

**RAPPORTO DI PROVA***TEST REPORT*
N° 5377-0902312

DATA: 23-11-2016

DATE:

Mod: 7.0-00
Rev: 2(18-01-2007)
Pag. 1/47**Identificazione del prodotto***Specimen description*

Descrizione <i>Description</i>	Concrete ballast to support photovoltaic panels
Nome commerciale <i>Commercial mark</i>	Sun Ballast
Model <i>Model</i>	Sun ballast 0°, 0°K, 3°, 3°K, 5°, 5°K, 5°.2, 5°.3, 5°.4, 5°.5, 5°.6, 8°, 10°, 10°60kg, 11°K, 11°, 11°.2, 11°.3, 15°, 20°, 30°, 30°.1, 35°.

Dati identificativi Cliente*Customer*

Nome <i>Name</i>	BASIC S.r.l.
Indirizzo <i>Address</i>	Via della Costituzione n° 26 42028 POVIGLIO (RE)

Norme di riferimento / Descrizione della attività / Procedura*Standard / Test description / Standard procedure*

Norma <i>Standard</i>	Not applicable
Descrizione della attività <i>Test description</i>	Wind tunnel testing
Procedura normalizzata <i>Standard procedure</i>	Test method: please refer to page 4

Informazioni generali sui campioni*General information*

Data ricevimento <i>Sample supply date</i>	21-11-2016
Codice Merce Ingresso <i>Incoming goods code</i>	869#16
Data esecuzione prove <i>Date of test</i>	21-11-2016
Pratica n° <i>Number of the dossier</i>	5377

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The test report shall not be partially reproduced without the written authorization of the head of the laboratory.

I risultati riportati attengono esclusivamente ai campioni verificati nel corso della prova.
The results contained in this report refer exclusively to the tested samples

Sample description

The sample to be tested consists in a constructive structure called "SUN BALLAST". It is made by two concrete blocks which are shaped in order to support and to ballast photovoltaic panels. The single photovoltaic panel is fitted by means of metal fasteners (two for each side) to a couple of SUN BALLAST elements that do not need any further fixing device to a base (for instance roof). The SUN BALLAST elements are realized according several geometries in order to get different exposition angles for the photovoltaic panels. The test report attains to tests completed for the types: 0°, 0°K, 3°, 3°K, 5°, 5°.2, 5°.3, 5°.4, 5°.5, 5°.6, 8°, 10°, 10°60kg, 11°K, 11°, 11°.2, 11°.3, 15°, 20°, 30°, 30°.1, 35°. The nominal dimension of the photovoltaic panels used in the tests are: 165cm x100cm.

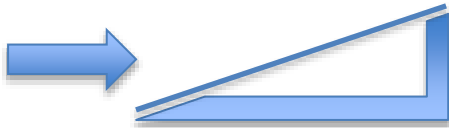
Installation in the wind tunnel

The samples had been installed on a wooden rigid plane 2.5mx2.5m; between the concrete base of the SUNBALLAST elements and the test base it has been installed a bituminous girdle.

Configuration "Wind direction"

Configuration "Against the wind"

Wind
direction



Test Method

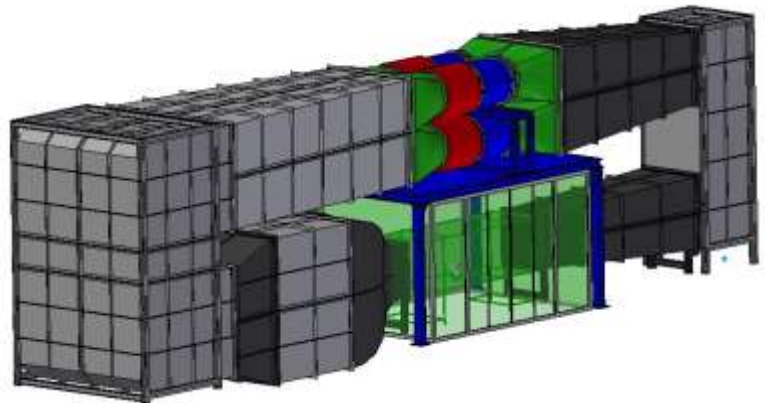
Scope

The tests had been completed in the wind tunnel installed in Newton Laboratory with the aim of exposing the "SUN BALLAST" constructive system and the installed photovoltaic panel to a normalized air flowstream.

The test is finalized to the study of possible breakings, Slippings, liftings, flipping over following the wind action.

Newton wind tunnel

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The test facility has been built to run with either an open or closed test section, as needed for particular experimental program. The required electric energy required is produced by mean of a power generator fully

integrated with the wind tunnel. The total power available is 300 kWatts. The wind tunnel is a single return closed circuit (Gottingen type) with a rectangular air path perimeter along centreline of 56m. The overall dimensions are 27m long, 4,5m wide, 8m high. The construction material is steel. In the curves of the wind tunnel corner vents (turning vanes) are installed. In the settling chambers n. 2 screens and n. 1 honeycomb wall are installed to uniform the speed and reduce the turbulence. Dynamic pressure variation across the jet The speed uniformity across the test section is checked realtime. On the end of the cross section of the nozzle n. 4 pitot tubes are installed according ISO5801. The variation of the speed on the end of the cross section of the nozzle does not exceed 0,5 %. Longitudinal Pressure Gradient The longitudinal variation of the speed along the test area is measured realtime: end of the cross section of the nozzle n. 4 pitot tubes installed according ISO5801 along the test chamber on the longital upper frame a pitot tube is permanently installed: additional pitot tube may be installed on demand at the beginning of the diffuser a pitot tube is installed and it is aligned with the upmost at the nozzle. The procedure used to measure the dynamic pressure variation across the jet allows to map the longitudinal pressure gradient by moving the equipment along the direction of the free stream. As reference: with the wind tunnel in the open configuration with a speed equal to 30 m/s along 5m the speed stays within 1% of variation respect to the mean (measured at the centre of the chamber) from 0,8 m to 4,2 m.

The test section used for the tests is 1,5m x 1,5 m

Analisis of the test results**Laboratory condition on the 21-11-2016**

- Temperature: 21°C, UR: 42%
- Air density: 1,17 kg/m³