

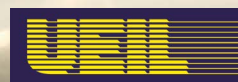
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**Military
lubricants**

*Major Rémi,
Military Fuel & Lubricants Engineer,
French Operational Energy Service*



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You may likely understand the difference between low SAPS oils, fuel-efficient oils, synthetic oils, and mineral oils, but do you know the difference between military lubricants and civilian ones? That's the question we will attempt to answer in this brief article.

It's relatively easy to understand that deploying an army to the other side of the world is a genuine logistical challenge. Regarding lubricants, the French Operational Energy Service distributes over 200 ingredients and various products to about a hundred different units using nearly as many types of vehicles. During an operation, given the technical nature of some products and the uncertain availability of local resources, all lubricants are transported from mainland France. Therefore, to reduce the resulting logistical complexity, it is important for the armed forces to rationalise the number of different products as much as possible. These products are grouped under logistical codes, each governed by military technical specifications. However, these specifications are developed only when necessary, as it would be counterproductive for the military to develop and maintain a specification for every product given the diversity and evolution of equipment. For this reason, whenever possible, civilian standards are used, and unique products are avoided to ensure alternative options are available.

In the land domain, the army uses a so-called universal engine oil. This synthetic oil of grade SAE 10W-40 is identified under NATO code O-1179. It is designed to lubricate all internal combustion engines in armoured vehicles and tanks in service. It is thus used in vehicles with a difference of over 40 years in age and therefore varying technical requirements. Its versatility is reflected in its characteristics, which are subject to a military specification. The oil must function in highly varied environments, from very cold to very hot conditions, without requiring a preliminary oil change for all vehicles. The pace of operations also demands that the oil be durable. To ensure this, it undergoes predictive maintenance through regular, rapid in-service monitoring via field analysis kits and through laboratory analyses.

In the maritime domain, two oils are particularly important for the French Navy. The first is a mineral oil for turbines and gears of ISO VG 68 grade, coded NATO O-249. This lubricant is used for both turbine bearing lubrication and certain gears. The versatility of

this oil is essential onboard ships to minimise handling errors and the number of different products onboard. The second is a monograde engine oil SAE 40, coded NATO O-278. Similar to the land domain, engine technologies may vary greatly, but the oil must remain the same for reasons of interoperability within fleet vessels and with allied vessels. This interoperability is further ensured through the regular updating of oil specifications within NATO working groups on fuels and lubricants.

This versatility and interoperability are not without consequences for the systems. It is acknowledged that, in these cases, these oils may not be the best in terms of technological performance. However, they are the best operationally as they ensure the forces' freedom of action and resource economy, two vital principles of warfare. Such compromises are not possible in the aviation domain for flight safety reasons. The product must be specifically authorised, making it nearly impossible to impose a single oil for the entire fleet of aircraft. Nevertheless, the armed forces also develop specifications, for example, for turbine oils. These technical specifications serve as a guarantee for air forces when a supplier fails and an alternative must be found. The specification thus ensures the resilience of forces during deployment.

For these reasons of versatility, interoperability, and resilience of deployed equipment fleets, the admission of a product to the distributed products list is governed by NATO Standard Agreement Number 1414. This standard specifies that to admit a new product code to the list, the applicant must technically demonstrate that there is no existing equivalent already distributed. Moreover, the advent of new engine or turbine technologies or the application of environmental standards through the use of bio-lubricants will undoubtedly provide opportunities for industries to work closely with the military to certify the most suitable products for operational forces.

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or contact
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