



A Deeper Look at Dimensional Factors

Shipping charges for less than a full truck load (LTL) or container load (LCL) have historically been calculated on the basis of gross weight in pounds or kilograms. If a carrier charged only by weight, lightweight packages could take up the same amount of space but yield less revenue to the carrier. The dimensional weight (dim weight) system of billing was devised so the carrier does not lose money when shipping lighter weight packages.

In the US, dim weight is calculated using the cubic inches of the package divided by a “dimensional” factor. This process has been accepted by the transportation industry as a method of establishing a minimum weight for the cubic space that a package, carton or crate occupies. Depending on the method of shipment and origin, there are six standard ways to calculate your billable weight. Each example below uses a 10”x12”x12” box, so the common calculation is $10 \times 12 \times 12 = 1440$ cubic inches. All carriers round partial pounds up to the next whole number (e.g. 8.4 = 9.0 pounds). Any box weighing less than the dim weight will be billed at the dim weight.

US Domestic

The dim weight divisor for domestic shipments is 194. Dividing 1440 by 194 = 7.42 (8.0 pounds). That means that any domestic shipment in a 10”x12”x12” box weighing less than eight pounds will be billed at eight pounds. It is important to note that UPS does not calculate dimensional weight on ground shipments smaller than three cubic feet (5184 cubic inches). We are using the shipment dimensions of 10”x12”x12” for convenience across all examples.

US International

The dim weight divisor for international shipments is 166. Dividing 1440 by 166 = 8.67 (9.0 pounds). The 166 rule has long been a cargo carrier standard for all exports from the United States.

Intra-Canadian Ground

Purolator and other Canadian carriers use a slightly different method of calculation that indexes all shipments to a cubic foot. They calculate the cubic inches but then divide by 1728 (one cubic foot) and multiply by a dim weight divisor of 10. In this example $1440 \text{ divided by } 1728 \times 10 = 8.33$ (9.0 pounds).

Intra-Canadian Air

Purolator standard list air shipments use a dim weight divisor of 15, so in this example, $1440 / 1728 \times 15 = 12.5$ (13.0 pounds).

Conversion to Metric for Non-US Origins

The major carriers in Europe introduced a method of calculating dim weight for ground packages this year. Europe is on a metric scale, so let’s convert inches to centimeters using the dimensions above. Since 1 in. = 2.54 cm, then $10 \times 2.54 = 25.40$ and $12 \times 2.54 = 30.48$ centimeters. A 10”x12”x12” box is therefore $25.4 \text{ cm} \times 30.48 \text{ cm} \times 30.48 \text{ cm} = 23,597$ cubic centimeters.

European Ground

Since the standard Euro ground dim weight divisor is 6,000, the dim weight in kilos is $23,597 / 6000 = 3.93$ (4.0 kilos). Since there are 2.204 pounds per kilo, then $4 \text{ kg} \times 2.204 = 8.82$ lbs or approximately 9.0 lbs. This is comparable to the minimum weight for US international export and Canadian Ground.

Outside US Express

The final method of calculating dim weight uses a lower factor for air dim weight of 5,000. In our example above, $23,597 / 5000 = 4.72$ (5.0 kilos). In US terms, the result is 11.02 pounds or 12 pounds dim weight. Let’s look at these six examples side by side.

Dim Weight Minimum Comparison in Pounds for a 10”x12”x12”

	US Domestic	US Export	Euro Ground	Canada Ground	Canada Air	Euro Air
Dimensional Wt	8	9	9	9	13	12

Obviously, the cost is different for each service, depending upon where you are shipping. In some cases, small package carriers and domestic forwarders have offered lower dimensional factors as an incentive for the business. ■

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