



Solar Simulator

Solar Simulator Finland Ltd.

Test Report

Public

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Ref. no.: CondumexBeniteztr170108HS.pdf

Uranus Comparative UV Radiation Analysis

Customer:

Servicios Condumex, S.A. DE C.V.
Carr. Constitución a S.L.P. km. 9.6
Parque Industrial Jurica
Santiago de Querétaro, Querétaro
76127 MÉXICO

Contract:

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Target:

Outer sheath of Cable
type: XCMK-HF 2X16mm²+1X16mm²



Testing time:

The start of the test: 30th of November, 2007
The end of the test: 18th of January, 2008
Total test time 1000 hours

Purpose of the test:

To test the withstand of the outer sheath of the cables to UV radiation. The mechanical tests consisting of the retention test of tensile strength and ultimate elongation of the cables are to be done after the UV radiation strain for reference and strained samples.

Test method:

The strain of the test is made through the use of continuous UV-radiation from mercury halide lamp. Total test time is 1000 hours. One set of five samples is taken away from the test after 350 test hours. They are stored in darkness and at room temperature. After the test for the reference samples, the 350 h samples and the 1000 h samples are made mechanical tests. The intensity of UV-radiation is 180 W/m². The black plate temperature is 60°C ± 2°C. The standards NF C 32-062-2 and IEC 60811-1-1/A1:2001 are followed.



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Validation of test method:

The test method was defined according to the requirements of the customer.
The spectrum of the used UV-radiation is the spectrum of the mercury halide lamp.
The results of the mechanical tests describe possible changes in the used materials.

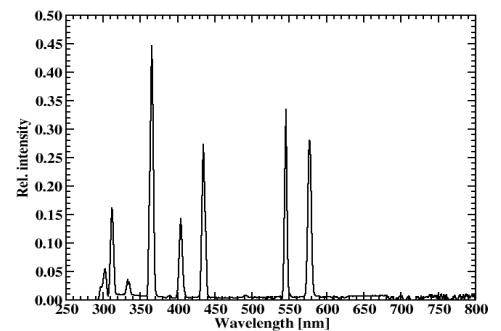
Actions done:

The customer had made the samples to a form of dogbone. The samples were attached from one end to a test stand. The test stand was placed into a test chamber together with the black plate.

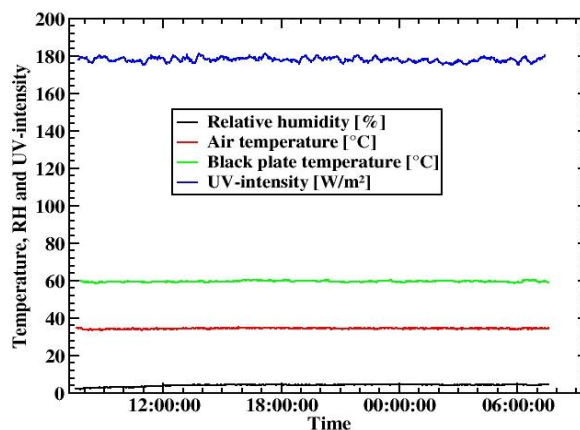
Test time [hours]	Sample No.
0 (Reference)	1.I, 1.II, 1.III, 1.IV, 1.V, 2.I, 2.II, 2.III, 2.IV, 2.V
350	3.I, 3.II, 3.III, 3.IV, 3.V
1000	5.I, 5.II, 5.III, 5.IV, 5.V

The intensity of the UV-radiation was $180 \text{ W/m}^2 \pm 10 \text{ W/m}^2$ at the samples. The intensity level was checked with a precision pyranometer and measured continuously with a UV-photodiode. The spectrum of the used mercury halide lamp is figured.

The UV radiation, black plate temperature, air temperature and relative humidity in the test chamber during a 24 hour test cycle are in the figure.



The surface temperature of the sample was measured during the test. The surface temperature measurement was done with an IR-thermometer where the emittance value was set to 0.95. The black plate temperature was 60°C . The surface temperature of the sample was 58°C .





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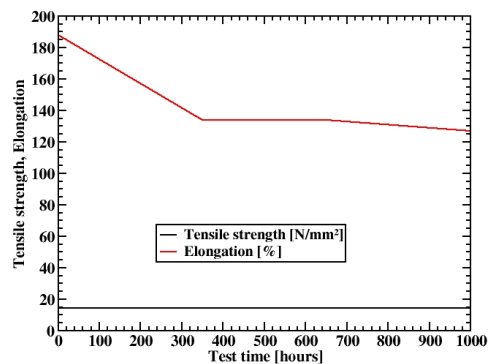
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● Luna Mechanical Analysis

Five samples of dogbones were removed from the test after 350 h and 1000 h. For these samples and Reference samples (0 h) were made tensile strength and elongation tests according to the standard IEC 60811-1-1/A1:2001. The tension speed during the measurements was 250 mm/min and the throat depth was 50 mm.



Conclusions:

The approval of the tested outer sheath of cable XCMK-HF 2X16mm²+1X16mm² is tabulated.

	Standard NF C 32-062-2	Test results	Approval
Elongation at break after 1000 hours	minimum 80 %	127 %	Passed
Retention of elongation:			
- after 350 hours	70 % of original	71 %	Passed
- between 350 – 1000 hours	max. -20 %	-5 %	Passed
- after 1000 hours	60 % of original	68 %	Passed
Tensile strength after 1000 hours	minimum 75 % of original	99 %	Passed

Remarks:

Actions, operations and reporting are in accordance with IEC/ISO 17025 'General requirements for the competence of testing laboratories'.

Signatures:

Littoinen, 18th of January, 2008

Timo Oksa

