

Crusher

Note: It is recommended that you read the Supporting Information page before you read this factsheet.

Preparation and completing work *(Preparation)*

- Crushers are used to support construction-related activities such as demolition and clearance work, with the output of a crusher used to recycle materials or to allow easier disposal. They are also a staple machine within the aggregate processing and production sector.
- The majority of crushers used for construction activities are mobile units, being either mounted on a road-going chassis or, more commonly, as self-propelled units that can be moved around a site whereas aggregate-type units tend to be both larger and static. Although there are several methods of crushing materials, jaw or cone crushers are the commonest types used for construction-related activities.
- There may be a team of operatives involved with the crushing operation including one or more designated crusher operators and loading personnel. The number of people involved depends on aspects such as crusher size, production rate, and the type and volume of material being processed. Incidents and accidents do occur with crushers and crushing operations and the aim of this factsheet is to outline issues that have occurred and remind those involved in crushing operations of the good working practices that should be followed.
- Proper pre-use checks are a requirement for the safe operation of any type of plant, including crushers. The operator (that is, anyone who is authorised to operate the crusher) is expected to undertake checks at the required intervals. Failure to properly check all relevant components before work could lead to incidents, near misses and injuries because faults can cause a malfunction or a component to fail, which affects both performance and safety.
- Checks and inspections that need to be made are indicated in the operator's manual for the crusher. Although the frequency of checks will be determined by the manufacturer, extreme or unusual operating conditions may require more frequent checks.
- Operators tend to undertake the daily checks, but they can also carry out more in-depth weekly-type checks and adjustments if they have had additional training on how to do the checks required for the model of crusher, and are competent to do so. They must immediately report any defect they find, even if they think it is minor, such as a small tear in a discharge belt, as they may not be qualified to make a suitable judgement.
- A method statement should be devised that, amongst many factors, identifies all risks and measures to be taken such as dust control, relevant PPE, the sequence of work, the number of personnel involved in the crushing operation and particularly the procedures for clearing any blockages.
- It is also important that all those involved in the crushing operation have been informed of its contents and the actions required of them. If conditions change during operations such as encountering a new material type, the method statement needs to be amended by an authorised person before work restarts.
- Planning of any crushing operation should take into account the type or types of materials that will be processed and for which the correct type of crusher should be selected as, for example, jaw-type crushers are unsuitable for processing timber.
- The operator or anyone undertaking maintenance of crushers with a remote-controlled pendant needs to ensure that both the power supply and the remote pendant are isolated and inactive before any pre-start checks, inspections and maintenance work are carried out.
- Many versions used in construction-related activities are self-propelled and can be travelled to various parts of a site. Before the crusher is moved, all components such as discharge conveyers need to be raised, folded or secured and the travel route must be checked for hazards such as poor or soft ground, overhead hazards and movement of other plant and people.

Working safely, at height and with others *(Working safely and Working at height)*

- The area around any crushing operation is a danger zone, and operators and supporting personnel have been struck by objects being ejected from the crusher or by the bucket of a loading machine, when standing on the platform. Guidance from the Health and Safety Executive states that no one should be on the access platform once the feed rate or speed have been set and checked.
- Many crushers are fitted with a magnetic separator which, as the name suggests, separates magnetic materials such as irons and steels, including reinforcing steel found in concrete structures. The magnetic separators are usually located over the discharge conveyer from which collected steel can be regularly removed.
- Where a crusher is being fed by a loading shovel, the loading ramp should be at no more than a 1 in 10 incline and designed so that the loading shovel discharges the load from the bucket whilst the machine is level, and is not discharging uphill. Discharging uphill may mean the loading shovel operator has limited vision and finds it harder to control the machine when discharging.
- Both processed materials and overspill from the crushing operation will accumulate around the machine so operators and supporting personnel need to take into account slips and trips, particularly on areas such as the platform where a layer of dust can pose a particular slip hazard. Personnel need to ensure when accessing the platform that there is sufficient foot grip to minimise slips and trips.
- When workers need to access any part of the crusher during pre-start checks, when setting up the machine or dealing with blockages, working at height requirements need to be considered and, in many cases, restraint harnessing may need to be worn.
- Crushing operations near to public areas can affect those nearby as they could be subjected to excessive noise and dust. Some form of shielding can be specified to prevent this. One method of limiting airborne dusts is minimising the drop height from a discharge conveyer, as too high a drop height to the stockpile can produce excessive dusts.

Maintenance and clearing blockages *(Maintenance)*

- The clearing of blocked, bridged or stalled crushers is a known cause of many injuries and deaths for which correct procedures must be followed. There are various causes for a stalled crusher with one factor being material jammed in the crushing chamber.
- Before any stalled or blocked crusher is cleared, a permit to work procedure must be devised and followed. The first action to be taken is the shutting down of the engine/power supply followed by a check to ensure that all rotating components are fully stopped, and the feed and main conveyers are isolated before attempting to clear and enter any stalled crusher.
- Some parts of a crusher, such as the jaws on a jaw-type, can still move even with the power supply disconnected or stopped due to stored energy, caused by the effect of gravity or weight on particular moving components. Relevant components must be isolated, clamped or locked to prevent unwanted movement.
- Where bridging of a crusher has occurred, one recommended procedure to clear bridged material is the use of a hydraulically-operated breaker. Wedges were once commonly used to clear bridged crushers, but the wedges have been ejected at high speed, striking operators or other personnel.
- Bridging of a crusher can occur when too much oversize material is fed into the crushing chamber – reducing the feed rate to the chamber can reduce the chances of bridging. An excess of scrap steel and iron can further damage components of a crusher and so should be minimised accordingly.
- All rotating and moving parts should be sufficiently guarded to prevent any contact with the operating personnel. Guarding cannot be removed during operation and should only be removed during maintenance activities by personnel who have had the appropriate training and when the crusher's power supply is isolated.

Sample questions

The following questions are based on the text within this factsheet and indicate how the questions and answers are structured. Based on the factsheet, there is only one correct answer. The correct answer to each question is indicated at the end of this factsheet.

Q1. What could be one risk of the operator being on the platform during operations?



Lack of ability to communicate with others involved in the operation



Unintentional movement of the crusher



Being struck by ejected objects



Being struck by material exiting the discharge conveyer

Q2. The crusher operator notices that a discharge belt has a small tear. Which one of the following statements would be the correct action for the operator to take?



To minimise downtime, they are allowed to monitor the tear to see if it gets worse before reporting it



They should report it immediately as they may not be qualified to make a judgement



They consider the tear insignificant so they can report the tear the end of the working day



They can ignore the tear until the belt fails

Study checklist

This checklist aims to act as a study aid to ensure that the reader has identified and understood the relevant parts of this factsheet.

Do you know?

1. Where the information about what check needs to be carried can be found.
2. Who determines the frequency of the required checks and inspections.
3. What the purpose of the method statement is and when it need to be updated.
4. What determines the type of crusher that is to be used.
5. What precautions need to be taken if carrying out checks on crushers fitted with a remote control pendant.
6. What the procedures are before moving a mobile crusher to a new part of the site.
7. Which areas of the crushing operation are considered hazardous.
8. Under what conditions is standing on the platform an acceptable practice.
9. What the maximum gradient is of a ramp for a loading shovel that is loading a crusher.
10. Why overspill around the crusher is hazardous to people on foot.
11. When fall-restraint harnessing would be required.
12. The methods that can reduce airborne dusts.
13. What is meant by a stalled or bridged crusher.
14. What the procedures are for dealing with a stalled, blocked or bridged crusher.
15. How 'stored energy' can be hazardous when dealing with blockages and how it can be eliminated.
16. Why the use of wedges is not recommended when dealing with a bridged crusher.
17. What can cause the bridging of a crusher.
18. When guarding can be removed.

Answers to sample questions: Q1: C and Q2: B