

# Rope Connections for Kernmantle Rope Extension

TER-REC0004 / Commission for Terrestrial Rescue

## 1. Introduction

On occasion, there is a need to extend ropes to be used within a rescue, when joining conventional kernmantle ropes used for rescue purposes, a limited range of knots/bends offer the best performance when working with rescue loads.

This recommendation identifies the knots to be used for this purpose.

## 2. Recommendation

Suitable knots for connecting ropes to extend them are:

- Ropes with sewn terminations: 10mm standard maillon connector
- Ropes with NO GROUND CONTACT:
  - Double or triple fisherman's bend.
- Rope with NO GROUND CONTACT BUT HIGH TENSION:
  - Reef (square) bend with double fisherman's backup
  
  - Double or Triple fisherman's bend or
  - Figure eight bend
- Ropes WITH GROUND CONTACT:
  - Flat Double overhand knot
  - Postman's knot
  - Single flat overhand knot with ropes of the same diameter and type

Pictures of these knots can be found in Section 4. Glossary

All knots must be properly dressed and all strands must be individually set prior to use. Bends require tails to be at least 10 times the rope diameter. Knots require sufficient tail to allow at least one roll.

### 3. Explanatory notes

The highest strength performance for connecting conventional kernmantle ropes is to use sewn rope loops terminations in conjunction with a 10 mm oval maillon rapide. This method of connection also provides the highest level of protection against jamming the rope connection into cracks and fissures.

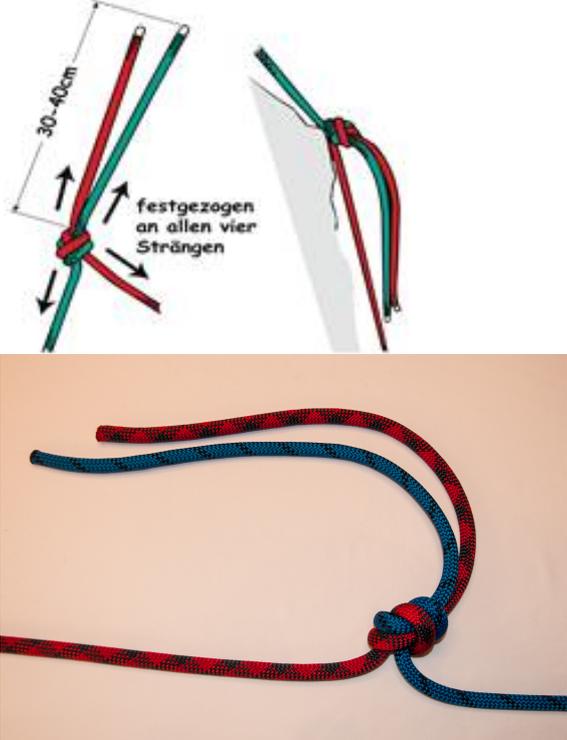
Where knots have to be tied to achieve the connection, it is recommended that only a limited number of knot types are used. These knots maintain a good strength performance after they have been tied and dressed properly.

When there is no risk of the rope(s) being in contact with the ground and/or running over edges then a Double or Triple Fisherman's Bend can be used.

Similarly where ropes are subject to high tension it can make it very difficult to untie these knots, the use of a reef bend with double fisherman's bends as back up or Figure of Eight bend may be used. An example of an application for these ties would be to join ropes for use in aerial ropeways.

Where knots may be in contact with the edges the use of double overhand knot or postman's knot allow the ties the move across ground with a reduced risk of jamming.

#### 4. Glossary

|                                  |   |
|----------------------------------|---|
| <p>Flat Single Overhand Knot</p> |  The diagram shows the steps to tie a Flat Single Overhand Knot. It starts with two ropes, one red and one green, held together. A bracket indicates a length of 30-40cm. The ropes are crossed to form a loop, and the text 'festgezogen an allen vier Strängen' (pull tight on all four strands) is shown with arrows. Below the diagram is a photograph of the completed knot on a red and blue rope. |
| <p>Flat Double Overhand Knot</p> |  The diagram illustrates the steps for a Flat Double Overhand Knot. It shows two ropes, one green and one yellow, being crossed to form a loop. Below this is a photograph of the completed knot on a red and blue rope.  |

|  |   |
|--|---|
| <p>Figure of Eight bend</p>                              |  A photograph of a red and blue braided rope tied in a Figure of Eight bend. The knot is centered, and the two ends of the rope extend horizontally to the left and right.  |
| <p>Flat Figure of Eight knot (for reference only)</p>    |  A photograph of a red and blue braided rope tied in a Flat Figure of Eight knot. The knot is positioned towards the right side of the frame, with the rope looping back to the left and then extending horizontally to the right. |
| <p>Reef (square) bend with double fisherman's backup</p> |  A photograph of a red and blue braided rope tied in a Reef (square) bend with double fisherman's backup. The knot is centered, and the two ends of the rope extend horizontally to the left and right.                           |

Double  
Fisherman's  
Bend



Triple  
Fisherman's  
Bend



|                                |   |
|--------------------------------|---|
| Sewn Loop/Maillo n connections |   |
| Postman's knot                 |   |
| Dressing a knot:               | A knot that has good form/shape with the rope strands correctly laid up; rope tails, loops or eyes are of a suitable length for use.                |
| Setting a knot:                | Once a knot has been dressed it should be set by firmly pulling/loading the ropes, tails or loops to firmly tighten all the strands used to tie it. |

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| <b>History of Revisions</b> |                          |
|-----------------------------|--------------------------|
| issued                      | 1996                     |
| revised                     | 2000 Chamonix (F)        |
| revised                     | 2010 Stary Smokovec (SK) |
| revised                     | 2013 Bol (HR)            |
| revised                     | 2014 Lake Tahoe (US)     |
| revised                     | 2017 Soldeu (AND)        |

