

INTRODUCTION	4
CHAPTER 1 – KEEPING PEOPLE SAFE	5
<i>KEEPING POWERED DOOR USERS SAFE</i>	12
CHAPTER 2 - BACKGROUND INFORMATION ON OVERHEAD DOORS	13
CLASSES OF POWERED DOORS	13
<i>Commercial Doors</i>	<i>13</i>
<i>Residential Doors</i>	<i>13</i>
TYPES OF POWERED DOORS	14
<i>Overhead Doors</i>	<i>14</i>
<i>Powered Gates</i>	<i>14</i>
COMPONENTS OF OVERHEAD DOORS	15
<i>Door Panels</i>	<i>15</i>
<i>Operator</i>	<i>15</i>
<i>Tracks</i>	<i>17</i>
<i>Cables, Chain Drives, and Drums</i>	<i>17</i>
<i>Springs</i>	<i>18</i>
<i>Controls</i>	<i>19</i>
CHAPTER 3 – POWERED DOOR ACCIDENTS	21
ACCIDENT RECONSTRUCTION.....	21
CHAPTER 4 – HUMAN FACTORS	23
HUMAN ERROR.....	23
HUMAN FACTORS AND OVERHEAD DOORS	24
CRUSHING HAZARDS.....	26
SOLUTIONS TO CRUSHING HAZARD.....	27
<i>Contact Sensors</i>	<i>27</i>
<i>Non-Contact Sensors/Optic Beams</i>	<i>27</i>
<i>Maximum Run Timer</i>	<i>28</i>
<i>Safety Bumper</i>	<i>29</i>
<i>Slip Clutches</i>	<i>29</i>
<i>Pressure Relieving Valve</i>	<i>30</i>
<i>Continuous Pressure Activation Switch</i>	<i>30</i>
<i>Audio/Visual Alarm</i>	<i>31</i>
<i>Inherent Entrapment System</i>	<i>31</i>
<i>Preventive Maintenance</i>	<i>31</i>
<i>Pinch Points of Overhead Doors</i>	<i>32</i>
OVERHEAD DOOR SPRING HAZARDS.....	32
CABLE FAILURE	33
<i>Cable Coming off of Spool</i>	<i>37</i>
<i>Crushing and Amputation Hazard Due to Cable Failure</i>	<i>38</i>
<i>Laceration and Amputation Hazard Due to Cables</i>	<i>39</i>
HAZARDS OF OLD OVERHEAD DOORS AND MALFUNCTIONING SAFETY SYSTEMS	40
SIMPLE TESTS TO PERFORM ON ANY OVERHEAD DOOR TO DETERMINE SAFETY	40
CHAPTER 6 – STANDARDS	42
THE CODE OF FEDERAL REGULATIONS 29CFR1910	42
<i>Code of Federal Regulations – 29CFR1910.212.(a)(3)(ii)</i>	<i>42</i>
ANSI/ASME B15.1	42
UNDERWRITERS LABORATORIES STANDARD 325.....	45
<i>Classes of Door or Gate Operators</i>	<i>45</i>
<i>Entrapment Protection Requirements</i>	<i>45</i>

Other Provisions of UL 325..... 46

CHAPTER 8 – THE HISTORY OF POWERED DOOR TECHNOLOGY 48

CHAPTER 9: DO I HAVE A CASE?..... 69

BIBLIOGRAPHY 71