10. PACKAGING OF WIRE AND CABLE

10.1 REEL SIZE

Selection of proper reel (spool) size depends on the length and overall diameter (O.D.) of the cable or wire to be rewound. A reel not matched to the weight of the cable wound on it may be damaged during shipment.

All wire and cable has a minimum safe bending radius. If cable is subjected to bends sharper than the minimum radius, damage to the material is likely. The minimum drum (hub) diameters given in Section 10.1.2 should be observed.

10.1.1 Reel Terminology

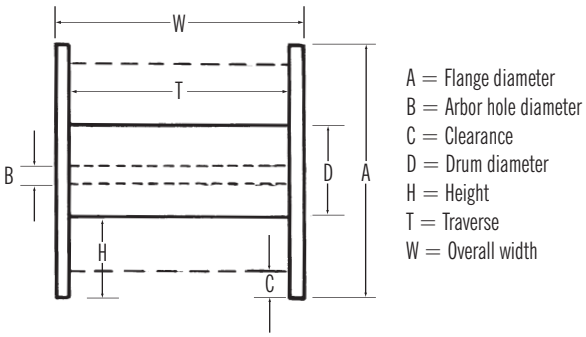

Figure 10.1–Reel Terminology

10.1.2 Minimum Drum Diameter

Table 10.1–Minimum Drum Diameter for Wire and Cable

Type of Cable	Minimum Drum Diameter as a Multiple of Outside Diameter of Cable
A. Single- and multiple-conductor nonmetallic-covered cable	
1. Nonshielded and wire shielded, including cable with concentric wires	
a. 0–2,000 volts	10
b. Over 2,000 volts	
(1) Nonjacketed with concentric wires	12
(2) All others	14
2. Tape shielded	
a. Helically applied	14
b. Longitudinally applied flat tape	20
c. Longitudinally applied corrugated tape	14

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Table 10.1 Minimum Drum Diameter for Wire and Cable (Continued)

Type of Cable	Minimum Drum Diameter as a Multiple of Outside Diameter of Cable
B. Single- and multiple-conductor metallic-covered cable	
1. Tubular metallic sheathed	
a. Lead	14
b. Aluminum	
(1) Outside diameter – 1.750" and less	25
(2) Outside diameter – 1.751" and larger	30
2. Wire armored	16
3. Flat tape armored	16
4. Corrugated metallic sheath	14
5. Interlocked armor	14
C. Multiple single conductors cabled together without common covering, including self-supporting cables – the circumscribing overall diameter shall be multiplied by the factor given in item A or B and then by the reduction factor of 0.75.	
D. Combinations – For combinations of the types described in items A, B and C, the highest factor for any component type shall be used.	
E. Single- and multiple-conductor cable in coilable nonmetallic duct	
Outside diameter of duct, inches – 0.0–0.50	26
0.51–1.00	24
1.01–1.25	22
1.26–1.50	21
Over 1.50	19
F. Fiber optic cables	20*
G. Bare conductor	20

Notes to Table:

1. When metallic-sheathed cables are covered only by a thermosetting or thermoplastic jacket, the outside diameter is the diameter over the metallic sheath itself. In all other cases, the outside diameter is the diameter outside of all the material on the cable in the state in which it is to be wound upon the reel.
2. For "flat-twin" cables (where the cable is placed upon the reel with its flat side against the drum), the minor outside diameter shall be multiplied by the appropriate factor to determine the minimum drum diameter.
3. The multiplying factors given for item E refer to the outside diameter of the duct.

* Some manufacturers recommend 30.

Source: NEMA WC 26 (EEMAC 201) Binational Wire and Cable Packaging Standard

10.1.3 Capacities and Dimensions of Shipping Reels

Table 10.2–Capacities of Typical Shipping Reels per NEMA WC 26

Flange Dia. (in.)	16	16	20	24	24	24	28	30	32	36
Traverse (in.)	10	12	12	12	12	16	18	18	24	24
Drum Dia. (in.)	12	6	8	10	12	10	12	12	16	16
Clearance (in.)	1	1	1	1	1	1	1	2	2	2
Cable O.D. (in.)										
0.10	3,406	12,576	20,436	30,182	26,724	40,243				
0.15	1,514	5,589	9,083	13,414	11,877	17,886	27,877	27,877	36,890	
0.20	852	3,144	5,109	7,546	6,681	10,061	15,681	15,681	20,750	30,182
0.25	545	2,012	3,270	4,829	4,276	6,439	10,036	10,036	13,280	19,317
0.30	378	1,397	2,271	3,354	2,969	4,471	6,969	6,969	9,222	13,414
0.35	278	1,027	1,668	2,464	2,182	3,285	5,120	5,120	6,776	9,855
0.40	213		1,277	1,886	1,670	2,515	3,920	3,920	5,188	7,546
0.45	168		1,009	1,490	1,320	1,987	3,097	3,097	4,099	5,962
0.50	136		817	1,207	1,069	1,610	2,509	2,509	3,320	4,829
0.55	113			998	883	1,330	2,073	2,073	2,744	3,991
0.60	95			838	742	1,118	1,742	1,742	2,306	3,354
0.65	81				633		1,485	1,485	1,965	2,858
0.70	70				545		1,280	1,280	1,694	2,464
0.75	61				475		1,115	1,115	1,476	2,146
0.80									1,297	1,886
0.85									1,149	1,671
0.90									1,025	1,490
0.95									920	1,338
1.00									830	1,207
1.05										
1.10										
1.15										
1.20										
1.25										
1.30										
1.35										
1.40										
1.45										
1.50										
1.55										
1.60										
1.65										
1.70										

The following formula from NEMA WC 26 can be used to calculate approximate cable capacity per reel:

$$\text{Footage} = \frac{0.262 \times T \times (H - C) \times (D + H - C)}{(\text{Wire OD})^2}$$

40	42	48	54	60	66	72	78	84	90	96
30	26	36	32	28	36	36	48	54	54	54
16	24	24	24	28	36	36	42	48	48	56
2	2	2	3	3	3	3	3	3	3	3
32,698	23,651									
22,707	16,424	35,632	40,243	43,445						
16,682	12,067	26,179	29,566	31,919	44,350					
12,773	9,239	20,043	22,637	24,438	33,955	45,097				
10,092	7,300	15,836	17,886	19,309	26,829	35,632				
8,174	5,913	12,828	14,488	15,640	21,731	28,862	43,010			
6,756	4,887	10,601	11,973	12,926	17,960	23,853	35,545	44,198		
5,677	4,106	8,908	10,061	10,861	15,091	20,043	29,868	37,139	46,688	48,771
4,837	3,499	7,590	8,573	9,255	12,859	17,078	25,450	31,645	39,782	41,557
4,171	3,017	6,545	7,392	7,980	11,087	14,725	21,944	27,285	34,302	35,832
3,633	2,628	5,701	6,439	6,951	9,658	12,828	19,116	23,769	29,881	31,214
3,193	2,310	5,011	5,659	6,110	8,489	11,274	16,801	20,890	26,262	27,434
2,829	2,046	4,439	5,013	5,412	7,519	9,987	14,882	18,505	23,263	24,301
2,523	1,825	3,959	4,471	4,827	6,707	8,908	13,275	16,506	20,750	21,676
2,264	1,638	3,553	4,013	4,333	6,020	7,995	11,914	14,814	18,624	19,454
2,044	1,478	3,207	3,622	3,910	5,433	7,215	10,752	13,370	16,808	17,558
	1,341	2,909	3,285	3,547	4,928	6,545	9,753	12,127	15,245	15,925
	1,222	2,650	2,993	3,231	4,490	5,963	8,886	11,049	13,891	14,510
	1,118	2,425	2,739	2,957	4,108	5,456	8,130	10,110	12,709	13,276
	1,027	2,227	2,515	2,715	3,773	5,011	7,467	9,285	11,672	12,193
	946	2,052	2,318	2,502	3,477	4,618	6,882	8,557	10,757	11,237
	875	1,898	2,143	2,314	3,215	4,270	6,362	7,911	9,945	10,389
	811	1,760	1,987	2,145	2,981	3,959	5,900	7,336	9,222	9,634
	754	1,636	1,848	1,995	2,772	3,681	5,486	6,821	8,575	8,958
	703	1,525	1,723	1,860	2,584	3,432	5,114	6,359	7,994	8,351
	657	1,425	1,610	1,738	2,415	3,207	4,779	5,942	7,470	7,803
				1,628	2,261	3,003	4,476	5,565	6,996	7,308
				1,527	2,122	2,819	4,200	5,223	6,566	6,858
				1,436	1,996	2,650	3,949	4,911	6,174	6,449
				1,353	1,880	2,497	3,721	4,626	5,816	6,075

Continued on next page >>

Table 10.2–Capacities of Typical Shipping Reels per NEMA WC 26 (Continued)

Flange Dia. (in.)	16	16	20	24	24	24	28	30	32	36
Traverse (in.)	10	12	12	12	12	16	18	18	24	24
Drum Dia. (in.)	12	6	8	10	12	10	12	12	16	16
Clearance (in.)	1	1	1	1	1	1	1	2	2	2
Cable OD (in.)										
1.75										
1.80										
1.85										
1.90										
1.95										
2.00										
2.05										
2.10										
2.15										
2.20										
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3.45										
3.50										

The following formula from NEMA WC 26 can be used to calculate approximate cable capacity per reel:

$$\text{Footage} = \frac{0.262 \times T \times (H - C) \times (D + H - C)}{(\text{Wire OD})^2}$$

40	42	48	54	60	66	72	78	84	90	96
30	26	36	32	28	36	36	48	54	54	54
16	24	24	24	28	36	36	42	48	48	56
2	2	2	3	3	3	3	3	3	3	3
				1,277	1,774	2,356	3,511	4,366	5,488	5,733
					1,677	2,227	3,319	4,127	5,188	5,419
					1,587	2,108	3,142	3,906	4,911	5,130
					1,505	1,999	2,979	3,704	4,656	4,864
					1,429	1,898	2,828	3,516	4,420	4,617
					1,358	1,804	2,688	3,342	4,202	4,389
					1,293	1,717	2,559	3,181	3,999	4,178
					1,232	1,636	2,438	3,032	3,811	3,981
					1,175	1,561	2,326	2,892	3,636	3,798
					1,122	1,491	2,222	2,762	3,473	3,628
							2,124	2,641	3,320	3,468
							2,033	2,527	3,177	3,319
							1,947	2,421	3,044	3,179
							1,867	2,321	2,918	3,048
							1,791	2,227	2,800	2,925
							1,720	2,139	2,689	2,809
							1,654	2,056	2,585	2,700
							1,591	1,978	2,486	2,597
								1,904	2,393	2,500
								1,834	2,306	2,408
								1,768	2,223	2,322
								1,705	2,144	2,239
								1,646	2,069	2,162
								1,590	1,999	2,088
								1,536	1,931	2,018
										1,951
										1,887
										1,827
										1,769
										1,715
										1,662
										1,612
										1,565
										1,519
										1,475
										1,433

Table 10.3–Typical Small Reel Dimensions

Reel	Reel dimensions (See Figure 10.2 below)					Approx. Reel Weight	Material
	A Flange Diameter (in.)	B Arbor Hole (in.)	D Drum Diameter (in.)	T Traverse (in.)	W Overall Width (in.)	(lb.)	
1	12	1½	6	6	6¾	2½	Plywood
2	13	1½	5	12¾	12¾	3¾	Plywood
3	16	1½	5	12	12¾	4½	Plywood
4	24	2	12	14	15	11	Plywood
5	30	2	12	14	15	21	Plywood
6	11⅜	2	8	3⅝	4	2	Plastic
7	16	2	12	3¼	3¾	4¼	Fiberboard
8	6½	¾	1 15/16	1½	1¾	½	Metal
9	6½	¾	1 15/16	2	2¼	½	Metal
10	6½	¾	1 15/16	3¼	3½	½	Metal
11	6½	¾	1 15/16	7½	7¾	¾	Metal
12	10½	1⅛	3½	2¾	3	1¼	Metal
13	10½	1⅛	3½	8	8¼	1¾	Metal

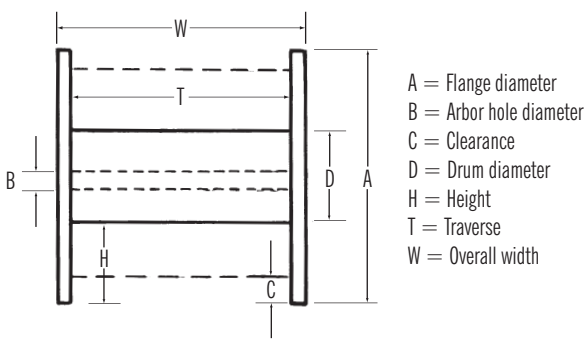

Figure 10.2–Reel Dimensions

10.2 REEL HANDLING

10.2.1 Storage and Shipment

Except for reels less than two feet in diameter and weighing less than 200 pounds, reels should be stored and shipped upright, i.e., resting on both flanges. Do not store or ship reels on their side. Storage or shipment of the reel while lying on its side greatly increases the likelihood of tangling and damage to the cable.

Both cable ends should be sealed against the entrance of moisture. Cables larger than 1⁄2 inch in diameter should be sealed with tight-fitting heat-shrinkable or hot-dipped (peel coat) end caps designed for the purpose. Smaller diameter cables should be sealed with PVC tape such as 3M Scotch 33 or with end caps (end caps preferred).

CAUTION: Make sure staples are shorter than flange thickness so that they cannot extend through the flange and damage the cable. Caution must also be used to prevent damage to the cable end as it is frequently utilized for hipot, continuity, or other tests. Be sure all staples and nails that might damage the cable are removed.

If reels of cable will be stored for longer than one month, they should be protected from rain and direct exposure to sunlight to maximize service life.

10.2.2 Moving and Lifting

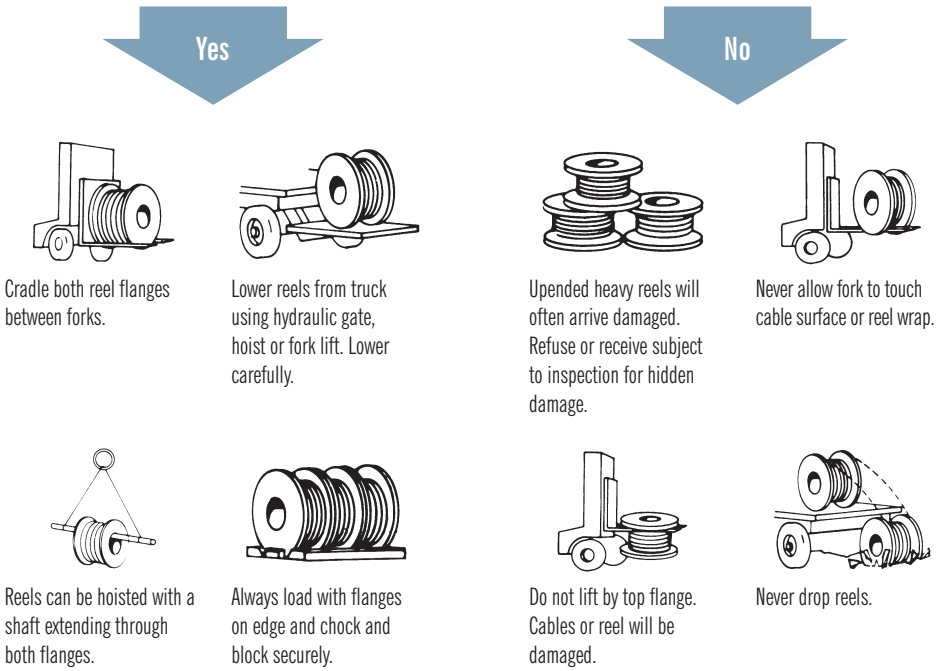

Figure 10.3–Proper Handling of Cable Reels