DENSO in Europe

DENSO in 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

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.

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.

DENSO Spark Plugs | Product Range

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

DOUBBLE PLATINUM (LONGLIFE), SINGLE PLATINUM (ZU)
> Improved, more reliable start
> More complete combustion (lower emissions)
> 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

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.
Spark Plugs | Plug Configurations

DIFFERENT RANGES IN THE DENSO SPARK PLUG PROGRAMME

The following overview summarizes 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

<table>
<thead>
<tr>
<th>Plug Type</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triple Electrode Plug</td>
<td>K20PRU</td>
<td>Ground electrode is longer by 0.5 mm for improved ignitability</td>
</tr>
<tr>
<td>Si-Grooved Plug for Rotary Engines</td>
<td>W30EX-U</td>
<td>Semi-grooved gap for high ignitability</td>
</tr>
<tr>
<td>Extended Plug</td>
<td>J20EA-U1</td>
<td>Ground electrode is longer by 0.5 mm for improved ignitability</td>
</tr>
</tbody>
</table>

Motorcycle Plugs

- Motorcycle Plug | W20MR-C | For Suzuki and Yamaha |
- Motorcycle Plug | U27FES | Wider gap (0.9mm) than conventional plugs (0.7mm) creating improved ignitability |

Extended Plugs

- Extended Plug | K20ECR-A11 | For Daihatsu |
- Extended Plug | J1B9F | Semi-grooved gap for improved ignitability |

Star Centre Electrode

- Star Centre Electrode | W6M-6U | Used for small engine plugs |

ISO Compatible Small Plug

- ISO Compatible Small Plug | Q16R-U1/Q16R-U1 | Compatible with ISO standard |

Single-Side Platinum Plug

- Single-Side Platinum Plug | Q16R-P1/Q16R-T1Y | Only the centre electrode is platinum tipped, allowing finer electrode control for improved ignitability |

Extended Platinum Plug

- Extended Platinum Plug | PKJ20CR-L11 | Spark position is extended into the combustion chamber |

Motorcycle Plugs

- Motorcycle Plug | W20MR-C | For Suzuki and Honda |
- Motorcycle Plug | U27FES | Very minute plug (6mm diameter x 19mm length, half-threaded) |

Extension Plug

- Extension Plug | K20PRTR-U1 | Ground electrode is taper-cut for improved ignitability |

Long Housing Plugs

- Long Housing Plugs | QL20R-R/QL20R-S | By making the model (cylindrical) longer, installation dimensions have been reduced |

Motorcycle Plugs

- Motorcycle Plug | QL10R-P1/QL10R-TP1 | Diametrically improved ignitability and durability |

Needle-to-noodle Iridium Plug

- Needle-to-noodle Iridium Plug | PK20IR11 | World’s first 0.7mm diameter ultra-thin Iridium alloy electrode, developed by DENSO |

Dual Electrode Platinum Plug

- Dual Electrode Platinum Plug | PK20IR11 | By reducing the hex size (16mm) the plug has been made smaller |

Extended Plug

- Extended Plug | X20ECR-U1 | For Audi, VW, Citroën, Fiat, Mercedes-Benz, Renault |

Plug for small engines

- Plug for small engines | Q16R-U1/Q16R-U1 | By reducing the hex size (16mm) the plug has been made smaller |

Extended Electrode Plug

- Extended Electrode Plug | K20ECR-A11 | Ground electrode is taper-cut for improved ignitability |

Plug for small engines

- Plug for small engines | Q16R-U1/Q16R-U1 | By reducing the hex size (16mm) the plug has been made smaller |

ISO Compatible Small Plug

- ISO Compatible Small Plug | Q16R-U1/Q16R-U1 | By reducing the hex size (16mm) the plug has been made smaller |

Extended Electrode Plug

- Extended Electrode Plug | K20ECR-A11 | For Daihatsu |

Plug for small engines

- Plug for small engines | Q16R-U1/Q16R-U1 | By reducing the hex size (16mm) the plug has been made smaller |

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Extended Electrode Plug

- Extended Electrode Plug | K20ECR-A11 | For Daihatsu |

Plug for small engines

- Plug for small engines | Q16R-U1/Q16R-U1 | By reducing the hex size (16mm) the plug has been made smaller |
Standard

Featuring DENSO Patented U-Groove Technology

U-GROOVE TECHNOLOGY

- Improved ignition, fuel saving, engine and emissions performance
- Better fuel economy: U-Groove can ignite leaner mixtures, allowing for fewer fuel losses.
- Smoother running: Because the gaps are spread, the electrodes, the base, and the gaps are more even and engine performance smoother.
- Optimal combustion: U-Groove enables efficient combustion by allowing the spark to fill the gap created by the U shape.
- Lower emissions: U-Groove creates the effect of a larger spark gap, without requiring the standard gap.
- Functionality: U-Groove is located in the ground electrode. The result is increased efficiency because the area around the electrode is not affected by wear, ensuring the U-Groove aids in the lifetime of the plug.

RESISTOR SPARK PLUG

Intelligent design for less radio interference

- Resistor excellent: Full range of high quality resistor plug features a metal sleeve around the insulator and protected connector point, to avoid malfunctioning of electronic equipment.
- Better radio functioning: Resistors located in the spark section of DENSO plug greatly reduce car emissions.

HEAT RANGE

The best heat range performance of any brand

- More heat range: DENSO plug covers more heat range than other manufacturers without compromises on quality.
- More heat range: DENSO plug cover all heat ranges.
- Better spark plug: More durable spark plug to cover all heat ranges.

TERMAL RESISTOR SPECIFICATION

- High performance, low noise, and less radio interference.
- High radio interference, high performance.
- Low radio interference, high performance.

GARNET

U-GROOVE GROUND ELECTRODE

- U-Groove permits a larger surface area necessary for flame travel and a larger surface area.
- A wide range of high quality resistor plugs for heat travel and a larger surface area.
- Resistor plugs with a shorter insulating nose create a shorter distance.
- Denso spark plugs with a shorter insulating nose create a shorter distance.
- Resistor plugs with a longer insulating nose create a longer distance.

CENTRE SHAFT (STEM)

- High electrical and thermal conductivity.
- Copper core centre electrode.
- Even heat distribution.
- Reduces noise that may affect electronic devices.

ERNIA

- High density resistance, low resistance, low noise.
- Human body resistance.
- Radio noise.

PACKING WASHER

- Copper-alloy material.
- High purity alumina for good electrical insulation, durability and thermal conductivity.
- Insulators made from high purity alumina for good electrical insulation, durability and thermal conductivity.

CHARGE CHARACTERISTICS

- Higher charge efficiency.
- Increased charge efficiency.
- Reduced noise from the charge.
- Solder, directly spark from low to high speeds.
Iridium Power

world’s smallest 0.4mm Diameter Centre Electrode

**CHaRACTERISTICS**

- **13** Iridium tip, 360° laser welding process patented by DENSO that withstands high heat range plugs have excellent heat resistance
- **14** Low heat range plugs have self-cleaning ability
- **15** All types feature extra fine centre electrode tip, made from a nickel bright plating as used on racing plugs
- **16** Lower emissions
- **17** Iridium tip, 360° laser welding process patented by DENSO that withstands high heat range plugs have excellent heat resistance
- **18** Low heat range plugs have self-cleaning ability
- **19** All types feature extra fine centre electrode tip, made from a nickel bright plating as used on racing plugs
- **20** Lower emissions
- **21** Ignites leaner mixtures
- **22** Complete combustion
- **23** Spark exposes better to air-fuel mixture, achieving more complete combustion
- **24** Increased output under various driving conditions
- **25** Increased response and acceleration performance
- **26** Improved fuel consumption

**ADVANTAGES IN DETAIL**

- **1** Iridium Power Patent
- **2** Ultra high ignitelability, reduced in less misfiring, and higher efficiency, improved engine performance
- **3** Higher electrical conductivity, improved power from iridium power
- **4** Increased output under various driving conditions
- **5** Improved fuel consumption
- **6** Improved response and acceleration performance

**RESISTOR SPARK PLUGS**

- Example using a small groove in the centre electrode: these similar technologies are offered by other manufacturers (for instance, the Toyota 1KR-FE engine).
- These DENSO plugs are available for the 1.0-litre 12V Peugeot 106 and Toyota Aygo.
- Later, when the Citroën C1 and Toyota Aygo were introduced, the same DENSO Spark Plug was fitted in the new Toyota 1KR-FE engine.

**HOLDING**

- Fewer part numbers to cover all heat ranges means less stock and lower costs for manufacturers without compromise on quality and performance.
Iridium Power | Line Up

COMPARATIVE Iridium Spark Plug TABLE
This 25 plug series overview provides all the details you need for DENSO’s Iridium Power series, making it easier to choose the right plug for each application.

**Iridium Power Line-Up**

- **IKH series**
  - IKH16, IKH20, IKH22
- **IK series**
  - IKH22. IKH27.
- **IX series**
  - IXG24, IXG27.
- **IT series**
  - ITF series
  - ITF24, ITF27.
- **IU series**
  - IU series
  - IU24A, IU27A, IU31A.
- **IW series**
  - IW27, IW29, IW31, IW34.

**Comparative Iridium Spark Plug Table**

<table>
<thead>
<tr>
<th>DENSO LINE-UP</th>
<th>DENSO LINE-UP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Iridium Racing plugs</strong></td>
<td><strong>Iridium Tough VKH16, Citroën and Yamaha</strong></td>
</tr>
<tr>
<td><strong>Gasket face height is 50.5 mm</strong></td>
<td><strong>Mainly used for cars</strong></td>
</tr>
<tr>
<td><strong>14mm dia x 25.0mm</strong></td>
<td><strong>14mm dia x 25.0mm long reach type</strong></td>
</tr>
<tr>
<td><strong>12mm dia x 19mm length type</strong></td>
<td><strong>12mm dia x 19mm length short reach type</strong></td>
</tr>
<tr>
<td><strong>50.5 mm</strong></td>
<td></td>
</tr>
</tbody>
</table>
Drivers that care about:
- Less time and maintenance than regular plugs
- Powerful performance
- Superb fuel consumption for daily journeys
- Achieving a much longer plug lifetime
- 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
- Improved acceleration: Dramatically improved acceleration
- Improved ignitability: Iridium Tough's 0.4mm diameter centre electrode delivers superb ignition performance
- Improved fuel consumption: Improved intake, less fuel consumption, less noise

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

**Iridium Tough**
- A revolutionary technology: Iridium Tough plugs take the world’s finest 0.4mm Iridium electrode but instead of a tapered cut, it is a ground ground electrode. Iridium Tough plugs have a flattened, water 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 maintenance result in less time and effort required for replacement.
- Less access required: The long design of Iridium Tough plugs means there is a longer service life.
- Ease of access: The Iridium Tough plugs can be replaced when it can be difficult to access the plugs for replacement.

**Improvement of durability**
- The difference in mileage
- The difference in acceleration
- The difference in fuel consumption
- The difference in ignitability

**Improved fuel consumption**
- Improved intake, less fuel consumption, less noise

**Improved ignitability**
- Iridium Tough plugs deliver a 5mm electrode, improving ignition performance

**Improved acceleration**
- Dramatically improved acceleration

**Highly reliable resistor**
- A bright nickel-plated resistor is standard on Iridium Tough plugs, reducing noise that may affect electronic devices.

**Platinum tipped ground electrode**
- A stepped 0.4mm ground electrode is used on platinumтолл plugs, helping to induce electrode wear, lowering the cost of regular maintenance and giving Iridium Tough a longer engine durability.

**The world’s finest 0.4mm dia. Ultra-fine Iridium centre electrode**
- Use of DENSO’s original high melting point iridium alloy has enabled development of 0.4mm centre electrode: the smallest in the world at 0.4mm.
- Standard melting points struggle to reach this level, and produce greatly increased durability.

**360° Laser welding**
- A 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 world’s smallest 0.4mm diameter centre electrode**
**IMPROVED FUEL CONSUMPTION**

This results in lower fuel consumption, making regular and longer journeys more economical.

**IMPROVED IGNITABILITY**

Now Europe is set to follow. Customers opting for longer life Iridium Tough specification. Spark plug sales in Japan consist of Iridium plugs; with most demand. Approximately 40% of DENSO’s total aftermarket. In Japan for example this plug type is in strong outstanding success around the world. In Japan for example Iridium Tough's lifespan of at least 100,000 km is the result of its combined iridium and platinum design: Iridium Tough's 0.4mm centre electrode produces steady resulting in less misfiring and greatly improved combustion.

**ENVIROMENTAL EXCELLENCE**

Cleaner exhaust emissions; better fuel consumption

**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 thing occurs. Iridium Tough's 0.4mm thin iridium electrode takes away the heat of the flame kernel until the flame kernel itself emits light, which is the result of its combined iridium and platinum design: Iridium Tough's ultra-fine 0.4mm iridium electrode helps combustion to spread much faster. With Iridium Tough, combustion spreads throughout the entire combustion chamber within 14,000 cycles – twice as fast as normal spark plugs.

**INCREASED COMBUSTION PRESSURE**

Better combustion pressure improves engine output

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 the entire combustion chamber within 14,000 cycles – twice as fast as normal spark plugs.

**Additional advantages**

- Cleaner exhaust emissions: The improved combustion efficiency of Iridium Tough also brings environmental benefits by producing a cleaner exhaust emission.
- Lower CO and CO2: Both CO and CO2 levels will be seen to decrease when using Iridium Tough plug.
- Improved mileage: Improved fuel consumption also brings an additional bonus for the environmentally conscious motorist.
- Faster spread of combustion, more stability and improved engine performance in comparison to normal spark plugs.
- Faster pressure rise: Iridium Tough increases the combustion pressure and output.

**DENSO CASE STUDY AND KEY ADVANTAGES**

**Special Characteristics**

Cleaner exhaust emissions; better fuel consumption

**Specifications**

- Iridium Tough 0.4mm thin iridium electrode takes away the heat of the flame kernel until the flame kernel itself emits light.
- 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 the entire combustion chamber within 14,000 cycles – twice as fast as normal spark plugs.
- Improved output: The result in faster spread of combustion, more stability and improved engine performance in comparison to normal spark plugs.

**DENSO ADDITIONAL ADVANTAGES**

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**Environmental Excellence**

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- Improved output: The result in faster spread of combustion, more stability and improved engine performance in comparison to normal spark plugs.
Iridium Racing | Unbeatable Performance on the Circuit

Drivers that care about:
- Unbeatable performance
- Ideal combustion conditions
- Unmatched ignition performance
- Higher power

Drivers will experience:
- Steadily high levels of response
- More power with an ideal combustion cycle
- Unparalleled performance

**IMPROVED OUTPUT**
More power with an ideal combustion cycle

- Higher performance: Iridium Racing plugs deliver the ultimate ignition performance and spark voltage ensuring that non-bang-out 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 racing drivers and teams.

**IMPROVED ACCELERATION**
Unbeatable acceleration performance on the circuit

- The world’s best: DENSO Iridium Racing plugs allow drivers to achieve the ultimate in automotive acceleration.
- Unparalleled performance: With its ultrafine, 0.4mm diameter centre electrode, Iridium Racing plugs also feature the evaluation of superb igniter performance and reduced spark voltage.
- Modern control: The plug’s ultrafine tip is also secured.
- Consistent response: Drivers will experience steady high levels of response.
- Maximum strength: Acceleration will also be noticeably increased.

**8,000 ALL-PLATINUM GROUND ELECTRODES**
- Iridium Racing plugs feature an Exclusive all platinum ground electrode.
- By expanding the size of the ground electrode tip, Iridium Racing plugs are able to create a performance gap and improve time to reach 100km/h.

**THERMAL RESISTANCE**
- The technology used to join the Iridium tip is a highly reliable, ‘360° laser welding’ process patented by DENSO that withstands driving conditions of all kinds.
- Process used to join the Iridium tip is a highly reliable, ‘360° laser welding’ process patented by DENSO.
- The process is extremely strong, and the self-cleaning performance is improved, making this a monolithic-type resistor.

**BRIGHT NICKEL PLATING**
- DENSO’s new bright nickel plating process enables easy visual identification of the plug without the need for stud tags.
- The bright nickel plating on the housing ensures a high level of corrosion resistance, even in wet weather and during motocross events.

**ELECTRODE**
- Electrode requires low voltage, and produces greatly increased ignitability.
- Miniaturisation of the centre electrode - the smallest in the world at 0.4mm.
- 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 laser welding instead of the conventional sintering technique.

**SIlicONE OiL COATiNG**
- Using the water repellent properties of silicone, the insulator surface is isolated from moisture and carbon, preventing a reduction in resistance.
- Blocks noise that may affect electronic devices.

**HiGHLY RELiABLE RESiSTOR**
- Blocks noise that may affect electronic devices.
- All Iridium Racing plugs feature 5kΩ resistance, the same as that used in most plug cords around the world.
- Included with the plug comes a terminal nut compatible to Nology HotWire and most plug cords around the world.

**TERMiNAL**
- Included with the plug comes a terminal nut compatible to Nology HotWire and most plug cords around the world.
- IWM01 / IK01 / IK02 / IQ01 / IA01 / IAE01 are solid terminals

**CHaRACTERISTICS**

| 28 | 28 |
**THE RIGHT SHAPE FOR YOUR NEEDS**

Iridium Racing plugs are ideal for racing and turn-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, as well as your specific needs. These plugs can already suit the cold level of tuning. It is also essential to choose the overall shape when choosing the right racing plug.

**OVERALL SHAPE**

**ELECTRODE SHAPE**

**Identifying Iridium Racing plugs**

<table>
<thead>
<tr>
<th>Plug Type</th>
<th>Thread Size</th>
<th>Electrode Diameter</th>
<th>Electrode Height</th>
<th>Insulator Projection</th>
<th>Spark Position</th>
<th>Reach</th>
<th>Gap</th>
<th>Terminal Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>RU01-34</td>
<td>14mm</td>
<td>2.0</td>
<td>0.5</td>
<td>1.9</td>
<td>S</td>
<td>5 R</td>
<td>0.5</td>
<td>R</td>
</tr>
<tr>
<td>IU01-31</td>
<td>14mm</td>
<td>2.0</td>
<td>0.5</td>
<td>1.9</td>
<td>S</td>
<td>5 R</td>
<td>0.5</td>
<td>R</td>
</tr>
<tr>
<td>IXU01-27</td>
<td>14mm</td>
<td>2.0</td>
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<td>1.9</td>
<td>S</td>
<td>5 R</td>
<td>0.5</td>
<td>R</td>
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<tr>
<td>IWM01-32</td>
<td>14mm</td>
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<td>0.5</td>
<td>1.9</td>
<td>S</td>
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<td>0.5</td>
<td>R</td>
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<tr>
<td>IAE01-32</td>
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<td>1.9</td>
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<td>5 R</td>
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<td>R</td>
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<tr>
<td>IQ02-24</td>
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<tr>
<td>IQ01-24</td>
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<td>5 R</td>
<td>0.5</td>
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</tr>
<tr>
<td>IRE01-35</td>
<td>14mm</td>
<td>2.0</td>
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<td>S</td>
<td>5 R</td>
<td>0.5</td>
<td>R</td>
</tr>
<tr>
<td>IW06-34</td>
<td>14mm</td>
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<td>0.5</td>
<td>1.9</td>
<td>S</td>
<td>5 R</td>
<td>0.5</td>
<td>R</td>
</tr>
</tbody>
</table>

*These plugs do not have flat ground electrodes.

**Sparking Gap**

For example, for a 1.1mm gap, set a gap between 1.0 and 1.1mm. This is the distance from the end of the insulator to the tip of the centre electrode. The + direction is the direction of the piston.

**Spark Plug**

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.

**Heat Range**

The heat range is the level of tuning. The greater the need to use a less heat range. The higher the need for a higher heat range.

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 thinner, the need for a lower heat range.

**WARNING**

On choosing the right racing plug check the overall shape (electrode shape) and the surface gap. Make sure the overall shape is the same as the standard plug, and the surface gap is between 1.0 and 1.1mm.

**TIPS**

- For racing, combustion chamber is greatly reduced.
- As a result, combustion voltage has improved dramatically.
- Increasing engine output and spark voltage; ensuring that non-firing and misfires under competitive advantage.

**Iridium Racing**

Technological DENSO spark plug technology helps the Toyota F1 team to improve engine performance.
## Cross References

### NGK | DENSO

<table>
<thead>
<tr>
<th>NGK</th>
<th>DENSO</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENSO</td>
<td>Iridium Racing</td>
</tr>
<tr>
<td>IRIUM POWER</td>
<td>IRIUM RACING</td>
</tr>
<tr>
<td>FIGURE</td>
<td>FIGURE</td>
</tr>
</tbody>
</table>

- **Note 1**: IW0 is a non-resistor type
- **Note 2**: Remove the gasket with nippers before use
- **Note 3**: BK and I are different from IW01/IW0 only in the hex size (18mm or 15mm) and are otherwise interchangeable in terms of installation

### Overall Shape

<table>
<thead>
<tr>
<th>Shape</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
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<td>6</td>
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</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
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</tr>
</tbody>
</table>

### Electrode Shape

<table>
<thead>
<tr>
<th>Shape</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

---

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**Note 2**: Remove the gasket with nippers before use
**Note 3**: BK and I are different from IW01/IW0 only in the hex size (18mm or 15mm) and are otherwise interchangeable in terms of installation
## Standard plugs / Platinum plugs / Iridium plugs

<table>
<thead>
<tr>
<th>Thread diameter and Hex size</th>
<th>Heat range</th>
<th>Thread reach</th>
<th>Electrode design</th>
<th>Internal construction</th>
<th>Gap configuration</th>
<th>Spark gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread diameter x Hex size</td>
<td>Thread reach</td>
<td>Electrode reach</td>
<td>Insulator</td>
<td>Insulator shape</td>
<td>Resistor</td>
<td>None</td>
</tr>
<tr>
<td>Thread diameter x Hex size</td>
<td>Thread reach</td>
<td>Electrode reach</td>
<td>Insulator</td>
<td>Insulator shape</td>
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<td>None</td>
</tr>
<tr>
<td>Thread diameter x Hex size</td>
<td>Thread reach</td>
<td>Electrode reach</td>
<td>Insulator</td>
<td>Insulator shape</td>
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<td>None</td>
</tr>
<tr>
<td>Thread diameter x Hex size</td>
<td>Thread reach</td>
<td>Electrode reach</td>
<td>Insulator</td>
<td>Insulator shape</td>
<td>Resistor</td>
<td>None</td>
</tr>
</tbody>
</table>

## Iridium Power / Iridium Tough

### High Performance plug

<table>
<thead>
<tr>
<th>Spark plug diameter, Reach, Hex size</th>
<th>Heat range</th>
<th>Thread diameter x Hex size</th>
<th>Overall size</th>
<th>Electrode shape</th>
<th>Heat range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (0.4mm Iridium center electrode)</td>
<td>1</td>
<td>A</td>
<td>1.4x13.0x18.0</td>
<td>Intermediate number</td>
<td>Intermediate number</td>
</tr>
<tr>
<td>2 (0.4mm Iridium center electrode)</td>
<td>2</td>
<td>A</td>
<td>1.4x13.0x18.0</td>
<td>Straight ground electrode</td>
<td>Straight ground electrode</td>
</tr>
<tr>
<td>3 (0.4mm Iridium center electrode)</td>
<td>3</td>
<td>A</td>
<td>1.4x13.0x18.0</td>
<td>Straight ground electrode</td>
<td>Straight ground electrode</td>
</tr>
<tr>
<td>4 (0.4mm Iridium center electrode)</td>
<td>4</td>
<td>A</td>
<td>1.4x13.0x18.0</td>
<td>Straight ground electrode</td>
<td>Straight ground electrode</td>
</tr>
</tbody>
</table>

## Iridium Racing

### High Performance plug

<table>
<thead>
<tr>
<th>Spark plug diameter, Reach, Hex size</th>
<th>Heat range</th>
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</tr>
</tbody>
</table>
Use of petrol with Fr / Mn additives. Additives are used to increase the octane

**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 BKR6EQP 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.

<table>
<thead>
<tr>
<th>thread size</th>
<th>Recommended Torque</th>
<th>New plug</th>
<th>Used plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6 Y type</td>
<td>8-10 Nm</td>
<td>± 1/2</td>
<td>± 1/2</td>
</tr>
<tr>
<td>M10 U, N type</td>
<td>10-15 Nm</td>
<td>± 2/3</td>
<td>± 1/12</td>
</tr>
<tr>
<td>M10 stainless steel gasket</td>
<td>10-15 Nm</td>
<td>± 3/4</td>
<td>± 1/12</td>
</tr>
<tr>
<td>M12 SXU, X, XE, XJ, O, J, ZAU, ZAA type</td>
<td>15-20 Nm</td>
<td>± 3/3</td>
<td>± 1/12</td>
</tr>
<tr>
<td>M14 PK, P, PKJ, PKQ, PQ, G, Q, QJ, S, SF, SK, SU, SV, SVK, VK, VKJ, W, ZT type</td>
<td>20-25 Nm</td>
<td>± 3/2</td>
<td>± 1/12</td>
</tr>
<tr>
<td>M14 Stainless steel gasket</td>
<td>20-25 Nm</td>
<td>± 3/2</td>
<td>± 1/12</td>
</tr>
<tr>
<td>M18 L, M, MA, MW type</td>
<td>30-40 Nm</td>
<td>± 1/4</td>
<td>± 1/12</td>
</tr>
<tr>
<td>M14 PT, PPU, T type</td>
<td>30-30 Nm</td>
<td>± 1/6</td>
<td>± 1/16</td>
</tr>
<tr>
<td>M18 MA type</td>
<td>30-40 Nm</td>
<td>± 1/4</td>
<td>± 1/12</td>
</tr>
</tbody>
</table>

**DENSO Spark Plugs | Fault Analysis**

- **Normal**
  - Appearance: Light grey or tan deposits and slight 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

- **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

- **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 than 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)
CHOOSE 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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aftermarket.denso-europe.com > where to buy