



USEFUL INFORMATION

Wire Rope Definitions

Ropes

Spiral Rope - An assembly of two or more layers of shaped and/or round wires laid helically over a center, usually a single round wire. There are three categories of spiral rope, i.e. spiral strand, half locked coil and full-locked coil.

Spiral Strand - An assembly of two or more layers of round wires laid helically over a center, usually a single round wire.

Half-Locked Coil Rope - A spiral rope type having an outer layer of wires containing alternate half lock and round wires.

Full-Locked Coil Rope - A spiral rope having an outer layer of full lock wires.

Stranded Rope - An assembly of several strands laid helically in one or more layers around a core or center. There are three categories of stranded rope, i.e. single layer, multi-layer and parallel-closed.

Single Layer Rope - Stranded rope consisting of one layer of strands laid helically over a core.

Note: Stranded ropes consisting of three of four outer strands may, or may not, have a core. Some three and four strand single layer ropes are designed to generate torque levels equivalent to those generated by Rotation-Resistant ropes.

Rotation-Resistant Rope - Stranded rope designed to generate reduced levels of torque and rotation when loaded and comprising an assembly of two or more layers of strands laid helically around the center, the direction of lay of the outer strands being opposite to that of the underlying layer.

Rotation-Resistant Rope | Category 1 - Stranded rope constructed in such a manner that it displays little or no tendency to rotate, or, if guided, transmits little or no torque, has at least fifteen outer strands and comprising an assembly of at least three layers of strands laid helically over a center in two or three operations, the direction of lay of the outer strands being opposite to that of the underlying layer.

Rotation-Resistant Rope | Category 2 - Stranded rope constructed in such a manner that it has significant resistance to rotation, has at least ten out strands and comprising an assembly of two or more layers of strands laid helically over a center in two or three operations, the direction of lay of the outer strands being opposite to that of the underlying layer.

Rotation-Resistant Rope | Category 3 - Stranded rope constructed in such a manner that it has limited resistance to rotation, has no more than nine outer strands and comprising an assembly of two layers of strands laid helically over a center in two operations, the direction of lay of the outer strands being opposite to that of the underlying layer.

Compacted Strand Rope - Rope in which the outer strands, prior to closing of the rope, are subjected to a compacting process such as drawing, rolling or swaging.

Compacted Swaged Rope - Rope which is subjected to a compacting process after closing, thus reducing its diameter.

Plastic (Solid Polymer) Filled Rope - Rope in which the free internal spaces are filled with a solid polymer. The polymer extends to, or slightly beyond, the outer circumference of the rope.

Cushioned Rope - Stranded rope in which the inner layers, inner strands or core strands are covered with solid polymers or fibers to form a cushion between adjacent strands or layers of strands.

Cushion Core Rope - Stranded rope in which the core is covered (coated) or filled and covered (coated) with a solid polymer.

Solid Polymer Covered Rope - Rope which is covered (coated) with a solid polymer.

Solid Polymer Covered and Filled Rope - Rope which is covered (coated) and filled with a solid polymer.

Rope Grade (Rr) - A number corresponding to a wire tensile strength grade on which the minimum breaking force of a rope is calculated.

Note: It does not imply that the actual tensile strength grades of the wires in a rope are necessarily the same as the rope grade.

Preformed Rope - Stranded rope in which the wires in the strands and the strands in the rope have their internal stresses reduced resulting in a rope in which, after removal of any serving, the wires and the strands will not spring out of the rope formation.

Note: Rotation-Resistant stranded ropes should be regarded as non-preformed rope even though the strands may have been partially (lightly) preformed during the closing process.

Rope Class - A grouping of rope constructions where the number of outer strands and the number of wires and how they are laid up are within defined limits, resulting in ropes within the class having similar strength and rotational properties.



Rope Construction - System which denotes the arrangement of the strands and wires within a rope, e.g. 6x19S; 6x36WS; 18x7; 34x7.

Cable-laid Rope - An assembly of several (usually six) single layer stranded ropes (referred to as unit ropes) laid helically over a core (usually a seventh single layer stranded rope).

Braided Rope - An assembly of several round strands braided in pairs.

Electro-mechanical Rope - A stranded or spiral containing electrical conductors.

Strand and Rope Lays

Lay Direction of Strand - The direction right (Z) or left (S) corresponding to the direction of lay of the outer layer of wires in relation to the longitudinal axis of the strand.

Lay Direction of Rope - The direction right (Z) or left (S) corresponding to the direction of lay of the outer strands in relation to the longitudinal axis of a stranded rope or the direction of lay of the outer wires in relation to the longitudinal axis of a spiral rope.

Regular Lay - Stranded rope in which the direction of lay of the wires in the outer strands is in the opposite direction to the lay of the outer strands in the rope. Right Regular Lay is designated zZ and Left Regular Lay is designated zS.

Note: This type of lay is sometimes referred to as "ordinary" lay.

Lang Lay - Stranded rope in which the direction of lay of the wires in the outer strands is the same as that of the outer strands in the rope. Right Lang Lay is designated zZ and Left Lang lay is designated sS.

Alternate Lay - Stranded rope in which the lay of the outer strands is alternatively Lang's lay and regular lay. Right hand alternate lay is designated AZ and left hand alternate lay is designated AS.

Contra-Lay - Rope in which at least one layer of wires in a spiral rope or one layer of strands in a stranded rope is laid in the opposite direction to the other layer(s) of wire or strands respectively.

Note: Contra-lay is only possible in spiral ropes having more than one layer of wires in multi-layer stranded ropes.

Rope Lay Length (Stranded Rope) - That distance parallel to the axis of the rope in which the outer strands make one complete turn (or helix) about the axis of the rope.

Cores

Core - Central element, usually of fiber or steel, of a single layer stranded rope, around which are laid helically the outer strands of a stranded rope or the outer unit ropes of a cable-laid rope.

Fiber Core - Core made from either natural (e.g. hemp, sisal) or synthetic fibers (e.g. polypropylene) and designated by its diameter and runnage.

Steel Core - Core produced either as an independent wire rope (e.g. 7x7) or wire strand (e.g. 1x7).

Solid Polymer Core - Core produced as a single element of solid polymer having a round or grooved shaped. It may also contain internal elements of wire or fiber.

Insert - Element of fiber or solid polymer so positioned as to separate adjacent strands or wires in the same or overlying layers and fill, or partly fill, some of the interstices in the rope.

Rope Characteristics and Properties

Fill Factor - The ratio between the sum of the nominal cross-sectional areas of all the load bearing wires in the rope and the circumscribed area of the rope based on its nominal diameter.

Spinning Loss Factor - The ratio between the calculated minimum breaking force of the rope and the calculated minimum aggregate breaking force of the rope.

Minimum Breaking Force (T min) - Specified value, in tons or kN, below which the measured breaking force is not allowed to fall in a prescribed test.

Rope Torque - Value, usually expressed in ft pounds or N.m, resulting from either test or calculation, relating to the torque generated when both ends of the rope are fixed and the rope is subjected to tensile loading.

Rope Turn - Value, usually expressed in degrees per foot/meter, resulting from either test or calculation, relating to the amount of rotation when one end of the rope is free to rotate and the rope is subjected to tensile loading.

Constructional Stretch (Initial Extension) - Amount of extension which is attributed to the initial bedding down of the wires within the strands and the strands within the rope due to tensile loading.

Note: This is sometimes referred to as constructional stretch.

Elastic Stretch (Extension) - Amount of extension which follows Hooke's Law within certain limits due to application of a tensile load.

Permanent Rope Extension - Non-elastic extension.