

## Heat Shrinkable End Caps



### Product Data Sheet

#### Characteristics

This data sheet covers heat shrinkable end caps whose dimensions will shrink to a predetermined size upon the application of heat above 125°C. The colour of these end caps is black (alternative colours available as a special order and subject to a minimum order quantity) and they are pre-coated during manufacture with a hot melt adhesive of translucent, yellowish colour in either spiral or film form.

#### Materials

The base compound of the end caps is a thermally stabilised cross linked polyolefin and the basic resin is compounded with chemical additives offering resistance against UV radiation, oxidation, ozone and other environmental effects. The end caps are coated inside with a polyamide based hot melt adhesive.

#### Typical Applications

The end caps are used for protecting the exposed cable ends from environmental effects and the ingress of moisture. They also offer insulation on the exposed cable end connected to the supply.

End caps with a spiral form coating of hot melt adhesive are used on a full range of PVC, XLPE and PILC electric cables and also with cables having a rubber type outer jacket and un-pressurised telecommunication cables.

End caps with a film form hot melt adhesive coating are suitable for use with pressurised telecommunications cables.

For pressurised telecom cables, the end caps are fitted with a non return air valve.

The following application table below gives the end cap dimensions and cable diameter range of usage for each model:-

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## Selection Table

End Cap Part No		End Cap Dimensions		Cable Diameter	
Standard Spiral adhesive	with Valve Film adhesive	ID-Ex (mm)	Length -Ex (mm)	Minimum (mm)	Maximum (mm)
CCSA009004	-	10.0/3.0	35	4	9
CCSA012005	-	15.0/4.5	45	5	12
CCSA017007	CCFA017007V	20.0/6.0	63	7	17
CCSA022010	CCFA022010V	25.0/8.5	70	10	22
CCSA034017	CCFA034017V	40.0/14.5	102	17	34
CCSA055028	CCFA055028V	63.0/24.0	118	28	55
CCSA065037	CCFA065037V	75.0/32.0	120	37	65
CCSA070043	CCFA070043V	78.0/38.0	130	43	70
CCSA100050	CCFA100050V	106.0/45.0	164	50	100
CCSA090065	CCFA090065V	100.0/57.0	155	65	90
CCSA110075	CCFA110075V	120.0/57.0	155	75	110
CCSA135080	CCFA135080V	145.0/57.0	155	80	135

### End Caps manufactured from Special Materials

End caps can also be supplied against specific order requirements manufactured from semi-conducting or high voltage non-tracking (Red) materials. Non tracking HV end caps are coated with a butyl rubber based mastic adhesive, which is waterproof, insulating and non tracking. Semi conducting end caps are coated with semi-conductive mastic or polyamide based hot melt adhesive or a suitable combination of both.

### Printing on the Product

End caps can be printed with a heat resistant white ink. The information printed on each cap can include:

1. Manufacturers logo
2. Product code
3. Applicable cable diameter and usage range.

### Packaging

End caps are packed telescopically, in a convenient way within a polythene bag, in order to reduce the consignment volume.

End caps sizes CCSA009004 to CCSA070043 are packed end to end in a tubular polythene bag sealed at both ends.

Larger end caps sizes CCSA100050, CCSA090065, CCSA110075 and CCSA135080 are packed in individual polythene bags with both ends sealed.

The outer packing is a standard corrugated carton with strapping. The carton carries a manufacturers label with information of the contents and customers name.

Please refer to the table below for the approximate packing information:-

End Cap Part No	Estimated quantity per standard carton 0.77x0.53x0.43m	Estimated gross weight Kgs
CCSA009004	13,600	19.75
CCSA012005	10,000	30.50
CCSA017007	4,000	26.20
CCSA022010	2,500	24.60
CCSA034017	880	19.35
CCSA055028	336	16.25
CCSA065037	216	14.10
CCSA070043	216	16.55
CCSA100050	85	10.90
CCSA090065	100	13.15
CCSA110075	72	10.10
CCSA135080	45	7.90

End Cap Part No	Estimated quantity per standard carton 0.77x0.53x0.43m	Estimated gross weight Kgs
CCFA017007V	1,200	26.65
CCFA022010V	1,000	24.90
CCFA034017V	700	25.90
CCFA055028V	288	18.40
CCFA065037V	216	17.20
CCFA070043V	216	19.65
CCFA100050V	85	12.15
CCFA090065V	100	14.55
CCFA110075V	72	11.15
CCFA135080V	45	8.55

**Specification sheet – Cable End Caps**

	<b>Characteristics</b>	<b>Requirements</b>	<b>Frequency</b>	<b>Control Method</b>
	<b>Product Control</b>			
1	Visual	Good and free from defects	100% - daily	Internal
2	Dimensions	As per the engineering drawing.	5 samples - daily	Internal
3	Tensile strength	Min 12 MPa (N/mm <sup>2</sup> )	5 samples daily	ASTM D 638
4	Ultimate elongation	Min 300%	5 samples daily	ASTM D 638
5	Environmental: 7 days outdoor @ 15 PSI	No leakage at 15 PSI	1 installation daily	Internal
6	Air pressure test: 30 PSI for 4 hours	No leakage	1 installation daily	Internal
7	Hardness	Min 45 shore D	Daily	ASTM 2240
8	Tensile strength after thermal ageing (150 <sup>o</sup> C, 168 hours)	Min 10 MPa (N/mm <sup>2</sup> )	Qualification	ISO 188
9	Ultimate elongation after thermal ageing (150 <sup>o</sup> C, 168 hours)	Min 250%	Qualification	ISO 188
10	Heat shock (225 <sup>o</sup> C for 4 hours)	No splitting cracking, dripping or flowing	Qualification	ESI 09-11
11	Environmental cycling – 8 cycles, 6 hours @ 60 <sup>o</sup> C, 6 hours @ -10 <sup>o</sup> C. Pressurised at 10 PSI	No leakage at 10 PSI	Qualification	Internal
12	Water Absorption	Max 1%	Qualification	ISO 62
13	Dielectric strength	Min 12kV/mm	Qualification	IEC 60243
14	Volume resistivity	Min 10 <sup>12</sup> ohm-cm	Qualification	IEC 60093
	<b>Raw Material control</b>			
15	Carbon black content	Min 2.5%	Compounding	BS2782 method 452B:1978
16	Tensile strength	Min 12MPa (N/mm <sup>2</sup> )	Compounding	ASTM D 638
17	Ultimate elongation	Min 300%	Compounding	ASTM D 638
18	Hardness	Min 45 Shore D	Compounding	ASTM 2240
			<b>Frequency</b>	<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In House

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## Heat Shrinkable Anode Caps



### Product Data Sheet

#### Characteristics

This data sheet covers heat shrinkable anode caps whose dimensions will shrink to a predetermined size upon the application of heat above 125° C. The colour of these anode caps is black and they are pre-coated during manufacture with a butyl rubber based adhesive

#### Materials

The base material of the anode caps is a thermally stabilised cross linked polyolefin and the basic resin is mixed with chemical additives offering protection against UV radiation, oxidation, ozone and other environmental effects. The anode caps are coated internally with a butyl rubber based adhesive.

#### Typical Applications

Anode caps are used for protecting the anode ends where the lead wire is connected to the anode. Protection of the connection between the anode and lead wire is important to prevent premature failure of the system due to corrosion causing the lead wire to come out of the anode. The anode cap provides electrical insulation and stress relief to the connection and the special rubber based adhesive on the inside of the cap, provides a water-tight seal and protects the anode end from moisture. The following application table below gives the anode cap dimensions for each model:-

#### Selection Table

Part No	Diameter of Anode End		Diameter of Lead Wire End		Length		
					Total	Anode End	Wire End
	R (mm)	S (mm)	R (mm)	S (mm)	S (mm)	S (mm)	S (mm)
AC080040	40.00	80.00	6.50	14.00	190.00	123.00	67.00
AC105040	40.00	105.00	6.50	14.00	190.00	123.00	67.00

**S: As supplied    R: Fully recovered**

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### Printing on the Product

Anode caps can be printed with a heat resistant white ink. The information printed on each cap can include:

1. Manufacturers logo
2. Product code

### Packaging

Anode caps are packed individually in a polythene bag with a specified number of caps packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name.

Anode Cap Part No	Estimated quantity per standard carton 0.77x0.53x0.43m	Estimated gross weight Kgs
AC080040	110	10.70
AC105040	72	7.65

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## Specification sheet – Anode Caps

	Characteristics	Requirements	Frequency	Control Method
	<b>Product Control</b>			
1	Visual	Good and free from defects	100% - daily	Internal
2	Dimensions	As per the engineering drawing.	5 samples daily	Internal
3	Tensile strength	Min 12 MPa (N/mm <sup>2</sup> )	5 samples daily	ASTM D 638
4	Ultimate elongation	Min 300%	5 samples daily	ASTM D 638
5	Hardness	Min 45 shore D	Daily	ASTM D 2240
6	Tensile strength after thermal ageing (150 <sup>o</sup> C, 168 hours)	Min 10 MPa (N/mm <sup>2</sup> )	Qualification	ISO 188
7	Ultimate elongation after thermal ageing (150 <sup>o</sup> C, 168 hours)	Min 250%	Qualification	ISO 188
8	Heat Shock (225 <sup>o</sup> C for 4 hours)	No splitting, cracking, dripping or flowing	Qualification	ESI 09-11
9	Water Absorption	Max 1%	Qualification	ISO - 62
10	Dielectric strength	Min 12kV/mm	Qualification	IEC 60243
11	Volume resistivity	Min 10 <sup>12</sup> ohm-cm	Qualification	IEC 60093
	<b>Raw Material control</b>			
12	Carbon black content	Min 2.5%	Compounding	BS2782 method 452B:1978
15	Tensile strength	Min 12MPa (N/mm <sup>2</sup> )	Compounding	ASTM D 638
16	Ultimate elongation	Min 300%	Compounding	ASTM D 638
17	Hardness	Min 45 Shore D	Compounding	ASTM D 2240
			<b>Frequency</b>	<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In house

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## Heat Shrinkable Low Voltage Breakouts

(Heat Shrink Low voltage breakouts up to 1kV)



### Product Data Sheet

#### Characteristics

This data sheet covers heat shrinkable low voltage breakouts whose dimension will shrink to a predetermined size upon the application of heat above 125° C. The colour of these breakouts is black; they are electrically insulating, UV resistant and weather proof. LV breakouts have two, three or four fingers and are spiral coated by machine with a polyamide based hot melt adhesive. Alternatively, as a special order, they can be coated with rubber mastic and covered with a release paper.

#### Materials

The base material of the LV breakouts is a thermally stabilised cross linked blend of polyolefin and a compatible grade of synthetic rubber. The basic resins are mixed with chemical additives offering fire retardant properties (optional) and protection against oxidation, ozone and other environmental effects. The fingers and the main body are internally coated by machine with a polyamide based hot melt adhesive or by special request by a butyl rubber based mastic manually applied. Both sealants are electrically insulating and waterproof.

#### Typical Applications

LV breakouts provide insulation and sealing over the crutch of multi-core cables. The hot melt adhesive or the butyl rubber mastic sealant provides a water tight environmental seal to the cable. The LV breakouts are normally used as an integral part of low voltage cable terminations up to 1kV.

The following application table below give the LV breakout dimensions:-

Breakout 2-Finger Part No	Breakout main diameter		Finger Diameter		Full Length	Finger Length
	R (mm)	S (mm)	R (mm)	S (mm)	R (mm)	R (mm)
01H2B033101403	10.00	33.00	3.00	14.00	90.00	20.00
01H2B060222407	22.00	60.00	6.70	24.00	120.00	35.00

Breakout 3-Finger Part No	Breakout main diameter		Finger Diameter		Full Length	Finger Length
	R (mm)	S (mm)	R (mm)	S (mm)	R (mm)	R (mm)
01H3B028091203	8.50	28.00	2.50	12.00	70.00	23.00
01H3B045141504	14.00	45.00	4.00	15.00	110.00	20.00
01H3B060222608	22.00	60.00	8.00	26.00	185.00	45.00
01H3B080333616	33.00	80.00	16.00	36.00	210.00	50.00
01H3B110334016	33.00	110.00	16.00	40.00	210.00	50.00
01H3B110474820	47.00	110.00	20.00	48.00	225.00	75.00
01H3B125475520	47.00	125.00	20.00	55.00	250.00	75.00
01H3B140546227	54.00	140.00	27.00	62.00	240.00	65.00
01H3B155546227	54.00	155.00	27.00	62.00	240.00	65.00

Breakout 4-Finger Part No	Breakout main diameter		Finger Diameter		Full Length	Finger Length
	R (mm)	S (mm)	R (mm)	S (mm)	R (mm)	R (mm)
01H4B028091002	8.50	28.00	1.80	10.00	70.00	23.00
01H4B038141504	14.00	38.00	3.20	15.00	105.00	25.00
01H4B050141504	14.00	50.00	3.20	15.00	105.00	25.00
01H4B055252006	25.00	55.00	6.00	20.00	180.00	45.00
01H4B065252506	25.00	65.00	6.00	25.00	180.00	45.00
01H4B072222509	22.00	72.00	8.50	25.00	190.00	45.00
01H4B0100333514	33.00	100.00	14.00	35.00	215.00	50.00
01H4B0125474520	47.00	125.00	20.00	45.00	245.00	72.00

**S= As supplied**

**R= Fully recovered**

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### Printing on the Product

Breakouts can be printed with heat resistant white ink. The information printed can include:

1. Manufacturers logo
2. Product code

### Packaging

LV breakouts are packed individually in a polythene bag, with a specified number of breakouts packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name.

Please refer to the table below for the approximate packing information:-

2-Finger Breakout Part No	Estimated quantity per standard carton: 0.77x0.53x0.43m	Estimated gross weight Kgs
01H2B033101403	1,400	17.40
01H2B060222407	560	21.50
3-Finger Breakout Part No	Estimated quantity per standard carton: 0.77x0.53x0.43m	Estimated gross weight Kgs
01H3B028091203	2,400	24.00
01H3B045141504	1,000	16.60
01H3B060222608	224	19.55
01H3B080333616	108	15.85
01H3B110334016	52	9.20
01H3B110474820	52	12.10
01H3B125475520	48	13.75
01H3B140546227	30	8.90
01H3B155546227	25	7.25
4-Finger Breakout Part No	Estimated quantity per standard carton: 0.77x0.53x0.43m	Estimated gross weight Kgs
01H4B028091002	2,240	22.95
01H4B038141504	1,000	18.00
01H4B050141504	780	19.20
01H4B055252006	252	19.90
01H4B065252506	200	16.20
01H4B072222509	170	14.10
01H4B100333514	80	12.40
01H4B125474520	48	14.75

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**Specification sheet – Low voltage breakouts**

	<b>Characteristics</b>	<b>Requirements</b>	<b>Frequency</b>	<b>Control Method</b>
	<b>Product Control</b>			
1	Visual	Good and free from defects	100% - daily	Internal
2	Dimensions	As per the engineering drawing.	5 samples daily	Internal
3	Tensile strength	Min 10 MPa (N/mm <sup>2</sup> )	5 samples daily	ASTM D 638
4	Ultimate elongation	Min 300%	5 samples daily	ASTM D 638
5	Hardness	Min 35 shore D	Daily	ASTM D 2240
6	Tensile strength after thermal ageing (150 <sup>o</sup> C, 168 hours)	Min 9 MPa (N/mm <sup>2</sup> )	Qualification	ISO 188
7	Ultimate elongation after thermal ageing (150 <sup>o</sup> C, 168 hours)	Min 250%	Qualification	ISO 188
8	Heat Shock (225 <sup>o</sup> C for 4 hours)	No splitting, cracking, dripping or flowing	Qualification	ESI 09-11
9	Water Absorption	Max 1%	Qualification	ISO – 62
10	Dielectric strength	Min 12kV/mm	Qualification	IEC 60243
11	Dielectric constant	5 Max	Qualification	ASTM D 150
12	Volume resistivity	Min 10 <sup>12</sup> ohm-cm	Qualification	IEC 60093
	<b>Raw Material control</b>			
13	Carbon black content	Min 2.5%	Compounding	BS2782 method 452B:1978
14	Tensile strength	Min 10MPa (N/mm <sup>2</sup> )	Compounding	ASTM D 638
15	Ultimate elongation	Min 300%	Compounding	ASTM D 638
15	Hardness	Min 35 Shore D	Compounding	ASTM D 2240
		<b>Frequency</b>		<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In house

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## Heat shrinkable Conductive Breakouts (Heat Shrink Semi-Conductive Cable Breakouts)



### Product Data Sheet.

#### Characteristics.

This data sheet covers heat shrinkable conductive breakouts whose dimensions will shrink to a predetermined size upon the application of heat above 125° C. The colour of these conductive breakouts is black; they are electrically semi conductive, UV resistant and weather proof. Conductive breakouts have three fingers and the main body is internally coated with mastic and covered with a release paper.

#### Materials

The base material of the conductive breakouts is a thermally stabilised cross linked polyolefin and the basic resin is mixed with chemical additives offering resistance against UV radiation, oxidation, ozone and other environmental effects. The most important additive is conductive carbon black, which adds electrical conductivity to the material. The sealant is butyl rubber based mastic which is electrically insulating and waterproof.

#### Typical Applications

Conductive breakouts provide a semi conductive screen and seal over the crutch of multi-core cables. The mastic sealant provides a water tight environmental seal to the cable. The conductive cable breakouts are normally used as an integral part of 3-core cable terminations up to 36 kV and also in 3-core cable joints up to 36 kV.

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The following application table below gives the conductive breakout dimensions:-

Conductive Breakout Part No	Breakout main diameter		Finger Diameter		Full Length	Finger Length
	R (mm)	S (mm)	R (mm)	S (mm)	R (mm)	R (mm)
MSCB060222408	22.00	60.00	8.00	24.00	185.00	45.00
MSCB080333616	33.00	80.00	16.00	36.00	210.00	50.00
MSCB095333616	33.00	95.00	16.00	36.00	210.00	50.00
MSCB110474820	47.00	110.00	20.00	48.00	225.00	75.00
MSCB125475520	47.00	125.00	20.00	55.00	250.00	75.00
MSCB140546227	54.00	140.00	27.00	62.00	240.00	65.00

**S= As supplied**

**R= Fully recovered**

### Printing on the Product

Breakouts can be printed with a heat resistant white ink. The information printed can include:

1. Manufacturers logo
2. Product code

### Packaging

Conductive breakouts are packed individually in a polythene bag, with a specified number of conductive breakouts packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name.

Cartons containing conductive breakouts should not be stored exposed to direct sunlight. The black colour of the conductive breakouts together with the conductive property of the material absorbs heat and may shrink the product even when the ambient temperature is much lower than normal shrinking temperature.

Please refer to the table below for the approximate packing information:-

Conductive Breakout Part No	Estimated quantity per standard carton 0.77x0.53x0.43m	Estimated gross weight Kgs
MSCB060222408	224	16.65
MSCB080333616	108	15.60
MSCB095333616	80	12.00
MSCB110474820	52	11.15
MSCB125475520	36	10.30
MSCB140546227	30	7.90

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**Specification sheet – Conductive breakouts**

	<b>Characteristics</b>	<b>Requirements</b>	<b>Frequency</b>	<b>Control Method</b>
	<b>Product Control</b>			
1	Visual	Good and free from defects	100% - daily	Internal
2	Dimensions	As per the engineering drawing.	5 samples daily	Internal
3	Tensile strength	Min 12 MPa (N/mm <sup>2</sup> )	5 samples daily	ASTM D 638
4	Ultimate elongation	Min 300%	5 samples daily	ASTM D 638
5	Hardness	Min 38 shore D	Daily	ASTM D 2240
6	Tensile strength after thermal ageing (135 <sup>o</sup> C, 168 hours)	Min 10 MPa (N/mm <sup>2</sup> )	Qualification	EATS 09-13
7	Ultimate elongation after thermal ageing (135 <sup>o</sup> C, 168 hours)	Min 250%	Qualification	EATS 09-13
8	Heat shock (250 <sup>o</sup> C for 30 minutes)	No splitting, cracking, dripping or flowing	Qualification	EATS 09-13
9	Water Absorption	Max 1%	Qualification	ISO – 62
10	Volume resistivity	2 * 10 <sup>4</sup> ohm-cm	Qualification	IEC- 60093
	<b>Raw Material control</b>			
11	Tensile strength	Min 12MPa (N/mm <sup>2</sup> )	Compounding	ASTM D 638
12	Ultimate elongation	Min 300%	Compounding	ASTM D 638
13	Hardness	Min 38 Shore D	Compounding	ASTM D 2240
		<b>Frequency</b>		<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In house

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## Heat Shrinkable Medium Voltage Breakouts (Heat Shrink Non-Tracking Medium Voltage Cable Breakouts)



### Product Data Sheet

#### Characteristics

This data sheet covers heat shrinkable medium voltage breakouts whose dimensions will shrink to a predetermined size upon the application of heat above 125° C. The colour of the MV breakouts is reddish brown; they are electrically insulating, anti-tracking, UV resistant, weather proof and flame retardant. MV breakouts have three fingers and the main body is internally coated with mastic and covered with a release paper.

#### Materials

The base material of the MV breakouts is a thermally stabilized cross linked blend of polyolefin and a compatible grade of synthetic rubber. The basic resin is mixed with chemical additives offering resistance against tracking erosion, fire, oxidation, ozone and other environmental effects. The sealant is a butyl rubber based mastic which is electrically insulating, water -proof and anti-tracking.

#### Typical Applications

MV Cable breakouts provide insulation and sealing over the crutch of multi-core cables. The mastic sealant provides a water tight environmental seal to the cable. The MV cable breakouts are normally used as an integral part of 3-core cable terminations up to 36 kV.



The following application table below gives the MV breakout dimensions.

Breakout Part No	Breakout main diameter		Finger Diameter		Full Length	Finger Length
	R (mm)	S (mm)	R (mm)	S (mm)	R (mm)	R (mm)
MTRB060222408	22.00	60.00	8.00	24.00	185.00	45.00
MTRB080333616	33.00	80.00	16.00	36.00	210.00	50.00
MTRB095333616	33.00	95.00	16.00	36.00	210.00	50.00
MTRB110474820	47.00	110.00	20.00	48.00	225.00	75.00
MTRB125475520	47.00	125.00	20.00	55.00	250.00	75.00
MTRB140546227	54.00	140.00	27.00	62.00	240.00	65.00

**S = As supplied**

**R = Fully recovered**

### Printing on the Product

Breakouts can be printed with a heat resistant white ink. The information printed can include:

1. Manufacturers logo
2. Product code (either of the breakout or of the termination)

### Packaging

MV breakouts are packed individually in a polythene bag, with a specified number of breakouts packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name. Please refer to the table below for the approximate packing information:-

Breakout Part No	Estimated quantity per standard carton 0.77x0.53x0.43m	Estimated gross weight Kgs
MTRB060222408	224	20.80
MTRB080333616	108	19.90
MTRB095333616	80	14.80
MTRB110474820	52	13.45
MTRB125475520	40	13.65
MTRB140546227	30	9.55

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**Specification sheet – Medium Voltage breakout**

	<b>Characteristics</b>	<b>Requirements</b>	<b>Frequency</b>	<b>Control Method</b>
	<b>Product Control</b>			
1	Visual	Good & free from defects	100% - daily	Internal
2	Dimensions	As per the engineering drawing.	5 samples daily	Internal
3	Tensile strength	Min 7 MPa (N/mm <sup>2</sup> )	5 samples daily	ASTM D 638
4	Ultimate elongation	Min 300%	5 samples daily	ASTM D 638
5	Hardness	Min 32 shore D	Daily	ASTM D 2240
6	Tensile strength after thermal ageing (135 <sup>o</sup> C, 168 hours)	Min 6 MPa (N/mm <sup>2</sup> )	Qualification	EATS 09-13
7	Ultimate elongation after thermal ageing (135 <sup>o</sup> C, 168 hours)	Min 250%	Qualification	EATS 09-13
8	Heat Shock (250 <sup>o</sup> C for 30 minutes)	No splitting, cracking, dripping or flowing	Qualification	EATS 09-13
9	Water Absorption	Max 1%	Qualification	ISO 62
10	Dielectric strength	Min 12kV/mm	Qualification	IEE 60243
11	Dielectric constant	5 Max	Qualification	ASTM D 150
12	Volume resistivity	Min 10 <sup>14</sup> ohm-cm	Qualification	IEC 60093
13	Resistance to tracking	No failure by tracking after: 1 hour @ 2.5kV 1 hour @ 2.75kV 1 hour @ 3.00kV and 20 minutes @ 3.25kV	Qualification	ASTM D 2303
14	Flame retardance	Non burning	Qualification	ESI 09-13
	<b>Raw Material control</b>			
15	Tensile strength	Min 7MPa (N/mm <sup>2</sup> )	Compounding	ASTM D 638
16	Ultimate elongation	Min 300%	Compounding	ASTM D 638
17	Hardness	Min 32 Shore D	Compounding	ASTM D 2240
		<b>Frequency</b>		<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In house

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# Heat Shrinkable Medium Voltage Straight Boots

(Heat Shrink Non-Tracking Medium Voltage Straight Boots)



## Product Data Sheet

### Characteristics

This data sheet covers heat shrinkable medium voltage straight boots whose dimensions will shrink to a predetermined size upon the application of heat above 125° C. The colour of the MV boots is reddish brown and they are electrically insulating, anti-tracking, UV resistant, weather proof and flame retardant. Both ends of these boots are internally coated with red mastic and covered with a release paper.

### Materials

The base material of the MV boot is a thermally stabilised cross-linked blend of polyolefin and a compatible grade of synthetic rubber. The basic resin is mixed with chemical additives offering resistance against tracking erosion, fire, oxidation, ozone and other environmental effects. The sealant is butyl rubber based mastic, which is electrically insulating and waterproof. Both inside ends of the boots are coated with the butyl rubber mastic.

### Typical Applications

MV straight boots provide insulation and sealing for bushings within cable-end boxes integral with switchgear and transformers. The mastic sealant provides a water-tight environmental seal to the bushing. The MV boots are also supplied as a part of heat shrink cable termination up to 36 kV for operation in air-filled cable-end boxes, designed with reduced clearances for compound filling. The boots are designed to withstand surges induced during the operational life of the termination.

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The following application table below indicates the dimensions of straight boots:-

Type	MV Boot	Cable-end diameter		Bushing-end Diameter		Length M	Length N	Full Length L
	Part No	R (mm)	S (mm)	R (mm)	S (mm)	R (mm)	R (mm)	R (mm)
Straight	MSB81303518	18.00	35.00	30.00	81.00	140.00	45.00	220.00
Straight	MSB81306018	18.00	60.00	30.00	81.00	140.00	45.00	220.00

**S = As Supplied      R = Fully Recovered**

### Printing on the Product

Straight boot can be printed with a heat resistant white ink. The information printed can include:

1. Manufacturers logo
2. Product code

### Packaging

MV straight boots are packed individually in a polythene bag, with a specified number of boots packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name. Please refer to the table below for the approximate packing information:-

MV straight Boot Part No	Estimated quantity per standard carton 0.77x0.53x0.43m	Estimated gross weight Kgs
MSB81303518	130	18.10
MSB81306018	130	18.40

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## Heat Shrinkable Medium Voltage Right Angle Boots

(Heat Shrink Non-Tracking Medium Voltage Right Angle Boots)



### Product Data Sheet

#### Characteristics

This data sheet covers heat shrinkable medium voltage right angle boots whose dimensions will shrink to a predetermined size upon the application of heat above 125° C. The colour of the MV boots is reddish brown and they are electrically insulating, anti-tracking, UV resistant, weather proof and flame retardant. Both ends of these boots are internally coated with red mastic and covered with a release paper.

#### Materials

The base material of the MV boot is a thermally stabilised cross-linked blend of polyolefin and a compatible grade of synthetic rubber. The basic resin is mixed with chemical additives offering resistance against tracking erosion, fire, oxidation, ozone and other environmental effects. The sealant is butyl rubber based mastic, which is electrically insulating and waterproof. Both inside ends of the boots are coated with the butyl rubber mastic.

#### Typical Applications

MV right angle boots provide insulation and sealing for bushings within cable-end boxes integral with switchgear and transformers. The mastic sealant provides a water-tight environmental seal to the bushing. The MV boots are also supplied as a part of heat shrink cable terminations up to 36 kV for operation in air-filled cable-end boxes, designed with reduced clearances for compound filling. The boots are designed to withstand surges induced during the operational life of the termination.



The following application table below indicates the dimensions of right angle boots:-

Type	MV Boot	Cable-end diameter		Bushing-end Diameter		Length M	Length N
	Part No	R (mm)	S (mm)	R (mm)	S (mm)	R (mm)	R (mm)
Right Angle	MAB81352715	15.00	27.00	35.00	81.00	125.00	145.00
Right Angle	MAB81354815	15.00	48.00	35.00	81.00	125.00	145.00
Right Angle	MAB81354815-A	15.00	48.00	35.00	81.00	95.00	145.00
Right Angle	MAB81354825	25.00	48.00	35.00	81.00	125.00	145.00
Right Angle	MAB95357025	25.00	70.00	35.00	95.00	125.00	145.00

**S = As Supplied    R = Fully Recovered**

#### Printing on the Product

MV right angel boot can be printed with a heat resistant white ink. The information printed can include:

1. Manufacturers logo
2. Product code

#### Packaging

MV right angel boots are packed individually in a polythene bag, with a specified number of boots packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name. Please refer to the table below for the approximate packing information:-

MV Right Angle Boot Part No	Estimated quantity per standard carton 0.77x0.53x0.43m	Estimated gross weight Kgs
MAB81352715	100	18.15
MAB81354815	100	20.75
MAB81354815-A	120	21.25
MAB81354825	80	18.25
MAB95357025	50	12.50

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**Specification sheet – Medium Voltage Straight & Right Angle Boots**

	<b>Characteristics</b>	<b>Requirements</b>	<b>Frequency</b>	<b>Control Method</b>
	<b>Product Control</b>			
1	Visual	Good & free from defects	100% - daily	Internal
2	Dimensions	As per the engineering drawing.	5 samples daily	Internal
3	Tensile strength	Min 7 MPa (N/mm <sup>2</sup> )	5 samples daily	ASTM D 638
4	Ultimate elongation	Min 300%	5 samples daily	ASTM D 638
5	Hardness	Min 32 shore D	Daily	ASTM D 2240
6	Tensile strength after thermal ageing (135 <sup>o</sup> C, 168 hours)	Min 6 MPa (N/mm <sup>2</sup> )	Qualification	EATS 09-13
7	Ultimate elongation after thermal ageing (135 <sup>o</sup> C, 168 hours)	Min 250%	Qualification	EATS 09-13
8	Heat Shock (250 <sup>o</sup> C for 30 minutes)	No splitting, cracking, dripping or flowing	Qualification	EATS 09-13
9	Water Absorption	Max 1%	Qualification	ISO 62
10	Dielectric strength	Min 12kV/mm	Qualification	IEE 60243
11	Dielectric constant	5 Max	Qualification	ASTM D 150
12	Volume resistivity	Min 10 <sup>14</sup> ohm-cm	Qualification	IEC 60093
13	Resistance to tracking	No failure by tracking after: 1 hour @ 2.5kV 1 hour @ 2.75kV 1 hour @ 3.00kV and 20 minutes @ 3.25kV	Qualification	ASTM D 2303
14	Flame retardance	Non burning	Qualification	ESI 09-13
	<b>Raw Material control</b>			
15	Tensile strength	Min 7MPa (N/mm <sup>2</sup> )	Compounding	ASTM D 638
16	Ultimate elongation	Min 300%	Compounding	ASTM D 638
17	Hardness	Min 32 Shore D	Compounding	ASTM D 2240
			<b>Frequency</b>	<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In house

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# Heat Shrinkable Non-Tracking HV Single Sheds

(Heat Shrink Creepage Extension Rain Sheds - Single)



## Product Data Sheet

### Characteristics

This data sheet covers heat shrinkable high voltage sheds whose dimensions will shrink to a predetermined size upon the application of heat above 125° C. The colour of the HV sheds is red and they are electrically insulating, anti-tracking, erosion resistant, weather proof and flame retardant. These HV sheds are normally supplied with an anti tracking red sealant coating covered with a release paper.

### Materials

The base material of the HV shed is a thermally stabilised cross-linked blend of polyolefin and a compatible grade of synthetic rubber. The basic resin is mixed with chemical additives offering protection against fire, oxidation, ozone and other environmental effects. The sealant is butyl rubber based mastic, which is electrically insulating, anti tracking and waterproof.

### Typical Applications

HV single sheds are used for extending the creepage path for medium voltage cable terminations, thereby reducing the cable tail length and the size of the switchgear cabinet required. Single sheds are suitable for the termination of the complete range of XLPE and PILC types of electrical cables

The following application table below indicates the HV single shed dimensions:-

Single HV Shed Part No	HV Shed Diameter		Skirt Diameter O-R	Neck - L L-S
	min D-S	max D-R		
ATS0903712	37.00	12.00	90.00	20.00
ATS0903716	37.00	16.00	90.00	25.00
ATS1155716	57.00	16.00	115.00	25.00
ATS1255725	57.00	25.00	125.00	30.00
ATS1457535	75.00	35.00	145.00	35.00
ATS20010035	100.00	35.00	200.00	40.00

**S = As Supplied      R = Fully Recovered**



### Printing on the Product

HV sheds can be printed with a heat resistant white ink. The information printed can include:

1. Manufacturers logo
2. Product code

### Packaging

HV sheds are packed individually in a polythene bag, with a specified number of sheds packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name. Please refer to the table below for the approximate packing information:-

Single HV Shed Part No	Estimated quantity per standard carton 0.77x0.53x0.43m	Estimated gross weight Kgs
ATS0903712	924	31.45
ATS0903716	1,000	38.90
ATS1155716	420	28.90
ATS1255725	455	28.45
ATS1457535	300	24.80
ATS20010035	72	17.05

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## Heat Shrinkable Non-Tracking HV Triple Sheds

(Heat Shrink Creepage Extension Rain Sheds - Triple)



### Product Data Sheet

#### Characteristics

This data sheet covers heat shrinkable high voltage triple sheds whose dimensions will shrink to a predetermined size upon the application of heat above 125° C. The colour of the HV sheds is red and they are electrically insulating, anti-tracking, erosion resistant, weather proof and flame retardant. These HV sheds are normally supplied with an anti tracking red sealant coating covered with a release paper.

#### Materials

The base material of the HV shed is a thermally stabilised cross-linked blend of polyolefin and a compatible grade of synthetic rubber. The basic resin is mixed with chemical additives offering protection against fire, oxidation, ozone and other environmental effects. The sealant is butyl rubber based mastic, which is electrically insulating, anti tracking and waterproof.

#### Typical Applications

HV triple sheds are used primarily to protect the crutch of the PILC 3 core cable while installing and connecting an outdoor termination by restricting the individual cable cores from over bending away from the crutch. They also provide additional creepage extension.

The following application table below indicates the HV triple shed dimensions:-

Triple HV Shed Part No	HV Shed Diameter		Skirt Diameter	Neck - L
	min D-S	max D-R	O-R	L-S
ATTS1353515	35.00	15.00	135.00	26.00
ATTS1654523	45.00	23.00	165.00	28.00
ATTS1656529	65.00	29.00	165.00	28.00

**S = As Supplied      R = Fully Recovered**



### Printing on the Product

HV triple shed can be printed with a heat resistant white ink. The information printed can include:

1. Manufacturers logo
2. Product code

### Packaging

HV triple sheds are packed individually in a polythene bag, with a specified number of sheds packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name. Please refer to the table below for the approximate packing information:-

Triple HV Shed Part No	Estimated quantity per standard carton 0.77x0.53x0.43m	Estimated gross weight Kgs
ATTS1353515	240	22.80
ATTS1654523	150	21.80
ATTS1656529	105	16.35

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**Specification sheet – HV Single & Triple Sheds**

	<b>Characteristics</b>	<b>Requirements</b>	<b>Frequency</b>	<b>Control Method</b>
	<b>Product Control</b>			
1	Visual	Good & free from defects	100% - daily	Internal
2	Dimensions	As per the engineering drawing.	5 samples daily	Internal
3	Tensile strength	Min 7 MPa (N/mm <sup>2</sup> )	5 samples daily	ASTM D 638
4	Ultimate elongation	Min 300%	5 samples daily	ASTM D 638
5	Hardness	Min 32 shore D	Daily	ASTM D 2240
6	Tensile strength after thermal ageing (135 <sup>0</sup> C, 168 hours)	Min 6 MPa (N/mm <sup>2</sup> )	Qualification	EATS 09-13
7	Ultimate elongation after thermal ageing (135 <sup>0</sup> C, 168 hours)	Min 250%	Qualification	EATS 09-13
8	Heat Shock (250 <sup>0</sup> C for 30 minutes)	No splitting, cracking, dripping or flowing	Qualification	EATS 09-13
9	Water Absorption	Max 1%	Qualification	ISO 62
10	Dielectric strength	Min 12kV/mm	Qualification	IEE 60243
11	Dielectric constant	5 Max	Qualification	ASTM D 150
12	Volume resistivity	Min 10 <sup>14</sup> ohm-cm	Qualification	IEC 60093
13	Resistance to tracking	No failure by tracking after: 1 hour @ 2.5kV 1 hour @ 2.75kV 1 hour @ 3.00kV and 20 minutes @ 3.25kV	Qualification	ASTM D 2303
14	Flame retardance	Non burning	Qualification	ESI 09-13
	<b>Raw Material control</b>			
15	Tensile strength	Min 7MPa (N/mm <sup>2</sup> )	Compounding	ASTM D 638
16	Ultimate elongation	Min 300%	Compounding	ASTM D 638
17	Hardness	Min 32 Shore D	Compounding	ASTM D 2240
		<b>Frequency</b>		<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In house

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## Heat Shrink Thin Wall Tubes



### Product Data Sheet

#### Characteristics

This data sheet covers heat shrinkable thin wall tubes whose dimensions will shrink to a predetermined size upon the application of heat above 100°C. Two categories of heat shrink thin wall tubes are manufactured:-

- Non-flame Retardant Heat Shrink Thin Wall Tubing – Type TWT. The standard colour for TWT (NFR) is black. Other colours such as blue, red, yellow, green, white and grey can be manufactured upon request and subject to a minimum order quantity.
- Commercial Grade Self-extinguishing Thin Wall Tubing – Type TWT-F. The standard colours for TWT (FR) are black, blue, red, yellow, green, white and grey.

The heat shrink thin wall tubes manufactured have the following features:-

- Excellent heat resistance: Made from cross linked polyolefin, non-melting.
- Large application range: Expansion ratio 2:1 and available in a range of colours.
- Easy installation: In the factory or at site using gas torch, hot blower or in hot oven. Shrinks uniformly over uneven surfaces.
- Sizes: Available in a wide range of sizes either metric (1.0 mm to 50.0 mm) or imperial inch size (3/64" to 2")

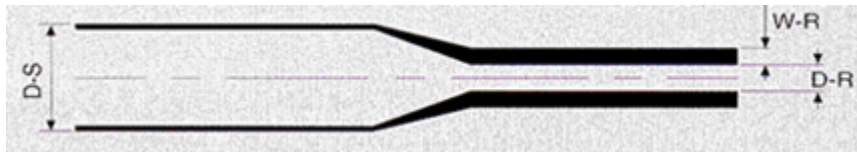
#### Materials

The basic material of the thin wall tubes is a thermally stabilised cross linked polyolefin. The basic resin is mixed with chemical additives offering protection against UV radiation, oxidation, ozone and other environmental effects.

### Typical Applications

Thin wall tubes are flexible commercial grade tubing useful for applications such as bundling, colour coding and harnessing of wires in automotive, electrical and electronics industry. These tubes offer excellent insulation and mechanical protection for wires combined with a wide range of colours making them ideal for various identification applications.

The following application table below gives the thin wall tube dimensions for each model:-



### Selection Tables

Imperial Sizes				
Size (imperial)	Internal Diameter		Wall Thickness	Standard Spool
	Min D - S	Max D - R	W - R	Length (meters)
3/64"	1.2	0.6	0.33	200
1/16"	1.6	0.8	0.36	200
3/32"	2.4	1.2	0.44	200
1/8"	3.2	1.6	0.44	150
3/16"	4.8	2.4	0.44	150
1/4"	6.4	3.2	0.56	150
3/8"	9.5	4.8	0.56	100
1/2"	12.7	6.35	0.56	100
3/4"	19.1	9.5	0.69	100
1"	25.4	12.7	0.76	50
1½"	38.2	19.1	0.96	25
2"	50.8	25.4	0.96	25

**S: As supplied    R: Fully recovered**

Metric Sizes				
Size (mm)	Internal Diameter		Wall Thickness	Standard Spool
	Min D - S	Max D - R	W - R	Length (meters)
1.0/0.5	1.00	0.50	0.33	200
1.5/0.75	1.50	0.75	0.36	200
2.0/1.0	2.00	1.00	0.44	200
2.5/1.25	2.50	1.25	0.44	200
3.0/1.5	3.00	1.50	0.44	150
3.5/1.75	3.50	1.75	0.44	150
4.0/2.0	4.00	2.00	0.44	150
5.0/2.5	5.00	2.50	0.56	150
6.0/3.0	6.00	3.00	0.56	150
7.0/3.5	7.00	3.50	0.56	100
8.0/4.0	8.00	4.00	0.56	100
9.0/4.5	9.00	4.50	0.56	100
10.0/5.0	10.00	5.00	0.56	100
11.0/5.5	11.00	5.50	0.56	100
12.0/6.0	12.00	6.00	0.56	100
13.0/6.5	13.00	6.50	0.69	100
14.0/7.0	14.00	7.00	0.69	100
15.0/7.5	15.00	7.50	0.69	100
16.0/8.0	16.00	8.00	0.69	100
18.0/9.0	18.00	9.00	0.76	100
20.0/10.0	20.00	10.00	0.76	100
22.0/11.0	22.00	11.00	0.76	100
25.0/12.5	25.00	12.50	0.86	50
30.0/15.0	30.00	15.00	0.86	50
40.0/20.0	40.00	20.00	0.96	25
50.0/25.0	50.00	25.00	0.96	25

**S: As supplied    R: Fully recovered**

**Printing on the Product**

Thin wall tubes are printed with a heat resistant white ink.

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### Packaging

Thin wall tubes are wound on standard spools with a specified number of spools packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name. Cartons containing thin wall tubes should not be stored exposed to direct sunlight.

Please refer to the tables below for the approximate packing information:-

Metric Size	Standard reel length metres	Estimated Qty per carton (metres)	Carton Size (metres)	Approximate Gross weight (kgs)	
				TWT (Non FR)	TWT-F (FR)
1.0/0.5	200	1200	0.31x0.31x0.23	2.66	3.09
1.5/0.75	200	1200	0.31x0.31x0.23	2.97	3.52
2.0/1.0	200	600	0.31x0.31x0.23	2.37	2.80
2.5/1.25	200	600	0.31x0.31x0.23	2.59	3.09
3.0/1.5	150	450	0.31x0.31x0.23	2.40	2.83
3.5/1.75	150	300	0.31x0.31x0.23	1.96	2.28
4.0/2.0	150	300	0.31x0.31x0.23	2.07	2.43
5.0/2.5	150	300	0.31x0.31x0.23	2.62	3.18
6.0/3.0	150	300	0.40x0.40x0.23	3.33	3.99
7.0/3.5	100	300	0.40x0.40x0.23	3.74	4.49
8.0/4.0	100	300	0.40x0.40x0.23	4.00	4.85
9.0/4.5	100	300	0.40x0.40x0.23	4.27	5.21
10.0/5.0	100	300	0.40x0.40x0.23	4.54	5.57
11.0/5.5	100	300	0.40x0.40x0.23	4.81	5.94
12.0/6.0	100	300	0.40x0.40x0.23	5.07	6.30
13.0/6.5	100	300	0.40x0.40x0.23	6.25	7.90
14.0/7.0	100	200	0.40x0.40x0.23	4.73	5.90
15.0/7.5	100	200	0.40x0.40x0.23	4.95	6.20
16.0/8.0	100	200	0.40x0.40x0.23	5.17	6.49
18.0/9.0	100	200	0.40x0.40x0.23	6.00	7.61
20.0/10.0	100	200	0.40x0.40x0.23	6.25	7.94
22.0/11.0	100	200	0.40x0.40x0.23	6.97	8.92
25.0/12.5	50	150	0.40x0.40x0.23	6.88	8.75
30.0/15.0	50	100	0.40x0.40x0.23	5.64	7.11
40.0/20.0	25	50	0.40x0.40x0.23	4.46	5.52
50.0/25.0	25	50	0.40x0.40x0.23	5.56	7.00

Imperial Size	Standard reel length metres	Estimated Qty per carton (metres)	Carton Size (metres)	Approximate Gross weight (kgs)	
				TWT (Non FR)	TWT-F (FR)
3/64"	200	1200	0.31x0.31x0.23	2.83	3.33
1/16"	200	1200	0.31x0.31x0.23	3.01	3.58
3/32"	200	600	0.31x0.31x0.23	2.71	3.26
1/8"	150	450	0.31x0.31x0.23	2.49	2.95
3/16"	150	300	0.31x0.31x0.23	2.35	2.79
1/4"	150	300	0.40x0.40x0.23	3.40	4.08
3/8"	100	300	0.40x0.40x0.23	3.83	4.77
1/2"	100	300	0.40x0.40x0.23	5.07	6.30
3/4"	100	200	0.40x0.40x0.23	6.25	7.94
1"	50	150	0.40x0.40x0.23	6.88	8.75
1½"	25	50	0.40x0.40x0.23	4.40	5.46
2"	25	50	0.40x0.40x0.23	5.56	7.00

**Specification sheet – Thin Wall Tube (TWT & TWT-F)**

	<b>Characteristics</b>	<b>Requirements</b>	<b>Frequency</b>	<b>Control Method</b>
	<b>Product Control</b>			
1	Visual	Good & free from defects	100% - daily	Internal
2	Dimensions	As per dimensional table	5 samples daily	Internal
3	Concentricity	Min 70%	3 samples daily	Internal
4	Longitudinal change	±5%	3 samples daily	Internal
5	Tensile strength	Min 10.4 MPa (N/mm <sup>2</sup> )	5 samples - routine	ASTM D 638
6	Ultimate elongation	Min 200%	5 samples - routine	ASTM D 638
7	Heat shock (200° C for 4 hours)	No splitting, cracking, dripping or flowing.	Qualification	ASTM D 2671
8	Dielectric strength	Min 20kV/mm	Qualification	IEC 60243
9	Tensile strength after thermal ageing (158° C, 168 hours)	Min 7.3 MPa (N/mm <sup>2</sup> )	Qualification	ASTM D 2671
10	Ultimate elongation after thermal ageing (158° C, 168 hours)	Min 100%	Qualification	ASTM D 2671
11	Volume resistivity	Min 10 <sup>12</sup> ohm-cm	Qualification	IEC 60093
12	Flammability <b>(for TWT-F only)</b>	Self extinguishing	Qualification	ASTM D 2671
13	Secant modulus	Max 173 MPa	Qualification	ASTM D 2671
14	Water absorption	Max 1%	Qualification	ISO 62
		<b>Frequency</b>		<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In house

Specifications and product dimensions given in this brochure are subject to change without prior notice.

## Heat Shrinkable Medium Wall Low Voltage Tubes (MWT)



### Product Data Sheet

#### Product Details and Application

This data sheet covers heat shrinkable medium wall tubing which has been developed for applications with power cables up to 1kV. MWT has excellent insulating properties combined with toughness, resistance to impact and abrasion providing mechanical protection. It offers good protection from environmental effects, ultra violet radiation and moisture. It is also resistant to oil and solvent attacks.

Medium wall tube (MWT) is easy to install using a gas torch to heat and recover the tubes onto the power cables or accessories. It has a high shrink ratio which allows it to be used across a wide range of cable sizes.

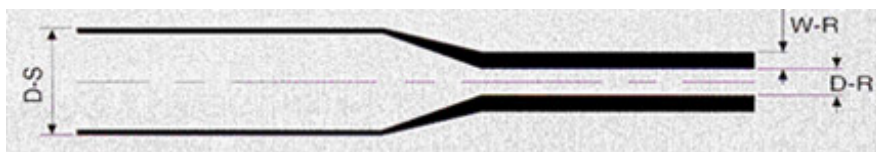
MWT is available in two forms: Uncoated MWTU and coated with hot melt adhesive MWTA. Coated tubes offer complete sealing

#### Features

- Excellent heat resistance: Made from cross linked polyolefin, non-melting.
- Large application range: Expansion ratio 3:1.
- Wide continuous operating temperature range: 55° C to 125° C.
- Shrinking temperature: Minimum 125° C.
- Easy installation: In the factory or on site using a gas torch, hot air blower or in a hot oven.

#### Dimensions

The following application table below indicates the MWT dimensions:-



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MWTU Part No/ Size (mm)	Internal Diameter		Wall Thickness W - R	Standard roll length (m)	
	Min D-S	Max D-R		MWTU (uncoated)	
MWTU01203	12	3	2.0	30	
MWTU02006	20	6	2.3	30	
MWTU03010	30	10	2.7	30	
MWTU04012	40	12	2.8	30	
MWTU05016	50	16	3.0	25	
MWTU06020	60	20	3.0	25	
MWTU07525	75	25	3.2	20	
MWTU08525	85	25	3.2	20	
MWTU10030	100	30	3.2	15	

MWTU Part No/ Size (mm)	Internal Diameter		Wall Thickness W - R	Standard lengths (mm)		
	Min D-S	Max D-R		MWTU (uncoated)		
MWTU11534-****	115	34	3.2	1000	1220	1500
MWTU14042-****	140	42	3.2	1000	1220	1500

Note – MWTU11534 and MWTU14042 are only supplied in cut lengths of 1000mm, 1220mm or 1550mm. To complete the product code please substitute \*\*\*\* with either 1000 or 1220 or 1500.

MWTA Part No/ Size (mm)	Internal Diameter		Wall Thickness W - R	Standard lengths (mm) MWTA (coated)		
	Min D-S	Max D-R				
MWTA01203-****	12	3	2.0	1000	1220	1500
MWTA02006-****	20	6	2.3	1000	1220	1500
MWTA03010-****	30	10	2.7	1000	1220	1500
MWTA04012-****	40	12	2.8	1000	1220	1500
MWTA05016-****	50	16	3.0	1000	1220	1500
MWTA06020-****	60	20	3.0	1000	1220	1500
MWTA07525-****	75	25	3.2	1000	1220	1500
MWTA08525-****	85	25	3.2	1000	1220	1500
MWTA10030-****	100	30	3.2	1000	1220	Not Available
MWTA11534-****	115	34	3.2	1000	1220	Not Available
MWTA14042-****	140	42	3.2	1000	1220	Not Available

Note – MWTA10030, MWTA11534 and MWTA14042 are only supplied in cut lengths of 1000mm or 1220mm. The remaining sizes supplied in cut lengths of 1,000mm, 1220mm and 1500mm. To complete the product code please substitute \*\*\*\* with either 1000 or 1220 or 1500.

**S = As Supplied      R = Fully Recovered**

**Specific lengths available upon request and subject to a minimum quantity**

### Packaging

Medium wall MWT is supplied in standard reel lengths for uncoated and standard lengths for coated with a specified number of each type packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name.

Please refer to the table below for the approximate packing information:-

MWTU Part No (uncoated)	Standard reel length (metres)	Estimated quantity per carton (metres/reels)	Approximate Carton Size (metres)	Approximate Gross Weight (kgs)
MWTU01203	30	360m – 12 reels	0.49x0.49x0.42	14.55
MWTU02006	30	210m – 7 reels	0.49x0.49x0.42	17.20
MWTU03010	30	180m – 6 reels	0.49x0.49x0.42	24.12
MWTU04012	30	150m – 5 reels	0.49x0.49x0.42	22.30
MWTU05016	25	100m – 4 reels	0.49x0.49x0.42	21.11
MWTU06020	25	75m – 3 reels	0.49x0.49x0.42	20.36
MWTU07525	20	60m – 3 reels	0.49x0.49x0.42	20.89
MWTU08525	20	60m – 3 reels	0.49x0.49x0.42	21.04
MWTU10030	15	30m – 2 reels	0.49x0.49x0.42	13.23

MWTU Part No (uncoated)	Standard length (mm)	Estimated quantity per carton (pieces)	Approximate Carton Size (metres)	Approximate Gross Weight (kgs)
MWTU11534-1000	1,000	45	1.10x0.41x0.49	19.34
MWTU14042-1000	1,000	30	1.10x0.41x0.49	20.25
MWTU11534-1220	1,220	45	1.25x0.41x0.49	23.35
MWTU14042-1220	1,220	30	1.25x0.41x0.49	24.40
MWTU11534-1500	1,500	45	1.55x0.41x0.49	28.30
MWTU14042-1500	1,500	30	1.55x0.41x0.49	29.56

MWTA Part No (Adhesive Coated)	Standard length (mm)	Estimated quantity per carton (pieces)	Approximate Carton Size (metres)	Approximate Gross Weight (kgs)
MWTA01203-1500	1,500	500	1.55x0.41x0.49	31.87
MWTA02006-1500	1,500	320	1.55x0.41x0.49	33.10
MWTA03010-1500	1,500	164	1.55x0.41x0.49	36.24
MWTA04012-1500	1,500	108	1.55x0.41x0.49	28.04
MWTA05016-1500	1,500	63	1.55x0.41x0.49	21.77
MWTA06020-1500	1,500	50	1.55x0.41x0.49	24.60
MWTA07525-1500	1,500	35	1.55x0.41x0.49	31.32
MWTA08525-1500	1,500	30	1.55x0.41x0.49	19.34

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MWTA Part No (Adhesive Coated)	Standard length (mm)	Estimated quantity per carton (pieces)	Approximate Carton Size (metres)	Approximate Gross Weight (kgs)
MWTA01203-1220	1,220	500	1.25x0.41x0.49	26.75
MWTA02006-1220	1,220	320	1.25x0.41x0.49	27.04
MWTA03010-1220	1,220	164	1.25x0.41x0.49	29.56
MWTA04012-1220	1,220	108	1.25x0.41x0.49	23.00
MWTA05016-1220	1,220	63	1.25x0.41x0.49	17.98
MWTA06020-1220	1,220	50	1.25x0.41x0.49	20.24
MWTA07525-1220	1,220	35	1.25x0.41x0.49	17.62
MWTA08525-1220	1,220	30	1.25x0.41x0.49	16.03
MWTA10030-1220	1,220	25	1.25x0.41x0.49	18.05
MWTA11534-1220	1,220	25	1.25x0.41x0.49	19.10
MWTA14042-1220	1,220	20	1.25x0.41x0.49	21.20

MWTA Part No (Adhesive Coated)	Standard length (mm)	Estimated quantity per carton (pieces)	Approximate Carton Size (metres)	Approximate Gross Weight (kgs)
MWTA01203-1000	1,000	500	1.10x0.41x0.49	21.70
MWTA02006-1000	1,000	320	1.10x0.41x0.49	22.52
MWTA03010-1000	1,000	164	1.10x0.41x0.49	24.64
MWTA04012-1000	1,000	108	1.10x0.41x0.49	19.16
MWTA05016-1000	1,000	63	1.10x0.41x0.49	14.97
MWTA06020-1000	1,000	50	1.10x0.41x0.49	16.85
MWTA07525-1000	1,000	35	1.10x0.41x0.49	14.67
MWTA08525-1000	1,000	30	1.10x0.41x0.49	13.34
MWTA10030-1000	1,000	25	1.10x0.41x0.49	15.00
MWTA11534-1000	1,000	25	1.10x0.41x0.49	16.00
MWTA14042-1000	1,000	20	1.10x0.41x0.49	17.50

**Specification sheet – Medium Wall Low Voltage Tube (MWTA & MWTU)**

	<b>Characteristics</b>	<b>Requirements</b>	<b>Frequency</b>	<b>Control Method</b>
	<b>Product Control</b>			
1	Visual	Good & free from defects	100% - daily	Internal
2	Dimensions	As per dimensional table	5 samples daily	Internal
3	Concentricity	Min 60%	3 samples daily	Internal
4	Longitudinal change	±10%	3 samples daily	Internal
5	Tensile strength	Min 12 MPa (N/mm <sup>2</sup> )	5 samples - routine	ASTM D 638
6	Ultimate elongation	Min 200%	5 samples - routine	ASTM D 638
7	Heat shock (200° C for 30 minutes)	No splitting, cracking, dripping or flowing.	Qualification	ASTM D 2671
8	Dielectric strength	Min 10kV/mm	Qualification	IEC 60243
9	Tensile strength after thermal ageing (158° C, 168 hours)	Min 10 MPa (N/mm <sup>2</sup> )	Qualification	ASTM D 2671
10	Ultimate elongation after thermal ageing (158° C, 168 hours)	Min 100%	Qualification	ASTM D 2671
11	Volume resistivity	Min 10 <sup>12</sup> ohm-cm	Qualification	IEC 60093
12	Secant modulus	Max 123 MPa	Qualification	ESI 09-11
13	Water absorption	Max 1%	Qualification	ISO 62
	<b>Raw Material Control</b>			
14	Carbon black content	Min 2.5%	Compounding	BS2782 Method - 452B:1978
		<b>Frequency</b>		<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In house

Specifications and product dimensions given in this brochure are subject to change without prior notice.

## Heat Shrinkable Medium Wall Anti-Tracking Tubes (ATT)



### Product Data Sheet

#### Product Details and Application

This data sheet covers heat shrinkable medium wall tubing which is non-tracking and used in indoor and outdoor terminations for medium voltage XLPE and paper insulated power cables. ATT has good resistance to tracking and erosion which provides excellent electrical insulation to the components inside. It offers good protection from environmental effects, ultra-violet radiation and moisture. The tough cross-linked polyolefin material provides good mechanical protection

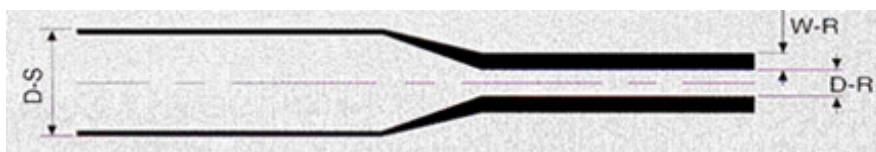
ATT is easy to install using a gas torch to heat and recover the tubes onto power cables or accessories. It has a high shrink ratio which allows it to be used across a wide range of cable sizes.

#### Features

- Excellent heat resistance: Made from cross linked polyolefin, non-melting.
- Large application range: Expansion ratio 3:1.
- Wide continuous operating temperature range: 55° C to 125° C.
- Shrinking temperature: Minimum 125° C.
- Easy installation: On site using a gas torch or hot air blower.

#### Dimensions

The following application table below indicates the medium wall NTT dimensions:-



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ATT Part No	Internal Diameter mm		Wall Thickness mm W – R	Standard Length (meters)
	Min D-S	Max D-R		
ATT02006	20	6	2.5	30
ATT03010	30	10	2.7	30
ATT04012	40	12	2.8	30
ATT05016	50	16	3.0	25
ATT06020	60	20	3.2	25
ATT07525	75	25	3.2	20

**S = As Supplied    R = Fully Recovered**

### Packaging

Medium wall ATT is supplied in standard reel lengths with a specified number of reels packed in a standard corrugated carton. The carton carries a manufacturers label with information of the contents and the customer's name. Please refer to the table below for the approximate packing information:-

ATT Part No	Standard reel length (metres)	Estimated quantity per carton (metres/reels) 0.49x0.49x0.42m	Approximate gross weight (kgs)
ATT02006	30	210m – 7 reels	15.42
ATT03010	30	180m – 6 reels	21.69
ATT04012	30	150m – 5 reels	22.90
ATT05016	25	100m – 4 reels	20.31
ATT06020	25	75m – 3 reels	22.53
ATT07525	20	60m – 3 reels	19.99

**Specification sheet – Medium Wall Anti Tracking Tube (ATT)**

	<b>Characteristics</b>	<b>Requirements</b>	<b>Frequency</b>	<b>Control Method</b>
	<b>Product Control</b>			
1	Visual	Good & free from defects	100% - daily	Internal
2	Dimensions	As per dimensional table	5 samples daily	Internal
3	Concentricity	Min 60%	3 samples daily	Internal
4	Longitudinal Change	±10%	3 samples daily	Internal
5	Tensile strength	Min 8 MPa (N/mm <sup>2</sup> )	5 samples - routine	ASTM D 638
6	Ultimate elongation	Min 200%	5 samples - routine	ASTM D 638
7	Heat shock (250° C for 30 minutes)	No splitting, cracking, dripping or flowing.	Qualification	EATS 09-13
8	Dielectric strength	Min 10kV/mm	Qualification	IEC 60243
9	Resistance to tracking	Class 1A – 3.5kV for 6 hours.	Qualification	IEC 60587
10	Tensile strength after thermal ageing (135° C, 168 hours)	Min 6 MPa (N/mm <sup>2</sup> )	Qualification	EATS 09-13
11	Ultimate elongation after thermal ageing (135° C, 168 hours)	Min 150%	Qualification	EATS 09-13
12	Volume resistivity	Min 10 <sup>14</sup> ohm-cm	Qualification	IEC 60093
13	Secant modulus	Max 170 MPa	Qualification	EATS 09-13
14	Water Absorption	Max 1%	Qualification	ISO 62
		<b>Frequency</b>		<b>Agency</b>
	<b>Daily</b>	Routine tests during production		In house
	<b>Qualification (Whichever is the earlier of a), b) or c)</b>	a) At the time of introduction of a new product		External or In house
		b) After a significant change in formulation		External or In house
		c) Every 3 years		External or In house
	<b>Compounding</b>	Every batch of material		In house

Specifications and product dimensions given in this brochure are subject to change without prior notice.

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