

PVC Insulated Industrial Cables



Catalogue 2009



FR



FR-LSH



ZHLS

The Cable Division (PVC Insulated Industrial Cable)

Set up in the year 1996, Havells Cables plant (an ISO: 9001-2000 certified unit) is located in Alwar, in the state of Rajasthan, India. Since inception, Havells has invested heavily in the manufacturing infrastructure, which has today become one of the largest in India. All type of cables are manufactured on most modern laser controlled automatic machines, using best raw material from primary manufacturers ensuring perfect quality.

Innovation is the hallmark of every vital development at Havells. Keeping this philosophy in mind, the company has invested in R&D to make sure that the clients get the advantage of latest technological developments. Through these innovations, we have been able to develop special insulating compounds & provide our clients the safest cables. For us safety of our clients will always be our prime concerns.



TAC FIA

Cable Plant, Alwar



Single Core PVC Insulated Copper Conductor (Unsheathed) Flexible Industrial Cables, 1100 Voltage Grade

Basic Code			Nominal Cross Sectional area of conductor	Number/ Nom. Dia of cond. strands*	Thickness of Insulation (Nom)	Approx. Overall Diameter	Current Carrying Capacity 2 Cables Single Phase		Max. Conductor Resistance per KM at 20°C
							Conduit/ Trunking	Unenclosed clipped directly to a surface or on cable trays	
FR	FR-LSH	ZHLS	sq. mm.	mm	mm	mm	Amps	Amps	Ohms
WHFFDN...A1X50			0.5	16/0.2	0.6	2.2	4	4	39.00
WHFFDN...A1X75			0.75	24/0.2	0.6	2.5	7	7	26.00
WHFFDN...A11X0	WHFFFN...A11X0**	WHFFZN...A11X0	1.0	14/0.3	0.7	2.8	11	12	18.10
WHFFDN...A11X5	WHFFFN...A11X5**	WHFFZN...A11X5	1.5	22/0.3	0.7	3.1	13	16	12.10
WHFFDN...A12X5	WHFFFN...A12X5**	WHFFZN...A12X5	2.5	36/0.3	0.8	3.8	18	22	7.41
WHFFDN...A14X0	WHFFFN...A14X0	WHFFZN...A14X0	4.0	56/0.3	0.8	4.3	24	29	4.95
WHFFDN...A16X0	WHFFFN...A16X0	WHFFZN...A16X0	6.0	84/0.3	0.8	4.9	31	37	3.30

...Fill the colour code i.e. B = Blue B.

Note: 90 metres length in carton packaging & 270 metres project lengths in polywrap packaging.

FR available in 90 metres packing & 270 metres with type A PVC.

**Conductor Shall be class-II for 1.0, 1.5 & 2.5 Sqmm & for other size shall be of class V as per IS:8130.

*The number and diameter of conductor strands are for reference only. Conductor resistance as per IS:8130 is the governing criteria.

Construction :-

Conductor : Plain annealed copper conductor as per IS:8130

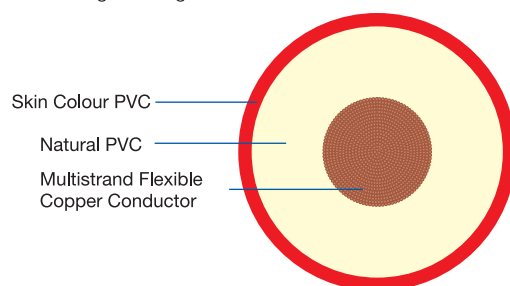
Insulation : **Primary** - Natural PVC with FR property
Secondary - Skin colour coated PVC with FR property

Insulation : Unicolour PVC with FRLSH property

Insulation : Unicolour polymeric compound with ZHLS property

Colour : Red/Yellow/Blue/Black/Green

Any other colour on specific request can also be supplied.



Single Core PVC Insulated Copper Conductor (Unsheathed) Flexible Industrial Cables, 1100 Voltage Grade

Basic Code	Nominal Cross Sectional area of conductor	Number/ Nom. Dia of cond. strands*	Thickness of Insulation (Nom)	Approx. Overall Diameter	Current Carrying Capacity 2 Cables Single Phase		Max. Conductor Resistance per KM at 20°C
					Conduit/ Trunking	Unenclosed clipped directly to a surface or on cable trays	
Life Line	sq. mm.	mm	mm	mm	Amps	Amps	Ohms
WHFFDN...B1010	10	80/0.4	1.0	6.30	50	61	1.91
WHFFDN...B1016	16	126/0.4	1.0	7.40	68	82	1.21
WHFFDN...B1025	25	196/0.4	1.2	9.10	85	103	0.780
WHFFDN...B1035	35	276/0.4	1.2	10.30	108	132	0.554
WHFFDN...B1050	50	396/0.4	1.4	12.20	144	174	0.386

...Fill the colour code i.e. B = Blue B.

Note: Conductor as per class V. 100 metres packing length as per IS:694 & in bigger packing on request.

*The number and diameter of conductor strands are for reference only. Conductor resistance as per IS:8130 is the governing criteria.

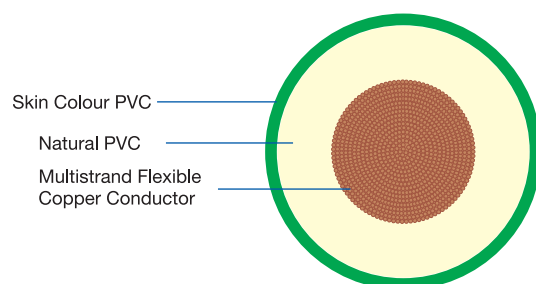
Construction :-

Conductor : Plain annealed copper conductor as per IS:8130

Insulation : **Primary** - Natural Type A PVC.
Secondary - Skin colour coated PVC.
(25 sq. mm & above are provided with unicolour Insulation only)

Colour : Red/Yellow/Blue/Black/Green

Any other colour on specific request can also be supplied. Subject to economical run.



Single Core PVC Insulated Copper Conductor (Unsheathed) Flexible Industrial Cables, 1100 Voltage Grade

Basic Code Life Line	Nominal Cross Sectional area of conductor sq. mm.	Number/ Nom. Dia of cond. strands*	Thickness of Insulation (Nom) mm	Approx. Overall Diameter mm	Current Carrying Max Capacity Amps	Max. Conductor Resistance per K.M. at 20° C Amps
WHFFDN...B1070	70	360/0.5	1.4	14.10	256	0.272
WHFFDN...B1095	95	475/0.5	1.6	16.40	304	0.206
WHFFDN...B1120	120	608/0.5	1.6	18.00	359	0.161
WHFFDN...B1150	150	750/0.5	1.8	20.10	406	0.129
WHFFDN...B1185	185	925/0.5	2.0	22.30	466	0.106
WHFFDN...B1240	240	1221/0.5	2.2	25.20	550	0.0801

...Fill the colour code i.e. B = Blue .B

Note: Conductor as per class V. Supplied in 100 metres length as per IS:694 & in bigger packing on request with 5% length tolerance.

*The number and diameter of conductor strands are for reference only. Conductor resistance as per IS:8130 is the governing criteria.



Single Core PVC Insulated Copper Conductor (Unsheathed) Flexible Industrial Cable, 1100 Voltage Grade

Basic Code	Nominal Cross Sectional area of conductor	Stranding No./Nom Dia of Cond.	Thickness of Insulation (Nom) Stand*	Approx. Overall Diameter	Current Carrying Capacity 2 Cables Single Phase		Max. Conductor Resistance per K.M. at 20° C
					Conduit/ Trunking	Unenclosed clipped directly to a surface or on cable trays	
	sq. mm.	mm	mm	mm	Amps	Amps	Ohms
WHFMDN...A11X0	1.0	7/0.43	0.7	2.8	13	14	18.10
WHFMDN...A11X5	1.5	7/0.53	0.7	3.1	16	19	12.10
WHFMDN...A12X5	2.5	7/0.67	0.8	3.8	22	26	7.41
WHFMDN...A14X0	4.0	7/0.85	0.8	4.30	29	35	4.61
WHFMDN...A16X0	6.0	7/1.04	0.8	4.90	37	49	3.08
WHFMDN...A1010	10	7/1.35	1.0	6.30	50	66	1.83
WHFMDN...A1016	16	7/1.70	1.0	7.40	68	89	1.15
WHFMDN...A1025	25	7/2.14	1.2	9.10	85	116	0.727
WHFMDN...A1035	35	7/2.50	1.2	10.30	109	143	0.524
WHFMDN...A1050	50	19/1.78	1.4	12.20	144	174	0.387

...Fill the colour code i.e. B = Blue .B

Note: 1-6 sq.mm in 90 metres and 10-50 sq.mm. in 100 metres & in bigger packing on request Generally as per IS:694. Manufactured against customer's orders only for economical runs.

*The number and diameter of conductor strands are for reference only. Conductor resistance as per IS:8130 is the governing criteria.

Construction :

Conductor : Plain annealed copper conductor as per IS:8130

Insulation : Primary - Natural PVC Type A PVC

Secondary - Skin colour coated PVC.

(25 sq. mm & above are provided with unicolour Insulation only)

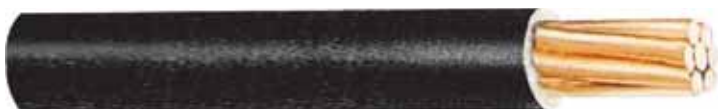
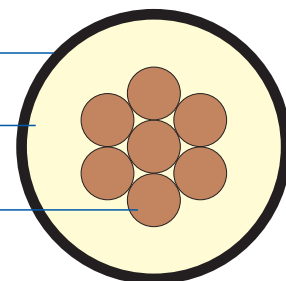
Colour : Red/Yellow/Blue/Black/Green

Any other colour on specific request can also be supplied.

Colour coded
Insulating grade
PVC coating

Natural PVC

Stranded Copper
Conductor



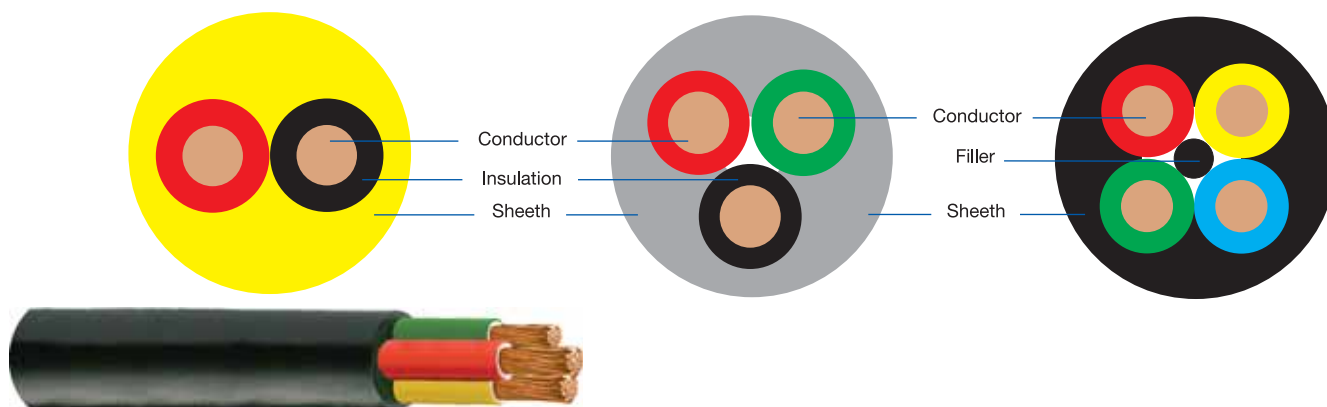
Multicore Round PVC Insulated Copper Conductor and PVC Sheathed Flexible Industrial Cables, 1100 Voltage Grade

Basic Code	Nominal Cross Sectional Area of Conductor	Number Nom. Dia of cond. strands*	Thickness of Insulation (Nom)	Nominal Thickness of Sheath			Appx . Overall Diameter			Current Rating AC	Voltage Drop/ Amp/Meter		Max. Conductor Resistance per KM at 20° C
				Two Core	Three Core	Four Core	Two Core	Three Core	Four Core		DC or Single Phase AC	3 Phase AC	
	sq. mm.	mm	mm	mm	mm	mm	mm	mm	mm	Amps	mV	mV	Ohms
WHMFDSKB_X50	0.5	16/0.20	0.6	0.9	0.9	0.9	6.2	6.6	7.2	5	83	72	39.0
WHMFDSKB_X75	0.75	24/0.20	0.6	0.9	0.9	0.9	6.5	6.9	7.6	8	56	48	26.0
WHMFDSKB_1X0**	1.0	14/0.30	0.6	0.9	0.9	0.9	6.9	7.3	8.2	13	43	37	19.5
WHMFDSKB_1X5**	1.5	22/0.30	0.6	0.9	0.9	1.0	7.6	8.2	9.3	18	31	26	13.3
WHMFDSKB_2X5**	2.5	36/0.30	0.7	1.0	1.0	1.0	9.0	9.6	10.5	24	18	16	7.98
WHMFDSKB_4X0	4.0	56/0.30	0.8	1.0	1.0	1.0	10.3	10.9	12.3	31	11	9.6	4.95

Note: Available in 100 metres length with black outer sheath & in bigger packing on request. Any colour on specific request can be supplied, in economical run.

*The number and diameter of conductor strands are for reference only. Conductor resistance as per IS:8130 is the governing criteria.

** Conductor shall be class-II for 1.0, 1.5 & 2.5 Sq_{mm} & for other size shall be of class V as per IS:8130.



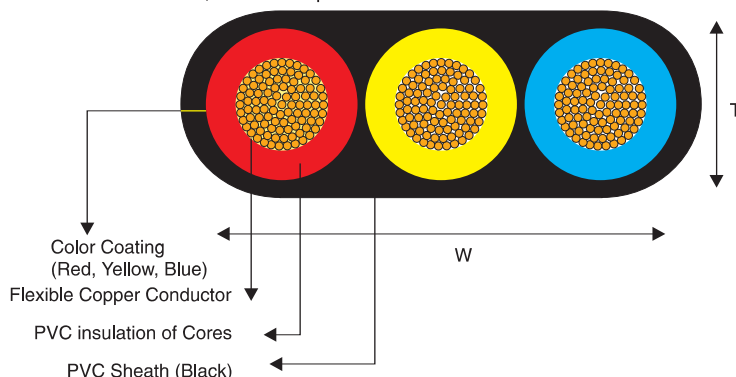
Three Core Flat PVC Insulated Flexible Industrial Cable for Submersible use, 1100 Voltage Grade

Basic Code	Nominal Area of Conductor	INSULATION			SHEATH		Max Conductor Resistance at 20°C (Max.)	Current Carrying Capacity at 40°C
		*Number/ Size of Wire for each Core	Thickness (Nom.)	Core dia. (Nom.)	Overall Dimensions			
	sq. mm	mm	mm	mm	Width W (Nom.) mm	Thickness T (Nom.) mm	Ohm/Km	Amps.
WHPFDSKB31X5**	1.50	22/0.30	0.7	3.0	10.4	4.8	12.1	14
WHPFDSKB32X5**	2.50	36/0.30	0.8	3.6	12.8	5.7	7.41	18
WHPFDSKB34X0	4.00	56/0.30	0.8	4.3	15.0	6.5	4.95	26
WHPFDSKB36X0	6.00	84/0.30	0.8	4.8	16.8	7.2	3.30	31
WHPFDSKB3010	10.00	80/0.40	1.0	6.3	21.0	8.8	1.91	42
WHPFDSKB3016	16.00	126/0.40	1.0	7.4	24.3	10.0	1.21	57
WHPFDSKB3025	25.00	196/0.40	1.2	9.0	30.0	12.0	0.78	72
WHPFDSKB3035	35.00	276/0.40	1.2	10.2	34.0	13.4	0.55	90

Note: Conductor as per class V. Available in 500 ± 5% metres packing on drums. Also available in 100 metres packing on request.

*The number and diameter of conductor strands are for reference only. Conductor resistance as per IS:8130 is the governing criteria.

**Conductor shall be of class-II for 1.0, 1.5 & 2.5 Sq_{mm} & for others size shall be of class V.





Havells FR-LSH Insulated Cables (Flame Retardant - Low Smoke & Halogen) Life Guard

FR-LSH Flexible cables are recommended for use in places with high human concentration like high rise buildings, offices, shopping malls, hospitals etc.

Havells FR-LSH insulated cables are made from specially formulated PVC Polymers that restrict the toxic gases and smoke as they are self extinguishing and do not allow the fire to spread.

Havells ZHLS Insulated Cables (Zero Halogen Low Smoke) Life Shield

This breakthrough comes as a result of the efforts of our R&D Centre at the Alwar plant. Our engineers have developed a special compound which has practically 0% halogen content & has a very high oxygen index.

Your personal Fire Fighter at home.

Superior Protection from Fire - In India we have

been using PVC compound for insulation which is a Flame Retardant material under normal atmospheric conditions. But when a fire occurs the oxygen percentage in its vicinity increases because of formation of air-drafts which makes general purpose PVC cables catch fire. FR & FR-LSH PVC Insulated Flexible Industrial cables have an oxygen index > 29 & offer some protection against propagation of the flame; however Havells ZHLS cables offer much superior protection against fire with



oxygen index > 35 .

An oxygen mask helping people trapped in fire breathe.

Non Toxic - Research shows that maximum number of casualties in Fire happen due to choking caused by generation of Hazardous gases. PVC Flame Retardant Low Smoke and Halogen cables release lesser toxic gases compared to ordinary PVC cables. Smoke generation in case of FR-LSH cables is $< 20\%$.

In this aspect our ZHLS cables are 10 times more superior compared to FR-LSH cables as they contain practically 0% halogens & therefore in case of fire release of Hazardous gases is $< 2\%$. This ensures that people trapped in Fire can breathe easy facilitating better chances of their rescue.

Save the environment

Every day thousands of tonnes of Hazardous Halogen gases are released in the environment resulting in depletion of the earth's ozone layer (which protects us from cancer causing UV radiations of the Sun) a phenomenon popularly known as green house effect. Havells ZHLS PVC insulated industrial cables contain practically 0% halogens and therefore are environment friendly. So when you sell/buy these cables you not only protect your near & dear ones but also your future generations against the Green House Effect.



Some comparative technical features are given in the details below.

S.No.	Feature	Standard Range Flame Retardant FR	Special Range	
			Flame Retardant Low Smoke & Halogen FR-LSH	Low Smoke ZHLS
1	Insulation Material	Spl. PVC	Spl. PVC	Spl. Polymer
2	Insulation Property	Good	Good	Very Good
3	Temperature Rating	70°C	70°C	70°C
4	Thermal Stability	Good	Good	Very Good
5	Flame Retardancy	Very Good	Very Good	Excellent
6	Safety during Burning	Good	Good	Excellent
7	Requirement of critical oxygen index as per ASTMD-2863 to catch fire (%)	> 29	> 29	> 35
8	Temperature Index	$> 250^{\circ}\text{C}$	$> 250^{\circ}\text{C}$	$> 280^{\circ}\text{C}$
9	Light Transmission (Visibility) during Cable as per ASTMD-2843 Burning (%)	NA —	> 40 Good	> 80 Excellent
10	Release of Halogen Gas During Burning (%)	NA —	$< 20\%$ Good	$< 2\%$ Excellent
11	Abrasion Resistance During Installation	Good	Good	Good

CO-AXIAL TV CABLES

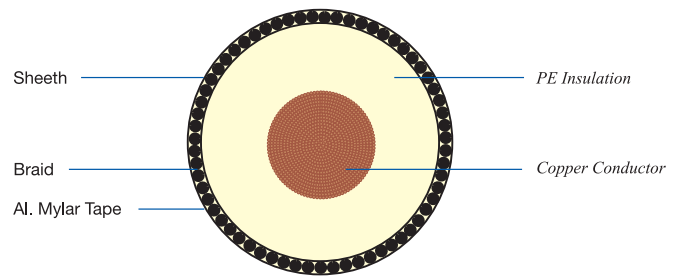
Co-axial TV Cables

Application

Used in cable TV operations, Computer net-working etc.

Construction

Solid annealed bare copper conductor polythelene insulated shielded with polyester backed aluminium tape and additional shielding with fine aluminium braid protected with polyester tape wrapping and sheathed with PVC.



Technical Data

S.No	Type	
1.	Size	RG-59, RG-6, RG-11
2.	Inner Conductor	Solid Copper
3.	Insulation	Gas Injected Physical Foamed Polyethylene
4.	Outer Conductor	Bonded Polyaluminium Tape, Braided with Aluminium Alloy Wire
5.	Outer Jacket	UV Resistant Black PVC Jacket
6.	Making	Progressive Sequential Length Marketing on Every Metre

Electrical Parameters

S.No	Type	RG-11 Foam	RG-6 Foam	RG-59 Foam
1.	Inner Conductor-			
	Max. Resistance (phm/km) @ 20 degree C	0.84	2.13	3.55
2.	Inner Conductor-			
	Loop Resistance (phm/km) @ 20 degree C	1.66	2.78	4.64
3.	Nom. Capacitance (pF/mttr.)	53	53	53
4.	Nom. Impedance (phm)	75	75	75
5.	Nom Velocity Ratio (%)	85	85	85
6.	Nom. Attenuation @ 25 degree (dB/100m)			
	@55 Mhz	2.82	1.95	6.73
	@83 Mhz	3.87	6.20	8.04
	@187 Mhz	5.74	9.15	11.81
	@211 Mhz	6.23	9.50	12.47
	@250 Mhz	6.72	10.50	13.45
	@300 Mhz	7.38	11.50	14.60
	@350 Mhz	7.94	12.45	15.71
	@400 Mhz	8.53	13.30	16.73
	@450 Mhz	9.02	14.35	17.72
	@500 Mhz	9.51	14.95	18.70
	@550 Mhz	9.92	15.70	19.52
7.	Structural Return Loss (db/100m)			
	From 30 to 300 Mhz	>26	>28	>30
	From 300 to 550 Mhz	>24	>22	>24
	Bending Radius, min (mm)	75	65	65

Construction Parameters

S.No	Type Foam	RG-11 Foam	RG-6 Foam	RG-59 Foam
1	Inner Conductor	Solid Bare Copper	Solid Bare Copper	Solid Bare Copper
2	Nom. Diameter (mm)	1.63	1.02	0.80
3	Dielectric	Foam PE	Foam PE	Foam PE
4	Nom. Diameter (mm)	7.11	4.57	3.55
5	Outer Conductor - First	Bonded AL Tape	Bonded AL Tape	Bonded AL Tape
6	Outer Conductor-second	AL Braid	AL Braid	AL Braid
7	Nom. Coverage (%)	60	60	60
8	Jacket	PVC (Black)	PVC (Black)	PVC (Black)
9	Nom. Diameter (mm)	10.00	7.00	6.20

Note: Supplied in 90 metres & 305 metres project packaging.

CO-AXIAL TV CABLES

Telephone Switch Board Cables

Application

Cables used for Indoor Telephones, Telephone Exchanges, Satellite Telecommunication Systems, Industrial Plant Communication Systems, EPBAX Systems, Closed Circuit Security Systems, In-House Telephone wiring and various other equipments involving telephones.

Standard

Cables are generally made as per TEC Specification No. G/WIR-06/02 or as per customer specification.

Construction

Solid annealed tinned/bare copper conductor, PVC insulated cores suitably colour coded for distinct identification, twisted to form pairs, pairs laid up, PVC sheathed. Armoured Cables are provided with Galvanised steel wire/strip armouring and then sheathed again with PVC.

Design / Material Options

Conductor	: Tinned copper/Bare copper
Insulation	: PVC/PVC / Polythelene
Shielding	: Over all shielded / Individual pair shielded and over all shielded with polyester backed aluminium tape or fine copper wire braid (Manufactured against customer's orders only for economical runs.)
Sheathing	: FRPVC/FRLSH/ Polythelene
Conductor size Cable	: 0.4/0.5/0.6/0.7/0.8/0.9 mm
Configuration	: 1p, 2p, 3p, 4p, 5p, 10p, 20p

Note: Supplied in 90 metres length carton except 3 pairs and above polywrap coils.

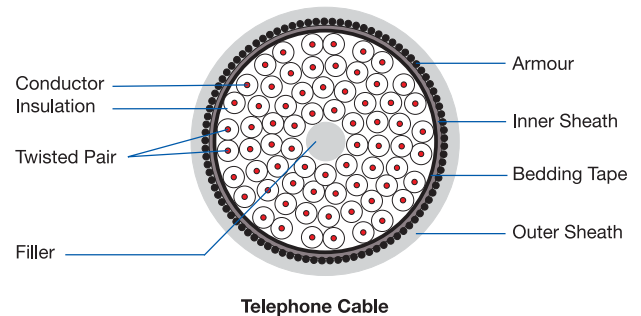
Buyers

BSNL, C.DOT, Switching equipment manufacturers, contractors of BSNL and C.DOT, every industrial and commercial establishment, construction industry and many more beside the general dealer market.

Salient Features for Telephone Cable

- Hard grade PVC insulation is used for long life and stable properties of cables.
- Staggered lays of twisted pairs are used to ensure minimum cross talk.
- Sizing and processing of conductor and insulated cores is done in precisely controlled manner on automatic modern machines to have optimum values of capacitance, capacitance unbalance, image and cross talk attenuation and characteristic impedance.
- Shielding is done to protect from outside / inter pair interference as per specific needs.

TELEPHONE CABLES



Telephone Cable

Havells Wires that don't Catch Fire



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Although every effort has been made to ensure accuracy in the compilation of the technical detail within this publication, specifications and performance data are constantly changing. Current details should, therefore, be checked with Havells Group.

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HAVELLS