Update from the National Science Foundation Wire Pool

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NSF Wire Pool Manager

UNOLS
UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

Topics for discussion

- Introduction
- Thimbles
- Synthetic Cable

Introduction

During the meeting please take time to meet

Andrea Harvey

The Wire Pool Database Administrator

Next Topic

- Introduction
- **Thimbles**
- Synthetic Cable

Not all thimbles are created equal

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Standard Wire Rope Thimble
¾” Crosby G-411

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Two Crosby ¾” Thimbles

Standard Wire Rope Thimble, G411

Extra Heavy Wire Rope Thimble, G414

G-411 STANDARD WIRE ROPE THIMBLES

- Recommended for light duty service
- Hot Dip galvanized steel.
- G-411 meets the performance requirements of Federal Specification FF-T-276b Type II, except for those provisions required of the contractor.

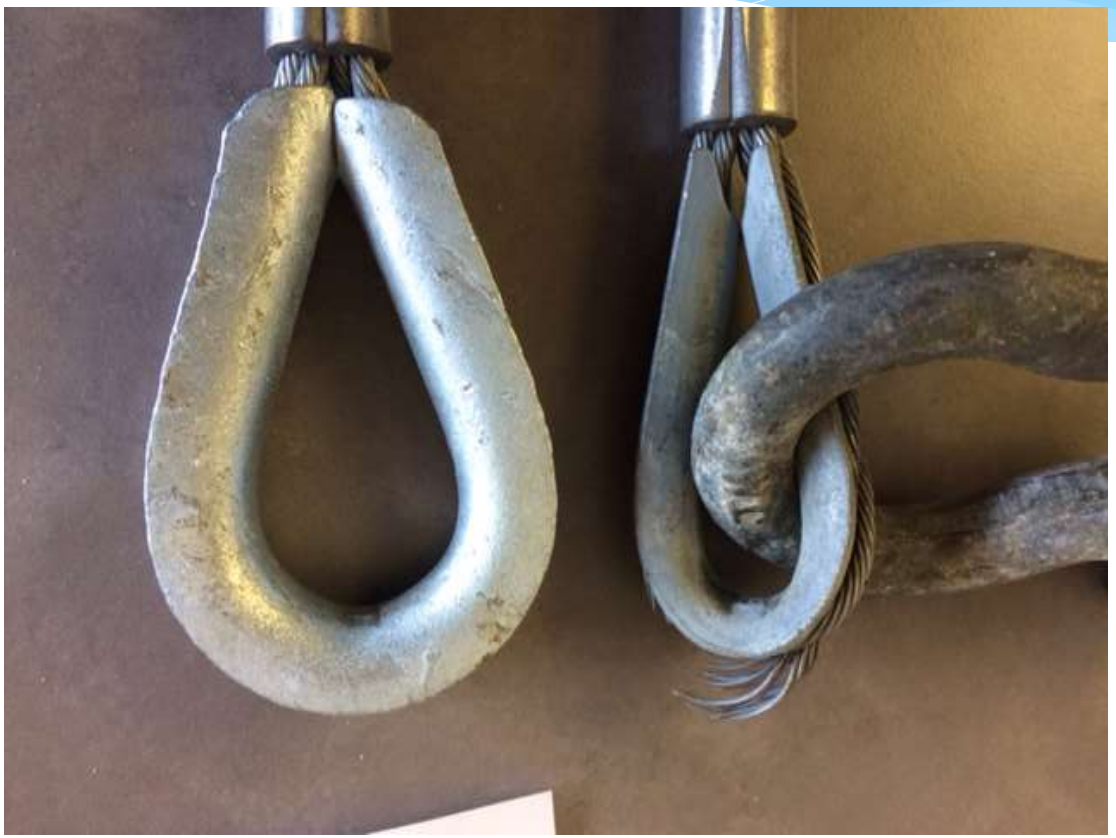
G-414 EXTRA HEAVY WIRE ROPE THIMBLES

A rugged rope thimble recommended for heavy duty service. Available in Hot Dip galvanized. G-414 meets the performance requirements of Federal Specification FF-T-276b Type III, except for those provisions required of the contractor.

Break test of ¼” Wire Rope terminated with standard wire rope thimbles

Small radius causes wire to fail

¼” Wire Rope break test with heavy wire rope thimble on left and standard wire rope thimble on right



3/8” Wire Rope break test with 3/8” standard wire rope thimble

9/16” Wire rope break

3/8” Wire Rope break with Standard wire rope thimble

Next Topic

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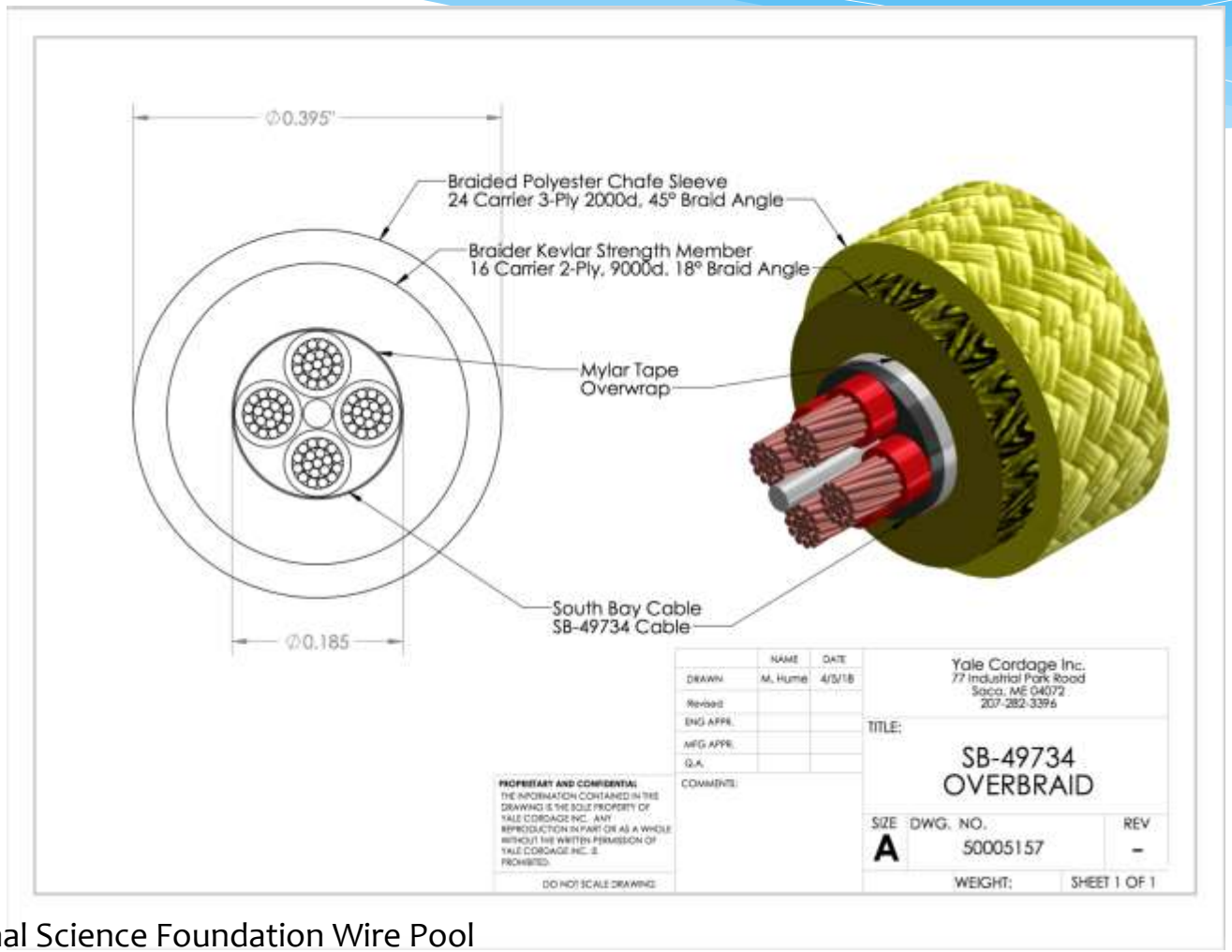
- **Synthetic Cable**

Synthetic Cables



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Synthetic Alternatives for CTD Cable

* Discussions with several manufactures about potential designs for a synthetic cable that could be an alternative to .322 EM cable
* 3 or 4 conductor cable options
* Conductor electrical properties to match existing .322
* Desirable to use existing winches in the Fleet
  * Existing drum size limits drum capacity with increasing cable diameters

Synthetic Cables

Manufacturer	Dia.	Rated Breaking Strength	Working Load	Conductors	Internal Material	Wet Weight (lbs/m)	Dry Weight (lbs/m)	Winch Capacity (m)	External Material
Cortland	0.322	4270	562	-	-	0.041	0.161	10000	-
South Bay	0.322	5000	1000	(3) #19 AWG	Kevlar	0.056	0.174	10000	Dacron Reinforced Polyurethane
Cortland	0.357	6294	899	-	-	0.044	0.190	8134	-
Cortland	0.382	5950	850	-	-	0.048	0.215	7104	-
Falmat	0.39	7100	1420	(4) #16 AWG	Vectran	0.092	0.266	6819	-
South Bay	0.395	10000	2000	(3) #22 AWG	Kevlar	0.043	0.220	6600	Dacron Reinforced Polyurethane
Yale	0.395	10000	2000	(4) #20 AWG	Kevlar	0.082	0.213	6600	Braided Polyester Sleeve
Cortland	0.396	7700	1100	-	-	0.049	0.229	6600	-
Cortland	0.47	11690	1686	(3) #19 AWG	Vectran	0.051	0.299	4693	Extruded Polyester Jacket
Cortland	0.54	16500	2200	(4) #18 AWG	Vectran	0.098	0.433	3555	Extruded Polyester Jacket
Rochester	0.322	10000	2500	(3) #19 AWG	Steel	0.473	0.574	10000	Steel Armor

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Synthetic Cables

Manufacturer	Dia.	Rated Breaking Strength	Working Load	Conductors	Internal Material	Wet Weight (lbs/m)	Dry Weight (lbs/m)	Winch Capacity (m)	External Material
Cortland	**0.322**	**4270**	562	-	-	0.041	0.161	**10000**	-
South Bay	**0.322**	**5000**	1000	(3) #19 AWG	Kevlar	0.056	0.174	**10000**	Dacron Reinforced Polyurethane
Cortland	**0.357**	**6294**	899	-	-	0.044	0.190	**8134**	-
Cortland	**0.382**	**5950**	850	-	-	0.048	0.215	**7104**	-
Falmat	**0.39**	**7100**	1420	(4) #16 AWG	Vectran	0.092	0.266	**6819**	-
South Bay	**0.395**	**10000**	2000	(3) #22 AWG	Kevlar	0.043	0.220	**6600**	Dacron Reinforced Polyurethane
Yale	**0.395**	**10000**	2000	(4) #20 AWG	Kevlar	0.082	0.213	**6600**	Braided Polyester Sleeve
Cortland	**0.396**	**7700**	1100	-	-	0.049	0.229	**6600**	-
Cortland	**0.47**	**11690**	1686	(3) #19 AWG	Vectran	0.051	0.299	**4693**	Extruded Polyester Jacket
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The Grim Reaper of Cables

Photo by Jacob Strock, University of Rhode Island

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CTD Scenario

* 5000 m CTD Cast
* 1000 lb CTD (dry), 600 lb (wet)
* Rosette with (24) 10 liter bottles
* Appendix A, section A.9.2 ”Finding a Factor of Safety for all Operations”
* Dynamic Load calculation modified (Mass Total x .39) instead of (Mass Total x .75).

Synthetic Cables

Manufacturer	Dia.	Rated Breaking Strength	Working Load	Conductors	Internal Material	Wet Weight (lbs/m)	Dry Weight (lbs/m)	Winch Capacity (m)	CTD Scenario Factor of Safety	Allowable Depth Using Manuf. WLL (m)
Cortland	**0.322**	**4270**	562	-	-	0.041	0.161	**10000**	**2.11**	0
South Bay	**0.322**	**5000**	1000	(3) #19 AWG	Kevlar	0.056	0.174	**10000**	**2.36**	0
Cortland	**0.357**	**6294**	899	-	-	0.044	0.190	**8134**	**3**	0
Cortland	**0.382**	**5950**	850	-	-	0.048	0.215	**7104**	**2.75**	0
Falmat	**0.39**	**7100**	1420	(4) #16 AWG	Vectran	0.092	0.266	**6819**	**2.86**	0
South Bay	**0.395**	**10000**	2000	(3) #22 AWG	Kevlar	0.043	0.220	**6600**	**4.66**	3900
Yale	**0.395**	**10000**	2000	(4) #20 AWG	Kevlar	0.082	0.213	**6600**	**4.28**	3000
Cortland	**0.396**	**7700**	1100	-	-	0.049	0.229	**6600**	**3.51**	0
~~**Cortland**~~	~~**0.47**~~	~~**11690**~~	1686	(3) #19 AWG	Vectran	0.051	0.299	~~**4693**~~	~~**5**~~	1000
~~**Cortland**~~	~~**0.54**~~	~~**16500**~~	2200	(4) #18 AWG	Vectran	0.098	0.433	~~**3555**~~	~~**5.82**~~	2600
Rochester	**0.322**	**10000**	2500	(3) #19 AWG	Steel	0.473	0.574	**10000**	**2.01**	1450

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Synthetic Cables

Manufacturer	Dia.	Rated Breaking Strength	Working Load	Conductors	Internal Material	Wet Weight (lbs/m)	Dry Weight (lbs/m)	Winch Capacity (m)	CTD Scenario Factor of Safety	Allowable Depth Using Manuf. WLL (m)
Cortland	0.322	4270	562	-	-	0.041	0.161	10000	2.11	0
South Bay	0.322	5000	1000	(3) #19 AWG	Kevlar	0.056	0.174	10000	2.36	0
Cortland	0.357	6294	899	-	-	0.044	0.190	8134	3	0
Cortland	0.382	5950	850	-	-	0.048	0.215	7104	2.75	0
Falmat	0.39	7100	1420	(4) #16 AWG	Vectran	0.092	0.266	6819	2.86	0
South Bay	0.395	10000	2000	(3) #22 AWG	Kevlar	0.043	0.220	6600	4.66	3900
Yale	0.395	10000	2000	(4) #20 AWG	Kevlar	0.082	0.213	6600	4.28	3000
Cortland	0.396	7700	1100	-	-	0.049	0.229	6600	3.51	0
Cortland	0.47	11690	1686	(3) #19 AWG	Vectran	0.051	0.299	4693	5	1000
Cortland	0.54	16500	2200	(4) #18 AWG	Vectran	0.098	0.433	3555	5.82	2600
Rochester	0.322	10000	2500	(3) #19 AWG	Steel	0.473	0.574	10000	2.01	1450

Summary

Thimbles

Safest to use thimbles that meet Federal Specification FF-T-276b Type III

Synthetic Cable

We have a lot to learn about the suitability of Synthetic Cables for over the side CTD work.

Can they be used at a factor of safety comparable to that used for steel armored cables?

Is using synthetic cable with existing ship's equipment an option?

Points to the need to conduct laboratory tests on candidate cables to see how they perform under typical at-sea operating conditions.

THANK YOU