Risk Assessment: Enerpac Hydraulic Cylinder

General Information

- **Equipment Name**: Enerpac Hydraulic Cylinder
- **Manufacturer**: Enerpac
- **Purpose**: Lifting, pushing, pulling, and holding heavy loads during maintenance, construction, and industrial applications.
- **Capacity**: Various
- **Standards Referenced**:
    - **AS 4024**: Safety of Machinery
    - **AS/NZS ISO 31000**: Risk Management
    - **AS/NZS 4801**: Occupational Health and Safety Management Systems
    - **AS 1418.1**: Cranes, Hoists, and Winches (Safe Use of Lifting Equipment)
    - **AS 2671**: Hydraulic Fluid Power – General Requirements

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Risk Matrix: Hierarchy of Risks and Severity

The table below identifies potential hazards, their risks, and control measures in accordance with the **hierarchy of controls** and Australian Standards.

Likelihood	Consequence Severity	Insignificant	Minor	Moderate	Major	Severe
Almost Certain			Hand injuries from manual handling.	Minor hydraulic leaks causing slips.	**Overloaded cylinder causing equipment failure.**	
Likely		Minor fluid spills causing slips.	Pinching/crushing due to improper setup.	Unsecured load slipping or falling.	**Hydraulic failure causing load collapse.**	
Possible		Wear and tear of components.	Oil contamination impacting operation.	**Cylinder instability on uneven ground.**	**Hose failure leading to hydraulic ejection.**	
Unlikely			Hose kinking reducing performance.	Hydraulic pressure loss under load.	**Sudden release of pressure causing injury.**	
Rare				Catastrophic cylinder burst.		**Fatal injury due to structural collapse.**

Hazards, Risks, and Control Measures

Hazard	Potential Risks	Risk Level (Pre-Control)	Control Measures	Residual Risk
Cylinder Overload	Structural failure causing collapse or injury.	Major	- Verify load weight before operation. - Use appropriate cylinder capacity. - Train operators.	Low
Hydraulic Hose Failure	High-pressure fluid injection causing severe injury.	Critical	- Inspect hoses for wear/cracks before use. - Use rated hoses. - Install pressure relief valves.	Medium
Unsecured Load	Load slipping, falling, or shifting.	High	- Secure load using supports or blocking. - Operate on level ground. - Use load alignment tools.	Medium
Sudden Pressure Release	Rapid movement of load causing impact injuries.	High	- Gradually release pressure. - Avoid exceeding system pressure ratings. - Use pressure gauges.	Low
Oil Leakage or Spills	Slip hazards or contamination.	Moderate	- Inspect seals and fittings regularly. - Clean up spills promptly. - Use drip trays as needed.	Low
Manual Handling	Back strain, hand injuries.	Moderate	- Use mechanical aids for lifting. - Train operators on proper handling techniques.	Low
Cylinder Instability	Tipping due to uneven ground or improper alignment.	High	- Place cylinder on stable surfaces. - Use load alignment plates or supports.	Medium
Improper Maintenance	Cylinder or hose failure due to wear or damage.	Critical	- Implement scheduled inspections and maintenance. - Replace worn components immediately.	Low

Control Hierarchy: Application to Risks

1. **Elimination**
    - Avoid using the hydraulic cylinder in situations where alternative lifting methods (e.g., cranes) are more suitable.
2. **Substitution**
    - Replace older or damaged cylinders with newer models featuring advanced safety features, such as pressure-relief systems.
3. **Engineering Controls**
    - Use pressure-relief valves to prevent overloading.
    - Stabilize the cylinder with load blocks, jacks, or supports.
    - Install hose guards to prevent kinks and external damage.
4. **Administrative Controls**
    - Provide detailed operator training in accordance with **AS 1418.1** and **AS 2671**.
    - Implement a pre-use checklist for inspections.
    - Document and schedule regular maintenance.
    - Clearly mark rated load capacity and pressure limits on the cylinder.
5. **Personal Protective Equipment (PPE)**
    - Operators must wear:
        - Safety goggles to prevent eye injuries from hydraulic leaks.
        - Oil-resistant gloves to protect against burns and high-pressure oil.
        - Steel-capped boots to prevent crushing injuries.
        - Hearing protection in high-noise environments.

Emergency Procedures

1. **Hydraulic Hose Failure**
    - Immediately cease operation.
    - Isolate the system to relieve pressure.

- Do not approach leaking or spraying hydraulic fluid until the pressure is fully released.
- Replace damaged components before resuming operation.

2. **Load Collapse or Instability**
    - Evacuate the area immediately to avoid further hazards.
    - Secure the load and stabilize the hydraulic cylinder.
    - Report the incident and inspect equipment for faults.
3. **Oil Leaks and Spills**
    - Contain the spill using absorbent materials.
    - Clean up promptly to eliminate slip hazards.
    - Dispose of contaminated materials in accordance with environmental guidelines.
4. **Personal Injury**
    - Administer first aid and call emergency services if necessary.
    - For hydraulic injection injuries, seek immediate medical attention (high-pressure fluid can cause internal damage).

Recommendations

1. **Compliance with Standards**
    - Operate in accordance with **AS 1418.1** and **AS 2671** for safe use of hydraulic lifting equipment.
    - Regularly review risk management policies in line with **AS/NZS ISO 31000**.
2. **Operator Training**
    - Conduct training programs to ensure workers understand equipment operation, hazards, and emergency procedures.
3. **Maintenance Schedule**
    - Implement a documented inspection and maintenance program as per **AS/NZS 4801**.

- Replace hoses and seals as part of routine maintenance to prevent high-pressure failures.

4. **Tooling and Equipment**
    - Use load-rated hydraulic hoses, fittings, and pressure gauges that comply with Australian standards.
    - Ensure safety accessories (e.g., load blocks, supports, and alignment plates) are readily available.
5. **Pre-Use Checklists**
    - Introduce daily checklists for inspecting the hydraulic cylinder, hoses, and connections before use.

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Reviewed By: Allen Besseling

This risk assessment ensures the safe operation of the Enerpac Hydraulic Cylinder while adhering to Australian Standards and the hierarchy of risk controls.