

# Guidance for the recovered paper industry

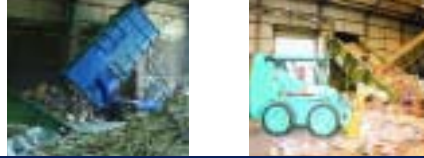


# safety

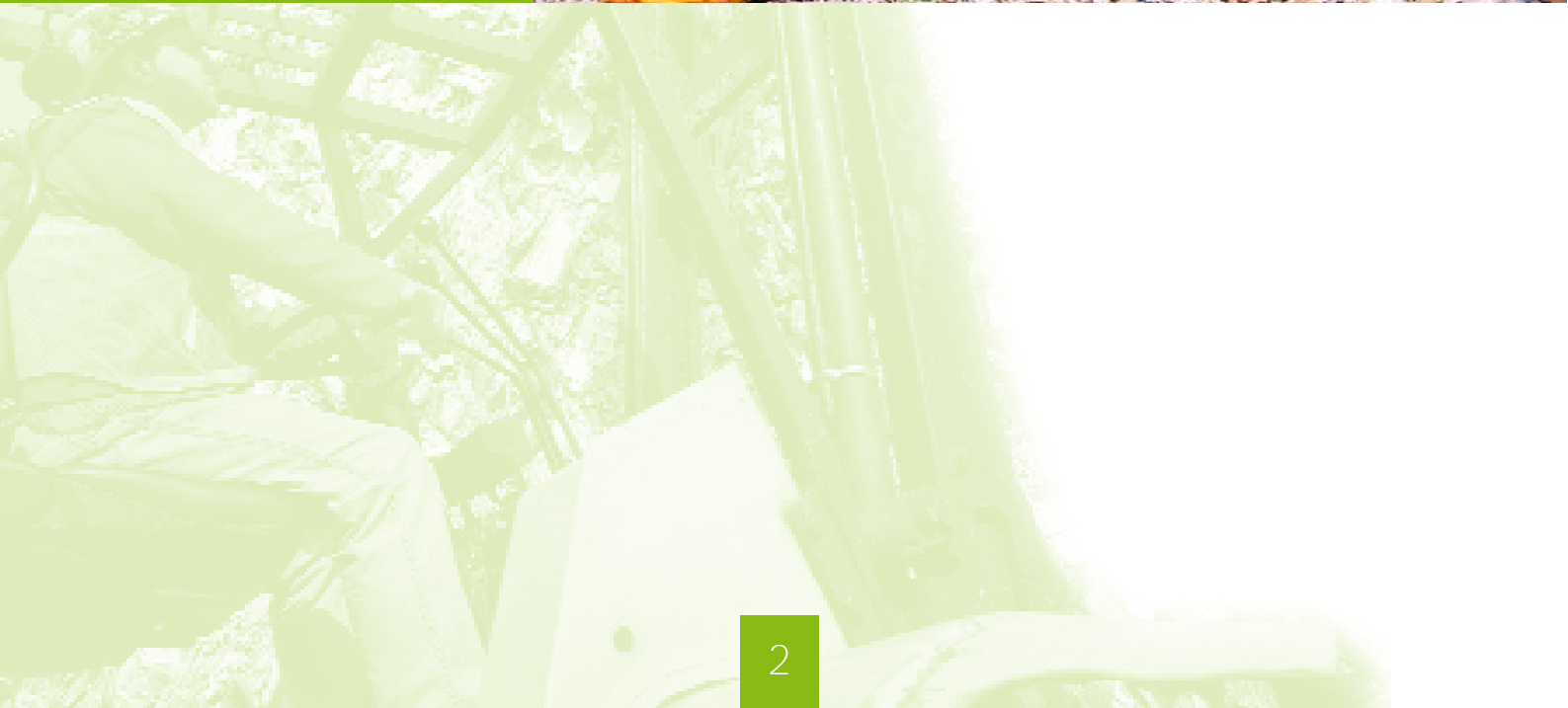
recover paper



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# Introduction

## Background

Recycling is a specialist industry which is rapidly expanding because of the need to reduce the amount of waste sent to landfill. This guidance has been produced by the Health and Safety Executive (HSE) following concerns about the high numbers of serious and fatal accidents to employees in the recovered paper industry - 11 people have died in accidents involving baling machines between 1988 and 2002.

It was written in consultation with the British Recovered Paper Association and the Independent Waste Paper Processors Association. It is aimed at managers and operators working in the recovered paper industry and identifies the main health and safety standards needed to achieve acceptable and safe working procedures. It lists further useful guidance at the back.

## Duties of employers

- Employers have a duty to provide a safe workplace, maintain safe systems of work and ensure the safety of their workers and members of the public. This applies to direct employees and anyone contracted to provide a service wherever work is undertaken, including at the roadside.
- Where there is more than one employer operating at a particular workplace, they should co-operate with each other to co-ordinate health and safety.
- The self-employed and contractors who provide drivers and vehicles have a responsibility for the services they supply and should also be aware of this guidance.

## Contractors

Make arrangements to ensure that contractors are covered by your health and safety procedures (including foreign drivers or non-English-speaking visitors). They must be told about:

- hazards on your site;
- your site rules and safety procedures;
- what to wear;
- what to do in a fire or other emergency, or if there is an accident;
- the first-aid, welfare and smoking facilities they can use.



## 1

# Loading, unloading and tipping operations

## Background

Loading, unloading and tipping recovered paper involves using a variety of vehicles, including curtain-siders, flatbeds, tail-lifts, mobile compaction vehicles and purpose-built vehicles fitted with skips/containers. Skip/container handling vehicles may use chains, cables or hook-lifts to load, tip and unload containers.



Paper and card is typically collected in bins, cages skips etc and transferred to specialist recycling sites for processing

## Risks

Over 50% of all accidents in the recovered paper industry between 1996 and 2000 reported to HSE involved transport safety. Many included being run over or struck by:

- moving vehicles;
- containers/skips unintentionally detaching;
- doors failing under pressure during tipping operations; and
- loads ejecting accidentally.

## Controls

- Assess the risks from your activity, ensure safe working practices are in place and everyone has been trained in those procedures.
- Wherever possible separate vehicles and pedestrians, especially when manoeuvring, reversing, loading, unloading, or tipping.
- Reversing is a high-risk activity. If you cannot avoid reversing operations, keep the distance to a minimum, as straight as possible, and keep people out of the area.
- Aim for good all-round vision. Consider using reversing cameras, improved mirrors, audible alarms or a mixture of these.
- Use a banksman when needed to ensure safe reversing. The banksman should be a designated, trained person whose job it is to keep the reversing area free of pedestrians and ensure a safe manoeuvre. Banksmen should wear high-visibility clothing, be visible at all times, stand in a safe position and use recognised signals to guide reversing vehicles (see HSE's leaflet INDG148 *Reversing vehicles*<sup>5</sup>).

- Ensure all employees and contractors are made aware of the site layout and follow your site segregation policy of separating vehicles and pedestrians, as well as one-way systems, speed controls, reversing etc.
- Do not permit anyone to approach or walk beneath a vehicle's unsupported load.

## Clearing blockages

### Risks

- Loose material is often stored in skips or containers, which may be attached to compactor units, and the paper may be densely compacted.
- Water can cause material (especially paper) to stick to the container sides, making removal difficult.

### Controls

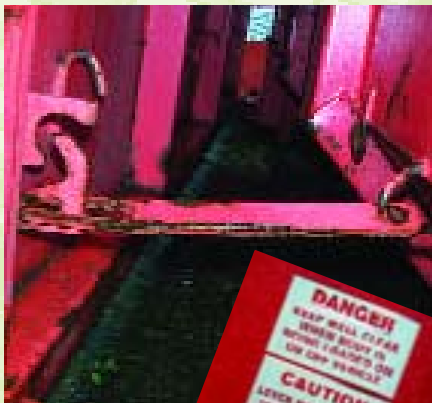
- In these circumstances:
  - lower the skip to the ground;
  - remove the vehicle;
  - use mobile plant to clear blockages, eg a skid loader or a lift truck.
- Remember to check that the bin floor is strong enough to take the weight of the plant used and that the plant is the right size/type to access the bin (use a small ramp if necessary).

## 2

# Skips and containers

## Background

A variety of skips and containers are used in the industry. These vary in size and condition and many serious and fatal accidents have been caused by poor maintenance or the failure of bin-locking mechanisms.



Typical restraining system fitted to container, and safety stickers



## Shunting

'Shunting' is also referred to as 'jogging' and is the practice of reversing vehicles and braking hard to shock or jog free blocked material from skips. Avoid this as it can cause uncontrolled release of the bin, due to excessive wear and failure of the components securing containers in place.

- Instruct and train drivers/operators to regularly inspect bins, doors and restraining devices and to report faults. You must check faults are remedied and provide a maintenance regime for skips and containers.
- Keep simple records of the checks carried out.

## Unintentional release of skip container rear doors

### Risks

- Paper puts significant stress on the door and door lock of skip containers, which can result in the door springing open or the load being ejected.
- Some older designs require the driver to stand behind the door while opening it, which places them in a dangerous position if the door flies open.
- Various restraining devices are used to secure doors open, including rigid hook and eye, chain fastening, or 'non-captive' locking devices. Single rear doors weigh approximately 500 kg and tipping with the bin inclined at 50-60° puts a significant load on these restraining devices.

### Controls

- Where possible, consider single-door containers with side-release locking mechanisms to reduce the number of moving parts.
- Maintain the locks, door handles, restraining devices and hinges and ensure they are adequate for the purpose.
- **Never** use baling wire or string to secure bin doors during tipping.
- Ensure drivers can operate the door locks in safety from the side of containers and that doors will not spring open when released.

## Runaway loads and vehicles

### Risks

- Several fatal accidents have involved skip/bulk loader runaways during loading or tipping activities.
- The handbrake facility on many vehicles is designed to operate on the rear wheels only.
- On some designs fully extending the vehicle stabiliser jacklegs may raise the vehicle's rear wheels off the ground, rendering the handbrake ineffective.

### Controls

- Consider fitting four-wheel braking systems or other effective means to ensure the vehicle cannot move during loading.
- Where practicable, fit flat plates instead of jackleg wheels to increase contact with the ground.
- Where manufacturers provide wheel chocks use these at all times when stationary. Information on chocking should be provided with the vehicle operating instructions.
- Instruct drivers to ensure the wheels remain in contact with the ground when operating jacks and to use chocks where provided (see HSE's leaflet INDG312 *Parking large goods vehicles safely*).

# 3

## Maintaining vehicles

### Background

Heavy plant and equipment deteriorates with use. Where safety critical components could fail causing injury, a formal, planned maintenance system must be in place.

### Risks

- A skip or container can detach if hydraulic components are not properly maintained. For example, a gooseneck fitted on a hook-lift vehicle is a safety critical component during the raising, lowering, and securing of the container. A failure of this system could lead directly to loss of controlled movement of the waste skip.

### Controls

- Under road traffic law you are required to maintain vehicles in a roadworthy condition.
- You should have an inspection and maintenance schedule to identify potential failures in critical components before they fail. Consult the vehicle/equipment manufacturers for details.
- Ensure the schedule includes visual examination of hydraulic systems, particularly pipes and hoses and the security of rams and moving parts.

- Check the cables on cable-lift vehicles, change them in pairs if defects are found **and** change them routinely at specified intervals.
- Consider testing the tipping mechanism using a fully loaded skip (this must only be carried out in a safe area) to check for ram creep, fluid leakage from the hydraulic hose and fittings, and other defects. Carry this out at different stages, eg just lifting the skip off the floor, part way on, part tipped, fully tipped etc.
- Check for hook deformity by comparing with a profile of a new hook (equipment manufacturers can provide this).



Hook profile showing stretched hook



Bent ram

- Where skip/container handling equipment performs a lifting operation, it will be subject to the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) and will require periodic examination by a competent person.
- Even where LOLER does not formally apply, a thorough maintenance regime should include similar measures to ensure equipment is in efficient working order and in good repair.

## 4

Sheeting  
and unsheeting

## Background

Sheeting and unsheeting involves covering or uncovering loaded skips and containers with a sheet or net to contain loose material and prevent spillage.

*Risks*

- Being struck by plant.
- Slips, trips and falls while alighting from cabs.
- Falls from the top of loads to ground level and into hidden voids while walking on loads to spread and tension sheets.
- Being blown off the top of vehicles by high winds.
- Being hit and/or run over by other vehicles.

*Controls*

- Ensure safe working procedures are in place and all people have been trained in those procedures.
- Operate and enforce a strict policy for drivers. Unless sheeting or unsheeting, they should stay in their cabs or in a driver refuge.
- All sheeting/unsheeting should be carried out in designated areas on level, undamaged ground, free of paper debris, away from all other vehicles and site operations to prevent interference and collisions.
- Alternatively restrict the movement of other vehicles until sheeting/unsheeting is completed and separate pedestrians from vehicles by strong, rigid barriers if necessary.
- Avoid the need for working at height where possible.
- Ensure bins/containers are not overfilled above the top and sides and the contents are evenly distributed.

- Do not use lift trucks to lift drivers onto the top of loads - use only purpose-built platforms or lifts.
- Provide shelter from adverse weather and suitable gloves, safety footwear, high-visibility jackets and wet weather clothing for drivers and others involved in sheeting operations.

## Autosheeters

- The safest option is for vehicles (including demountables) to be fitted with automatic sheeting systems (autosheeters) wherever practicable.
- Consider retrofitting autosheeters to existing vehicles in stages.
- They are easier and faster to operate, enabling drivers to make more pick-ups during a working day (offsetting some of the installation costs).
- They reduce the risks associated with sheeting on and off site and remove the need for drivers to walk on loads.
- Follow the manufacturer's instructions and training advice in how to use autosheeting equipment.
- It may not be practicable to retrofit autosheeting systems to some vehicles because of their design. In these circumstances drivers should sheet **from the ground or a suitable gantry**. This removes the need to climb onto the top of loads, but is only suitable for lightweight sheets or nets.



## Manual sheeting from the ground

If sheeting has to be done from the ground follow these five easy steps:



Throw and hook rope over bin



Pull sheet across bin



Pull sheet over opposite end of bin



Pull sheet over front end of bin



Tie off

## Working platforms, gantries and harnesses

- These are an alternative to autosheeters, but do not reduce sheeting risks off-site.
- They are difficult to move around and maintenance, training and supervision costs can be high.
- They need regular maintenance checks to identify wear and damage.
- There is a risk of falling onto or between vehicles and platforms due to varying heights and widths.
- Lanyards limit falls – they do not prevent them. Free-fall distances on lanyards should be short enough to prevent the user hitting the ground.
- Safety harnesses must be attached to a suitable anchorage. Lanyards and their fixings must be inspected and maintained.
- Train people, including visiting drivers, to use the equipment properly.



## 5

# Collections and deliveries

## Background

Specialist companies exchange skips, containers and compactor units on retail and other sites so that paper and cardboard can be recycled.

## Bin siting and exchanges

### Risks

- Retailers may position waste compactor units and bins well away from their 'selling activities' in awkward spaces, jeopardising the safety of drivers, members of the public and site employees.
- Store staff may not be trained on the specific hazards and risks associated with these containers and exchanges.
- Changing skips, containers or compactor units is complicated, time consuming and involves repetitive movements.
- HSE is aware of incidents where adults and children have been found in skips. **Check before removing the skip.**
- Drivers are often forced to reverse blind while manoeuvring empty bins onto compactor units (the bin obscures the driver's rear vision) and there have been fatal accidents when people have stood between compactor units and reversing vehicles.



Part of a bin-exchange operation

## Controls

### Safe systems

- Whoever controls skip-collection areas (ie the store management or the site owner), in conjunction with the skip provider, should assess the risk of the activity to ensure safe working practices are in place and train everyone in those procedures. Record, review and update training regularly.
- It is essential to segregate pedestrians and vehicles.
- A safe system of work should set out bin-exchange procedures, clear roles and responsibilities for all staff concerned, and how to separate pedestrians from vehicles and control vehicle movement.
- Have a safe system of work to lock-off and isolate machinery during exchanges.
- The waste producer must confirm who the driver must report to on arrival at the site and drivers should be made aware of site safety procedures.

### Maintenance

- The compactor owner/provider should develop maintenance procedures for the compactor. The user should follow these systems and:
  - identify and report faults;
  - isolate the compactor to prevent tampering;
  - repair damage; and
  - record the maintenance undertaken.
- Site operators should ensure that policies, procedures and safeguards are properly implemented and supervised by a responsible person.
- Spot checks should be made to ensure these systems are followed.

## Vehicle safety

- Position containers, skips, bins and compactors to allow vehicles safe access for loading, unloading, and exchange operations, avoiding unnecessary vehicle movement.
- Some companies use CCTV reversing aids on skip lorries to give the driver improved rear vision, which makes the task safer, quicker, and easier, and reduces the chance of costly damage to nearby equipment and structures.
- Guide rails help to position bins in relation to compactor units, reducing damage to plant and equipment and removing the need for a banksman to direct reversing operations.
- Display appropriate signs or notices and enforce vehicle speed restrictions.

## Good housekeeping

- Make sure the area is clear of food cages and debris to improve access to the compactor and reduce slips, trips and falls.
- Have a housekeeping policy covering the area around the compactor bin, backed up by regular checks to ensure unobstructed access for vehicles and staff.
- Rotting food, vermin and other debris in bins increases the risk to recycling company employees who have to handle (hand-pick) recyclables from waste.
- Drivers should not climb into bins to decant overfilled containers.
- Remove food and other contraries from the area regularly.

## 6

# Sorting recovered paper

## Background

Sorting recovered paper involves separating recyclables (newspaper, card, pamphlets and magazines (PAMS)) from unusable material. This may be done using purpose-built sorting stations (materials recycling facilities (MRFs)), conveyors, or sorting on the floor. The method chosen depends on the material to be sorted, its source and the quantity involved.

## Risks

- People working on picking lines are especially vulnerable to musculoskeletal injuries caused by repetitive movement and continual bending over conveyors to remove recyclables and contraries.
- The risk of exposure to clinical waste, decomposing food and loads contaminated by vermin or insects may lead to ill health, such as injuries caused by hypodermic needles (sharps) or Leptospirosis (Weil's disease).
- Entanglement with moving conveyor belts.
- Slips, trips and falls caused by poor housekeeping (especially accumulated paper around conveyor feeds).
- Puncture wounds caused by hand tools and glass.
- Inhalation of dust, particularly on construction and demolition lines, can result in respiratory problems.



*Moving material to the conveyor*

## Controls

- Assess the risk of the activity, ensure safe working practices are in place and everyone has been trained in those procedures.
- Reinforce the importance of good hygiene, ie hands should be thoroughly washed before eating, drinking, smoking or going to the toilet.
- Provide sharps bins to store hypodermics until you can arrange safe removal from the site by a specialist disposal company.
- Provide pickers with personal protective equipment (PPE), including gloves, high-visibility vests and protective footwear.
- Check PPE is worn at all times as directed by site policy and rules and regularly inspect it for damage. Clean or replace it when necessary.
- Arrange 'face fitting' of respiratory protective equipment (RPE) for people working on dusty picking lines and ensure all PPE is compatible.
- Maintain good housekeeping standards and practices to minimise the risk of slips and trips. HSE's guidance booklet HSG155 *Slips and trips: Guidance for employers on identifying hazards and controlling risks*<sup>3</sup> provides general guidance on good practice solutions.

## 7

## Hand-held saws

## Background

Hand-held circular saws are used to split or 'slab off' paper broke from large reels, separating paper from the central core (if present), and aid baling by reducing the reel size. Methods include 'free hand' splitting, where the operator holds a circular saw to complete the task and 'fixed frame' splitting, where a circular saw is mounted on a fixed frame (fitted with dust extraction) and pushed along a rail by the operator at the desired height. Operators often stand on top of cut paper to continue splitting the reel, creating instability and a risk of falls.

## Risks

- Lacerated legs, feet and other limbs from contact with the rotating blade.
- Falls.

## Controls

- If reel splitting is done regularly, replace 'free hand' cutting with 'fixed frame' saws.
- Design frames to hold reels firmly in place.
- If 'free hand' splitting is unavoidable, provide uncluttered work areas, high standards of operator training, supervision appropriate to the risk and written safe systems of work setting out how to handle and secure reels, how to use the saw, and encouraging regular removal of waste.
- 'Free hand' and 'fixed frame' saws should:
  - have a spring-loaded, retractable blade guard;
  - operate at 110 volts supplied via a transformer centre tapped to earth;
  - have regular maintenance checks of the saw, blade and electrical supply lead.

- Wherever practical provide and use lifting equipment or wheeled containers to collect and remove reels and cut waste.
- Issue operators with suitable PPE including gloves/gauntlets, and eye and hearing protection. Ensure all PPE is compatible.
- Ensure operators are aware that protective equipment may help control risks to health, such as inhalation of dust and hearing loss, and some safety risks, eg eye damage, but will not provide protection against contact with the rotating blade.
- Where there is a dust problem, respond to it under the Control of Substances Hazardous to Health Regulations 2002 (COSHH) hierarchy, ie elimination, substitution, control and personal protection. See HSE's leaflet INDG136(rev2) *COSHH a brief guide to the regulations: What you need to know about the Control of Substances Hazardous to Health Regulations 2002 (COSHH)*.<sup>4</sup>
- You may need to provide **both** local exhaust ventilation and respiratory protective equipment to fully control exposure.
- Provide training and maintain good standards of housekeeping.



A well-guarded tunnel saw



Control panel



Reel cutting

# 8

## Balers

### Background

Baling machines are used to compress paper and card for recycling. They vary in size and design and are either horizontal or vertical. Balers processing large quantities are fed by inclined or horizontal conveyors, and smaller versions may be conveyor- or hand-fed.

The paper to be baled drops (from the conveyor where fitted) into a compaction chamber, and the bale is ejected after passing through a wire-tying mechanism. These machines need regular preventive maintenance to ensure the integrity of all hydraulics, air systems, structural supports/fascia, guarding, and other safety equipment, especially emergency stops and isolators.



Waste travels up the inclined conveyor to the hopper



At the top of an inclined conveyor, material drops into the hopper and compaction chamber

### Risks

- Fatal crush injuries from closure of the pre-compaction lid and main compaction ram when the machine is started up while clearing blockages.
- Falls into the compaction chamber.
- Amputation of limbs when operators reach into openings in the compaction mechanism.
- Accessing the baling mechanism from the outlet of the machine, to adjust the bale, or check on the wire-feed mechanism.
- Trap/entanglement with compactors and baling mechanisms.
- Falls from height.

### Controls

- Control devices (emergency stop and other controls where appropriate) must be clearly visible, properly marked, reliable and perform all the tasks necessary for safe operation.
- All machines must have a means to isolate and lock off power, in an accessible position nearby.
- You must assess the overall assembly of the machinery or parts of machinery designed to work together before use.
- Safeguards **must** function correctly, and safety controls, emergency stop and isolators **must stop** the machinery **and** all associated equipment when operated.
- Operators need to be made aware of the risks when people or vehicles enter a potential danger zone, the procedures for clearing material blocks, and the importance of emergency procedures.
- Provide additional barriers if there is moving traffic in the vicinity of the operator console, eg lorries emptying waste material, or excavators/lift trucks used to load conveyors.



Guarded needlepit, bale ejection mechanism, access ladder to top of conveyor, and platform. Note barrier protection to prevent vehicles striking baler and conveyor



## Emergency stop devices

Install suitable and sufficient emergency stop devices to the conveyor and baler. Consider where people work and where they could become trapped on the conveyor system.

### Tripwires

Tripwires may be in the following forms:

- A single tripwire hung centrally up the length of the conveyor with pull cords suspended at regular intervals that can be reached easily.
- Tripwires arranged like 'goalposts' over the conveyor fitted with suspended pull cords (for easy operation) positioned at regular intervals along the conveyor length.
- A pull cord fitted along the top edge of both side panels on the conveyor (additional pull cords may be necessary for deep-sided conveyors).



Pull cord at both sides and across the top of the conveyor feeding the baler

## Emergency stop buttons

- Fit 'Stop' buttons to the external framework where they can be quickly reached by anyone working in the area.
- The distance between emergency stops and pull cords will depend on the layout and size of the machine and conveyor.
- The recommended distance between such devices is 3 m but it may need to be less than this in some circumstances, eg where a very short conveyor is used.
- Emergency stops need to be easily accessible from every place a person works and is likely to be working.



Emergency stop buttons at easily accessible locations fitted to the external framework

## Personnel detection systems

- Personnel detection systems are designed to stop equipment if someone wearing a signal emitter is identified or a detector recognises body heat.
- These are software devices and should only be considered as additional safeguards - they should **not** be used instead of emergency stop devices.

## Nip guards

- Eliminate hazards from moving parts of machinery using fixed or interlocked guards.
- Where regular access is required, provide interlocked guards, eg for inspection ports, covers or doors containing adjustment mechanisms such as conveyor alignment/tensioning.
- Interlocks may take the form of electric switching and/or a mechanical 'trapped key' system - fit both types where appropriate.

## Conveyors

### Risks

- Falls from inclined conveyors to the ground.
- Trap/entanglement with moving parts.
- Walking on conveyors.

### Controls

- Enclosures at the top of inclined conveyors should deter anyone from intentionally gaining direct access onto the conveyor feed or baler.
- **Entry onto a moving conveyor must not be permitted under any circumstances.** If it is absolutely necessary to walk up an inclined conveyor, the conveyor **and** baling machine **must** be isolated, locked off and a safety harness **must** be used, attached to a suitable anchorage.
- Erect a fixed access platform where regular access is required.
- Some conveyors are fitted with hold-to-run, or limited movement controls. These must only be used for the purposes intended by the manufacturer and by qualified maintenance engineers following a permit-to-work scheme.



- Some larger inclined conveyors feeding balers have recessed pits (loaded by lorries or steer loaders). Measures must be taken to prevent vehicles hitting the steelwork structure or falling into the pit. For example, if lorries tip against the pit, fit wheel stops and if skid/steer loaders are used, ensure lorries discharge in a separate area away from the steelwork and edge of the pit.
- If people are manually feeding the conveyor, provide fixed or movable edge protection.
- You may need to provide warning signs and special flooring to prevent pedestrians from straying or slipping into pits.
- Free-fall distances on lanyards should be short enough to prevent falls into the baling chamber.
- Provide a written safe system of work for clearing blockages, including isolation procedures. It should be possible to clear the majority of blockages from a safe place, without needing to climb into the hopper itself.
- Consider the height of guarding provided and eliminate any unnecessary footholds. You may need additional guardrails to prevent falls.
- The site management are responsible for managing and enforcing safe systems. Only allow access to the hopper, baling chamber and ram under a full permit-to-work system. Train operators in these procedures.

## Hoppers

### Risks

- Falling from walkways or platforms at the top of the conveyor where it feeds waste material into a hopper or chute.
- Falling through the feed chute into the hopper and being baled while clearing blockages.

### Controls

- Platforms may provide access to a hatchway at the side of the hopper for viewing and to the top of the hopper for clearing blockages.
- It should not be possible to reach into the hopper or baling chamber. Hatchways must include fixed guards (eg grilles or bars) to prevent access to dangerous parts.
- Unless permanent safe access is provided, use fall-arrest equipment with suitable anchorage points. These require routine thorough inspection and authorised operators trained in their use.

## Distributors (rufflers, fluffers)

### Risks

- Conical shaped distributors (often known as fluffers or rufflers) can be driven into the hopper immediately above the baling chamber to break up compacted waste (eg newspapers). The distributor is moved into the hopper through sliding or hinged doors (often large enough to allow a person to fall or climb into the baling chamber).
- The distributor blades (cutters) spin at extremely high speeds to even out awkward loads and minimise voids. Any contact with the moving cutters will cause severe injury or death.

## Controls

- Distributors **must** be interlocked to ensure:
  - they can only be started up when they are inside the feed hopper and the access door is closed;
  - they cannot be removed until they have stopped rotating.
- If the door for moving the distributor in and out of the hopper is big enough for a person to enter, consider it an unauthorised entry point and interlock/guard to a high standard.

## Hoggers

### Risks

- Hoggers are used to break up waste, eg cardboard tubes, before baling and consist of a series of arms or blades projecting approximately 6 in (15 cm) from a shaft revolving at high speed. They are often very noisy and the revolving arm can inflict considerable injuries or kill.

## Controls

- Provide full enclosure, isolate the machine and make sure it is stationary (the run-down time may be several minutes) before removing guards to carry out maintenance. Time-delay interlocks are one solution.



## Baling mechanism

When the baling process is complete, material is pushed out through various wire strands, which form the bale straps. The wire is held under tension and progressively unwinds around the baled waste. While the bale is being ejected, a dial or counter measures its length. Once the pre-set length of the bale is achieved, a series of profiled hooks (needles), driven under power, pass through the bale, twist and make-off the wire, completing the bale strapping.



Baled paper



A strapped bale being ejected

## Risks

- Shear traps formed by the hydraulic ram or electrically driven motor.
- Entanglement in the rotating shaft and the meshing of the gears.
- The needles, as well as the risk of entanglement with the wires.
- The ram. Operators trying to remove broken wires or debris from needle channels in the ram have suffered amputations when the ram has moved back.

## Controls

- Make sure guards cover the full path of the ram and needle stroke including the needle pit.
- Always provide fixed and interlocked guards to enclose the wire-forming assembly.
- The discharge of the machine should also include tunnel guarding, to stop operators being able to reach dangerous parts.

## Blockages

### Risks

- **Clearing blockages is the single biggest killer in the industry.**

### Controls

- Pre-sort selected material into compatible types to avoid blockages during compaction and help standardise the size and weight of finished bales.
- Always evenly load material onto the conveyor to prevent build-up.

## Reversing

- Consider installing a 'reverse' facility to feed conveyors. This allows withdrawal of material from the top of the conveyor to ground level, eliminating the potential for falls.
- Take care to prevent dislodged material from falling onto people.
- Note that reversing facilities are unsuitable for slat conveyors as material can stick between the slats and cause additional blockages.

## Rodding

- Some blockages can be rodded out quickly and safely, **but this should only be carried out by trained operators** using a push-stick or other appropriate tool, inserted through a barred hatchway at the side of the hopper **as long as** there is no risk of falling into the hopper.
- Access to dangerous machinery parts must not be possible during this process.

## Safe systems of work

- A few blockages may require access onto the conveyor and into the hopper or baling chamber, resulting in long periods of downtime. Employers should provide a written system for this work.
- Where access is required into the hopper, baling chamber or ram then the detailed requirements of the written system of work should be backed up with a full permit-to-work system.



- Exact details of your safe systems of work for clearing blockages will depend on the type and make of the baler and the management on site, but as a minimum should include:
  - controls to ensure anyone working on equipment physically **isolates and locks off** the baler and **all** ancillary equipment, eg the feed conveyor and hogger, before gaining entry. This should involve locking off an electrical isolator, attaching a personal padlock or departmental 'isolock', or a sufficiently reliable key exchange system;
  - after removing blockages all guards **must** be replaced and checked before machinery/equipment is reinstated.
- **The permit-to-work system should be under the control of a properly trained and authorised supervisor or manager.**

## Accessing the blockage

Safe access is essential, so consider the following methods:

- Provide either permanent access, purpose-built temporary access equipment, eg scaffolding, or use a mobile working platform (eg a mobile elevating work platform (MEWP)/cherry picker) to reach the blockage.
- Before relying on temporary equipment, you must consider local factors, including the size or height of the platform, and whether additional safeguards are required to protect people on the platform.
- Whatever access solution is used, operators must be properly trained and supervised. Familiarity can lead to short cuts being taken, or safety devices being abused.
- Employers should take measures to reduce the risk of falls. This may involve drop-down platforms, erecting additional scaffolds with toe-boards over the open edge of conveyors feeding waste material into the hopper, or using safety harnesses and suitable anchorage.



# 9

## Compactors

### Background

Compactors compress recovered material or waste into a container for eventual recycling or disposal. They are often used on retail sites, and may therefore be accessible to the unsupervised public, in particular children.

Machines typically include a feed inlet, compaction chamber and outlet to a skip/container. The hopper can be loaded by hand, lift truck, an attached bin-tipping mechanism capable of lifting and tipping wheeled bins, or a conveyor system. A reciprocating ram compresses material under automatic or manual control into a skip/container (which is removed for emptying). However, in some machines, the compactor is integral with the container ('Portapack') and the complete unit is removed from site when full.

Compactors can be either stand-alone units, or incorporated into an integrated material recovery system, for example some printing companies have automatic extraction systems blowing paper trimmings directly into compactors.

When the skip/container is full, a pair of tubes or pins are inserted in the feed opening of the container. This procedure is known as 'pinning off' and prevents the waste falling out during transport.

### Risks

- Falling or climbing into compaction chambers to retrieve or clear waste material, causing crush and amputation injuries from:
  - closing lids;
  - the main compaction ram or compression flap/lid (the ram can form shear traps);
  - 'pinning off' and 'barring'.
- When compactors, originally designed for use in a combined automated system, are used as stand-alone units, this allows access via the feed opening to dangerous parts.
- When something goes wrong, usually following a malfunction, if compactors and all associated equipment are not isolated correctly, the compactor may start up unexpectedly once sensors register material (or a person) in the chamber.
- Overloaded containers causing operational difficulties.
- Poorly maintained equipment, seized container clamps, damaged tube pockets and incorrect pressure settings.
- Working in poor light and restricted access areas.

### Controls

- All machines must have a means to isolate and lock off power, in an accessible position. Instructions on how and where to isolate must be clear and unambiguous.
- In the case of separate machinery designed to work together, you must assess the overall assembly for safety before it is put into service. This is to ensure that all safeguards function correctly and safety controls (including emergency stops and isolators) can stop the compactor and conveyors.
- Where regular access is required, interlocked guards must be provided,

eg for inspection ports, covers or doors enclosing adjustment mechanisms such as conveyor alignment/tensioning. The greater the risk of injury, the more dependable the interlocking system has to be. If a guard opening is big enough for a person to climb into the compaction chamber, the guard should be interlocked to a high standard.

- It should only be possible to start or restart equipment using the proper controls. Stoppages may be planned or accidental, eg operation of an emergency protection device. You should not be able to restart the equipment by resetting a protection device, eg an interlock, or by physical withdrawal from the area covered by a sensing device - the operation of a start control should also be required.
- Maintain equipment properly following manufacturer's guidance.
- Site compactors in a position that allows enough space and headroom for a vehicle to reverse onto the compactor to remove/replace the container. Wherever possible, segregate the area from personnel or provide barriers or other means of separation. NB Hook-lift vehicles require considerable headroom to lift a container onto and off the vehicle.
- Provide suitable, well-lit space around the compactor to allow pinning off to be done safely.
- The pinning off mechanism must either be designed to prevent access to moving parts, or be fitted with interlocked guards. Captive tubes which are inserted into the ram face before fitting the container are preferred for new designs.
- Air conveyor systems feeding compactors should have remote power packs. Do not site these under the body of the machine, to minimise the risk of fire caused by paper packing around the motor.



## Guarding the drive unit

- Fully enclose all drive and power units to prevent contact with dangerous parts.
- Restrict access to the machine to authorised people only.
- Wherever possible, enclose internal components forming part of the compactor ram mechanism by fixed guarding that can only be removed with a tool.
- Make additional interlocking arrangements if guards are accessed regularly (typically on larger machines).

## Guarding the inlet hopper

- Take measures to prevent people reaching into the danger zone to clear obstructions or clean the chamber.
- Employers/users must identify measures to control the risk of people falling/climbing into the compaction chamber.
- Compactors fed by high-level chutes or conveyor systems should be positioned, or enclosed, to prevent ready access, eg use an overhead conveyor to the feed inlet and enclose the hopper completely. The height of the hopper loading lid must conform to the minimum reach dimensions set out in BS EN 294.<sup>5</sup>

## Stand-alone units

Where units are supplied/intended for stand-alone purposes (not integrated into an automated process) then additional safeguards will be needed. Select the most suitable means of preventing access to dangerous parts using a risk assessment by the user, based on site-specific circumstances, eg the location of the compactor and surrounding activities. Sometimes a combination of measures will be necessary to control the risk of injury. Examples include:

- fitting a narrow inlet (to prevent people getting into the unit);
- an extended loading chute so that lift trucks can load over the top (to prevent people standing on the compactor unit and compromising reach distances);
- fitting a safety trip/push bar;
- an interlocked hopper lid. Larger hopper lids should be powered or power-assisted for easier operation. These must also incorporate a suitable approved interlock to prevent injury and access to dangerous parts.

## Bin lifts

### Risks

- People being crushed or struck by the lifting mechanism (during operation) fitted to the side or end of compactors to raise, tip and lower the contents of a waste container bin.

### Controls

- Enclose static compactors with fixed guards to prevent access to the danger zone and fit them with an interlocked gate to position/remove the bin.
- Position the controls for opening the bin lift outside the enclosure away from the bin lift movement.
- Controls for portable compactors fitted with a tipper system should wherever practicable be 'hold to run'. Release of the controls at any time during the lifting cycle should stop the movement of all machinery immediately. Use two-hand controls where there remains a risk of contact with moving parts of the mechanism.
- Additional safeguards may be required to control the activity if machine operators cannot monitor/prevent people approaching the danger zone.

## Blockages

### Risks

- **Most serious and fatal accidents happen while clearing blockages.**

### Controls

- Minimise blockages by ensuring the compactor is not overloaded and waste is pre-sorted before loading into the hopper or onto the conveyor.
- Make sure a written safe system of work for clearing blockages is in place and all operators have been trained to use it. Supervisors should periodically check that the system is followed.
- Exact details of your safe systems of work for clearing blockages will depend on the type and make of the compactor and the management on site, but as a minimum should include:
  - controls to ensure anyone working on equipment physically **isolates and locks off** the compactor **and** all ancillary equipment, eg the feed conveyor, before attempting to clear the blockage. This should involve locking off an electrical isolator, attaching a personal padlock or departmental 'isolock', or a sufficiently reliable key exchange system;
  - after removing blockages all guards **must** be replaced and checked before machinery/equipment is reinstated.

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# Training and supervision

## Background

As well as physical safeguards, employers must ensure that all employees, including supervisors and managers, have adequate health and safety training. Training methods vary for different people and jobs depending on existing abilities and the risks of the job. Remember there are several hazardous activities in the recovered paper industry where specific job training in safe systems of work is essential, eg operating baling machines and clearing blockages. Employers, managers and supervisors are legally responsible for maintaining a safe working environment and for identifying hazards or poor working practices and correcting them.

Employers, managers and supervisors need to know enough about health and safety to assess the training needs of individuals at regular intervals. Their commitment to health and safety should be spelt out in the company safety policy.

## Operator training

Training for operators should, as a minimum, include:

- how to carry out simple checks to ensure guards and other safety devices are in place and working properly;
- reporting defects and who they need to tell;
- a safe system of work for operating machines;
- a safe system of work for cleaning machines;
- what to wear;
- what to do in an emergency and fire and first-aid procedures.

## Manual handling and musculoskeletal disorders

### Risks

- Continual sorting of material over long periods can lead to repetitive strain injuries.
- Lifting and twisting can cause back and other injuries.

### Controls

- Avoid musculoskeletal (MSD) risks wherever possible.
- Encourage job rotation to relieve monotony and reduce repetitive movements.
- If job rotation can't be provided, frequent breaks should be taken away from picking lines.

- Train staff to use mechanical aids where provided and train them in good manual-handling techniques.
- Provide alternatives to manual work wherever possible, eg move reels with clamp trucks and provide equipment to mechanically handle large loads.
- Ensure employees are aware of the kind of activities that can damage muscles and joints (the neck, shoulders and upper limbs are particularly at risk). These include:
  - poor working positions;
  - awkward or static postures;
  - high levels of force;
  - high levels of repetition;
  - difficult manual handling;
  - too much bending, stretching or effort.

## Safe systems of work

You must have training in safe systems of work, which should include:

- Who should do the work.
- Required safety devices.
- What training, instruction and supervision is required.
- Details of the hazards identified and the correct method for the job to be completed.

The safe systems of work should include:

- Written instructions for the task.
- Signs warning of the dangers located at various points on the equipment.
- Regular checks to ensure that the system is working as designed.

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