

Electrical Thumb Rules

Written by Administrator

Wednesday, 20 August 2014 13:31 - Last Updated Wednesday, 20 August 2014 13:46

Size of Cable on Secondary Side of Transformer (11KV/433V)

Ref: KSEI Handbook

| Rating of T/O (KVA) | Primary current (Amp) | Secondary Current (Amp) | Min. Size of Neutral (mm ²) | Min. Earthing Size of Cable (mm ²) |
|---------------------|-----------------------|-------------------------|---|--|
| 63 | 3.3 | 84 | 25X3 | 50mm ² |
| 100 | 5.25 | 133.3 | 25X3 | 95mm ² or (2×50 mm ²) |
| 160 | 8.4 | 213.3 | 25X3 | 185mm ² or (2×95 mm ²) |
| 200 | 10.49 | 266.6 | 25X3 | 300mm ² or (2×120 mm ²) |
| 250 | 13.12 | 333 | 25X3 | 2×185 mm ² |
| 315 | 16.53 | 420 | 31X3 or 25X4 | (2×300 mm ²) or (3×185 mm ²) |
| 400 | 21.80 | 533 | 38X3 | (3×300 mm ²) or (2×400 mm ²) |
| 500 | 26.20 | 666.5 | 25X6 | (3×400 mm ²) or (4×240 mm ²) |
| 630 | 33 | 840 | 31X6 | 4×400 mm ² |
| 750 | 39.36 | 1000 | 50X4 | Bus Bar Trucking (min. Isc 50KA) |
| 1000 | 52.50 | 1333 | 210mm ² | Bus Bar Trucking (min. Isc 50KA) |
| 1250 | 65.50 | 1667 | 290mm ² | Bus Bar Trucking (min. Isc 50KA) |
| 1600 | 83.98 | 2133 | 380mm ² | Bus Bar Trucking (min. Isc 50KA) |
| 2000 | 105.00 | 2666 | 450mm ² | Bus Bar Trucking (min. Isc 50KA) |

HT Fuse on Primary Side of Transformer (11KV/433V)

Rating of T/O (KVA) Primary current (Amp) Secondary Current (Amp) HT Fuse (Amp)

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| Min (Amp) | | Max(Amp) | | |
|------------------|--------|-----------------|-----|-----|
| 63 | 3.3 | 84 | 10 | 16 |
| 100 | 5.25 | 133.3 | 16 | 25 |
| 160 | 8.4 | 213.3 | 16 | 40 |
| 200 | 10.49 | 266.6 | 25 | 40 |
| 250 | 13.12 | 333 | 32 | 40 |
| 315 | 16.53 | 420 | 40 | 63 |
| 400 | 21.80 | 533 | 40 | 63 |
| 500 | 26.20 | 666.5 | 50 | 100 |
| 630 | 33 | 840 | 63 | 100 |
| 750 | 39.36 | 1000 | 75 | 160 |
| 1000 | 52.50 | 1333 | 100 | 160 |
| 1250 | 65.50 | 1667 | 100 | 200 |
| 1600 | 83.98 | 2133 | 160 | 250 |
| 2000 | 105.00 | 2666 | 200 | 250 |

Capacitor Bank for Power Supply Voltage

| System Voltage | Minimum rating of capacitor bank |
|-----------------------|---|
| 3.3 KV , 6.6KV | 75 Kvar |
| 11 KV | 200 Kvar |
| 22 KV | 400 Kvar |
| 33 KV | 600 Kvar |

Capacities of PVC conduits

| Nominal conductor Size mm | 16 mm | 20 mm | 25 mm | 32 mm |
|----------------------------------|--------------|--------------|--------------|--------------|
|----------------------------------|--------------|--------------|--------------|--------------|

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Number of Cables (maximum)

| | | | | |
|-----|---|---|----|----|
| 1.0 | 6 | 5 | 19 | 30 |
| 1.5 | 5 | 4 | 15 | 24 |
| 2.5 | 3 | 3 | 11 | 17 |
| 4 | 2 | 2 | 8 | 13 |
| 6 | 2 | - | 6 | 10 |
| 10 | - | - | 4 | 6 |
| 16 | - | - | 3 | 4 |
| 25 | - | - | 2 | 3 |
| 35 | - | - | - | 2 |

System Highest and Lower Voltage

Ref: NEC(India) :2011

| System Voltage | Highest Voltage | Lowest Voltage |
|----------------|-----------------|----------------|
| 240 V | 264 V | 216 V |
| 415 V | 457 V | 374 V |
| 3.3 kV | 3.6 kV | 3.0 kV |
| 6.6 kV | 7.2 kV | 6.0 kV |
| 11 kV | 12 kV | 10 kV |
| 22 kV | 24 kV | 20 kV |
| 33 kV | 36 kV | 30 kV |
| 66 kV | 72.5 kV | 60 kV |
| 66 kV | 72.5 kV | 60 kV |
| 132 kV | 145 kV | 120 kV |
| 220 | kV 245 kV | 200 kV |
| 400 kV | 420 kV | 380 kV |

Number of Points for Dwelling Unit

Ref: NEC(India) :2011

| No. | Description | Area for the Main Dwelling Unit (m2) | | | |
|-----|-------------|--------------------------------------|--------|--------|--------|
| | | 35 mm2 | 45 mm2 | 55 mm2 | 85 mm2 |

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| | | | | | | |
|---|--------------------|------|------|-------|-------|-------|
| 1 | Light points | 7 No | 8 No | 10 No | 12 No | 17 No |
| 2 | Ceiling fans Pont | 2 No | 3 No | 4 No | 5 No | 7 No |
| 3 | Ceiling fans No's | 2 No | 2 No | 3 No | 4 No | 5 No |
| 4 | 6A Socket outlets | 2 No | 3 No | 4No | 5 No | 7 No |
| 5 | 16A Socket outlets | - | 1 No | 2 No | 3 No | 4No |
| 6 | Call-bell (buzzer) | - | - | 1 No | 1 No | 1 No |

Recommended Schedule of Socket-Outlets

Ref: NEC(India) :2011

| Description | Number of Socket | |
|---------------------|------------------|------------|
| | 6A Socket | 16A Socket |
| Bedroom | 2 | 1 |
| Living room | 2 | 2 |
| Kitchen | 1 | 2 |
| Dining room | 2 | 1 |
| Garage | 1 | 1 |
| For refrigerator | - | 1 |
| For air-conditioner | - | 1 for each |
| Verandah | 1 per 10mter2 | 1 |
| Bathroom | 1 | 1 |

Power requirements of the building

Ref: NEC(India) :2011

| Part of Electrical Installation | Part of the Total Power Requirement | Power Factor | % |
|---|-------------------------------------|--------------|---|
| Ventilation, heating (air-conditioning) | 45% | 1.0 | |
| Power plant (drives) | 52% | 0.65 | |
| Lighting | 30% | 0.95 | |
| Lifts | 20% | 1.0 | |
| Kitchen | 10% | 0.6 | |
| Laundry | 5% | 0.6 | |

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Lift Car Speed

Ref: NEC(India) :2011

| Occupancy | No. of Floors Served | Car Speed m/s |
|--|----------------------|---------------------|
| Office building | 4 to 5 | 0.5 to 0.75 m/sec |
| Office building | 6 to 12 | 0.75 to 1.5 m/sec |
| Shops and departmental stores | 13 to 20 | More than 1.5 m/sec |
| Passenger lifts for low and medium lodging houses | | 0.5 m/sec |
| Hotels | 4 to 5 | 0.5 to 0.75 m/sec |
| Normal load carrying lifts | - | 2.0 to 2.5 m/sec |
| Hospital passenger Lift | 4 to 5 | 0.5 to 0.75 m/sec |
| Hospital passenger Lift | 13 to 20 | More than 1.5 m/sec |
| Hospital bed lifts (Short travel lifts insmall hospitals) | | 0.25 m/sec |
| Hospital bed lifts (Normal) | - | 0.5 m/sec |
| Hospital bed lifts (Long travel lifts inGeneral hospitals) | | 1.5 m/sec |

Capacitor Ratings at Rated Voltage

Ref: NEC(India) :2011

| Motor Rating (Kw) | Capacitor Rating in kVAR for Motor | | | | Speed | |
|-------------------|------------------------------------|------------|--------------|------------|------------|------------|
| | 3 000rev/min | 500rev/min | 1 000rev/min | 750rev/min | 600rev/min | 500rev/min |
| 2.25 | 1 | 1 | 1.5 | 2 | 2.5 | 2.5 |
| 3.7 | 2 | 2 | 2.5 | 3.5 | 4 | 4 |
| 5.7 | 2 | 3 | 3.5 | 4.5 | 5 | 5.5 |
| 7.5 | 3 | 4 | 4.5 | 5.5 | 6 | 6.5 |
| 11.2 | 4 | 5 | 6 | 7.5 | 8.5 | 9 |
| 15 | 5 | 6 | 7 | 9 | 11 | 12 |
| 18.7 | 6 | 7 | 9 | 10.5 | 13 | 14.5 |
| 22.5 | 7 | 8 | 10 | 12 | 15 | 17 |
| 37 | 11 | 12.5 | 16 | 18 | 23 | 25 |
| 57 | 16 | 17 | 21 | 23 | 29 | 32 |
| 75 | 21 | 23 | 26 | 28 | 35 | 40 |
| 102 | 31 | 33 | 36 | 38 | 45 | 55 |

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| | | | | | | |
|-----|----|----|----|----|----|----|
| 150 | 40 | 42 | 45 | 47 | 60 | 67 |
| 187 | 46 | 50 | 53 | 55 | 68 | 76 |

:Maximum Current Demand for Motor:

Ref: NEC(India) :2011

| Nature of supply | Size of installation | Maximum current demand |
|---|----------------------|--|
| Single phase or Three phase including 0.75 kW | | Six times the full load current |
| Above 0.75 kW and up to 7.5 kW | | Three times the full load current |
| Above 7.5 kW up to and up to 11 kW | | Two times the full load current |
| Above 11 kW | | One and half times the full load current |

Rated Basic Insulation Level (BIL)

Ref: NEC(India) :2011

| Nominal System Voltage (kV) | Rated BIL (kVp) |
|-----------------------------|-----------------|
| 33 KV | 170 |
| 22 KV | 125 |
| 11 KV | 75 |
| 6.6 KV | 60 |
| 3.3 KV | 40 |

Illumination Level

Ref: NEC(India) :2011

| Location | Illumination Level (Lux) |
|---------------------------------|--------------------------|
| Residence | |
| Entrance / Hallways | 100 |
| Living room | 300 |
| Dining Room | 150 |
| Bed Room (General) | 300 |
| Bed Room (Dressing , Bed Heads) | 200 |
| Kitchen | 200 |
| Kitchen sink | 300 |
| Bathroom | 100 |
| Sewing | 700 |
| Workshop | 200 |
| Staircase | 100 |

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| | |
|-------------------------------------|------------|
| Garage | 70 |
| Study Room | 300 |
| Office Building | |
| Entrance hall / Reception | 150 |
| Conference Room / Executive Office | 300 |
| General Office Space | 300 |
| Business Machinery Operation | 450 |
| Drawing Office | 450 |
| Corridors | 70 |
| Stairs | 100 |
| Lift landing | 150 |
| Hospital Building | |
| Reception & Waiting | 150 |
| General ward | 100 |
| Bed Side | 150 |
| Toilet | 70 |
| Stairs | 100 |
| Operation Theatre (General) | 300 |
| Operation Theatre (Operation Table) | Special |
| Laboratories | 300 |
| Radiology | 100 |
| Causality | 150 |
| Dispensaries | 300 |
| Laundry | 200 |
| Dry Cleaning | 200 |
| Ironing | 300 |
| General Office | 450 |
| Kitchen | 200 |
| Assembly & Concert Halls | |
| Foyers | 100 to 150 |
| Auditoria | 100 to 150 |
| Platform | 450 |
| Corridors | 70 |
| Stairs | 100 |
| Cinema Halls | |
| Foyers | 150 |
| Auditoria | 50 |
| Corridors | 70 |
| Stairs | 100 |
| Theatres | |
| Foyers | 150 |
| Auditoria | 70 |
| Corridors | 70 |
| Stairs | 100 |
| School / College Building | |
| Assembly Halls | |

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| | |
|--------------------|------------|
| General | 150 |
| Examination center | 300 |
| Platform | 300 |
| Classes | |
| Desktop | 300 |
| Blackboard | 200 to 300 |
| Libraries | |
| Shelves | 70 to 150 |
| Reading Room | 150 to 300 |
| Reading Table | 300 to 700 |
| Cataloguing | 150 to 300 |
| General | |
| Office | 300 |
| Staff Room | 150 |
| Corridors | 70 |
| Stairs | 100 |

Lamp's Lumen Data

| Rating (Watt) | Life (Hours) | Initial Lumens |
|---------------------------------|--------------|----------------|
| Incandescent Lamp | | |
| 60 | 1000 | 870 |
| 100 | 750 | 1750 |
| 150 | 2000 | 1740 |
| 200 | 2000 | 2300 |
| 500 | 2000 | 6500 |
| Fluorescent Lamp | | |
| 18 | 7000 | 1120 |
| 20 | 7000 | 1020 |
| 36 | 7000 | 2800 |
| 40 | 7000 | 2700 |
| 2X40 | 7000 | 4000 |
| Compact Fluorescent Lamp | | |
| 5 | 10000 | 220 |
| 7 | 7000 | 380 |
| 11 | 7000 | 560 |
| 13 | 7000 | 680 |
| 15 | 7000 | 810 |
| 18 | 7000 | 1050 |
| 23 | 7000 | 1500 |
| 26 | 7000 | 1800 |
| 32 | 7000 | 2400 |
| Mercury Vapour Lamp | | |
| 100 | 18000 | 3700 |

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| | | |
|--|-------|--------|
| 175 | 24000 | 8600 |
| 250 | 24000 | 12100 |
| 400 | 24000 | 22500 |
| 1000 | 24000 | 57000 |
| Metal Halide Lamp | | |
| 50 | 15000 | 3400 |
| 70 | 15000 | 5600 |
| 100 | 15000 | 9000 |
| 150 | 10000 | 13500 |
| 175 | 10000 | 15000 |
| 250 | 10000 | 20500 |
| 400 | 20000 | 36000 |
| 1000 | 12000 | 110000 |
| High Pressure Sodium Vapour Lamps | | |
| 35 | 16000 | 2250 |
| 50 | 24000 | 4000 |
| 70 | 24000 | 5800 |
| 100 | 24000 | 9500 |
| 150 | 24000 | 16000 |
| 250 | 24000 | 27500 |
| 400 | 24000 | 47500 |
| 1000 | 24000 | 140000 |
| Pulse Start Metal Halide Lamp | | |
| 50 | 15000 | 3400 |
| 70 | 15000 | 5600 |
| 100 | 15000 | 9000 |
| 150 | 15000 | 15000 |
| 175 | 15000 | 17500 |
| 200 | 15000 | 21000 |
| 250 | 15000 | 26300 |
| 320 | 20000 | 34000 |
| 400 | 20000 | 44000 |
| 450 | 20000 | 50000 |

:Duty Type of Motor:

Ref: IS-325

| Duty Type Symbol | Duty Type | Application |
|-------------------------|---|---|
| S1 | Continuous Duty | Pumps, Bowers, Compressors, Fans |
| S2 | Short Time Duty | Siren, Flood relief Gates |
| S3 | Intermittent Periodic Duty | Valve, Actuators, Wire drawing machine |
| S4 | Intermittent Periodic Duty with starting | Lift, Cranes, Lifts, Escalators |
| S5 | Intermittent Periodic Duty with starting and breaking | Lift, Cranes, Break (with electronics Breaks), Ro |
| S6 | Continuous Duty with Intermittent Periodic Duty | Machine Tools, Conveyors |

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S7 Continuous Duty with starting / Breaking Machine tools,
S8 Continuous Duty with periodic load changes Planning Applications

Type of Distribution System

As per IEC 60364-3

Unearthed System

IT

First Letter (the neutral point in relation to

Second letter (Exposed conductive parts of the

Earthed System

TT / TN (TN-S, TN-C, TN-C-S)

earth): T = directly earthed neutral (from the French word

electrical installation in relation to earth): T = directly

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Credits: Mr. Jignesh Parmar

About Jignesh Parmar

Jignesh Parmar has completed his B.E(Electrical) from Gujarat University. He is member of Institution of Engineers (MIE), India. Membership No:M-1473586. He has more than 12 years experience in Transmission -Distribution-Electrical Energy theft detection-Electrical Maintenance-Electrical Projects (Planning-Designing-Technical Review-coordination -Execution). He is Presently associate with one of the leading business group as a Assistant Manager at Ahmedabad, India. He has published numbers of Technical Articles in "Electrical Mirror", "Electrical India", "Lighting India", "Industrial Electrix"(Australian Power Publications) Magazines. He is Freelancer Programmer of Advance Excel and design useful Excel base Electrical Programs as per IS, NEC, IEC, IEEE codes. He is Technical Blogger and Familiar with English, Hindi, Gujarati, French languages. He wants to Share his experience & Knowledge and help technical enthusiasts to find suitable solutions and updating themselves on various Engineering Topics.