Product Data

Perfecto TR RC

Transformer oil

Description

Castrol Perfecto TR RC is a high quality, mineral based insulating oil which meets or exceeds IEC 60296 (03), ASTM D3457, IEEEC 57, 106, BS 148 and AS 1767 and is designed for use in transformers and electrical switchgear.

This product contains re-processed oil.

Application

Purity – the oil as an insulant
Freedom from traces of water, dust and fibrous material is of the highest importance in a transformer oil. The presence of such contaminants in an oil seriously lowers its electrical strength by creating paths for the passage of a spark or arc. The term “electrical purity” has been used in these notes to express this feature. Perfecto TR RC, where supplied in 205 litre drums, possesses a guaranteed electrical strength of 40 kV minimum at time of filling. Where supplied in smaller containers this guarantee cannot be maintained owing to the difficulty of ensuring absolute cleanliness of these containers

Heat Conductivity
In all forms of energy conversion, be they mechanical or electrical, some losses are unavoidable and these usually result in the formation of heat. If, after a limited initial temperature rise, this heat is not dissipated as rapidly as it is formed, the temperature of the system may climb to a dangerous level. Electrical transformers are no exception to this general rule. There is a definite, and rather low, limit to the maximum temperature that they can be allowed to attain. This limit is set by the insulation; if it is exceeded, the insulation will break down and the transformer will fail.

Heat can be dissipated in three ways, by convection, by radiation and by conduction, each of which comes into play for the heat generated in the iron core and copper conductors of a transformer.

In most large units an intermediate medium for heat dissipation is provided by the oil, the rate of heat transfer is mainly governed by the oil’s heat conductivity and heat capacity, and by the effect of convection. Heat removal by oil is mainly a function of viscosity, since a less viscous fluid is able to circulate more rapidly under the effect of convection. Accordingly, transformer oils should have the lowest possible viscosity consistent with its other desirable properties.

Low viscosity oil, too, is more “efficient” in this action. It circulates more easily within the winding and ducts of the transformer and thus helps to prevent the formation of local hot spots. Perfecto TR RC is formulated to a relatively low viscosity to ensure efficient heat dissipation.

Although low viscosity is a desirable feature, oils of low viscosity generally have the highest volatility. Perfecto TR RC is formulated with a base oil having a low vapour pressure at the operation temperature of the equipment to ensure that loss by evaporation and undue fire risk may be avoided.

Volatility is one of the chief factors setting the lower limit of viscosity. The flash point of oil is related to its volatility and it must be recognized that whenever hot petroleum oils are in contact with electrical equipment, fire and explosion are potential risks. To lessen these hazards Perfecto TR RC exceeds the minimum flashpoint of 140°C. This flash point is appreciably higher than the maximum temperature a transformer is likely to reach.

Approval Status

Perfecto TR RC meets or exceeds IEC 60296 (03), ASTM D3457, IEEEC 57, 106, BS 148 and AS 1767 for transformer oil for transformers and switchgear.

Advantages

Low Pour Point
Perfecto TR RC has a relatively low pour point to resist wax separation at low temperatures.

High Chemical Stability
Transformers may generate excessive temperatures, either from high loading or sludge formation impeding heat transference. These temperature increases place additional stresses on the insulation materials and the oil. Under these conditions the rate of oxidation and acidity increase in the oil may be delayed or inhibited by the addition of antioxidants. Perfecto TR RC has been developed to satisfy these arduous operation conditions.

Switchgear Oils
The major components of oil filled switchgear are circuit-breakers, current and potential transformers and bus-bar chambers. With switchgear components the chief function of the oil is the quenching of the electric arc that forms between the contacts as they separate. However, insulation and cooling are also important. The most important requirement in quenching an arc is that it should occur in the shortest possible time especially when the circuit-breaker, for example, is operating to clear an electrical fault. It has been found this effect is best achieved with oils as low as possible in viscosity consistent with other requirements. The desirable properties of switchgear oils coincide approximately with those of transformer oils and in practice identical oils are used.

Typical Characteristics

Name	Method	Units	Perfecto TR RC
Appearance	ASTM D1524	-	Clear & Bright
Specific Gravity @ 15°C / 59°F	ASTM D1298	-	0.91 max
Density @ 15°C / 59°F	ASTM D4052	kg/m³	895 max
Flash Point - closed cup method	ASTM D93	°C	140 min
Breakdown Voltage	IEC 60156	kV	50 min
Dielectric Dissipation Factor (DDF) @ 90°C	IEC 60247	%	0.3 max
DBPC Concentration	ASTM D2668	%w/w	0.3
Corrosive Sulphur	ASTM D1275B and Cigre Method TF A2.32.01	-	Non corrosive
Gassing Tendency	IEC 60628	ul/min	30 max
Resistivity @ 90°C	IEC 60247	Gohm.m	200 min
Interfacial Surface Tension (IFT)	ASTM D971	mN/m	40 min
Moisture Content	IEC 60814	mg/kg	25 max
Oxidation Stability after 500hrs	IEC 1125 Method C	-	Pass
Total Furan	IEC 61198	mg/kg	0.1 max
PCB Content	ASTM D4059	mg/kg	Not detectable
Acidity	ASTM D974	mgKOH/g	0.01 max

The above figures are typical of those obtained with normal production tolerance and do not constitute a specification.

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