Industrial Series
Spark Plug Failure Modes

Over torquing:

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<th>Cracks in the threads</th>
<th>Seal ring deformation</th>
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- Over torquing:
  - Ceramic failures
  - Seal ring deformation

M18 plugs should be torqued to 35-45 Nm (26-33 Lb-ft)
M14 plugs should be torqued to 28 Nm (21 Lb-ft)

Over torquing is the most common cause of problems with industrial spark plugs. Over torquing can cause the seal between the ceramic and housing to break and cause cracks in the housing allowing combustion gases to escape. If the ceramic is not loose, the discoloration on the ceramic is called corona discharge and is normal when high voltages are present.

If using anti-seize lubricant, 1000°C "metal free" lubricant must be used. Hot metal lubricants can cause spark plugs to seize in the cylinder head.

Bosch recommends when installing spark plugs to use a torque wrench and the correct torque in ft.-lbs. As a general guideline, if a torque wrench is not available, hand tighten the plug until it is seated in the cylinder head. Spark plugs with gaskets should be tightened an additional 90°.

*Note: Avoid overtightening or undertightening as spark plug or engine damage may result. Always follow the manufacturer recommended torque specifications.
### High Transversal Forces

**Damage caused by socket**

During installation and removal, if the socket is not fully seated on the plug or is applied at an angle, the side force can cause cracks in the ceramic between the housing and insulator.

**Socket with supports (not recommended)**

Use a torque wrench with a wide bore. Wrenches with supports, as seen to the right, are more likely to damage the ceramic.

### Deposits

#### Normal operating conditions

Plugs are covered with normal oil ash. Engine is operating as desired.

#### High Electrode Wear

Engine is operating as desired, but plugs have reached the end of their life. Replace plugs.

#### Excessive Engine Oil

Plugs are coated with oil indicating high oil consumption. This could lead to a spark plug failure such as cracked insulator or oil fouling resulting in difficulty starting.

#### Iron Deposits

The red coating is iron. The conductive iron leads to misfires as the spark travels from the center electrode to the housing instead of jumping between the electrodes (note white lines on the ceramic). The engine is not operating as desired. Valves may not be seating correctly.

#### Mishandling or Impact

Plug was damaged during installation or impacted during use. Use caution when installing new plugs. Do not drop plugs into cylinder head during installation.

#### Excessive heat

A melted ground electrode indicates pre-ignition. Ensure proper heat range of the plug is used and check ignition timing.