

- Resistant to electrical arc tracking in wet or dry conditions
- Single or dual wall constructions
- Small size, ultra light weight
- Exceptional chemical resistance

## Spec 55

### Wire and cable

Spec 55 wire is insulated with modified radiation cross-linked ETFE polymer. It has a temperature rating of -65°C to 200°C continuous, and combines the easy handling of a flexible wire with excellent scrape abrasion and cut-through characteristics.

The dual wall airframe construction of Spec 55 wire is currently used on

numerous aircraft programmes. It has a choice of two total wall thickness, 0.25 mm and 0.2mm, both have a contrasting core colour to act as a damage indicator. Chosen for its balance of properties, Spec 55 wire has outstanding resistance to chemicals and solvents, excellent electrical arc track resistance, and is not susceptible to UV and moisture degradation. Single wall

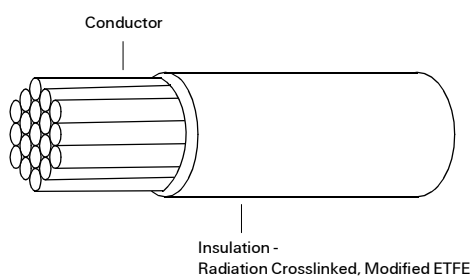
equipment wire constructions are available in 0.10 mm and 0.15 mm wall thicknesses for use inside black boxes where flexibility and solder-iron resistance make it a wire which is very easy to reliably install.

Both single and dual wall insulated wires are available in twisted pairs, triples, etc., and as screened and jacketed cables.

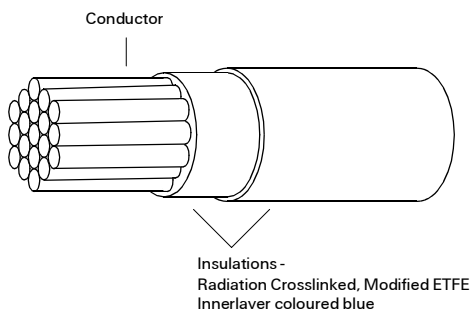
### Specifications

|                                                                                                      |
|------------------------------------------------------------------------------------------------------|
| MIL-W-22759/32-35 and /41 to /46 and MIL-DTL-C-27500 (Cables)                                        |
| Defence Standard 61-12 Part 33                                                                       |
| VG952 18 Part 20, Type D; Part 21, Type A; Part 22, Type A; Part 23, Type A, Part 1001 and Part 1002 |
| VDE 9426, 9427, 9428                                                                                 |
| British Standard 3G233                                                                               |
| Civil Aviation Authority Accessory Approval E11749                                                   |
| Boeing BMS 13-48                                                                                     |
| Airbus ABS 0820 to 0826                                                                              |
| Underwriters Laboratory Style 3467                                                                   |
| NASA preferred product list                                                                          |
| European Space Agency 3901/012, 3901/020 and 3901/022                                                |
| Raychem Specification 55                                                                             |

### Spec 55 Insulation system - Single wall



### Spec 55 Insulation system - Dual wall



# Spec 55

## Physical characteristics

### Size and weight

Spec 55 wire provides one of the most comprehensive wiring product ranges for aerospace users, with a wide choice of conductor sizes and insulation wall thickness. The dual wall airframe wire has an insulation wall thickness of either 0.2mm or 0.25 mm for robustness in unprotected harnesses and has excellent wire to wire abrasion properties. The single wall equipment wire has a 0.15 mm wall thickness for use inside equipment and

protected harnesses. For high density interconnect wiring, the 450 volt 55M041X series of equipment wire has a nominal 0.1 mm wall and provides considerable weight and size savings over other comparable wires.

### Handling

The excellent flexibility and low resilience makes Spec 55 the ideal wire to install, both in new aircraft and equipment and for maintenance purposes. The wire is easily stripped with conventional tooling. The insulation is readily marked by hot stamp, ink jet or laser, and can be potted without pre-etching.

For full descriptions of the appropriate tools see separate wire handling guide.

## Typical properties

|                                                                    |                                                  |
|--------------------------------------------------------------------|--------------------------------------------------|
| Temperature rating (Tin plated conductor)                          | -65°C to +150°C                                  |
| (Silver or nickel plated conductor)                                | -65°C to +200°C                                  |
| Thermal endurance                                                  | 200°C, 10000 h                                   |
| Scrape abrasion (BS 3G233)                                         | >100 cycles at 150°C                             |
| Flexing endurance (Boeing BSS 7324)                                | >1000 cycles                                     |
| Voltage rating                                                     | 600 V, 450V                                      |
| Tensile strength + core elongation                                 | (Airframe wire only) 35 N/mm <sup>2</sup> , 125% |
| Tensile strength + total elongation                                | (All primary wire) 35 N/mm <sup>2</sup> , 75%    |
| Notch propagation BS 3G230 0.05 mm notch                           | Pass                                             |
| Solder iron resistance (370°C, 1 minute)                           | Pass                                             |
| Solderability - Tin plated copper conductor<br>BS 3G233 conditions | <0.8 secs to wet                                 |
| Shrinkage                                                          | <1%                                              |
| Long term water resistance                                         | Will not hydrolyse                               |
| Permittivity 1 KHz (ASTM D150)                                     | 2.7                                              |
| Dissipation factor (ASTM D150)                                     | 0.001                                            |

## Environmental performance

### Temperature rating

Spec 55 wire and cable is rated for continuous operation from -65°C to +200°C and for short periods at temperatures as high as 400°C.

### Mechanical performance

Radiation crosslinking of the Spec 55 insulation significantly improves the following mechanical characteristics; scrape (sharp edges), cross wire abrasion, cut-through resistance and creep resistance.

### Solder iron/Overload resistance

Radiation crosslinking ensures that the insulation does not melt at high temperature. As a result Spec 55 wire is resistant to hot

solder irons and current overloads which would melt most thermoplastic insulations.

### Chemical resistance

Spec 55 is unaffected by all commonly used chemicals, eg. fuels, hydraulic fluids, defluxing agents, cleaners, coolants and de-icers. It also shows excellent resistance to weathering (UV, ozone, pollutants, water).

### Space wire

Spec 55 is available in special versions suitable for use in outer space meeting both ESA and NASA requirements for outgassing.

### Flammability

Special additives increase the flame retardance

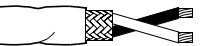
of Spec 55 compared to unirradiated ETFE so that it meets the latest high performance tests, eg. BS 3G230 vertical test FAR 25.

### Electrical arc tracking resistance

Spec 55 insulation demonstrates resistance to arc tracking under both wet and dry conditions at aircraft system voltages.

## Spec 55

### Spec 55 wire & cable: Standard constructions, nominal sizes, strandings, diameters and weights

| Conductor | Primary wire                                                                      | Twisted pair                                                                      | Single                                                                             | Screened & jacketed                                                                 |
|-----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|           |                                                                                   |                                                                                   |                                                                                    | Pair                                                                                |
|           |  |  |  |  |

### 55A - AWG conductor: Equipment/Interconnect wires & cables

| Size | Stranding (mm) | 55A011X<br>OD (mm) | Weight (g/m) | 55A012X<br>OD (mm) | Weight (g/m) | 55A111X<br>OD (mm) | Weight (g/m) | 55A112X<br>OD (mm) | Weight (g/m) |
|------|----------------|--------------------|--------------|--------------------|--------------|--------------------|--------------|--------------------|--------------|
| 30   | 7/0.102        | 0.61               | 0.98         | 1.27               | 1.94         | 1.51               | 5.1          | 2.12               | 7.74         |
| 28   | 7/127          | 0.68               | 1.35         | 1.42               | 2.68         | 1.59               | 5.8          | 2.27               | 8.9          |
| 26   | 19/102         | 0.81               | 2.1          | 1.67               | 4.2          | 1.71               | 6.85         | 2.53               | 11.32        |
| 24   | 19/127         | 0.94               | 2.98         | 1.93               | 5.96         | 1.84               | 8.2          | 2.8                | 13.86        |
| 22   | 19/0.16        | 1.09               | 4.2          | 2.23               | 8.6          | 1.99               | 10.3         | 3.07               | 17.9         |
| 20   | 19/0.203       | 1.27               | 6.4          | 2.66               | 13.26        | 2.2                | 13.4         | 3.5                | 23.8         |
| 18   | 19/0.25        | 1.52               | 9.7          | 3.2                | 19.57        | 2.45               | 17.88        | 4.1                | 32.6         |
| 16   | 19/287         | 1.73               | 12.4         | 3.58               | 25.8         | 2.67               | 21.75        | 4.43               | 39.7         |
| 14   | 19/0.36        | 2.2                | 19.4         | 4.47               | 39.6         | 3.1                | 30.4         | 5.3                | 57.0         |
| 12   | 37/0.32        | 2.62               | 29.35        | 5.38               | 60/0         | 3.55               | 42.46        | 6.3                | 81.2         |
| 10   | 37/0.403       | 3.25               | 47.4         | 6.65               | 96.7         | 4.2                | 62.7         | -                  | -            |
| 8    | 133/0.287      | 4.77               | 87.6         | 9.8                | 178.8        | 5.8                | 110.5        | -                  | -            |

### 55A - AWG conductor: Airframe wires & cables

| Size | Stranding (mm) | 55A081X<br>OD (mm) | Weight (g/m) | 55A082X<br>OD (mm) | Weight (g/m) | 55A111X<br>OD (mm) | Weight (g/m) | 55A112X<br>OD (mm) | Weight (g/m) |
|------|----------------|--------------------|--------------|--------------------|--------------|--------------------|--------------|--------------------|--------------|
| 26   | 19/102         | 1.01               | 2.5          | 2.1                | 5.1          | 1.71               | 6.85         | 2.63               | 11.32        |
| 24   | 19/127         | 1.14               | 3.4          | 2.33               | 6.84         | 1.84               | 8.2          | 2.8                | 13.86        |
| 22   | 19/0.16        | 1.27               | 4.8          | 2.64               | 9.98         | 1.99               | 10.3         | 3.07               | 17.9         |
| 20   | 19/0.203       | 1.47               | 7.0          | 3.07               | 14.75        | 2.2                | 13.4         | 3.5                | 23.8         |
| 18   | 19/0.25        | 1.78               | 10.7         | 3.63               | 21.9         | 2.45               | 17.88        | 4.1                | 32.6         |
| 16   | 19/287         | 1.95               | 13.4         | 4.06               | 27.5         | 2.67               | 21.75        | 4.43               | 39.7         |
| 14   | 37/0.36        | 2.4                | 20.5         | 4.9                | 42.3         | 3.1                | 30.4         | 6.3                | 57.0         |
| 12   | 37/0.32        | 2.82               | 30.5         | 5.8                | 63.0         | 3.55               | 42.46        | 6.3                | 81.2         |
| 10   | 37/0.403       | 3.4                | 48.3         | 7.1                | 99.1         | 4.2                | 62.7         | -                  | -            |

### 55PC - AWG conductor: Statistical Process Controlled Airframe wires & cables

| Size | Stranding (mm) | 55PC021X<br>OD (mm) | Weight (g/m) | 55PC042X<br>OD (mm) | Weight (g/m) | 55PC141X<br>OD (mm) | Weight (g/m) | 55PC142X<br>OD (mm) | Weight (g/m) |
|------|----------------|---------------------|--------------|---------------------|--------------|---------------------|--------------|---------------------|--------------|
| 26   | 19/102         | 0.087               | 1.8          | -                   | -            | 1.52                | 6.32         | 2.33                | 10.75        |
| 24   | 19/127         | 1.00                | 3.2          | 2.0                 | 6.3          | 1.65                | 7.63         | 2.89                | 13.27        |
| 22   | 19/0.16        | 1.15                | 4.56         | 2.31                | 9.12         | 1.80                | 9.55         | 2.89                | 17.28        |
| 20   | 19/0.203       | 1.37                | 6.8          | 2.74                | 13.66        | 2.00                | 12.47        | 3.30                | 23.00        |
| 18   | 19/0.25        | 1.61                | 10.3         | 3.22                | 20.6         | 2.23                | 16.72        | 3.78                | 31.33        |
| 16   | 19/287         | 1.8                 | 12.96        | 3.6                 | 26.0         | 2.44                | 20.05        | 4.16                | 38.05        |
| 14   | 19/0.36        | 2.18                | 19.86        | 4.36                | 39.9         | 2.79                | 28.08        | 4.92                | 54.25        |
| 12   | 37/0.32        | 2.66                | 30.2         | 5.3                 | 60.8         | 3.30                | 40.45        | 5.92                | 78.80        |
| 10   | 37/0.403       | 3.27                | 47.9         | -                   | -            | 3.98                | 61.16        | 7.39                | 128.06       |

X = 1 - Tin plated copper conductor.  
 4 - Silver plated high strength copper alloy conductor.  
 (Recommended for size 24 & 26in airframe applications).

### 55PC - extra light weight constructions

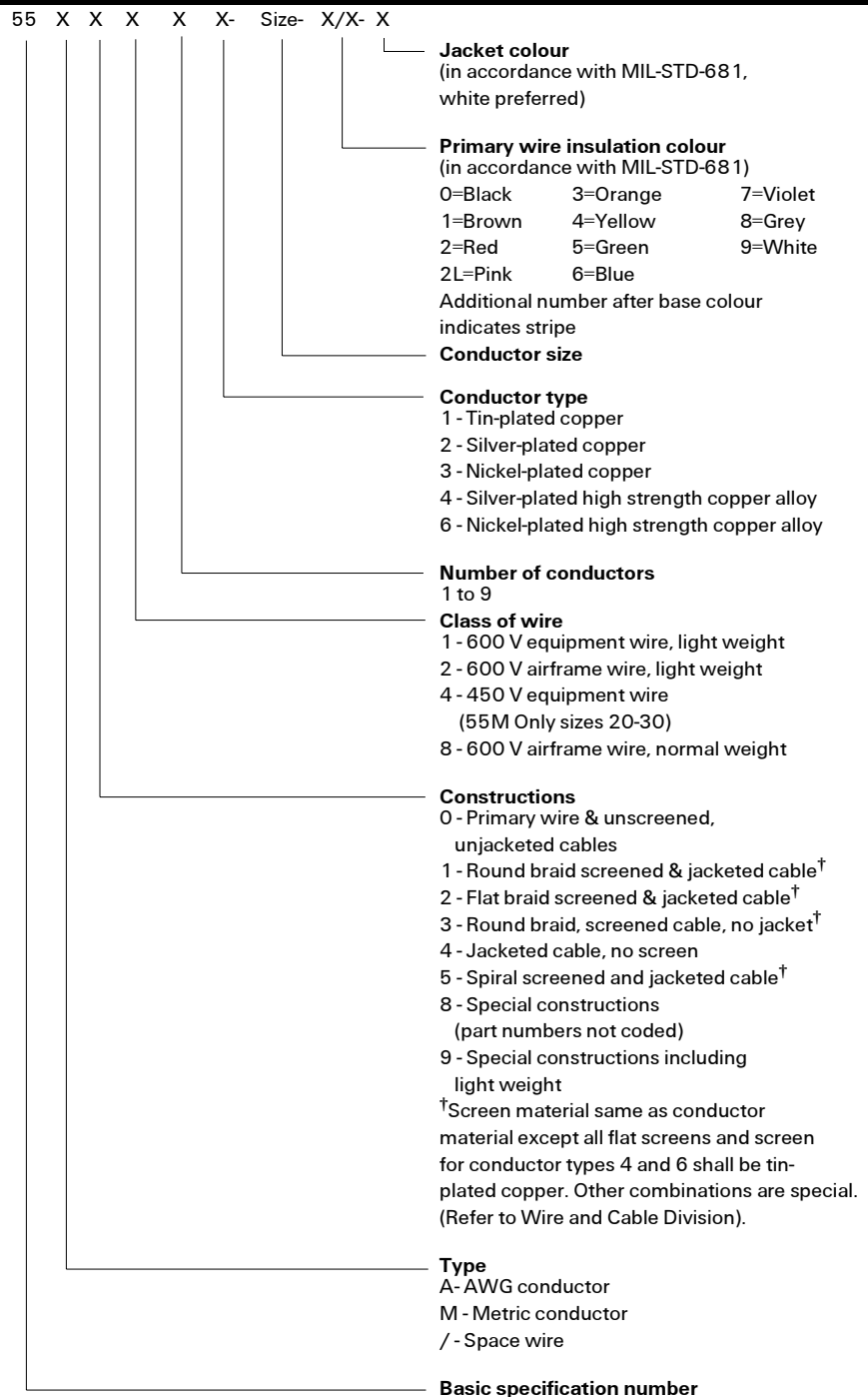
For applications where weight is critical, light weight tight tolerance conductors and insulations are available. These are

manufactured using statistical process control methods and achieve weights that are equal or lighter than the equivalent polyimide/

PTFE constructions.  
 Contact Wire & Cable Division for further details.

# Spec 55

## Part numbering system



## Typical ordering example

3 conductors, red, yellow, blue, 600 volt equipment wire with overall round braid, 20 AWG tinned conductor and white jacket: total part number is 55A1131-20-2/4/6-9.

## Ordering information

A list of stock policy items can be identified by contacting the relevant Product Specialist or Sales Order Office. Stock policy items are recognized by the use of a suffix, such as (300) defining the pack size, typically 55A0111-22-9(300).

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