

# The Path to Fluid Power Safety

## 1. Identify Tasks & Hazards using a Risk Assessment with Fluid Power Considerations:

|  |  |
|--|--|
| <b>Lockout/Tagout (LOTO) Control of Hazardous Energy</b> .....                               | <b>ANSI Z244.1-2003</b>                                  |
| Risk Assessments & Hierarchy of Reducing Risk.....   | <b>ANSI B11.TR3-2000, ANSI RIA 15.06, EN-954</b>         |
| <b>Performance Criteria for Safeguarding</b> .....   | <b>ANSI B11.19-2003</b>                                  |
| <b>Alternative LOTO Methods</b> per ANSI Z244  |  |
| Increase Productivity by using <b>Single Point Lockout</b> or <b>Partial De-Energization</b> |  |
| <b>Safety Standards for Packaging Machinery</b>  | <b>ANSI/PMMI B155.1-2006</b>                             |
| <b>Performance Degradation</b> .....   | Sluggish or Erratic Valve effecting <b>Stopping Time</b> |
| Leaks in Valve or Actuator .....   | Fail to Energize or to Extend                            |
| Fail to De-Energize or Return .....  | Hose whip caused by Fitting or Tubing Failures           |
| Overpressure Failure .....   | Lubrication Oil Mist in Exhaust Air                      |
| Vertical Load Holding Hazards .....  | Exhaust Noise Hazards                                    |
| Unexpected Violent Actuator Movements during Startup .....                                   | Unexpected Release of Stored Energy                      |

## 2. Classify Hazards into Category B, 1, 2, 3 or 4 using worst possible case

|   |  |   |                             |  |   |                                    |   |
|---|--|---|-----------------------------|--|---|------------------------------------|---|
| <p style="text-align: center;"><b>Severity of Injury</b></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;"> <p><b>S1</b><br/>Slight<br/>(Reversible)</p> </td> <td style="width: 50%; text-align: center;"> <p><b>S2</b><br/>Serious<br/>(Non-Reversible)</p> </td> </tr> </table> <p style="text-align: center;"><b>Frequency &amp; Duration to Exposure</b></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;"> <p><b>F1</b><br/>Seldom</p> </td> <td style="width: 50%; text-align: center;"> <p><b>F2</b><br/>Frequent to<br/>Continuous and/or<br/>long exposure</p> </td> </tr> </table> <p style="text-align: center;"><b>Possibility of Avoiding the Hazard</b></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;"> <p><b>P1</b><br/>Possible under<br/>Specific Conditions</p> </td> <td style="width: 50%; text-align: center;"> <p><b>P2</b><br/>Less Possible</p> </td> </tr> </table> | <p><b>S1</b><br/>Slight<br/>(Reversible)</p>                             | <p><b>S2</b><br/>Serious<br/>(Non-Reversible)</p> | <p><b>F1</b><br/>Seldom</p> | <p><b>F2</b><br/>Frequent to<br/>Continuous and/or<br/>long exposure</p> | <p><b>P1</b><br/>Possible under<br/>Specific Conditions</p> | <p><b>P2</b><br/>Less Possible</p> | <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; border-radius: 5px; padding: 2px;">Risk Assessment</div> <div style="border: 1px solid black; border-radius: 5px; padding: 2px;">Category</div> </div> <p><b>Preferred Category</b> Some risk levels offer 2 choices. If the equipment is clean, dry &amp; the levels of maintenance and inspection of the safety system are high, select the lower, otherwise select the higher.</p> <ul style="list-style-type: none"> <li><b>Possible Lower Category</b> In some applications, the designer can select a lower category by using other safeguard measures, such as hard guarding.</li> </ul> <p> <b>More than Required</b></p> |
| <p><b>S1</b><br/>Slight<br/>(Reversible)</p>  | <p><b>S2</b><br/>Serious<br/>(Non-Reversible)</p>                        |   |                             |  |   |                                    |   |
| <p><b>F1</b><br/>Seldom</p>   | <p><b>F2</b><br/>Frequent to<br/>Continuous and/or<br/>long exposure</p> |   |                             |  |   |                                    |   |
| <p><b>P1</b><br/>Possible under<br/>Specific Conditions</p>   | <p><b>P2</b><br/>Less Possible</p>                                       |   |                             |  |   |                                    |   |

## 3. Reduce the Risk by a Risk Reduction Hierarchy

- |            |                   |
|------------|-------------------|
| Preferred: | Design out        |
| Second:    | Guard out         |
| Third:     | Signage & devices |
| Fourth:    | Worker awareness  |
| Fifth:     | Method/Procedures |

## 4. Select Appropriate Controls for Safeguarding: Select Category B, 1, 2, 3, 4, Rated Devices

## 5. Assess Residual Risk Is the residual risk tolerable?

## 6. Record Actions Taken & Monitor Results and Document

