

Electrode Gap Metric Conversion

inch	.020	.022	.024	.025	.028	.030	.032	.036	.040	.044	.048	.054	.060	.064	.080
mm	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.9	1.0	1.1	1.2	1.35	1.5	1.6	2.0

Gapping Specifications

Bosch Spark Plugs are pre-gapped at the factory. In most cases, that gap is indicated on the package. If the gap is adjustable and different from the gap specified by the engine manufacturer, it needs to be adjusted. For proper performance and exhaust emissions, the gap must be within ± 0.004 " of the specified value. For most applications, the pre-set gap is correct.

Note: Bosch OE Fine Wire Iridium, OE Fine Wire Double Platinum and OE Fine Wire Platinum are pre-gapped adjustment of gap could cause damage to the center electrode. See Spark Plug Gapping section.

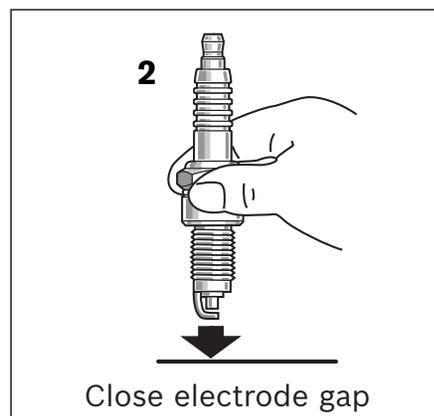
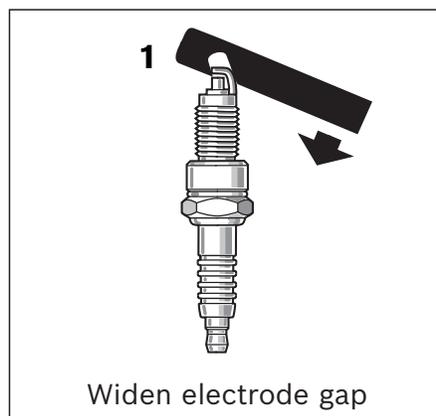
Spark Plug Gapping

(Bosch OE Fine Wire Iridium, OE Fine Wire Double Platinum, and OE Fine Wire Platinum Spark Plugs come with gaps pre-set at the factory. These gaps are never to be adjusted.)

Bosch Super Plus Spark Plugs also have factory-set gaps. For most plugs, the setting is shown on the plug package. These gaps are correct for the most popular applications of these plugs. There are applications, however, for which the gap setting has to be adjusted according to the vehicle manufacturer's specifications.

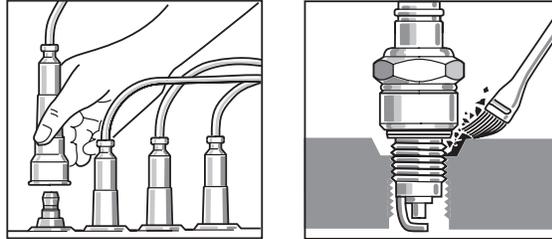
To avoid damage to a spark plug in the process of adjusting the gap, it is important to follow these guidelines:

- To widen the electrode gap, use a tool that only pulls back the ground electrode, without applying pressure to the center electrode (see illustration 1). The tool must not be wedged between the electrodes as that may cause damage to the insulator nose.
- To close the electrode gap, carefully tap the plug, electrode first, on a hard surface, as shown in illustration 2.



Spark Plug Installation Procedure

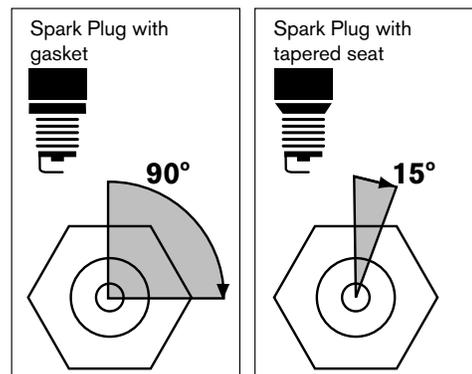
- Allow engine to cool.
- Disconnect cables or ignition coils. Mark spark plug cables/coils to ensure replacement in proper sequence.
- Loosen plugs one or two turns and clean surrounding area so that no dirt particles get into the threads or the combustion chamber.
- Remove worn spark plugs. If the spark plug is extremely tight, loosen only a little to allow penetrating oil to drip onto exposed thread, screw the plug in again and attempt to remove it after a few minutes.
- Check gap of new Bosch Spark Plugs and adjust if necessary. (**Note:** Bosch OE Fine Wire Iridium, OE Fine Wire Double Platinum, and OE Fine Wire Platinum are pre-gapped from the factory.)
- Thread in Bosch Spark Plug until hand tight. Using a torque wrench and suitable spark plug socket, tighten the spark plug to the manufacturers recommended torque. If torque wrench is not available, follow the procedure below (2).*
- Replace spark plug wires or coil boots if equipped.



Spark Plug Tightening Procedures

Bosch recommends when installing spark plugs to use a torque wrench and the correct torque in ft.-lbs. listed below. 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°. Spark plugs with tapered seats should be tightened an additional 15°.*

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



Tighten All Plugs With a Torque Wrench

Plugs should be tightened with a torque wrench to the manufacturers recommended torque specifications. Failure to sufficiently seat the plug in the engine spark plug seat, or over tightening the plug, will likely result in one or more of the following:

- Damaged spark plug (melting of electrodes, separation of the insulator from the shell, discoloration of shell and terminal nut)
- Burnt spark plug wire or coil boot
- Severe engine damage

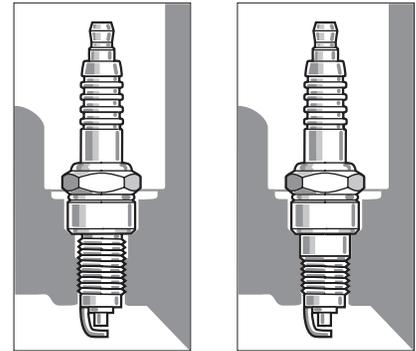
Recommended Torques For Spark Plug Installation

Thread size	10mm With Gasket	12mm With Gasket	14mm With Gasket	14mm With Tapered Seat	18mm With Gasket	18mm With Tapered Seat
Torque ft.-lbs.	8-11	12-15	19-22	12-15	20-23	14-17

Note: If anti-seize compound is used, reduce torque by 30% to avoid over-torquing.

Half-Thread vs. Full-Thread Spark Plugs

Some General Motors and Ford engines are equipped with original equipment spark plugs where the shell is partially threaded (examples: AC R43NTS8 or Motorcraft AWSF42C) to facilitate installation during engine assembly. The installation of full threaded plugs, in place of a partial threaded plug duplicates the original equipment plug reach (see illustration) and does not alter engine performance. Service Bulletins from Vehicle Manufacturers have approved of the use of full threaded spark plugs in place of partial. Do not install partial threaded plugs where the original equipment plug is full-threaded as severe engine damage is likely as a result of inadequate heat transfer.



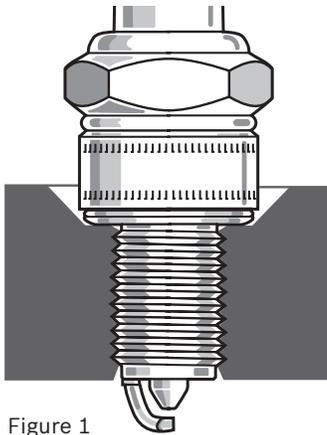


Figure 1
One gasket correct plug seat.

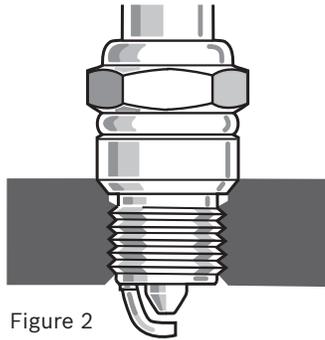


Figure 2
Conical plug installed correctly.

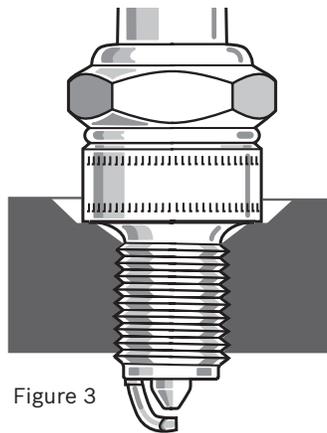


Figure 3
No gasket, danger of pre-ignition. Overheating of the ground electrode, difficulties in removal.

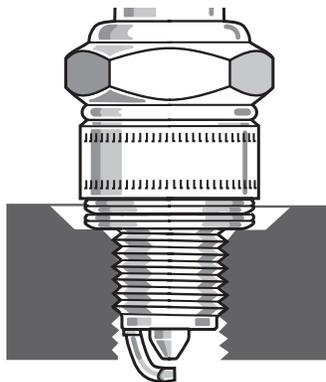


Figure 4
Two gaskets results in cylinder threads becoming filled with residue.

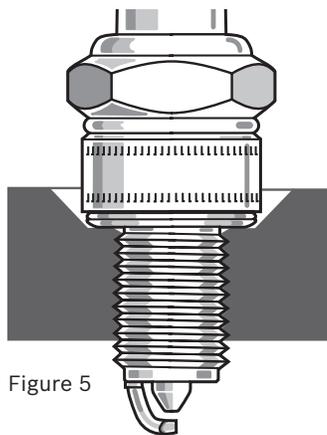


Figure 5
Spark plug with long reach in a cylinder head designed for shorter reach plug.

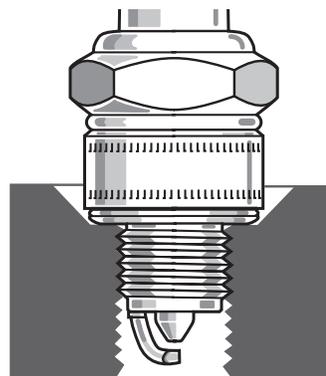


Figure 6
Spark plug with short reach in a cylinder head designed for longer reach plug.

Installation Tips:

To avoid problems later, it is always wise to check that the plug has the correct reach for the engine and that the gasket is in place during installation (see figure 1). Some plugs, however, do not require a gasket (see figure 2). These are usually plugs with a conical (or tapered) seat. When installing these plugs, it is important that the mating surfaces are clean and that you do not over-torque the plug. If a plug is installed without a gasket (see figure 3), excessive heating and pre-ignition may occur due to poor heat transfer and blow-by of combustion gases. Also, the threads will project in the combustion chamber and become filled with residue making removal difficult. On the other hand, if two gaskets are used (see figure 4), residue will collect in the exposed cylinder threads. This will make the next installation of the correct plug extremely difficult. The same conditions occur when installing a plug with incorrect reach, (see figures 5 & 6).

Important, please read!

Plugs must be tightened with a torque wrench. See page 309 for recommended values. Failure to sufficiently seat the plug in the engine spark plug seat will likely result in one or more of the following:

Damaged spark plug (melting of electrodes, separation of the insulator from the shell, discoloration of shell and terminal nut), burnt spark plug wire and severe engine damage.

Avoid overtightening of the spark plug which will result in plugs damage (insulator becomes loose and center electrode melts). Bosch Spark Plug threads are rolled and nickelplated eliminating the need to use anti-seize compound (if anti-seize material is used, reduce the torque recommendations by 30%). Make sure cylinder head plug threads are free of carbon deposits – if necessary “chase” threads with a cleaning tool.

Automotive Spark Plug Type and Heat Range Chart



Thread Size & Hex	Heat Range	Super Plus & Specialty Plugs		Silver Plugs		Platinum Plugs		Double Platinum Plugs		Iridium Plugs	
		Plug Number	Part Number	Plug Number	Part Number	Plug Number	Part Number	Plug Number	Part Number	Plug Number	Part Number
12mm Thread 3/4" Reach 11/16" Hex	Hot ↑	X5DC	7409								
	↓ Cold	XR5DC		XR4CS	7701						
12mm Thread 3/4" Reach 5/8" Hex	Hot ↕	Y6DC	7416								
	↓ Cold										
12mm Thread 1" Reach 5/8" Hex Extended Tip	Hot ↑										
	↓ Cold									YR6SII330X	9619
12mm Thread 1" Reach 9/16" Hex Extended Tip	Hot ↑										
	↓ Cold							VR8SPP33X	8121	VR8NII35U VR7NII33X	9620 9621
14mm Thread 3/8" Reach 13/16" Hex	Hot ↑	WR9EC+	7915								
	↓ Cold	WR8EC+ W7EC W5EC	7908 7535 7534								
14mm Thread 3/8" Reach 13/16" Hex Extended Tip	Hot ↑	WR10FC+	7919								
	↓ Cold	WR10FCY+ WR10FCZ+ WR9FC+ WR9FCY	7920 7921 7916 7517								
14mm Thread Tapered Seat .460" Reach 5/8" Hex	Hot ↑	HR10AC+	7983								
	↓ Cold	HR10ACY HR9AC+ HR9ACY+ HR8AC+	7584 7972 7973 7968			HR9BPP30X HR9BPP30V HR7BPP30X	6712 6708 6722			HR9BII330V	9659
14mm Thread Tapered Seat .460" Reach 5/8" Hex Extended Tip	Hot ↑	HR10BC+	7985								
	↓ Cold	HR10BCX+ HR10BCY+ HR10BCZ+ HR9BC HR9BC+ HR9BCY+ HR9BCZ HR8BC+ HR6BC+	7986 7987 7988 7975 7975 7976 7577 7969 7964								

NOTE: See Page 301 for part number interchange.

Automotive Spark Plug Type and Heat Range Chart

Spark Plugs

		Super Plus & Specialty Plugs		Silver Plugs		Platinum Plugs		Double Platinum Plugs		Iridium Plugs		
Thread Size & Hex	Heat Range	Plug Number	Part Number	Plug Number	Part Number	Plug Number	Part Number	Plug Number	Part Number	Plug Number	Part Number	
14mm Thread 1/2" Reach 13/16" Hex	Hot ↑	W10AC										
		WR8AC+	7902									
		WR7AC+	7996									
		WR5AC+	7932	W5AS								
		W4AC		W4AS								
	↓ Cold	W3AC		W3AS								
				W2AS								
14mm Thread 1/2" Reach 13/16" Hex Extended Tip	Hot ↑	WR8BC+	7903									
		W7BC	7997									
		WR7BC+	7997									
		W6BC	7993									
		W5BC	7931									
	↓ Cold	WR5BC+	7931									
14mm Thread Tapered Seat 11/16" Reach 5/8" Hex Extended Tip	Hot ↑	HR10DCX+	7989									
		H9DC	7574									
		HR9DC+	7978									
		HR9DCX+	7979									
		HR9DCY	7980									
		HR9LCX+	7982									
		HR9LCY+	7974									
		H8DC	7970				HR8JPP302V	6715	HR8JPP33V	8120	HR8LII33U	9602
		HR8DC+	7970				HR8DPP30Y	6706	HR8DPP33Y	8106	HR8JII33V	9660
		HR8DCX+	7971				HR8DPP30X	6723	HR8DPP33X	8119	HR8DII33X	9657
		H8DC0					HR8DPP30V	6709	HR8DPP33V	8108	HR8KII33V	9655
		HR7DC	7918								HR8KII33Y	9653
		HR7DC+	7918								HR7DII33V	9606
		H7DC0					HR7DPP30Y	6710	HR7DPP33Y	8111	HR7KII33V	9605
		H7LDCR					HR7DPP30V	6701	HR7DPP33V	8103	HR7KII33Y	9623
		HGR7KQC	7411	HR6DS								
		H6DC	7966									
		HR6DC	7966									
		H6DC0		H4CS					HR6DPP33X	8113	HR6KII33X	9608
		H5DC		H3CS								
↓ Cold			H2CS									

NOTE: See Page 301 for part number interchange.

Importance of a Spark Plug's Heat Range

A plug's heat range is its ability to transfer the excess heat from the insulator tip to the cylinder head. The speed of this transfer is commonly described by the term "hot plug" and "cold plug." A "hot plug" means that the heat transfer is slow, causing the plug to operate at a higher temperature. A "cold plug" has a faster rate of heat transfer, thus it operates at a cooler temperature. In other words, a "hot" plug has a low heat range, a "cold" plug has a high heat range.

Plugs are available in different heat ranges to accommodate the operating conditions of different engines and driving conditions. A plug must operate hot enough to stay clean (not foul) and cold enough to prevent pre-ignition (premature ignition of the fuel-air mixture). If pre-ignition were not controlled, engine performance would drop and the plug would eventually destroy itself by overheating.

The heat range is determined, for the most part, by the insulator material, the length of the insulator tip, and the alloy material of the center electrode. The amount of heat transfer is affected by the size and shape of the space between the insulator and plug shell and by the quality of insulator material. A positive contact between the insulator and shell must be provided. Figures 1 and 2 show these differences.

Why is Bosch Super Plus better?

Because of the yttrium enhanced copper core center electrode, Bosch Super Plus reaches its self-cleaning temperature earlier to resist fouling in city traffic. Heat dissipation is also accelerated during highway driving.

Why is Bosch Platinum Plus better?

With a platinum center electrode and a unique insulator design the Platinum Plus plug has a wider heat range than copper core plugs and reaches its self-cleaning temperature only seconds after the start.

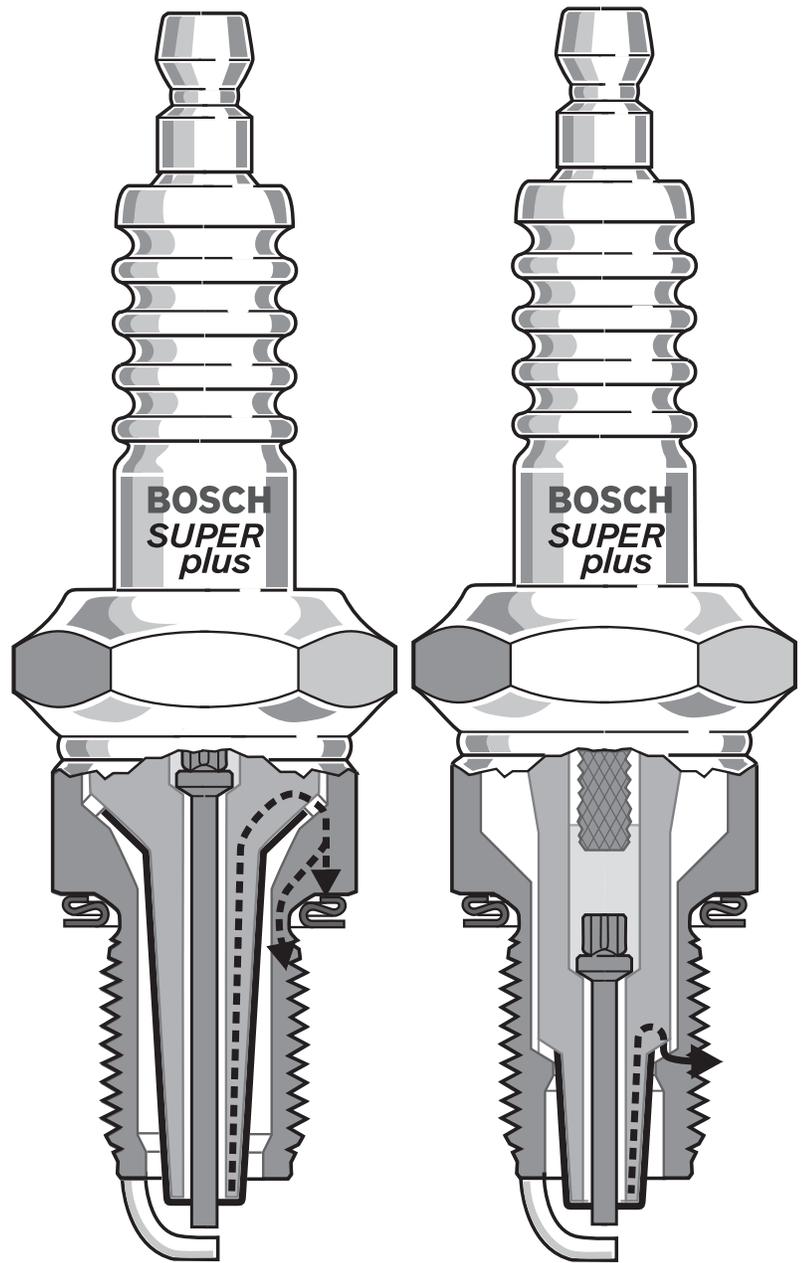


Figure 1

Figure 2

---> Heat-absorbing surface
 ———> Thermal conduction path

HOT PLUG
Figure 1
 Spark plug with high heat range (hot plug), large insulator base area absorbs much heat.

COLD PLUG
Figure 2
 Spark plug with low heat range (cold plug), small insulator base area absorbs little heat.

Selecting the Right Heat Range

A plug's heat range should be lower than the pre-ignition zone and higher than the cold fouling zone. In this lower temperature area, residues from fuel and oil additive are no longer burnt away and may cause the plug to misfire.

Generally, a colder plug is better suited for high speed highway traveling. A hotter plug is better for prolonged idling and city travel. The Heat Range Chart in our spark plug catalog will give you a listing of the various ranges available for different plugs.

Figure 1: The working temperature depends upon the heat absorption and heat dissipation of the spark plug. 20% of the heat absorbed by the spark plug is transferred to the passing mixture. The other 80% is dissipated through thermal conduction.

Figure 2: The curves below plot the temperature on the insulator tip of plugs with three different heat ranges. Plug "A" is too cold, and tends to foul during low speeds. Plug "C" is too hot, and will result in pre-ignition at higher speeds. The ideal heat range ("B") will always operate in the temperature zone between the fouling and pre-ignition areas. The results in an engine that operates more efficiently and economically, and produces fewer harmful emissions.

Figure 3 & 4: One way to minimize fouling is to use an extended tip electrode spark plug to help keep the plug clean at lower operating temperatures. The extended tip electrode reaches deeper into the combustion chamber than the regular tip plug. Residues are burned away more rapidly during firing, and the plug cools better during the intake stroke.

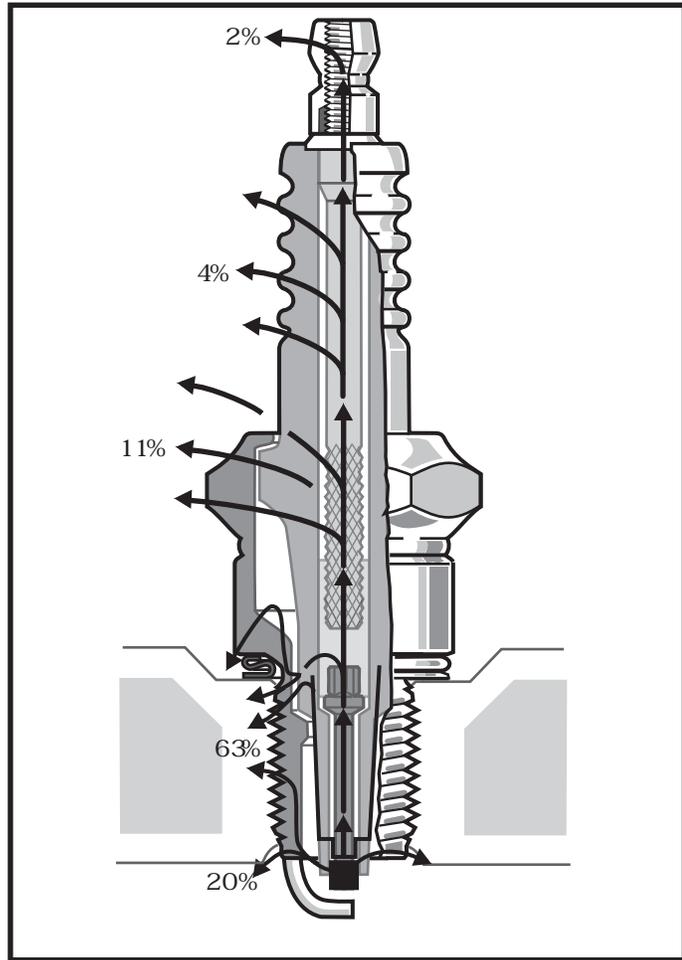
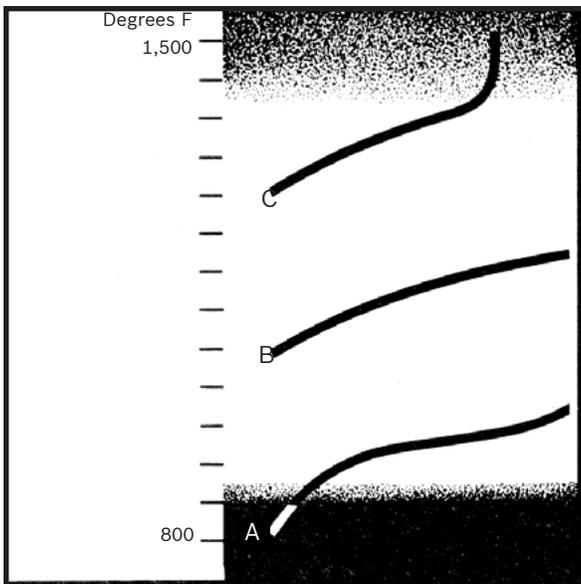
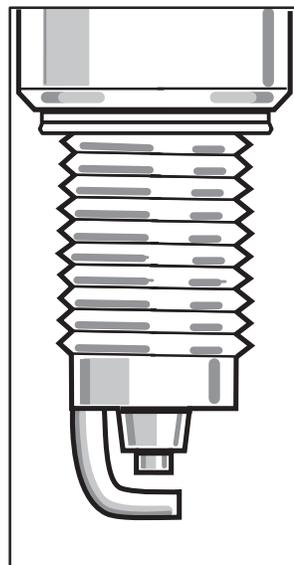


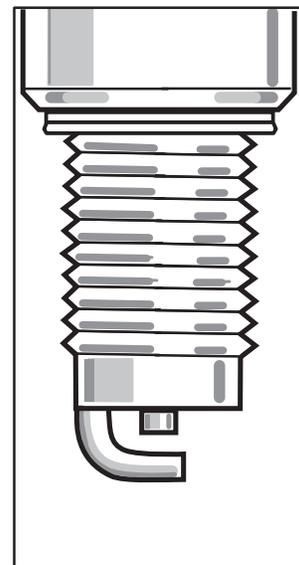
Figure 1



IDLE FULL LOAD
Figure 2



Extended Tip Electrode
Figure 3



Regular Tip Electrode
Figure 4

Materials, shapes and assembly techniques are important to a plug's performance and life span. If any of these are varied, the operating characteristics are also varied. Critical parts of a spark plug and their purpose are detailed below.

1. Pyranit insulator. The most important part of a plug. It's made from aluminum oxide and glassy additives so it can hold up under 30,000 volts and an operating temperature up to 1550°F. The thermal conductivity of the insulator in this temperature range is crucial for establishing the plug's heat range and its performance under different driving conditions.

2. Current barrier. These ceramic ribs are more than just an identifying mark. They are designed to increase the path between the terminal stud and plug shell in order to reduce current leakage.

3. Shell. Steel is the most common material for most shells. The shell and insulator are mated together with an electro-heat-shrinking process. Some manufacturers use zinc plating, but Bosch shells are plated with nickel. The nickel plating prevents seizing in the cylinder heads. Zinc plating is more susceptible to seizing.

4. Electrode seal. A gas tight seal at this location prevents "blow-by" of hot combustion gases that rob engine power. Our seals are made of an exclusive mixture of graphitized-metal-glass to maintain constant conductivity at all operating temperatures.

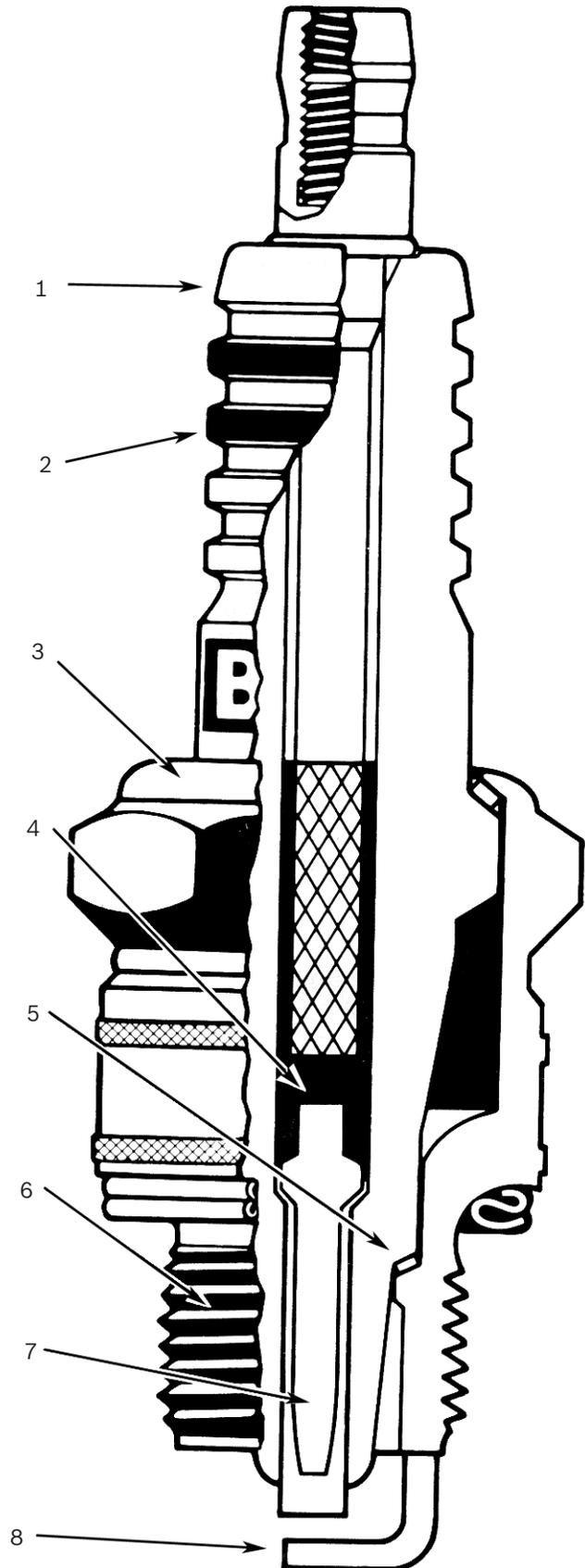
5. Insulator seal. This seal performs the same functions as the electrode seal; to prevent "blow-by" of combustion gases. Also it conducts heat from the insulator to the cylinder head. This assures a consistent heat range.

6. Threads. In order to prevent "cross-threading" in the cylinder head, plug threads should be completely rolled to eliminate sharp edges.

7. Center electrode. Bosch Super Plus Plugs have a heavy duty yttrium copper core center electrode. Therefore the plug reaches its self-cleaning temperature earlier to resist fouling in city traffic. Heat dissipation is also accelerated during highway driving. Heavy duty to prevent premature erosion and corrosion.

Bosch Platinum Plus Plugs have a thin platinum rod sintered into a unique insulator design. Platinum Plugs reach their self cleaning temperature even earlier than copper core plugs. This results in quicker starts and smoother acceleration.

8. Ground electrode. The center and ground electrodes combine to form the spark gap. Since the ground electrode is also exposed to high temperatures and voltage, its material and size are extremely important. All Bosch Spark Plugs use a heavy duty rated ground electrode.



Insulator Function

Of all the parts in a spark plug, no part does more than the insulator. It not only has to efficiently perform a variety of functions, but it also has to have certain properties in order to do these jobs while withstanding the immense pressures, temperatures and vibrations of an engine. The insulator has two specific functions, as shown in figure 1.

1. Its name describes one function. It must insulate the ignition voltage from the engine block. The insulator accomplishes this by its material and shape. Aluminum oxide and glassy additives are combined and shaped to produce an insulator with high electrical resistance. The ribs on the top portion of the insulator are also important. These molded ribs increase the distance between the terminal stud and plug shell. Thus, the resistance to leakage current is considerably improved.
2. The insulator establishes the plug's heat range by the shape, length and thickness of its tip, as shown in figure 2. The smaller insulator of a "cold" plug absorbs less combustion heat, and is able to dissipate the heat quickly. The larger insulator of a "hot" plug absorbs more heat which it dissipates more slowly. Because it retains more heat, it is termed a hot plug.

Figure 1

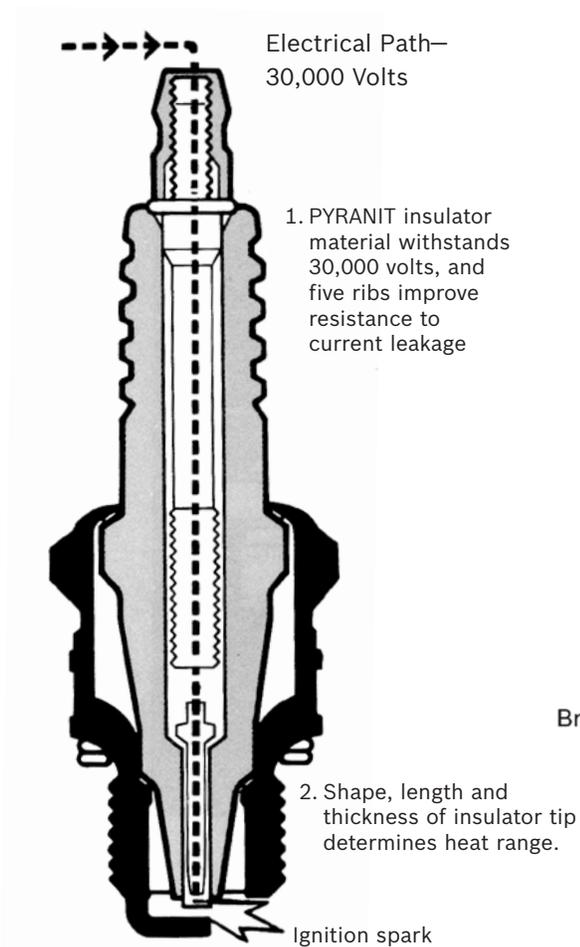
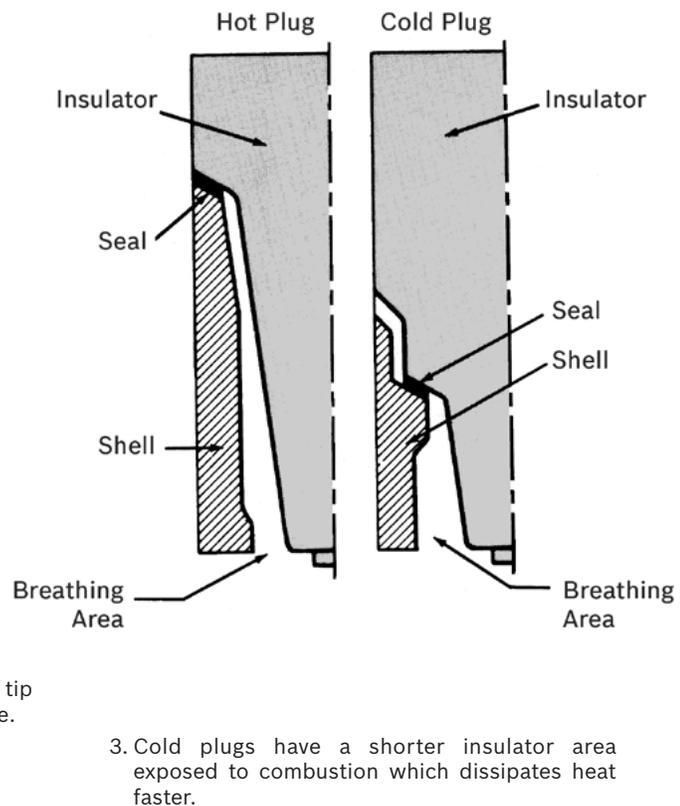


Figure 2



The most apparent difference in spark plug design is variations in thread size, reach and plug height. The plug an engine designer will select depends upon the engine size, performance and operating conditions.

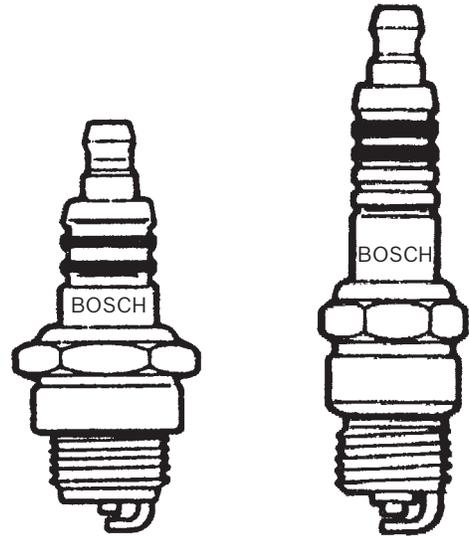
Thread sizes. Plugs subjected to high-abuse applications, normally associated with 2-cycle engines, require more breathing area. For this reason, sometimes the 18mm plug is used. This size also has higher physical strength and is used in snowmobiles, ATVs, tractors and commercial/industrial equipment.

The 14mm plug is standard for most 4-cycle American and imported engines. Most marine engines, lawnmowers, snowblowers, power saws and motorcycles also use 14mm plugs.

Reaches. The "reach" is the distance from the gasket seat (but not including the gasket), to the end of the threads. Different reaches are necessary because of the variations in cylinder head designs and thickness. In most American cars, the 3/8" and 3/4" reaches are the most popular, while the 1/2" and 3/4" are common in imported cars. Aluminum engines use longer reach plugs, 1/2", 3/4" and 1", to assure a better, stronger fit to the head.

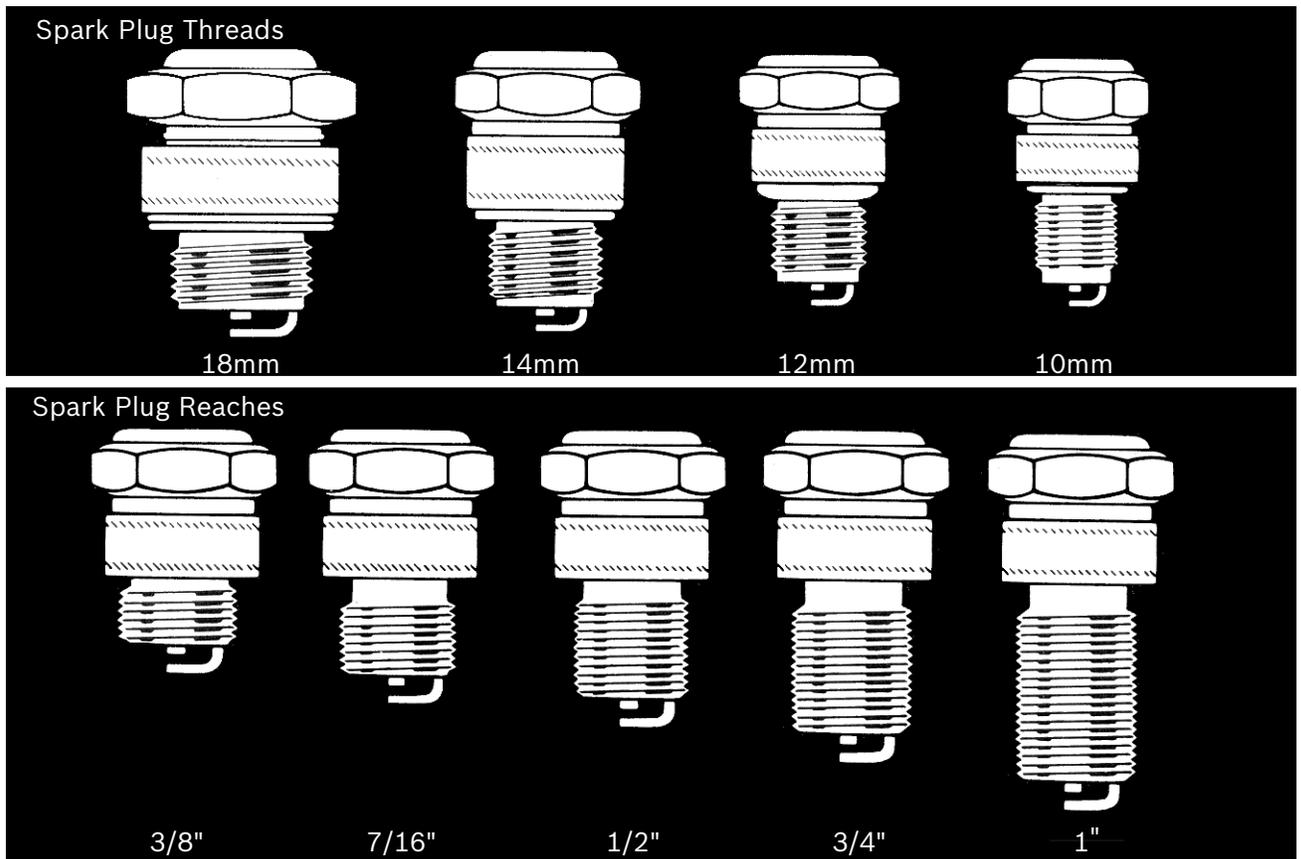
It is extremely important to install the right reach specified by the engine manufacturer in order to prevent severe engine damage.

Length. For all practical purposes, most plugs have the same overall length. The one exception is the short, or mini-plug, developed for applications where space limitations prevent using the standard plug.



Length of mini-plug

Standard length plug



Spark Plug Threads

18mm

14mm

12mm

10mm

Spark Plug Reaches

3/8"

7/16"

1/2"

3/4"

1"

BOSCH IRIIDIUM/DOUBLE PLATINUM/PLATINUM SPARK PLUG LIMITED WARRANTY TO LICENSED AUTOMOTIVE REPAIR SHOPS

Robert Bosch LLC (“Bosch”) warrants to all licensed automotive repair shops that all new Bosch Iridium, Double Platinum and Platinum spark plugs (“Products”) will be free from defects in material and workmanship in accordance with the following:

This limited warranty is effective for a period of one (1) year from the date of installation (“Warranty Period”). Bosch will reimburse the Shop for the cost of the Product, in the amount of (A) up to \$6.99/plug for Iridium sparkplugs; (B) up to \$4.49/plug for Double Platinum spark plugs, and (C) up to \$2.99/plug for Platinum spark plugs, plus the normal and customary labor costs, at the rate up to \$75.00 per hour, incurred in installing the defective Product. All labor costs will be calculated so as not to exceed the standard labor times published by ALLDATA.

THIS LIMITED WARRANTY DOES NOT COVER the workmanship of any installer. **THIS LIMITED WARRANTY IS VOID** under the following circumstances:

- Failure to install the Product using a professional technician and a licensed automotive repair shop (“Shop”);
- Failure to follow Bosch’s application recommendations printed in the Bosch catalog;
- Failure to change the spark plug within the recommended interval for spark plug changes published in the vehicle manual;
- Damage or failure caused by misuse, abuse, vandalism, negligence, modification, abuse, or improper application, installation or operation;
- Damage cause by water, fire, environmental hazard, force of nature or other impact outside of normal operating guidelines, and
- Damage or failure caused by unauthorized service or use of unauthorized parts.

Bosch reserves the right to make changes in design or improvements on its Product without creating or assuming any obligation to install or implement the same on any Products previously sold. In addition, Bosch may change this limited warranty policy at any time. Please refer to www.boschautoparts.com/SparkPlugs for the most current version of this limited warranty policy.

TO THE EXTENT PERMITTED BY LAW, THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. BOSCH WILL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL OR EXEMPLARY DAMAGES OF ANY KIND, INCLUDING, WITHOUT LIMITATION, TELEPHONE CALLS, LOSS OF TIME, INCONVENIENCE AND LOST PROFITS. ALSO, TO THE EXTENT PERMITTED BY LAW, THIS WARRANTY SETS OUT YOUR EXCLUSIVE REMEDIES WITH RESPECT TO THE PRODUCT. NO ATTEMPT TO ALTER, MODIFY OR AMEND THIS WARRANTY SHALL BE EFFECTIVE UNLESS AUTHORIZED IN WRITING BY AN OFFICER OF BOSCH.

To obtain performance of this limited warranty, the Shop must submit a warranty claim to Bosch’s TSS Department within thirty (30) days after discovery of the damage or Product failure and make the alleged defective Product available for examination and testing within fourteen (14) days thereafter. All warranty claims must be substantiated with the following:

- Completed warranty claim form;
- Repair order from the initial installation;
- Repair order from the replacement installation; and
- Proof of purchase of the Product.

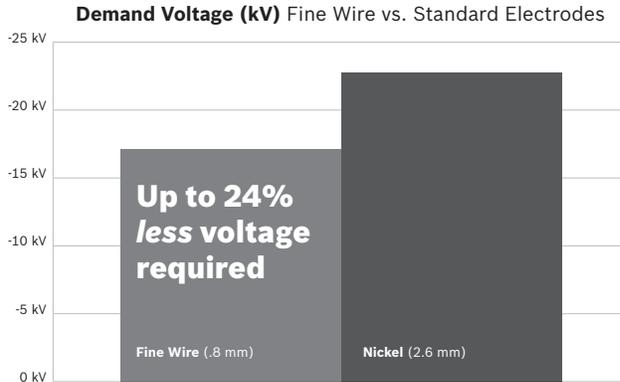
Bosch TSS Department

1-800-732-6724

Some states do not allow limitations on how long implied warranties last, or the exclusion or limitation of consequential or incidental damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

Why Fine Wire Technology

The Bosch OE Fine Wire family takes less voltage to fire, increasing the lifetime of the spark plugs and other components (coils) and ensuring reliable ignition.



If a non-fine wire plug is used where the OE called for fine wire, demand voltage can be adversely affected leading to weaker spark and lower ignitability. A fine wire plug provides:

- Improved ignitability
- Better idle stability
- Improved throttle response/acceleration
- Easier starts in cold weather
- Lower emissions
- Reduced stress on other ignition system components (coils)

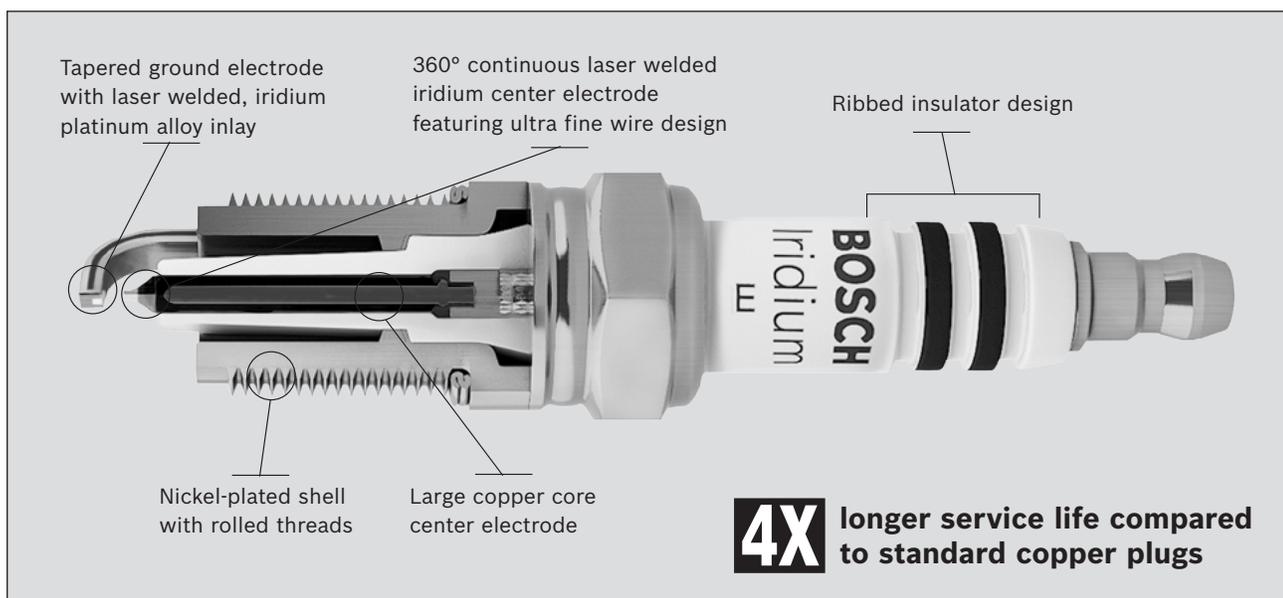
Not all competitors utilize fine wire technology in their precious metal spark plugs.

Don't sacrifice performance. Choose the Bosch OE Fine Wire Spark Plug family.

Fine wire spark plugs are great upgrades for older vehicles with lower energy ignition systems.

Feature Matrix	Bosch Iridium	Bosch Double Platinum	Bosch Platinum
Service life versus standard Copper plugs	4X	3X	2X
Customer satisfaction guarantee	7 years	6 years	4 years
Performance / Long life	Highest performance / Longest life	Longer life	Performance
Original equipment specific fine wire design	•	•	•
Professional technician warranty	•	•	•
Pre-gapped	•	•	•
Turbo, gasoline direct injection compatible	•	•	•
Precious metal	Iridium ground electrode & center electrode	Platinum ground electrode & center electrode	Platinum center electrode
Electrode close-up			

OE Fine Wire Iridium Features and Benefits

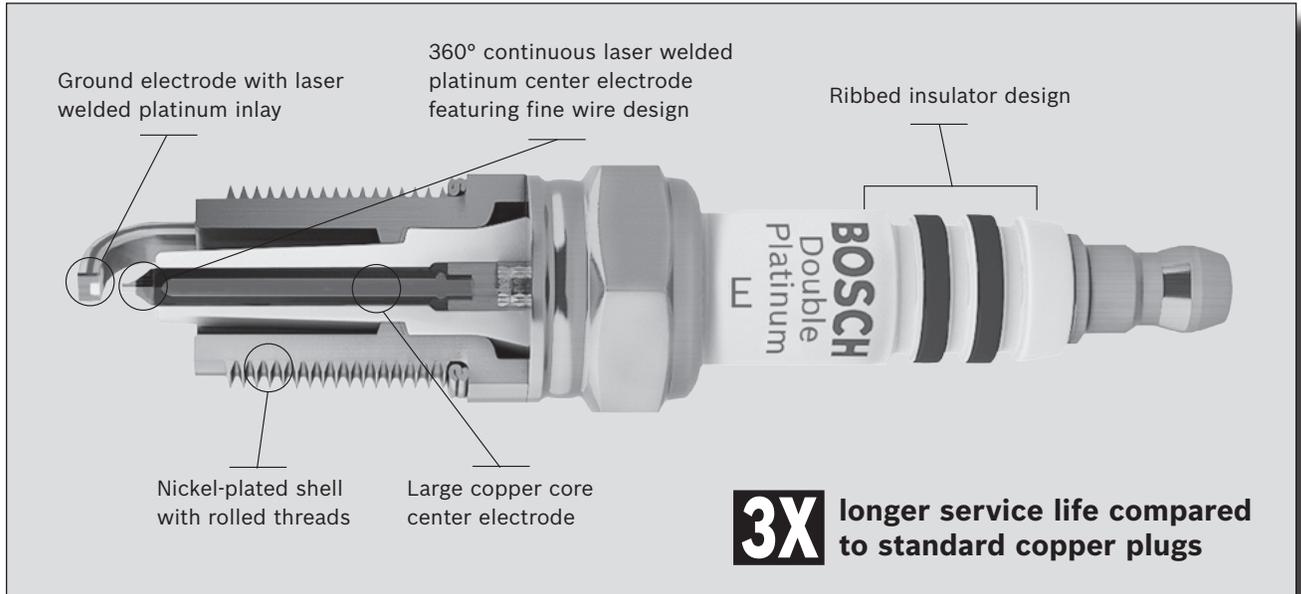


OE Fine Wire Iridium

High performance. Long life. OE technology.

You don't have to choose between high performance and long life in your iridium spark plug – Bosch Iridium Spark Plugs are engineered to deliver both. Bosch original equipment design, materials and processes represent the best of OE technology. This member of Bosch's OE fine wire spark plug family includes an ultra fine wire design and laser welded tapered ground electrode to deliver optimum performance, while the iridium center electrode and ground electrode help it to go the distance.

Feature	Benefit
Ultra fine wire design	Delivers the ultimate in ignitability and performance life
Iridium center electrode	Provides longest life and resists wear
360° continuous laser welded center electrode	Provides exceptional resistance to thermal shock and cracking, increasing durability
Tapered ground electrode power	Reduces flame shrouding for improved combustion and more power
Laser welded Iridium ground electrode	Promotes durability and longest life, resists cracking and potential loss for improved durability
Nickel plated housing	Provides complete anti-seize and corrosion protection
Pre-gapped	No need for gap – faster installation
7-year performance satisfaction guarantee	Gives your customers miles of worry-free driving
Professional Technician Warranty	Industry-leading warranty for peace of mind



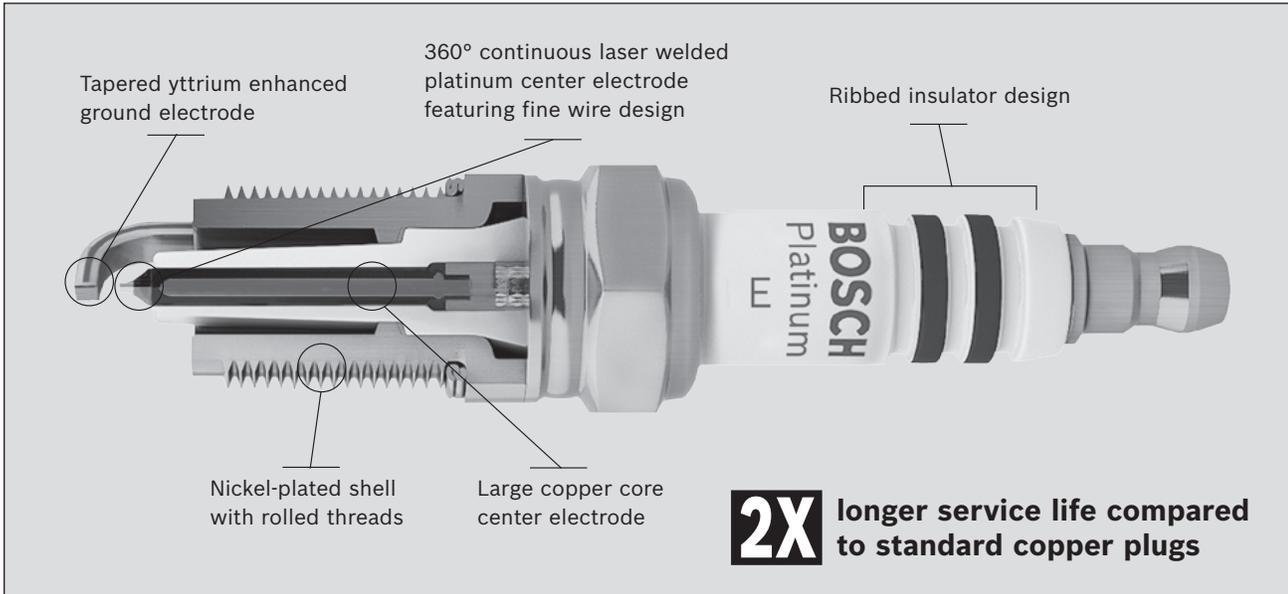
OE Fine Wire Double Platinum

Extended performance life. OE technology.

Bosch Double Platinum spark plugs are engineered to extend performance life and durability. The fine wire design of the center electrode improves ignitability and performance in your engine while the platinum tip on both the center and ground electrodes ensure longer life

Feature	Benefit
Fine wire design	Delivers better ignitability and performance life
Platinum center electrode	Promotes durability and longer life
360° continuous laser welded center electrode	Provides exceptional resistance to thermal shock and cracking, increasing durability
Laser welded platinum tipped ground electrode	Promotes durability and longer life
Nickel plated housing	Provides complete anti-seize and corrosion protection
Pre-gapped	No need for gap – faster installation
6-year performance satisfaction guarantee	Gives your customers miles of worry-free driving
Professional Technician Warranty	Industry-leading warranty for peace of mind

OE Fine Wire Platinum Features and Benefits

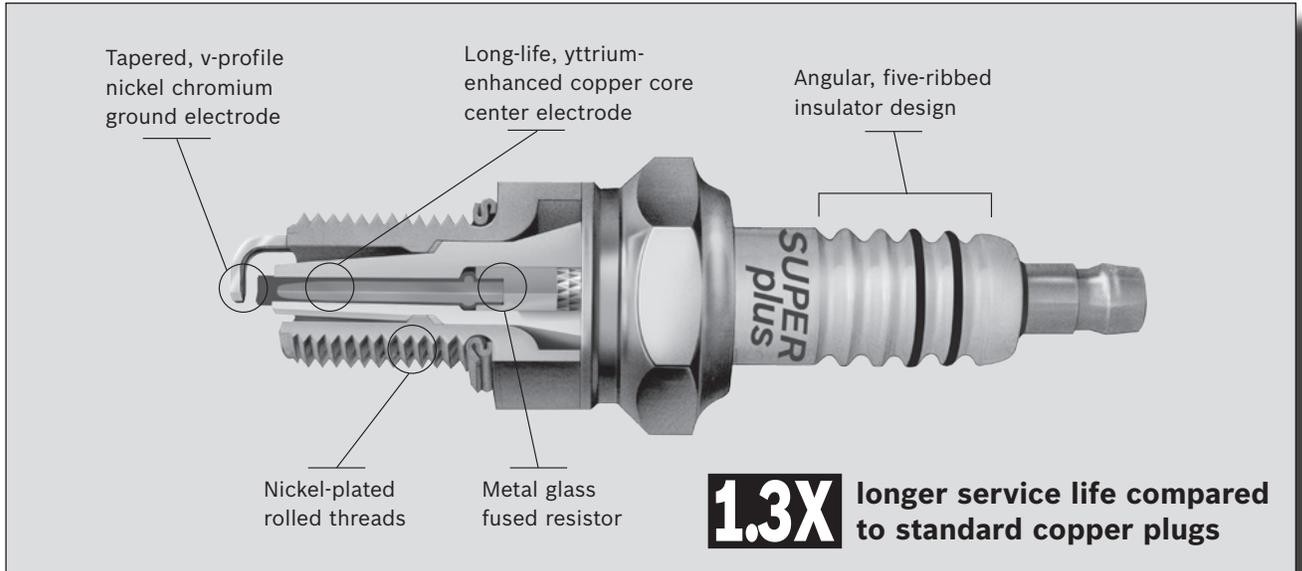


OE Fine Wire Platinum

Improved ignitability and performance life. OE technology.

From the brand trusted in the world's most advanced engines, Bosch Platinum Spark Plugs are engineered to provide you with improved ignitability and performance. The OE fine wire platinum design delivers optimum fit and function.

Feature	Benefit
Fine wire design	Delivers improved ignitability and performance life
Platinum center electrode	Promotes long life and resistance to wear
360° continuous laser welded center electrode	Provides exceptional resistance to thermal shock and cracking, increasing durability
Yttrium enhanced tapered ground electrode	Resists wear and reduces flame shrouding for improved combustion, more power and increased durability
Nickel plated housing	Provides complete anti-seize and corrosion protection
Pre-gapped	No need for gap – faster installation
4-year performance satisfaction guarantee	Gives your customers miles of worry-free driving
Professional Technician Warranty	Industry-leading warranty for peace of mind



Bosch Super Plus

For practically every vehicle there is a suitable Bosch Super Plus variant available that, with its special heat range, has been precisely adapted to the engine in question.

Bosch Super Plus features an yttrium-enhanced copper core center electrode and an electrode gap which has been set at the factory. The center electrode's copper core serves to efficiently conduct the heat away to prevent the electrode from overheating. The yttrium alloy protects the copper core against corrosion and ensures up to a **30% longer performance life.**



With yttrium



Without yttrium

Feature	Benefit
Long-life, yttrium-enhanced copper core center electrode	Superior reliability and increased resistance to spark plug erosion for a 30% longer performance life vs. even OE copper core plugs
Tapered, v-profile nickel chromium ground electrode	Improved starting in cold weather and increased fuel ignitability
Nickel-plated rolled threads	Complete anti-seize and corrosion protection
Metal glass fused resistor	Maximum interference suppression
Angular, five-ribbed insulator design	Prevents misfire due to current leakage

If you don't feel the difference with Bosch or are not satisfied, we will pay for the plugs.

OE Fine Wire Iridium Warranty

Robert Bosch LLC guarantees your satisfaction or the improved performance in your vehicle when you use Bosch Iridium Spark Plugs. If you are not satisfied or do not experience quicker starts, smoother acceleration and improved fuel efficiency, return the plugs with your dated sales receipt and Bosch will refund the purchase price of the spark plugs. This guarantee applies to properly tuned vehicles and extends for seven years, or for the manufacturer's recommended spark plug change interval as indicated in the owner's manual, whichever occurs first. For maximum performance and lowered emissions, do not exceed the vehicle manufacturer's recommendations. This guarantee does not extend to damages due to misuse, accident, abuse, neglect, improper installation or application. This guarantee is limited solely to refund of the cost of spark plugs and does not include the cost of labor for removal or installation.

OE Fine Wire Double Platinum Warranty

Robert Bosch LLC guarantees that you will feel the improved performance in your vehicle when you use Bosch Double Platinum spark plugs. If you do not experience quicker starts, smoother acceleration and improved fuel efficiency, return the plugs with your dated sales receipt and Bosch will refund the purchase price of the spark plugs. This guarantee applies to properly tuned vehicles and extends for six years, or for the manufacturer's recommended spark plug change interval as indicated in the owner's manual, whichever occurs first. For maximum performance and lowered emissions, do not exceed the vehicle manufacturer's recommendation. This guarantee does not extend to damages due to misuse, accident, abuse, neglect, improper installation or application. This guarantee is limited solely to the refund of the cost of the spark plugs and does not include cost of labor for removal or installation.

OE Fine Wire Platinum Warranty

Robert Bosch LLC guarantees that you will feel the improved performance in your vehicle when you use Bosch Platinum spark plugs. If you do not experience quicker starts, smoother acceleration and improved fuel efficiency, return the plugs with your dated sales receipt and Bosch will refund the purchase price of the spark plugs. This guarantee applies to properly tuned vehicles and extends for four years, or for the manufacturer's recommended spark plug change interval as indicated in the owner's manual, whichever occurs first. For maximum performance and lowered emissions, do not exceed the vehicle manufacturer's recommendation. This guarantee does not extend to damages due to misuse, accident, abuse, neglect, improper installation or application. This guarantee is limited solely to the refund of the cost of the spark plugs and does not include cost of labor for removal or installation.

Visit BoschAutoParts.com for downloadable forms.

Spark Plug Warranty

Robert Bosch Corporation (“Bosch”) warrants all new Bosch Spark Plugs (“Product”) sold by it against defects in material and workmanship throughout the vehicle manufacturer’s entire recommended spark plug change interval as indicated in the vehicle owner’s manual commencing on the date of sale to the first end-user (“Consumer”). If engine damage occurs which is proven to have been caused by a defective Product, Bosch will assume the reasonable costs of repairing the damage. Bosch will not assume any liability for damage resulting from any deviation from Bosch’s application recommendations as printed in Bosch’s catalog, nor will Bosch assume liability for any Product which has not been properly installed in accordance with Bosch’s written instructions and accepted industry standards.

This warranty is limited to the original Consumer, i.e., not transferable to subsequent owners of the Product or Vehicle. Specifically excluded from this warranty are failures caused by misuse, neglect, modification, abuse, improper application, installation or operation, or by unauthorized service or use of unauthorized parts.

To the extent allowed by law, this warranty sets out your exclusive remedies with respect to Products covered by it, whether for negligence or otherwise. Neither Robert Bosch Corporation nor its affiliated companies will be liable for incidental or consequential damages, such as telephone calls, loss of time, inconvenience, commercial loss, etc. THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW, WHETHER FOR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, IS LIMITED TO THE PERIOD THAT THIS EXPRESS WARRANTY IS EFFECTIVE. No attempt to alter, modify, or amend this warranty shall be effective unless authorized in writing by an officer of Bosch.

Some states do not allow limitations on how long implied warranties last, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Manufacturers’ Warranties

Consumers are sometimes told by an automobile dealer’s service writer or mechanic that a brand of replacement spark plug cannot be used in the consumer’s vehicle during the warranty period. The claim is made that use of the brand will “void the warranty,” with the statement or implication that only the original equipment brand of spark plugs may be used. This, of course, tends to cast doubt on the quality of the replacement spark plug.

That claim is simply not true. Under the Magnuson-Moss Warranty Act and general principles of the Federal Trade Commission Act, a manufacturer may **not** require the use of any brand of spark plug (or any other article) unless the manufacturer provides the item **free of charge** under the terms of the warranty.

So if the consumer is told that only the original equipment spark plug will not void the warranty, he should request that the OE spark plug be supplied free of charge. If he is charged for the spark plug, the manufacturer or dealer will be violating the Magnuson-Moss Warranty Act or other applicable law.

It should be noted that the Magnuson-Moss Act applies only to consumer products, and not to businesses such as fleets or government agencies.

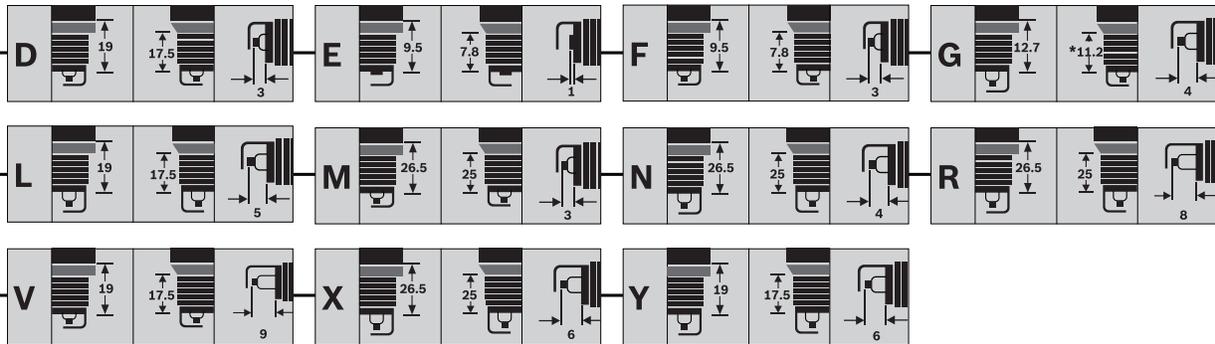
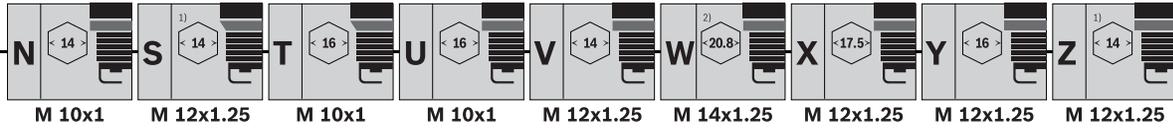
Bosch Spark Plugs meet or exceed warranty requirements of all vehicle and engine manufacturers and when properly installed in accordance with the recommended application will not adversely affect the emission control system of any vehicle.

Numbering System



Seat shape and thread	A $\langle 14 \rangle$	D $\langle 20.8 \rangle$	E ¹⁾ $\langle 12 \rangle$	F $\langle 16 \rangle$	H $\langle 16 \rangle$	K ¹⁾ $\langle 14 \rangle$	L $\langle 14 \rangle$	M $\langle 26 \rangle$		
	M 12x1.25	M 18x1.5	M 10x1.0	M 14x1.25	M 14x1.25	M 14x1.25	M 14x1.25	M 18x1.5		
Design	B	Water-tight, for shielded ignition cable dia. 7 mm	C	Water-tight, for shielded ignition cable dia. 5 mm	E	Surface gap spark plug without ground electrode	G	Surface gap spark plug with ground electrode (s)	H	Half thread
Heat range code number										
Thread length Spark position										
Type of electrode										
Electrode material	C	Copper	E	Nickel-yttrium	P	Platinum	S	Silver	I	Platinum-iridium
Version	R	Burn-off resistor	S	0.7	T	0.8	U	1.0	V	1.3
	W	0.9	X	1.1	Y	1.5	Z	2.0	+	SUPER plus Technology

* The thread length for spark plugs with seat shape D and spark position A or B is 10.9 mm.

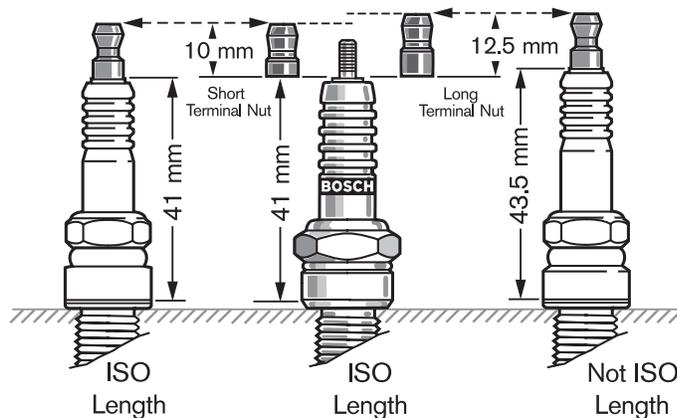


0	Differences from basic design						
1	P0 design with Ni ground electrode						
2	Binary ground electrode						
3	Special length thread						
4	Extended insulator nose						
9	Special design						
	Center electrode with welded-on platinum wafer Diameter 0.8 or 1.1 mm possible	Center electrode with welded-on platinum wafer Diameter 0.6 or 0.8 mm possible	Ground electrode Mono nickel- yttrium	Ground electrode Binary nickel- yttrium	Ground electrode Mono nickel- yttrium laser-alloyed platinum inlay	Ground electrode Binary nickel- yttrium laser-alloyed platinum inlay	
10	●	-	●	-	-	-	
15	●	-	●	-	-	-	
22	●	-	-	-	●	-	
222	●	-	-	-	-	●	
23	-	●	-	-	●	-	
232	-	●	-	-	-	●	
30	-	●	●	-	-	-	
302	-	●	-	●	-	-	
33	-	●	-	-	●	-	
332	-	●	-	-	-	●	

1) Double hexagon 2) Hexagon size 19.0 mm for low-power engine version WS

ISO Spark Plug Applications

Prior to 1989 several Japanese vehicle manufacturers installed spark plugs which exceeded ISO length standards. To provide correct electrical connection, equivalent Bosch spark plugs (FR7 and 8DCX, FR7 and 8DPX) are supplied with a "long" terminal nut to match the length of the non-conforming ISO competitive spark plugs. See illustration below.



Starting in 1989 Japanese vehicle manufacturers installed spark plugs which conform to ISO standards. The difference in the two plugs can be identified by the letter "K" prior to the heat range number.

ISO	NGK	ND
Not ISO	BKR6E-11	K20R-U
	BCPR6E-11	Q20R-U

A short terminal nut should be used on applications with centrally located ISO spark plugs (as in 4 valve per cylinder applications) installed as OE. When replacing centrally located ISO standard spark plugs with Bosch spark plugs FR7DCX, FR7DPX, FR8DCX or FR8DPX a short terminal nut must be used.

Spark Plug Analysis

Spark Plug Faces Analysis — Part 1



BOSCH

1. Normal Condition

Insulator nose grayish-white or grayish-yellow to brown. Engine is in order. Heat range of plug correct. Mixture setting and ignition timing are correct, no misfiring, cold-starting device functioning. No deposits from fuel additives containing lead or from alloying constituents in the engine oil. No overheating.



2. Sooted — Carbon-fouled

Insulator nose, electrodes and spark plug shell covered with velvet-like dull black soot deposits. Cause: Incorrect mixture setting (carburetor fuel injection); mixture too rich, air filter very dirty, automatic choke not in order or manual choke pulled too long, mainly short-distance driving, spark plug too cold, heat-range code number too low.

Effects: Misfiring, difficult cold-starting.

Remedy: Adjust A/F mixture and choke device, check air filter.



3. Oil-fouled

Insulator nose, electrodes and spark-plug shell covered with shiny soot or carbon residues.

Cause: Too much oil in combustion chamber. Oil level too high, badly worn piston rings, cylinders and valve guides. In two-stroke engines, too much oil in mixture.

Effects: Misfiring, difficult starting.

Remedy: Overhaul engine, adjust oil/fuel ratio (2-stroke engines), fit new spark plugs.



4. Lead fouling

Insulator nose covered in places with brown/yellow glazing, which can have a greenish color.

Cause: Lead additives in fuel. Glazing results from high engine loading after extended part-load operation.

Effects: At high loads, the glazing becomes conductive and causes misfiring.

Remedy: Fit new spark plugs since cleaning the old one is pointless.



5. Pronounced lead fouling

Insulator nose covered in places with thick brown/yellow glazing, which can have a greenish color.

Cause: Lead additives in fuel. Glazing results from high engine loading after extended partload operation.

Effects: At high loads the glazing becomes conductive and causes misfiring.

Remedy: Fit new spark plugs since cleaning the old ones is pointless.



6. Formation of ash

Heavy ash deposits on the insulator nose resulting from oil and fuel additives, in the scavenging area and on the ground electrode. The structure of the ash is loose to cinder-like.

Cause: Alloying constituents, particularly from engine oil, can deposit this ash in the combustion chamber and on the spark-plug face.

Effects: Can lead to auto-ignition with loss of power and possible engine damage.

Remedy: Repair the engine. Fit new spark plugs. Possibly change engine-oil type.



7. Center electrode covered with melted deposits

Melted deposits on center electrode. Insulator tip blistered, spongy and soft.

Cause: Overheating caused by auto-ignition. For instance, due to ignition being too far advanced, combustion deposits in the combustion chamber, defective valves, defective ignition distributor, poor-quality fuel. Possibly, spark-plug heat-range value is too low.

Effects: Misfiring, loss of power (engine damage).

Remedy: Check the engine, ignition and mixture formation system. Fit new spark plugs with correct heat-range code number.



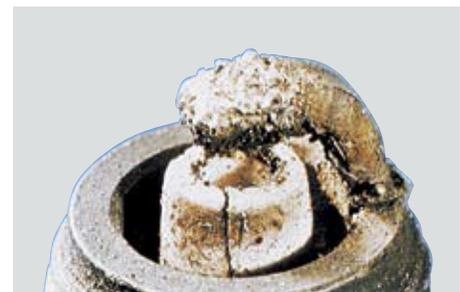
8. Partially melted center electrode

Center electrode has melted and ground electrode is severely damaged.

Cause: Overheating caused by auto-ignition. For instance, due to ignition being too far advanced, combustion deposits in the combustion chamber, defective valves, defective ignition distributor, poor-quality fuel.

Effects: Misfiring, loss of power (engine damage). Insulator-nose fracture, possibly due to overheated center electrode.

Remedy: Check the engine, ignition and mixture-formation system. Fit new spark plugs.



9. Partially melted electrodes

Cauliflower-like appearance of the electrodes. Possible deposit of materials not originating from the spark plug.

Cause: Overheating caused by auto-ignition. For instance, due to ignition being too far advanced, combustion deposits in the combustion chamber, defective valves, defective ignition distributor, poor-quality fuel.

Effects: Power loss becomes noticeable before total failure occurs (engine damage).

Remedy: Check engine and mixture-formation system. Fit new spark plugs.



10. Heavy wear on center electrode

Cause: Spark plug exchange interval has been exceeded

Effects: Misfiring, particularly during acceleration (ignition voltage no longer sufficient for the large electrode gap).

Poor starting.

Remedy: Fit new spark plugs.



11. Heavy wear on ground electrode

Cause: Aggressive fuel and oil additives. Unfavorable flow conditions in combustion chamber, possibly as a result of combustion deposits. Engine knock. Overheating has not taken place.

Effects: Misfiring, particularly during acceleration (ignition voltage no longer sufficient for the large electrode gap).

Poor starting.

Remedy: Fit new spark plugs.



12. Insulator-nose fracture

Cause: Mechanical damage (spark plug has been dropped or bad handling has put pressure on the center electrode).

In exceptional cases, deposits between the insulator nose and the center electrode, as well as center-electrode corrosion, can cause the insulator nose to fracture (this applies particularly for excessively long periods of use).

Effects: Misfiring, spark arcs-over at a point that is inaccessible for the fresh charge of A/F mixture.

Remedy: Fit new spark plugs.

