



**HAVELLS**

# LT/HT Power & Control Cables



## International Catalogue 2022

- HT Power Cables from 3.6/6 kV upto 220 kV
- 0.6/1 kV Power Cables
- 0.6/1 kV Copper Control Cables

# Certification

 <p>National Accreditation Board for Testing and Calibration Laboratories NABL</p> <p><b>CERTIFICATE OF ACCREDITATION</b></p> <p><b>HAVELLS INDIA LIMITED</b></p> <p>has been assessed and accredited in accordance with the standard <b>ISO/IEC 17025:2017</b></p> <p>"General Requirements for the Competence of Testing &amp; Calibration Laboratories"</p> <p>for the facilities at A-462-A, SP-215, M.L.A., Alore, RAJESTHAN, INDIA in the field of <b>TESTING</b></p> <p>Certificate Number: 02_1001 Issue Date: 24/08/2019 Valid Until: 23/08/2021</p> <p>The validity is extended to one year from 23/08/2021.</p> <p>This certificate remains valid for the scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard &amp; the relevant requirements of NABL. (To get the scope of accreditation of the laboratory, one may visit <a href="http://www.nabl-india.org">www.nabl-india.org</a>)</p> <p>Name of Legal Identity : <b>HAVELLS INDIA LIMITED</b> Signed for and on behalf of NABL.  N. Venkateswaran Chief Executive Officer</p> <p></p>	<p><b>BASEC</b> Sociedad Argentina de Certificación</p> <p><b>Certificate of Conformity</b></p> <p><b>Havells India Limited</b> Alore - 301030 Rajasthan, India</p> <p>Has implemented and maintains a Management System that fully complies with the requirements of <b>BASEC PCR Issue 10 2019</b></p> <p>In respect of the location listed above and for the following scope of activities:</p> <p><b>Scope of Certification:</b></p> <p>The design, manufacture, testing and distribution of cable products to National and International specifications including: LV Power Cables, LV Control Cables, LV Motor Winding Cables, HV Power Cables up to and including 22 KV. The above with: Copper or Aluminum Conductors, PVC or XLPE insulation, Braided Steel or Aluminum Stranding Armored, Copper Mesh/Tape Screened, PVC, Lead Sheath Zinc-Mangan or Polyethylene Sheath.</p> <p>Issue no.: 9 Date of initial certification: 11/08/2019 Issue date: 18/08/2020 Signed by and on behalf of the British Approvals Service for Testing</p> <p> Tony Linton Date: 18/08/2020</p> <p><b>BASEC</b> PCR</p> <p>Expiry date: 16/08/2023</p>	<p><b>DNV</b></p> <p><b>MANAGEMENT SYSTEM CERTIFICATE</b></p> <p>This is to certify that the management system of <b>Havells India Limited</b> CRS Tower, C-22, Sector 10A, Express Highway, Node - 221 304, Uttar Pradesh, India</p> <p>has been found to conform to the Quality Management System standard <b>ISO 9001:2015</b>.</p> <p>This certificate is valid for the following scope: Design, manufacturing, servicing and marketing of LT power cables, HT power cables, control cables &amp; domestic wire cables</p> <p>  </p>
<p><b>DNV-GL</b></p> <p><b>MANAGEMENT SYSTEM CERTIFICATE</b></p> <p>Certificate No: 020124-PHI-A001-000 Initial certification date: 20-Aug-2015 Re-certification date: 20-Aug-2018 Scope of certification: 20-Aug-2018</p> <p>This is to certify that the management system of <b>Havells India Limited</b> Works: A - 462-A, SP-215, 204, 204(A), Alore, - 301 030, Rajasthan, India</p> <p>has been found to conform to the Environmental Management System Standard <b>ISO 14001:2015</b></p> <p>This certificate is valid for the following scope: Design &amp; manufacture of LT power cables, HT power cables upto 60KV, control cables and domestic wire cables</p> <p>  </p>	<p><b>DNV</b></p> <p><b>MANAGEMENT SYSTEM CERTIFICATE</b></p> <p>Certificate No: 020124-PHI-A001-000 Initial certification date: 20-Aug-2015 Re-certification date: 20-Aug-2018 Scope of certification: 20-Aug-2018</p> <p>This is to certify that the management system of <b>Havells India Limited</b> A - 462-A, SP-215, 204, 204 (A), Alore - 301 030, Rajasthan, India</p> <p>has been found to conform to the Energy Management System standard <b>ISO 50001:2018</b></p> <p>This certificate is valid for the following scope: Design &amp; manufacture of LT power cables, HT power cables, EHV cables upto 220 KV, Control cables &amp; Domestic wire cables</p> <p>  </p>	<p><b>DNV-GL</b></p> <p><b>MANAGEMENT SYSTEM CERTIFICATE</b></p> <p>Certificate No: 020124-PHI-A001-000 Initial certification date: 20-Aug-2015 Re-certification date: 20-Aug-2018 Scope of certification: 20-Aug-2018</p> <p>This is to certify that the management system of <b>Havells India Limited</b> A - 462-A, SP - 215, 204 - 204(A), Alore - 301 030, Rajasthan, India</p> <p>has been found to conform to the Occupational Health and Safety Management System standard <b>ISO 45001:2018</b></p> <p>This certificate is valid for the following scope: Design &amp; manufacture of LT power cables, HT power cables upto 60 KV, control cables and domestic wire cables</p> <p>  </p>

Building customer confidence by providing a wide range of quality products and services through team work.



## About HAVELLS

Havells India Ltd is a billion-dollar-plus organization, and is one of the largest & India's fastest growing electrical and power distribution equipment manufacturer with products ranging from Industrial & Domestic Circuit Protection Switchgear, Cables & Wires, Motors, Fans, Power Capacitors, CFL Lamps, Luminaires for Domestic, Commercial & Industrial applications, Modular Switches, Water Heaters and Domestic Appliances covering the entire gamut of household, commercial and industrial electrical needs.

Havells owns some of the prestigious global brands like Crabtree, Sylvania, Concord, Luminance & Standard. With 94 branches / representative offices and over 8000 professionals in over 50 countries across the globe, the group has achieved rapid success in the past few years. Its 15 state-of-the-art manufacturing units in India located at Haridwar, Baddi, Noida, Faridabad, Alwar, Neemrana, and 9 state-of-the-art manufacturing plants located across Europe, Latin America & Africa churn out globally acclaimed products. Havells is a name synonymous with excellence and expertise in the electrical industry. Its 20000 strong global distribution network is prompt to service customers.

The company has acquired a number of International certifications, like CSA, KEMA, CB, CE, ASTA, CPA, SEMKO, SIRIUM (Malaysia), SPRING (Singapore), TSE (Turkey), SNI (Indonesia) and EDD (Bahrain) for various products. Today, Havells and its brands have emerged as the preferred choice of electrical products for discerning individuals and industrial consumers both in India and abroad.

In an attempt to transform itself from an industrial product company to a consumer products company, Havells launched the consumer electrical products such as CFLs, Fans, Modular Switches Luminaires, Water Heaters and Domestic Appliances. The company has been consistent in its brand promotion with sponsorship of Cricket events like T20 World Cup, India- Australia Series and IPL Season first, second, third, fourth & fifth.

The company has also taken the initiative to reach directly to the consumers through "Havells Galaxy" – a one stop shop for all electrical and lighting needs. Havells has more than 100 such Galaxies across the country.

# Index

Types of Cables	Page No.	
International Standards	5	
Type Designation of Cables	5	
Manufacturing Process	6	
Cable Specifications	7	
Manufacturing of Cables	8	
Advantage	9	
NABL Testing Laboratory	9	
Cable range at a glance	10-11	
<b>LT POWER &amp; CONTROL CABLE</b>	<b>12-13</b>	
<b>1. 0.6/1.0 kV XLPE INSULATED CABLES AS PER IEC 60502-I/BS 5467</b>	<b>Table No.</b>	
a) Single core Cu/Al conductor XLPE insulated unarmoured cable 6 sq. mm to 1000 sq. mm	1 & 2	14-15
b) Single core Cu/Al conductor XLPE insulated Al wire armoured cable 6 sq. mm to 1000 sq. mm	3 & 4	16-17
c) Two core Cu/Al conductor XLPE unarmoured cable 4 sq. mm to 400 sq. mm	5 & 6	18-19
d) Two core Cu/Al conductor XLPE steel wire armoured cable 4 sq. mm to 400 sq. mm	7 & 8	20-21
e) Three core Cu/Al conductor XLPE insulated unarmoured cable 4 sq. mm to 400 sq. mm	9 & 10	22-23
f) Three core Cu/Al conductor XLPE insulated steel wire armoured cable 4 sq. mm to 400 sq. mm	11 & 12	24-25
g) Three & half core Cu/Al conductor XLPE insulated unarmoured cable 25 sq. mm to 400 sq. mm	13 & 14	26-27
h) Three & half core Cu/Al conductor XLPE insulated steel wire armoured cable 25 sq. mm to 400 sq. mm	15 & 16	28-29
i) Four core Cu/Al conductor XLPE insulated unarmoured cable 4 sq. mm to 400 sq. mm	17 & 18	30-31
j) Four core Cu/Al conductor XLPE insulated steel wire armoured cable 4 sq. mm to 400 sq. mm	19 & 20	32-33
<b>2. 0.6/1.0 kV XLPE INSULATED CONTROL CABLES AS PER IEC 60502-I/BS 5467</b>		
a) 1.5 sq. mm unarmoured Control Cable from 2 to 61 Core	21 & 22	34-35
b) 1.5 sq. mm armoured Control Cable from 2 to 61 Core	23 & 24	36-37
c) 2.5 sq. mm unarmoured Control Cable from 2 to 61 Core	25 & 26	38-39
d) 2.5 sq. mm armoured Control Cable from 2 to 61 Core	27 & 28	40-41
<b>3. 1.8/3.0 (3.6) kV XLPE INSULATED CABLES AS PER IEC 60502-I/BS 5467</b>		
a) Single core Cu/Al conductor XLPE insulated Al wire armoured cable 25 sq. mm to 630 sq. mm	29 & 30	34-35
b) Three core Cu/Al conductor XLPE insulated steel wire armoured cable 25 sq. mm to 400 sq. mm	31 & 32	36-37
<b>HT POWER CABLE</b>	<b>46-47</b>	
<b>4. 3.6/6.0 (7.2) kV XLPE INSULATED CABLES AS PER IEC 60502-2</b>		
a) Single core Cu/Al conductor XLPE insulated Al wire armoured cable 25 sq. mm to 1000 sq. mm	33 & 34	48-49
b) Three core Cu/Al conductor XLPE insulated steel wire armoured cable 25 sq. mm to 400 sq. mm	35 & 36	50-51
<b>5. 6/10 (12) kV XLPE INSULATED CABLES AS PER IEC 60502-2</b>		
a) Single core Cu/Al conductor XLPE insulated Al wire armoured cable 25 sq. mm to 1000 sq. mm	37 & 38	52-53
b) Three core Cu/Al conductor XLPE insulated steel wire armoured cable 25 sq. mm to 400 sq. mm	39 & 40	54-55
<b>6. 8.7/15 (17.5) kV XLPE INSULATED CABLES AS PER IEC 60502-2</b>		
a) Single core Cu/Al conductor XLPE insulated Al wire armoured cable 25 sq. mm to 1000 sq. mm	41 & 42	56-57
b) Three core Cu/Al conductor XLPE insulated steel wire armoured cable 25 sq. mm to 300 sq. mm	43 & 44	58-59
<b>7. 12/20 (24) kV XLPE INSULATED CABLES AS PER IEC 60502-2</b>		
a) Single core Cu/Al conductor XLPE insulated Al wire armoured cable 25 sq. mm to 1000 sq. mm	46 & 46	60-61
b) Three core Cu/Al conductor XLPE insulated steel wire armoured cable 35 sq. mm to 300 sq. mm	47 & 48	62-63
<b>8. 18/30 (36) kV XLPE INSULATED CABLES AS PER IEC 60502-2</b>		
a) Single core Cu/Al conductor XLPE insulated Al wire armoured cable 50 sq. mm to 1000 sq. mm	49 & 50	64-65
b) Three core Cu/Al conductor XLPE insulated steel wire armoured cable 50 sq. mm to 300 sq. mm	51 & 52	66-67
Basic Assumption for Current Rating		68-69
Short Circuit Current		70-71
List of Major Customer		72-73

# International Standards

## Power Cables

The Cable are produced to conform with the International standard such as:

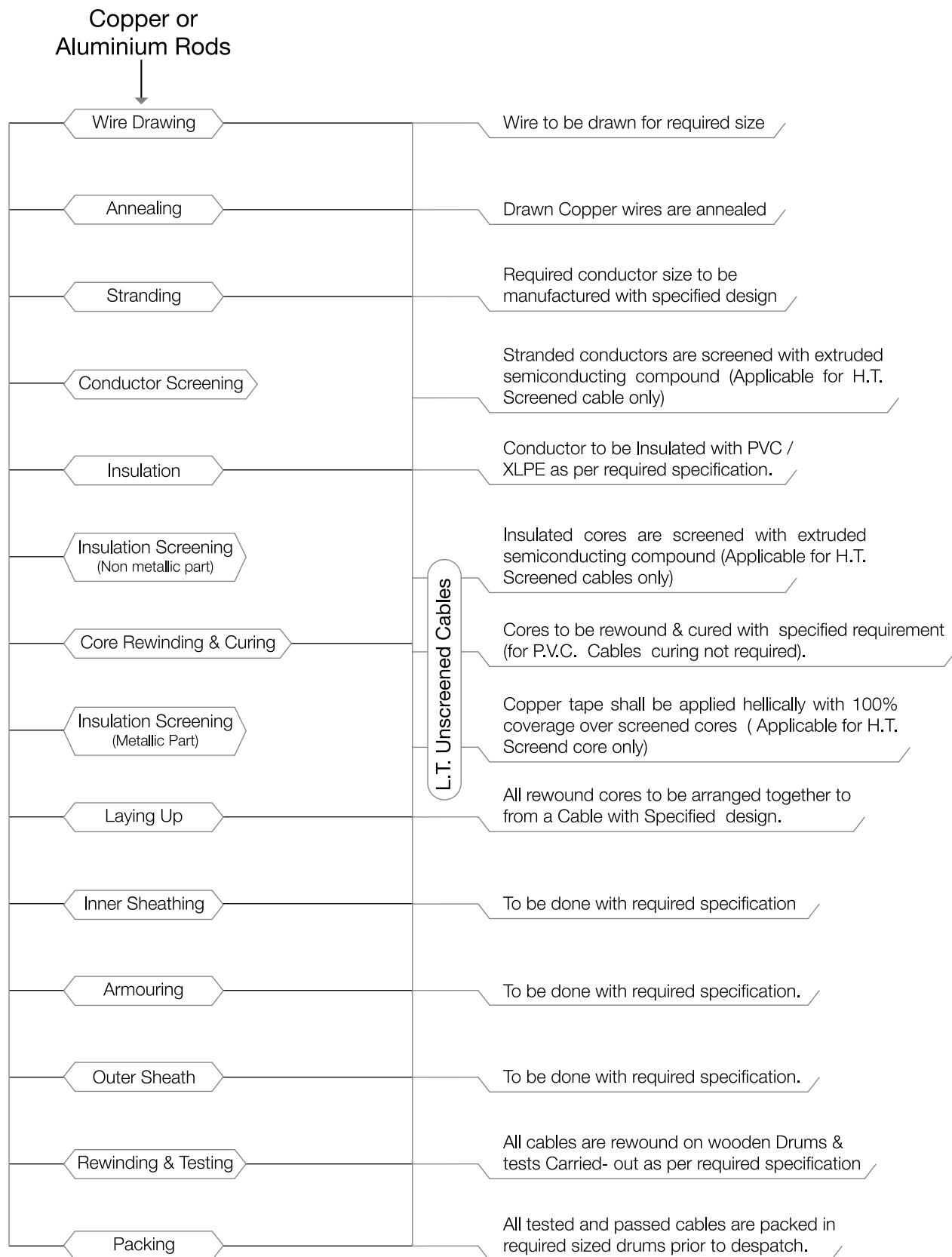
SNI	:	Standards National Indonesia
SPLN	:	Standards Perusahaan Umum Listrik Negara
IEC	:	International Electrotechnical Commission
ICEA	:	Insulated Cable Engineers Association
NEMA	:	National Electrical Manufacturers Association
BS	:	British Standards
JIS	:	Japanese Industrial Standards
VDE	:	Verband Deutscher Elektrotechniker
DIN	:	Deutsche Industrial Norm
By Request	:	We will also produce products according to customer's specification/other specification.

## Type Designation of Cables

N	:	Cable with Copper Conductor
NA	:	Cable with Aluminum Conductor
Y	:	PVC Insulation
2X	:	Cross-linked (XLPE) Insulation
Y	:	PVC Sheath
C	:	Concentric Copper Conductor
B	:	Double Steel Tape Armoured
F	:	Galvanized Strip
Gb	:	Steel Tape Helix (Following F or R)
Re	:	Circular Stranded Conductor
Rm	:	Circular Stranded Conductor
Sm	:	Shaped Stranded Conductor
Cm	:	Compacted Circular Stranded Conductor
H	:	Non-metallic Semi-conducting screen over Conductor & over Insulation
S	:	Metallic Screen of copper wire or tape
SE	:	Non-metallic Semi-conducting screen over Conductor & over Insulation and copper screen around each individual core for three core cable
Ra	:	Round Aluminium wire armour

# Manufacturing Process

H.T. Screened Cables



# Cable Specification

## 1. Scope

Cable covered in this catalogue are manufactured and tested as per IEC 60502-1 & 2 and BS 5467 however, Havells can supply XLPE/PVC insulated cables as per any other International & as per customer specification.

## 2. Construction & Material

### a) Conductor

- Material of conductor shall be aluminium or plain annealed Copper
- Shape of conductor shall be solid/stranded circular compacted & non compacted/stranded shaped compacted as per class -1 & Class-2 of IEC 60228 or BS 6360

### b) Conductor Screening

-All the cable s of rated voltage above 1.8/3.0 kV grade shall be manufactured with conductor screening which shall be consist of extruded layer of semiconducting compound confirming to IEC 60502-2

### c) Insulation

- The insulation shall be cross linked polyethylene (XLPE) confirming with the test requirement if IEC 60502 & IEC 60811

### d) Insulation Screening

All the cables of rated voltage above 1.8/3.0 kV grade shall be manufactured with conductor screening which shall be consist of not metallic part in combination with metallic part.

The nonmetallic part shall consist of extruded layer of semiconducting compound as per IEC 60502-2. The metallic part shall consist of one or more layer of copper tapes & shall be applied helically over non metallic part. In order to meet the requirement of desired short circuit level of screen, concentric layers of copper wire may be applied with combination of copper tape.

The avoid the cavities & voids formation in dielectric particularly on bending operation of cable, perfect bonding of layers of conductor screen, insulation & insulation screen is preferred. To ensure this, Havells applying three layers in one operation through tripple head extrusion.

### e) Core Identification

- The core of cable of rated voltage below 1.8/3.0 kV grade shall be identified with Red, Yellow, Blue & Black coloured core
- The Red, Yellow & Blue Coloured strips applied above nonmetallic part of insulation screening for rated voltage of 3.6/6.0 kV & above.

### f) Inner Covering

- Inner covering shall be applied under armour & shall be consist of extruded/tapped layer of PVC as per IEC-60502

### g) Armour

Armour shall be as per IEC 60502 of following type

- Round steel wire or flat steel strip
- Double layer of metallic tape

Material of armour shall be galvanized steel for Multicore cable & Aluminium for single core cables

### h) Outer Covering

- All cables are normally provided with an extruded layer of PVC of black colour
- Material of outer covering shall be PVC confirming to type-ST-2 of IEC 60502

Other material such as Flame Retardent Low Smoke PVC, anti-rat & anti-termite PVC, Ultraviolet resistant PVC etc. also provided on request.

# Manufacturing of Cables

Cables with Aluminium and Copper conductor and polymer insulation are manufactured at Havells India Ltd. (Cable Works) Alwar. Essentially cables comprise of conductors, insulation, inner-sheath, armour and outersheath. The brief description of the process is mentioned as under:

## CONDUCTOR

Havells Cables are available with both aluminum and copper conductors. It is manufactured with solid/Stranded Circular/ Shaped Aluminium / Copper Conductor. Stranding makes Cables flexible and easy to handle while shaping makes them compact.

Compaction is provided to all stranded conductor constructions as under:

1. Circular Conductor With one wire in the centre conductor contains 6, 12, 18, 24, 30... wire layers in either unilay or opposite helical directions. The conductor is sized upto 92% compaction.
2. Shaped Conductors In all multicore cables from 25 sq. mm size, conductors are "shaped". Compaction degree in multicore power cables is upto 92%.
3. Segmental Conductor As a special case Havells cables of 1600 sq. mm are made up of segmental conductors.

The conductor is manufactured in equal segments and compacted, then laid together. This reduces A.C. losses in the large sized conductor, which are due to skin and proximity effects.

Havells has special construction of conductor to suggest to its customer for meeting their specific need.

Havells copper conductor cables are of the same construction that of cables with Aluminium conductor except for high tensile strength, superior conductivity, better flexibility and ease of jointing, copper cables are used in control, instrumentation, winding, submarine, mining and ship wiring etc. etc applications.

All conductors for Havells cables are manufactured strictly in accordance with National and International specifications.

National specifications IS 8130

International specification IEC 60228 / BS 6360

## DIELECTRIC INSULATION

Insulation for Havells cables is strictly as per National and International specifications.

Havells cables are designed and manufactured with polymer dielectrics to bear thermal and thermomechanical stresses safely at continuous normal and short circuit temperature conditions.

Havells cables are available with both thermoplastic & thermo setting insulations.

- PVC Cables Thermoplastic dielectric

- XLPE Cables Thermo setting dielectric

Havells PVC cables use PVC compounds that take care of over load and short circuit current with both coarse & fine protection systems.

Havells XLPE cables use XLPE compound with anti oxidant stabilizers and traces of aromatic polynuclear hydrocarbon. Thus improving electrical treeing characteristics and mechanical strength of insulation.

Havells cables are friendly during continuous, emergency and short circuit conditions.

Though there is no change in basic design of Havells cables yet the latest manufacturing process gives improved reliability and compactness to cables. The relative thermal expansion during short circuit between dielectric and conductor is therefore limited to minimum both in PVC & XLPE, thus limiting displacement of cores in cables during short circuit.

Insulation for Havells Cables are strictly manufactured and applied over conductor in accordance with National and International specifications:

National Specification IS 5831/IS 7098

International Specifications BS 6746/BS 5467/IEC 60502

## SCREENING

XLPE Cables with rated voltage over 3300 V shall be provided with conductor and insulation screening as follows:

**Conductor** Conductor shall be screened with extruded

### Screen

Semiconducting compound as per IEC 60502 - 2.

### Insulation

Insulation screening shall consist of non-metallic

### Screen

Part in combination with metallic part. Non metallic part shall consist of either semi conducting compound tape applied helically or extruded layer of semi conducting compound, applied directly over insulation. Over this, metallic part (copper tape) shall be applied helically with overlap as per IEC 60502-2.

To avoid the cavities and voids formation in dielectric particularly on bending operation of cable, perfect bonding of insulation and screening is required. To ensure this Havells applying conductor screen, insulation and insulation screen (non-metallic part) in one operation through triple extrusion.

## LAYING UP

Cores are tested on line during production both for physical and electrical characteristics. Control is observed within tight tolerance limits for dimensions in case of PVC/XLPE insulation. For multicore cables cores are laid up on our latest laying up machine equipped with sector correction equipment. In case of XLPE insulated cores the same are cured so as to impart the requisite characteristics both electrical and mechanical and then are laid up.

## INNERSHEATH

Laid up cables are provided with inner sheath with high quality of PVC which acts as bedding for steel wire / strip armouring. Wherever required, filler cords are provided to maintain the circularity to laid up cables.

In Havells Cable-polymers used for inner sheath are softer than insulation or outer sheath & are compatible with temperature ratings of cables & do not have deleterious effect on any other component of cable.

Inner sheath is applied either with extrusion or by wrapping. In Havells Cables though the inner sheath is closely applied on the laid up cores, same can be stripped with ease without damaging insulation.

The inner sheath dimensions are maintained strictly in accordance with laid down specification .

Specification For PVC/XLPE Cables - IEC 60502-P-1 & 2

## ARMOURING

Mechanical protection to the cable is provided with armouring. Havells single core cables are armoured with Aluminium or Aluminium alloy wire/ strips, thus avoiding magnetic hysteresis losses on A.C. System.

Multicore cables are provided with galvanised steel wire/strips.

Havells cables are provided with galvanised wire armouring, where cables are to run vertically and are subjected to stresses.

Havells Mining cables are armoured with steel wire and tinned copper wires, so as to provide conductivity of armour more than 75% of main conductor of cable.

Havells cables armour wires/strips are of low resistivity material and meet the requirements of IEC 60502-1.

Havells armoured cables are with almost 95% armour coverage.

## OUTER SHEATH

All Havells Cables are provided with PVC/polymer outer sheath.

Havells Cables are manufactured with various characteristics of sheathing compounds.

General purpose sheathing Compound ST1

Heat resistant Compound for sheath (H.R.) ST2

Fire Retardant Low IEC 754 Part I

Smoke Compound IEC 60332 Part I& III

(FRLS) IEEE 383

ASTM-2843

ASTM-2863

Flame Retardant Compound (FR) to EIL Specn.

Ultra Violet Radiations Resistance Compound to ASTM G-53.

Anti Rodent and Anti Termite Compound.

PVC compounds used for Havells Cables are of various grades to meet

# Advantage

specifications BS - 6746/ IEC - 60502 - 1.

In order to be identified, Havells Cables have their name embossed/printed/ indented on outer sheath at regular intervals on the outer sheath of Havells Cables, Voltage Grade, cable size, trade name & year of manufacture are embossed, as desired.

Cables are sequentially marked for length at every metre throughout its length.

## FINAL TESTING

Each Havells Cable is tested for all applicable Routine Tests.

From a lot of Cable one cable of each type is tested for Type tests, as per relevant specifications.

Havells conduct its testing at Havell's India Ltd. cable plant at Alwar for acceptance test as per specification.

Testing of Havells Cables are carried out as per Havells Work Standards for testing, besides applicable standards.

## ADVANTAGES OF PVC CABLES

1. A non-hygroscopic insulation almost unaffected by moisture.
2. Non-migration of compound permitting vertical installation.
3. Complete protection against most forms of electrolytic and chemical corrosion.
4. A tough and resilient sheath with excellent fire - resisting qualities.
5. Good ageing characteristics.

# NABL Testing Laboratory

Havells India Ltd has emphasised on product quality by demonstrating quality evaluation for wires & cables at international level by obtaining NABL National accreditation board for calibration & testing laboratories for testing & DSIR recognised technology center at cable division. NABL is an autonomous body which is working under the Department of Science & Research Industry (Govt. of India).

National accreditation board for testing and calibration to boast of, it is the first-of-its-kind private facility in India. The lab fully equipped as per international standard to test XLPE cables upto 66 kV grade, PVC cables, Flexible cables, aerial bunched cables, photovoltaic cables, instrumentation cables, fire survival cables.

The lab covers Indian standards, British standard, International Electrotechnical Commission (IEC) standards, TUV-Germany standards, American Society for Testing and Material (ASTM) standards and Institute of Electrical & Electronics Engineers (IEEE) standards along with eight types of different fire test to demonstrate fire-retardant behavior in cable.

## ADVANTAGES OF XLPE CABLES

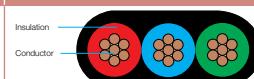
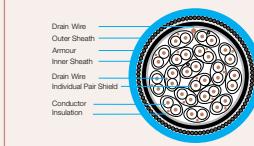
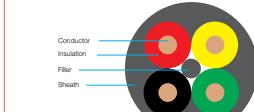
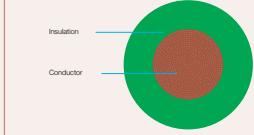
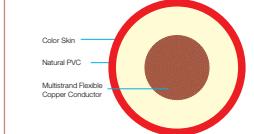
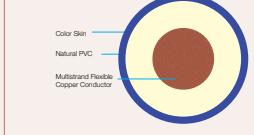
1. Higher Current Rating.
2. Higher Short Circuit Rating.
3. Longer Service Life.
4. For a short time it can withstand maximum 130°C and is favourable to endure short circuit stresses.
5. It is less sensitive to the setting of the network protection.
6. Because of the thermosetting process taking place due to the effect of cross linking, the crack resistance is increased.
7. Due to the chemical cross-linking internal stresses are reduced. Consequently the material is less sensitive during manufacturing process to the setting of the cooling gradient.
8. The thermal resistivity of cross-linked material is favourably low, compared to thermoplastic material.
9. The low dielectric loss is a significant advantage.
10. The excellent mechanical features of the insulation improves the protection against external effects.
11. The resistance of the XLPE to acids, alkalies is outstanding and is often compensating the adverse environmental influences.



# Cable range at a glance

Application	Type & Size	Options	Cross Sectional View
Cables for Power Supply to Residential, Commercial & Industrial units	PVC/XLPE Power cables for 0.6/1 upto 1.8/3 KV for Electrical Substations as per IEC:60502-1 Sizes: Single Core 10-1000 sq. mm Multicore 6-630 sq. mm	Conductor - Stranded / Solid, Circular / Shaped Aluminium / Copper Insulation - PVC / HR PVC / XLPE Inner Sheath - PVC / HR PVC / FRLS / PVC Unarmoured / Armoured - G.S. Round Wire/ Flat Strip or Aluminum Wire / Flat Strip Outer Sheath - PVC/ HR PVC/ FRLS PVC	
Cables for Power Supply to Residential, Commercial & Industrial units	PVC/XLPE Power cables for 0.6/1 upto 1.8/3 KV for Electrical Substations as per IEC:60502-1 Sizes: Single Core 10-1000 sq. mm Multicore 6-630 sq. mm	Conductor - Stranded / Solid, Circular / Shaped Aluminium / Copper Insulation - PVC / HR PVC / XLPE Inner Sheath - PVC / HR PVC / FRLS / PVC Unarmoured / Armoured - G.S. Round Wire/ Flat Strip or Aluminum Wire / Flat Strip Outer Sheath - <b>LSZH Compound</b> <span style="color:red;">new</span>	
Heavy Duty XLPE Power cables for Power Generation Distribution	XLPE Power cables for 6/10(12) upto 18/30 (36) KV for Electrical Substations as per IEC:60502-2 Sizes: Single Core 25-1000 sq. mm Multicore 25-400 sq. mm	Conductor - Circular - Aluminum/Copper Insulation - XLPE Innersheath - PVC / HR PVC / FRLS Unarmoured / Armoured - G.S Round Wire / Flat Strip or Aluminum Wire / Flat Strip Outersheath - PVC / HR PVC / FRLS	
Heavy Duty XLPE Power cables for Power Generation Distribution	XLPE Power cables for 6/10(12) upto 18/30 (36) KV for Electrical Substations as per IEC:60502-2 Sizes: Single Core 25-1000 sq. mm Multicore 25-400 sq. mm	Conductor - Circular - Aluminum/Copper Insulation - XLPE Innersheath - PVC / HR PVC / FRLS Unarmoured / Armoured - G.S Round Wire / Flat Strip or Aluminum Wire / Flat Strip Outer Sheath - <b>LSZH Compound</b> <span style="color:red;">new</span>	
Arial Bunched / Bundled required for over head power distribution	PE/XLPE insulated 0.6/1 KV to 18/30 KV as per IEC:60502 Part 1 & 2	Conductor - Stranded Circular compacted Aluminium Insulation - PE/XLPE Messenger conductor - All Aluminium Alloy-Bare/ Insulated Street Light Cond. - Stranded Circular Compacted Aluminium, Bare/Insulated	
Fire Survival Cables for fire hazardous/ prone areas <span style="color:red;">new</span>	Annealed electrolytic copper conductor, heat barrier, XLPE, LSZH inner sheath G.S. wire and LSZH outer sheath as per BS 7846 testing as per IEC 331 & BS 6387	Conductor - Solid/Stranded, Plain /Tinned Heat Barrier - Mica Tape Insulation - XLPE Innersheath - LSZH Compound Armoured - G.S. Round Wire/ Flat Strip Outersheath - LSZH Compound	
Solar cable for Solar plant <span style="color:red;">new</span>	Trinned cooper XLPO insulated & LSZH sheathed 1000V AC/ 1800V DC as per TUV specifications 2PFG - 1169/08-2007	Conductor - Flexible trinned copper Insulation - Cross linked polyolefin compound Sheath - XLPO/ LSZH Compound	
Copper Control Cables for Power Switch yard Control / Relay Equipment	Annealed electrolytic copper conductor, PVC/XLPE insulated, PVC sheathed 0.6/1 KV grade as per IEC: 60502-1 Sizes : 1.5 / 2.5 sq. mm upto 61 core 4 & 6 sq. mm upto 4 core	Conductor - Solid/Stranded, Plain /Tinned Insulation - PVC/HR PVC/XLPE Innersheath - PVC/HR PVC/FRLS/Zero Halogen Unarmoured / Armoured - G.S. Round Wire / Flat Strip Outersheath - PVC/HR PVC/FRLS/Zero Halogen Additional Option : Overall shielding with Aluminum mylar tape with 100% coverage & 25% overlap on laid up cores for static noise rejection.	
Copper Round Submersible Cable	Annealed electrolytic copper conductor, PVC insulated, PVC inner sheathed & Outer sheathed 1.1KV grade as per IS: 1554/IS-694 (In general) Sizes : 1.5 to 120 sq. mm	Conductor - Flexible Plain Copper Insulation - PVC Innersheath - PVC Outersheath - PVC	

# Cable range at a glance

Application	Type & Size	Options	Cross Sectional View
Flat cables for Submersible Pumps & Motors	Stranded Plain copper, PVC insulated & PVC sheathed of 1.1kV grade as per IS: 694 Sizes : 3 core - 1.5 to 50 sq. mm	Insulation - PVC Sheathing - PVC	
Instrumentation Signal Cables for Process control & Instrumentation	PVC Sheathed 225/500 V grade cables as per BS: 5308 / DIN VDE 0815 & 816 / IS: 1554 / IEC: 189 Sizes: 0.5/0.75/1.0/1.5 sq. mm	Conductor - Stranded / Solid, plain / tinned Insulation - PVC / HR PVC / PE / Zero Halogen Shielding - Individual Pair / over all pairs Drain wire - Solid Stranded Innersheath - PVC / HR PVC Zero Halogen Unarmoured/Armoured-G.S. Round Wire, Flat Strip Outersheath - PVC / HR PVC / FRLS / Zero Halogen Compound	
Flexible & Cord Cables for appliances, Machine Tools & Equipment Wiring	Multistrand, flexible, bright annealed electrolytic copper conductor, PVC insulated and sheathed upto 300/500 V as per BS:6004 Sizes : Single, Two, Three or Four core upto 25 sq. mm	Insulation - PVC Unsheathed /Sheathed - PVC / FRLS	
Wiring Cables for electrical industry	Multistrand Flexible, upto 450/750V grade PVC Cables as per BS: 6004/IEC:60227 Sizes : Single core 1.0 - 630 sq. mm	Conductor - Bright Annealed Copper Insulation - PVC/ FRLS PVC / Zero Halogen	
Energy Cables for Power Supply to Telephone Exchanges / UPS / Battery Backup / Equipments	PVC Flexible Cables upto 450/750 V grade as per BS: 6004/IEC:60227 Sizes : 1.0 upto 240 sq. mm Single Core	Conductor - Stranded / annealed Copper Insulation FR - Flame retardant PVC Insulated industrial cables with S3 features  FR-LSH PVC Insulated industrial cables	   
Energy Cables for Power Supply to Telephone Exchanges / UPS / Battery Backup / Equipments	Flexible Cables upto 450/750 V grade as per BS: 6004/IEC:60227 Sizes : 1.0 upto 240 sq. mm Single Core	Conductor - Stranded / annealed Copper Insulation-HFFR Insulated industrial cables  	
Heat Resistant Panel Wire	Flexible Cables upto 450/750 V grade as per BS: 6231/IEC:60227 Sizes : 1.0 upto 240 sq. mm Single Core	Insulation - HR PVC - 105° C Insulated	
Fire Survival/Fire Resistant Wire <b>new</b>	Flexible Cables upto 450/750V generally to BS 7211 Sizes : 1.0 upto 240 sq. mm Single Core	Conductor - Stranded Flexible Copper Insulation - Glass mica tape & HFFR (Halogen free flame Retardant ) Compound	



Inside View - Cable Factory





# LT POWER & CONTROL CABLE



LT POWER & CONTROL CABLE

**XLPE INSULATED CABLE**

- Higher current rating and emergency overload rating
- Superior short circuit rating
- Low dielectric loss
- Much better insulation resistance
- Resistant to chemical & corrosive gases etc.
- Better resistance to surge currents
- Much longer life of the cables

**INSULATED MATERIAL**

- XLPE
- PVC

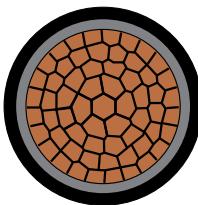
**PVC INSULATED CABLE**

- High dielectric strength & resistance to D.C. voltage effects
- High mechanical strength & resistance to abrasion, vibration & ageing
- Resistant to most acids, alkalies, to temporary contact with solvents, oils and liquid fluids
- Flame retardant, does not support combustion and self extinguishing

**APPLICABLE STANDARD**

- IEC 60502 Part-1/BS 5467
- BS 6746





### XLPE Insulated Unarmoured Single Core Cable

(Copper/AI. Conductor, XLPE Insulated and PVC Sheathed)

Type of Cable	:	N2XY/NA2XY
Rated Voltage	:	0.6/1 kV
Size Range	:	6 to 1000 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Natural
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Sheath	:	Extruded PVC

**TABLE - 1**

Technical Detail for Havells 0.6/1 KV Single Core, Copper/Alum Cond., XLPE Insulated, Unarmoured Cable as per IEC-60502-1

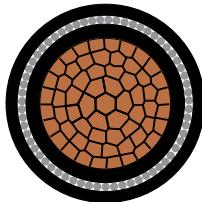
Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts.	Packing Dimensions Diameter X Width cm x cm
				Copper	Aluminium		
6	0.70	1.40	8	100	60	1000	67x60
10	0.70	1.40	9	150	80	1000	72x60
16	0.70	1.40	9	200	100	1000	76x60
25	0.90	1.40	11	300	145	1000	72x60
35	0.90	1.40	12	400	180	1000	85x64
50	1.00	1.40	13	500	230	1000	85x64
70	1.10	1.40	15	700	310	1000	100x80
95	1.10	1.50	17	1000	410	1000	105x80
120	1.20	1.50	19	1200	500	1000	115x80
150	1.40	1.60	21	1450	570	1000	116x92
185	1.60	1.60	23	1800	740	1000	120x92
240	1.70	1.70	26	2400	900	500	105x80
300	1.80	1.80	29	2950	1100	500	116x80
400	2.00	1.90	32	3700	1350	500	137x80
500	2.20	2.00	36	4750	1700	500	146x95
630	2.40	2.20	41	6100	2300	500	162x95
800	2.60	2.30	45	7700	2800	250	170x80
1000	2.80	2.40	49	9600	3500	250	192x120

**TABLE - 2**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Min. Insulation Resistance Constant in Mohm-KM (Min)		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)				
								With Copper Cond.		With Al. Cond.		
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C	
6	4.610	3.080	367	3.67	3.5	0.56	0.86	56	58	43	42	
10	3.080	1.830	367	3.67	3.5	0.94	1.43	78	77	58	55	
16	1.910	1.150	367	3.67	3.5	1.50	2.29	105	100	80	76	
25	1.200	0.727	367	3.67	3.5	2.35	3.58	135	129	103	98	
35	0.868	0.524	367	3.67	3.5	3.29	5.01	169	155	129	117	
50	0.641	0.387	367	3.67	3.5	4.70	7.15	207	183	159	139	
70	0.443	0.268	367	3.67	3.5	6.58	10.01	268	225	206	170	
95	0.320	0.193	367	3.67	3.5	8.93	13.59	328	270	253	204	
120	0.253	0.153	367	3.67	3.5	11.28	17.16	383	306	296	233	
150	0.206	0.124	367	3.67	3.5	14.10	21.45	444	343	343	261	
185	0.164	0.0991	367	3.67	3.5	17.39	26.46	510	387	395	296	
240	0.125	0.0754	367	3.67	3.5	22.56	34.32	607	448	471	343	
300	0.100	0.0601	367	3.67	3.5	28.20	42.90	703	502	547	386	
400	0.0778	0.0470	367	3.67	3.5	37.60	57.20	823	555	663	442	
500	0.0605	0.0366	367	3.67	3.5	47.00	71.50	946	620	770	502	
630	0.0469	0.0283	367	3.67	3.5	59.22	90.09	1088	688	899	566	
800	0.0367	0.0221	367	3.67	3.5	75.20	114.40	1185	748	998	631	
1000	0.0291	0.0176	367	3.67	3.5	94.00	143.00	1307	798	1124	693	

\*Above current ratings are in standard condition for different site conditions tabulated current ratings shall be multiplied by rating factor as given in page 59



### XLPE Insulated Armoured Single Core Cable

(Copper/AI. Conductor, XLPE Insulated, Round AI. Wire

Armoured and PVC Sheathed)

Type of Cable	:	N2XRaY/NA2XRaY
Rated Voltage	:	0.6/1 kV
Size Range	:	6 to 1000 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	Indoor and outdoor installation direct Bureal preferably use where considerable me chanical stress must be envisaged.
Identification of Core	:	Natural
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Armouring	:	Round Aluminium Wire
Outer Sheath	:	Extruded PVC

**TABLE - 3**

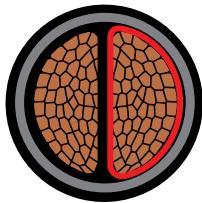
Technical Detail for Havells 0.6/1 kV Single Core, Copper/Alum Cond., XLPE Insulated, Al Armoured Cable as per IEC -60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Aprox. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Normal Outer Sheath Thickness (mm)	Aprox. Overall Dimeter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
6	0.70	1.00	0.90	1.80	13	260	220	1000	94x70
10	0.70	1.00	0.90	1.80	14	300	240	1000	94x70
16	0.70	1.00	0.90	1.80	15	350	260	1000	100x70
25	0.90	1.00	0.90	1.80	16	470	330	1000	107x80
35	0.90	1.00	0.90	1.80	17	580	370	1000	107x80
50	1.00	1.00	1.25	1.80	19	750	470	1000	116x80
70	1.10	1.00	1.25	1.80	21	970	560	1000	116x92
95	1.10	1.00	1.25	1.80	23	1250	680	500	107x80
120	1.20	1.00	1.60	1.80	25	1550	850	500	110x80
150	1.40	1.00	1.60	1.80	27	1850	970	500	116x80
185	1.60	1.00	1.60	1.80	29	2200	1150	500	125x80
240	1.70	1.00	1.60	1.90	31	2800	1400	500	137x80
300	1.80	1.00	1.60	1.90	35	3400	1600	500	146x95
400	2.00	1.20	2.00	2.10	39	4400	2100	500	156x95
500	2.20	1.20	2.00	2.20	43	5500	2500	500	162x95
630	2.40	1.20	2.00	2.30	48	6900	3100	500	177x107
800	2.60	1.40	2.50	2.50	53	8850	3900	500	192x120
1000	2.80	1.40	2.50	2.70	57	10600	4700	500	207x120

**TABLE - 4**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM (Min)		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.	Current Rating (Amps.)			
	Al.	Copper	At 20°C	At 90°C			Al.	Copper	Air 30°C	Ground 20°C
6	4.610	3.080	367	3.67	3.5	0.56	0.86	56	58	43
10	3.080	1.830	367	3.67	3.5	0.94	1.43	78	77	58
16	1.910	1.150	367	3.67	3.5	1.50	2.29	105	100	80
25	1.200	0.727	367	3.67	3.5	2.35	3.58	135	129	103
35	0.868	0.524	367	3.67	3.5	3.29	5.01	169	155	129
50	0.641	0.387	367	3.67	3.5	4.70	7.15	207	183	159
70	0.443	0.268	367	3.67	3.5	6.58	10.01	268	225	206
95	0.320	0.193	367	3.67	3.5	8.93	13.59	328	270	253
120	0.253	0.153	367	3.67	3.5	11.28	17.16	383	306	296
150	0.206	0.124	367	3.67	3.5	14.10	21.45	444	343	343
185	0.164	0.0991	367	3.67	3.5	17.39	26.46	510	387	395
240	0.125	0.0754	367	3.67	3.5	22.56	34.32	607	448	471
300	0.100	0.0601	367	3.67	3.5	28.20	42.90	703	502	547
400	0.0778	0.0470	367	3.67	3.5	37.60	57.20	823	555	663
500	0.0605	0.0366	367	3.67	3.5	47.00	71.50	946	620	770
630	0.0469	0.0283	367	3.67	3.5	59.22	90.09	1088	688	899
800	0.0367	0.0221	367	3.67	3.5	75.20	114.40	1185	748	998
1000	0.0291	0.0176	367	3.67	3.5	94.00	143.00	1307	798	1124



### XLPE Insulated Unarmoured Two Core Cable

(Copper/AI. Conductor, XLPE Insulated and PVC Sheathed)

Type of Cable	:	N2XY/NA2XY
Rated Voltage	:	0.6/1 kV
Size Range	:	4 to 400 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Red & Black
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Outer Sheath	:	Extruded PVC

**TABLE - 5**

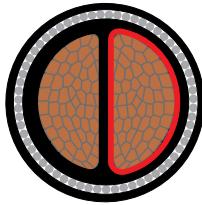
Technical Detail for Havells 0.6/1 kV Two Core, Copper/Alum Cond., XLPE Insulated, Unarmoured Cable as per IEC -60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Nominal Outer Sheath Thickness (mm)	Aprox. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
				Copper	Aluminum		
4	0.70	1.80	14	260	220	1000	64x70
6	0.70	1.80	15	320	260	1000	100x80
10	0.70	1.80	17	470	350	1000	107x80
16	0.70	1.80	17	520	330	1000	107x80
25	0.90	1.80	19	730	440	1000	116x80
35	0.90	1.80	21	930	520	1000	116x92
50	1.00	1.80	23	1200	600	500	107x80
70	1.10	1.80	25	1500	700	500	116x80
95	1.10	2.00	29	2100	1000	500	137x80
120	1.20	2.10	31	2700	1250	500	140x80
150	1.40	2.20	34	3200	1500	500	146x95
185	1.60	2.30	38	4000	1900	500	162x95
240	1.70	2.50	42	5200	2350	500	165x100
300	1.80	2.70	45	6500	2900	500	171x171
400	2.00	2.90	51	8100	3550	250	162x100

**TABLE - 6**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM (Min)		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)				
								With Copper Cond.		With Al. Cond.		
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C	
4	7.410	4.610	367	3.67	3.5	0.376	0.572	49	46	38	33	
6	4.610	3.080	367	3.67	3.5	0.564	0.858	63	58	49	42	
10	3.080	1.830	367	3.67	3.5	0.94	1.43	86	77	67	55	
16	1.910	1.150	367	3.67	3.5	1.50	2.29	115	100	91	76	
25	1.200	0.727	367	3.67	3.5	2.35	3.58	149	129	108	98	
35	0.868	0.524	367	3.67	3.5	3.29	5.01	185	155	135	117	
50	0.641	0.387	367	3.67	3.5	4.70	7.15	225	183	164	139	
70	0.443	0.268	367	3.67	3.5	6.58	10.01	289	225	211	170	
95	0.320	0.193	367	3.67	3.5	8.93	13.59	352	270	257	204	
120	0.253	0.153	367	3.67	3.5	11.28	17.16	410	306	300	233	
150	0.206	0.124	367	3.67	3.5	14.10	21.45	473	343	346	261	
185	0.164	0.0991	367	3.67	3.5	17.39	26.46	542	387	397	296	
240	0.125	0.0754	367	3.67	3.5	22.56	34.32	641	448	470	343	
300	0.100	0.0601	367	3.67	3.5	28.20	42.90	741	502	543	386	
400	0.0778	0.0470	367	3.67	3.5	37.60	57.20	807	514	652	416	



### XLPE Insulated Armoured Two Core Cable

(Copper/AI. Conductor, XLPE Insulated, Round AI. Wire Armoured and PVC Sheathed)

Type of Cable	:	N2XRY/NA2XRY
Rated Voltage	:	0.6/1 kV
Size Range	:	6 to 400 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Red & Black
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Armouring	:	Galvanized Round Steel Wire
Outer Sheath	:	Extruded PVC

**TABLE - 7**

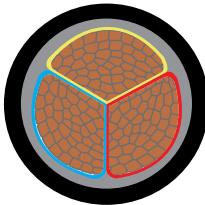
Technical Detail for Havells 0.6/1 kV Two Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC -60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
4	0.70	1.00	0.90	1.80	15	430	380	1000	94x70
6	0.70	1.00	0.90	1.80	16	500	450	1000	100x80
10	0.70	1.00	1.25	1.80	18	770	670	1000	107x80
16	0.70	1.00	1.25	1.80	19	800	590	1000	116x80
25	0.90	1.00	1.60	1.80	21	1150	850	1000	116x92
35	0.90	1.00	1.60	1.80	23	1400	950	500	107x80
50	1.00	1.00	1.60	1.80	25	1700	1100	500	110x80
70	1.10	1.00	1.60	2.00	28	2200	1400	500	116x80
95	1.10	1.20	2.00	2.10	32	3000	1900	500	137x80
120	1.20	1.20	2.00	2.20	35	3550	2150	500	140x80
150	1.40	1.20	2.00	2.30	37	4200	2500	500	146x95
185	1.60	1.40	2.50	2.50	42	5400	3100	500	162x95
240	1.70	1.40	2.50	2.70	46	6700	3850	500	171x100
300	1.80	1.60	2.50	2.80	49	8100	4500	500	180x107
400	2.00	1.60	2.50	3.10	55	9900	5300	250	170x100

**TABLE - 8**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM (Min)		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.	Current Rating (Amps.)				
							With Copper Cond.		With Al. Cond.		
	Al.	Copper	At 20°C	At 90°C			Al.	Copper	Air 30°C	Ground 20°C	
4	7.410	4.610	367	3.67	3.5	0.376	0.572	49	46	38	33
6	4.610	3.080	367	3.67	3.5	0.564	0.858	63	58	49	42
10	3.080	1.830	367	3.67	3.5	0.94	1.43	86	77	67	55
16	1.910	1.150	367	3.67	3.5	1.50	2.29	115	100	91	76
25	1.200	0.727	367	3.67	3.5	2.35	3.58	149	129	108	98
35	0.868	0.524	367	3.67	3.5	3.29	5.01	185	155	135	117
50	0.641	0.387	367	3.67	3.5	4.70	7.15	225	183	164	139
70	0.443	0.268	367	3.67	3.5	6.58	10.01	289	225	211	170
95	0.320	0.193	367	3.67	3.5	8.93	13.59	352	270	257	204
120	0.253	0.153	367	3.67	3.5	11.28	17.16	410	306	300	233
150	0.206	0.124	367	3.67	3.5	14.10	21.45	473	343	346	261
185	0.164	0.0991	367	3.67	3.5	17.39	26.46	542	387	397	296
240	0.125	0.0754	367	3.67	3.5	22.56	34.32	641	448	470	343
300	0.100	0.0601	367	3.67	3.5	28.20	42.90	741	502	543	386
400	0.0778	0.0470	367	3.67	3.5	37.60	57.20	807	514	652	416



### XLPE Insulated Unarmoured Three Core Cable

(Copper/AI. Conductor, XLPE Insulated and PVC Sheathed)

Type of Cable	:	N2XY/NA2XY
Rated Voltage	:	0.6/1 kV
Size Range	:	4 to 400 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Red, Yellow & Blue
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Outer Sheath	:	Extruded PVC

**TABLE - 9**

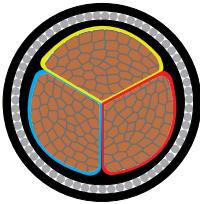
Technical Detail for Havells 0.6/1 kV Three Core, Copper/Alum Cond., XLPE Insulated, Unarmoured cable as per IEC -60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
				Copper	Aluminum		
4	0.70	1.80	14	300	240	1000	94x70
6	0.70	1.80	15	380	290	1000	100x80
10	0.70	1.80	18	560	370	1000	116x80
16	0.70	1.80	19	700	430	1000	116x80
25	0.90	1.80	21	1000	530	1000	116x92
35	0.90	1.80	24	1300	650	500	107x80
50	1.00	1.80	26	1650	800	500	116x80
70	1.10	1.90	30	2350	1100	500	137x80
95	1.10	2.00	33	3100	1400	500	140x80
120	1.20	2.10	36	3850	1700	500	150x80
150	1.40	2.30	40	4750	2150	500	167x95
185	1.60	2.40	44	5850	2600	500	170x100
240	1.70	2.60	50	7600	3300	250	160x90
300	1.80	2.70	55	9700	4000	250	165x95
400	2.00	3.00	61	11800	4900	250	170x100

**TABLE - 10**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM (Min)		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)				
								With Copper Cond.		With Al. Cond.		
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C	
4	7.410	4.610	367	3.67	3.5	0.376	0.572	39	39	32	39	
6	4.610	3.080	367	3.67	3.5	0.564	0.858	49	49	42	49	
10	3.080	1.830	367	3.67	3.5	0.94	1.43	65	65	58	65	
16	1.910	1.150	367	3.67	3.5	1.50	2.29	84	84	77	64	
25	1.200	0.727	367	3.67	3.5	2.35	3.58	107	107	97	82	
35	0.868	0.524	367	3.67	3.5	3.29	5.01	129	129	120	98	
50	0.641	0.387	367	3.67	3.5	4.70	7.15	153	153	146	117	
70	0.443	0.268	367	3.67	3.5	6.58	10.01	188	188	187	144	
95	0.320	0.193	367	3.67	3.5	8.93	13.59	226	226	227	172	
120	0.253	0.153	367	3.67	3.5	11.28	17.16	257	257	263	197	
150	0.206	0.124	367	3.67	3.5	14.10	21.45	287	287	304	220	
185	0.164	0.0991	367	3.67	3.5	17.39	26.46	324	324	347	250	
240	0.125	0.0754	367	3.67	3.5	22.56	34.32	375	375	409	290	
300	0.100	0.0601	367	3.67	3.5	28.20	42.90	419	419	471	326	
400	0.0778	0.0470	367	3.67	3.5	37.60	57.20	456	456	579	363	



### **XLPE Insulated Armoured Three Core Cable**

(Copper/AI. Conductor, XLPE Insulated Galvanized Round Steel Wire Armoured and PVC Sheathed)

Type of Cable	:	N2XRY/NA2XRY
Rated Voltage	:	0.6/1 kV
Size Range	:	4 to 400 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Red, Yellow & Blue
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### **Construction**

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Armouring	:	Galvanized Round Steel Wire
Outer Sheath	:	Extruded PVC

**TABLE - 11**

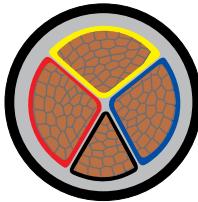
Technical Detail for Havells 0.6/1 kV Three Core, Copper Cond., XLPE Insulated, Armoured Cable as per IEC -60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
4	0.70	1.00	0.90	1.80	16	460	390	1000	100x80
6	0.70	1.00	0.90	1.80	17	540	450	1000	107x80
10	0.70	1.00	1.25	1.80	20	830	750	1000	116x80
16	0.70	1.00	1.25	1.80	21	1000	730	1000	116x92
25	0.90	1.00	1.60	1.80	24	1450	1000	1000	120x92
35	0.90	1.00	1.60	1.80	26	1800	1200	500	110x80
50	1.00	1.00	1.60	1.90	28	2250	1400	500	116x80
70	1.10	1.20	2.00	2.00	33	3200	2000	500	140x80
95	1.10	1.20	2.00	2.20	36	4050	2350	500	140x95
120	1.20	1.20	2.00	2.30	39	4900	2750	500	156x95
150	1.40	1.40	2.50	2.50	44	6250	3600	500	165x100
185	1.60	1.40	2.50	2.60	48	7500	4250	500	171x107
240	1.70	1.60	2.50	2.80	54	9400	5050	500	195x120
300	1.80	1.60	2.50	3.00	59	11200	6000	250	165x100
400	2.00	1.60	2.50	3.20	65	14000	7000	250	185x120

**TABLE - 12**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM (Min)		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)				
								With Copper Cond.		With Al. Cond.		
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C	
4	7.410	4.610	367	3.67	3.5	0.376	0.572	39	39	32	39	
6	4.610	3.080	367	3.67	3.5	0.564	0.858	49	49	42	49	
10	3.080	1.830	367	3.67	3.5	0.94	1.43	65	65	58	65	
16	1.910	1.150	367	3.67	3.5	1.50	2.29	84	84	77	64	
25	1.200	0.727	367	3.67	3.5	2.35	3.58	107	107	97	82	
35	0.868	0.524	367	3.67	3.5	3.29	5.01	129	129	120	98	
50	0.641	0.387	367	3.67	3.5	4.70	7.15	153	153	146	117	
70	0.443	0.268	367	3.67	3.5	6.58	10.01	188	188	187	144	
95	0.320	0.193	367	3.67	3.5	8.93	13.59	226	226	227	172	
120	0.253	0.153	367	3.67	3.5	11.28	17.16	257	257	263	197	
150	0.206	0.124	367	3.67	3.5	14.10	21.45	287	287	304	220	
185	0.164	0.0991	367	3.67	3.5	17.39	26.46	324	324	347	250	
240	0.125	0.0754	367	3.67	3.5	22.56	34.32	375	375	409	290	
300	0.100	0.0601	367	3.67	3.5	28.20	42.90	419	419	471	326	
400	0.0778	0.0470	367	3.67	3.5	37.60	57.20	456	456	579	363	



### XLPE Insulated Unarmoured Three & half Core Cable

(Copper/AI. Conductor, XLPE Insulated and PVC Sheathed)

Type of Cable	:	N2XY/NA2XY
Rated Voltage	:	0.6/1 kV
Size Range	:	25 to 400 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Red, Yellow, Blue & Black
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Outer Sheath	:	Extruded PVC

**TABLE - 13**

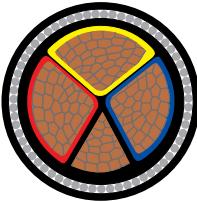
Technical Detail for Havells 0.6/1 kV Three & Half Core, Copper/Alum Cond., XLPE Insulated, Unarmoured Cable as per IEC - 60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
				Copper	Aluminum		
3X 25 +16	0.90/0.70	1.80	23	1150	630	500	107x80
3X35 +16	0.90/0.70	1.80	25	1450	750	500	116x80
3X 50+25	1.00/0.90	1.80	27	1900	900	500	120x80
3X70+35	1.10/0.90	1.90	31	2700	1200	500	140x80
3X95 +50	1.10/1.00	2.10	34	3600	1600	500	150x95
3X120+70	1.20/1.10	2.20	38	4500	2000	500	156x95
3X150+70	1.40/1.10	2.30	43	5400	2400	500	171x100
3X 185+95	1.60/1.10	2.50	46	6700	2700	250	150x95
3X240+120	1.70/1.20	2.70	51	8700	3600	250	156x95
3X300+150	1.80/1.40	2.90	57	10800	4500	250	171x100
3X400+185	2.00/1.60	3.10	63	13500	5500	250	180x107

**TABLE - 14**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM (Min)		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C
3 X 25 + 10	1.2/1.91	0.727/1.15	367	3.67	3.5	2.35	3.58	107	107	97	82
3 X 35 + 16	0.868/1.91	0.524/1.15	367	3.67	3.5	3.29	5.01	129	129	120	98
3 X 50 + 25	0.641/1.20	0.287/0.727	367	3.67	3.5	4.70	7.15	153	153	146	117
3 X 70 + 35	0.443/0.868	0.268/0.524	367	3.67	3.5	6.58	10.01	188	188	187	144
3 X 95 + 50	0.32/0.641	0.193/0.387	367	3.67	3.5	8.93	13.59	226	226	227	172
3 X 120 + 70	0.253/0.443	0.153/0.268	367	3.67	3.5	11.28	17.16	257	257	263	197
3 X 150 + 70	0.206/0.443	0.124/0.268	367	3.67	3.5	14.10	21.45	287	287	304	220
3 X 185 + 95	0.164/0.320	0.0991/0.193	367	3.67	3.5	17.39	26.46	324	324	347	250
3 X 240 + 120	0.125/0.253	0.0754/0.153	367	3.67	3.5	22.56	34.32	375	375	409	290
3 X 300 + 150	0.100/0.206	0.0601/0.124	367	3.67	3.5	28.20	42.90	419	419	471	326
3 X 400 + 185	0.0778/0.164	0.0470/0.0991	367	3.67	3.5	37.60	57.20	456	456	579	363



### XLPE Insulated Armoured Three & half Core Cable

(Copper/AI. Conductor, XLPE Insulated Galvanized Round Steel Wire Armoured and PVC Sheathed)

Type of Cable	:	N2XRY/NA2XRY
Rated Voltage	:	0.6/1 kV
Size Range	:	25 to 400 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Red, Yellow Blue & Black
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Armouring	:	Galvanized Round Steel Wire
Outer Sheath	:	Extruded PVC

**TABLE - 15**

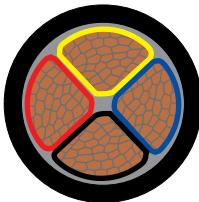
Technical Detail for Havells 0.6/1 kV Three & Half Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
3X 25 +16	0.90/0.70	1.00	1.60	1.80	25	1650	1150	500	107x80
3X35 +16	0.90/0.70	1.00	1.60	1.80	28	2000	1300	500	116x80
3X 50+25	1.00/0.90	1.00	1.60	1.90	30	2550	1500	500	125x80
3X70+35	1.10/0.90	1.20	2.00	2.10	35	3600	2200	500	140x80
3X95 +50	1.10/1.00	1.20	2.00	2.20	39	4600	2650	500	146x95
3X120+70	1.20/1.10	1.20	2.00	2.40	42	5650	3150	500	162x95
3X150+70	1.40/1.10	1.40	2.50	2.50	48	7100	4050	500	117x107
3X 185+95	1.60/1.10	1.40	2.50	2.70	52	8600	4800	250	160x95
3X240+120	1.70/1.20	1.60	2.50	2.90	58	10600	5700	250	156x95
3X300+150	1.80/1.40	1.60	2.50	3.00	63	12800	6600	250	171x95
3X400+185	2.00/1.60	1.60	3.15	3.30	70	16500	8700	200	180x95

**TABLE - 16**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM (Min)		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C
3 X 25 + 10	1.2/1.91	0.727/1.15	367	3.67	3.5	2.35	3.58	107	107	97	82
3 X 35 + 16	0.868/1.91	0.524/1.15	367	3.67	3.5	3.29	5.01	129	129	120	98
3 X 50 + 25	0.641/1.20	0.387/0.727	367	3.67	3.5	4.70	7.15	153	153	146	117
3 X 70 + 35	0.443/0.868	0.268/0.524	367	3.67	3.5	6.58	10.01	188	188	187	144
3 X 95 + 50	0.32/0.641	0.193/0.387	367	3.67	3.5	8.93	13.59	226	226	227	172
3 X 120 + 70	0.253/0.443	0.153/0.268	367	3.67	3.5	11.28	17.16	257	257	263	197
3 X 150 + 70	0.206/0.443	0.124/0.268	367	3.67	3.5	14.10	21.45	287	287	304	220
3 X 185 + 95	0.164/0.320	0.0991/0.193	367	3.67	3.5	17.39	26.46	324	324	347	250
3 X 240 + 120	0.125/0.253	0.0754/0.153	367	3.67	3.5	22.56	34.32	375	375	409	290
3 X 300 + 150	0.100/0.206	0.0601/0.124	367	3.67	3.5	28.20	42.90	419	419	471	326
3 X 400 + 185	0.0778/0.164	0.0470/0.0991	367	3.67	3.5	37.60	57.20	456	456	579	363



### XLPE Insulated Unarmoured Four Core Cable

(Copper/AI. Conductor, XLPE Insulated and PVC Sheathed)

Type of Cable	:	N2XY/NA2XY
Rated Voltage	:	0.6/1 kV
Size Range	:	4 to 400 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Red, Yellow, Blue & Black
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Outer Sheath	:	Extruded PVC

**TABLE - 17**

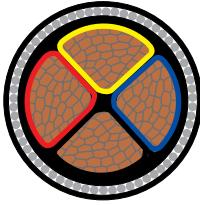
Technical Detail for Havells 0.6/1 kV Four Core, Copper/Alum. Cond., XLPE Insulated, Unarmoured Cable as per IEC-60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
				Copper	Aluminum		
4	0.70	1.80	15	360	270	500	100x80
6	0.70	1.80	17	460	330	500	107x80
10	0.70	1.80	20	680	400	500	116x92
16	0.70	1.80	21	800	450	500	116x92
25	0.90	1.80	23	1250	650	500	107x80
35	0.90	1.80	26	1600	800	500	116x80
50	1.00	1.90	29	2100	1000	500	125x80
70	1.10	2.00	33	3000	1400	500	140x80
95	1.10	2.10	37	4000	1800	500	150x95
120	1.20	2.30	41	5100	2250	500	165x100
150	1.40	2.40	45	6100	2700	500	177x107
185	1.60	2.60	50	7600	3200	250	150x100
240	1.70	2.80	57	9900	4000	250	160x100
300	1.80	3.00	63	12300	5000	250	170x100
400	2.00	3.30	70	15700	6400	200	177x100

**TABLE - 18**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C
4	7.410	4.610	367	3.67	3.5	0.376	0.572	39	39	32	39
6	4.610	3.080	367	3.67	3.5	0.564	0.858	49	49	42	49
10	3.080	1.830	367	3.67	3.5	0.94	1.43	65	65	58	65
16	1.910	1.150	367	3.67	3.5	1.50	2.29	84	84	77	64
25	1.200	0.727	367	3.67	3.5	2.35	3.58	107	107	97	82
35	0.868	0.524	367	3.67	3.5	3.29	5.01	129	129	120	98
50	0.641	0.387	367	3.67	3.5	4.70	7.15	153	153	146	117
70	0.443	0.268	367	3.67	3.5	6.58	10.01	188	188	187	144
95	0.320	0.193	367	3.67	3.5	8.93	13.59	226	226	227	172
120	0.253	0.153	367	3.67	3.5	11.28	17.16	257	257	263	197
150	0.206	0.124	367	3.67	3.5	14.10	21.45	287	287	304	220
185	0.164	0.0991	367	3.67	3.5	17.39	26.46	324	324	347	250
240	0.125	0.0754	367	3.67	3.5	22.56	34.32	375	375	409	290
300	0.100	0.0601	367	3.67	3.5	28.20	42.90	419	419	471	326
400	0.0778	0.0470	367	3.67	3.5	37.60	57.20	456	456	579	363



### XLPE Insulated Armoured Four Core Cable

(Copper/AI. Conductor, XLPE Insulated Galvanized round steel Wire  
Armoured and PVC Sheathed)

Type of Cable	:	N2XRY/NA2XRY
Rated Voltage	:	0.6/1 kV
Size Range	:	4 to 400 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Red, Yellow, Blue & Black
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Armouring	:	Galvanized Round Steel Wire
Outer Sheath	:	Extruded PVC

**TABLE - 19**

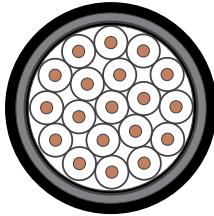
Technical Detail for Havells 0.6/1 kV Four Core, Copper/Alum. Cond., XLPE Insulated, Armoured Cable as per IEC-60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
4	0.70	1.00	0.90	1.80	17	520	430	500	107x80
6	0.70	1.00	1.25	1.80	19	720	590	500	116x80
10	0.70	1.00	1.25	1.80	21	980	690	500	116x192
16	0.70	1.00	1.60	1.80	23	1300	950	500	107x80
25	0.90	1.00	1.60	1.80	26	1800	1200	500	110x80
35	0.90	1.00	1.60	1.90	28	2250	1400	500	116x80
50	1.00	1.00	1.60	2.00	31	2800	1700	500	125x80
70	1.10	1.20	2.00	2.20	36	4000	2400	500	146x95
95	1.10	1.20	2.00	2.30	40	5100	2900	500	156x95
120	1.20	1.40	2.50	2.50	45	6700	3800	500	165x100
150	1.40	1.40	2.50	2.60	50	7900	4400	250	146x95
185	1.60	1.40	2.50	2.80	55	9500	5200	250	155x95
240	1.70	1.60	2.50	3.00	60	12000	6400	250	165x100
300	1.80	1.60	2.50	3.20	66	14600	7500	200	175x104
400	2.00	1.80	3.15	3.50	76	19000	9900	200	180x104

**TABLE - 20**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C
4	7.410	4.610	367	3.67	3.5	0.376	0.572	39	39	32	39
6	4.610	3.080	367	3.67	3.5	0.564	0.858	49	49	42	49
10	3.080	1.830	367	3.67	3.5	0.94	1.43	65	65	58	65
16	1.910	1.150	367	3.67	3.5	1.50	2.29	84	84	77	64
25	1.200	0.727	367	3.67	3.5	2.35	3.58	107	107	97	82
35	0.868	0.524	367	3.67	3.5	3.29	5.01	129	129	120	98
50	0.641	0.387	367	3.67	3.5	4.70	7.15	153	153	146	117
70	0.443	0.268	367	3.67	3.5	6.58	10.01	188	188	187	144
95	0.320	0.193	367	3.67	3.5	8.93	13.59	226	226	227	172
120	0.253	0.153	367	3.67	3.5	11.28	17.16	257	257	263	197
150	0.206	0.124	367	3.67	3.5	14.10	21.45	287	287	304	220
185	0.164	0.0991	367	3.67	3.5	17.39	26.46	324	324	347	250
240	0.125	0.754	367	3.67	3.5	22.56	34.32	375	375	409	290
300	0.100	0.0601	367	3.67	3.5	28.20	42.90	419	419	471	326
400	0.0778	0.0470	367	3.67	3.5	37.60	57.20	456	456	579	363



### XLPE Insulated Unarmoured Control Cable

(Copper Conductor, XLPE Insulated and PVC Sheathed)

Type of Cable	:	N2XY
Rated Voltage	:	0.6/1 kV
Size Range	:	2 to 61 x 1.5 mm <sup>2</sup>
Specification	:	IEC-60502-1, BS:5467
Application	:	For Electric Power Circuit
Identification of Core	:	Black with white numbering
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Outer Sheath	:	Extruded PVC

**TABLE - 21**

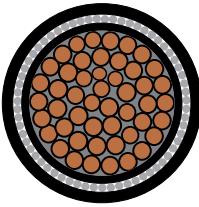
Technical Detail for Havells 0.6/1 kV 1.5 Sq mm , Copper Cond., XLPE Insulated, Un-Armoured Control Cable as per IEC-60502-1/BS-5467

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Nominal Outer Sheath Thickness (mm)	Aprox. Overall Dimeter (mm)	Overall weight Approx. (kgs.km)	Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
				Copper		
2	0.70	1.80	12	200	1000	85x64
3	0.70	1.80	13	220	1000	94x70
4	0.70	1.80	14	250	1000	100x80
5	0.70	1.80	15	280	1000	107x80
6	0.70	1.80	16	310	1000	100x80
7	0.70	1.80	16	310	1000	110x80
10	0.70	1.80	18	430	1000	94x80
12	0.70	1.80	19	450	1000	100x80
14	0.70	1.80	20	500	500	100x80
16	0.70	1.80	21	550	500	107x80
19	0.70	1.80	22	620	500	110x80
24	0.70	1.80	24	770	500	116x80
27	0.70	1.80	25	820	500	120x80
30	0.70	1.80	26	900	500	125x80
37	0.70	1.80	28	1050	500	137x80
40	0.70	1.80	29	1100	500	137x80
48	0.70	1.80	31	1300	500	140x80
52	0.70	1.90	32	1400	500	146x80
61	0.70	1.90	34	1650	500	150x80

**TABLE - 22**

#### Electrical Characteristics

No. of Core	Max. Cond. resistance at 20°C in OHM/KM	Insulation Resistance Constant in Mohm-KM		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.	Current Rating (Amps.)	
						With Copper Cond.	
	Copper	At 20°C	At 90°C		Copper	Air 30°C	Ground 20°C
2	12.1	367	3.67	3.5	0.215	26	27
3	12.1	367	3.67	3.5	0.215	23	23
4	12.1	367	3.67	3.5	0.215	23	23
5	12.1	367	3.67	3.5	0.215	18	29
6	12.1	367	3.67	3.5	0.215	13	17
7	12.1	367	3.67	3.5	0.215	13	17
10	12.1	367	3.67	3.5	0.215	12	15
12	12.1	367	3.67	3.5	0.215	11	14
14	12.1	367	3.67	3.5	0.215	11	14
16	12.1	367	3.67	3.5	0.215	10	13
19	12.1	367	3.67	3.5	0.215	9	12
24	12.1	367	3.67	3.5	0.215	8	11
27	12.1	367	3.67	3.5	0.215	8	11
30	12.1	367	3.67	3.5	0.215	8	11
37	12.1	367	3.67	3.5	0.215	8	11
40	12.1	367	3.67	3.5	0.215	8	11
48	12.1	367	3.67	3.5	0.215	8	11
52	12.1	367	3.67	3.5	0.215	8	11
61	12.1	367	3.67	3.5	0.215	8	11



### XLPE Insulated Armoured Control Cable

(Copper Conductor, XLPE Insulated Round Steel Wire Armoured and PVC Sheathed)

Type of Cable	:	N2XRY
Rated Voltage	:	0.6/1 kV
Size Range	:	2 to 61 x 1.5 mm <sup>2</sup>
Specification	:	IEC-60502-1, BS:5467
Application	:	For Electric Power Circuit
Identification of Core	:	Black with white numbering
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Armouring	:	Galvanized Steel Round Wire
Outer Sheath	:	Extruded PVC

**TABLE - 23**

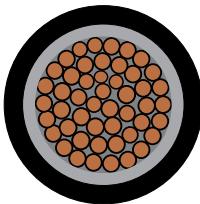
Technical Detail for Havells 0.6/1 kV 1.5 Sq mm, Copper Cond., XLPE Insulated, Armoured Control Cable as per IEC-60502-1/BS-5467

No. of Core	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armoured Wire Size (mm)	Nominal Outer Sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs./km)	Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
2	0.70	1.00	0.90	1.80	14	350	1000	94x70
3	0.70	1.00	0.90	1.80	15	360	1000	96x70
4	0.70	1.00	0.90	1.80	16	400	1000	100x80
5	0.70	1.00	0.90	1.80	17	450	1000	107x80
6	0.70	1.00	0.90	1.80	18	500	1000	100x80
7	0.70	1.00	0.90	1.80	18	500	1000	100x80
10	0.70	1.00	1.25	1.80	21	770	1000	105x80
12	0.70	1.00	1.25	1.80	21	810	1000	105x80
14	0.70	1.00	1.25	1.80	22	870	500	107x80
16	0.70	1.00	1.25	1.80	23	950	500	110x80
19	0.70	1.00	1.25	1.80	24	1030	500	110x80
24	0.70	1.00	1.60	1.80	27	1400	500	116x80
27	0.70	1.00	1.60	1.80	28	1450	500	116x80
30	0.70	1.00	1.60	1.80	29	1530	500	130x80
37	0.70	1.00	1.60	1.80	31	1730	500	140x80
40	0.70	1.00	1.60	1.90	32	1850	500	140x80
48	0.70	1.00	1.60	1.90	35	2100	500	150x80
52	0.70	1.00	1.60	2.00	36	2200	500	150x80
61	0.70	1.20	2.00	2.10	39	2750	500	150x80

**TABLE - 24**

#### Electrical Characteristics

No. of Core	Max. Cond. resistance at 20°C in OHM/KM	Insulation Resistance Constant in Mohm-KM		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps. Copper	Current Rating (Amps.) With Copper Cond.	
		Copper	At 20°C			Air 30°C	Ground 20°C
2	12.1	367	3.67	3.5	0.215	26	27
3	12.1	367	3.67	3.5	0.215	23	23
4	12.1	367	3.67	3.5	0.215	23	23
5	12.1	367	3.67	3.5	0.215	18	29
6	12.1	367	3.67	3.5	0.215	13	17
7	12.1	367	3.67	3.5	0.215	13	17
10	12.1	367	3.67	3.5	0.215	12	15
12	12.1	367	3.67	3.5	0.215	11	14
14	12.1	367	3.67	3.5	0.215	11	14
16	12.1	367	3.67	3.5	0.215	10	13
19	12.1	367	3.67	3.5	0.215	9	12
24	12.1	367	3.67	3.5	0.215	8	11
27	12.1	367	3.67	3.5	0.215	8	11
30	12.1	367	3.67	3.5	0.215	8	11
37	12.1	367	3.67	3.5	0.215	8	11
40	12.1	367	3.67	3.5	0.215	8	11
48	12.1	367	3.67	3.5	0.215	8	11
52	12.1	367	3.67	3.5	0.215	8	11
61	12.1	367	3.67	3.5	0.215	8	11



### XLPE Insulated Unarmoured Control Cable

(Copper Conductor, XLPE Insulated and PVC Sheathed)

Type of Cable	:	N2XY
Rated Voltage	:	0.6/1 kV
Size Range	:	2 to 61 x 2.5 mm <sup>2</sup>
Specification	:	IEC-60502-1, BS:5467
Application	:	For Electric Power Circuit
Identification of Core	:	Black with white numbering
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Outer Sheath	:	Extruded PVC

**TABLE - 25**

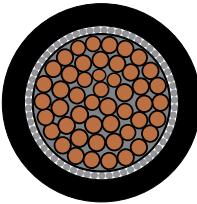
Technical Detail for Havells 0.6/1 kV 2.5 Sq mm, Copper Cond., XLPE Insulated, Un-Armoured Control Cable as per IEC-60502-1/BS-5467

No. of Core	Nominal Insulation Thickness (mm)	Approx. Outer Sheath Thickness (mm)	Aprox. Overall Dimeter (mm)	Overall weight Approx. (kgs.km) Copper	Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
2	0.70	1.80	13	240	1000	94x70
3	0.70	1.80	14	270	1000	100x80
4	0.70	1.80	15	310	1000	100x80
5	0.70	1.80	16	350	1000	107x80
6	0.70	1.80	17	430	1000	110x80
7	0.70	1.80	17	400	1000	116x80
10	0.70	1.80	20	550	1000	116x92
12	0.70	1.80	21	600	500	107x80
14	0.70	1.80	22	670	500	110x80
16	0.70	1.80	23	750	500	116x80
19	0.70	1.80	24	840	500	120x80
24	0.70	1.80	27	1050	500	125x80
27	0.70	1.80	28	1130	500	135x80
30	0.70	1.80	29	1220	500	140x80
37	0.70	1.80	31	1450	500	140x80
40	0.70	1.80	32	1550	500	145x80
48	0.70	1.90	35	1850	500	156x95
52	0.70	2.00	37	2000	500	160x95
61	0.70	2.00	39	2300	500	165x100

**TABLE - 26**

#### Electrical Characteristics

No. of Core	Max. Cond. resistance at 20°C in OHM/KM Copper	Insulation Resistance Constant in Mohm-KM		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps. Copper	Current Rating (Amps.) With Copper Cond.	
		At 20°C	At 90°C			Air 30°C	Ground 20°C
2	7.41	367	3.67	3.5	0.358	36	35
3	7.41	367	3.67	3.5	0.358	32	30
4	7.41	367	3.67	3.5	0.358	32	30
5	7.41	367	3.67	3.5	0.358	25	40
6	7.41	367	3.67	3.5	0.358	20	32
7	7.41	367	3.67	3.5	0.358	18	29
10	7.41	367	3.67	3.5	0.358	16	26
12	7.41	367	3.67	3.5	0.358	15	23
14	7.41	367	3.67	3.5	0.358	14	22
16	7.41	367	3.67	3.5	0.358	13	21
19	7.41	367	3.67	3.5	0.358	13	21
24	7.41	367	3.67	3.5	0.358	11	18
27	7.41	367	3.67	3.5	0.358	11	18
30	7.41	367	3.67	3.5	0.358	11	18
37	7.41	367	3.67	3.5	0.358	11	18
40	7.41	367	3.67	3.5	0.358	11	18
48	7.41	367	3.67	3.5	0.358	11	18
52	7.41	367	3.67	3.5	0.358	11	18
61	7.41	367	3.67	3.5	0.358	11	18



### XLPE Insulated Armoured Control Cable

(Copper Conductor, XLPE Insulated, Round Steel Wire Armoured and PVC Sheathed)

Type of Cable	:	N2XRY
Rated Voltage	:	0.6/1 kV
Size Range	:	2 to 61 x 2.5 mm <sup>2</sup>
Specification	:	IEC-60502-1, BS:5467
Application	:	For Electric Power Circuit
Identification of Core	:	Black with white numbering
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Annealed Copper
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Armouring	:	Galvanized Round Steel Wire
Outer Sheath	:	Extruded PVC

**TABLE - 27**

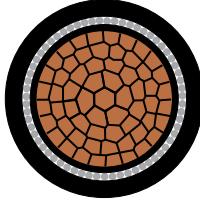
Technical Detail for Havells 0.6/1 kV 2.5 Sq mm, Copper Cond., XLPE Insulated, Armoured Control Cable as per IEC-60502-1/BS-5467

No. of Core	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armoured Wire Size (mm)	Nominal Outer Sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs./km)	Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
2	0.70	1.00	0.90	1.80	15	400	1000	100x80
3	0.70	1.00	0.90	1.80	16	410	1000	100x80
4	0.70	1.00	0.90	1.80	17	470	1000	107x80
5	0.70	1.00	0.90	1.80	18	530	1000	107x80
6	0.70	1.00	1.25	1.80	19	650	1000	110x80
7	0.70	1.00	1.25	1.80	19	700	1000	110x80
10	0.70	1.00	1.25	1.80	23	920	500	107x80
12	0.70	1.00	1.25	1.80	23	1000	500	110x80
14	0.70	1.00	1.25	1.80	24	1070	500	110x80
16	0.70	1.00	1.60	1.80	26	1300	500	116x80
19	0.70	1.00	1.60	1.80	27	1400	500	125x80
24	0.70	1.00	1.60	1.80	30	1730	500	137x80
27	0.70	1.00	1.60	1.80	31	1800	500	140x80
30	0.70	1.00	1.60	1.90	32	1950	500	140x80
37	0.70	1.00	1.60	1.90	34	2200	500	145x80
40	0.70	1.00	1.60	2.00	35	2350	500	150x95
48	0.70	1.20	2.00	2.10	39	3000	500	156x95
52	0.70	1.20	2.00	2.10	40	3100	500	165x100
61	0.70	1.20	2.00	2.20	43	3500	500	170x107

**TABLE - 28**

#### Electrical Characteristics

No. of Core	Max. Cond. resistance at 20°C in OHM/KM Copper	Insulation Resistance Constant in Mohm-KM		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps. Copper	Current Rating (Amps.) With Copper Cond.	
		At 20°C	At 90°C			Air 30°C	Ground 20°C
2	7.41	367	3.67	3.5	0.358	36	35
3	7.41	367	3.67	3.5	0.358	32	30
4	7.41	367	3.67	3.5	0.358	32	30
5	7.41	367	3.67	3.5	0.358	25	40
6	7.41	367	3.67	3.5	0.358	20	32
7	7.41	367	3.67	3.5	0.358	18	29
10	7.41	367	3.67	3.5	0.358	16	26
12	7.41	367	3.67	3.5	0.358	15	23
14	7.41	367	3.67	3.5	0.358	14	22
16	7.41	367	3.67	3.5	0.358	13	21
19	7.41	367	3.67	3.5	0.358	13	21
24	7.41	367	3.67	3.5	0.358	11	18
27	7.41	367	3.67	3.5	0.358	11	18
30	7.41	367	3.67	3.5	0.358	11	18
37	7.41	367	3.67	3.5	0.358	11	18
40	7.41	367	3.67	3.5	0.358	11	18
48	7.41	367	3.67	3.5	0.358	11	18
52	7.41	367	3.67	3.5	0.358	11	18
61	7.41	367	3.67	3.5	0.358	11	18



### **XLPE Insulated Armoured Single Core Cable**

(Copper/AI. Conductor, XLPE Insulated, Round AI. Wire Armoured and PVC Sheathed)

Type of Cable	:	N2XRaY/NA2XRaY
Rated Voltage	:	1.8/3.0 (3.6) kV
Size Range	:	25 to 630 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	Indoor and outdoor installations direct Bureal preferably use where considerable mechanical stress must be envisaged.
Identification of Core	:	Natural
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### **Construction**

Conductor	:	Annealed Copper/Aluminium
Insulation	:	XLPE
Armouring	:	Round Aluminium Wire
Outer Sheath	:	Extruded PVC

**TABLE - 29**

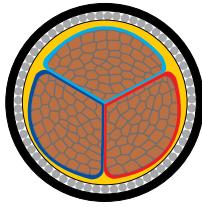
Technical Detail for Havells 1.8/3.0 (3.6) kV Single Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable As Per IEC-60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
25	2.00	1.00	1.25	1.8	19	580	440	1000	110x74
35	2.00	1.00	1.25	1.8	20	700	490	1000	114x74
50	2.00	1.00	1.25	1.8	21	830	550	1000	114x74
70	2.00	1.00	1.25	1.8	23	1050	650	500	105x74
95	2.00	1.00	1.60	1.8	25	1350	810	500	110x74
120	2.00	1.00	1.60	1.8	27	1600	920	500	126x87
150	2.00	1.00	1.60	1.8	29	1900	1030	500	148x87
185	2.00	1.00	1.60	1.8	30	2250	1170	500	156x96
240	2.00	1.00	1.60	1.9	32	2800	1400	500	160x96
300	2.00	1.00	1.60	2.0	35	3400	1650	500	164x96
400	2.00	1.20	2.00	2.1	40	4350	2100	500	165x105
500	2.20	1.20	2.00	2.2	43	5400	2500	500	168x107
630	2.40	1.20	2.00	2.3	47	6900	3100	500	180x126

**TABLE - 30**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C
25	1.200	0.727	367	3.67	6.5	2.35	3.58	135	129	103	98
35	0.868	0.524	367	3.67	6.5	3.29	5.01	169	155	129	117
50	0.641	0.387	367	3.67	6.5	4.70	7.15	207	183	159	139
70	0.443	0.268	367	3.67	6.5	6.58	10.01	268	225	206	170
95	0.320	0.193	367	3.67	6.5	8.93	13.59	328	270	253	204
120	0.253	0.153	367	3.67	6.5	11.28	17.16	383	306	296	233
150	0.206	0.124	367	3.67	6.5	14.10	21.45	444	343	343	261
185	0.164	0.0991	367	3.67	6.5	17.39	26.46	510	387	395	296
240	0.125	0.0754	367	3.67	6.5	22.56	34.32	607	448	471	343
300	0.100	0.0601	367	3.67	6.5	28.20	42.90	703	502	547	386
400	0.0778	0.0470	367	3.67	6.5	37.60	57.20	823	555	663	442
500	0.0605	0.0366	367	3.67	6.5	47.00	71.5	946	620	770	502
630	0.0469	0.0283	367	3.67	6.5	59.22	90.09	1088	688	899	566



### XLPE Insulated Armoured Three Core Cable

(Copper/AI. Conductor, XLPE Insulated, Galvanized Round Steel Wire Armoured and PVC Sheathed)

Type of Cable	:	N2XRY/NA2XRY
Rated Voltage	:	1.8/3.0 (3.6) kV
Size Range	:	25 to 400 mm <sup>2</sup>
Specification	:	IEC-60502-1
Application	:	For Electric Power Circuit
Identification of Core	:	Red, Yellow & Blue
Type of Packing	:	Wooden Drum

Other specification and colour are available on request

### Construction

Conductor	:	Copper/Aluminium
Insulation	:	XLPE
Inner Sheath	:	Extruded PVC
Armouring	:	Galvanized Round Steel Wire
Outer Sheath	:	Extruded PVC

**TABLE - 31**

Technical Detail for Havells 1.8/3.0 (3.6) kV Three Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-1

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
25	2.00	1.00	1.60	1.9	29	1750	1300	500	137x80
35	2.00	1.00	1.60	1.9	32	2100	1500	500	140x80
50	2.00	1.20	2.00	2.1	35	2800	2000	500	146x95
70	2.00	1.20	2.00	2.2	38	3500	2300	500	150x95
95	2.00	1.20	2.00	2.3	42	4350	2700	500	162x95
120	2.00	1.40	2.50	2.4	45	5500	3450	500	171x100
150	2.00	1.40	2.50	2.5	48	6400	3850	500	177x107
185	2.00	1.40	2.50	2.7	51	7700	4450	250	171x104
240	2.00	1.60	2.50	2.8	56	9500	5250	250	180x104
300	2.00	1.60	2.50	3.0	60	11400	6050	250	180x107
400	2.00	1.60	2.50	3.2	66	14000	7200	200	187x119

**TABLE - 32**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Insulation Resistance Constant in Mohm-KM		A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper	At 20°C	At 90°C		Al.	Copper	Air 30°C	Ground 20°C	Air 30°C	Ground 20°C
25	1.200	0.727	367	3.67	6.5	2.35	3.58	127	97	97	82
35	0.868	0.524	367	3.67	6.5	3.29	5.01	158	120	120	98
50	0.641	0.387	367	3.67	6.5	4.70	7.15	192	146	146	117
70	0.443	0.268	367	3.67	6.5	6.58	10.01	246	187	187	144
95	0.320	0.193	367	3.67	6.5	8.93	13.59	298	227	227	172
120	0.253	0.153	367	3.67	6.5	11.28	17.16	346	263	263	197
150	0.206	0.124	367	3.67	6.5	14.10	21.45	399	304	304	220
185	0.164	0.0991	367	3.67	6.5	17.39	26.46	456	347	347	250
240	0.125	0.0754	367	3.67	6.5	22.56	34.32	538	409	409	290
300	0.100	0.0601	367	3.67	6.5	28.20	42.90	621	471	471	326
400	0.0778	0.0470	367	3.67	6.5	37.60	57.20	728	579	579	363



HT POWER CABLE



HT POWER CABLE

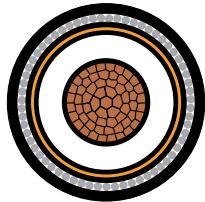
**HT POWER CABLE**

- High continuous current rating
- Higher short circuit rating
- High emergency load capacity
- Low dielectric loss
- Longer charging currents
- Free from height limitation & maintenance
- Resistant to vibration, moisture, chemical & corrosive gases
- Much longer life of the cable

**APPLICABLE STANDARD**

- IEC 60502 Part-2/BS 6622





### XLPE Insulated Armoured Single Core HT Cable

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen Metallic Screen, Separation Sheath, Round Al. Wire, Armoured and PVC sheathed)

Type of Cable : N2XHSYRaY/NA2XHSYRaY

Rated Voltage : 3.6/6.0 (7.2) kV

Size Range : 25 to 1000 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Natural

Type of Packing : Wooden Drum

Other specification and colour are available on request

### Construction

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Separation Sheath - PVC

Aluminium Round Wire Armour

Outer Sheath - PVC

**TABLE - 33**

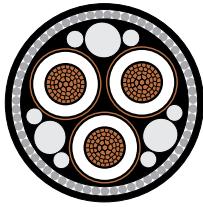
Technical Detail for Havells 3.6/6.0 (7.2) kV Single Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
25	2.50	1.00	1.25	1.80	22	700	550	500	107x80
35	2.50	1.00	1.60	1.80	24	870	660	500	110x80
50	2.50	1.00	1.60	1.80	25	1000	740	500	116x80
70	2.50	1.00	1.60	1.80	27	1250	850	500	125x80
95	2.50	1.00	1.60	1.80	28	1500	970	500	137x80
120	2.50	1.00	1.60	1.90	30	1800	1100	500	140x80
150	2.50	1.00	1.60	1.90	32	2100	1230	500	146x95
185	2.50	1.00	1.60	2.00	33	2500	1400	500	150x95
240	2.60	1.20	2.00	2.10	37	3200	1750	500	156x95
300	2.80	1.20	2.00	2.20	40	3900	2050	500	165x100
400	3.00	1.20	2.00	2.30	44	4750	2500	500	177x107
500	3.20	1.20	2.50	2.40	50	6100	3150	250	156x95
630	3.20	1.40	2.50	2.50	54	7600	3800	250	165x100
800	3.20	1.40	2.50	2.70	59	9400	4500	250	180x104
1000	3.20	1.60	2.50	2.80	63	11500	5350	250	186x104

**TABLE - 34**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper				Copper	Al.	With Copper Cond.	With Al. Cond.		
	mH/KM	mF/KM	Air 30°C	Ground 20°C		Air 30°C	Ground 20°C	Air 30°C	Ground 20°C		
25	1.200	0.727	0.49	0.27	12.5	3.58	2.35	196	144	153	112
35	0.868	0.524	0.46	0.30	12.5	5.01	3.29	238	172	185	134
50	0.641	0.387	0.43	0.33	12.5	7.15	4.70	286	203	222	157
70	0.443	0.268	0.41	0.37	12.5	10.01	6.58	356	246	278	192
95	0.320	0.193	0.39	0.42	12.5	13.59	8.93	434	293	338	229
120	0.253	0.153	0.37	0.46	12.5	17.16	11.28	500	332	391	260
150	0.206	0.124	0.36	0.49	12.5	21.45	14.10	559	366	440	288
185	0.164	0.0991	0.35	0.54	12.5	26.46	17.39	637	410	504	324
240	0.125	0.0754	0.34	0.58	12.5	34.32	22.56	745	470	593	373
300	0.100	0.0601	0.33	0.60	12.5	42.90	28.20	846	524	677	419
400	0.0778	0.0470	0.32	0.64	12.5	57.20	37.60	938	572	769	466
500	0.0605	0.0366	0.32	0.65	12.5	71.50	47.00	1090	710	760	566
630	0.0469	0.0283	0.31	0.73	12.5	90.09	59.22	1260	790	850	640
800	0.0367	0.0221	0.30	0.81	12.5	114.40	75.20	1410	910	960	720
1000	0.0291	0.0176	0.29	0.90	12.5	143.00	94.00	1610	1030	1100	800



### XLPE Insulated Armoured Three Core HT Cable

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen Metallic Screen, Filler Inner, Covering, Galvanized Round Steel Wire Armoured and PVC sheathed)

Type of Cable : N2XXEYRY/NA2XSEYRY

Rated Voltage : 3.6/6.0 (7.2) kV

Size Range : 25 to 400 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Red, Yellow & Blue

Type of Packing : Wooden Drum

Other specification and colour are available on request

### Construction

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Filler

Inner Covering

Galvanized Steel Round Wire Armour

Over Sheath - PVC

**TABLE - 35**

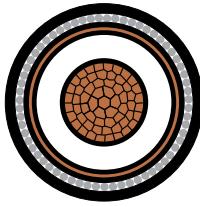
Technical Detail for Havells 3.6/6.0 (7.2) kV Three Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
25	2.50	1.20	2.00	2.20	40	2850	2400	500	165x95
35	2.50	1.20	2.00	2.30	42	3300	2650	500	165x100
50	2.50	1.20	2.50	2.40	46	4200	3350	500	177x107
70	2.50	1.40	2.50	2.50	50	5150	3900	250	171x104
95	2.50	1.40	2.50	2.70	54	6200	4500	250	180x104
120	2.50	1.40	2.50	2.80	57	7200	5050	250	185x104
150	2.50	1.60	2.50	2.90	61	8300	5700	250	187x107
185	2.50	1.60	2.50	3.00	65	9700	6400	250	187x120
240	2.60	1.60	2.50	3.20	70	11800	7450	250	195x128
300	2.80	1.80	3.15	3.40	78	14900	9500	250	200x128
400	3.00	1.80	3.15	3.70	86	18300	11300	250	210x128

**TABLE - 36**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper				Copper	Al.	With Copper Cond.	With Al. Cond.		
	mH/KM	mF/KM	Air 30°C	Ground 20°C		Air 30°C	Ground 20°C	Air 30°C	Ground 20°C		
25	1.200	0.727	0.39	0.27	12.5	3.58	2.35	143	129	111	100
35	0.868	0.524	0.37	0.30	12.5	5.01	3.29	172	154	133	119
50	0.641	0.387	0.34	0.33	12.5	7.15	4.70	205	181	159	140
70	0.443	0.268	0.33	0.37	12.5	10.01	6.58	253	220	196	171
95	0.320	0.193	0.31	0.42	12.5	13.59	8.93	307	263	238	204
120	0.253	0.153	0.30	0.46	12.5	17.16	11.28	352	298	274	232
150	0.206	0.124	0.29	0.49	12.5	21.45	14.10	397	332	309	259
185	0.164	0.0991	0.29	0.54	12.5	26.46	17.39	453	374	354	293
240	0.125	0.0754	0.28	0.58	12.5	34.32	22.56	529	431	415	338
300	0.100	0.0601	0.27	0.60	12.5	42.90	28.20	599	482	472	380
400	0.0778	0.0470	0.26	0.64	12.5	57.20	37.60	683	541	545	432



### **XLPE Insulated Armoured Single Core HT Cable**

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen, XLPE Insulated. Ins. Semi-conducting screen, Metallic Screen, Separation Sheath Round Al. Wire, armoured and PVC sheathed)

Type of Cable : N2XHSYRaY/NA2XHSYRaY

Rated Voltage : 6/10 (12) kV

Size Range : 25 to 1000 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Natural

Type of Packing : Wooden Drum

Other specification and colour are available on request

### **Construction**

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Separation Sheath - PVC

Round Aluminium Wire Armour

Over Sheath - PVC

**TABLE - 37**

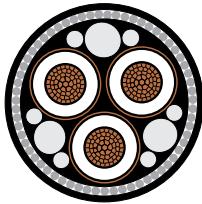
Technical Detail for Havells 6/10 (12) KV Single Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
25	3.40	1.00	1.60	1.80	25	820	680	500	116x80
35	3.40	1.00	1.60	1.80	26	950	750	500	120x80
50	3.40	1.00	1.60	1.80	27	1100	830	500	125x80
70	3.40	1.00	1.60	1.80	29	1350	940	500	137x80
95	3.40	1.00	1.60	1.90	31	1650	1100	500	140x95
120	3.40	1.00	1.60	1.90	32	1900	1200	500	146x95
150	3.40	1.00	1.60	2.00	34	2200	1350	500	150x95
185	3.40	1.20	2.00	2.00	36	2700	1600	500	156x95
240	3.40	1.20	2.00	2.10	39	3300	1900	500	162x95
300	3.40	1.20	2.00	2.20	41	3950	2150	500	165x100
400	3.40	1.20	2.00	2.30	44	4850	2550	500	192x120
500	3.40	1.20	2.50	2.40	50	6100	3200	250	171x107
630	3.40	1.40	2.50	2.50	54	7600	3800	250	180x104
800	3.40	1.40	2.50	2.70	59	9400	4550	250	180x107
1000	3.40	1.60	2.50	2.80	63	11500	5400	250	187x119

**TABLE - 38**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.	Current Rating (Amps.)				
	Al.	Copper					With Copper Cond.	With Al. Cond.			
25	1.200	0.727	0.50	0.21	21	3.58	2.35	196	144	153	112
35	0.868	0.524	0.48	0.23	21	5.01	3.29	238	172	185	134
50	0.641	0.387	0.45	0.26	21	7.15	4.70	286	203	222	157
70	0.443	0.268	0.42	0.29	21	10.01	6.58	356	246	278	192
95	0.320	0.193	0.40	0.33	21	13.59	8.93	434	293	338	229
120	0.253	0.153	0.38	0.35	21	17.16	11.28	500	332	391	260
150	0.206	0.124	0.38	0.38	21	21.45	14.10	559	366	440	288
185	0.164	0.0991	0.36	0.42	21	26.46	17.39	637	410	504	324
240	0.125	0.0754	0.35	0.46	21	34.32	22.56	745	470	593	373
300	0.100	0.0601	0.34	0.50	21	42.90	28.20	846	524	677	419
400	0.0778	0.0470	0.32	.057	21	57.20	37.60	938	572	769	466
500	0.0605	0.0366	0.32	0.62	21	71.50	47.00	1090	710	760	566
630	0.0469	0.0283	0.31	0.70	21	90.09	59.22	1260	790	850	640
800	0.0367	0.0221	0.30	0.77	21	114.40	75.20	1410	910	960	720
1000	0.0291	0.0176	0.29	0.85	21	143.00	94.00	1610	1030	1100	800



### XLPE Insulated Armoured Three Core HT Cable

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen, XLPE Insulated. Ins. Semi-conducting screen, Metallic Screen, Filler Inner Coering, Round Steel Wire, armoured and PVC sheathed)

Type of Cable : N2XSEYRY/NA2XSEYRY

Rated Voltage : 6/10 (12) kV

Size Range : 25 to 400 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Red, Yellow & Blue

Type of Packing : Wooden Drum

Other specification and colour are available on request

### Construction

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Filler

Inner Covering

Galvanized Steel Round Wire Armour

Over Sheath - PVC

**TABLE - 39**

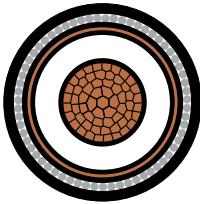
Technical Detail for Havells 6/10 (12) KV Three Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
25	3.40	1.20	2.00	2.30	44	3200	2800	500	171x100
35	3.40	1.40	2.50	2.50	48	4150	3550	500	177x107
50	3.40	1.40	2.50	2.50	51	4750	3900	500	192x120
70	3.40	1.40	2.50	2.70	54	5650	4450	250	180x104
95	3.40	1.40	2.50	2.80	58	6700	5000	250	186x107
120	3.40	1.60	2.50	2.90	62	7800	5650	250	190x107
150	3.40	1.60	2.50	3.00	65	8900	6250	250	190x120
185	3.40	1.60	2.50	3.10	69	10200	6900	250	195x120
240	3.40	1.60	3.15	3.30	75	13000	8700	200	195x120
300	3.40	1.80	3.15	3.50	81	15400	10000	200	200x128
400	3.40	1.80	3.15	3.70	88	18500	11600	200	210x128

**TABLE - 40**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.	Current Rating (Amps.)			
	Al.	Copper					With Copper Cond.	With Al. Cond.	Air 30°C	Ground 20°C
25	1.200	0.727	0.41	0.21	21	3.58	2.35	143	129	111
35	0.868	0.524	0.39	0.23	21	5.01	3.29	172	154	133
50	0.641	0.387	0.36	0.26	21	7.15	4.70	205	181	159
70	0.443	0.268	0.34	0.29	21	10.01	6.58	253	220	196
95	0.320	0.193	0.33	0.33	21	13.59	8.93	307	263	238
120	0.253	0.153	0.31	0.35	21	17.16	11.28	352	298	274
150	0.206	0.124	0.30	0.38	21	21.45	14.10	397	332	309
185	0.164	0.0991	0.30	0.42	21	26.46	17.39	453	374	354
240	0.125	0.0754	0.28	0.46	21	34.32	22.56	529	431	415
300	0.100	0.0601	0.28	0.50	21	42.90	28.20	599	482	472
400	0.0778	0.0470	0.27	0.55	21	57.20	37.60	683	541	545
										432



### XLPE Insulated Armoured Single Core HT Cable

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen, Metallic Screen, Separation Sheath, Round Al. Wire armoured and PVC sheathed)

Type of Cable : N2XHSYRaY/NA2XHSYRaY

Rated Voltage : 8.7/15 (17.5) kV

Size Range : 25 to 1000 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Natural

Type of Packing : Wooden Drum

Other specification and colour are available on request

### Construction

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Separation Sheath - PVC

Round Aluminium Wire Armour

Over Sheath - PVC

**TABLE - 41**

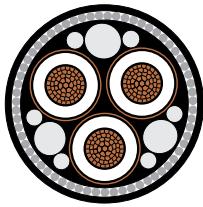
Technical Detail for Havells 8.7/15 (17.5) kV Single Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
25	4.50	1.00	1.60	1.80	27	930	780	500	125x80
35	4.50	1.00	1.60	1.80	28	1050	850	500	137x80
50	4.50	1.00	1.60	1.80	29	1200	950	500	140x80
70	4.50	1.00	1.60	1.90	31	1500	1100	500	146x80
95	4.50	1.00	1.60	1.90	33	1750	1200	500	150x80
120	4.50	1.00	2.00	2.00	35	2100	1400	500	155x80
150	4.50	1.20	2.00	2.10	37	2500	1600	500	156x95
185	4.50	1.20	2.00	2.10	39	2900	1800	500	165x100
240	4.50	1.20	2.00	2.20	41	3500	2050	500	171x100
300	4.50	1.20	2.00	2.30	43	4150	2350	500	177x107
400	4.50	1.20	2.50	2.40	48	5150	2850	500	192x120
500	4.50	1.40	2.50	2.50	53	6400	3500	250	176x104
630	4.50	1.40	2.50	2.60	57	7850	4050	250	180x104
800	4.50	1.40	2.50	2.80	61	9700	4800	250	187x120
1000	4.50	1.60	2.50	2.90	66	11700	5650	250	192x120

**TABLE - 42**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper				Copper	Al.	With Copper Cond.	With Al. Cond.		
	mH/KM	mF/KM	Air 30°C	Ground 20°C		Air 30°C	Ground 20°C	Air 30°C	Ground 20°C		
25	1.200	0.727	0.50	0.17	30.5	3.58	2.35	196	144	153	112
35	0.868	0.524	0.50	0.19	30.5	5.01	3.29	238	172	185	134
50	0.641	0.387	0.46	0.21	30.5	7.15	4.70	286	203	222	157
70	0.443	0.268	0.44	0.23	30.5	10.01	6.58	356	246	278	192
95	0.320	0.193	0.42	0.26	30.5	13.59	8.93	434	293	338	229
120	0.253	0.153	0.40	0.28	30.5	17.16	11.28	500	332	391	260
150	0.206	0.124	0.39	0.30	30.5	21.45	14.10	559	366	440	288
185	0.164	0.0991	0.38	0.33	30.5	26.46	17.16	637	410	504	324
240	0.125	0.0754	0.36	0.36	30.5	34.32	22.56	745	470	593	373
300	0.100	0.0601	0.35	0.40	30.5	42.90	28.20	846	524	677	419
400	0.0778	0.0470	0.34	.045	30.5	57.20	37.60	938	572	769	466
500	0.0605	0.0366	0.33	0.48	30.5	71.50	47.00	1090	710	760	566
630	0.0469	0.0283	0.32	0.54	30.5	90.09	59.22	1260	790	850	640
800	0.0367	0.0221	0.31	0.60	30.5	114.40	75.20	1410	910	960	720
1000	0.0291	0.0176	0.30	0.66	30.5	143.00	94.00	1610	1030	1100	800



### **XLPE Insulated Armoured Three Core HT Cable**

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen, Metallic Screen, Filler Inner Covering, Round Steel Wire armoured and PVC sheathed)

Type of Cable : N2XSEYRY/NA2XSEYRY

Rated Voltage : 8.7/15 (17.5) kV

Size Range : 25 to 300 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Red, Yellow & Blue

Type of Packing : Wooden Drum

Other specification and colour are available on request

### **Construction**

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Filler

Inner Covering

Galvanized Steel Round Wire Armour

Over Sheath - PVC

**TABLE - 43**

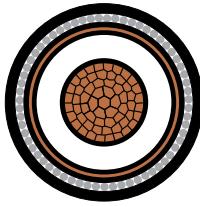
Technical Detail For Havells 8.7/15 (17.5) kV Three Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
25	4.50	1.40	2.50	2.50	50	4150	3700	500	180x107
35	4.50	1.40	2.50	2.60	53	4700	4100	250	176x104
50	4.50	1.40	2.50	2.70	56	5300	4500	250	180x104
70	4.50	1.60	2.50	2.80	60	6300	5100	250	185x107
95	4.50	1.60	2.50	3.00	64	7450	5750	250	187x120
120	4.50	1.60	2.50	3.10	67	8500	6350	250	190x120
150	4.50	1.60	2.50	3.20	70	9600	6950	250	195x120
185	4.50	1.60	3.15	3.30	75	11700	8400	250	195x128
240	4.50	1.80	3.15	3.50	81	14000	9700	200	207x128
300	4.50	1.80	3.15	3.60	86	16200	10800	200	210x128

**TABLE - 44**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.	Current Rating (Amps.)			
	Al.	Copper					With Copper Cond.	With Al. Cond.	Air 30°C	Ground 20°C
25	1.20	0.727	0.44	0.17	30.5	3.58	2.35	143	129	111
35	0.868	0.524	0.42	0.19	30.5	5.01	3.29	172	154	133
50	0.641	0.387	0.39	0.21	30.5	7.15	4.70	205	181	159
70	0.443	0.268	0.37	0.23	30.5	10.01	6.58	253	220	196
95	0.320	0.193	0.353	0.26	30.5	13.59	8.93	307	263	238
120	0.253	0.153	0.33	0.28	30.5	17.16	11.28	352	298	274
150	0.206	0.124	0.32	0.30	30.5	21.45	14.10	397	332	309
185	0.164	0.0991	0.31	0.33	30.5	26.46	17.16	453	374	354
240	0.125	0.0754	0.30	0.36	30.5	34.32	22.56	529	431	415
300	0.100	0.0601	0.29	0.40	30.5	42.90	28.20	599	482	472
										380



### XLPE Insulated Armoured Single Core HT Cable

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen, Metallic Screen, Separation Sheath, Round Al. Wire armoured and PVC sheathed)

Type of Cable : N2XHSYRaY/NA2XHSYRaY

Rated Voltage : 12/20 (24) kV

Size Range : 25 to 1000 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Natural

Type of Packing : Wooden Drum

Other specification and colour are available on request

### Construction

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Separation Sheath - PVC

Round Aluminium Wire Armour

Over Sheath - PVC

**TABLE - 45**

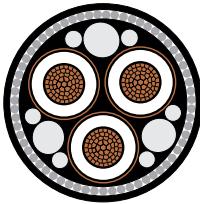
Technical Detail for Havells 12/20 (24) kV Single Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
25	5.50	1.00	1.60	1.80	29	1030	890	500	137x80
35	5.50	1.00	1.60	1.90	30	1170	970	500	140x80
50	5.50	1.00	1.60	1.90	32	1350	1070	500	146x95
70	5.50	1.00	1.60	2.00	33	1600	1200	500	150x95
95	5.50	1.00	2.00	2.00	36	1950	1400	500	158x95
120	5.50	1.20	2.00	2.10	38	2300	1600	500	167x95
150	5.50	1.20	2.00	2.10	39	2600	1750	500	165x100
185	5.50	1.20	2.00	2.20	41	3000	1950	500	171x100
240	5.50	1.20	2.00	2.30	43	3650	2200	500	177x107
300	5.50	1.20	2.00	2.30	46	4300	2500	500	180x107
400	5.50	1.40	2.50	2.50	51	5400	3100	250	195x120
500	5.50	1.40	2.50	2.60	55	6600	3700	250	180x104
630	5.50	1.40	2.50	2.70	59	8100	4300	250	180x110
800	5.50	1.60	2.50	2.80	64	9950	5050	250	187x120
1000	5.50	1.60	2.50	3.00	68	12000	5900	250	192x120

**TABLE - 46**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.	Current Rating (Amps.)				
	Al.	Copper					With Copper Cond.	With Al. Cond.			
25	1.20	0.727	0.52	0.15	42.0	3.58	2.35	196	144	153	112
35	0.868	0.524	0.51	0.17	42.0	5.01	3.29	238	172	185	134
50	0.641	0.387	0.48	0.18	42.0	7.15	4.70	286	203	222	157
70	0.443	0.268	0.46	0.20	42.0	10.01	6.58	356	246	278	192
95	0.320	0.193	0.43	0.22	42.0	13.59	8.93	434	293	338	229
120	0.253	0.153	0.41	0.24	42.0	17.16	11.28	500	332	391	260
150	0.206	0.124	0.40	0.26	42.0	21.45	14.10	559	366	440	288
185	0.164	0.0991	0.39	0.28	42.0	26.46	17.16	637	410	504	324
240	0.125	0.0754	0.37	0.31	42.0	34.32	22.56	745	470	593	373
300	0.100	0.0601	0.36	0.34	42.0	42.90	28.20	846	524	677	419
400	0.0778	0.0470	0.35	0.38	42.0	57.20	37.60	938	572	769	466
500	0.0605	0.0366	0.34	0.41	42.0	71.50	47.00	1090	710	760	566
630	0.0469	0.0283	0.33	0.45	42.0	90.09	59.22	1260	790	850	640
800	0.0367	0.0221	0.32	0.50	42.0	114.40	75.20	1410	910	960	720
1000	0.0291	0.0176	0.31	0.55	42.0	143.00	94.00	1610	1030	1100	800



### **XLPE Insulated Armoured Three Core HT Cable**

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen, Metallic Screen, Filler Inner Covering, Round Steel Wire armoured and PVC sheathed)

Type of Cable : N2XSEYRY/NA2XSEYRY

Rated Voltage : 12/20 (24) kV

Size Range : 35 to 300 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Red, Yellow & Blue

Type of Packing : Wooden Drum

Other specification and colour are available on request

### **Construction**

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Filler

Inner Covering

Galvanized Steel Round Wire Armour

Over Sheath - PVC

**TABLE - 47**

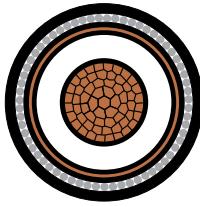
Technical Detail for Havells 12/20 (24) kV Three Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
35	5.50	1.40	2.50	2.80	58	5300	4650	500	210x130
50	5.50	1.60	2.50	2.90	61	6000	5200	250	182x120
70	5.50	1.60	2.50	3.00	65	6950	5700	250	187x120
95	5.50	1.60	2.50	3.10	68	8100	6400	250	190x120
120	5.50	1.60	2.50	3.20	71	9100	7000	250	190x120
150	5.50	1.80	3.15	3.40	77	11100	8500	200	190x120
185	5.50	1.80	3.15	3.50	81	12600	9300	200	195x128
240	5.50	1.80	3.15	3.60	86	14800	10500	200	200x130
300	5.50	1.80	3.15	3.80	91	17100	11600	200	220x130

**TABLE - 48**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.	Current Rating (Amps.)					
							With Copper Cond.		With Al. Cond.			
	Al.	Copper	mH/KM	mF/KM			Copper	Al.	Air 30°C	Ground 20°C		
35	0.868	0.524	0.43	0.17	42.0	5.01	3.29	172	154	133	119	
50	0.641	0.387	0.40	0.18	42.0	7.15	4.70	205	181	159	140	
70	0.443	0.268	0.38	0.20	42.0	10.01	6.58	253	220	196	171	
95	0.320	0.193	0.36	0.22	42.0	13.59	8.93	307	263	238	204	
120	0.253	0.153	0.35	0.24	42.0	17.16	11.28	352	298	274	232	
150	0.206	0.124	0.34	0.26	42.0	21.45	14.10	397	332	309	259	
185	0.164	0.0991	0.33	0.28	42.0	26.46	17.16	453	374	354	293	
240	0.125	0.0754	0.31	0.31	42.0	34.32	22.56	529	431	415	338	
300	0.100	0.0601	0.30	0.34	42.0	42.90	28.20	599	482	472	380	



### XLPE Insulated Armoured Single Core HT Cable

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen, Metallic Screen, Separation Sheath, Round Al. Wire armoured and PVC sheathed)

Type of Cable : N2XHSYRaY/NA2XHSYRaY

Rated Voltage : 18/30 (36) kV

Size Range : 50 to 1000 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Natural

Type of Packing : Wooden Drum

Other specification and colour are available on request

### Construction

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Separation Sheath - PVC

Round Aluminium Wire Armour

Over Sheath - PVC

**TABLE - 49**

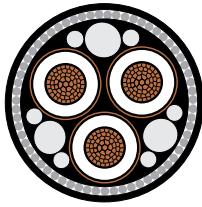
Technical Detail for Havells 18/30 (36) kV Single Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
50	8.0	1.2	2.00	2.1	38	1800	1500	500	162x95
70	8.0	1.2	2.00	2.2	40	2050	1650	500	165x100
95	8.0	1.2	2.00	2.2	41	2400	1850	500	171x100
120	8.0	1.2	2.00	2.3	43	2700	2000	500	180x107
150	8.0	1.2	2.00	2.3	45	3000	2150	500	182x110
185	8.0	1.2	2.50	2.4	47	3550	2500	500	192x120
240	8.0	1.4	2.50	2.5	50	4300	2900	500	195x120
300	8.0	1.4	2.50	2.6	53	5000	3200	500	207x128
400	8.0	1.4	2.50	2.7	56	5950	3650	500	180x104
500	8.0	1.4	2.50	2.8	60	7200	4250	250	187x120
630	8.0	1.6	2.50	2.9	65	8700	4900	250	187x120
800	8.0	1.6	2.50	3.0	69	10600	5700	250	195x120
1000	8.0	1.6	2.50	3.1	73	12600	6500	250	195x130

**TABLE - 50**

#### Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper				Copper	Al.	With Copper Cond.	With Al. Cond.		
	mH/KM	mF/KM	Air 30°C	Ground 20°C		Air 30°C	Ground 20°C	Air 30°C	Ground 20°C		
50	0.641	0.387	0.51	0.14	63	7.15	4.70	286	203	222	157
70	0.443	0.268	0.49	0.16	63	10.01	6.58	356	246	278	192
95	0.320	0.193	0.46	0.17	63	13.59	8.93	434	293	338	229
120	0.253	0.153	0.44	0.18	63	17.16	11.28	500	332	391	260
150	0.206	0.124	0.43	0.20	63	21.45	14.10	559	366	440	288
185	0.164	0.0991	0.42	0.21	63	26.46	17.39	637	410	504	324
240	0.125	0.0754	0.40	0.23	63	34.32	22.56	745	470	593	373
300	0.100	0.0601	0.39	0.25	63	42.90	28.20	846	524	677	419
400	0.0778	0.0470	0.37	.028	63	57.20	37.60	938	572	769	466
500	0.0605	0.0366	0.36	0.30	63	71.50	47.00	1090	710	760	566
630	0.0469	0.0283	0.35	0.33	63	90.09	59.22	1260	790	850	640
800	0.0367	0.0221	0.33	0.36	63	114.40	75.20	1410	910	960	720
1000	0.0291	0.0176	0.32	0.40	63	143.00	94.00	1610	1030	1100	800



### XLPE Insulated Armoured Three Core HT Cable

(Cu/Al. Conductor, Semi-conducting Screen, XLPE Insulated, Ins. Semi-conducting Screen, Metallic Screen, Filler Inner Covering, Round Steel Wire armoured and PVC sheathed)

Type of Cable : N2XSEYRY/NA2XSEYRY

Rated Voltage : 18/30 (36) kV

Size Range : 50 to 300 mm<sup>2</sup>

Specification : IEC-60502-2

Application : For Electric Power Circuit

Identification of Core : Red, Yellow & Blue

Type of Packing : Wooden Drum

Other specification and colour are available on request

### Construction

Conductor - Copper/Aluminium

Semi Conducting Conductor Screen

XLPE Insulation

Semi-Conducting Insulation Screen

Metallic Screen

Filler

Inner Covering

Galvanized Steel Round Wire Armour

Over Sheath - PVC

**TABLE - 51**

Technical Detail for Havells 18/30 (36) kV Three Core, Copper/Alum Cond., XLPE Insulated, Armoured Cable as per IEC-60502-2

Conductor Nominal Area (sq. mm)	Nominal Insulation Thickness (mm)	Approx. Inner Covering Thickness (mm)	Nominal Armour Wire Size (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Diameter (mm)	Overall weight Approx. (kgs.km)		Standard Drum length mts	Packing Dimensions Diameter X Width cm x cm
						Copper	Aluminum		
50	8.00	1.60	2.50	3.30	73	7650	6800	250	200x128
70	8.00	1.80	3.15	3.40	78	9500	8300	250	210x130
95	8.00	1.80	3.15	3.50	82	10700	9000	250	215x130
120	8.00	1.80	3.15	3.60	85	11900	9800	250	220x130
150	8.00	1.80	3.15	3.70	89	13100	10500	250	225x130
185	8.00	1.80	3.15	3.90	92	14600	11300	200	220x130
240	8.00	1.80	3.15	4.00	97	16800	12500	200	225x130
300	8.00	2.00	3.15	4.20	103	19400	13900	200	230x130

**TABLE - 52**

## Electrical Characteristics

Conductor Nominal Area (sq. mm)	Max. Cond. resistance at 20°C in OHM/KM		Inductance of cable	Capacitance of cable	A.C. with-stand Voltage KV/5 Min.	Short Circuit Rating of Cable for 1 Sec. in K. Amps.		Current Rating (Amps.)			
	Al.	Copper				Copper	Al.	With Copper Cond.	With Al. Cond.		
	mH/KM	mF/KM	Air 30°C	Ground 20°C		Air 30°C	Ground 20°C	Air 30°C	Ground 20°C		
50	0.641	0.387	0.45	0.14	63.0	7.15	4.70	205	181	159	140
70	0.443	0.268	0.42	0.16	63.0	10.01	6.58	253	220	196	171
95	0.320	0.193	0.40	0.17	63.0	13.59	8.93	307	263	238	204
120	0.253	0.153	0.38	0.18	63.0	17.16	11.28	352	298	274	232
150	0.206	0.124	0.37	0.20	63.0	21.45	14.10	397	332	309	259
185	0.164	0.0991	0.36	0.21	63.0	26.46	17.16	453	374	354	293
240	0.125	0.0754	0.34	0.23	63.0	34.32	22.56	529	431	415	338
300	0.100	0.0601	0.33	0.25	63.0	42.90	28.20	599	482	472	380

**BASIC ASSUMPTION FOR CURRENT RATINGS\***

The current ratings of cables as indicated in various table have been calculated on certain assured conditions in actual practice these conditions may be different. Therefore to determine the actual current rating as per installation conditions, the tabulated rating shall be multiplied with appropriate factor.

## a) Basic Assumption for current Ratings

- i) Maximum permissible temperature for XLPE insulation 90°C
- ii) Ground temperature 20°C
- iii) Ambient temperaturae 30°C
- iv) Thermal resistivity of soil 1.5 K·m/W
- v) Depth of laying 0.7 Mtr
- vi) Single core cable installed in one circuit in following arrangement.
- vii) Multi core cables installed in single circuitl.

**b) Rating Factor**

## i) Rating factor related to variation in ambient air temperature

Air Temperature in Deg. C	20	25	30	35	40	45	50	55	60
Rating factor	1.08	1.04	1.00	0.96	0.91	0.87	0.82	0.76	0.71

## ii) Rating factor related to variation in ground temperature

Ground Temperature in Deg. C	10	15	20	25	30	35	40	45	50
Rating factor	1.07	1.04	1.00	0.96	0.93	0.89	0.85	0.80	0.76

## Correction factors for depths of laying for direct buried cables

Depth of laying m	Single-core cables		Three-core cables	
	Nominal conductor size mm <sup>2</sup>			
	≤ 185 mm <sup>2</sup>	> 185 mm <sup>2</sup>		
0.5	1.04	1.06	1.04	
0.6	1.02	1.04	1.03	
0.8	1.00	1.00	1.00	
1.0	0.98	0.97	0.98	
1.25	0.96	0.95	0.96	
1.5	0.95	0.93	0.95	
1.75	0.94	0.91	0.94	
2.0	0.93	0.90	0.93	
2.5	0.91	0.88	0.91	
3.0	0.90	0.86	0.90	

## Correction factors for depths of laying for cables in ducts

Depth of laying m	Single-core cables		Three-core cables	
	Nominal conductor size mm <sup>2</sup>			
	≤ 185 mm <sup>2</sup>	> 185 mm <sup>2</sup>		
0.5	1.04	1.05	1.03	
0.6	1.02	1.03	1.02	
0.8	1.00	1.00	1.00	
1.0	0.98	0.97	0.99	
1.25	0.96	0.95	0.97	
1.5	0.95	0.93	0.96	
1.75	0.94	0.92	0.95	
2.0	0.93	0.91	0.94	
2.5	0.91	0.89	0.93	
3.0	0.90	0.88	0.92	

Correction factors for soil thermal resistivities for direct buried single-core cables

Nominal area of conductor mm <sup>2</sup>	Values of soil thermal resistivity K·m/W							
	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0
16	1.29	1.24	1.19	1.15	1.00	0.89	0.82	0.75
25	1.30	1.25	1.20	1.16	1.00	0.89	0.81	0.75
35	1.30	1.25	1.21	1.16	1.00	0.89	0.81	0.75
50	1.32	1.26	1.21	1.16	1.00	0.89	0.81	0.74
70	1.33	1.27	1.22	1.17	1.00	0.89	0.81	0.74
95	1.34	1.28	1.22	1.18	1.00	0.89	0.80	0.74
120	1.34	1.28	1.22	1.18	1.00	0.88	0.80	0.74
150	1.35	1.28	1.23	1.18	1.00	0.88	0.80	0.74
185	1.35	1.29	1.23	1.18	1.00	0.88	0.80	0.74
240	1.36	1.29	1.23	1.18	1.00	0.88	0.80	0.73
300	1.36	1.30	1.24	1.19	1.00	0.88	0.80	0.73
400	1.37	1.30	1.24	1.19	1.00	0.88	0.79	0.73

## v) Ground Rating Factor

## i) Cable laid direct in ground

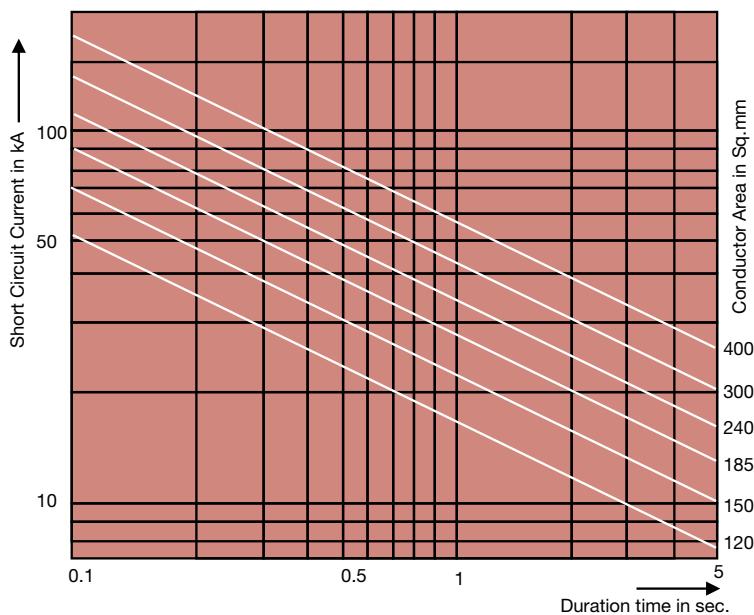
No. of cables/circuit in group		2	3	4	6
	Touching	0.79	0.69	0.62	0.54
Multicope cables in	S=15cm	0.82	0.72	0.66	0.59
Horizontal formation	S=30cm	0.86	0.76	0.72	0.65
	Touching	-	-	0.60	0.51
Multicore cables in	S=15cm	-	-	0.64	0.55
Tier formation	S=30cm	-	-	0.69	0.60
	Touching	0.78	0.68	0.61	0.53
Single core cables in trefoil	S=15cm	0.82	0.71	0.65	0.57
Touching for motor	S=30cm	0.85	0.76	0.71	0.65

## ii) Cable laid in racks/air

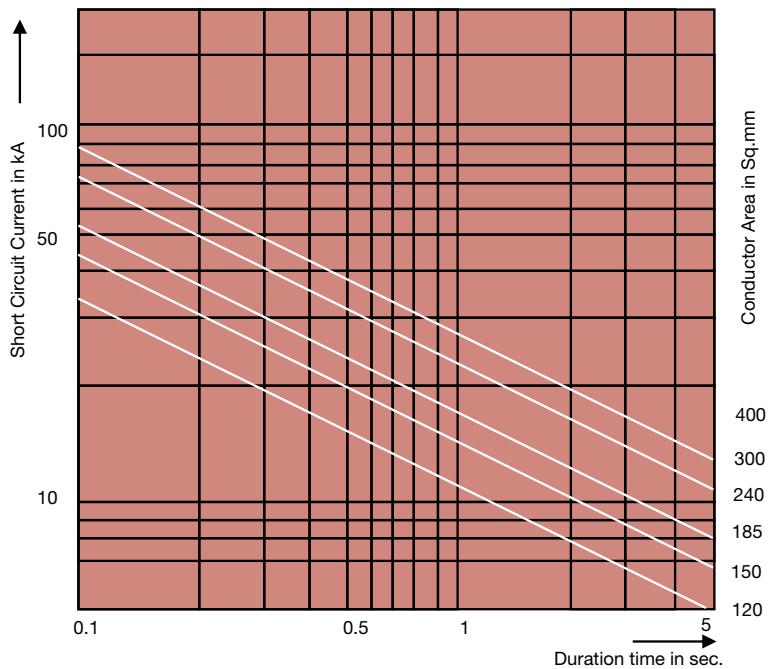
No. of cables/circuit in group			1	2	3	4
Multicope cables (Touching)	No. of Cable in Racks	1	1.00	0.84	0.80	0.76
		2	1.00	0.80	0.76	0.71
		3	1.00	0.78	0.74	0.70
		4	1.00	0.76	0.72	0.68
Multi cables (Spacing of Cable equal to diameter of Cable)	No. of Cable in Racks	1	1.00	0.98	0.96	0.93
		2	1.00	0.95	0.96	0.93
		3	1.00	0.94	0.92	0.89
		4	1.00	0.93	0.90	0.87
S/core cable in trefoil touching formation (spacing between circuits equal to twice the diameter of cable)	No. of Cable in Racks	1	1.00	0.98	0.96	-
		2	1.00	0.95	0.93	-
		3	1.00	0.94	0.92	-
		4	1.00	0.93	0.90	-

## SHORT CIRCUIT CURRENT

Short Circuit (Copper Conductor)



Short Circuit (Aluminium Conductor)



The short circuit ratings (r.m.s. values) of XLPE insulated cables have been calculated on the following assumptions.

1. Conductor temperature 90°C prior to short circuit
2. Max permissible temperature 250°C during short circuit
3. Specific gravity
  - a. Copper 8.89 gm/cc
  - b. Aluminium 2.703 gm/cc
4. Resistivity
  - a. Copper 17.241x10<sup>-6</sup> mm
  - b. Aluminium 28.264x10<sup>-6</sup> mm

The maximum short circuit current is calculated with the following formula.

Where  $I_{sh} = r \cdot ms.$  value of short circuit current (kA)  
 $K =$  a constant (0.143 & 0.094 for copper & aluminum respectively)

A- nominal area of the conductor ( $mm^2$ )  
t- duration of the short circuit (sec.)

## Handling & Storage

### Handling (Unloading at site)

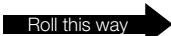
On receipt of cable drum visual inspection of drums should be made ensuring drum packing is original. While unloading the cables certain precautions are to be taken to ensure the safety of the cable.

1. The cable drum should not be dropped or thrown from railway wagons or trucks during unloading operations as the shock may cause serious damage to cable layers. A crane should be used for unloading cable drums. When lifting drums with the crane, it is recommended that the lagging should be kept in place to prevent the flanges from crushing on to the cable. If the crane is not available a ramp should be prepared with approximate inclination of 1:3 or 1:4. The cable drum should be rolled over the ramp by means of ropes and winches. Additionally a sand bed at the foot of the ramp may be prepared to brake the rolling he cable drum.

2. Cable should not be dragged along the earth surface.

3. Cable ends should always be sealed by means of suitable end sealing materials to prevent moisturisation of cores and amour.

4. Drum should be rolled in direction of arrow marked on the drum.

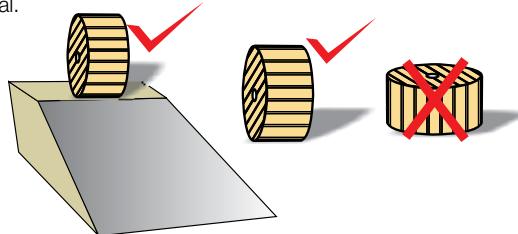


### Storage:

Cable should be stored in drum covered place to prevent exposure to climatic conditons and tear of wooden drum and it should preferably on a concrete surace/firm surce which will not cause to drums to sink and thus lead to flange rot and extreme difficulty in moving the drum.

All drum shoudl be stored in such a manner as to leave sufficient space battens placed directly under the flanges.

In no case should the drums be stored. "On the Flat", i.e., with flange horizontal.

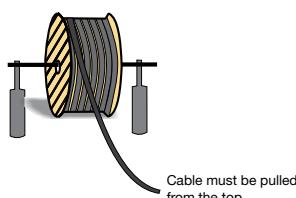


### Laying:

For laying of cable special cares to taken to prevent sharp bending, kinking, twisting. Cables hould be unwound from drum by proper mounting the cable drum on a cable wheel making sure the spindle is strong enough to carry the weight without bending and that it is lying horizontally in bearings as to prevent the drum creeping to one side or the other while it is rotating.

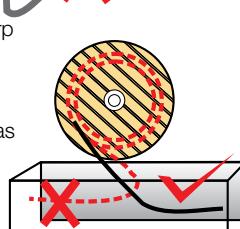
Provision should be make to break the drum to avoid further rolling & buckling of cable during sudden stop. A simple wooden plank can server this purpose.

This is incorrect way of pulling the cable & will cause kinks & twist in cable.  
Shall be avoided at all



Cable must be pulled across hard & sharp objects to avoid the damage of PVC covering & insulation.

Cable must be laid in ducts or trenches as shown in Fig.



However following salien points are to be considered during laying procedure of cable laid in racks and in built-in trenches.

1. For laying of cable power cables to be placed at the bottom most layer and control cables at top most layer.

2. Single core power cable for use on AC system shall be laid in delta formation supported by non-magnetic material. Trefoil clamps of suitable size are to be placed at regular intervals but preferably not more then 800mm. Axial spacing of two circuits in delta formation shall not be less then 4 times the cable dia.

Multicore control cables can be laid single core DC circuits may be clamped by means of galvanized mild steel saddles but 1.1 kV single core cables should be clamped by means of non-magnetic sadles. The saddles shall not be placed at intervals more then 100 mm. for horizontal and 1200 mm for vertical runs.

3. Multicore control cables can be laid touching each other on cable racks and wherever required may be taken in two layer. They should be calmed by means of PVC straps both for horizontal and vertical runs (alternatively, fabricated aluminium clamps may be use) at regular intervals.

4. a) If the cables are buried directly in ground 1.5. 1255 is to be followed for code of practice. However generally cables are laid 1000mm. below finished ground level at any point of cable run at 75mm of sand cushioning to be provided.

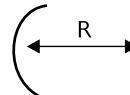
b) In loose soil concrete pillar should be provided for as support and hence pipes are recommended to the used for cable path.

5. If there is a possibility of mechanical damage, cables should be protected by means of mild steel cover place on racks.

6. While laying cables, special care to be taken at bends. Followings are recommended bending radius for power and control cables.

Voltage Rating kV	PVC and XLPE Cables	
	Single Core	Multicore
Upto 1.1 kV	15D	12D
Above 1.1 but upto 11 kV	15D	15D
Above 11 kV	20D	15D

Where 'D' is overall diameter of cable



7. Maximum safe pulling force (when pilled by pulling eye) Aluminium Conductor Cables: 3.0 Kg/MM<sup>2</sup> Copper conductor cables: 5.0 Kg/MM<sup>2</sup> Proper method of pulling of cable should be used.

### TESTING

#### Insulation resistance measurement of cable

The voltage rating of I.R. Tested (Megger)

Should be chosen as following table:

Voltage grade of Cable	Rating of IR Tester (Megger)	Voltage grade of Cable	Rating of IR Tester (Megger)
1.1 kV	500V	11 kV	1000
3.3 kV	1000	22 kV	2500
6.6 kV	1000	33 kV	2500

#### Testing during laying:

All new cables shall be megger-tested before joining. After jointing is completed all LV cables shall be megger-tested.

#### End Termination & Jointing:

Termination and jointing of power and control cables shall be done by means of compression method using solder-less tinned copper/Aluminium terminal lugs. For controls terminals, ring tongue of reducer pin type terminal lug can be used to suit the purpose.

# List of Major Customer

## SECTOR -1 GOVERNMENT ORGANIZATION

S. No.	Name of Customer	S. No.	Name of Customer
1	Engineers India Ltd	11	Department of Atomic Energy
2	NTPC	12	Airport Authority of India
3	NHPC	13	Electricity Department, UT Chandigarh
4	BHEL	14	NDMC
5	Power Grid Corporation of India Ltd.	15	EPIL
6	Steel Authority Of India	16	Electricity Department, Pondicherry
7	Eastern Railway, Fairlie Place, Kolkata	17	NTECL Vallor
8	Nuclear Power Corporation Ltd.	18	Aravali Power Corporation Ltd. (IGSTPP)
9	BEST Bombay	19	Durgapur Power Ltd.
10	Damodar Valley Corporation, kolkata	20	GETCO - Gujarat Energy Transmission Corporation

## STATE ELECTRICITY BOARD

S. No.	Name of Customer	S. No.	Name of Customer
1	Jaipur Vidhyut Vitran Nigam Limited	19	Uttarkhand Power Corporation Ltd.
2	Jodhpur Vidhyut Vitran Nigam Limited	20	MVNL, Lucknow
3	Rajasthan Rajya Vidhyut Vitran Nigam Limited	21	PUVNL , Varanasi
4	Ajmer Vidhyut Vitran Nigam Limited	22	PVVNL, Meerut
5	Kerela State Electricity Board	23	DVVNL, Agra
6	Madhya Pradesh State Electricity Board	24	CPDCL of AP Itd, Hyderabad
7	Gujrat Energy Transmission Corporation Itd.	25	APGENCO of AP Itd, Hyderabad
8	Uttar Gujurat Vij company Itd.	26	EPDCL of AP Itd, Vishakhapatnam
9	Dakshin Gujurat Vij company Itd.	27	NPDCL of AP Itd, Warangal
10	Paschim Gujurat Vij company Itd.	28	DPDCL of AP Itd, Tripuri
11	Madhya Gujurat Vij company Itd.	29	WBSECL
12	Maharastra State electricity Distribution Corporation Itd.	30	North Delhi Power Limited, New Delhi
13	Maharastra State electricity Generation Corporation Itd.	31	CESC Limited
14	Maharastra State electricity Transmission Corp.	32	TANGEDCO
15	Uttar Haryana Bijli Vitran Nigam, Ltd.	33	BSES Limited
16	Dakshin Haryana Bijli Vitran Nigam, Ltd.	34	HPSEB
17	BESCOM , Bangalore	35	NTECL , Chennai
18	Noida Power Corporation Ltd.		

## SECTOR - 2 OIL & GAS CORPORATION

S. No.	Name of Customer	S. No.	Name of Customer
1	Indian Oil Corporation Ltd	10	MRPL , Mangalore
2	IOCL- PIPE LINE PROJECT	11	CPCL, Chennai
3	IOCL - REFINERY (8 Cities)	12	Boingaigaon Refinery & Petro Ltd. Assam
4	Gas Authority of India Ltd.	13	Haldia Perto Chemicals
5	Bharat Petroleum Corporation Ltd.	14	Reliance Industries Itd.
6	Hindustan Petroleum Corporation Ltd.	15	Reliance Petroleum Itd.
7	Mittal Petroleum	16	Kochi Petroleum Itd.
8	Oil India Ltd.	17	ESSAR Oil
9	Numaligarh Refinery Ltd.		

## SECTOR - 3 CEMENT

S. No.	Name of Customer	S. No.	Name of Customer
1	ACC cement	7	Aditya birla Cement
2	Amrit Cement	8	Adhunik Cement
3	Vicat Sagar Cement	9	Mysore Cement
4	Raghuram Cement	10	L & T Cement
5	Ultratec Cement	11	Grasim Cement
6	JP Cement	12	Shree Cement, Beawar, Ajmer

**SECTOR - 4 CORPORATE HOUSES**

S. No.	Name of Customer	S. No.	Name of Customer
1	Reliance Energy	8	JSW Steel
2	Jai Prakash Industries Ltd. , New Delhi	9	TATA Steel
3	Monenet Ispat & Energy Ltd.	10	VISA Steel
4	Grasim Industries Ltd.	11	INDUS BUILDWELL Ltd.
5	Jindal Steel & Power	12	Schneider electric
6	BILT graphics paper products ltd.	13	Adani Group
7	Welspun, Mumbai		

**SECTOR - 5 PROMINENT EXPORT CUSTOMERS**

S. No.	Name of Customer	S. No.	Name of Customer
1	Ethio Cement, Ethiopia	23	Indorama Petrochemicals Ltd., Nigeria
2	Mohan Energy Corporation Ltd.	24	Hoima Sugar, Uganda
3	Angelique International,	25	Kakira Sugar, Uganda
4	Inter Trade Commercial services TANESCO, Tanzania	26	Abacus Parental, Uganda
5	Afghan Solar, Afghanistan	27	Technofab Engineering, (for Tanzania)
6	VEETEK Nigeria	28	World Trade Center, Nigeria
7	SKIPPER SEIL LTD. (for Nigeria)	29	Varun Beverages, Zambia
8	Arun Fabricators, Mauritius	30	Geo Steel, LLC, Georgia
9	African Commodities Dubai (for Nigeria)	31	Kati Substation, Mali
10	Duraplast INC, Liberia	32	NET Health Ltd., Tanzania
11	Yangaon Transformers, Myanmar	33	VA Tech Wabag, (for Nepal)
12	National Cement Co., Kenya	34	Toshiba Plant Systems Corporation, Japan
13	Kinyara Sugar, Uganda	35	Kolam International, D.R. Congo
14	Silver Spring, Uganda	36	Nithya Paper, Sri Lanka
15	Supereme Electricals, Kolkata (for Nigeria)	37	Lanka Nature, Sri Lanka
16	Roofings & Rolling mills , Uganda	38	OLAM, DRC
17	Sameer Agriculture Kenya	39	Pioneer Cement, Dubai
18	Maisha Mubati, Uganda	40	GSEZ, Gabon
19	NIPP/PHCN, Nigeria	41	KHD Humboldt, (for Shivam Cement, Nepal)
20	Polygroup, Ghana	42	Alacrity Productions Systems Ltd., Nigeria
21	Toyo Engineering Ltd., Japan	43	Dengote Refinery, Nigeria
22	Indorama ELEME Fertilizers & Chemicals Ltd., Nigeria	44	CLAIRE Engineers Pvt. Ltd., (for Sudan)

**SECTOR - 6 EPC CONTRACTORS**

S. No.	Name of Customer	S. No.	Name of Customer
1	ABB Limited	7	Alstom - Power Automation Systems
2	Larsen & Toubro - ECC	8	ESSAR Projects
3	Siemens	9	Sterling & Willson
4	Mcnally Bharat	10	Punj Lloyd
5	Sudhir Power projects Ltd.	11	Areva T & D Ltd.
6	A 2 Z maintainence and constuctions	12	Thyssenkrupp, Pune

**SECTOR - 7 FERTILIZER**

S. No.	Name of Customer	S. No.	Name of Customer
1	National Fertilizer Ltd.	4	IFFCO
2	ESSAR ( Fertilizer)	5	Kanpur Fertilizers
3	Matrix		

## NOTE





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.

ZHOMC00006/NOV18/DEC21



### Havells India Ltd. (Export Division)

Corp Office: QRG Towers, 2D, Sector-126, Expressway, Noida-201304 (U.P), Ph. +91-120-3331000,  
E-mail: ibdteam@havells.com, www.havells.com

Join us on Facebook at [www.facebook.com/havells](https://www.facebook.com/havells) and share your ways to save the planet!

CIN - L31900DL1983PLC016304

### Havells Middle East (Branch)

4A-523 (East Wing), Dubai Airport Free Zone, P.O. Box-371143, Dubai, United Arab Emirates,  
Tel: +97142991422



**HAVELLS**