could take the maximum impact loading which might be required of it would very likely so damage the belt as to render it unsafe for use Therefore, only sample belts and worn or doubtful belts should be tested, and these should always be tested to destruction to determine their safety They should be kept as samples and used only to help judge the safety of other belts

In judging the safety of a belt, the following vital, and to some extent conflicting, factors must be considered

1 Sufficient strength to stop the wearer after a maximum free fall
2 A shock absorber to limit the impact loading and prevent injury to the wearer or failure of the anchorage, life line, or belt
3 Short enough stopping distance to prevent the wearer from striking some dangerous obstruction before he stops
4 Sufficient margin on all these factors, so far as possible, to cover all unknowns such as weight of the wearer, distance of his fall, his physical fitness, the distance to any damaging obstruction, variations in the strength or elasticity of materials, and deterioration of materials due to wear or other causes

The primary caution regarding the use of safety belts, as with other personal protective equipment, is to see that they are worn and used correctly Since a safety belt is worthless unless it is being worn at the time that a fall is possible It should also be securely buckled and worn tight enough to prevent any possibility of the man's slipping out of it

Lifelines

For most lifelines, manila rope of $\frac{3}{4}$ in diameter or nylon rope of $\frac{1}{2}$ in diameter is recommended Nylon is more resistant to wear or abrasion than is manila and is also more resistant to some chemicals Ropes made of other synthetic fibers such as Dacron, polyethylene, and polypropylene have characteristics that make them very good performers in certain applications In a lifeline where shock loading strength and high energy absorption is paramount, nylon is superior

Knots reduce the strength of all ropes Recent tests have shown that manila lifelines of $\frac{1}{2}$ in diameter, when knotted around a bar or other anchorage, are not strong enough at the knots to be safe for general use unless a shock absorber of low load limit is used

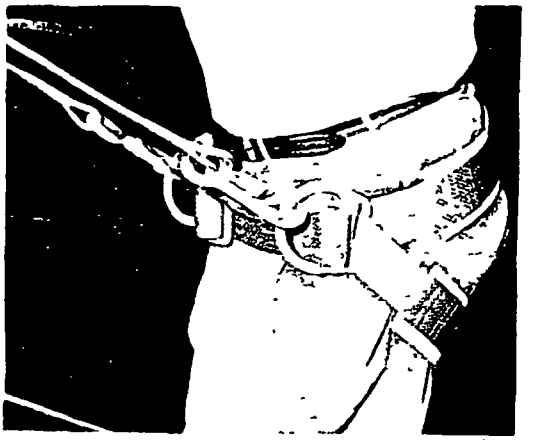


FIG 38-40 —Multipurpose safety belt with two D-rings can be worn about the waist or slipped down around the buttocks for work on inclines

How much a knot reduces strength depends upon the type of knot or hitch used and the amount of moisture in the rope Moisture increases the strength of a rope in a knot or around a sharp bend, and dryness greatly diminishes its strength at such points In some cases, a knot will reduce the tensile strength of a rope to less than half of its breaking strength

If rope is spliced into snaps and D-rings instead of knotted (Fig 38-40), the splice will retain approximately 90 per cent of the breaking strength of the rope Breaking strength is always measured in a straight line pull on the rope

Manila rope of $\frac{1}{2}$-in diameter has a breaking strength of approximately 2650 pounds, or (dividing by a safety factor of 5) a safe load strength of 530 pounds Spun nylon rope of $\frac{1}{2}$-in diameter is rated to have a breaking strength of 6400 pounds—a safe load strength of 710 pounds

Manila rope of $\frac{3}{4}$-in diameter rates a breaking strength of 5400 pounds—a safe load strength of 1080 pounds When a low-load-limit shock absorber is used, $\frac{3}{4}$-in manila rope or $\frac{1}{2}$-in nylon rope is considered strong