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Road vehicles — Ignition coils — Electrical characteristics and test methods

*Véhicules routiers — Bobines d'allumage — Caractéristiques électriques et
méthodes d'essai*



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Road vehicles — Ignition coils — Electrical characteristics and test methods

1 Scope

This International Standard applies to ignition coils for inductive energy storage. It defines test methods for ignition coils used in ignition systems with solid state switching of spark ignited internal combustion engines.

2 Parameters

2.1 General

The performance of an ignition coil is governed by three major sets of parameters:

- those inherent within the coil;
- those associated with the external conditions affecting the primary side of the coil;
- those affecting the output or secondary side of the coil.

The behaviour of the coil at its low tension terminals shall be known to the supplier of the interruption system. Similarly the output at the high tension (HT) terminals shall be known to those concerned with specifying the spark plug demand and the routing of the HT output. Several of the parameters to be derived interact and they shall, therefore, be quoted as a complete set.

The parameters listed in 2.2 to 2.4 do not provide a direct indication of the operational temperature rise of the coil.

2.2 Coil construction parameters

- Primary resistance (R_p)
- Primary inductance (L_p) (for reference only)
- Turns ratio (for reference only)
- Secondary resistance (R_s) (for reference only)
- Primary current reference time (t_{rel}) (for a limited range of R_p)
- Primary leakage inductance (L_{pl})

2.3 Primary side parameters (switching)

- Nominal primary interruption current (I_{Np})
- Primary clamp voltage (U_{plm})

2.4 Output parameters, governed by construction and switching

- Maximum secondary output voltage (U_{sm})
- Ignition limiting load resistance (R_{15kV})
- Secondary voltage rise time (t_{sUr}) (timing retard)
- Zener discharge energy (E_{zd})
- Zener discharge duration (t_{zsd})
- Maximum zener discharge current (I_{zdm})

3 Test conditions

All tests shall be done at an ambient temperature of $(23 \pm 5) ^\circ\text{C}$ and a relative humidity between 45 % and 75 %.

Before measuring resistance, ensure the temperature of the coil is stable.

All equipment shall be calibrated before measurements are made.

4 Test equipment

4.1 Coil

For the test purposes the coil shall be arranged as shown in figures 1 and 2. For double ended coils, one HT terminal shall be grounded through a 0,5 kV zener diode, simulating the exhaust spark.

4.2 d.c. source

A d.c. source shall be used having a 10 % to 90 % transient recovery time of not more than 50 μs over the load range encountered in use. It shall have no more than 50 mV variation in average voltage from no load to full ignition system load and no more than 100 mV peak-to-peak ripple over the same load range. The power supply shall be positioned immediately adjacent to the system being tested.

This d.c. source shall be adjusted to:

$(13,5 \pm 0,1) \text{ V}$ for 12 V systems;

$(27 \pm 0,2) \text{ V}$ for 24 V systems.

4.3 Oscilloscope

An oscilloscope with a maximum rise time of 35 ns, with a minimum band pass of 10 MHz shall be used (P1, P2, P3, P4). The overall measuring inaccuracy including compensated and calibrated voltage and current probes (see 4.4 and 4.5) shall be less than:

1 % for voltages below or equal to 1 500 V;

3 % for voltages above 1 500 V;

1 % for current measurements.