

**Test report no.:** 90616/10-II

**Customer:** Haogenplast Ltd.  
Plastic Industries  
42880 Kibbutz Haogen  
ISRAEL

**Order:** Testing of weathering fastness according to  
EN ISO 4892-2 on a printing membrane for  
swimming pools made of PVC.

**E-mail of:** 2010-06-09  
2010-09-07

**Ref:** Ms. Nurit Naveh

**Test samples received:** 2010-06-10

**Test period:** 2010-07-05 to 2011-04-07

This test report comprises 4 pages.

Würzburg, 2011-07-01  
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**1. Order**

By its emails of 9 June 2010 and 7 September 2010 the company Haogenplast Ltd., Plastic Industries, 42880 Kibbutz Haogen, ISRAEL, instructed SKZ - TeConA GmbH to test the weathering fastness according to EN ISO 4892-2 on a printing membrane for swimming pools made of PVC.

**2. Test material**

On 10 June 2010 the SKZ - TeConA GmbH received the following test material:

2 x A4 sheets of a printing membrane for swimming pools.

*Manufacturers data:*

Designation product:	15UL (with laquer)
Code no.:	327069015002
Serial no.:	37.1660
Colour:	blue 8286

**3. Test procedure**

Unless otherwise noted testing was performed at a standard atmosphere of 23/50, class 1 in accordance with DIN EN ISO 291.

Usually we carry out tests according to standards for which we have an accreditation. The list of all standards for which we are accredited is shown on the homepage at [www.skz.de](http://www.skz.de).

**3.1 Testing of colour fastness after artificial weathering**

The testing of colour fastness after artificial weathering was performed in a weathering device according to EN ISO 4892-2: 2006-02 (Methods of exposure to laboratory light sources - part 2: Xenon-arc lamps).

The samples were exposed to artificial weathering up to an irradiation dose of 12 GJ/m<sup>2</sup> in the wave length range between 300 nm and 800 nm. The following parameters were used:

Test apparatus:	XENOTEST® BETA LM
Light source:	Xenon-arc source
Filter:	terrestrial daylight simulation
Operation:	non-alternating mode
Black standard temperature:	60 ± 3 °C
White standard temperature:	40 - 45 °C
Relative humidity:	65 ± 5 %
Spray cycle:	18 min water spray, 102 min dry cycle
Irradiance $E_{UV}$ (300 - 400) nm:	60 ± 2 W/m <sup>2</sup>
Irradiation dose (300 - 800) nm:	12 GJ/m <sup>2</sup>
Exposure period:	6130 h
Start:	2010-07-06
End:	2010-11-15

### 3.1.1 Visual assessment

Visual evaluation was carried out according to ISO 4582 by using the grey scale according to ISO 105-A02 for assessing change in colour and the grey scale according to ISO 105-A03 for assessing staining.

### 3.1.2 Colourimetric assessment

The sample colour was measured by means of a spectrophotometer of a wave length area of 360 - 750 nm, standard light type D65, gloss inclusion, 10° normal inspection. It was determined the colour distance  $\Delta E^*_{ab}$  according to ISO 7724-3.

The sample was measured before and after artificial weathering at the same measuring position on the sample, upon identical sample placement.

Due to that, also in case of the not single-coloured foils with surface texture, a guide value for colour change can be determined in terms of colourimetry.

#### 4. Test results

##### 4.1 Colour fastness after artificial weathering

##### 4.1.1 Visual assessment

Weathering duration	Irradiation dose (300 nm - 800 nm)	Grey scale grade according to ISO 105 A02	Grey scale grade according to ISO 105 A03
1000 h	2 GJ/m <sup>2</sup>	4 - 5	4 - 5
2000 h	4 GJ/m <sup>2</sup>	4	4
3000 h	6 GJ/m <sup>2</sup>	3 - 4	4
4000 h	8 GJ/m <sup>2</sup>	3 - 4	4
5000 h	10 GJ/m <sup>2</sup>	3	4
6000 h	12 GJ/m <sup>2</sup>	3	4

No peel-off, bubbles or streaks were found on the surface of the sample.

##### 4.1.2 Colourimetric assessment

Weathering duration	Irradiation dose (300 nm - 800 nm)	Colour distance			
		$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*_{ab}$
1000 h	2 GJ/m <sup>2</sup>	0.4	0.3	0.6	0.8
2000 h	4 GJ/m <sup>2</sup>	0.9	0.7	1.3	1.7
3000 h	6 GJ/m <sup>2</sup>	1.2	1.0	1.9	2.4
4000 h	8 GJ/m <sup>2</sup>	1.3	1.2	2.2	2.8
5000 h	10 GJ/m <sup>2</sup>	1.0	1.4	2.5	3.0
6000 h	12 GJ/m <sup>2</sup>	1.1	1.5	2.7	3.3