DOLAV®

CASE STUDY
ABUSE

ABUSE READY!

DROPPED! • CRUSHED! • SPIKED! • ROTATED!

Best price for spec does not tell the 'real life' story.

There is no Which? test for plastic pallet boxes but, says Dolav, "They need greater strengths than are called for in design specifications."

DROP TEST

After a 3-metre drop onto concrete, only the Dolav was undamaged

LOAD TEST

Dolav recovered when the load was released… corner pillars remained fully supportive

IMPACT TEST

The Dolav was least affected. All were marked. Two were penetrated.

ROTATING FORK TEST

Dolav moulded-in runners withstood the force. No damage observed to the Dolav.

Abuse Ready!

Dropped, crushed, spiked and rotated – that's what testing organisation, TÜV SÜD Product Service did to the Dolav Ace plastic pallet box. They also did exactly the same to three other competitive products to see how they compare. As Dolav suspected, their Dolav Ace out-performed all the competition tested.

All the plastic boxes performed to their published specification but in the view of Dolav that is a long way from the real world of plastic pallet box abuse – especially in waste and recycling applications. Dolav wanted maximum abuse. TÜV SÜD Product Service obliged with a set of repeatable standardised tests to give reliable comparative performance.

TÜV SÜD performed

- Drop tests
- Compression/load tests
- Fork tine impact / penetration tests
- Rotating fork test for runner strength

According to Dolav buying apparently lower-cost product only on 'published specification for the price' can be an expensive folly. Product durability and the length of in-service life far better determines value for money. It's simple, the longer plastic pallet boxes last the better value they are and 'least cost for specification' does not relate to length of in-service life. Indeed, the published specifications of competing products can be identical but in a harsh environment the best buy will be the one with greatest reserves of strength. So buying 'least-cost for specification' can lead to a short service life, excessive replacement and increasing annual costs. That raises the core question: Which came out best in objective independent testing to withstand severe abuse? No surprise, it was the Dolav Ace 1000 plastic pallet box.

Test details

TÜV SÜD tested each plastic pallet box with the same four tests designed to mirror harsh handling, rough use and abuse of plastic pallet boxes in the real world, especially in recycling where containers can have some of the worst treatment.

Drop tests

From three metres high products were dropped onto their top and bottom corners on to a concrete surface. Closely examined and photographed for damage or lack of it afterwards each box was scrutinised. Cracks appeared in all the competitive products. Only the Dolav 1000 Ace was undamaged.




Drop Test results - Dolav: "Scuffing only observed"
'Others': "Bottom corner runner cracked", "runner partially dislodged", "crack to corner where runner locates". *All drops were performed onto concrete.*

Compression / load test

Some products showed catastrophic failure with severe overloading. While all the products tested performed correctly within their published bottom-load specifications with progressively increased 'real world overloading', distortion occurred on each to different extents. Amazingly, the Dolav 1000 Ace shows only some modest central rib depression at maximum compression which self-corrected when released. The test report states, "The Dolav pallet box corner pillars remained fully supportive at the machine's maximum compression." That was at a loading too high to be achieved in use. These load tests used the largest compression machine in Europe which has a maximum compression of 13.6 tonnes.

Compression / load Test results - Dolav: Shows a wavy undulation to the pallet box at 10000kgf (22000lbf), which fully recovered when the load was released … the pallet box corner pillars remained fully supportive at the machine's maximum compression

'Others' included: "… some buckling of the pallet box as the load increased which mainly recovered when load removed", "… buckled significantly as load increased … mostly recovered … permanent damage to sides visible, test stopped at 12022kgf (26449lbf)" and some buckling recovered when load removed …

Note: Whilst a buckled box may recover its shape after its load has been released that's too late after a stack of boxes has collapsed.

Fork tine impact / penetration test

Spiked! Many plastic boxes are penetrated by the forks on fork lift trucks. They have a small area at the point and so when driven at even slow speed into the side of a plastic pallet box the point pressure can be high and break through the plastic wall or at least cause an obvious indentation and weakness. Each product, with the same 500kg load of lead acid batteries, travelled down a slope angled at 88 degrees to be potentially impaled on a single fork tine. One was penetrated. All were marked. The Dolav was least affected.

Fork tine impact test results – Dolav: With 500kg load, shows the slight indentation upon impact with the side of the pallet box.

Others: With 500kg load, "Tine impacted side …left deep indentation, and on two: "tine pierced through … on impact".

Runner strength

Since rotation of pallet boxes is a vital part of the products' role, runner strength and integrity is a subject regularly and frequently discussed by customers and users. No surprise that many specify the Dolav with its one-piece, integrally-moulded runners and avoid, 'clip-on runners which can come off'. Hence the very critical 'rotation fork test'.

Rotating fork test - Dolav: "The pallet did not adversely bend at its side face … the moulded runners withstood the force at its highest point.", "No damage observed to the base of the pallet box following the rotational test."

Another: "pallet box flexed outwards at its side … runners bent … runner lugs partially un-located from their snapped-in positions.".

Rotating fork test

Pallets rotated on truck forks rely on their runners and side wall strength. In this test the load was 900kg of used car batteries within the Dolav Ace rotated through 180º and tipping out all of the contents. Maximum loading occurs just before tipping out the load as most of the weight is on one end wall and all of the weight is taken by the runners and legs. With the Dolav Ace the pallet box did not adversely bend the end wall, the one-piece, integrally-moulded runners withstood the force at its heaviest point and the box show no damage. Test observations on a competitive product, by contrast, were less positive and included, "pallet box flexed outwards at its side … runners bent … runner lugs partially un-located from their snapped-in positions." It met spec but not application.

Coping with abuse – Products need greater strengths than are called for in design specifications.

A spokesperson for Dolav commented in the test report, "Materials handling equipment is often abused. We have manufactured pallet boxes for nearly 40 years. They are used to contain and protect their contents in harsh environments from -30ºC in the winter of Northern Russia to +40ºC in the hot sun in the Middle East. Our products have clear performance specifications, usually similar to those of competitors' products. We have approvals from regulatory bodies, as do our competitors. It would seem that the only difference will be in price. In practice pallet boxes are mishandled, they suffer abuse way beyond that anticipated in their [required] design specifications even allowing for built in safety factors.

"Dolav has built up goodwill around the world for manufacturing pallet boxes that not only meet specifications and certifications but take heavy abuse for years. We asked TÜV SÜD Product Service, as an independent test laboratory, if it could devise repeatable tests which showed how much abuse Dolav products would accept and construct similar tests with our competitors' products. This might even set a new standard for performance measurement and allow buyers to predict lifetime costs of employing particular pallet boxes."

Published real world case studies

Among lead acid battery recyclers the Dolav 1000 Ace is known as the 'Battery Ace' because, as one user puts it, "It lasts three times longer than any other box pallet," and auto battery recycling can be really harsh use.

Test Specification:
ASTM D4196 -09 Standard Practice for Performance Testing of Shipping Containers and Systems

- ASTM Test Method D5276 (Reapproved 2009): Standard Method for Drop Test of Loaded Containers by Free Fall
- ASTM Test Method D 642 (Reapproved 2010): Standard Method for Determining Compressive Resistance of Shipping Containers, Components and Unit Loads.
- ASTM Test Method D 880 (Reapproved 2008): Impact Testing of Shipping Containers and Systems
- ASTM Test Method D 6055 -96 (Reapproved 2007): Standard Method for Mechanical Handling of Unitized Loads and Large Shipping Cases and Crates.

DOLAV UK LIMITED, Neaton Business Park, Norwich Road, Watton, Norfolk IP25 6JB
Office: 01953 889422 • Web: www.uk.dolav-news.com • www.dolav-uk.co.uk

DOLAV IRELAND, 2 Broadmeadows Road, Swords, Co. Dublin
Office: +353(0) 1 8402354 • Mob: +353(0) 87 2578321 • Web: www.dolav-ireland.ie

OFFICES: Belgium, China, Denmark, France, Germany, Holland, Ireland, Israel, Italy, Russia, Singapore, UK, USA