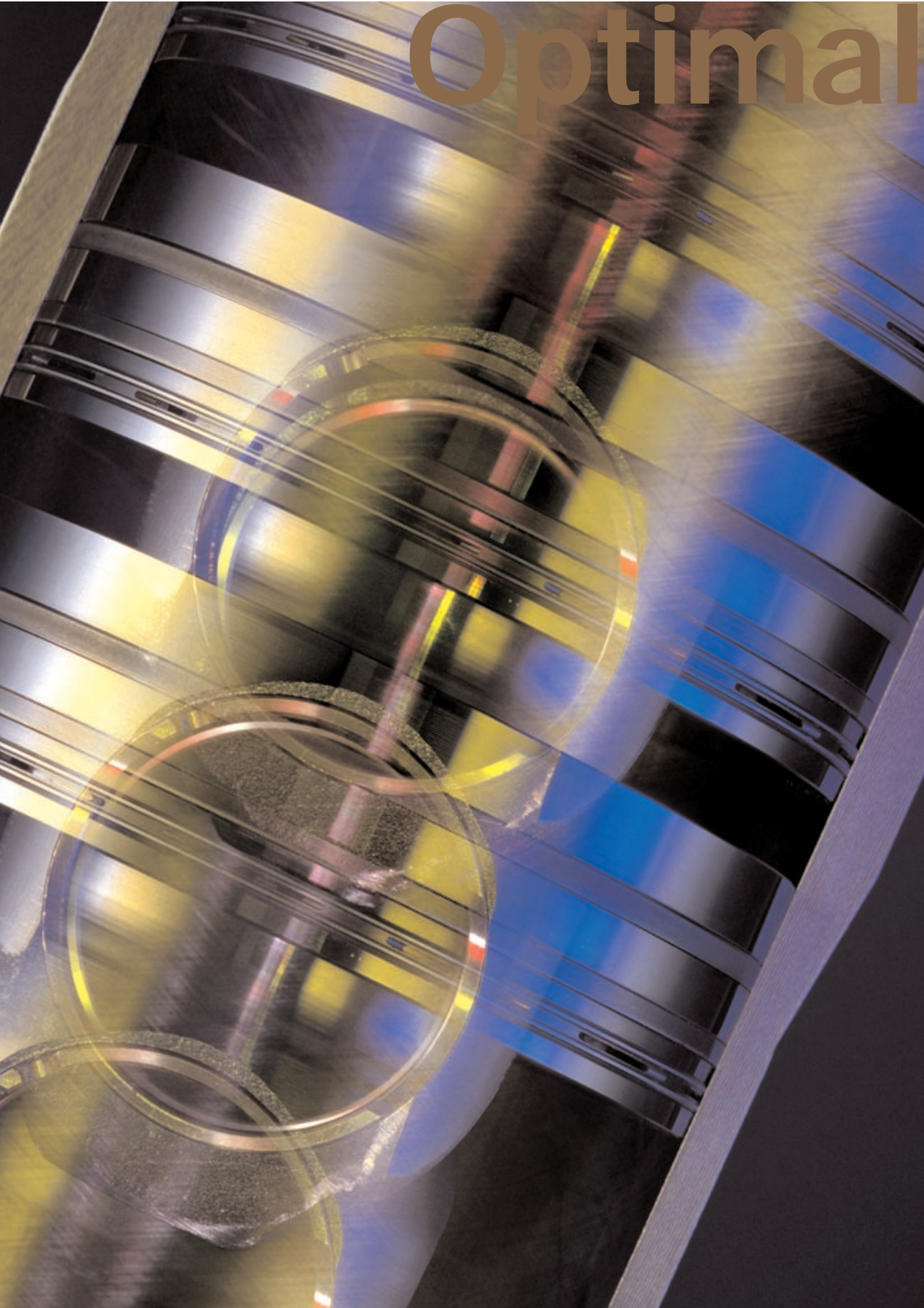


Lubrizol® 9450

An additive package
setting new standards
of oil performance

Optimal



Lubrizol Heavy Duty Diesel Oils



A lubricant performance package that meets the challenge demanded by a changing engine oil market

the challenge

Customers of oil formulators are demanding new standards of engine oil performance. This is primarily due to a new generation of diesel engine which is sweeping through Europe, North America, and the rest of the world. Developed in response to concerns about exhaust emissions, severe operating conditions, and rising maintenance costs, the new engines are designed to burn cleaner, work harder, and need less servicing. They will benefit diesel vehicle owners and operators - and the environment.

For engine oil formulators to satisfy their customers' needs to meet this new standard of oil performance, poses a significant challenge. The oils that diesel owners and operators will demand must:

- Provide no-compromise heavy duty diesel engine protection by oil performance that can cope with increasingly long drain intervals combined with excessive soot loadings caused by engine design changes
- Be competitively valued in an increasingly cost-conscious market

This market demand for new standards of engine oil performance is a major challenge facing today's oils suppliers. A novel approach is required to meet such a challenge.

Lubrizol 9450, a newly developed heavy duty diesel performance package, is the ideal solution. Its features have been carefully optimised, in several ways, to provide a new standard of core dedicated diesel performance.

Lubrizol 9450 is:

- Optimised to provide maximum durability in the new generation of heavy duty diesel engines. Sets a 'new standard' by providing new ACEA TD3 and API CG-4 at its core, and ensures diesel vehicle owners and operators have reduced maintenance costs by providing longer drain intervals and cleaner unworn engines.
- Optimised for rationalisation above and below the core treat level. The use of low ash, high dispersant chemistry ensures the formulation is suitable for low emissions engines at all levels of performance. This allows cost savings in terms of inventory rationalisation and also means the product chemistry will remain relevant as specifications become more severe.

the solution



Optimal durability

Optimised by design

Most new diesel engine oils are devised by simply modifying or enriching existing formulations. When faced with the difficult challenge posed by new generation low emission engines, however, a totally new 'optimal' approach is needed, starting with a clean sheet of paper.

Such a challenge must address the need to provide an additive package that sets new standards of dedicated diesel performance as its core characteristic.

To meet this challenge, a wide range of possible components were specially selected, matrix-tested, calibrated, and re-tested in combination. These components included dispersants, detergents, anti-wear agents and antioxidants.

This work has resulted in Lubrizol 9450, the optimal heavy duty diesel performance package that enables oil marketers to match the key lubrication needs demanded by new engine technology, such as optimal soot control, engine durability, and engine cleanliness.

A new standard of oil performance

Oil formulator customers have in the past always demanded mainline diesel performance based upon European and American credentials. Specifically the combination of MB 228.1 and API CF-4 satisfied the majority of their fleet applications.

With the advent of the changing market, fleet operator needs are switching towards reduced maintenance costs and hence longer drain intervals coupled with cleaner unworn engines. This move is being supported by engine manufacturers and ACEA (Association des Constructeurs Europeens de l'Automobile) alike by requiring MB 228.3 and components of API CG-4 in their specifications. Lubrizol 9450 satisfies this market demand by providing this requirement as its core profile.

Achieves ACEA requirements

A heavy-duty diesel oil standard has been devised by ACEA to replace the equivalent CCMC test sequence. ACEA is retaining the CCMC's most difficult piston and bore polish test, the OM 364A, and is introducing new tests such as the OM 602A cam wear. ACEA is also including the Mack T-8 soot thickening test - a key component of API CG-4. Lubrizol 9450, formulated at a cost-competitive treatment rate, meets all applicable ACEA specifications.

Qualifies for API CG-4 performance

The most challenging impact of new-generation engine design on lubricants is soot loading and piston deposits. This is why API CG-4 lubricants require both a high level of soot control dispersancy for for the Mack T-8 test, and a low level of deposit forming sulphated ash for the Cat 1N test. However the low ash level must not compromise the high level of detergency required by the OM 364A test in the ACEA sequences. Obviously an optimal formulation is required to meet both API CG-4 and ACEA TD3.

Proven performance at the core

Lubrizol 9450 is optimally formulated to provide dedicated heavy duty diesel performance. At its core treatment level of 13.6%

Lubrizol 9450 sets new standards by giving an oil that fulfils both ACEA TD3 and API CG-4 requirements.

Potential for rationalisation

In the coming months you will be provided with updates announcing our success as each performance target is met as we progress towards the full rationalisation potential of Lubrizol 9450.

API CF-4 and a further downtreat is targeted to give a profile of ACEA TD1 and API CF.

Addition of boosters will give the SHPD profile which includes MAN QC-13017, and a further target has been set to achieve UHPD performance as defined by Mercedes Benz 228.5.

Downtreating from the core will give the HPD (high performance diesel) profile of ACEA TD2 and

Cost effective formulations

Lubrizol 9450's performance claims have been designed to provide optimal cost effective treatment levels. A further formulation cost saving can be achieved when combining Lubrizol 9450 with Lubrizol 7077 viscosity modifier system and Lubrizol 7749B pour point depressant.

Testwork to date has been conducted using this outstanding additive combination in an SAE 15W-40 viscosity grade with Esso basestocks. Basestock and viscosity grade readacross testwork programmes will ensure a selection of versatile formulations are available to meet specific customer needs.

UHPD

Target performance profile (multi):
ACEA TD4
MB 228.5
Volvo VDS-2
MAN QC 13-017

SHPD

Target performance profile (multi):
ACEA TD3
MB 228.3
Volvo VDS-2
MAN QC 13-017

Core

Proven performance profile (multi):
13.6% wt. Lubrizol 9450
ACEA TD3
API CG-4
Mack EO-L
MB 228.3
Volvo VDS-2 (pending)

HPD

Target performance profile (multi):
ACEA TD2
API CF-4
MB 228.1

Lower treat

Target performance profile (multi and mono):
ACEA TD1
API CF/CF-2
MB 227

Optimal cleanliness

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