



NORTON CORROSION LIMITED

MATERIAL SUBMITTALS

CATHODIC PROTECTION SYSTEM CONTAINMENT WALL ANACORTES, WASHINGTON

Prepared for: Pacific Pile & Marine
Attention: Greg Anderes
grega@pacificpile.com

October 2009
NCL File No. C-19854-M

CORROSION CONTROL SPECIALISTS SINCE 1959

8820 222nd Street SE
Woodinville, WA 98077

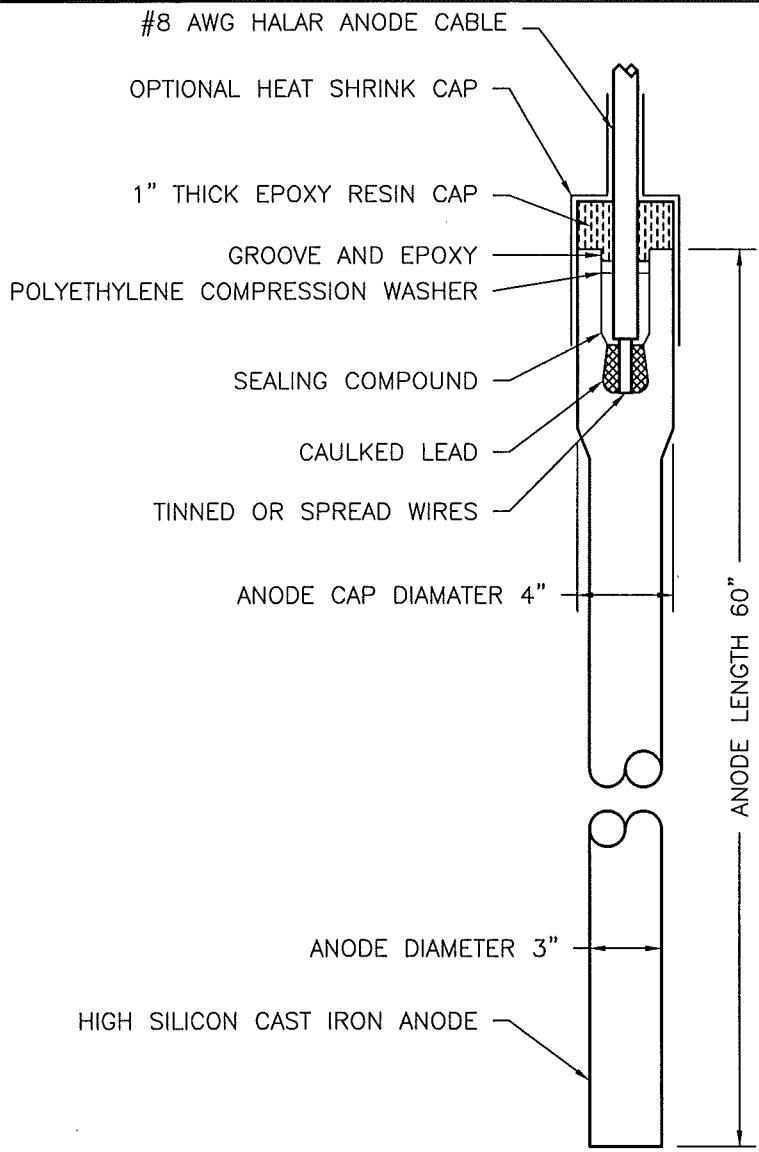
1-800-426-3111

Phone: 425-483-1616
Fax: 425-485-1754

**CATHODIC PROTECTION SYSTEM
CONTAINMENT WALL
ANACORTES, WASHINGTON**

INDEX

	<u>Product</u>	<u>Manufacturer</u>
1.0	ANODE	Anotec Co. 3" x 60" HSCI w/#8 Halar
2.0	COKE BREEZE	Loresco SC-3
3.0	WIRE	#2 HMW/PE (Anode Header) #8 Halar (Anode Leads) #10 & #1 RHW (Bond Wire)
4.0	WIRE CONNECTORS	Burndy YC2C4 Copper Crimps
5.0	SPLICE KITS	Raychem ASE Splice Kit
6.0	HALF-CELLS	Borin CuSO ₄ Reference Cell
7.0	IR FREE SENSOR	Norton Corrosion Limited IR Free Steel Coupons
8.0	TEST STATIONS	Christy Vault Type G3 NCL Manf. Dwg No 2/CP2
10.0	WARNING TAPE	Terra Tape 3" Wide Warning Tape
11.0	THERMITE WELD	Erico Type VS Connection
12.0	PROTECTIVE COATING	Carboline A-788 Splash Zone Mastic



Y:\BLOCKS\anodes\A-10520-01.r00.DWG, 10/14/2009 4:00:11 PM

NCL
Norton
Corrosion
Limited
 Woodinville, WA
 (800) 426-3111
 www.nortoncorrosion.com

CAST IRON ANODE

NCL JOB#:

Drawing #:
 Designed By:
 Drawn By:
 Approved By:
 Date Drawn:
 Revision #:
 Date Revised:

A-10520-01
 R.G.
 R.H.
 D.D.
 26APR2006
 0



Kris-Tech Wire Co.

921 Seneca St. • PO Box 4377 • Rome, NY 13442-4377 USA
Telephone 315-339-5268 • Fax 315-339-5277
WWW.KRISTECHWIRE.COM

1.0 Scope: This specification describes single conductor cathodic protection cable. It is used for direct earth burial DC feeder cable for cathodic protection systems, storage tanks, pipelines, wells, ocean vessels, and metallic structures buried or water submerged.

2.0 Applicable Standards:

- 2.1 ASTM B-1 and B-8 for soft drawn annealed copper conductors
- 2.2 ASTM D-1248, NEMA WC-5, ICEA S-61-402 for High Molecularweight Polyethylene (HMWPE)

3.0 Conductors: The single copper conductors shall be solid or stranded annealed or hard uncoated copper per UL83 and ASTM requirements.

4.0 Insulation: The conductor shall be insulated with black, sunlight resistant polyethylene complying with the physical and electrical properties per ASTM D-1248, Type I, Grades E1-E5, J1 and J3. Types II, III, and IV are available on request. The insulation shall be concentrically applied and the minimum at any point shall not be less than 90% of the specified average thickness. Rated at 75°C, 600 volts.

5.0 Identification: The wire shall be identified by surface marking indicating the manufacturer and AWG size.

6.0 Packaging: Long length bulk reels are standard. Custom lengths are available by request.

7.0 Tests: The wire shall be tested in accordance with the requirements of ASTM B-3, B-8, and D-1248. All wire will be spark tested at 7500 VAC.

AWG	Standard Number of Strands	Insulation Thickness	Nominal Overall Diameter – Inches (standard strands)	Approx. Shipping Weight (Lbs./Mft.)	Nominal DC Resistance OHM/1000 ft. @ 20°C
14	7	.110	.29	38	2.624
12	7	.110	.31	48	1.650
10	7	.110	.34	62	1.038
8	7	.110	.37	87	0.653
6	7	.110	.40	122	0.411
4	7	.110	.45	175	0.258
2	7	.110	.51	260	0.162
1	19	.125	.58	330	0.129
1/0	19	.125	.62	405	0.102
2/0	19	.125	.66	495	0.081

Custom construction, packaging, and colors available by quotation.




Specification: HALAR 2065 CPC
Issue Date: 08/29/07
Supersedes: 06/12/07

Kris-Tech Wire Co.

921 Seneca St. • PO Box 4377 • Rome, NY 13442-4377 USA
Telephone 315-339-5268 • Fax 315-339-5277
WWW.KRISTECHWIRE.COM

- 1.0 Scope:** This specification describes single conductor cathodic protection cable. The Halar (ECTFE) insulated, Polyethylene (HMWPE) jacketed product is designed to withstand corrosive gases and brackish water conditions. It is used for direct earth burial DC feeder cable for cathodic protection systems, tanks, pipelines, wells, ocean vessels, and metal structures buried or water submerged.
- 2.0 Applicable Standards:**
2.1 ASTM B-1 and B-8 for soft drawn annealed copper conductors.
2.2 ASTM D1248, D-638, D-792, D-257, NEMA WC-5, ICEA S-61-402 for HMWPE.
- 3.0 Conductors:** The single copper conductors shall be solid or stranded annealed or hard uncoated copper per UL83 and ASTM requirements.
- 4.0 Insulation/Jacket:** The conductor shall be insulated with a homogeneous layer of ECTFE and jacketed with black, sunlight resistant high molecular weight polyethylene (HMWPE) complying with the physical and electrical properties per ASTM D-1248, Type I, Grades E1-E5, J1 and J3. Types II, III, and IV are available. The insulation and jacket shall be concentrically applied and the minimum at any point shall not be less than 90% of the specified average thickness. Rated at 75°C, 600 volts.
- 5.0 Identification:** The wire may be identified by surface marking the manufacturer and AWG size.
- 6.0 Packaging:** Long length bulk reels are standard. Custom lengths are available by request.
- 7.0 Tests:** The wire shall be tested in accordance with the requirements of ASTM B-3, B-8, and D-1248. All wire will be spark tested at 7500 VAC.



AWG	Standard Number of Strands	Insulation Thickness (inches)	Jacket Thickness (inches)	Nominal Overall Diameter (inches)	Approx. Shipping Weight (Lbs./Mft.)	Nominal DC Resistance OHM/1000 ft. @ 20°C
14	7	0.020	0.065	0.24	-	2.624
12	7	0.020	0.065	0.26	-	1.650
10	7	0.020	0.065	0.28	-	1.038
8	7	0.020	0.065	0.32	98	0.653
6	7	0.020	0.065	0.35	115	0.411
4	7	0.020	0.065	0.42	167	0.258
2	7	0.020	0.065	0.46	251	0.162
1	19	0.020	0.065	0.50	311	0.129
1/0	19	0.020	0.065	0.59	373	0.102

Custom construction, packaging, and colors available by quotation.

ROME USE-2 or RHW-2 or RHH Rome-XLPE Insulation, 600 Volts

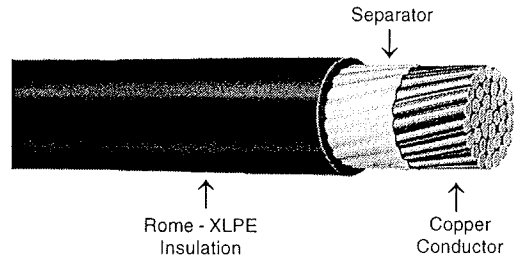
APPLICATION:

For lighting and power applications in accordance with the National Electrical Code and for other general purpose wiring applications. Suitable for use in circuits not exceeding 600 volts at conductor temperatures not exceeding 90°C in wet or dry locations. May be installed in raceway, duct, direct burial and aerial installations.

STANDARDS:

1. Listed by UL as Type USE-2 (90°C wet or dry) per Standard 854 for Service Entrance Cables.
2. Listed by UL as Types RHW-2 (90°C wet or dry) or RHH (90°C dry) per Standard 44.
3. Conforms to ICEA S-95-658/NEMA WC70, utilizing Column A insulation thicknesses.
4. Conforms to Federal Specification CID A-A-59544.

CONSTRUCTION: Annealed copper conductor, Rome-XLPE thermosetting chemically crosslinked polyethylene insulation, surface printed.



Size AWG or kcmil	No. of Strands	Insulation Thickness Mils	Nom. Diam. Inches	Copper				Stock Items
				Ampacity		Approx. Wt. lb./1000 Ft.		
				90°C * USE-2 RHW-2 RHH	75°C ** USE RHW	Net	Shipping	
Solid								
14	Solid	45	.16	25 ^t	20 ^t	21	24	-
12	Solid	45	.18	30 ^t	25 ^t	30	33	S
10	Solid	45	.20	40 ^t	35 ^t	43	46	S
8	Solid	60	.25	55	50	68	73	-
Stranded								
14	7	45	.17	25 ^t	20 ^t	23	25	-
12	7	45	.19	30 ^t	25 ^t	32	33	S
10	7	45	.21	40 ^t	35 ^t	45	49	S
8	7	60	.27	55	50	72	79	S
6	7	60	.31	75	65	105	115	S
4	7	60	.36	95	85	155	175	S
2	7	60	.41	130	115	234	255	S
1	19	80	.49	150	130	305	330	S
1/0	19	80	.53	170	150	380	405	S
2/0	19	80	.58	195	175	470	495	S
3/0	19	80	.63	225	200	580	615	S
4/0	19	80	.68	260	230	725	765	S
250	37	95	.76	290	255	865	925	S
300	37	95	.81	320	285	1025	1090	-
350	37	95	.86	350	310	1190	1250	S
400	37	95	.91	380	335	1345	1410	-
500	37	95	.99	430	380	1665	1760	S
600	61	110	1.10	475	420	2020	2110	-
750	61	110	1.20	535	475	2500	2600	S
1000	61	110	1.35	615	545	3225	3420	-
1250	91	125	1.51	665	590	4130	4310	-
1500	91	125	1.63	705	625	4930	5110	-
1750	127	125	1.74	735	650	5720	5990	-
2000	127	125	1.85	750	665	6510	6910	-

*AMPACITY in accordance with NEC for not more than three conductors. As RHW-2: in raceway, 90°C conductor temperature and 30°C ambient in wet or dry locations. As RHH: in raceway, 90°C conductor temperature and 30°C ambient in dry locations. As USE-2: direct burial, 90°C conductor temperature and 30°C ambient in wet locations.

**AMPACITY in accordance with NEC for not more than three conductors. As RHW: in raceway, 75°C conductor temperature and 30°C ambient in wet or dry locations. As USE: direct burial, 75°C conductor temperature and 30°C ambient in wet locations.

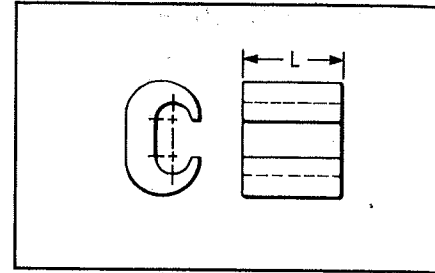
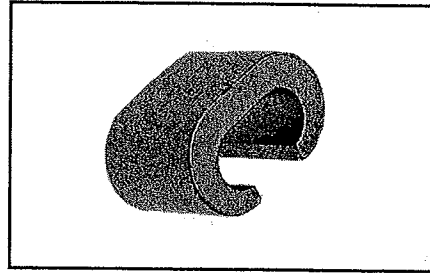
^t The overcurrent protection shall not exceed 15 amperes for 14 AWG, 20 amperes for 12 AWG and 30 amperes for 10 AWG.

YC-C

COPPER CRIMPIT™

Line Tap for Range of Copper

Range-taking compression tap connector made of pure copper. Designed to be gripped in the jaws or dies of installation tool, then slipped directly over line for easy installation. Also used for deadending.



Copperweld-Copper Conductors

- 8A - Use CRIMPITS™ accommodating 6 str. Copper
- 6A - Use CRIMPITS™ accommodating 4 Str. Copper
- 4A - Use CRIMPITS™ accommodating 2 Str. Copper
- 2A - Use CRIMPITS™ accommodating 1/0 & 2/0 Copper

E-18



CATALOG NUMBER	RUN	TAP	L	DIE INDEX	TOOLS, DIE SET CATALOG NO., & (NUMBER OF CRIMPS)			CRIMPIT™ FOR 1 STR. COPPER	
					MD7, MD6	OUR840	Y35, Y750, Y45†, Y46‡	RUN	TAP
YC10C10*	12 Sol. - 10 Str.	12 Sol. - 10 Str.	3/8	238	W238 (1)	W238 (1)	U238 (1)		
YC8C8	8 Sol. - 8 Str.	10 Sol. - 8 Str.	1/2	162 or K	W 162 (2)	W162 (2)	U162** (1)		
YC4C8	6 Sol. - 4 Str.	8 Sol. - 8 Str.	5/8	BG or 5/8	BG (2) W-BG** (1)	CXBG (2)	U-BG (1)	-	-
YC4C6		6 Sol. - 6 Str.							
YC4C4		4 Sol. - 4 Str.							
YC2C4	2 Sol. - 2 Str.	8 Sol. - 4 Str.	3/4	C	W-C (2)	-	U-C (1)	1 Str.	6.8 Str., 8 Sol.
YC2C2	2 Sol. - 2 Str.	2 Sol. - 2 Str.						-	-
YC26C2	1/0 Sol. - 2/0 Str.	8 Sol. - 2 Str.	7/8	E or O	-	-	U-E (3) U-O (1)	1 Str.	1 or 2 Str.
YC26C26		1/0 Sol. - 2/0 Str.							
YC28C2	3/0 Sol. - 4/0 Str.	6 Sol. - 2 Str.	1-1/16	F or D3	-	-	U-F (3) U-D3 ** (1)	-	-
YC28C26		1/0 Sol. - 2/0 Str.							
YC28C28		3/0 Sol. - 4/0 Str.							

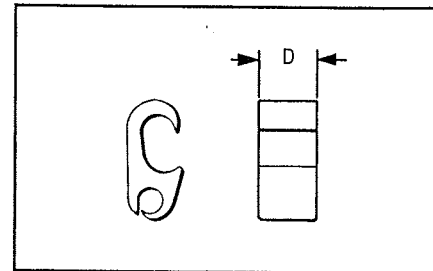
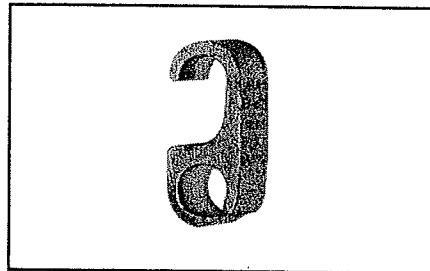
** Multiple crimp die set. Makes more than one crimp per tool compression. Figure () indicates number of compressions.
 † U Die with adapter PT-6515.
 ‡ U Die with adapter PUADP-1.
 * Not UL listed.

TYPE YP-C

COPPER CRIMPIT™

Line Tap for Extra Wide Range of Copper

Figure "6" -shaped, wide range-taking copper, compression tap connector for primary service taps and secondary service drops. Connector can be gripped in tool and slipped over the line for easy installation.



CATALOG NUMBER	D	RUN	TAP	DIE INDEX	TOOLS, DIE SET CATALOG NO., & (NUMBER OF CRIMPS)
YP2C2	.75	6 Sol. - 2 Str.	6 Sol. - 2 Str.	0	U-O (1)
YP28C28	1.00	2/0 Str. - 4/0 Str.	2/0 Str. - 4/0 Str.	D≥	U-D3 (1)
YP29C26	.75	1/0 Str. - 250	4 Sol. - 2/0 Str.		

† U Die with adapter PT-6515.
 ‡ U Die with adapter PUADP-1.

The Raychem Anode Splice Encapsulation Kit is a heat-shrinkable sleeve internally coated with self-encapsulating adhesive that enables it to completely insulate and seal such connectors as the standard split bolt and compression connector.

The ASE is designed specifically for protecting anode splice connections of HMWPE, HDPE, and Raychem Permarad® cables used in impressed current cathodic protection systems.

Insulated and sealed in minutes

Simplicity of design enables rapid and reliable installation. A single splice encapsulation kit covers many cable sizes while eliminating time-consuming taping as well as compound mixing and curing. The kits can be installed in approximately three minutes at temperatures as low as -40°F (-40°C).

ASE splice encapsulations can be direct-buried immediately after installation. The completed encapsulation is mechanically strong, electrically insulated, and sealed from moisture and contamination.

Material properties

The dielectric strength of ASE splices has a typical value of 300 volts/mil (min) @ .050" using ASTM D149 test method; the volume resistivity is 1×10^{13} ohm cm min. ASTM D257; cold impact -55°C , "no breaking," ASTM D746, and water absorption (24 hr @ 25°C), .5% max, ASTM D570.

The ASE splices are designed and tested to ANSI C119.1. Ask for our test report 609-1.



General information

ASE

(length 7 $\frac{3}{4}$ inches)

Compression connectors:

Die index, C, D, O; Wire range, Main 6-4/0 AWG, Tap 14-4/0 AWG. Max. connector length 3.25 inches.

Standard split bolt:

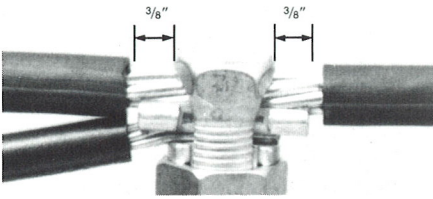
Wire range, Main 6-2 AWG, Tap 14-2 AWG. Max. connector length 1.5 inches.

Materials in kit

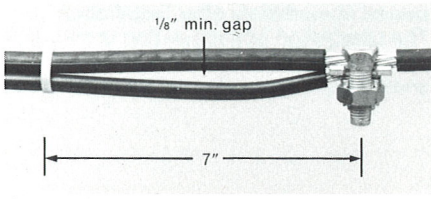
1 Heat-shrinkable wrap-sleeve
1 Insulation strip or black insulation tape
2 Tie wrap
1 Closure channel

Installation instructions

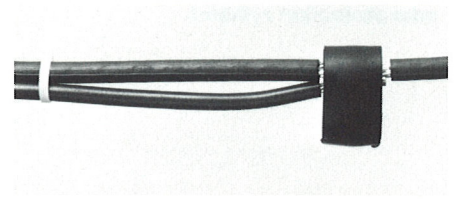
A. Prepare cable



1. Install connector. **Note** maximum length of stripped wire leads. Wipe off excess contact compound.

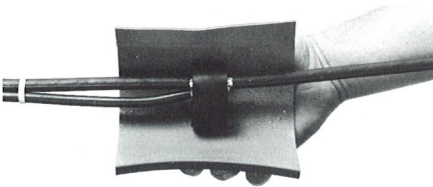


2. Position tie wrap(s) as shown. Two are required for "H" connections. **Note** $\frac{1}{8}$ inch gap produced for adhesive encapsulation.



3. Wrap insulation strip or tape centered on connection. If required, heat strip end slightly to tack in place.

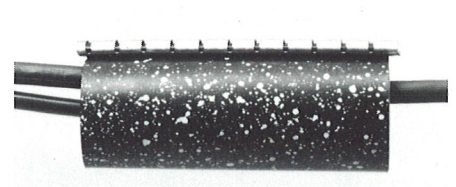
B. Position sleeve



1. Position sleeve closure over main cable run.

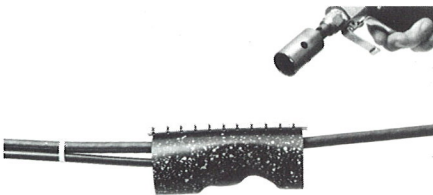


2. Slide channel onto sleeve rails.

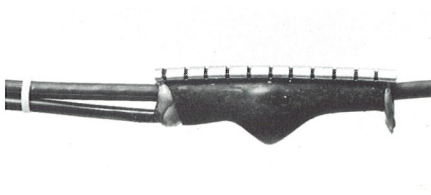


3. Channel ends should extend evenly beyond ends of sleeve.

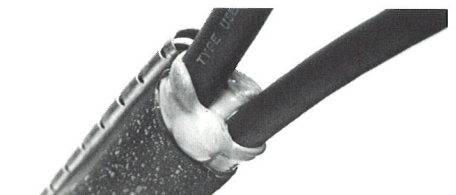
C. Heat-shrink assembly



1. Using yellow tip of torch* flame, apply heat in a uniform back and forth motion, giving special emphasis to rail/channel area.



2. Apply heat until all indicator paint changes color. Adhesive will extrude from sleeve ends.



3. A few minutes cooling may be required for complete encapsulation to occur between cables.

All products sold in multiples of standard packaging.
*Note: Raychem FH 2616A1 torch is recommended.

The information given herein, including drawings, illustrations and schematics which are intended for illustration purposes only, is believed to be reliable. However, Raychem makes no warranties as to its accuracy or completeness and disclaims any liability in connection with its use. Raychem's obligations shall be only as set forth in Raychem's Standard Terms and Conditions of Sale for this product and in no case will Raychem be liable for any incidental, indirect or consequential damages arising out of the sale, resale, use or misuse of the product. Users of Raychem products should make their own evaluation to determine the suitability of each such product for the specific application.

Raychem Corporation

300 Constitution Drive
Menlo Park, CA 94025-1164
Tel (800) 241-1929
Fax (650) 361-5502

Belgium

Raychem NV
Diestsesteenweg 692
3010 Kessel-Lo
Tel (32) 16 351 231
Fax (32) 16 351 694

Argentina

Tel (54) 1/394-5150
Fax (54) 1/326-9985

India

Tel (91) 11 332-9861
Fax (91) 11 335-4250

Korea

Tel (82) 2/557-7752
Fax (85) 2/553-6615

Mexico

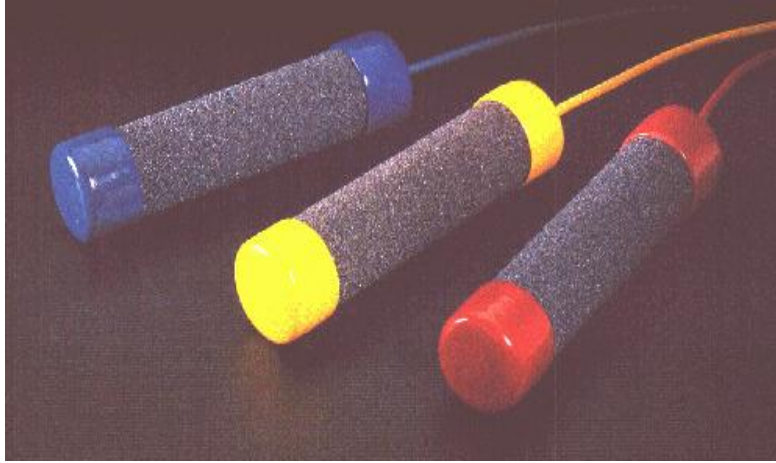
Tel (525) 260-8896
Fax (525) 260-3310

Singapore

Tel (65) 278-0001
Fax (65) 278-9502

STELTH²

*Stationary Reference Electrodes
for Underground and Concrete Service*



NEW! Moisture Retention Membrane - MRM™

Features:

*Minimum 20 year service life.
8 square inches of sensing surface area
gives you 5-8 times more surface area
than other electrodes. This makes
electrode positioning less critical to
achieve accurate readings.
Will not dry out in desert dry soil, a
condition that renders other electrodes
ineffective. Cyclical variations in soil conditions,
ranging from hydrated to dehydrated, have no
adverse effect on the Stelth2 electrode.
Electrodes may be taken out of service for
extended periods of time and reintroduced
into the system without affecting electrode
accuracy or ability to reactivate. (Electrode
will fire up in under 5 minutes.)*

*New! Now two levels of chloride ion trapping
technologies are used in the "Stelth 2".*

First *We impregnate a trapping
material into
the ceramic sensing tube that traps
chloride
ions before they reach the chemistry of the
"Stelth 2" (patent pending).*

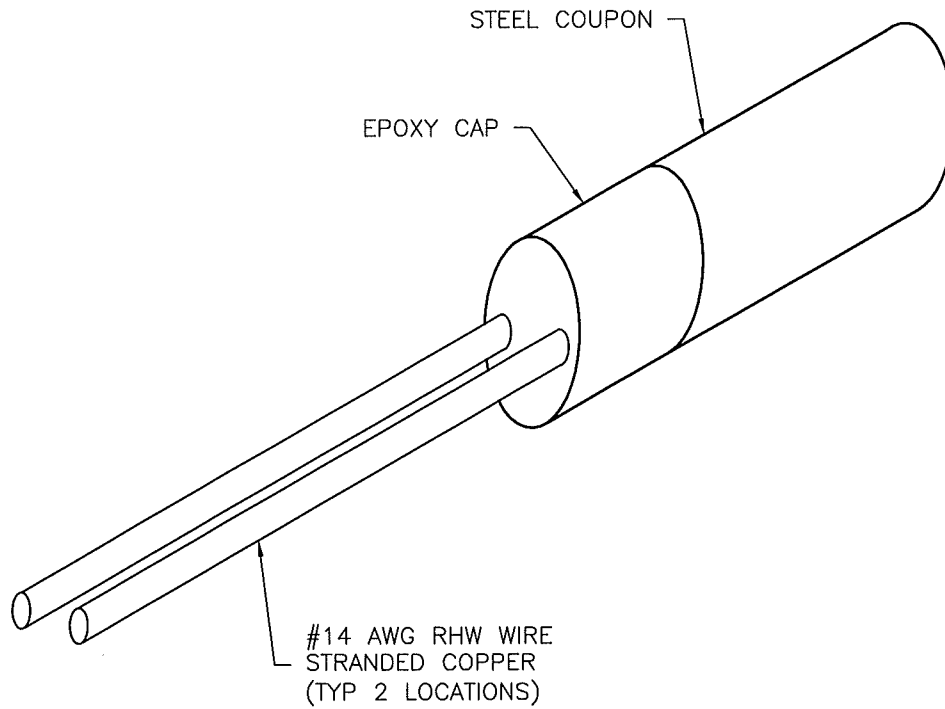
Second *We employ a chloride ion
trapping
system that removes chloride ions that
penetrate the CuSO₄ chemistry of the
"Stelth 2"
before these ions can cause damage.
Both of these systems have given us an
additional benefit of lowering the
internal
resistance of the "Stelth 2" reference
electrode.*

Note *Chlorides at levels of only 200*

*Stelth2 Model SRE-007-CUY
Copper-Copper Sulfate (Cu-CuSO₄) for Underground and Concrete Service.*



*Size:
1.5 (3.81cm) diameter x 6" (15.24cm)
long
"space age" ceramic tube with yellow
protective caps.
Lead Wire:
50' (15.24cm) of #14 RHH-RHW yellow
wire.
Stability:
+/- 10 millivolts with 3.0 microamps load.
Temperature Range:
+32 to +135 F (0 to +57.2 C)*



Y:\Sensors\009187-01.r00.dwg, 10/14/2009 12:04:13 PM



**Norton
Corrosion
Limited**

Woodinville, WA
(800) 426-3111

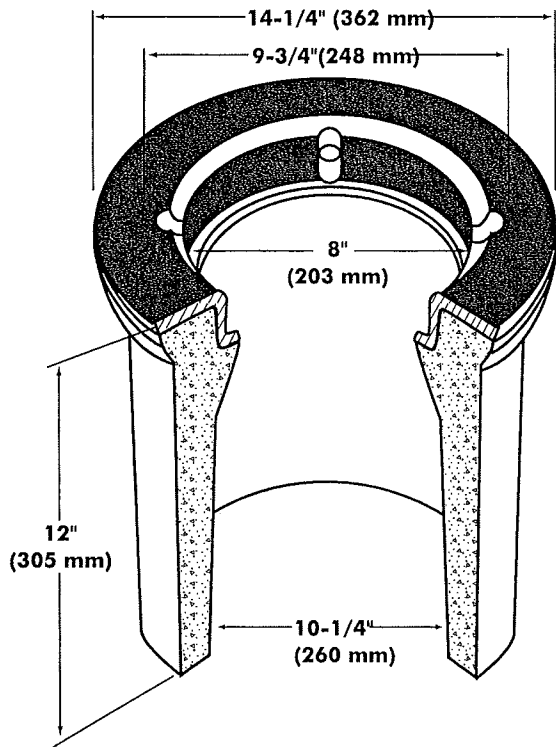
www.nortoncorrosion.com

I.R. FREE SENSOR
ASSEMBLY

NCL JOB#:

Drawing #:
Designed By:
Drawn By:
Approved By:
Date Drawn:
Revision #:
Date Revised:

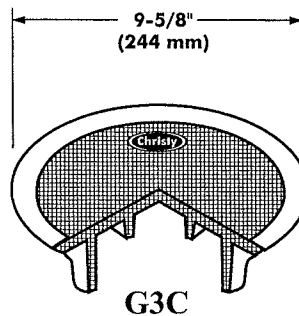
A-009187-01
J.K.
R.H.
D.D.
18SEP2007
0



High density reinforced concrete box with cast iron ring for heavy traffic areas.

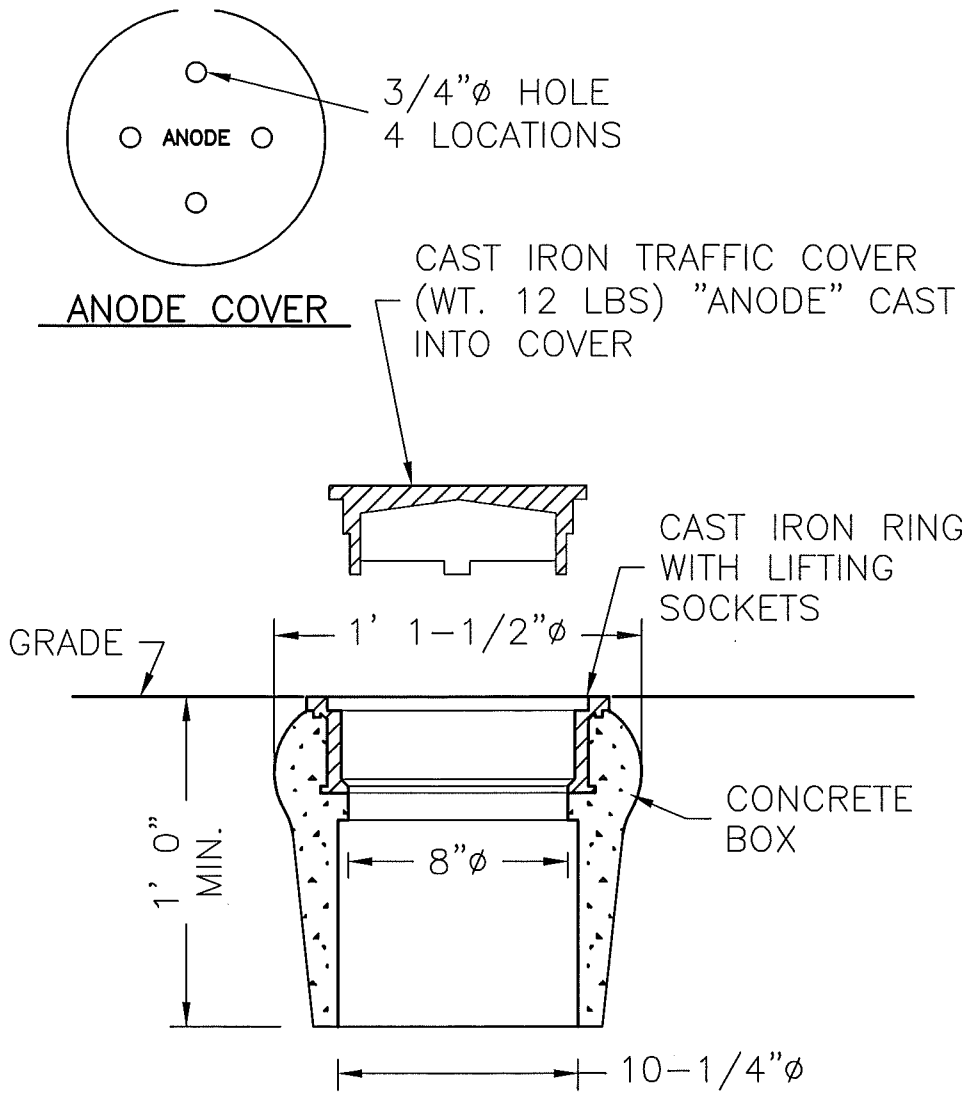
Engineered and designed to be interchangeable with Brooks 3RT.

Vandal resistance is optional at extra cost by the addition of hold down bolts.



Christy Ordering Code	Item	Approx. Shipping Weight	Description
G3BOX	Box	71	G3 Traffic Valve Box (10-1/4" I.D. x 12" high) Interchangeable with Brooks 3RT Box - 36 per pallet
G3C	Lid	14	Cast iron
G5X12	Extension	32	12" reinforced concrete - 32 per pallet
G5XP8	Extension	1	ADS 8" plastic
G5XP12	Extension	1	ADS 12" plastic
F8XP18	Extension	2	ADS 18" plastic
F14XP120	Extension	12	ADS 10' length plastic

TO FIND CENTIMETERS MULTIPLY INCHES BY 2.5 • TO FIND KILOGRAMS MULTIPLY POUNDS BY .45



NOTES:

1. COAT CONCRETE BOX AND LID WITH PROTECTIVE COATING.

ANODE TEST STATION DETAIL

MARKING TAPE

TERRA TAPE® STANDARD SPECIFICATIONS

- Terra Tape® Standard is a pigmented polyolefin film with a printed message on one side.
- The ink used to print the material is permanent and cannot be removed by normal handling or upon underground burial.
- The material and ink are chemically inert and will not degrade when exposed to acids, alkalies and other destructive substances commonly found in soil.
- This material is available in the colors red, orange, yellow, blue, green and white. Other colors may be available upon request.

The physical test methods along with typical properties and values are listed below.

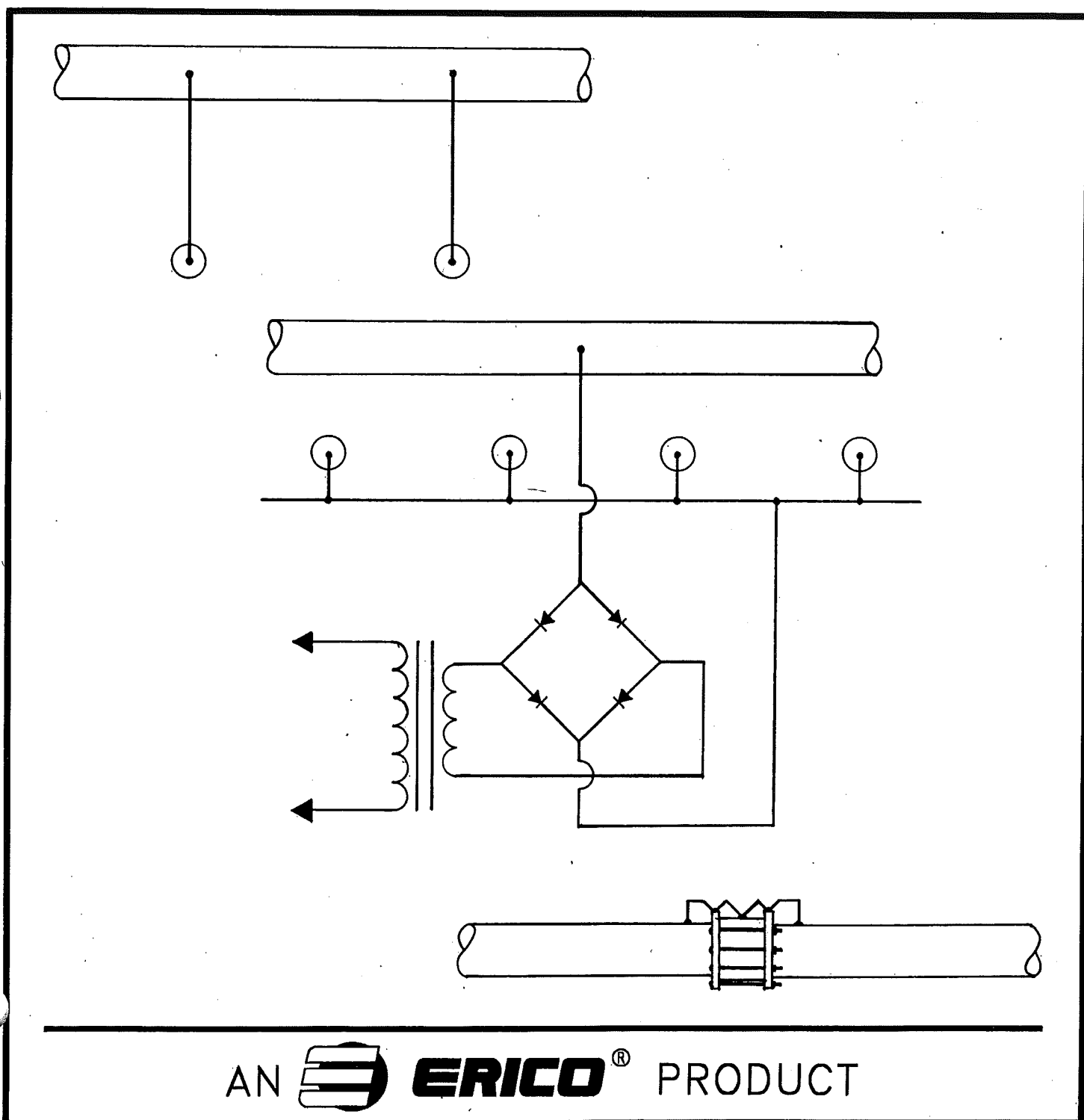
PHYSICAL PROPERTIES AND TYPICAL VALUES				
PROPERTY		ASTM TEST METHOD	US VALUE	METRIC VALUE
Standard Weight		D-751	20 lbs/1000 ft ²	9.7 kg/100m ²
Thickness		D-2103	4.0 mils	0.1 mm
3" Tensile	MD	D-882	45.0 lbf	200.2 N
	MD	"	3750 psi	25.9 Mpa
	TD	"	43.0 lbf	191.2 N
	TD	"	3580 psi	24.7 Mpa
Elongation	MD	D-882	700 %	700%
	TD	"	780 %	780%
PPT Tear	MD	D-2582	15.0 lbf	66.7 N
	TD	"	15.5 lbf	68.9 N
Tongue Tear	MD	D-1938	6.0 lbf	26.7 N
	TD	"	7.0 lbf	31.1 N
Trapezoidal Tear	MD	D-4533	9.0 lbf	40.0 N
	TD	"	8.0 lbf	35.6 N
Dart (Impact Strength)		D-1709	0.63 lbs	0.29 kg
Printability		D-2578	≥ 40 dynes	≥ 40 dynes

MD-Machine Direction
TD- Transverse Direction

TERRA TAPE®
DIVISION OF REEF INDUSTRIES, INC.

CADWELD[®]

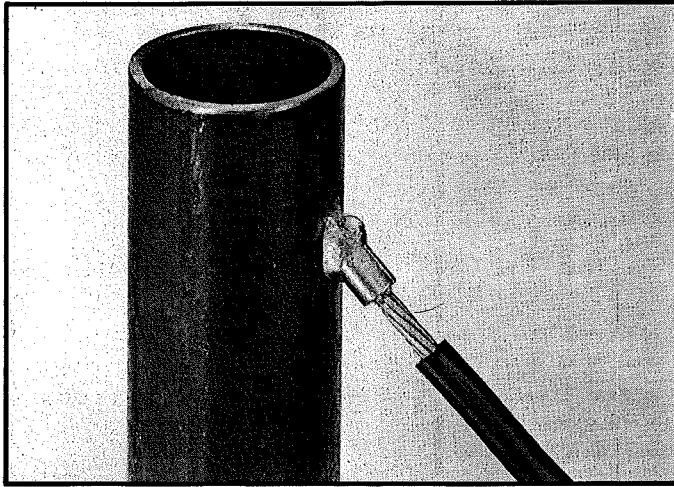
CATHODIC PROTECTION CONNECTIONS



AN  **ERICO[®]** PRODUCT

CATHODIC PROTECTION CONNECTIONS

TYPE VS CONNECTION



Tap conductor to vertical
STEEL pipe or flat surface

For DUCTILE IRON, See page 12.

Conductor Size	Surface	Welder Part No.†	Welder Price	Weld Metal
#14 to #10 Solid in sleeve CAB-133-1H #8 Solid or Stranded, #6 Solid	Flat (12" & larger pipe)	CAVST-1G	CAT	CA15
	3/4" to 3-1/2" pipe	CAVST-1GA	CAT	CA15
	4" to 10" pipe	CAVST-1GB	CAT	CA15
6 Stranded	Flat (12" & larger pipe)	CAVST-1H	CAT	CA15
	3/4" to 3-1/2" pipe	CAVST-1HA	CAT	CA15
	4" to 10" pipe	CAVST-1HB	CAT	CA15
4 Solid	Flat (12" & larger pipe)	CAVST-1K	CAT	CA25
	3/4" to 1-1/2" pipe	CAVST-1KA	CAT	CA25
	2" to 4" pipe	CAVST-1KB	CAT	CA25
	5" to 10" pipe	CAVST-1KC	CAT	CA25
4 Stranded	Flat (12" & larger pipe)	CAVST-1L	CAT	CA25
	3/4" to 1-1/2" pipe	CAVST-1LA	CAT	CA25
	2" to 4" pipe	CAVST-1LB	CAT	CA25
	5" to 10" pipe	CAVST-1LC	CAT	CA25
2 Solid	Flat (14" & larger pipe)	CAVST-1T	CAT	CA25
	1" to 1-1/2" pipe	CAVST-1TA	CAT	CA25
	2" to 4" pipe	CAVST-1TB	CAT	CA25
	5" to 12" pipe	CAVST-1TC	CAT	CA25
2 Stranded	Flat (14" & larger pipe)	CAVST-1V	CAT	CA32
	1" to 1-1/2" pipe	CAVST-1VA	CAT	CA32
	2" to 3" pipe	CAVST-1VB	CAT	CA32
	4" to 6" pipe	CAVST-1VC	CAT	CA32
	8" to 12" pipe	CAVST-1VD	CAT	CA32
1 Stranded	Flat (18" & larger pipe)	CAVSP-1Y	CAP	CA45
	1-1/2" to 2-1/2" pipe	CAVSP-1YA	CAP	CA45
	3" to 4" pipe	CAVSP-1YB	CAP	CA45
	5" to 10" pipe	CAVSP-1YC	CAP	CA45
	12" to 16" pipe	CAVSP-1YD	CAP	CA45
1/0 Stranded	Flat (18" & larger pipe)	CAVSP-2C	CAP	CA65
	2-1/2" to 4" pipe	CAVSP-2CA	CAP	CA65
	5" to 10" pipe	CAVSP-2CB	CAP	CA65
	12" to 16" pipe	CAVSP-2CC	CAP	CA65
2/0 Stranded	Flat (18" & larger pipe)	CAVSP-2G	CAP	CA65
	3" to 4" pipe	CAVSP-2GA	CAP	CA65
	5" to 10" pipe	CAVSP-2GB	CAP	CA65
	12" to 16" pipe	CAVSP-2GC	CAP	CA65

†Welder Part No. includes mold frame. If mold only (less frame) is required, order—Welder Part No.—"M".

Selection & Specification Data

Generic Type	Epoxy Polyamide
Description	Solvent-free patching compound used for repairing pits, cracks and voids in steel, concrete, wood and other surfaces. Has the unique ability to be mixed, applied and cured underwater.
Features	<ul style="list-style-type: none"> ▪ Designed for underwater and other wet applications ▪ Can be applied up to 2" in thickness ▪ Self-priming on most surfaces and over most generic types of coatings ▪ Rapid cure characteristics ▪ VOC compliant to current AIM regulations
Color	Olive Green
Finish	Flat
Primers	Self-priming
Topcoats	Epoxies, Polyurethanes if required
Dry Film Thickness	1/8"-2" (3.1-50 mm) for most applications 1/4" (6.4 mm) is practical maximum thickness for vertical and overhead applications.
Solids Content	By Volume: 99% ± 1%
Theoretical Coverage Rate	1604 ml ft ² (24.5 m ² /l at 25 microns) Allow for loss in mixing and application. Field experience has displayed a realistic coverage rate of 8 ft ² /gallon (.2 m ² /l). This figure accounts for actual losses and the fact that the product is frequently applied at higher dry film thicknesses.
VOC Values	As supplied: 0.00 lbs/gal (0 g/l) These are nominal values.
Dry Temp. Resistance	Continuous: 200°F (93°C) Non-Continuous: 250°F (121°C)

Substrates & Surface Preparation

General	Remove all oil or grease from the surface with Carboline Surface Cleaner 3 in accordance with SSPC-SP1.
	Remove all dirt, loose paint, spalling concrete, rotted wood, marine growth and other contaminants by abrasive blasting or high pressure water blasting.
	Hand or power tool cleaning methods may be used but are of limited benefit and are time consuming.
	Abrasive blasting can be done underwater as the initial air blast will clear a path through the water for the abrasive/air mixture.
	When working at the splash zone or in salt water, coat cleaned metal surfaces as soon as possible to minimize new corrosion.

September 2004 replaces April 2003

0969

To the best of our knowledge the technical data contained herein is true and accurate on the date of publication and is subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of products. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Carboline[®] and Carboguard[®] are registered trademarks of Carboline Company.

KOP-COAT® A-788

Application Equipment

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve desired results.

General Guidelines:

General Apply by hand, trowel or broad knife. Spread material smoothly onto the surface in a 1/8" to 1/4" (3.1 to 6.4 mm) thick layer using enough pressure to displace water and air bubbles. Smooth out the area by hand. When starting another mix, start spreading at and away from the previous applied film. This will help prevent trapped air bubbles or leaving an area uncoated.

If applying to dry surfaces in dry air, periodically rewet hands or tools with water to keep the product from sticking.

When used as a patch or grout, force the material into the hole or crack and smooth by hand to the thickness needed. For larger patches greater than 1/2" (12.7 mm), use a steel or fiberglass plate for added support. Apply A-788 to the substrate, then embed the support plate (cut larger than the hole) and apply A-788 overall.

When applied underwater or when wetted with water during application, the surface of A-788 will form an emulsified lighter green "scum" layer. This layer is normal and facilitates application. The film under the "scum" layer remains undisturbed and will cure properly. The "scum" layer will cure and become part of the finish when A-788 is cured above water; however, this layer will remain soft and uncured when the A-788 is kept underwater during curing.

Mixing & Thinning

Mixing Mix one Part A to one Part B by volume. Mix by hand "scooping" a quantity of the "A" component from the can and then "scoop" the same quantity of the "B" component from its can. Mix and knead the two components by hand until the yellow and black colors have combined to make a uniform olive green color. Apply this mixture immediately after mixing; no sweat-in time is required. To assist in mixing, keep the gloved hands and the materials wet with water during the mixing process.

Thinning Not recommended. Use of thinners other than those supplied or recommended by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.

Pot Life Working times at 70°F (21°C), below and above water:
Golfball size mix: 40 minutes
Baseball to Softball size mix: 30 minutes
1/2 gallon mix: 15 minutes
Working times are reduced by one-half at temperatures above 80°F (27°C).

Do not mix more material than can be applied in the working times listed. The material may still appear to be workable after the time limit is exceeded, but it will not properly adhere to the substrate after application and curing.

September 2004 replaces April 2003

To the best of our knowledge the technical data contained herein is true and accurate on the date of publication and is subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of products. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Carboline® and Carbolguard® are registered trademarks of Carboline Company.

Cleanup & Safety

Cleanup Use Thinner #2 or Acetone.

Safety Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas. Some people may be sensitive to the epoxy resins used in this material, so tight fitting rubber gloves should always be worn during the mixing process. When used for marine applications in splash zone areas, use all necessary precautions to protect the applicators. Wear wet or dry suits if necessary to help preserve body heat and use approved life jackets and safety lines. Avoid working in rough water.

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Normal	65°-75°F (18°-24°C)	60°-80°F (16°-27°C)	60°-80°F (16°-27°C)	30-70%
Minimum	50°F (10°C)	50°F (10°C)	50°F (10°C)	0%
Maximum	100°F (38°C)	110°F (43°C)	100°F (38°C)	100%

Special application techniques may be required above or below normal application conditions. Do not apply or cure in acidic or alkaline water (pH less than 6 or greater than 9) or in solutions containing solvents.

Curing Schedule

Surface Temp. & 50% Relative Humidity	Dry to Touch	Dry to Handle or Topcoat	Maximum Recoat Time
50°F (10°C)	8 Hours	36 Hours	72 Hours
60°F (16°C)	4 Hours	16 Hours	48 Hours
75°F (24°C)	2 Hours	8 Hours	24 Hours
90°F (32°C)	1 Hour	6 Hours	12 Hours

These times are based on a 1/8" (3.1 mm) dry film thickness. Higher film thicknesses or cooler temperatures will require longer cure times. If the maximum recoat times have been exceeded, the surface must be abraded by sweep blasting or sanding to produce a rough surface and to remove the "scum" layer before the application of any further coatings.

Packaging, Handling & Storage

Shipping Weight (Approximate)	1/2 Gallon Kit 10 lbs (4 kg)	2 Gallon Kit 30 lbs (13 kg)
Flash Point (Setflash)	Part A: >200°F (93°C) Part B: >200°F (93°C)	
Storage Temperature & Humidity	40° -110°F (4°-43°C)	Store indoors. 0-100% Relative Humidity
Shelf Life	Part A & B: Min. 24 months at 75°F (24°C)	

*Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.



350 Hunley Industrial Court, St. Louis, MO 63144-1599
314/644-1000 314/644-4617 (fax) www.carboline.com

An **RPM** Company