

Test Report

**Impact resistance test in accordance with
DIN EN 12975-2:2006 using ice balls**

TÜV Report No.: 21208924

Cologne, 28th of March 2008



DAT-P-226/06-00

Publication or transfer of this report to third parties is only permissible in its complete and unabridged form. Publication or dissemination of extracts, appraisals or any other revision and adaptation hereof, in particular for advertising purposes, is only permissible on receipt of prior written agreement by TÜV Rheinland.

The test results presented in this report only refer to the test item.

**TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, 51101 Köln
D – 51105 Köln, Am Grauen Stein, Tel.: ++49-221/806-2477, Fax: ++49-221/806-1350**

Report-No.: 21208924**Impact resistance test in accordance with
DIN EN 12975-2:2006 using ice balls**

Client: Thermomax
Balloo Cresent, Bangor
BT19 7UP
United Kingdom

TÜV Quotatio No.: (via email 2007-11-09)
TÜV Order No.: 21208924

Order of: 2008-01-18
Date of receipt of test item: 2007-02-06
Commencement of test: 2008-02-22

TÜV Client No.: 3006475

Examiner: Dipl.-Ing. U. Fritzsche (Tel.:+49 221 806-4105)
Department: Renewable Energies

No of pages: 5

Appendix: 2

Impact resistance test in accordance with DIN EN 12975-2:2006 using ice balls**Test conditions**

Diameter of ball:	25 mm (+/- 5%)
Mass of ball:	7.53 g (+/- 5%)
Speed of ball:	23 m/s (+/- 5%)

Test procedure

Number of drops: 10

The Thermomax evacuated tube collector DF 100 was submitted in the Test Centre for Renewable Energies of the TÜV Immissionsschutz und Energiesysteme GmbH for an examination on impact resistance with ice balls according to DIN EN 12975-2:2006. The individual shots were shot from a maximum distance of 10 cm perpendicularly to the manifold box on the glass tubes. After each shot the point of impact was submitted to a visual check and the test equipment was positioned over the next tube. The maximum number of shots per tube has been two.

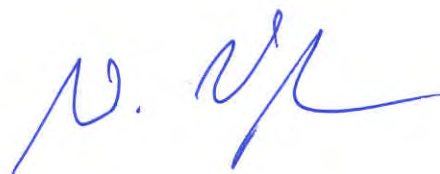
1.1 Test results

During the testing no major visual defects were detected, so that the collector met the pass criteria for impact resistance test with ice balls according to DIN EN 12975-2.

Cologne, 28th of March 2008



Responsible for collector qualification testing



Business Field Manager Renewable Energies

Annex 1: Protocol

Protocol Impact Resistance Test Thermomax ETC DF 100						
Hit- No.:	Diameter of ice ball	Mass	runtime	velocity	No. of tube:	Result
	[mm]	[g]	[ms]	[m/s]	within 10 cm to manifold case	
1	25	7,6	7,583	24,20 ¹⁾	1	No visible damages
2	25	7,6	8,960	22,32	2	No visible damages
3	25	7,7	8,135	24,20 ¹⁾	2	No visible damages
4	25	7,6	8,289	24,13	3	No visible damages
5	25	7,7	8,476	23,60	3	No visible damages
6	25	7,5	8,946	22,36	4	No visible damages
7	25	7,6	8,334	24,00	4	No visible damages
8	25	7,6	7,688	24,20 ¹⁾	5	No visible damages
9	25	7,7	7,865	24,20 ¹⁾	5	No visible damages
10	25	7,6	8,608	23,23	6	No visible damages

¹⁾ Upper limit 23 m/s + 5%

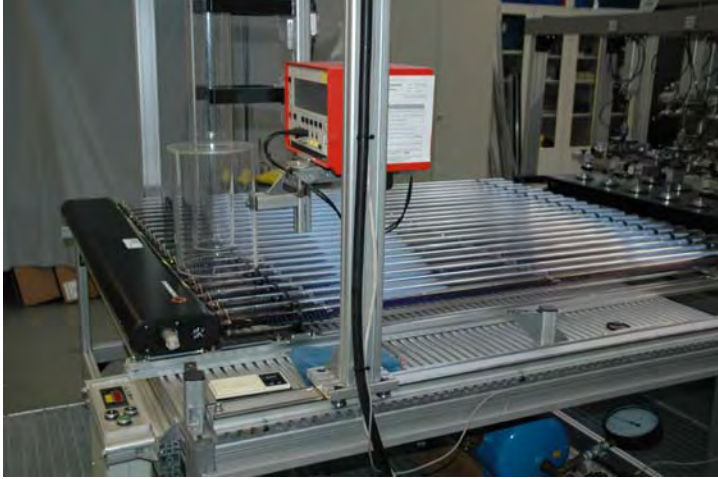
Annex 2: Photo documentation

Bild 1: Test set-up, „impact test“

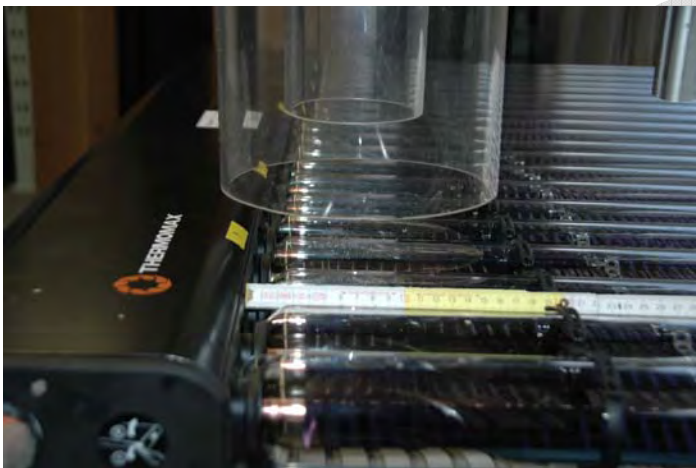


Bild 2: Location of impact

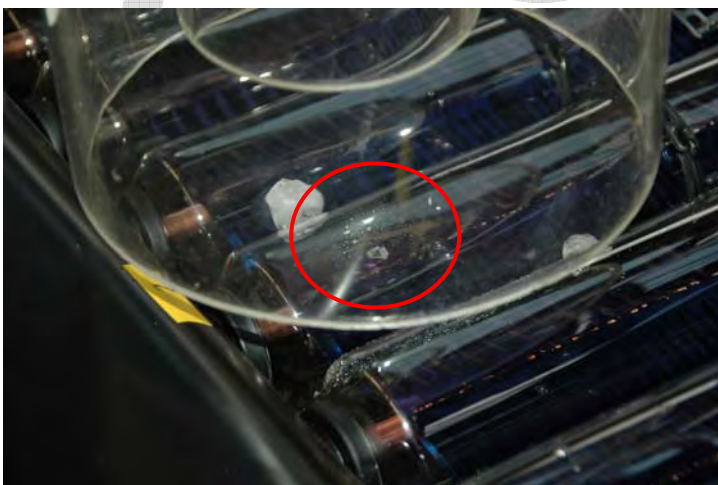


Bild 3: Detail shot impact point