

DOM™-24 Selection Guide

The use of oils for food has a long history in countries around the world, and along with such cooking methods as steaming and baking, deep frying has longstanding history. Especially in the recent years of the frozen food golden age, the presence of fried foods that can be frozen and reheated has increased at our tables year after year. While these foods may taste great, many health-related topics concerning the use of cooking oil have come up with one specific aspect which requires special attention.

That topic is “oil degradation.”

When frying oil is used continuously, it has a negative impact on the taste, color, appearance, and even the smell of the food. Frying with degraded oil can even cause issues with digestion, as it converts the fried food into bad cholesterol-containing food, which can harm the stomach. Sufficiently degraded oil can become a “toxic Substance” that threatens our health. In fact, a case of food poisoning from instant ramen was reported in Japan in 1964. In the Kansai region, 69 people were affected with symptoms of food poisoning, including diarrhea and vomiting. In today’ s climate of stricter food safety and quality control, producing fried foods with degraded oil not only impacts the flavor, but food manufacturers run the risk of liability claims from health damages, not to mention the loss of consumer confidence.

Because businesses today are looking for ways to cut costs in the face of rapid increases in oil and other raw ingredient costs, extending the time that oil can be used before changing it by even a day is a key directive. In other words, companies can profit from using oil right up until the last possible moment before it becomes unusable.

Considering the background information above, it’ s easy to see why monitoring the degradation of oil in fried food production is so crucial. In order to address this need, ATAGO suggests the DOM-24 oil degradation meter. Even so, traditional devices for measuring the degradation of oil already exist, and many customers are already using them. As such, why would ATAGO develop the DOM-24 now, and why should customers choose it? The below introduces the DOM-24 product specifications, and comparison to other measuring devices will suggest the reasons for the decision.

vs Digital Measurement Devices

A number of factors are at play when discussing the degradation of oil, but the key factor is oxidation due to air exposure, polymerization due to heat, and free fatty acids created due to the water content of food. Oil degradation measurements indicate the progression of the aforementioned factors, and this indicator varies depending on which factor is being focused on. The next three sections will compare three major measurement methods - Digital Measurement Devices, Titration Method, and Test Strips - to the DOM-24.

[1] Numerical acid value (AV), doubling the scale with TPM

In order to determine the degradation of oil, Acid Value (AV) and Total Polar Materials (TPM) are used as indicators. Governing authorities in each country enforce their set quality standards and oil degradation point for food. *Note 1

What separates the DOM-24 from all other oil degradation measurement devices is its ability to display Acid Value (AV).

Typical digital meters measure dielectric constant of oil to calculate the Total Polar Materials (TPM) to determine the degradation of oil. On the other hand, what about the DOM-24? Although the DOM-24 also uses the same measurement principle of measuring dielectric constant to find the Total Polar Materials (TPM), it then converts those readings into Acid Value (AV) using a conversion table for a double scale. That is to say, the DOM-24 can display either the AV value or the TPM value.

In other words, one device can satisfy the needs of both users who are monitoring AV, and users who are monitoring TPM. Put another way, the DOM-24 is marketable to every region in the world.

[2] Superior Temperature Range

The DOM-24 measurement temperature range is between 0-225°C, a specification that allows for measurements of low temperature oils. But why does measuring low temperature oils make it superior? It's because users have told us that oil they measure is not always necessarily high temperature. If the timing to change the oil is determined by checking the oil condition first thing in the morning or at the end of the day, the ability to measure low temperature oil contributes to shortening the measurement time and reducing risk of burns from measuring high temperature oil.

[3] Design

The DOM-24's simplistic cylindrical appearance expresses its expedient operation but its functionality inevitably extends beyond just that of an industrial design.

The first point is the long distance from the sensor to the handle. While the risk of burn injuries from deep frying is a major concern, one of DOM-24's distinctive characteristics ensures a good distance from the oil to the person's hand. The low risk of burn injury, even when inserting the device in high temperature oil, leads to ensured safety of employees, which serves to reduce the risk of workplace accidents. Making the DOM-24 a device that anyone can use safely was one of our main goals.

Another characteristic is that the DOM-24 can be used to stir the oil. There are instances where oil is not uniform in various layers depending on its temperature or degradation progress, and stirring the oil using the DOM-24 may give greater measurement accuracy.

Furthermore, the weight of DOM-24 in your hand may surprise you. A wrist strap can be attached so that there is no worry of dropping it. From the profound structure of DOM-24, you can probably feel the style of hidden potential as the market leader.

Plus, a portion of the chassis is transparent, as you probably noticed. This was done to show you the electronics in the internal construction of the device, so that you'll love it and get such a kick out of using it to measure your food, or that's what the people who designed it were thinking when they put together such a new-fangled design.

[4] Impact and Water Resistance

There's a cover on the delicate sensor assembly, to make it resilient. In our own drop tests, we confirmed that it continued to work without issue after being dropped from a height above waist-level, so part timers and other people who aren't the owner can use it without concern.

In addition, the water resistance is IP67, so there's no problem if it's dropped in water. You can use it around water without hesitation.

[5] Made in JAPAN

Many digital oil degradation meters are assembled overseas, but ATAGO's DOM-24 is manufactured entirely in Japan. Fully trained ATAGO staff with plenty of experience can help answer questions or clear up any unclear points. In the unlikely event that the unit is damaged or requires service, our service centers in Japan and around the world can take care of it right away.

The full support system in place is a point that lets you choose the DOM-24 in safety.

vs Titration

Measuring the degradation of oils can be done using titration. As you know, this method requires the preparation of equipment, beakers, and reagents. Beyond that, these measurements are mainly done in a lab, and not intended to be done on food manufacturing premises.

The following are the ways in which the DOM-24 surpasses measurement by titration.

[1] Ease of Operation

None of the equipment or reagents required for titration are necessary. The DOM-24 can be inserted into oil as it's being used, and simply by powering on the instrument and pressing the start button it displays the degradation, so the ease of operation makes it an attractive device.

[2] Digital Display

Especially with base titration, the individual has to determine when the color changes, and mistakes naturally occur. In order to minimize these errors, multiple measurements are taken, and the user utilizes the average of these. The DOM-24, on the other hand, eliminates error by having the user go by the digital display. As a plus, it is not necessary to take extra measurements to find an average.

[3] Ability to Measure at High Temperatures

The simplicity of the DOM-24's use and design make it an exceptionally useful meter on the production floor. Depending on the production floor, the oil may always be low temperature, or it may sometimes be high temperature, but the DOM-24 can handle both low and high temperatures due to its 0-225°C temperature range. It also has the merit of being a timesaver, since it does away with the need to wait for oil to cool.

[4] Safety

When collecting samples for titration measurements, moving samples from the production floor to the lab may result in dropping the sample, or burns. However, the DOM-24 can be used on the production floor, eliminating this danger. Additionally, as previously stated, the danger of burns while taking a measurement is reduced due to the design providing a long distance between the sensor and the hand holding the instrument.

[5] Ecology

The DOM-24 does not produce waste. Unlike titration, it doesn't require sampling of the oil, so troublesome issue of disposing of the oil does not arise. Naturally, the risk of contaminating food is also reduced; being kind to the environment is important not only to businesses, but to everyone in our society as well. Through introducing the DOM-24 and reducing waste, businesses can improve their social image, and reduce their disposal costs.

[6] Cost Performance

The DOM-24 costs 58,000 Yen. After one purchase of the DOM-24, being able to measure repeatedly measure samples without having to worry about reagents and other consumables is surely very appealing.

vs Test Strips & Reagent Test Kits

Test strips and reagent test kits are cheap and easy to use, which is why they're the measurement devices commonly found currently in food production facilities. *Note 2 As previously mentioned, if the DOM-24 is competitive as a digital device thanks to its measurement principle and specs, then analog measurement devices, represented by test strips, must surely be competitive through their distribution, frequency of use, and name recognition. Measurements with test strips and reagent test kits involve immersing a test piece into the oil, and using either Acid Value (AV) or Peroxide Value (PV or POV) as an indicator, determine the degree of oil deterioration based on the color change of the test piece. How can the DOM-24 take over this market, when these devices have such a high market share? Refer to the points below.

[1] Simple Operation

Since a test strip only needs to be dipped into oil, the measurements themselves are extremely simple. However, older people or long-time users of test strips may feel that, at a first glance, a digital device is difficult to use. However, this doubt is swept away the moment they touch the device. The simplicity of displaying the oil degradation just by powering the device on and pressing the start button is hugely appealing for the DOM-24.

[2] Digital Display

Once you are accustomed to their operation, test strips may seem simple at a quick glance, a user may realize that it is actually difficult to read the value when using them. A vague indicator like color is subjective, and its performance as a device also serves as a cause of error due to different perspectives of its users; thus, it cannot be said to be a suitable method for degradation of oil that requires a strict degree of monitoring. That issue, in addition to having a digital unit that can display numeric values that anyone can understand, compares excellently against test strips. The DOM-24's scale is also in increments of 0.1. Considering that many test strips have 0.5 increments, it's clear which is better for control.

Further considering recent demands for high quality control standards, the measurement results given in "numbers" that are easy to leave as a record (instead of relying on the operator's senses) ought to be reason enough to switch from test strips to the DOM-24.

[3] Ability to Measure at High Temperatures

Test strips are not able to measure oil at high temperatures, so measurements must be taken after it cools. The time it takes for the oil to cool is lost, which translates to wasted labor cost, which only hurts an owner. At the same time, the DOM-24 can measure at temperatures between 0°C-225°C, which eliminates this issue. The DOM-24 promises to liberate you from the pointless time of letting oil cool.

[4] Safety

Many people resist the idea of bringing test strips or reagents into areas where food is being handled. It of course evokes a fear towards the health of their customers, and the risk of that a sample may contaminate the food product must also be taken into account. We cannot deny that no matter how careful an operator is, some small portion may enter the food due to human error and environmental factors.

Since the DOM-24 can take measurements without needing any kind of reagent, operators can feel reassured. Even the slightest contamination will cause immeasurable loss of public trust and economic loss. The importance of removing the hazard of contamination that has recently been loudly advocated for, is also clear from the perspective of keeping consumers' food products safe. Our ideal goal is to ensure that the DOM-24 is all you need at the measurement site.

[5] Ecology

As stated above, the DOM-24 does not produce waste. Unlike test strips, it doesn't require sampling of the oil, so troublesome issue of disposing of the oil does not arise. Naturally, the risk of contaminating food is also reduced; being kind to the environment is important not only to businesses, but to everyone in our society as well. Through introducing the DOM-24 and reducing waste, businesses can improve their social image, and reduce their disposal costs.

(Note) *1

- In EU countries, for example in Germany, and France, frying oil is changed when it reaches 24%.
- Some countries, including The Netherlands, Finland, and Australia use AV.
- ISO660:2009, 8420:2002
“Animal & Vegetable fats and oils - Determination of Acid value and Acidity”

(Note) *2

Referring to the results of our survey about market share in JAPAN, we found that the majority of users are believed to be using test strips.

Test Strips	38	(64%)
Titration	8	(13%)
Nothing	8	(13%)
Sense of Color	6	(10%)

* Total 59 (Includes users who use both test strips and titration.)