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DING OIL SELLING SPECIFICATION

Product: **Hydraulic Brake & Clutch Fluid: ESP 260/165 DOT 4**
Specification No: OSS 118
Issue No: 6
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Orthene ESP Grade Brake Fluid has been specially formulated to enable Electronic Stability Program (ESP) systems to operate effectively over a wide temperature range. Suitable for all ESP and other conventional brake systems using Glycol Ether based Brake Fluids.

The product shall fully meet the requirements of the latest issue of the US FMVSS 116 DOT 4, DOT 3, SAE J 1703, SAE J 1704 and ISO 4925 (Classes 3, 4 & 6) Specifications. The product shall also meet the following requirements:

Test	Units	Method	Specification
Equilibrium Reflux Boiling Point	°C.	FMVSS 116	260 Min.
Wet Equilibrium Boiling Point	°C.	FMVSS 116	165 Min.
Kinematic Viscosity at -40 °C.	cSt	ASTM D 445	750 Max.

Test Required		Typical Results	Specification
Dry Equilibrium Reflux Boiling Point, °C		267	260 °C. Min.
Wet Equilibrium Reflux Boiling Point, °C		172	165 °C. Min.
Kinematic Viscosity	@ -40 °C, cSt	675	750 cSt Max.
	@ 100 °C, cSt	2.10	1.5 cSt Min.
pH		8.53	7 – 11.5
High Temperature Stability, °C		-1	+/- 3.0 °C. Max
Chemical Stability, °C		+1	+/- 3.0 °C. Max
Evaporation, %w/w		61	80% Max
Fluidity & Appearance	@ -40 °C	Pass, 4 seconds	No freezing, Bubble time 10 sec. Max
	@ -50 °C	Pass, 8 seconds	No freezing, Bubble time 35 sec. Max
Water Tolerance	@ -40 °C	Clear, 3 seconds	10 seconds Max
	@ +60 °C	Clear, No sediment	Sediment not to exceed 0.05% v/v
Compatibility	@ -40 °C	Clear, No stratification	No stratification
	@ +60 °C	Clear, No sediment	Sediment not to exceed 0.05% v/v
Colour, visual		Pale Amber	Water white to amber
Water Content, %		< 0.20	Not required
Density @ 20 °C, g/ml		1.052	Not required

Corrosion Resistance

Tinned Iron	Δ mg/cm^2	-0.03	0.2 Max
	Appearance	Good	No pitting or etching
Steel	Δ mg/cm^2	-0.01	0.2 Max
	Appearance	Good	No pitting or etching
Aluminium	Δ mg/cm^2	Nil	0.1 Max
	Appearance	Good	No pitting or etching
Cast Iron	Δ mg/cm^2	-0.03	0.2 Max
	Appearance	Good	No pitting or etching
Brass	Δ mg/cm^2	-0.08	0.4 Max
	Appearance	Good	No pitting or etching
Copper	Δ mg/cm^2	-0.05	0.4 Max
	Appearance	Good	No pitting or etching
Zinc	Δ mg/cm^2	+0.01	0.4 Max
	Appearance	Good	No pitting or etching
Fluid Appearance		Pass	No crystallisation or gelling
Sediment %		< 0.05	< 0.1%
pH		8.20	7 – 11.5
Rubber Diameter Change mm		+0.16	+1.40 Max
Hardness Change °IRHD		-4	-15 °IRHD Max
Appearance		Pass	No sloughing, blistering or disintegration

Oxidation Resistance

Cast Iron	Δ mg/cm^2	+0.04	0.3 Max
	Appearance	Pass	No pitting or roughening
Aluminium	Δ mg/cm^2	+0.02	0.05 Max
	Appearance	Pass	No pitting or roughening

Effect on Rubber

SBR @ 70 °C	Ø change, mm	+0.56	0.15 to 1.40
	Δ hardness, IRHD	-3	0 to -10
	Δ volume, %	+6.21	1 to 16
	Appearance	Good	No blistering, sloughing or disintegration
SBR @ 120 °C	Ø change, mm	+0.73	0.15 to 1.40
	Δ hardness, IRHD	-7	0 to -15
	Δ volume, %	+7.69	1 to 16
	Appearance	Good	No blistering, sloughing or disintegration
EPDM @ 70 °C (as required by SAE J1703)	Δ hardness, IRHD	-2	0 to -10
	Δ volume, %	+1.39	0 to 10
	Appearance	Good	No blistering, sloughing or disintegration
EPDM @ 120 °C	Δ hardness, IRHD	-2	0 to -15
	Δ volume, %	+1.91	0 to 10
	Appearance	Good	No blistering, sloughing or disintegration
Natural @ 70 °C (as required by ISO 4925)	Ø change, mm	+0.38	0.15 to 1.40
	Δ hardness, IRHD	-5	0 to -10
	Δ volume, %	+4.61	1 to 16
	Appearance	Good	No blistering, sloughing or disintegration