

# HOW TO CALCULATE TCO FOR GAS CYLINDERS

IF YOUR ULTIMATE GOAL IS COST SAVINGS, IT'S SHORTSIGHTED TO FOCUS SOLELY ON PURCHASE PRICE WHEN ACQUIRING HIGH-PRESSURE GAS CYLINDERS.

Because a typical cylinder will be in service for decades, it will incur substantial operational costs over its lifetime. Being aware of these expenses — and weighing them against short-term cost savings — is crucial for making a wise purchasing decision that will minimize Total Cost of Ownership (TCO).

At Worthington Industries, we design industrial gas cylinders with TCO in mind. We recently concluded a 15-year study that calculates TCO for standard 50 liter/200 bar and 300 bar steel industrial gas cylinders.

We're using this research to inform our product development but also wanted to share our findings with procurement managers in the gas industry so that they can make the best purchasing decisions based on TCO.

Here's a summary of the results of our 15-year study using the Worthington Model for Calculating TCO for Gas Cylinders, which establishes a clear process for deriving TCO. Use it to take the guesswork out of your cost savings calculations and to prove the value of your purchasing decisions to your organization.

## 3 MAIN FACTORS AFFECTING TCO

TCO for industrial gas cylinders is based on three main factors: **cylinder weight, logistics, and maintenance.**

### CYLINDER WEIGHT

An empty 50 liter/200 bar steel cylinder weighs between 44 and 60 kg, with Worthington cylinders being the lightest on the market at 44 kg — at least 5 kg lighter on average than those of any competitor. Typically, these cylinders are transported on trucks with a maximum load capacity of 24,000 kg.

Once an average weight for the delivery crew, steel pallets, and other equipment is factored in, you can load between 262 and 348 filled cylinders on a lorry, assuming an average constant weight of 5.005 kg for a mix of Ar, N<sub>2</sub>, and O<sub>2</sub> gas — the only variable being the inherent weights of the different cylinders under evaluation.

Over a period of 15 years, this difference in load capacity due to cylinder weight results in a substantial “gap to full use of max load” per cylinder, which means more trips to delivery sites.

These supplemental truckloads incur additional expenses, including fuel and delivery staff wages. Based on a projected 120 fillings over the 15 year period, 400 km round trips from filling center to delivery sites, and a fuel cost of 1.5 EUR per km, the added cost per cylinder can be as high as 38.05 EUR (see Figure 1).

### LOGISTICS

Having to schedule more trips to deliver the same number of cylinders not only incurs the direct costs of fuel and wages, it also contributes to the deterioration of

the trucks, pallets, and other ancillary equipment used for loading and offloading.

These indirect costs are difficult to calculate so we used a conservative projection of the additional cost per cylinder, based on cylinder weight, in our model for calculating TCO — 2.20 EUR for cylinders in the 50 kg range and 11.00 EUR for cylinders that weigh 60 kg.

In addition to these logistics costs derived from the physical characteristics of the different types of cylinders on the market, there will also inevitably be opportunity costs associated with the service record of the provider you choose. If your cylinder manufacturer has an on-time delivery rate of less than 99%, there will be occasional penalties and administrative expenses. Missed deliveries will also reflect poorly on your company and there is always a cost associated with loss of reputation.

### MAINTENANCE

The last significant factor to consider when evaluating gas cylinder TCO is how well they will stand up over time. Those that aren't built to last will require periodic refurbishing to keep them operational.

One of the features that has a significant effect on minimizing the need for maintenance is the type of finish used on a cylinder — a factor that Worthington takes very seriously, offering high-quality powder coating that will last the



entire 15-year period in question as a standard.

If a cylinder does not have a durable finish — and most on the market do not — it will have to be painted an average of one time over 15 years. This process costs roughly 12.00 EUR each time.

Plus, whenever cylinders are refinished, they are taken out of circulation for four weeks, leading to lost rental income during that period. Assuming a rental rate of 0.50 EUR per day and 1.72 EUR transport costs to get the cylinders to and from the finishing facility, there is a total debit of 16.79 EUR per cylinder for these non-operational periods.

## TOTAL COSTS

In addition to the factors noted above, the Worthington Model also includes minor costs associated with marketing, safety, and environmental well-being. Once all of these figures are added up, it's evident that heavier cylinders incur significantly higher TCOs over time (see Figure 2).

These figures become especially compelling when you multiply them by typical cylinder purchase quantities (see Figure 3).

The next time you are tempted to buy gas cylinders based on purchase price savings of 5.00, 10.00, or 20.00 EUR per unit, pause and consider the total cost of your decision. A short-term gross savings of hundreds of thousands could cost you millions in the long run.

Figure 1. Additional 15-Year Cost per Cylinder Based on Cylinder Weight

CYLINDER WEIGHT	NUMBER OF CYLINDERS PER TRUCK	GAP TO FULL USE OF MAX LOAD	ADDITIONAL COSTS
44 kg	348	0 kg	0.00 EUR
49 kg	315	1,566 kg	11.89 EUR
52 kg	299	2,784 kg	21.40 EUR
60 kg	262	5,568 kg	38.05 EUR

Figure 2. Total 15-Year TCO per Cylinder Based on Cylinder Weight

CYLINDER WEIGHT	TOTAL COST OF OWNERSHIP
44 kg	140.00 EUR
49 kg	187.56 EUR
51 kg	199.08 EUR
60 kg	242.27 EUR

Figure 3. 15-Year TCO for Typical Cylinder Purchase Quantities

CYLINDER WEIGHT	10,000 CYLINDERS	30,000 CYLINDERS	100,000 CYLINDERS
44 kg	1.40 MM EUR	4.20 MM EUR	14.00 MM EUR
49 kg	1.88 MM EUR	5.63 MM EUR	18.77 MM EUR
51 kg	1.99 MM EUR	5.97 MM EUR	19.91 MM EUR
60 kg	2.42 MM EUR	7.27 MM EUR	24.23 MM EUR

FOR A COPY OF OUR 15-YEAR TCO STUDY AND A MORE DETAILED EXPLANATION OF THE WORTHINGTON METHOD FOR CALCULATING TCO FOR GAS CYLINDERS, PLEASE CONTACT YOUR WORTHINGTON ACCOUNT REPRESENTATIVE OR CALL +43 7485 606 0.

## ABOUT WORTHINGTON INDUSTRIES

Worthington Industries is the leading global manufacturer of pressure cylinders and related products for industrial, transportation and fleet fuel storage, energy and consumer products markets. Our broad product line of steel, aluminum and composite cylinders, cryogenic vessels, storage tanks and specialty components serves more than 4,000 customers in 70 countries, and is backed by a team who provides unsurpassed customer service with market-leading technical, product, and market expertise. [www.worthingtonindustries.com/tco/](http://www.worthingtonindustries.com/tco/)