

	TABLE OF CONTENTS	
		Page
1	FOREWORD	1
2	SCOPE.	3
3	BASIS FOR THE SELECTION OF MACHINES	5
	3.1 General	5
	3.2. Area classification	5
	3.3 Equipment - Type of protection.	5
	3.4 Test and Certification	6
	3.5 Repairs to Certified Equipment	7
	3.5.1 Certification and test requirements.	7
4	IGNITIONS AND IGNITION MECHANISMS.	8
	4.1 Ignitions which have been notified.	8
	4.2 Ignition mechanisms	8
	4.2.1 Circulating currents in non-active parts and bonding straps	9
	4.2.2 Internal sources of ignition.	9
	4.2.2.1 Stator coil movement.	9
	4.2.2.2 Coil/rotor bar movement	9
	4.2.2.3 High voltage discharges.	10
	4.2.2.4 Contamination	10
	4.2.2.5 Thermal ageing	11
	4.2.3 Common seal and lube oil systems.	11
5	RISK CONSIDERATIONS FOR EXISTING MACHINES	13
	5.1 Legal aspects	13
	5.2 Procedure for undertaking a risk assessment.	13
	5.3 Use of Decision Trees	13
	5.3.1 Decision tree approach to ensure a gas free start.	14
	5.3.2 A more detailed Decision tree approach.	14
	5.4 Undertaking a more detailed risk assessment.	15
	5.4.1 Ignition Probability Factor (IPF), see Table 1	15
	5.4.1.1 Voltage	15
	5.4.1.2 Power	15
	5.4.4.3 Number of Poles	15
	5.4.4.4 Start frequency	15
	5.4.4.5 Contamination.	16
	5.4.4.6 Winding age.	16
	5.4.4.7 Rotor construction	16
	5.4.2 Consequences of ignition depending on location and product. (LPF) . .	17
	5.4.2.1 Type of flammable material involved.	17
	5.4.2.2 Location of the machine.	18
	5.4.3 Risk associated with presence of people. (PPF)	20
	5.4.3.1 Presence of people within 50 metres. (PPF A)	20
	5.4.3.2 People between 50 and 200 m (PPF B)	20
	5.4.3.3 People between 200 and 1000 m. (PPF C).	21
6	UTILISATION OF NUMERICAL ANALYSIS SCORES	23
	6.1 General	23
	6.2 Totalisation of scores	23
	6.3 Criticality of scores.	24
	6.4 A Case Study	25
	6.5 Actions based on design considerations and operating procedures.	25

6.5.1	Circulating currents in the framework	25
6.5.2	Common lube-seal oil systems.	26
6.5.3	Pressurisation, pre-purging or periodic purging.	26
6.5.3.1	Pressurisation	26
6.5.3.2	Pre-purging	26
6.5.3.3	Periodic purging	26
6.5.4	Use of gas detection equipment.	27
6.6	Considerations relevant to replacing all, or parts of, a machine.	27
6.6.1	Relevant to both Ex ‘e’ and Ex ‘N’ machines.	27
6.6.2	Changing complete machine.	27
6.6.3	Changing rotors	28
6.7	Considerations relevant to Area Classification.	28
6.7.1	Zones and Area Classification	28
6.7.2	Extent of Zones.	28
6.7.3	Improving ventilation in buildings	29
6.8	Improvement in maintenance techniques	29
7	THE FUTURE	31
7.1	International, European and British Standards	31
7.2	European Directives.	32
7.3	Ex ‘N’ Machines	33
7.4	Ex ‘e’ Machines.	34
7.5	Other types of machine.	35
APPENDIX A	37	
Page 1	RISK ASSESSMENT DECISION TREE No. 1	37
Page 2	ALTERNATIVE Q & A FORM	38
APPENDIX B	39	
Page 1	RISK ASSESSMENT DECISION TREE No. 2	39
Page 2	ASSESSMENT. CONSOLIDATED TOTAL FOR A MACHINE	40
APPENDIX C	41	
PROPERTIES OF FLAMMABLE MATERIALS	41	
APPENDIX D	43	
RELEVANT STANDARDS PUBLICATIONS AND ABBREVIATIONS	43	
1	British, European and International Standards.	43
2	European Directives	43
3	Other Publications	43
4	Abbreviations and Acronyms.	44
APPENDIX E	45	
SOME CALCULATED VALUES -	45	
APPENDIX F	47	
A CASE STUDY Brief Details and results	47	
APPENDIX G	49	
First review concerning open ventillated motors	49	
AMENDMENTS to previous editions	51	
LIST OF EEMUA PUBLICATIONS...At end of book		