53.0		70.6		94.2		62	—
12.7	12.7	16.9	16.9	22.6	22.6	30.1	30.1	40.2	40.2	53.6	53.6	71.5	71.5	95.3	95.3	68	68
12.9		17.2		22.9		30.5		40.7		54.2		72.3		96.5		75	
13.0	13.0		17.4	23.2	23.2	30.9	30.9	41.2	41.2	54.9	54.9	73.2	73.2	97.6	97.6	82	82
13.2		17.6		23.4		31.2		41.7		55.6		74.1		98.8		91	

Standard resistance values are obtained from the decade table by multiplying by powers of 10. As an example, 13.3 can represent ohms, 133 ohms, 1.33k, 133k, 133k, 133 Megohm.

## **Military Product Identification**



#### MILITARY PART ORDERING EXAMPLES To help in ordering, the following are representative samples of military part numbers cross-referenced to Dale® part numbers. For complete information, consult Military Specification Qualified Products List. **RESISTORS: Fixed and Variable** 1. Style 1. Style MIL-R-26E (Basic [RW]) (Established Reliability MIL-R-39007 [RWR]) Characteristic Characteristic 49R9 Dale Type G-3 49.9 ohm RW80 F Value (Tolerance below 1 ohm 10% 3. Resistance Value 1 3 4 $\overline{2}$ 3 4. Tolerance 1 ohm and up 5%) CW-2C-1 100 ohm, 5% ν 101 Dale Type RW69 3 2 3 1 1. Style MIL-R-10509F (Basic [RN]) (Established Reliability MIL-R-55182 [RNR]) 2. Characteristic - Temperature Coefficient RN60 D 1003 F Dale Type CMF-60 100k 3. Resistance Value 3 3 1 4. Tolerance 1. Style MIL-R-18546D (Basic [RE]) (Established Reliability MIL-R-39009 [RER]) 2. Characteristic - Maximum continuous NOTE: 1% tolerance per G 1001 = Dale Type RH-10 Military Specification. operating temperatures 3. Resistance Value 1 Style MIL-R-22684C (Basic [RL]) (Established Reliability MIL-R-39017 [RLR]) NOTE: Parts will be 2. Terminal = Dale Type CMF-07 S 103 J color banded. Resistance Value 3 4. Tolerance 1. Style MIL-R-22097F (Basic [RJ]) (Established Reliability MIL-R-39035 [RJR]) Characteristic NOTE: 10% tolerance per Techno Type Р 103 412 RJ24 3. Terminal Military Specification. 3 4 1.3 Resistance 1. Style 4. Terminal MIL-R-27208C (Basic [RT]) (Established Reliability MIL-R-39015 [RTR]) NOTE: 5% tolerance per 2 Résistance - $\frac{2}{3}$ $\frac{P}{4}$ 102 = Techno Type 126S Temperature Characteristic Military Specification 3. Temperature Characteristic 1. Style Failure Rate Level MIL-R-39007G (Established Reliability [RWR]) (Basic - MIL-R-26 [RW]) 2. Terminal RWR74 S 10R1 F R Dale Type 3. Resistance Value 4 5 3 3 4. Tolerance MIL-R-39009C (Established Reliability [RER]) (Basic - MIL-R-18546 [RE]) 1. Style 2. Tolerance = Dale Type ERH-10 RER65 F 1001 R 3. Resistance Value 4. Failure Rate Level 1. Style MIL-R-39015C (Established Reliability [RTR]) (Basic - MIL-R-27208 [RT]) 2. Characteristic 102 R Techno Type M39015/3 D P 007 3. Terminal 3 5 $\overline{2}$ 3 4 5 1. 2 1 5. Failure Rate Level NOTE: 5% tolerance per Military Specification. 1. Style 5. Failure Rate Level MIL-R-39017E (Established Reliability [RLR]) (Basic - MIL-R-22684 [RL]) Terminal Type С G R Dale Type ERL-07 10k 3. Resistance Value 3 5 3 4. Tolerance 1. Style MIL-R-39035B (Established Reliability [RJR]) (Basic - MIL-R-22097 [RJ]) 2. Characteristic 102 R Techno Type RJR24 F 10% F P 3. Terminal $\overline{2}$ $\overline{3}$ 4 5 Resistance 5. Failure Rate Level NOTE: 10% tolerance per Military Specification 1. Military Specification 4. Resistance Value MIL-R-49465A (Basic [RLV]) (Established Reliability - None) NOTE: 2. Specification 5. Tolerance = Dale Type CPSL-3-6 0.01 ohm R0100 M49465 02 L L Characteristic 3. Characteristic 3 5 MIL-R-55182F (Established Reliability [RNR]) (Basic MIL-R-10509 [RN]) 2. Characteristic/Temperature Coefficient = Dale Type ERC-55 T-2 49.9 ohm S RNC55 H 49R9 F S 3. Resistance Value 5 $\overline{2}$ 3 4. Tolerance 5. Failure Rate Level 1. Military Specification MIL-R-55342E (Established Reliability [RM]) (Basic - None) S 100E R Dale Type RCM550 100k Specification Sheet Number M55342 02 5 5 3, 4 6 4. Termination Material $\overline{2}$ 3 5 6 1 4 5. Resistance Value and Tolerance M Characteristic NOTES: Failure Rate Level One surface, pretinned, solderable terminations. D55342 is used for 07 detail specification sheet. Separate code for resistance value and tolerance is used in this Military Specification.

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RACK	AND	PA	NEL	. CO	NNE	CT	ORS	3									TO THE REAL PROPERTY OF THE PARTY OF THE PAR
MIL-C- M2 <u>87</u> 48			(Bas				eliab =			ИМР <u>2</u> 2G 7	35 <u>7</u>	-	S <u>L2</u> L 6	Military Specification     Specification Sheet No.     Insert Designator (B-7)     Shield (0 = None)		5. Shell Polarizati 6. Jackscrews or 7. Contacts (1A = 100 perc	Guidepins
RESIS	TOR	NE	TWC	RK	S												
MIL-R- M8 <u>340</u> 10 1, 2			(Basi 1 <b>003</b> 4	c [RZ <u><b>G</b></u> 5	) (Esta <u><b>A</b></u> 6	ablish =		eliability M le Type	IIL-R-87 MDM	,		6	<u>A</u>	NOTE: M Characteristic.	Military S     Specificat     Character     Resistance	tion Sheet Number ristic	5. Tolerance 6. Schematic
Resist	ance	Va	lue E	Exar	nple	s											
Thre	e Dig	it Fiç	jure						Four	Digit Fig	jure			Fiv	e Digit Figur	е	
	100	= 10	ohm,	101 =	100	ohm				49R9 = 4	49.9 oh	m,	1000 :	= 100 ohm	10R60 = 10	0.6 ohm, 10000 =	lk ohm
	102	= 1k	ohm,	203 =	20k d	ohm				1001 = 1	1k ohm	, 1	004 =	1 Megohm	12701 = 12	2.7k ohm, 10202 =	102k ohm
Tolera	nce	Exa	mple	es													
A :	= ± 0.0	05%			B =	± 0.1	10%		D :	= ± 0.509	%			F = ± 1.0%	$G = \pm 2.0\%$	J = ± 5	5.0%
TRANS	SFO	RME	RS	AND	INE	)UC	TOF	<b>3</b> S									
MIL-T- M27	27E 215 2	(Bas	5 =		ablishe ale T			ty - None) -3Q0TR	1.0 m	nH 29	%				<ol><li>3. Specificat</li></ol>	pecification ion Sheet Number ion Sheet Dash Nur g Value and Electric	
MIL-C- LT 1		<b>)5E</b> <u>K</u> 3	-					eliability M 0 μH to 1		,		N		Parts will be color banded. Value per Military Standard dash number.	1. Style 2. Grade and 3. Family K	d Class = Coil, Radio Freque	ency, Fixed

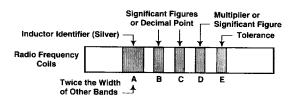
MILITARY CO	oldr codes -	FILM RESIST	ons			
BAND	A & B	BAND C				
COLOR	1st and 2nd SIGNIFICANT FIGURE	COLOR	VALUE MULTIPLIER			
Black	0	Black	1			
Brown	1	Brown	10			
Red	2	Red	100			
Orange	3	Orange	1,000			
Yellow	4	Yellow	10,000			
Green	5	Green	100,000			
Blue	6	Blue	1,000,000			
Purple (Violet)	7	Silver	0.01			
Gray	8	Gold	0.1			
White	9					
Valu First Significant Figu Second Signific		Terminal (1 1/2 times width Tolerance				
BAN	ND D	BAND E				
COLOR	RESISTANCE TOLERANCE (Percent)	COLOR	TERMINAL			
Gold	± 5%	White	Solderable			
Red	± 2%					

### 8 1/2 x 11 & Pocket-Size Color Code ID Charts

For a 8 1/2 x 11 chart, or a supply of pocket-size charts showing actual colors used in marking film resistors and RF chokes, write to Dale Electronics, Inc., Advertising Department, 2064 12th Avenue, P.O. Box 609, Columbus, NE 68602-0609 or call (402) 563-6417.

Indicate size and type of chart desired: Film Resistor chart or RF Choke.

HILITARY OF	of or conse	RECOUS	
	BAND A & B	BAND C	BAND C
COLOR	SIGNIFICANT FIGURES or DECIMAL POINT	MULTIPLIER* or SIGNIFICANT FIGURE	INDUCTANCE TOLERANCE
Black	0	1	_
Brown	1	10	± 1%
Red	2	100	± 2%
Orange	3	1,000	± 3%
Yellow	4	10,000	± 4%
Green	5	_	_
Blue	6	_	_
Violet	7	_	
Gray	8	_	_
White	9	_	_
None**	_		± 20%
Silver	_	_	± 10%
Gold	Decimal Point	_	± 5%



**Band "A"** is twice the width of the other bands and is silver in color to identify part as an inductor. \*\*\*

For Inductance Values Less Than 10 either Band "B" or Band C" will be gold and will represent the decimal point. The other two bands ("B" and "D" or "C" and "D") will represent significant figures.

For Inductance Values of 10 or More Band "B" and Band "C" represent significant figures and Band "D" is the Multiplier.

For small units, dots may be used in place of bands.

- The multiplier is the factor by which two significant figures are multiplied to yield the nominal inductance value.
- \*\* Indicates body color.
- \*\*\* Coated inductors are marked with four color bands, the first being a double wide significant figure or decimal point in lieu of the double wide silver inductor identifier.