DENSO

DENSO Spark Plugs

Discovering DENSO Technology

Driven by Quality

DENSO Spark Plugs | Table of Contents

DENSO
SPARK PLUGS

DENSO in Europe | The Aftermarket Originals

DENSO Aftermarket Europe is part of DENSO Corporation, one of the world's Top 3 manufacturers of advanced automotive technology, systems and components.

Founded in 1949 DENSO is a pioneer of quality products for the automotive industry, supplying a huge range of original equipment to every major vehicle manufacturer in the world. In fact you'll find original DENSO parts in nine out of ten cars on the road.

We are also proud to bring that unique expertise to the European independent aftermarket. Our technologically advanced programmes feature only OE specification products especially selected for distributor and end-user customers. We manage that supply directly through DENSO Aftermarket Europe, supported by a growing network of local aftermarket sales offices.

Spark Plugs are one of DENSO's main specialisms. Our continual Research & Development work has led to many of the sector's most important innovations, including U-groove technology and the world's smallest Iridium tip. As a major sponsor and technical partner of Toyota Motor Corporation's Formula 1 team, the Honda LCR MotoGP team, the Subaru World Rally Team and other motorsports we also know all about high performance; passing on that experience in our Iridium and Racing ranges.

So with a Spark Plug to suit every application and motoring need, you can rely on DENSO.

Introduction | About this Publication

This Spark Plug Manual from DENSO Aftermarket Europe aims to provide distributors, wholesalers and end-users with everything you need to know about our unique, OE specification spark plugs. From technical data and application guides to case studies and visuals about each range, you'll have all the information you require.

The DENSO Spark Plug family comprises three core product ranges: Standard, Platinum and Iridium. Each offers a choice of different specifications providing individual applications and performance characteristics.

DENSO Spark Plugs | Product Range

DENSO has been setting the standard for spark plug technology since 1959. We develop all of our ranges in-house, and manufacture them in our own QS 9000 and ISO 9000 certified factories worldwide – with 'zero defects' as standard. We also provide this outstanding OE quality to the aftermarket. Including Standard, Platinum and Iridium, DENSO Spark Plugs cover a complete range of continually updated references. Guaranteeing optimum engine performance, choose DENSO Spark Plugs for every automotive, motorcycle, marine and small engine application.

STANDARD
> Copper glass seal helps heat dissipation
> Standard U-groove
> Deeply inserted copper core
> Heat resistant nickel plating

DOUBLE PLATINUM (LONGLIFE), SINGLE PLATINUM (ZU)
> Improved, more reliable start
> More complete combustion (lower emissions)
> Improved ability to overcome tuning imperfections
> Superior throttle response and acceleration
> Race proven technology

IRIDIUM LONGLIFE, IRIDIUM TOUGH, IRIDIUM POWER
> Superb ignitability
> Low required voltage
> Better acceleration response and operational stability
> Lower fuel consumption
> Longer lifetime

IRIDIUM RACING
> F1 technology
> Ultimate acceleration
> High reliability
> Boosted performance

		Standard	Platinum		Iridium				
	Type	Standard	Single Platinum	Double Platinum Type	Iridium OEM Type[5]	Iridium Long Life Type[5]	Iridium Power	Iridium Tough	Iridium Racing
Specifications	U-groove	+ [1]	+	-	-	-	+ [2]	-	-
	Tapered cut ground electrode	some types [3]	+	-	-	-	+ [2]	-	-
	Material ground electrode	Normal	Normal	Platinum tipped	Platinum tipped	Platinum tipped	Normal	Platinum tipped	Full platinum
	Centre electrode	2,5 mm	0,7 mm	1,1 mm	0,7 mm	0,4 mm	0,4 mm	0,4 mm	0,4 mm [4]
	Available heat range	9 - 27	14 - 34	16 - 22	16 - 22	16 - 27	16 - 34	16 - 24	24 - 35
	Resistor	Most types	Most types	All types	All types	All types	All types	All types	All types
	High performance	+	+++	++	++++	++++	+++++	+++++	+++++
	Fuel saving	Good	Better	Better	Best	Best	Best	Best	-
	Life time	Standard	Standard	Long life	Long life	Long life	Standard	Long life	For racing only

[1] Spark plug types without a 'U' in the type name do not have a U-groove
[2] Not applicable to IU24A, IU27A, IU31A, IUF27A and IUF31A
[3] Spark plug types with a 'Z' in the type name have a tapered cut ground electrode
[4] Except for surface gap types
[5] OEM Types, only for specific vehicles

Spark Plugs | Plug Configurations

DIFFERENT RANGES IN THE DENSO SPARK PLUG PROGRAMME

The following overview summarises the different plug configurations in the DENSO Spark Plug programme, making it easier to choose the right plug for each application.

- **Standard**
- **Platinum**
- **Iridium Power**

Triple Electrode Plug

Example **K22PB/W20EPB**

- Triple ground electrodes
- Increased durability
- For Audi, VW, Citroën, Fiat, Mercedes-Benz, Renault

U-Grooved Plug

Example **W16EX-U**

- U-groove ground electrode delivers high ignition energy
- Easily ignites even lean mixtures
- Fully projected (2.5mm insulator projection) so reduces carbon fouling
- Starts smoothly and good acceleration performance

Semi-Surface Gap Plug for Rotary Engines

Example **S29A**

- Semi-surface gap discharge
- Increased ignitability, fouling resistance and durability
- Reduced voltage loss using a 7 rib design

Extended Plugs

Example **J16AR-U11**

- U-groove ground electrode for superior ignition performance
- Ignites even lean mixtures
- Spark position is extended into the ignition chamber for improved combustion efficiency, fuel consumption and drivability

Example **KJ20CR11/KJ20CR-U11**

- Exclusivly for Mazda and Mitsubishi vehicles
- KJ20CR11 has no U-groove
- KJ20CR-U11 has a U-groove

Extended Plugs

Example **KJ20CR-L11**

- Ground electrode is taper cut
- Finer centre electrode
- Improved ignitability
- Exclusively for specified vehicles

Example **J16AY**

- Exclusively for Daihatsu
- Two ground electrodes ensure durability

Semi-Surface Gap Plug

Example **W20EKR-S11/W20EPR-S11**

- Semi-surface discharge increases ignitability and fouling resistance
- W20EKR-S11 for Honda vehicle
- W20EPR-S11 for Mitsubishi vehicles

Semi-Surface Double Electrode Plug

Example **W20ETR-S11**

- Double ground electrode with 1mm gap
- Short, opposed-type dual ground electrode gives excellent durability
- Full projection improves ignitability
- New supplementary gap improves fouling resistance
- Exclusively for Toyota and Daihatsu

Shrouded Semi-Surface Gap Double Electrode Plug

Example **K20DTR-S11/W20DTR-S11**

- Semi-surface gap construction
- End of threaded portion extended into combustion chamber
- Shroud attached to improve fouling resistance
- Exclusively for Daihatsu and Subaru

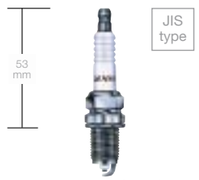
Star Centre Electrode

Example **W9LM-US**

- Used for small engine plugs
- Creates stronger spark and easier starting
- Reduces chance of misfiring
- Reduces carbon fouling
- Features a U-groove ground electrode

Small Hexagonal Plug

Example **Q16R-U11/Q16PR-U11**



- By reducing hex size (16mm) the plug has been made smaller

ISO Compatible Small Hex Plug

Example **K16-RU11K/K16PR-U11**

- Compatible with ISO standards
- Take care with installation: installed height is 2.5mm shorter than with Q type

Small Plug for Small Cars

Example **XU22EPR-U**

- By reducing hex size (16mm) the plug becomes compatible with small cars
- Thread size 12mm

Long Housing Plugs

Example **QL20PR-U/QL20TR-S**

- By making the middle cylinder longer, installation dimensions have been secured
- QL20TR-S has double ground electrodes and a semi-surface gap for improved anti-fouling
- Exclusivly for Daihatsu

TaperSeat plug

Example **T16EPR-U**

- Solely for non-Japanese vehicles that do not have a gasket

Resistor Plug

Reduces the amount of radio noise generated during ignition

Reduced Radio Noise

- 5k Ω resistor added between the centre electrode and the centre electrode core
- Reduces radio noise during ignition
- (Most new cars now come as standard with resistor plugs)

Motorcycle Plugs

Example **X24GPR-U**

- Thread has 3mm shroud and 22mm reach
- Exclusively for Honda

Example **X24EPR-U9**

- 12mm diameter x 19mm length

Motorcycle Plugs

Example **W27EMR-C**

- Plug with a compact insulator head
- Exclusively for Suzuki and Honda

Example **U27FER9**

- 10mm diameter x 19mm length, half-threaded
- Wider gap (0.9mm) than conventional plugs (0.6 to 0.7mm) creating improved ignitability
- Exclusively for Honda

Example **U31ETR**

- Double ground electrodes for improved heat resistance
- Exclusively for Kawasaki and Suzuki

Example **U27ESR-N**

- 10mm diameter x 19mm length, fully threaded
- By making projection 0.5mm greater, fouling resistance has been improved
- Exclusively for Kawasaki, Suzuki and Yamaha

Example **U20FSR-U**

- 10mm diameter x 12.7mm length

Motorcycle Plugs

Example **Y27FER**

- Very miniature plug (8mm diameter x 19mm length, half-threaded)
- Exclusively for Honda specified vehicles

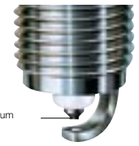
Platinum ZU Plug

Example **W31ES-ZU**

- Taper-cut ground electrode dramatically reduces quenching action
- Increased ignitability
- Special 0.7mm platinum alloy in centre electrode
- Spot welded in three places for high reliability

Platinum Plug

Example **PK20R11**



- Platinum used in both the centre electrode and ground electrode
- Fine centre electrode and platinum tip improve fuel consumption, drivability and durability

Platinum Plug for DLI (+Discharge)

Example **PK20R-P11**

- Increased size of platinum prevents wear during plus (+) discharge

Extended Platinum Plug

Example **PKJ20CR-L11**

- Spark position is extended into the combustion chamber
- Increased combustion efficiency
- Improved fuel consumption and driveability

Dual Electrode Platinum Plug

Example **PK20TR11**

- The parts of the centre electrode facing the ground electrodes are platinum tipped
- Dual electrode construction requires lower voltage during the plus (+) discharge

Single-Side Platinum Plug

Example **Q20PR-P11/K16PR-TP1**

- Only the centre electrode is platinum tipped, allowing a fine electrode
- Improved fuel consumption, driveability and durability
- Ground electrode is taper-cut for increased ignitability

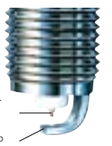
Needle to needle Iridium Plug

Example **FK20HR11**

- Revolutionary DENSO technology
- Needle-shaped ground electrode
- Unparalleled reduction in quenching action

Iridium Plug

Example **SK16R-P11/SK20R11**



- World's first 0.7mm diameter ultra-fine Iridium alloy electrode, developed by DENSO
- Dramatically improved ignitability and lifetime

Standard | Featuring DENSO Patented U-Groove Technology

Drivers that care about:

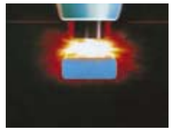
- All-round performance
- Long-lasting reliability
- Value for money
- Peace of mind
- A popular choice

U-GROOVE TECHNOLOGY
Improved ignition, fuel saving, engine and emissions performance

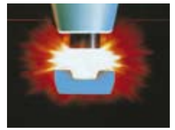
> Better fuel economy: U-groove can ignite leaner mixtures, meaning fewer misfires
> Smoother running: Because the spark and flame are not squashed between the electrodes, the flamefront is larger and engine performance smoother
> Efficient combustion: U-groove enables complete, efficient combustion by allowing the spark to fill the gap created by the 'U' shape
> Lower emissions: U-groove creates the effect of a bigger spark gap, while maintaining the standard gap
> Durability: U-groove is located on the ground electrode (not the centre electrode) because that is the area least affected by wear; ensuring the U-groove lasts the lifetime of the plug

RESISTOR SPARK PLUG
Intelligent design for less radio interference

> Resistor excellence: Full range of high quality resistor plugs feature a metal sleeve around the insulator and a protected connection point, to avoid malfunctioning of electronic equipment
> Better radio functioning: Resistors located in the spark section of DENSO plugs greatly reduce car radio interference
> All-round electronic systems performance: Resistors also avoid interference with mobile telephones, ignition and fuel management systems, ABS and navigation systems



Conventional plug



Standard plug

Reduced Radio Noise

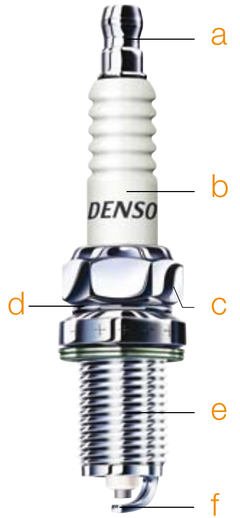
DENSO's patented U-groove technology delivers better all-round performance and fuel economy

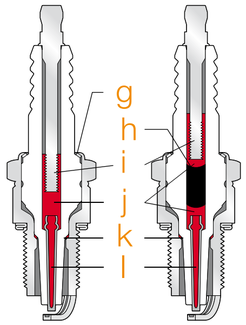
HEAT RANGE
The best heat range performance of any brand

> More heat ranges: DENSO plugs cover more heat ranges than other manufacturers without compromise on quality and performance; ensuring the right choice for almost every application, with optimal engine performance
> Less stock: Fewer part numbers to cover all heat ranges means less stock holding
> Ideal operating temperature: Spark Plug design channels the ideal amount of heat out of the combustion chamber, ensuring DENSO plugs run neither too hot (causing pre-ignition), nor too cold (causing carbon fouling)
> Better operating range: For optimised heat transfer DENSO uses copper-cored centre electrodes embedded in a copper-glass seal, which ensures a gastight connection and increased operating range
> Plugs for every purpose: Choose 'cold' DENSO plugs for long distances, high speed or heavy driving where rapid heat dissipation is essential. Choose 'hot' DENSO plugs to help resist fouling on short distances and stop-and-go driving
  'Hot' spark plugs: A good range of lower number DENSO spark plugs with a long insulating nose create a longer distance for heat travel and a larger surface to absorb the heat
  'Cold' spark plugs: A wide choice of higher number DENSO spark plugs with a shorter insulating nose and smaller heat absorption surface enable faster channelling of heat to the cylinder head

DENSO	16	20	22	24	27	29	31	32	34	35
NGK	5	6	7	8	9	9.5	10	10.5	11	11.5
Champion	12, 11	10, 9	8, 7	6, 63, 61	4, 59	57	55	53		
Bosch	8	7,6	5	4	3		2			

DENSO Spark Plugs cover more heat ranges compared to other manufacturers





Conventional Plug | Resistor Plug

U-GROOVE ELECTRODE

a TERMINAL

b FIVE-RIB CERAMIC INSULATOR
> Five-rib design resists breakage, reduces voltage loss and prevents missed sparks
> Design delivers 20% more insulation than conventional plugs
> Insulators made from high purity alumina for good electrical insulation, durability and thermal conductivity
> Improved performance in wet conditions, and in plugs with a large gap operating under a high voltage

c HOUSING
> Highly corrosion resistant nickel plating

d ELECTRICAL HEAT SEAL
> Heat resistance, good hermetic seal, low variation in heat range

e GASKET

f U-GROOVE GROUND ELECTRODE
> U-shaped groove creates large volume necessary for flame kernel to form
> Allows low spark voltage to be achieved without increasing the gap
> Spark exposes better to air-fuel mixture, achieving more complete combustion
> Ignites leaner mixtures
> Lower emissions
> Choice: U-groove technology is a standard feature of most DENSO spark plugs; more than 300 references in all

g RING

h RESISTOR
> 5k Ω resistor specification
> Reduces noise that may affect electronic devices

i CENTRE SHAFT (STEM)

j COPPER-GLASS SEAL
> Special mixture of copper and glass powder bonds centre electrode and insulator together
> Airtight seal prevents escape of hot combustion gases
> High electrical and thermal conductivity
> Even heat distribution

k PACKING WASHER

l COPPER-CORE CENTRE ELECTRODE
> Centre electrode of wear-resistant nickel- chrome binary alloy with deeply inserted copper core
> Increased operating range
> Releases intense heat from the electrode
> Strong, steady spark from low to high speeds

LEADING MARQUES CHOOSE DENSO PLUGS

DENSO spark plugs are fitted as Original Equipment in many applications, among them the Citroën C1, Peugeot 107 and Toyota Aygo.

The DENSO K20HR-U11 Standard spark plug was selected for the 1.0 litre 12V Aygo. Later when the Citroën C1 and Peugeot 107 were introduced, the same DENSO Spark Plug was fitted in the new Toyota 1KR-FE engine.

The K20HRU11 features DENSO's patented U-groove technology, as do the majority of Standard DENSO spark plugs. The main advantage of this U-groove technology is the more complete combustion it achieves. Although similar technologies are offered by other manufacturers (for example using a small groove in the centre electrode) these do not last as long as the unique DENSO U-groove design.

U-GROOVE TECHNOLOGY

> U-shaped groove in ground electrode creates large volume necessary for flame kernel to form
> Results in improved ignition performance, smoother running and better fuel economy

CONSOLIDATED HEAT RANGE

> DENSO plugs cover more heat ranges than other manufacturers without compromise on quality and performance
> Fewer part numbers to cover all heat ranges means less stock holding

RESISTOR SPARK PLUGS

> Resistors located in the spark section of DENSO plugs greatly reduce car radio interference
> Resistors also avoid interference with mobile telephones, ignition and fuel management systems, ABS and navigation systems

Iridium Power

World's Smallest 0.4mm Diameter Centre Electrode

Drivers that care about:

Great acceleration and torque compared to regular plugs

Superb fuel consumption for daily journeys

Powerful performance

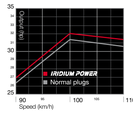
The next level of response

IMPROVED OUTPUT

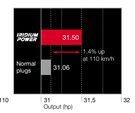
More power with an optimal combustion cycle

IRIDIUM POWER

> Vastly improved combustion: Iridium Power has a low required voltage and a high ignitability, resulting in less misfiring and always a spark which dramatically improves combustion
> Better engine output: The significantly improved combustion enables engine output to increase
> Measurable results: Motorcycle engine bench tests on Iridium Power show a 0.5ps (1.4%) improvement in output at 110km/h compared to normal plugs



Motorcycle Bench Test Showing Improved Combustion From Iridium Power
Vehicle: 250cc (2 cycle water cooled, V2 cylinders)



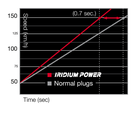
Conditions: Full 90-110km/h
Data: In-company Comparison

IMPROVED ACCELERATION

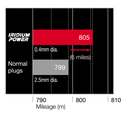
Increased response and acceleration performance

IRIDIUM POWER

> High ignitability: The world's only 0.4mm dia. Iridium centre electrode and specially shaped ground electrodes give high ignitability and low required voltages
> Better firing: Electrode fires better under high required voltage conditions, and gives fewer misfires when under conditions where ignition is difficult
> Improved acceleration: Acceleration is superior to normal plugs



Motorcycle Bench Test Showing Improved Acceleration From Iridium Power
Vehicle: 250cc (2 cycle water cooled, V2 cylinders)



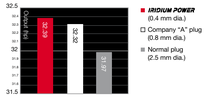
Conditions: Fixed at 6th Gear, full open acceleration from 50km/h using automatic driving device
Data: In-company Comparison

IMPROVED POWER

Increased output under various driving conditions

IRIDIUM POWER

> Unique power: The power produced by the 0.4mm electrode is unmatched by any other plugs
> Beats other high performance plugs: Using a 0.4mm dia. fine centre electrode there is more power than with 0.8mm and 2.5mm plugs



Motorcycle Bench Test Showing Improved Power From Iridium Power
Vehicle: 250cc (2 cycle water cooled, V2 cylinders)

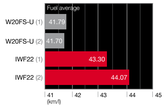
Conditions: Full (100km/h)

IMPROVED FUEL CONSUMPTION

Improved ignition, less fuel consumption, less noise

IRIDIUM POWER

> Better engine performance: The excellent ignitability of Iridium Power's unique 0.4mm fine electrode draws out much more performance from the engine
> Improved fuel consumption: Comparing a normal plug (W20FS-U) with an Iridium Power (IWF22) on a 2 cycle 50cc engine, tests show fuel consumption improves by around 5%



Note: Fuel consumption was measured using a chassis dynamo. These results may not be the same during general driving.

Motorcycle Bench Test Showing Improved Fuel Consumption From Iridium Power
Vehicle: Honda DIO (2 Cycle, Single Cylinder, Air Cooled, 50cc)

Conditions: Speed 30km/h, Freight Weight 120kg. Measured Time 10 minutes
Cooling air speed 30km/h
Data: In-company Comparison

a TERMINAL
> A terminal nut for most of the world's plug cords is attached
> Please remove for vehicle types that do not require a terminal
> IWM type is solid terminal

5k Ω

b HIGHLY RELIABLE RESISTOR
> All types feature 5k Ω resistance specification and contain a highly reliable monolithic-type resistor
> Reduces noise that may affect electronic devices

c BRIGHT NICKEL PLATING
> Bright nickel plating on the housing ensures a high level of corrosion resistance
> Plating is as used on racing plugs
> Resistant to rust, even in wet weather and during motocross events
> Low heat range types not included

TAPERED CUT

d TAPERED CUT GROUND ELECTRODE
> Ground electrode tip is cut to form a fine taper
> Reduces flash suppression effect, improving ignitability
> Streamlined taper shape smooths fuel-air mixture, resulting in steady ignition

U-GROOVE ELECTRODE

e U-GROOVE GROUND ELECTRODE
> U-shaped groove creates large volume necessary for flame kernel to form
> Allows low spark voltage to be achieved without increasing the gap
> Spark exposes better to air-fuel mixture, achieving more complete combustion
> Ignites leaner mixtures
> Lower emissions
> (IUF27A IUF31A IU24A IU27A IU31A are not included)

0.4mm IRIDIUM

f THE WORLD'S FIRST 0.4MM DIA. ULTRA-FINE IRIDIUM CENTRE ELECTRODE
> All types feature extra fine centre electrode tip, made from a new iridium alloy (developed and patented by DENSO) with a high melting point
> Electrode requires low voltage, and produces superb ignitability
> Draws out better performance from the car including increased acceleration, acceleration response, operational stability and lower fuel consumption

g PROJECTED CENTRE ELECTRODE
> Centre electrode is projected more than in conventional types
> Improved accelerator response
> Greater acceleration
> (IU31 IUH24 IUH27 IX22 IX24 IX27 IUF22 IUF24 IWF22 IWF24 IWF27 IW24 IW27 IW29 IW31 IW34 only)

h INSULATOR PROJECTION
> All types feature insulator projection that has an optimised design based on its heat range
> Low heat range plugs have self-cleaning ability
> High heat range plugs have Excellent heat resistance

LASER WELDING

i 360° LASER WELDING
> Process used to join the Iridium tip is a highly reliable, "360° laser welding" process patented by DENSO that withstands driving conditions of all kinds

POWER IN ACTION

The results of a Toyota Yaris 1.3 chassis dynamo test clearly demonstrate the increased performance delivered by Iridium Power plugs compared to standard plugs. Tests showed that with normal plugs, output was 98.2PS whilst torque was 14.8 kgf. When these were changed to Iridium Power plugs; the output was 99.3PS with a torque of 15.2 kgf – an improvement of around 1.5%.

IMPROVED OUTPUT
> Low required voltage and a high ignitability, resulting in less misfiring and no spark which dramatically improves combustion
> Significantly improved combustion enables engine output to increase

IMPROVED ACCELERATION
> 0.4mm dia. Iridium centre electrode and specially shaped ground electrodes give high ignitability, fewer misfires and low required voltages
> Acceleration is superior to normal plugs

IMPROVED POWER
> The power produced by the 0.4mm electrode is unmatched by any other plugs
> Using a 0.4mm dia. fine centre electrode there is more power than with 0.8mm and 2.5mm plugs

IMPROVED FUEL CONSUMPTION
> The excellent ignitability of Iridium Power's 0.4mm fine electrode draws out much more performance from the engine
> Tests show fuel consumption improves by around 5%

High Performance Spark Plug

IRIDIUM POWER®

Iridium Power | Line Up

COMPARATIVE IRIDIUM SPARK PLUG TABLE

This 20-plug series overview provides all the details you need on DENSO's Iridium Power series, making it easier to choose the right plug for each application

IRIDIUM POWER

IT series
IT16. IT20. IT22. IT24. IT27.

- 14mm dia. x 17.5mm length tapered seat type
- For use with GM, Ford, Citroën, Jaguar, Peugeot, Volvo, Mercedes-Benz, Lancia, Renault, Audi and Mazda

ITF series
ITF16. ITF20. ITF22. ITF24.

- 14mm dia x 11.2mm length tapered seat type
- For use with GM and Ford

IXU series
IXU22. IXU24. IXU27.

- 12mm dia. x 19mm length fully threaded type
- The insulator is fully projected (1.5mm) creating a wide heat range and greater ignitability
- 16mm hex
- For use with small cars and motorcycles such as Ducati

IX series
IX22. IX24. IX27.

- 12mm dia. x 19mm length fully threaded type
- Using the high heat resistance of the iridium electrode, the spark position is projected 0.4mm more than in standard types (1.6 - 2.0mm)
- Harnessing the low required voltage of the 0.4mm dia. Iridium the gap is wider than in standard types (0.7 - 0.8mm)
- A further increase in ignitability
- 18mm hex

IKH series
IKH16. IKH20. IKH22. IKH24. IKH27.

- 14mm dia x 26.5mm length; long reach type
- For Subaru 3 litre, Nissan, Peugeot, Citroën and Yamaha Manne
- Iridium Tough VKH16, VKH20 and VKH22 are also available

IK series
IK16. IK20. IK22. IK16L. IK20L. IK16G. IK20G. IK22G. IK24. IK27. IK31. IK34.

- Mainly used for cars; ISO type
- 14mm dia. x 19mm length type
- IK22 and above are for tuned engines, with a spark gap of 0.8mm
- IK L is extended type (spark position 6mm)
- IK G equips a stainless steel gasket

IQ series
IQ16. IQ20. IQ22. IQ24. IQ27. IQ31. IQ34.

- Mainly used for cars
- 14mm dia. x 19mm length type
- IQ22 and above are for tuned engines, with a spark gap of 0.8mm

IW series
IW16. IW20. IW22. IW24. IW27. IW29. IW31. IW34.

- 14mm dia. x 19mm length fully threaded type
- W16 to 22 are focused on ignitability with a 1.5mm projection
- IW24 to 34 are focused on heat resistance with a projection of -1.5mm
- The spark position of IW24 to 34 is projected 0.5mm compared to normal (1.0 - 1.5mm)

IX-B series
IX22B. IX24B. IX27B.

- 12mm dia. x 19mm length fully threaded type
- Compared to the IX type, the insulator projection is extended 0.9mm (0.6 - 1.5mm) resulting in a wider heat range
- The spark position is projected 0.8mm more than the IX type (2.0 - 2.8mm)
- 18mm hex

IXG series
IXG24. IXG27.

- The Iridium Power versions of the 2mm shroud type plugs (X24/27GP-U) used by Honda
- Applicable to CB400SS
- An expansion of applications is planned
- Applicable to Honda CB400SS XR400RR CL400/RS XL250R CBX250S FTR250 CBX400F XR250R

IU series
IU20. IU22. IU24. IU27. IU31.

- 10mm dia. x 19mm length fully threaded type
- Harnessing the low required voltage of the 0.4mm iridium centre electrode, the spark gap is wider than in the normal type
- A further increase in ignitability
- For motorcycles such as Yamaha and Kawasaki. Also for Ferani, Maserati and Alfa Romeo

IU-A series
IU24A. IU27A. IU31A.

- 10mm dia. x 19mm length fully threaded slant ground electrode type
- Harnessing the low required voltage of the 0.4mm dia. Iridium, the gap is wider than in the normal type (0.7 - 0.9mm)
- Ignitability is greatly increased
- By making this a single electrode, the spark location is stabilised compared to double ground electrode types securing ideal combustion conditions

IWM series
IWM24. IWM27. IWM31.

- Gasket face height is approximately 10mm shorter than the IW type
- The Iridium Power version of the IWM01– Iridium Racing plugs

IWF series
IWF16. IWF20. IWF22. IWF24. IWF27.

- 14mm dia. x 12.7mm length short reach type
- IWF27 uses the heat resistance of the iridium electrode to extend the spark position 0.5mm (1.0 - 1.5mm)
- Harnessing the low required voltage of the 0.4mm dia. Iridium, the gap is wider than in standard types (0.7 - 0.8mm) and ignitability is increased even further

ITV series
ITV16. ITV20. ITV22. ITV24. ITV27.

- 14mm dia x 25.0mm length tapered seat, long reach type
- For the Ford Focus, Mondeo, Escape, Chevrolet Blazer and Mazda Tribute

ITL series
ITL16. ITL20.

- 14mm dia. x 25.0mm length tapered seat, long reach type
- Designed so that the head of the plug is 6mm higher than in the ITV
- For the Chrysler, PT Cruiser and Voyager

IUH series
IUH24. IUH27.

- 10mm dia x 19mm length half-threaded type
- Using the high heat resistance of the iridium electrode, the spark position is extended 0.4mm compared to standard types (1.6 - 2.0mm)
- For Honda

IUF series
IUF22. IUF24. IUF14-UB.

- 10mm dia. x 12.7mm length short reach type
- Using the high heat resistance of the iridium, the spark position is extended 0.4mm compared to standard types (1.6 - 2.0mm)
- Harnessing the low required voltage of the 0.4mm dia. Iridium, the spark gap is wider than in normal types (0.7 - 0.8mm)

IUF-A series
IUF27A. IUF31A.

- 10mm dia. x 12.7mm length short type
- The ground electrode has a slant shape, reducing the thermal stress on it

IY series
IY24. IY27 . IY31.

- 8mm dia. x 19mm length tapered seat, half thread type
- The world's first 8mm thread diameter iridium plug
- Can be used with Honda Smart Dio ('04-), VFR400, VF400, Kitaco Monkey Head and NR750

Iridium Power | Specifications

TYPE	SPECIFICATIONS (SPEC)	DIAMETER (DIA) (mm)	REACH (mm)	HEXAGONAL (HEX) (mm)	GAP (mm)	PROJECTION	SPARK POSITION	GROUND ELECTRODE HEIGHT	TERMINAL SHAPE	RESITOR (kΩ)	NUMBER (NO.)	IRIDIUM POWER BARCODE	ONE PC BOX DENSO P/N
IQ16	JIS	14	19	16	1.1	1.5	3.0	5.5	RC	5	I01	0 42511 05301 4	067700-8700
IQ20	JIS	14	19	16	1.1	1.5	3.0	5.5	RC	5	I02	0 42511 05302 1	067700-8710
IQ22	JIS	14	19	16	0.8	1.5	3.0	5.5	RC	5	I13	0 42511 05313 7	067700-8480
IQ24	JIS	14	19	16	0.8	1.5	3.0	5.5	RC	5	I14	0 42511 05314 4	067700-8490
IQ27	JIS	14	19	16	0.8	1.5	3.0	5.5	RC	5	I15	0 42511 05315 1	067700-8500
IQ31	JIS	14	19	16	0.8	-0.5	1.0	3.2	RC	5	I23	0 42511 05323 6	067700-9230
IQ34	JIS	14	19	16	0.8	-0.5	1.0	3.2	RC	5	I24	0 42511 05324 3	067700-9600
IK16	ISO	14	19	16	1.1	1.5	3.0	5.5	RC	5	I03	0 42511 05303 8	067700-8680
IK20	ISO	14	19	16	1.1	1.5	3.0	5.5	RC	5	I04	0 42511 05304 5	067700-8690
IK22	ISO	14	19	16	0.8	1.5	3.0	5.5	RC	5	I10	0 42511 05310 6	067700-8430
IK24	ISO	14	19	16	0.8	1.5	3.0	5.5	RC	5	I11	0 42511 05311 3	067700-8460
IK27	ISO	14	19	16	0.8	1.5	3.0	5.5	RC	5	I12	0 42511 05312 0	067700-8470
IK31	ISO	14	19	16	0.8	-0.5	1.0	3.2	RC	5	I21	0 42511 05321 2	067700-9220
IK34	ISO	14	19	16	0.8	-0.5	1.0	3.2	RC	5	I22	0 42511 05322 9	067700-9590
IK16G	ISO, SUS GASKET	14	19	16	1.1	1.5	3.0	5.2	S	5	I51	0 42511 05351 9	267700-5610
IK20G	ISO, SUS GASKET	14	19	16	1.1	1.5	3.0	5.2	S	5	I52	0 42511 05352 6	267700-5620
IK22G	ISO, SUS GASKET	14	19	16	0.8	1.5	3.0	5.2	RC	5	I48	0 42511 05348 9	267700-3790
IK16L	ISO EXTENDED	14	19	16	1.1	2.5	5.0	7.8	RC	5	I57	0 42511 05357 1	267700-5120
IK20L	ISO EXTENDED	14	19	16	1.1	2.5	5.0	7.8	RC	5	I58	0 42511 05358 8	267700-5130
IKH16	LONG REACH 26.5MM	14	26.5	16	1.1	1.5	3.0	5.5	RC	5	I43	0 42511 05343 4	267700-3660
IKH20	LONG REACH 26.5MM	14	26.5	16	1.1	1.5	3.0	5.5	RC	5	I44	0 42511 05344 1	267700-3670
IKH22	LONG REACH 26.5MM	14	26.5	16	0.8	1.5	3.0	5.5	RC	5	I45	0 42511 05345 8	267700-2650
IKH24	LONG REACH 26.5MM	14	26.5	16	0.8	1.5	3.0	5.5	RC	5	I46	0 42511 05346 5	267700-4280
IKH27	LONG REACH 26.5MM	14	26.5	16	0.8	1.5	3.0	5.5	RC	5	I47	0 42511 05347 2	267700 4290
IW16		14	19	20.6	1.1	1.5	3.0	5.5	RC	5	I05	0 42511 05305 2	067700-8650
IW20		14	19	20.6	1.1	1.5	3.0	5.5	RC	5	I06	0 42511 05306 9	067700-8660
IW22		14	19	20.6	0.8	1.5	3.0	5.2	RC	5	I07	0 42511 05307 6	067700-8670
IW24		14	19	20.6	0.7	-0.5	1.5	3.6	RC	5	I16	0 42511 05316 8	067700-8890
IW27		14	19	20.6	0.7	-0.5	1.5	3.6	RC	5	I17	0 42511 05317 5	067700-8900
IW29		14	19	20.6	0.7	-0.5	1.5	3.6	RC	5	I18	0 42511 05318 2	067700-8910
IW31		14	19	20.6	0.7	-0.5	1.5	3.6	RC	5	I19	0 42511 05319 9	067700-8920
IW34		14	19	20.6	0.7	-0.5	1.5	3.6	RC	5	I20	0 42511 05320 5	067700-8930
IWM24	INSULATOR COMPACT	14	19	20.6	0.8	-1.5	0.5	2.7	S	5	I91	0 42511 05391 5	267700-2890
IWM27	INSULATOR COMPACT	14	19	20.6	0.8	-1.5	0.5	2.7	S	5	I92	0 42511 05392 2	267700-2900
IWM31	INSULATOR COMPACT	14	19	20.6	0.8	-1.5	0.5	2.7	S	5	I93	0 42511 05393 9	267700-2910
IWF16		14	12.7	20.6	0.8	1.5	3.0	5.2	R	5	I59	0 42511 05359 5	267700-5000
IWF20		14	12.7	20.6	0.8	1.5	3.0	5.2	R	5	I78	0 42511 05378 6	267700-5010
IWF22		14	12.7	20.6	0.8	-0.5	1.5	3.7	R	5	I79	0 42511 05379 3	067700-9410
IWF24		14	12.7	20.6	0.8	-0.5	1.5	3.7	R	5	I80	0 42511 05380 9	067700-9420
IWF27		14	12.7	20.6	0.8	-0.5	1.5	3.7	R	5	I81	0 42511 05381 6	067700-9430
ITV16	LONG REACH (TAPER SEAT)	14	25	16	1.1	1.5	3.0	5.5	RC	5	I38	0 42511 05338 0	267700-3700
ITV20	LONG REACH (TAPER SEAT)	14	25	16	1.1	1.5	3.0	5.5	RC	5	I39	0 42511 05339 7	267700-3710
ITV22	LONG REACH (TAPER SEAT)	14	25	16	0.8	1.5	3.0	5.2	RC	5	I40	0 42511 05340 3	267700-2500
ITV24	LONG REACH (TAPER SEAT)	14	25	16	0.8	-0.5	1.0	3.2	RC	5	I41	0 42511 05341 0	267700-2510
ITV27	LONG REACH (TAPER SEAT)	14	25	16	0.8	-0.5	1.0	3.2	RC	5	I42	0 42511 05342 7	267700-2520
ITL16	LONGER INSULATOR LONG REACH (TS*)	14	25	16	1.1	1.5	3.0	5.5	RC	5	I49	0 42511 05349 6	267700-4980
ITL20	LONGER INSULATOR LONG REACH (TS*)	14	25	16	1.1	1.5	3.0	5.5	RC	5	I50	0 42511 05350 2	267700-4990
IT16	TAPER SEAT	14	17.5	16	1.1	1.5	3.0	5.5	R	5	I25	0 42511 05325 0	267700-0610
IT20	TAPER SEAT	14	17.5	16	1.1	1.5	3.0	5.5	R	5	I26	0 42511 05326 7	267700-0620
IT22	TAPER SEAT	14	17.5	16	0.8	1.5	3.0	5.2	R	5	I27	0 42511 05327 4	267700-0630
IT24	TAPER SEAT	14	17.5	16	0.8	-0.5	1.0	3.2	R	5	I28	0 42511 05328 1	267700-0640
IT27	TAPER SEAT	14	17.5	16	0.8	-0.5	1.0	3.2	R	5	I29	0 42511 05329 8	267700-0650
ITF16	TAPER SEAT	14	11.2	16	1.1	1.5	3.0	5.5	R	5	I30	0 42511 05330 4	267700-0660
ITF20	TAPER SEAT	14	11.2	16	1.1	1.5	3.0	5.5	R	5	I31	0 42511 05331 1	267700-0670
ITF22	TAPER SEAT	14	11.2	16	0.8	1.5	3.0	5.2	R	5	I32	0 42511 05332 8	267700-0680
ITF24	TAPER SEAT	14	11.2	16	0.8	-0.5	1.0	3.2	R	5	I33	0 42511 05333 5	267700-0690
ITF27	TAPER SEAT	14	11.2	16	0.8	-0.5	1.0	3.2	R	5	I34	0 42511 05334 2	267700-0700
IXU22		12	19	16	0.9	1.3	2.8	5.0	RC	5	I08	0 42511 05308 3	067700-8720
IXU24		12	19	16	0.9	1.3	2.8	5.0	RC	5	I09	0 42511 05309 0	067700-8730
IXU27		12	19	16	0.9	1.3	2.8	5.0	RC	5	I37	0 42511 05337 3	067700-8600
IX22		12	19	18	0.8	0.6	2.0	4.1	R	5	I71	0 42511 05371 7	067700-9350
IX24		12	19	18	0.8	0.6	2.0	4.1	R	5	I72	0 42511 05372 4	067700-9360
IX27		12	19	18	0.8	0.6	2.0	4.1	R	5	I73	0 42511 05373 1	067700-9370
IX22B		12	19	18	0.9	1.5	2.8	5.0	R	5	I75	0 42511 05375 5	067700-9380
IX24B		12	19	18	0.9	1.5	2.8	5.0	R	5	I76	0 42511 05376 2	067700-9390
IX27B		12	19	18	0.9	1.5	2.8	5.0	R	5	I77	0 42511 05377 9	067700-9400
IXG24	SHROUD	12	22	18	0.7	0.7	2.0	4.1	R	5	I94	0 42511 05394 6	267700-2920
IXG27	SHROUD	12	22	18	0.7	0.7	2.0	4.1	R	5	I95	0 42511 05395 3	267700-2930
IU20		10	19	16	0.9	-0.5	0.7	2.6	R	5	I60	0 42511 05360 1	267700-5020
IU22		10	19	16	0.9	-0.5	0.7	2.6	R	5	I61	0 42511 05361 8	267700-9260
IU24		10	19	16	0.9	-0.5	0.7	2.6	R	5	I62	0 42511 05362 5	267700-9270
IU27		10	19	16	0.9	-0.5	0.7	2.6	R	5	I63	0 42511 05363 2	267700-9280
IU31		10	19	16	0.9	-0.5	0.7	2.6	R	5	I64	0 42511 05364 9	267700-9290
IU24A		10	19	16	0.9	-0.5	1.0	2.9	R	5	I65	0 42511 05365 6	267700-9300
IU27A		10	19	16	0.9	-0.5	1.0	2.9	R	5	I66	0 42511 05366 3	267700-9310
IU31A		10	19	16	0.9	-0.5	1.0	2.9	R	5	I67	0 42511 05367 0	267700-9320
IUH24	HALF THREAD	10	19	16	0.9	0.6	2.0	3.9	R	5	I68	0 42511 05368 7	267700-9330
IUH27	HALF THREAD	10	19	16	0.9	0.6	2.0	3.9	R	5	I69	0 42511 05369 4	267700-9340
IUF22		10	12.7	16	0.8	0.6	2.0	3.8	R	5	I83	0 42511 05383 0	267700-9480
IUF24		10	12.7	16	0.8	0.6	2.0	3.8	R	5	I84	0 42511 05384 7	267700-9490
IUF27A		10	12.7	16	0.9	-0.5	1.0	2.9	R	5	I85	0 42511 05385 4	267700-9700
IUF31A		10	12.7	16	0.9	-0.5	1.0	2.9	R	5	I86	0 42511 05386 1	267700-9710
IY24	HALF THREAD	8	19	13	0.7	0.6	1.4	2.9	R	5	I100	0 42511 05400 4	267700-4490
IY27	HALF THREAD	8	19	13	0.7	0.6	1.4	2.9	R	5	I101	0 42511 05401 1	267700-4500
IY31	HALF THREAD	8	19	13	0.7	-0.5	0.5	2.0	R	5	I102	0 42511 05402 8	267700-4510

* TS = TAPER SEAT

Iridium Power | OEM Type

TYPE	SPECIFICATIONS (SPEC)	DIAMETER (DIA) (mm)	REACH (mm)	HEXAGONAL (HEX) (mm)	GAP (mm)	PROJECTION	SPARK POSITION	GROUND ELECTRODE HEIGHT	TERMINAL SHAPE	RESITOR (kΩ)	NUMBER (NO.)	IRIDIUM POWER BARCODE	ONE PC BOX DENSO P/N
IK24C11	ISO	14	19	16	1.1	1.5	3.0	5.7	S	5	I35	0 42511 05335 9	067700-9550
IK27C11	ISO	14	19	16	1.1	0.5	2.0	4.7	S	5	I36	0 42511 05336 6	067700-9520
VK16PR-Z11	GROUND ELECTRODE PT. & TAPERCUT	14	19	16	1.1	1.5	3.0	5.7	S	5	V28	0 42511 05628 2	267700-1840
VK20PR-Z11	GROUND ELECTRODE PT. & TAPERCUT	14	19	16	1.1	1.5	3.0	5.7	S	5	V15	0 42511 05615 2	267700-1850
VK22PR-Z11	GROUND ELECTRODE PT. & TAPERCUT	14	19	16	1.1	1.5	3.0	5.7	S	5	V29	0 42511 05629 9	267700-1860
VK24PR-Z11	GROUND ELECTRODE PT. & TAPERCUT	14	19	16	1.1	1.5	3.0	5.7	S	5	V16	0 42511 05616 9	267700-1870
VK27PR-Z11	GROUND ELECTRODE PT. & TAPERCUT	14	19	16	1.1	0.5	2.0	4.7	S	5	V30	0 42511 05630 5	267700-2050
VKJ20PR-M1	GROUND ELECTRODE PT. & TAPERCUT	14	19	16	1.1	3.0	5.0	7.7	S	5	V33	0 42511 05633 6	267700-1970
SVK20RZ8	GROUND ELECTRODE PT. & TAPERCUT	14	19	16	0.8	1.5	3.5	5.7	S	5		-	067700-9740
SVK20RZ11	GROUND ELECTRODE PT. & TAPERCUT	14	19	16	1.1	1.5	3.5	6.0	S	5		-	067700-8620
VW16R-A13	GROUND ELECTRODE PT. & TAPERCUT	14	19	20.6	1.3	2.5	4.0	6.9	S	5		-	267700-1640
VX20BC	GROUND ELECTRODE PT.	12	19	18	0.9	1.5	2.8	5.0	T	5	V34	0 42511 05634 3	067700-9830
VX22BC	GROUND ELECTRODE PT.	12	19	18	0.9	1.5	2.8	5.0	T	5	V14	0 42511 05614 5	067700-9720
IXU22C	NO U-GROOVE	12	19	16	0.8	1.3	2.8	4.9	S	5		-	267700-5170
IU27D		10	19	16	0.9	0.5	1.8	3.8	T	5	I90	0 42511 05390 8	267700-0850
IUH24D	HALF THREAD	10	19	16	0.9	0.6	2.0	4.0	R	5	I87	0 42511 05387 8	067700-9560
IUH27D	HALF THREAD	10	19	16	0.9	0.6	2.0	4.0	R	5	I88	0 42511 05388 5	067700-9570
VUH24D	HALF THREAD GROUND ELEC. PT. & TC*	10	19	16	0.9	0.6	2.0	4.0	T	5	V26	0 42511 05626 8	267700-2010
VUH27D	HALF THREAD GROUND ELEC. PT. & TC*	10	19	16	0.9	0.6	2.0	4.0	T	5	V27	0 42511 05627 5	267700-1931
VUH27ES	HALF THREAD GROUND ELEC. PT. & TC* STAINLESS STEEL (SUS) GASKET	10	19	16	0.9	0.6	2.0	4.0	T	5		-	267700-4770
VNH24Z	HALF THREAD, GROUND ELEC. PT. & TC*	10	19	16	0.9	0.6	2.0	4.0	S	5	V32	0 42511 05632 9	267700-2060
VNH27Z	HALF THREAD, GROUND ELEC. PT. & TC*	10	19	16	0.9	0.6	2.0	4.0	S	5	V31	0 42511 05631 2	267700-2070
IUF14-UB		10	12.7	16	0.7	0.6	1.6	3.3	S	5	I89	0 42511 05389 2	267700-0540

Spark gap – For example, for a 1.1mm gap, it is set at the range between 1.0 and 1.1mm
Insulator projection – This is the distance from the end of the housing to the end of the insulator. The + direction is the direction of the piston
Spark position – This is the distance from the end of the housing to the tip of the centre electrode. The + direction is the direction of the piston
Ground electrode height – This is the distance from the end of the housing to the tip of the ground electrode. The + direction is the direction of the piston
Terminal shape – S. Solid R. Removable RC. Crimped T. Threaded

* TC = TAPERCUT

Iridium Tough | World's Smallest 0.4mm Diameter Centre Electrode

Drivers that care about:

Superb fuel consumption for daily journeys

Powerful performance

Less time and maintenance than regular plugs

Controlled electrode wear improves fuel consumption and lengthens lifetime to at least 100,000 km

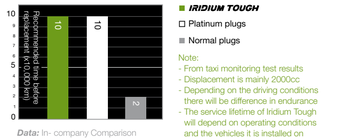
LONGER LIFETIME

Iridium and platinum technologies combine to create a plug with a lifetime of at least 100,000km

IRIDIUM TOUGH*

> Platinum technology: Like Iridium Power plugs, Iridium Tough plugs feature the world's finest 0.4mm Iridium electrode but instead of a tapered cut U-grooved ground electrode Iridium Tough plugs have a platinum wafer tip
> Longer life: The Iridium and platinum technologies limit the wear on the electrode, improving fuel consumption and achieving a much longer plug lifetime
> Lower maintenance: A long lifetime and ease of use mean that less time and effort is required on maintenance
> Less access required: The long lifespan of Iridium Tough plugs means there is a longer service interval. This is why many car manufacturers choose these plugs for engines where it can be difficult to access the plugs for replacement

Comparison of durability



Data: In- company Comparison

Note:
- From taxi monitoring test results
- Displacement is mainly 2000cc
- Depending on the driving conditions there will be difference in endurance
- The service lifetime of Iridium Tough will depend on operating conditions and the vehicles it is installed on
- Service lifetime may become shorter depending on the vehicle's ignition system

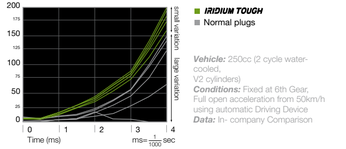
IMPROVED IGNITABILITY

0.4mm electrode delivers superb ignition performance

IRIDIUM TOUGH*

> Vastly improved ignitability: Iridium Tough's 0.4mm diameter centre electrode has a low required voltage and produces excellent ignitability
> Fewer misfires: Compared to normal plugs the flame spreads further for longer, resulting in less misfiring and greatly improved combustion
> Better engine output: The significantly improved combustion enables engine output to increase

Comparison of flame spread



Vehicle: 250cc (2 cycle water-cooled, V2 cylinders)
Conditions: Fixed at 6th Gear, Full open acceleration from 50km/h using automatic Driving Device
Data: In- company Comparison

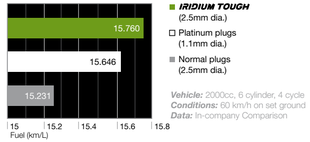
IMPROVED FUEL CONSUMPTION

Improved mileage, less fuel consumption, less noise

IRIDIUM TOUGH*

> Better engine performance: The excellent ignitability of Iridium Power's 0.4mm fine electrode draws out much more performance from the engine
> Better fuel economy: This results in lower fuel consumption, making regular and longer journeys more economical

The difference in mileage



Vehicle: 2000cc, 6 cylinder, 4 cycle
Conditions: 60 km/h on set ground
Data: In-company Comparison

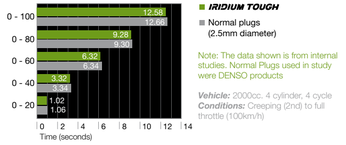
IMPROVED ACCELERATION

Steady ignitability produces dramatically improved acceleration

IRIDIUM TOUGH*

> Acceleration excellence: As it draws out better performance from the engine, Iridium Tough's 0.4mm centre electrode also acts to help increase acceleration, acceleration response and operational stability
> Proven improvement: Tests consistently show that Iridium Tough enables vehicles to accelerate more quickly than when using Standard Plugs

The difference in acceleration



Note: The data shown is from internal studies. Normal Plugs used in study were DENSO products

Vehicle: 2000cc, 4 cylinder, 4 cycle
Conditions: Creeping (2nd) to full throttle (100km/h)

a BRIGHT NICKEL PLATING
> Bright nickel plating on the housing ensures a high level of corrosion resistance
> Plating is the same as used on racing plugs
> Resistant to rust, even in wet weather and during motocross events

b HIGHLY RELIABLE RESISTOR

5k Ω

> All types feature 5k Ω resistance specification and contain a highly reliable monolithic-type resistor
> Reduces noise that may affect electronic devices

c PLATINUM TIPPED GROUND ELECTRODE
> Instead of a U-grooved ground electrode, the Iridium Tough ground electrode uses a platinum wafer tip
> Helping to reduce electrode wear, the platinum tipped ground electrode gives Iridium Tough a high degree of durability

d THE WORLD'S FIRST 0.4MM DIA. ULTRA-FINE IRIDIUM CENTRE ELECTRODE

0.4mm IRIDIUM

> Use of DENSO's original high melting point iridium alloy has enabled miniaturisation of the centre electrode - the smallest in the world at 0.4mm
> Electrode requires low voltage, and produces greatly increased ignitability

e 360° LASER WELDING
> Process used to join the Iridium tip is a highly reliable, '360° laser welding' process patented by DENSO that withstands driving conditions of all kinds

IRIDIUM TOUGH IMPRESSES THE MARKET

Iridium Tough's lifespan of at least 100,000 km is the result of its combined iridium and platinum design: Iridium Tough plugs feature DENSO's unique 0.4mm Iridium centre electrode, and a traditional ground electrode with a platinum wafer tip.

This exceptional lifespan has made Iridium Tough an outstanding success around the world. In Japan for example Iridium Tough is fitted as OE by eight car manufacturers in approximately 95 different models – with more being added all the time.

Now the plug is also enjoying great success in the aftermarket. In Japan for example this plug type is in strong demand. Approximately 40% of DENSO's total aftermarket spark plug sales in Japan consist of Iridium plugs; with most customers opting for longer life Iridium Tough specification. Now Europe is set to follow.

LONGER LIFETIME

> Iridium and platinum technologies combine to create a plug with a lifetime of 100,000km
> A long lifetime and ease of use mean that less time and effort is required on maintenance

IMPROVED FUEL CONSUMPTION

> The excellent ignitability of Iridium Power's 0.4mm fine electrode draws out much more performance from the engine
> This results in lower fuel consumption, making regular and longer journeys more economical

IMPROVED IGNITABILITY

> 0.4mm diameter centre electrode has a low required voltage and produces excellent ignitability
> Compared to normal plugs the flame spreads further for longer, resulting in less misfiring and greatly improved combustion

IMPROVED ACCELERATION

> Iridium Tough's 0.4mm centre electrode produces steady ignitability that draws out better performance from the engine
> At the same time it also increases acceleration, acceleration response and operational stability

High Performance Spark Plug

IRIDIUM TOUGH®

Iridium Tough | Additional advantages

BETTER FLAME KERNEL

Quenching effect of the plug is reduced by the miniaturised electrode

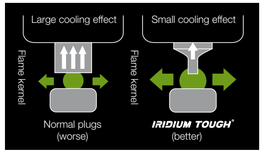
> Less quenching (cooling): Normally a thick spark plug electrode takes away the heat of the spark as soon as firing occurs. Iridium Tough's ultra-fine 0.4mm iridium electrode draws less heat away from the flame kernel than a normal plug; improving ignitability
> Bigger flame: Iridium Tough is less quenching because the contact area between the electrode and the flame kernel are so small
> Efficient firing: The Iridium Tough process means that after sparks discharge onto the electrode and form a small flame, the flame is able to spread more easily. The growth of the flame then accelerates, until explosive combustion occurs

INCREASED COMBUSTION PRESSURE

Better combustion pressure improves engine output

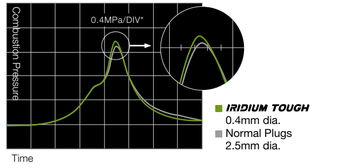
> Stronger flame kernel: By decreasing the cooling effect that the centre electrode has on the growth of the flame kernel, Iridium Tough forms a stronger flame kernel to improve ignition
> Faster combustion: This superior ignitability of Iridium Tough's ultra-fine 0.4mm electrode helps combustion to spread much faster. With Iridium Tough combustion spreads throughout nearly the entire combustion chamber within 4/1000 seconds of discharge – twice as fast as normal spark plugs
> Improved output: The result is faster spread of combustion, more stability and improved engine performance in comparison to normal spark plugs

Promotion of Flame Kernel Growth



Note:
The fine electrode has a smaller cooling effect on the flame kernel

Comparison of Combustion Pressure



Vehicle: 1600cc 4 cylinder
Conditions: 1200rpm – 60KPa
*0.4MPa/DIV average ripple mark of 256cycle

Note:
Iridium Tough increases combustion pressure and output

ENVIRONMENTAL EXCELLENCE

Cleaner exhaust emissions; better fuel consumption

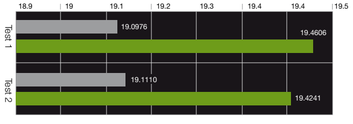
> Cleaner exhaust emissions: The improved combustion efficiency of Iridium Tough also brings environmental benefits by producing a cleaner exhaust emission
> Less CO and CO2: Both CO and CO2 levels will be seen to decrease when undertaking 'Euro III' emissions tests
> Improved mileage: Improved fuel consumption also brings an additional bonus for the environmentally conscious motorist

CO2 g/km: Iridium Tough compared to Normal Plugs

Data: In-company Comparison

IRIDIUM TOUGH
Normal Plugs

Fuel Consumption (km/L): Iridium Tough compared to Normal Plugs



Data: In-company Comparison

IRIDIUM TOUGH
Normal Plugs

Iridium Tough | Specifications

TYPE	SPECIFICATIONS (SPEC)	DIAMETER (DIA) (mm)	REACH (mm)	HEXAGONAL (HEX) (mm)	GAP (mm)	PROJECTION	SPARK POSITION	GROUND ELECTRODE HEIGHT	TERMINAL SHAPE	RESITOR (kΩ)	NUMBER (NO.)	IRIDIUM TOUGH BARCODE	ONE PC BOX DENSO P/N
VQ16	JIS	14	19	16	1.1	1.5	3.0	5.7	RC	5	V01	0 42511 05601 5	267700-0740
VQ20	JIS	14	19	16	1.1	1.5	3.0	5.7	RC	5	V02	0 42511 05602 2	267700-0750
VQ22	JIS	14	19	16	0.8	1.5	3.0	5.4	RC	5	V13	0 42511 05613 8	267700-0760
VK16	ISO	14	19	16	1.1	1.5	3.0	5.7	RC	5	V03	0 42511 05603 9	267700-0710
VK20	ISO	14	19	16	1.1	1.5	3.0	5.7	RC	5	V04	0 42511 05604 6	267700-0720
VK22	ISO	14	19	16	0.8	1.5	3.0	5.4	RC	5	V10	0 42511 05610 7	267700-0730
VK16G	ISO,SUS, GASKET	14	19	16	1.1	1.5	3.0	5.7	S	5	V40	0 42511 05640 4	267700-5610
VK20G	ISO,SUS, GASKET	14	19	16	1.1	1.5	3.0	5.7	S	5	V41	0 42511 05641 1	267700-5620
VK22G	ISO,SUS, GASKET	14	19	16	0.8	1.5	3.0	5.4	RC	5	V36	0 42511 05636 7	267700-3800
VK20Y	ISO	14	19	16	0.8	1.5	3.0	5.4	RC	5	V20	0 42511 05620 6	267700-3720
VKA16*	NEW 3 ELECTRODE SHROUD	14	22	16	1.1	2.5	4.0	6.5	RC	5	V22	0 42511 05622 0	267700-5030
VKA20*	NEW 3 ELECTRODE SHROUD	14	22	16	1.1	2.5	4.0	6.5	RC	5	V23	0 42511 05623 7	267700-5040
VKB16*	NEW 3 ELECTRODE	14	19	16	1.1	2.5	4.0	6.5	RC	5	V24	0 42511 05624 4	267700-5050
VKB20*	NEW 3 ELECTRODE	14	19	16	1.1	2.5	4.0	6.5	RC	5	V25	0 42511 05625 1	267700-5060
VKH16	LONG REACH	14	26.5	16	1.1	1.5	3.0	5.7	RC	5	V17	0 42511 05617 6	267700-3680
VKH20	LONG REACH	14	26.5	16	1.1	1.5	3.0	5.7	RC	5	V18	0 42511 05618 3	267700-3690
VKH22	LONG REACH	14	26.5	16	0.8	1.5	3.0	5.4	RC	5	V19	0 42511 05619 0	267700-2680
VKH20Y	LONG REACH	14	26.5	16	0.8	1.5	3.0	5.4	RC	5	V39	0 42511 05639 8	267700-4540
VW16		14	19	20.6	1.1	1.5	3.0	5.5	RC	5	V05	0 42511 05605 3	267700-0770
VW20		14	19	20.6	1.1	1.5	3.0	5.5	RC	5	V06	0 42511 05606 0	267700-0780
VW22		14	19	20.6	0.8	1.5	3.0	5.2	RC	5	V07	0 42511 05607 7	267700-0790
VT16		14	17.5	16	1.1	1.5	3.0	5.5	RC	5	V21	0 42511 05621 3	267700-2810
VT20		14	17.5	16	1.1	1.5	3.0	5.5	RC	5	V38	0 42511 05638 1	267700-4480
VXU22		12	19	16	0.9	1.3	2.8	5.0	RC	5	V08	0 42511 05608 4	267700-0800
VXU24		12	19	16	0.9	1.3	2.8	5.0	RC	5	V09	0 42511 05609 1	267700-0810

Spark gap – For example, for a 1.1mm gap, it is set at the range between 1.0 and 1.1mm
Insulator projection – This is the distance from the end of the housing to the end of the insulator. The + direction is the direction of the piston
Spark position – This is the distance from the end of the housing to the tip of the centre electrode.The + direction is the direction of the piston
Ground electrode height – This is the distance from the end of the housing to the tip of the ground electrode. The + direction is the direction of the piston
Terminal shape – S. Solid R. Removable RC. Crimped T. Threaded
* Limited Availability

Iridium Racing | Unbeatable Performance on the Circuit

Drivers that care about:

Unbeatable acceleration performance

Ideal combustion conditions

More power

Unparalleled ignition performance

A ride like never before

IMPROVED OUTPUT
More power with an ideal combustion cycle

IRIDIUM RACING*

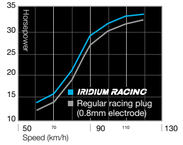
> Superb performance: Iridium Racing plugs deliver the ultimate ignition performance and spark voltage; ensuring that non-firing and misfires under a variety of conditions are greatly reduced
> Better engine output: As a result, combustion conditions have improved dramatically, increasing engine output
> Race proven: The reliability and durability of Iridium Racing plugs is borne out by race results and the trust of internationally respected motor racing drivers and riders

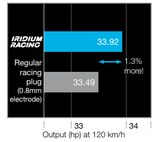
IMPROVED ACCELERATION
Unbeatable acceleration performance on the circuit

IRIDIUM RACING*

> The age of iridium: DENSO Iridium Racing plugs allow drivers to discover the ultimate in automotive acceleration
> Unparalleled performance: With an ultra-fine, 0.4mm diameter centre electrode, Iridium Racing plugs are the realisation of superb ignition performance and unmatched spark voltage
> Misfire control: The plugs allow misfires to be controlled
> Consistent response: Drivers will experience steadily high levels of response
> Maximum strength: Acceleration will also be noticeably increased

Iridium Racing outperforms regular racing plugs for output

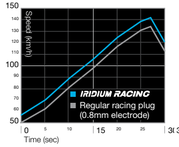


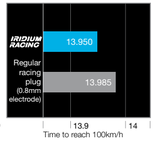


Vehicle: 250cc (2 cycle water cooled, 2 cylinders
Conditions: WOT 60 to 120km/h (locked in 4th)
Data: In-company Comparison

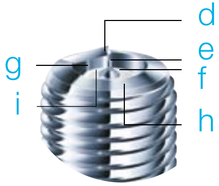
Note:
'Regular racing plug' refers to a DENSO product

Iridium Racing Outperforms Regular Racing Plugs For Acceleration





Vehicle: 250cc (2 cycle water cooled, 2 cylinders
Conditions: 50km/h, then accelerating for 27 seconds at full throttle (locked in 4th)
Data: In-company Comparison



a **TERMINAL**
> Included with the plug comes a terminal nut compatible to Nology HotWire and most plug cords around the world
> IRE01 / IW01 specify crimping
> IWM01 / IK01 / IK02 / IQ01 / IQ02 / IA01 / IAE01 are solid terminals

b **HIGHLY RELIABLE RESISTOR**
> All Iridium Racing plugs feature 5k Ω resistance specification and contain a highly reliable monolithic-type resistor
> Blocks noise that may affect electronic devices
> IW06 has no resistor

c **BRIGHT NICKEL PLATING**
> Bright nickel plating on the housing ensures a high level of corrosion resistance, even in wet weather and during motocross events
> Because the amount of plating on the threads is low, damage to the female thread in the cylinder is reduced

d **0.8MM ALL-PLATINUM GROUND ELECTRODE**
> Iridium Racing plugs feature an 0.8mm, all-platinum ground electrode
> Compared to the nickel alloy used in conventional spark plugs, the high melting point of platinum reduces problems such as ground electrode melting and wear
> Platinum alloy is welded on and gapped without any bending, reducing residual stress and increasing durability

e **THE WORLD'S FIRST 0.4MM DIA. ULTRA-FINE IRIDIUM CENTRE ELECTRODE**
> Use of DENSO's original high melting point iridium alloy has enabled miniaturisation of the centre electrode - the smallest in the world at 0.4mm
> Electrode requires low voltage, and produces greatly increased ignitability
> DENSO has patented the composition of its iridium alloy, the manufacturing method (adding rhodium to improve high temperature oxidation resistance) and the welding method (using melting instead of the conventional sintering technique)

f **SPARK CLEANING POCKET**
> Between the centre electrode and the insulator, a small pocket has been opened around the tip clearance
> When there is carbon fouling or deposition, this part will discharge and burn off the carbon, restoring electrical resistance
> Technology is patented by DENSO

g **SILICONE OIL COATING**
> During the start of a race, non-starting from carbon fouling and carbon deposits can be dangerous. To prevent this, the insulator has been coated with a silicone coating
> Using the water repellent properties of silicone, the insulator surface is isolated from moisture and carbon, preventing a reduction in resistance

h **HOUSING END FACE CHAMFER**
> To improve the tolerance to abnormal combustion conditions, the housing end face chamfer have been enlarged. This balances out any slight inaccuracies in tuning
> Because the exhaust of residual gas and the flow of new gas have been facilitated, the self- cleaning performance is improved, making this a carbon fouling resistant design

i **INSULATORS FOR RACING**
> Using a new, stronger insulator developed by repeating numerous race trials, strength has been increased by about 20%

j **360° LASER WELDING**
> Process used to join the Iridium tip is a highly reliable, '360° laser welding' process patented by DENSO that withstands driving conditions of all kinds

"The way an engine is used in F1 is very complex. It must deliver power but also have a very clean and robust combustion, whilst optimising fuel consumption. DENSO's expertise helps us to achieve this. For example; sometimes we have to save fuel in order to schedule a later pit stop. So relying on stability of combustion and good ignition is fundamental for us, so we can play around with it to gain a competitive advantage."

LUCA MARMORINI, TECHNICAL DIRECTOR, Engine at Panasonic Toyota Racing, commenting on how DENSO spark plug technology helps the Toyota F1 team to improve engine performance

IMPROVED OUTPUT

> Iridium Racing plugs deliver the ultimate ignition performance and spark voltage; ensuring that non-firing and misfires under a variety of conditions are greatly reduced
> As a result, combustion conditions have improved dramatically, increasing engine output

IMPROVED ACCELERATION

> DENSO Iridium Racing plugs allow drivers to discover steadily high levels of response and noticeably increased acceleration
> With an ultra-fine, 0.4mm diameter centre electrode, they combine superb ignition performance with unmatched spark voltage

High Performance Spark Plug

IRIDIUM RACING®

Iridium Racing | Choosing a Racing Plug

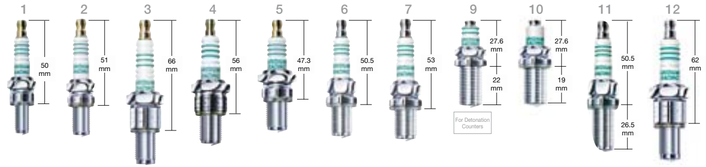
THE RIGHT SHAPE FOR YOUR NEEDS

Iridium Racing plugs are ideal for racing and tuned-up engines. Because racing engines do not have standard specifications it is important to select the appropriate plug type.

The following table indicates which racing spark plug will meet your specific requirements. Choose one based on the heat range of the standard plug or Iridium Power plugs currently being used, and that already suits the car's level of tuning. It is also essential to check the overall shape when choosing the right racing plug.

Generally, electrodes that project into the combustion chamber have better ignitability and better performance. However, because of more exposure to high temperature combustion gases and as the ground electrode becomes longer, heat resistance and durability decrease. The higher the level of tuning, the greater the need to use a less projecting type. As the level of tuning increases, so does the need for a higher heat range.

OVERALL SHAPE



Warning: On choosing the right racing plug check the overall shape

ELECTRODE SHAPE

TYPE (heat range)	TYPE	FIGURE ELECTRODE	CROSS REFERENCE
IU01-□	U-E	1 A	R0373A, R0379A, R016
RU01-□	U-E (SURFACE)	1 C	R0045J, R0045Q
IXU01-□	XU-E	2 A	R216, R2525
IRE01-□	ROTARY ENGINE	3 B	R6725
IW01-□	W-E	4 A	R6385P, R7376, R6918B
IW06-□	W-E (NON RESISTOR)	4 A	B-EGP, R4630A
IWM01-□	W-EM	5 A	R5184, R6179AP
IK01-□	ISO (SLANT ELECTRODE)	6 A	R7116, R7117
IK02-□	ISO (STRAIGHT ELECTRODE)	6 B	R7279, R7118, R7119
IQ01-□	SLANT ELECTRODE	7 A	R7236, R7237
IQ02-□	STRAIGHT ELECTRODE	7 B	R7238, R7239
IA01-□	W/ DETONATION COUNTER	8 A	R7282A, R6120A
IAE01-□	W/O DETONATION COUNTER	9 A	R7282, R6120
IKH01-□	K (LONG REACH)	10 A	R7438
IRL01-□	ROTARY ENGINE RX8	11 A	R7440A-L
IRT01-□	ROTARY ENGINE RX8	12 A	R7440B-T

RU01 are surface gap plugs – do not have Iridium centre electrodes and all-platinum ground electrodes

Identifying Iridium Racing

(Stamped into the center of the housing)

I	W	0	1	27
Variety	**Thread size**	**Intermediate number** (overall size)	**Intermediate number*** (electrode shape)	**Heat range**
I Iridium R Surface gap	U 10mm XU 12mm RE 14mm RL 14mm RT 14mm W 14mm WM 14mm K 14mm Q 14mm A 14mm AE 14mm KH 14mm		1 Oblique ground electrode or surface gap plug 2 Flat ground electrode 3 Oblique ground electrode and resistor-less plug	24 27 29 31 32 34 35

*Exception: IREO01 has a flat ground electrode.

Iridium Racing | Specifications

TYPE	SPECIFICATIONS (SPEC)	DIAMETER (DIA) (mm)	REACH (mm)	HEXAGONAL (HEX) (mm)	GAP (mm)	PROJECTION	SPARK POSITION	GROUND ELECTRODE HEIGHT	TERMINAL SHAPE	RESISTOR (kΩ)	NUMBER (NU)	IRIDIUM RACING BARCODE	ONE PC BOX DENSO P/N
IK01-24	ISO (SLANT ELECTRODE)	14	19	16	0.7	-1.0	0.5	2.0	S	5	R01	0 42511 05701 2	267700-1310
IK01-27	ISO (SLANT ELECTRODE)	14	19	16	0.7	-1.0	0.5	2.0	S	5	R02	0 42511 05702 9	267700-1320
IK01-31	ISO (SLANT ELECTRODE)	14	19	16	0.7	-1.0	0.5	2.0	S	5	R03	0 42511 05703 6	267700-1330
IK01-34	ISO (SLANT ELECTRODE)	14	19	16	0.7	-1.0	0.5	2.0	S	5	R42	0 42511 05742 5	267700-1340
IK02-24	ISO (STRAIGHT ELECTRODE)	14	19	16	0.7	-2.3	-0.8	0.7	S	5	R04	0 42511 05704 3	267700-1360
IK02-27	ISO (STRAIGHT ELECTRODE)	14	19	16	0.7	-2.3	-0.8	0.7	S	5	R05	0 42511 05705 0	267700-1370
IK02-31	ISO (STRAIGHT ELECTRODE)	14	19	16	0.7	-2.3	-0.8	0.7	S	5	R06	0 42511 05706 7	267700-1380
IKH01-24	LONG REACH	14	26.5	16	0.7	-1.0	0.5	2.0	S	5	R49	0 42511 05749 4	267700-4450
IKH01-27	LONG REACH	14	26.5	16	0.7	-1.0	0.5	2.0	S	5	R50	0 42511 05750 0	267700-4460
IKH01-31	LONG REACH	14	26.5	16	0.7	-1.0	0.5	2.0	S	5	R51	0 42511 05751 7	267700-4470
IQ01-24	SLANT ELECTRODE	14	19	16	0.7	-1.0	0.5	2.0	S	5	R07	0 42511 05707 4	267700-1410
IQ01-27	SLANT ELECTRODE	14	19	16	0.7	-1.0	0.5	2.0	S	5	R08	0 42511 05708 1	267700-1420
IQ01-31	SLANT ELECTRODE	14	19	16	0.7	-1.0	0.5	2.0	S	5	R09	0 42511 05709 8	267700-1430
IQ01-34	SLANT ELECTRODE	14	19	16	0.7	-1.0	0.5	2.0	S	5	R43	0 42511 05743 2	267700-1440
IQ02-24	STRAIGHT ELECTRODE	14	19	16	0.7	-2.3	-0.8	0.7	S	5	R10	0 42511 05710 4	267700-1460
IQ02-27	STRAIGHT ELECTRODE	14	19	16	0.7	-2.3	-0.8	0.7	S	5	R11	0 42511 05711 1	267700-1470
IQ02-31	STRAIGHT ELECTRODE	14	19	16	0.7	-2.3	-0.8	0.7	S	5	R12	0 42511 05712 8	267700-1480
IW01-24	W-E	14	19	20.6	0.6	-1.5	0.0	1.6	RC	5	R13	0 42511 05713 5	267700-1110
IW01-27	W-E	14	19	20.6	0.6	-1.5	0.0	1.6	RC	5	R14	0 42511 05714 2	267700-1120
IW01-29	W-E	14	19	20.6	0.6	-1.5	0.0	1.6	RC	5	R15	0 42511 05715 9	267700-1130
IW01-31	W-E	14	19	20.6	0.6	-1.5	0.0	1.6	RC	5	R16	0 42511 05716 6	267700-1140
IW01-32	W-E	14	19	20.6	0.6	-1.5	0.0	1.6	RC	5	R17	0 42511 05717 3	267700-1150
IW01-34	W-E	14	19	20.6	0.6	-1.5	0.0	1.6	RC	5	R18	0 42511 05718 0	267700-1160
IW06-27	W-E NON RESISTOR	14	19	20.6	0.6	-1.5	0.0	1.6	S	0	R44	0 42511 05744 9	067600-1810
IW06-31	W-E NON RESISTOR	14	19	20.6	0.6	-1.5	0.0	1.6	S	0	R45	0 42511 05745 6	067600-1820
IW06-34	W-E NON RESISTOR	14	19	20.6	0.6	-1.5	0.0	1.6	S	0	R46	0 42511 05746 3	067600-1830
IRE01-27	ROTARY ENGINE	14	21.5	20.6	0.7	-2.2	-0.7	0.8	RC	5	R19	0 42511 05719 7	267700-1520
IRE01-31	ROTARY ENGINE	14	21.5	20.6	0.7	-2.2	-0.7	0.8	RC	5	R20	0 42511 05720 3	267700-1530
IRE01-32	ROTARY ENGINE	14	21.5	20.6	0.7	-2.2	-0.7	0.8	RC	5	R21	0 42511 05721 0	267700-1540
IRE01-34	ROTARY ENGINE	14	21.5	20.6	0.7	-2.2	-0.7	0.8	RC	5	R22	0 42511 05722 7	267700-1550
IRE01-35	ROTARY ENGINE	14	21.5	20.6	0.7	-2.2	-0.7	0.8	RC	5	R41	0 42511 05741 8	267700-1560
IRL01-27	ROTARY RX8 (LEADING)	14	21	20.6	1.1	-2.5	-0.5	1.6	S	5	R54	0 42511 05754 8	267700-4820
IRL01-31	ROTARY RX8 (LEADING)	14	21	20.6	1.1	-2.5	-0.5	1.6	S	5	R55	0 42511 05755 5	267700-4830
IRT01-31	ROTARY RX8 (TRAILING)	14	19	20.6	1.1	-2.5	-0.5	1.6	S	5	R52	0 42511 05752 4	267700-4840
IRT01-34	ROTARY RX8 (TRAILING)	14	19	20.6	1.1	-2.5	-0.5	1.6	S	5	R53	0 42511 05753 1	267700-4850
IA01-31	WITH DETONATION COUNTER	14	22	16	0.6	-1.0	0.5	1.9	S	5	R23	0 42511 05723 4	267700-1260
IA01-32	WITH DETONATION COUNTER	14	22	16	0.6	-1.0	0.5	1.9	S	5	R24	0 42511 05724 1	267700-1270
IA01-34	WITH DETONATION COUNTER	14	22	16	0.6	-1.0	0.5	1.9	S	5	R25	0 42511 05725 8	267700-1280
IAE01-32	WITHOUT DETONATION COUNTER	14	19	16	0.6	-1.3	0.5	2.1	S	5	R47	0 42511 05747 0	267700-2940
IAE01-34	WITHOUT DETONATION COUNTER	14	19	16	0.6	-1.3	0.5	2.1	S	5	R48	0 42511 05748 7	267700-2950
IWM01-29	W-EM	14	19	20.6	0.6	-1.5	0.0	1.6	S	5	R26	0 42511 05726 5	267700-1210
IWM01-31	W-EM	14	19	20.6	0.6	-1.5	0.0	1.6	S	5	R27	0 42511 05727 2	267700-1220
IWM01-32	W-EM	14	19	20.6	0.6	-1.5	0.0	1.6	S	5	R28	0 42511 05728 9	267700-1230
IWM01-34	W-EM	14	19	20.6	0.6	-1.5	0.0	1.6	S	5	R29	0 42511 05729 6	267700-1240
IXU01-24	XU-E	12	19	16	0.6	-1.5	0.0	1.4	R	5	R30	0 42511 05730 2	267700-1060
IXU01-27	XU-E	12	19	16	0.6	-1.5	0.0	1.4	R	5	R31	0 42511 05731 9	267700-1070
IXU01-31	XU-E	12	19	16	0.6	-1.5	0.0	1.4	R	5	R32	0 42511 05732 6	267700-1080
IXU01-34	XU-E	12	19	16	0.6	-1.5	0.0	1.4	R	5	R33	0 42511 05733 3	267700-1090
IU01-24	U-E	10	19	16	0.6	-1.8	-0.3	1.2	R	5	R34	0 42511 05734 0	267700-1010
IU01-27	U-E	10	19	16	0.6	-1.8	-0.3	1.2	R	5	R35	0 42511 05735 7	267700-1020
IU01-31	U-E	10	19	16	0.6	-1.8	-0.3	1.2	R	5	R36	0 42511 05736 4	267700-1030
IU01-34	U-E	10	19	16	0.6	-1.8	-0.3	1.2	R	5	R37	0 42511 05737 1	267700-1040
*RU01-27	U-E (SURFACE)	10	19	16	1.1	-0.2	0.0	0.0	R	5	R38	0 42511 05738 8	267700-1570
*RU01-31	U-E (SURFACE)	10	19	16	1.1	-0.2	0.0	0.0	R	5	R39	0 42511 05739 5	267700-1580
*RU01-34	U-E (SURFACE)	10	19	16	1.1	-0.2	0.0	0.0	R	5	R40	0 42511 05740 1	267700-1590

Spark gap – For example, for a 1.1mm gap, it is set at the range between 1.0 and 1.1mm
Insulator projection – This is the distance from the end of the housing to the end of the insulator. The + direction is the direction of the piston
Spark position – This is the distance from the end of the housing to the tip of the centre electrode. The + direction is the direction of the piston
Ground electrode height – This is the distance from the end of the housing to the tip of the ground electrode. The + direction is the direction of the piston
Terminal shape – S. Solid R. Removable RC. Crimped T. Threaded
* These plugs do not have iridium electrodes

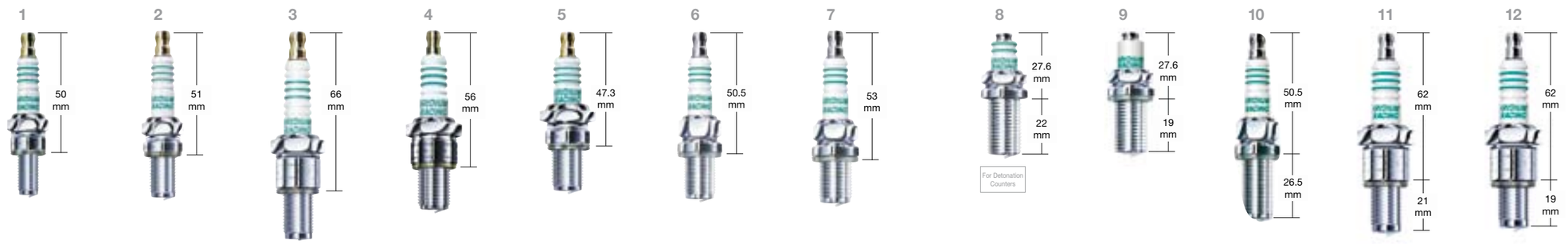
NGK						DENSO		
DIA. (mm)	REACH (mm)	HEX (mm)	RESISTOR	FIGURE	TYPE	IRIDIUM POWER	IRIDIUM RACING	FIGURE
14	19	20.6		BP-E	R4304A- ☐	IW ☐		4 D
14	19	20.6		B-E	B ☐ EGP		IW01/IW06- ☐ (Note 1)	4 A
14	19	20.6		B-E	B ☐ EGV	IW ☐		4 D
14	19	20.6		B-E	R4118S- ☐	IW ☐		4 D
14	19	20.6		B-E	R4630A- ☐		IW01/IW06- ☐ (Note 1)	4 A
14	19	20.6	R	B-E	R6252K- ☐		IW01/IW06- ☐ (Note 1)	4 A
14	19	20.6	R	B-E	R6918B- ☐		IW01/IW06- ☐ (Note 1)	4 A
14	19	20.6	R	B-E	R6918C- ☐		IW01/IW06- ☐ (Note 1)	4 A
14	19	20.6	R	B-E	R6021E- ☐	IW ☐		4 D
14	19	20.6	R	B-E	R6385- ☐ P		IW01/IW06- ☐ (Note 1)	4 A
14	19	20.6	R	B-E	R7376 (Ir)		IW01/IW06- ☐ (Note 1)	4 A
14	19	20.6		B-E SEMISURFACE	R5649- ☐			
14	19	20.6	R	B-E SEMISURFACE	R6712- ☐			
14	19	20.6		B-E COMPACT	R5184- ☐		IWM01- ☐	5 A
14	19	20.6	R	B-E COMPACT	R5300A- ☐			
14	19	20.6	R	B-E COMPACT	R5300N- ☐			
14	19	20.6	R	B-E COMPACT	R5540F- ☐			
14	19	20.6	R	B-E COMPACT	R6179A- ☐ P		IWM01- ☐	5 A
14	22	20.6	R	B-E COMPACT	R6179C- ☐ PA			
14	22	20.6	R	B-E	R7376B (Ir)			
14	22	16	R	BC-E COMPACT	R6120A- ☐		IA01- ☐	8 A
14	22	16	R	BC-E COMPACT	R7282A- ☐ (Ir)		IA01- ☐	8 A
14	19	16	R	BC-E COMPACT	R6120- ☐		IAE01- ☐	9 A
14	19	16	R	BC-E COMPACT	R6120C- ☐		IAE01- ☐ (Note 2)	9 A
14	19	16	R	BC-E COMPACT	R6120M- ☐		IAE01- ☐ (Note 2)	9 A
14	19	16	R	BC-E COMPACT	R7282- ☐ (Ir)		IAE01- ☐	9 A
14	19	16	R	BC-E COMPACT	R7282C- ☐ (Ir)		IAE01- ☐ (Note 2)	9 A
14	19	16	R	BC-E COMPACT	R7282M- ☐ (Ir)		IAE01- ☐ (Note 2)	9 A
14	19	16	R	BK-E ISO	R6888A- ☐	IK ☐		6 D
14	19	16		BK-E ISO	R7112- ☐	IK ☐		6 D
14	19	16	R	BK-E ISO	R7113- ☐	IK ☐		6 D
14	19	16	R	BK-E ISO	R7433- ☐ (ir)	IK ☐		6 D
14	19	16		BK-E ISO	R7114- ☐	IK ☐		6
14	19	16	R	BK-E ISO	R7115- ☐	IK ☐		6 D
14	19	16		BK-E ISO	R7116- ☐		IK01- ☐	6 A
14	19	16	R	BK-E ISO	R7117- ☐		IK01- ☐	6 A
14	19	16		BK-E ISO	R7118- ☐		IK01- ☐	6 B
14	19	16	R	BK-E ISO	R7119- ☐		IK01- ☐	6 B
14	19	16	R	BK-E ISO	R7434- ☐ (Ir)		IK01- ☐	6 A

Note 1 - IW06 is a non-resistor type
Note 2 - Remove the gasket with nippers before use
Note 3 - IX ☐B and IX ☐ is different from IXU01- ☐ only in the hex size
(18mm or 16mm) and are otherwise interchangeable in terms of installation

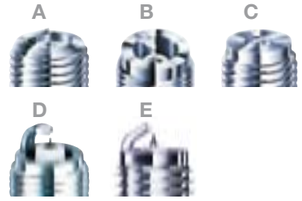
NGK						DENSO		
DIA. (mm)	REACH (mm)	HEX (mm)	RESISTOR	FIGURE	TYPE	IRIDIUM POWER	IRIDIUM RACING	FIGURE
14	19	16	R	BK-E ISO	R7279- ☐ (Ir)		IK02- ☐	6 B
14	19	16	R	BK-E SEMISURFACE	R6601- ☐			
14	19	16		BK-E SEMISURFACE	R6711- ☐			
14	19	16	R	BCP-E	R7435- ☐ (Ir)	IQ ☐		7 D
14	19	16		BCP-E	R7232- ☐	IQ ☐		7 D
14	19	16	R	BCP-E	R7233- ☐	IQ ☐		7 D
14	19	16		BC-E	R7234- ☐	IQ ☐		7 D
14	19	16	R	BC-E	R7235- ☐	IQ ☐		7 D
14	19	16		BC-E	R7236- ☐		IQ01- ☐	7 A
14	19	16	R	BC-E	R7237- ☐		IQ01- ☐	7 A
14	19	16		BC-E	R7238- ☐		IQ02- ☐	7 B
14	19	16	R	BC-E	R7239- ☐		IQ02- ☐	7 B
14	19	16	R	BC-E	R7436- ☐ (Ir)		IQ01- ☐	7 A
14	19	16		BC-E SEMISURFACE	R5883- ☐			
14	19	16	R	BC-E SEMISURFACE	R6690- ☐			
14	26.5	16	R	LFR	R7437- ☐ (Ir)	IKH ☐		10 D
14	26.5	16	R	LFR	R7438- ☐ (Ir)		IKH01- ☐	10 A
14	12.7	20.6		B-H	R5525- ☐	IWF ☐		— D
14	12.7	20.6		B-H	R5530- ☐			
14	21.5	20.6	R	ROTARY	R6725- ☐		IRE01- ☐	3 B
14	21.5	20.6	R	ROTARY	R7420- ☐ (Ir)		IRE01- ☐	3 B
14	21.5	20.6		ROTARY °SURFACE	T813J-N13			
14	21	20.6	R	ROTARY RX-8 (L)	R7440A- ☐ L (Ir)		IRL01- ☐	11 A
14	19	20.6	R	ROTARY RX-8 (T)	R7440B- ☐ T (Ir)		IRT01- ☐	12 A
12	19	18		D-E	R216- ☐		IXU01- ☐ (Note 3)	2 A
12	19	18		D-E	R217- ☐	X ☐ (Note 3)	IXU01- ☐ (Note 3)	2 D, 2 A
12	21	18		D-Z	R2188- ☐			
12	19	16	R	DC-E SEMISURFACE	R2349- ☐		IXU01- ☐ (Note 3)	2 A
12	19	16	R	DC-E	R2525- ☐			
12	19	16		DC-E SEMISURFACE	R2430- ☐		IU01- ☐	1 A
10	19	16		C-E	R016- ☐	IU ☐A		1 E
10	19	16		C-E	R017- ☐		IU01- ☐	1 A
10	19	16		C-E	R0373A- ☐ (Ir)			
10	19	16		C-E SEMISURFACE	R0045G- ☐		RU01- ☐	1 ☐
10	19	16		C-E SEMISURFACE	R0045J- ☐		RU01- ☐	1 ☐
10	19	16	R	C-E SEMISURFACE	R0045Q- ☐		IU01- ☐	1 A
10	19	16	R	C-EH HALF THREAD	R0379A-10 (Ir)	IUF ☐(A)		—D ,—E
10	12.7	16		C-H	R0161- ☐	IY☐		— D
8	19	12.7	R	E-EH SEMISURFACE	R847- ☐			

Note 1 - IW06 is a non-resistor type
Note 2 - Remove the gasket with nippers before use
Note 3 - IX ☐B and IX ☐ is different from IXU01- ☐ only in the hex size
(18mm or 16mm) and are otherwise interchangeable in terms of installation

Overall Shape



Electrode Shape



Standard plugs / Platinum plugs / Iridium plugs

W — Thread diameter and Hex size

Thread diameter x Hex size

- **FK** 14x16.0 (Super ignitable plug)
- **J*** 14x20.8 (Projected plug)
- **L** 18x22.2
- **M** 18x25.4 (Reach 12mm)
- **MA** 18x20.8 (Taper seat, Reach 12mm)
- **MW** 18x20.8 (Reach 12mm)
- **N** 10x16.0
- **K*** 14x16.0
- **KJ*** 14x16.0 (Projected plug)
- **P*** 14x20.8 (Platinum plug)
- **PK*** 14x16.0 (Platinum plug)
- **PKJ*** 14x16.0 (Platinum plug, Projected)
- **PQ*** 14x16.0 (Platinum plug)
- **PT*** 14x16.0 (Platinum plug, Taper seat)
- **PTJ*** 14x16.0 (Platinum plug, Projected, Taper seat)
- **Q*** 14x16.0
- **QJ*** 14x16.0 (Projected plug)
- **QL*** 14x16.0 (Long cylinder housing)
- **S** 14x20.8 (Surface gap plug)
- **SF** 14x20.8 (Surface gap plug)
- **S*** 14x20.8 (0.7mm Iridium)
- **SK*** 14x16.0 (0.7mm Iridium)
- **SKJ*** 14x16.0 (0.7mm Iridium, Projected)
- **SV*** 14x16.0 (0.4mm Iridium, Platinum ground electrode)
- **SVK*** 14x16.0 (0.4mm Iridium, Platinum ground electrode)
- **SXU*** 12x1 6.0
- **T** 14x16.0 (Taper seat)
- **TR** 14x20.8 (Marine applications, Reach 12.7mm)
- **U** 10x16.0
- **U** 10x14.0 (U20M-U only)
- **VK*** 14x16.0 (0.4mm Iridium, Platinum ground electrode)
- **VKJ*** 14x16.0 (0.4mm Iridium, Platinum ground electrode, Projected)
- **VW*** 14x120.8 (0.4mm Iridium, Platinum ground electrode)
- **W** 14x20.8 14x19.0 (Compact type)
- **X** 12x18.0
- **XE** 12x14.0
- **XU** 12x16.0
- **Y** 8x13.0
- **Z** 1/2 PFx23.8 (0.55mm Iridium)
- **ZXE** 12x14.0 (0.55mm Iridium)
- **ZXU** 12x16.0 (0.55mm Iridium)
- **ZT** 14x16.0 (0.55mm Iridium)

* Thread reach 19.0mm.

16 — Heat range

DENSO	NGK	Champion	Bosch
9	2	18	10
14	4	16, 14	9
16	5	12, 11	8
20	6	10, 9	7, 6
22	7	8,7	5
24	8	6, 63, 61	4
27	9	4, 59	3
29	9,5	57	
31	10	55	2
32	10,5	53	
34	11		
35	11,5		

E — Thread reach

- **A** 19.0mm (Electrode position 7mm)
  21.5mm
- **B** 19.0mm (Electrode position 9.5mm)
- **C** 19.0mm (Electrode position 5mm)
- **D** 19.0mm (Shroud 2mm)
- **E (Gasket)**
  19.0mm
  20.0mm
- **E (Taper seat)**
  17.5mm
- **F** 12.7mm
- **FE** 19.0mm (Half thread)
- **G** 19.0mm (Shroud 2mm)
  19.0mm (Shroud 2.8mm)
- **H** 19.0mm (Electrode position 8.5mm)
  26.5mm
- **L** 11.2mm
- **M** 8.6mm
- **N (Taper seat)**
  17.5mm (Half thread)
- **V (Taper seat)**
  25.0mm
- **None (Gasket)**
  9.5mm
  11.2mm
  19.0mm
  21.5mm
- **None (Taper seat)**
  8.3mm
  11.2mm

X — Electrode design

- **A** Double ground electrodes
- **A** Oblique ground electrodes (for Racing)
- **AY** Double ground electrodes (bent shape)
- **B** Triple ground electrodes
- **BG** Triple ground electrodes (shrouded)
- **D** Quadruple ground electrodes
- **K** 1mm Insulator projection
- **LM** Compact type (Hex size 20.6mm)
- **M** Shortened insulator head length
- **N** Racing type (Nickel electrode)
- **Pt** Racing type (Platinum-electrodes)
- **P** Projected (1.5mm projection)
- **S** Non-projected
- **T** Double ground electrodes
- **TM** Double ground electrodes
- **V** Slant ground electrode
- **X** Extra projected (2.5mm projection)

R — Internal construction

- **R** Resistor

None
Non-resistor

Exception
S29, S29A both have resistor

-U — Gap configuration

- **-A** Increased platinum size on ground electrode
- **-B** Platinum on ground electrode
- **-C** Cut-back ground electrode
- **-E** Platinum on ground electrode
- **-F** Platinum on ground electrode
- **-G** Lubricated thread (for CNG applications)
- **-GL** Platinum center electrode
- **-L** 3.5mm projected insulator Tapered center electrode
- **-M** Increased ground electrode
- **-N** For Kawasaki and Yamaha
- **-P** Double layer of platinum on ground electrode
- **-S** Semi-surface gap
- **-S** Stainless steel gasket
- **-TP** Platinum center electrode; Tapered ground electrode
- **-U** U-groove in ground electrode
- **-US** Star shaped center electrode; U-groove in ground electrode
- **-V** 0.7mm platinum center electrode
- **-Z** Tapered ground electrode
- **-ZU** 0.7mm platinum center electrode; Tapered ground electrode

11 — Spark gap

- **5** 0.5mm (.020")
- **8** 0.8mm (.032")
- **9** 0.9mm (.035")
- **10** 1.0mm (.040")
- **11** 1.1mm (.044")
- **13** 1.3mm (.050")
- **14** 1.4mm (.055")
- **15** 1.5mm (.060")
- **20** 2.0mm (.080")

None
Cars: 0.8mm
MC: 0.7mm

Exception
P16R, PQ16R, PQ20R are 1.1mm

Iridium Power / Iridium Tough

I — High Performance plug

- **I** 0.4mm Iridium center electrode
- **V** 0.4mm Iridium center electrode; Platinum tipped ground electrode

U — Thread Diameter, Reach, Hex size

Thread diameter x Reach x Hex size (mm)

- **K** 14x19.0x16.0
- **KH** 14x26.5x16.0
- **Q** 14x19.0x16.0
- **T** 14x17.5x16.0 (Taper seat)
- **TF** 14x11.2x16.0 (Taper seat)
- **TL** 14x25.0x16.0 (Taper seat; Long insulator)
- **TV** 14x25.0x16.0 (Taper seat)
- **U** 10x19.0x16.0
- **UF** 10x12.7x16.0
- **UH** 10x19.0 (Half thread) x16.0
- **W** 14x19.0x20.6
- **WF** 14x12.7x20.6
- **WM** 14x19.0x20.6 (Compact insulator)
- **X** 12x19.0x18.0
- **XG** 12x21.5x18.0 (Shrouded)
- **XU** 12x19.0x16.0
- **Y** 8x19.0 (Half thread) x13.0

27 — Heat range

DENSO	NGK	Champion	Bosch
16	5	12, 11	8
20	6	10, 9	7, 6
22	7	8,7	5
24	8	6, 63, 61	4
27	9	4, 59	3
29	9,5	57	
31	10	55	2
32	10,5	53	
34	11		
35	11,5		

A — Type

- **A** Slant electrode; No U-groove; No taper cut
- **B** 1.5mm projected insulator
- **C** No U-groove
- **D** No U-groove; Inconel ground electrode
- **ES** Stainless steel gasket
- **G** Stainless steel gasket
- **J** 2.5mm projected insulator
- **T** Strengthening insulator; TAXI applications
- **X** 0.8mm Gap
- **Y** 0.8mm Gap
- **Z** Taper cut

Iridium Racing

I — High Performance plug

- **I** 0.4mm Iridium centre electrode
- **R** Surface gap

W — Thread Diameter, Reach, Hex size

Thread diameter x Reach x Hex size (mm)

- **A** 14x22.0x16.0
- **AE** 14x19.0x16.0
- **K** 14x19.0x16.0
- **KH** 14x26.5x16.0
- **Q** 14x19.0x16.0
- **RE** 14x21.5x20.8
- **RL** 14x21.0x20.8
- **RT** 14x19.0x20.8
- **U** 10x19.0x16.0
- **W** 14x19.0x20.8
- **WM** 14x19.0x20.8
- **XU** 12x19.0x16.0

0 — Overall size

Intermediate number

1 — Electrode shape

Intermediate number

- **1** Slant ground electrode or surface gap
- **2** Straight ground electrode
- **6** Slant ground electrode; non-resistor

27 — Heat range

DENSO	NGK	Champion	Bosch
24	8	6, 63, 61	4
27	9	4, 59	3
29	9,5	57	
31	10	55	2
32	10,5	53	
34	11		
35	11,5		

RU01 are surface gap plugs, NO iridium centre electrode and NO all-platinum ground electrodes

Spark Plugs | Installation

RECOMMENDED TORQUE AND TIGHTENING ANGLE FOR DENSO PLUGS

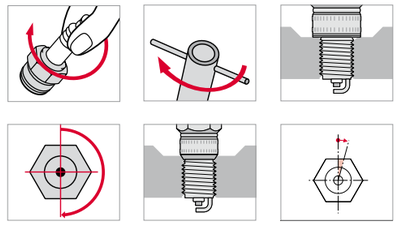
1 Use the correct wrench for the hex on the plug, and be careful not to damage the insulator

2 When changing, make sure that the oil etc on the outside of the plug does not enter the engine interior

3 When putting the plugs in, clean the engine side of the flange and put in the plugs after making sure the gasket is in the flange

4 Make sure the plugs are vertical and tighten them by hand until they cannot be tightened any further

5 Then, use a plug wrench to tighten them accurately to the torque or rotation angle shown in the chart on the right



RECOMMENDED INSTALLATION TORQUE SPECIFICATION

	Thread size		Recommended Torque	Recommended Turns	
				New plug	Used plug
Gasket	M8	Y type	8-10 Nm	± 1	± 1/12
	M10	U, N type	10-15 Nm	± 2/3	± 1/12
	M10	Stainless steel gasket	10-15 Nm	± 3/4	± 1/12
	M12	SXU, X, XE, XU, ZXE, ZXU type	15-20 Nm	± 1/3	± 1/12
	M14	FK, J, K, KJ, P, PK, PKJ, PQ, Q, QJ, QL, S, SF, SK, SKJ, SV, SVK, VK, VKJ, W, ZT type	20-25 Nm	± 1/2	± 1/12
	M14	Stainless steel gasket	20-25 Nm	± 2/3	± 1/12
	M18	L, M, MA, MW type	30-40 Nm	± 1/4	± 1/12
Taper seat	M14	PT, PTJ, T type	20-30 Nm	± 1/16	± 1/16
	M18	MA type	30-40 Nm	± 1/4	± 1/12

If a thread lubricant such as grease is coated on the thread, tightening to the recommended torque will tighten too much; this has been linked to seal leakage. Do not use a thread lubricant.

Tightening more than the tightening angles and torques shown in the above table could result in damage to the engine and furthermore could result in the plug coming off at the thread

DENSO OE and AM | Differences

Aftermarket spark plugs often look different from the original equipment examples they will be replacing. To help you choose with confidence, the examples below discuss two common examples where DENSO supplies a visually different, but entirely suitable, aftermarket spark plug from the original specification.

BMW

Many BMW series like the E46 and the Mini run a NGK BKR6EQUP plug, which is a 4-electrode semi surface long life type. There is no DENSO version of this BMW plug which has the same appearance. However, there are DENSO plugs which are completely suitable such as the K20TXR or the PK20PTR-S9.

> Instead of the BMW plug, you can use the semi surface K20TXR, but you have to remember that the service life is 50,000km and it has two electrodes instead of four, so it will look different.
> If you want to stick to the 100,000km (63,000 mile) service life of BMW, you can use the PK20PTR-S9 which is a platinum 2-electrode semi surface plug.

K20TXR

VOLVO

Many Volvo engines run a 3-electrode semi-surface plug from Eyguem. This plug has three very thin ground electrodes. The service interval that Volvo recommends for this plug is 45,000 km (27,950 miles). Because the three ground electrodes of these plugs are so thin, the total mass and therefore the lifetime is comparable to a DENSO double electrode type.

> If you would go for the appearance, the K20PB (3-electrode type) would be correct. However this plug will last much longer than the Volvo types.
> The DENSO spark plug that equals the Volvo plug in heatrange, semi-surface effect, service life and performance is the DENSO K20TXR (2-electrode type), which has a different appearance.

K22PB

DENSO Spark Plugs | Fault Analysis

Normal
Appearance: Light grey or tan deposits and slight electrode erosion

Carbon Fouling
Appearance: Dry, soft black carbon on the insulator and electrodes

Results: Poor starting, misfiring, faulty acceleration

Possible causes: Faulty choke – over-rich air-fuel mixture, delayed ignition timing, bad ignition leads, plug Heat Range too cold

Lead Fouling
Appearance: Yellow or tan cinder-like deposits or a shiny glaze coating on the insulator

Results: Misfiring under sudden acceleration or heavy load conditions but no adverse effect under normal operating conditions

Possible causes: Use of petrol with high-lead content

Over Heating
Appearance: An extremely white insulator with small black depositis and premature electrode erosion

Results: Loss of power at high speed / heavy load

Possible causes: Plug insufficiently tightened, engine insufficiently cooled, ignition timing too advanced, plug heat range too hot, severe detonation

Pre-Ignition
Appearance: A melted or burned centre and/or ground electrode, blistered insulator and aluminium or other metallic deposits on the insulator

Results: Loss of power then causing engine damage

Possible causes: Much the same as over-heating. Pre-ignition takes place when combustion begins before the timed spark occurs

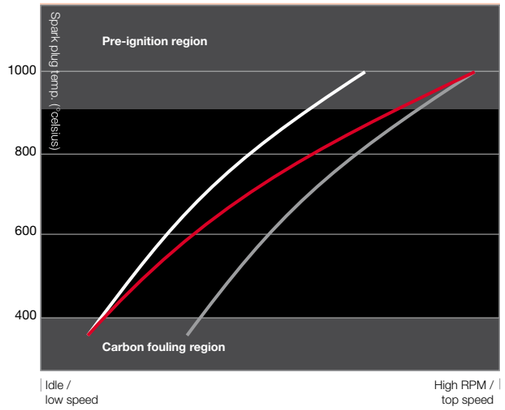
Fuel-Additives Fouling
Appearance: Red ground electrode and insulator nose

Results: Poor starting, misfiring, faulty acceleration and loss of power

Possible causes: Use of petrol with Fr / Mn additives. Additives are used to increase the octane number (especially in Russia)

Special Road Conditions | Selecting the Right Plug

HEAT RANGE & APPLICATIONS



CHOOSING THE RIGHT PLUG FOR THE RIGHT CONDITIONS

There are many circumstances such as engine and driving conditions where the correct plug choice is clear. For example, if strenuous driving continues for a long time using normal plugs, the plug will overheat. What is important is to inspect the condition of a vehicle's current plugs, and choose a plug accordingly.

When the air temperature is high (summer):
The inlet air temperature also becomes higher, increasing the load to the engine. Choose a plug with a higher heat range.

If horsepower has been increased through tuning:
The increase in explosive power leads to an increase in combustion chamber temperature, making pre-ignition more likely. Choose a plug with a higher heat range and a higher level of heat resistance.

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EUROPEAN HEADQUARTERS

Denso Europe B.V.
Hogeweyselaan 165
1382 JL Weesp
The Netherlands
Tel: +31 (0)294 493 493
Fax: +31 (0)294 417 122

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