HAVELLS

LT/HT Power & Control Cables

Catalogue 2019

- HT Power Cables upto 66 kV
- 1.1 kV Power Cables
- 1.1 kV Copper Control Cables

NABL

OHSAS 18001 SAFETY SYSTEM CERTIFICATION

ISO 9001 QUALITY SYSTEM CERTIFICATION

ISO 14001 ENVIRONMENTAL SYSTEM CERTIFICATION

QRG GROUP

NABL

National Accreditation Board for Testing and Calibration Laboratories

Department of Science & Technology, India

CERTIFICATE OF ACCREDITATION

HAVELLS INDIA LIMITED

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2005

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

A-461/462 & SP-215, M.I.A. Alwar, Rajasthan

in the discipline of

ELECTRICAL TESTING

Certificate Number T-2038

Issue Date 05/08/2013

Valid Until 04/08/2015

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the additional requirements of NABL.

Signed for and on behalf of NABL

Mallika Gupta, Convenor — Anil Relia, Doctor — Dr T. Ramasami, Chairman

DNV

DET NORSKE VERITAS

MANAGEMENT SYSTEM CERTIFICATE

Certificate No. 4437-2007-AQ-IND-RvA Rev. 02

This is to certify that

HAVELLS INDIA LIMITED

at

Works:- A-461/462, 204A & SP-215, MIA, Alwar - 301 030, Rajasthan, INDIA
Corporate Office:- QRG Tower, 2D, Sector 126, Express Highway, Noida - 201 304, INDIA

has been found to conform to the Quality Management System Standard:

ISO 9001:2008

This certificate is valid for the following scope:

DESIGN, MANUFACTURE, SERVICING & SUPPLY OF LT POWER CABLES, HT POWER CABLES UP TO 66 KV, CONTROL CABLES AND DOMESTIC WIRE CABLES

Initial Certification date: 27 March 1997
This Certificate is valid until: 26 March 2015
The audit has been performed under the supervision of: Anil Kumar, Lead Auditor

Place and date of issue: Chennai, 28 March 2012
for the Accredited Unit: DET NORSKE VERITAS CERTIFICATION B.V., THE NETHERLANDS
Bhupalam Ajit, Management Representative

DNV

DNV BUSINESS ASSURANCE

MANAGEMENT SYSTEM CERTIFICATE

Certificate No. 133295-2013-AE-IND-RvA

This is to certify that

HAVELLS INDIA LIMITED

at

A 461 & 462 MIA, Alwar - 301 030, Rajasthan, INDIA

has been found to conform to the Environmental Management System Standard:

ISO 14001:2004

This certificate is valid for the following scope:

DESIGN, MANUFACTURE AND SUPPLY OF LT POWER CABLES, HT POWER CABLES UPTO 66KV, CONTROL CABLES AND DOMESTIC WIRE CABLES

Initial Certification date: 30 April 2013
This Certificate is valid until: 29 April 2016
The audit has been performed under the supervision of: Anil Gupta, Lead Auditor

Place and date of issue: Chennai, 04 May 2013
for the Accredited Unit: DET NORSKE VERITAS CERTIFICATION B.V., THE NETHERLANDS
Bhupalam Ajit, Management Representative

DNV

DNV BUSINESS ASSURANCE

MANAGEMENT SYSTEM CERTIFICATE

Certificate No. 133295-2013-HSO-IND-DNV

This is to certify that

HAVELLS INDIA LIMITED

at

A 461 & 462 MIA, Alwar - 301 030, Rajasthan, INDIA

has been found to conform to the Occupational Health and Safety Management System Standard:

OHSAS 18001:2007

This certificate is valid for the following scope:

DESIGN, MANUFACTURE AND SUPPLY OF LT POWER CABLES, HT POWER CABLES UPTO 66KV, CONTROL CABLES AND DOMESTIC WIRE CABLES

Initial Certification date: 30 April 2013
This Certificate is valid until: 29 April 2016
The audit has been performed under the supervision of: Anil Gupta, Lead Auditor

Place and date of issue: Chennai, 04 May 2013
for the Certifying Unit: DET NORSKE VERITAS, MUMBAI, INDIA
Bhupalam Ajit, Management Representative

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

NABL

SAFETY SYSTEM CERTIFICATION OHSAS 18001 DNV

QUALITY SYSTEM CERTIFICATION ISO 9001 DNV

ENVIRONMENTAL SYSTEM CERTIFICATION ISO 14001 DNV

BASEC ISO 9001 004 CERTIFICATE NO: CS1-207

ABOUT HAVELLS

A company with an unflinching commitment to quality, innovation, and customer satisfaction, Havells India Limited has today emerged as a dominant player in the Fast Moving Electrical Goods industry. The company manufactures a number of products ranging from Cables, Wires and Switchgear in domestic and industrial segments, to Fans, Water Heaters, Small Appliances, Air coolers, Personal Grooming, Home Automation, Switches, LED lighting & fixtures in the consumer facing segments. With the acquisition of Lloyd, and the entry into the Water Purifier category, the company has become a fine example of successful transition and transformation from a Fast Moving Electrical Goods manufacturer to a true Consumer Durables company, steadily spreading its operations across India.

Havells started its operations in the 1970s and since then, the company has used a judicious mix of organic growth and inorganic opportunities to boost revenues and scale up business. The company today owns a range of established and prestigious brands like Havells, Lloyd, Crabtree and Standard that are sold through its extensive network of dealers and retailers spread across the country. Havells has 12 state-of-the-art manufacturing units in the country located at Haridwar, Baddi, Sahibabad, Faridabad, Assam, Alwar and Neemrana. These units manufacture globally acclaimed products, synonymous with excellence and precision.

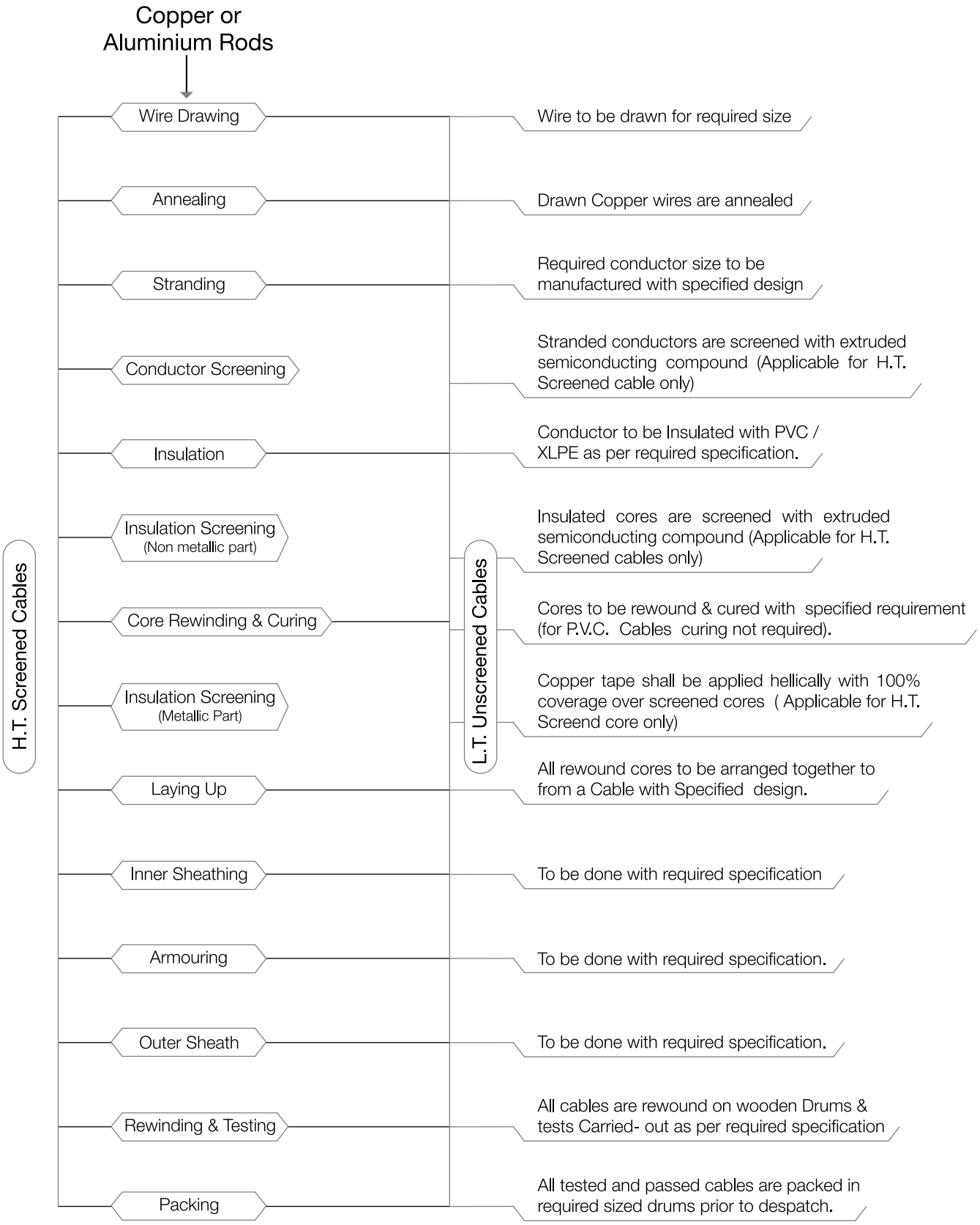
The company has acquired a number of certifications, like BASEC, UL, ISO 9001, ISO 14001, ISO 18001, ISO 50001 for the Cable Plant, Our Test laboratory has the NABL accreditation for testing of cables and calibration of testing equipment. Today, Havells and its brands have emerged as the preferred choice of electrical products for discerning individuals and industrial consumers both in India and abroad.

The company has a strong domestic presence with 40 offices employing close to 6,500 professionals across the country supported by over 7,600 dealers and distributors with world-class service network in 400 cities across India. Given the enormous size, scale and reach of the operations, Havells today boats of 415 exclusive brands shop known as Havells Galaxies to provide better shopping experience to our consumers.

Index

Details for BIS Licences		
For PVC Cables	**For XLPE Cables**	**For 66 kV Cables**
IS 1554 (Part-1), 1988 CM/L No.: 81579 82	IS 7098 (Part-1), 1988 CM/L No.: 81896 92	IS 7098 (Part- 3) CM/L No: 3098967
IS 1554 (Part-2), 1988 CM/L No.: 82594 85	IS 7098 (Part-2), 1985 CM/L No.: 83683 89	

Manufacturing Process



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 16 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 IS 7098 Part 2.
Insulation	Insulation screening shall consist of non-metalic
Screen	Part in combination with metalic part. Non metalic part shall consist of either semi conducting compound tape applied hellically or extruded layer of semi conducting compound, applied directly over insulation. Over this, metalic part (copper tape) shall be applied hellically with overlap as per IS 7098 Part 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-metalic part) in one operation through tripple 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 pf 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 deleteriocus 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 Cables	IS 1554 (Part-I & II)
	For XLPE Cables	IS 7098 (Part-I & II)

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 IS 3975.

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 Retartant Compound (FR)	to EIL Specn.

Ultra Voilet 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 specifications IS 5831.

Advantage

In order to be identified, Havells Cables have their name embossed/printed/ indented on outersheath 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 characterstics.

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 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.

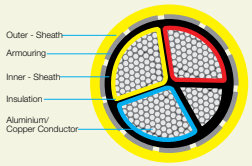
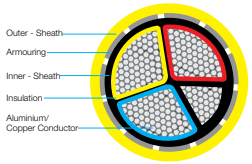
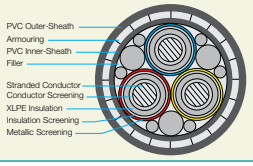
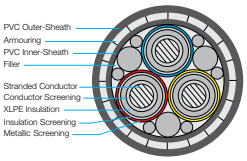
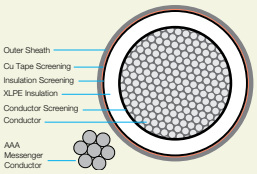
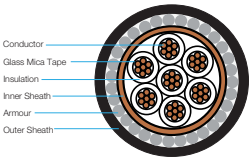
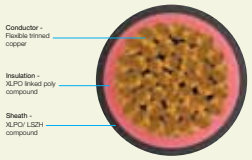
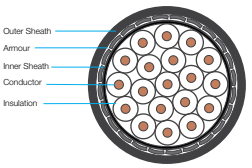
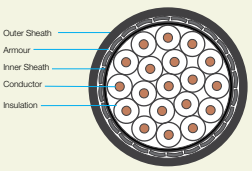
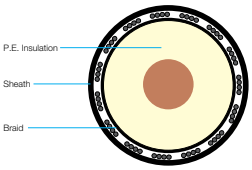
NABL Testing Laboratory

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 laborites) 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).

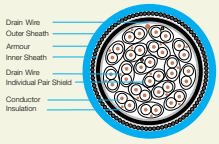
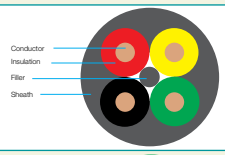
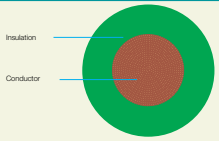
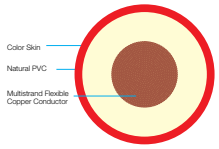
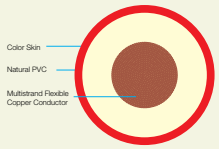
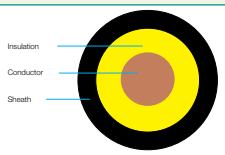
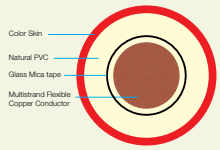
National accreditation board for testing and calibration to boast of, it is the first-of-its-kind private facility in india. The lab fully equipped as per international standard to test XLPE cables upto 220 kV grade, PVC cables, Flexible cables, aerial bunched cables, photovoltaic cables, instrumentation cables, fire survival cables.

The lab cover 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 type of different fire test to demonstrate fire-retardant behavior in cable.

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 1.1 & 3.3 kV for Electrical Substations as per IS 1554-I & 2/ IS 7098-1 & 2 Sizes: Single Core 10 SQ. mm - 1000 SQ. mm Multicore 6 SQ. mm - 630 SQ. mm	**Conductor** - Stranded / Solid, Circular / Shaped Aluminium / Copper **Insulation** - PVC / HR PVC **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 1.1 & 3.3 kV for Electrical Substations as per IS 1554-I & 2/ IS 7098-1 & 2 Sizes: Single Core 10 SQ. mm - 1000 SQ. mm Multicore 6 SQ. mm - 630 SQ. mm	**Conductor** - Stranded / Solid, Circular / Shaped Aluminium / Copper **Insulation** - PVC / HR PVC **Inner Sheath** - PVC / HR PVC / FRLS / PVC **Unarmoured / Armoured** - G.S. Round Wire/ Flat Strip or Aluminum Wire / Flat Strip **Outer Sheath** - **LSZH Compound** new	
Heavy Duty XLPE Power cables for Power Generation Distribution	XLPE Power cables upto 19/33 kV grade 33 kV (E) as per IS 7098 - II Sizes: Single Core: 25 SQ. mm - 1000 SQ. mm Multicore: 25 SQ. mm - 400 SQ. mm	**Conductor** - Circular/Shaped - 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 upto 19/33 kV grade 33 kV (E) as per IS 7098 - II Sizes: Single Core: 25 SQ. mm- 1000 SQ. mm Multicore: 25 SQ. mm - 400 SQ. mm	**Conductor** - Circular/Shaped - Aluminum/Copper **Insulation** - XLPE **Innersheath** - PVC / HR PVC / FRLS Unarmoured / Armoured - G.S Round Wire / Flat Strip or Aluminum Wire / Flat Strip **Outer Sheath** - **LSZH Compound** new	
Arial Bunched/ Bundled required for over head power distribution	PE/XLPE insulated 1.1 kV to 33 kV as per IS 14255 & IS 7098-I & II	**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 new	Annealed electrolytic copper conductor, heat barrier, XLPE, LSZH inner sheath G.S. wire and LSZH outer sheath as per IS 7098-I/ 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 new	Trinned cooper XLPO insulated & LSZH sheathed 1100 V AC/ 1800 V 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 650 V / 1100 V grade as per IS 1554-I & IS 7098-I Sizes: 1.5 SQ. mm / 2.5 SQ. mm upto 61 core 4 SQ. mm & 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.	
Telecom / Switch board cables for Indoor Telephones	Annealed Copper conductor, PVC Insulated as per DOT TEC Spec No: G/WIR-06/02 Sizes: 0.4 SQ. mm / 0.5 SQ. mm / 0.6 SQ. mm / 0.7 SQ. mm / 0.9 SQ. mm	**Conductor** - Tinned / Plain **Insulation** - PVC / HR PVC / Nylon **Innersheath** - PVC/ HR PVC/ FRLS Unarmoured / Armoured - G.S. round wire / Flat Strip **Outer sheath** - PVC/HR PVC/FRLS **Additlonal Option** - Individual / Overall pair/ Shielding / Screening	
Coaxial cables for Telcom / icrowave / CATV / MATV industry	Available in specified RG & UR Series as per MIL-C-17 / BS 2316 / IS 5608 / IS 11967 Sizes: Suitable for Impedance of 50 Ohm / 75 Ohm / 100 Ohm / 125 Ohm	**Conductor** - Plain / Tinned / Copper Clad Steel / Silver Plated **Insulation** - Solid / Foam / Semi air spaced **Screen** - Single / Double braid **Sheath** - PVC / HR PVC / FRLS / P.E	

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 1.1 kV grade as per IS 694 **Sizes: 3 core - 1.5 SQ. mm to 50 SQ. mm**	**Insulation** - PVC / HR PVC **Sheathing** - PVC / HR PVC	
Instrumentation Signal Cables for Process control & Instrumentation	PVC Sheathed 225/650/1100 V grade cables as per BS 5308 / DIN VDE 0815 & 816 / IS 1554 / IEC 189 **Sizes:** **0.5 SQ. mm / 0.75 SQ. mm / 1.0 SQ. mm / 1.5 SQ. mm**	**Conductor** - Standed / Solid, plain / tinned **Insulation** - PVC / HR PVC / P.E / 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 1100 V as per IS 694 **Sizes: Single, Two, Three or Four core upto 25 SQ. mm**	**Insulation** - PVC / HR PVC / FRLS / Zero Halogen **Unsheathed /Sheathed** - PVC / HR PVC / FRLS	
Wiring Cables for electrical industry	Multistrand Flexible, upto 1100 V grade PVC Cables as per IS 694 **Sizes:** **Single core 1.0 SQ. mm - 630 SQ. mm**	**Conductor** - Bright Annealed Copper **Insulation** - PVC/ HR PVC/ FRLS PVC / Zero Halogen	
Energy Cables for Power Supply to Telephone Exchanges / UPS / Battery Backup / Equipments	PVC Flexible Cables upto 1.1 kV grade as per IS 694 **Sizes:** **1.0 SQ. mm upto 240 SQ. mm Single / Multi Core**	**Conductor** - Stranded / annealed Copper **Insulation** **FR - Flame** retardant PVC Insulated industrial cables 1100 V with S3 features **FR-LSH** PVC Insulated industrial cables 1100 V	
Energy Cables for Power Supply to Telephone Exchanges / UPS / Battery Backup / Equipments	Flexible Cables upto 1.1 kV grade as per IS 694 **Sizes:** **1.0 SQ. mm upto 240 SQ. mm Single / Multi Core**	**Conductor** - Stranded / annealed Copper **Insulation-HFFR** Insulated industrial cables 1100 V	
Air Field Lighting Cables	Stranded plain annealed copper, PVC insulated & PVC sheathed of 5 kV grade **Sizes:** **Single core & Two core in 6 SQ.mm, 16 SQ.mm & 25 SQ.mm**	**Insulation** - PVC / XLPE	
FS Wire new	Flexible Cables upto 450/750 V generally to BS 7211 **Sizes:** **1.0 upto 240 SQ. mm Single Core**	**Conductor** - Stranded Flexible Copper **Insulation** - Glass mica tape & HFFR Compound	

Inside View - Cable Factory

LT POWER & CONTROL CABLE

LT POWER & CONTROL CABLE

FEATURES

XLPE INSULATED CABLE

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

PVC INSULATED CABLE

- High dielectric strength & resistance to DC 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

INSULATED MATERIAL

- XLPE
- PVC

APPLICABLE STANDARD

- IS 7098 Part-1
- IS 1554 Part-1

Table - 1

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, UN-ARMOURED CABLES

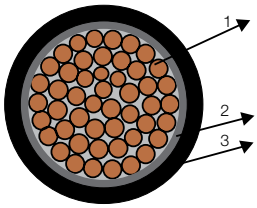
Cable Code: AYY/YY
Ref Specification: IS 1554 Part-1

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Al Conductor
	Aluminium	Copper				AYY	YY
SQ. mm	Nos	Nos	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	1.00	1.80	8	80	100
6	1/3	1/3	1.00	1.80	9	90	120
10	1/7	6	1.00	1.80	10	110	170
16	6	6	1.00	1.80	10	150	250
25	6	6	1.20	1.80	12	200	350
35	6	6	1.20	1.80	13	250	450
50	6	6	1.40	1.80	15	300	600
70	12	12	1.40	1.80	16	400	800
95	15	15	1.60	1.80	18	500	1050
120	15	18	1.60	2.00	20	600	1300
150	15	18	1.80	2.00	22	700	1600
185	30	30	2.00	2.00	24	850	1950
240	30	34	2.20	2.00	27	1100	2500
300	30	34	2.40	2.00	30	1300	3100
400	53	53	2.60	2.20	34	1700	3950
500	53	53	3.00	2.20	37	2100	5000
630	53	53	3.40	2.40	42	2700	6450
800	53	53	3.40	2.40	46	3250	8050
1000	53	53	3.40	2.60	50	3950	9950

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1 Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Circular
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm and above - Stranded Compacted Circular
2 Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Black
3 Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	8.89	5.53	0.140	0.58	36	33	32	46	42	43	0.304	0.460
6	4.61	3.08	5.53	3.70	0.127	0.68	44	42	41	57	54	54	0.456	0.690
10	3.08	1.83	3.70	2.20	0.118	0.83	59	56	56	75	72	72	0.760	1.15
16	1.91	1.15	2.29	1.38	0.110	1.01	75	71	72	94	92	92	1.22	1.84
25	1.20	0.727	1.44	0.87	0.105	1.05	97	93	99	125	120	125	1.90	2.88
35	0.868	0.524	1.04	0.63	0.100	1.22	120	110	120	150	140	155	2.66	4.03
50	0.641	0.387	0.769	0.464	0.098	1.22	145	130	150	180	165	190	3.80	5.75
70	0.443	0.268	0.532	0.322	0.091	1.43	170	155	185	220	200	235	5.32	8.05
95	0.320	0.193	0.384	0.232	0.088	1.47	205	180	215	265	230	275	7.22	10.90
120	0.253	0.153	0.304	0.184	0.086	1.62	230	200	240	300	255	310	9.12	13.80
150	0.206	0.1240	0.247	0.1488	0.085	1.62	265	220	270	340	280	345	11.40	17.30
185	0.164	0.0991	0.197	0.1189	0.084	1.62	300	240	305	380	305	390	14.10	21.30
240	0.125	0.0754	0.151	0.0912	0.082	1.72	335	270	350	420	340	445	18.20	27.30
300	0.100	0.0601	0.122	0.0733	0.080	1.74	370	295	395	465	370	500	22.80	34.50
400	0.0778	0.0470	0.0961	0.0580	0.080	1.81	410	335	455	500	405	570	30.40	46.00
500	0.0605	0.0366	0.0759	0.0459	0.079	1.86	435	355	490	540	430	610	38.00	57.50
630	0.0469	0.0283	0.0610	0.0368	0.077	1.87	485	395	560	590	465	680	47.90	72.50
800	0.0367	0.0221	0.0503	0.0303	0.077	1.98	525	420	650	645	500	745	60.80	92.00
1000	0.0291	0.0176	0.0422	0.0255	0.076	2.20	570	445	735	705	546	890	76.00	115.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 2

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
TWO CORE, ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, UN-ARMOURED CABLES

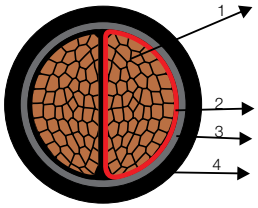
Cable Code: AYY/YY
Ref Specification: IS 1554 Part-1

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
							With Al Conductor	With Cu Conductor
	Aluminium	Copper					AYY	YY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	1.00	0.30	1.80	13	230	280
6	1/3	1/3	1.00	0.30	1.80	15	270	350
10	1/7	6	1.00	0.30	1.80	16	330	480
16	6	6	1.00	0.30	1.80	16	350	500
25	6	6	1.20	0.30	2.00	19	450	750
35	6	6	1.20	0.30	2.00	20	550	950
50	6	6	1.40	0.30	2.00	23	700	1250
70	12	12	1.40	0.30	2.00	25	850	1650
95	15	15	1.60	0.40	2.20	29	1150	2250
120	15	18	1.60	0.40	2.20	31	1300	2700
150	15	18	1.80	0.40	2.40	33	1600	3300
185	30	30	2.00	0.50	2.40	36	1900	4100
240	30	34	2.20	0.50	2.60	42	2450	5250
300	30	34	2.40	0.60	2.80	45	2950	6500
400	53	53	2.60	0.70	3.20	51	3800	8300
500	53	53	3.00	0.70	3.40	57	4750	10550
630	53	53	3.40	0.70	3.80	64	6000	13500

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 Sq.mm and above - Stranded Compacted Shaped
Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Red & Black
Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	8.89	5.53	0.098	0.23	32	27	27	41	35	35	0.304	0.460
6	4.61	3.08	5.53	3.70	0.096	0.28	40	34	35	50	44	45	0.456	0.690
10	3.08	1.83	3.70	2.20	0.091	0.34	55	45	47	70	58	60	0.760	1.15
16	1.91	1.15	2.29	1.38	0.085	0.40	70	58	59	90	75	78	1.22	1.84
25	1.20	0.727	1.44	0.87	0.083	0.42	90	76	78	115	97	105	1.90	2.88
35	0.868	0.524	1.04	0.63	0.082	0.48	110	92	99	140	120	125	2.66	4.03
50	0.641	0.387	0.769	0.464	0.082	0.49	135	115	125	165	145	155	3.80	5.75
70	0.443	0.268	0.532	0.322	0.076	0.56	160	140	150	205	180	195	5.32	8.05
95	0.320	0.193	0.384	0.232	0.076	0.58	190	170	185	240	215	230	7.22	10.90
120	0.253	0.153	0.304	0.184	0.075	0.63	210	190	210	275	235	265	9.12	13.80
150	0.206	0.1240	0.247	0.1488	0.074	0.63	240	210	240	310	270	305	11.40	17.30
185	0.164	0.0991	0.197	0.1189	0.074	0.64	275	240	275	350	300	350	14.10	21.28
240	0.125	0.0754	0.151	0.0912	0.073	0.67	320	275	325	405	345	410	18.20	27.60
300	0.100	0.0601	0.122	0.0733	0.073	0.68	355	305	365	450	385	465	22.80	34.50
400	0.0778	0.0470	0.0961	0.0580	0.072	0.70	385	345	420	490	425	530	30.40	46.00
500	0.0605	0.0366	0.0759	0.0459	0.072	0.70	425	380	475	540	460	605	38.00	57.50
630	0.0469	0.0283	0.0610	0.0368	0.072	0.70	465	415	540	640	550	785	47.90	72.55

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 3

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, UN-ARMOURED CABLES

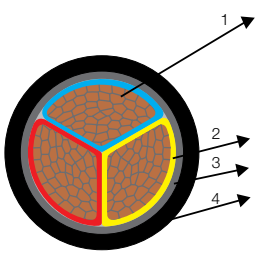
Cable Code: AYY/YY
Ref Specification: IS 1554 Part-1

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
							With Al Conductor	With Cu Conductor
	Aluminium	Copper					AYY	YY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	1.00	0.30	1.80	14	250	330
6	1/3	1/3	1.00	0.30	1.80	15	310	420
10	1/7	6	1.00	0.30	1.80	17	370	580
16	6	6	1.00	0.30	1.80	18	450	700
25	6	6	1.20	0.30	2.00	21	600	1050
35	6	6	1.20	0.30	2.00	23	700	1350
50	6	6	1.40	0.30	2.00	26	900	1750
70	12	12	1.40	0.40	2.20	29	1200	2400
95	15	15	1.60	0.40	2.20	33	1500	3200
120	15	18	1.60	0.40	2.20	36	1800	3900
150	15	18	1.80	0.50	2.40	40	2200	4800
185	30	30	2.00	0.50	2.60	43	2700	5950
240	30	34	2.20	0.60	2.80	49	3550	7750
300	30	34	2.40	0.60	3.00	54	4200	9600
400	53	53	2.60	0.70	3.40	61	5350	12200
500	53	53	3.00	0.70	3.60	69	6750	15500
630	53	53	3.40	0.70	4.00	77	8550	19900

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1 Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2 Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Red, Yelow & Blue
3 Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
4 Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	8.89	5.53	0.098	0.23	28	23	23	36	30	30	0.304	0.460
6	4.61	3.08	5.53	3.70	0.096	0.28	35	30	30	45	38	39	0.456	0.690
10	3.08	1.83	3.70	2.20	0.091	0.34	46	39	40	60	50	52	0.760	1.15
16	1.91	1.15	2.29	1.38	0.085	0.40	60	50	51	77	64	66	1.22	1.84
25	1.20	0.727	1.44	0.87	0.083	0.42	76	63	70	99	81	90	1.90	2.88
35	0.868	0.524	1.04	0.63	0.082	0.48	92	77	86	120	99	110	2.66	4.03
50	0.641	0.387	0.769	0.464	0.082	0.49	110	95	105	145	125	135	3.80	5.75
70	0.443	0.268	0.532	0.322	0.076	0.56	135	115	130	175	150	165	5.32	8.05
95	0.320	0.193	0.384	0.232	0.076	0.58	165	140	155	210	175	200	7.22	10.90
120	0.253	0.153	0.304	0.184	0.075	0.63	185	155	180	240	195	230	9.12	13.80
150	0.206	0.1240	0.247	0.1488	0.074	0.63	210	175	205	270	225	265	11.40	17.30
185	0.164	0.0991	0.197	0.1189	0.074	0.64	235	200	240	300	255	305	14.10	21.30
240	0.125	0.0754	0.151	0.0912	0.073	0.67	275	235	280	345	295	355	18.20	27.60
300	0.100	0.0601	0.122	0.0733	0.073	0.68	305	260	315	385	335	400	22.80	34.50
400	0.0778	0.0470	0.0961	0.0580	0.072	0.70	335	290	375	425	360	455	30.40	46.00
500	0.0605	0.0366	0.759	0.0459	0.072	0.70	370	320	425	470	390	520	38.00	57.50
630	0.0469	0.0283	0.0610	0.0368	0.072	0.70	405	350	480	555	470	675	47.90	72.50

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 4

TECHNICAL DETAILS FOR HAVELLS 1.1 kV, THREE & HALF CORE ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, UN-ARMOURED CABLES

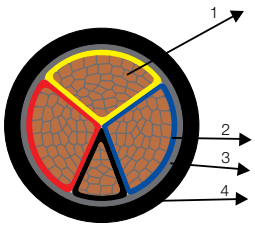
Cable Code: AYY/YY
Ref Specification: IS 1554 Part-1

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
							With Al Conductor	With Cu Conductor
	Aluminium	Copper					AYY	YY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km
3×25+16	6/6	6/6	1.20/1.00	0.30	2.00	23	700	1250
3×35+16	6/6	6/6	1.20/1.00	0.30	2.00	25	800	1550
3×50+25	6/6	6/6	1.40/1.20	0.30	2.20	28	1050	2050
3×70+35	12/6	12/6	1.40/1.20	0.40	2.20	32	1400	2800
3×95 +50	15/6	15/6	1.60/1.40	0.40	2.20	36	1800	3700
3×120+70	15/12	18/12	1.60/1.40	0.50	2.40	39	2200	4700
3×150+70	15/12	18/12	1.80/1.40	0.50	2.40	43	2550	5550
3×185+95	30/15	30/15	2.00/1.60	0.50	2.60	47	3150	6900
3×240+120	30/15	34/18	2.20/1.60	0.60	3.00	53	4050	8950
3×300+150	30/15	34/18	2.40/1.80	0.60	3.20	58	4900	11100
3×400+185	53/30	53/30	2.60/2.00	0.70	3.40	64	6150	14000
3×500+240	53/30	53/34	3.00/2.20	0.70	3.80	76	7900	18050
3×630+300	53/30	53/34	3.40/2.40	0.70	4.00	84	9900	22950

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1. Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
   Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
   For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2. Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Red, Yelow, Blue & Black
3. Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
4. Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
   Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
3×25+16	1.20	0.727	1.44	0.87	0.083	0.42	76	63	70	99	81	90	1.90	2.88
3×35+16	0.868	0.524	1.04	0.63	0.082	0.48	92	77	86	120	99	110	2.66	4.03
3×50+25	0.641	0.387	0.769	0.464	0.082	0.49	110	95	105	145	125	135	3.80	5.75
3×70+35	0.443	0.268	0.532	0.322	0.076	0.56	135	115	130	175	150	165	5.32	8.05
3×95+50	0.320	0.193	0.384	0.232	0.076	0.58	165	140	155	210	175	200	7.22	10.90
3×120+70	0.253	0.153	0.304	0.184	0.075	0.63	185	155	180	240	195	230	9.12	13.80
3×150+70	0.206	0.1240	0.247	0.1488	0.074	0.63	210	175	205	270	225	265	11.40	17.30
3×185+95	0.164	0.0991	0.197	0.1189	0.074	0.64	235	200	240	300	255	305	14.10	21.30
3×240+120	0.125	0.0754	0.151	0.0912	0.073	0.67	275	235	280	345	295	355	18.20	27.60
3×300+150	0.100	0.0601	0.122	0.0733	0.073	0.68	305	260	315	385	335	400	22.80	34.50
3×400+185	0.0778	0.0470	0.0961	0.0580	0.072	0.70	335	290	375	425	360	455	30.40	46.00
3×500+240	0.0605	0.0366	0.0759	0.0459	0.072	0.70	370	320	425	470	390	520	38.00	57.50
3×630+300	0.0469	0.0283	0.0610	0.0368	0.072	0.70	405	350	480	555	470	675	47.90	72.50

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 5

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
FOUR CORE, ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, UN-ARMOURED CABLES

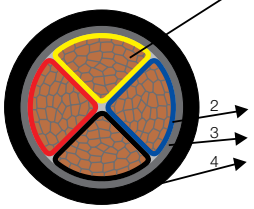
Cable Code: AYY/YY
Ref Specification IS 1554 Part-1

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
	Aluminium	Copper					With Al Conductor	With Cu Conductor
							AYY	YY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	1.00	0.30	1.80	15	290	400
6	1/3	1/3	1.00	0.30	1.80	17	350	510
10	1/7	6	1.00	0.30	1.80	19	440	710
16	6	6	1.00	0.30	2.00	21	550	950
25	6	6	1.20	0.30	2.00	23	750	1350
35	6	6	1.20	0.30	2.00	26	900	1700
50	6	6	1.40	0.40	2.20	29	1200	2300
70	12	12	1.40	0.40	2.20	32	1500	3100
95	15	15	1.60	0.40	2.40	37	2000	4200
120	15	18	1.60	0.50	2.40	41	2400	5150
150	15	18	1.80	0.50	2.60	45	2900	6350
185	30	30	2.00	0.60	2.80	50	3600	7900
240	30	34	2.20	0.60	3.00	56	4550	10200
300	30	34	2.40	0.70	3.40	64	5650	12750
400	53	53	2.60	0.70	3.60	70	7000	16100
500	53	53	3.00	0.70	4.00	79	8950	20550
630	53	53	3.40	0.70	4.00	89	11200	26250

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1 Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2 Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Red, Yelow, Blue & Black
3 Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
4 Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	8.89	5.53	0.098	0.23	28	23	23	36	30	30	0.304	0.460
6	4.61	3.08	5.53	3.70	0.096	0.28	35	30	30	45	38	39	0.456	0.690
10	3.08	1.83	3.70	2.20	0.091	0.34	46	39	40	60	50	52	0.760	1.15
16	1.91	1.15	2.29	1.38	0.085	0.40	60	50	51	77	64	66	1.22	1.84
25	1.20	0.727	1.44	0.87	0.083	0.42	76	63	70	99	81	90	1.90	2.88
35	0.868	0.524	1.04	0.63	0.082	0.48	92	77	86	120	99	110	2.66	4.03
50	0.641	0.387	0.769	0.464	0.082	0.49	110	95	105	145	125	135	3.80	5.75
70	0.443	0.268	0.532	0.322	0.076	0.56	135	115	130	175	150	165	5.32	8.05
95	0.320	0.193	0.384	0.232	0.076	0.58	165	140	155	210	175	200	7.22	10.90
120	0.253	0.153	0.304	0.184	0.075	0.63	185	155	180	240	195	230	9.12	13.80
150	0.206	0.1240	0.247	0.1488	0.074	0.63	210	175	205	270	225	265	11.40	17.30
185	0.164	0.0991	0.197	0.1189	0.074	0.64	235	200	240	300	255	305	14.10	21.30
240	0.125	0.0754	0.151	0.0912	0.073	0.67	275	235	280	345	295	355	18.20	27.60
300	0.100	0.0601	0.122	0.0733	0.073	0.68	305	260	315	385	335	400	22.80	34.50
400	0.0778	0.0470	0.0961	0.0580	0.072	0.70	335	290	375	425	360	455	30.40	46.00
500	0.0605	0.0366	0.0759	0.0459	0.072	0.70	370	320	425	470	390	520	38.00	57.50
630	0.0469	0.0283	0.0610	0.0368	0.072	0.70	405	350	480	555	470	675	47.90	72.50

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 6

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, ARMOURED CABLES

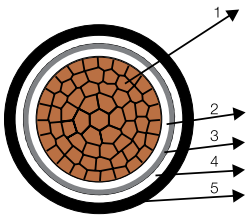
Ref Specification: IS 1554 Part-1
Cable Code: AYFaY/YFaY, AYWaY/YWaY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Flat Strip Armoured (AYFaY/YFaY)					Round Wire Armoured (AYWaY/YWaY)				
				Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
							With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper					AYFaY	YFaY				AYWaY	YWaY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	1.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	11	130	160
6	1/3	1/3	1.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	12	150	190
10	1/7	6	1.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	13	170	240
16	6	6	1.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	13	250	300
25	6	6	1.50	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	300	450
35	6	6	1.50	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	350	550
50	6	6	1.70	N/A	N/A	N/A	N/A	N/A	1.40	1.24	17	400	700
70	12	12	1.70	N/A	N/A	N/A	N/A	N/A	1.40	1.40	19	500	900
95	15	15	1.90	4×0.80	1.40	20	600	1150	1.60	1.40	22	700	1250
120	15	18	1.90	4×0.80	1.40	22	700	1400	1.60	1.40	23	800	1450
150	15	18	2.10	4×0.80	1.40	23	800	1700	1.60	1.40	25	900	1750
185	30	30	2.30	4×0.80	1.40	25	1000	2050	1.60	1.40	27	1050	2150
240	30	34	2.50	4×0.80	1.40	28	1200	2600	1.60	1.56	30	1350	2750
300	30	34	2.70	4×0.80	1.56	31	1500	3250	1.60	1.56	33	1600	3350
400	53	53	3.00	4×0.80	1.56	35	1850	4100	2.00	1.56	38	2050	4300
500	53	53	3.40	4×0.80	1.56	39	2300	5150	2.00	1.72	42	2550	5400
630	53	53	3.90	4×0.80	1.72	44	2900	6650	2.00	1.88	46	3200	6950
800	53	53	3.90	4×0.80	1.88	48	3550	8350	2.00	1.88	51	3800	8600
1000	53	53	3.90	4×0.80	2.04	51	4250	10250	2.50	2.04	55	4700	10700

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1. Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
   Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Circular
   For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm and above - Stranded Compacted Circular
2. Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Black
3. Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
4. Armouring: Single Layer of Aluminium Round Wire / Flat Strip
5. Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
   Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	8.89	5.53	0.157	0.48	36	33	32	46	42	43	0.304	0.460
6	4.61	3.08	5.53	3.70	0.148	0.56	44	42	41	57	54	54	0.456	0.690
10	3.08	1.83	3.70	2.20	0.138	0.67	59	56	56	75	72	72	0.760	1.15
16	1.91	1.15	2.29	1.38	0.128	0.81	75	71	72	94	92	92	1.22	1.84
25	1.20	0.727	1.44	0.87	0.120	0.87	97	93	99	125	120	125	1.90	2.88
35	0.868	0.524	1.04	0.63	0.114	1.00	120	110	120	150	140	155	2.66	4.03
50	0.641	0.387	0.769	0.464	0.110	1.03	145	130	150	180	165	190	3.80	5.75
70	0.443	0.268	0.532	0.322	0.103	1.21	170	155	185	220	200	235	5.32	8.05
95	0.320	0.193	0.384	0.232	0.101	1.27	205	180	215	265	230	275	7.22	10.90
120	0.253	0.153	0.304	0.184	0.096	1.42	230	200	240	300	255	310	9.12	13.80
150	0.206	0.1240	0.247	0.1488	0.094	1.42	265	220	270	340	280	345	11.40	17.30
185	0.164	0.0991	0.197	0.1189	0.092	1.44	300	240	305	380	305	390	14.10	21.30
240	0.125	0.0754	0.151	0.0912	0.090	1.53	335	270	350	420	340	445	18.20	27.60
300	0.100	0.0601	0.122	0.0733	0.088	1.56	370	295	395	465	370	500	22.80	34.50
400	0.0778	0.0470	0.0961	0.0580	0.088	1.59	410	335	455	500	405	570	30.40	46.00
500	0.0605	0.0366	0.076	0.0459	0.087	1.67	435	355	490	540	430	610	38.00	57.50
630	0.0469	0.0283	0.0610	0.0368	0.086	1.67	485	395	560	590	465	680	47.88	72.50
800	0.0367	0.0221	0.0503	0.0303	0.083	1.75	525	420	650	645	500	745	60.80	92.00
1000	0.0291	0.0176	0.0422	0.0255	0.082	1.94	570	445	735	705	546	890	76.00	115.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 7

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
TWO CORE, ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, ARMOURED CABLE

Ref Specification: IS 1554 Part-1

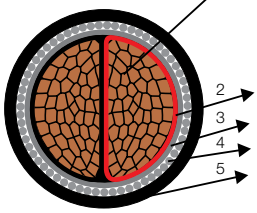
Cable Code: AYFY/YFY, AYWY/YWY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (AYFY/YFY)					Round Wire Armoured (AYWaY/YWaY)				
					Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
								With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper						AYFY	YFY				AYWY	YWY
SQ. mm	Nos	Nos	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	1.00	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	460	520
6	1/3	1/3	1.00	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	530	620
10	1/7	6	1.00	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	18	620	780
16	6	6	1.00	0.30	4×0.80	1.40	17	500	700.0	1.60	1.40	18	700	850
25	6	6	1.20	0.30	4×0.80	1.40	19	600	950.0	1.60	1.40	21	850	1150
35	6	6	1.20	0.30	4×0.80	1.40	21	750	1150.0	1.60	1.40	22	950	1350
50	6	6	1.40	0.30	4×0.80	1.40	23	900	1450.0	1.60	1.56	25	1200	1750
70	12	12	1.40	0.30	4×0.80	1.56	26	1100	1900.0	1.60	1.56	27	1400	2200
95	15	15	1.60	0.40	4×0.80	1.56	29	1400	2500.0	2.00	1.56	32	1900	3000
120	15	18	1.60	0.40	4×0.80	1.56	31	1600	3000.0	2.00	1.72	34	2150	3550
150	15	18	1.80	0.40	4×0.80	1.72	34	1900	3650.0	2.00	1.72	36	2500	4200
185	30	30	2.00	0.50	4×0.80	1.88	37	2300	4450.0	2.00	1.88	40	2950	5100
240	30	34	2.20	0.50	4×0.80	2.04	42	2850	5700.0	2.50	2.04	46	3850	6700
300	30	34	2.40	0.60	4×0.80	2.20	46	3400	6950.0	2.50	2.20	49	4550	8100
400	53	53	2.60	0.70	4×0.80	2.36	51	4200	8750.0	3.15	2.52	56	6050	10600
500	53	53	3.00	0.70	4×0.80	2.68	57	5250	11050.0	3.15	2.84	62	7350	13150
630	53	53	3.40	0.70	4×0.80	2.84	64	6550	14050.0	4.00	3.00	70	9750	17250

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1. Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
   Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
   For Copper Conductor- 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2. Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Red & Black
3. Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
4. Armouring: Single Layer of Galvanized Steel Round Wire / Flat Strip
5. Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
   Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	8.89	5.53	0.098	0.23	32	27	27	41	35	35	0.304	0.460
6	4.61	3.08	5.53	3.70	0.096	0.28	40	34	35	50	44	45	0.456	0.690
10	3.08	1.83	3.70	2.20	0.091	0.34	55	45	47	70	58	60	0.760	1.150
16	1.91	1.15	2.29	1.38	0.085	0.40	70	58	59	90	75	78	1.22	1.840
25	1.20	0.727	1.44	0.870	0.083	0.42	90	76	78	115	97	105	1.90	2.880
35	0.868	0.524	1.04	0.630	0.082	0.48	110	92	99	140	120	125	2.66	4.030
50	0.641	0.387	0.769	0.464	0.082	0.49	135	115	125	165	145	155	3.80	5.750
70	0.443	0.268	0.532	0.322	0.076	0.56	160	140	150	205	180	195	5.32	8.050
95	0.320	0.193	0.384	0.232	0.076	0.58	190	170	185	240	215	230	7.22	10.90
120	0.253	0.153	0.304	0.184	0.075	0.63	210	190	210	275	235	265	9.12	13.80
150	0.206	0.1240	0.247	0.1488	0.074	0.63	240	210	240	310	270	305	11.40	17.30
185	0.164	0.0991	0.197	0.1189	0.074	0.64	275	240	275	350	300	350	14.10	21.30
240	0.125	0.0754	0.151	0.0912	0.073	0.67	320	275	325	405	345	410	18.20	27.60
300	0.100	0.0601	0.122	0.0733	0.073	0.68	355	305	365	450	385	465	22.80	34.50
400	0.0778	0.0470	0.0961	0.0580	0.072	0.70	385	345	420	490	425	530	30.40	46.00
500	0.0605	0.0366	0.0759	0.0459	0.072	0.70	425	380	475	540	460	605	38.00	57.50
630	0.0469	0.0283	0.0610	0.0368	0.072	0.70	465	415	540	640	550	785	47.90	72.50

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 8

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, ARMOURED CABLE

Ref Specification: IS 1554 Part-1

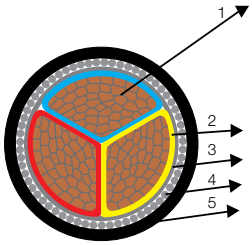
Cable Code: AYFY/YFY, AYWY/YWY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (AYFY/YFY)					Round Wire Armoured (AYWaY/YWaY)				
					Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
								With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper						AYFY	YFY				AYWY	YWY
SQ. mm	Nos	Nos	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	1.00	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	460	540
6	1/3	1/3	1.00	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	17	530	650
10	1/7	6	1.00	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.40	19	620	840
16	6	6	1.00	0.30	4×0.80	1.40	19	600	900.0	1.60	1.40	21	850	1100
25	6	6	1.20	0.30	4×0.80	1.40	22	800	1250.0	1.60	1.40	23	1050	1500
35	6	6	1.20	0.30	4×0.80	1.40	23	950	1550.0	1.60	1.40	25	1200	1800
50	6	6	1.40	0.30	4×0.80	1.56	27	1200	2050.0	1.60	1.56	28	1500	2300
70	12	12	1.40	0.40	4×0.80	1.56	30	1500	2700.0	2.00	1.56	32	2000	3200
95	15	15	1.60	0.40	4×0.80	1.56	33	1850	3550.0	2.00	1.72	36	2450	4150
120	15	18	1.60	0.40	4×0.80	1.72	36	2200	4300.0	2.00	1.72	39	2800	4900
150	15	18	1.80	0.50	4×0.80	1.88	40	2650	5250.0	2.00	1.88	43	3350	5900
185	30	30	2.00	0.50	4×0.80	1.88	44	3150	6400.0	2.50	2.04	48	4300	7500
240	30	34	2.20	0.60	4×0.80	2.20	50	4000	8250.0	2.50	2.20	53	5250	9450
300	30	34	2.40	0.60	4×0.80	2.36	55	4800	10150.0	2.50	2.36	58	6150	11450
400	53	53	2.60	0.70	4×0.80	2.52	61	5950	12750.0	3.15	2.68	66	8200	14950
500	53	53	3.00	0.70	4×0.80	2.84	69	7450	16200.0	3.15	3.00	74	10000	18700
630	53	53	3.40	0.70	4×0.80	3.00	77	9300	20600.0	4.00	3.00	84	13150	24400

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1. Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
   Shape of Conductor: For Aluminium Conductor - 4 SQ.mm, 6 SQ.mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
   For Copper Conductor - 4 SQ.mm & 6 SQ.mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2. Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Red, Yellow & Blue
3. Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
4. Armouring: Single Layer of Galvanized Steel Round Wire / Flat Strip
5. Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
   Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	8.89	5.53	0.098	0.23	28	23	23	36	30	30	0.304	0.460
6	4.61	3.08	5.53	3.70	0.096	0.28	35	30	30	45	38	39	0.456	0.690
10	3.08	1.83	3.70	2.20	0.091	0.34	46	39	40	60	50	52	0.760	1.15
16	1.91	1.15	2.29	1.38	0.085	0.40	60	50	51	77	64	66	1.22	1.84
25	1.20	0.727	1.44	0.87	0.083	0.42	76	63	70	99	81	90	1.90	2.88
35	0.868	0.524	1.04	0.63	0.082	0.48	92	77	86	120	99	110	2.66	4.03
50	0.641	0.387	0.769	0.464	0.082	0.49	110	95	105	145	125	135	3.80	5.75
70	0.443	0.268	0.532	0.322	0.076	0.56	135	115	130	175	150	165	5.32	8.05
95	0.320	0.193	0.384	0.232	0.076	0.58	165	140	155	210	175	200	7.22	10.90
120	0.253	0.153	0.304	0.184	0.075	0.63	185	155	180	240	195	230	9.12	13.80
150	0.206	0.1240	0.247	0.1488	0.074	0.63	210	175	205	270	225	265	11.40	17.30
185	0.164	0.0991	0.197	0.1189	0.074	0.64	235	200	240	300	255	305	14.10	21.30
240	0.125	0.0754	0.151	0.0912	0.073	0.67	275	235	280	345	295	355	18.20	27.60
300	0.100	0.0601	0.122	0.0733	0.073	0.68	305	260	315	385	335	400	22.80	34.50
400	0.0778	0.0470	0.0961	0.0580	0.072	0.70	335	290	375	425	360	455	30.40	46.00
500	0.0605	0.0366	0.0759	0.0459	0.072	0.70	370	320	425	470	390	520	38.00	57.50
630	0.0469	0.0283	0.0610	0.0368	0.072	0.70	405	350	480	555	470	675	47.90	72.50

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 9

TECHNICAL DETAILS FOR HAVELLS 1.1 kV, THREE & HALF CORE ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, ARMOURED CABLE

Ref Specification: IS 1554 Part-1

Cable Code: AYFY/YFY, AYWY/YWY

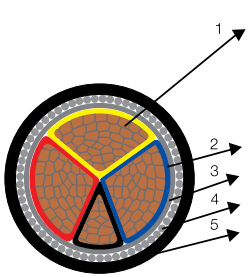
Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (AYFY/YFY)					Round Wire Armoured (AYWaY/YWaY)				
					Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
								With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper						AYFY	YFY				AYWY	YWY
SQ. mm	Nos	Nos	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
3×25+16	6/6	6/6	1.20/1.00	0.30	4×0.80	1.40	23	900	1450	1.60	1.40	25	1150	1700
3×35+16	6/6	6/6	1.20/1.00	0.30	4×0.80	1.40	25	1050	1800	1.60	1.40	27	1350	2050
3×50+25	6/6	6/6	1.40/1.20	0.30	4×0.80	1.56	29	1350	2350	2.00	1.56	30	1650	2600
3×70+35	12/6	12/6	1.40/1.20	0.40	4×0.80	1.56	32	1700	3100	2.00	1.56	34	2200	3600
3×95+50	15/6	15/6	1.60/1.40	0.40	4×0.80	1.56	36	2150	4050	2.00	1.72	39	2800	4750
3×120+70	15/12	18/12	1.60/1.40	0.50	4×0.80	1.72	40	2550	5050	2.00	1.88	42	3300	5750
3×150+70	15/12	18/12	1.80/1.40	0.50	4×0.80	1.88	44	3000	6000	2.00	1.88	46	3750	6700
3×185+95	30/15	30/15	2.00/1.60	0.50	4×0.80	2.04	48	3650	7400	2.50	2.04	51	4850	8650
3×240+120	30/15	34/18	2.20/1.60	0.60	4×0.80	2.2	53	4500	9400	2.50	2.36	57	5850	10800
3×300+150	30/15	34/18	2.40/1.80	0.60	4×0.80	2.36	58	5450	11650	3.15	2.52	63	7600	13800
3×400+185	53/30	53/30	2.60/2.00	0.70	4×0.80	2.68	64	6750	14600	3.15	2.68	69	9000	16850
3×500+240	53/30	53/34	3.00/2.20	0.70	4×0.80	2.84	76	8550	18700	4	3.00	83	12400	22500
3×630+300	53/30	53/34	3.40/2.40	0.70	4×0.80	3.00	84	10600	23700	4	3.00	91	14750	27800

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



Conductor Material: Aluminium / Copper as per Class-2 of IS 8130

Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped

For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped

1. Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Red, Yellow, Blue & Black
2. Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
3. Armouring: Single Layer of Galvanized Steel Round Wire / Flat Strip
4. Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
5. Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 Second Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
3×25+16	1.20	0.727	1.44	0.87	0.083	0.42	76	63	70	99	81	90	1.90	2.88
3×35+16	0.868	0.524	1.04	0.63	0.082	0.48	92	77	86	120	99	110	2.66	4.03
3×50+25	0.641	0.387	0.769	0.464	0.082	0.49	110	95	105	145	125	135	3.80	5.75
3×70+35	0.443	0.268	0.532	0.322	0.076	0.56	135	115	130	175	150	165	5.32	8.05
3×95+50	0.320	0.193	0.384	0.232	0.076	0.58	165	140	155	210	175	200	7.22	10.90
3×120+70	0.253	0.153	0.304	0.184	0.075	0.63	185	155	180	240	195	230	9.12	13.80
3×150+70	0.206	0.1240	0.247	0.1488	0.074	0.63	210	175	205	270	225	265	11.40	17.30
3×185+95	0.164	0.0991	0.197	0.1189	0.074	0.64	235	200	240	300	255	305	14.10	21.30
3×240+120	0.125	0.0754	0.151	0.0912	0.073	0.67	275	235	280	345	295	355	18.20	27.60
3×300+150	0.100	0.0601	0.122	0.0733	0.073	0.68	305	260	315	385	335	400	22.80	34.50
3×400+185	0.0778	0.0470	0.0961	0.0580	0.072	0.70	335	290	375	425	360	455	30.40	46.00
3×500+240	0.0605	0.0366	0.0759	0.0459	0.072	0.70	370	320	425	470	390	520	38.00	57.50
3×630+300	0.0469	0.0283	0.0610	0.0368	0.072	0.70	405	350	480	555	470	675	47.90	72.50

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 10

TECHNICAL DETAILS FOR HAVELLS 1.1 kV FOUR CORE, ALUMINIUM/COPPER CONDUCTOR, PVC INSULATED, ARMOURED CABLES

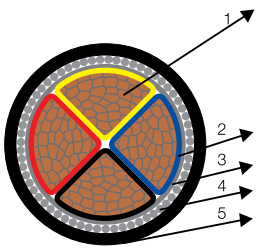
Ref Specification: IS 1554 Part-1
Cable Code: AYFY/YFY, AYWY/YWY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (AYFY/YFY)					Round Wire Armoured (AYWaY/YWaY)				
					Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
								With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper						AYFY	YFY				AYWY	YWY
SQ. mm	Nos	Nos	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	1.00	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	17	520	620
6	1/3	1/3	1.00	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	19	610	770
10	1/7	6	1.00	0.30	4×0.80	1.40	19	600	850	1.60	1.40	21	790	1060
16	6	6	1.00	0.30	4×0.80	1.40	21	750	1100.0	1.60	1.40	23	950	1350
25	6	6	1.20	0.30	4×0.80	1.40	24	950	1550.0	1.60	1.40	25	1200	1800
35	6	6	1.20	0.30	4×0.80	1.40	26	1150	2000.0	1.60	1.56	28	1450	2300
50	6	6	1.40	0.40	4×0.80	1.56	30	1450	2550.0	2.00	1.56	32	2000	3100
70	12	12	1.40	0.40	4×0.80	1.56	33	1850	3450.0	2.00	1.56	35	2400	4000
95	15	15	1.60	0.40	4×0.80	1.72	38	2350	4600.0	2.00	1.72	40	3000	5250
120	15	18	1.60	0.50	4×0.80	1.88	41	2800	5650.0	2.00	1.88	44	3500	6350
150	15	18	1.80	0.50	4×0.80	1.88	45	3300	6800.0	2.50	2.04	49	4500	7950
185	30	30	2.00	0.60	4×0.80	2.04	50	4000	8350.0	2.50	2.20	54	5350	9700
240	30	34	2.20	0.60	4×0.80	2.36	57	5100	10800.0	2.50	2.36	60	6500	12250
300	30	34	2.40	0.70	4×0.80	2.52	64	6200	13300.0	3.15	2.68	69	8500	15700
400	53	53	2.60	0.70	4×0.80	2.84	71	7650	16750.0	3.15	2.84	75	10200	19350
500	53	53	3.00	0.70	4×0.80	3.00	79	9600	21300.0	4.00	3.00	85	13550	25300
630	53	53	3.40	0.70	4×0.80	3.00	89	11700	27050.0	4.00	3.00	95	16350	31450

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Colour: Red, Yellow, Blue & Black
Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
Armouring: Single Layer of Galvanized Steel Round Wire / Flat Strip
Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 Second Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	8.89	5.53	0.098	0.23	28	23	23	36	30	30	0.304	0.460
6	4.61	3.08	5.53	3.70	0.096	0.28	35	30	30	45	38	39	0.456	0.690
10	3.08	1.83	3.70	2.20	0.091	0.34	46	39	40	60	50	52	0.760	1.15
16	1.91	1.15	2.29	1.38	0.085	0.40	60	50	51	77	64	66	1.22	1.84
25	1.20	0.727	1.44	0.87	0.083	0.42	76	63	70	99	81	90	1.90	2.88
35	0.868	0.524	1.04	0.63	0.082	0.48	92	77	86	120	99	110	2.66	4.03
50	0.641	0.387	0.769	0.464	0.082	0.49	110	95	105	145	125	135	3.80	5.75
70	0.443	0.268	0.532	0.322	0.076	0.56	135	115	130	175	150	165	5.32	8.05
95	0.320	0.193	0.384	0.232	0.076	0.58	165	140	155	210	175	200	7.22	10.90
120	0.253	0.153	0.304	0.184	0.075	0.63	185	155	180	240	195	230	9.12	13.80
150	0.206	0.1240	0.247	0.1488	0.074	0.63	210	175	205	270	225	265	11.40	17.30
185	0.164	0.0991	0.197	0.1189	0.074	0.64	235	200	240	300	255	305	14.10	21.30
240	0.125	0.0754	0.151	0.0912	0.073	0.67	275	235	280	345	295	355	18.20	27.60
300	0.100	0.0601	0.122	0.0733	0.073	0.68	305	260	315	385	335	400	22.80	34.50
400	0.0778	0.0470	0.0961	0.0580	0.072	0.70	335	290	375	425	360	455	30.40	46.00
500	0.0605	0.0366	0.0759	0.0459	0.072	0.70	370	320	425	470	390	520	38.00	57.50
630	0.0469	0.0283	0.0610	0.0368	0.072	0.70	405	350	480	555	470	675	47.90	72.50

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 11

TECHNICAL DETAILS FOR HAVELLS 1.1 kV 1.5 SQ. mm COPPER CONDUCTOR, PVC INSULATED, ARMOURED / UNARMOURED CONTROL CABLES

Ref Specification: IS 1554 Part-1

Cable Code: YY/YFY/YWY

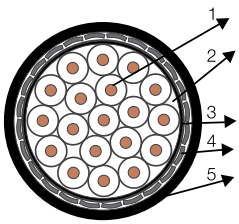
Physical Parameters

No. of Cores	Minimum Inner Sheath Thickness	Unarmoured (YY)					Flat Strip Armoured (YFY)						Round Wire Armoured (YWY)					
		Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable		Dimension of Armour Strip	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable		Nominal Dia of Armour Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable	
			Solid Cond.	Std. cond.	Soild Cond	Std. cond.			Soild Cond	Std. cond.	Soild Cond	Std. cond.			Soild Cond	Std. cond.	Soild Cond	Std. cond.
Nos	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	mm	kg/km	kg/km
2	0.30	1.80	11	11	160	170	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	13	13	340	360
3	0.30	1.80	11	12	190	200	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	13	14	360	380
4	0.30	1.80	12	13	220	230	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	14	14	400	420
5	0.30	1.80	13	14	260	270	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	15	460	480
6	0.30	1.80	14	15	300	310	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	16	510	530
7	0.30	1.80	14	15	280	300	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	16	530	550
10	0.30	1.80	17	18	380	400	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.40	19	20	700	740
12	0.30	1.80	18	18	430	450	4×0.8	1.24	18	19	620	640	1.60	1.40	20	21	810	850
14	0.30	1.80	18	19	490	500	4×0.8	1.40	19	20	680	730	1.60	1.40	21	22	880	940
16	0.30	1.80	19	20	540	560	4×0.8	1.40	20	21	760	780	1.60	1.40	22	23	970	1000
19	0.30	2.00	20	21	630	660	4×0.8	1.40	21	22	830	880	1.60	1.40	23	24	1060	1110
24	0.30	2.00	23	25	780	820	4×0.8	1.40	24	25	1020	1070	1.60	1.40	25	27	1220	1340
27	0.30	2.00	24	25	850	890	4×0.8	1.40	24	26	1110	1150	1.60	1.40	26	27	1360	1430
30	0.30	2.00	25	26	930	970	4×0.8	1.40	25	27	1180	1250	1.60	1.40	27	28	1450	1520
37	0.30	2.00	27	28	1100	1150	4×0.8	1.40	27	28	1380	1450	1.60	1.40	29	30	1690	1740
40	0.30	2.00	27	29	1170	1220	4×0.8	1.40	28	29	1460	1530	1.60	1.56	30	31	1780	1870
44	0.30	2.00	30	31	1290	1350	4×0.8	1.56	30	32	1630	1710	1.60	1.56	32	34	1950	2040
52	0.40	2.20	31	33	1520	1590	4×0.8	1.56	32	33	1850	1940	2.00	1.56	34	36	2390	2510
61	0.40	2.20	33	35	1740	1820	4×0.8	1.56	34	35	2090	2210	2.00	1.56	36	38	2660	2780

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1. Conductor: Solid / Stranded Annealed Bare Copper as per Class-2 of IS 8130; Options: Tinned
2. Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Nominal Insulation Thickness: 0.80 mm
3. Core Identification: Upto 5 cores: By colour coding & Above 5 cores: By colour coding / Number printing on cores as per IS 1554 Part-1
4. Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
5. Armouring: Single Layer of Aluminium Round Wire / Flat Strip
6. Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
7. Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

No. of Cores	Max. Conductor D.C.Resistance at 20 °C	Approx. Conductor A.C.Resistance		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
						For General Purpose Insulation			For Heat Resisting Insulation				
		at 70 °C	at 85 °C			Ground	Duct	Air	Ground	Duct	Air	For General Purpose Insulation	For Heat Resisting Insulation
Nos	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
2	12.10	14.52	15.20	0.112	0.20	23	20	20	26	24	24	0.173	0.156
3	12.10	14.52	15.20	0.112	0.20	21	17	17	24	21	21	0.173	0.156
4	12.10	14.52	15.20	0.112	0.20	21	17	17	24	21	21	0.173	0.156
5	12.10	14.52	15.20	0.112	0.20	21	17	17	24	21	21	0.173	0.156
6	12.10	14.52	15.20	0.112	0.20	15	13	13	17	16	16	0.173	0.156
7	12.10	14.52	15.20	0.112	0.20	14	13	13	16	15	15	0.173	0.156
10	12.10	14.52	15.20	0.112	0.20	13	11	11	15	13	13	0.173	0.156
12	12.10	14.52	15.20	0.112	0.20	12	10	10	14	12	12	0.173	0.156
14	12.10	14.52	15.20	0.112	0.20	11	10	10	13	12	12	0.173	0.156
16	12.10	14.52	15.20	0.112	0.20	11	9	9	13	11	11	0.173	0.156
19	12.10	14.52	15.20	0.112	0.20	10	9	9	11	11	11	0.173	0.156
24	12.10	14.52	15.20	0.112	0.20	9	8	8	10	10	10	0.173	0.156
27	12.10	14.52	15.20	0.112	0.20	9	8	8	10	10	10	0.173	0.156
30	12.10	14.52	15.20	0.112	0.20	9	7	7	10	8	8	0.173	0.156
37	12.10	14.52	15.20	0.112	0.20	8	7	7	9	8	8	0.173	0.156
40	12.10	14.52	15.20	0.112	0.20	8	7	7	9	8	8	0.173	0.156
44	12.10	14.52	15.20	0.112	0.20	7	7	7	8	7	7	0.173	0.156
52	12.10	14.52	15.20	0.112	0.20	6	6	6	7	7	7	0.173	0.156
61	12.10	14.52	15.20	0.112	0.20	6	6	6	7	7	7	0.173	0.156

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 12

TECHNICAL DETAILS FOR HAVELLS 1.1 kV 2.5 SQ. mm COPPER CONDUCTOR, PVC INSULATED, ARMOURED / UNARMOURED CONTROL CABLES

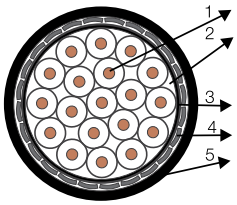
Ref. Specification: IS 1554 PART -1
Cable Code: YY/YFY/YWY

Physical Parameters

No. of Cores	Minimum Inner Sheath Thickness	Unarmoured (YY)					Flat Strip Armoured (YFY)						Round Wire Armoured (YWY)					
		Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable		Dimension of Armour Strip	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable		Nominal Dia of Armour Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable	
			Solid Cond.	Std. cond.	Soild Cond.	Std. cond.			Soild Cond.	Std. cond.	Soild Cond.	Std. cond.			Soild Cond.	Std. cond.	Soild Cond.	Std. cond.
Nos	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	mm	kg/km	kg/km
2	0.30	1.80	12	13	210	220	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	14	14	410	440
3	0.30	1.80	13	13	250	260	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	15	430	450
4	0.30	1.80	14	14	300	310	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	16	500	520
5	0.30	1.80	15	15	360	360	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	17	17	570	590
6	0.30	1.80	16	16	400	420	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	18	18	630	660
7	0.30	1.80	16	16	390	400	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	18	18	670	700
10	0.30	1.80	20	20	530	550	4×0.8	1.40	20	21	750	790	1.60	1.40	22	23	960	1010
12	0.30	2.00	21	21	620	650	4×0.8	1.40	21	22	820	870	1.60	1.40	23	24	1040	1100
14	0.30	2.00	21	22	700	730	4×0.8	1.40	22	23	920	970	1.60	1.40	24	24	1150	1190
16	0.30	2.00	22	23	780	810	4×0.8	1.40	23	24	1020	1050	1.60	1.40	25	26	1240	1300
19	0.30	2.00	24	25	890	930	4×0.8	1.40	24	25	1130	1190	1.60	1.40	26	27	1390	1450
24	0.30	2.00	27	29	1110	1150	4×0.8	1.40	28	29	1400	1470	1.60	1.56	30	31	1720	1790
27	0.30	2.00	28	29	1210	1260	4×0.8	1.40	28	30	1510	1580	1.60	1.56	30	32	1840	1920
30	0.30	2.00	29	30	1320	1380	4×0.8	1.56	30	31	1670	1750	1.60	1.56	31	33	1980	2060
37	0.40	2.20	32	33	1630	1700	4×0.8	1.56	32	34	1960	2050	2.00	1.56	34	36	2520	2620
40	0.40	2.20	33	34	1730	1800	4×0.8	1.56	33	35	2080	2160	2.00	1.56	36	37	2620	2740
44	0.40	2.20	35	37	1900	1980	4×0.8	1.56	36	37	2300	2380	2.00	1.56	38	40	2900	3020
52	0.40	2.20	37	38	2190	2280	4×0.8	1.56	37	39	2600	2700	2.00	1.72	40	42	3260	3400
61	0.40	2.20	39	41	2520	2620	4×0.8	1.56	40	41	2950	3050	2.00	1.72	42	44	3640	3810

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



Conductor: Solid / Stranded Annealed Bare Copper as per Class-2 of IS 8130; Options: Tinned
Insulation Material: PVC Type-A OR HR PVC Type-C as per IS 5831; Nominal Insulation Thickness: 0.90 mm
Core Identification: Upto 5 cores: By colour coding & Above 5 cores: By colour coding / Number printing on cores as per IS 1554 Part-1
Inner Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
Armouring: Single Layer of Aluminium Round Wire / Flat Strip
Outer Sheath: PVC Type ST-1 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

No. of Cores	Max. Conductor D.C.Resistance at 20 °C	Approx. Conductor A.C.Resistance		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
						For General Purpose Insulation			For Heat Resisting Insulation				
		at 70 °C	at 85 °C			Ground	Duct	Air	Ground	Duct	Air	For General Purpose Insulation	For Heat Resisting Insulation
Nos	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
2	7.41	8.89	9.34	0.107	0.22	32	27	27	38	32	32	0.288	0.260
3	7.41	8.89	9.34	0.107	0.22	27	24	24	30	28	28	0.288	0.260
4	7.41	8.89	9.34	0.107	0.22	27	24	24	30	28	28	0.288	0.260
5	7.41	8.89	9.34	0.107	0.22	27	24	24	30	28	28	0.288	0.260
6	7.41	8.89	9.34	0.107	0.22	21	18	18	24	21	21	0.288	0.260
7	7.41	8.89	9.34	0.107	0.22	20	17	17	22	20	20	0.288	0.260
10	7.41	8.89	9.34	0.107	0.22	18	15	15	20	16	16	0.288	0.260
12	7.41	8.89	9.34	0.107	0.22	17	14	14	19	16	16	0.288	0.260
14	7.41	8.89	9.34	0.107	0.22	16	13	13	18	15	15	0.288	0.260
16	7.41	8.89	9.34	0.107	0.22	15	13	13	17	15	15	0.288	0.260
19	7.41	8.89	9.34	0.107	0.22	14	12	12	16	14	14	0.288	0.260
24	7.41	8.89	9.34	0.107	0.22	13	11	11	14	13	13	0.288	0.260
27	7.41	8.89	9.34	0.107	0.220	12	10	10	13	12	12	0.288	0.260
30	7.41	8.89	9.34	0.107	0.22	12	10	10	13	12	12	0.288	0.260
37	7.41	8.89	9.34	0.107	0.22	11	9	9	12	10	10	0.288	0.260
40	7.41	8.89	9.34	0.107	0.22	11	9	9	12	10	10	0.288	0.260
44	7.41	8.89	9.34	0.107	0.22	10	9	9	11	10	10	0.288	0.260
52	7.41	8.89	9.34	0.107	0.22	9	8	8	10	10	10	0.288	0.260
61	7.41	8.89	9.34	0.107	0.22	8	8	8	9	9	9	0.288	0.260

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no.52 - 54

Table - 13

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, UN-ARMOURED CABLES

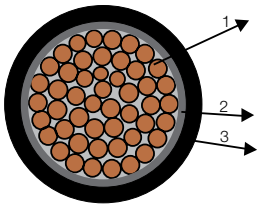
Ref Specification: IS 7098 Part-1
Cable Code: A2XY/2XY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Nominal Outer Sheath Thickness	Approx. Overall Diameter of Cable	Approx. Weight of Cable	
	Aluminium	Copper				With Al Conductor A2XY	With Cu Conductor 2XY
SQ. mm	Nos	Nos	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	0.70	1.80	7	70	90
6	1/3	1/3	0.70	1.80	8	80	110
10	1/7	6	0.70	1.80	9	90	160
16	6	6	0.70	1.80	10	130	250
25	6	6	0.90	1.80	11	150	350
35	6	6	0.90	1.80	12	200	400
50	6	6	1.00	1.80	14	250	550
70	12	12	1.10	1.80	16	350	750
95	15	15	1.10	1.80	18	450	1000
120	15	18	1.20	1.80	19	500	1250
150	15	18	1.40	2.00	21	650	1500
185	30	30	1.60	2.00	24	800	1850
240	30	34	1.70	2.00	26	950	2400
300	30	34	1.80	2.00	29	1150	2950
400	53	53	2.00	2.20	33	1500	3750
500	53	53	2.20	2.20	36	1850	4750
630	53	53	2.40	2.20	40	2350	6100
800	53	53	2.60	2.40	44	2900	7750
1000	53	53	2.80	2.60	48	3600	9650

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Circular
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm and above - Stranded Compacted Circular
Insulation Material: XLPE (Cross linked polyethylene); Colour: Natural
Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	9.48	5.90	0.136	0.29	43	36	38	54	46	48	0.376	0.572
6	4.61	3.08	5.90	3.94	0.128	0.34	55	47	50	67	57	61	0.564	0.858
10	3.08	1.83	3.94	2.34	0.118	0.42	69	58	64	90	76	83	0.940	1.43
16	1.91	1.15	2.44	1.47	0.108	0.50	89	75	84	115	97	108	1.50	2.28
25	1.20	0.727	1.54	0.931	0.102	0.52	115	96	112	148	124	144	2.35	3.57
35	0.868	0.524	1.11	0.671	0.097	0.60	137	115	137	177	148	176	3.29	5.00
50	0.641	0.387	0.820	0.495	0.092	0.63	161	135	165	208	174	212	4.70	7.15
70	0.443	0.268	0.567	0.343	0.088	0.68	198	165	209	255	213	269	6.58	10.01
95	0.320	0.193	0.411	0.248	0.085	0.79	243	199	264	312	256	340	8.93	13.59
120	0.253	0.153	0.325	0.197	0.082	0.79	276	226	308	355	291	396	11.28	17.16
150	0.206	0.1240	0.265	0.159	0.082	0.79	308	252	350	396	324	450	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.082	0.79	349	285	406	447	365	519	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.079	0.84	404	329	480	515	420	613	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.078	0.86	454	369	551	576	469	700	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.077	0.88	518	421	647	651	528	813	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.076	0.90	588	476	751	727	589	930	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.075	0.94	663	536	868	806	651	1056	59.22	90.09
800	0.0367	0.0221	0.0530	0.0319	0.075	0.97	740	596	992	877	707	1179	75.20	114.40
1000	0.0291	0.0176	0.0444	0.0268	0.068	1.01	812	652	1117	935	751	1288	94.00	143.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 14

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
TWO CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, UN-ARMOURED CABLES

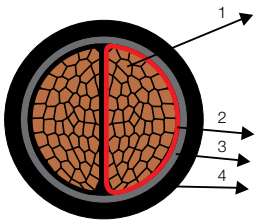
Ref Specification: IS 7098 Part-1
Cable Code: A2XY/2XY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
	Aluminium	Copper					With Al Conductor A2XY	With Cu Conductor 2XY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	0.70	0.30	1.80	12	180	240
6	1/3	1/3	0.70	0.30	1.80	13	220	300
10	1/7	6	0.70	0.30	1.80	15	280	420
16	6	6	0.70	0.30	1.80	14	250	450
25	6	6	0.90	0.30	2.00	18	400	700
35	6	6	0.90	0.30	2.00	19	450	900
50	6	6	1.00	0.30	2.00	21	600	1150
70	12	12	1.10	0.30	2.00	24	750	1550
95	15	15	1.10	0.40	2.20	27	950	2100
120	15	18	1.20	0.40	2.20	29	1150	2550
150	15	18	1.40	0.40	2.20	31	1350	3100
185	30	30	1.60	0.50	2.40	35	1700	3850
240	30	34	1.70	0.50	2.60	40	2150	5000
300	30	34	1.80	0.60	2.80	43	2650	6200
400	53	53	2.00	0.60	3.00	48	3300	7850
500	53	53	2.20	0.70	3.40	54	4200	10000
630	53	53	2.40	0.70	3.80	59	5200	12750

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1. Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
   Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 Sq.mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
   For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2. Insulation Material: XLPE (Cross linked polyethylene); Colour: Red & Black
3. Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
4. Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
   Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	9.48	5.90	0.098	0.11	42	36	38	54	45	48	0.376	0.572
6	4.61	3.08	5.90	3.94	0.090	0.13	55	46	50	67	56	61	0.564	0.858
10	3.08	1.83	3.94	2.34	0.084	0.16	68	57	64	89	75	83	0.940	1.43
16	1.91	1.15	2.44	1.47	0.080	0.18	89	74	83	115	96	108	1.50	2.29
25	1.20	0.727	1.54	0.931	0.080	0.20	114	95	109	147	122	140	2.35	3.58
35	0.868	0.524	1.11	0.671	0.080	0.23	136	113	133	176	146	172	3.29	5.01
50	0.641	0.387	0.820	0.495	0.078	0.24	161	134	162	208	173	208	4.70	7.15
70	0.443	0.268	0.567	0.343	0.077	0.26	197	164	204	253	211	262	6.58	10.01
95	0.320	0.193	0.411	0.248	0.074	0.29	235	196	251	302	252	322	8.93	13.59
120	0.253	0.153	0.325	0.197	0.072	0.29	266	222	287	340	284	368	11.28	17.16
150	0.206	0.1240	0.265	0.159	0.072	0.29	296	248	328	379	317	419	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.072	0.29	335	281	379	425	357	482	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.072	0.31	385	324	448	486	409	566	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.071	0.33	432	364	513	541	456	644	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.070	0.33	487	412	593	602	508	734	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.070	0.34	548	463	683	665	562	831	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.069	0.36	612	518	784	728	616	936	59.22	90.09

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 15

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, UN-ARMOURED CABLES

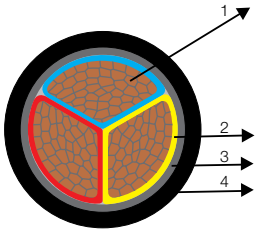
Ref Specification: IS 7098 Part-1
Cable Code: A2XY/2XY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
	Aluminium	Copper					With Al Conductor	With Cu Conductor
							A2XY	2XY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	0.70	0.30	1.80	13	200	280
6	1/3	1/3	0.70	0.30	1.80	14	250	360
10	1/7	6	0.70	0.30	1.80	16	310	510
16	6	6	0.70	0.30	1.80	17	350	650
25	6	6	0.90	0.30	2.00	20	500	950
35	6	6	0.90	0.30	2.00	22	600	1250
50	6	6	1.00	0.30	2.00	24	800	1600
70	12	12	1.10	0.40	2.20	28	1050	2250
95	15	15	1.10	0.40	2.20	31	1300	3000
120	15	18	1.20	0.40	2.20	34	1600	3700
150	15	18	1.40	0.50	2.40	38	1950	4550.70
185	30	30	1.60	0.50	2.60	42	2450	5650
240	30	34	1.70	0.60	2.80	47	3100	7350
300	30	34	1.80	0.60	3.00	52	3800	9100
400	53	53	2.00	0.70	3.20	58	4750	11550
500	53	53	2.20	0.70	3.60	65	6000	14750
630	53	53	2.40	0.70	3.80	73	7500	18800

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2 Insulation Material: XLPE (Cross linked polyethylene); Colour: Red, Yellow & Blue
3 Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
4 Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
	Aluminium	Copper	Aluminium	Copper			For Aluminium Conductor			For Copper Conductor				
							Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	9.48	5.90	0.098	0.11	35	30	32	45	38	41	0.376	0.572
6	4.61	3.08	5.90	3.94	0.090	0.13	46	38	42	56	47	52	0.564	0.858
10	3.08	1.83	3.94	2.34	0.084	0.16	57	48	54	74	62	70	0.940	1.43
16	1.91	1.15	2.44	1.47	0.080	0.18	74	61	69	95	79	89	1.50	2.29
25	1.20	0.727	1.54	0.931	0.080	0.20	95	79	93	122	102	119	2.35	3.58
35	0.868	0.524	1.11	0.671	0.080	0.23	114	94	114	146	122	147	3.29	5.01
50	0.641	0.387	0.820	0.495	0.078	0.24	134	112	138	173	144	179	4.70	7.15
70	0.443	0.268	0.567	0.343	0.077	0.26	164	137	175	212	177	226	6.58	10.01
95	0.320	0.193	0.411	0.248	0.074	0.29	197	164	216	254	212	279	8.93	13.59
120	0.253	0.153	0.325	0.197	0.072	0.29	223	187	249	287	240	320	11.28	17.16
150	0.206	0.1240	0.265	0.159	0.072	0.29	249	209	284	321	269	365	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.072	0.29	282	238	329	362	304	422	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.072	0.31	327	276	392	418	352	500	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.071	0.33	369	312	452	469	396	574	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.070	0.33	420	356	526	528	447	662	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.070	0.34	478	412	612	593	511	760	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.069	0.36	542	468	712	661	571	870	59.22	90.09

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 16

TECHNICAL DETAILS FOR HAVELLS 1.1 kV, THREE & HALF CORE ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, UN-ARMOURED CABLES

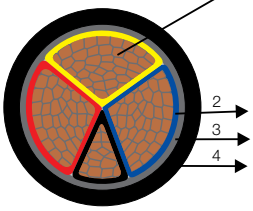
Ref Specification: IS 7098 Part-1
Cable Code: A2XY/2XY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
	Aluminium	Copper					With Al Conductor A2XY	With Cu Conductor 2XY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km
3×25+16	6/6	6/6	0.90/0.70	0.30	2.00	21	600	1150
3×35+16	6/6	6/6	0.90/0.70	0.30	2.00	24	700	1400
3×50+25	6/6	6/6	1.00/0.90	0.30	2.00	26	900	1850
3×70+35	12/6	12/6	1.10/0.90	0.40	2.20	30	1200	2600
3×95+50	15/6	15/6	1.10/1.00	0.40	2.20	34	1500	3450
3×120+70	15/12	18/12	1.20/1.10	0.40	2.20	37	1800	4350
3×150+70	15/12	18/12	1.40/1.10	0.50	2.40	41	2250	5250
3×185+95	30/15	30/15	1.60/1.10	0.50	2.60	46	2800	6600
3×240+120	30/15	34/18	1.70/1.20	0.60	2.80	50	3550	8500
3×300+150	30/15	34/18	1.80/1.40	0.60	3.00	55	4300	10500
3×400+185	53/30	53/30	2.00/1.60	0.70	3.40	62	5450	13350
3×500+240	53/30	53/34	2.20/1.70	0.70	3.60	72	6900	17050
3×630+300	53/30	53/34	2.40/1.80	0.70	4.00	80	8700	21750

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1 Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2 Insulation Material: XLPE (Cross linked polyethylene); Colour: Red, Yellow, Blue & Black
3 Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
4 Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
3×25+16	1.20	0.727	1.54	0.931	0.080	0.20	95	79	93	122	102	119	2.35	3.58
3×35+16	0.868	0.524	1.11	0.671	0.080	0.23	114	94	114	146	122	147	3.29	5.01
3×50+25	0.641	0.387	0.820	0.495	0.078	0.24	134	112	138	173	144	179	4.70	7.15
3×70+35	0.443	0.268	0.567	0.343	0.077	0.26	164	137	175	212	177	226	6.58	10.01
3×95+50	0.320	0.193	0.411	0.248	0.074	0.29	197	164	216	254	212	279	8.93	13.59
3×120+70	0.253	0.153	0.325	0.197	0.072	0.29	223	187	249	287	240	320	11.28	17.16
3×150+70	0.206	0.1240	0.265	0.159	0.072	0.29	249	209	284	321	269	365	14.10	21.45
3×185+95	0.164	0.0991	0.211	0.127	0.072	0.29	282	238	329	362	304	422	17.39	26.46
3×240+120	0.125	0.0754	0.162	0.0976	0.072	0.31	327	276	392	418	352	500	22.56	34.32
3×300+150	0.100	0.0601	0.130	0.0778	0.071	0.33	369	312	452	469	396	574	28.20	42.90
3×400+185	0.0778	0.0470	0.1023	0.0618	0.070	0.33	420	356	526	528	447	662	37.60	57.20
3×500+240	0.0605	0.0366	0.0808	0.0489	0.070	0.34	478	412	612	593	511	760	47.00	71.50
3×630+300	0.0469	0.0283	0.0648	0.0391	0.069	0.36	542	468	712	661	571	870	59.22	90.09

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 17

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
FOUR CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, UN-ARMOURED CABLES

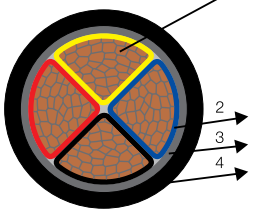
Ref Specification: IS 7098 Part-1
Cable Code: A2XY/2XY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
	Aluminium	Copper					With Al Conductor	With Cu Conductor
							A2XY	2XY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	0.70	0.30	1.80	14	230	340
6	1/3	1/3	0.70	0.30	1.80	15	290	430
10	1/7	6	0.70	0.30	1.80	17	360	630
16	6	6	0.70	0.30	1.80	19	450	800
25	6	6	0.90	0.30	2.00	22	600	1200
35	6	6	0.90	0.30	2.00	24	750	1600
50	6	6	1.00	0.30	2.00	27	950	2000
70	12	12	1.10	0.40	2.20	31	1300	2900
95	15	15	1.10	0.40	2.20	35	1700	3900
120	15	18	1.20	0.50	2.40	39	2100	4900
150	15	18	1.40	0.50	2.60	43	2550	6000
185	30	30	1.60	0.50	2.80	48	3150	7450
240	30	34	1.70	0.60	3.00	54	4000	9700
300	30	34	1.80	0.70	3.20	61	4950	12050
400	53	53	2.00	0.70	3.60	68	6250	15350
500	53	53	2.20	0.70	3.80	75	7800	19450
630	53	53	2.40	0.70	4.00	84	9800	24850

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1 Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2 Insulation Material: XLPE (Cross linked polyethylene); Colour: Red, Yellow & Blue
3 Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
4 Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
	Aluminium	Copper	Aluminium	Copper			For Aluminium Conductor			For Copper Conductor				
							Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	9.48	5.90	0.098	0.11	35	30	32	45	38	41	0.376	0.572
6	4.61	3.08	5.90	3.94	0.090	0.13	46	38	42	56	47	52	0.564	0.858
10	3.08	1.83	3.94	2.34	0.084	0.16	57	48	54	74	62	70	0.940	1.43
16	1.91	1.15	2.44	1.47	0.080	0.18	74	61	69	95	79	89	1.50	2.29
25	1.20	0.727	1.54	0.931	0.080	0.20	95	79	93	122	102	119	2.35	3.58
35	0.868	0.524	1.11	0.671	0.080	0.23	114	94	114	146	122	147	3.29	5.01
50	0.641	0.387	0.820	0.495	0.078	0.24	134	112	138	173	144	179	4.70	7.15
70	0.443	0.268	0.567	0.343	0.077	0.26	164	137	175	212	177	226	6.58	10.01
95	0.320	0.193	0.411	0.248	0.074	0.29	197	164	216	254	212	279	8.93	13.59
120	0.253	0.153	0.325	0.197	0.072	0.29	223	187	249	287	240	320	11.28	17.16
150	0.206	0.1240	0.265	0.159	0.072	0.29	249	209	284	321	269	365	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.072	0.29	282	238	329	362	304	422	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.072	0.31	327	276	392	418	352	500	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.071	0.33	369	312	452	469	396	574	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.070	0.33	420	356	526	528	447	662	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.070	0.34	478	412	612	593	511	760	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.069	0.36	542	468	712	661	571	870	59.22	90.09

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 18

TECHNICAL DETAILS FOR HAVELLS 1.1 KV
SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

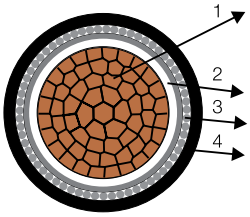
Ref Specification: IS 7098 Part-1
Cable Code: A2XFaY/2XFaY, A2XWaY/2XWaY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Flat Strip Armoured (A2XFaY/2XFaY)					Round Wire Armoured (A2XWaY/2XWaY)				
				Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
							With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper					A2XFaY	2XFaY				A2XWaY	2XWaY
SQ. mm	Nos	Nos	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	1.00	N/A	N/A	N/A	N/A	N/A	1.40	1.24	10	120	150
6	1/3	1/3	1.00	N/A	N/A	N/A	N/A	N/A	1.40	1.24	11	130	170
10	1/7	6	1.00	N/A	N/A	N/A	N/A	N/A	1.40	1.24	12	150	220
16	6	6	1.00	N/A	N/A	N/A	N/A	N/A	1.40	1.24	12	200	300
25	6	6	1.20	N/A	N/A	N/A	N/A	N/A	1.40	1.24	14	250	400
35	6	6	1.20	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	300	500
50	6	6	1.3	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	360	650
70	12	12	1.40	N/A	N/A	N/A	N/A	N/A	1.40	1.24	18	450	850
95	15	15	1.40	4×0.80	1.40	19	500	1100	1.60	1.40	21	600	1150
120	15	18	1.50	4×0.80	1.40	21	600	1300	1.60	1.40	22	700	1400
150	15	18	1.70	4×0.80	1.40	23	700	1600	1.60	1.40	24	800	1650
185	30	30	1.90	4×0.80	1.40	25	900	1950	1.60	1.40	26	950	2050
240	30	34	2.00	4×0.80	1.40	27	1050	2500	1.60	1.40	29	1150	2600
300	30	34	2.10	4×0.80	1.56	30	1300	3100	1.60	1.56	32	1400	3200
400	53	53	2.40	4×0.80	1.56	34	1650	3900	2.00	1.56	36	1850	4100
500	53	53	2.60	4×0.80	1.56	37	2000	4900	2.00	1.56	40	2200	5100
630	53	53	2.80	4×0.80	1.72	42	2520	6300	2.00	1.72	44	2750	6500
800	53	53	3.10	4×0.80	1.72	46	3150	7950	2.00	1.88	49	3450	8250
1000	53	53	3.30	4×0.80	1.88	50	3850	9850	2.50	2.04	54	4300	10300

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Circular
For Cu Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm and above - Stranded Compacted Circular
Insulation Material: XLPE (Cross linked polyethylene); Colour: Natural
Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Armouring: Single Layer of Aluminium Round Wire / Flat Strip
Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	9.48	5.90	0.152	0.22	43	36	38	54	46	48	0.376	0.572
6	4.61	3.08	5.90	3.94	0.144	0.26	55	47	50	67	57	61	0.56	0.858
10	3.08	1.83	3.94	2.34	0.133	0.31	69	58	64	90	76	83	0.94	1.43
16	1.91	1.15	2.44	1.47	0.122	0.40	89	75	84	115	97	108	1.50	2.29
25	1.20	0.727	1.54	0.931	0.116	0.40	115	96	112	148	124	144	2.35	3.58
35	0.868	0.524	1.11	0.671	0.110	0.47	137	115	137	177	148	176	3.29	5.01
50	0.641	0.387	0.820	0.495	0.103	0.50	161	135	165	208	174	212	4.70	7.15
70	0.443	0.268	0.567	0.343	0.099	0.55	198	165	209	255	213	269	6.58	10.01
95	0.320	0.193	0.411	0.248	0.097	0.64	243	199	264	312	256	340	8.93	13.59
120	0.253	0.153	0.325	0.197	0.093	0.67	276	226	308	355	291	396	11.28	17.16
150	0.206	0.1240	0.265	0.159	0.091	0.67	308	252	350	396	324	450	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.090	0.67	349	285	406	447	365	519	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.086	0.72	404	329	480	515	420	613	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.085	0.75	454	369	551	576	469	700	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.085	0.75	518	421	647	651	528	813	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.083	0.77	588	476	751	727	589	930	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.082	0.81	663	536	868	806	651	1056	59.22	90.09
800	0.0367	0.0221	0.0530	0.0319	0.081	0.88	740	596	992	877	707	1179	75.20	114.40
1000	0.0291	0.0176	0.0444	0.0268	0.081	0.88	812	652	1117	935	751	1288	94.00	143.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 1.1 kV
TWO CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

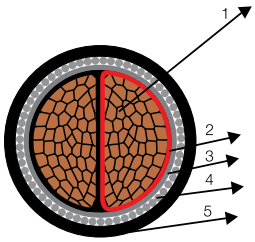
Ref Specification: IS 7098 Part-1
Cable Code: A2XFY/2XFY, A2XWY/2XWY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWY/2XWY)				
					Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
								With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	Nos	Nos	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	14	370	470
6	1/3	1/3	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	460	550
10	1/7	6	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	17	530	700
16	6	6	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.40	17	550	750
25	6	6	0.90	0.30	4×0.80	1.40	18	550	850.0	1.60	1.40	20	750	1050
35	6	6	0.90	0.30	4×0.80	1.40	20	650	1050.0	1.60	1.40	21	850	1250
50	6	6	1.00	0.30	4×0.80	1.40	22	750	1350.0	1.60	1.40	23	1000	1550
70	12	12	1.10	0.30	4×0.80	1.56	25	1000	1800.0	1.60	1.56	26	1250	2050
95	15	15	1.10	0.40	4×0.80	1.56	27	1250	2350.0	2.00	1.56	30	1700	2800
120	15	18	1.20	0.40	4×0.80	1.56	30	1450	2850.0	2.00	1.56	32	1950	3350
150	15	18	1.40	0.40	4×0.80	1.72	32	1700	3450.0	2.00	1.72	35	2250	4000
185	30	30	1.60	0.50	4×0.80	1.72	35	2050	4200.0	2.00	1.88	38	2700	4850
240	30	34	1.70	0.50	4×0.80	1.88	40	2550	5400.0	2.50	2.04	44	3550	6350
300	30	34	1.80	0.60	4×0.80	2.04	43	3000	6550.0	2.50	2.20	47	4100	7650
400	53	53	2.00	0.60	4×0.80	2.36	49	4000	8300.0	2.50	2.36	52	4950	9500
500	53	53	2.20	0.70	4×0.80	2.52	54	4650	10450.0	3.15	2.68	59	6500	12300
630	53	53	2.40	0.70	4×0.80	2.68	60	5700	13200.0	3.15	2.84	64	7800	15350

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1. Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
   Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
   For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2. Insulation Material: XLPE (Cross linked polyethylene); Colour: Red & Black
3. Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
4. Armouring: Single Layer of Galvanized Steel Round Wire / Flat Strip
5. Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
   Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	9.48	5.90	0.098	0.11	42	36	38	54	45	48	0.376	0.572
6	4.61	3.08	5.90	3.94	0.090	0.13	55	46	50	67	56	61	0.564	0.858
10	3.08	1.83	3.94	2.34	0.084	0.16	68	57	64	89	75	83	0.940	1.43
16	1.91	1.15	2.44	1.47	0.080	0.18	89	74	83	115	96	108	1.50	2.29
25	1.20	0.727	1.54	0.931	0.080	0.20	114	95	109	147	122	140	2.35	3.58
35	0.868	0.524	1.11	0.671	0.080	0.23	136	113	133	176	146	172	3.29	5.01
50	0.641	0.387	0.820	0.495	0.078	0.24	161	134	162	208	173	208	4.70	7.15
70	0.443	0.268	0.567	0.343	0.077	0.26	197	164	204	253	211	262	6.58	10.1
95	0.320	0.193	0.411	0.248	0.074	0.29	235	196	251	302	252	322	8.93	13.59
120	0.253	0.153	0.325	0.197	0.072	0.29	266	222	287	340	284	368	11.28	17.16
150	0.206	0.1240	0.265	0.159	0.072	0.29	296	248	328	379	317	419	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.072	0.29	335	281	379	425	357	482	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.072	0.31	385	324	448	486	409	566	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.071	0.33	432	364	513	541	456	644	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.070	0.33	487	412	593	602	508	734	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.070	0.34	548	463	683	665	562	831	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.069	0.36	612	518	784	728	616	936	59.22	90.09

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 20

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

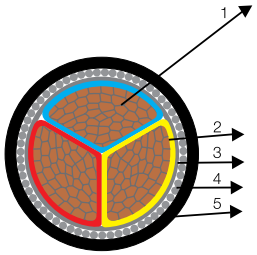
Ref Specification: IS 7098 Part-1
Cable Code: A2XFY/2XFY, A2XWY/2XWY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWY/2XWY)				
					Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
								With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	Nos	Nos	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	400	490
6	1/3	1/3	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	460	580
10	1/7	6	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	17	540	750
16	6	6	0.70	0.30	4x0.80	1.24	18	550	850.0	1.60	1.40	20	700	1000
25	6	6	0.90	0.30	4x0.80	1.40	20	700	1150.0	1.60	1.40	22	900	1350
35	6	6	0.90	0.30	4x0.80	1.40	22	850	1450.0	1.60	1.40	24	1050	1700
50	6	6	1.00	0.30	4x0.80	1.40	25	1000	1850.0	1.60	1.56	27	1300	2100
70	12	12	1.10	0.40	4x0.80	1.56	29	1350	2550.0	2.00	1.56	31	1800	3000
95	15	15	1.10	0.40	4x0.80	1.56	31	1600	3300.0	2.00	1.56	34	2150	3800
120	15	18	1.20	0.40	4x0.80	1.56	34	1900	4000.0	2.00	1.72	37	2550	4650
150	15	18	1.40	0.50	4x0.80	1.72	38	2350	4950.0	2.00	1.88	41	3000	5600
185	30	30	1.60	0.50	4x0.80	1.88	42	2850	6050.0	2.50	2.04	46	3950	7150
240	30	34	1.70	0.60	4x0.80	2.04	47	3500	7750.0	2.50	2.20	51	4800	9000
300	30	34	1.80	0.60	4x0.80	2.20	52	4250	9550.0	2.50	2.36	56	5600	10900
400	53	53	2.00	0.70	4x0.80	2.52	59	5350	12250.0	3.15	2.68	64	7450	14200
500	53	53	2.20	0.70	4x0.80	2.68	65	6550	15300.0	3.15	2.84	70	8900	17600
630	53	53	2.40	0.70	4x0.80	2.84	73	8150	19450.0	4.00	3.00	79	11800	23100

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
Insulation Material: XLPE (Cross linked polyethylene); Colour: Red,Yellow & Blue
Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Armouring: Single Layer of Galvanized Steel Round Wire / Flat Strip
Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	9.48	5.90	0.098	0.11	35	30	32	45	38	41	0.376	0.572
6	4.61	3.08	5.90	3.94	0.090	0.13	46	38	42	56	47	52	0.564	0.858
10	3.08	1.83	3.94	2.34	0.084	0.16	57	48	54	74	62	70	0.940	1.43
16	1.91	1.15	2.44	1.47	0.080	0.18	74	61	69	95	79	89	1.50	2.29
25	1.20	0.727	1.54	0.931	0.080	0.20	95	79	93	122	102	119	2.35	3.58
35	0.868	0.524	1.11	0.671	0.080	0.23	114	94	114	146	122	147	3.29	5.01
50	0.641	0.387	0.820	0.495	0.078	0.24	134	112	138	173	144	179	4.70	7.15
70	0.443	0.268	0.567	0.343	0.077	0.26	164	137	175	212	177	226	6.58	10.01
95	0.320	0.193	0.411	0.248	0.074	0.29	197	164	216	254	212	279	8.93	13.59
120	0.253	0.153	0.325	0.197	0.072	0.29	223	187	249	287	240	320	11.28	17.16
150	0.206	0.1240	0.265	0.159	0.072	0.29	249	209	284	321	269	365	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.072	0.29	282	238	329	362	304	422	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.072	0.31	327	276	392	418	352	500	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.071	0.33	369	312	452	469	396	574	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.070	0.33	420	356	526	528	447	662	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.070	0.34	478	412	612	593	511	760	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.069	0.36	542	468	712	661	571	870	59.22	90.09

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 21

TECHNICAL DETAILS FOR HAVELLS 1.1 kV, THREE & HALF CORE ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

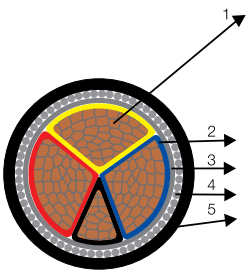
Ref Specification: IS 7098 Part-1
Cable Code: A2XFY/2XFY, A2XWY/2XWY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thick-ness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWY/2XWY)				
					Nominal Armour Strip Dimension	Minimum Outer Sheath Thick-ness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
								With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	Nos	Nos	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
3×25 +16	6/6	6/6	0.90/0.70	0.30	4×0.80	1.40	22	800	1350	1.60	1.40	23	1000	1550
3×35+16	6/6	6/6	0.90/0.70	0.30	4×0.80	1.40	24	950	1650	1.60	1.40	26	1200	1900
3×50+25	6/6	6/6	1.00/0.90	0.30	4×0.80	1.40	27	1150	2150	1.60	1.56	28	1450	2400
3×70+35	12/6	12/6	1.10/0.90	0.40	4×0.80	1.56	31	1500	2850	2.00	1.56	33	2000	3400
3×95+50	15/6	15/6	1.10/1.00	0.40	4×0.80	1.56	34	1850	3800	2.00	1.56	36	2400	4350
3×120+70	15/12	18/12	1.20/1.10	0.40	4×0.80	1.72	38	2250	4750	2.00	1.72	40	2900	5400
3×150+70	15/12	18/12	1.40/1.10	0.50	4×0.80	1.72	41	2650	5600	2.00	1.88	44	3400	6400
3×185+95	30/15	30/15	1.60/1.10	0.50	4×0.80	1.88	46	3200	7000	2.50	2.04	50	4450	8200
3×240+120	30/15	34/18	1.70/1.20	0.60	4×0.80	2.04	50	4000	8900	2.50	2.2	54	5250	10200
3×300+150	30/15	34/18	1.80/1.40	0.60	4×0.80	2.2	55	4800	11000	2.50	2.36	59	6200	12400
3×400+185	53/30	53/30	2.00/1.60	0.70	4×0.80	2.52	62	5950	13850	3.15	2.68	66	8200	16050
3×500+240	53/30	53/34	2.20/1.70	0.70	4×0.80	2.68	72	7500	17650	3.15	2.84	77	10150	20250
3×630+300	53/30	53/34	2.40/1.80	0.70	4×0.80	3.00	80	9300	22400	4.00	3.00	86	13250	26300

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1. Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
   Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
   For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2. Insulation Material: XLPE (Cross linked polyethylene); Colour: Red, Yellow, Blue & Black
3. Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
4. Armouring: Single Layer of Galvanized Steel Round Wire / Flat Strip
5. Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
   Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
3×25+16	1.20	0.727	1.54	0.931	0.080	0.20	95	79	93	122	102	119	2.35	3.58
3×35+16	0.868	0.524	1.11	0.671	0.080	0.23	114	94	114	146	122	147	3.29	5.01
3×50+25	0.641	0.387	0.820	0.495	0.078	0.24	134	112	138	173	144	179	4.70	7.15
3×70+35	0.443	0.268	0.567	0.343	0.077	0.26	164	137	175	212	177	226	6.58	10.01
3×95+50	0.320	0.193	0.411	0.248	0.074	0.29	197	164	216	254	212	279	8.93	13.59
3×120+70	0.253	0.153	0.325	0.197	0.072	0.29	223	187	249	287	240	320	11.28	17.16
3×150+70	0.206	0.1240	0.265	0.159	0.072	0.29	249	209	284	321	269	365	14.10	21.45
3×185+95	0.164	0.0991	0.211	0.127	0.072	0.29	282	238	329	362	304	422	17.39	26.46
3×240+120	0.125	0.0754	0.162	0.0976	0.072	0.31	327	276	392	418	352	500	22.56	34.32
3×300+150	0.100	0.0601	0.130	0.0778	0.071	0.33	369	312	452	469	396	574	28.20	42.90
3×400+185	0.0778	0.0470	0.1023	0.0618	0.070	0.33	420	356	526	528	447	662	37.60	57.20
3×500+240	0.0605	0.0366	0.0808	0.0489	0.070	0.34	478	412	612	593	511	760	47.00	71.50
3×630+300	0.0469	0.0283	0.0648	0.0391	0.069	0.36	542	468	712	661	571	870	59.22	90.09

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 22

TECHNICAL DETAILS FOR HAVELLS 1.1 kV
FOUR CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

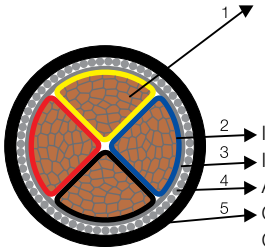
Ref Specification: IS 7098 Part-1
Cable Code: A2XFY/2XFY, A2XWY/2XWY

Physical Parameters

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWY/2XWY)				
					Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
								With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
	Aluminium	Copper						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	Nos	Nos	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
4	1/3	1/3	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	440	560
6	1/3	1/3	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.24	17	520	670
10	1/7	6	0.70	0.30	N/A	N/A	N/A	N/A	N/A	1.40	1.40	19	620	900
16	6	6	0.70	0.30	4×0.80	1.40	20	650	1000	1.60	1.40	21	850	1200
25	6	6	0.90	0.30	4×0.80	1.40	22	850	1450	1.60	1.40	24	1100	1700
35	6	6	0.90	0.30	4×0.80	1.40	25	1000	1850	1.60	1.40	26	1300	2100
50	6	6	1.00	0.30	4×0.80	1.56	28	1300	2400	1.60	1.56	29	1550	2700
70	12	12	1.10	0.40	4×0.80	1.56	32	1650	3250	2.00	1.56	34	2200	3800
95	15	15	1.10	0.40	4×0.80	1.56	35	2000	4250	2.00	1.72	38	2700	4900
120	15	18	1.20	0.50	4×0.80	1.72	39	2500	5300	2.00	1.88	42	3200	6000
150	15	18	1.40	0.50	4×0.80	1.88	43	2950	6400	2.50	2.04	47	4100	7550
185	30	30	1.60	0.50	4×0.80	2.04	48	3600	7950	2.50	2.20	52	4850	9150
240	30	34	1.70	0.60	4×0.80	2.20	54	4500	10200	2.50	2.36	58	5950	11600
300	30	34	1.80	0.70	4×0.80	2.36	61	5500	12600	3.15	2.52	66	7750	14850
400	53	53	2.00	0.70	4×0.80	2.68	68	6850	15900	3.15	2.84	73	9350	18400
500	53	53	2.20	0.70	4×0.80	2.84	75	8500	20100	4.00	3.00	82	12400	24000
630	53	53	2.40	0.70	4×0.80	3.00	84	10550	25650	4.00	3.00	91	14750	30000

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1 Conductor Material: Aluminium / Copper as per Class-2 of IS 8130
Shape of Conductor: For Aluminium Conductor - 4 SQ. mm, 6 SQ. mm & 10 SQ. mm Solid / Stranded Non Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
For Copper Conductor - 4 SQ. mm & 6 SQ. mm Solid / Stranded Non Compacted Circular, 10 SQ. mm - Stranded Compacted Circular, 16 SQ. mm and above - Stranded Compacted Shaped
2 Insulation Material: XLPE (Cross linked polyethylene); Colour: Red,Yellow, Blue & Black
3 Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
4 Armouring: Single Layer of Galvanized Steel Round Wire / Flat Strip
5 Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
4	7.41	4.61	9.48	5.90	0.098	0.11	35	30	32	45	38	41	0.376	0.572
6	4.61	3.08	5.90	3.94	0.090	0.13	46	38	42	56	47	52	0.564	0.858
10	3.08	1.83	3.94	2.34	0.084	0.16	57	48	54	74	62	70	0.940	1.43
16	1.91	1.15	2.44	1.47	0.080	0.18	74	61	69	95	79	89	1.50	2.29
25	1.20	0.727	1.54	0.931	0.080	0.20	95	79	93	122	102	119	2.35	3.58
35	0.868	0.524	1.11	0.671	0.080	0.23	114	94	114	146	122	147	3.29	5.01
50	0.641	0.387	0.820	0.495	0.078	0.24	134	112	138	173	144	179	4.70	7.15
70	0.443	0.268	0.567	0.343	0.077	0.26	164	137	175	212	177	226	6.58	10.01
95	0.320	0.193	0.411	0.248	0.074	0.29	197	164	216	254	212	279	8.93	13.59
120	0.253	0.153	0.325	0.197	0.072	0.29	223	187	249	287	240	320	11.28	17.16
150	0.206	0.1240	0.265	0.159	0.072	0.29	249	209	284	321	269	365	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.072	0.29	282	238	329	362	304	422	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.072	0.31	327	276	392	418	352	500	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.071	0.33	369	312	452	469	396	574	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.070	0.33	420	356	526	528	447	662	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.070	0.34	478	412	612	593	511	760	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.069	0.36	542	468	712	661	571	870	59.22	90.09

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 23

TECHNICAL DETAILS FOR HAVELLS 1.1 kV 1.5 SQ. mm COPPER CONDUCTOR, XLPE INSULATED, ARMOURED / UNARMOURED CONTROL CABLES

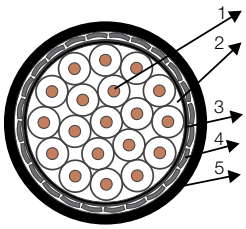
Ref Specification: IS 7098 Part-1
Cable Code: 2XY/2XFY/2XWY

Physical Parameters

No. of Cores	Minimum Inner Sheath Thickness	Unarmoured (2XY)					Flat Strip Armoured (2XFY)						Round Wire Armoured (2XWY)					
		Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable		Dimension of Armour Strip	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable		Nominal Dia of Armour Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable	
			Solid Cond.	Std. cond.	Soild Cond	Std. cond.			Soild Cond	Std. cond.	Soild Cond	Std. cond.			Soild Cond	Std. cond.	Soild Cond	Std. cond.
Nos	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	mm	kg/km	kg/km
2	0.30	1.80	10	10	150	150	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	12	13	320	350
3	0.30	1.80	11	11	170	200	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	13	13	330	350
4	0.30	1.80	12	12	200	200	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	14	14	370	400
5	0.30	1.80	12	13	230	250	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	14	15	420	450
6	0.30	1.80	13	14	260	300	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	16	460	500
7	0.30	1.80	13	14	250	250	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	16	470	500
10	0.30	1.80	16	16	340	350	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	18	19	640	650
12	0.30	1.80	17	17	380	400	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.40	19	20	750	800
14	0.30	1.80	17	18	420	450	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.40	20	21	800	850
16	0.30	1.80	18	19	470	500	4×0.8	1.40	19	20	660	700	1.60	1.40	21	22	860	900
19	0.30	1.80	19	20	550	550	4×0.8	1.40	20	21	750	750	1.60	1.40	21	22	940	1000
24	0.30	2.00	22	23	680	700	4×0.8	1.40	23	24	920	950	1.60	1.40	24	25	1140	1200
27	0.30	2.00	23	24	730	750	4×0.8	1.40	23	24	970	1000	1.60	1.40	25	26	1210	1300
30	0.30	2.00	23	25	800	850	4×0.8	1.40	24	25	1030	1100	1.60	1.40	25	27	1290	1350
37	0.30	2.00	25	26	940	1000	4×0.8	1.40	25	27	1200	1250	1.60	1.40	27	29	1510	1600
40	0.30	2.00	26	27	1030	1080	4×0.8	1.40	26	28	1310	1380	1.60	1.40	28	29	1590	1680
44	0.30	2.00	28	30	1130	1170	4×0.8	1.40	28	30	1420	1490	1.60	1.56	31	32	1760	1850
52	0.30	2.00	29	31	1290	1340	4×0.8	1.56	30	32	1640	1710	1.60	1.56	32	33	1950	2050
61	0.40	2.20	31	33	1520	1580	4×0.8	1.56	32	34	1860	1940	2.00	1.56	34	36	2410	2520

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



1. Conductor: Solid / Stranded Annealed Bare Copper as per Class-2 of IS 8130; Options: Tinned
2. Insulation Material: XLPE as per IS 5831; Nominal Insulation Thickness: 0.70 mm
3. Core Identification: Upto 5 cores: By colour coding & Above 5 cores: By colour coding / Number printing on cores as per IS 7098 Part-1
4. Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
5. Armouring: Single Layer of Aluminium Round Wire / Flat Strip
6. Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
7. Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Number of Cores	Max. Conductor D.C.Resistance at 20 °C	Approx. Conductor A.C.Resistance	Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating for XLPE Insulation			Short Circuit Current Rating for 1 s Duration
					Ground	Duct	Air	
Nos	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	kA
2	12.10	15.49	0.102	0.09	31	27	27	0.215
3	12.10	15.49	0.102	0.09	26	22	23	0.215
4	12.10	15.49	0.102	0.09	26	22	23	0.215
5	12.10	15.49	0.102	0.09	26	22	23	0.215
6	12.10	15.49	0.102	0.09	23	20	20	0.215
7	12.10	15.49	0.102	0.09	20	18	18	0.215
10	12.10	15.49	0.102	0.09	17	15	15	0.215
12	12.10	15.49	0.102	0.09	16	14	14	0.215
14	12.10	15.49	0.102	0.09	16	14	14	0.215
16	12.10	15.49	0.102	0.09	14	12	12	0.215
19	12.10	15.49	0.102	0.09	14	12	12	0.215
24	12.10	15.49	0.102	0.09	12	11	11	0.215
27	12.10	15.49	0.102	0.09	11	9	9	0.215
30	12.10	15.49	0.102	0.09	11	9	9	0.215
37	12.10	15.49	0.102	0.09	11	9	9	0.215
40	12.10	15.49	0.102	0.09	9	8	8	0.215
44	12.10	15.49	0.102	0.09	9	8	8	0.215
52	12.10	15.49	0.102	0.09	9	8	8	0.215
61	12.10	15.49	0.102	0.09	9	8	8	0.215

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 24

TECHNICAL DETAILS FOR HAVELLS 1.1 kV 2.5 SQ. mm COPPER CONDUCTOR, XLPE INSULATED, ARMOURED / UNARMOURED CONTROL CABLES

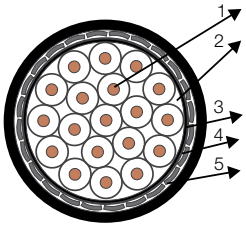
Ref Specification: IS 7098 Part-1
Cable Code: 2XY/2XFY/2XWY

Physical Parameters

No. of Cores	Minimum Inner Sheath Thickness	Unarmoured (2XY)					Flat Strip Armoured (2XFY)						Round Wire Armoured (2XWY)					
		Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable		Dimension of Armour Strip	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable		Nominal Dia of Armour Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable		Approx. Weight of Cable	
			Solid Cond.	Std. cond.	Soild Cond	Std. cond.			Soild Cond	Std. cond.	Soild Cond	Std. cond.			Soild Cond	Std. cond.	Soild Cond	Std. cond.
Nos	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	mm	kg/km	kg/km
2	0.30	1.80	11	12	180	200	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	13	13	370	400
3	0.30	1.80	12	12	210	220	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	14	14	390	410
4	0.30	1.80	13	13	250	270	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	15	440	460
5	0.30	1.80	14	14	300	310	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	15	16	500	520
6	0.30	1.80	15	15	350	360	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	17	560	580
7	0.30	1.80	15	15	330	340	N/A	N/A	N/A	N/A	N/A	N/A	1.40	1.24	16	17	590	610
10	0.30	1.80	18	19	450	470	4x0.8	1.24	19	20	650	690	1.60	1.40	20	21	850	880
12	0.30	1.80	19	20	530	550	4x0.8	1.40	19	20	700	750	1.60	1.40	21	22	920	950
14	0.30	1.80	20	21	590	610	4x0.8	1.40	20	21	790	830	1.60	1.40	22	23	1000	1030
16	0.30	2.00	21	22	660	680	4x0.8	1.40	21	22	880	900	1.60	1.40	23	24	1080	1130
19	0.30	2.00	22	23	750	780	4x0.8	1.40	22	23	970	1010	1.60	1.40	24	25	1200	1260
24	0.30	2.00	25	26	930	960	4x0.8	1.40	25	27	1190	1240	1.60	1.40	27	29	1480	1540
27	0.30	2.00	25	27	1020	1050	4x0.8	1.40	26	27	1300	1320	1.60	1.40	28	29	1580	1640
30	0.30	2.00	26	28	1110	1150	4x0.8	1.40	27	28	1410	1470	1.60	1.40	29	30	1690	1770
37	0.30	2.00	29	30	1370	1410	4x0.8	1.40	30	31	1690	1720	1.60	1.56	31	32	1980	2050
40	0.30	2.00	29	31	1450	1500	4x0.8	1.56	31	32	1800	1870	1.60	1.56	32	33	2110	2210
44	0.40	2.20	32	34	1630	1690	4x0.8	1.56	32	34	1990	2070	2.00	1.56	35	37	2520	2650
52	0.40	2.20	33	35	1870	1940	4x0.8	1.56	34	36	2250	2340	2.00	1.56	36	38	2810	2920
61	0.40	2.20	35	37	2150	2220	4x0.8	1.56	36	38	3160	2640	2.00	1.56	38	40	3160	3280

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.
** Refer page no. 55 for normal delivery lengths & packing details.

Cross-sectional view



Conductor: Solid / Stranded Annealed Bare Copper as per Class-2 of IS 8130; Options: Tinned
Insulation Material: XLPE as per IS 5831; Nominal Insulation Thickness: 0.70 mm
Core Identification: Upto 5 cores: By colour coding & Above 5 cores: By colour coding / Number printing on cores as per IS 7098 Part-1
Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Armouring: Single Layer of Aluminium Round Wire / Flat Strip
Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Number of Cores	Max. Conductor D.C.Resistance at 20 °C	Approx. Conductor A.C.Resistance	Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating for XLPE Insulation			Short Circuit Current Rating for 1 s Duration
					Ground	Duct	Air	
Nos	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	kA
2	7.41	9.48	0.100	0.10	41	35	36	0.358
3	7.41	9.48	0.100	0.10	34	30	30	0.358
4	7.41	9.48	0.100	0.10	34	30	30	0.358
5	7.41	9.48	0.100	0.10	34	30	30	0.358
6	7.41	9.48	0.100	0.10	31	27	27	0.358
7	7.41	9.48	0.100	0.10	27	23	23	0.358
10	7.41	9.48	0.100	0.10	23	20	20	0.358
12	7.41	9.48	0.100	0.10	20	18	18	0.358
14	7.41	9.48	0.100	0.10	20	18	18	0.358
16	7.41	9.48	0.100	0.10	18	16	16	0.358
19	7.41	9.48	0.100	0.10	18	16	16	0.358
24	7.41	9.48	0.100	0.10	16	14	14	0.358
27	7.41	9.48	0.100	0.10	14	13	13	0.358
30	7.41	9.48	0.100	0.10	14	13	13	0.358
37	7.41	9.48	0.100	0.10	14	13	13	0.358
40	7.41	9.48	0.100	0.10	12	11	11	0.358
44	7.41	9.48	0.100	0.10	12	11	11	0.358
52	7.41	9.48	0.100	0.10	12	11	11	0.358
61	7.41	9.48	0.100	0.10	12	11	11	0.358

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

HT POWER CABLE

FEATURES

HT POWER CABLE

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

APPLICABLE STANDARD

- IS 7098 Part-2

Table - 25

TECHNICAL DETAILS FOR HAVELLS 3.3 kV
SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

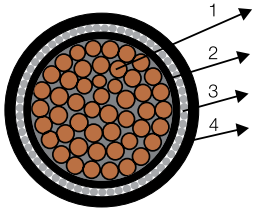
Ref Specification: IS 7098 Part-2
Cable Code: A2XWaY/2XWaY (3.3 kV - EARTHED / UNEARTHED)

Physical Parameters

Size (Cross Sectional Area)	Nominal Insulation Thickness	Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
					With Al Conductor	With Cu Conductor
					A2XWaY	2XWaY
SQ. mm	mm	mm	mm	mm	kg/km	kg/km
25	2.50	1.40	1.24	17	350	500
35	2.50	1.40	1.24	18	400	600
50	2.50	1.40	1.40	19	500	750
70	2.50	1.60	1.40	21	600	1000
95	2.50	1.60	1.40	23	700	1250
120	2.50	1.60	1.40	24	800	1500
150	2.50	1.60	1.40	26	900	1800
185	2.50	1.60	1.40	27	1050	2150
240	2.50	1.60	1.56	30	1300	2700
300	2.50	1.60	1.56	32	1500	3300
400	2.60	2.00	1.56	36	1900	4200
500	2.80	2.00	1.56	41	2300	5250
630	3.00	2.00	1.72	45	2850	6650
800	3.30	2.00	1.88	51	3550	8450
1000	3.50	2.50	2.04	56	4450	10600

- Tabulated approx. net weights of cables are only for guidelines for transportation / loading / unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Insulation Material: XLPE (Cross linked polyethylene); Colour: Natural
3. Armouring: Single Layer of Aluminium Round Wire
4. Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type

Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.133	0.25	100	91	110	130	115	145	2.35	3.58
35	0.868	0.524	1.11	0.671	0.126	0.29	120	110	135	155	140	175	3.29	5.00
50	0.641	0.387	0.82	0.495	0.122	0.33	140	125	165	185	165	215	4.70	7.15
70	0.443	0.268	0.567	0.343	0.116	0.38	175	155	210	225	200	270	6.58	10.00
95	0.32	0.193	0.41	0.248	0.111	0.44	205	185	255	265	235	330	8.93	13.59
120	0.253	0.153	0.325	0.197	0.106	0.49	235	210	295	300	265	380	11.28	17.16
150	0.206	0.124	0.265	0.159	0.103	0.53	260	230	335	335	300	430	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.100	0.58	295	260	390	380	335	495	17.39	26.45
240	0.125	0.0754	0.162	0.0976	0.097	0.67	340	300	460	435	385	590	22.56	34.32
300	0.10	0.0601	0.130	0.0778	0.095	0.73	385	335	530	490	430	670	28.20	42.90
400	0.0778	0.047	0.1023	0.0618	0.093	0.84	440	380	620	550	480	780	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.091	0.86	495	430	730	610	530	900	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.090	0.88	560	485	840	680	590	1020	59.22	90.10
800	0.0367	0.0221	0.053	0.0319	0.088	0.94	620	530	960	740	630	1140	75.20	114.40
1000	0.0291	0.0176	0.0444	0.0268	0.086	0.99	670	570	1070	780	660	1250	94.00	143.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 3.3 KV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

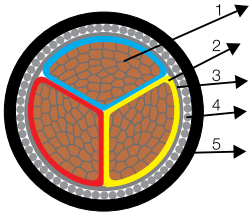
Cable Code: A2XFY/2XFY, A2XWY/2XWY (3.3 kV - EARTHED / UNEARTHED)

Physical Parameters

Size (Cross Sectional Area)	Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWY/2XWY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal Dia of Armor Wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	2.20	0.30	4×0.80	1.40	27	1000	1450	1.60	1.56	30	1300	1750
35	2.20	0.30	4×0.80	1.56	29	1200	1800	1.60	1.56	33	1500	2100
50	2.20	0.40	4×0.80	1.56	31	1400	2250	2.00	1.56	35	1900	2750
70	2.20	0.40	4×0.80	1.56	34	1650	2900	2.00	1.56	38	2250	3450
95	2.20	0.40	4×0.80	1.72	37	2000	3700	2.00	1.72	42	2650	4300
120	2.20	0.50	4×0.80	1.72	40	2350	4450	2.00	1.88	45	3050	5150
150	2.20	0.50	4×0.80	1.88	43	2700	5300	2.50	2.04	48	3750	6400
185	2.20	0.50	4×0.80	2.04	46	3150	6450	2.50	2.04	51	4300	7600
240	2.20	0.60	4×0.80	2.2	51	3850	8150	2.50	2.20	56	5050	9400
300	2.20	0.60	4×0.80	2.2	55	4350	9900	2.50	2.36	60	5800	11250
400	2.20	0.70	4×0.80	2.52	61	5400	12350	3.15	2.68	67	7700	14600

- Tabulated approx. net weights of cables are only for guidelines for transportation / loading / unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Insulation Material: XLPE (Cross linked polyethylene); Colour: Red, Yellow & Blue
3. Inner Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
4. Armouring: Single Layer of Galvanized Steel Round Wire / Flat Strip
5. Outer Sheath: PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type

Colour of Outer Sheath: Black or any other Colour as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.098	0.25	94	80	99	120	100	125	2.35	3.58
35	0.868	0.524	1.11	0.671	0.094	0.29	115	95	120	145	120	155	3.29	5.00
50	0.641	0.387	0.82	0.495	0.086	0.33	135	110	145	170	145	190	4.70	7.15
70	0.443	0.268	0.567	0.343	0.084	0.38	165	140	185	210	175	235	6.58	10.01
95	0.32	0.193	0.41	0.248	0.081	0.44	195	165	225	250	210	290	8.93	13.59
120	0.253	0.153	0.325	0.197	0.078	0.49	220	185	255	285	240	330	11.28	17.16
150	0.206	0.124	0.265	0.159	0.076	0.53	245	210	295	315	270	375	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.075	0.58	280	235	340	355	300	435	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.073	0.67	320	270	400	410	350	510	22.56	34.32
300	0.1	0.0601	0.13	0.0778	0.072	0.73	360	305	460	460	390	590	28.20	42.90
400	0.0778	0.047	0.1023	0.0618	0.071	0.84	410	350	535	520	440	670	37.60	57.20

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 27

TECHNICAL DETAILS FOR HAVELLS 3.3 kV SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

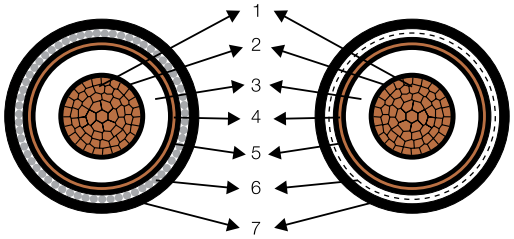
Cable Code: A2XFaY/2XFaY, A2XWaY/2XWaY (3.3 kV - EARTHED / UNEARTHED)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFaY/2XFaY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFaY	2XFaY				A2XWaY	2XWaY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	2.50	0.30	4×0.80	1.40	18	450	550	1.60	1.40	20	500	650
35	2.50	0.30	4×0.80	1.40	19	500	650	1.60	1.40	21	550	750
50	2.50	0.30	4×0.80	1.40	21	550	800	1.60	1.40	22	650	900
70	2.50	0.30	4×0.80	1.40	22	650	1050	1.60	1.40	24	750	1150
95	2.50	0.30	4×0.80	1.40	24	750	1300	1.60	1.40	25	850	1400
120	2.50	0.30	4×0.80	1.40	25	850	1550	1.60	1.40	27	950	1650
150	2.50	0.30	4×0.80	1.40	27	1000	1800	1.60	1.56	29	1100	1950
185	2.50	0.30	4×0.80	1.56	29	1150	2200	1.60	1.56	30	1250	2300
240	2.50	0.40	4×0.80	1.56	31	1400	2750	2.00	1.56	34	1550	2950
300	2.50	0.40	4×0.80	1.56	33	1600	3300	2.00	1.56	36	1800	3550
400	2.60	0.40	4×0.80	1.56	37	1900	4100	2.00	1.72	40	2200	4450
500	2.80	0.40	4×0.80	1.72	42	2400	5200	2.00	1.72	44	2650	5550
630	3.00	0.50	4×0.80	1.72	46	3000	6600	2.00	1.88	49	3250	7000
800	3.30	0.50	4×0.80	1.88	51	3650	8300	2.50	2.04	55	4100	8900
1000	3.50	0.60	4×0.80	2.04	56	4400	10250	2.50	2.20	59	4950	10950

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by helically wrapped Copper Tape
5. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
6. Armouring: Single layer of Aluminium Round Wire / Flat Strip
7. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: FR Type/FRLS Type
   Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.133	0.25	100	91	110	130	115	145	2.35	3.58
35	0.868	0.524	1.11	0.671	0.126	0.29	120	110	135	155	140	175	3.29	5.01
50	0.641	0.387	0.820	0.495	0.122	0.33	140	125	165	185	165	215	4.70	7.15
70	0.443	0.268	0.567	0.343	0.116	0.38	175	155	210	225	200	270	6.58	10.01
95	0.320	0.193	0.410	0.248	0.111	0.44	205	185	255	265	235	330	8.93	13.59
120	0.253	0.153	0.325	0.197	0.106	0.49	235	210	295	300	265	380	11.28	17.16
150	0.206	0.124	0.265	0.159	0.103	0.53	260	230	335	335	300	430	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.100	0.58	295	260	390	380	335	495	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.097	0.67	340	300	460	435	385	590	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.095	0.73	385	335	530	490	430	670	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.093	0.84	440	380	620	550	480	780	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.091	0.86	495	430	730	610	530	900	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.090	0.88	560	485	840	680	590	1020	59.22	90.10
800	0.0367	0.0221	0.0530	0.0319	0.088	0.94	620	530	960	740	630	1140	75.20	114.40
1000	0.0291	0.0176	0.0444	0.0268	0.086	0.99	670	570	1070	780	660	1250	94.00	143.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 3.3 kV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

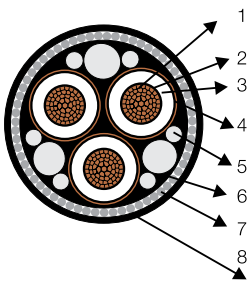
Cable Code: A2XFY/2XFY, A2XWY/2XWY (3.3 kV - EARTHED / UNEARTHED)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	2.20	0.40	4×0.80	1.56	32	1450	1850	2.00	1.56	35	2000	2400
35	2.20	0.40	4×0.80	1.56	35	1700	2250	2.00	1.72	37	2300	2850
50	2.20	0.40	4×0.80	1.72	38	2000	2750	2.00	1.72	40	2650	3350
70	2.20	0.50	4×0.80	1.72	41	2350	3500	2.00	1.88	44	3100	4200
95	2.20	0.50	4×0.80	1.88	45	2800	4350	2.50	2.04	49	3950	5500
120	2.20	0.50	4×0.80	2.04	48	3250	5200	2.50	2.04	52	4500	6350
150	2.20	0.60	4×0.80	2.04	52	3700	6150	2.50	2.20	56	5000	7400
185	2.20	0.60	4×0.80	2.20	56	4300	7350	2.50	2.36	60	5750	8750
240	2.20	0.60	4×0.80	2.36	61	5150	9200	2.50	2.36	64	6600	10600
300	2.20	0.70	4×0.80	2.52	66	6050	11100	3.15	2.68	71	8350	13350
400	2.20	0.70	4×0.80	2.68	73	7300	13800	3.15	2.84	78	9850	16300

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by helically wrapped Copper Tape
5. Filler: PVC Filler
6. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
7. Armouring: Single layer of Galvanized Steel Round Wire / Flat Strip
8. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.098	0.25	94	80	99	120	100	125	2.35	3.58
35	0.868	0.524	1.11	0.671	0.094	0.29	115	95	120	145	120	155	3.29	5.01
50	0.641	0.387	0.820	0.495	0.086	0.33	135	110	145	170	145	190	4.70	7.15
70	0.443	0.268	0.567	0.343	0.084	0.38	165	140	185	210	175	235	6.58	10.01
95	0.320	0.193	0.410	0.248	0.081	0.44	195	165	225	250	210	290	8.93	13.59
120	0.253	0.153	0.325	0.197	0.078	0.49	220	185	255	285	240	330	11.28	17.16
150	0.206	0.124	0.265	0.159	0.076	0.53	245	210	295	315	270	375	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.075	0.58	280	235	340	355	300	435	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.073	0.67	320	270	400	410	350	510	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.072	0.73	360	305	460	460	390	590	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.071	0.84	410	350	535	520	440	670	37.60	57.20

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 3.8/6.6 kV SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

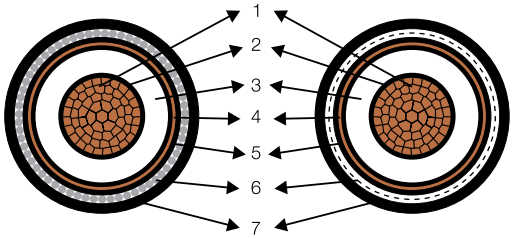
Ref Specification: IS 7098 Part-2
Cable Code: A2XFaY/2XFaY, A2XWaY/2XWaY (6.6 kV EARTHED)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFaY/2XFaY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFaY	2XFaY				A2XWaY	2XWaY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	2.80	0.30	4×0.80	1.40	19	450	600	1.60	1.40	21	550	650
35	2.80	0.30	4×0.80	1.40	20	500	700	1.60	1.40	22	600	800
50	2.80	0.30	4×0.80	1.40	21	600	850	1.60	1.40	23	650	950
70	2.80	0.30	4×0.80	1.40	23	700	1050	1.60	1.40	24	750	1150
95	2.80	0.30	4×0.80	1.40	24	800	1300	1.60	1.40	26	900	1450
120	2.80	0.30	4×0.80	1.40	26	900	1550	1.60	1.40	27	1000	1700
150	2.80	0.30	4×0.80	1.40	27	1000	1850	1.60	1.56	29	1150	2000
185	2.80	0.30	4×0.80	1.56	30	1200	2200	1.60	1.56	31	1300	2350
240	2.80	0.40	4×0.80	1.56	32	1400	2750	2.00	1.56	34	1600	3000
300	3.00	0.40	4×0.80	1.56	34	1650	3350	2.00	1.56	37	1850	3650
400	3.30	0.40	4×0.80	1.56	38	2000	4200	2.00	1.72	41	2300	4550
500	3.50	0.50	4×0.80	1.72	43	2550	5300	2.00	1.88	46	2800	5700
630	3.50	0.50	4×0.80	1.88	47	3050	6700	2.00	1.88	50	3350	7100
800	3.50	0.50	4×0.80	1.88	52	3700	8300	2.50	2.04	55	4150	8950
1000	3.60	0.60	4×0.80	2.04	56	4450	10250	2.50	2.20	59	4950	11000

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by hellically wrapped Copper Tape
5. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
6. Armouring: Single layer of Aluminium Round Wire / Flat Strip
7. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.149	0.21	100	90	120	130	115	155	2.35	3.58
35	0.868	0.524	1.11	0.671	0.142	0.24	120	105	145	155	140	185	3.29	5.01
50	0.641	0.387	0.820	0.495	0.133	0.27	140	125	170	185	160	220	4.70	7.15
70	0.443	0.268	0.567	0.343	0.127	0.31	175	155	215	225	195	275	6.58	10.01
95	0.320	0.193	0.410	0.248	0.121	0.36	205	180	260	265	235	340	8.93	13.59
120	0.253	0.153	0.325	0.197	0.116	0.39	235	205	305	300	265	390	11.28	17.16
150	0.206	0.124	0.265	0.159	0.113	0.43	260	230	345	335	295	440	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.109	0.47	295	260	395	380	330	510	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.105	0.53	340	300	470	435	380	600	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.104	0.54	385	335	540	490	425	680	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.102	0.57	440	380	630	550	480	790	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.100	0.60	495	430	730	610	530	910	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.096	0.67	560	480	840	680	580	1030	59.22	90.10
800	0.0367	0.0221	0.0530	0.0319	0.094	0.76	620	530	960	740	630	1140	75.20	114.40
1000	0.0291	0.0176	0.0444	0.0268	0.092	0.82	680	580	1070	790	670	1250	94.00	143.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 3.8/6.6 kV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

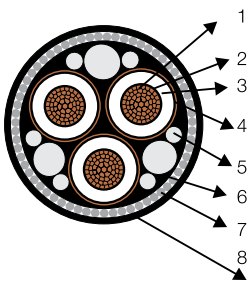
Ref Specification: IS 7098 Part-2
Cable Code: A2XFY/2XFY, A2XWY/2XWY (6.6 kV EARTHED)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	2.80	0.40	4×0.80	1.56	35	1650	2050	2.00	1.56	38	2300	2650
35	2.80	0.40	4×0.80	1.72	38	1900	2450	2.00	1.72	40	2550	3050
50	2.80	0.50	4×0.80	1.72	41	2200	2950	2.00	1.72	43	2950	3650
70	2.80	0.50	4×0.80	1.88	44	2600	3700	2.00	1.88	47	3350	4400
95	2.80	0.50	4×0.80	1.88	48	3050	4600	2.50	2.04	51	4250	5750
120	2.80	0.60	4×0.80	2.04	51	3500	5450	2.50	2.04	55	4800	6700
150	2.80	0.60	4×0.80	2.20	55	4000	6450	2.50	2.20	58	5350	7750
185	2.80	0.60	4×0.80	2.20	58	4550	7600	2.50	2.36	62	6050	9050
240	2.80	0.70	4×0.80	2.36	64	5450	9450	3.15	2.36	69	7700	11650
300	3.00	0.70	4×0.80	2.52	69	6450	11550	3.15	2.68	74	8950	13900
400	3.30	0.70	4×0.80	2.84	78	8000	14450	4.00	2.84	85	11850	18200

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconducting Compound
3. Insulation Material: Crosslinked Polyethylene (Xlpe)
4. Insulation Screening: Extruded Semiconducting Compound Followed By Helically Wrapped Copper Tape.
5. PVC Fillers
6. Inner Sheath: Extruded PVC
7. Armouring: Single Layer Of Galvanized Flat Strip/ Round Wires.
8. Outer Sheath: PVC Type St-2 Of IS 5831— Options: PVC Type St-2/ Fr Type/ Frls Type

Colour Of Outer Sheath: Black. Options: Any Other Colours As Per Requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.126	0.21	95	82	105	120	105	135	2.35	3.58
35	0.868	0.524	1.11	0.671	0.120	0.24	115	97	125	145	125	165	3.29	5.01
50	0.641	0.387	0.820	0.495	0.114	0.27	130	115	150	170	150	195	4.70	7.15
70	0.443	0.268	0.567	0.343	0.107	0.31	160	140	190	210	180	240	6.58	10.01
95	0.320	0.193	0.410	0.248	0.102	0.36	190	165	230	250	215	295	8.93	13.59
120	0.253	0.153	0.325	0.197	0.098	0.39	220	190	260	280	240	335	11.28	17.16
150	0.206	0.124	0.265	0.159	0.095	0.43	245	210	295	310	270	380	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.093	0.47	275	240	335	350	305	430	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.090	0.53	315	275	395	400	350	500	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.090	0.54	355	310	450	445	390	570	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.087	0.57	400	350	520	500	440	650	37.60	57.20

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 6.6/6.6 kV & 6.35/11 kV SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

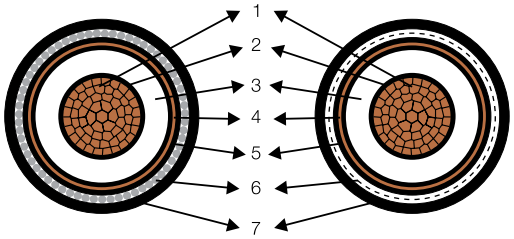
Physical Parameters

Cable Code: A2XFaY/2XFaY, A2XWaY/2XWaY (6.6 kV UNEARTHED / 11 kV EARTHED GRADE)

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFaY/2XFaY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFaY	2XFaY				A2XWaY	2XWaY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	3.60	0.30	4×0.80	1.40	21	500	650	1.60	1.40	22	600	750
35	3.60	0.30	4×0.80	1.40	22	600	750	1.60	1.40	23	650	850
50	3.60	0.30	4×0.80	1.40	23	650	900	1.60	1.40	25	750	1000
70	3.60	0.30	4×0.80	1.40	24	750	1100	1.60	1.40	26	850	1250
95	3.60	0.30	4×0.80	1.40	26	900	1400	1.60	1.40	28	950	1500
120	3.60	0.30	4×0.80	1.40	27	950	1650	1.60	1.56	29	1100	1800
150	3.60	0.30	4×0.80	1.56	29	1100	1950	1.60	1.56	31	1250	2100
185	3.60	0.40	4×0.80	1.56	31	1300	2300	2.00	1.56	34	1500	2550
240	3.60	0.40	4×0.80	1.56	34	1500	2850	2.00	1.56	36	1700	3100
300	3.60	0.40	4×0.80	1.56	35	1700	3400	2.00	1.56	38	1950	3700
400	3.60	0.40	4×0.80	1.72	39	2100	4250	2.00	1.72	41	2350	4600
500	3.60	0.50	4×0.80	1.72	44	2550	5300	2.00	1.88	46	2850	5750
630	3.60	0.50	4×0.80	1.88	48	3100	6700	2.00	1.88	50	3350	7100
800	3.60	0.50	4×0.80	1.88	52	3700	8300	2.50	2.04	55	4200	9000
1000	3.60	0.60	4×0.80	2.04	50	4450	10250	2.50	2.20	60	5000	11000

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by hellically wrapped Copper Tape
5. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
6. Armouring: Single layer of Aluminium Round Wire / Flat Strip
7. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.164	0.18	100	90	120	130	115	155	2.35	3.58
35	0.868	0.524	1.11	0.671	0.156	0.20	120	105	145	155	140	185	3.29	5.01
50	0.641	0.387	0.820	0.495	0.147	0.22	140	125	170	185	160	220	4.70	7.15
70	0.443	0.268	0.567	0.343	0.139	0.26	175	155	215	225	195	275	6.58	10.01
95	0.320	0.193	0.410	0.248	0.133	0.29	205	180	260	265	235	340	8.93	13.59
120	0.253	0.153	0.325	0.197	0.127	0.32	235	205	305	300	265	390	11.28	17.16
150	0.206	0.124	0.265	0.159	0.124	0.35	260	230	345	335	295	440	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.120	0.38	295	260	395	380	330	510	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.117	0.43	340	300	470	435	380	600	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.113	0.46	385	335	540	490	425	680	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.110	0.53	440	380	630	550	480	790	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.107	0.59	495	430	730	610	530	910	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.104	0.66	560	480	840	680	580	1030	59.22	90.10
800	0.0367	0.0221	0.0530	0.0319	0.100	0.74	620	530	960	740	630	1140	75.20	114.40
1000	0.0291	0.0176	0.0444	0.0268	0.098	0.82	680	580	1070	790	670	1250	94.00	143.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 6.6/6.6 kV & 6.35/11 kV THREE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

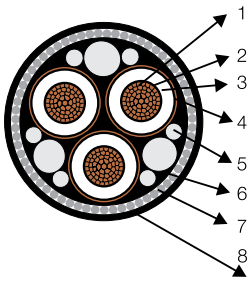
Physical Parameters

Cable Code: A2XFY/2XFY, A2XWY/2XWY (6.6 kV UNEARTHED / 11 kV EARTHED GRADE)

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	3.60	0.40	4×0.80	1.72	39	1950	2350	2.00	1.72	41	2600	2950
35	3.60	0.50	4×0.80	1.72	41	2250	2750	2.00	1.88	44	2950	3450
50	3.60	0.50	4×0.80	1.88	44	2550	3250	2.50	2.04	48	3650	4350
70	3.60	0.50	4×0.80	1.88	48	2900	4000	2.50	2.04	51	4100	5150
95	3.60	0.60	4×0.80	2.04	52	3450	4950	2.50	2.20	55	4750	6250
120	3.60	0.60	4×0.80	2.20	55	3900	5850	2.50	2.36	58	5250	7200
150	3.60	0.60	4×0.80	2.20	58	4350	6800	2.50	2.36	62	5850	8200
185	3.60	0.70	4×0.80	2.36	62	5050	8050	3.15	2.52	67	7250	10200
240	3.60	0.70	4×0.80	2.52	67	5950	9950	3.15	2.68	73	8300	12200
300	3.60	0.70	4×0.80	2.68	72	6850	11900	3.15	2.84	77	9400	14400
400	3.60	0.70	4×0.80	2.84	79	8200	14650	4.00	3.00	86	12100	18450

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by helically wrapped Copper Tape
5. Filler: PVC Filler
6. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
7. Armouring: Single layer of Galvanized Steel Round Wire / Flat Strip
8. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.133	0.18	95	82	105	120	105	135	2.35	3.58
35	0.868	0.524	1.11	0.671	0.126	0.20	115	97	125	145	125	165	3.29	5.01
50	0.641	0.387	0.820	0.495	0.118	0.22	130	115	150	170	150	195	4.70	7.15
70	0.443	0.268	0.567	0.343	0.116	0.26	160	140	190	210	180	240	6.58	10.01
95	0.320	0.193	0.410	0.248	0.107	0.29	190	165	230	250	215	295	8.93	13.59
120	0.253	0.153	0.325	0.197	0.102	0.32	220	190	260	280	240	335	11.28	17.16
150	0.206	0.124	0.265	0.159	0.099	0.35	245	210	295	310	270	380	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.097	0.38	275	240	335	350	305	430	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.084	0.43	315	275	395	400	350	500	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.083	0.46	355	310	450	445	390	570	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.089	0.53	400	350	520	500	440	650	37.60	57.20

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 11/11 kV
SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

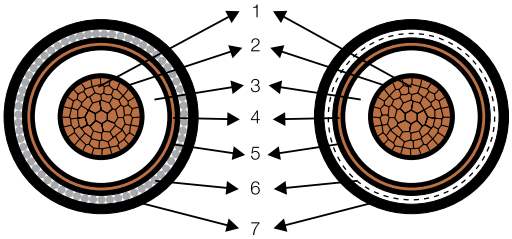
Cable Code: A2XFaY/2XFaY, A2XWaY/2XWaY (11 kV UNEARTHED GRADE)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFaY/2XFaY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFaY	2XFaY				A2XWaY	2XWaY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	5.50	0.30	4×0.80	1.40	24	700	800	1.60	1.40	26	800	900
35	5.50	0.30	4×0.80	1.40	26	750	900	1.60	1.40	27	850	1050
50	5.50	0.30	4×0.80	1.40	27	800	1100	1.60	1.56	29	950	1200
70	5.50	0.30	4×0.80	1.56	29	950	1300	1.60	1.56	30	1050	1450
95	5.50	0.30	4×0.80	1.56	30	1100	1600	2.00	1.56	32	1200	1850
120	5.50	0.40	4×0.80	1.56	32	1200	1900	2.00	1.56	34	1400	2100
150	5.50	0.40	4×0.80	1.56	34	1350	2150	2.00	1.56	36	1550	2400
185	5.50	0.40	4×0.80	1.56	35	1500	2500	2.00	1.56	38	1700	2800
240	5.50	0.40	4×0.80	1.56	37	1750	3100	2.00	1.72	40	2000	3400
300	5.50	0.40	4×0.80	1.72	40	2000	3700	2.00	1.72	42	2250	4000
400	5.50	0.50	4×0.80	1.72	43	2400	4550	2.00	1.88	46	2700	4950
500	5.50	0.50	4×0.80	1.88	48	2900	5650	2.50	2.04	51	3300	6200
630	5.50	0.50	4×0.80	1.88	51	3400	7000	2.50	2.04	55	3900	7600
800	5.50	0.60	4×0.80	2.04	56	4100	8700	2.50	2.20	60	4650	9450
1000	5.50	0.60	4×0.80	2.20	60	4850	10650	2.50	2.36	64	5400	11450

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconducting Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by hellically wrapped Copper Tape
5. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
6. Armouring: Single layer of Aluminium Round Wire / Flat Strip
7. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.164	0.14	100	90	120	130	115	155	2.35	3.58
35	0.868	0.524	1.11	0.671	0.156	0.16	120	105	145	155	140	185	3.29	5.01
50	0.641	0.387	0.820	0.495	0.147	0.17	140	125	170	185	160	220	4.70	7.15
70	0.443	0.268	0.567	0.343	0.139	0.20	175	155	215	225	195	275	6.58	10.01
95	0.320	0.193	0.410	0.248	0.132	0.21	205	180	260	265	235	340	8.93	13.59
120	0.253	0.153	0.325	0.197	0.126	0.23	235	205	305	300	265	390	11.28	17.16
150	0.206	0.124	0.265	0.159	0.124	0.25	260	230	345	335	295	440	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.120	0.26	295	260	395	380	330	510	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.116	0.29	340	300	470	435	380	600	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.112	0.32	385	335	540	490	425	680	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.109	0.35	440	380	630	550	480	790	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.105	0.39	495	430	730	610	530	910	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.102	0.43	560	480	840	680	580	1030	59.22	90.10
800	0.0367	0.0221	0.0530	0.0319	0.097	0.50	620	530	960	740	630	1140	75.20	114.40
1000	0.0291	0.0176	0.0444	0.0268	0.096	0.56	680	580	1070	790	670	1250	94.00	143.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 11/11 kV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

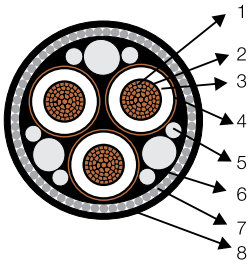
Cable Code: A2XFY/2XFY, A2XWY/2XWY (11 kV UNEARTHED GRADE)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	5.50	0.50	4×0.80	1.88	48	2700	3050	2.50	2.04	51	3900	4200
35	5.50	0.50	4×0.80	2.04	50	3000	3500	2.50	2.20	54	4250	4700
50	5.50	0.60	4×0.80	2.20	53	3400	4100	2.50	2.20	57	4700	5400
70	5.50	0.60	4×0.80	2.20	57	3850	4900	2.50	2.36	61	5300	6300
95	5.50	0.60	4×0.80	2.36	61	4400	5900	3.15	2.52	66	6600	8000
120	5.50	0.70	4×0.80	2.52	65	4950	6850	3.15	2.52	69	7200	9050
150	5.50	0.70	4×0.80	2.52	68	5500	7850	3.15	2.68	72	7800	10150
185	5.50	0.70	4×0.80	2.68	71	6100	9100	3.15	2.84	76	8650	11550
240	5.50	0.70	4×0.80	2.84	76	7100	11050	3.15	3.00	81	9800	13700
300	5.50	0.70	4×0.80	3.00	81	8100	13100	4.00	3.00	88	12000	16900
400	5.50	0.70	4×0.80	3.00	88	9400	15800	4.00	3.00	95	13600	19900

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by helically wrapped Copper Tape
5. Filler: PVC Filler
6. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
7. Armouring: Single layer of Galvanized Steel Round Wire / Flat Strip
8. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.145	0.14	95	82	105	120	105	135	2.35	3.58
35	0.868	0.524	1.11	0.671	0.138	0.16	115	97	125	145	125	165	3.29	5.01
50	0.641	0.387	0.820	0.495	0.129	0.17	130	115	150	170	150	195	4.70	7.15
70	0.443	0.268	0.567	0.343	0.124	0.20	160	140	190	210	180	240	6.58	10.01
95	0.320	0.193	0.410	0.248	0.116	0.21	190	165	230	250	215	295	8.93	13.59
120	0.253	0.153	0.325	0.197	0.112	0.23	220	190	260	280	240	335	11.28	17.16
150	0.206	0.124	0.265	0.159	0.108	0.25	245	210	295	310	270	380	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.105	0.26	275	240	335	350	305	430	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.102	0.29	315	275	395	400	350	500	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.0999	0.32	355	310	450	445	390	570	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.0954	0.35	400	350	520	500	440	650	37.60	57.20

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

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TECHNICAL DETAILS FOR HAVELLS 12.7/22 kV SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

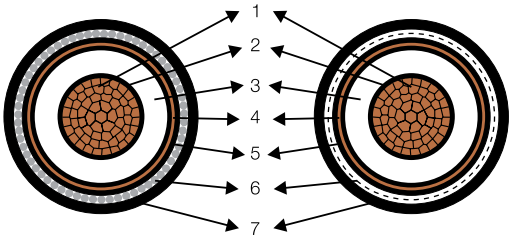
Cable Code: A2XFaY/2XFaY, A2XWaY/2XWaY (22 kV EARTHED GRADE)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFaY/2XFaY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFaY	2XFaY				A2XWaY	2XWaY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	6.00	0.30	4×0.80	1.40	25	700	850	1.60	1.40	27	800	950
35	6.00	0.30	4×0.80	1.40	26	800	950	1.60	1.56	28	900	1100
50	6.00	0.30	4×0.80	1.56	28	900	1150	1.60	1.56	30	1000	1250
70	6.00	0.30	4×0.80	1.56	30	1000	1400	1.60	1.56	31	1100	1500
95	6.00	0.40	4×0.80	1.56	31	1150	1700	2.00	1.56	34	1350	1900
120	6.00	0.40	4×0.80	1.56	33	1300	1950	2.00	1.56	35	1500	2150
150	6.00	0.40	4×0.80	1.56	35	1400	2200	2.00	1.56	37	1600	2450
185	6.00	0.40	4×0.80	1.56	36	1550	2600	2.00	1.72	39	1800	2900
240	6.00	0.40	4×0.80	1.56	38	1800	3150	2.00	1.72	41	2050	3450
300	6.00	0.40	4×0.80	1.72	41	2100	3800	2.00	1.72	43	2300	4100
400	6.00	0.50	4×0.80	1.88	45	2500	4650	2.00	1.88	47	2750	5000
500	6.00	0.50	4×0.80	1.88	49	2950	5750	2.50	2.04	52	3400	6300
630	6.00	0.50	4×0.80	2.04	53	3500	7100	2.50	2.04	56	3950	7700
800	6.00	0.60	4×0.80	2.04	57	4200	8800	2.50	2.20	61	4750	9550
1000	6.00	0.60	4×0.80	2.20	61	4950	10750	2.50	2.36	65	5550	11550

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by hellically wrapped Copper Tape
5. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
6. Armouring: Single layer of Aluminium Round Wire / Flat Strip
7. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C. Resistance at 20 °C		Approx. Conductor A.C. Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.166	0.13	100	90	120	130	115	155	2.35	3.58
35	0.868	0.524	1.11	0.671	0.158	0.15	120	105	145	155	135	185	3.29	5.01
50	0.641	0.387	0.820	0.495	0.149	0.16	140	120	175	180	155	225	4.70	7.15
70	0.443	0.268	0.567	0.343	0.140	0.18	170	150	220	215	190	280	6.58	10.01
95	0.320	0.193	0.410	0.248	0.134	0.20	200	175	265	255	220	335	8.93	13.59
120	0.253	0.153	0.325	0.197	0.130	0.22	225	195	300	285	245	380	11.28	17.16
150	0.206	0.124	0.265	0.159	0.126	0.23	250	215	340	310	270	430	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.122	0.25	280	240	385	345	300	485	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.118	0.27	315	275	450	390	335	560	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.113	0.30	345	300	500	420	360	620	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.110	0.32	385	330	570	455	395	690	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.107	0.36	415	360	640	480	415	750	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.103	0.40	450	385	720	510	440	820	59.22	90.10
800	0.0367	0.0221	0.0530	0.0319	0.0997	0.46	485	415	790	540	460	840	75.20	114.40
1000	0.0291	0.0176	0.0444	0.0268	0.0970	0.52	510	435	850	550	475	940	94.00	143.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 36

TECHNICAL DETAILS FOR HAVELLS 12.7/22 kV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

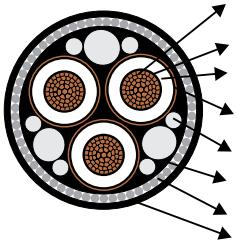
Cable Code: A2XFY/2XFY, A2XWY/2XWY (22 kV EARTHED GRADE)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	6.00	0.50	4×0.80	2.04	50	2900	3250	2.50	2.20	54	4200	4500
35	6.00	0.60	4×0.80	2.04	52	3200	3750	2.50	2.20	56	4600	5050
50	6.00	0.60	4×0.80	2.20	56	3350	4350	2.50	2.36	60	5050	5700
70	6.00	0.60	4×0.80	2.36	59	3850	5200	2.50	2.36	63	5600	6600
95	6.00	0.60	4×0.80	2.36	63	4700	6150	3.15	2.52	68	7000	8350
120	6.00	0.70	4×0.80	2.52	66	5250	7150	3.15	2.68	71	7550	9400
150	6.00	0.70	4×0.80	2.68	70	5800	8150	3.15	2.68	75	8200	10500
185	6.00	0.70	4×0.80	2.68	73	6400	9400	3.15	2.84	79	9100	11950
240	6.00	0.70	4×0.80	2.84	78	7400	11400	4.00	3.00	85	11350	15200
300	6.00	0.70	4×0.80	3.00	83	8350	13350	4.00	3.00	90	12350	17250
400	6.00	0.70	4×0.80	3.00	90	9700	16150	4.00	3.00	97	14100	20400

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by helically wrapped Copper Tape
5. Filler: PVC Filler
6. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
7. Armouring: Single layer of Galvanized Steel Round Wire / Flat Strip
8. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C. Resistance at 20 °C		Approx. Conductor A.C. Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.148	0.13	90	85	110	120	100	135	2.35	3.58
35	0.868	0.524	1.11	0.671	0.141	0.15	110	100	130	145	120	165	3.29	5.01
50	0.641	0.387	0.820	0.495	0.132	0.16	130	115	155	170	150	200	4.70	7.15
70	0.443	0.268	0.567	0.343	0.125	0.18	160	140	190	205	180	245	6.58	10.01
95	0.320	0.193	0.410	0.248	0.119	0.20	190	170	230	245	215	300	8.93	13.59
120	0.253	0.153	0.325	0.197	0.114	0.22	215	190	265	275	245	340	11.28	17.16
150	0.206	0.124	0.265	0.159	0.111	0.23	240	215	300	305	275	385	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.107	0.25	270	240	340	345	305	435	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.104	0.27	310	275	400	395	350	510	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.102	0.30	350	310	455	440	390	580	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.097	0.32	395	355	530	495	440	660	37.60	57.20

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 37

TECHNICAL DETAILS FOR HAVELLS 19/33 kV
SINGLE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

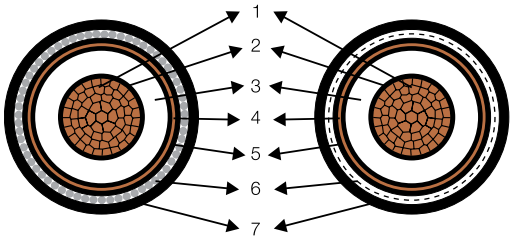
Cable Code: A2XFaY/2XFaY, A2XWaY/2XWaY (33 kV EARTHED GRADE)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFaY/2XFaY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFaY	2XFaY				A2XWaY	2XWaY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	8.80	0.40	4×0.80	1.56	32	1050	1150	2.00	1.56	34	1250	1400
35	8.80	0.40	4×0.80	1.56	33	1150	1300	2.00	1.56	35	1350	1500
50	8.80	0.40	4×0.80	1.56	34	1200	1450	2.00	1.56	37	1450	1700
70	8.80	0.40	4×0.80	1.56	36	1350	1700	2.00	1.56	38	1550	1950
95	8.80	0.40	4×0.80	1.56	37	1500	2000	2.00	1.72	40	1750	2300
120	8.80	0.40	4×0.80	1.72	39	1650	2300	2.00	1.72	41	1900	2550
150	8.80	0.40	4×0.80	1.72	40	1800	2600	2.00	1.72	43	2050	2900
185	8.80	0.50	4×0.80	1.72	42	2000	3000	2.00	1.88	45	2300	3300
240	8.80	0.50	4×0.80	1.88	45	2300	3650	2.00	1.88	47	2550	3950
300	8.80	0.50	4×0.80	1.88	47	2550	4250	2.50	2.04	50	3000	4750
400	8.80	0.50	4×0.80	2.04	50	2950	5100	2.50	2.04	54	3400	5650
500	8.80	0.60	4×0.80	2.04	55	3500	6250	2.50	2.20	59	4050	6900
630	8.80	0.60	4×0.80	2.20	59	4100	7700	2.50	2.36	63	4700	8400
800	8.80	0.60	4×0.80	2.36	63	4850	9450	2.50	2.36	67	5400	10200
1000	8.80	0.70	4×0.80	2.36	67	5650	11400	3.15	2.52	72	6550	12550

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by hellically wrapped Copper Tape
5. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
6. Armouring: Single layer of Aluminium Round Wire / Flat Strip
7. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

Colour of Outer Sheath: Black or any other color as per requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C. Resistance at 20 °C		Approx. Conductor A.C. Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	µF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.175	0.10	100	90	120	130	115	155	2.35	3.58
35	0.868	0.524	1.11	0.671	0.169	0.11	120	105	145	155	135	185	3.29	5.01
50	0.641	0.387	0.820	0.495	0.161	0.12	140	120	175	180	155	225	4.70	7.15
70	0.443	0.268	0.567	0.343	0.152	0.14	170	150	220	215	190	280	6.58	10.01
95	0.320	0.193	0.410	0.248	0.145	0.15	200	175	265	255	220	335	8.93	13.59
120	0.253	0.153	0.325	0.197	0.140	0.16	225	195	300	285	245	380	11.28	17.16
150	0.206	0.124	0.265	0.159	0.135	0.18	250	215	340	310	270	430	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.130	0.19	280	240	385	345	300	485	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.126	0.21	315	275	450	390	335	560	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.122	0.23	345	300	500	420	360	620	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.117	0.25	385	330	570	455	395	690	37.60	57.20
500	0.0605	0.0366	0.0808	0.0489	0.113	0.27	415	360	640	480	415	750	47.00	71.50
630	0.0469	0.0283	0.0648	0.0391	0.111	0.29	450	385	720	510	440	820	59.22	90.10
800	0.0367	0.0221	0.0530	0.0319	0.105	0.34	485	415	790	540	460	840	75.20	114.40
1000	0.0291	0.0176	0.0444	0.0268	0.102	0.37	510	435	850	550	475	940	94.00	143.00

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

Table - 38

TECHNICAL DETAILS FOR HAVELLS 19/33 kV
THREE CORE, ALUMINIUM/COPPER CONDUCTOR, XLPE INSULATED, ARMOURED CABLES

Ref Specification: IS 7098 Part-2

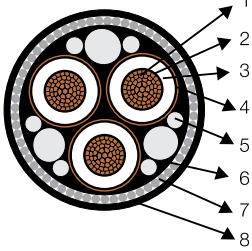
Cable Code: A2XFY/2XFY, A2XWY/2XWY (33 kV EARTHED GRADE)

Physical Parameters

Size (Cross Sectional Area)	Nominal insulation thickness	Minimum Inner Sheath Thickness	Flat Strip Armoured (A2XFY/2XFY)					Round Wire Armoured (A2XWaY/2XWaY)				
			Nominal Armour Strip Dimension	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable		Nominal dia of armor wire	Minimum Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
						With Al Conductor	With Cu Conductor				With Al Conductor	With Cu Conductor
						A2XFY	2XFY				A2XWY	2XWY
SQ. mm	mm	mm	mm	mm	mm	kg/km	kg/km	mm	mm	mm	kg/km	kg/km
25	8.80	0.70	4×0.80	2.36	63	4350	4650	3.15	2.52	68	6600	6800
35	8.80	0.70	4×0.80	2.52	66	4750	5200	3.15	2.68	71	7050	7400
50	8.80	0.70	4×0.80	2.52	69	5150	5800	3.15	2.68	74	7550	8100
70	8.80	0.70	4×0.80	2.68	72	5700	6700	3.15	2.84	77	8250	9200
95	8.80	0.70	4×0.80	2.84	76	6350	7800	3.15	3.00	81	9050	10450
120	8.80	0.70	4×0.80	2.84	79	6900	8700	4.00	3.00	86	10800	12500
150	8.80	0.70	4×0.80	3.00	83	7550	9850	4.00	3.00	89	11550	13750
185	8.80	0.70	4×0.80	3.00	86	9000	11100	4.00	3.00	93	12300	15100
240	8.80	0.70	4×0.80	3.00	91	9100	13000	4.00	3.00	97	13500	17250
300	8.80	0.70	4×0.80	3.00	96	10100	15050	4.00	3.00	102	14700	19550
400	8.80	0.70	4×0.80	3.00	103	11600	17950	4.00	3.00	109	16400	22600

* Tabulated Approx. Weight of Cable are only for the purpose of guideline for transportation, loading & unloading purpose.

Cross-sectional view



1. Conductor: Stranded Compacted Circular Aluminum / Copper as per Class-2 of IS 8130
2. Conductor Screening: Extruded Semiconductor Compound
3. Insulation Material: XLPE (Cross linked polyethylene)
4. Insulation Screening: Extruded Semiconducting Compound followed by helically wrapped Copper Tape
5. Filler: PVC Filler
6. Inner Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type
7. Armouring: Single layer of Galvanized Steel Round Wire / Flat Strip
8. Outer Sheath: Extruded PVC Type ST-2 as per IS 5831; Options: PVC Type ST-2/FR Type/FRLS Type

   Colour Of Outer Sheath: Black. Options: Any Other Colours As Per Requirement

Electrical Parameters

Size (Cross Sectional Area)	Max. Conductor D.C. Resistance at 20 °C		Approx. Conductor A.C. Resistance at 90 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 s Duration	
							For Aluminium Conductor			For Copper Conductor				
	Aluminium	Copper	Aluminium	Copper			Ground	Duct	Air	Ground	Duct	Air	Aluminium	Copper
SQ. mm	Ω/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	A	A	A	A	A	A	kA	kA
25	1.20	0.727	1.54	0.931	0.160	0.10	90	85	110	120	100	135	2.35	3.58
35	0.868	0.524	1.11	0.671	0.153	0.11	110	100	130	145	120	165	3.29	5.01
50	0.641	0.387	0.820	0.495	0.146	0.12	130	115	155	170	150	200	4.70	7.15
70	0.443	0.268	0.567	0.343	0.138	0.14	160	140	190	205	180	245	6.58	10.01
95	0.320	0.193	0.410	0.248	0.130	0.15	190	170	230	245	215	300	8.93	13.59
120	0.253	0.153	0.325	0.197	0.125	0.16	215	190	265	275	245	340	11.28	17.16
150	0.206	0.124	0.265	0.159	0.122	0.18	240	215	300	305	275	385	14.10	21.45
185	0.164	0.0991	0.211	0.127	0.118	0.19	270	240	340	345	305	435	17.39	26.46
240	0.125	0.0754	0.162	0.0976	0.113	0.21	310	275	400	395	350	510	22.56	34.32
300	0.100	0.0601	0.130	0.0778	0.111	0.23	350	310	455	440	390	580	28.20	42.90
400	0.0778	0.0470	0.1023	0.0618	0.106	0.25	395	355	530	495	440	660	37.60	57.20

Note: Normal current ratings are given in standard conditions (as given in page no 52, 53), if site conditions are different, current rating should be multiplied by rating factor as given in page no. 52 - 54

BASIC ASSUMPTION FOR CURRENT RATINGS & RATING FACTORS

SCOPE

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

a) Basic assumption for current ratings

l) Maximum permissible temperature - 90 °C for XLPE insulation, 70 °C for general purpose PVC, 85 °C for HR PVC
ii) Ground/Duct temperature - 30 °C
iii) Ambient temperature - 40 °C
iv) Thermal resistivity of soil - 150 °C.cm/W
v) Thermal resistivity of Dielectric 650 °C.cm/W for PVC, 350 °C.cm/W for XLPE
vi) Single core cables installed in one circuit in following arrangement
OR
vi) Multicore cables installed in single circuit

Voltage Grade	Depth of Laying
1.1 kV cables	750 mm
3.3 kV to 11 kV	900 mm
More than 11 kV	1050 mm

b) Rating Factors

i) Rating factors related to variation in ambient air temperature

Air Temperature in °C		20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C	55 °C
	Normal PVC	1.32	1.25	1.16	1.09	1.00	0.90	0.80	0.80
Rating factors	HR PVC	1.22	1.17	1.12	1.06	1.00	0.94	0.87	0.80
	XLPE	1.20	1.16	1.11	1.06	1.00	0.95	0..88	0.82

ii) Rating factors related to variation in ground temperature

Air Temperature in °C		15 °C	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
	Normal PVC	1.17	1.12	1.06	1.00	0.94	0.87	0.79	0.71
Rating factors	HR PVC	1.13	1.09	1.04	1.00	0.95	0.90	0.85	0.80
	XLPE	1.12	1.08	1.04	1.00	0.96	0.91	0..87	0.82

iii) Rating factors related to variation in ground thermal resistivity of soil for 3 single core cables laid direct in ground. (Average value)

Thermal Resistivity in °C.cm/W	100	120	150	200	250	300
Rating factors	1.20	1.10	1.00	0.90	0.81	0.74

iv) Rating factors related to variation in ground thermal resistivity of soil for multi core cables laid direct in ground. (Average value)

Thermal Resistivity in °C.cm/W	100	120	150	200	250	300
Rating factors	1.16	1.08	1.00	0.90	0.82	0.76

v) Rating factors related to variation in depth of laying for 1.1 kV cables

1. For cross-sectional area of conductor < 25 SQ. mm

Depth of laying (cm) >	75	90	105	120	150	180 & Above
Rating factors	1.00	0.99	0.98	0.97	0.96	0.95

2. For cross-sectional area of conductor 25 SQ. mm to 300 SQ. mm

Depth of laying (cm) >	75	90	105	120	150	180 & Above
Rating factors	1.00	0.98	0.97	0.96	0.94	0.93

3. For cross-sectional area of conductor above 300 SQ. mm

Depth of laying (cm) >	75	90	105	120	150	180 & Above
Rating factors	1.00	0.97	0.96	0.95	0.92	0.91

vi) Rating factors related to variation in depth of laying for 3.3 kV to 11 kV cables

Depth of laying (cm) >	75	90	105	120	150	180 & Above
Rating factors	-	1.00	0.99	0.98	0.96	0.95

vii) Rating factors related to variation in depth of laying for above 11 kV cables

Depth of laying (cm) >	75	90	105	120	150	180 & Above
Rating factors	-	-	1.00	0.99	0.98	0.96

Group Rating Factors

1. Cable laid direct in Ground

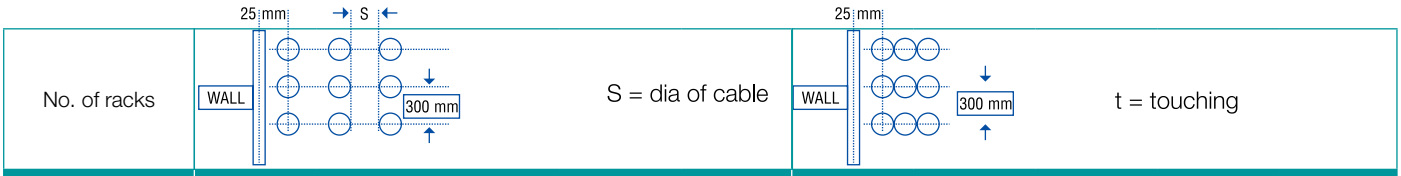
No of cables/ circuits in groups	Multicore cables in horizontal formation					Single cables in horizontal formation				
	Touching	S = 15 cm	S = 30 cm	S = 45 cm	S = 60 cm	Touching	S = 15 cm	S = 30 cm	S = 45 cm	S = 60 cm
2	0.80	0.84	0.87	0.90	0.91	0.80	0.85	0.90	0.92	0.95
3	0.68	0.74	0.79	0.83	0.86	0.70	0.78	0.85	0.88	0.91
4	0.62	0.69	0.75	0.80	0.83	0.64	0.73	0.81	0.86	0.89
5	0.58	0.65	0.72	0.77	0.80	0.59	0.70	0.79	0.84	0.88
6	0.55	0.62	0.69	0.75	0.78	0.55	0.67	0.77	0.83	0.87
7	0.52	0.59	0.67	0.73	0.77	0.53	0.65	0.76	0.82	0.86
8	0.50	0.57	0.66	0.72	0.75	0.51	0.64	0.76	0.82	0.86
9	0.48	0.55	0.65	0.71	0.75	0.49	0.63	0.74	0.81	0.85
10	0.46	0.54	0.64	0.70	0.74	0.48	0.63	0.74	0.81	0.85
11	0.45	0.53	0.63	0.70	0.74	0.47	0.62	0.73	0.80	0.84
12	0.44	0.52	0.62	0.69	0.73	0.46	0.61	0.73	0.80	0.84

S = axial spacing of cable

No. of cables/ circuits in groups	No. of Tier	Multicore cables in Tier formation				
		Touching	S = 15 cm	S = 30 cm	S = 45 cm	S = 60 cm
2	1	0.80	0.84	0.87	0.90	0.91
3	1	0.68	0.74	0.79	0.83	0.86
4	2	0.60	0.66	0.73	0.77	0.79
5	2	0.55	0.61	0.68	0.71	0.73
6	2	0.51	0.57	0.63	0.67	0.69
7	3	0.48	0.54	0.59	0.63	0.64
8	3	0.46	0.51	0.56	0.60	0.61
9	3	0.44	0.48	0.53	0.57	0.58
10	4	0.42	0.47	0.52	0.55	0.56
11	4	0.41	0.46	0.50	0.54	0.55
12	4	0.40	0.45	0.49	0.53	0.54

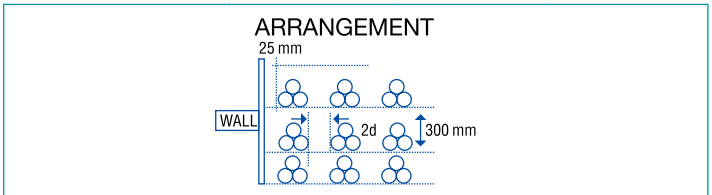
2. Cable laid direct in open racks in air

(i) Multicore Cables in open racks in air



No. of racks	No. of cables per rack					No. of cables per rack				
	1	2	3	6	9	1	2	3	6	9
1	1.00	0.98	0.96	0.93	0.92	1.00	0.84	0.80	0.75	0.73
2	1.00	0.95	0.93	0.90	0.89	1.00	0.80	0.76	0.71	0.69
3	1.00	0.94	0.92	0.89	0.88	1.00	0.78	0.74	0.70	0.68
6	1.00	0.93	0.90	0.87	0.86	1.00	0.76	0.72	0.65	0.66

(ii) Single Core Cables In open racks In air



No. of Racks	No. of Circuit Racks (3 single cores) per rack		
	1	2	6
1	1	0.98	0.96
2	1	0.95	0.93
3	1	0.94	0.92
4	1	0.93	0.9

S = axial spacing of cable

No. of cables/ circuits in groups	No. of Tier	Multicore cables in Tier formation				
		Touching	S = 15 cm	S = 30 cm	S = 45 cm	S = 60 cm
2	1	0.80	0.84	0.87	0.90	0.91
3	1	0.68	0.74	0.79	0.83	0.86
4	2	0.60	0.66	0.73	0.77	0.79
5	2	0.55	0.61	0.68	0.71	0.73
6	2	0.51	0.57	0.63	0.67	0.69
7	3	0.48	0.54	0.59	0.63	0.64
8	3	0.46	0.51	0.56	0.6	0.61
9	3	0.44	0.48	0.53	0.57	0.58
10	4	0.42	0.47	0.52	0.55	0.56
11	4	0.41	0.46	0.50	0.54	0.55
12	4	0.40	0.45	0.49	0.53	0.54

No. of cables/ circuits in groups	Multicore cable (Touching) No of cables in racks				Multicore cables (spacing of cable equal to dia meter of cable No of cables in racks				S/core cables in trefoil touching formation spacing between circuits equal to twice the diameter of cable) No of cables in racks			
	1	2	3	4	1	2	3	4	1	2	3	4
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	0.84	0.80	0.78	0.76	0.98	0.95	0.94	0.93	0.98	0.95	0.94	0.93
3	0.80	0.76	0.74	0.72	0.96	0.93	0.92	0.90	0.96	0.93	0.92	0.90
4	0.76	0.71	0.70	0.68	0.93	0.90	0.89	0.87	—	—	—	—

Estimated Voltage Drops in PVC/XLPE Aluminium Cables For A.C. System

Nominal area of conductor (SQ. mm)	(Voltage drop - V/km/A)			
	P.V.C. Cable		XLPE Cable	
	Single Phase	Three Phase	Single Phase	Three System
1.5	43.44	37.62	46.34	40.13
2.5	29.04	25.15	30.98	26.83
4	17.78	15.40	18.98	16.44
6	11.06	9.58	11.80	10.22
10	7.40	6.41	7.88	6.82
16	4.58	3.97	4.90	4.24
25	2.89	2.50	3.08	2.67
35	2.10	1.80	2.23	1.94
50	1.55	1.30	1.65	1.44
70	1.10	0.94	1.15	1.00
95	0.79	0.68	0.83	0.70
120	0.63	0.55	0.66	0.56
150	0.52	0.46	0.55	0.48
185	0.42	0.37	0.44	0.40
240	0.34	0.30	0.35	0.30
300	0.28	0.26	0.30	0.26
400	0.24	0.22	0.24	0.22
500	0.23	0.20	0.23	0.20
630	0.20	0.18	0.21	0.18
800	0.19	-	0.20	-
1000	0.18	-	0.18	-

**Above voltage drops (V/km/A) shall be multiplied with rated current & length of Cable in km to calculate total voltage drop in particular length and size of cables.

* Selection criteria of MV/HV cable size for primary distribution

SCOPE

The conductor size in the cables for any installation is also governed by its ability to carry short circuit current of system. For L.V. distribution cable may be selected on the basis of continuous load current. But in case of MV/HV distribution it is always safer to select the cable on the basis of ability of conductor to carry expected short circuit current. Short circuit current rating of cable should in line with short circuit capacity of damping apparatus such as circuit breakers, Transformers & reactor etc. beside its capacity to carry desired load current. Short circuit ratings of cables each size are given in relevant tables & have been calculated on the basis of IEC-949 & IEC-986 & on the following assumption

a) **Temperature of conductor just prior to short circuit**
i) With XLPE insulation - 90 °C ii) With PVC insulation - 70 °C

b) **Maximum permissible conductor temperature during short circuit**
i) With XLPE insulation - 250 °C ii) With PVC insulation - 160 °C

c) **Volumetric specific heat of the conductor**
i) With Aluminium conductor - 2.5×10^{-3} J/°C/MM^3
ii) With Copper conductor - 3.45×10^{-3} J/°C/MM^3

d) **Reciprocal of temperature co-efficient of resistance at 9 °C**
i) With Aluminium conductor - 228 ii) With Copper conductor - 234.5

Short circuit current rating at different duration may be calculated as

$$Ish\ (\text{for t duration}) = \frac{Ish\ (\text{for 1 s})}{t}$$

Ish for 1 s Duration is given in relevant tables in kA
t = Time duration required tobe calculated of short circuit in s

SELECTION CRITERIA OF H.V./MV CABLES FOR PRIMARY DISTRIBUTION

	REQUIRED DATAS	FOR EXAMPLE
1)	Nominal System voltage at H.T. Side	11 kV
2)	Short circuit level for H.T. system	25 kA
3)	Fault withstand time for H.T. CBs	0.5 s
4)	Formula for calculating H.T. cable size	

With Aluiminium cond./XLPE insulated cable $= \frac{Ish \times \sqrt{t}}{0.094}$ $= \frac{25 \times \sqrt{0.5}}{0.094}$

$= 188$

Hence nearest higher size 240 SQ. mm is required

With Copper cond./XLPE insulated cable $= \frac{Ish \times \sqrt{t}}{0.143} = \frac{25 \times \sqrt{0.5}}{0.143}$

$= 124$

Hence nearest higher size 150 SQ. mm is required

ELECTRICAL FORMULAS FOR CALCULATING AC LOAD CURRENT

Load current in Ampere when kVA is given	for Single phase (AC) $\frac{kVA \times 1000}{V}$	for Three phase (AC) $\frac{kVA \times 1000}{1.732 \times V}$
Load current in Ampere when kW is given	for Single phase (AC) $\frac{kW \times 1000}{V \times pf}$	for Three phase (AC) $\frac{kW \times 1000}{1.732 \times V \times pf}$
Load current in Ampere when H.P. is given	for Single phase (AC) $\frac{H.P. \times 746}{V \times \%EFf \times pf}$	for Three phase (AC) $\frac{H.P. \times 746}{1.732 \times V \times \%Eff \times pf}$

V = Nominal system voltage in Volts, pf = Power factor, kVA = Kilo Volts Ampere, H.P. = Horse Power

Standard drum lengths of cables

STANDARD LENGTH (MTS) WITH ± 5% TOLERANCE			
DESCRIPTION OF CABLE UNARMOURED	STRIP ARMOURED	ROUND WIRE ARMOURED	
1.1 kV PVC/XLPE CABLES WITH ALUMINIUM			
~ SINGLE CORE	up to 150 SQ. mm-1000 185 to 1000 SQ. mm-500	up to 150 SQ. mm-1000 185 to 1000 SQ. mm-500	up to 150 SQ. mm-1000 185 to 1000 SQ. mm-500
~ TWO CORE	up to 50 SQ. mm-1000 70 to 630 SQ. mm-500	up to 50 SQ. mm-1000 70 to 630 SQ. mm-500	up to 50 SQ. mm-1000, 70 to 500 SQ. mm 500, 630 SQ. mm-250
~ THREE CORE	up to 50 SQ. mm-1000 70 to 630 SQ. mm-500	up to 50 SQ. mm-1000 70 to 500 SQ. mm-500 630 SQ. mm-250	up to 50 SQ. mm-1000, 70 to 300 SQ. mm 500, 500 to 630 SQ. mm-250
~ THREE & HALF CORE	up to 50 SQ. mm-1000 70 to 630 SQ. mm-500	up to SQ. mm-1000 70 to 400 SQ. mm-500 500 to 630 SQ. mm-250	up to 50 SQ. mm-1000, 70 to 300 SQ. mm 500, 400-630 SQ. mm-250
'FOUR CORE	up to 50 SQ. mm-1000 70 to 500 SQ. mm-500 630 SQ. mm-250	up to 50 SQ. mm-1000 70 to 400 SQ. mm-500 500 to 630 SQ. mm-250	up to 50 SQ. mm-1000, 70 to 240 SQ. mm 500, 300 to 630 SQ. mm-250
1.1 kV PVC/XLPE CABLES WITH COPPER CONDUCTOR			
~ SINGLE CORE	up to 150 SQ. mm-1000 185 to 630 SQ. mm-500 800 to 1000 SQ. mm-250	up to 150 SQ. mm-1000 185 to 630 SQ. mm-500 800 to 1000 SQ. mm-250	up to 150 SQ. mm-1000 185 to 630 SQ. mm-500 800 to 1000 SQ. mm-250
~ TWO CORE	up to 10 SQ. mm-1000 16 to 300 SQ. mm-500 400 to 630 SQ. mm-250	up to 10 SQ. mm-1000 16 to 300 SQ. mm-500 400 to 630 SQ. mm-250	up to 10S SQ. mm-1000, 70 to 500 SQ. mm 500, 500, 300 to 630 SQ. mm-250
~ THREE CORE	up to 10 SQ. mm-1000 300 to 400 SQ. mm-250	up to 10 SQ. mm-1000 16 to 240 SQ. mm-500 240 to 400 SQ. mm-250	up to 10 SQ. mm-1000, 16 to 185 SQ. mm 16 to 185 SQ. mm-500 500, 240 to 400 SQ. mm-250
~ THREE & HALF CORE	up to 10 SQ. mm-1000 300 to 400 SQ. mm-250	up to 10 SQ. mm-1000 16 to 240 SQ. mm-500 240 to 400 SQ. mm-250	up to 10 SQ. mm-1000, 16 to 150 SQ. mm 16 to 185 SQ. mm-500 500, 185 to 400 SQ. mm-250
' FOUR CORE	up to 10 SQ. mm-1000 16 to 240 SQ. mm-500 300 to 400 SQ. mm-250	up to 10 SQ. mm-1000 16 to 150 SQ. mm-500 240 to 400 SQ. mm-250	up to 10 SQ. mm-1000, 16 to 150 SQ. mm 500, 185 to 400 SQ. mm-250

- Control cables more than FOUR CORES shall be supplied in 500 m length

DESCRPITON OF CABLE	6.35/11 kV GRADE	1/11 kV GRADE	19/33 kV GRADE
H.T. XLPE CABLES WITH ALUMINIUM CONDUCTOR			
~ SINGLE CORE-A2XWaY	up to 150 SQ. mm-1000 185 to 1000 SQ. mm-500	up to 150 SQ. mm-1000 185 to 1000 SQ. mm-500	up to 150 SQ. mm-1000 185 to 1000 SQ. mm-500
~ THREE CORE-A2XFY	25 to 300 SQ. mm-500 400 SQ. mm-250	25 to 185 SQ. mm-500 240 to 400 SQ. mm-250	25 to 95 SQ. mm-500 120 to 400 SQ. mm-250
~ THREE CORE-A2XWY	25 TO 150 SQ. mm-500 185 to 300 SQ. mm-250 400 SQ. mm-200	25 to 95 SQ. mm-500 120 to 240 SQ. mm-250 300 to 400 SQ. mm-200	25 to 50 SQ. mm-250 70 to 120 SQ. mm-250 185 to 400 SQ. mm-200

Quality Control

It has been rightly said that “Quality is never an accident, it is always the result of intelligent efforts”.
In the manufacture of cables, intelligent efforts are incorporated to achieve quality. For a quality end products, control starts from proper design of the product. All raw materials are selected carefully and only materials of high quality are used in production. Having done this, stage wise inspection is done to ensure conformity with the requirements of relevant Indian Standards where these apply.

Stage - Wise Inspection

i)	Wire-Drawing	: Wire diameter Surface Shape Quality of joints in the wire
ii)	Stranding of Wires:	: Quality of joints in the wires Compaction of conductor Shape of Conductor Dimensions Resistance of Conductor
iii)	Insulation:	: Dimension over Insulation, Thickness of Insulation,
iv)	Curing (for XLPE Insulation)	: Hot set test, Tensile strength & elongation test.
v)	Screening (for H.T. Screened cables)	: Dimension over screen, thick of screen visual examination of surface/defects.
v)	Laying Up	: Sequence of Cores Direction of lay Diameter over laid up cores Circularity
vi)	Inner Sheath	: Thickness of Sheath Diameter over Sheath Surface Uniformity Circularity Porosity
vii)	Armouring	: Diameter of Wires/ Dimensions of Strips Direction of lay Coverage Quality of Joints of Wires
viii)	Outer Sheath	: Thickness of Sheath Diameter over Sheath Tightness of Sheath Eccentricity Porosity, Embossing

RM Testing Lab

Test

The tests on cables have been classified broadly in four categories as follows:

Routine Tests:

Tests carried out on each cable to check the requirements which are likely to vary during production.

Type Tests:

Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of cable.

Acceptance Tests:

Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

Optional Tests:

Special tests to be carried out when required by agreement between the purchaser and the manufacturer.

Special tests required for FRLS Cables can also be carried out at our works i.e. Halogen gas generation test to IEC - 754 Part - I, Smoke generation test to ASTMD 2843, Oxygen index test and Temperature index test to ASTMD - 2863, Flammability test to (1) IEC-332-1, (2) Swedish Chimney test to SS-4241475 Class F3 & (3) IEC-332-3, Flame resistance test to IEEE-383.

Together with the most advanced equipment available, we are able to offer to our valued customers assurances of highest quality and strict adherence to the required specification. As a third party guarantee, our cables have passed rigorous tests at various Government recogonized test laboratories such as CPRI, Shri Ram Test House, ERDA Baroda, National Test House, ERTL, RTC.

Routine Tests, Type Tests, Acceptance Tests and Optional Tests as per the Indian Standard Specification for Power and Control Cables with PVC insulation, Cross linked Polyethylene insulation and Special Tests are given in the Annexure.

Tensile Testing Machine

List of Tests as per IS 1554(Part - I): 1988, IS 1554 (Part- II):1988, IS 7098 (Part - I):1988 and IS 7098 (Part-II): 1985

1. Routine Tests:
   - a) Conductor Resistance Test
   - b) High Voltage Test
   - c) Armour Resistance Test for mining Type Cables
   - d) Partial Discharge test (for H.T. Screened cable)

2. Type Tests:
   - a) Tensile Test (for Aluminium Conductor)
   - b) Wrapping Test (for Aluminium Conductor)
   - c) Annealing Test (for Copper Conductor)
   - d) Conductor Resistance Test
   - e) Test for Armour Wires/Strips
   - f) Test for thickness of Insulation & Sheath
   - g) Physical Test for Insulation & Outer Sheath
   - h) Insulation Resistance Test
   - i) High Voltage Test
   - j) Flammability Test
   - k) Hot Set Test - (For XLPE Insulation only)
   - l) Partial Discharge test (for H.T. Screened cable)
   - m) Bending test (for H.T. Screened cable)
   - n) Dielectric Power factor test (for H.T. Screened cable with rated voltage 6.35/11 kV & above)
   - o) Heating cycle test (for H.T. Screened cable)
   - p) Impulse withstand test (for H.T. Screened cable)

3 Acceptance Tests:
   - a) Tensile Test (For Aluminium Conductor)
   - b) Wrapping Test (For Aluminium Conductor)
   - c) Annealing Test (For Copper Conductor)
   - d) Conductor Resistance Test
   - e) Test for thickness of Insulation & Sheath
   - f) High Voltage Test
   - g) Insulation Resistance Test
   - h) Tensile Strength & Elongation at break test for Insulation and Sheath
   - l) Hot Set Test - (for XLPE Insulation only)
   - j) Partial Discharge test (for H.T. Screened cable)

4. Optional Tests:
   - a) Cold Bend Test
   - b) Cold Impact Test
   - c) Armour Resistance Test (for other than Mining Type Cables)

5. Special Tests (As Applicable):
   - a) Oxygen Index Test as per ASTMD - 2863-77
   - b) Temp. Index Test as per ASTMD - 2863-77
   - c) Smoke Generation Test as per ASTMD - 2843-77
   - d) Acid Gas Generation Test as per IEC - 754-1
   - e) Flammability Test as per IEC - 332-1, IEEE-383, SS-4241475 Class F3 and IEC - 332-3
   - g) Water absorption test (by Electrical Method)
   - h) Ultra voilet resistance to ASTM-G-53
   - i) Die electric Strength retention test
   - j) Test for Antirodent & Antitermite property

For selection of a cable, a first hand knowledge of the system in which the cable is to be used, and the installation conditions under which the cable has to operate, is necessary. A knowledge of statutory restrictions and the manufacturing facilities available in the country will help in finding out as to what type of cable will be available for particular usage. The environmental conditions under which the cable has to operate will decide its protective covering. Thus once voltage grade of the cable, number of cores, conductor material, type of insulation and protective coverings are known, size of conductor remains to be decided. The first and foremost criteria for the size of conductor is continuous current rating for the present load. There after the same should be checked for short circuit, voltage drop, over load capacities and future expansions. Once decided the selection of next higher size compared to what is essential for the requirement, will always be worthwhile.

Economic considerations are also necessary.

INFORMATION REQUIRED WITH ENQUIRY & ORDER

The following information should be included in an enquiry:

i) Voltage Grade.

ii) Whether cable is to be used on Earthed or Unearthed system (for voltages above 3.3 kV).

iii) Type of installation whether in air or in ducts or in ground.

iv) If cables are grouped together, then number of cables in group and vertical and horizontal spacing between them.

v) Required value and duration of short circuit current.

Following further informations are also required for offering the exact type of cable for any specific purpose:

a) The normal ambient or operating temperature.

b) The maximum temperature to which the PVC will be ex posed and the duration and frequency of such exposures.

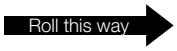
c) The material with which the PVC will be in contact i.e. oil, gases, acids, alkalies etc. at normal and maximum temperature.

d) If special flame retardent property is required.

e) If any special electrical characteristics needed.

Handling (Unloading at site): On receipt of cable drums 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 cables.

1. The cable drums should not be dropped or thrown from rail way 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 curshing 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 the 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 armour.
4. Drums should be rolled in direction of arrow marked on the drum.

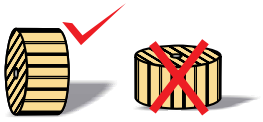


Storage:

Cables should be stored in a dry covered place to prevent exposure to climatic conditions and wear and tear of wooden drums and it should preferably on a concrete surface/firm surface which will not cause the drums to sink and thus lead to flange rot and extreme difficulty in moving the drums.

All drums should be stored in such a manner as to leave sufficient space between them for air circulation. It is desirable for drums to stand on battens placed directly under the flanges.

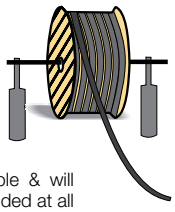
In no case should the drums be stored, “On the Flat”, i.e., with flange horizontal.



Laying:

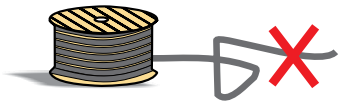
For laying of cables special cares to be taken to prevent sharp bending, kinking, twisting. Cable should be unwound from drum by proper mounting the cable drum on a cable wheel making sure the spindle is strong enough to carry the weight without bending and that it is lying horizontally in the bearings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

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



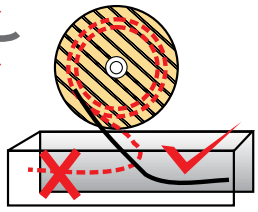
This is incorrect way of pulling the cable & will cause kinks & twist in cable. Shall be avoided at all

Cable must be puled from the top



Cable must be pulled accross hard & sharp objects to avoid the damage to ve covering & insulation

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



However, following salient points are to be considered during laying procedure of cables laid in racks and in built-in trenches.

1. For laying of cables 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 than 800 mm. Axial spacing of two circuits in delta formation shall not be less than 4 times the cable dia.

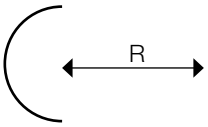
n case of multicore power cables, cables shall be laid side by side, with spacings not less than one cable diameter. However derating factors for cables laid on trenches are to be referred.

Multicore power cables and single core DC circuits may be clamped by means of galvanised mild steel saddles but 1.1 kV single core cables should be clamped by means of non-magnetic saddles. The saddles shall not be placed at intervals more than 1500 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 layers. They should be clamped by means of PVC straps both for horizontal and vertical runs (alternatively, fabricated aluminium clamps may be used) at regular intervals.
4. a) If the cables are buried directly in ground IS 1255 is to be followed for code of practice. However, generally cables are laid 1000 mm below finished ground level at any point of cable run and 75 mm of sand cushioning to be provided.
4. 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 covers placed on racks.
6. While laying cables, special care to be taken at bends. Followings are the recommended bending radius for power and control cables.

Voltage Rating kV	PVC and XLPE Cables	
	Single Core	Multi Core
up to 1.1 Above 1.1 but	15 d	12 d
up to 11 kV	15 d	15 d
Above 11 kV	20 d	15 d

Where ‘d’ is overall diameter of cable.



7. Maximum safe pulling force (when pulled by pulling eye) Aluminium Conductor Cables: 3.0 kg/mm^2 Copper Conductor Cables: 5.0 kg/mm^2 Proper method of pulling of cable should be used.

TESTING

INSULATION RESISTANCE MEASUREMENT OF CABLE

The voltage rating of I.R. Tester (Megger) should be chosen as following table:

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

Testing during laying:

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

End Terminations & Jointing:

Termination and jointing of Power & Control Cables shall be done by means of compression methods using solderless tinned copper/ Aluminium terminal lugs. For control cables terminations, ring tongue or reducer pin type terminal lug can also be used to suit the purpose.

Overhead/Outdoor Termination

XLPE insulation should be protected from direct solar rays or else ultra violet resistant sleeving / tapping must be provided on exposed XLPE insulation at the Termination to avoid degradation / cracking due to direct exposer of solar rays.

A view of dispatch yard

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		

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	MVVNL, Lucknow
3	Rajasthan Rajya Vidhyut Vitran Nigam Limited	21	PUVVNL , 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 ltd, Hyderabad
7	Gujrat Energy Transmission Corporation ltd.	25	APGENCO of AP ltd, Hyderabad
8	Uttar Gujrat Vij company ltd.	26	EPDCL of AP ltd, Vishakhapatnam
9	Dakshin Gujrat Vij company ltd.	27	NPDCL of AP ltd, Warangal
10	Paschim Gujrat Vij company ltd.	28	DPDCL of AP ltd, Triputi
11	Madhya Gujrat Vij company ltd.	29	WBSECL
12	Maharastra State electricity Distribution Corporation ltd.	30	North Delhi Power Limited, New Delhi
13	Maharastra State electricity Generation Corporation ltd.	31	CESC Limited
14	Maharastra State electricity Transmisssion Corpn.	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 ltd.
6	Hindustan Petroleum Corporation Ltd.	15	Reliance Petroleum ltd.
7	Mittal Petroleum	16	Kochi Petroleum ltd.
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	21	Toyo Engineering Ltd., Japan
2	Mohan Energy Corporation Ltd.	22	Indorama ELEME Fertilizers & Chemicals Ltd., Nigeria
3	Angelique International,	23	Indorama Petrochemicals Ltd., Nigeria
4	Inter Trade Commercial services TANESCO, Tanzania	24	Hoima Sugar, Uganda
5	Afghan Solar, Afghanistan	25	Kakira Sugar, Uganda
6	VEETEK Nigeria	26	Technofab Engineering, (for Tanzania)
7	Nimra Jeddah Electric Est Saudi Arabia	27	World Trade Center, Nigeria
8	True Liberty Electrical & Contracting Company, Kuwait	28	Varun Beverages, Zambia
9	African Commodities Dubai (for Nigeria)	29	Geo Steel, LLC, Georgia
10	Duraplast INC, Liberia	30	Kati Substation, Mali
11	Yangaon Transformers, Myanmar	31	NET Health Ltd., Tanzania
12	UB Engineering, Dubai	32	VA Tech Wabag, (for Nepal)
13	Kinyara Sugar, Uganda	33	Kolam International, D.R. Congo
14	Silver Spring, Uganda	34	Nithya Paper, Srilanka
15	Supereme Electricals, Kolkata (for Nigeria)	35	Alacrity Production Systems Limited, Nigeria
16	Roofings & Rolling mills , Uganda	36	Arun Fabricators, Mauritius
17	Sameer Agriculture Kenya	37	Venture Global Tech, Qatar for RLOC Project
18	SESCO, Saudi Arabia	38	Anlima Energy, 110 MW Power Project Chittagong, Bangladesh
19	NIPP/PHCN, Nigeria	39	Hosaf Power, 114 MW Power Project Chittagong, Bangladesh
20	Polygroup, Ghana		

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		

Fire Survival Cables

Introduction

Need of ensuring safe operation of critical circuits is essential in today's installations. Normal cables used in such installations render useless in fire incidences. At Havells, your safety is our concern. Havells has now developed special type "Fire Survival Cables" through research. These cables - also known as CIRCUIT INTEGRITY CABLES & are designed to sustain the high temperatures for a defined minimum period of time under direct fire. These cables are useful to maintain their integrity during the defined period of fire. The construction of these cables is different if compared with ordinary cables. The conductor is manufactured with a specially designed heat barrier and fire resistant insulation which resists the fire to reach conductor surface. The cable continues to remain into operation at high temperatures like 650 °C, 750 °C and 950 °C as per various conditions of operation and applications.

Wires offering same properties are also available.

Specification

These cables are manufactured and tested in accordance with BS 7846, IS 7098(P-1), IEC 69331 and BS 6387 for required temperatures and duration - depending upon the application of cable and site conditions.

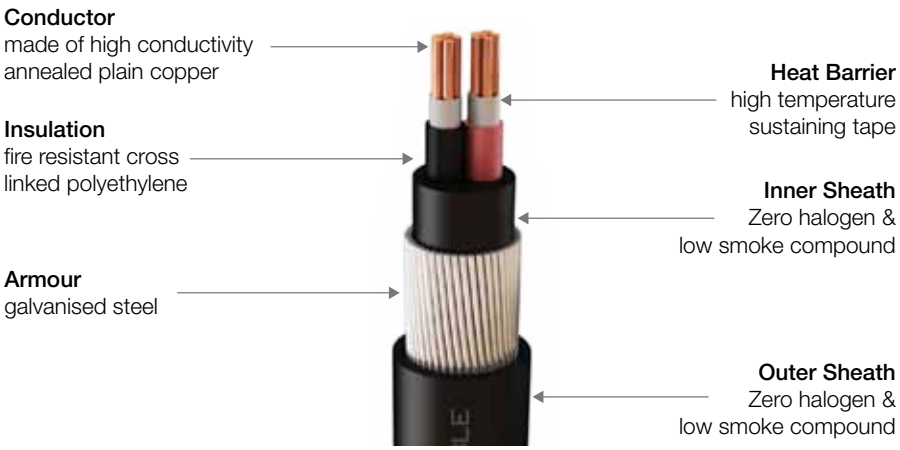
Constituents

HAVELLS FS CABLES are manufactured with the following materials.

1. Annealed Plain Copper Conductor
2. Heat Barrier Over the Conductor
3. Cross Linked Polyethylene
4. Galvanised Steel Armour
5. Zero Halogen & Low Smoke Compound

The ZHLS compound ascertains the least smoke and hence increased light transmission during burning of cables. The circuit integrity of HAVELLS FS cables at high temperatures remains unaltered for the required time period as per the specification defined.

Constructions



Solar Cables

Introduction

Solar photovoltaic industry gets more attention as the most promising environment- friendly industry, and it is expected to have the significant role in resolving the earth's energy problem. As production costs diminish, users increasingly view these energy sources as clean, cheap and reliable. In this background, the demand for "SOLAR CABLE", which is the current transmission medium of solar energy power generation, is expected to increase with the expansion of market.

Special Properties of Solar Cables

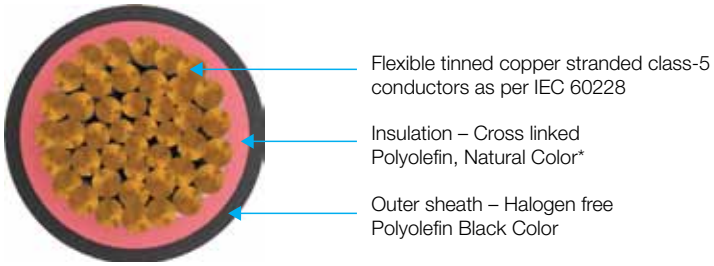
- **Lifetime reliability:** lasts up to 30 years even under tough external conditions.
- **Outdoor durability:** resists extreme temperatures (-40 °C to 120 °C maximum at the core) and ozone resistant.
- **UV resistance:** full protection against ultraviolet rays.
- **Halogen-free:** Low Smoke Emission & Low Toxicity/Corrosivity during fire.
- **Properties against fire:** flame retardant, fire retardant.
- **Flexibility and stripability:** for fast and easy installation.
- **Fully recyclable:** in accordance with new environmental regulations.
- **Easy installation** with color identification (blue, red).
- **Suitable to common connector types.**
- TÜV certified.

Constituents

Havells solar cables are manufactured with the following materials.

1. Annealed Tinned Copper Conductor
2. Cross Linked Polyolefin Compound
3. Zero Halogen Polyolefin Compound

Construction of solar cable



***can be manufactured with Red/Black colour**

Required Features of Solar cable

CHEMICAL FEATURES

- Weather resistant
- Resistant to mineral oils
- Resistant to acids & alkaline

THERMAL FEATURES

- Maximum conductor temperature of operation-120 °C during 20000 hours.
- Minimum operating temperature: - 40 °C

ELECTRICAL FEATURES

- Voltage rating: 1.5 (1.8) kVdc / 0.6/1.0 (1.2) kVac
- High voltage test: 6.5 kVdc for 5 minutes.

MECHANICAL FEATURES

- Resistant to Impact , tear & abrasion
- Minimum bending radius – 4 times of overall diameter.
- Safe pulling force -50 N/SQ. mm

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

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