



National Federation of Demolition Contractors  
**Voice of the Global Demolition Industry**

# SAFE USE OF MOBILE CRUSHERS & SCREENING PLANT **GUIDANCE NOTES**



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# INTRODUCTION

The National Federation of Demolition Contractors (NFDC) is represented on the British Standards subcommittee which prepares the code of practice for demolition (BS6187) and is, along with the Institute of Demolition Engineers (IDE), the Voice of the Global Demolition Industry.

Founded in 1941 to help spearhead London's post-Blitz clean-up campaign, the NFDC's members are responsible for more than 90% of all demolition that takes place in the UK. Today, the NFDC is committed to establishing safe working practices for its members and to represent their interests in areas such as training, safety, the environment, waste management, industry guidance, legislative changes and codes of practice.

However, in researching and preparing the information contained within this document the NFDC cannot be held responsible for its subsequent use, nor for any errors or omissions it may contain.

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# SCOPE

## 1.1 Scope of Guidance

- Definitions
- Nature, applicability and status of guidance
- Limitations of good practice guidance

The scope of this guidance is to define the roles, safe working practices and acceptable levels of control needed to use a mobile crusher in a demolition environment. For the purposes of this guidance, a mobile crusher is defined as a wheel or track-mounted machine incorporating a jaw or impact type crusher that allows it to crush concrete, bricks, blocks and other forms of construction and demolition waste.

Mobile crushers are not designed as shredders and are generally unsuitable for the processing of timber, plastics or any materials in which asbestos may be present. For the purposes of these guidance notes, no other type of equipment is considered. This document is not intended to replace the equipment operators' or instruction manual but to supplement them and to aid in the planning, evaluation and utilisation of mobile crushers. **A full working method statement and specific risk assessment should be produced for all works involving a mobile crusher.** This document is intended to be used purely as a guide in the production of such a method statement.

The method statement must take account of all the issues raised in this document as well as prevailing site, environmental and regulatory conditions. The guidance has sought to avoid being over prescriptive as this might limit the scope for innovation and the development of cost-effective crushing and screening solutions. Furthermore, this guide is an enabling document and does not form a code of practice. The guidance does not in any way limit the responsibilities of those parties involved in the design, specification, installation, operation, maintenance and repair of mobile crushing equipment.

While the guide describes best practice in general terms, it cannot deal with every eventuality and site condition. This guidance cannot cover every risk and is not comprehensive. It does not attempt to detail individual machinery safety concerns, but will only highlight those key matters of concern. The risks associated with your particular operation, and the methods of reducing those risks, should be revealed during your risk assessment. A formulation of good practice can only be of value where it is applied with careful planning, supervision, control and monitoring of the mobile crusher on site under appropriate contractual arrangements.

**All parties have to exercise their own knowledge, experience and judgement.**



## 1.2 Key Risks

- Machinery guarding
- Clearing Blocked or Stalled Crushers
- Slips and trips
- Transport – coming in to contact with excavators loading the crusher

## 1.3 Typical Layouts

Mobile crushers are normally fed from loading shovels, backhoe excavators or from other processing machinery; a conveyor, for example. In its simplest form it will be a stand-alone machine, fed directly with the material to be crushed and discharged into a stockpile.

If the material to be crushed is reinforced concrete, a magnetic separator will often be positioned over the discharge conveyor to remove the metal and prevent it from contaminating the production run material.



## 1.4 Feeding

**If the mobile crusher is to be fed directly by a loading shovel or excavator, then:**

- Excavator standing pads should be suitable (stable) and should be high enough for the operator to be able to monitor the feed hopper from the cab. Safe access to the excavator must be provided for the operator.
- Where wheeled loading shovels are used, then the ramp should be wide enough to allow for adequate edge protection (min 1.5m high) on either side of the ramp as well as for the tracking of the machine.
- The maximum gradient of the ramp should be within the capacity of the loader (a maximum gradient of 1:10 is recommended)
- The last few metres of the ramp should be level so that the machine is not discharging uphill, thus enabling operators to more easily monitor the feed. The loading shovel will also be more stable.

**Ensure pedestrians and obstructions are excluded from the working area. If the crusher is to be fed directly by a conveyor:**

- All dangerous moving parts of machinery should be suitably guarded.
- Failure to replace guards (on crushers and conveyors) after cleaning or maintenance work is a major cause of injury on these machines.



## 1.5 Blocked Crushers

Causes of crusher blockages can be grouped under two main headings:

- Stalling due to:
  - Electrical or mechanical failure
  - Material jammed in the chamber causing an overload
  - Overfeeding material
  - Entry of tramp metal or wood
  - Excessive clay or other fines in the crushing cavity preventing small material passing through the crusher
- Bridging due to:
  - Oversize feed material
  - A foreign body in the crusher feed or discharge chamber obstructing the feed material

## 1.6 Prevention

Working on the premise that prevention is better than cure, every effort should be made to prevent oversize material or tramp metal entering into the crusher feed hopper by:

- Reducing oversize material by drop ball, hydraulic breaker, pulveriser or other means
- Training and instructing the loader driver not to load oversize material
- Following the manufacturer's recommendations on the rate, presentation of feed and crusher settings
- Instituting a programme of good housekeeping to prevent scrap steel entering shovel buckets
- Ensuring the size of buckets are appropriate to the capacity of the crusher
- Regular inspection of metal parts (e.g. bucket teeth and dumper wear plates etc) to ensure they are unlikely to break off and enter the crusher feed
- The strategic placing of electrical magnets and/or the installation of metal detectors to prevent tramp metal from entering the crusher
- The use of level indicators for feed control
- Maintenance of drive systems



A properly designed mobile crushing operation should not need any person to be present on the crusher access platform during normal crushing operations. Being on the access platform during normal operation presents the following risks:

- Struck by objects ejected from the crusher, such as pieces of stone or metal.
- Being pulled into the crushing chamber when attempting to pull out contaminants (e.g. reinforcing bar).
- Struck by the loader bucket if the access platform is within the working radius of the loading machine (for 360 degree excavators).
- Falling if adequate guardrails and access arrangements are not provided.
- Noise. Process noise at this level can cause deafness
- Dust, especially in the case of crushing concrete or bricks or any other high silica content material. Breathing silica dust can cause serious respiratory diseases.
- Whole body vibration. Anyone on the platform could be subjected to constant low frequency vibration. It may be necessary for a person equipped with the appropriate PPE (e.g. ear defenders, dust mask, eye protection, hard hat, protective footwear, high visibility outer garment) to spend a few minutes setting the feed speed initially if there is no remote facility. The feed should then be controlled from the machine feeding the crusher by varying the loading rate into the feed hopper.

## 1.7 Action when a crusher becomes blocked

- Have a nominated person to supervise the activity and call for assistance as necessary
- Stop the feed at the earliest opportunity and isolate the plant to ensure all processes are stopped
- Remove excess material by mechanical means where possible before the cause of the blockage can be dealt with
- In some cases, however, an amount of removal by hand will be involved and when this occurs the crusher and associated plant must be stopped and isolated
- Manual removal should only be carried out by suitably trained and competent persons

### Hazards encountered may be:

- Poor or difficult access
- Accidental start up of feeder, crusher or adjacent plant
- Being struck by material from the feeder, chute or projected material
- The movement of any material present inside the crusher
- Slipping and falling
- Manual handling of rocks and equipment
- Unexpected movement of crusher components. In the case of an impact crusher, ensure that the rotor has stopped and is secured before opening the crusher chamber
- Damaged electrical cable
- Noise
- Stored energy from electrical, hydraulic, compressed air, mechanical sources and gravity
- Unsafe placement of material removed from the crusher



## 1.8 Clearing Blockages

### ● Bridged crushers

The preferred method of clearing a bridged crusher is by the use of a breaker boom fitted with a hydraulic breaker. An alternative could be a hydraulic excavator fitted with a quick hitch with pick and/or breaker, (subject to suitable access being available). Where the boom is operated remotely, by radio control, the use of closed circuit television CCTV may be employed to assist the operator. Depending on the result of your risk assessment, clearing a bridging blockage with a hydraulic breaker boom or similar, can be carried out with or without the crusher still operating, but the former is not recommended due to the risk of damage to the breaker boom and breaker.

● **Use of cranes** (including manually operated lifting tackle), Lifting and Slings When a hydraulic breaker boom or excavator are not available, then other methods such as cranes with slings and hooks may be employed; should it be necessary for a person to enter the crusher to position hooks or slings, the crusher, feed and main conveyor must be stopped, isolated and locked off (in accordance with manufacturers/suppliers instructions and safe working practise) and a safety harness worn.

### ● Other available options

Other methods, such as the use of bars, hand hammers and hydraulic jacking systems may be employed, but should always be subject to a detailed and thorough risk assessment; and the crusher, feeder and main conveyor shut down and isolated before any activity starts; and locked off (in accordance with manufacturers/suppliers

in-



structions and safe working practise).

Careful consideration should be given to the risk of large pieces of feed material moving and causing trap or crush injuries. Wedges should NOT be used due to the risk of them becoming a projectile (this has caused fatalities in the past when used with the crusher running). Another option in the past has been the use of explosive charges with blockages in large crushers, today this is considered high risk and would not be appropriate for the type/size of mobile crusher used in demolition and recycling.

## 1.9 Stalled Crushers

A stalled crusher should be treated as possibly being jammed with tramp metal, which could be ejected with fatal consequences. Written instructions should be issued to plant operators. This should detail the procedures to follow in the event of a crusher stalling. These instructions should include the following:

- Isolation of motive power to the crusher and associated plant procedure in operation at the site
  - Clear the area of all personnel
  - Notify the site manager of the stalled crusher
- If, after careful examination, there appears to be no electrical or mechanical reason why the crusher has stalled, it may indicate that the crusher is jammed by tramp metal or oversized material. A “stalled crusher permit to work” system should be implemented. This work should only be carried out by person/s that are suitably trained and competent.

Wherever possible any inspection of the crushing cavity of a jaw crusher or crushing chamber of an impact crusher should be carried out with great care.

## Remember

**Fatal accidents (due to material being ejected) have occurred to people who have examined the crushing cavity of a stalled crusher from above when**



## the crusher is still operating.

### 1.10 Slips and Trips - spillage

Keeping working areas clear of spillages improves operational efficiency and also reduces the risk of slips and trips – a major cause of accidents.

#### Minimise spillages by:

- Maintaining conveyor skirts
- Maintaining the correct adjustment and condition of belt scrapers. Ensure that any feed conveyor discharges centrally into the feed hopper.
- Designing loading shovel ramps to minimise the amount of material that will spill from the ramp itself.

Never remove guards to clean up while the machine is in operation. If guards need to be removed, shut off and lock off in accordance

with manufacturers/suppliers instructions and safe working practice.

### 1.11 Transport

To minimise the transport risks on site, a risk assessment should address:

- A safe site
- Safe equipment
- A safe worker

It is essential where possible to segregate pedestrians from moving plant such as loading shovels, excavators and dump trucks by the use of physical barriers.



## 1.12 Mobile Screens

Mobile screens are large sieves that vibrate or rotate to sort feed material by size and stockpile finished products. Often mobile screens are wheel or track mounted stand-alone machines, fed by loading shovels, excavators or from other processing machinery; such as an upstream crusher or conveyor.

A full working method statement and specific risk assessment should be produced for all works involving a mobile screen.

When loading the screen follow the suggestions listed in Section 1.4 Feeding.

If the material being screened is likely to contain metal or tramp material, a magnetic separator should be incorporated on the plant to remove the metal from the production run & prevent further risk of machine damage and/or blockage

A properly designed mobile screening operation does not require any person to be present on the screener access platform/s during normal screening operations. It is good practice to enforce a 20m (66ft) hazard exclusion zone around the mobile screen whilst operating.

- **NO persons should enter this exclusion zone whilst the unit is operational.**
- **The only exception being access to the machine controls, whilst not loading material.**

**Potential risks present (within the hazard zone) around the machine during normal operation include:**

- Struck by objects falling or ejected from the screen, hopper conveyors and / or reject grid
- Struck by loader and or excavator feeding the screen & or clearing stockpiles
- Falling if adequate guardrails and access arrangements are not provided

- Noise. Process noise at this level can cause deafness

- Dust, especially in the case of crushing concrete or bricks or any other high silica content material. Breathing silica dust can cause serious respiratory diseases.

- Whole body vibration. Anyone on the platform could be subjected to constant low frequency vibration.

Operatives should always wear appropriate PPE (e.g. ear defenders, dust mask, eye protection, hard hat, protective footwear, high visibility outer garment & a safety harnesses if working at height). In all cases a risk assessment must be in place and the method statement followed. To minimise transport risks on site, a risk assessment should be conducted to consider; the workers, site & equipment. Where possible segregate pedestrians from moving plant such as loading shovels, excavators and dump trucks by the use of physical barriers.

To minimise screen blockages, where possible prevent oversize material and or foreign objects entering the screen feed hopper:

- Reduce oversize material by drop ball, hydraulic breaker, pulveriser or other means
- Train and instructing the loader driver not to load oversize material
- Follow the manufacturer's recommendations on the rate, presentation of feed and screen settings

**Common causes of screen blockages include:**

**Stalling due to:**

- Electrical or mechanical failure
- Material jammed in the screen causing an overload
- Overfeeding material
- Entry of tramp metal or wood
- Excessive clay or fines in the screen preventing small material passing through the media

**Bridging due to:**

- Oversize feed material
- A foreign body in the screen feed or screen discharge obstructing the material.

### **In the event of a blockage**

- Stop the feed at the earliest opportunity and isolate the plant to ensure all processes are stopped.
- Remove excess material by mechanical means where possible.
- In some cases, however, an amount of removal by hand will be involved and when this occurs the screen and associated plant must be stopped and isolated.
- Manual removal should only be carried out by suitably trained and competent persons.

Keeping working areas clear of spillages improves operational efficiency and also

reduces the risk of slips and trips – a major cause of accidents.

### **Minimise spillages by:**

- Maintain conveyor skirts
- Maintain the correct adjustment and condition of belt scrapers.
- Design loading ramps to minimise the amount of material that will spill from the ramp itself.

Never remove guards to clean up while the machine is in operation. If guards need to be removed, shut off and lock off.

### **Always follow the manufacturer's maintenance procedures**





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