

Nouryon

Armolube 211



Friction modifier



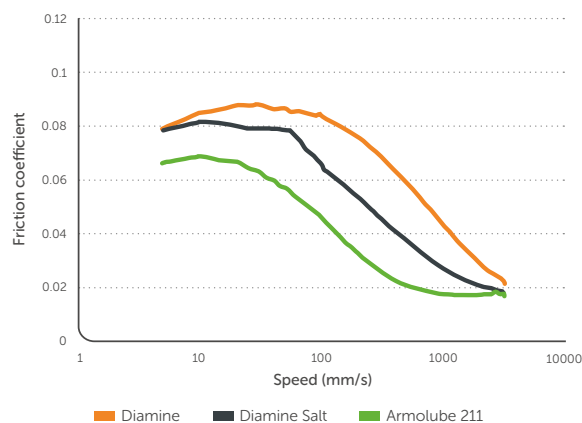
Fuel economy improvement remains a major challenge facing the automotive market. The use of friction modifiers to reduce or control friction scenarios during engine or driveline lifetime remains a key tool for Automotive lubricant formulators. Selection of correct friction modifiers has been shown to achieve savings of up to 2% and helps reduce CO2 emissions.

Moving friction performance forward

Friction modifiers are used almost universally in engine oils as well as added to fluids used in transmissions.

MTM friction evaluation

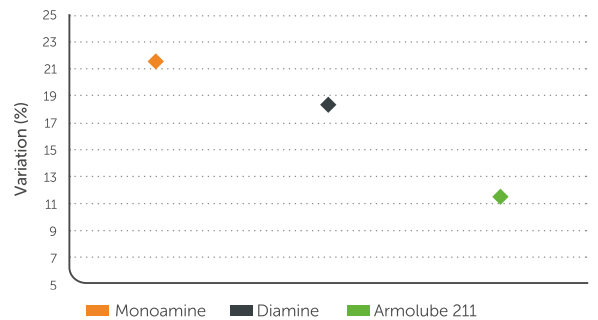
When comparing Armolube 211 in a Group II base oil which included ZDDP there was a clear lowering of friction across all regions. This suggests a change in friction profile in the mixed lubrication boundary which can lead to reduced wear.



Addition of 0.5 wt% of Armolube 211 in base oil including ZDDP. MTM test at 120°C and 50/50 slide roll ratio.

Armolube 211 has been shown to be less aggressive to seals which increases formulating options. This is shown using CEC L-39-96 test method by comparing technology at 1% in base oil.

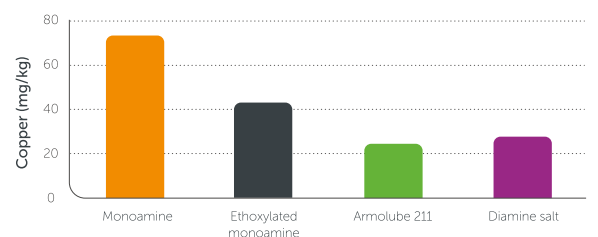
The reduced seal volume change provides an added benefit for formulators as higher treat rates to reduce friction can be achieved.



Volume change in seals testing, addition of 1.0 wt% of Armolube 211 in base oil for 1 week at 150°C.

This improved seal performance of close to 50% vs a monoamine, increases the scope to allow the friction reduction properties of Armolube 211 to be realized.

Armolube 211 shows significant improved leaching vs monoamine and other commonly used fatty amine ethoxylates as well as other diamine salts. This is another advantage to formulators looking to realize friction reduction.



Leaching study using copper strip at 135°C for 168 hours with continuous air blown through the solution.

Armolube 211 Product Data Sheet

Application	Additive for engine/transmission oil for improved fuel economy	
Use	0.1-1.5 wt% is recommended	
Typical properties	Chemical and physical data	Typical values
	Amine number	170-190 mgKOH/g
	Color	0-9 Gardner
	Moisture	max 1%
	Viscosity	118 cP at 60°C
	Flash point	100-199°C
	Melting point	30-40°C
	Appearance	paste at 20°C
Typical data are based on our own measurements or derived from the literature They do not constitute part of the delivery specification		
Storage and handling	Armolube 211 is available in drums or bulk Armolube 211 should be stored under cover, protected against rain and direct sunlight	
Handling and safety	A Safety Data Sheet is available	

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