

## Pvc Cables

PRODUCT CODE (ASICC)	77471
QUALITY AND STANDARDS	IS 694
PRODUCTION CAPACITY	Quantity: 36000 Coils of 100 meter each (per annum) Value : Rs. 72,000,00
YEAR OF PREPARATION	2002 _ 2003
PREPARED BY	Small Industries Service Institute Takyelpat Industrial Estate Imphal-795001 and Office of the Development Commissioner Small Scale Industries Electrical and Electronics Division 7th Floor, Nirman Bhavan, New Delhi-110011.

### Introduction

Low voltage copper conductor PVC cables are extensively used for domestic home appliances wiring, house wiring and internal wiring for lighting circuits in factories, power supply for office automation, in control, instrumentation, submarine, mining, ship wiring applications etc. due to its high tensile strength, superior conductivity, better flexibility and ease of jointing.

### Market Potential

Demand of domestic electric cable is bound to increase firstly, due to ambitious programme for electrification and house building secondly, due to renovation job as old cable has to be removed to avoid any short circuit due to ageing with new advanced cable of high conductivity in given size with perfect insulation against any electric fault.

Not with standing the bulk of the demand is met by large scale unit or multinationals manufacturing these product but due to cheaper rate of production by small scale unit there is always scope for small scale unit.

### Basis and Presumptions

- i) The basis for calculation of production capacity has been taken on single shift basis on 75% efficiency.
- ii) The maximum capacity utilization on single shift basis for 300 days a year. During first year and second year of operations the capacity utilization is 60% and 80% respectively. The unit is expected to achieve full capacity utilization from the third year onwards.

iii) The salaries and wages, cost of raw materials, utilities, rents, etc. are based on the prevailing rates in and around Imphal. These cost factors are likely to vary with time and location.

iv) Interest on term loan and working capital loan has been taken at the rate of 18% on an average. This rate may vary depending upon the policy of the financial institutions/agencies from time to time.

v) The cost of machinery and equipments refer to a particular make / model and prices are approximate.

vi) The break-even point percentage indicated is of full capacity utilization.

vii) The project preparation cost etc. whenever required could be considered under pre-operative expenses.

viii) The essential production machinery and test equipment required for the project have been indicated. The unit may also utilize common test facilities available at Electronics Test and Development Centres (ETDCs) and Electronic Regional Test Laboratories (ERTLs) and Regional Testing Centres (RTCs).

### **Implementation Schedule**

The major activities in the implementation of the project has been listed and the average time for implementation of the project is estimated at 12 months:

<b><i>Sl. Activity No.</i></b>	<b><i>Period (In Months)</i></b>
1. Preparation of project report	1
2. Registration and other formalities	1
3. Sanction of loan by financial institutions	3
4. Plant and Machinery :	
a) Placement of orders	1
b) Procurement	2
c) Power connection/ Electrification	2
d) Installation/Erection of machinery/Test Equipment	2
5. Procurement of raw materials	2
6. Recruitment of Technical Personnel etc.	2
7. Trial production	11
8. Commercial production	12

### Notes

1. Many of the above activities shall be initiated concurrently.
2. Procurement of raw materials commences from the 8th month onwards.
3. When imported plant and machinery are required, the implementation period of project may vary from 12 months to 15 months.

### Technical Aspects

#### Process of Manufacture

Copper conductor (wire) of the required size is fed into the Extruder where in PVC is coated on the wire to the specified thickness. The extruded wire after passing through the cooling tank is coiled on the take off system. The wire is coiled into the length of 100 meters and tested as per IS specification.

Insulation is strictly as per National and International specification. PVC cables are available as Thermoplastic dielectric. PVC cables use PVC compound that takes care of overload and short circuit currents with both coarse and fine protection systems.

*Laying up:* Cores are tested on line during production both for physical and electric characteristic. For multi core cables, cores are laid up on latest laying machine, equipped with sector correction equipments.

*Insulation:* Laid up cables are provided with insulation of high quality PVC polymer which is softer than outer sheath and are compatible with temperature rating of the cables.

*Outer sheath:* Cables are provided with PVC/polymer outer sheath with various characteristics of sheathing compounds.

General purpose sheathing compound	ST1
High Temp. Resistant Compound (HR)	ST2
Fire Retardant Low Smoke Compound (FRLS)	ICE 754 Part I ICE 332 Part I and III ICE 383 ASTM - 2843 ASTM - 2863

#### Advantages of PVC Cables

1. Compacted conductors to reduce AC losses which are due to skin and proximity effect.

2. Installation to bear thermal and thermo-mechanical stresses at continuous normal and short circuit temperature condition.
3. Complete protection against most forms of electrolytic and chemical corrosion.
4. A non-hygroscopic insulation almost unaffected by moisture.
5. Non-migration of compound permitting vertical installation.
6. A tough and resilient sheath with excellent fire retarding qualities.
7. Good ageing characteristics
8. Not affected by vibration.
9. Reduce internal stress and low dielectric loss.
10. Higher current and short circuit current rating.

#### *Tests*

Cables are manufactured and undergo the following Tests:

1. Conductor resistant test
2. Thickness of thermoplastic and elastomeric insulation and sheath
3. Tensile strength and elongation at break of thermoplastic and elastomeric insulation and sheath.
4. Thermal ageing in air.
5. Shrinkage Test.
6. Ozone resistant Test
7. Heat shock Test.
8. Hot deformation Test.
9. Bleeding and Bromming Test.
10. Cold impact Test.
11. Water absorption test (electrical)
12. Environmental stress cracking test

### Cable Range at a Glance

<b>Application</b> Flexible and cord cables for appliances, Machine Tools and Equipment Wiring	<b>Type/Size</b> Annealed electrolytic copper conductor, PVC insulated and sheathed upto 1100V as per IS 694 Size: Single, Two, Three or Four core upto 6 sq. mm	<b>Options</b> Insulation - PVC/HR PVC/FRLS PVC/Zero Halogen Unsheathed Sheathed -PVC/HR PVC/FRLS PVC/Zero Halogen
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Technical Specification for Multicore round PVC Insulated Copper Conductor and Sheathed Cables in Voltage Grade upto and Including 1100 V

Nominal Cross Sectional area of conductor mm <sup>2</sup>	No./ Nom. Dia. Of Wire	Thick- ness of Insu- lation	Nominal Thickness of Sheath			Approx. Overall Dimension			Cur- rent Rating AC	Voltage DC 1 ph mV	Drop 3 ph AC mV	Resis- tance Max Per Km @ 20°C
			Two Core mm	Three Core mm	Four Core mm	Two Core mm	Three Core mm	Four Core mm				
0.5	16/0.20	0.6	0.9	0.9	0.9	6.2	6.6	7.2	4	83	72	39.0
0.75	24/0.20	0.6	0.9	0.9	0.9	6.5	6.9	7.6	7	56	48	26.0
1.0	14/0.30	0.6	0.9	0.9	0.9	6.9	7.3	8.2	11	43	37	19.5
1.5	22/0.30	0.6	0.9	0.9	1.0	7.6	8.2	9.3	15	31	26	13.3
2.5	36/0.30	0.7	1.0	1.0	1.0	9.0	9.3	10.5	20	18	16	7.98
4.0	56/0.30	0.8	1.0	1.0	1.0	10.3	10.9	12.3	26	11	9.6	4.95



### Application Type/Size Options

Heavy Duty Domestic Wires for House Wiring, Power supply and distribution for houses and other construction needs	Single core with three/seven strands PVC insulated copper conductor as per BS2004 :1961 Size: 1/18, 3/22, 3/20, 7/22, 7/20, 7/1 87/16, SWG upto 37/14-LP	Conductor: plain annealed/stranded Insulation: PVC/HR PVC/FR PVC/FRLS PVC/zero Halogen Colour: Red/ Yellow/Blue/Green/Grey
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Technical Specification for Single Core PVC Insulated Copper Conductor (unsheathed) Heavy duty Domestic Wires in Voltage Grade upto and Including 1100V.

No. of Wires/SWG	No./Diameter of Wires mm	Standard Resistance	Radial Thickness at 20°C ohm/km	Overall Diameter of Insulation	Current Carrying Capacity Amps. mm mm (appx.)
1/18	1/1.12	17.58	1.14	3.5	5
3/22	3/0.74	13.76	1.14	4.0	10
3/20	3/0.91	8.927	1.14	4.4	15
7/22	7/0.74	5.879	1.14	4.6	20
7/20	7/0.91	3.815	1.30	5.4	28
7/18	7/1.12	2.555	1.30	6.0	36
7/16	7/1.62	1.207	1.30	7.5	53

### Production Capacity (per annum)

Machinery and equipments provided in the scheme can be utilized for the manufacture of wire types and signs as mentioned above. However, the commonly used wires for domestic purposes and the light wiring is 1.5 sq. mm. The production targets have been planned on the basis of 1.5 Sq. mm. Annual capacity - 3,60,00 coils of 100 meters length in carton packaging, Value: Rs 72,00,000

### Quality Control and Standard

IS 694.

Motive Power 25 kW.

### Pollution Control

The Government accords utmost importance to control environmental pollution. The small-scale entrepreneurs should have an environmental friendly attitude and adopt pollution control measures by process modification and technology substitution.

India having acceded to the Montreal Protocol in September 1992, the production and use of Ozone Depleting Substances (ODS) like Chlorofluore Carbon (CFCs), Carbon Tetrachloride, Halons and methyl Chloroform etc. need to be phased out immediately with alternative chemicals/solvents. A notification for detailed Rules to regulate ODS phase out under the Environment Protection Act, 1986 have been put in place with effect from 19th July 2000.

### **Energy Conservation**

With the growing energy needs and shortage coupled with rising energy cost, a greater thrust in energy efficiency in industrial sector has been given by the Government of India since 1980s. The Energy Conservation Act, 2001 has been enacted on 18th August 2001, which provides for efficient use of energy, its conservation and capacity building of Bureau of Energy Efficiency created under the Act.

The following steps may help for conservation of electrical energy:

- i) Adoption of energy conserving technologies, production aids and testing facilities.
- ii) Efficient management of process/manufacturing machineries and systems, QC and testing equipments for yielding maximum Energy Conservation.
- iii) Optimum use of electrical energy for heating during soldering process can be obtained by using efficient temperature controlled soldering and de-soldering stations.
- iv) Periodical maintenance of motors, compressors etc.
- v) Use of power factor correction capacitors. Proper selection and layout of lighting system; timely switching on-off of the lights; use of compact fluorescent lamps wherever possible etc.

### **Financial Aspects**

#### **A. Fixed Capital**

##### **(i) Land and Building (per month)**

500 Sq. Meters

Rented @ Rs. 20 Sq. Meter

**(Rs.)**

10,000

##### **(ii) Machinery and Equipments**

###### *(a) Production Units*

<b>Sl. Description No.</b>	<b>Qty.</b>	<b>Value (Rs.)</b>
1. Laying machines, equipment with sector correction equipments	1	35,000
2. PVC Extruder and wire coating Machine 65 mm complete with cooling through supply stand	1	5,00,000



take up unit control panel with Automatic temperature indication controller		
3. Wire straightening Equipment	1	10,000
4. Cable printing machines	1	10,000
5. Coil rewinding and length measuring machine	1	25,000
6. Extrusion dies and nozzles etc.	LS	20,000
<b>Total</b>		<b>6,00,000</b>

*(b) Testing Equipments*

<b>Sl. No.</b>	<b>Description</b>	<b>Qty.</b>	<b>Value (Rs.)</b>
1.	Continuous spark tester 0-11 kv	1	15,000
2.	Micrometer 0.25 mm LC 01	1	4,000
3.	Travelling Microscope LC 0.001 Magnification 10 X	1	5,000
4.	Chemical Balance 0-200 gms, Least measure 0.1 Mg.	1	2,000
5.	Double Kelvin Bridge upto 5 Ohm least count $1 \times 10^{-6}$	1	10,000
6.	Tensile testing machine Cap. Range 50-100-500 kg	1	35,000
7.	Electrically heated thermostatically controlled Air Cooled Oven, Size 450 x 450 mm <sup>2</sup> Temperature range upto $200 \pm 1^{\circ}\text{C}$	1	15,000
8.	Ageing oven fitted with vertical tubes	1	5,000
9.	Pressure Test Apparatus	1	1,000
10.	Stamping Dies	1	1,000
11.	High Voltage Test set AC 0-10 kV	1	10,000
12.	Insulation Resistance Tester 500V DC	1	2,500
13.	Hot water bath Temp. $80^{\circ}\text{C} + 2^{\circ}\text{C}$	1	7,500
14.	High Voltage Test Set DC 0-2 kV	1	4,000
15.	Fire Resistance Test Apparatus, complete	1	4,000

with Burner, enclosure  
and stand

16. Mandril for bleading and Blooming Test	1	750
17. Stop watch with stop and reset	1	250
18. Multimeter	1	3,000
<b>Total</b>		<b>1,25,000</b>

**C. Electrification and Installations**

(1) Cost of power conection		10,000
(2) Electrification and Installation charges @ 10 per cent of cost of machines and equipments		72,500
(3) Cost of office equipments etc.		50,000
<b>(iii) Pre-operative expenses</b>		<b>20,000</b>
<b>Total Fixed Capital</b>		<b>8,77,500</b>

**B. Working Capital**

**(i) Personnel**

**Salaries and Wages (per month)**

<b>Sl. Designation No.</b>	<b>No.</b>	<b>Salary (Rs.)</b>	<b>Total (Rs.)</b>
<i>(a) Administrative and Supervisory</i>			
Work Manager cum Engineer	1	6,000	6,000
Account Officer	1	4,000	4,000
Clerk/Typist	1	2,000	2,000
peon cum chowkidar	1	1,500	1,500
<i>(b) Skilled/un-Skilled</i>			
Supervisor	1	4,000	4,000
Skilled Worker	2	2,000	4,000
un-skilled Worker	4	1,500	6,000
Total (Salaries)			27,500
<i>Perquisites @ 15% of salaries</i>			4,125
<b>Total</b>			<b>31,625</b>
<b>Say</b>			<b>32,000</b>

**(ii) Raw Material Including Packaging Requirements (per month)**

<b>Sl. Particulars No.</b>	<b>Qty</b>	<b>Rates (Rs.)</b>	<b>Value (Rs.)</b>
1. Tinned copper wire	2MT	75,000/MT	1,50,000
2. PVC compound (cable grade)	3.5MT	50,000/MT	1,75,000
3. Polymer outer sheath	1MT	25,000/mt	25,000

compounds			
4. Packing materials (polythene film)	3,000	2/coil	6,000
5. Packing Box	3,000	2/box	6,000
<b>Total</b>			<b>3,62,000</b>
<b>(iii) Utilities (per month)</b>			<b>(Rs.)</b>
Power 4,000 Units @ Rs. 2.25/unit			9,000
Water			1,000
<b>Total</b>			<b>10,000</b>
<b>(iv) Other Contingent Expenses (per month)</b>			<b>(Rs.)</b>
1. Rent			10,000
2. Postage and Stationery			2,000
3. Telephone			3,000
4. Consumable store			5,000
5. Repair and maintenance			5,000
6. Transportation charges			10,000
7. Advertisement and Publicity charges			10,000
8. Sales Expenses			5,000
<b>Total</b>			<b>50,000</b>
<b>(v) Total Recurring Expenditure (per month)</b>			<b>4,54,000</b>
<b>(vi) Total Working Capital (for 3 Months)</b>			<b>13,62,000</b>
<b>C. Total Capital Investment</b>			
(i) Fixed Capital			8,77,500
(ii) Working Capital (for 3 Months Basis)			13,62,000
<b>Total</b>			<b>22,39,500</b>
<b>Machinery Utilization</b>			
Utilization of major machines is expected to be 80%.			
<b>Financial Analysis</b>			
<b>(1) Cost of Production (per year)</b>			
Total recurring cost			54,48,000
Depreciation on machinery and equipment @ 10%			72,000
Depreciation on office equipment @ 20%			10,000
Intrest on total investment @ 18%			4,03,110
<b>Total</b>			<b>59,33,110</b>

**(2) Turnover (per year) (Rs.)**

Production of 36,000 coils of 100

meter each @ Rs. 200 per coil

Turnover  $36,000 \times 200 = \text{Rs. } 72,000,00$

**(3) Net Profit (per year)**

= Rs. 72,00,000- 59,33,110

= **Rs. 12,66,890**

**(4) Net Profit Ratio**

$$= \frac{\text{Net Profit per year} \times 100}{\text{Turnover (per year)}}$$

$$= \frac{12,66,890 \times 100}{72,00,000}$$

$$= \mathbf{17.59\%}$$

**(5) Rate of Return**

$$= \frac{\text{Net Profit per year} \times 100}{\text{Total investment}}$$

$$= \frac{12,66,890 \times 100}{22,39,500}$$

$$= \mathbf{56.57\%}$$

**(6) Break-even Point**

**(i) Fixed Cost**

	<b>(Rs.)</b>
a) Total depreciation	82,500
b) Rent	1,20,000
c) Interest	4,03,110
d) 40% of salary and wages	1,53,600
e) 40% of other contingent expenses (excluding rent)	1,92,000
<b>Total</b>	<b>9,51,210</b>

**(ii) Net Profit (per year)**

$$\mathbf{B.E.P.} = \frac{\text{Fixed Cost} \times 100}{\text{Fixed Cost} + \text{Profit}}$$

$$= \frac{951210 \times 100}{951210 + 12,66,890}$$

$$= \mathbf{42.88\%}$$

**Additional Information**

a. The Project Profile may be modified/tailored to suit the individual entrepreneurship qualities/capacity, production programme and also to suit the locational characteristics, wherever applicable.

b. The Electrical Technology is undergoing rapid strides of change and there is need for regular monitoring of the national and international technology scenario. The unit may, therefore, keep abreast with the new technologies in order to keep them in pace with the developments for global competition.

c. Quality today is not only confined to the product or service alone. It also extends to the process and environment in which they are generated. The ISO 9000 defines standards for Quality Management Systems and ISO 14001 defines standards for Environmental

Management System for acceptability at international level. The unit may therefore adopt these standards for global competition.

d. The margin money recommended is 25% of the working capital requirement at an average. However, the percentage of margin money may vary as per bank's discretion.

### **Addresses of Machinery and Equipment Suppliers**

1. M/s. Dhiman Engineering Works  
2535, Prem Narain Street, Churi Walan, Delhi-110006.

2. M/s. N S I C Limited  
(Marketing Divn.), Industrial Estate, New Delhi-110021.

3. M/s. International Plastic Engineers  
M-10, Street No. I, Indl. Estate, New Rohtak Road, New Delhi-110005.

4. M/s. Golden Engineering Industries  
8797, Shidipura Crossing, Rani Jhansi Road,  
New Delhi-110005.

5. M/s. Boolani Engineering Corpn.  
Prabha Devi Indl. Estate, 402, Veer Savarkar Marg,  
Mumbai-400025.

6. M/s. Kolsite Industries  
31, Shah Industrial Estate, Off. Veer Desai Road,  
Andheri West, P .O. Box No. 7368,  
Mumbai-58.

7. M/s. Brimco Plastic machinery Co. Ltd.  
Plot 55, Govt. Indl. Estate, Mumbai.

8. M/s. Rectifiers and Electronics  
WH-49, Mayapuri Indl. Area, Phase-I, New Delhi.

9. M/s. Automatic Electric Co. Ltd.  
Rectifier House, 570, Naigam Cross Road,  
Box\_7103, Mumbai-400013.

10. M/s. Zaran Trading Agency  
Box\_6657, Bandra, Mumbai-50,

11. M/s. BPL India Ltd.  
304, Ashok Bhawan, Nehru Place,  
New Delhi-110024.

12. M/s. Toshniwal Bros. Pvt. Ltd.  
M.G. Road, Ajmer.

13. M/s. Blue State Ltd.  
Bhandari House, 91, Nehru Place,  
New Delhi.

14. M/s. Oriental Scientific Apparatus Workshop  
Jawahar Lal Nehru Marg, Ambala Cantt. - 133001.

15. M/s. Precision Scientific Equipments Works  
26, Patel Road, S. P. Nagar,  
New Delhi-110002.

**Addresses of Raw Material Suppliers**

1. M/s. National Organic Chemical Industries Ltd.  
Bank of Baroda Building, Parliament Street, New Delhi.

2. M/s. Shriram Chemical Industries Ltd.  
Shriram Nagar, Kota.

3. M/s. Calico Plastics Ltd.  
Anil Chambers, Mumbai.

4. M/s. Indian Aluminium Co. Ltd.  
United Commercial Bank Bldg.,  
Parliament Street, New Delhi.