

DATE: Thursday, May 18, 2006

REPORT : PDS/06-043-1/1-NDSW

SUBJECT: Project with various desiccants performance under sever humidity conditions.

APPLICANT: Nordic Power Desiccants

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Coordinator



De Schepper Philip
Technical Responsible

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Introduction

The "Packaging Centre" is a Spin-Off from the Technical University 'XOIS Hogeschool Limburg' situated in Diepenbeek near Hasselt in Belgium. We originated from the courses in Packaging engineering. As knowledge and research centre of packaging and packaging materials and with a great background in testing we are among the few leading laboratories in performing absorption tests on desiccant materials. Laboratory studies as well as field studies are our working area, starting from logging of container transports on land and on sea. Furthermore, replication of these transports in our laboratory or the more standard testing under constant humidity in the climatic chamber (WEISS).



Testing

It was in this matter that we were contacted by the "NORDIC POWER DESICCANT" Company to conduct a research project on the absorption abilities of their container desiccants. During this research we were also able to perform tests on five alternative desiccant brands, simultaneously and under the exact same conditions. This has produced an accurate comparison of six commercially available container desiccants currently being used extensively on a world wide scale.

Two Nordic products were tested, the "Nordic Magnum" with 750g active material and the "Nordic Piccolo" with 250g active material. The ingredients and construction of both products are exactly the same, only the quantity and the shape of the bag was different. A constant climate of 38°C and 90% relative humidity is maintained throughout the test. This is one of the strongest standards regarding humidity testing. This climate persisted for 29 days during which measurements were taken at regular intervals from all six desiccants.

WEISS – Climat Controlled Chamber

Conclusions

The Nordic desiccants continued absorption throughout the entire duration of the test and at no point showed signs of saturation or leaking. This means that they remained active for more than 29 days. All of the other materials reached saturation well within 14 days.

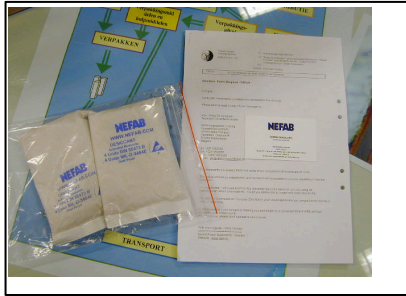
It can be seen from the graphical illustration that when saturation point was reached the integrity of some of the desiccant bags was compromised and a very strong saline solution proceeded to leak out.

At the time of termination of this test the absorbed volume of the Nordic materials was recorded at more than 250% while all the other materials had an absorption of maximum 60%.

If a desiccant is to be used within a sea container it is obvious that it should have the ability to continue absorbing moisture for a period of time that would cover the transit duration of the container. The desiccant must remain both "leak proof" and "active" throughout the duration of enclosure and transit. It is this standard that defines the product as a true "Container Desiccant".

Received samples

2 small bags **Nefab**
about 150g
161 g start weight



2 bags **PRO DRI**
about 2 kg each
2205 g start weight



1 bag **HULL BLYTH**
about 2kg
2183 g start weight



1 bag **SUPER O SEC**
about 2kg
2208 g start weight



2 x 6 bags **Nordic Magnum**
about 750 g each
775 g start weight

2 x 12 bags **Nordic Piccolo**
about 250 g each
250 g start weight



2 bags **DANISH DRY BAG**
about 2 kg each
1951g start weight



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Test preparations

One package (for the Nordic samples 2 packages) of each desiccant brand was conditioned in the climatic chamber at 38°C and 90% Relative Humidity for a total of 29 days. This climate was chosen to represent the extreme conditions and is the worst standard conditioning with regard to humidity. During this period, on a regular bases, the weight of each desiccant bag was recorded, and the difference was noted. This difference in weight gain or loss is representative of the absorption of moisture or loss to leakage.

Additionally, another set of the Nordic desiccants are conditioned at 23°C and 50% relative humidity with the same weighing program. The purpose of this test was to demonstrate absorption at below average temperature and humidity. This test was performed in a conditioned room at 23°C and 50%RH.

These tests were carried out by Philip De Schepper, in the laboratory of the Packaging Centre in Diepenbeek, room D 102, in the period between March and May 2006.

Climatic chamber, WEISS, SB2/300

Balance, Mettler Toledo SB32001

Calculations are made by recalibrating the initial weight to 1000 g, uniformly amongst all six different brands of desiccant so that direct comparison is possible.

Results

Conditioning at 38°C – 90% RH

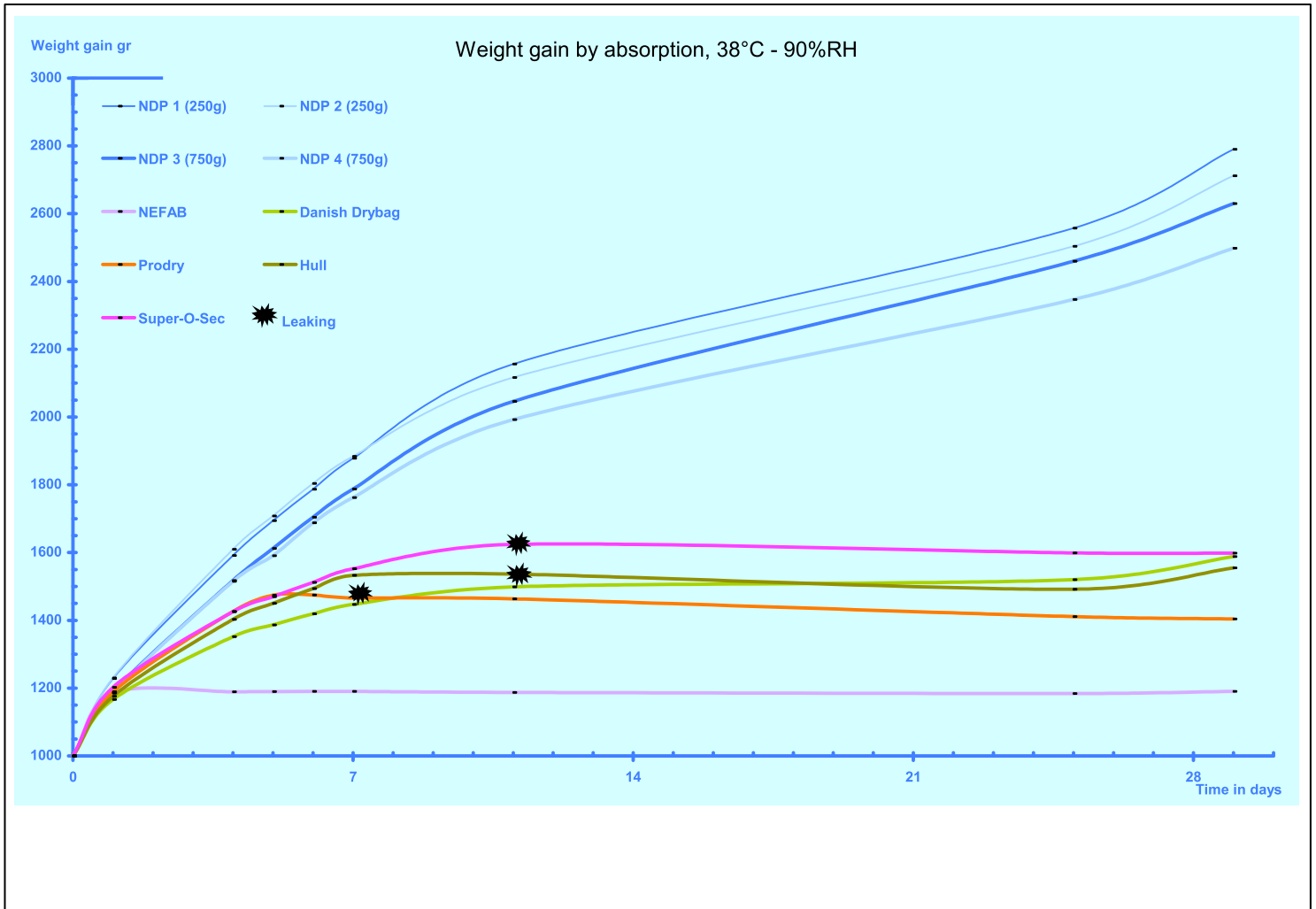
	time in hours	0	1,00	4,00	5,00	6,00	7,00	11,00	25,00	29,00
			24	96	120	144	168	264	600	696
NDP 1 (250g)	1000	1228	1592	1695	1787	1878	2157	2557	2790	2790
NDP 2 (250g)	1000	1230	1610	1708	1804	1884	2117	2504	2712	2712
NDP 3 (750g)	1000	1188	1518	1612	1704	1788	2046	2460	2630	2630
NDP 4 (750g)	1000	1186	1515	1591	1688	1763	1993	2347	2498	2498
NEFAB	1000	1186	1189	1190	1191	1191	1188	1184	1191	1191
Danish Drybag	1000	1167	1352	1386	1419	1447	1499	1520	1588	1588
Prodry	1000	1189	1427	1474	1475	1466	1463	1411	1404	1404
Hull	1000	1176	1403	1450	1493	1533	1536	1492	1555	1555
Super-O-Sec	1000	1202	1426	1470	1512	1552	1624	1599	1599	1599

Conditioning 23°C – 50% RH

	time in hours	0	24	96	120	144	168	264	600	696
NDP 5 (250g) / 50%	1000	1044	1143	1170	1195	1217	1302	1511	1548	1548
NDP 6 (750g) / 50%	1000	1037	1123	1147	1170	1191	1272	1502	1548	1548

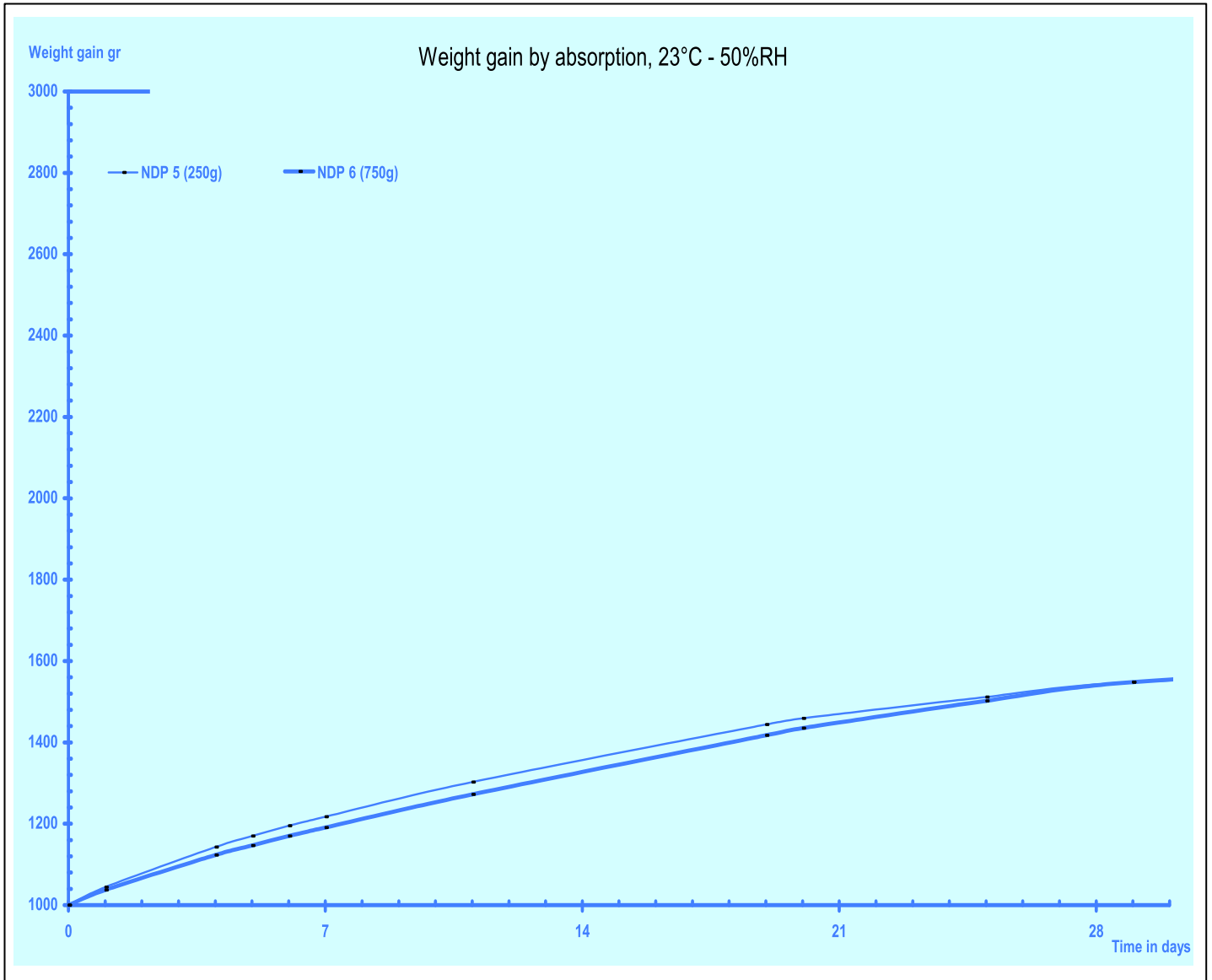
For graphical representation see annex, 2 pages.

De Schepper Philip
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