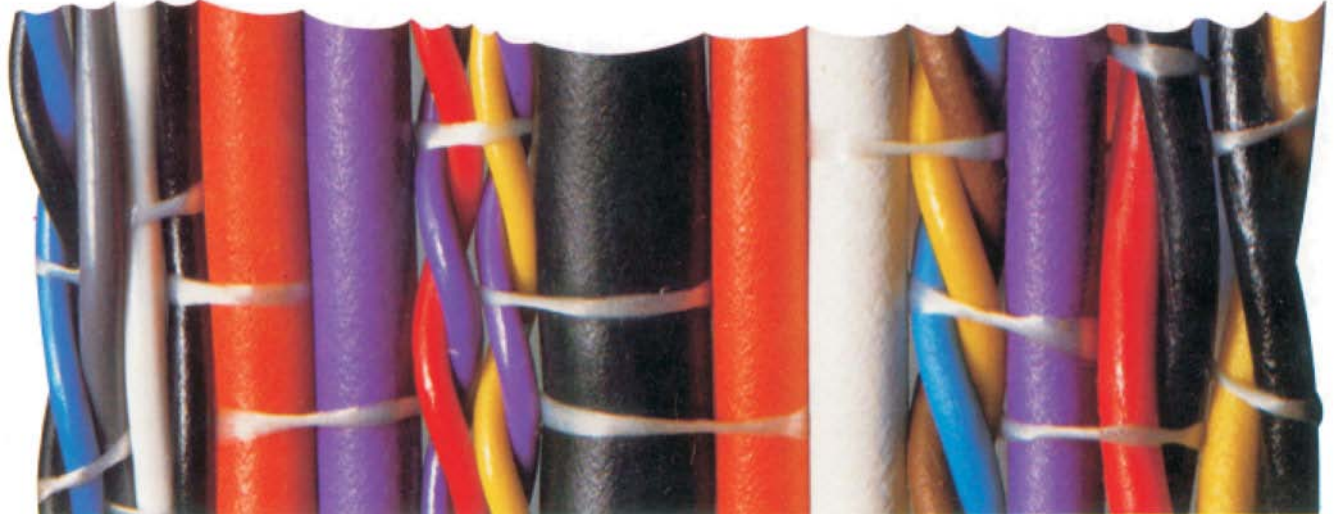


# Flexibility of Choice



## Hybrid

- The process of autolacing wires together to create a multiway cable
- A cost effective method of providing a custom design against specific mechanical and electrical parameters

Connecting the future

**Tekdata**  
interconnect systems

# Hybrid

Different wire types can be positioned in a ribbon form to suit the exact requirements of the cable type Twisted pairs, twisted triples, coaxes and single wires can be formatted with power lines, where appropriate to give an optimum solution to an interconnection problem.

## Design criteria

- Termination pattern  
(see example below)
- Cross-talk considerations
- Impedance characteristics
- Temperature requirements
- Overall environmental constraints
- Mobility
- Overall screening and sheathing
- Adherence to specification

## Hybrid features

- Wires can be laid-in to suit termination pattern
- "Noisy" wires can be positioned in the ribbon remotely from sensitive wires
- Conductor type and relative position can be specified to give repeatable electrical performance
- High temperature wires are available
- A variety of insulations can be mixed e.g. PVC and PTFE
- High degree of mechanical flexibility
- Cables can be layered to maximise packaging
- Wire retains its full specification, undegraded by the Tekdata manufacturing process

## COST BENEFITS

In cable design there is frequently a "trade-off" to be made between exact requirements and buying a standard. Because of the unique manufacturing process, Tekdata are able to supply small quantities of custom-designed cables. To effect a multipurpose cable -layers of Hybrid cable can be screened or dielectrically spaced from other conductors Prohibitive set-up charges, applicable to conventional cable manufacturers, **do not apply** to Tekdata hybrid cables **20 metres minimum run can be obtained.**

## COAXS, TRIPLES , SCREENED SINGLES AND TWISTED PAIRS COMMONLY USED IN HYBRID CABLES.

DESCRIPTION	WIRE	NO. OF STRANDS/DIA OF	INS. TYPE	INSULATION	RELEVANT SPECIFICATION	EFFECTIVE DIA (NOM.) MM
Twisted Triple	32	7/0.080	A	PTFE	BSG 210	1.18
Twisted Triple	7/0.120	2	PVC	DEF 61-12 PT6	2.1	
Twisted Triple	24	7/0.2	B	PTFE	BSG 210,	2.44
Twisted Triple	24	7/0.200	1	PVC	DEF 61-12 PT 6	2.1
Twisted Triple	24	7/0.200	2	PVC	DEF 61-12 PT6	2.6
Twisted Triple	24	19/0.127	N/A	Raychem 44	44A 0131-24	2.04
Twisted Triple	20	16/0.200	2	PVC	DEF 61 -1 2 PT 6	3.3
Screened Single	30	7/0.100	N/A	PVC	NOT APPLICABLE	2
Screened Single	26	19/0.102	5	ETFE	EL 2133	1.81
Screened Single	24	19/0.127	N/A	Raychem 44	44A 1111-24	1.8
Screened Single	22	19/0.150	5	ETFE	EL 2133	2.13
Screened Twisted Pair	30	7/0.100	N/A	PVC	DEF 61-12 PT4:7-1-2C	3
Screened Twisted Pair	26	19/0.102	N/A	ETFE	EL 2133 Where applicable	1.81
Screened Twisted Pair	26	19/0.102	N/A	Raychem 44	44A 11 21-26	2.59
Screened Twisted Pair	24	7/0.200	N/A	PVC	DEF61-12PT 4:7-2-2C	4.8
Screened T.P. inc. Drainwire	24	7/0.200	N/A	PVC	NOT APPLICABLE	4.04
Screened Twisted Pair	22	19/0.150	N/A	ETFE	EL 2133	3.35
Screened Twisted Pair	20	16/0.200	N/A	PVC	DEF 61-12 PT 4:16-2-2C	6.17
Coaxial 50 OHM	N/A	7 strands	-	Polythene/PVC	URM 76	5
Coaxial 50 OHM	N/A	7 strands	-	Polythene/PVC	RG174 A/U	3
Coaxial 50 OHM	N/A	Solid strand	-	Polythene/PVC	RG 62 A/U	6.15
Coaxial 50 OHM	N/A	7 strands	-	Raychem	Raychem 5026A 1318-0	2.25
Coaxial 75 OHM	N/A	Solid strand	-	Polythene/PVC	RG 59 B/U	6.15
Coaxial 95 OHM	N/A	7 strands	-	PTFE/FEP	RG 180 B/U	3.68
Microphone- 55 OHM	20	16 strands	-	Polyethylene/PVC	N/A	4.1

### Wire Marshalling

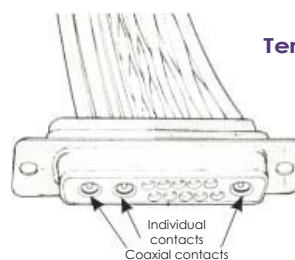
The organisation of wires to suit a particular application can bring benefits in terms of a reduction in total installed costs.

- Wire packaging can be improved to reduce termination allowance
- Individual wires that have a precise function can be selected to suit For example specific wires routed near a hot spot can be PTFE or ETFE whereas other wires marshalled elsewhere may be PVC

### Termination Example

Wire positioning ribbon suits

Standard Hybrid connector.



## POPULAR WIRE STYLES AND SIZES USED IN HYBRID CABLES

### RELATED SPECIFICATIONS

PVC classes

PVC types

- BS 4808 PT 2

UL

- DEF 61 -1 2 PT 6

- As UL reference number

Note Ribbon can be UL listed to

UL E63299 and UL E76086

ETFE

-EL 2133

Wires can be supplied silver plated for operating temperature -65°C to +150°C

PTFE

-BSG 21 0 + DEF

61-12 PT 8 Wires can be supplied nickel plated for operating temperature -

Raychem44A

- EL 2109, DEF 61-12 PT 8

Raychem 55A

- MIL 81044/12

- MIL-W-22759/32

Notation

Note ● = Normally available from stock  
○ = Available by request

TRADE NAMES

KAPTON -Registered trade name of Du Pont De Nemours plc

RAYCHEM --Registered trade name of Raychem plc

Whilst every attempt has been made to ensure the Information is correct no liability is accepted for any Inaccuracy

Wire size - AWG	No of strands/wire dia. Of each strand	C.S.A. mm <sup>2</sup>	PVC Class 0 (-15°C to +85°C)	PVC Class 1 (-15°C to +85°C)	PVC Class 2 (-15°C to +85°C)	PVC Class 3 (-20°C to +85°C)	PVC Type 1 (-15°C to +85°C)	PVC Type 2 (-15°C to +85°C)	VERY FLEX. PVC (-15°C to 70°C)	PVC UL 1007 (-10°C to +80°C)	PVC UL 1061 (-10°C to +80°C)	PVC UL 1679 (-10°C to +80°C)	PVC UL 1569 (-10°C to +80°C)	ETFE Type A (-65°C to +120°C)	ETFE Type B (-65°C to +120°C)	ETFE Type C (-65°C to +120°C)	PTFE Type A (-50°C to +200°C)	PTFE Type B (-50°C to +200°C)	PTFE Type C (-50°C to +200°C)	RAYCHEM 44A (65°C to +150°C)	RAYCHEM 55A (65°C to +150°C)	KAPTON Type 1 (-65°C to +200°C)	KAPTON Type 2 (-65°C to +200°C)	KAPTON Type 3 (-65°C to +200°C)
34	6/0.070	0.023							●															
32	7/0.080	0.035															●	○	○				○	
30	1/0.250	0.049	○														○	○	○				○	○
30	7/0.100	0.055	○											○	○	○	●	○	○				○	○
30	7/0.102	0.060																		○	○		○	○
28	1/0.315	0.078															●						○	○
28	7/0.120	0.079					●	●		●	●													
28	1/0.320	0.080	○																					
28	7/0.125	0.086												●	○	○	●	○	○				○	○
28	7/0.127	0.089																			●	○		
28	50/0.050	0.098							●															
26	7/0.150	0.124												○			●	○	○				○	○
26	1/0.400	0.130	○	○	○		●	●									●	○					○	○
26	7/0.016	0.140									●													
26	19/0.100	0.150												●	○	○							○	○
26	19/0.102	0.155																		○	○			
24	1/0.050	0.200		○																				
24	7/0.200	0.220	○	○			●	●		●			●	●	○	○	●	●	○				○	○
24	19/0.125	0.233												○	○	○							○	○
24	19/0.127	0.240																			●	○		
24	130/0.05	0.255							●															
23	1/0.600	0.280	○	○	○		●	●											○				○	○
22	19/0.150	0.336												●	○	○	●	●	○				○	○
22	19/0.160	0.380																			○	○		
21	55/0.100	0.430							●															
20	10/0.250	0.491																						
20	1/0.800	0.500		○																				
20	16/0.200	0.500		○	○		●																	
20	19/0.200	0.597												○	○	○	○	●	○				○	○
20	19/0.203	0.320																				○	○	
19	1/0.900	0.636					●												○					
19	24/0.200	0.750				○	●																	
18	16/0.250	0.785											●											
18	19/0.250	0.933												○	○	○		○	○				○	○
18	19/0.254	0.960																			○	○		
18	32/0.200	1.000																						
16	19/0.287	1.230																				○	○	
16	19/0.300	1.340												○	○	○								○
16	30/0.250	1.500				○																		
14	19/0.335	1.680														○				○				
14	37/0.250	1.810														○								
14	19/0.361	1.940																				○	○	
14	63/0.200	2.000				○																		
12	50/0.250	2.500				○																		
12	37/0.315	2.880															○							
12	37/0.320	2.970																				○	○	
12	19/0.450	3.020															○							
10	37/0.400	4.650															○							

## The MULTIFLAT concept of sheathed cables

HYBRID ribbons can be screened and overall PVC jacketed to increase the electrical integrity and improve the mechanical robustness and resistance to abrasion.

Many applications necessitate a high temperature **wire** for a variety of reasons. The risk of damaged wire insulation, due to soldering, may preclude the use of PVC as a wire insulant. But PVC as an overall jacket to a higher temperature insulation primary core (eg ETFE, Raychem, PTFE), may be both satisfactory and economical. MULTIFLAT combines the hybrid ribbon construction to give single or multiple layer screened or screened and sheathed cables.

- Individual layers can be screened from each other.
- Cables can be designed to have a "mechanical memory" e.g. retractiles.
- Standard cables exist for IEEE" IEC" EUR" Modem designs.



### Twisted Pair Ribbon

PVC colour coded wires to UL listing 1679. Ribbons can be layered and ready split to suit termination process.

### Screening

Tinned copper braiding provides minimum of 85% electrical screen coverage. Techniques are available to screen the termination area on most connector types.

### Over-Jacketing

PVC sheathing provides an abrasion resistant covering whilst still retaining ribbon flexibility. A high temperature sheathing is also available where necessary.

**Tekdata**  
interconnect systems

[www.tekdata-interconnect.com](http://www.tekdata-interconnect.com)

Tekdata Interconnections Limited Innovation House The Glades Festival Way Etruria Stoke-on-Trent Staffordshire ST1 5SQ  
Tel: +44 (0) 1782 254 700 Fax: +44 (0) 1782 254 701 Email: [cables@tekdata-interconnect.com](mailto:cables@tekdata-interconnect.com)