APPLICATION / DESIGN NOTES ON NOISE SUPPRESSOR RESISTORS (HANS)

GENESIS:

Gasoline Engine ignition systems produce high frequency electromagnetic interference (EMI), known in common parlance as Radio Frequency Interference (RFI).

These frequencies are random in nature and for extremely short durations like fraction of a second, but the working of almost every electronic product can be affected by them in varying degrees.

The areas where these disturbances are critical and must be suppressed are in engine and ABS control electronics as well as radio and telephone communications where the interference manifests itself in crackles & rattles in the line.

This interference is generated by sparks created at the following places in the high voltage side of gasoline engine ignition systems –

1) Sparks are produced at the coil where the battery voltage is converted into high voltage pulses.
2) At the distributor where the high voltage is routed to the respective spark plug.
3) At the spark plug itself at combustion stage.

LEGISLATION ENACTED :

As these disturbances must be reduced to an acceptable level, international legislation to limit the level of radio interference has been enacted by different countries worldwide.

For example, one of the legislations in force is as per Council Directive 72/245/EEC dated 20th June 1972 relating to "The suppression of radio interference produced by spark ignition engines fitted to motor vehicles", which is applicable in Europe.

It must be noted that levels specified vary from country to country as per their own legislation enacted.

COMPLIANCE WITH LEGISLATION ENACTED :

One of the best techno economic methods of complying with the legislations in force is by changing conventional spark plug leads from stranded cables to solid core wire with a noise suppressor resistor introduced between the end of the wire and the spark plug by fitting the resistor in the spark plug cap in the case of a motorcycle / scooter or by introducing the noise suppressor resistor in the rotor of the distributor in the case of motor vehicles.

The noise suppressor resistors are so designed that the ohmic value chosen is such that it gives the resistor a certain self inductance between 10μH to 1mH, which influences the frequency response by changing the impedance.

The impedance which stands for total effective resistance of a circuit is the factor responsible for the damping down of the disturbances in such a manner as to comply with the legislation in force.

Calculations of engine r.p.m., the consequent ignition frequency indicate that the ignition voltage pulses are around 38KV and the noise suppressor resistors when introduced in the circuit should not change these base pulses to ensure efficient working of the entire ignition system.

In view of the above it has been found that these noise suppressor resistors function as desired provided the resistance values are between 1K0 Ohm and 15K Ohm, which translates to self inductance between 10μH to 1mH which in turn changes the impedance which dampens the disturbance by influencing the frequency response.

These noise suppressor resistors are now introduced by HTR covered by our HANS series.

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CONSTRUCTION :

The construction of these resistors simply put consists of a wire wound resistor where the resistive element (wire) is wound in a single layer on a fibre glass core with crimped brass end caps which form the electrodes.

Each of these resistors are tailor made to suit a specific application / car ignition system and all types are developed on request.

NOTE :

Normally resistors are specified by stating Power rating, Resistance Value and Tolerance of the resistance value.

Since these noise suppressor resistors are only exposed to repetitive exponential pulses and not to continuous current, the pulse withstanding capacity is of primary importance where most of the dissipation of heat generated by the pulses will depend on the mass of resistance wire and the final assembly in which the noise suppressor resistor is fitted in.

In view of this, it does not make any sense to specify the power rating of these noise suppressor resistors as power dissipation depends on the current wave form and frequency coming from the ignition coil and further in this case current in this circuit is only generated in the discharge cycle.

Lastly due to to nature of the application a low tolerance is not required and most noise suppressor resistors are specified with 20% to 10% tolerance.