

ROPE, an assemblage of several twifts or strings of hemp, twifted together by means of a wheel ; of various uses, as in binding, staving, drawing, suspending, &c. ; or, all cordage, in general, above one inch in circumference, mostly made of hemp spun into yarns or threads of a certain length ; and a number of these yarns or threads, according to the size of the rope, are twifted together, and called a strand. Three of these strands twifted or laid together, is called a hawser-laid rope, and nine of them a cable-laid rope. See *ROPE-Making*.

R O P

When the rope is made very thick, it is called a *cable*; and when very small, a *cord*.

Though it be difficult to give a certain account of the forces required to bend ropes of different diameters, in making them go round bodies of different bignesses, yet to make no allowance for the loss of motion sustained thereby, would be as prejudicial to the practice of mechanics, as it would be to overlook the friction of the parts of engines. The difficulty of ascertaining this force arises from the different materials of which they are made, their different stiffness according as they are more or less twisted; and sometimes from the temperature of the air, as to moisture and dryness.

Dr. Defaguliers has computed the forces required to bend ropes of different diameters; stretched by different weights, round rollers of different bignesses. The result of his experiment is expressed in the following table.

Diameters of the ropes of three strands, expressed in tenth parts of an inch.	Weights stretching the ropes, expressed in lb. avoirdupois.	Resistance about a roller of half an inch diameter, in oz. avoirdupois.	Resistance about a roller of one inch diameter, in oz. avoirdupois.	Resistance about a roller one and a half inch diameter, in oz. avoirdupois.
0.5	60	225	112½	75
0.2	60	90	45	30
0.1	60	45	22½	15
0.5	40	150	75	50
0.2	40	60	30	20
0.1	40	30	15	10
0.5	20	75	37½	25
0.2	20	30	15	10
0.1	20	15	7½	*

On the whole, it has been found by experiments, that the difficulty of bending a rope round a roller decreases directly as the diameter of the roller increases, or is, inversely, as the diameter of the roller. See Defaguliers, *Experim. Phil.* vol. i. p. 233, &c. See also **CORDAGE**.

A TABLE, shewing how many fathoms, feet, and inches of a rope of any size, under fourteen inches, makes a hundred weight, with the use of the table.

Inches.	Fathoms.	Feet.	Inches.	Fathoms.	Feet.	Inches.	Fathoms.	Feet.	Inches.	Fathoms.	Feet.	Inches.
1	486	0 0	4	24	0 0	8	7	3 6	11	3	4 1	14
1¼	313	13 0	4½	21	3 0	8¼	7	0 8	11¼	3	3 3	14¼
1½	216	0 0	5	19	3 0	8½	6	4 3	12	3	2 3	15
1¾	159	3 0	5¼	17	4 0	8¾	6	2 1	12¼	3	2 1	15¼
2	124	3 0	5½	16	1 0	9	6	0 0	12½	3	2 0	15½
2¼	96	7 0	5¾	14	4 6	9¼	5	4 0	12¾	2	7 8	15¾
2½	77	3 0	6	13	3 0	9½	5	2 0	13	2	5 3	16
2¾	65	4 0	6¼	12	2 0	9¾	5	0 6	13¼	2	4 9	16¼
3	54	0 0	6½	11	3 0	10	4	5 0	13½	2	4 0	16½
3¼	45	5 2	6¾	10	4 0	10¼	4	4 1	13¾	2	3 6	16¾
3½	39	3 0	7	9	5 6	10½	4	2 2	14	2	2 1	17
3¾	34	3 9	7¼	9	1 6	10¾	4	1 8				
4	30	1 6	7½	8	4 0	11	4	0 3				
4¼	26	5 3	7¾	8	3 6	11¼	3	5 7				

R O P

Suppose I want to know how much of eight-inch and quarter rope will make a hundred weight? Find 8¼ under inches, and against it, in the sixth column, you find 7 0 8, which shews in a rope of 8¼, there will be seven fathoms eight inches required to make one hundred weight.

A TABLE, shewing the weight of any cable or rope of 120 fathoms in length, and for every half inch from three inches to twenty-four in circumference.

Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.
3	2	1	7	14	0	12	36	0	16	68	0
3½	4	0	8	16	0	12½	39	0	17	72	1
4	4	1	8½	18	0	13	42	1	17½	76	2
4½	5	0	9	20	1	13½	45	7	18	81	0
5	5	1	9½	22	2	14	49	0	18½	85	2
5½	7	0	10	25	0	14½	52	2	19	90	1
6	9	0	10½	27	2	15	56	1	19½	95	0
6½	10	2	11	30	1	15½	60	0	20	100	0
7	10	1	11½	33	0	16	64	0	20½	105	0

The greatest consumption of rope is used for the purposes of navigation in rigging of ships: where, though ropes include the whole cordage, there are several particularly denominated, and which have particular names given to them; as follow.

1. Awning-ropes are the ridge and side-ropes. The ridge-rope reeves through the trucks seized along the middle of the awning; the side-ropes reeve through the trucks seized along the side of the awning. By these ropes the awnings are spread between the masts.
2. Bell-rope, nine or ten feet in length, which splices round a thimble in the eye of the bell-crank. In the middle of the rope is a diamond-knot, and at the end a double wall-knot crowned.
3. Boat-rope, or painter, that by which the boat is towed at the stern; it splices with a thimble to a ring-bolt inside the stem.
4. Bolt-rope, the rope sewed to the edges of the sails, as the head-rope, foot-rope, and leech-rope.
5. Breast-rope, that fastened along the laniard of the shrouds, for safety, when heaving the lead in the chains.
6. Bucket-rope, that which is fastened to the bucket for hauling up water.
7. Buoy-rope, the one fastened to the buoy and crown of the anchor.
8. Davit-rope, the lashing which secures the davit to the shrouds when out of use.
9. Entering-ropes have their upper end thrust through the eye in the iron-stations at the gangways, and are walled and crowned; and diamond-knots are made at every nine inches asunder in the whole length.
10. Grapnel-rope, that which is bent to the grapnel, by which the boats ride.
11. Guitt-rope, that fastened to an eye-bolt in the ship's side, and to the outer end of a boom projecting from the ship's side, by guys, to keep the boats clear from rubbing against the sides.
12. Heel-rope, that which hauls out the bowsprit of cutters, and the jib and studding-fail boom.
13. Man-ropes are for the security of the men going out upon the bowsprit.
14. Parral-ropes are to connect the ribs and trucks of the parral together.
15. Passing-ropes lead round the ship through the eyes in the quarter wait and forecattle-stations, have one end stopped through the eye of the gangway-station, with a wall-knot crowned, and are set forward through an eye-bolt in the knight-head with a laniard, having a thimble turned into the end.
16. Ring-ropes are occasionally made fast to the ring or stopper-bolts in the deck, and by cross turns round the cable, to confine it more securely in stormy weather.
17. Slip-rope is to trice the bight of the cable into the heads;

heads; a slip-rope is also used in casting off a vessel, till got into the tide's way, &c. 18. Swab-rope is made fast to the eye of the swab, to raise it out of the water. 19. Tiller-ropes are the ropes by which the tiller is worked by means of the steering-wheel. 20. Top-rope is the rope that is reeved through the sheave-hole in the heel of the topmast, to raise it by its tackle to the mast-head. 21. Yard-ropes are only temporarily used to heave the yards on board.

Ropes are distinguished by being either *cable-laid* or *hawser-laid*: the former are composed of nine strands, viz. three great strands, each of which is composed of three smaller strands, and each containing an equal number of threads: and a rope, cable-laid, eight inches in circumference, has 333 threads, equally divided, and laid into nine strands: the latter is made with three strands, each of which contains a certain number of rope-yarns, in proportion to the size of the rope required. A rope hawser-laid, eight inches in circumference, has 414 threads, equally divided, and laid into three strands. Thirty fathoms of yarn make eighteen fathoms of rope cable-laid, and so in proportion. Thirty fathoms of yarn make twenty fathoms of rope hawser-laid, and so in proportion. Ropes of from one to two and a half inches in circumference are hawser-laid; of three inches to ten inches, either hawser-laid or cable-laid; and from ten inches to any greater dimension, always cable-laid.

Twice-laid cordage is made of cast rigging, as shrouds, stays, mooring and other cables, which, if not much worn, will make good ropes for netting ships' sides, worming and wooding for cables, spun-yarn for seizing, worming for large stays, seizing for strops of blocks, small cable-laid ropes for warping ships, ratlines, scaffolding-ropes for dock yards, &c.

When the yarn of this old stuff is overhauled, a little thin tar should be poured on it, which will make it pliable and lie better. The yarn unfit for knotting will pick into oakum for caulking.

To open a cable, for making it into small ropes, hang the strands upon three hooks in the tackle-board, stretch it out tight upon the hooks in the sledge, and heave till they are untwisted; then draw out the yarn.

The process of making small ropes is similar to making large ones, except the twisting and closing, which are done by a back-frame wheel or a table-wheel. See the next article.