FAQs - Spark Plugs

Q: How do I "read" a spark plug?

A: Being able to "read" a spark plug can be a valuable tuning aid. By examining the insulator firing nose color, an experienced engine tuner can determine a great deal about the engine's overall operating condition.

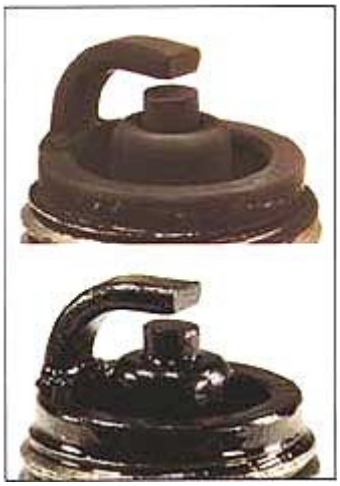
In general, a light tan/gray color tells you that the spark plug is operating at optimum temperature and that the engine is in good condition. Dark coloring, such as heavy black wet or dry deposits can indicate an overly-rich condition, too cold a heat range spark plug, a possible vacuum leak, low compression, overly retarded timing or too large a plug gap.

If the deposits are wet, it can be an indication of a breached head gasket, poor oil control from ring or valvetrain problems or an extremely rich condition - depending on the nature of the liquid present at the firing tip.

Signs of fouling or excessive heat must be traced quickly to prevent further deterioration of performance and possible engine damage.

Normal Condition
An engine's condition can be judged by the appearance of the spark plug's firing end. If the firing end of a spark plug is brown or light gray, the condition can be judged to be good and the spark plug is functioning optimally.

Dry and Wet Fouling
Although there are many different cases, if the insulation resistance between the center electrode and the shell is over 10 ohms, the engine can be started normally. If the insulation resistance drops to 0 ohms, the firing end is fouled by either wet or dry carbon.



Overheating
When a spark plug overheats, deposits that have accumulated on the insulator tip melt and give the insulator tip a glazed or glossy appearance.

Deposits
The accumulation of deposits on the firing end is influenced by oil leakage, fuel quality and the engine's operating duration.

Lead Fouling
Lead fouling usually appears as yellowish brown deposits on the insulator nose. This can not be detected by a resitsance tester at room temperature. Lead compounds combine at different temperatures. Those formed at 370-470℃ (700-790℉) having the greatest influence on lead resistance.

Breakage
Breakage is usually caused by thermal expansion and thermal shock due to sudden heating or cooling.

Normal Life
A worn spark plug not only wastes fuel but also strains the whole ignition system because the expanded gap (due to erosion) requires higher

voltages. Normal rates of gap growth are as follows:
Four Stroke Engines: 0.01~0.02 mm/1,000 km (0.00063~0.000126 inches/1,000 miles)
Two Stroke Engines: 0.02~0.04 mm/1,000 km (0.000126~0.00252 inches/1,000 miles)

Abnormal Erosion
Abnormal electrode erosion is caused by the effects of corrosion, oxidation and reaction with lead - all resulting in abnormal gap growth.

Melting
Melting is caused by overheating. Mostly, the electrode surface is rather lustrous and uneven. The melting point of nickel alloy is 1,200~1,300℃ (2,200~2,400℉).

Erosion, Corrosion and Oxidation
The material of the electrodes has oxidized, and when the oxidation is heavy it will be green on the surface. The surface of the electrodes are also fretted and rough.

Lead Erosion
Lead erosion is caused by lead compounds in the gasoline which react chemically with the material of the electrodes (nickel alloy) as high temperatures; crystal of nickel alloy fall off because of the lead compounds permeating and seperating the grain boundary of the nickel alloy. Typical lead erosion causes the surface of the ground electrode to become thinner, and the tip of the electrode looks as if it has been chipped.

Examples of common problems that effect the firing nose of the plug >

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