



**PERFORMANCE TESTING OF
SPIRAL WRAP AND CABLE CLIPS**

Prepared for:

Walt Ogrodnik/CEO
HazardGuard Safety Wire, Inc.
300 Hardy Dr.
Pittsburgh, PA 15241
Phone: 412-835-6312
Fax: 412-833-3016

Technical Report Number

30010071

Test Protocol

Safety Wire Protocol

April 21, 2009

Prepared by:

A handwritten signature in black ink that reads "Ryan M. Beets".

Ryan Beets, Project Technician

Approved by:

A handwritten signature in black ink that reads "L. Eddy".

Larry Eddy, Technical Team Lead



Program Description

To verify if the provided spiral wrap and cable clips perform as claimed: "When properly applied to wire, cable, or electrical cord sets, this spiral wrap will begin to change from a green color (at 106°F) to an orange color (at 111°F) when exposed to heat." The samples shall also be monitored (reverse hysteresis) as the temperature cools. As the sample cools it shall return to the original green color at the temperature referenced in the Chromicolor Temperature Range Chart for Temperature Type 41.

Executive Summary

The Spiral Wrap and Cable Clips performed as claimed (referenced in the Chromicolor Temperature Range Chart at Temperature Type 41, see attached table) when heated from 106°F to 111°F. The color gradually changed from green to orange as the temperature rose. As the temperature was lowered, the sample gradually changed color, returning to its original green shade at 95°F.

Revisions

None

The conditions observed during testing are contained in this report.



TABLE OF CONTENTS

Samples: 4



As Received State 4

Functionality Testing 4

Equipment List:..... 5

April 21, 2009

Samples:			
Manufacturer	Model/SKU	Quantity	Description
Plastic Extruded Parts, Inc	UNKNOWN	1	Spiral Wrap
HPE Plastics, Inc	UNKNOWN	1	Cable Clip



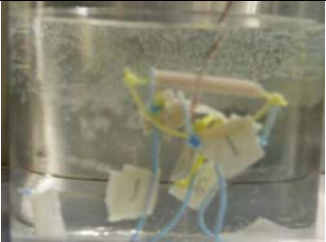
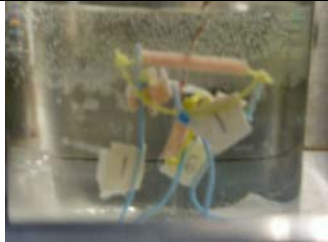

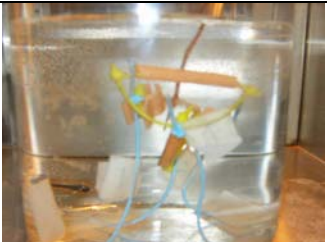

As Received State	
Standard Referenced: OnSpeX Test Method (Include Photo)	
Examine each sample for any shipping damage to packaging or product, and check for missing parts and/or accessories.	
 <p>Spiral Wrap</p>	 <p>Cable Clip</p>

Functionality Testing	
Standard Referenced: Customer Method	
Testing will be performed on spiral wrap and round clips. Record temperatures to the 10th of a degree F. Test and plot the progressive color changes of the samples as the surrounding temperature (water bath) increases (plot in 1 degree increments); the samples shall also be monitored (reverse hysteresis) as the temperature cools. Verify if product performs as intended: "When properly applied to wire, cable, or electrical cordsets, this spiral wrap will begin to change from a green color (at 106°F) to an orange color (at 111°F) when exposed to heat."	
<i>Note: the starting and end points may be more discernable, while the middle points may have an element of visual subjectivity.</i>	
Manufacturer	Results
Spiral Wrap	Meets
Cable Clip	Meets
Comments: The Spiral Wrap and Cable Clips performed as claimed (referenced in the Chromicolor Temperature Range Chart at Temperature Type 41, see attached table) when heated from 106°F to 111°F. The color gradually changed from green to orange as the temperature rose. As the temperature was lowered, the sample gradually changed color, returning to its original green shade at 95°F.	
<i>* See Table and Photos Below*</i>	

April 21, 2009

Water Temperature vs. Time			
Time (Min:Sec)	Temperature (°F)	Time (Min:Sec)	Temperature (°F)
00:00	106.2	05:30	108.9
00:30	106.4	06:00	109.1
01:00	106.7	06:30	109.3
01:30	106.9	07:00	109.6
02:00	107.3	07:30	109.8
02:30	107.4	08:00	110.0
03:00	107.7	08:30	110.2
03:30	108.0	09:00	110.5
04:00	108.2	09:30	110.7
04:30	108.5	10:00	110.9
05:00	108.7	10:30	111.1
		11:00	111.4

Photos:

			
Pre Test – Lower than 106°F	Pre Test – Lower than 106°F	During Test at 7 minutes 30 seconds	During Test at 10 minutes 30 seconds
			
Post Test – Greater than 111°F	Post Test – Greater than 111°F	Reverse Hysteresis returned to original color at 95°F	

Equipment List:

Description	Barcode #	Instrument Range
Temperature Indicator	CLETPI98	
Environmental Chamber	CH-302	



MATSUI INTERNATIONAL CO. INC.

1501 WEST 178th STREET, GARDENA, CALIFORNIA 90248
(310) 767-7812 • (800) 359-5679 • FAX (310) 767-7836

CHROMICOLOR® TEMPERATURE RANGE CHART

Temperature Type	Regular Type			
	upon <u>Re-cooling</u>		upon <u>Heating</u>	
	Color Appears Below		Color Disappears Above	
	Centigrade	Fahrenheit	Centigrade	Fahrenheit
** 025	-25.0	-13.0	-15.0	5.0
** 015	-13.0	8.6	0.0	32.0
07	-4.0	24.8	5.0	41.0
5	1.0	33.8	12.0	53.6
** 8	5.0	41.0	14.0	57.2
10	8.0	46.4	16.0	60.8
15	11.0	51.8	19.0	66.2
17	14.0	57.2	23.0	73.4
20	16.0	60.8	26.0	78.8
22	20.0	68.0	29.0	84.2
25	22.0	71.6	31.0	87.8
27	24.0	75.2	33.0	91.4
** 30	25.0	77.0	35.0	95.0
35	27.0	80.6	36.0	96.8
37	32.0	89.6	41.0	105.8
41	35.0	95.0	44.0	111.2
45	40.0	104.0	50.0	122.0
47	44.0	111.2	58.0	136.4
60	53.0	127.4	65.0	149.0

** These types have some restrictions on minimum order quantity and colors available. Please contact your sales rep.

Long storage, storage temperature or air temperature may cause abnormalities of color change temperature range of Chromicolor® products. If this occurs, apply heat of 65°C or more for one minute so Chromicolor® disappears completely and the temperature change range will be returned to normal.