

## Bursting Strength vs. Edge Crush Test

Choosing the right corrugated carton can be a relatively simple task. Size up the item you wish to ship, select an appropriate carton, load your item, surround it with cushioning material or dunnage if needed, and ship it on its way. But when you go back and stop to look at the number of different types of corrugated you have to choose from, things become a little more confusing. There are varying thicknesses (single wall, double wall, triple wall, etc.), several different flute types (A, B, C, E, F, etc.), and a wide variety of papers that can be used in corrugated construction. All of these factors determine the strength and durability of the carton. Too weak, and the carton may collapse or puncture. But too strong, and you're paying for material you don't need.

When choosing the proper corrugated carton from an environmental standpoint [selecting a properly sized carton](#) can make a very big difference. Using post-consumer recycled content is another important consideration. But even cartons with high levels of post consumer content require energy and create pollution in their manufacture, so reducing the total amount of material used is an important consideration. Besides reducing carton size, another waste prevention strategy is to avoid purchasing cartons that are overly protective.

There are currently two tests used throughout the corrugated industry to determine strength. Historically, the long time industry standard has been the Bursting (Mullen) Test, which is related to the rough handling durability of corrugated material. Bursting Test is a measure of the force required to rupture or puncture the face of corrugated board and is measured by a Mullen Tester. This force is indirectly related to a carton's ability to withstand external or internal forces and thus to contain and protect a product during shipment. Bursting strength is reported in pounds (for example, 275#).

A newer standard that has achieved widespread acceptance is the Edge Crush Test (ECT). This is a true performance test and is directly related to the stacking strength of a carton. ECT is a measure of the edgewise compressive strength of corrugated board. It is measured by compressing a small segment of board on edge between two rigid platens or plates perpendicular to the direction of the flutes until a peak load is established. This is measured in pounds per lineal inch of load bearing edge (lb/in), but usually reported as an ECT value (for example, 44 ECT).

Land Quality Division  
Solid Waste Policy  
and Program  
Development Section  
811 SW 6th Avenue  
Portland, OR 97204  
Phone: (503) 229-5913  
1 (800) 452-4011  
Fax: (503) 229-6977  
[www.deq.state.or.us](http://www.deq.state.or.us)

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David Allaway  
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Mullen Tester



Edge Crush Tester

**Corrugated Board Strength Equivalencies:  
Single Wall Corrugated**

Bursting Test	Minimum Edge Crush Test	Maximum Suggested Loading Limit Per Carton
125#	23 ECT	20 lbs.
150#	26 ECT	35 lbs.
175#	29 ECT	50 lbs.
200#	32 ECT	65 lbs.
275#	44 ECT	95 lbs.
350#	55 ECT	120 lbs.

**Corrugated Board Strength Equivalencies:  
Double Wall Corrugated**

Bursting Test	Minimum Edge Crush Test	Maximum Suggested Loading Limit Per Carton
200#	42 ECT	80 lbs.
275#	48 ECT	100 lbs.
350#	51 ECT	120 lbs.
400#	61 ECT	140 lbs.
500#	71 ECT	160 lbs.
600#	82 ECT	180 lbs.

Here it is important to point out that the equivalent ECT values are given as a **minimum** value. This is because corrugators may use one of many different “recipes” to make each type of corrugated. Each makeup will vary slightly in overall strength. For example differing formulas for a 200# single wall corrugated will cause the equivalent ECT board to vary between 32 ECT and 44 ECT. It is important to understand what type of corrugated you are using before deciding to substitute any equivalent.

For example, if you are shipping a product that weights between 50-65 pounds, a 32 ECT single-wall carton should be sufficient, in most cases. If your carton is going to be subjected to severe handling, the 200# carton might be a better option. It would be equivalent to a carton with an ECT of 32 or higher, and the bursting test is more of a true measure of rough handling.

The fundamental difference between the two tests is that under the Burst Test a minimum board basis weight is required. That is, the Burst Test requires that the base papers used to make corrugated fiberboard weigh at least a certain minimum number of pounds per given unit area. The ECT eliminated this requirement, which allows the use of lighter weight materials while still providing high performance. When you are comparing two identically sized cartons with equivalent strengths, one being Burst Test rated and one being ECT rated, the ECT rated carton will weigh less. In other words the ECT rated carton will use less corrugated material.

For example compare a 275# single wall to an equivalent 44 ECT single wall corrugated board. On average, the 275# Burst Test rated single wall carton will weigh 175 pounds per 1000 square feet of material used. An equivalent 44 ECT rated single wall carton will weigh on average 149 pounds per 1000 square feet of material used. The 44 ECT board will reduce the material used by 14.8%.

Put differently, the proper ECT rated corrugated provides an equivalent level of strength, but uses less material. This translates into fewer raw materials, lower energy requirements, and reduced pollution, in all stages of the package's life cycle. Combining lighter materials in a properly sized carton with increasing amounts of recycled content means ECT rated corrugated reduces waste even further.

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