

1.0 Reference and Address			
Report Number	0551892CRT-001	Original Issued: 9-Jan-2006	Revised: 15-May-2009
Standard(s)	<p>IEEE 45, IEEE Recommended Practice for Electrical Installations on Shipboard, Sept. 16, 1998, Standard for Marine Shipboard Cable, UL 1309, First Edition, dated July 14, 1995, CSA C22.2 No. 245, dated July 14, 1995</p> <p>IEEE 1580-2001, IEEE Recommended Practice for Marine Cable for Use on Shipboard and Fixed or Floating Platforms, IEEE 1580-2001, June 14, 2001</p> <p>Classification Society (DNV, ABS, and LRS) Type Approval in accordance with International Electrotechnical Commission (IEC) 92-3, Second Edition, 1965, Electrical Installations in Ships and Amendments 1-6, IEC 332-3, Category A, Second Edition, March 1992. The Bostrig 125 Type P Marine Shipboard Cables are rated at 110 C in accordance with the International Association of Drilling Contractors (IADC-DCCS-1/1991) and American Railroads (AAR) S-501. The Bostrig 125 Type P Marine Shipboard Cables have been evaluated and found to comply with UL 1277 Type TC Open Wiring Option requirements, and with the Crush and Impact requirements of UL 2225. Alternate jackets described as BIW Formulation F001 and N009, rated in accordance with NEK 606 (1997), Cable for Offshore Installations Halogen-Free or MUD Resistant, may be used for MUD resistant applications.</p>		
Entirely Replaces	Report 0551892CRT-001 originally issued January 9, 2006 and last revised October 25, 2006		
Applicant	Draka Cableteq USA	Manufacturer 1	Draka Cableteq USA
Address	22 Joseph E. Warner Blvd. North Dighton, MA 02764	Address	761 Joseph E. Warner Blvd. Taunton, MA 02780
Country	USA	Country	USA
Contact	Mr. Walter Constantine	Contact	Mr. David Snow
Phone	508-513-2312	Phone	508-513-2444
FAX	508-821-9436	FAX	508-824-1596
Email	walter.constantine@draka.com	Email	NA
Manufacturer 2	Draka Cableteq USA	Manufacturer 3	Suzhou Draka Cable Company
Address	1 Tamaqua Blvd. Schuylkill Haven, PA 17972	Address	No. 88 Kangyuan Road Xiangcheng Economic Development District Suzhou 215131 Jaingsu Province
Country	USA	Country	P.R. of China
Contact	Mr. Tom McAfee	Contact	Mr. Peter Waterworth
Phone	507-385-4381, extension 9243	Phone	0086 512 6578 8219
FAX	NA	FAX	0086 512 6587 9866
Email	NA	Email	NA
		Alternate	Ms. Luo Lan (Sophia Luo)
		Phone	0086 512 6578 9850
		FAX	0086 512 6578 9866
		Email	NA

2.0 Product Description									
Product	Marine Shipboard Cable for Use on Shipboard and Fixed or Floating Platforms								
Brand name	NA								
Description	<p><u>Power and distribution Cables:</u> 600V and 2000V Single Conductor Power Bostrig 125 Type P Marine Shipboard Cables, with an optional bronze basket weave armor or an armor and overall sheath. 600V and 2000V Multiconductor power Bostrig 125 Type P Marine Shipboard Cable, with an optional basket weave armor or armor and overall sheath.</p> <p><u>Control Cables:</u> 600V Multiconductor Control Bostrig 125 Type P Marine Shipboard Cable, with an optional bronze basket weave armor or an armor and overall sheath.</p> <p><u>Signal Cables:</u> 300V and 600V Shielded Instrumentation Bostrig 125 Type P Marine Shipboard Cable, with an optional bronze basket weave armor or an armor and overall sheath.</p>								
Models	None								
Model Similarity	NA								
Ratings	<table border="0"> <thead> <tr> <th>Product</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Power & Distribution Cables:</td> <td>600V & 2000V</td> </tr> <tr> <td>Control Cables:</td> <td>600V</td> </tr> <tr> <td>Signal Cables:</td> <td>300V & 600V</td> </tr> </tbody> </table>	Product	Voltage	Power & Distribution Cables:	600V & 2000V	Control Cables:	600V	Signal Cables:	300V & 600V
Product	Voltage								
Power & Distribution Cables:	600V & 2000V								
Control Cables:	600V								
Signal Cables:	300V & 600V								
Other Ratings	NA								

3.0 Product Photographs

NONE

4.0 Critical Listed Components

NONE

5.0 Critical Unlisted Components

NONE

6.0 Critical Features

Recognized Component – A component part, which has been previously evaluated by an accredited certification body with restrictions and must be evaluated as part of the basic product considering the restrictions as specified by the Conditions of Acceptability.

Listed Component - A component part, which has been previously Listed or Certified by an accredited Certification Organization with no restrictions and is used in the intended application within its ratings.

Unlisted Component - A part that has not been previously evaluated to the appropriate designated component standard. It may also be a listed or recognized component that is being used outside of its evaluated Listing or component recognition.

Critical Features/Components - An essential part, material, subassembly, system, software, or accessory of a product that has a direct bearing on the product's conformance to applicable requirements of the product standard.

Construction Details - For specific construction details, reference should be made to the photographs and descriptions. All dimensions are approximate unless specified as exact or within a tolerance. In addition to the specific construction details described in this Report, the following general requirements also apply.

1. Markings - The product is marked as follows:

Cable Markings: The following is ink, indented or embossed printed on the surface of the cable's outer jacket at 40 inch maximum intervals.

- 1) Cable description
- 2) Cable manufacturer/company name or trade names of "Tamaqua" & "BIW" (optional if control number is printed)
- 3) "IEEE 45-1998" and/or "UL 1309" and/or "CSA C22.2 No. 245" and/or "IEEE 1580-2001"
- 4) Cable Type designation in accordance with the standard
- 5) Conductor size ("AWG" is optional)
- 6) Voltage rating
- 7) "c(ETL)us" (optional)
- 8) "ETL Listed" (optional)
- 9) ETL Control Number (optional if cable manufacturer/company name and code identifying manufacturing location is present)
- 10) Date of manufacture (optional)
- 11) Length markings (optional)

Label or Shipping Tag Markings: The follow appears on the label or shipping tag.

- 1) "ETL Listed" (optional)
- 2) "IEEE 45-1998" and/or "UL 1309" and/or "CSA C22.2 No. 245" and/or "IEEE1580-2001"
- 3) c(ETL)us Logo (optional)
- 4) ETL Control Number (optional if cable manufacturer/company name and code identifying manufacturing location is present)
- 5) Cable manufacturer/company name or trade name
- 6) Conductor size ("AWG" is optional)
- 7) Date of manufacture (Month and Year)
- 8) Number of conductors or pairs
- 9) Length of cable in container or reel

Installation, Operation and Safety Instructions - Instructions for the proper installation and safe use of this product are provided by the manufacturer.

7.0 Construction Detail

Section 1

PRODUCT COVERED: Marine Cables for Use on Shipboard and Fixed or Floating Platforms.

Power & Distribution Cables: 600V and 2000V Single Conductor Power Bostrig 125 Type P Marine Shipboard Cables, with an optional bronze basket weave armor or an armor and overall sheath.
600V and 2000V Multiconductor power Bostrig 125 Type P Marine Shipboard Cable, with an optional basket weave armor or armor and overall sheath.

Control Cables: 600V Multiconductor Control Bostrig 125 Type P Marine Shipboard Cable, with an optional bronze basket weave armor or an armor and overall sheath.

Signal Cables: 300V and 600V Shielded Instrumentation Bostrig 125 Type P Marine Shipboard Cable, with an optional bronze basket weave armor or an armor and overall sheath.

PRODUCT DESCRIPTION:

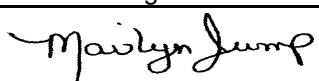
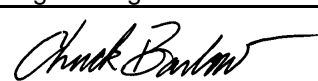
The jacket material is Type "N" Thermosetting Neoprene (BIW Formulation P-046 or P-047, colorable) or Type "CPE" Thermosetting Chlorinated Polyethylene (BIW Formulation C-007) . The insulation material is Type "P", Polyolefin (BIW Formulation X-013). All cables are constructed of the same jacket and insulation materials. The cables are rated at 100C (212F) in accordance with IEEE 1580 & UL 1309/CSA C22.2 No. 245 and 110C (230F) in accordance with the International Association of Drilling Contractors (IADC-DCCS-1/1991), Guidelines for Industrial System DC Cable for Mobile Offshore Drilling Units), which references the Association of American Railroads (AAR) S-501, Wiring and Cable Specification, Section 5.2. Alternate jackets described as BIW Formulation F001 and N009 rated in accordance with NEK 606 (1997) may be used for MUD resistance applications.

8.0 Test Summary			
<u>Tests conducted in accordance with IEC 92-3, Second Edition, 1965 & Amendments 1-6</u>			<u>Section</u>
General Examination			10.35
Insulation Thickness			10.37
Sheath Thickness			10.38
Dimensions of Metal Coverings			10.39
Overall Diameters			10.40
Conductor Diameter measured by Resistance			10.36 & 10.42
High Voltage Test			10.43
Insulation Resistance			10.44
Increase in A.C. Capacitance after Immersion			10.47
Flame Retardance Test (IEC 332-1)			10.5
Test on Bunched Wires and Cables			IEC 332-3, Cat A
Hot Set Test for XLPE			Appendix GA
Mechanical Characteristics of Insulating Compounds			10.55
Mechanical Characteristics of Sheathing Compounds			10.56
Resistance to Oil Immersion for ST1 & SH1 Sheaths			10.58
Tinning Test on Copper Wires			10.02 & 10.672
<u>Tests conducted in accordance with NEK 606 Section 2.6.1</u>			<u>Section</u>
Tensile Elongation and Strength (Unaged)			2.6.1
Tensile Elongation and Strength (After Oil Aging)			2.6.1
Volume Swelling (After Oil Aging)			2.6.1
Weight Increase (After Oil Aging)			2.6.1
Oxygen Index (After Oil Aging)			2.6.1

Results of the tests indicate the specimens conform to applicable test criteria.

8.0 Test Summary			
Evaluation Period	March 24, 2009 - May 15, 2009		Project No. 3176472
Sample Receipt Date	30-Mar-09	Condition	Production
			Sample ID 186974-3, -4 & -5
Test Location	Intertek, Elmendorf, TX; PTLI, Pittsfield, MA; Draka, North Dighton, MA		
Test Procedure	Test Laboratory		
Determination of the result includes consideration of measurement uncertainty from the test equipment and			
The following tests were performed:			
Test Description			
Tests conducted on finished cable	UL 1309/CSA C22.2 No. 245		IEEE 1580-2001
Flammability	4.3.4		5.17.5
Ease of Stripping	4.3.5		5.17.6
Salt Water Immersion	4.3.6		5.17.7
Oil Immersion	4.3.7		5.17.8
Pull-Through Metal Plates	4.3.8		5.17.9
Bending Endurance	4.3.9		5.17.10
Cold Bend Test	4.3.1		5.17.11
Cold Impact Test	4.3.2		5.17.12
Tests conducted on jacket material			
Jacket Type	Type CPE		Type CPE
Physical Requirements - Unaged	Table 5		Table 16
Physical Requirements - Air Oven Aged	Table 5		Table 16
Physical Requirements - Oil Immersion Aged	Table 5		Table 16
Physical Requirements - Weatherometer Aged	4.3.3		Table 16
Mechanical Water Absorption	NA		Table 16
Tear Resistance	NA		Table 16
Test on Bunched Wires and Cables	NA		IEC 60332-3-22

Results of the tests indicate the specimens conform the applicable test criteria.

8.1 Signatures			
A representative sample of the product covered by this report has been evaluated and found to comply with the applicable requirements of the standards indicated in Section 1.0			
Completed by:	Marilyn Jump	Reviewed by:	Chuck Barlow
Title:	Associate Engineer	Title:	Engineering Reviewer
Signature:		Signature:	

9.0 Correlation Page For Multiple Listings

The following products, which are identical to those identified in this report except for model number and Listee name, are authorized to bear the ETL label under provisions of the Intertek Multiple Listing Program.

BASIC LISTEE	Draka Cableteq USA
Address	22 Joseph E. Warner Blvd. North Dighton, MA 02764
Country	USA
Product	Marine Shipboard Cable for Use on Shipboard and Fixed or Floating Platforms

MULTIPLE LISTEE 1	NONE	
Address		
Country		
Brand Name		
ASSOCIATED MANUFACTURER		
Address		
Country		
ASSOCIATED MANUFACTURER		
Address		
Country		
ASSOCIATED MANUFACTURER		
Address		
Country		
ASSOCIATED MANUFACTURER		
Address		
Country		
MULTIPLE LISTEE 1 MODELS		BASIC LISTEE MODELS

10.0 General Information

The Applicant and Manufacturer have agreed to produce, test and label ETL Listed products in accordance with the requirements of this Report. The Manufacturer has also agreed to notify Intertek and to request authorization prior to using alternate parts, components or materials.

COMPONENTS

Components used shall be those itemized in this Intertek report covering the product, including any amendments and/or revisions.

LISTING MARK

The ETL Listing mark applied to the products shall either be separable in form, such as labels purchased from Intertek, or on a product nameplate or other media only as specifically authorized by Intertek. Use of the mark is subject to the control of Intertek.

MANUFACTURING AND PRODUCTION TESTS

Manufacturing and Production Tests shall be performed as required in this Report.

FOLLOW-UP SERVICE

Periodic unannounced audits of the manufacturing facility shall be scheduled by Intertek. An audit report shall be issued after each visit. Special attention will be given to the following:

1. Conformance of the manufactured product to the descriptions in this Report.
2. Conformance of the use of the ETL mark with the requirements of this Report and the Certification Agreement.
3. Manufacturing changes.
4. Performance of specified Manufacturing and Production Tests.

In the event that the Intertek representative identifies non-conformance(s) to any provision of this Report, the Applicant shall take one or more of the following actions:

1. Correct the non-conformance.
2. Remove the ETL Mark from non-conforming product.
3. Contact the issuing product safety evaluation center for instructions.

10.0 Follow-up Services Sample(s)

In accordance with Intertek Follow-up Services, a minimum length of cable of one of the products covered in this listing report, as determined by the formula below, shall be submitted on a frequency of one (1) sample per twelve (12) months for the following tests.

Flame Test in accordance with Section 5.17.5 of IEEE STD 1580-2001

Flame Testing is performed to UL 1685 - FT4/IEEE 1202 Flame Test

Minimum sample length in feet is determined using one of the following tables:

Cables less than 13 mm (0.5 inch) in diameter		
Cable diameter, mm (inch)		Minimum sample length (feet)
From	But less than	
	3 (0.12)	2000
3 (0.12)	5 (0.20)	1500
5 (0.20)	6 (0.24)	750
6 (0.24)	9 (0.35)	250
9 (0.35)	11 (0.43)	200
11 (0.43)	13 (0.51)	200

Cables less than 13 mm (0.5 inch) in diameter		
Cable diameter, mm (inch)		Minimum sample length (feet)
From	But less than	
13 (0.51)	15 (0.59)	100
15 (0.59)	19 (0.75)	75
19 (0.75)	21 (0.83)	75
21 (0.83)	26 (1.0)	50
26 (1.0)	28 (1.1)	50
28 (1.1)	39 (1.5)	50
39 (1.5)	52 (2.0)	40
52 (2.0)	73 (2.9)	30
73 (2.9)	120 (4.7)	20

For flat cable the diameter is to be an equivalent diameter calculated using the following formula:
 $D = 1.1284 \times (TW)^{1/2}$

Where: D is the calculated cable diameter
 T is the length of the minor axis of the cable
 W is the length of the major axis of the cable

The sample should be sent to Intertek at the following address:

Required Information and Mailing Address:

A completed sample submittal sheet (Last Page of this report) along with a copy of the "Construction Detail" page of this report with specific compounds identified shall be attached to the selected sample and sent to Intertek, Elmendorf, TX

Intertek
16015 Shady Falls Road
Elmendorf, TX 78112
Attn: Les Hopkins

10.0 Follow-up Services Sample(s) (continued)

Physical Requirements of jacket material (unaged and air oven aged) in accordance with Table 17 of IEEE STD 1580-2001

Accelerated Water Absorption Test (Electrical Method) on Insulation in accordance with Table 13 of IEEE STD 1580-2001. This test is to be performed once every three years.

50 feet (15 meters) of sample along with a completed sample submittal sheet (Last Page of this report) and a copy of the "Construction Detail" page of this report with specific compounds identified shall be attached to the selected sample and sent to Intertek, Cortland, NY, ATTN: Wire & Cable Group

**Intertek
3933 US Route 11
Cortland, NY 13045
Attn: Wire & Cable Group**

10.1 Evaluation of Unlisted Components

Because Unlisted Components are uncontrolled, and they do not fall under a third party follow up program, Intertek may require these components to be tested and/or evaluated at least once annually, more often for certain components, as part of the independent certification process. The Unlisted Components in Section 5.0 require testing and/or evaluation as indicated.

Note to Intertek Follow Up Inspector: The Component Evaluation Center, CEC, will notify you in writing when these components must be selected and sent to the CEC for re-evaluation

Ship the samples to:
Intertek
Component Evaluation Center
13200 Levan Road
Livonia, MI 4850
USA

Sample Disposition: Due to the destructive nature of the testing, all samples will be discarded at the conclusion of testing unless, the manufacturer specifically requests the return of the samples. The request for return must accompany the initial component shipment.

11.0 Manufacturing and Production Tests

The manufacturer agrees to conduct the following Routine Tests (RT) on each unit as specified in Table 6 of IEEE STD 1580-2001

11.1 High Voltage Test

(IEEE STD 1580-2001 Section)

Each finished reel of cable shall be tested and successfully withstand for a period of five minutes the high-voltage ac test potential given in table 19 of IEEE 1580. The ac potential shall be applied between the conductors and ground for five minutes. Dielectric breakdown shall be detected by measuring the current leakage through the insulation.

	AC Test Potential (V)					
	0-300V	301-600/ 1000V	1001-2000V		2001-5000V	
Conductor AWG or circular mil						
22 - 19	1.5	1.5				
18 - 15	1.5	1.5				
14 - 9		3.5	5.5			
8 - 2		5.5	7.0		13.0	
1 - 4/0		7.0	8.0		13.0	
2500 000 - 525 000		8.0	9.5		13.0	
525 001 and larger		10.0	11.5		13.0	
Shielded cables rated:	5000V	8000V	15000V	25000V	28000V	35000V
8	13.0					
6 - 2	13.0	18.0	27.0			
1	13.0	18.0	27.0	38.0	42.0	
1/0 and larger	13.0	18.0	27.0	38.0	42.0	49.0

11.2 Conductor Resistance

IEEE STD 1580-2001, Section 5.17.3

Conductor resistance should be measured on finished cable in accordance with the procedures outlined in UL 1581, Section 220, and corrected to 20°C or 25°C. Maximum resistance values should be in accordance with Tables 10 or 11 of IEEE STD 1580-2001.

11.3 Insulation Resistance

IEEE STD 1580-2001, Section 5.17.4

Each reel of finished cable should have an insulation resistance measured between each conductor and ground (metallic sheath, metallic shield, metallic armor or water).

For single conductor cables rated 0-2000V manufactured without shield or armor, the insulation resistance test is not required when spark tested according to the spark test requirements of UL 1581, Section 900, with the values of Table 20 of IEEE STD 1580-2001.

Compliance with the insulation resistance test is determined in accordance with the method described in subclause 4.28.2 of CSA C22.2 No. 03 or UL 1581. The insulation resistance constant *K* for a test at 15.6°C is obtained in Table 12, 13 or 14 of IEEE STD 1580-2001 for the specific insulation under test.

11.4 Additional Production Sample Tests (PST)

The manufacturer agrees to conduct the following Production Sample Tests (PST) as specified in Table 6 of IEEE 1580-2001, at a frequency as specified in Section 6 of the applicable NEMA specification.

Test	IEEE STD 1580-2001 Section
Insulation	Tables 12, 13, 14 or 15
Jacket	Tables 16, 17 or 18
High Voltage	Section 5.17.1
Flammability	Section 5.17.5
Ease of Stripping	Section 5.17.6

11.5 TEST EQUIPMENT

All equipment used for production line testing must be calibrated annually, and the calibration must be traceable to NIST or the applicable national organization relevant to the country where the inspection is conducted.

