

तार ....  
जसमा आगो लाग्दैन

सुरक्षाको प्रत्याभुति ....

Double Coated

**RATHI**  
cable

qualityaustria  
Succeed with Quality

CERTIFIED  
I:Net  
MANAGEMENT SYSTEM  
ISO 9001-2015  
CERTIFIED COMPANY

नेपाल गुणस्तर प्रमाण विज्ञान  
अ. गु. ३४४



### Quality assurance:

- Electro Magnetic Steam
- Drawing Technology with double coating
- Fire proofed high grade PVC wire
- 100% Copper
- 100% Bunching
- High Resistance
- Anti Termite & Anti Rodent



उत्पादक:

अन्नपूर्णा केबल्स इण्डस्ट्रिज प्रा. लि.  
विराटनगर, मोरङ्ग (नेपाल)

f Rathi Cable



## PROFILE

**Rathi Group**, The foundation laid by Late Rama Kishan Rathi, a man of dreams, whose forefathers came along all the way from Rajasthan in search of better living and prosperity for the family long back. Rajasthan was suffering from heavy draught and acute scarcity of necessary and essential commodities. The hard work and toil of Late Rama Kishan Rathi and his two brothers Shrikishan Rathi and Jaikishan Rathi in Bikram Samvat 1970 established him as a successful businessman as well as an important pillar of the society.

Starting his business by selling the essential commodities in the nearby markets on week days and local market, which he used to bring from the nearby Indian market. Gradually he managed to establish a rice mill Jugal Rice and Oil Mills Pvt. Ltd. This mill was the milestone which established well him in the field of rice export that later on he was called as the “Rice King” of Nepal. The rice was exported to all parts of Asia as well as the European countries. During the season he had to hire many rice mills of nearby areas to fulfil the orders.

With the new generation taking over the business, Rathi Group decided to diversify into various manufacturing and trading units.

**Annapurna Electricals** was established in the year 1983 AD dedicated in the manufacturing of domestic electrical products locating in Biratnagar, Nepal. The unit is dedicated in mitigating the demand for quality products through well-equipped machines, trained manpower, and quality raw materials. We are the oldest and largest manufacturer of electrical products in the country.

**Annapurna Winding Wires**, est. in 1984, the company has indulged in manufacturing of super enameled copper winding wire from 9 SWG to 41 SWG with an installed capacity of 1200 MT per annum. The company also deals in copper strips, copper plates, copper sticks etc. The company is striving towards maintaining the quality by bringing new machines supported by the latest technologies, trained and skilled man power.

**Rathi Adhesive Industries**, est. in 1990 AD, one of the oldest companies in Nepal for manufacturing of adhesives and similar products like white wood adhesives, glue, and lamination glue, etc.

**Annapurna Cables Industries Pvt. Ltd.**, est. in 2001 AD, is Nepal's no. 1 cable manufacturing unit with our manufacturing facility located in Biratnagar. We manufacture house wiring cables, flexible cables, multi-strand cables, auto cables, ACSR conductor, Power cables, XLPE Cables etc. These cables are manufactured in “**RATHI**” and “**ANNAPURNA**” brands, which is NS Standard and ISO certified. “**RATHI**” and “**ANNAPURNA**” brand is well renowned in Nepal market for its high quality assurance. Our competitive edge lies in product innovation, superior quality and easy availability. The company imports raw materials such as PVC, Copper Rods and Aluminium Rods of high quality from renowned companies in India. The company has a well-equipped laboratory, with every stage of production, from raw materials to finished products, having been tested that ensures high quality products. With the company growth over the years and demand in the market increasing, it has entered in manufacturing of Power Cable with the latest manufacturing technologies.

Power Cable is manufactured in XLPE/PVC coating in armoured/unarmoured for both Aluminium and Copper products. Our strength is derived from our customers and the growth of the customers is a pre-requisite to the growth of the company and hence, customer satisfaction is Annapurna Cables Industries Pvt. Ltd. prime and important objective. Social and environmental responsibility has been at the forefront of Annapurna Cables Industries Pvt. Ltd. operating philosophy and as a result the company consistently contributes to socially responsible activities. For instance, we provide scholarships to students every year and make direct and indirect contribution to social activities and for development of society.

We, **Rathi Group**, maintain all kinds of facilities for our employees and create good working environment. We aim at providing quality assurance on products and also provide after sale services, and easy availability of products.



## PRODUCT / RANGE

### House Wiring Cable Brand(Rathi/Annapurna/Rathi Gold-FRLS)

- i) Single Core (unsheathed and sheathed)
- ii) Circular Twins, Three, Four Core (sheathed)
- iii) Flat Twin or Three Core (sheathed)

### Flexible Cable/Cords

- i) Single Core (unsheathed and sheathed)
- ii) Parallel or Twisted Twin (unsheathed)
- iii) Circular Twins, Three, Four Core (sheathed)
- iv) Flat Twin or Three Core (sheathed)

### PVC/XLPE Power Cable

- i) Copper Conductor Armoured and Unarmoured (PVC/XLPE insulated and sheathed) 1 core upto 1000 sq. mm and multicore upto 400 sq. mm
- ii) Aluminium Conductor Armoured and Unarmoured (PVC/XLPE insulated and sheathed) 1 core upto 1000 sq. mm and multicore upto 400 sq. mm

### PVC Control Cables

Copper conductor armoured and unarmoured upto 44 core in size 1.5 sq mm 2.5. mm and 4 sq. mm.

### Concentric Cables

Aluminium conductor in different sizes mainly used by NEA for subscriber connection upto 25 sq. mm

### Communication Cables

- i) Indoor Telephone Cables upto 5 pairs (sheathed & unsheathed)
- ii) Outdoor Telephone Cables (sheathed & unsheathed)
- iii) Self Supporting Drop Wires
- iv) Jumper Wires
- v) Self Supporting cables upto 50 pairs
- vi) Multi Pair cables upto 50 pairs

### Auto Cables

Heavy duty battery terminal cables upto 61/0.9 mm

### Overhead Transmission Conductors

ACC, AAAC, ACSR, INSULATED CONDUCTORS

### Bare Copper, Aluminium Wires & Special Cables

Annealed soft drawn high conductivity electric wires (0.10 mm to 6 mm) & any specified cables.

### Earth wires

8swg, 10swg, 12swg, etc.

# RATHI

## Submersible Cable

Uniform Resistance

Tough & Flexible - Double Layer Protection

Enhanced Electrical Performance

BEST INNOVATIVE SUSTAINABLE QUALITY

## OUR BRAND

Rathi Cable

Rathi Green Cable

Rathi Lifeguard Cable

Rathi Annapurna Cable

## SPECIFICATIONS

NS:344, BS:6004, IS:694

NS:344, BS:6346, IS:1554

NS:259



हाम्रो चाहना, तपाईंको सुरक्षा: अन्नपूर्णा केबुल

तार .....  
जसमा आगो लाग्दैन

**RATHI**  
cable



Twisted  
Double Coated  
electric pvc wires



## Quality Policy

Motto of Annapurna Cables Industries Pvt. Ltd. is to provide the customer satisfaction through quality service and product confirming to relevant specifications at competitive price to meet or exceed customer requirement, which will be achieved through continuous improvements in quality of work enhancing employee involvement at all levels and by using best available resources.

## Some Salient Features of Rathi Wires & Cables

- Made from quality raw materials.
- ISO 9001:2015 certified company.
- Awarded with NS mark by Nepal Bureau of Standard & Metrology.
- Follow national (NS) and international standard (IS, BS, IEC) and customer's specification.
- Manufacturing experience in the field of conductors and cables for 3 decades.
- Well equipped machineries to produce 1.5 sq. mm to 1000 sq. mm power cables.
- In house testing facility and opportunity to inspect at every stages of manufacturing.
- Manned by highly experienced and trained engineers and professionals.
- Well established packaging and delivery system.
- Quality product and services at competitive price.
- A long list of customer ranging from giant private sector to public sector.

## Specifications

Rathi cable follows and ensures well-known National and International standards for Wires and Cables. The company is equipped to produce the domestic, telecommunication, industrial and power cables as per customer's specification at any times.

Nepal Standard	NS	29,344
Indian Standard	IS	694:2010
	IS	8130
	IS	1554 (Part 1)/88
	IS	7098 (Part 11)
British Standard	IS	14255:1995
	BS	6004
	BS	6346
	BS	6500

## The Production Process

The production process is the heart of Rathi branded wires and cables. Each production step considers the proper resource utilization and energy conservation. The product design and production planning along with housekeeping activities are highly considered during production process. The mass balance is taken care in each step of operational techniques. The product properties are considered to be unaffected by environmental conditions in use, and cable properties such as Conductivity, Tensile strength, Elongation, Insulation thickness, Continuity, Mass, Shape and Size of conductors are taken care by the production and laboratory supervisors at every meter of production.

# THE QUALITY ASSURANCE

The quality control department is equipped with state-of-the-art equipment and the established system of quality control keeps a close eye at every stages of production beginning from the raw material to the finished product. The Routine Test is carried out for manufacturing process assurance, Type Test is carried out on sampling basis of each lot of production to confirm the relevant specification and the Acceptance test is done in our laboratory prior to dispatch of wires/cables as per customer demand, if required. The final product is issued with a test certificate confirming to the relevant standard. As the company has been certified with Quality Management System (ISO 9001:2015) and NS Mark (National Standard), it becomes imperative to ensure as the third party certification to our customers.



**Universal Tensile Tester**



**Insulation Resistance & Volume Resistivity**



**High Voltage Tester**

- Our Lab Equipments**
1. Universal Tensile Tester
  2. Insulation Resistance & Volume Resistivity
  3. High Voltage Tester
  4. Conductor Resistance
  5. Laboratory Oven
  6. Thermal Stability Oven
  7. Four Cell Ageing Oven
  8. Environmental Test Chamber
  9. Digital Temp. Controlled Water Bath With Timer
  10. Flamibility Test
  11. Torsion Test Apparatus
  12. Density Tester



**Conductor Resistance**

## Packing

The every meter length of cable is marked with brand name and size of cable on insulation/sheath and the wire/cable is coiled and wrapped properly. The domestic wire/cable is packed properly with the packing details in coil, however, the industrial cable is packed in non returnable wooden drum. The care is always taken to save the property of cable and easy drum handling. The packing and constructional details of drum components can be made available to the customer on request

**Table 1: Properties of Copper and Aluminium:**

Properties	Copper Annealed	Copper Hard drawn	Aluminium Hard drawn	Aluminium 3/4 Hard
Conductivity, Percent	100	97	61	61
Density at 20°C, gm/cc	8.89	8.89	2.703	2.703
Coeff. of linear exp, /°C x 10 <sup>-6</sup>	17	17	23	23
Melting Point, °C	1083	1083	659	659
Specific heat, cal/gm	0.092	0.092	0.23	0.23
Thermal conductivity at 0-100°C, cal/cm/sec/°C	0.92	0.92	0.54	0.54
Resistivity at 20°C, micro ohm-cm	1.724	1.771	2.845	2.845
Temp. Coeff. of Resistance at 20 °C,/C	0.00393	0.00381	0.004	0.004
Ultimate Tensile Stress, Kg/mm <sup>2</sup> (approx.)	25.3	42.2	14.8-19	11.5-15.5
Young's Modulus, Kg/mm <sup>2</sup>	12600	-	7000	7000

## RATHI FRLS CABLES



**Table 2: Comparison between Copper and Aluminium Conductor:**

Particulars	Copper	Aluminium
<b>For Equal Resistance</b>		
Area ratio for round conductor	1	1.61
Diameter ratio for round conductor	1	1.27
Weight ratio	1	0.48
<b>For Equal Current &amp; Temperature Rise</b>		
Area ratio for round conductor	1	1.39
Diameter ratio for round conductor	1	1.18
Weight ratio	1	0.42
<b>For Equal Diameter</b>		
Resistance ratio	1	1.61
Current carrying capacity	1	0.78

**Table 3: Rathi** Single core PVC insulated multistrand copper conductor (unsheathed) heavy duty cables for flexible wiring voltage grade 650/1100 V.

Nominal CS area of conductor	Number of wires and dia of wires	Nominal thickness of insulation	Conductor resistance ohm/km (max)	Current carrying capacity in conduit/Trunking	2 cable single Ø unenclosed clipped directly to a surface or on cable trays
Sq mm	(mm)	(mm)	At 20 <sup>o</sup> C	Amps	Amps
0.75	11/0.3	0.60	24.01	8	9
1.0	14/0.3	0.70	18.10	11	12
1.5	21/0.3	0.70	12.10	13	16
2.5	36/0.3	0.80	7.41	18	22
4.0	56/0.3	0.80	4.95	24	29
6.0	84/0.3	0.80	3.30	31	37
10	80/0.4	1.00	1.91	42	51
16	127/0.4	1.00	1.21	57	68
25	196/0.4	1.20	0.780	71	86
35	276/0.4	1.20	0.554	91	110
50	396/0.4	1.40	0.386	120	145

**Table 4: Rathi** Multicore round flexible PVC insulated copper conductor and sheathed cables for flexible wiring in voltage grade 650/1100V.

Nominal CS area of conductor	Number/ Nom. Dia of wires	Thickness of insulation (Nominal)	Nominal thickness of sheath				Resistance max per Km at 20 <sup>o</sup> C	Current rating AC	Voltage drop	
			Twin core	Three core	Four core	Five core			D/C 1 Ø AC	3 Ø AC
mm	mm	mm	mm	mm	mm	mm	Ohms	Amps	mV	mV
0.5	7/0.30	0.6	0.9	0.9	0.9	0.9	39.0	4	83	72
0.75	11/0.30	0.6	0.9	0.9	0.9	0.9	26.0	7	56	48
1.0	14/0.30	0.6	0.9	0.9	0.9	1.0	19.5	11	43	37
1.5	21/0.30	0.6	0.9	0.9	1.0	1.0	13.3	15	31	26
2.5	36/0.30	0.7	1.0	1.0	1.0	1.0	7.98	20	18	16
4.0	56/0.30	0.8	1.0	1.0	1.0	1.0	4.95	26	11	9.6

**Table 5: Rathi** Multi core multistrand PVC insulated copper conductor and sheathed cables for fixed wiring in voltage grade 650/1100 V (Conforming to IS:694:2010)

Nominal CS Area of Conductor mm	Number/ Nominal Dia of wires mm	Thickness of Insulation (Nominal) mm	Nominal thickness of sheath			Current Rating AC Amps	Voltage Drop		Resistance max /km at 20° C Ohms
			Twin Core mm	Three Core mm	Four Core mm		DC/ 1Ø AC mV	3Ø AC mV	
1.0.	7/0.43	0.6	0.9	0.9	0.9	11	42	37	18.1
1.5	7/0.52	0.6	0.9	0.9	0.9	15	28	24	12.1
2.5	7/0.67	0.7	1.0	1.0	1.0	20	17	15	7.41
4.0	7/0.85	0.8	1.1	1.1	1.1	26	11	9.2	4.61
6.0	7/1.04	0.8	1.1	1.1	1.2	31	7.1	6.2	3.08
10	7/1.35	1.0	1.2	1.2	1.3	42	4.2	3.7	1.83
16	7/1.70	1.0	1.3	1.3	1.4	57	2.7	2.3	1.15
25	7/2.14	1.2	1.5	1.5	1.6	71	1.7	1.5	0.727
35	7/2.50	1.2	1.6	1.6	1.7	91	1.3	1.1	0.524
50	19/1.78	1.4	1.7	1.7	1.8	120	0.97	0.84	0.387

**RATHI**  
cable



**Table 6: Rathi** Auto Cables.

AS PER BS: 6862				AS PER BS: 2465			
Cond. size, mm	Cond. Area, Sq. mm	Current Rating, Amp	Overall Diameter, Amp	Cond. size, mm	Cond. Area, Sq. mm	Current Rating, Amp	Overall Diameter, mm
7/0.3 (2mm)	0.5	4	2.1	10//0.3	0.7	6	2.5
9/0.3 (3mm)	0.6	6	2.5	15//0.3	1.0	11	2.7
14/0.3 (4mm)	1.0	11	2.7	22//0.3	1.5	15	3.0
28/0.5 (5mm)	2.0	17	3.4	29//0.3	2.0	17	3.2
35/0.3 (6mm)	2.5	19	3.8	36//0.3	2.5	19	3.4
44/0.3 (7mm)	3.0	22	4.2	57//0.3	4.0	26	4.8
65/0.3 (8mm)	4.5	28	5.1	85//0.3	6.0	34	5.6

हाम्रो वाहना, तपाईंको सुरक्षा: अन्नपूर्णा केबुल

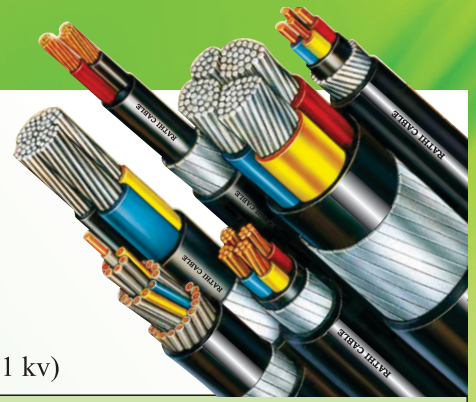
**TABLE 7: Solid & Stranded Power Cable Copper Conductor for Insulated Cables**

Nominal Area	Circular Conductor				Circular / Shaped Conductor	
	No./Nominal Diameter of wire	Overall Dia.	Calculated Area	Calculated Weight	Resistance per Km 20°c	
					Max. allowable for Single Core cable	Max. allowable for Multi Core cable
Sq. mm	mm	mm	Sq. mm	Kg/km	Ohms	Ohms
1.5	1/1.38	1.38	1.496	13.239	11.9	12.1
2.5	1/1.78	1.78	2.489	22.127	7.14	7.26
4.0	1/2.25	2.25	3.977	35.355	4.47	4.56
4.0	7/0.85	2.55	3.973	36.035	4.52	4.61
6.0	1/2.76	2.76	5.985	53.205	2.97	3.03
6.0	7/1.04	3.12	5.948	53.948	3.02	3.08
10.0	1/3.57	3.57	10.013	89.015	1.77	1.81
10.0	7/1.35	4.05	10.023	90.908	1.78	1.83
16.0	7/1.70	5.10	15.895	144.167	1.13	1.15
25.0	7/2.14	6.42	25.187	228.446	0.712	0.727
35.0	7/2.52	7.56	34.927	316.786	0.514	0.524
50.0	7/3.02	9.06	50.162	454.969	0.379	0.381
70.0	19/2.14	10.70	68.366	620.079	0.262	0.268
95.0	19/2.52	12.60	94.802	856.854	0.189	0.193
120.0	37/2.03	14.21	119.800	1086.586	0.150	0.153
150.0	37/2.25	15.75	147.174	1334.868	0.122	0.124
185.0	37/2.52	17.64	184.615	1674.458	0.0972	0.0991
240.0	37/2.85	19.95	236.132	2141.717	0.074	0.0754
300.0	61/2.52	22.68	304.365	2760.590	0.059	0.0601
400.0	61/2.85	25.65	389.299	3530.941	0.0461	0.047
500.0	61/3.20	28.80	490.788	4451.447	0.0366	0.0373

**TABLE 8: Solid & Stranded Power Cable Aluminium Conductor for Insulated Cables**

Nominal Area	Circular Conductor				Circular or Shaped Conductor	
	No./Nominal Dia of wire	Overall dia	Calculated area	Calculated weight	Resistance per Km at 20°c	
					Maximum allowable for Single core cable	Maximum allowable for Multi core cable
Sq. mm	mm	mm	Sq. mm	Kg/km	Ohms	Ohms
1.5	1/1.38	1.38	1.496	4.043	19.7	20.0
2.5	1/1.78	1.78	2.489	6.727	11.7	12.0
4.0	1/2.25	2.25	3.977	10.749	7.39	7.54
4.0	7/0.85	2.55	3.973	10.953	7.55	7.70
6.0	1/2.76	2.76	5.985	16.177	4.91	5.01
6.0	7/1.04	3.12	5.948	16.398	4.99	5.09
10.0	1/3.57	3.57	10.013	27.065	2.94	3.00
10.0	7/1.35	4.05	10.023	27.634	2.96	3.02
16.0	7/1.70	5.10	15.895	43.823	1.87	1.91
25.0	7/2.14	6.42	25.187	69.442	1.18	1.20
35.0	7/2.52	7.58	34.927	96.295	0.851	0.868
50.0	7/3.02	9.06	50.162	138.299	0.628	0.641
70.0	19/2.14	10.70	68.366	188.489	0.435	0.443
95.0	19/2.52	12.60	94.802	261.374	0.313	0.320
120.0	37/2.03	14.21	119.800	330.295	0.248	0.253
150.0	37/2.25	15.75	147.174	405.767	0.202	0.206
185.0	37/2.52	17.64	184.615	508.994	0.161	0.164
240.0	37/2.85	19.95	236.132	651.030	0.122	0.125
300.0	61/2.52	22.68	304.365	839.152	0.0976	0.100
400.0	61/2.85	25.65	389.299	1073.32	0.0763	0.0778
500.0	61/3.20	28.80	490.788	1353.131	0.0605	0.0617

# POWER CABLES



**Table 9: Rathi Single Core (Armoured and Unarmoured) Power Cables with Copper and Aluminium Conductors. (Voltage Grade 1.1 kv)**

Cross Sectional Area Sq. mm	Thickness Insulation		Thickness of PVC Outer Sheath		Max. Outer Dia.		Current Rating			
	Unarm mm	Arm mm	Unarm mm	Arm mm	Unarm mm	Arm mm	Copper		Aluminium	
							Direct in Ground Amps	Laid in air Amps	Direct in Ground Amps	Laid in air Amps
1.5	0.8	1.1	1.8	1.24	7.8	9.2	25	22	21	18
2.5	0.9	1.3	1.8	1.24	8.0	10.2	35	30	28	25
4.0	1.0	1.3	1.8	1.24	8.3	10.7	39	35	31	27
6.0	1.0	1.3	1.8	1.24	9.2	11.6	49	44	39	35
10.0	1.0	1.3	1.8	1.24	10.1	12.5	65	60	51	47
16.0	1.0	1.3	1.8	1.24	10.8	13.2	85	82	66	64
25.0	1.2	1.5	1.8	1.24	12.4	14.8	110	105	86	84
35.0	1.2	1.5	1.8	1.24	13.4	15.8	130	125	100	105
50.0	1.4	1.7	1.8	1.24	15.2	17.6	155	165	120	130
70.0	1.4	1.7	1.8	1.4	16.8	19.6	190	205	140	155
95.0	1.6	1.9	1.8	1.4	18.9	20.9	220	245	175	190
120.0	1.6	1.9	2.0	1.4	20.8	22.4	250	280	195	220
150.0	1.8	2.1	2.0	1.4	22.7	24.3	280	320	220	250
185.0	2.0	2.3	2.0	1.4	24.8	26.4	305	370	240	290
240.0	2.2	2.5	2.0	1.4	27.4	29.1	345	425	270	335
300.0	2.4	2.7	2.0	1.56	30.0	32.1	375	475	295	380
400.0	2.6	3.0	2.2	1.56	34.2	36.0	400	550	325	435
500.0	3.0	3.4	2.2	1.56	37.8	39.6	425	590	345	480
630.0	3.4	3.9	2.4	1.72	42.7	44.7	470	660	390	550
800.0	3.4	3.9	2.4	1.88	47.1	49.4	530	725	440	600
1000.0	3.4	3.9	2.6	2.04	51.5	53.7	590	870	490	720

**Table 10: Rathi Two Core (Armoured and Unarmoured) Power Cable with Copper and Aluminium Conductors. (Voltage Grade 1.1 kv)**

Cross Sectional Area Sq. mm	Thickness of PVC Insulation mm	Thickness of Inner Sheath mm	Thickness of PVC Outer Sheath mm	Max. Outer Dia.		Current Rating			
				Unarm mm	Arm mm	Copper		Aluminium	
						Direct in Ground Amps	Laid in air Amps	Direct in Ground Amps	Laid in air Amps
1.5	0.8	0.3	1.8	10.80	13.30	23	20	18	16
2.5	0.9	0.3	1.8	11.90	14.50	32	27	25	21
4.0	1.0	0.3	1.8	13.30	15.90	41	35	32	27
6.0	1.0	0.3	1.8	14.30	16.90	50	45	40	35
10.0	1.0	0.3	1.8	16.00	18.50	70	60	55	47
16.0	1.0	0.3	1.8	16.80	19.40	90	78	70	59
25.0	1.2	0.3	2.0	19.60	21.50	115	105	86	75
35.0	1.2	0.3	2.0	21.00	23.00	140	125	110	99
50.0	1.4	0.3	2.0	23.70	25.50	165	155	135	125
70.0	1.4	0.3	2.0	25.70	27.50	205	195	160	150
95.0	1.6	0.3	2.0	29.50	30.90	240	230	190	185
120.0	1.6	0.4	2.0	32.00	33.20	275	265	210	210
150.0	1.8	0.4	2.2	34.60	36.40	310	305	240	240
185.0	2.0	0.4	2.2	37.90	40.10	350	350	275	275
240.0	2.2	0.5	2.4	42.65	44.30	405	410	320	325
300.0	2.4	0.5	2.6	46.90	48.70	450	465	355	365
400.0	2.6	0.6	2.8	52.40	54.10	490	530	385	420
500.0	3.0	0.6	3.0	59.55	60.00	550	370	430	470

**Table 11: Rathi Three Core (Armoured and Unarmoured) Power Cables with Copper and Aluminium Conductors**  
(Voltage Grade 1.1 kv)

Cross Sectional Area	Thickness of PVC Insulation	Thickness of Inner Sheath	Thickness of PVC Outer Sheath	Max. Outer Dia.		Current Rating			
						Copper		Aluminium	
				Unarm	Arm	Direct in Ground	Laid In air	Direct in Ground	Laid In air
Sq. mm	mm	mm	mm	mm	mm	Amps	Amps	Amps	Amps
1.5	0.8	0.3	1.8	11.10	13.80	21	17	16	13
2.5	0.9	0.3	1.8	12.50	15.10	27	24	21	18
4.0	1.0	0.3	1.8	14.00	16.60	36	30	28	23
6.0	1.0	0.3	1.8	15.20	17.70	45	39	35	30
10.0	1.0	0.3	1.8	17.00	18.60	60	52	46	40
16.0	1.0	0.3	1.8	18.00	20.30	77	66	60	51
25.0	1.2	0.3	2.0	21.60	23.40	99	90	73	67
35.0	1.2	0.3	2.0	23.50	25.40	120	110	92	86
50.0	1.4	0.3	2.0	26.90	28.80	145	135	110	105
70.0	1.4	0.4	2.2	30.50	32.20	175	165	135	130
95.0	1.6	0.4	2.2	34.50	36.40	210	200	165	155
120.0	1.6	0.4	2.2	37.50	39.40	240	230	185	180
150.0	1.8	0.5	2.4	41.50	43.30	270	265	210	205
185.0	2.0	0.5	2.6	46.00	48.20	300	305	235	240
240.0	2.2	0.5	2.6	51.00	53.60	345	355	275	280
300.0	2.4	0.6	3.0	57.00	59.40	385	400	305	315
400.0	2.6	0.7	3.2	64.00	65.90	425	455	335	375
500.0	3.0	0.7	3.4	72.00	74.00	460	490	370	420

**Table 12: Rathi Three and Half Core (Armoured and Unarmoured) Power Cables with Copper and Aluminium Conductors**  
(Voltage Grade 1.1 kv)

Cross Sectional Area	Thickness of PVC Insulation	Thickness of Inner Sheath	Thickness of PVC Outer Sheath	Max. Outer Dia.		Current Rating			
						Copper		Aluminium	
				Unarm	Arm	Direct in Ground	Laid In air	Direct in Ground	Laid In air
Sq. mm	mm	mm	mm	mm	mm	Amps	Amps	Amps	Amps
25/16	1.2/1.0	0.3	2.0	23.50	25.30	99	90	73	67
35/16	1.2/1.0	0.3	2.0	25.60	27.60	120	110	92	86
50/25	1.4/1.2	0.3	2.2	29.90	31.90	145	135	110	105
70/35	1.4/1.2	0.4	2.2	33.10	35.10	175	165	135	130
95/50	1.6/1.4	0.4	2.2	37.80	40.20	210	200	165	155
120/70	1.6/1.4	0.5	2.4	41.40	43.40	240	230	185	180
150/70	1.8/1.4	0.5	2.6	45.90	47.70	270	265	210	205
185/95	2.0/1.6	0.5	2.8	51.20	53.00	300	305	235	240
240/120	2.2/1.6	0.6	3.0	57.20	59.00	345	355	275	280
300/150	2.4/1.8	0.7	3.2	63.90	65.70	385	400	305	315
400/185	2.6/2.0	0.7	3.4	71.20	73.40	425	455	335	375
500/240	3.0/2.2	0.7	3.8	81.10	81.70	460	490	370	420

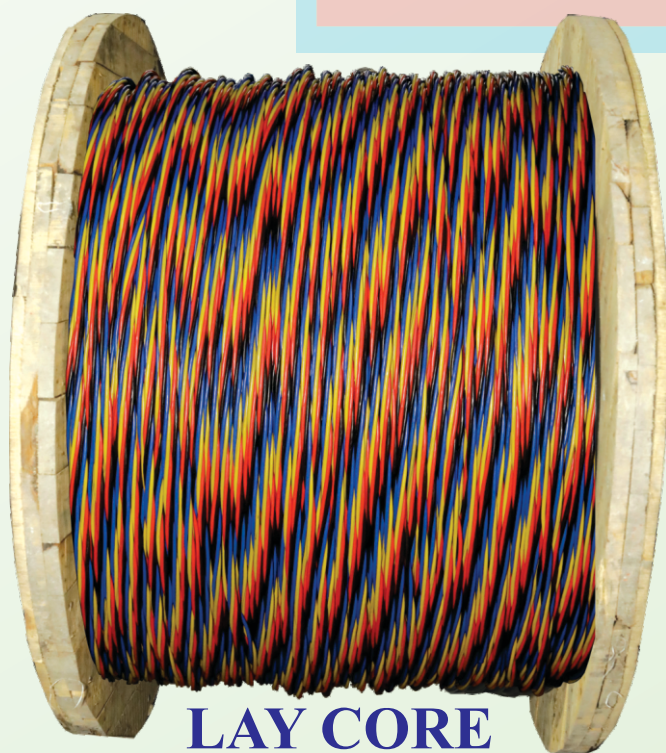
**Table 13: Rathi Four Core (Armoured and Unarmoured) Power Cables with Copper and Aluminium Conductors**  
(Voltage Grade 1.1 kv)

Cross Sectional Area	Thickness of PVC Insulation	Thickness of Inner Sheath	Thickness of PVC Outer Sheath	Max. Outer Dia.		Current Rating			
						Copper		Aluminium	
				Unarm	Arm	Direct in Ground	Laid In air	Direct in Ground	Laid In air
Sq. mm	mm	mm	mm	mm	mm	Amps	Amps	Amps	Amps
1.5	0.8	0.3	1.8	12.00	14.80	21	17	16	13
2.5	0.9	0.3	1.8	13.50	16.30	27	24	21	18
4.0	1.0	0.3	1.8	15.00	18.00	36	30	28	23
6.0	1.0	0.3	1.8	16.50	19.60	45	39	35	30
10.0	1.0	0.3	1.8	18.50	20.80	60	52	46	40
16.0	1.0	0.3	2.0	20.90	22.80	77	66	60	51
25.0	1.2	0.3	2.0	24.60	26.50	99	90	73	67
35.0	1.2	0.3	2.0	27.00	28.90	120	110	92	86
50.0	1.4	0.4	2.2	31.60	33.50	145	135	110	105
70.0	1.4	0.4	2.2	35.10	37.00	175	165	135	130
95.0	1.6	0.5	2.4	40.40	42.30	210	200	165	155
120.0	1.6	0.5	2.4	43.90	46.30	240	230	185	180
150.0	1.8	0.5	2.4	48.70	50.90	270	265	210	205
185.0	2.0	0.6	2.8	54.40	56.60	300	305	235	240
240.0	2.2	0.6	3.0	60.70	62.90	345	355	275	280
300.0	2.4	0.7	3.4	68.50	70.30	385	400	305	315
400.0	2.6	0.7	3.6	76.10	78.30	425	455	335	375
500.0	3.0	0.7	4.0	85.70	87.40	460	490	370	420

Outer Dia is for Conduit & Trunk guidance only.

**Table 14: Rathi PVC insulated Armoured and Unarmoured Control Cables with Copper Conductors.**

No. of cores x Area	Thickness of Insulation Minimum	Thickness of Inner Sheath	Outer Thickness		Approx OD		Max DC resistance at 20° C	Current Rating		
			Unarm	Arm	Unarm	Arm		Direct in Ground	In Duct	Laid In air
No. x mm <sup>2</sup>	mm	mm	mm	mm	mm	mm	Ohm/km	Amps	Amps	Amps
2x1.5	0.8	0.3	1.24	1.8	11.7	13.6	12.1	23	20	20
3x1.5	0.8	0.3	1.24	1.8	12.3	14.1	12.1	21	17	17
4x1.5	0.8	0.3	1.24	1.8	13.1	14.9	12.1	21	17	17
5x1.5	0.8	0.3	1.24	1.8	14.3	16.1	12.1	21	17	17
6x1.5	0.8	0.3	1.24	1.8	15.3	17.1	12.1	15	13	13
7x1.5	0.8	0.3	1.24	1.8	15.3	17.1	12.1	14	13	13
10x1.5	0.8	0.3	1.40	1.8	18.6	20.8	12.1	13	11	11
12x1.5	0.8	0.3	1.24	1.8	9.2	19.8	12.1	12	10	10
14x1.5	0.8	0.3	1.40	1.8	20.0	21.0	12.1	11	10	10
16x1.5	0.8	0.3	1.40	1.8	21.0	22.0	12.1	11	9	9
19x1.5	0.8	0.3	1.40	2.0	22.4	23.2	12.1	10	9	9
24x1.5	0.8	0.3	1.40	2.0	25.8	26.4	12.1	9	8	8
27x1.5	0.8	0.3	1.40	2.0	26.2	26.9	12.1	9	8	8
30x1.5	0.8	0.3	1.40	2.0	27.2	27.8	12.1	9	7	7
37x1.5	0.8	0.3	1.40	2.0	29.1	29.7	12.1	8	7	7
44x1.5	0.8	0.3	1.56	2.0	32.3	33.4	12.1	7	6	6
52x1.5	0.8	0.4	1.56	2.0	34.0	35.0	12.1	7	6	6
61x1.5	0.8	0.4	1.56	2.2	36.3	36.9	12.1	6	6	6
2x2.5	0.9	0.3	1.24	1.8	12.8	15.0	7.41	32	27	27
3x2.5	0.9	0.3	1.24	1.8	13.7	15.5	7.41	27	24	24
4x2.5	0.9	0.3	1.24	1.8	14.7	16.5	7.41	27	24	24
5x2.5	0.9	0.3	1.24	1.8	16.0	18.0	7.41	27	24	24
6x2.5	0.9	0.3	1.24	1.8	17.0	19.0	7.41	21	18	18
7x2.5	0.9	0.3	1.24	1.8	17.0	19.0	7.41	20	17	17
10x2.5	0.9	0.3	1.40	1.8	21.1	23.8	7.41	18	15	15
12x2.5	0.9	0.3	1.40	2.0	20.3	22.8	7.41	17	14	14
14x2.5	0.9	0.3	1.40	2.0	23.2	23.9	7.41	16	13	13
16x2.5	0.9	0.3	1.40	2.0	24.4	25.0	7.41	15	12	12
19x2.5	0.9	0.3	1.40	2.0	25.7	26.3	7.41	14	12	12
24x2.5	0.9	0.3	1.40	2.0	29.7	30.3	7.41	13	11	11
27x2.5	0.9	0.3	1.40	2.0	30.3	30.9	7.41	12	10	10
30x2.5	0.9	0.3	1.56	2.0	31.3	32.3	7.41	12	10	10
37x2.5	0.9	0.4	1.56	2.2	34.2	34.9	7.41	11	9	9
44x2.5	0.9	0.4	1.56	2.2	38.2	38.9	7.41	10	9	9
52x2.5	0.9	0.4	1.56	2.2	39.9	40.3	7.41	10	8	8
61x2.5	0.9	0.4	1.56	2.2	41.9	42.5	7.41	9	8	8



**LAY CORE**



**ABC CABLE**

# XLPE CABLES



LT-XLPE cables are fast replacing PVC cables and find varied applications in electrical purposes. With the inherent advantages of XLPE over PVC cables, the company has focused also on XLPE cables with tomorrow in mind.

**Table 15: Rathi** Over all Diameter of 1.1 KV, 31/2 Core.XLPE/PVC Insulated PVC Sheathed (Armoured & Unarmoured) Cables.

Size	Approx. Overall Diameter (mm)					
	Unarmoured		Flat strip Armoured		Wire Armoured	
mm <sup>2</sup>	PVC	XLPE	PVC	XLPE	PVC	XLPE
25	24.9	23.4	26.6	25.1	28.2	26.8
35	27.3	25.8	29	27.1	30.7	29.2
50	29.3	27.5	31.5	29.2	33.2	31.3
70	33.3	31.8	35.0	33.5	37.5	36.0
95	38.0	35.5	39.7	37.2	42.6	39.7
120	41.5	39.0	43.2	44.1	46.1	43.6
150	45.2	42.9	47.3	44.6	49.8	47.6
185	50.1	44.1	52.2	49.8	55.8	53.8
240	56.9	54.0	58.6	55.7	62.6	59.6
300	63.2	60.0	64.9	61.6	70.4	65.6
400	70.5	67.4	72.6	69.1	77.6	74.6

**Table 16: Rathi** Current Rating (In Ground) for XLPE Insulated 1.1 KV Grade Cable.

Size	Aluminium Conductor				Copper Conductor			
	Single Core		Multi Core		Single Core		Multi Core	
mm <sup>2</sup>	PVC	XLPE	PVC	XLPE	PVC	XLPE	PVC	XLPE
10	51	55	46	50	65	71	60	65
16	66	74	60	68	85	95	77	87
25	86	98	76	90	110	125	99	115
35	100	118	92	108	130	150	120	138
50	120	137	110	126	155	175	145	161
70	140	172	135	158	190	220	175	202
95	175	204	165	187	220	260	210	239
120	195	234	185	215	250	301	240	276
150	220	262	210	240	280	336	270	298
185	240	298	235	273	305	381	300	350
240	270	344	275	316	345	441	345	405
300	295	387	305	355	375	496	385	455
400	325	458	335	420	400	586	425	538

## Advantages of XLPE cable over PVC cable are as under

- XLPE cable has longer life than PVC cables.
- XLPE cable has higher conductor temperature rating i.e. 90°C as against 70°C of PVC.
- XLPE cable has higher short circuit rating (250°C) as against 160°C for PVC).
- XLPE cable has higher emergency overload capacity than PVC cables (upto 60%)
- The moisture resistance of XLPE cables is nearly 100 times than that of PVC cables.
- The insulation resistance of XLPE cable is very high compared to PVC ( as high as 1000 times)
- The corrosion resistance of XLPE cable is very high in polluted atmosphere than PVC cables.
- XLPE cable has better properties of resistance to chemical and corrosive gases.
- XLPE cable has better properties to withstand vibrations and hot impacts.
- XLPE cable has low installation cost because of light weight, dimensions and are more flexible.
- XLPE cable is easier and quicker for jointing purposes.
- XLPE cable is ideal for transmission and distribution of power.

**Table 17: Rathi** Comparison of AC Current rating between XLPE and PVC Aluminium conductors cables.

Nominal CS of conductor mm <sup>2</sup>	3 Single core cables				Multi core cables			
	In ground (Amps)		In Air (Amps)		In ground (Amps)		In Air (Amps)	
	XLPE	PVC	XLPE	PVC	XLPE	PVC	XLPE	PVC
25	99	86	115	84	95	76	99	70
35	117	100	140	105	116	92	117	86
50	138	120	170	130	140	110	140	105
70	168	140	210	155	170	135	176	130
95	204	175	255	190	200	165	221	155
120	230	195	300	220	225	185	258	180
150	265	220	342	250	255	210	294	205
185	295	240	385	290	285	235	339	240
240	340	270	450	335	325	275	402	280
300	390	295	519	380	370	305	461	315
400	450	325	605	435	435	335	542	375

### Continuous Current Rating

The current ratings given in Tables (1 to 14) are based on the following conditions of laying:

Maximum Conductor Temperature	: 70°C for General Purpose PVC insulated cables : 85°C for Heat Resisting PVC insulated cables : 90°C for XLPE insulated cables
Ground temperature	: 30°C
Ambient air temperature	: 40°C
Thermal resistivity of Soil	: 150 (cm degree C)/W.
Depth of laying (For cable laid direct in ground and duct)	: 750 mm
Type of installation	
Twin, Three & Multicore Cable-	: Laid singly
Single core cable	: 3 cables in close Trefoil formation

## RATING FACTORS

In actual practice the condition of installation may be different than those given above. Therefore to determine the continuous current rating under the actual operating conditions, the current rating should be multiplied by the appropriate rating factors as shown in Table below.

Variation in ambient air temperature							
Ambient Temperature (°C)	25	30	35	40	45	50	
Rating Factor	1.25	1.16	1.09	1.00	0.90	0.80	
Variation in ground temperature							
Ground Temperature (°C)	15	20	25	30	35	40	45 50
Rating Factor	1.17	1.12	1.06	1.00	0.94	0.87	0.79 0.71
Variation in depth of laying ground							
Voltage Depth of laying cm	75	90	105	120	150	180 & above	
grade Upto 25mm <sup>2</sup>	1.00	0.99	0.98	0.97	0.96	0.95	
1.1kV Above 25 & upto 300mm <sup>2</sup>	1.00	0.98	0.97	0.96	0.94	0.93	
Above 300mm <sup>2</sup>	1.00	0.97	0.96	0.95	0.92	0.91	

The rating factors for other different variations can be made available to our customers on request.

### Short Circuit Rating

$$I_{sh} = KA/\sqrt{t}$$

Where,

$I_{sh}$  = Short circuit Current in kilo amp s during time t.

A = Cross-sectional area of conductor in sq.mm

T = Duration of short circuit in seconds.

K = Constant.

For PVC insulated cables or Aluminium K= 75.8 and for Copper K = 109.

For XLPE insulated cables for Aluminium K= 94 and for Copper K = 144.

Note: The detailed short circuit ratings are available on request.

**Table 18: ALUMINIUM CONDUCTOR STEEL REINFORCED (A.C.S.R.) Based On I. S. 398**

CONDUCTOR  CODE NAME	ELECTRICAL PROPERTIES										MECHANICAL PROPERTIES						
	Nominal Copper Area Equivalent mm <sup>2</sup>		Calculated Equivalent Area of Aluminium mm <sup>2</sup>	Calculated Resistance at 20°C When Corrected to Standard Weight Ohm/Km	Approx. Current Carrying Capacity Amp.		Stranding & Wire Diameter (mm)			Conductor diameter mm	Conductor Area mm <sup>2</sup>	Approx Weight Kg/Km		Approx Ultimate Strength Kg			
	Area (mm <sup>2</sup> )	S.W.g (Inch <sup>2</sup> )			40°C Amb Temp	45°C Amb Temp	Aluminium No.	Aluminium Dia.	Steel No.			Steel Dia.	Total		Al. St.		
MODE	6.5	0.01	8	10.47	2.718	-	-	6	1.50	1	1.50	4.50	12.37	43	29	14	407
SQUIRREL	13	0.02	8	20.71	1.374	115	107	6	2.11	1	2.11	6.33	24.48	80	53	27	771
GOPHER	16	0.025	7	25.90	1.098	133	123	6	2.36	1	2.36	7.08	30.62	106	72	34	952
WEASEL	20	0.03	6	31.21	0.9116	150	139	6	2.59	1	2.59	7.77	36.88	128	87	41	1136
FERRET	25	0.04	4	41.87	0.6795	181	168	6	3.00	1	3.00	9.00	49.48	171	116	55	1503
RABBIT	30	0.05	3	52.21	0.5449	208	193	6	3.35	1	3.35	10.05	61.71	214	145	69	1860
MINK	40	0.06	2	63.32	0.4565	234	217	6	3.66	1	3.66	10.98	73.65	255	173	82	2207
HORSE	42	-	-	71.58	0.3977	-	-	12	2.79	7	2.79	13.95	87.53	543	205	338	6108
BEAVER	45	0.07	1	74.07	0.3841	261	242	6	3.99	1	3.99	11.97	87.53	304	206	98	2613
RACCOON	48	0.075	-5/0	77.83	0.3656	270	250	6	4.09	1	1.09	12.27	91.97	318	215	103	2746
OTTER	50	0.08	1/0	82.85	0.3434	281	260	6	4.22	1	4.22	12.66	97.91	339	230	109	2923
CAT	55	0.09	1.5/0	94.21	0.302	305	283	6	4.50	1	4.50	13.50	111.30	385	261	124	3324
DOG	65	0.1	2/0	103.60	0.2745	324	300	6	4.72	7	1.57	14.16	118.50	394	288	106	3299
LEOPARD	80	0.125	4/0	129.70	0.2193	375	348	6	5.28	7	1.76	15.48	148.40	493	360	133	4137
COYOTE	80	0.125	4/0	128.50	0.2214	375	348	26	2.54	7	1.90	15.86	151.60	521	365	156	4638
TIGER	80	0.125	4/0	128.10	0.2221	382	354	30	2.36	7	2.36	16.52	131.80	604	363	241	5758
WOLF	95	0.15	5/0	154.30	0.1844	430	398	30	2.59	7	2.59	18.13	195.00	727	436	291	6880

**Table 19: INSULATED A.C.S.R. CONDUCTOR TECHNICAL DETAILS**

Descriptions	Code	Squirrel	Weasel	Rabbit	Dog	Wolf
		Unit	0.02	0.03	0.05	0.1
Dia. of Aluminium Strands	mm	2.11	2.59	3.35	4.72	2.59
Dia. of G.I. Steel	mm	2.11	2.59	3.35	1.57	2.59
Overall Diameter of Conductor	mm	6.33	7.77	10.05	14.15	18.13
Lay Ratio		10 to 14	10 to 14	10 to 14	10 to 14	10 to 14
DC. Resistance at 20° c	Ω/km	1.403	0.9352	0.556	0.281	0.1884
Breaking Load Before Stranding	KN. Min	0.63	0.89	1.43	2.78	0.89
Breaking Load After Stranding	KN. Min	0.6	0.85	1.36	2.64	0.85
Thickness	mm	1	1	1	1	2
OD	mm	8.33	9.77	12.05	16.15	22.13
Resistivity	Ohm*cm	1*10 <sup>14</sup>	1*10 <sup>14</sup>	1*10 <sup>14</sup>	1*10 <sup>14</sup>	1*10 <sup>14</sup>
Weight of conductor	Kg/Km	84	127.7	214	394	726

## **NEED OF AERIAL BUNCHED CABLE (ABC):**

ABC is the advanced insulated conductor, used for overhead lines which reduce the losses in transmission and good transporting electricity to consumer for the reliability for the system.

ABC is insulated with a more heat taking material i.e. (Cross-linked Polyethylene)

### **STANDARDS :**

BS 7870, Part v - 1999

IS 14255 - 1995

IEC 502 - 1994

### **QUALITY OBJECTIVES :**

We manufacture house wiring cables, flexible cables, multi-strand cables, auto cables, ACSR conductor, power cables, XLPE cables, ABC cables etc. These cables are manufacture in " RATHI" and ANNAPURNA" brands, which is NS standard and ISO certified, "RATHI" and "ANNAPURNA" brand is well renowned in Nepal market for its high quality assurance.

### **QUALITY POLICY :**

Motto of Annapurna Cables Industries Pvt. Ltd. is to provide the customer satisfaction through quality service and product confirming to relevant specifications at competitive price to meet or exceed customer requirement, which will be achieved through continuous improvements in quality of work enhancing employee involvement at all levels and by using best available resources.

### **QUALITY CONTROL SYSTEM :**

The system refers to the operational techniques and activities used to fulfill requirements for quality. Our system detects and identifies non-confirming product while providing an after-the fact warning to which consumer react. The quality control is the paramount factor in production management and in this management system, the quality control aspect is not only the responsibility fo technicians and Engineers in the work place, but it is the responsibility of total organization including the top management, middle management and the workers. The Quality control activities conducted in Annapurna Cables Industries Pvt. Ltd. may be outlined in the form of a FLOW-CHART shown below.

**QUALITY ASSURANCE PLAN :** Annapurna Cables Industries Pvt. Ltd. have Quality Assurance Plan (QAP) containing over all quality management & procedures. It emphasis on the quality control during the various phases of the production of goods from selection and procurement of raw materials to manufacture, testing and dispatch to consumer's ware house. It mainly contains in three ways.

- a) In-Coming quality assurance plan.
- b) In-process quality assurance plan.
- c) Final product quality assurance plan.

And there details mentioned in our quality-assurance plan sheet.

### **QUALITY TESTING :**

- The tests shall be conducted on complete cables according to standards including the following tests.

### **CONSTRUCTION TESTS :**

- Verification of diameter of conductor and insulated conductions and thickness of insulation and etc.

### **TESTS ON XLPE :**

- Hot set tests
- Tensile Strength at break
- Elongation at break
- Shrinkage

### **ELECTRICAL TESTS :**

- Spark test @ 3 kv
- High voltage test @ 3 Kv
- Insulation resistance
- Conductor resistance at 20<sup>o</sup> C.

### **MECHANICAL TEST :**

- Breaking load test
- Bending test
- ★ The tests conducted as standards.

**COILING / PACKING:** The cables shall be round on a drum of suitable size and packed accordance with IS: 10418/1982

**Table 20: TECHNICAL DETAILS OF ABC CABLE**

Characteristics	Nominal cross-sectional area of conductor, mm								
	16	25	35	50	70	95	120	150	185
Nominal Area	16	25	35	50	70	95	120	150	185
Numbers of cores	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4
Form of conductors	Stranded compacted circular								
Number of wires in conductor	7	7	7	7	19	19	19	37	37
Diameter of Conductor	1.70	2.14	2.52	3	2.14	2.52	2.85	2.25	2.52
Minimum Thickness	1.5	1.5	1.8	2	2	2.2	2.4	2.6	2.6
Maximum D.C. resistance of conductor @ 20°C /( $\Omega$ /km)	1.91	1.20	0.868	0.641	0.443	0.320	0.253	0.206	0.164
Minimum diameter of core (excluding ribs) Mm	8.12	9.44	11.18	10.11	14.72	17.02	19.07	20.97	22.86
Minimum breaking load of conductor( Before Stranding) (KN)	0.43	0.64	0.85	1.17	0.64	0.85	1.07	0.68	0.85
Minimum breaking load of conductor(After Stranding) (KN)	0.41	0.61	0.81	1.11	0.61	0.81	1.02	0.64	0.81
Insulation Resistance (Ohm*cm)	$1 \times 10^{14}$	$1 \times 10^{14}$	$1 \times 10^{14}$	$1 \times 10^{14}$	$1 \times 10^{14}$	$1 \times 10^{14}$	$1 \times 10^{14}$	$1 \times 10^{14}$	$1 \times 10^{14}$
Bending Test	No Crack	No Crack	No Crack	No Crack	No Crack	No Crack	No Crack	No Crack	No Crack



**ACSR**

**Identification of ABC Core**

For urban areas where short spans apply both neutral supported and fully supported cables have similar mechanical loading performance. Therefore similar strength and length poles can be used for either cable.

**For rural areas where longer spans apply.**

- i. Fully supported cable is the only cable capable of achieving long spans.
- ii. Pole stays are required to enable the fully supported cable to achieve its maximum capacity.
- iii Pole stays may be required for neutral supported cable even though the spans are shorter.
- iv To separate the cores of either cable on very long spans the cables cannot be under the highest tension i.e. install IPC's on non tension side of strain clamp.

# Overhead versus Underground System

The choice between overhead and underground system depends upon a number of widely differing factors.

1. **Public Safety:** The underground system is more safe than overhead system because wiring is placed underground.
2. **Initial Cost:** The initial cost of an underground system is five to ten times more because of trenching, conduits, cables etc. than overhead system.
3. **Flexibility:** The overhead system, poles, wires, transformers can be easily shifted and is more flexible than underground system.
4. **Faults:** The chances of faults in underground system are very rare as the cables are laid underground and are provided with better insulation.
5. **Fault location and Repairs:** In overhead system, the conductors are visible and easily accessible so that fault location and repairs can be easily made.
6. **Appearance:** The appearance of an underground system is better as all the distribution lines are invisible.
7. **Current carrying capacity and voltage drop:** Overhead conductor has considerably higher current carrying capacity than underground cable because of high conductor spacing.
8. **Useful life:** An overhead system may have useful life of 25 years whereas an underground system may have a useful life of more than 50 years.
9. **Maintenance Cost:** The maintenance cost of underground system is very low as compared with that of overhead system because of less chances of faults and service interruptions from wind, lightning, traffic hazards etc.
10. **Interference with communication circuits:** An overhead system causes electromagnetic interference with the telephone lines. However, there is no such interference with the underground system.

## SELECTION OF CABLES

1. Select the system voltage- AC or DC
2. Select the phase- single phase or three phase
3. Select conditions of installation- single core or multicore
4. Select laying condition of cable- Ground (armoured) or air (unarmoured)
5. Select the maximum continuous current expected as per required load.

Example: For 3 Phase AC motor of 50HP with 90% efficiency having P. f. 0.80 with 400 V line voltage, the maximum continuous current will be

$$\begin{aligned}IL &= H.P. \times 746 \\ &= 1.732 \times \text{Line voltage} \times \text{efficiency} \times \text{p.f.} \\ &= 50 \times 746 \\ &= 1.732 \times 400 \times 0.9 \times 0.8 \\ &= 74.77 \gg 75 \text{ A}\end{aligned}$$

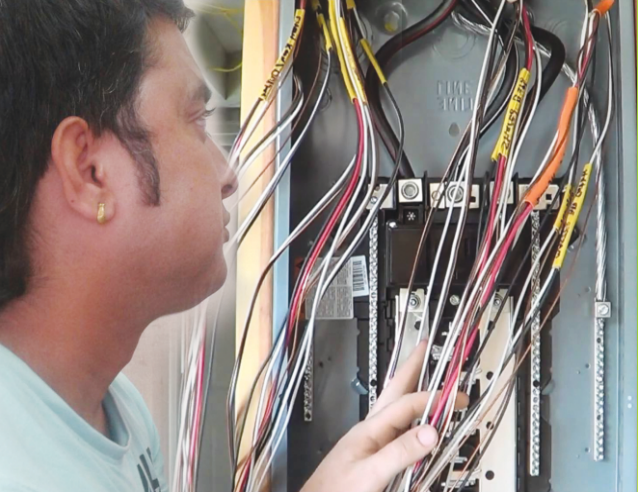
6. Select the conditions of laying and apply relevant correction factor
7. Select the grouping correction factor and correct the current,  $I = IL/C_g$

Example: If two cable sets of two 3-phase circuit is grouped together, laid direct in ground, single layer and touching,  $I = 75/0.79 = 94.93 \gg 95 \text{ A}$

8. Find the nearest higher current carrying capacity of relevant conductor cross sectional area from given table 1-14 and select the corresponding cable of your requirement.

Example. Current carrying capacity 95 A is shown in table for 25 sqmm x 3.5 core armoured copper PVC insulated cable armoured cable.

9. Calculate the voltage drop across the selected cable for the length of installation. If the voltage drop is less than 2.5% then the selected cable is suitable for the installation, otherwise select the next higher cross sectional area of the conductor.
10. Besides above factors, standardisation of cable sizes, minimum running cost, future expansion, standardisation of accessories, etc should be considered especially for large distribution systems.



# **RATHI** cable

## 1.1 KV LT XLPE CABLES



ISO 9001-2015  
CERTIFIED COMPANY



हाम्रो वाहना, तपाईंको सुरक्षा: अन्नपूर्णा केबुल

तार .....



जसमा आगो लाग्दैन

Double Coated  
**RATHI** GOLD  
FRLS CABLES



- 100% Copper
- 100% Bunching (बटाई गरिएको)
- सुरक्षित र उच्च प्रतिरोधात्मक
- मुसाले पनि नकाट्ने

