

Index

A

- Air blast circuit breaker, 153
- Air insulated substation, 139
- Alternative gases, 241
- Ambipolar diffusion, 28
- Arc chute, 176
- Artificial current zero crossing, 232
- Axial blast, 154, 161

B

- Black box model
 - arc-network interactions, 51, 52
 - Cassie arc model, 49
 - general formulations, 48
 - Mayr arc model, 50

C

- Cable charging current breaking test. *See* capacitive current switching tests
- Capacitive current switching tests, 110
- Charge carrier
 - diffusion, 27
 - drift, 26
 - electric current density, 27
 - mobility, 27
 - recombination, 25
- Circuit breaker, 8
- Circuit breaker testing
 - capacitive current switching tests, 112
 - direct method, 86
 - short circuit making, 96, 97
 - synthetic method, 88
- Coil current, 220
- Computational fluid dynamics, 46
- Contact travel curve, 204
- Coulometric Karl Fischer titration, 197
- Cup contacts, 179
- Current chopping, 43, 114

- Current clogging, 161
- Current commutation, 152, 231

D

- Diffusion coefficient, 27
- Direct current interruption, 226
- Disconnect switch, 8
- Distribution level switchgear, 143, 164
- Drift velocity, 26
- Drive mechanism, 5, 104
- Dynamic contact resistance measurement, 213

E

- Earthing switch, 8
- Electron affinity, 25
- Electronegative gas. *See* electron affinity
- Embedded pole, 181
- Energy conservation equation, 45
- Excitation, 23
- Explosive electron emission, 41

F

- Fault clearing time, 230
- Fault current limiters
 - current limiting reactors, 233
 - hybrid fault current limiters, 239
 - saturable core fault current limiters, 237
 - solid-state fault current limiters, 238
 - superconducting fault current limiters, 235
- Field emission, 24
- Fluoroketone, 242
- Fluoronitrile, 242
- Four-point resistance measurement, 200
- Fowler-Nordheim equation. *See* field emission

G

- Gas flow, 154
- Gas insulated substation, 140

Gas viscosity, 37
 Global warming, 241
 Grading capacitor, 154

H

Hardgas principle, 165
 Heat conduction, 34
 Heat convection, 37
 High pressure arc
 anode voltage drop, 31
 cathode voltage drop, 31
 electric potential distribution, 31
 electrical conductivity, 32
 particle density, 32
 static arc characteristics, 30
 temperature distribution, 38
 thermal conductivity, 35
 High-speed earthing switch, 8
 High voltage direct current (HVDC)
 interruption, 226
 High voltage fuse
 back-up, 167
 current limiting, 166
 current limiting characteristics, 172
 design, 167
 general purpose, 167
 interaction with load break switch, 172, 173
 M-spot, 170
 non-current limiting, 166
 temperature distribution, 169
 High voltage switchgear. *See* transmission
 level switchgear

I

Impact ionisation, 23
 Inductive-resistive load switching, 105
 Initial arc, 19
 Inrush current, 100, 102
 Insulation resistance measurement, 197
 Interruption chamber, 5
 Ionisation energy, 22

K

Kilometric fault. *See* short line fault

L

Larmor radius, 178
 Lateral blast, 154, 159
 Linear variable differential
 transformer, 207
 Line charging current breaking test. *See*
 capacitive current switching tests

Load break switch, 8, 96, 105, 165, 172, 174,
 180, 184
 Local thermodynamic equilibrium, 45
 Lorentz forces, 7, 178
 Low voltage switchgear, 176

M

Magnetic air switchgear, 176
 Magnetohydrodynamic model, 45
 Magneto-resistive sensor, 205
 Major Failure (MaF), 188
 Mass conservation equation, 45
 Momentum conservation equation, 45
 Maxwell's equations, 46
Medium voltage, 129
 Medium voltage switchgear. *See* Distribution
 level switchgear
 Metal bellows, 178
 Metal vapour arc. *See* vacuum arc
 Multiple re-ignitions, 118

N

Navier-stokes equation, 45

O

Oil circuit breaker
 bulk oil, 156
 minimum oil, 158
 Operating mechanism, 5
 drive mechanism, 191, 192, 207, 214, 217,
 218
 Operating time, 210

P

Partial discharge, 196
 Pole discrepancy, 212
 Position transducer, 203
 Pre-strike, 93, 109
 Primary distribution switchgear, 143

R

Radial blast, 154
 Radial magnetic field contacts, 179
 Rate of Rise of Recovery Voltage (RRRV), 15
 Recovery voltage
 power frequency, 63
 transient recovery voltage (TRV), 65, 67,
 68, 70
 Richardson-Schottky equation. *See* thermionic
 emission
 Ring main unit, 138
 Rogowski coil, 220

S

- Saha equation, 22
- Secondary distribution switchgear, 143
- SF₆ circuit breaker
 - dual pressure, 159
 - puffer type, 160
 - rotary arc, 175
 - self blast type, 163
 - single pressure, 159
- SF₆ free current interruption, 240
- SF₆ leak detection, 194
- Short circuit current
 - balanced short circuit, 60
 - DC component, 62
 - making, 94
 - near generator, 63
 - single phase short circuit, 61
 - three phase short circuit, 61
 - unbalanced short circuit, 61
- Short line fault, 75
- Spiral contacts, 179
- Substation configurations
 - double busbar, 137
 - ring bus configuration, 138
 - single busbar, 137
- Suicide pot, 157
- Superconducting fault current limiter
 - resistive type, 236
 - saturable core type, 237
 - shielded core (inductive) type, 237
- Switching arc
 - electrical conductivity, 147
 - energy dissipation, 16, 93
 - initiation, 18
 - recovery, 151
 - thermal conductivity, 147
 - time constant, 38
- Switching overvoltage
 - current chopping, 116
 - energization of transmission lines, 99
 - interruption of small inductive currents, 112, 114, 115
 - multiple re-ignitions, 118
 - synchronized closing, 103
 - virtual current chopping, 121
- Synthetic testing
 - capacitive current switching tests, 111

- parallel current injection method, 90
- series current injection method, 89
- short circuit making test, 96
- synchronisation, 92

T

- Thermal ionisation, 22
- Thermionic emission, 24
- Thermo-field emission, 25
- Thermovision, 201
- Transfer current, 173
- Transient recovery voltage
 - current injection method, 72, 73, 76
 - four parameter TRV, 85
 - mainly active load current interruption, 107
 - out of phase, 81
 - short line fault, 75
 - single phase, 65
 - three phase, 70
 - transmission level circuit breaker, 68, 70
 - two parameter TRV, 85
- Transmission level switchgear, 151
- Travel curve. *See* contact travel curve
- Tunnelling effect, 24
- Two-zone model, 47

V

- Vacuum arc
 - anode spot, 42
 - cathode spot, 41
 - constricted mode, 42
 - dielectric recovery, 151
 - diffuse mode, 41
- Vacuum interrupter, 177
- Vapour shield, 178
- Vibration analysis, 218
- Voltage Levels definition
 - distribution level voltage, 9
 - high voltage, 9
 - low voltage, 9
 - medium voltage, 9
 - sub-transmission level voltage, 9
 - transmission level voltage, 9

W

- Work function, 24