

ENGINE OIL ANALYSIS: UNDERSTANDING TAN & TBN



Why your oil analysis needs to evolve the same way your oil has

For years, Total Base Number (TBN or BN) has been used as one of the key measurements in the field to help determine remaining oil life by indicating the amount of performance-related additive left in the engine oil. In short, it helps you know when engine oil needs to be changed. That's still true, but TBN on its own no longer serves as a comprehensive or definitive indicator of performance left in engine oil due to a number of other new and more revealing factors in the mix.

New Era, New Engines

New and improved product formulations—along with an evolution in cleaner, ultra-low-sulfur diesel fuels (ULSD)—are changing the way TBN is used. In the past, a high TBN was needed to combat and neutralize the high-sulfur fuels in use, which would generate significant amounts of sulfuric acid. But with this evolution, we're seeing inherently lower TBNs in the field today.

Essentially, while TBN may now appear to deplete more quickly, this is a reflection of upgrades in HDMO formulation chemistry and not the health of the remaining oil. There are also other factors contributing to the continued trend towards lower TBN condemning limits, such as the worldwide reduction of new oil quality categories that promote higher-quality products.

What does this mean for the future? Used oil analysis must now rely on a more comprehensive mix of factors that includes wear, oxidation, viscosity and **Total Acid Number (TAN or AN)**.

TOTAL BASE NUMBER (TBN): THE SUMMARY

TBN gives an indication of the amount of base available in the oil to neutralize organic and inorganic acids that accumulate in the crankcase of diesel engines during their operation.

HOW IS IT MEASURED?

The quantity of base is expressed in milligrams of potassium hydroxide per gram that is required to titrate a sample, dissolved in a specific solvent to a specified endpoint.

WHY ELSE IS IT IMPORTANT?

TBN plays an important role in the qualification of lubricants, where it is referenced by ACEA and Global DHD for specifications, OEMs and lubricant companies for fresh oil standards, and more.

WHAT INFLUENCES IT?

Factors that can affect TBN depletion rate in service include:

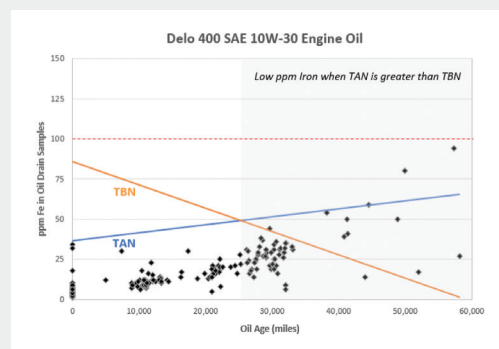
- Product formulation
- Diesel fuel sulfur levels
- Biodiesel levels in diesel fuel
- Exhaust Gas Recirculation (EGR) rates
- Oil oxidation rates
- Extension of oil drain intervals



A SHIFT IN FOCUS: THE TAN DIFFERENCE

Acid in the engine oil is a major driver of corrosion, oxidation, nitration and increased viscosity, all of which are downsides that affect performance. Ultimately, it's a root cause of equipment harm—and where TAN measurements more clearly indicate the actual operating conditions within your engine environment, TBN is limited in that it indicates only how much additive remains to protect against those performance downsides.

As the industry continues to evolve, this will continue to result in even lower TBN results in used oil analysis. Over time, it will become more and more important for the industry to find better and more specific ways to monitor oil and engine condition. Good performance in your engine oil isn't about having a high-detergent TBN measurement alone: It's about having the right balance of oxidative stability, soot dispersancy, deposit control, wear performance, detergency and TBN retention.



Ultimately, a more comprehensive mix of indicators is needed to provide a full picture of oil health and performance, including:

- TAN
- Oxidation
- Wear metals
- Viscosity

Ready for the next oil change?

As TAN and other factors become more and more reliable indicators of performance, a more comprehensive and revealing used oil analysis program is needed to ensure your oil's performance is where it needs to be.

With **Chevron's LubeWatch® Oil Analysis Program**, you can zero in on the most insightful results—including TAN. Including both standard and specialty test kits, LubeWatch enables you to track the performance of the lubricants and understand the changing environment within a piece of equipment to identify contamination or wear before it results in costly downtime. The program's blend of knowledgeable people, targeted products and customized services can help you ensure you keep your equipment running longer with routine analysis that helps you optimize and maximize equipment life and oil replacement intervals.

To get started, visit our website or contact your Chevron rep directly about LubeWatch today.

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