

The British Caving Association  
Minutes of the Equipment and Techniques Committee

**Date:** 17<sup>th</sup> March 2012 11.15am

**Location:** Windmill, Dudley

**Attendees:** Nick Williams (NW) Chairman  
Andy Lewington (AL) CCC representative  
Roger King (RK) DCUC representative,  
Bob Dearman (BD) DCA representative  
Glenn Jones (GJ) CNCC representative  
Les Sykes (LS) co-opted member  
Faye Litherland (FL) CSCC representative  
Bob Mehew (RM) Rope Test Officer

**1.0 Apologies:** None

**2.0 Chairman's Opening Remarks:** NW thanked everyone for attending. He asked for a volunteer to take minutes. RM agreed to do so.

**3.0 Notice of Items to be raised under AOB:** GJ asked for the concern he identified in his email arising from an item in the CSCC minutes to be discussed. Agreed to deal with under item 15. NW noted that he needed to raise a point relating to NAMHO under AOB.

**4.0 Minutes of the previous meeting (held 8 October 2011) and matters arising from the minutes not due to be covered elsewhere:**

**4.1 Minutes:** RM noted that the attachment "Anchor Tests 2011" was not tabled at the meeting. BD and LS assured that the attachment contained all the information tabled at the October meeting plus the additional work done after the meeting. BD noted that Action 7.4.2 was incorrectly placed on him. GJ noted that Action 4.2.1 was incorrectly placed on him. RK noted that in items 4.2 at action 13.1, item 9 including Action 9.1.1 had his initials as RC. The meeting accepted the minutes so corrected.

**4.2 Matters arising:**

Action List

*4.2.1 GJ to provide detail of May 2nd 2006 CSCC payment to CNCC - DC to resend details to GJ. - Action considered closed.*

*4.2.2 All to provide a list of potential fixed aids to NW – None received, Action Continues on ALL By next meeting. – NW noted that AL had supplied a list, see Annex 1. BM suggested that in the absence of other lists, this provided a good enough spread of types of fixed aids to inform the committee's discussions. NW noted that a list would be required if fixed aids were to come within BCA's insurance cover. The meeting accepted that this action was closed.*

*4.2.3 BD & LS to produce a validation process to NW – NW noted that the latest version of the IPTD dated 13 December 2011 had been issued to committee members by email on 4 January along with*

the minutes of the last meeting. He asked if it covered revalidation of installers. LS confirmed it was covered under item 10.5. Action closed.

BD asked if there was list of currently valid installers. GJ handed over a list to NW. The question was asked about a list of all installers ever trained. LS said he had such a list and had supplied a copy to RM. RM queried if the list was truly comprehensive. LS & RM agreed to supply a list to GJ and NW.

**Action 4.2.1 LS & RM to provide GJ and NW with his records of all installers ever trained.**

7.2.1 Action GJ to return any 2<sup>nd</sup> "production" batch anchors he held to NW. Done. Action closed.

7.2.2 NW to draft a statement and seek agreement of attendees by email for presentation to Council meeting on 15 October. NW noted the statement had been issued though he had not been able to do so in time for the then Council meeting. Action closed.

7.2.3 DW to prepare text of statement for posting at entrances of affected caves and check with GJ & LS. Done. Action closed.

7.2.4 GJ and LS to canvass CNCC committee for agreement to place statement at cave entrances. Agreement was given. Action closed.

7.2.5 Subject to CNCC's agreement, DW & RM to place statement when agreed at entrances to affected caves. Notices were placed at the entrances to affected caves. Action closed.

7.3.1 FL to produces notes on her dialogue with Bolt Products. FL stated this was ongoing.

**Action 4.2.2 FL to produces notes on her dialogue with Bolt Products.**

7.3.2 FL to provide indicative T&S costs for an audit of Bolt Products. Done. Action closed.

7.3.3 FL to draft a User Specification for the potential purchase of anchors. Defer to item 15.

7.4.1 BD & LS to produce a program for testing and obtain Bolt Products anchors to match requirements. Done. Action closed.

7.4.2 BD to supply NW with Declaration of Conformity for resin. Noting BD's comment, NW asked if LS could supply the declarations for both RAWL and KMR resins. LS agreed.

**Action 4.2.3 LS to supply Declarations of Conformity for RAWL and KMR resins to NW.**

8.1.1 NW & BD to produce plan of work for upgrading puller and seek agreement from Committee by email. Done. Action closed.

9.1.1 NW, RC[K] & AL to develop document on Installing Anchors in substrates other than limestone. Ongoing.

**Action 4.2.4 NW, RK & AL to develop document on Installing Anchors in substrates other than limestone.**

10.1.1 BD to run some tests on “spinning bolt” to ensure thorough mixing of resin in hole and report back to Committee. BD noted that as no BP anchors were available, he had not been able to conduct any tests. Ongoing.

**Action 4.2.5 BD to run some tests on “spinning bolt” to ensure thorough mixing of resin in hole and report back to Committee.**

AOB.1 RM to estimate 2012 budget for Rope Test Rig. Provided. Action closed.

AOB.2 FL to estimate cost of trip to Bolt Products. Done. Action closed.

AOB.3 NW to draft outline for Budget and seek agreement by email from committee. NW reported that whilst he had not produced a formal budget, he had spoken with the Treasurer who was content with the position. The action was closed.

**4.3 Work between Meetings:**

**4.3.1 Adoption of Bolt Products anchors and a new axial force requirement**

NW reported that he had emailed all committee members on 10<sup>th</sup> December with a request to approve Bolt Products (BP) anchors and to change the axial force requirements. He read out his email, copied at Annex 2 (including attachments). NW noted that no one had asked him for information relating to Bolt Products quality control measures. NW reported that all bar one had voted for the adoption and setting a new axial force requirement, the exception having abstained. RM stated that he had abstained for reasons he had circulated in reply to the email. The meeting agreed to attaching those reasons to the minutes, see Annex 3. NW observed that the anchor model number needed to be specified in adoption but the selected anchor was the 100mm long product. *(Note added post meeting - the number was declared as GP8-100-16A4.)*

BD noted that the BP anchor were clearly stronger than all others tested.

FL asked about inspection requirements and what the life expectancy was. It was noted that pre use inspection was required by the user and that it was planned to undertake a testing program. LS noted that the results indicated the BP anchor well exceeded the Mountaineering Anchor standard. RM noted that it was on this basis that the inspection program by BCA was being withdrawn.

FL asked about calibration of the load cell. RM reported that the load cell had been supplied with a Certificate of Conformity rather than a calibration certificate. RM was organising the calibration of the load cell. FL stated her endorsement of the anchor would be dependent upon an acceptable result of that calibration.

FL sought clarification on how would substrate failure be dealt with in confirming adequacy. AL noted the problem with using mean less 3 standard deviations. RM suggested that the industry approach of using the 5% fractile (95% of tested anchors exceeded) would be a suitable balance between the severity of 3 standard deviations (more than 99% of anchors exceeded) and the mean (50% of anchors exceeded). But this would require adopting a lower value than the proposed 25kN which he understood was linked to using the mean result.

FL suggested that work needed to be done on finding out what limiting level of substrate strength was appropriate for use of the 100mm long BP anchors.

NW sought a clear set of words to adopt the BP anchors. After some deliberation, the following statement was put forward.

**The standard for acceptance of an anchor type on the basis of an axial load is based on the 15kN axial load value as cited in Section 4.3.1 of the Mountaineering Equipment – Rock Anchors – Safety requirements and test methods BS EN 959 : 2007, as computed as the 5% fractile value as specified in Section 4.2 (3) of the Euro Code Basis of Structural Design Standard BS EN 1990 : 2002 from the results of a batch test of a minimum of 32 anchors.**

**At this point in time the committee does not have sufficient information to make a recommendation on an alternative minimum number of anchors for testing in different substrates.**

The statement was unanimously agreed by the meeting. As a consequence, given the results of the BP anchor type GP8-100-16A4 exceeded the statement's criterion, the BP anchor type GP8-100-16A4 was adopted subject to FL's reservation re calibration. RM withdrew his abstention.

*(Note added post meeting – this acceptance was not explicitly made since the model number was not known at the time but it was the clear wish of the meeting.)*

**5.0 Voting arrangements for E+T Committee – BCA Manual of Operations:** NW reported to the meeting that he had had to take a position at Council's meeting on a proposal that voting at all Special Committee meetings (of which E&T was one) would be restricted to only RCC representatives without consulting all members. He had argued that if co-opted members were not allowed to vote at special committees, then it was likely they would not be prepared to offer their services. This view was broadly accepted by Council.

FL sought agreement that where an RCC was impacted by a decision, then only RCCs should be able to vote. NW suggested that it would be impossible to satisfactorily formalise this. However, given that special committees can adopt any voting procedure they choose, then it was better left until the occasion arose. The general view of the meeting was that having every co-opted member able to vote was the preferred position.

**6.0 Rope test report:** A report had been circulated, see Annex 4. The meeting noted its contents.

**7.0 Development of policies for fixed aids other than SRT/ladder anchors:** NW noted the topic had considerable history dating back into the 1990s. There was a draft policy but he felt it was worth questioning why a policy was required. AL reported that he wanted to see at least some advice produced. FL said she wanted policy which covered principles such as galvanic corrosion. RM suggested that policy should be high level and not cover such technical details.

NW asked if it was decided that a general policy was not required, then why was the IPTD for anchors required? He saw one need which was to provide support to the coverage of installation work by BCA's insurance. Although it would not be clear if the insurance did cover the activity until a claim was made, it was clear that having documentation which was robustly written, used good practice and set benchmarks would significantly help to ensure the scheme was covered. However if one wrote at the detailed level of a procedure, then the document became too large and created problems in its own right. He felt that somewhere in between with a document presented as guidelines was more appropriate. FL and BD agreed.

GJ asked whether there was value in such work. If a document was issued as guidance, then it was likely that cavers would ignore it and suggested it would be a waste of time producing such material.

BD suggested producing a list of “don’ts” such as don’t use electron ladders as fixed aides since they relatively quickly corrode when left in a cave. FL supported the idea.

**Action 7.1 BD and FL to produce a list of “don’ts” with respect to equipment being used as a fixed aid.**

NW suggested that others might like to make contributions to the list of “don’ts” direct to FL and BD.

NW asked if there was anything else which could be done. He had drafted some points but had not got them into a presentable statement. GJ asked if a statement could be produced. RM suggested that it might be better to await the list of “don’ts” so as to see how a statement could be fleshed out. NW agreed to append his set of points to the minutes, see Annex 5.

The meeting adjourned for lunch.

**8.0 Installation of anchors in substrates other than limestone:** NW noted there was need to get other people shown how to use the anchor puller. It was pointed out that a valid installer was required as part of the team since anchors had to be placed.

FL asked if the work on different substrates could be reduced by consideration of the compressive strength of various rocks. Thus rocks which have higher compressive strength would not require the same degree of testing as rocks with lower compressive strength. RK offered to seek advice. RK also noted that Snailbeach mine offered a possible site covering several rock types. It was noted that the puller was not suitable for going underground due to its bulk and weight. *(Note added post meeting – also, the load cell and hand set is not waterproof.)* AL noted that although North Wales were already placing a range of anchors in their caves, he should be able to identify a site for testing anchors in a slate. LS proposed using BP 150mm long anchors *(note added post meeting - type GP8 – 150 16A4)*. LS, BD and GJ volunteered to undertake the testing if AL could identify a site. RK suggested that Devon would have several sites for testing anchors. NW said he could undertake a compressive strength test if samples could be acquired. It was proposed that 2 inch diamond core drilled samples should be acquired. NW asked if a sample could be obtained from the limestone already used as a test bed. LS noted that quarry rock would be micro fractured by previous blasting so any samples would have to come from an alternative site such as that above Yordas cave. A question was raised on the size of cone failure. RM said he had been advised that the size was based on theoretical grounds but his contact could not recall the theory. *(Note added post meeting - the conservative value is based on a 30 degree half angle for the cone top.)* It was agreed that a budget of up to £500 could be spent on undertaking some tests of anchors in other substrates.

**Action 8.0.1 AL to identify and obtain permission for a test site in North Wales.**

**Action 8.0.2 LS to purchase some BP 150mm long anchors (type GP8 – 150 16A4) and a 2 inch diamond drill bit.**

**Action 8.0.3 RK to make enquiries on compressive strength of rocks and the basis of cone failure.**

**9.0 Anchor scheme admin report:** GJ reported that there had been no changes since his last report to the committee.

**10.0 Update on BP anchor testing:** NW asked if there was anything else to add to the Anchor Tests 2011 report. LS confirmed that no further work had been conducted. NW proposed a vote of thanks to BD, GJ & LS for all their effort which was agreed by the rest of the members.

**11.0 Update on supply of BP anchors:** LS reported that some 2000 anchors had been ordered with 190 due in advance by post. He was uncertain when the postal delivery was due but understood the proposal was that BP would bring the rest across to the UK around the end of May.

**Action 11.0.1 LS to obtain expected delivery date from Bolt Products.**

LS noted that each anchor would be stamped in sequence A01 to 99, B01 to 99 and so on. FL enquired if stamping might weaken the anchor. BD recalled some work he was involved in some while ago when they took 40 steel crabs, stamped 20 of them and then pulled all of them to destruction. There was no difference between the two sets.

**12. Update on anchor tester:** NW noted that the ram and pump had been replaced at a cost of around £570 by more powerful ones. The ram had been modified so it was captive at both ends. The new pump has a vent cap system which is required to be opened in use but closed for travel, else fluid will leak out. LS confirmed to NW that he still held around a litre of fluid.

NW asked if there were any other improvements required. GJ asked for a eye to be located near the top of the upright so the frame could be held in position against a vertical face as a number of test beds had been placed in vertical sides rather than in horizontal floors. LS asked for carrying handles on each of the long side pieces of the frame. It was noted that the method of coupling the puller to an anchor required two bites to extract an anchor. NW noted that a previous anchor tester designed by S Goodwin had a useful coupling piece. RM commented that he had supplied a design to replace the current use of shackles. RK offered to see if he could manufacture a new coupling piece.

**Action 12.0.1 RM to supply RK with designs of the two proposed coupling devices.**

NW noted that BD had suggested testing maillons. BD reported that during their anchor testing work they had purchased a new 12mm maillon which broke on the first use at 26kN against a rated value of 55kN. He had suggested that BCA should conduct some tests on maillons. LS commented that the standard for testing carabineers included a specification for the diameter of the bar which coupled the crab to the puller. He thought the diameter was somewhat larger than 12mm which might account for the failure. He agreed to produce details.

**Action 12.0.2 LS to identify the diameter of bar used in testing carabineers and the related Standard(s).**

NW suggested that the puller needed an I beam with hole to enable it to be used to test maillons. BD volunteered to undertake the testing. The meeting agreed to allow a budget of up to £100 to cover materials and samples.

**Action 12.0.3 BD to progress developing the anchor puller into a device for testing maillons and undertake some tests.**

**13.0 Anchor placement training arrangements:** NW noted the need for more people to be trained to install anchors which in turn indicated a need for a fourth trainer. In previous discussion Mark Wright had been identified as a suitable trainer with more than sufficient back ground competence. BD supported his nomination. RM proposed and BD seconded Mark Wright's formal acceptance as a

trainer for the BCA anchor scheme. The meeting agreed the proposal. BD said he would brief Mark on several points.

NW asked about numbers of people wanting training. AL noted that his training was about to run out and Dewi Lloyd and Gethin Thomas from North Wales were seeking training. RK noted that there were several people identified from Devon for training. FL said she had 13 people wishing to be trained from CSCC. NW added that he understood NAMHO had asked for training.

NW proposed that it was acceptable to use a Peco anchor in place of a BP anchor for the candidate to install in training. Following a discussion this was agreed. It was also noted that each of the trainers needed to have a BP anchor so they had at least one to show trainees. RK asked if each region could also hold one sample for demonstration purposes. This was agreed. FL suggested that any Peco anchors so used should be clearly marked with a slit in the head to warn people that they were not to be used. It was agreed that any anchors placed for training purposes should be visibly damaged to indicate they were not for use.

GJ suggested that Mark Wright should concentrate on responding to training demands from other regions whilst he, LS and BD serviced demands from CNCC and DCA regions. It was accepted that it was simplest if regions should make contact direct with Mark Wright to arrange dates and locations for training. In response to a query, BD suggested that it was best to train up to 3 people at one time. It was noted that a successful training exercise had been conducted with 6 people at once.

RM asked about distribution of anchors when supplies arrive. NW suggested that this was not possible to do at this time. GJ noted that normally the process would be for a region to contact him as Anchor Administrator to request anchors and resin for each project. GJ would organise the purchase of resin and then supply the request. FL indicated she would set out a list of CSCC requirements and send it to GJ.

**14.0 Update/discussion on status of installed PECO anchors:** NW noted that the 2 year program only started when the replacement anchors became available. GJ said that he was proposing to label each Peco anchor as each new anchor was installed along side it. They would then go back and remove the Pecos after completing the whole installation program.

NW had also tried out a simple pull rig using a hollow ram set up. The experiment had been a partial failure in that the anchor had only been extracted for about three quarters of its length before the 12mm threaded rod used to couple the ram to the anchor broke. The residual elasticity in the threaded bar was sufficient to fire the sheared end away from the ram with some force and hence the technique could be actively dangerous in addition to the failure of the puller to effectively remove the bolt. Further work would be required to see if this system could be made in to a compact and workable puller. In reply to a query, he noted that he had not drilled the resin to weaken it prior to trying to extract the anchor.

## **15.0 Other IPTD matters:**

**15.1 Anchor User Specification:** Action 7.3.3 required FL to draft a User Specification for the potential purchase of anchors. FL reported that she had started drafting the specification. One aspect was to define the range of potential uses the anchor might be put to; such as SRT, traverse protection, anchor for ladder and line, anchor for aid climbing, etc. From this range of potential uses the document should go on to amongst other things, predict an expected life time for the product and a common usage loading / unloading stress (not fall) for each use. This would allow one to identify the requirements of an accelerated life time test where a test sample could be cycled

through loading to a certain value, unloading and repeat for say 1,000 cycles before testing. Then one goes onto to repeat for a larger number of cycles, say 5,000 and test and again for say 10,000 cycles so as to obtain evidence that the anchor system is fit for the expected life time use of the anchor (or define the life time before replacement is required). NW asked if the test would cover more than just the metal anchor. FL replied that it should cover the whole system. BD asked who could do such testing. It was noted that this was a potentially suitable experiment for a final year university engineering student. RM suggested that FL should issue her draft user specification to members for comment.

GJ commented that another use of the User Specification was to define the requirements of the item for procurement. FL agreed that this was so but acknowledged that events had overtaken her work. But she hoped that the specification could be in place by the time the next order was placed.

RM suggested that the email should cover other aspects such as resin and the need for accelerated life time testing. In reply to a query from LS, RM noted that accelerated life time testing of materials were usually conducted at an elevated temperature. LS observed that some DMM anchors were placed in the Oman where temperatures reached over 50 deg. C.

LS asked how the load value might be selected. RM indicated there was work to justify a limiting usage load. LS observed that anchors could be used in tyrolean traverses in rescues which would involve much higher loads than otherwise expected from normal usage by a single person.

**Action 15.1.1 FL to issue her draft User Specification for comment by members.**

*(Note added post meeting - it is assumed that Action 7.3.3 was closed as a consequence of this action.)*

**15.2 Concern with item in CSCC Minutes:** GJ had emailed out prior to the meeting to seek clarification on an apparently contradictory report in the minutes of the February 4th 2012 CSCC meeting (<http://csc.org.uk/wiki/doku.php?id=documents:start>);

***“FL clarified that the acceptance of the IPTD with regards to SRT competence is only applicable for placing anchors for SRT pitches only***

*9.4 GP asked for clarification regarding the wording of 9.1 paragraph 2 of the previous minutes with regards to SRT competence (05/11/11 “As a result of the process of arbitration, CSCC have agreed to the IPTD including a requirement for Council of Southern Caving Clubs SRT competence, on the basis that the document will become copyright of BCA and subject to future revision as agreed by the E+T Committee”). FL clarified that the acceptance of the IPTD with regards to SRT competence is only applicable for placing anchors for SRT pitches only”*

I [GJ] seek clarification as the minutes of the October E&T meeting record that ***“As a result of the process of arbitration, CSCC have agreed to the IPTD including a requirement for Council of Southern Caving Clubs SRT competence, on the basis that the document will become copyright of BCA and subject to future revision as agreed by the E+T Committee”***

The IPTD clearly states;

**10.1** *Cavers wishing to be considered for training must be competent in S.R.T. and rigging techniques and be approved in writing by the Regional Council. These skills must be assessed by the*



*trainer during anchor installation training which may be suspended if this competence falls into doubt.*

and;

*10.3. Eco/Peco resin bonded anchors that are to be included on the BCA anchor scheme insurance must only be installed by cavers who have been trained under the scheme approved by the British Caving Association and have the authority of the Regional Council.*

Therefore, all anchors installed under the BCA scheme must be installed as per 10.1 and 10.3 above, that clearly will include ladder and lifeline pitches (if they are to be included as part of the BCA scheme).

NW noted that he accepted he had made a promise to CSCC which he had not made clear to GJ, BD and LS in that he had distinguished between SRT anchors and anchors for other purposes. GJ noted that the IPTD was not just for SRT application and said he was surprised to read the CSCC minutes since the IPTD also covered the question of SRT competence. RM sought clarification on whether the point of dispute was relating to just anchor usage or just SRT competence or both. NW accepted there were two points, the coverage of the scheme to anchors for use other than SRT and also the requirement for SRT competence.

NW sought the views of AL and RK. RK said DCUC have accepted that as the IPTD requires SRT competence, then they can only put forward people for training who were competent. However such competence was not necessary in many of the locations where they desired to place anchors for use with ladder and lifeline. He noted the same was also true on Mendip.

GJ pointed out that the question of SRT competence was secondary. He had understood that CSCC had accepted the IPTD as it then stood and now he learnt that they had not. FL stated that they had accepted it for anchors placed for SRT. NW accepted that he was responsible for causing this confusion.

AL observed that in South Wales most vertical pitches were already rigged with anchors so the current focus was on use of anchors as fixed aides elsewhere. As many cavers felt they could not gain SRT competence due to them not having a need to use the technique, they were adopting other systems of anchors. NW said his concern was that IPTD did not reflect all of the needs of cavers. RK noted that he had learnt of some cavers in Devon and Cornwall were already purchasing BP anchors and placing them in mines.

[RM left the meeting at this point. Subsequent minutes prepared by NW].

NW stated it was important that the document reflected the actual practice in the regions since otherwise it could become a stick to beat us with and it was clear that some regions had officially accepted it even though they clearly had no intention of actually applying it. It did not make sense to him to apply the same requirement for anchors placed for SRT to those which would clearly never be used as SRT anchors, for example chains in Blue Pencil Passage in Swildons or the Surprise View ladder in Peak Cavern. Furthermore, he could not see the point in wasting further time on arguing over CSCC's acceptance of the document or otherwise since BCA did not have any powers or means of enforcing the document.

FL stated that she knew that even if CSCC were to adopt the policy they would be unable to enforce it and she would rather see a document which has some credibility with the people who need to use it than one which provides a gold standard but which in practice is widely ignored.

GJ, BD and LS then stated that they would withdraw from the E&T committee. GJ requested that his disgust with the way the matter had been handled should be recorded.

#### **16. Date/location for next meeting**

It was agreed that the next meeting should be held on 27 October 2012, provisionally at the Windmill again.

#### **17. Any Other Business**

17.1 NW stated that he had had an approach from NAHMO who would like to consider the placing of anchors under the BCA scheme in mines. In view of the previous discussion, no conclusion was reached on this point.

17.2 AL requested guidance on what could be done with an old drill belonging to E+T currently in his possession. It was agreed that it should be auctioned in aid of SWCRO.

The meeting closed at approximately 15:30.

## Action List

- 4.2.1 LS & RM to provide GJ and NW with his records of all installers ever trained.
- 4.2.2 FL to produce notes on her dialogue with Bolt Products.
- 4.2.3 LS to supply Declarations of Conformity for RAWL and KMR resins to NW.
- 4.2.4 NW, RK & AL to develop document on Installing Anchors in substrates other than limestone.
- 4.2.5 BD to run some tests on “spinning bolt” to ensure thorough mixing of resin in hole and report back to Committee.
- 7.1 BD and FL to produce a list of “don’ts” with respect to equipment being used as a fixed aid.
- 8.0.1 AL to identify and obtain permission for a test site in North Wales.
- 8.0.2 LS to purchase some BP 150mm long anchors (type GP8 – 150 16A4) and a 2 inch diamond drill bit.
- 8.0.3 RK to make enquiries on compressive strength of rocks and the basis of cone failure.
- 11.0.1 LS to obtain expected delivery date from Bolt Products.
- 12.0.1 RM to supply RK with designs of the two proposed coupling devices.
- 12.0.2 LS to identify the diameter of bar used in testing carabineers and the related Standard(s).
- 12.0.3 BD to progress developing the anchor puller into a device for testing maillons and undertake some tests.
- 15.1.1 FL to issue her draft User Specification for comment by members.
- 17.2 AL to arrange for disposal of the drill with proceeds going to SWCRO

## Annex 1 - FIXED AIDS

These are some examples of fixed aids in S Wales:

Handlines, traverse lines, lifelines

11mm Edelrid superstatic eg Draenen

Hawser rope c9mm Aggy climb to Priory road

Metal chain handline Craig a Fynnon, OFD

Wire traverses OFD 1 8mm with stainless fittings

### Ladders

Stainless steel ladders: Darren Draenen; 10mm stainless steel bar bent into shape, rungs clip together, (6.5 tonne stress before showing signs of fracture)

10mm zinc plated chain for rigging ladders: Darren

Old metal ladder: Eglwys Faen, Craig a Ffynnon OFD Dan yr Ogof

New chain ladder: The Rising DYO

Stainless steel ladders Darren: Busmans, Man in the Roof, Antlers: 12mm stainless bar, tough shrink wrap, , stainless hangers formed from 5mm stainless angle bar, M8 maillons, acetal plastic, 10mm mild steel chain links (rust accepted), M8 stainless turnbuckle to adjust ladder, M10x80 A4 sleeve bolts,

### Anchors:

Few Ecoanchors, mostly Draenen and Pwll Dwfn

10mm maillons for rigging, 12mm maillons for lifelines Draenen

8mm spits Aggy Waterfall climb

Expansion anchors common in Aggy and elsewhere in S Wales

OFD anchors 12mm twist stainless, Hangfix Inox M12 bolt, Rock 12 mm dia, 10mm maillons,

Old anchors including eye bolts OFD

Rope slings OFD

10mm stainless bolts Darren

### Steps

Isolated metal Steps: Darren, OFD Maypole Inlet

Scaffold bars OFD 1 (to stand on crossing pools)

Metal bars (scaffold) for rigging

### Other

Reflective streamway escape route markers

Skyhook OFD

A Lewington

ANNEX 2 – EMAIL FROM NW RE ADOPTION OF BP ANCHORS AND A NEW AXIAL FORCE REQUIREMENT

**From:** nick.williams@hucklow.net

**Subject:** Bolt Products anchors

**Date:** 10 December 2011 21:32:24 GMT

**To:** les@speleoadventure.wanadoo.co.uk, robert.mehew@talktalk.net, chairman@thedca.org.uk, roger296king@btinternet.com, andrewlewington@hotmail.com, secretary@northwalescavingclub.org.uk, faye.litherland@blueskyeng.co.uk, glennjones@orange.fr, mybigadventure@me.com

**Cc:** andy@andyeavis.com, dweare@supanet.com

Dear All,

Following considerable further work by Bob Dearman, Les Sykes and Glen Jones, we now have a clear proposal based on extensive testing for a replacement for the DMM Eco anchor. Rather than wait until the next E+T meeting scheduled for February, I am hoping that we can agree this choice in an e-mail correspondence. This message is being sent to all voting members of the E+T Committee (plus members of the BCA Executive for information).

I would be grateful if you would review the attachments and the following information and confirm to me if you are in favour or against the endorsement of the BT twisted anchor as a replacement for the DMM Eco Anchor in the BCA's anchor placement scheme.

Please note the following comments as part of your considerations:

- Adoption of Bob and Les' report will, in effect, be a formal decision by E+T to downgrade the anchor performance from our previous 40kN specification to 25kN. We have discussed this in Committee in the past, but we have not yet taken a formal decision to reduce the specification.
- In addition to Bob and Les' report, I have also attached two sets of papers from Jim Titt at Bolt Products. One of these is his Certificate of Conformity for the products he makes, the other is a pair of test results from some tests done on Bolt Products' behalf by TuV.
- It is clear from these papers that Bolt Products do not have any complete independent test results to confirm their claim of compliance with EN 959, but they do have some corroborating evidence for their self-certification of the products.
- In addition to the attached information, I can confirm to E+T committee members that I have seen an exchange of correspondence with Jim Titt which confirms that Bolt Products have in place the basic quality control measures required to ensure consistency and control of production for their products. This information is commercially confidential, but I can forward a summary to E+T members who would like to see it.

I would be grateful for a reply confirming your view on whether or not we should endorse the BT anchors, ideally within the next two or three days. Please let me know if you have any questions or require additional information.

Regards

Nick.

(attachments follow)

Votes in favour received from: Nick Williams, Les Sykes, Faye Litherland, Stephan Natynczuk, Roger King, Bob Dearman, Glenn Jones (received via Bob Dearman), Abstension received from Bob Mehew.



European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

### Declaration of conformity

This is to certify that the product group-  
Glue-in Protection Bolts, comprising of product numbers:-

GP6-80-12

GP6-100-12

GP6-150-12

GP8-80-16

GP8-100-16

GP8-150-16

in A2 (1.4301) and A4 (1.4401) stainless steel.

conforms in all respects to the requirements of EN959 06/2007.

Date 30/07/07

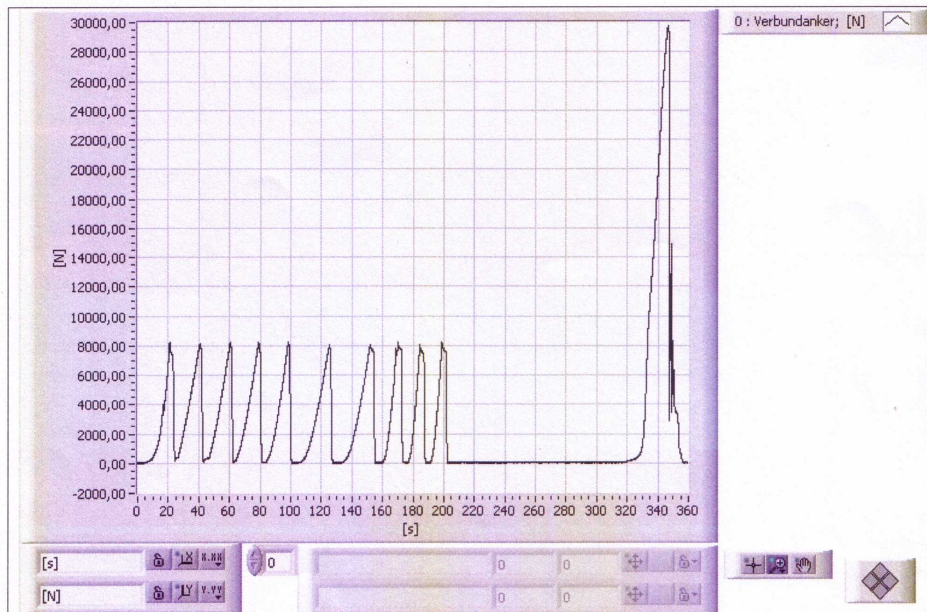
James L.Titt

Bolt Products, Hecken 40, 85461 Bockhorn, Germany

# MESSERGEBNIS MEASURING RESULT



**Bearbeiter / Project Manager:** Volker Kron  
**Auftraggeber / Applicant:** Bolt Products  
**Auftragsnr. / Report-No.:** 71330960  
**Produkt / Product:** Bohrhaken Typ 6-80-12  
**Modell / Item:** Verbundanker;  
**Prüfungsart / Kind of test:** EN 959: 2007; 4.3.1 Axiale Belastung  
**Kenndaten / Technical Data:** Beim Setzen 15 mm aus Beton draußen



Bezeichnung	Minimum X	Maximum X	Minimum Y	Maximum Y
0 : Verbundanker; [N]	0,00 s	359,29 s	-11,07 N	29747,88 N

## Berechnungen / Calculations:

**Kommentar / Comment:** 10 x 8 kN ohne Problem; Auszug des Bohrhakens aus Bohrloch; Anforderung > 15 kN erfüllt;

**Messkarten / DAQ-Card:**  
PCI 6220  
**Aufnehmer / DAQ-Card:**  
Wägezelle 10 t

**Messverstärker / Amplifier:**  
MC 55  
**Software / Software:**  
UniLAB 2004 / HE-Datentechnik

**Seite / Page:** 1 of 1  
**Datum / date:** 25.01.2008

**Tel. / Phone:** +49 89 5008-4198  
**Fax / Fax:** +49 89 5008-4316

**TÜV Product Service GmbH** TEC-SPORTS  
Ridlerstraße 65 - D-80339 München

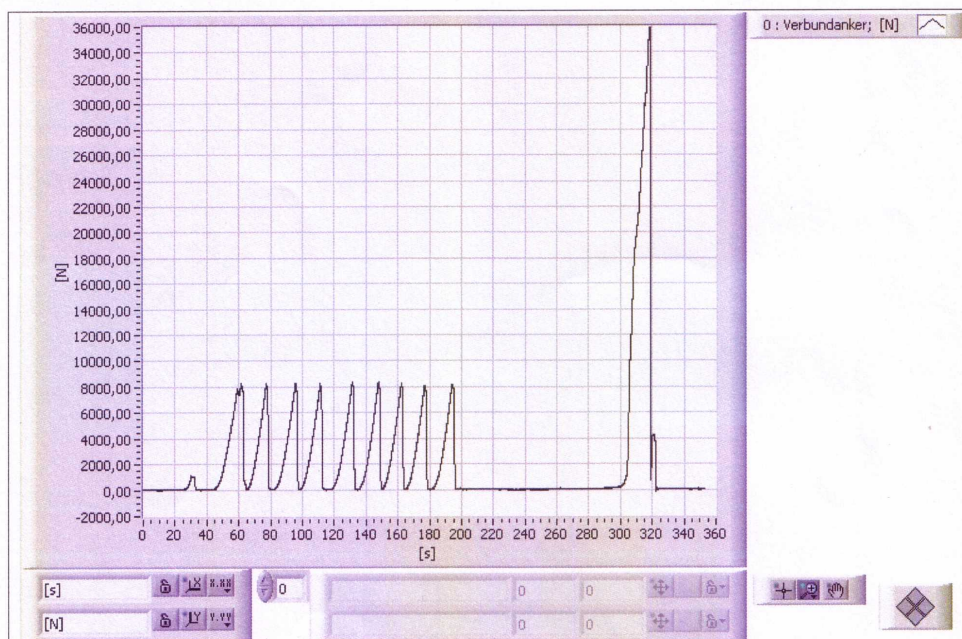
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## MESSERGEBNIS MEASURING RESULT



**Bearbeiter / Project Manager:** Volker Kron  
**Auftraggeber / Applicant:** Bolt Products  
**Auftragsnr. / Report-No.:** 71330960  
**Produkt / Product:** Bohrhaken Typ 6-80-12  
**Modell / Item:** Verbundanker;  
**Prüfungsart / Kind of test:** EN 959: 2007; 4.3.2 Radiale Belastung  
**Kenndaten / Technical Data:** siehe Bericht



Bezeichnung	Minimum X	Maximum X	Minimum Y	Maximum Y
0 : Verbundanker; [N]	0,00 s	353,19 s	-147,89 N	35910,91 N

### Berechnungen / Calculations:

**Kommentar / Comment:** 10 x 8 kN ohne Probleme; Bruch des 6 mm Drahts bei Lasche bei ca 36 kN; Anforderung 25 kN erfüllt;

**Messkarten / DAQ-Card:**  
 PCI 6220  
**Aufnehmer / DAQ-Card:**  
 Wägezelle 10 t

**Messverstärker / Amplifier:**  
 MC 55  
**Software / Software:**  
 UniLAB 2004 / HE-Datentechnik

Seite / Page: 1 of 1	Tel. / Phone: +49 89 5008-4198	TÜV Product Service GmbH TEC-SPORTS
Datum / date: 25.01.2008	Fax / Fax: +49 89 5008-4316	Ridlerstraße 65 - D-80339 München

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## ANNEX 3 R MEHEW'S COMMENTS ON PROPOSED ADOPTION OF BOLT PRODUCT ANCHORS AND NEW AXIAL FORCE REQUIREMENT

### Comments on Anchor Report 2011

1 The data has only been statistically analysed using mean and range. The industry standard is to use the 5% fractile value, BS EN 1990 : 2002 Section 4.2 (3) page 36. This is explained in Fischer's document, see page 29 of [http://fischer.de/en/desktopdefault.aspx/tabid-17/237\\_read-240/](http://fischer.de/en/desktopdefault.aspx/tabid-17/237_read-240/).

Extracting the data from the Appendix 1 gives the following results:

Test	1 mod	2 mod	3	4	5	DMM
ave	27.9	34.9	33.6	35.2	44.9	39.8
SD	4.07	6.22	5.32	4.71	8.70	9.45
5% fractile	18.9	21.2	21.9	24.8	25.8	19.0
	Pico Batch 2	Pico Batch 2	Pico Batch 1	BP Rawl resin	BP KMR resin	DMM's Eco

#### Notes

*"1 mod" & "2 mod" data exclude results where the anchor metal broke.*

*5% fractile uses the factor of 2.2 as cited in Fischer eq 2.1 page 30.*

*The final column cites DMM Eco anchor published (CNCC web site) and unpublished (S Goodwill dissertation) data. (The published data alone gives a value of 25.1kN.)*

Thus the 5% fractile value for Test 5 barely exceeds the proposed 25kN specification whilst the existing DMM Eco anchors fail to meet the proposed standard. The Mountaineering Anchor Standard BS EN 959 : 2007 cites 15kN for axial and 25kN for radial load bearing capacity. I suggest it is unwise to adopt the 25kN value for axial load bearing capacity.

2 The report notes the observation in Test 5 that "On a number of the tests cone fracture and delamination of the substrate occurred followed by the failure of the resin to rock bond." The Mountaineering Anchor Standard requires the load from the puller to be placed back into the substrate at more than 105% of the length of the anchor (Sec 5.3.2.2). I know the relevant distances for the puller were close to this requirement for DMM Eco anchors. Is the distance criterion OK for Bolt Product anchors?

3 No radial tests have been reported.

4 Sec 4.2.2 of the Mountaineering Anchor Standard provides a specification for the size of the eye. Does the eye meet that when sunken into the rock?

B Meheew

## ANNEX 4 – REPORT OF ROPE TEST OFFICER

### Fixed handlines

Rope acquired and set of locations virtually agreed.

A Reference Samples - Bob Mehew - Total 18m - 8 samples

B Black Rift, Rana, Assynt, Scotland Black Rift - Julian Walford - Total = 19m - 6 samples + 3 SS Maillons - Await nod from CNCC G Jones see email 28/2/12

C Slate Mine, North Wales - Gethin Thomas - Total = 22m – 6 samples + 6 SS maillons - Nod from CCC Andy Lewington 4/3/12

D Ireby Cavern, Yorkshire - Andy Chapman - Total 32m – 10 + ?2 samples + 60cm sling and 1 SS Maillon - Nod from CNCC G Jones 28/2/12

E Charterhouse, Mendip - Andrew Atkinson - 32m total - ? samples + 6 SS maillons - Nod from CSCC F Litherland 29/2/12

F Cartgate Level, James Halls Over Engine Mine, Derbyshire, Roy Rodgers - Overall total 28m - 8 samples + 6 SS maillons - Await nod

G 2nd BC in Craig a Ffynnon plus Antler Passage in Daren Cilau - Estimate two times 15m - Await nod from CCC Andy Lewington see his email 4/3/12

Have 200m length, assume 10% shrinkage on conditioning so 180m available.

	A	B	C	D	E	F	G	Total
Overall Total	18	19	22	32	32	28	30?	181?
Samples	8	6	6	12?	?	8	?	32+?
ratio	2.3	3.2	3.7	2.7		3.5		
Maillons	0	3	6	1	6	6	?	22

### LTRT

Issued 4 ropes from 200m to:

BCA 1Hs to 1We to Paul Brooks for 150 usage by post 3/1/12

BCA 2Hs to 2We to Roy Rogers for 50 usage by hand 1/2/12

BCA 3Hs to 1We to Ralph Johnson for 100 usage via Nick 7/1/12

BCA 4Hs to 4We to Boyd Potts for 200 usage by hand 7/1/12

Have 4 new dry, 8 new wet, 8 new washed wet samples to test, total 20 in all. I am holding 8 “old” washed wet samples to test when ropes come back in plus expect 4 sets (covering 50, 100, 150 & 200 usage levels) of 13 samples making a further 60 samples to test.

### BPC rig

Still can't calculate distance but work continues to find out why. I am hoping to get our load cell plus anchor puller load cell calibrated in near future.

Bob Mehew  
11/3/12

1. Do we need a policy for aids other than bolts? If not, why do we even need one for bolts?
2. Assuming that we do, what do we want it to achieve?
3. Should we identify aids which are suitable, or would it be easier to have a policy which says "aids must be suitable for the purpose to which they are put, the following are not deemed as suitable for permanent inclusion in a cave...electron ladders, bits of fish box, knicker elastic" (or whatever)
4. Assuming that we do want to make some sensible recommendations, how about the following as a start:
  - a. Aids should only be installed where they make a significant contribution to the safety of a cave, or where they provide a conservation benefit;
  - b. Aids which are no longer required should be removed from the cave and disposed of in an environmentally conscious manner;
  - c. Aids should be inspected and maintained as appropriate;
  - d. The materials from which aids are manufactured should be selected to give the best corrosion resistance possible;