Essential Oils Dispensing
A Step-by-Step Guide

Essential Oils

carow
Dispensing Success

With **Insider Insights** from Steve Carow

When your product is essential oils, dispensing success means everything.

Choosing the right process for capping essential oils is your company's ultimate opportunity to satisfy your customers.

If you select the proper capping setup, the essential oil drops or pours as desired, the bottle cap does not leak, and purchasers become repeat customers.

If something happens during the capping process, from sourcing the caps to capping the bottles, it can diminish the customer experience. Leaky, messy essential oil caps and bottles lead to a less than stellar customer experience—which is the last thing you want to happen for your business.

This guide will explain everything you need to know about capping essential oil bottles to ensure your company is prepared from start to finish.

We'll start with what you should do when receiving the caps--and end with the final product ready to ship to distributors or customers. Along the way, I'll also share some Insider's Insights to help ensure your dispensing success.

- Steve Carow
President

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Checking Incoming Materials

The first step to take after selecting the best materials for capping essential oils is to verify the shipment of these materials. For each order, you will need to review all the pieces that comprise your finished oil product.

To assist you, we have compiled a step-by-step process that will help you verify incoming materials in a systematic and thorough manner. The following is applicable for reviewing the receipt of essential oil dropper bottles, caps, and dropper bottle inserts:

Step 1

When you receive a shipment, visually review each item.

If the box or bag holding the materials has a hole in it, is crushed, or has some other defect, this is an indicator the cleanliness or safety of the materials may be compromised.

If you see glass fragments (such as from broken essential oil dropper bottles) in the shipping container, this is a cause for alarm. The biggest concern is that these glass fragments may have found their way into the bottles or droppers. If this happens, it would put your end customers at risk when using the essential oils. It is a lawsuit in the making, not to mention a primary concern for your company's ability to provide a safe product.

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What happens if you do receive materials that are in some way damaged or potentially compromised?

Before you proceed with unpacking the rest of the materials, document the damage. Use a digital camera or smartphone to record evidence to share with the supplier. Remember to include a time and date stamp on the images for verification purposes.

Prior to contacting the supplier, make sure you have all applicable documentation, such as shipping receipts, purchase orders, invoices, etc., on hand. They will need this information, and will most likely request evidence of the damaged materials. Having everything readily available can expedite the process and allow you to get the replacement materials sooner.

How do you know if you received the correct items?

There are four key pieces of information that can be verified to ensure that you have the correct bottles, caps and dropper inserts. Each time you receive a new shipment of materials you need to identify these bits of information. If you notice any discrepancies, you will be able to request replacements immediately. Otherwise, if you use the wrong materials, there will be quality control issues at some point in the filling and capping process.

Here are the four areas to verify with the receipt of materials:

- [ ] Refer to your Purchase Order (PO) and shipping receipts to identify the part number and description.
- [ ] Match this up with the label on the actual material you have received.
- [ ] Visually inspect the materials, e.g., essential oil dropper bottles, essential oil caps, dropper inserts, etc., while referencing technical drawings and/or retained samples to make sure the received items are the same as those you intended to order.
- [ ] Compare any embossing or printing located on the material.

What happens if there is a discrepancy in the materials you have received in a shipment?

As with the situation of the broken or damaged materials, you need to document everything. Stop opening the rest of the materials, and take photos or videos of the packaging, using time and date stamping.

Contact the supplier or the packaging provider immediately to solve the problem. You must resolve any such issues with materials before you or a third-party packager can successfully complete a batch run.

Step 2

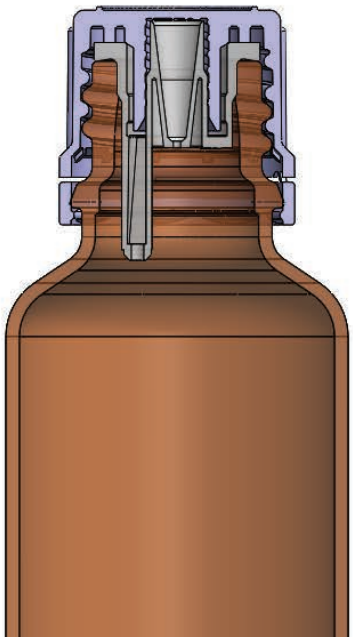
Conduct a lot-check of your components prior to production

For this, you want to use the military standard (also known as MIL-STD or MIL-SPEC) for critical dimensions and performance. Note: if you have purchased materials from a reliable supplier, this will already have been covered. However, most distributors are unaware of the need for lot checks, which can cause more work for you. Let us know if you need additional lot checks for verification of your product packaging. If you are short on time, pull one piece of each component needed and compare to the drawing supplied by your vendor. You can easily tell by measuring a couple of critical dimensions if you have the correct part.

Choose Universal Sizing Standards

Another way to ensure that you improve your capping experience and reduce complications is to select the right size for the materials. The dropper inserts, dropper bottles, and caps should all be the same size. Optimally, you want to choose the industry standard of 18 DIN caps and droppers along with 18 DIN essential oil dropper bottles.

We recommend using 18 DIN because these essential oil bottle caps and bottle necks are universally designed to work together. When you select 18 DIN, the sizing is standard for any manufacturer around the world in the bottling supply industry. You can rest assured your 18 DIN bottles can be filled in the same manner at multiple facilities without the need for proprietary or custom-made filling machinery.



EuroDrop® dispensing system comprised of Dropper Bottle, Dropper Insert and cap all with a common 18 DIN neck finish to ensure a perfect fit every time.

Stages of the Capping Process

Once your glass bottles are filled with essential oils, either by hand or machine, you are ready to start capping.

Whether capping by hand or machine, the capping process will go through three "phases":

1. **Dropper insertion into the bottle**
2. **Tamper-band of the cap traveling over the bottle transfer ring**
3. **Tightening the cap to the final torque**

Each one of these phases can present a challenge, and care should be taken to complete each one properly.

Speaking of the torque, this requires a distinct process to allow you to set the torque for the capping machinery.

Set Up a Torque Program

Why should you set up a torque program?

Torque is the rotational force or power applied to a cap when capping a bottle. Correct cap torque is necessary to achieve a balance between sealing while not breaking the cap and/or allowing the package to be opened.

There are two phases of a torque program

1

You will need to establish the on-torque also known as the application torque. This is required each time the machine is set up for a new lot.

2

You will also need to set up an off-torque program. This is a procedure that ensures you are capping the essential oil bottles consistently throughout a run. It can also be an indicator of issues with the capping or filling machinery.

Setting up a torque program establishes a standard by which you can gain consistent results in capping essential oils. This will insure that filling-line operators will produce consistent results that will give the best customer experience.

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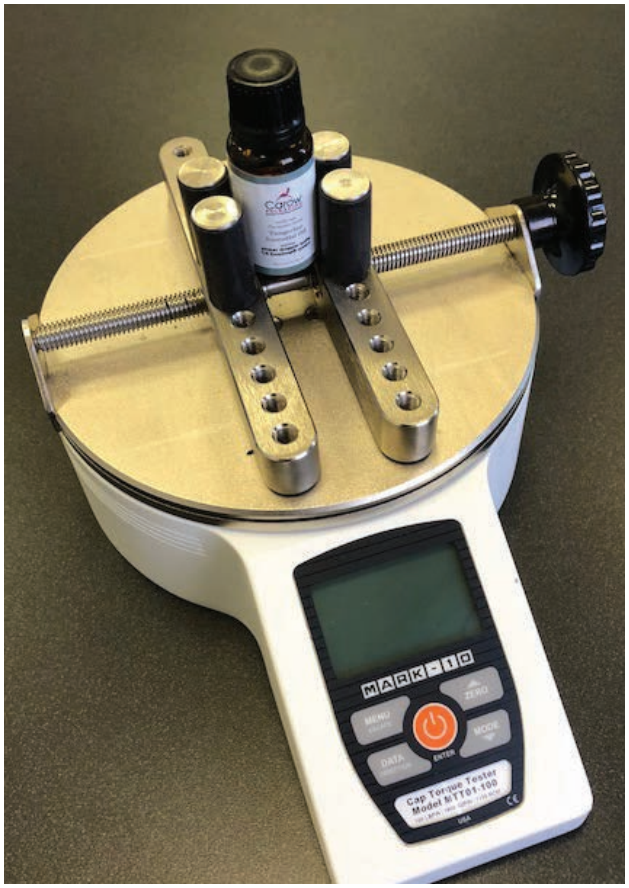
How do you identify torque settings?



You need to purchase a torque meter, which is also known as a torque sensor or torque transducer. If you don't own a meter, a quality bottle or cap supplier, such as Carow Packaging, may have one you can use or may offer torque testing as a complimentary service.

Expect to pay anywhere from $500 to $1,500 for this device. Once you have a torque meter, you will start by establishing the on-torque and off-torque for capping essential oil bottles. You need to use a torque device for this process because capping machines do not have a dial that indicates the on-torque for product runs.

Steps for On-Torque Testing

Step 1:	To get started with on-torque testing, you will need empty bottles and essential oil bottle caps.
Step 2:	Send the empty bottles and caps through the capping machine. Note that there should not be any product in the bottles during this test run.
Step 3:	On-torque is established by measuring the off-torque with a torque meter. Torque range for dropper caps during an application needs to be within 7 to 9 in/lbs. Removal torque should be 3.5 to 5 in/lbs within 5 minutes of capping. If you are achieving this, then the on-torque is set correctly.
Step 4:	If you are not achieving the correct removal torque, then change the speed and distance settings on the capping machine. Repeat steps 1-3 until removal torque measures 3.5 to 5 in/lbs within 5 minutes of capping.
Step 5:	While testing the on-torque, take notice of the chuck or capping wheels to look for any signs of wear and tear or loose capping mechanisms. If there are issues with the machinery, these will need to be remedied or replaced in order to achieve proper results with testing.
Step 6:	After the correct removal torque range has been achieved then document the capping speed, distance and other settings to aid the future production runs.

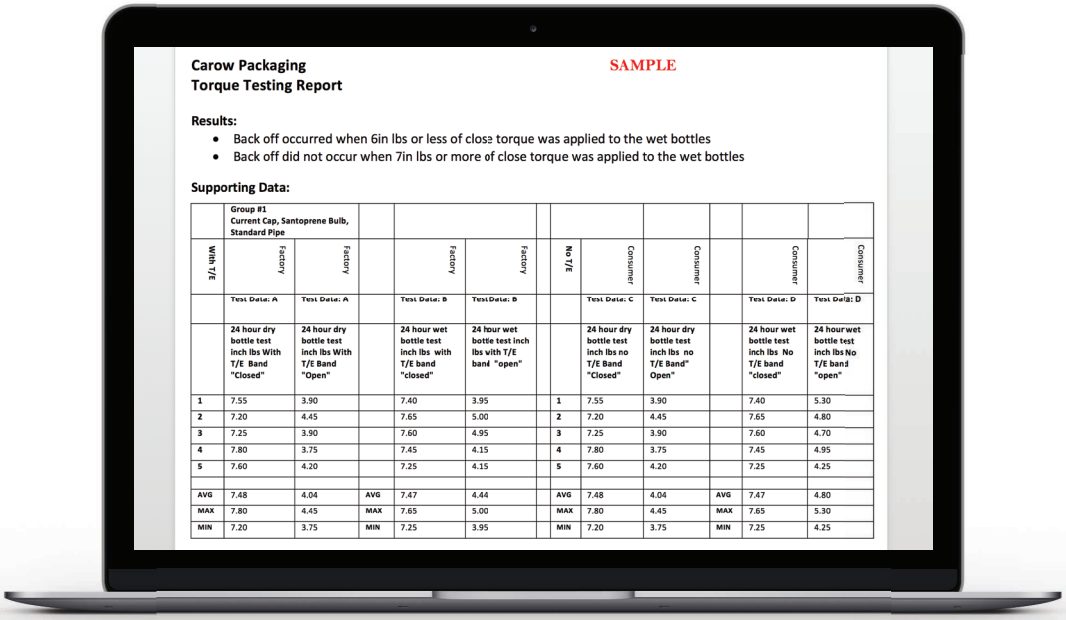
Steps for Off-Torque Testing

The off-torque ensures you are consistently capping essential oil bottles in the same—and the correct—manner after filling with the oil. With this program, you are alerted to any malfunctions with the materials, capping machinery, or filling machine. In addition, you can better gauge any issues with the process of capping essential oils.

Step 1:	**For off-torque testing, you need to decide how often per lot you will measure the off-torque.** We recommend you measure the off-torque at the beginning of filling bottles, in addition to regular intervals throughout the filling and capping process. For the interval testing, choose between measuring off-torque according to piece count or by elapsed time, i.e., every two hours during a run. Commit to this procedural decision for every batch bottled to ensure the validity of the results.
Step 2:	**Filling and capping operators must be properly trained to measure off-torque.** Devise a written protocol that operators must follow. If you do not currently have a protocol on file, let us know, and we will help you develop one for your operators. We have extensive experience in developing protocols for businesses of all sizes.

Step 3:

All off-torque test results must be logged in a systematic way, i.e., a chart or spreadsheet.



Carow Packaging SAMPLE
Torque Testing Report

Results:

- Back off occurred when 6in lbs or less of close torque was applied to the wet bottles
- Back off did not occur when 7in lbs or more of close torque was applied to the wet bottles

Supporting Data:

	Group #1 Current Cap, Santoprene Bulb, Standard Pipe									
With T/E	Factory	Factory		Factory	Factory	No T/E	Consumer	Consumer		Consumer	Consumer
	Test Data: A	Test Data: A		Test Data: B	Test Data: B		Test Data: C	Test Data: C		Test Data: D	Test Data: D
	24 hour dry bottle test inch lbs With T/E Band "Closed"	24 hour dry bottle test inch lbs With T/E Band "Open"		24 hour wet bottle test inch lbs with T/E band "closed"	24 hour wet bottle test inch lbs with T/E band "open"		24 hour dry bottle test inch lbs no T/E Band "Closed"	24 hour dry bottle test inch lbs no T/E Band" Open"		24 hour wet bottle test inch lbs No T/E band "closed"	24 hour wet bottle test inch lbs No T/E band "open"
1	7.55	3.90		7.40	3.95	1	7.55	3.90		7.40	5.30
2	7.20	4.45		7.65	5.00	2	7.20	4.45		7.65	4.80
3	7.25	3.90		7.60	4.95	3	7.25	3.90		7.60	4.70
4	7.80	3.75		7.45	4.15	4	7.80	3.75		7.45	4.95
5	7.60	4.20		7.25	4.15	5	7.60	4.20		7.25	4.25
AVG	7.48	4.04	AVG	7.47	4.44	AVG	7.48	4.04	AVG	7.47	4.80
MAX	7.80	4.45	MAX	7.65	5.00	MAX	7.80	4.45	MAX	7.65	5.30
MIN	7.20	3.75	MIN	7.25	3.95	MIN	7.20	3.75	MIN	7.25	4.25

Include the measurement and the operator initials/signature, as well as the time recorded or lot number if using a piece count. This will track operator performance and ensure compliance with regulatory standards.

The data shows trends or discrepancies based on operator, time of day, etc. This information should be evaluated and used to identify issues and make adjustments as needed (e.g., replacing the chuck on the capping machine) to ensure more consistent off-torque measurements.

Step 4:

When bottling and capping essential oils, the off-torque should be 3.5 to 5 in/lbs within 5 minutes of capping.

If the off-torque measurements fall outside of the preferred range, you must have a procedure for the operator to follow that corrects the off-torque.

More to Consider: When Filling Essential Oil Bottles

Your priority is to achieve optimal capping for every batch or lot packaged. Once the materials and torque are confirmed, the next step is to determine a maximum fill amount for the bottle size. Overfilling causes several problems in the sealing process which ultimately lead to a mess for the end user and you.

There are ways, however, to avoid overfilling and ensure your customer has a positive experience using your essential oils.

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Choose the Correct Bottle

To avoid overfilling, start by using professional grade dropper bottles for your essential oil bottling needs. These bottles are designed with an overflow capacity that validates label claims, e.g., you have a bottle labeled with 30 ml of essential oil, and you are guaranteed to sell that precise amount.

Industry standard essential oil bottles also allot for overfill space, which accommodates any variations in the filling machine.

Fill by Volume

Dropper bottles are designed according to a precise fill volume, which allows you to choose the correct bottle size for your product needs. These bottles are made with extra head space in the neck of the bottle to accommodate a small amount of overfill.

More importantly, due to the extra head space a dropper insert can be placed inside the bottle without compressing the liquid, even if there is a small amount of extra essential oil added.

A liquid cannot be compressed. This is a law of physics. Any attempt at compressing essential oils will lead to seepage over the neck and onto the threads of the bottle, as well as leakage on the outside of the bottle.

Next, fill essential oil bottles according to volume. **Never fill the bottles by weight.** Industry grade essential oil dropper bottles are designed to hold product by volume. The volume will remain consistent from batch to batch, even if you opt to use a new filling machine or packager.

> **For instance:** 30 ml of mercury uses the same space as 30 ml of water. The differential here is the density of the liquid per milliliter. 30 ml of mercury weighs 406 grams, while 30 ml of water weighs 30 grams.

In the case of essential oils, they weigh less than water because oils have a lighter density than water. Therefore, if you fill an essential oil bottle with 30 grams of oil, instead of 30 ml, you are likely to cause overfilling.

Results of Overfilled Bottles

Overfilling essential oil bottles causes leakage onto the neck. When this happens, there are two possible results.

1 The cap of the essential oil bottle can back-off during storage, transit, or shipping.

An essential oil is a slippery substance. When it spills over the neck, it leads to lubrication of the threads of the bottle neck. The torque relies on the friction between the cap and the bottle neck to ensure proper capping.

Bottle on left shows proper fill with meniscus of liquid at shoulder level. Bottle on right shows overfill with liquid covering the Dropper Insert. This will cause leakage onto the neck and result in the cap backing off during shipping and storage.

2 The cap can be over-torqued during the capping process

Normally, the maximum torque is reached when the cap is fully turned onto the bottle and reaches the "end" of the thread. This physical fact and the friction created between the thread of the cap and bottle create the torque-retention. Oil on the bottle threads greatly reduces the friction between the bottle and cap threads. This, in combination with the capper, can cause the cap to "jump" the threads and return to an earlier stage of rotation onto the bottle. At this point the torque is greatly reduced and will fall below the recommended 7-9 in/lbs of application torque recommended for sealing.

Attempts to rework the cap usually fail for the following reasons:

- Any attempt to reclose the cap results in the cap jumping the thread again
- Wiping the threads usually does not adequately remove the oil on the threads
- Increasing the torque on the capper only worsens the problem

In addition to not remedying the problem, all of the steps cited above result in lost productivity and increased cost of production.

Please Note

Essential oil leaking over the neck of the dropper bottle can also be caused by the filling machine heads. Prevent this issue by checking the filling machinery prior to filling. The valves must close properly after the fill volume is reached to reduce dripping onto subsequent bottles.

How to Achieve Successful Capping

As you work to achieve optimal essential bottle capping, here are some questions that you will want to ask:

Q: How do you know that the operator met the required torque measurements for the batch run?

A: Begin by reviewing the operator's log via the chart or spreadsheet after every production run to identify any discrepancies.

Q: Is the tamper-evident band fully seated over the transferring of essential oil dropper bottle?

A: The tamper-evident band will be below the transfer ring at the end of the capping process. If the tamper-evident band is bulging or the removal torque is very low, those are clear indicators that the band is not fully seated. As a result, it is not properly sealed and must be removed from the batch.

Q: Is the dropper fully seated into the bottle neck when you remove the essential oil caps from the bottles?

A: The dropper should not come out of the bottle when the cap is removed. It should remain firmly attached to the bottle neck.

Q: Do you see oil on the threads of the bottle after removing the cap from a bottle?

A: If yes, then there is an issue that needs to be addressed before you can sell the product. This can be caused by overfilling the bottle. It may be due to the filling machine head dripping product on the neck of the bottle after filling is complete, which causes the cap to be improperly sealed.

As you continue to work with essential oil capping and bottling, you will most likely encounter problems or situations that require extensive guidance. This is where we hope you'll reach out to us for assistance.

CAROW PACKAGING AND ESSENTIAL OILS

Carow Packaging has been a trusted advisor to companies in the essential oils market for more than 30 years. During that time, our dispensing expertise has helped our clients capitalize on opportunities, respond to challenges and achieve dispensing success.

Now, we're ready to help your essential oils company by assuring the right dispensing products and containers, fast response to your needs and short lead times.

GET YOUR COMPLIMENTARY ESSENTIAL OILS DISPENSING SAMPLE KIT

It's time to enhance your essential oils dispensing quality, safety and customer experience. It starts with our complimentary Dispensing Sample Kit.

The complimentary kit includes:

- Glass dropper bottles
- Regular EuroDrop® caps and dropper inserts
- Tamper evident EuroDrop® caps and dropper inserts
- Child resistant and tamper evident EuroDrop® caps and dropper inserts
- Tamper evident dropper pipette
- Fine application pump and sprayer

Contact us today for your complimentary Essential Oils Dispensing Sample Kit.

sales@carowpackaging.com

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Carow Packaging • 7810 Virgina Road, Crystal Lake, IL 60014 • +1 815.455.4600 • carowpackaging.com