



# Rope Use Reference

## Rope Fiber Selection Guide: Fiber Properties- Typical Values

	Manila	Sisal	Cotton	Nylon	Polyester	Polypropylene	Polyethylene	Aramid <sup>1</sup>	UHMWPE <sup>2</sup>
<b>STRENGTH:</b> Breaking Tenacity-Dry (grams/denier) Wet Strength vs. Dry Strength Shock-load Absorption Ability	5.0-6.0 Up to 120% Poor	4.0-5.0 Up to 120% Poor	2.0-3.0 Up to 120% Very Poor	7.0-9.5 85-90% Excellent	7.0-9.5 100% Good	6.5 100% Very Good	6.0 100% Fair	18-26.5 95% Poor	30.0 100% Fair
<b>WEIGHT:</b> Specific Gravity floats	1.38 No	1.38 No	1.54 No	1.14 No	1.38 No	0.91 Yes	0.95 Yes	1.44 Yes	0.97 Yes
<b>ELONGATION:</b> Percent at Break Creep(extension under sustained load)	10-12% Very Low	10-12% Very Low	5-12% Very Low	18-25% Moderate	12-15% Low	15-25% High	15-25% High	1.5%-3.6% Very Low	3.5% Moderate
<b>EFFECTS OF MOISTURE:</b> Water Absorption of Individual Fibers Dielectric Properties	Up to 100% Very Poor	Up to 100% Very Poor	Up to 100% Very Poor	2-8% Poor	<1% Good	None Excellent	None Excellent	3.5-7% Poor	None Excellent
<b>DEGRADATION:</b> Resistance to UV in Sunlight Resistance to Rot and Mildew Storage Requirements	Good Poor Dry only	Good Poor Dry only	Good Poor Dry only	Good Excellent Dry only	Excellent Excellent Dry only	Poor (Black is best) Excellent Wet or Dry	Poor (Black is best) Excellent Wet or Dry	Fair Excellent Wet or Dry	Fair Excellent Wet or Dry
<b>ROPE ABRASION RESISTANCE:</b> Surface Internal	Good Fair	Fair Fair	Poor Fair	Very Good Excellent	Excellent Excellent	Good Good	Good Good	Fair Fair	Very Good Excellent
<b>THERMAL PROPERTIES:</b> Melts at (degrees)	Does not melt Chars at 350°F	Does not melt Chars at 350°F	Does not melt Chars at 300°F	420°-480°F	490°-500°F	330°F	275°F	800°F-Begins to decompose	297°F
<b>RESISTANCE<sup>3</sup>:</b> Resistance to Acids Resistance to Alkalis Resistance to Oils and Gas	Poor Poor Poor	Poor Poor Fair	Poor Fair Poor	Fair Very Good Very Good	Good Fair Very Good	Excellent Excellent Very Good	Excellent Excellent Very Good	Fair Fair Very Good	Excellent Excellent Very Good

1 Based on Dupont Kevlar Data

2 Based on Allied/Signal Spectra Data-Type 900. Ultra High Molecular Weight Polyethylene

3 Resistance is relative to the length of exposure, percent of concentration and temperature.

## WARNING - WORKING LOADS

Because of the wide range of rope use, rope condition, exposure to the factors affecting rope behavior, and the degree of risk of life and property involved, it is not realistic to make standard recommendations as to design factors or working loads. However, to provide guidelines, a range of design factors and working loads are provided for rope in good condition with appropriate splices, in non-critical applications and under normal service condition. Normal service is generally considered to be used under static or very modest dynamic load conditions. Design factors range from 5:1 to 12:1 for normal service and modest dynamic loading, and should be higher for critical applications. Finally, minimum breaking strengths vary greatly among manufacturers. Check the manufacturer's minimum break strength for the specific rope being considered.

## CORDAGE SIZES

SIZE NO.*	DIA.(IN.)	CIRC.(IN.)**	SIZE NO.*	DIA. (IN)	CIRC.(IN.)**	DIA. (IN.)	CIRC.(IN.)**	DIA. (IN.)	CIRC.(IN)**
2	1/16	3/16	9	9/32	7/8	1-1/4	3-3/4	3	9
2-1/2	5/64	1/4	10	5/16	1	1-5/16	4	3-1/4-3-5/16	10
3	3/32	5/16	12	3/8	1-1/8	1-1/2	4-1/2	3-1/2-3-5/8	11
3-1/2	7/64	11/32	14	7/16	1-1/4	1-5/8	5	4	12
4	1/8	3/8	16	1/2	1-1/2	1-3/4	5-1/2	4-1/4-4-5/16	13
4-1/2	9/64	7/16	18	9/16	1-3/4	2	6	4-1/2-4-5/8	14
5	5/32	1/2	20	5/8	2	2-1/8	6-1/2	5	15
5-1/2	11/64	17/32		3/4	2-1/4	2-1/4	7	5-1/4-5-5/16	16
6	3/16	5/8		7/8	2-3/4	2-1/2	7-1/2	5-1/2-5-5/8	17
7	7/32	11/16		1	3	2-5/8	8	6	18
8	1/4	3/4		1-1/8	3-1/2	2-7/8	8-1/2		

\*Generally used only for braided cords, clothesline and sashcords.

\*\* Cordage Institutes uses reference size number which is the approximate circumference of the rope.