

## Choosing the Right Sized Shipping Carton

The size of corrugated shipping carton you choose can be one of your most important strategies for packaging waste prevention and corresponding environmental benefits. As shown in [this study](#), it typically requires much more energy to produce a corrugated box than it does to produce the void fills used to fill the box. From these results you can understand the environmental benefits of using a properly sized carton, and see why it becomes important to stock enough different cartons in your inventory so they are relatively close in size to the products you ship. You avoid shipping products in boxes that are grossly oversized, and using an excess of void fills or cushioning materials. By shipping in the smallest possible package you keep packaging material out landfills and ultimately save in both packaging and shipping costs.

What's the difference between "void fill" and "cushioning"? **Void filling** is simply filling the void space created when the product you are shipping does not completely fill its shipping carton. This keeps the product from shifting and bouncing during transport, but does not necessarily cushion the product on all sides. In contrast, **cushioning** surrounds a product and holds it in place while absorbing shocks and vibrations during shipment. Cushioning provides a higher level of protection than void filling, but cushioning isn't always necessary.

When shipping non fragile items where no cushioning is required, choose a carton that comes closest to matching your product's size. Void fill any remaining space within the package, if needed. Some items may require no void filling at all (here it may be appropriate to look into a [shipping bag](#)).

If you are shipping items in stock packaging where cushioning is required, each freight carrier may have slightly differing recommendations. Adhering to these minimum packaging guidelines may have an effect if filing claims on goods damaged in shipment. That is not to say that you must follow a carrier's recommendations, as in many cases they can be overly protective. In order to see if it is possible to vary from a freight carrier's recommendations take a look at [these suggestions](#). Here is a sampling of carrier cushioning recommendations...

### **UPS**

"Each item should be surrounded by at least two inches (five cm) of cushioning and be placed at least two inches (five cm) away from the walls of the box.

This will protect your items from product-against-product damage and shield them from the shock and vibration that can be conducted from the exterior of the box to its contents in transit."

[http://www.ups.com/content/us/en/resources/prepare/guidelines/prepare\\_package2.html](http://www.ups.com/content/us/en/resources/prepare/guidelines/prepare_package2.html)

### **FEDEX**

"Use at least 2" to 3" of packing material all around the item (item should be centered). Fragile items require more cushioning."

<http://www.fedex.com/us/services/shipinfo/packaging/ground.html>

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## **USPS**

“Place the cushioning all around your items. Close and shake the box to see whether you have enough cushioning. Add more newspaper, styrofoam, bubble wrap if you hear items shifting.”  
<http://www.usps.com/send/prepemailandpackages/preparingpackages.htm>

To illustrate the benefit of having a good variety of stock cartons in your inventory let's take a look at a couple of examples. First let's look at a commonly used 12x12 footprint carton and see how only varying the height effects the fiber content. The following table illustrates the difference in fiber content from one carton height to the next.

Carton Height	Carton Weight (lbs)	% Weight Savings (By using the next smallest size)
12"	1.011	4.15 %
11"	0.969	4.33 %
10"	0.927	4.75 %
9"	0.885	4.86 %
8"	0.842	4.99 %
7"	0.800	5.25 %
6"	0.758	5.54 %
5"	0.716	6.00 %
4"	0.673	6.24 %
3"	0.631	6.66 %
2"	0.589	-

Table 1: 12"x12" Carton Weight Differences

You can see that every inch you can eliminate will have an impact. The percentage savings gradually decreases as you increase in height due to the fact that the 12" x 12" footprint does not change and the flap area remains constant. Even though the savings might seem small, over hundreds or thousands of shipments these savings will add up.

One suggestion here is to avoid cartons where the length and width are much larger than the depth. These cartons will have excessively large flap areas in comparison to the body of the carton. If this configuration is necessary, consider using either a telescoping box (Figure 1) or an end loading carton (Figure 2) which will have a much smaller flap area and total fiber content.

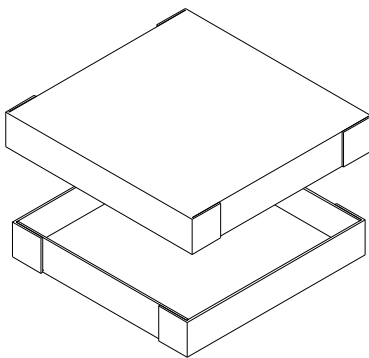


Figure 1:  
Full Telescoping Design Style Tray

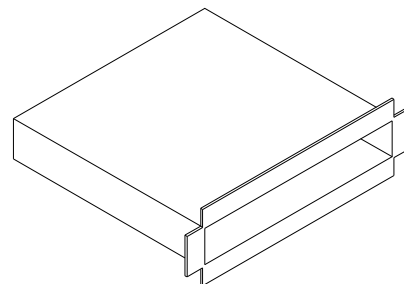


Figure 2:  
End Loading Carton

Now let's take a look at a second example using cubic cartons and varying all dimensions at the same time.

Carton Size	Carton Weight (lbs)	% Weight Savings (By using the next smallest size)
12" x 12" x 12"	1.011	15.63 %
11" x 11" x 11"	0.853	17.12 %
10" x 10" x 10"	0.707	18.53 %
9" x 9" x 9"	0.576	20.66 %
8" x 8" x 8"	0.457	22.76 %
7" x 7" x 7"	0.353	25.78 %
6" x 6" x 6"	0.262	-

Table 2: Cubic Cartons

Here you can see how every inch you can take out of your carton will have a large impact on the amount of fiber used.

An added benefit of reducing the size of shipping cartons is material saving for internal cushioning or void fills. Less empty space translates into less void fill use. [Click here](#) for an example.

Finally, smaller cartons ship more compactly, so keeping carton sizes close to the size of the products being shipped allows more cartons per truck. This improves transportation efficiency and reduces truck traffic, fuel use, and associated air pollution.

Thus, having a reasonable variety of different stock cartons is an important environmental strategy, allowing for reductions in environmental impacts of corrugated fiber, void fill/dunnage, and transportation.

### **Example**

Stocking a greater variety of box sizes can slightly complicate inventory management, and unit prices of boxes might be higher for smaller orders. However, the savings in void fills may compensate for that change. Here's an example using real material prices at a hypothetical business, one that uses 40,000 11" x 11" x 11" cartons per year. In this example, 25% of the cartons (as shipped) have an extra 2" of empty head space (they are only 9" full). The head space is filled using layers of ½" polyethylene bubble.

Replacing 10,000 of the cartons with cartons that are only 9" high would increase unit prices for cartons, but would eliminate the need for extra bubble, at a net savings of \$1,300/year, not including savings in reduced warehouse space and loading cycle time needed for the bubble wrap.

	<b>Before</b>	<b>After</b>
11 x 11 x 11" boxes		
40,000 @ \$0.2940 each	\$11,760	
30,000 @ \$0.3106 each		\$9,318
11 x 11 x 9" boxes		
10,000 @ \$0.3140 each		\$3,140
½" bubble layered to fill top 2" gap in 10,000 boxes	<u>\$2,000</u>	<u>\$0</u>
Totals	\$13,760	\$12,458
<b>Savings</b>		<b>\$1,302</b>

Thus, even if optimization and diversifying box inventory leads to slightly higher unit prices, it can still yield financial benefits.

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