

Contents

De	Dedication				
Preface					
1	Introduction				
	1.1 General approach to developing an environmental		1		
		management system	5		
	1.2	Summary of requirements of ISO 14001	6		
	1.3	Other ISO 14000 standards	8		
	1.4	Engineering aspects of ISO 14001 requirements	9		
	1.5	What is essential and what is not when implementing ISO 14001?	11		
		References	12		
2	Design and Implementation of ISO 14001 Environmental				
	Management Systems				
	2.1	Design of an environmental management system	14		
	2.2	Environmental management system implementation	17		
	2.3	Environmental management system costing	33		
	2.4	Environmental management system audits	36		
	2.5	ISO 14001 registration	38		
	2.6	Publicity about good environmental performance	39		
		Reference	39		
3	Measurement Systems in Environmental Management		41		
	3.1	Choosing suitable measuring instruments	42		
	3.2	Calibration of measuring instruments	53		
	3.3	Documentation of measurement and calibration systems	61		
		References	63		
4	Measurement System Errors				
	**-	Random errors	66		
	4.2	Systematic errors	78		
	4.3	Error reduction using intelligent instruments	86		
	4.4	Total measurement system errors	88		
		References	90		

5	Mea	surement Signal Conversion, Processing, Transmission and Recording	91	
	5.1	Variable conversion elements	91	
	5.2	Signal processing	95	
	5.3	Signal transmission	106	
	5.4	Signal recording	112	
6	Quantification and Effects of Air Pollution			
	6.1	Air pollution sources and effects	117	
	6.2	Measurement of air quality: particulate matter content	120	
	6.3	Measurement of air quality: concentration of polluting		
		gaseous products	122	
		References	133	
7	C			
	7. I	Sources and forms of water pollution	135	
	7.2	Consequences of water pollution	136	
	7.3	Water sampling in rivers	138	
	7.4	Testing of river water for pollution	139	
		References	147	
8	Control of Air and Water Pollution			
	8.1	Air pollution control	149	
	8.2	Water pollution control	156	
		References	157	
9	Noise, Vibration and Shock Pollution			
	9.1	Noise	159	
	9.2	Vibration	163	
	9.3	Shock	170	
10	Waste Management			
		Waste reduction	173	
	10.2	···	177	
		References	181	
11	System Reliability and Risk Assessment for Environmental Protection			
	II.I	— ·3	184	
		Identifying hazards	184	
	11.3		186	
	11.4		188	
	11.5		190	
	11.6		190	
	11.7	References and further reading	201	
12	Statistical Process Control			
	12.1	Conditions for application of statistical process control	204	
	12.2	Principles of statistical process control	205	

			Contents	V
	12.3	XBAR chart (or MEAN chart)		200
	12.4	CUSUM chart (cumulative sum chart)		212
	12.5	RANGE chart (R chart)		214
	12.6	Summary of control charts		218
		References		218
13	Moni	itoring Process Parameter Values to Minimise Pollution Risk		219
	13.1	Temperature measurement		220
	13.2	Pressure measurement		23:
	13.3	Flow measurement		244
	13.4	Level measurement		25
		References		26:
Appendix 1 Appendix 2		1 Summary of ISO 14000 Series Standards		26
		Typical Structure of an Environmental Management		
		System Manual		27 1
Ind	lex			283