

Safe Use of Explosives in Construction

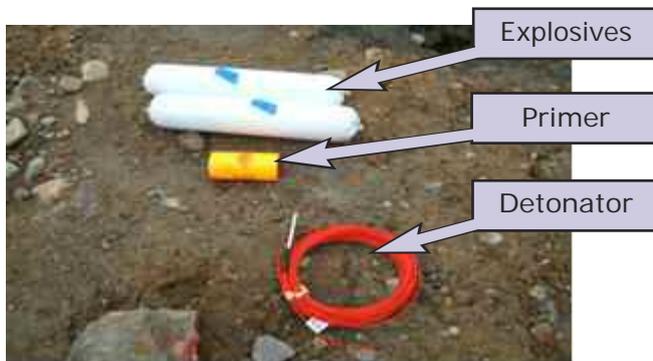
'Safe to Blast'

Information Sheet

This guide has been developed to provide general information to site management on issues dealing with safe use of explosives on construction sites. The availability of commercial explosives is regulated under the Explosives Act 1875 and associated Explosives Regulations.

Explosives are strictly controlled and a person may not import, store or manufacture explosives without a license issued by the Department of Justice and Equality. Under the Safety, Health and Welfare (Construction) Regulations 2013 Part 8: Explosives; clear duties are detailed on the use of explosives on construction sites.

This information sheet will cover the use and operation of explosives in the field and will look at the following key areas; appointments, shotfiring rules, planning / blast specification, risk assessment, charging, danger zones & misfires.



Picture 1: Typical Explosive's Components



Picture 2: Typical Blast Shelter

Appointments

The Regulations impose clear and specific duties on Contractors under Part 8 Explosives;

- Appointments of the following competent persons must be made by the contractor in writing and confirmation of acceptance of these appointments must also be received in writing;

- Explosives Supervisor
- Shotfirer & Trainee Shotfirer
- Storekeeper (Where required)

These persons must have sufficient experience, knowledge, training to carry out their roles safely; on acceptance of their appointments they must confirm this in writing to the contractor.

Note: The Explosives Supervisor and Shotfirer can be appointed to both positions.

Explosives Supervisor

The explosives supervisor must be appointed in writing by the contractor. The explosives supervisor must be competent and have sufficient experience to carry out the role. The contractor must ensure that at no time is there more than one person acting as the Explosives Supervisor at the site.

The explosives supervisor is required to carry out key duties such as;

1. Preparing a written blast specification which includes;
 - a. Minimising the risk of flyrock being projected outside the declared danger zone.
 - b. Minimising the risk of misfires.
 - c. Determining the location of misfired shots.

2. Communication with the appointed shotfirer.
3. Supervision.
4. Amending the blast specification where necessary e.g. to suit local conditions.

Shotfirer

All shotfirers must possess sufficient practical and theoretical knowledge and experience to perform their full range of duties. All persons carrying out shotfiring duties must be in possession of a SOLAS CSCS Shotfiring registration card. A trainee shotfirer must work under the supervision of an experienced shotfirer, until the necessary competence has been acquired and demonstrated.

Shotfiring Operations may include;

•Priming Cartridges	•Charging & Stemming Holes
•Linking and Connecting Shots	•Withdrawal & Sheltering of Persons
•Inspection & Testing of a Shotfiring Circuit	•Firing a Shot
•Checking for Misfires	•Destroying Surplus Explosives

Shotfiring Rules

Shotfiring rules must be drafted and implemented on site wherever blasting is planned to be carried out by the contractor. The purpose of shotfiring rules is to ensure that practical operating procedures are in place, that they are understood and acted on so as to ensure the safety of the workforce and members of the public in the vicinity of operations. The key points to be included in any 'Shotfiring Rules' are;

- (a) The appointments and authorisation of explosive supervisors, shotfirers, trainee shotfirers, and others working with explosives;
- (b) The explosives supervisor / shotfirer to check that:
 - (i) The equipment provided is suitable and safe; and
 - (ii) Site conditions are in line with the blast specification before working with explosives;
- (c) Times when shotfiring is permitted;
- (d) The determination of the danger zone likely to be created by the firing of each shot, the evacuation and control of the danger zone and the provision of effective shelters when a shot is tested or fired;
- (e) Warning systems including, as appropriate:
 - (i) The use of flags or notices;
 - (ii) A system of audible signals to warn people to withdraw from the danger zone and to give the all clear;
 - (iii) the posting of sentries;
- (f) Inspection of the blast site after firing to check the blast area and whether a misfire has occurred;
- (g) Ensuring that normal working is resumed only when the shotfirer is fully satisfied that it is safe and the all clear is sounded;
- (h) Safeguarding charged, but unfired shot-holes at the end of the working day. These arrangements should ensure that someone is in attendance or within sight of the charged holes at all times to prevent theft or unauthorized initiation of the explosives (including detonators);

- (i) Dealing with misfires and the discovery of unfired explosives from previous operations. There must always be a competent person available, normally the explosives supervisor, to ensure that any misfire is dealt with safely;
- (j) Safe disposal of surplus explosives (including detonators) that may remain after completion of shotfiring; and
- (k) Monitoring arrangements to ensure the rules are complied with.

Planning / Blast Specification

The purpose of the blasting specification is to minimise the risk associated with the firing of shots. The blasting specification must be specific to each blast, and take account of site conditions. The specification should be designed to achieve the following goals:

- Minimise the risk of flyrock being projected outside of the declared danger zone;
- Minimise the risk of misfires;
- Enable the location of any misfired shots to be accurately determined.

The specification should take account of:

- (i) Experience gained from previous blasts at the construction site;
- (ii) Any unusual circumstances which are present or likely to arise; and
- (iii) the design of the excavation required.

The following matters need to be addressed when planning, preparing and undertaking a blast:

1. The location on a construction site to be blasted;
2. A drilling plan / log should be prepared showing the hole positions, the length, diameter and the angle of inclination of each hole and direction to which the drill is to be set for each hole. It should also consider the surface position and number or other identifier for each shothole; the angle of inclination, direction, length and diameter of, and extent of any sub grade drilling for each completed shothole;
3. The burden ('burden' - distance from hole to exposed face) around each shothole should be adequately determined.
4. The quantity, type and position of explosives and stemming material used;
5. The system of initiation, including full details of any delay sequence and timing;
6. The danger zone, shotfiring position and sentry positions should be determined;
7. The date and time of the blast and prevailing weather conditions.
8. The proximity of other persons, dwellings, roads, railway lines, commercial buildings or other places which could be affected.
9. Notification of An Garda Siochana.

The blast specification should record information on all of these matters

Site Specific Risk Assessment

What is a Risk Assessment?

A risk assessment is a careful examination of what could cause harm to people as a result of a work activity. It allows you to take the necessary precautions to prevent harm occurring.

How do I do a risk assessment?

There are five steps to a risk assessment:

1. Look at the hazards.
2. Decide who might be harmed and how.
3. Evaluate the risks and decide whether the existing precautions are adequate or whether more should be done.
4. Record your findings.
5. Review your assessment.

What do I need to consider if I am doing a risk assessment?

If you are doing a risk assessment you need to consider the following:

- the work activity;
- the equipment to be used;
- the duration of the work;
- the location of the work activity i.e. presence of hazards such as adjoining properties, members of the public;
- the working environment, e.g. weather conditions, geology, lighting, other persons, falls from height, drilling rigs and mobile plant;
- condition and stability of existing work surfaces;
- physical capabilities of the workers.

Charging the Shot

When carrying out charging operations the following should be taken into account;

- Only sufficient explosives for the blasting operations should be available on site and under the direct control of the appointed shotfirer;
- Boxed explosives and detonators should not be opened and kept apart until required. These materials should not be left lying around;
- Holes should be checked at regular intervals during loading to check that;
 - Cartridges are not stuck at high level;
 - Correct amount of explosive is loaded into each hole e.g. bulk explosives is not lost into cavities or voids in the ground;
- That metal objects are not used to manipulate stuck cartridges in holes;
- That holes are stemmed with single size crushed aggregate;
- On completion of charging that the area is kept clear and circuits remain open until blasting occurs.

Danger Zone

The characteristics of the blast specification will determine the danger zone. The purpose of a danger zone is to protect persons in the event of a fly-rock incident and from entering a live blast area. When determining the danger zone the explosives supervisor has to take into account the following:

1. Other works which maybe ongoing adjacent or near the blasting area;
2. Other persons i.e. public roads, workplaces and habitable dwellings within the danger zone;

3. If members of the public are living within the danger zone the blast should be re-designed so as they are not affected;
4. Clearance & checking of danger zones;
5. Placement of adequate number of sentries around the danger zones and communication with same;
6. Adequate traffic management procedures are in place where traffic has to be stopped;
7. Final checking procedures and sounding of audible warning devices;
8. Protection for the shotfirer.

Misfires

When misfires occur they are defined into two categories Type A & Type B;

Type A Misfire: Testing before firing a shot reveals broken continuity which cannot be rectified.

Type B Misfire: Failure of any or part of a shot to explode when fired.

If a Type A or B misfire occur there must be clear written procedures in place to deal with these eventualities. These are normally covered in the shotfiring rules which will contain procedures to deal with the appropriate type of misfire.

Note:

- Where a misfire has occurred the contractor must follow the safety procedures as laid down in the shotfiring rules and also to include risk assessment and method statement.
- A suitable record of a misfire must be recorded.

8 Steps to Successful Blasting on Construction Sites

