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Applications
Engineering Note

RPX Gel Free Ribbon Cable Tutorial for Aerial Self Support Applications

AEN155, Revision 1

Corning Optical Communications has products and solutions that can accommodate most installation types. This paper will discuss the capabilities of Corning RPX cable and RPX FlexNap used in an all-dielectric self-support (ADSS) application.

Corning's RPX cable is an all-dielectric design with a rectangular profile as compared to traditionally round cable. The RPX Cable may be installed in a duct, direct buried, lashed aerially or in the self-support aerial installation application. This design allows for lower weight, increased fiber density when compared to traditional ADSS cables, and is available in 24, 48, 72, 96, and 144 fiber counts. A cross section view of the cable is shown in Figure 1 below.
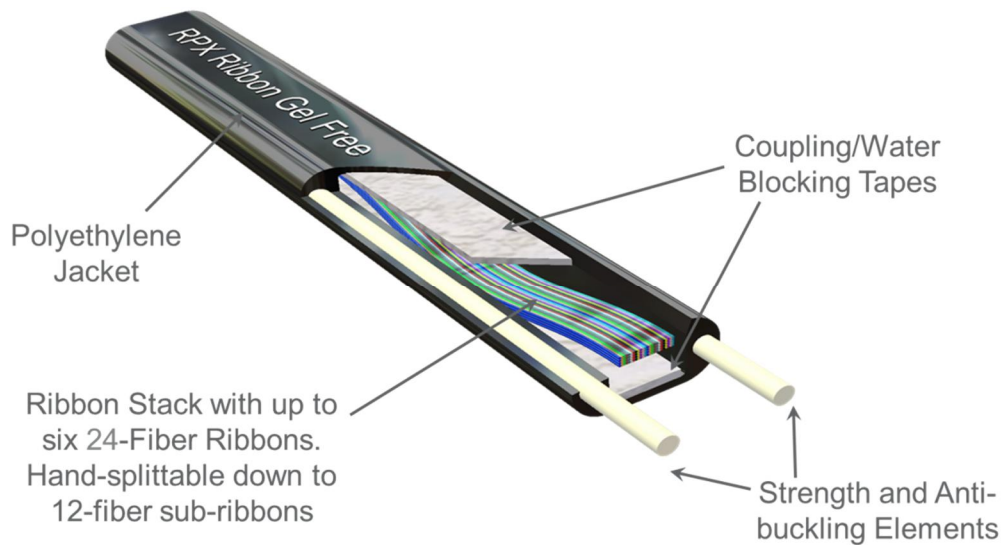

Figure 1. RPX Cable Components

The rectangular profile and lightweight design allows the cable to be installed using lower tensions and without the need for additional wind vibration dampers (Table 1). RPX cable also provides an easy access jacket for craft-friendly cable entry while remaining robust enough to handle environmental stresses.

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Span - ft. (m)	Sag %	Installation Tension - lbf (N)	
		RPX	SOLO Short
50 (15)	1.0	40 (178)	83 (368)
100 (30)	1.0	80 (356)	166 (737)
150 (46)	1.0	120 (534)	248 (1105)
200 (61)	1.0	160 (712)	331 (1473)
250 (76)	1.0	200 (890)	414 (1842)
300 (91)	1.0	240 (1068)	497 (2210)
350 (107)	1.0	279 (1241)	580 (2579)
400 (122)	1.0	319 (1419)	663 (2947)
450 (137)	1.0	----	745 (3315)
500 (152)	1.0	----	828 (3684)

Table 1. 144F Cable Installation Tensions

RPX cable is available as bulk cable in fiber counts from 24-144. As with any other ribbon cable, it can support mid-span access and splicing in traditional outside plant installations.

RPX cable is also available as part of the FlexNAP solution set. It can be built utilizing any of the fiber counts, with a preterminated tether at specified locations. The tethers for RPX cable can be 4, 8, and 12 fiber counts. This custom, factory built cable assembly provides significantly quicker installation times and therefore lower total cost, especially when compared to installing traditional ADSS cable in an FTTx network. Additional information and a detailed video explaining FlexNAP is available at this link:
http://www.corning.com/opcomm/nafta/en/markets_applications/evolant/FlexNapUpdate.aspx

The RPX cable design has preferential bend performance similar to traditional ribbon cable designs. The design also supports a smaller, nine-inch, minimum bend radius for both short term and long-term loads when compared to traditional ADSS cables.

Fiber Count	Height (mm)	Width (mm)	Weight (kg/km)
24 & 48	7.8	15.8	77
72 & 96	8.2	15.8	85
144	8.6	15.8	94

Table 2. RPX Dimensions

RPX cable has a maximum installation (short-term) tensile rating of 600 lbf. When used in a self-support installation, the cable should see a maximum of approximately 320 lbf. during installation, with operational loads reaching approximately 600 lbf. Tables 3 and 4 provide span lengths and tensions for the three NESC loading conditions at 1.0% and 1.5% sag.

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Span	Installation Sag	Max Installation Tension	NESC Heavy Max. Sag			NESC Medium Max. Sag			NESC Light Max. Sag		
			Max Oper Tension	Max Mid-Span Sag	No Wind, -1C, With Ice Vertical Sag	Max Oper Tension	Max Mid-Span Sag	No Wind, -1C, With Ice Vertical Sag	Max Oper Tension	Max Mid-Span Sag	No Wind, -1C, With Ice Vertical Sag
ft.	%	lbf.	lbf.	ft.	ft.	lbf.	ft.	ft.	lbf.	ft.	ft.
25	1.0	20	142	0.6	0.6	93	0.5	0.5	26	0.3	0.3
50	1.0	40	232	1.4	1.4	153	1.1	1.1	50	0.7	0.7
75	1.0	60	309	2.4	2.4	205	1.8	1.8	73	1.1	1.1
100	1.0	80	378	3.5	3.5	252	2.7	2.7	95	1.5	1.5
125	1.0	100	443	4.6	4.6	297	3.5	3.5	117	1.9	1.9
150	1.0	120	504	5.8	5.8	339	4.5	4.5	139	2.3	2.3
175	1.0	140	563	7.1	7.1	380	5.4	5.4	160	2.7	2.7
200	1.0	160	619	8.5	8.5	419	6.4	6.4	182	3.1	3.1
225	1.0	180				457	7.5	7.5	203	3.6	3.6
250	1.0	200				494	8.6	8.6	224	4.0	4.0
275	1.0	220				530	9.6	9.6	244	4.4	4.4
300	1.0	240				565	10.8	10.8	265	4.8	4.8
325	1.0	260				600	11.9	11.9	286	5.3	5.3
350	1.0	279							306	5.7	5.7
375	1.0	299							327	6.1	6.1
400	1.0	319							347	6.6	6.6

Table 3. RPX Sag & Tension at 1.0%

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Span	Installation Sag	Max Installation Tension	NESC Heavy Max. Sag			NESC Medium Max. Sag			NESC Light Max. Sag		
			Max Oper Tension	Max Mid Span Sag	No Wind, -1C, With Ice Vertical Sag	Max Oper Tension	Max Mid Span Sag	No Wind, -1C, With Ice Vertical Sag	Max Oper Tension	Max Mid Span Sag	No Wind, -1C, With Ice Vertical Sag
ft.	%	lbf.	lbf.	ft.	ft.	lbf.	ft	ft.	lbf.	ft.	ft.
25	1.5	13	130	0.6	0.6	81	0.5	0.5	20	0.4	0.4
50	1.5	27	217	1.5	1.5	137	1.2	1.2	39	0.9	0.9
75	1.5	40	290	2.5	2.5	186	2.0	2.0	57	1.4	1.4
100	1.5	53	357	3.7	3.7	231	2.9	2.9	74	1.9	1.9
125	1.5	67	419	4.9	4.9	272	3.9	3.9	91	2.4	2.4
150	1.5	80	478	6.2	6.2	311	4.9	4.9	108	3.0	3.0
175	1.5	93	533	7.5	7.5	348	5.9	5.9	124	3.5	3.5
200	1.5	107	587	9.0	9.0	384	7.0	7.0	140	4.1	4.1
225	1.5	120				419	8.2	8.2	156	4.6	4.6
250	1.5	133				453	9.3	9.3	171	5.2	5.2
275	1.5	147				486	10.5	10.5	187	5.8	5.8
300	1.5	160				518	11.8	11.8	202	6.4	6.4
325	1.5	173				549	13.0	13.0	217	6.9	6.9
350	1.5	187				580	14.3	14.3	232	7.5	7.5
375	1.5	200							247	8.1	8.1
400	1.5	213							262	8.7	8.7
425	1.5	227							277	9.3	9.3
450	1.5	240							292	9.9	9.9

Table 4. RPX Sag & Tension at 1.5%

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When installing RPX cable, slack may need to be stored at multiple locations. There are three primary methods for installing slack with self-support RPX cable. The first two methods store slack at the pole. One method is to coil the cable and store it on the pole. Most installers do not choose this method due to clearance and climbing requirements. The other method is to run the cable down the pole and store the slack at the base. When slack is stored off the poles, it can be stored in the spans with snowshoes like any other form of ADSS cable. Table 5 below shows the max distance into a span the snowshoe can reside for the given environmental condition. Figure 2 is a diagram showing cable slack storage in the span, with RPX cable.

NESC Heavy			NESC Medium			NESC Light		
Sag (%)	Span length (ft.)	Snowshoe Position (Ft from pole)	Sag (%)	Span length (ft.)	Snowshoe Position (Ft from pole)	Sag (%)	Span length (ft.)	Snowshoe Position (Ft from pole)
1.0	195	9.75	1.0	310	15.5	1.0	395	19.75
1.0	185	18.5	1.0	285	28.5	1.0	375	37.5
1.0	165	33	1.0	270	54	1.0	345	69
1.0	150	45	1.0	240	72	1.0	310	93
1.0	135	54	1.0	220	88	1.0	280	112
1.0	125	62.5	1.0	200	100	1.0	245	122.5
1.0	115	69	1.0	185	111	1.0	220	132
1.0	110	77	1.0	165	115.5	1.0	195	136.5
1.0	95	76	1.0	150	120	1.0	180	144
1.0	90	81	1.0	140	126	1.0	160	144
2.0	220	11	2.0	365	18.25	2.0	440	66
2.0	210	21	2.0	345	34.5	2.0	425	85
2.0	190	38	2.0	320	64	2.0	385	115.5
2.0	175	52.5	2.0	295	88.5	2.0	350	140
2.0	160	64	2.0	270	108	2.0	310	155
2.0	145	72.5	2.0	245	122.5	2.0	280	168
2.0	135	81	2.0	225	135	2.0	255	178.5
2.0	125	87.5	2.0	210	147	2.0	235	188
2.0	120	96	2.0	190	152	2.0	210	189
2.0	110	99	2.0	180	162	3.0	440	132
3.0	245	12.25	3.0	410	20.5	3.0	405	162
3.0	230	23	3.0	390	39	3.0	365	182.5
3.0	215	43	3.0	360	72	3.0	330	198
3.0	195	58.5	3.0	340	102	3.0	300	210
3.0	180	72	3.0	310	124	3.0	280	224
3.0	170	85	3.0	285	142.5	3.0	260	234
3.0	160	96	3.0	265				
3.0	150	105	3.0	245				
3.0	140	112	3.0	235				
3.0	145	130.5	3.0	220				

Table 5. RPX Slack Allowance

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Slack Storage with Snowshoes
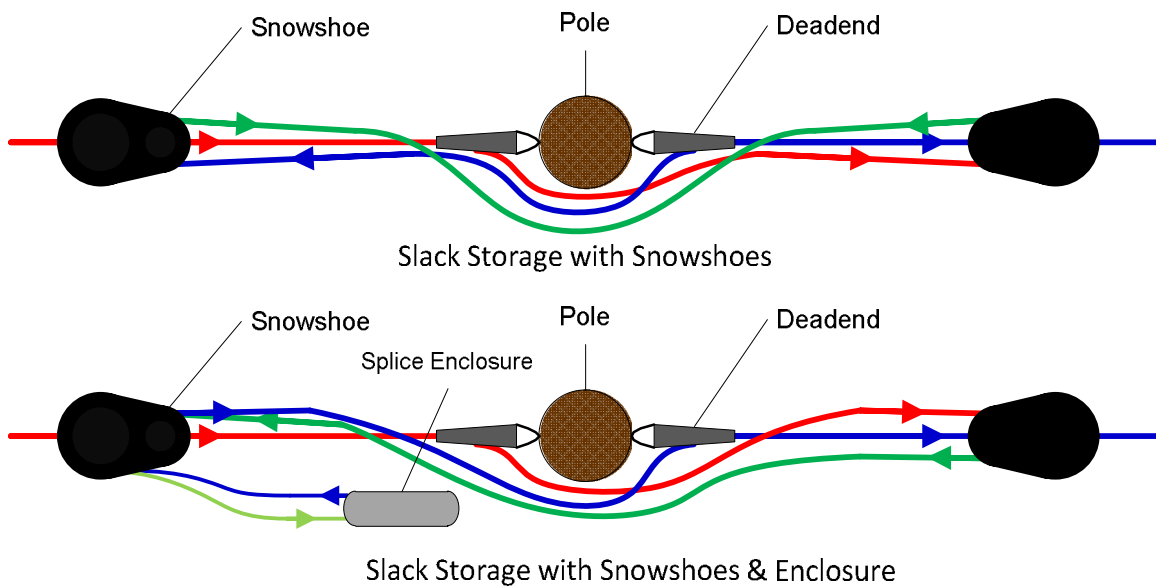
Slack Storage with Snowshoes & Enclosure

Figure 2. RPX Cable Slack Storage with Snowshoes

Corning offers dead-end hardware, along with suspension clamps for use with RPX cables. These clamps are specifically designed to maximize the cable systems performance without affecting long-term cable and fiber reliability. These clamps are also in compliance with IEEE 1591 and 1222 standards for ADSS hardware.

The RPX Deadend clamp is a mechanical wedge style clamp. This stainless steel clamp is designed to hold the required cable load without damaging the cable. The bail is removable for ease of installation with standard pole hardware and is designed with a breakaway feature at approximately 1000 lbs. when used around a ½" diameter eyebolt.

Figure 3. RPX Deadend Clamp (RPX-DEADEND-E1)

The RPX Suspension clamp is a mechanical compression style bell-mouth clamp. This clamp style allows the RPX cable to move freely about the pole without any potential cable damage. The clamp is rated for use within a 20-degree total angle change. (For angles larger than 20 degrees, the double deadend method is required.) The RPX Suspension clamp is designed to be used with hook style pole hardware, or in conjunction with a shackle and standard pole hardware.

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Figure 4. RPX Suspension Clamp (RPX-SUSP-H1)

Corning does not recommend the use of midspan drop attachments to ADSS cables because of the extra loading incurred when used in a self-support method. Depending on the environmental conditions, the rated loading of the cable could be exceeded. ADSS cables can move more than steel messengers when environmentally loaded. This movement will, in turn, change the sag of the drops going to the home. In conditions such as heavy ice loading and/or high wind, the drop cables could sag close the ground, risking damage. If midspan drop attachment is required, contact Corning Technical Support for assistance.

Corning RPX Gel Free Ribbon Cable is a valuable alternative to traditional ADSS deployments, especially for FTTX applications. Contact Corning Applications Engineering or your Corning Salesperson for more information.

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