



Bolting Policy

Background

Permanent anchors are used to allow rigging of pitches or hazardous sections of cave where natural anchors are not available. A SUI bolting statement was produced following requests within the Irish caving community for guidance on placement of anchors and fixed aids and the need for training in resin fixed anchor installation. Both the SUI and ICRO have a responsibility to protect the finite and delicate environment of caves from unnecessary alteration. The guideline pertains to anchor placement for more permanent rigging but does not refer directly to more temporary anchors that are used at times of initial exploration work.

The SUI has had an anchor programme begun in the 1990's which was delivered under the umbrella of the British Caving Association scheme using resin anchors recommended by and installers trained in this system.

This policy aims to clarify some (but not all) queries. It is clearly NOT a protocol which tend to be unwieldy in the highly conditional environment of caving nor is it a technical guide to bolting (information on which being available elsewhere) but a guideline which currently *represents best practice in general terms* based on local knowledge and knowledge and experience of organisations elsewhere in a similar situation to Irish caving. Finally it is a document making good practice statements for installing fixed anchors in general and affirming the system which has been in place for installing resin anchors in Ireland on behalf of the SUI for some years as well as suggesting additional anchor systems which are approved for more long term use.

SUI Conservation Statement

Fixed artificial aids should be used sparingly avoiding any suggestion of proliferation. They should be well placed with safety and conservation in mind. Other artificial aids should only be introduced when they are demonstrably necessary; where a natural alternative is not available; and where they will be useful - not to mention safe.

General SUI Recommendations

1. Cavers using anchors shall be responsible for checking each anchor prior to use on each and every occasion
2. Artificial permanent anchors should only be placed when natural anchors are not available or not practicable/safe in order to protect the delicate environment of the cave OR to replace defective/unsafe existing anchors in areas where access is required
3. It is recommended that a minimum of TWO people each with a number of years of rigging experience at least, discuss anchor placement and positioning prior to installing an anchor.
4. Where more extensive anchor placement projects are to take place for example for training purposes the committee should be consulted prior to placement
5. If an anchor is required, the site chosen should take account of the most common method of negotiating the pitch for example SRT, laddering, or pull through. Consideration should also be given to potential use of anchors in a rescue situation
6. Use solid rock walls only avoiding outcrops and irregular surfaces. Anchors must be placed at least 200mm apart in sound rock away from cracks, faults or bedding planes. Fissured or hollow sounding rock must not be used as this can lead to substrate and anchor placement failure.
7. Anchors need to be as high as practicable; the main belay knot, shared anchors, traverse lines, and attachment for belay device or pulley should be at least shoulder high. This will decrease fall factors for anyone fastened on, facilitate SRT rescue and access to and from the head of the pitch.

SUI Resin Fixed Anchor Scheme

1. The resin anchor scheme followed by the SUI will continue according to the manner set down by the BCA in terms of equipment, training, installation and reporting of defects.
2. Resin anchors placed according to this scheme should be recorded on the placement form and submitted to the appointed Bolting Officer of the SUI
3. The Bolting Officer shall have responsibility for maintaining a register of approved installers, recording the details of anchor placements and acting as the point of contact for reporting potentially defective anchors as well as investigating these reports and taking action to decommission or replace said anchors in the manner set out in the BCA scheme.
4. Defective resin anchors should be reported to the Bolting Officer. Example of defects can be:
 - a. Grooves or abrasive areas within the inside of the outer curvature of the anchor
 - b. Fracturing of the rock within 200 mm of an anchor
 - c. Rotation of resin within the drilled hole of a resin anchor
 - d. Rotation of the anchor within the resin component of a resin-fixed anchor
 - e. Egress of an anchor from resin or egress of the resin component from the drilled hole of a resin-fixed anchor
5. Inspection of anchors and reporting of defects
 - a. Cavers using anchors shall be responsible for checking each anchor prior to use on each and every occasion
 - b. The Bolting Officer shall investigate reports of unsatisfactory resin anchors within a reasonable time period and will take action to decommission or replace any such anchors found to be unsafe
 - c. The Bolting Officer shall provide a report on each such investigation to the SUI committee

Anchor placement is a vital skill in cave rescue, however the SUI recommends that generally bolt anchors should not be placed during a rescue practice nor in anticipation of a rescue unless replacing existing unsafe anchors or as a pre-planned exercise, discussed and agreed on by the committee and local wardens, to facilitate long term, safe and useful training whilst being mindful of cave conservation needs. Furthermore the SUI suggests that anchor placement may take place in retrospect

following a live rescue where it is felt that additional anchors would have helped but were not placed during the rescue. Practice in placing anchors for rescue purposes should take part in less vulnerable sites for example selected quarries.

Other Anchor Systems Used in Irish Caves

1. During the preparation of this document the SUI has noted a number of other anchor systems which have been used successfully in many locations for cave access. A list of these approved anchor systems is included as an appendix. These include a number of resin fixed anchors which do not specifically form part of the BCA resin fixed anchor scheme but are nonetheless appropriate for long term use.
2. Although these approved anchors have been used widely elsewhere the SUI will not be providing formal training in their installation. Appropriate instruction should be completed prior to use of any system and manufacturer's instructions for installation must be followed.
3. As with all fixed anchors in the sport of caving, individuals using anchors shall be responsible for checking each anchor prior to use on each and every occasion
4. Defective approved anchors may be reported to the Bolting Officer to decommission or replace said anchors

A number of other anchor systems have often been used during the initial exploration of a cave or in aven climbing (for example self drilling expansion bolt anchors). The SUI expects that the use of these systems will continue but recommends a more robust system to be used for more permanent access

Further Information

Can be found in the following sources:

1. Speleological Union of Ireland Conservation & Access Policy www.caving.ie
2. Bolting policy of the British Caving Association www.british-caving.org.uk
3. 'Permanent resin bonded anchors, installation procedure, training & documentation' **(2011)** R Dearman & L Sykes, *British Caving Association*
4. 'Alpine Caving Techniques' **(2002)** Marbach G & Tourte B, *Speleoprojects Publishing*
5. Petzl bolting products and installation guides www.petzl.com

Appendix 1 – Resin Bolt Placement Reporting Sheet

Bolt Placement Report

Cave Name:

Date installed:

Pitch/traverse name or number:

Type of anchor:

Number of anchors placed:

Batch and/or serial number of anchor and resin where applicable:

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Installed by:

Discussed with:

To be sent to the SUI Bolting Officer

Appendix 2 – Defective Anchor Reporting Sheet

Defective Anchor Report

Cave Name:

Date noted:

Name of person reporting defect:

Telephone:

Pitch/traverse name or number:

Anchor number, counting from the start of the traverse or pitch:

Type of anchor:

Problem (please circle as appropriate):

-Rotation of the anchor within the placement:

-Egress of the anchor from the resin

-Egress of the resin and anchor from the hole

-Wear or grooves on the anchor

-Rotation or egress of a non-resin anchor

-Looseness or fracture of the rock in which the anchor is placed.

-Obvious damage to the anchor or placement from rock fall.

To be sent to the SUI Bolting Officer

Appendix 3 – Additional Approved Anchor Systems

DMM Eco-bolts: Resin fixed 8mm 316 stainless steel anchors formed into a double “P” shape requiring the provision of an 18mm hole drilled to a depth of 100mm which must be cleaned of dust. The resin consists of a 2-part mix that can be used in either wet or dry conditions. The resin components require premixing before use. The anchor cannot be loaded until the resin cures which can take a minimum of 6 hours and up to 72 hours. These anchors were those placed as part of the original SUI bolting programme

Fixe “Glue in”: Single shaft formed and welded 10 or 12mm stainless steel anchor. The Fixe is mounted at an angle of 15 degrees to the horizontal and a portion of the connecting ring is resin fixed below the surface of the rock. The Fixe requires a particular drilling technique to locate and bed correctly.

Petzl Collinox P55: A resin fixed forged 10mm stainless steel anchor, 70mm long requiring the provision of a 12mm hole drilled to a depth of 70mm which must be cleaned of dust and dry. The Collinox must be twisted at least 10times in the resin filled hole to correctly mix and set the resin. Depending on the resin used and the temperature, the anchor can be used from between 40minutes and 4 days. The Collinox has a rated loading of 25kN in all directions.

Petzl Bat’inox P57: Similar to the Collinox, the Bat’inox is a resin fixed forged 14mm stainless steel anchor, 100mm long requiring the provision of a 16mm hole drilled to a depth of 100mm which must be cleaned of dust and dry. The Bat’inox must be twisted at least 10times in the resin filled hole to correctly mix and set the resin. Depending on the resin used and the temperature, the anchor can be used from between 40minutes and 4 days. The Bat’inox has a rated loading of 50kN in all directions.

Through Bolts: 10 or 12mm stainless steel bolts with integrated expanding locking collars mounted on a shaft. An appropriately sized hole is drilled and cleaned before the through bolt is inserted. A hanger can then be mounted on the bolt using an appropriately sized nut and washer. The hanger is generally removed after use and the nut and washer left in place although some systems have an integral hanger. Successfully used through bolts are the Raumer Hang Fixe M10L, Raumer Full Time 12mm, Petzl long life P38 and its replacement the Petzl Coeur Goujon P32/P33. Through bolts are also available in smaller diameters such as 8mm and 6mm but their use is not recommended for more permanent rigging in Irish caves.