CHASNZ
Construction Health & Safety NZ

GOOD PRACTICE GUIDE

Safe use and maintenance of low loader ramps for loading/ unloading equipment

CHASNZ and industry; working together to achieve consistent site access standards and safer worksites for everyone.

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Foreword from the regulator

When considering the question of what is reasonably practicable in the context of the HSWA the regulator and courts will apply relevant legislation, approved codes of practice and industry guidance from a recognised source.

CHASNZ is seen by WorkSafe NZ as a provider of industry guidance for the construction industry.

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Contents

1.0 Introduction

This guide helps owners, operators, maintainers, and designers of low-loader trailers manage ramp operation and maintenance risks.

Low-loaders are road-going trailers with low deck heights, designed to allow vehicles and mobile plant—including overweight or over-dimension loads—to be driven on and off via rear ramps. These ramps pose significant hazards, such as uncontrolled drops or crush injuries, which can lead to serious injuries or fatalities (SIFs).

Using Energy-Based Safety, this guide identifies ramp hazards exceeding 1,500 joules—most likely to cause Serious Injuries and Fatalities (SIFs)—and suggests controls to eliminate or minimise them. It targets Persons Conducting a Business or Undertaking (PCBUs) under the Health and Safety at Work Act 2015 (HSWA), offering flexibility to adapt Direct Controls (eliminating or mitigating energy) or Alternative Controls (addressing human error) to specific operations.

While focused on trailers towed by prime movers, many principles apply to low-loader transporter trucks, with differences (e.g., integrated hydraulics) noted where relevant.

2.0 Health and Safety at Work

The Health and Safety at Work Act 2015 (HSWA) sets out principles, duties, and rights for workplace health and safety, aligning with Energy-Based Safety's focus on controlling high-energy hazards (those with energy greater than or equal to 1500 joules).

2.1 PRIMARY DUTY OF CARE

Persons Conducting a Business or Undertaking (PCBUs) have a primary duty to ensure, so far as is reasonably practicable, the health and safety of workers and others. This includes:

- Providing and maintaining safe plant (e.g., low-loaders with ramps).
- Ensuring safe systems for ramp use during loading/unloading.
- Offering training and supervision to manage ramp hazards.

For example, a PCBU must ensure ramps don't drop uncontrollably, using Direct Controls like double-acting rams to eliminate the risk, or Alternative Controls like spotters if elimination isn't feasible.

2.2 WORKING WITH OTHER PCBUS

PCBUs sharing duties (e.g., low-loader owners and site operators) must consult, coordinate, and manage overlapping risks, such as those from ramp operations. Duties cannot be contracted out, but PCBUs can agree on joint risk management plans.

2.3 WORKER ENGAGEMENT AND PARTICIPATION

PCBUs must engage workers on health and safety, leveraging their insights into ramp risks (e.g., hydraulic failures) and effective controls (e.g., better control placement). Workers should participate in improving safety practices.

2.4 WORKER DUTIES

Workers must:

- Take reasonable care for their own safety and others'.
- Follow reasonable PCBU instructions (e.g., using ramp controls correctly).
- Cooperate with safety policies, like reporting hydraulic leaks.

2.5 MANAGING RISK - HIERARCHY OF CONTROL MEASURES

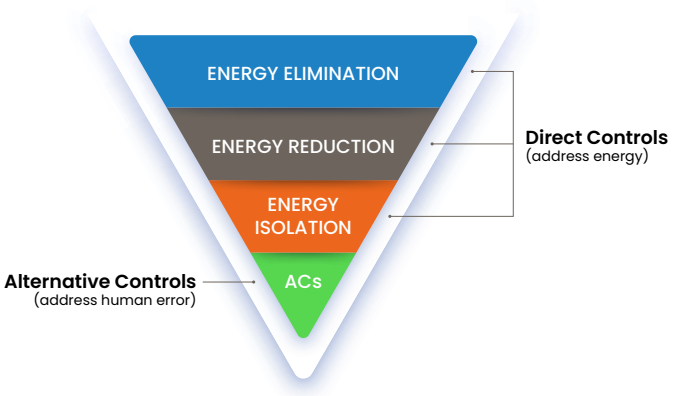
HSWA requires risks to be eliminated so far as reasonably practicable; if not, they must be minimised.

The hierarchy of controls prioritises:

1. Elimination: Remove the hazard (e.g., replace unstable ramps).
2. Substitution: Use less hazardous options.
3. Engineering Controls: Mitigate energy (e.g., hydraulic valves).
4. Administrative Controls: Manage human error (e.g., training).

This guide applies this hierarchy to ramp hazards, using Energy-Based Safety to classify controls as Direct or Alternative.

Hierarchy of Energy Controls



HSWA duties quick reference:

Duty	Description	Ramp Example
PCBU Primary Duty	Ensure safety so far as reasonably practicable	Fit ramps with holding valves
Worker Engagement	Involve workers in risk assessment	Consult on crush zone management
Hierarchy of Controls	Eliminate, then minimize risks	Barricades over spotters for zones

3.0 Low-Loader Ramps - High Energy Hazards

Low-loader ramps present high-energy hazards (Energy ≥1500 joules) that can cause SIFs. Industry data highlights ramps as a leading injury source in heavy haulage. Below are key risks, marked with high-energy icons:

Uncontrolled Ramp Descent: Ramps dropping due to hydraulic failure (e.g., single-acting rams without controls) release gravitational energy, risking crush injuries or load shifts.

Crush Zones: Kinetic energy from ramp movement or equipment near ramps endangers workers in close proximity.

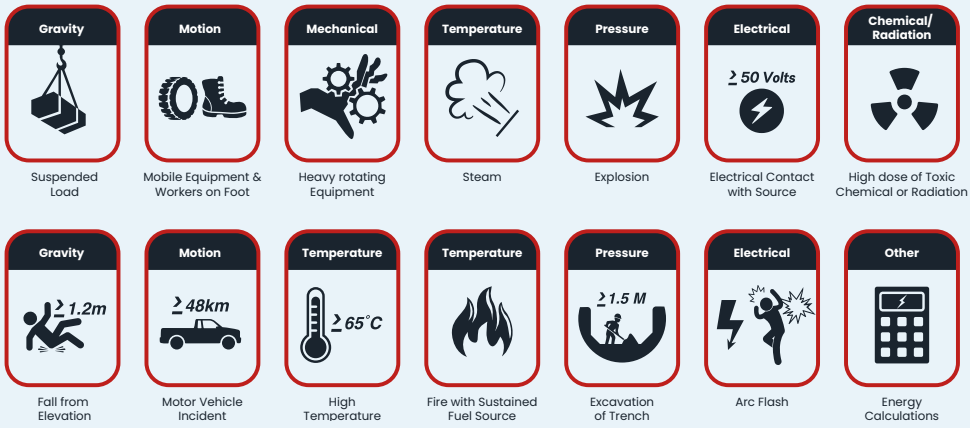
Stored Hydraulic Energy: Unexpected release of hydraulic pressure (e.g., from leaks or valve failure) can propel ramps or components with lethal force.

These hazards arise during loading, unloading, and transit, requiring robust controls to protect workers and others on site.

4.0 Controlling Ramp-Related High-Energy Hazards

Under HSWA, PCBUs must manage ramp hazards, selecting Direct Controls (eliminating/mitigating energy below 1,500 joules, effective despite human error) or Alternative Controls (mitigating human error when Direct Controls aren't feasible) based on site-specific risks.

Energy is the fundamental cause of injuries, with high energy leading to serious injuries and fatalities (SIFs). STKY, short for "Stuff that kills you", refers to high-energy hazards that are likely to lead to SIF.



A Direct Control has 3 key requirements:

Specifically targeted to the High Energy source.

Effectively mitigates exposure to High Energy when installed, verified, and used properly.

Effective when someone makes a mistake.

A **Direct Control** is essential/needed to eliminate or mitigate high-energy hazards and save lives.

When a **Direct Control** is not feasible, there must be at least 2 Alternative Controls, from at least 2 or more of the following categories: Physical Obstacle, Direct Monitoring and Visual Reminder.

Alternative Controls are a system of complementary controls that reduce the likelihood of human error.

Physical Obstacle
An obstruction that blocks the path or hinders progress toward a high energy hazard Example: Cones with toppers, danger tape, barriers around equipment.

Dedicated Monitoring
Devoted and continuous attention to the high energy hazard Example: Monitoring alarms, proximity detection devices with two 2-way warnings, spotter (refer to rule 5 and 7)*

Visual Reminder
A visible warning of the presence of the high energy hazard Example: Signage (refer to rule 8)*, temporary traffic lights, painted lines.

Access Alternative Controls rules

Alternative Controls

- are relevant only when they are in place during the work
- are a placeholder as we aspire to the Direct Control of the high-energy
- are primarily designed to mitigate human errors rather than solely reducing energy levels
- should require supporting processes such as JSAs, Pre-job briefs or permits

4.1 DESIGN CONSIDERATIONS

Direct Controls:

- Double-Acting Rams with Holding Valves: Prevent free fall, stop descent mid-motion, and reduce energy below 1,500 joules even if operators make mistakes.
- Engineered Ramp Locks: Isolate hydraulic energy, preventing unintended movement.

Alternative Controls:

- Single-Acting Rams with Flow Restrictors/Ball Valves: Slow descent, requiring precise operation and maintenance checks.
- Rearward-Angled Ramps: Reduce push-over needs, supported by operator training.

Hydraulic Ram Systems:

- Single-Acting Rams: These rams have one hydraulic connection and rely on gravity or external force for descent. Without additional controls, they can drop uncontrollably, posing a high-energy hazard. Solutions like flow restrictors or ball valves can be fitted to control lowering speed, reducing the risk of sudden drops.
- Double-Acting Rams: These rams have two hydraulic connections, allowing powered ascent and descent. When equipped with holding valves, they prevent free fall and enable mid-descent stops, significantly reducing high-energy risks. However, they may require truck modifications (e.g., return lines) and risk pin or cylinder damage under load unless fitted with relief valves or float positions.

Engineering Solutions for Ramp Descent:

Fitting flow restrictors or ball valves in hydraulic lines can limit descent speed for single-acting rams. Angling ramps rearward eliminates the need for push-over, enhancing safety when paired with accessible controls (e.g., beaver tail valve banks).

Power-up/power-down systems with holding valves prevent free fall and allow precise control for double-acting rams. Relief valves or float positions are essential to avoid damaging pins or cylinders under load.

Advanced options, such as counterbalance valves, can improve load control and reduce spool leakage, but they add complexity and cost.

4.2 OPERATIONAL PRACTICES

Direct Controls:

- Physical Barricades: Block crush zones, absorbing kinetic energy from ramps or loads.

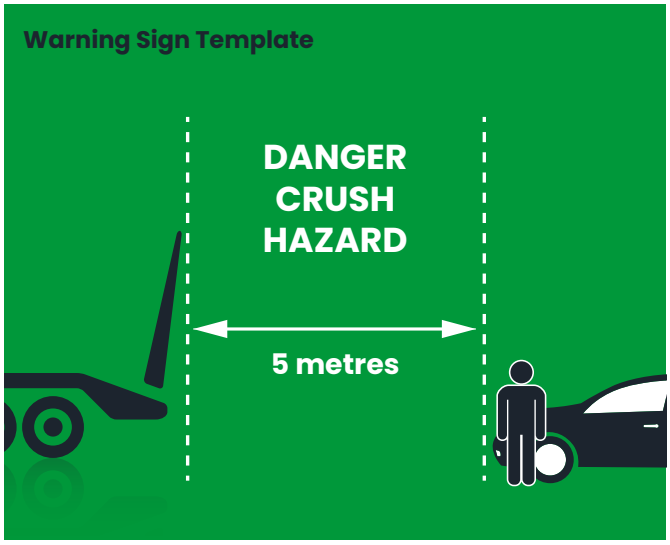
Alternative Controls:

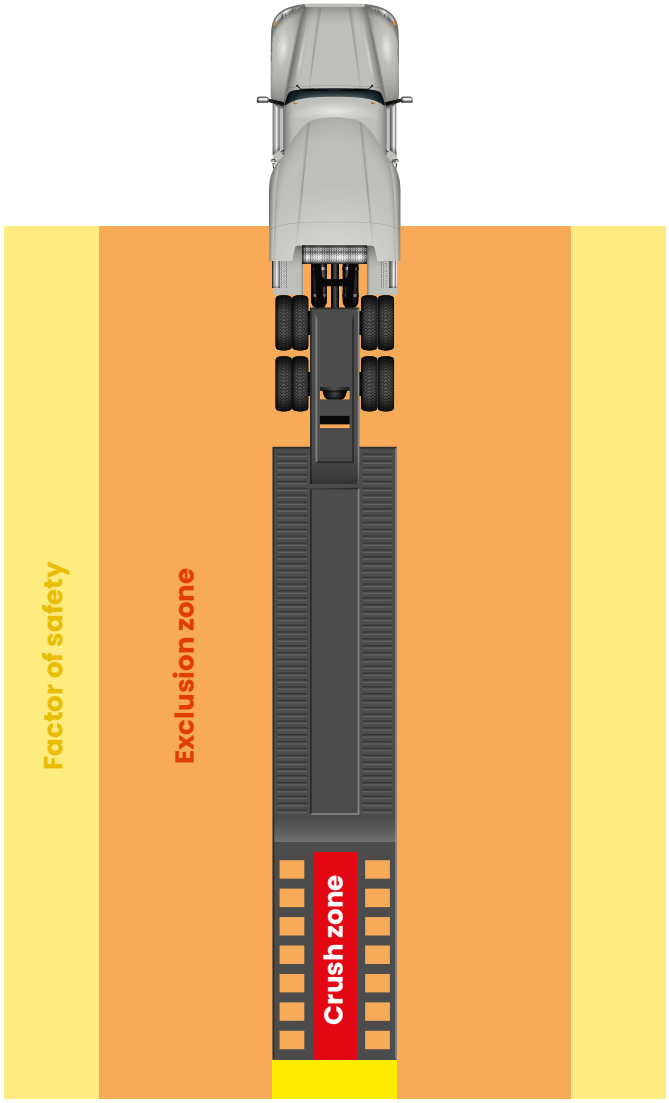
- Exclusion Zones: Extend beyond ramp length, monitored by dedicated spotters with two-way radios (clear, uninterrupted communication).
- Side/Beaver Tail Controls: Position operators outside crush zones, backed by pre-job briefs and visibility checks.

Operator Positioning and Control Placement:

Ramp controls (e.g., hydraulic switches or valves) should be positioned to keep operators outside crush and fall zones while maintaining visibility. Options include:

- Side-mounted controls (e.g., along the trailer coaming): Enhance visibility but may expose operators to traffic.
- Rear beaver tail controls (e.g., passenger side): Allow monitoring of the drop zone while staying clear of fall zones.
- Cab controls: Reduce exposure but limit sightlines, potentially requiring spotters.
- Operators must activate ramps outside crush zones, using controls prioritising safety and visibility.





Factor of safety
Extra space in case of exclusion zone being encroached

Exclusion zone
Consider height of the load in case of fall from the deck

Loading Zone
Allow enough space for the load to be maneuvered safely

Crush zone
No go area for workers until ramps are deployed

4.3 TRAINING AND COMPETENCY

Direct Controls:

- None—training isn't Direct by definition.

Alternative Controls:

- Speciality Training: Verified training on hydraulic systems (e.g., single- vs double-acting rams), including simulations of ramp failure.
- Site Induction: Covers ramp-specific hazards and controls, documented in competency registers.

4.4 MAINTENANCE AND INSPECTION

Direct Controls:

- Hydraulic Isolation: Regular tests (every 6 months) with lockout/tagout and de-energizing systems to eliminate stored energy.

Alternative Controls:

- Daily Visual Checks: Inspect rams and pins, using signage to warn of hidden leaks or wear, supported by maintenance logs.
- PCBUs should prioritise Direct Controls for maximum safety, using Alternative Controls where Direct options are impractical, ensuring compliance with HSWA's hierarchy.

Maintenance and Inspection Protocols for Hydraulic Systems:

- Hydraulic systems, including rams, connections, and actuating mechanisms, should be visually inspected daily as part of a pre-use checklist.
- Hydraulic components should be formally inspected every six months, and testing dates should be recorded on a visible sticker affixed to the trailer.
- Maintenance providers must follow lockout/tagout procedures to de-energise hydraulic systems before servicing, ensuring no stored energy is present.
- Any maintenance or repair work on hydraulic systems should be documented, with handover procedures confirming the system's safety before returning to operation.

Summary of Direct and Alternative Controls

Category	Direct Control Example	Alternative Control Example
Design	Double-acting rams with valves	Flow restrictors on single-acting
Operation	Physical barricades for zones	Spotters with radios
Training	N/A (not Direct)	Specialty training on hydraulics
Maintenance	Hydraulic isolation tests	Daily visual checks with signage

5.0 Supporting tools

5.1 EXAMPLE PRE-USE / CLOSE-DOWN CHECKLIST

LOW-LOADER PRE-USE / CLOSEDOWN CHECK SHEET

Operator name	
Date	
Machine ID number	
Attachments (Include ID)	

Each check should be made when undertaking a pre- or closedown check. Each check is deemed safe unless **you** report defects or safety risks. Add notes of defects or safety concerns to the comments section at the bottom of the checklist.

Or indicate that you are using the manufacturer's check sheet, then indicate any defects in the comments section at the bottom of the checklist.

I am using the manufacturers pre start / closedown checklist.	**Tick here (x)**

General Inspection

- Confirm operator competency to operate the low-loader.
- Provide machine familiarity training materials.
- Confirm that the towing vehicle has completed pre-use checks.
- Overall condition – No visible damage or defects
- Cleanliness – Free from excessive dirt, debris, or obstructions.

Brakes & Suspension

- **Service brakes** – Check for proper function and ensure no leaks.
- **Parking brake** – Confirm it engages fully and holds the trailer securely.
- **Air system** – Inspect for leaks and verify proper pressure buildup.
- **Suspension** – Assess condition and operation, noting that specific training may be required to understand its function and perform checks correctly.
- **Steering** – For trailers with steering axles, check alignment and responsiveness.
- **Clip-on axles** – Verify safe use, correct installation, and secure removal of any detachable axles, ensuring they meet operational standards.

Tyres & Wheels

- **Tyre pressure** – Within recommended limits.
- **Tyre tread** – Meets legal requirements, no excessive wear.
- **Wheel nuts** – Properly tightened.
- **Rims** – No cracks, dents, or damage.

Lights & Reflectors

- **Indicators, brake lights, and tail lights** – Functioning correctly.
- **Reflectors** – Clean, visible, and not broken.

Chassis & Body

- **Frame** – Check for no cracks, rust, or damage.
- **Deck** – Ensure it's secure and free from structural damage.
- **Load-securing points** – Verify no damage and proper positioning.
- **Rear ramps** – USE CAUTION, AVOID RAMP CRUSH ZONES, and ensure they are structurally sound.
- **Gooseneck** – For compensating gooseneck types, inspect hitch adjustment mechanisms and mounting points for wear or failure, paying specific attention to their safe operation.

Hydraulics

- **Hydraulic fluid** – Confirm levels are filled and check for leaks.
- **Ramp locks/tensioners** – Ensure they are in place and functioning correctly.
- **Hydraulic accumulators** – If present, follow specific de-energising processes to release pressure safely before inspection or maintenance.

- **Hydraulic testing sticker** – Verify that the maintenance sticker on the trailer's side shows the last test date and the next due date (typically every 6 months), and report any overdue tests to the supervisor.

Coupling & Connections

- **Kingpin** – No damage or excessive wear.
- **Fifth wheel** – Properly greased and locked.
- **Air and electrical connections** – Secure, no leaks or loose wires.

Load Restraint Equipment

- **Chains, straps, and tensioners** – Not worn, frayed, or broken.
- **Winches and binders** – Operational and adequately secured.

Safety Equipment

- **Fire extinguisher** – Present and within service date.
- **First aid kit** – Fully stocked and accessible.
- **High-visibility clothing** – Available for operator.
- **Spill kit** – Present and accessible.

Load security

- Confirm that the load is secured following the NZTA truck loading code.

Final Checks

- Walk-around inspection completed.
- Any defects reported to the supervisor before departure.

Defects or safety concerns:

Operator signed:	

You should return this sheet to your employer. Work should not start until any defects have been resolved.

5.2 EXAMPLE PLANT DELIVERY HANDOVER CHECK SHEET

PLANT DELIVERY AND HANDOVER CHECK SHEET

Handover completed by (NAME)	
Operator name	
Date	
Machine ID number	
Attachments (Include ID)	

Pre-Handover Inspection (Before Loading)

- Confirm plant identification (Make, Model, Serial Number).
- Check for any existing damage on the plant and document it.
- Verify the plant's operational status – Start-up, brakes, and hydraulics working.
- Ensure plant fuel levels are adequate for offloading.
- Verify the competency of the plant operator when loading the machine.
- Conduct loading risk assessment.

Loading Process

- Ensure the loading area is level, firm, and clear of hazards.
- Establish an exclusion zone around the loading area.
- Confirm communication method (radio/hand signals) between driver and guide.
- Secure all attachments (buckets, blades, etc.) before transport.
- Load plant safely, ensuring proper weight distribution.
- Engage brakes and secure the machine with chains or restraints live with the NZTA truck loading code.

Transport Checks

- Verify that the load is within legal weight and height limits.
- Confirm that all plant attachments are adequately secured.
- Check that warning signs and permits (if required) are in place.
- Ensure all documentation (risk assessments, permits) is completed.

Delivery & Offloading

- Confirm delivery site is suitable for safe unloading.
- Establish an exclusion zone for unloading.
- Provide machine familiarity training materials.
- Verify Plant operator competency to unload the machine.
- Ensure personnel involved are wearing appropriate PPE.
- Check the plant for any transport-related damage.
- Offload plant safely using correct procedures.

Final Handover & Sign-Off

- Verify recipient details and obtain a signature.
- Ensure all attachments and accessories are delivered.
- Record any issues or concerns in the handover document.

Handover received by (SIGN)	
Operator name	
Date	
Machine ID number	
Attachments (Include ID)	

Defects or safety concerns:

6.0 Information Sources and Attachments

This guide was produced with key New Zealand construction and transportation industry stakeholders. Its content was extracted from reference material from international and New Zealand sources.

6.1 SOURCES:

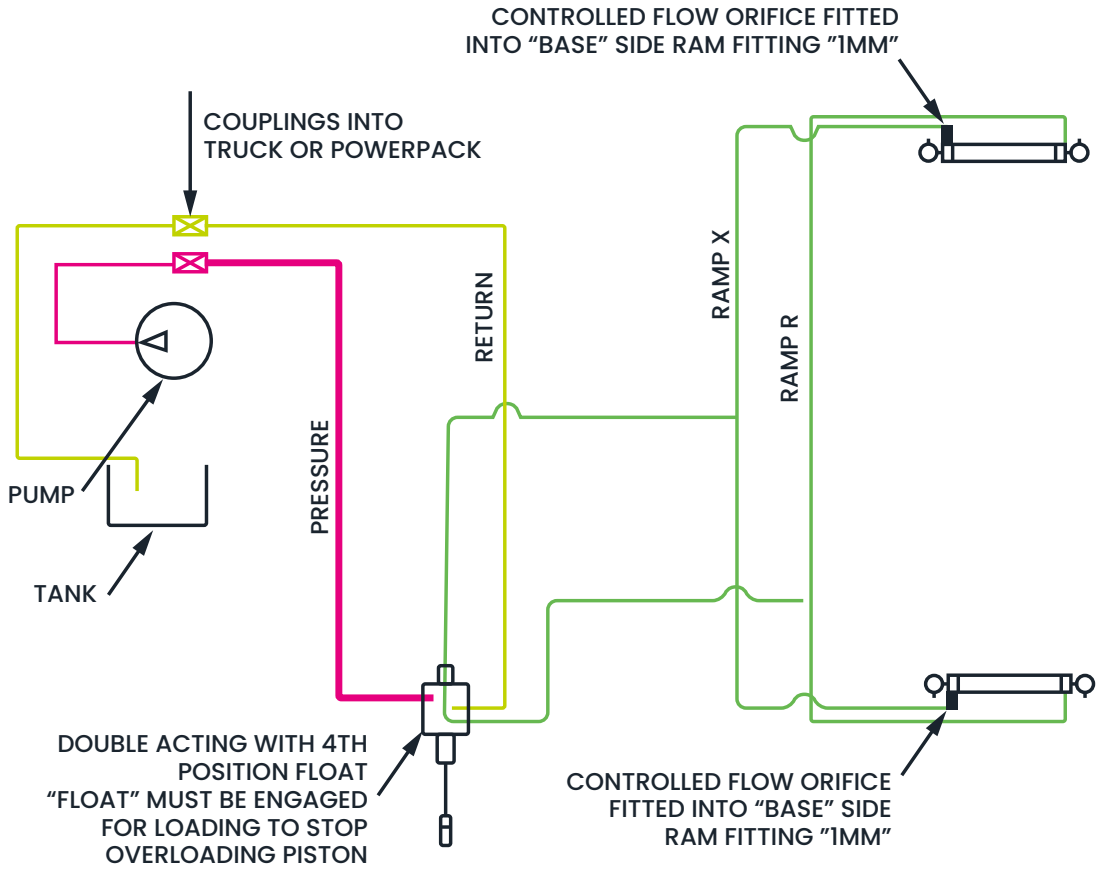
1. New Zealand Heavy Haulage Association (NZHHA)
2. Health and Safety at Work Act 2015.
3. Safe Work Australia Code of Practice: Managing the risks of plant in the workplace.
4. Health & Safety Executive: HSG144 safe use of vehicles on construction sites.
5. Ministry of Business, Innovation & Employment Factsheet: Implementing the Health & Safety at Work Act 2015; Mobile Plant.
6. New Zealand Transport Agency: The official New Zealand truck loading code.
7. New Zealand Transport Agency; Operator information pack; Supporting safe and compliant heavy goods and large passenger service transport operations.
8. WorkSafe NZ Quick Guide, Keeping safe while securing and covering loads on vehicles, September 2023.
9. Worksafe Victoria Safety Alerts, Tailgate lifters and loading ramp vehicles and trailers.
10. NZITSG: Good Practice Guide for safe operation of side loaders.
11. **https://www.worksafe.qld.gov.au/news-and-events/alerts/workplace-health-and-safety-alerts/2013/truck-and-trailer-ramps:** Queensland WorkSafe alert provides safety insights on truck and trailer ramps, which applies to low-loader equipment.
12. **https://www.google.com/search?sca_esv=04ccc06d6a14a3bd&q=Low+loader+safety+queensland+requirements&sa=X&ved=2ahUKEwiuoPLxp7mJAxX7rVYBHepwExAQ1QJ6BAgvEAE&biw=1954&bih=1165&dpr=1.5:** A search link identified Queensland's safety requirements for low-loaders, contributing to region-specific safety considerations.
13. **https://www.transporting.nz/wp-content/uploads/2023/09/NZITSG-Good-Practice-Guide_June2023.pdf:** NZITSG's good practice guide offers additional best transport safety practices relevant to low-loader operations.
14. **https://www.google.com/search?q=low+loader+safety&oq=low+loader+safety&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIHCAEQIRigATIHCAIQIRigATIHCAMQIRigATIHCAQQIRigAdIBCDQxNTVqMGo3qAIAsAIA&sourceid=chrome&ie=UTF-8:** A link for general low-loader safety information, which you can use to gather broader safety insights.
15. **https://sdvh.co.uk/what-is-a-low-loader/:** UK-based resource defining low-loaders and providing basic information useful for foundational understanding.
16. **https://www.worksafe.vic.gov.au/safety-alerts/tailgate-lifters-and-loading-ramps-vehicles-and-trailers:** Victorian WorkSafe safety alert offers specific warnings on tailgate lifters and loading ramps relevant to low-loader safety.
17. **https://www.nzta.govt.nz/resources/commercial-toolkit/:** NZTA's commercial toolkit provides resources on commercial vehicle safety, including guidance applicable to low-loaders.
18. **https://www.nzta.govt.nz/driver-licences/getting-a-licence/licences-by-vehicle-type/what-you-can-drive/:** NZTA's driver licensing information details requirements for low-loader operators and ensures compliance with licensing standards.

6.2 ATTACHMENTS

Double-Acting Ram Specifications: Two hydraulic lines, stops mid-drop.

- Fit a hydraulic valve to suit double-acting ramp rams with truck hydraulics to the passenger side of the trailer. Positioning of this valve should be done so the ramps can be worked from a safe distance.
- Install double-acting rams to reduce physical interaction with the ramps. The ramps will need to be modified to suit the ram. The rams will be fully extended when the ramps are at 95 degrees, reducing the possibility of the ramps over-centring.
- Fit a flow control orifice internally in the hydraulic system so as to prevent removal or modification.
- Fitting return lines should be done to acommodate the new hydraulic system being fitted.
- The 1mm flow office is based on a performance requirement of lowering speed. Allow for the case of differing circumstances where 1mm is either too big or too small. A maximum fall reate should define the objective in all circumstances. Same for single-acting rams.

DOUBLE ACTING FROM TRUCK OR POWERPACK WITH PRESSURE AND RETURN

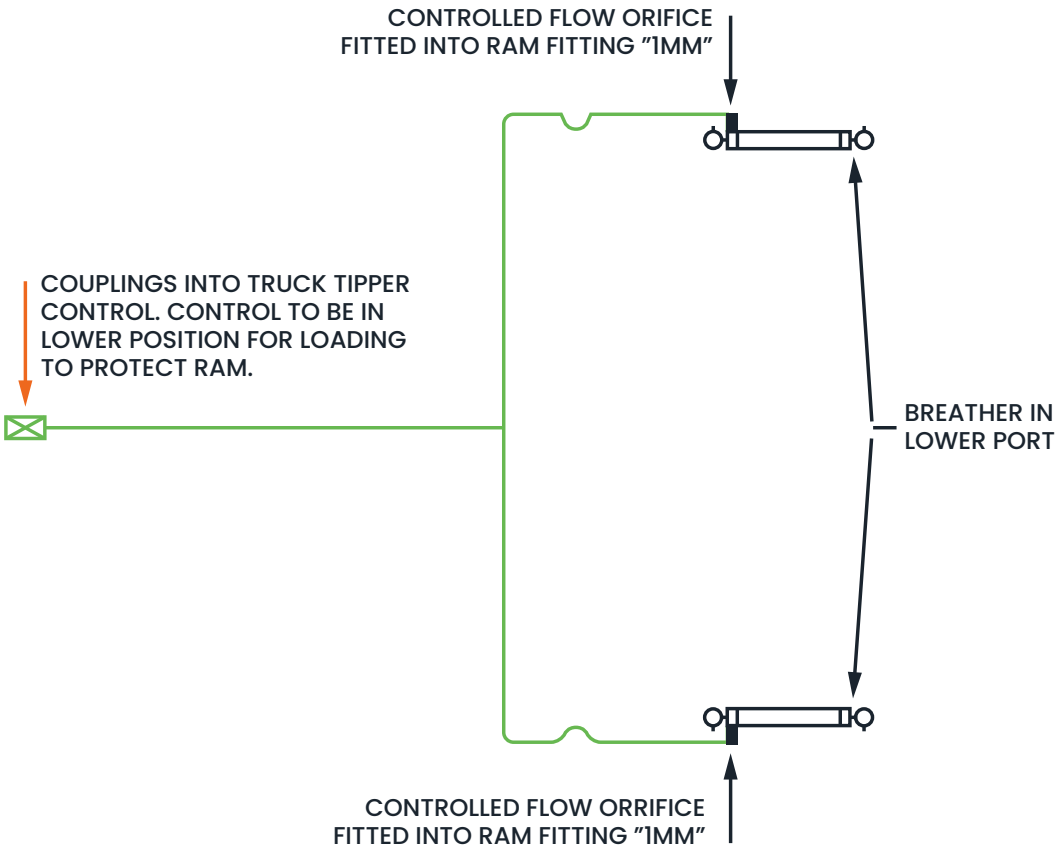


The "double acting with 4th position float" valve needs to be defined with a formal circuit diagram symbol to properly clarify the function required of this valve in the circuit.

6.2 ATTACHMENTS

Single-Acting Ram Specifications: One hydraulic line needs restrictors/valves

SINGLE ACTING FROM TRUCK TIPPER CONTROL DOUBLE ACTING PREFFERED METHOD



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- New Zealand Heavy Haulage Association (NZHHA)
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- TMC Trailers
- Waimea Engineering
- Modern Transport Engineers
- TR Group
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- Winstone Aggregates
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