

# **PREFERRED KNOTS FOR USE IN CANYONS**

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Recreational canyoning groups are questioning the traditional knots to join rope or tape. It has been argued that the more traditional Double Fisherman's Knot is very tight to undo after use and often catches on obstacles during rope pull down. The Tape Knot can be difficult to adjust and now some groups have started using unconventional knots such as the Overhand Knot for joining rope or tape.

On behalf of the Bushwalker's Wilderness Rescue Squad (BWRS) Rock Squad, I (with some help from squad members) have conducted a series of tests in a voluntary capacity to determine the preferred knots that could be used in recreational canyoning. Tests have been conducted on the tensile strength and slippage of various knots. Cyclic loading and rope pull down issues have also been investigated. The knots tested were the Tape, Double Fisherman's, Overhand for rope & tape, Rethreaded Figure 8, Abnormal Figure 8 & Alpine Butterfly (used to tie 2 ropes together). 139 hours of actual testing has been undertaken which does not include the considerable time to plan, analyse and write up the report. A paper on this work was presented at the Outdoor Recreational Industry Council NSW conference in September 2001. I am hoping to continue research on the topic in the future.

A summary of the findings are presented below:

## **Disclaimer**

It is considered the sample size of six specimens per test conducted in this project is not large enough to make absolute statements. However, an indication of what to expect can be drawn from these results. The results from this work are not a substitute for proper training.

## **Knot Strength**

The Double Fisherman's was the strongest knot tested for joining rope. The Rethreaded Figure 8 knot was the second strongest knot tested. All knots tested had acceptable strength for recreational abseiling. There may be an issue with the strength of the Overhand Knot when used on older rope.

## **Safety Factor**

It appears some knots are weaker than the standard 30% allowed for strength loss due to a knot. It is recommended the safety factor for the Tape knot be increased from SF8 to SF10, and the Overhand knot be increased from SF8 to SF15. The Double Fisherman's knot is a strong knot and SF8 is acceptable.

## **Slippage**

The Rethreaded Figure 8 Knot had the least slippage of the knots tested for rope. The second best was the Double Fisherman's Knot. The Overhand Knot was acceptable.

## **Unsafe Knots**

The Abnormal Figure 8 Knot is dangerous due to roll back slippage. It is possible that this knot when poorly packed and with short tails could completely undo with loads as low as 50kgs. Even a well-packed knot could roll back at 200kgs. The Alpine Butterfly is dangerous for joining two ropes together as it can be tied the wrong way and could undo. It is not obvious to check this from casual inspection. The Alpine Butterfly knot tied as a midline loop is safe. The Overhand Knot should not be used on tape due to progressive cyclic slippage.

## **Knots for Anchor Slings**

The Tape Knot for tape and the Double Fisherman's for rope are still considered the preferred knots for tying anchor slings together due to strength and slippage considerations.

## **Knot for Joining Canyon Ropes Together**

The Overhand Knot with tails leading performed best for tying two ropes together in the rope pull down tests. Wet ropes required double the load to pull down.

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