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# CABLE SPECIFICATIONS

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## Fire Systems

### Loop Cables i.e. from Fire Panel to Detectors:

#### Description:

The panel supplies power to the detectors (and I/O units) and communicates with these devices on the same pair of wires. The cable to be used for this purpose is as follows:

#### Specifications

Type:	Fire resistant; screened cable
Cores:	2 or 4
Core size:	0.8mm minimum (see general info)
Max loop resistance:	100Ω for both cores (i.e. 50Ω per core)
Max capacitance:	1μF
Max loop length:	2km

#### Recommended cables:

##### Pirelli FP200

<b>Manufacturer:</b>	Pirelli
<b>Model number(s):</b>	FP200 Gold FP200 Flex
<b>Approvals:</b>	BASEC approved to BS7629 LPCB approved to BS6387 category CWZ

*See Appendix A: Pirelli 'FP200' Technical Specifications*


##### FR20

<b>Manufacturer:</b>	Cabletronics
<b>Model number(s):</b>	FR20
<b>Approvals:</b>	

*See Appendix B: FR20 Technical Specifications*

#### General Info:

Loop load calculations should be performed for each loop to ensure that the loop has been designed correctly. A program to perform these calculations is available from GE Interlogix.

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## Network Communication (i.e. between panels)

One or more panels can share data with each other and with Global or Local Repeaters. In order to communicate with each other the panels must be fitted with a network card. The network communication utilizes the ArcNet protocol and can take place over copper wire (RS485) or via optical fiber.

## RS485 (Copper) Network

### Description:

RS485 utilizes a balanced line driver that drives into specific line impedance. The cable that is used must have the correct characteristics otherwise communication will not be possible.

### Specifications

Type:	Twisted pair, low capacitance screened cable for RS485 applications
Cores:	2 are preferred but multi-pair cable can also be used provided that the other cores are not used for other signals.
Core size:	Not critical provided that the cable has the correct characteristics
Cable characteristics:	
Impedance:	120Ω (nominal)
Capacitance (core to core):	42pF/m
Capacitance (core to screen):	75pF/m

### Recommended cables:

#### Belden 9841


<b>Manufacturer:</b>	Belden
<b>Model number(s):</b>	9841 RS485 Cable
<b>Approvals:</b>	TIA/EIA 568-A standard, NEMA WC-63,

*See Appendix C: Belden 9841 Product Data Sheet*

#### IEC Category 5

<b>Manufacturer:</b>	Various
<b>Model number(s):</b>	CAT5, Category 5, UTP Cat5
<b>Approvals:</b>	

*See Appendix D: WCAT52 Product Data Sheet*

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**Special Note:**

Cat5 cables do not have exactly the right impedance but it has been found to be close enough for most RS485 applications. If the system is to have cable runs exceeding 800m or more than 6 nodes then Belden 9841 is recommended rather than Cat5. Many CAT5 cables are not screened. Unscreened cable is not recommended particularly in noisy environments

**General Information:**

The cable impedance has to be correct otherwise the communication signal will be distorted resulting in poor communication.

The total length of any single cable run must not exceed 1500m.

The number of nodes (panels and repeaters) on any single cable may not exceed 32 with a maximum number of 255 nodes per network.

Refer to the GE Interlogix Network Configuration Guide for details of how wire the panels and configure the network.

**Fiber optic network**

**Description:**

The optical fiber communication utilizes a general purpose optical Transmit Receive set operating at 860nm. When used with good quality fiber and careful installation it can achieve a distance of 3.5km per link.

**Specifications**

Type: 50/125 or 62.5/125 graded fiber or 200µm fiber


Cores: 2 cores per link.

Core size: 50/125 or 62.5/125

Connector type: ST (*ST is trademark of AT&T Lightguide Cable Connectors*)

Power budget: 4.2dB with 50/125 fiber  
8.0dB with 62.5/125 fiber  
12dB with 200µm fiber

*Note: The total signal loss from panel to panel must not exceed this figure*

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**Recommended cables:**

Any provided the power loss is within the power budget when measured at 860nm.

**Manufacturer:** Any  
**Model number(s):** As appropriate  
**Approvals:** -

**Communication with mimic panels (Current loop - FM8xx)**

**Description:**

Each fire panel can have up to 15 mimic driver boards with one or more of these driver boards per mimic. The fire panel communicates with these boards using a four wire current loop – two wires to transmit data and two wires to receive the reply.


**Specifications**

Type: Low capacitance screened cable; twisted pair  
Cores: 4  
Core size: as appropriate (0.8mm minimum)  
Cable Capacitance: 150nF (maximum for whole cable)  
Cable resistance: 50Ω (total resistance)  
Maximum length: 1km (in ideal conditions; may be shorter in noisy environments)

**Recommended cables:**

Any - provided that the overall limits are not exceeded.


**Manufacturer:** Any  
**Model number(s):** As appropriate  
**Approvals:** -

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## Intrusion

### 2.2.1 Description:

There are no specific cables to be used with the Intrusion systems. Normal communication cable is adequate for wiring of zone's, powering of devices and for the data bus.

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# CCTV

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## RS485 (Copper) Network

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### Description:

RS485 utilizes a balanced line driver that drives into a specific line impedance. The cable that is used must have the correct characteristics otherwise communication will not be possible. This is used between the Multiplexers and keypads.

### Specifications

Type: Twisted pair, low capacitance screened cable for RS485 applications

Cores: 2 is preferred but multi-pair cable can also be used provided that the other cores are not used for other signals.

Core size: Not critical provided that the cable has the correct characteristics

### Cable characteristics:

Impedance:	120Ω (nominal)
Capacitance (core to core):	42pF/m
Capacitance (core to screen):	75pF/m

### Recommended cables:

#### Belden 9841


<b>Manufacturer:</b>	Belden
<b>Model number(s):</b>	9841 RS485 Cable
<b>Approvals:</b>	TIA/EIA 568-A standard, NEMA WC-63,

*See Appendix C: Belden 9841 Product Data Sheet*

#### IEC Category 5

<b>Manufacturer:</b>	Various
<b>Model number(s):</b>	CAT5, Category 5, UTP Cat5
<b>Approvals:</b>	

*See Appendix D: WCAT52 Product Data Sheet*

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**Special Note:**

Cat5 cables do not have exactly the right impedance but it has been found to be close enough for most RS485 applications. If the system is to have cable runs exceeding 800m or more than 6 nodes then Belden 9841 is recommended rather than Cat5. Many CAT5 cables are not screened. **Unscreened cable is not recommended** particularly in noisy environments

**General Information:**

The cable impedance has to be correct otherwise the communication signal will be distorted resulting in poor communication.

The total length of any single cable run must not exceed 1500m.

## Video cable

**Description:**

The video cable used between video O/P and video I/P devices, such as Cameras, monitors and multiplexers.

**Specifications:**

0-150 meters RG179 (thin coax)


0-200 meters URM70 (stranded core coax)

0-300 meters RG59 (solid core coax)

*See Appendix E: WCRG59 Product Data Sheet*

0-600 meters RG11 (thick black internal coax)

0-650 meters CT125 (green sheathed direct burial coax)

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# ATS

## RS485 (Copper) Network

### Description:

RS485 utilizes a balanced line driver that drives into a specific line impedance. The cable that is used must have the correct characteristics otherwise communication will not be possible. This is used between the ATS panels, RAS and DGP's.

### Specifications

Type: Twisted pair, low capacitance screened cable for RS485 applications

Cores: 2 is preferred but multi-pair cable can also be used provided that the other cores are not used for other signals.

Core size: Not critical provided that the cable has the correct characteristics

### Cable characteristics:

Impedance:	120Ω (nominal)
Capacitance (core to core):	42pF/m
Capacitance (core to screen):	75pF/m

### Recommended cables:

#### Belden 9841


**Manufacturer:** Belden  
**Model number(s):** 9841 RS485 Cable  
**Approvals:** TIA/EIA 568-A standard, NEMA WC-63,

*See Appendix C: Belden 9841 Product Data Sheet*

#### IEC Category 5

**Manufacturer:** Various  
**Model number(s):** CAT5, Category 5, UTP Cat5  
**Approvals:**

*See Appendix D: WCAT52 Product Data Sheet*


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**Special Note:**

Cat5 cables do not have exactly the right impedance but it has been found to be close enough for most RS485 applications. If the system is to have cable runs exceeding 800m or more than 6 nodes then Belden 9841 is recommended rather than Cat5. Many CAT5 cables are not screened. **Unscreened cable is not recommended** particularly in noisy environments

**General Information:**

- The cable impedance has to be correct otherwise the communication signal will be distorted resulting in poor communication.  
 The total length of any single cable run must not exceed 1500m.

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## Access control

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### Communication between controllers including keycard (PC interface)

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**Description:**

Each keycard can have up to 32 panels connected to it. The communication takes place over 4 wires - two wires to transmit data and two wires to receive the reply.

**Specifications**

Type:	Low capacitance screened cable; twisted pair
Cores:	4
Core size:	as appropriate (0.5mm minimum)
Cable Capacitance:	Not specified
Cable resistance:	50Ω (total resistance)
Maximum length:	800m (in ideal conditions; may be shorter in noisy environments)

**Recommended cables:**

Any - provided that the overall limits are not exceeded.

<b>Manufacturer:</b>	Any
<b>Model number(s):</b>	As appropriate
<b>Approvals:</b>	-


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### Between controllers and readers

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**Description:**

Each controller reader input is designed to take one or 2 readers. If only one The communication takes place over 2 wires – the other two are used to carry power to the readers.

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### Specifications

Type:	Low capacitance screened cable; twisted pair
Cores:	4
Core size:	as appropriate (0.5mm minimum)
Cable Capacitance:	Not specified
Cable resistance:	20Ω (total resistance)
Maximum length:	800m (in ideal conditions; may be shorter in noisy environments)

### Recommended cables:


Any - provided that the overall limits are not exceeded.

<b>Manufacturer:</b>	Any
<b>Model number(s):</b>	As appropriate
<b>Approvals:</b>	-

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### Other field wiring

Other wiring (e.g. from controller to door lock, from controller to door contact, etc) does not carry data and hence the cable type is not critical. To ensure that the remote devices receive adequate voltage, the appropriate cable thickness and length should be suitable for the load.

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## APPENDIX A:

## PIRELLI 'FP 200' TECHNICAL SPECIFICATIONS

<b>FIRE RESISTANT CABLES</b>	<b>LOW VOLTAGE</b>
	<b>300/500 V</b>

<b>FP200 Gold®</b>	 
<b>BS7629-1</b>	<b>BS5839-1:2002</b>

**CABLE CHARACTERISTICS**



**KEY APPLICATIONS**


Fire detection and fire alarm systems for buildings. FP200 Gold is BASEC and LPCB approved in accordance with the requirements of BS5839-1:2002 Clause 26.2 for standard fire resisting cables. Emergency lighting or other essential service circuits

**CABLE DESCRIPTION**

**CONDUCTOR**

Plain annealed copper solid (1.0 - 2.5mm<sup>2</sup>) or stranded (4.0mm<sup>2</sup>) circular conductor complying with BS6360 class 1 or class 2

**INSULATION**

High Performance damage resistant Insudite™ 

**Core identification:**

- brown-blue
- ○ brown-black-grey
- ○ ○ blue-brown-black-grey

**SCREEN**

Laminated aluminium tape screen bonded to sheath and in contact with full size tinned annealed copper circuit protective conductor which provides automatic screen earthing

**SHEATH**

Robust thermoplastic LSOH sheath: Colour - White or Red  
Other colours to special order  
For external exposure the use of white sheath is recommended




Nominal cross sectional area mm <sup>2</sup>	Conceptual construction no./mm	Mean overall diameter mm	Approximate cable weight kg/km	Maximum conductor resistance at 20°C ohms/km	Current rating DC or single phase AC Enclosed Amps	Current rating DC or single phase AC Clipped direct Amps	Volt drop DC or single phase AC mV/A/m	Recommended accessories		
								LSOH <sup>1</sup> fixing clips	Nylon <sup>2</sup> LSOH <sup>1</sup> gland	FP Fire fix™ fixing clips
<b>Two core</b>										
1.0	1/1.13	8.0	78	18.1	13	15	44	AP7	251/GL2520	UFPNF02*
1.5	1/1.38	8.1	93	12.1	16.5	19.5	29	AP7	251/GL2520	UFPNF02*
2.5	1/1.78	9.5	140	7.4	23	27	18	AP9	251/GL2520	-
4.0	7/0.85	11.2	195	4.6	30	36	11	AP11	252/GL2520	-
<b>Three core</b>										
1.0	1/1.13	8.2	88	18.1	13	15	44	AP7	251/GL2520	UFPNF02*
1.5	1/1.38	8.5	116	12.1	16.5	19.5	29	AP8	251/GL2520	UFPNF04*
2.5	1/1.78	10.6	180	7.4	23	27	18	AP10	252/GL2520	-
4.0	7/0.85	11.9	248	4.6	30	36	11	AP11	252/GL2520	-
<b>Four core</b>										
1.0	1/1.13	8.5	107	18.1	13	15	44	AP8	251/GL2520	UFPNF04*
1.5	1/1.38	10.0	143	12.1	16.5	19.5	29	AP9	251/GL2520	-
2.5	1/1.78	11.9	225	7.4	23	27	18	AP11	252/GL2520	-
4.0	7/0.85	13.2	310	4.6	30	36	11	AP13	254	-

FP200 Gold<sup>®</sup> is also available in multi-core versions (7, 12 & 19 core configurations)  
 1 Recommended clip spacing 300 mm horizontal and 400mm vertical  
 2 Brass glands may be used as an alternative  
 Minimum recommended installation temperature 0°C  
 Installation methods for current rating in accordance with BS7671/IEE Wiring Regulations  
 The tabulated ratings are based upon a 30°C ambient temperature and 70°C operating temperature.  
 For other ambient temperatures or where cables are grouped together, appropriate rating factors should be applied.

\* R - Red  
W - White



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<b>FIRE RESISTANT CABLES</b>	<b>LOW VOLTAGE</b>
	<b>300/500 V</b>

# FP200 Gold®



**BS7629-1**

**BS5839-1:2002**


**Temperature rating factors:**

Ambient rating factors °C	Rating Factor
25	1.03
30	1.00
35	0.94
40	0.87
45	0.79
50	0.71
55	0.61
60	0.50

**Correction Factors for groupings**

Number of circuits	Rating Factor
2	0.80
3	0.70
4	0.65
5	0.60
6	0.57
7	0.54
8	0.52
9	0.50



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## **APPENDIX B:**

### **FR20 TECHNICAL SPECIFICATIONS**



## FR20 TECHNICAL SPECIFICATIONS

### 1. 1/.8 1 Pair PC/P/DAM/FR20 Red

Copper O/D 0.8mm PCW

Conductor Resistance of 1 pair : 82 Ohm / km

Capacitance of 1 pair, between cores : 93 pF / m

Capacitance of 1 core to screen : 190 pF / m

Insulation resistance core to screen : 1 500 V DC

Insulation resistance between cores : 3 000 V DC

### 2. 1/.8 2 Pair PC/P/DAM/FR20 Red

Copper O/D 0.8mm PCW

Conductor Resistance of 1 pair : 81 Ohm / km

Capacitance of 2 pairs, between cores : 105 pF / m

Capacitance of 2 pairs 1 core to screen: 180 pF / m

Insulation Resistance core to screen : 1 500 V DC


Insulation Resistance between cores : 3 000 V DC

#### TEST EQUIPMENT:

Siemens Bridge-Resistor Model M273


Hewlett-Packard Capacitance Bridge 4263

B.I.C.C. H/V Tester R 1009 C

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# APPENDIX C:

## BELDEN 9841 PRODUCT DATA SHEET

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**Detailed Specifications & Technical Data**



**BELDEN**Cable™

**9841 Paired - Low Capacitance EIA RS-485**

	<p>For more information please call <b>1-800-Belden1</b></p> <p><u>See Put-ups and Colors</u></p> <p><u>Color Code Chart : No. 5 for Paired Cables (Western Electric Standard).pdf</u></p>
---	--

**Description:**

24 AWG stranded (7x32) tinned copper conductors, twisted pair, polyethylene insulated, overall 100% Beldfoil® shield plus a 90% tinned copper braid shield, 24 AWG (7x32) tinned copper drain wire, PVC jacket.

**PHYSICAL CHARACTERISTICS:**

**CONDUCTOR:**

Number of Pairs	1
Total Number of Conductors	2
AWG	24
Stranding	7x32
Conductor Material	TC - Tinned Copper

**INSULATION:**

Insulation Material	PE - Polyethylene
---------------------	-------------------

**Lay Length :**

Lay Length (in.)	Direction	Twists/ft (twist/ft)
2.5	Left Hand Lay	4.8

Twists/ft.	4.8
------------	-----

Pair Color Code Chart	White/Blue and Blue/White
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**OUTER SHIELD:**

Outer Shield Material Trade Name	Beldfoil®
----------------------------------	-----------


Outer Shield Type	Tape/Braid
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**Outer Shield Material :**

Layer Number	Material Trade Name	Type	Material	% Coverage (%)
1	Beldfoil®	Tape	Aluminum Foil-Polyester Tape	100
2		Braid	TC - Tinned Copper	90

**OUTER SHIELD DRAIN WIRE :**

Outer Shield Drain Wire AWG	24
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**Detailed Specifications & Technical Data**



**BELDEN**Cable™

**9841 Paired - Low Capacitance EIA RS-485**

Outer Shield Drain Wire Stranding	7x32
Outer Shield Drain Wire Conductor Material	TC - Tinned Copper

**OUTER JACKET:**

Outer Jacket Material	PVC - Polyvinyl Chloride
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**OVERALL NOMINAL DIAMETER:**

Overall Nominal Diameter	.232 in.
--------------------------	----------

**MECHANICAL CHARACTERISTICS:**

Operating Temperature Range	-30°C To +80°C
UL Temperature Rating	80°C
Bulk Cable Weight	36 lbs/1000 ft.
Max. Recommended Pulling Tension	72.3 lbs.
Min. Bend Radius (Install)	2.5 in.

**APPLICABLE SPECIFICATIONS AND AGENCY COMPLIANCE:**

**APPLICABLE STANDARDS:**

NEC/(UL) Specification	CM
CEC/C(UL) Specification	CM
AWM Specification	UL Style 2919 (30 V 80°C)

**PLENUM/NON-PLENUM:**


Plenum (Y/N)	N
Plenum Number	82841, 89841

**ELECTRICAL CHARACTERISTICS:**

Nom. Characteristic Impedance	120 Ohms
Nom. Capacitance Conductor to Conductor @ 1 KHz	12.8 pF/ft
Nom. Cap. Cond. to Other Cond. & Shield @ 1 KHz	23 pF/ft
Nominal Velocity of Propagation	66 %
Nominal Delay	1.6 ns/ft
Nom. Conductor DC Resistance @ 20 Deg. C	24 Ohms/1000 ft
Nominal Outer Shield DC Resistance @ 20 Deg. C	3.4 Ohms/1000 ft
Nom. Attenuation (dB/100 ft)	0.6 (@ 1 MHz) dB/100 ft.
Max. Operating Voltage - UL	300 V RMS, 30 V RMS (UL AWM Style 2919)
Max. Recommended Current	2.1 Amps per conductor @ 25°C

**PUT-UPS AND COLORS:**

Item	Description	Put-Up (ft.)	Ship Weight (lbs.)	Jacket Color	Notes
9841 060100	1 PR #24 PE SH PVC	100	4.3	CHROME	

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**Detailed Specifications & Technical Data**



**BELDEN**Cable™

**9841 Paired - Low Capacitance EIA RS-485**


9841 0601000	1 PR #24 PE SH PVC	1000	40	CHROME	C
9841 060500	1 PR #24 PE SH PVC	500	20	CHROME	C

C = CRATE REEL PUT-UP.


Revision Number: 1      Revision Date: 06-09-2004

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## APPENDIX D: WCAT52 PRODUCT DATA SHEET

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## WCAT52

2 Pairs, FTP LAN Cable, Category 5 Enhanced, Reels of 500 m

In the early 1990s, a series of regulations regarding data transmission installations in new and renovated buildings were drawn up. This occurred after the EIA/TIA 568 and 569, ISO/IEC 11801, EN 50173 and DIN VDE 44312-5 standards came into force, and after discussions about the recent EN 50288 European series relating to the structured cabling of the buildings. Cabling systems allow the transport of different types of information: LAN, traditional and digital telephony (ISDN), video images, alarms and controls.

### Certification

In addition to a very high standard of workmanship needed to meet the latest international standards, which establish the rules for the wiring of commercial buildings, the connections in a network must guarantee the utmost flexibility and universality. They must be able to support the widest range of current and future protocols.

As a result, the transmission media must be specifically designed to meet these requirements. In this area, they have also taken on a very important role in gaining certification for these cables, from both SGS and independent laboratories, that is recognised at national and international levels.

### Category 5 "enhanced" cable, tested up to 200 MHz

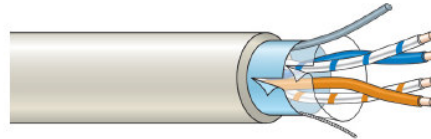
The idea of this new cable category, which has transmission tested up to 200 MHz, is that these cables can be used for high bit-rate data networks with greater flexibility and availability than ordinary Category 5 cables.

In addition, they are characterised by a level of immunity which permits good transmission in even the most severe AMC environments and which complies with all types of application with radiation limits.

When the ACR (Attenuation to Crosstalk Ratio) is insufficient, problems may arise due to high frequency EMC performances and insufficient return losses.

### WCAT used with Advisor Master

When WCAT cable is used with the Advisor Master systems, the rules with respect to maximum length of the databus and the databus topology should be respected. See installation manuals for more details.



### Standard Features

- 2 x 2 x AWG 24/1 FTP, category 5, enhanced
- Recommended for:
  - Advisor Masters panels
  - Networked fire panels and repeaters
- Certified by SGS for the compliance to the ISO/IEC 11801 (certification n°30.35.94.203/4)



## WCAT52

2 Pairs, FTP LAN Cable, Category 5 Enhanced, Reels of 500 m


### Specifications

<b>Inner conductor</b>	
Material	Bare copper AWG 24/1
Dimensions (Ø)	1 x 0.52 mm
Type	Solid
Type	Polyolefin
<b>Cable elements</b>	
Number of pairs	2
Colour	White-blue / blue
	White-orange / orange
	-
<b>Shield material</b>	1 Tinned copper D.W.26/1 AWG + AL/PET tape
<b>Jacket</b>	
Material	F.R. PVC
Colour	Grey - RAL 7032
Outer dimensions (Ø)	5.20 mm
<b>Weight</b>	30 kg / km
<b>Installation characteristics</b>	
Min. bend radius	42 mm
Operating temperature	-20 °C to +75 °C
Max. pull strength	10 kg
<b>Max. DC loop resistance</b>	16.8 ohm / 100 m at +20 °C
<b>Nom. mutual capacitance</b>	47 pF/m at 1 kHz
<b>Max. capacitance unbalance</b>	100 pF/100 m at 1 kHz
<b>Characteristic impedance</b>	100 ± 15 ohm
<b>Structural return loss</b>	
At 20 MHz	25 dB
At 100 MHz	23 dB
At 200 MHz	20 dB
<b>Nom. velocity of propagation</b>	74 %
<b>Max. propagation delay</b>	4.8 nsec./m
<b>Max propagation delay skew</b>	0.10 nsec/m
<b>Test voltage</b>	700 VAC per 1 min
<b>Max. rating voltage</b>	125 V (not for power purposes)
<b>Insulation resistance</b>	2 Gohm x km
<b>Heat release</b>	507 MJ/km

### Ordering Information


Part No.	Description
WCAT52	2 pairs, FTP LAN cable, category 5 enhanced, reels of 500 m



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# APPENDIX E:

## WRG59 PRODUCT DATA SHEET

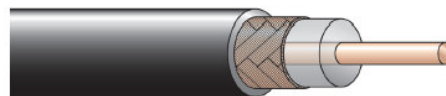
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**WRG59**

*RG59 Coax Cable - Box of 100 m*


The WRG59 CCTV coaxial cable with stranded copper covered steel inner conductor, solid polyethylene dielectric and bair copper braid outer conductor, is protected by a black thermoplastic material jacket.



Standard Features

- 75 ohm CCTV coaxial cable
- Video signal distribution
- Application : All CCTV interconnection up to 300 m without amplification



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