ISGINTT

International Safety Guide
for Inland Navigation Tank-barges and Terminals

First Edition

CENTRAL COMMISSION FOR THE NAVIGATION OF THE RHINE
OIL COMPANIES INTERNATIONAL MARINE FORUM

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The Central Commission for the Navigation of the Rhine (CCNR) is an international organisation created by the Congress of Vienna and ruled by the Revised Convention for the Navigation of the Rhine.

The Oil Companies International Marine Forum (OCIMF) is a voluntary association of oil companies having an interest in the shipment and terminalling of crude oil and oil products. OCIMF is organised to represent its membership before, and consult with, the International Maritime Organization and other government bodies on matters relating to the shipment and terminalling of crude oil and oil products, including marine pollution and safety.

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FOREWORD

The CCNR, together with other international bodies, provides the forum for developing and adopting and, thereafter, reviewing and updating, as may be necessary, the regulatory framework within which navigation on the Rhine and other European waterways operates. In the years since the adoption by CCNR of the Regulation concerning the Carriage of Dangerous Goods on the Rhine (ADNR)[1], the safety and security record and the environmental performance of the inland tank-barge industry in Europe has improved considerably. Such an improvement, however, cannot be brought about by regulation alone; it is also testimony to the good practices adopted and constantly refined by industry, and the dedication to safety and environmental protection of the people it employs.

One of the main functions of the international associations that have prepared this publication is to represent the industry's interests at regulatory bodies such as the Central Commission for the Navigation of the Rhine (CCNR) and the International Maritime Organization (IMO). The European Chemical Industry Council (CEFIC), the European Barge Union (EBU), the European Skippers Organization (ESO), the European Petroleum Industry Association (EUROPIA), the European Sea Ports Organisation (ESPO), the Federation of European Tank Storage (FETSA), the Oil Companies International Marine Forum (OCIMF), and the Society of International Gas Tanker and Terminal Operators (SIGTTO) all contribute to various extents to the work of these regulatory bodies.

This commitment to continuous improvement is demonstrated by the industry's efforts to develop the International Safety Guide for Inland Tank-barges and Terminals – or ISGINTT, as it is known within the industry.

It therefore gives us great pleasure to introduce this first edition of the Guide. The CCNR recognises ISGINTT as the principal industry reference manual on the safe operation of tankers and the terminals that serve them.

This Guide provides best known safety practices on the operation of tank-barges and terminals and also embraces a risk-based control philosophy. By enhancing risk awareness, ISGINTT seeks to foster an environment where the uncertainties associated with some shipboard operations are reduced not solely by prescription, but also by encouraging barge and terminal crew, as well as their employers, to identify the risks in everything they are doing and to then implement fit-for-purpose risk reduction measures. This puts the focus on people and is, therefore, entirely consistent with a strategy related to the human element.

We are confident that ISGINTT will not only contribute to the further improvement of the industry's excellent safety record but will also bring us closer to the goal of zero accidents to which we all aspire. We, therefore, commend it to all interested parties.

In order to ensure wide-spread use, the Guide will also be published in the working languages of the CCNR, i.e. Dutch, French and German. We wish to thank the CCNR member states, as well as the organisations and companies mentioned in the back of the Guide who, with their financial contributions, have made the translation of the Guide into these languages possible.

Jean-Marie Woehrling
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[1] In 2011 the ADNR will be replaced by the "European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways" (ADN) which will be adopted by most member states of the European Union as required by Directive 2008/68/EC and of the United Nations Economic Committee for Europe (UN ECE).

INTRODUCTION

Safety is critical to the tanker industry. The authors of the International Safety Guide for Inland Tank-barges and Terminals (ISGINTT) hope that the Guide will become the standard reference work on the safe operation of inland tank-barges and the terminals they serve. To do so, the Guide must keep abreast of changes in tanker design and operating practice, and reflect the latest technology and legislation.

In this text, account has been taken of the latest thinking on a number of issues including the generation of static electricity and stray currents. The Safety Check-Lists contained in the Guide cover ship/shore as well ship/barge (and vice versa) transhipment of cargo and slops. The authors hope that these Check-Lists comprehensively reflect the individual and joint responsibilities of the tank-barge and the terminal and that the Check-Lists will be adopted universally by ports and terminals.

The Guide is divided into five sections: “General Information”; “Tanker Information”; “Terminal Information”, the “Management of the Tanker and Terminal Interface” and “Additional Information for the Handling of Liquefied Gases”.

The OCIMF “International Safety Guide for Oil Tankers and Terminals” (ISGOTT), 5th Edition and, for certain chapters dealing with gaseous products, the SIGTTO “Liquefied Gas Handling Principles on Ships and In Terminals” were used as templates to avoid gaps and assure compatibility in ship/barge interfaces. Use of any OCIMF and SIGTTO publications in the development of ISGINTT is in no way intended to constitute a waiver of any of the intellectual property rights of OCIMF and SIGTTO in the publication. All intellectual property rights shall be respected.

The authors believe that ISGINTT will provide the best technical guidance on inland tank-barge and terminal operations. All operators are urged to ensure that the recommendations in this Guide are not only read and fully understood, but also followed.

The CCNR has established the ISGINTT Secretariat to support the initial development of the ISGINTT and to ensure its foreseen regular update in the future. The Secretariat encourages the users of the ISGINTT to transmit comments and suggestions for improvement for possible inclusion in future editions. The ISGINTT website not only provides the latest information on the ISGINTT, but serves also as the communication link between users of the ISGINTT on the one side and the experts and organisations, who participated in its development, on the other side.

The ISGINTT website can be found at www.isgintt.org, the ISGINTT Secretariat can be reached by email at secretariat@isgintt.org.

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CONTENTS

FOREWORD v

INTRODUCTION vii

PURPOSE AND SCOPE xxxiii

BIBLIOGRAPHY xxxv

DEFINITIONS xxxix

PART 1 - GENERAL INFORMATION 1

CHAPTER 1 – BASIC PROPERTIES OF BULK LIQUIDS 3

1.1 Vapour Pressure 3
1.1.1 True Vapour Pressure 3
1.1.2 Reid Vapour Pressure 4

1.2 Flammability 4
1.2.1 General 4
1.2.2 Explosive Limits 4
1.2.3 Effect of Inert Gas on Flammability 4
1.2.4 Tests for Flammability 6
1.2.5 Flashpoint 6
1.2.6 Flammability Classification 6

1.3 Density of Hydrocarbon Gases 8

1.4 Corrosiveness 9

CHAPTER 2 - HAZARDS OF BULK LIQUIDS 11

2.1 Flammability 11

2.2 Density 11

2.3 Toxicity 11
2.3.1 Introduction 11
2.3.2 Bulk Liquids 12
2.3.3 Product vapours 13
2.3.4 Material Safety Data Sheets (MSDS) / Safety Data Sheets (SDS) 14
2.3.5 Benzene, other CMR-Products and Aromatic Hydrocarbons 14

2.3.6 Hydrogen Sulphide (H_2S) 15
2.3.7 Mercaptans 20
2.3.8 Gasolines Containing Tetraethyl Lead (TEL) or Tetramethyl Lead (TML) 20
2.3.9 Inert Gas 20
2.3.10 Oxygen Deficiency 21
2.3.11 FAME (Fatty Acid Methyl Ester) 21
2.3.12 MTBE/ETBE 21
2.3.13 Ethanol 22

2.4 Gas Measurement 22
2.4.1 Introduction 22
2.4.2 Measurement of Product Concentration 23
2.4.3 Flammable Gas Monitors (Explosimeters) 23
2.4.4 Non-Catalytic Heated Filament Gas Indicators (Tankscopes) 26
2.4.5 Inferometer (Refractive Index Meter) 28
2.4.6 Infra-red (IR) Instruments 29
2.4.7 Measurement of Low Concentrations of Toxic Gases 31
2.4.8 Fixed Gas Detection Installations 32
2.4.9 Measurement of Oxygen Concentrations 32
2.4.10 Use of Oxygen Analysers 33
2.4.11 Multi-gas Instruments 34
2.4.12 Personal Gas Monitors 34
2.4.13 Gas Sample Lines and Sampling Procedures 35

2.5 Product Gas Evolution and Dispersion 36
2.5.1 Introduction 36
2.5.2 Gas Evolution and Venting 37
2.5.3 Gas Dispersion 39
2.5.4 Variables Affecting Dispersion 39
2.5.5 Minimising Hazards from Vented Gas 45
2.5.6 N/A 47

2.6 N/A 47

2.7 The Hazards Associated with the Handling, Storage and Carriage of Residual Products 47
2.7.1 General 47
2.7.2 Nature of Hazard 47
2.7.3 Flashpoint and Headspace Flammability Measurement 48
2.7.4 Precautionary Measures 48
2.7.5 Hydrogen Sulphide Hazard in Residual Fuel Oils 49

CHAPTER 3 - STATIC ELECTRICITY 51

3.1 Principles of Electrostatics 51
3.1.1 Summary 51
3.1.2 Charge Separation 52
3.1.3 Charge Accumulation 53
3.1.4 Electrostatic Discharge 53
3.1.5 Electrostatic Properties of Gases and Mists 57

3.2 General Precautions Against Electrostatic Hazards 57
3.2.1 Overview 57
3.2.2 Bonding 59
3.2.3 Avoiding Loose Conductive Objects 60

3.3 Other Sources of Electrostatic Hazards 60
3.3.1 Filters 60
3.3.2 Fixed Equipment in Cargo Tanks 60
3.3.3 Free Fall in Tanks 61
3.3.4 Water Mists 61
3.3.5 Inert Gas 62
3.3.6 Discharge of Carbon Dioxide 62
3.3.7 Clothing and Footwear 63
3.3.8 Synthetic Materials 63

CHAPTER 4 - GENERAL HAZARDS FOR TANKER AND TERMINAL 65

4.1 General Principles 65

4.2 Control of Potential Ignition Sources 66
4.2.1 Naked Lights 66
4.2.2 Smoking 66
4.2.3 Galley Stoves and Cooking Appliances 68
4.2.4 Engine and Boiler Rooms 68

4.3 Portable Electrical Equipment 69
4.3.1 General 69
4.3.2 Lamps and Other Electrical Equipment on Flexible Cables (Wandering Leads) 69
4.3.3 Air Driven Lamps 69
4.3.4 Torches (Flashlights), Lamps and Portable Battery Powered Equipment 69
4.3.5 Cameras 70
4.3.6 Other Portable Electrical Equipment 70

4.4 Management of Electrical Equipment and Installations in Dangerous Areas 71
4.4.1 General 71
4.4.2 Dangerous and Hazardous Areas 71
4.4.3 Electrical Equipment 72
4.4.4 Inspection and Maintenance of Electrical Equipment 73
4.4.5 Electrical Repairs, Maintenance and Test Work at Terminals 74

4.5 Use of Tools 75
4.5.1 Grit Blasting and Mechanically Powered Tools 75
4.5.2 Hand Tools 76

4.6 Equipment Made of Aluminium 76

4.7 Cathodic Protection Anodes in Cargo Tanks 76

4.8 Communications Equipment 77
4.8.1 General 77
4.8.2 Tanker's Radio Equipment 77
4.8.3 Tanker's Radar Equipment 78
4.8.4 Automatic Identification Systems (AIS) 78
4.8.5 Telephones 79
4.8.6 Mobile Telephones 79
4.8.7 Pagers 79

4.9 Spontaneous Combustion 80

4.10 Auto-Ignition 80

4.11 Asbestos 80

CHAPTER 5 - FIRE-FIGHTING 81

5.1 Theory of Fire-Fighting 81

5.2 Types of Fire and Appropriate Extinguishing Agents 81
5.2.1 Class A - Fires Involving Solid Materials, Usually of an Organic Nature, in which Combustion Normally Takes Place with the Formation of Glowing Embers 81
5.2.2 Class B - Fires Involving Liquids or Liquefiable Solids 81
5.2.3 Class C - Fires Involving Gases 82
5.2.4 Class D - Fires Involving Metals 83
5.2.5 Class F - Fires Involving Cooking Media (Vegetable or Animal Oils and Fats) in Cooking Appliances 83
5.2.6 Electrical Equipment Fires 83

5.3 Extinguishing Agents 83
5.3.1 Cooling Agents 83
5.3.2 Smothering Agents 84
5.3.3 Flame Inhibiting Agents 86

5.4 Fire Detection Systems 87

5.5 General Precautions 87

CHAPTER 6 -SECURITY 89

6.1 General 89

6.2 Security Assessments 89

6.3 Responsibilities Under the ISPS Code 90

6.4 Security Plans 90

6.5 Security Plans for Inland Tankers 91

6.6 Declaration of Security (DoS) 92

PART 2 - TANKER INFORMATION 95

CHAPTER 7 - SHIPBOARD SYSTEMS 97

7.1 Fixed Inert Gas Systems 97
- 7.1.1 General 97
- 7.1.2 Sources of Inert Gas 97
- 7.1.3 Composition and Quality of Inert Gas 98
- 7.1.4 Methods of Replacing Tank Atmospheres 98
- 7.1.5 Cargo Tank Atmosphere Control 99
- 7.1.6 Application to Cargo Tank Operations 99
- 7.1.7 Precautions to be Taken to Avoid Health Hazards 103
- 7.1.8 Cargo Tank Protection Against Over/Under-Pressure 104
- 7.1.9 N/A 105
- 7.1.10 N/A 105
- 7.1.11 Cold Weather Precautions for Inert Gas Systems 105
- 7.1.12 Inert Gas System Failure 106
- 7.1.13 Inert Gas Plant Repairs 107

7.2 Venting Systems 107
- 7.2.1 General 107
- 7.2.2 Tank Over-Pressurisation and Under-Pressurisation 108

7.3 Cargo and Ballast Systems 110
- 7.3.1 Operation Manual 110
- 7.3.2 Cargo and Ballast System Integrity 110
- 7.3.3 Loading Rates 111
- 7.3.4 Monitoring of Void and Ballast Spaces 113

7.4 Power and Propulsion Systems 113

7.5 N/A 113

7.6 N/A 113

CHAPTER 8 - SHIP'S EQUIPMENT 115

8.1 Shipboard Fire-Fighting Equipment 115
8.1.1 General 115
8.1.2 Tanker Fixed Fire-Fighting Installations - Cooling 115
8.1.3 Tanker Fixed Fire-Fighting Installations - Smothering 115
8.1.4 Portable Fire Extinguishers 116

8.2 Gas Testing Equipment 117
8.2.1 Introduction 117
8.2.2 Summary of Gas Testing Tasks 118
8.2.3 The Provision of Gas Measuring Instruments 119
8.2.4 Alarm Functions on Gas Measuring Instruments 119
8.2.5 Sampling Lines 119
8.2.6 Calibration 120
8.2.7 Operational Testing and Inspection 120
8.2.8 Disposable Personal Gas Monitors 121

8.3 Lifting Equipment 121
8.3.1 Inspection and Maintenance 121
8.3.2 Training 122

CHAPTER 9 - MANAGEMENT OF SAFETY AND EMERGENCIES 123

9.1 The International Safety Management (ISM) Code 123

9.2 Safety Management Systems 124
9.2.1 Risk Assessment 125

9.3 Permit to Work Systems 125
9.3.1 General 125
9.3.2 Permit to Work Systems - Structure 126
9.3.3 Permit to Work Systems - Principles of Operation 127
9.3.4 Permit to Work Forms 127
9.3.5 Work Planning Meetings 128

9.4 Hot Work 128
9.4.1 Control of Hot Work 128
9.4.2 Hot Work Inside a Designated Space 128
9.4.3 Hot Work Outside a Designated Space 129
9.4.4 Hot Work in Dangerous or Hazardous Areas 131

9.5 Welding and Burning Equipment 137

9.6 Other Hazardous Tasks 137

9.7 Management of Contractors 138

9.8 Repairs at a Facility Other Than a Shipyard 138
9.8.1 Introduction 138
9.8.2 General 138
9.8.3 Supervision and Control 139
9.8.4 Pre-Arrival Planning 139
9.8.5 Mooring Arrangements 139
9.8.6 Shore Facilities 140
9.8.7 Pre-Work Safety Meeting 140
9.8.8 Work Permits 141
9.8.9 Tank Condition 141
9.8.10 Cargo Lines 141
9.8.11 Fire-Fighting Precautions 142
9.8.12 Dedicated Safety Responsible Person 142
9.8.13 Hot Work 142

9.9 Shipboard Emergency Management 143
9.9.1 General 143
9.9.2 Tanker Emergency Plan 143
9.9.3 Actions in the Event of an Emergency 145

CHAPTER 10 - ENCLOSED SPACES 147

10.1 Definition and General Caution 147

10.2 Hazards of Enclosed Spaces 147
10.2.1 Assessment of Risk 147
10.2.2 Respiratory Hazards 148
10.2.3 Cargo Vapours and Toxic Gases 148
10.2.4 Particular Toxic Vapours 149
10.2.5 Oxygen Deficiency 149
10.2.6 N/A 150

10.3 Atmosphere Tests Prior to Entry 150

10.4 Control of Entry into Enclosed Spaces 151

10.5 Safeguards for Enclosed Space Entry 152

10.6 Emergency Procedures 153
10.6.1 Evacuation from Enclosed Spaces 153
10.6.2 Rescue from Enclosed Spaces 153
10.6.3 Resuscitation 153

10.7 Entry into Enclosed Spaces with Atmospheres Known or Suspected to be Unsafe for Entry 154

10.8 Respiratory Protective Equipment 155
10.8.1 Self-Contained Breathing Apparatus (SCBA) 155
10.8.2 Air Line Breathing Apparatus 156
10.8.3 Emergency Escape Breathing Device (EEBD) 157
10.8.4 Cartridge or Canister Face Masks 158
10.8.5 Hose Mask (Fresh Air Breathing Apparatus) 159
10.8.6 Equipment Maintenance 159
10.8.7 Stowage 159
10.8.8 Training 159

10.9 Work in Enclosed Spaces 159
10.9.1 General Requirements 159
10.9.2 Opening Equipment and Fittings 160
10.9.3 Use of Tools 160
10.9.4 Use of Electric Lights and Electrical Equipment 160
10.9.5 Removal of Sludge, Scale and Sediment 160
10.9.6 N/A 160

10.10 Pumproom Entry Precautions 161
10.10.1 Ventilation 161
10.10.2 Pumproom Entry Procedures 161

10.11 Pumproom Operational Precautions 162
10.11.1 General Precautions 162
10.11.2 Cargo and Ballast Line Draining Procedures 163
10.11.3 Routine Maintenance and Housekeeping Issues 163
10.11.4 Maintenance of Electrical Equipment in the Pumproom 164
10.11.5 Inspection and Maintenance of Pumproom Ventilation Fans 164
10.11.6 Testing of Alarms and Trips 164
10.11.7 Miscellaneous 164

CHAPTER 11 - SHIPBOARD OPERATIONS 167

11.1 Cargo Operations 167
11.1.1 General 167
11.1.2 Setting of Lines and Valves 167
11.1.3 Valve Operation 167
11.1.4 Pressure Surges 168
11.1.5 Butterfly and Non-Return (Check) Valves 168
11.1.6 Loading Procedures 168
11.1.7 Loading Static Accumulator Oils 173
11.1.8 Loading Very High Vapour Pressure Cargoes 180
11.1.9 Loading Cargoes Containing Hydrogen Sulphide (H_2S) 181
11.1.10 Loading Cargoes Containing Benzene 182

11.1.11 Loading Heated Products 182
11.1.12 Loading Over the Top (sometimes known as 'Loading Overall') 183
11.1.13 Loading at Terminals Having Vapour Emission Control (VEC) Systems 183
11.1.14 Discharging Procedures 186
11.1.15 Pipeline and Hose Clearing Following Cargo Operations 189

11.2 Stability, Stress, Trim and Sloshing Considerations 192
11.2.1 General 192
11.2.2 Free Surface Effects 192
11.2.3 Sloshing 193
11.2.4 Loading and Discharge Planning 193

11.3 Tank Cleaning 194
11.3.1 General 194
11.3.2 Tank Washing Risk Management 194
11.3.3 Supervision and Preparation 195
11.3.4 Tank Atmospheres 195
11.3.5 Tank Washing 196
11.3.6 Precautions for Tank Washing 200

11.4 Gas Freeing 203
11.4.1 General 203
11.4.2 Gas Free for Entry Without Breathing Apparatus 203
11.4.3 Procedures and Precautions 204
11.4.4 Gas Testing and Measurement 205
11.4.5 Fixed Gas Freeing Equipment 205
11.4.6 Portable Fans 205
11.4.7 Ventilating Double Hull Ballast Tanks 206
11.4.8 Gas Freeing in Preparation for Hot Work 206

11.5 N/A 206

11.6 Ballast Operations 206
11.6.1 Introduction 206
11.6.2 General 206
11.6.3 Loading Cargo Tank Ballast 206
11.6.4 Loading Segregated Ballast 207
11.6.5 Deballasting in Port 208
11.6.6 Discharging Segregated Ballast 208
11.6.7 N/A 209
11.6.8 N/A 209

11.7 Cargo Leakage into Double Hull Tanks 209
11.7.1 Action to be Taken 209
11.7.2 N/A 210
11.8 Cargo Measurement, Ullaging, Dipping and Sampling 210
11.8.1 General 210
11.8.2 Measuring and Sampling Non-Inerted Tanks 211
11.8.3 Measuring and Sampling Inerted Tanks 214
11.8.4 Measuring and Sampling Cargoes Containing Toxic Substances 217
11.8.5 Closed Gauging for Custody Transfer 217
11.9 Transfers Between Vessels 218
11.9.1 Tanker-to-Tanker Transfers 218
11.9.2 Seegoing Vessel-to-Inland Tanker and Inland Tanker-to-Seegoing Vessel 218
11.9.3 Tanker-to-Tanker Transfers Using Vapour Balancing 219
11.9.4 Tanker-to-Tanker Transfers Using Terminal Facilities 219
11.9.5 Tanker-to-Tanker Electric Currents 219

CHAPTER 12 - CARRIAGE AND STORAGE OF HAZARDOUS MATERIALS 221

12.1 Liquefied Gases 221
12.2 Tanker's Stores 222
12.2.1 General 222
12.2.2 Paint 222
12.2.3 Chemicals 222
12.2.4 Cleaning Liquids 222
12.2.5 Spare Gear Storage 222
12.3 Cargo and Bunker Samples 223
12.4 Other Materials 223
12.4.1 Sawdust, Oil Absorbent Granules and Pads 223
12.4.2 Garbage 223

12.5 Packaged Cargoes 223
12.5.1 Petroleum and Other Flammable Liquids 223
12.5.2 N/A 225
12.5.3 Entry into Holds 225
12.5.4 Portable Electrical Equipment 225
12.5.5 Smothering Type Fire Extinguishing Systems 225
12.5.6 Fire-Fighting Precautions 225
12.5.7 Forecastle Spaces 225
12.5.8 Material Stowed on Deck 226
12.5.9 N/A 226

CHAPTER 13 - HUMAN ELEMENT CONSIDERATIONS 227

13.1 Manning Levels 227
13.2 Training and Experience 228
13.3 Hours of Rest 229
13.3.1 Statutory Requirements 229
13.3.2 Fatigue 230
13.4 Drug and Alcohol Policy 230
13.4.1 Industry Guidelines 230
13.4.2 Control of Alcohol 230
13.4.3 Drug and Alcohol Testing Programmes 231
13.5 Drug Trafficking 231
13.6 Employment Practices 231

CHAPTER 14 - SPECIAL SHIP TYPES - N/A 233

PART 3 - TERMINAL INFORMATION 235

CHAPTER 15 - TERMINAL MANAGEMENT AND INFORMATION 237

15.1 Compliance 237

15.2 Hazard Identification and Risk Management 238

15.3 Operating Manual 238

15.4 Terminal Information and Port Regulations 239

15.5 Supervision and Control 239
15.5.1 Manning Levels 239
15.5.2 De-Manning of Berths During Cargo Handling 240
15.5.3 Checks on Quantity During Cargo Handling 240
15.5.4 Training 240

15.6 Tanker and Berth Compatibility 240
15.6.1 Maximum Draught 241
15.6.2 Maximum Displacement 241
15.6.3 Length Overall (LOA) 241
15.6.4 Other Criteria 241

15.7 Documentation 242

CHAPTER 16 - TERMINAL OPERATIONS 243

16.1 Pre-Arrival Communications 243

16.2 Mooring 243
16.2.1 Mooring Equipment 243

16.3 Limiting Conditions for Operations 244

16.4 Tanker/Shore Access 244
16.4.1 General 244
16.4.2 Provision of Tanker/Shore Access 245
16.4.3 Access Equipment 245
16.4.4 Sighting of Gangway 246
16.4.5 Safety Nets 246
16.4.6 Routine Maintenance 246
16.4.7 Unauthorised Persons 247
16.4.8 Persons Smoking or Intoxicated 247

16.5 Double Banking 247

16.6 Over the Tide Cargo Operations 247
16.6.1 Discharging Over the Tide 248
16.6.2 Loading Over the Tide 248
16.7 Operations Where the Tanker is not Always Afloat 248
16.8 Generation of Pressure Surges in Pipelines 249
16.8.1 Introduction 249
16.8.2 Generation of a Pressure Surge 249
16.9 Assessment of Pressure Surges 251
16.9.1 Effective Valve Closure Time 251
16.9.2 Derivation of Total Pressure in the System 251
16.9.3 Overall System Design 251
16.10 Reduction of Pressure Surge Hazard 252
16.10.1 General Precautions 252
16.10.2 Limitation of Flow Rate to Avoid the Risk of a Damaging Pressure Surge 252
16.11 Pipeline Flow Control as a Static Precaution 253
16.11.1 General 253
16.11.2 Flow Control Requirements 253
16.11.3 Controlling Loading Rates 253
16.11.4 Discharge into Shore Installations 253

CHAPTER 17 - TERMINAL SYSTEMS AND EQUIPMENT 255

17.1 Electrical Equipment 255
17.2 Fendering 255
17.3 Lifting Equipment 256
17.3.1 Inspection and Maintenance 256
17.3.2 Training in the Use of Lifting Equipment 256
17.4 Lighting 257

17.5 Tanker/Shore Electrical Isolation 257
17.5.1 General 257
17.5.2 Tanker-to-Shore Electric Currents 257
17.5.3 N/A 259
17.5.4 Tanker/Shore Bonding Cables 259
17.5.5 Insulating Flange 260
17.6 Earthing and Bonding Practice in the Terminal 262
17.7 Vigilance Control (Dead Man's Switch) 263

CHAPTER 18 - CARGO TRANSFER EQUIPMENT 265

18.1 Metal Cargo Arms 265
18.1.1 Operating Envelope 265
18.1.2 Forces on Manifolds 265
18.1.3 Tanker Manifold Restrictions 266
18.1.4 Inadvertent Filling of Arms while Parked 266
18.1.5 Ice Formation 266
18.1.6 Mechanical Couplers 266
18.1.7 Wind Forces 267
18.1.8 Precautions when Connecting and Disconnecting Arms 267
18.1.9 Precautions while Arms are Connected 267
18.1.10 Powered Emergency Release Couplings (PERCs) 267
18.2 Cargo Hoses 268
18.2.1 General 268
18.2.2 Types and Applications 268
18.2.3 Performance 269
18.2.4 Marking 269
18.2.5 Flow Velocities 269
18.2.6 Inspection, Testing and Maintenance Requirements for Dock Cargo Hoses 270
18.2.7 Hose Flange Standards 275
18.2.8 Operating Conditions 275
18.2.9 Extended Storage 275
18.2.10 Checks Before Hose Handling 276
18.2.11 Handling, Lifting and Suspending 276
18.2.12 N/A 278
18.2.13 N/A 278
18.3 Vapour Emission Control Systems 278

CHAPTER 19 - SAFETY AND FIRE PROTECTION 279

19.1 Safety 279
19.1.1 Design Considerations 279
19.1.2 Safety Management 280
19.1.3 Permit to Work Systems - General Considerations 280

19.2 Terminal Fire Protection 281
19.2.1 General 281
19.2.2 Fire Prevention and Isolation 282
19.2.3 Fire Detection and Alarm Systems 282
19.2.4 Automatic Detection Systems 282
19.2.5 Selection of Fire Detectors 283
19.2.6 Location and Spacing of Fire Detectors 283
19.2.7 Fixed Combustible and Toxic Gas Detectors 284
19.2.8 Locating Fixed Combustible and Toxic Gas Detectors 284
19.2.9 Fixed Combustible and Toxic Gas Analysers 284
19.2.10 Fire Extinguishing System Compatibility 286

19.3 Alarm and Signalling Systems 286
19.3.1 Types of Alarm Systems 286
19.3.2 Types of Signal 286
19.3.3 Alarm and Signalling System Design 286
19.3.4 Alternative Alarm and Signalling System Design 287
19.3.5 Interface Between Detection Systems and Alarm or Fire Extinguishing Systems - Circuit Design 287
19.3.6 Electric Power Sources 287

19.4 Detection and Alarm Systems at Terminals Handling Crude Oil, Petroleum and Chemical Products 288
19.4.1 General 288
19.4.2 Control Rooms/Control Buildings 289

19.5 Fire-Fighting Equipment 289
19.5.1 Terminal Fire-Fighting Equipment 290
19.5.2 Portable and Wheeled Fire Extinguishers and Monitors 290
19.5.3 Terminal Fixed Fire-Fighting Equipment 291

19.6 Water-Borne Fire-Fighting Equipment 297

19.7 Protective Clothing 298

19.8 Access for Fire-Fighting Services 298

CHAPTER 20 - EMERGENCY PREPAREDNESS 299

20.1 Overview 299

20.2 Terminal Emergency Planning - Plan Components and Procedures 300
20.2.1 Preparation 300
20.2.2 Control 301
20.2.3 Communications and Alarms 302
20.2.4 Site Plans and Maps 303
20.2.5 Access to Equipment 303
20.2.6 Road Traffic Movement and Control 303
20.2.7 Outside Services 304
20.2.8 Training for Emergencies 305

20.3 Definition and Hierarchy of Emergencies 306
20.3.1 General 306
20.3.2 Hierarchy of Emergencies 306
20.3.3 Assessing Risks 307

20.4 Terminal Emergency Plan 307
20.4.1 Format 307
20.4.2 Preparation 308
20.4.3 Resource Availability 308
20.4.4 Miscellaneous Organisational Items 309

20.5 Emergency Removal of Tanker from Berth 311

CHAPTER 21 - EMERGENCY EVACUATION 313

21.1 General 313
21.1.1 Tanker Evacuation 314
21.1.2 Non-Essential Personnel 314

21.2 Evacuation and Personnel Escape Routes 314
21.2.1 Primary and Secondary Escape Routes 314
21.2.2 Protection of Personnel 314
21.2.3 Boat Access 315
21.2.4 Availability of Rescue Craft 315
21.2.5 Life Saving Appliances 315

21.3 N/A 316

21.4 Training and Drills 316

PART 4 - MANAGEMENT OF THE TANKER AND TERMINAL INTERFACE 317

CHAPTER 22 - COMMUNICATIONS 319

22.1 Procedures and Precautions 319
22.1.1 Communications Equipment 319
22.1.2 Communications Procedures 319
22.1.3 Compliance with Terminal and Local Regulations 320

22.2 Pre-Arrival Exchange of Information 320
22.2.1 Exchange of Security Information 320
22.2.2 Tanker to Appropriate Competent Authority 320
22.2.3 Tanker to Terminal 321
22.2.4 Terminal to Tanker 321

22.3 Pre-Berthing Exchange of Information 322
22.3.1 Tanker to Terminal and/or Pilot 322
22.3.2 Terminal and/or Pilot to Tanker 322

22.4 Pre-Transfer Exchange of Information 322
22.4.1 Tanker to Terminal 323
22.4.2 Terminal to Tanker 324

22.5 Agreed Loading Plan 325

22.6 Agreed Discharge Plan 326

22.7 Agreement to Carry Out Repairs 327
22.7.1 Repairs on the Tanker 327
22.7.2 Repairs on the Terminal 328
22.7.3 Use of Tools whilst a Tanker is Alongside a Terminal 328

CHAPTER 23 - MOORING 329

23.1 Personnel Safety 329

23.2 Security of Moorings 329

23.3 Preparations for Arrival 329
23.3.1 Tanker's Mooring Equipment 329
23.3.2 Assisting Craft 330
23.3.3 Emergency Use of Tugs or Other Craft 330

23.4 Mooring at Jetty Berths 330
23.4.1 Type and Quality of Mooring Lines 331
23.4.2 Management of Moorings at Alongside Berths 331

23.5 N/A 333

CHAPTER 24 - PRECAUTIONS ON TANKER AND TERMINAL DURING CARGO HANDLING 335

24.1 External Openings in Accommodation and Engine Rooms 335

24.2 Air Conditioning and Ventilation Systems 336

24.3 Openings in Cargo Tanks 337
- 24.3.1 Cargo Tank Lids 337
- 24.3.2 Sighting and Ullage Ports 337
- 24.3.3 Cargo Tank Vent Outlets 337
- 24.3.4 Tank Washing Openings 337

24.4 Inspection of Tanker Cargo Tanks Before Loading 338

24.5 Segregated Ballast Tank Lids 338

24.6 Tanker and Shore Cargo Connections 338
- 24.6.1 Flange Connections 338
- 24.6.2 Removal of Blank Flanges 339
- 24.6.3 Reducers and Spools 339
- 24.6.4 Lighting 339
- 24.6.5 Emergency Release 339

24.7 Accidental Product Spillage and Leakage 340
- 24.7.1 General 340
- 24.7.2 N/A 340
- 24.7.3 Scupper Plugs 340
- 24.7.4 Spill Containment 341
- 24.7.5 Tanker and Shore Cargo Pipelines not in Use 341

24.8 Fire-Fighting Equipment 341

24.9 Proximity to Other Vessels 341
- 24.9.1 Tankers at Adjacent Berths 341
- 24.9.2 General Cargo Tankers at Adjacent Berths 341
- 24.9.3 Tanker Operations at General Cargo Berths 342
- 24.9.4 Tugs and Other Craft Alongside 342

24.10 Notices 343
24.10.1 Notices on the Tanker 343
24.10.2 Notices on the Terminal 343
24.11 Manning Requirements 344
24.12 Control of Naked Flames and Other Potential Ignition Sources 344
24.13 Control of Vehicles and Other Equipment 344
24.14 N/A 344

CHAPTER 25 - BUNKERING OPERATIONS 345

25.1 General 345
25.2 Bunkering Procedures 345
25.3 The Bunkering Operation 346
25.4 The Bunkering Safety Check-List for Bunker Delivery to Inland Ships 346
25.4.1 General 346
25.4.2 Guidelines for Use 347
25.4.3 Bunkering Safety Check-List for Bunker Delivery to Inland Ships 349

CHAPTER 26 - SAFETY MANAGEMENT 351

26.1 Climatic Conditions 351
26.1.1 Terminal Advice of Adverse Weather Conditions 351
26.1.2 Wind Conditions 352
26.1.3 Electrical Storms (Lightning) 352
26.2 Personnel Safety 352
26.2.1 Personal Protective Equipment (PPE) 352
26.2.2 Slip and Fall Hazards 352
26.2.3 Personal Hygiene 353
26.2.4 Clothing Made of Synthetic Materials 353
26.3 The Safety Check-Lists 353
26.3.1 General 353
26.3.2 Guidelines for Use 354
26.3.3 Example Safety Letter 357
26.4 Guidelines for Completing the Tanker-Shore Safety Check-List 358

26.5 Emergency Actions 358
26.5.1 Fire or Explosion on a Berth 358
26.5.2 Fire on a Tanker at a Terminal or on the other Tanker 358
26.5.3 International Shore Fire Connection (if required) 361
26.5.4 Emergency Release Procedures 362
26.5.5 Emergency Towing-Off Pennants 362

PART 5 - GAS 363

CHAPTER 27 – BASIC PROPERTIES OF LIQUEFIED GASES 365

27.1 Liquefied Gases 365
27.2 Liquefied Gas Production 366
27.2.1 LNG Production 366
27.2.2 LPG Production 369
27.2.3 Production of Chemical Gases 371
27.2.4 The Principal Products 372
27.3 Chemical Structure of Gases 374
27.4 Saturated and Unsaturated Hydrocarbons 377
27.5 The Chemical Gases 378
27.6 Chemical Properties 380
27.7 Inert Gas and Nitrogen 384
27.8 Polymerisation 385
27.9 Hydrate Formation 387
27.10 Lubrication 388
27.11 Physical Properties 389
27.12 States of Matter 389
27.12.1 Solids, Liquids and Gases 389
27.12.2 Spillage of Liquefied Gas 391
27.12.3 Vaporisation of Spilled Liquid 392
27.13 Principles of Refrigeration 392
27.14 Critical Temperatures and Pressures 394
27.15 Liquid/Vapour Volume Relationships 394
27.16 Ideal Gas Laws 394

27.17 Saturated Vapour Pressure 398
27.18 Liquid and Vapour Densities 402
27.18.1 Liquid Density 402
27.18.2 Vapour Density 403
27.19 Physical Properties of Gas Mixtures 403
27.20 Bubble Points and Dew Points for Mixtures 405
27.21 Reliquefaction and Enthalpy 407
27.21.1 Enthalpy 407
27.21.2 Refrigeration 407
27.22 Flammability 409
27.23 Suppression of Flammability by Inert Gas 414
27.24 Sources of Ignition 416

CHAPTER 28 – HAZARDS OF GASES 417

28.1 Cargo Hazards 417
28.2 Flammability 420
28.2.1 Operational Aspects 420
28.2.2 Emergency Aspects 420
28.3 Air Deficiency 420
28.3.1 Toxicity 420
28.3.2 Asphyxia (Suffocation) 422
28.3.3 Medical Treatment 423
28.3.4 Oxygen Therapy 426
28.4 Frostbite 427
28.5 Chemical Burns 428
28.6 Transport to Hospital 428
28.7 Hazardous Atmospheres 429
28.7.1 The Need for Gas Testing 429
28.7.2 Oxygen Analysers 429
28.7.3 Combustible Gas Indicators 429
28.7.4 Toxicity Detectors 429

CHAPTER 29 – STATIC ELECTRICITY 431

29.1 Electrostatics 431

CHAPTER 30 – FIRE-FIGHTING 433

30.1 The Principal Hazards 433
30.1.1 Flammability 433

30.2 Liquefied Gas Fires 434
30.2.1 General 434
30.2.2 Jet Fires 434
30.2.3 Liquid (pool) Fires 434
30.2.4 Fires in Compressor Rooms 436
30.2.5 Manifold Fires 436

30.3 Liquefied Gas Fire-Fighting 436
30.3.1 Extinguishing Mediums 436
30.3.2 Training 438

CHAPTER 31 – SHIPBOARD SYSTEMS 439

31.1 Cargo Pipelines and Valves 439
31.1.1 Cargo Pipelines 439
31.1.2 Cargo Valves 440
31.1.3 Emergency Shut-down (ESD) Systems 441
31.1.4 Relief Valves for Cargo Tanks and Pipelines 442

31.2 Cargo Pumps 443

31.3 Cargo Heaters 451

31.4 Cargo Vaporisers 452

31.5 Reliquefaction Plants and Boil-Off Control 452
31.5.1 Indirect Cycles 453
31.5.2 Direct Cycles 453

31.6 Cargo Compressors and Associated Equipment 458
31.6.1 Reciprocating Compressors 458
31.6.2 Screw Compressors 461
31.6.3 Compressor Suction Liquid Separator 462
31.6.4 Purge Gas Condenser 462

31.7 Inert Gas and Nitrogen Systems 463
31.7.1 Nitrogen Production on Tankers 463
31.7.2 Pure Nitrogen from the Shore 464
31.8 Electrical Equipment in Gas Dangerous Spaces 464
31.9 Instrumentation 466
31.9.1 Liquid Level Instrumentation 466
31.9.2 Level Alarm and Automatic Shut-down Systems 467
31.9.3 Pressure and Temperature Monitoring 467

CHAPTER 32 – SHIPBOARD OPERATIONS 469

32.1 Sequence of Operations 469
32.2 Tank Inspection, Dryng and Inerting 470
32.2.1 Tank Inspection 470
32.2.2 Drying 470
32.2.3 Inerting – Before Loading 471
32.3 Gassing-up 475
32.4 Cool-Down 477
32.5 Loading 479
32.5.1 Loading – Preliminary Procedures 479
32.5.2 Control of Vapours During Loading 481
32.5.3 Loading – Early Stages 482
32.5.4 Bulk Loading 485
32.5.5 Cargo Tank Filling Limits 486
32.6 The Loaded Voyage 488
32.6.1 Operation of the Reliquefaction Plant 490
32.7 Discharging 491
32.7.1 Discharge by Pressurising the Vapour Space 491
32.7.2 Discharge by Pumps 491
32.7.3 Discharge via Booster Pump and Cargo Heater 496
32.7.4 Draining Tanks and Pipelines 497
32.8 The Ballast Voyage 498
32.9 Changing Cargo (and Preparation for Drydock) 498
32.9.1 Removal of Remaining Liquid 499
32.9.2 Warming-up 500
32.9.3 Inerting – After Discharge 501
32.9.4 Aerating 502
32.9.5 Ammonia – Special Procedures 503

32.10 Ship-To-Ship Transfer 504
32.11 Conclusion 504

CHAPTER 33 – TYPES OF GAS CARRIERS 505

33.1 Types of Gas Carriers 505
33.2 Cargo Containment Systems 507
33.2.1 Independent Tanks 507
33.2.2 Membrane Tanks (Membrane – 0.7 to 1.5 mm thick) 511
33.2.3 Semi-Membrane Tanks 515
33.2.4 Integral Tanks 515
33.3 Materials of Construction and Insulation 515
33.3.1 Construction Materials 515
33.3.2 Tank Insulation 516

INDEX 519

APPENDICES

Appendix 1: Tanker - Shore Safety Check-List
Appendix 2: Seagoing - Inland Tanker / Inland Tanker Safety Check-List
Appendix 3: Hazardous Disposal Safety Check-List
Appendix 4: Non hazardous Disposal Safety Check-List
Appendix 5: Bunkering Safety Check-List for Bunker Delivery to Inland Ships
Appendix 6: Bunkering Safety Check-List for Bunker Delivery to Maritime Ships
Appendix 7: Guidelines for Completing the Safety Check-Lists

PURPOSE AND SCOPE

The purpose of this Guide is to improve safety of transport of dangerous goods at the interface of inland tank-barges with other vessels or shore facilities (terminals). The Guide is not intended to create, to replace or to amend current legal requirements, but to provide additional guidelines that should not be part of legal requirements.

The safety Guide is recommended for implementation by the participating industry organisations CEFIC, EBU, ESO, ESPO, EUROPIA, FETSA, IAPH, OCIMF, ICS and SIGTTO with the necessary political and legal support of CCNR.

This Guide makes recommendations for tanker and terminal personnel on the safe carriage and handling of such products that are normally carried in petroleum, chemicals or liquefied gas tankers and terminals handling those vessels.

The purpose of the Guide is also to provide operational advice to assist personnel directly involved in tanker and terminal operations. It does not provide a definitive description of how tanker and terminal operations are conducted. It does, however, provide guidance on, and examples of, certain aspects of tanker and terminal operations and how they may be managed. Effective management of risk demands processes and controls that can quickly adapt to change. Therefore, the guidance given is, in many cases, intentionally non-prescriptive and alternative procedures may be adopted by some operators in the management of their operations. These alternative procedures may exceed the recommendations contained in this Guide.

When adopting alternative procedures, operators should follow a risk based management process that incorporates systems for identifying and assessing the risks and for demonstrating how they are managed. For shipboard operations, this course of action must satisfy the requirements of relevant legislation.

It should be borne in mind that, in all cases, the advice given in the Guide is subject to any local or national terminal regulations that may be applicable, and those concerned should ensure that they are aware of any such requirements.

It is recommended that a copy of the Guide be kept and used on board every tanker and in every terminal to provide advice on operational procedures and the shared responsibility for operations at the ship/shore interface.

Certain subjects are dealt with in greater detail in other publications issued by CCNR, OCIMF, ICS or SIGTTO or by other inland navigation or maritime intergovernmental organisations or industry organisations. Where this is the case, an appropriate reference is made, and a list of these publications is given in the bibliography.

It is not the purpose of the Guide to make recommendations on design or construction of tankers. Information on these matters may be obtained from intergovernmental organisations, national authorities and from authorised bodies such as classification societies active in the field of inland navigation. Similarly, the Guide does not attempt to deal with certain other safety related matters, e.g. navigation and shipyard safety, although some aspects are inevitably touched upon.

Finally, the Guide is not intended to encompass floating installations including Floating Production Storage and Offloading Units (FPSOs) and Floating Storage Units (FSUs); operators of such installations may, however, wish to consider the guidance given to the extent that good tanker practice is equally applicable to their operations.

BIBLIOGRAPHY

The following publications are referred to within this Guide or represent a source of good industry information and should be consulted as appropriate for additional information.

BSI	Circular Flanges for Pipes, Valves and Fittings (Class Designated). Steel, Cast Iron and Copper Alloy Flanges. Specification for Steel Flanges (BS 1560. 3-1)
CEN	Classification of Fires (EN 2)
IMO	Code for Existing Ships Carrying Liquefied Gases in Bulk
IMO	Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
IMO	Crude Oil Washing Systems
EU	Directive of the European Parliament and of the Council of 12 December 2006 laying down technical requirements for inland waterway vessels and repealing Council Directive 82/714/EEC (2006/87/EC)
EU	Directive 2008/68/EC of the European Parliament and of the Council of 24 September 2008 on the inland transport of dangerous goods
ICS	Drug Trafficking and Drug Abuse: Guidelines for Owners and Masters on Prevention, Detection and Recognition
CEN	Explosive Atmospheres - Part 10-1: Classification of Areas Explosive Gas Atmospheres (EN 60079-10-1)
IEC	Electrical Installations in Ships - Part 502: Tankers - Special Features (IEC 60092-502)
CENELEC	Electrostatics - Code of Practice for the Avoidance of Hazards Due to Static Electricity (Technical Report CLC/TR 50404)
IMO	Emergency Procedures for Ships Carrying Dangerous Goods – Group Emergency Schedules
UNECE	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN)

UNECE	European Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
IMO	Guidelines on Fatigue
IMO	Guidelines for Maintenance and Monitoring of Onboard Materials Containing Asbestos (MSC/Circ.1045, 28 May 2002)
OCIMF	Guidelines for the Control of Drugs and Alcohol Onboard Ship
IMO	Guidelines on Maintenance and Inspection of Fire Protection Systems and Appliances (MSC/Circ.850, 8 June 1998)
Energy Institute	HM 50. Guidelines for the Cleaning of Tanks and Lines for Marine Tank Vessels Carrying Petroleum and Refined Products
IMO	IGC Code - The International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
IMO	IMDG Code - the International Maritime Dangerous Goods Code
CEN	Inland navigation vessels - Installation of berths and loading areas (EN 14329)
OCIMF	International Safety Guide for Oil Tankers and Terminals (ISGOTT)
IMO	International Safety Management (ISM) Code
IMO	ISPS - International Ship and Port Facility Security Code
SIGTTO/OCIMF	Jetty Maintenance and Inspection Guide
SIGTTO	Liquefied Gas Handling Principles on Ships and in Terminals
OCIMF	Marine Terminal Baseline Criteria and Assessment Questionnaire
OCIMF	Marine Terminal Training and Competence Assessment Guidelines for Oil and Petroleum Product Terminals
IMO	MARPOL 73/78 - International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978
EFOA	MTBE/ETBE Transport over Inland Waterway Guidelines
ICS	Model Ship Security Plan
IMO	Recommendations for Material Safety Data Sheets (MSDS) for MARPOL Annex I Oil Cargo and Oil Fuel (MSC Res. 286(86))
IMO	Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas

CCNR	Regulation concerning the Carriage of Dangerous Goods on the Rhine (ADNR)
CCNR	Rhine Vessel Inspection Regulation
IMO	SOLAS 74/88 - International Convention for the Safety of Life at Sea, 1974 and 1988 Protocol, as amended
IMO	Standards for Vapour Emission Control Systems (MSC/Circ.585, 16 April 1992)
CEN	Transport Quality Management System - Road, Rail and Inland navigation transport - Quality management system requirements to supplement EN ISO 9001 for the transport of dangerous goods with regard to safety (EN 12798)

Details of these and other publications are available from the following internet web sites:

CDI	www.cdi.org.uk
CDIT	www.cdit.nl
CEFIC	www.cefic.org
CCNR	www.ccr-zkr.org
DC	www.ccr-zkr.org
EBIS	www.ebis.nl
EFOA	www.efoa.org
EIGA	www.eiga.org
IAPH	www.iaphworldports.org
ICS	www.marisec.org
IMO	www.imo.org
IVR	www.ivr.nl
OCIMF	www.ocimf.com
SIGTTO	www.sigtto.org
UNECE	www.unece.org

DEFINITIONS

For the purpose of this Guide, the following definitions apply:

Adiabatic

Describes an ideal process undergone by a gas in which no gain or loss of heat occurs.

Administration

Means the government of the state whose flag the ship is entitled to fly.

ALARP

As low as reasonably practicable.

Antistatic additive

A substance added to a petroleum product to raise its electrical conductivity to a safe level above 50 picoSiemens/metre (pS/m) to prevent accumulation of static electricity.

Approved equipment

Equipment of a design that has been tested and approved by an appropriate authority, such as a government department or classification society. The authority should have certified the equipment as safe for use in a specified hazardous or dangerous area.

Auto-ignition

The ignition of a combustible material without initiation by a spark or flame, when the material has been raised to a temperature at which self-sustaining combustion occurs.

Barge

Any cargo vessel for inland navigation.

Boil-off

Boil-off is the vapour produced above the surface of a boiling cargo due to evaporation. It is caused by heat ingress or a drop in pressure.

Boiling Point

The temperature at which the vapour pressure of a liquid is equal to the pressure on its surface (the boiling point varies with pressure).

Bonding

The connecting together of metal parts to ensure electrical continuity.

Booster Pump

A pump used to increase the discharge pressure from another pump (such as a cargo pump).

Bulk Cargo

Cargo carried as a liquid in cargo tanks and not shipped in drums, containers or packages.

Carbamates

A white powdery substance produced by the reaction of ammonia with carbon dioxide.

Carcinogen

A substance capable of causing cancer.

Cargo Area

That part of the ship which contains the cargo containment system, cargo pumps and compressor rooms, and includes the deck area above the cargo containment system. Where fitted, cofferdams, ballast tanks and void spaces at the after end of the aftermost hold space or the forward end of the forward most hold space are excluded from the cargo area. (Refer to the Gas Codes for a more detailed definition).

Cargo Containment Systems

The arrangement for containment of cargo including, where fitted, primary and secondary barriers, associated insulations, interbarrier spaces and the structure required for the support of these elements. (Refer to the Gas Codes for a more detailed definition.)

Cascade Reliquefaction Cycle

A process in which vapour boil-off from cargo tanks is condensed in a cargo condenser in which the coolant is a refrigerant gas such as R22 or equivalent. The refrigerant gas is then compressed and passed through a conventional sea water-cooled condenser.

Cathodic protection

The prevention of corrosion by electrochemical techniques. On tankers, it may be applied either externally to the hull or internally to the surfaces of tanks. At terminals, it is frequently applied to steel piles and fender panels.

Cavitation

A process occurring within the impeller of a centrifugal pump when pressure at the inlet to the impeller falls below that of the vapour pressure of the liquid being pumped. The bubbles of vapour which are formed collapse with impulsive force in the higher pressure regions of the impeller. This effect can cause significant damage to the impeller surfaces and, furthermore, pumps may loose suction.

Certificate of Fitness

A certificate issued by a flag administration confirming that the structure, equipment, fittings, arrangements and materials used in the construction of a gas carrier are in compliance with the relevant Gas Code or applicable legal requirements. Such certification may be issued on behalf of the administration by an approved classification society.

Certified Gas Free

A tank or compartment is certified to be gas-free when its atmosphere has been tested with an approved instrument and found in a suitable condition by an independent chemist. This means it is not deficient in oxygen and sufficiently free of toxic or flammable gas for a specified purpose.

Clingage

Oil remaining on the walls of a pipe or on the internal surfaces of tanks after the bulk of the oil has been removed.

Closed operations

Ballasting, loading or discharging operations carried out without recourse to opening ullage and sighting ports. During closed operations, ships will require the means to enable closed monitoring of tank contents, either by a fixed gauging system or by using portable equipment passed through a vapour lock.

CMR Substance

A substance that is carcinogenic, mutagenic or reprotoxic.

Cold Work

Work that cannot create a source of ignition.

Combustible (also referred to as ‘Flammable’)

Capable of being ignited and of burning. For the purposes of this Guide, the terms ‘combustible’ and ‘flammable’ are synonymous.

Compression Ratio

The ratio of the absolute pressure at the discharge from a compressor divided by the absolute pressure at the suction.

Condensate

Reliquefied gases which collect in the condenser and which are then returned to the cargo tanks.

Craft

Any vessel for auxiliary services such as a tug, mooring boat, work boat, supply vessel, fire-fighting boat, rescue craft.

Company

The owner of a ship or any other organisation or person, such as the manager or the bareboat charterer, who has assumed the responsibility for the operation of the ship from the owner of the ship, including the duties and responsibilities imposed by the ISM Code.

Competent person

A person who has been adequately trained to undertake the tasks they are required to perform within their job description. For personnel in the shipping industry, they should be able to demonstrate this competence by the production of certificates recognised by the ship's administration.

Critical Pressure

The pressure at which a substance exists in the liquid state at its critical temperature. (In other words it is the saturation pressure at the critical temperature).

Critical Temperature

The temperature above which a gas cannot be liquefied by pressure alone.

Cryogenics

The study of the behaviour of matter at very low temperatures.

Dangerous area

An area on a tanker which, for the purposes of the installation and use of electrical equipment, is regarded as dangerous. (For terminal, see 'Hazardous area'.)

Dangerous goods

Dangerous goods means those substances and articles the carriage of which is prohibited by applicable legislation, or authorized only under the conditions prescribed therein.

Deepwell Pump

A type of centrifugal cargo pump commonly found on gas carriers. The prime mover is usually an electric or hydraulic motor. The motor is usually mounted on top of the cargo tank and drives, via a long transmission shaft, through a double seal arrangement, the pump assembly located in the bottom of the tank. The cargo discharge pipeline surrounds the drive shaft and the shaft bearings are cooled and lubricated by the liquid being pumped.

Density

The mass per unit volume of a substance at specified conditions of temperature and pressure (see 1.3).

Dew point

The temperature at which condensation will take place within a gas if further cooling occurs.

Dry chemical powder

A flame inhibiting powder used in fire-fighting.

Earthing (also referred to as 'Grounding')

The electrical connection of equipment to the main body of the 'earth' to ensure that it is at earth potential. On board ship, the connection is made to the main metallic structure of the ship, which is at earth potential because of the conductivity of the sea.

Enclosed space

A space that has limited openings for entry and exit, unfavourable natural ventilation, and that is not designed for continuous worker occupancy.

This includes cargo spaces, double bottoms, fuel tanks, ballast tanks, pump rooms, cofferdams, void spaces, duct keels, inter-barrier spaces, engine crankcases and sewage tanks.

Endothermic

A process which is accompanied by the absorption of heat.

Enthalpy

Enthalpy is a thermodynamic measure of the total heat content of a liquid or vapour at a given temperature and is expressed in energy per unit mass (kJoules per 1 kg) from absolute zero. Therefore, for a liquid/vapour mixture, it will be seen that it is the sum of the enthalpy of the liquid plus the latent heat of vaporization.

Entropy

Entropy of a liquid/gas system remains constant if no heat enters or leaves while it alters its volume or does work but increases or decreases should a small amount of heat enter or leave. Its value is determined by dividing the intrinsic energy of the material by its absolute temperature. The intrinsic energy is the product of specific heat at constant volume multiplied by a change in temperature. Entropy is expressed in heat content per mass per unit of temperature. In the SI system its units are therefore Joule/kg/K. It should be noted that in a reversible process in which there is no heat rejection or absorption, the change of entropy is zero.

Entry permit

A document issued by a Responsible Person allowing entry into a space or compartment during a specific time interval.

Explosimeter

See 'Combustible gas indicator'.

Explosion-proof (also referred to as 'Flame-proof ')

Electrical equipment is defined and certified as explosion-proof when it is enclosed in a case that is capable of withstanding the explosion within it of a hydrocarbon gas/air mixture or other specified flammable gas mixture. It must also prevent the ignition of such a mixture outside the case either by spark or flame from the internal explosion or as a result of the temperature rise of the case following the internal explosion. The equipment must operate at such an external temperature that a surrounding flammable atmosphere will not be ignited.

Explosive range

See ‘Flammable range’.

Flame arrester

A permeable matrix of metal, ceramic or other heat-resisting materials which can cool even an intense flame, and any following combustion products, below the temperature required for the ignition of the flammable gas on the other side of the arrester.

Flame-proof

See ‘Explosion-proof ’.

Flame screen

A portable or fitted device incorporating one or more corrosion resistant wire-woven fabrics of very small mesh, which is used for preventing sparks from entering a tank or vent opening or, for a short time, preventing the passage of flame. (Not to be confused with ‘Flame arrester’.)

Flammable (also referred to as ‘Combustible’)

Capable of being ignited and of burning. For the purposes of this Guide, the terms ‘flammable’ and ‘combustible’ are synonymous.

Flammable gas monitors (also referred to as ‘Explosimeter’)

An instrument for measuring the composition of hydrocarbon gas/air mixtures, usually giving the result as a percentage of the Lower Explosive Limit (LEL).

Flammable range (also referred to as ‘Explosive range’)

The range of hydrocarbon gas concentrations in air between the Lower and Upper Flammable (Explosive) Limits. Mixtures within this range are capable of being ignited and of burning.

Flashlight

See ‘Torch’.

Flashpoint

The lowest temperature at which a liquid gives off sufficient gas to form a flammable gas mixture near the surface of the liquid. It is measured in a laboratory in standard apparatus using a prescribed procedure.

Flow rate

The linear velocity of flow of liquid in a pipeline, usually measured in metres per second (m/s). The determination of the flow rates at locations within cargo pipeline systems is essential when handling static accumulator cargoes.

Foam (also referred to as ‘Froth’)

An aerated solution that is used for fire prevention and fire-fighting.

Foam concentrate (also referred to as 'Foam compound')

The full strength liquid received from the supplier which is diluted and processed to produce foam.

Foam solution

The mixture produced by diluting foam concentrate with water before processing to make foam.

Free fall

The unrestricted fall of liquid into a tank.

From the top, or Overall

See 'Loading over the top'.

Froth

See 'Foam'.

Gas Codes

The Gas Codes are the Codes of construction and equipment of ships carrying liquefied gases in bulk (The International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, Code for Existing Ships Carrying Liquefied Gases in Bulk).

These standards are published by IMO.

Gas-Dangerous Space or Zone

A space or zone (defined by the Gas Codes) within a ship's cargo area which is designated as likely to contain flammable vapour and which is not equipped with approved arrangements to ensure that its atmosphere is maintained in a safe condition at all times. (Refer to the Gas Codes for a more detailed definition).

Gas free

A tank, compartment or container is gas free when sufficient fresh air has been introduced into it to lower the level of any flammable, toxic or inert gas to that required for a specific purpose, e.g. Hot Work, entry etc.

Gas free certificate

A certificate issued by an authorised Responsible Person confirming that, at the time of testing, a tank, compartment or container was gas free for a specific purpose.

Gas-Freeing

The removal of toxic, and/or flammable gas from a tank or enclosed space with inert gas followed by the introduction of fresh air.

Gassing-up

Gassing-up means replacing an inert atmosphere in a tank with the vapour from the next cargo to a suitable level to allow cooling down and loading.

Grounding

See ‘Earthing’.

Halon

A halogenated hydrocarbon used in fire-fighting that inhibits flame propagation.

Hazardous area

An area on shore which, for the purposes of the installation and use of electrical equipment, is regarded as dangerous. Such hazardous areas are graded into hazardous zones depending upon the probability of the presence of a flammable gas mixture. (For ships, see ‘Dangerous area’.)

Hazardous task

A task other than Hot Work which presents a hazard to the ship, terminal or personnel, the performance of which needs to be controlled by a risk assessment process such as a Permit to Work system or a controlled procedure.

Hazardous zone

See ‘Hazardous area’.

Hot Work

Work involving sources of ignition or temperatures sufficiently high to cause the ignition of a flammable gas mixture. This includes any work requiring the use of welding, burning or soldering equipment, blow torches, some power driven tools, portable electrical equipment which is not intrinsically safe or contained within an approved explosion-proof housing, and internal combustion engines.

Hot Work Permit

A document issued by a Responsible Person permitting specific Hot Work to be done during a particular time interval in a defined area.

Hydrocarbon gas

A gas composed entirely of hydrocarbons.

Inert condition

A condition in which the oxygen content throughout the atmosphere of a tank has been reduced to 8 per cent or less by volume by the addition of inert gas.

Inert gas

A gas or a mixture of gases, such as flue gas, containing insufficient oxygen to support the combustion of hydrocarbons.

Inert gas plant

All equipment fitted to supply, cool, clean, pressurise, monitor and control the delivery of inert gas to the cargo tank systems.

Inert Gas System (IGS)

An inert gas plant and inert gas distribution system together with means for preventing backflow of cargo gases to the machinery spaces, fixed and portable measuring instruments and control devices.

Inerting

The introduction of inert gas into a tank with the object of attaining the inert condition.

Insulating flange

A flanged joint incorporating an insulating gasket, sleeves and washers to prevent electrical continuity between ship and shore.

Interface detector

An electrical instrument for detecting the boundary between oil and water.

International Safety Management (ISM) Code

An international standard for the safe management and operation of ships and for pollution prevention. The Code establishes safety management objectives and requires a Safety Management System (SMS) to be established by the Company and audited and approved by the flag administration.

Intrinsically safe

An electrical circuit, or part of a circuit, is intrinsically safe if any spark or thermal effect produced normally (i.e. by breaking or closing the circuit) or accidentally (e.g. by short circuit or earth fault) is incapable, under prescribed test conditions, of igniting a prescribed gas mixture.

Isothermal

Descriptive of a process undergone by an ideal gas when it passes through pressure or volume variations without a change of temperature.

Latent Heat

The heat required to cause a change in state of a substance from solid to liquid (latent heat of fusion) or from liquid to vapour (latent heat of vaporisation). These phase changes occur without change of temperature at the melting point and boiling point, respectively.

Latent Heat of Vaporisation

Quantity of heat to change the state of a substance from liquid to vapour (or vice versa) without change of temperature.

Liquefied Gas

A liquid which has a saturated vapour pressure exceeding 2.8 bar absolute at 37.8°C and certain other substances specified in the Gas Codes.

LNG

This is the abbreviation for Liquefied Natural Gas, the principal constituent of which is methane.

Loading over the top (also referred to as 'Loading overall')

The loading of cargo or ballast through an open-ended pipe or by means of an open-ended hose entering a tank through a deck opening, resulting in the free fall of liquid.

Loading rate

The volumetric measure of liquid loaded within a given period, usually expressed as cubic metres per hour (m^3/h) or barrels per hour (bbls/h).

Lower Explosive Limit (LEL)

The concentration of a hydrocarbon gas in air below which there is insufficient hydrocarbon to support and propagate combustion. Sometimes referred to as Lower Flammable Limit (LFL).

LPG

This is the abbreviation for Liquefied Petroleum Gas. This group of products includes propane and butane which can be shipped separately or as a mixture. LPGs may be refinery by-products or may be produced in conjunction with crude oil or natural gas.

MARVS

This is the abbreviation for the Maximum Allowable Relief Valve Setting on a ship's cargo tank — as stated on the ship's Certificate of Fitness.

Material Safety Data Sheet (MSDS)

A document identifying a substance and all its constituents. It provides the recipient with all necessary information to manage the substance safely. The format and content of an MSDS for MARPOL Annex I oil cargoes and oil fuel are prescribed in IMO Resolution MSC.286(86). See SDS.

Mercaptans

A group of naturally occurring organic chemicals containing sulphur. They are present in some crude oils and in pentane plus cargoes. They have a strong odour.

Naked lights

Open flames or fires, lighted cigarettes, cigars, pipes or similar smoking materials, any other unconfined sources of ignition, electrical and other equipment liable to cause sparking while in use, unprotected light bulbs or any surface with a temperature that is equal to or higher than the auto-ignition temperature of the products handled in the operation.

Non-volatile petroleum

Petroleum having a flashpoint of 60ºC or above, as determined by the closed cup method of test.

Odour threshold

The lowest concentration of vapour in air that can be detected by smell.

Oxygen analyser or oxygen meter

An instrument for determining the percentage of oxygen in a sample of the atmosphere drawn from a tank, pipe or compartment.

Packaged cargo

Petroleum or other cargo in drums, packages or other containers.

Pellistor

An electrical sensor unit fitted in a flammable gas detector for measuring hydrocarbon vapours and air mixtures to determine whether the mixture is within the flammable range.

Permit (to work)

A document issued by a Responsible Person which allows work to be performed in compliance with the ship's Safety Management System.

Permit to Work system

A system for controlling activities that expose the ship, the terminal, personnel or the environment to hazard. The system will provide risk assessment techniques and apply them to the varying levels of risk that may be experienced. The system should conform to a recognised industry guideline.

Petroleum

Crude oil and liquid hydrocarbon products derived from it.

Petroleum gas

A gas evolved from petroleum. The main constituents of petroleum gases are hydrocarbons, but they may also contain other substances, such as hydrogen sulphide or lead alkyls, as minor constituents.

Phases of oil

Oil is considered to have three phases in which it can exist depending on the grade of oil and its temperature. The three phases are the solid phase, the liquid phase and the vapour phase. The phases do not exist in isolation and operators must manage the carriage of oil with an understanding of the combinations of the phases of oil in the cargo being carried.

Polymerisation

The chemical union of two or more molecules of the same compound to form a larger molecule of a new compound called a polymer. By this mechanism the reaction can become self-propagating causing liquids to become more viscous and the end result may even be a solid.

Pour point

The lowest temperature at which a petroleum oil will remain fluid.

Pressure surge

A sudden increase in the pressure of the liquid in a pipeline brought about by an abrupt change in flow rate.

Pressure/vacuum relief valve (P/V valve)

A device that provides for the flow of the small volumes of vapour, air or inert gas mixtures caused by thermal variations in a cargo tank.

Pump purging

The operation of clearing liquid from submerged pumps.

Purging

The introduction of inert gas into a tank already in the inert condition with the object of further reducing the existing oxygen content and/or reducing the existing hydrocarbon gas content to a level below which combustion cannot be supported if air is subsequently introduced into the tank.

Pyrophoric iron sulphide

Iron sulphide capable of a rapid exothermic oxidation causing incandescence when exposed to air and potential ignition of flammable hydrocarbon gas/air mixtures.

Receiver

The consignee according to the contract for carriage. If the consignee designates a third party in accordance with the provisions applicable to the contract for carriage, this person shall be deemed to be the consignee. If the transport operation takes place without a contract for carriage, the enterprise which takes charge of the dangerous goods on arrival shall be deemed to be the consignee.

Reid Vapour Pressure (RVP)

The vapour pressure of a liquid determined in a standard manner in the Reid apparatus at a temperature of 37.8ºC and with a ratio of gas to liquid volume of 4:1. Used for comparison purposes only. See ‘True Vapour Pressure’.

Relative Liquid Density

The mass of a liquid at a given temperature compared with the mass of an equal volume of fresh water at the same temperature or at a different given temperature.

Relaxation time

The time taken for an electrostatic charge to relax or dissipate from a liquid. This time is typically half a minute for static accumulator liquids. Not to be confused with ‘Settling time’ - see definition.

Responsible Officer (or Person)

A person appointed by the Company or the Master of the ship and empowered to take all decisions relating to a specific task, and having the necessary knowledge and experience for that purpose.

Resuscitator

Equipment to assist or restore the breathing of personnel overcome by gas or lack of oxygen.

Rollover

The phenomenon where the stability of two stratified layers of liquid of differing relative density is disturbed resulting in a spontaneous rapid mixing of the layers accompanied in the case of liquefied gases, by violent vapour evolution.

Safety Data Sheet (SDS)

A document identifying a substance and all its constituents. It provides the recipient with all necessary information to manage the substance safely. Guidance on the format and content of an SDS are given in the European Globally Harmonized System of Classification and Labelling of Chemicals (GHS). See MSDS.

Safety Management System (SMS)

A formal, documented system required by the ISM Code, compliance with which should ensure that all operations and activities on board a ship are carried out in a safe manner.

Secondary Barrier

The liquid-resisting outer element of a cargo containment system designed to provide temporary containment of a leakage of liquid cargo through the primary barrier and to prevent the lowering of the temperature of the ship's structure to an unsafe level.

Self-stowing mooring winch

A mooring winch fitted with a drum on which a mooring wire or rope is made fast and automatically stowed.

Settling time

The time it takes for tank contents to stop moving once filling has stopped, and therefore the cessation of further static electricity generation. Typically, this time is 30 minutes. Not to be confused with 'Relaxation time' - see definition.

Slops

A mixture of cargo residues and washing water, rust or sludge which is either suitable or not suitable for pumping.

SOLAS

The International Convention for the Safety of Life at Sea 1974 and its Protocol of 1988, as amended.

Sounding pipe

A pipe extending from the top of the tank to the bottom through which the contents of the tank can be measured. The pipe is usually perforated to ensure the level of liquid in the pipe is the same as the level of liquid in the body of the tank and to prevent the possibility of spillages. The pipe should be electrically bonded to the ship's structure at the deck and at its lower end.

Sour crude oil or products

A term used to describe crude oil or products containing appreciable amounts of hydrogen sulphide and/or mercaptans.

Spiked crude oil

A crude oil blended with a liquefied gas or condensate.

Spontaneous combustion

The ignition of material brought about by a heat producing (exothermic) chemical reaction within the material itself without exposure to an external source of ignition.

Spread loading

The practice of loading a number of tanks simultaneously to avoid static electricity generation when loading static accumulator cargoes.

Static accumulator oil

An oil with an electrical conductivity of less than 50 picoSiemens/metre (pS/m), so that it is capable of retaining a significant electrostatic charge.

Static electricity

The electricity produced by movement between dissimilar materials through physical contact and separation.

Static non-accumulator oil

An oil with an electrical conductivity greater than 50 picoSiemens/metre (pS/m), so that it is incapable of retaining a significant electrostatic charge.

Stripping

The final operation in draining liquid from a tank or pipeline.

Submerged Pump (deepwell)

A type of centrifugal cargo pump commonly installed on gas carriers and in terminals in the bottom of a cargo tank. It comprises a drive motor, impeller and bearings totally submerged by the cargo when the tank contains bulk liquid.

Supplier

The enterprise which consigns dangerous goods either on its own behalf or for a third party. If the transport operation is carried out under a contract for carriage, consignor means the consignor according to the contract for carriage. In the case of a tank vessel, when the cargo tanks are empty or have just been unloaded, the master is considered to be the consignor for the purpose of the transport document.

Surge Pressure

A phenomenon generated in a pipeline system when there is a change in the rate of flow of liquid in the line. Surge pressures can be dangerously high if the change of flow rate is too rapid and the resultant shock waves can damage pumping equipment and cause rupture of pipelines and associated equipment.

Tank cleaning

The process of removing hydrocarbon vapours, liquid or residue from tanks. Usually carried out so that tanks can be entered for inspection or Hot Work or to avoid contamination between grades.

Tanker

A ship designed to carry liquid petroleum, chemical or gas cargo in bulk.

Terminal

A place where tankers are berthed or moored for the purpose of loading or discharging petroleum cargo.

Terminal Representative

A person designated by the terminal to take responsibility for an operation or duty.

Threshold Limit Value (TLV)

Airborne concentrations of substances under which it is believed that nearly all workers may be exposed day after day with no adverse effect. TLVs are advisory exposure guidelines, not legal standards, and are based on industrial experience and studies. There are three different types of TLVs:

- Time Weighted Average (TLV-TWA) - The airborne concentration of a toxic substance averaged over an 8 hour period, usually expressed in parts per million (ppm).
- Short Term Exposure Limit (TLV-STEL) - The airborne concentration of a toxic substance averaged over any 15 minute period, usually expressed in parts per million (ppm).
- Ceiling (TLV-C) - The concentration that should not be exceeded during any part of the working exposure.

Topping-off

The operation of completing the loading of a tank to a required ullage.

Topping-up

The introduction of inert gas into a tank that is already in the inert condition with the object of raising the tank pressure to prevent any ingress of air.

Torch (also referred to as 'Flashlight')

A battery operated hand lamp. An approved torch is one that is approved by a competent authority for use in a flammable atmosphere.

Toxicity

The degree to which a substance or mixture of substances can harm humans or animals.

'Acute toxicity' involves harmful effects to an organism through a single short term exposure.

'Chronic toxicity' is the ability of a substance or mixture of substances to cause harmful effects over an extended period, usually upon repeated or continuous exposure, sometimes lasting for the entire life of the exposed organism.

True Vapour Pressure (TVP)

The absolute pressure exerted by the gas produced by evaporation from a liquid when gas and liquid are in equilibrium at the prevailing temperature and the gas liquid ratio is effectively zero. See 'Reid Vapour Pressure'.

Ullage

The space above the liquid in a tank, conventionally measured as the distance from the calibration point to the liquid surface.

Upper Explosive Limit (UEL)

The concentration of a hydrocarbon gas in air above which there is insufficient oxygen to support and propagate combustion. Sometimes referred to as Upper Flammable Limit (UFL).

Vapour

A gas below its critical temperature.

Vapour Emission Control System (VECS)

An arrangement of piping and equipment used to control vapour emissions during tanker operations, including ship and shore vapour collection systems, monitoring and control devices and vapour processing arrangements.

Vapour lock system

Equipment fitted to a tank to enable the measuring and sampling of cargoes without release of vapour or inert gas pressure.

Void Space

An enclosed space in the cargo area external to a cargo containment system, other than a hold space, ballast space, fuel oil tank, cargo pump or compressor room or any space in normal use by personnel.

Volatile petroleum

Petroleum having a flashpoint below 60ºC as determined by the closed cup method of test.

Water fog

A suspension in the atmosphere of very fine droplets of water usually delivered at a high pressure through a fog nozzle for use in fire-fighting.

Water spray

A spray of water divided into coarse drops by delivery through a special nozzle for use in fire-fighting.