

# Contents

---

<b>Foreword .....</b>	<b>VIII</b>
<b>Abbreviations used in this Guide .....</b>	<b>VIII</b>
<b>1 Introduction.....</b>	<b>1</b>
1.1 Purpose .....	1
1.2 Scope.....	1
1.3 About this Edition.....	2
<b>2 Legislation and Standards.....</b>	<b>3</b>
2.1 Legislation.....	3
2.2 Standards .....	3
<b>3 A Process Safety Viewpoint .....</b>	<b>4</b>
3.1 Learning from Industry Incidents .....	4
3.1.1 Heat exchanger rupture and ammonia release (1 fatality, 6 injuries), Houston, Texas, June 2008 .....	4
3.1.2 Catastrophic rupture of a liquid nitrogen tank, Japan, August 1992 .....	4
3.1.3 Reboiler explosion (BLEVE) and Fire at Olefins Plant (2 fatalities, multiple injuries), Louisiana, 2013.....	4
3.2 Relief Valves as a Layer of Protection.....	4
3.3 Reliability .....	5
<b>4 Managing Safe Isolation for Maintenance .....</b>	<b>6</b>
4.1 Managing Safe Isolations for Relief System Work .....	6
4.1.1 Examples of typical Chemical Industry Arrangement.....	6
4.1.2 Example of a Typical Refinery Arrangement .....	8
4.2 Managing Safe De-isolation Following Relief System Work .....	9
<b>5 Inherent Safety.....</b>	<b>10</b>
5.1 Three-way Valves .....	10
5.2 Single Relief Valves.....	11
5.3 Safe Isolation and HSG 253 .....	12

<b>6 Interlock Systems .....</b>	<b>13</b>
6.1 Key System .....	13
6.2 Mechanical Frame .....	14
6.3 Examples of Interlock Applications .....	16
6.3.1 EXAMPLE 1 – Management of Duty Standby Relief Systems to ensure overpressure protection cannot be isolated .....	16
6.3.2 EXAMPLE 2 – Liquid Thermal Expansion .....	17
6.3.3 EXAMPLE 3 – Isolation of Source of Excess Overpressure .....	18
6.3.4 EXAMPLE 4 – Multiple Relief Devices .....	18
<b>7 Administrative Controls.....</b>	<b>19</b>
7.1 Tagging or ‘Car Sealing’ .....	20
7.2 Padlock and Chain/Locking Plate.....	20
7.3 Checks and Audits.....	21
7.4 Site Cardinal Rules.....	21
7.5 Safety Critical Procedures.....	22
7.6 Post Maintenance Checklists .....	22
<b>8 Isolations – Key Specification and Installation Considerations .....</b>	<b>23</b>
<b>Appendix A – Checklist Questions for Managing Isolations.....</b>	<b>27</b>
<b>Appendix B – Learning from Industry Incidents .....</b>	<b>28</b>
B1 Heat exchanger rupture and ammonia release – 1 fatality, 6 injuries, Houston, Texas, June 2008.....	28
B2 Catastrophic rupture of a liquid nitrogen tank – Food Factory, Japan Hokkaido, August 1992.....	30
B3 Reboiler explosion (BLEVE) and Fire at Olefins Plant – 2 fatalities, multiple injuries, Louisiana, 2013 .....	32
B4 Gas release at a bulk terminals complex – 1 fatality, 160 hospitalized, 16000 evacuated. Chicago, Illinois 26 April 194.....	33
<b>References.....</b>	<b>34</b>
Other Publications .....	34
<b>Bibliography.....</b>	<b>35</b>
Other Publications .....	36
<b>EEMUA Publications: Feedback Form.....</b>	<b>38</b>
<b>EEMUA Publications Catalogue .....</b>	<b>39</b>

## List of Figures

Figure 1: Swiss Cheese Model.....5

Figure 2: Relief system schematic – Duty standby system with each leg containing a bursting disc and relief valve with discharge to atmosphere.....6

Figure 3: Relief system schematic – Duty standby system with each leg containing a bursting disc and relief valve with discharge to common header .....7

Figure 4: Relief system schematic – Typical refinery setup with non-interlocked single isolation valves on both inlet and discharge piping...9

Figure 5: Illustrating a Transflow and a Non-Transflow 3 Way Valve..... 11

Figure 6: A 4 Valve Key Interlock Logic Diagram ..... 13

Figure 7: An Example of a Mechanical (sliding) Interlock Frame..... 15

Figure 8: A Mechanical Lever Interlock Arrangement for Quarter-turn Valves ..... 15

Figure 9: Relief system schematic – Simple mechanical key interlock arrangement..... 16

Figure 10: Relief system schematic – Complex mechanical key interlock arrangement” ..... 17

Figure 11: Use of Key Interlock in Relief of a Blocked-in Liquid Filled System..... 17

Figure 12: Interlock Isolation of Source of Excess Overpressure ..... 18

Figure 13: System with Multiple Relieving Devices with Changeover Facility..... 18

Figure 14: Examples of Administrative Controls..... 19