CONTENTS

1 Scope 17
2 ~~Normative~~ References 17
3 Terms and Definitions 20
4 Constructional requirements for all electrical apparatus 22
4.1 General 22
4.2 Electrical connections 22
4.3 Clearances 25
4.4 Creepage distances 31
4.5 Solid electrical insulating materials 32
4.6 Windings 32
4.7 Temperature limitations 33
4.8 Wiring internal to apparatus 35
4.9 Degrees of protection provided by enclosures 35
~~4.10 Fasteners~~ 35
5 Supplementary requirements for specific electrical apparatus 36
5.1 General 36
5.2 Rotating electrical machines 36
5.3 Luminaires 41
5.4 Cap lights and handlights 45
5.5 Measuring instruments and instrument transformers 46
5.6 Transformers other than instrument transformers 46
5.7 Batteries 47
5.8 General purpose connection and junction boxes 52
5.9 Resistance heaters (other than trace heaters) 52
5.10 Other electrical apparatus 54
6 Type verifications and type tests 54
6.1 Dielectric strength 54
6.2 Rotating electrical machines 55
6.3 Luminaires designed for mains supply 56
6.4 Measuring instruments and instrument transformers 59
6.5 Transformers other than instrument transformers 59
6.6 Secondary batteries 59
6.7 General purpose connection and junction boxes 62
6.8 Resistance heating devices and resistance heating units 62
6.9 Terminal insulating material tests 63
6.10 Terminal dielectric tests 63
7 Routine verifications and routine tests 65
7.1 Dielectric tests 65
7.2 Dielectric tests for batteries 65
7.3 Inter-turn overvoltage tests 65
8 Ex component certificates 65
8.1 General 65
8.2 Terminals 65
9 Marking and instructions 66
9.1 General marking 66
9.2 Instructions for use 66

9.3 Warning markings 68
Annex A (normative) Cage motors – Methods of test and of calculation 69
Annex B (normative) Type tests for specific forms of resistance heating devices or resistance heating units (other than trace heater) 71
Annex C (informative) Cage motors – Thermal protection in service 73
Annex D (informative) Resistance heating devices and units – Additional electrical protection 75
Annex E (informative) Combinations of terminals and conductors for general purpose connection and junction boxes 77
Annex F (informative) Dimensions of copper conductors 79
Annex G (informative) Potential stator winding discharge risk assessment – Ignition risk factors 81
Annex H (normative) Test procedure for T8, T10 and T12 lamps 83
Annex I (informative) Introduction of an alternative risk assessment method encompassing 'Equipment Protection Levels' for Ex Equipment 89
Annex J (informative) Bibliography 95
Annex K (informative) United States major deviations 97

Figure 1 – Determination of creepage distances and clearances 31
Figure 2 – Minimum values of the time t_E of motors in relation to the starting current ratio I_A/I_N 39
Figure 3 – Arrangement for the luminaire vibration test 58
Figure A.1 – Diagram illustrating the determination of time t_E 70
Figure E.1 – Example of defined terminal/conductor arrangement table 78
Figure H.1 – Asymmetric pulse test circuit 84
Figure H.2 – Asymmetric power detection circuit 86
Figure H.3 – Flow Chart – Asymmetric power Test 87

Table 1 – Creepage distances and clearances 27
Table 2 – Tracking resistance of insulating materials 31
Table 3 – Limiting temperatures for insulated windings 34
Table 4 – Potential air gap sparking risk assessment for cage rotor ignition risk factors 38
Table 5 – Minimum distance between lamp and protective cover 41
Table 6 – Creepage distances and clearances for screw lamp caps 42
Table 7 – Resistance to the effect of short-circuit currents 46
Table 8 – Explosion test mixtures 56
Table 9 – Insertion torque and minimum removal torque 57
Table 10 – Value for pull-out tests 64
Table 11 – Creepage distances and clearances for screw lamp caps 67
Table 12 – Text of warning markings 68
Table F.1 – Standard cross-sections of copper conductors 79
Table G.1 – Potential stator winding discharge risk assessment – Ignition risk factors 81
Table I.1 – Traditional relationship of EPLs to Zones (no additional risk assessment) 91
Table I.2 – Description of risk of ignition protection provided 92