

SAFETY BULLETIN

Choosing Ropes for Vertical Lifelines

What is the acceptable type of rope to be used from a bosun's chair, swing staging or similar device?

The question was posed to OHS Magazine (the Southam bi-monthly publication that is regarded by health and safety professionals as a major information source) by a worker in Belledune, NB who goes on to say, "Boilermakers in my area are requesting polypropylene rope, but when I purchased rope from my supplier, I was given nylon rope that was approved by the Canadian Standards Association (CSA) for lifelines to be used with rope grabs."

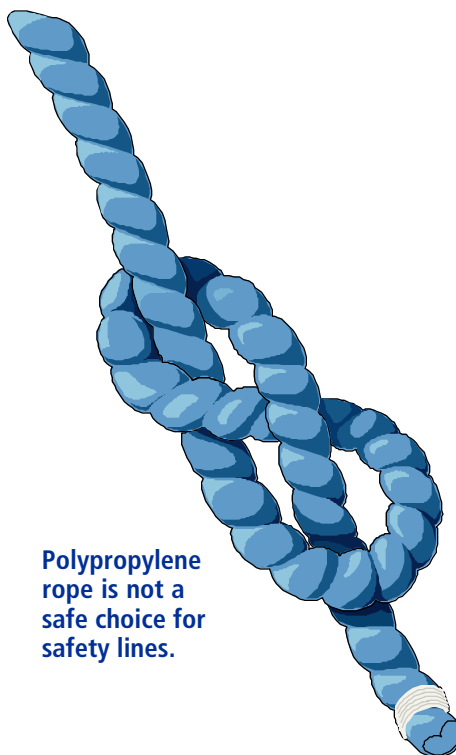
OHS Magazine sent the question to Jean Arteau, a researcher at the Institut de recherche en santé et en sécurité du travail (IRSST). WHSCC reprints (with permission) Mr. Arteau's detailed response to give you important information that may be relevant to your workplace and your choices of lifelines for the work you do.

Your supplier gave you the correct rope. In fact, polypropylene ropes should not be used for vertical lifelines—this statement is based on polypropylene's physiochemical properties, on standards and on test results (detailed below).

In order to ensure a worker's safety, a full-body harness must be used with an energy absorber, a lanyard and a fall arrester (rope grab) sliding along a vertical lifeline. The lifeline (rope) should be selected based on what the manufacturer recommends, generally a 5/8" cable. An 11/16" rope is normally thought to last longer, but this is not the case.

Short-term economy is achieved in choosing a polypropylene model, but his model can deteriorate in 12 to 18 months under the effect of ultraviolet light. Also, rope that is too thick (11/16") will be rapidly worn by a

fall arrester designed for a 5/8" rope. Finally, constant friction against a roof edge quickly causes abrasion of all the surface strands. There is, therefore, a significant advantage to purchasing better quality rope that is treated to withstand ultraviolet rays



Polypropylene rope is not a safe choice for safety lines.

or made of three-strand nylon or polyester, which also withstands ultraviolet rays much better than polypropylene rope.

Vertical lifeline fibres are the subject of specific requirements in the European and American standards, and in the proposed revision of the Canadian standard. European standards EN 353-2:1992 and EN 354:1992 stipulate that "the vertical lifeline shall be a synthetic fibre rope. Fibre ropes shall be made from synthetic fibres that have characteristics consistent with those of polyamide or polyester fibres. The number of strands of a laid rope shall be at least three. Three-strand polyamide ropes shall comply with ISO 1140, three-strand polyester ropes with ISO 1141."

ANSI standard Z359.1-1992 stipulates the following: "Rope used in vertical lifelines shall be made of virgin synthetic materials having strength, aging, abrasion resistance and heat resistance characteristics equivalent or superior to polyamides. Synthetic rope shall have an elastic elongation of not more than 22% at a load of 1,800 pounds (8 kN) when tested in accordance with references 8.3.2 or 8.3.3, as applicable."

The Canadian national standard, CAN / CGSB-40.13-95, Hawserlaid Polypropylene Monofilament Rope, states the following in article 1.3: "This rope is for general purpose use and may not be suitable for some specific applications. Polypropylene rope should not be used in situations where it is likely to receive extended exposure to sunlight or in situations relating to the preservation of human life such as lifelines or for other lifesaving purposes."

The 1978 edition of this standard stated the same thing. The proposed revision of the Canadian standard CSA Z259.2.1 on vertical lifelines uses the wording of the European standard. There is, therefore, a convergence of all the current standards.

The recommendation in the various standards to avoid polypropylene rope is, then, based on the fact that ultraviolet rays affect polypropylene; it becomes fragile, brittle and more readily mechanically worn. Recent tests carried out for the Commission de la santé et de la sécurité du travail du Québec (CSST) show a 63 percent loss of tensile strength for polypropylene ropes that are 12 to 18 months old. While the tensile strength for a new 16-mm polypropylene rope is approximately 26 kN, the observed strength varies from 9.2 to 12.6 kN. The minimum strength required for a rope used in a fall arrest system is 18 to 22 kN, namely the breaking strength of the anchor point according to the different Canadian regulations.

For these reasons, polypropylene rope is not a safe choice.

Prevention Services, Workplace Health, Safety and Compensation Commission

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