

INDEX TO ELECTRICAL ENGINEERS' DIGEST

SECTION - I GLOSSARY OF ELECTRICAL ENGINEERING RELEVANT TERMS

Sr.	Title	Page
1	Technical terms used in Design Basis and Specification	1
2	Units used for Electrical System	1
3	General Electrical Technical Terms	2
4	Power Generation Relevant Technical Terms	4
5	Transformer Relevant Technical Terms	8
6	Protective Relays Relevant Technical Terms	9
7	HV and LV Switchgear Relevant Technical Terms	11
8	Motor Relevant Technical Terms	12
9	Battery Relevant Technical Terms	15
10	Illumination System Relevant Technical Terms	17
11	Earthing and Grounding Relevant Technical Terms	18
12	Lightning Surge and Protection Relevant Technical Terms	19
13	Various Performance Indices and Factors in Electrical System	21
14	Energy Audit Relevant Technical Terms	22
15	Power Electronics Relevant Technical Terms	22
16	Fire and Safety Relevant Technical Terms	23

Section - II General Technical Specification for Electrical Equipments

	General Notes for Use of Technical Specification	
1	Design Basis - Site Conditions for all Specification	24
	Transformers and Tap Changer	
2	Power Transformers	25
3	On-load Tap Changer	26
4	Distribution Transformers	27
	EHV Switchgear (To be installed switchyard)	
5	Outdoor EHV Isolators	29
6	Outdoor Lightning Arrestors	30
7	EHV Circuit Breakers	30
8	EHV Current Transformers	31
9	EHV Voltage Transformers	32
	HV and LV Switchgear and Panels	
10	Indoor HV and LV Switchboard Panels	32
11	Internal Wiring applicable to HV, LV, Lighting and other Metal-clad Panels	34
12	Instrument Transformers for Switchboard Panel applicable to HV, LV, Lighting and other Metal-clad Panels	34

Sr.	Title	Page
13	Meters and Selector Switches for Switchboard Panel applicable to HV, LV, Lighting and other Metal-clad board	35
HV and LV Switchgear and Panels		
14	Indicating Lamps for HV, LV Panels and Lighting Boards	36
15	Accessories for Switchboard Panel applicable to HV, LV, Lighting and other Metal-clad boards	36
16	Switchboard Panel Auxiliary supply, Illumination and Heater applicable to HV, LV Panels, Lighting Board	37
17	HV Circuit Breaker for Metal-clad Indoor Switchboard	37
18	Indoor Metal-clad HV Isolators/Load Break Switch	38
19	LV Air Circuit Breaker for Metal-clad Switchboard	38
20	LV Moulded Case Circuit Breaker(MCCB)	39
21	LV Switchboard Components Technical Specification	40
Rotating Machines		
22	HT Squirrel Cage Induction Motors	41
23	LT Squirrel Cage Induction Motors	43
24	Additional specification for Flameproof/Explosion proof HT and LT motors	44
25	HT And LT AC Alternator	45
Cables & Wire		
26	HT/LT XLPE And PVC Power Cables	48
27	LT Control Cables	49
28	PVC Flexible Cables	51
29	Bare Aluminium Conductors for Transmission Lines	51
30	1.1 kV Grade Aerial Bunched Conductor	51
31	11 kV HT Porcelain Insulators for Transmission Lines	52
Capacitors		
32	LV Capacitors	53
33	Automatic Power Factor Control Panel and Relay	54
Battery		
34	DC Battery Set	56
35	Battery Charger	56
36	Uninterrupted Power Supply (UPS) Systems	57
37	Panels for Battery Chargers/UPS	57
38	Neutral Grounding Resistor for Generator	59
Miscellaneous		
39	Local Push Button Stations/Local Control Stations	61
40	Power Socket outlets or Receptacles	62
41	Compression type Terminal Lugs for Aluminium Conductors	62
42	Brass Cable Glands for XLPE/PVC Cables	63

Sr.	Title	Page
	Illumination System	
43	Swaged Type Steel Tubular Poles	63
44	Stanchion (Swan neck/J type) Steel Tubular Poles	65
45	Luminaires (Lighting fixtures)	65
	Industrial fluorescent luminaire	
	Industrial Well-glass luminaire	
	Street lighting luminaire	
46	Miniature Circuit Breakers (MCB)	65
47	Residual Current Circuit Breakers (RCCB)	66
48	Moulded Isolators for General Applications	66
49	Protective Relays	66
	Over current and Earth Fault Protection Relay (50/51)	
	Under-voltage OR Over-voltage Protection Relay (27 OR 59)	
	Differential Protection for transformer Relay (87T)	
	High speed Master Trip Relay (86)	
	Motor Protection Relay (Multi-function)	
50	Technical Specification for Electrical Safety Equipments	68
	Rubber Mats	
	Insulated Hand gloves	
	Sand Buckets and Stand	
	Shock Treatment Charts	
	Danger Boards	
51	Portable Fire Extinguishers for Different Types of Fires and Classification of Fire Different Type of Portable Fire Extinguisher Classification of Fire and Use of Fire Extinguisher	68
52	Typical Technical Specification for DG Sets of 15 - 125 KVA	70

Section - III
Electrical Engineering & Designing

Sr.	Title	Page
1	Basic Electrical Engineering Calculations	72
2	Sizing of PCC and MCC Incomer	74
3	Sizing of Transformer	79
4	Voltage Drop Calculations for Feeder Cable - Cable sizing	79
5	Guide for Selection of AC Contactors	82
6	Design of DC Battery and Battery Charger Capacity	83
7	Design of Earthing System Ref. IS:3043	86
8	Lightning Protection System Assessment and Design	89

Sr.	Title	Page
9	Fault Level Calculations and Designing	97
10	Determination of LT Capacitor Capacity on Panel Bus for Power Factor Compensation and Economics	103
11	Design of Illumination System	104
12	Design of Capacity of Emergency DG set	109
13	Synchronization and Parallel Operation of Generators and Transformer	110
14	Electrical Engineering for Hazardous Areas	111
	14.1 Process of Explosion and Fire	
	14.2 Classification of Hazardous Areas	
	14.3 Consideration for Electrical Equipment for Hazardous Areas	
15	Selection of Induction Motors for Industrial Applications	113

Section - IV
Preventive Maintenance of Electrical Equipments

Sr.	Title	Page
1	Preventive Maintenance Schedule and Practices	119
2	Preventive Maintenance of Transformers	119
3	Preventive Maintenance of HT and LT Motors	120
4	Preventive Maintenance of HV Switchgear and Panels	122
5	Preventive Maintenance of LV Switchgear and PCC/MCC Panels	125
6	Preventive Maintenance of Earthing System	127
7	Preventive Maintenance of Switchyard Equipments	128
	7.1 Lightning Arresters	
	7.2 EHV Isolators	
	7.3 EHV Current Transformers	
	7.4 EHV Potential Transformers	
	7.5 Outdoor Circuit Breakers	
8	Preventive Maintenance of Battery and Battery Charger	131
	8.1 Lead acid battery	
	8.2 Nickel-Cadmium Battery Set	
	8.3 Battery Charger	
9	Preventive Maintenance of Capacitors and APFC Panels	134
	9.1 Capacitors	
	9.2 APFC Panel	
10	Preventive Maintenance of XLPE and PVC Cables and Trays	137
11	Preventive Maintenance of HT and LT Overhead Transmission Lines	137

Section - V
Tips for Energy Conservation

Sr.	Title	Page
1	General tips for Energy Saving	139
2	Tips for Energy Saving in Electrical Power Distribution Systems	139
3	Tips for Energy Saving in Transformers	140
4	Tips for Energy Saving in Electric Motors	140
5	Tips for Energy Saving in Illumination Systems	141
6	Tips for Energy Saving in Chillers	141
7	Tips for Energy Saving in Refrigeration Systems	142
8	Tips for Energy Saving in Heat, Ventilation & Air-conditioning (HVAC) Systems	143
9	Tips for Energy Saving in Air Compressors & Compressed Air Systems	144
10	Tips for Energy Saving in Cooling Tower and Cooling Water Systems	145
11	Tips for Energy Saving in Pumping Systems	146

Section - VI
Useful Formulae

Sr.	Title	Page
	Formulae for Areas, Perimeter, Surface Areas and Volumes	147

Section - VII

Extracts from Various Statutory Provisions Applicable to Electrical Engineering and Installations

Sr.	Title	Page
1	Extracts from The Electricity Act, 2003	150
2	Extracts from The Indian Electricity Rules, 1956	151
3	Energy Audit under The Gujarat Use of Electrical Energy (Regulation) Order, 1999	157
4	Extracts from The Gujarat Lifts and Escalators Act, 2000	158
5	Extracts from The Gujarat Lifts and Escalators Rules, 2001	161
5-A	Amendment dated 27th December, 2007 in Gujarat Lifts and Escalators Rules, 2001	I - XI
6	Extracts from the Energy Conservation Act, 2001	190
7	Extracts from IS: 3043 Code of Practice for Earthing	198

Section - VIII
Reference Material

Sr.	Title	Page
1	Indian Standards and Codes	201
2	Reference Books for Government Acts and Rules	208
3	Technical Reference Books	209

Section - IX
Electrical Engineering Data

Table No.	Title	Page
	General Technical data	
1	Electrical Insulation Class and Insulating Materials	210
2	Resistance Correction Factors at Different Temperatures	210
3	Ingress Protection (IP) Ratings - IEC/EN 60529 specifying Environmental Protection provided by an Enclosure	211
4	Degree of Protection provided by Enclosures - As per IS:12063	211
5	Resistivity Coefficient, Temperature Coefficient and Conductivity for some Common Materials	212
6	Weight and Resistance of Copper and Aluminium Conductors	212
7	Converting Ampere between Single Phase/Two Phase and 3 Phase	213
8	Guide for Resistance Colour Code	214
9	Minimum Electrical Clearances for Outdoor Sub-Stations	214
	Switchgear	
	Technical Data for all Switchgear	
10	Copper and Aluminium Busbars: Construction Details and Current Carrying Capacity at 35°C Ambient Temperature and 30°C Temp. Rise	215
	HV Switchgear	
11	Data for Coordinated Ratings of HV Circuit Breakers	216
	LV Switchgear	
12	Switchgear Selection for Type 2 Co-ordination. DOL Starter	217
13	Switchgear Selection for Type 2 Co-ordination. Star/Delta Starter	218
	Relays	
14	Device Identification Numbers as per Function of Protective Relays	219
	Electric Motors	
	Technical Data applicable to all Types of Motors	
15	Motor Performance Parameters for Different Methods of Starting	221
16	HT and LT Motor Enclosure Nomenclature and Methods of Cooling as per IEC34 - 6, IS:6362	221
17	Derating factors applied to Motor Output	222
18	Duty Cycles For Motors as Defined by IEC	222
19	Mounting Arrangements for Motors	223
20	Selection of LT Motor Frame Size according to Rating	224
21	Typical Full Load Slip for Motors	224
	LT Motors	
22	Technical Data for Performance and Operating Characteristics of Energy Efficient TEFC Squirrel Cage LT Motors - 3000 RPM, 2-pole	225

Table No.	Title	Page
23	Technical Data for Performance and Operating Characteristics of Energy Efficient TEFC Squirrel Cage LT Motors - 1500 RPM, 4-pole	227
24	Performance and Operating Characteristics of Energy Efficient TEFC, Squirrel Cage Foot-mounted LT Motors - 1000 RPM, 6-pole	229
25	Performance and Operating Characteristics of Energy Efficient TEFC, Squirrel Cage Foot-mounted LT Motors - 750 RPM, 8-pole	230
26	Totally Enclosed Fan Cooled Squirrel Cage Foot mounted (B3) LT Motor showing Dimensional Details (Frame 63 to 160)	231
27	Totally Enclosed Fan Cooled Squirrel Cage Foot mounted (B3) LT Motor showing Dimensional Details (Frame 180 to 225)	232
28	Totally Enclosed Fan Cooled Squirrel Cage Foot mounted (B3) LT Motor showing Dimensional Details (Frame 250 to 315)	233
29	Totally Enclosed Fan Cooled Squirrel Cage Flange mounted (B5) LT Motor showing Dimensional Details	234
30	Totally Enclosed Fan Cooled Squirrel Cage Face mounted (B14) LT Motor showing Dimensional Details	235
31	Performance and Operating Characteristics of Slip Ring LT Motors	236
	Capacitor	
32	Recommended Capacitor Ratings for Direct Connection to Induction Motors	237
33	Capacitor Rating for Welding Transformers	237
34	Multiplication Factor for Derivation of Capacitor Size for System Power Factor Improvement	238
35	Capacitor Current in Amp at Different Test Voltage	239
	Power and Control Cables	
	Technical Data applicable to all Types of Cables	
36	Codes used for Identification of XLPE and PVC Cables	240
37	Cable Core Identification Colours	240
38	Short-circuit Current Ratings for HT/LT XLPE and PVC Insulated Cables with Aluminium/Copper Conductor	241
39	Basis for Continuous Current Ratings for XLPE and PVC Cables	241
40	Technical Data useful for Calculating Short-circuit Ratings of Cables	242
41	Permissible Bending Radius for Various Cables to be maintained while laying	242
42	Cable Range at a Glance	243
43	Reactance of HT Single-core and Multi-core XLPE Insulated Armoured and Un-armoured Cables with Aluminium Conductor conforming to IS:7098 (Part-2)	245
44	AC/DC Resistance and Capacitance of HT Single-core and Multi-core XLPE Insulated Armoured & Un-armoured Cables with Aluminium Conductor conforming to IS:7098 (Part-2)	246

Table No.	Title	Page
45	Current Ratings for Three core HT XLPE Insulated Armoured Cables with Aluminium Conductor conforming to IS:7098 (Part-2)	246
46	Current Ratings for Single core HT XLPE Insulated Armoured and Un-armoured Cables with Aluminium Conductor conforming to IS:7098 (Part-2)	247
47	Electrical Characteristics of 1100V Grade Single-core & Multi-core XLPE Insulated Armoured & Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 7098 (Part-1)	248
	Power and Control Cables	
48	Electrical Characteristics of 1100V Grade Single-core & Multi-core PVC Insulated Armoured & Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 1554 (Part-1)	249
49	Current Ratings for Single & Multi-core 1100V Grade XLPE Insulated Armoured and Un-armoured Cables with Aluminium Conductor	250
50	Current Ratings for Single & Multi-core 1100V Grade PVC Insulated Armoured and Un-armoured Cables with Aluminium Conductor - General Purpose Insulation	251
51	Current Ratings for Single & Multi-core 1100V Grade XLPE Insulated Armoured and Un-armoured Cables with Copper Conductor	250
52	Constructional Features of 1 Core, 1100V Grade XLPE Insulated Armoured and Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 7098 (Part-1)	253
53	Constructional Features of 2 Core, 1100V Grade XLPE Insulated Armoured and Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 7098 (Part-1)	254
54	Constructional Features of 3 Core, 1100V Grade XLPE Insulated Armoured and Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 7098 (Part-1)	255
55	Constructional Features of 3.5 Core, 1100V Grade XLPE Insulated Armoured and Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 7098 (Part-1)	256
56	Constructional Features of 4 Core, 1100V Grade XLPE Insulated Armoured and Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 7098 (Part-1)	257
57	Constructional Features of 1 Core, 1100V Grade PVC Insulated Armoured and Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 1554 (Part-1)	258
58	Constructional Features of 2 Core, 1100V Grade PVC Insulated Armoured and Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 1554 (Part-1)	259
59	Constructional Features of 3 Core, 1100V Grade PVC Insulated Armoured and Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 1554 (Part-1)	260
60	Constructional Features of 3.5 Core, 1100V Grade PVC Insulated Armoured and Un-armoured Cables with Aluminium/Copper Conductor conforming to IS: 1554 (Part-1)	261
61	Constructional Features of 4 Core, 1100V Grade PVC Insulated Armoured and Un armoured Cables with Aluminium/Copper Conductor conforming to IS: 1554 (Part-1)	262
62	Electrical Characteristics of 650 / 1100V Grade Multi - core Plain PVC Insulated Flexible Cables with Plain Copper Conductor conforming to IS:694-1977	263
63	Electrical Characteristics of 650/1100V Grade Single-core PVC Insulated Cables with Aluminium/Copper Conductor for House Wiring conforming to IS:694 1977	264

Table No.	Title	Page
64	Electrical Characteristics of 650V Grade Single-core PVC Insulated Unsheathed and Sheathed Flexible Cables with Plain Copper Conductor for House Wiring	265
65	Electrical Characteristics of 650/1100V Grade Multi-core PVC Insulated and Sheathed Flexible Cables with Plain Copper Conductor for Industrial Applications	265
	Rating Factors for XLPE/PVC Cables	
66	Rating Factors for Variation in Ambient Air Temperatures for XLPE and PVC Cables	266
67	Rating Factors for Variation in Ground Temperatures for XLPE and PVC Cables laid directly in Ground	266
68	Rating Factors for XLPE and PVC Cables for Depth of Laying-Cables laid directly in Ground	266
69	Group Rating Factors for Single Core XLPE and PVC Cables laid in Trefoil Formation	267
	❖ Cables laid in trefoil directly in ground in horizontal formation	
	❖ Cables laid in horizontal formation in single way ducts	
	❖ Cables laid on trays/racks in covered trench with removable covers	
	❖ Cable laid as on trays/racks in open air	
70	Group Rating Factors for Twin and Multi-core XLPE and PVC Cables	268
	❖ Cables laid directly in ground in horizontal formation	
	❖ Cables laid in single way in ducts/pipes in horizontal formation	
	❖ Cables laid on trays/racks in covered trench with removable covers	
	❖ Cable laid as on trays/racks in open air - cables separated	
	❖ Cables laid on trays/racks exposed to air - cables touching	
71	Rating Factors for Variation in Thermal Resistivity of Soil for Two and Three Single core XLPE and PVC Cables laid direct in Ground	269
72	Rating Factors for Variation in Thermal Resistivity of Soil for Twin and Multi-core XLPE and PVC Cables laid direct in Ground	270
73	Comparative Current Ratings and Voltage Drop for 1100V Grade, PVC and XLPE Cables with Aluminium Conductor	270
74	Selection Chart for Single Compression Gland for 1.1 kV Gr, Armoured Cables	271
75	Selection Chart for Double Compression Gland for 1.1 kV Gr, Armoured Cables	272
76	Selection Chart for Flameproof Gland for 1.1 kV Grade, Armoured Cables	273
	Bare Aluminium Conductors used in Overhead Lines	
77	Electrical and Mechanical Characteristics of Aluminium Conductor Steel Reinforced (ACSR) used for Overhead Transmission Lines conforming to IS:398-1976 (Part-II)	274
78	Electrical and Mechanical Characteristics of All Aluminium Conductor (AAC) used for Overhead Transmission Lines conforming to IS:398-1961	275
79	Electrical and Mechanical Characteristics of All Aluminium Conductor (AAC) used for Overhead Transmission Lines as per Manufacturers' Specification	276
80	Technical Data common for 1.1 kV Gr, 3½ /4 core Aerial Bunched Conductors	276
81	Technical Data for 1.1 kV Grade 3½ core Aerial Bunched Conductor	277
82	Technical Data for 1.1 kV Grade 4 core Aerial Bunched Conductor	277

Table No.	Title	Page
	Transformers	
83	Data for Current, Cable Sizes, Weight, Oil Quantity, Neutral Size, Impedance for 11/0.433 kV Transformers of Standard Ratings	278
84	Characteristics of New Insulating Oil (Ref. IS: 335-1993)	278
	Current and Voltage Transformers	
	Current Transformers	
85	Limits of Current and Phase Displacement Errors for Measuring Current Transformers	279
86	Limits of Current and Phase Displacement Errors for Protection Current Transformers	279
87	Standard VA Burdens for Current Transformers	279
88	Applications of Current Transformers as per Accuracy Class	279
	Voltage Transformers	
89	Limits of Voltage and Phase Displacement Errors for Measuring Voltage Transformers	279
90	Limits of Voltage and Phase Displacement Errors for Protection Voltage Transformers	280
91	Limits of Voltage and Phase Displacement Errors for Residually connected Voltage Transformers	280
92	Applications of Measuring Voltage Transformers as per Accuracy Class	280
93	Value of Burdens imposed by various measuring instruments on CT and VT	280
	DC Battery and Chargers	
94	Characteristics and Applications of Different Types of Batteries	281
95	Discharge Rating of Lead Acid Battery	281
96	Discharge Rating of Nickel Cadmium Battery	281
	Earthing System	
97	Resistivity of Different Types of Soils	282
98	Properties of Earthing System Materials Aluminium, Copper and Galvanized Iron at 20°C	283
99	Design Data for Earth Electrodes	283
100	Material Constants for Earthing Materials (Ref. IS:3043-1987)	283
101	Current Ratings (A/mm ²) for Various Earthing Conductors	284
102	Recommended Size of Earthing Conductor for Various Fault Currents	284
103	Weight of Earthing Materials in kg/Mtr	284
104	Calculated Conductor Size for Neutral Grounding of Transformer	285
105	Recommended Earth Conductors for Motors	285
	Lightning Protection	
106	Estimated Average Annual Lightning Flash Density in terms of Lightning Flashes per km ² per year (IS: 2309)	285

Table No.	Title	Page
	Lightning Protection	
107	Weighing Factors for Assessment of Lightning Protection for Buildings/Structures having normal Processes and Covered/Open Storage as provided in IS:2309 1989	285
107A	Weighing Factor A for Activity in Building or Usage of Structure	286
107B	Weighing Factor B for Type of Construction	286
107C	Weighing Factor C for Contents OR Consequential effects	286
107D	Weighing Factor D for Degree of isolation	287
107E	Weighing Factor E for Type of country	287
108	Protective angle for coverage under lightning protective zone	287
109	Criteria for Positioning and spacing of down conductors	287
110	Weighing Factors for Recommending Lightning Protection for Buildings/Structures housing Explosive or flammable Processes and Covered/Open Storage containing Explosive or Flammable Substances as provided in IS:2309 - 1989	288
110A	Weighing Factor A for Proximity of personnel	288
110B	Weighing Factor B for Frequency of lightning strike experienced in past	288
110C	Weighing Factor C for Importance of building	288
110D	Weighing Factor D for Classification of building based on explosion hazard of contents	288
110E	Weighing Factor E for Quantity of explosives generally stored	288
110F	Weighing Factor F for Building replacement cost	289
110G	Weighing Factor G for Ratio of Cost of materials stored to cost of bldg.	289
110H	Weighing Factor H for Type of country OR Nature of terrain	289
110J	Weighing Factor J for Probability of building being struck by lightning strike	289
110K	Weighing Factor K for Location of building	289
110L	Weighing Factor L for Type of Building structure	289
110M	Weighing Factor M for Sensitivity of Substance in building	290
111	Recommended Lightning Protection for Buildings/Structures housing Explosive or flammable Processes and Covered/Open Storage containing Explosive or Flammable Substances	290
112	Standard technical data considered in Isolation distance calculations to prevent Side Flashing in Lightning Protection System (IS:2309)	290
113	Data of Materials and Minimum sizes for various Components for Lightning Protection System	291
	Illumination System	
114	Recommended values of Maintenance Factors	291
115	Recommended values of Space to Mounting Height Ratio	291
116	Recommended Values of Illuminance and Glare Index	292
117	Reflectance from Painted Surfaces - Percent Reflected Lumens	300
118	Interpretation of Protection Symbols marked on Lighting Luminaries	300
119	Luminous Flux in Lumens of Different Types of Lamps Industrial and Commercial Wiring	301

Table No.	Title	Page
120	Maximum Permissible Nos. of Grade Single Core Cables for drawing in PVC Conduits	301
121	Maximum Permissible Nos. of Grade Single Core Cables for drawing in Rigid Steel Conduits	302
122	Dimensional Details of Rigid Black PVC Conduits (Ref. IS: 9537-1983 Part -3)	302
123	Dimensional Details of Heavy Gauge Welded Steel Conduits Explosive & Hazardous Areas	302
124	Different Types of Protection Measures currently recognized Worldwide as Effective Techniques to prevent Explosions	303
125	Classification of Electrical Equipment for Explosive atmosphere	305
126	Explosive Certification Code for Electrical Equipments	305
	Energy Audit	
127	Cable Losses for 3 core PVC/XLPE Insulated Aluminium Power Cables	306
128	Factors affecting Different Types of Losses in Electric Motor	306
129	Heat Gain from Electric Motors in Air-conditioned Areas	307
130	Electric Motor Losses and Percentage Contribution	307
131	Recommended Insulation Thickness on Pipes used for Heating Systems, Hot Water and Low, Medium and High Pressure Steam Systems	308
132	Recommended Insulation Thickness on Pipes used for Cooling Systems, Chilled Water and Brine Circulation Systems	308
133	Steam Loss due to Leakage from Orifice	308
134	Gas Loss due to leakage from Orifice	309
135	Thermal Conductivity of Metals at Different Temperatures	309
136	Heat Loss from Non-insulated Steam Pipes	310
137	Equivalent Length of Pipe for Frictional Head Loss	310
138	Frictional Head Losses from Pipeline Valves and Fittings	311
139	Characteristics of Thermic Fluids	312
140	Physical Properties of Refrigerants	312
141	Comparison of Performance of Refrigerants Per kW Cooling	313
142	Effect of Evaporator and Condenser Temperatures on Performance of Refrigeration Machine	313
143	Expected Specific Power Consumption of Air Compressors	313
144	Coefficient of Performance, Energy Efficiency Ratio and Specific Power for Vapour Compression Systems	314
145	Coefficient of Performance, Steam/Fuel Consumption, Energy Efficiency Ratio for Vapour Absorption Systems	314
146	Relation between Speed, Head, Flow and Electric Power as per Laws of Affinity	315
147	Typical Thermal Insulating Materials for use in Temperature Range 50°C to 1000°C	315
148	Radiation heat transfer Emissivity Coefficients of some common Materials	316

Table No.	Title	Page
	Structural Steel Data	
149	Data for Stainless Steel Pipe Standards	317
150	Data of Weights for Stainless Steel Sheets & Plates	318
151	Indian Standard Rolled Steel Joists (Steel Beams) as per IS: 808 1964	319
152	MS Angles as per IS: 808 1964	321
153	Indian Standard Channel Sections for Structural Use as per IS: 808 1964	322
154	Indian Standard Channel Sections for General Use as per IS: 3954 - 1966	322
155	Standard Steel Properties and Sections MS Flats	323

Section - X
Unit Conversion Tables

Table No.	Title	Page
156	Conversion for Units of Angles	324
157	Conversion for Units of Torque	324
158	Conversion for Units of Length	325
159	Conversion for Units of Weight and Mass Units	325
160	Conversion for Units of Area	326
161	Conversion for Units of Pressure	326
162	Conversion for Pressure to Head Units	327
163	Conversion for Units of Volume	327
164	Conversion for Units of Force	328
165	Conversion for Units of Flow	328
166	Conversion for Units of Energy	329
167	Conversion for Units of Power	329
168	Conversion for Units of Velocity	330
169	Conversion for Units of Acceleration	330
170	Conversion for Units of Illuminance	330
171	Conversion for Units of Luminance (Brightness)	330
172	Conversion for Units of Specific Heat	331
173	Conversion for Units of Specific Heat Capacity	331
174	Conversion for Units of Density	331
175	Indian Standard Wire Gauges and British Gauges Units Conversion	332
176	Conversion for Units of Temperature	332
177	Conversion for Units of Viscosity	332
178	Viscosity Scales Units Conversion	333