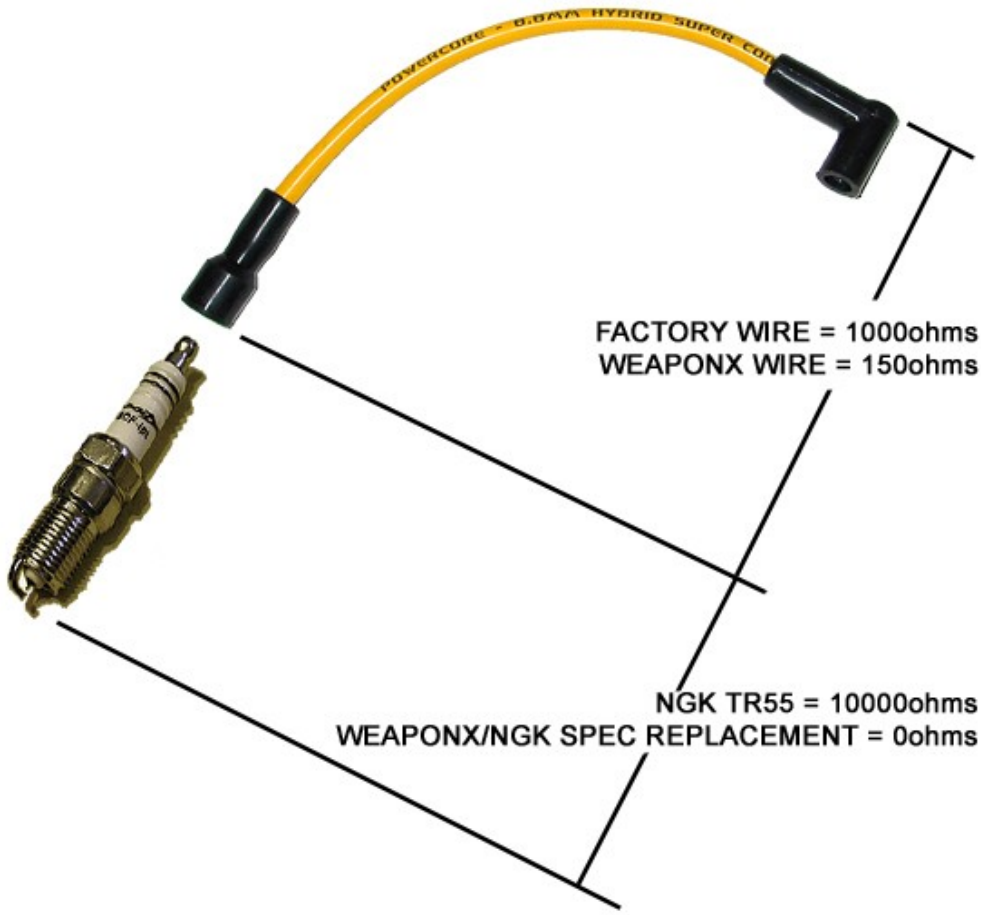
PowerCORE 8.8mm Hybrid Super Conducting Wire
CORETECH OVERVIEW

The ideal ignition system comprises of various components to improve power output but hidden among the power output various other important factors contribute to a properly operating ignition environment.

One of the first considerations is overall circuit resistance. When it comes to circuit resistance in an ignition system. It should be noted that the wire is typically less then 10% of the total circuit resistance after the ignition coil. See below diagram FIG A.
FIG A



TOTAL FACTORY RESISTANCE IN THE IGNITION CIRCUIT **11,000ohms**
TOTAL RESISTANCE IN THE WEAPONX IGNITION CIRCUIT **150ohms**

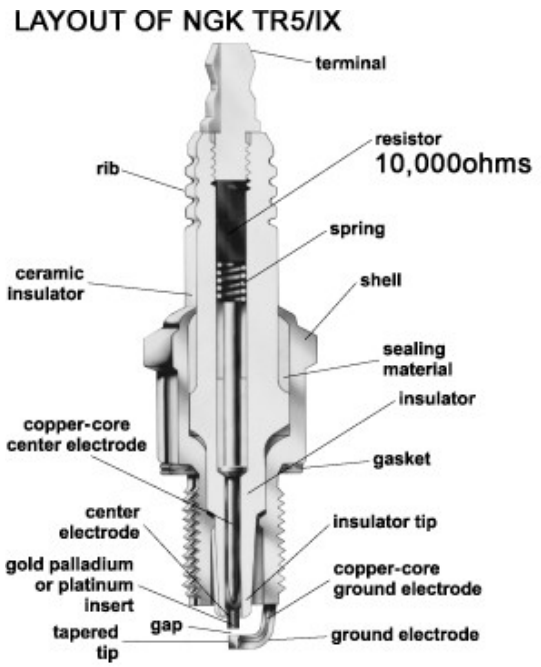
To summarize, the highest circuit resistance point is observed in the spark plug so it should be noted that lowering the resistance of the wire to 0 ohms means the only accomplishment was reducing circuit resistance by less then 10% in most typical instances. For example, a stock GM LS1 ignition wire measures approximately 1000ohms. Many typical wires will measure from 50 – 500 ohms but still rely on the EMI and RFI capability of the spark plug in question to reduce a second important ignition consideration, harmful ignition noise which can be potentially damaging to onboard electronics. It should also be noted that the smallest resistance found in an

off the shelf spark plugs is ~5000ohms but ~10000ohms was the industry standard for years.

The WeaponX system is aimed to create the lowest 'system' resistance available but still fulfill the requirements of reduced EMI / RFI interference levels for proper electrical system functionality. To achieve this aim a proper 0 ohm spark plug was specified and wires were produced to lower interference levels to acceptable levels. Lower resistance levels produce the highest possible output when used with a 0 ohm spark plug.

Most do not recognize that even with a 0 ohm wire a 10,000ohm resistance still resides within the spark plug so unless the system is upgraded as a package typical systems reclaim less then 10% of the overall system resistance and a 0 ohm spark plug will cause excessive interference with many low resistance ignition wires.

The WeaponX PowerCORE system is tested to reliably reduce system resistance 99.99% to produce the highest output, and lowest reliable circuit resistance to prevent excessive interference levels.



LEFT, an internal picture of a standard spark plug. Typically a carbon resistance is used to reduce EMI and RFI interference levels in the vehicle. It should be noted that WeaponX spec'd spark plugs use a solid OFC core allowing for a zero ohm plug.

Typically *the reasoning behind a resistor in spark plugs are used as low cost interference suppression devices that reduce system interference levels.*

Originally, in the 50's, spark plugs were produced with an internal resistance to prevent radio noise interference. Since then no progress has been made on the ignition performance front in regards to the design of spark plugs and internal resistance levels. All “off the shelf” spark plugs still use internal carbon resistors to reduce radio interference but as vehicles became more 'electronic' in nature the resistor in the spark plugs and ignition wires now served a dual purpose, to reduce radio humm (interference) and to keep engine control signals from sensors in the engine bay working properly. This is primarily because ignition systems, due to their high voltages, operating in inherently noisy environments.

The WeaponX approach removes the resistance and reliably uses new technology in the ignition wire to suppress these interference levels rather then relying on technology over half a decade old resulting in drastically improved performance levels in all critical areas.

The WeaponX PowerCORE spiral wound conductor is the ideal upgrade to reduce resistance levels, interferences and increase power output of your engine. The technology takes current through the conductor to create a magnetic field and the induced current attempts to maintain a steady state current through it without the interferences typically associated in an ignition environment. This internal inductance has a natural reaction to control and filter harmful frequencies much similar to how frequency filters work in audio systems. By merging these technologies WeaponX can take full advantage of removing the spark plug internal resistance for maximum power output and acceptable operational levels in reducing interference in the electronic systems.

By developing a system, rather then a wire, WeaponX is able to deliver the sweet spot for low resistance, low interference and high ignition output.

Typically we have noticed the following on many naturally aspirated engines :
- slight stumble most experience at idle is eliminated
- throttle response is instant
- engine smooths out across the rpm range
- clean performing electronics
- reduced system resistance by 99.9%
- engine power improvements by as much as 10% depending on application

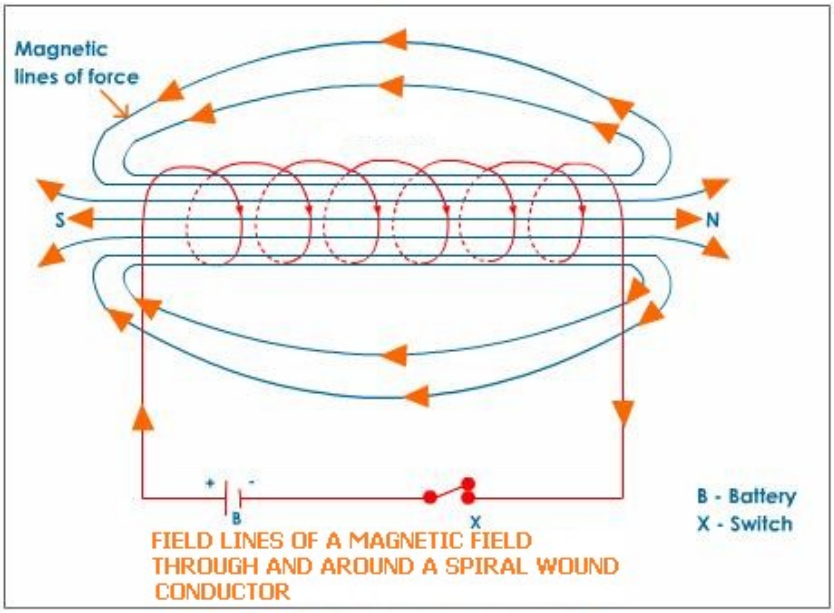
WeaponX PowerCORE energy recovery

Typically reducing system resistance about 10000 ohms by removing the resistor in the spark plug nets increased engine hp and throttle response, so what is needed in further increase energy to the spark gap was to accomplish energy recovery where it made the most sense to gain the highest power output possible.

The major differences between competitor wire and PowerCORE wire are the types of materials used and WeaponX's CORE technology system.

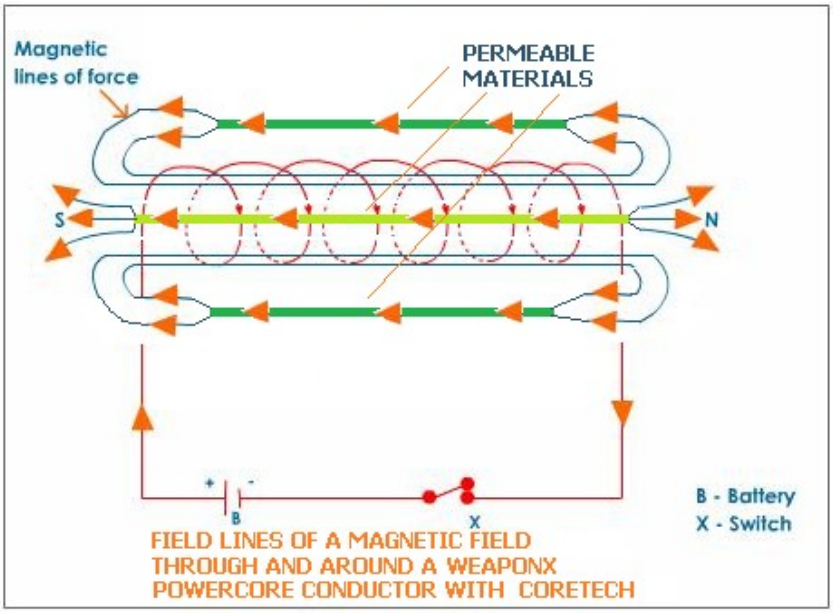
Magnetic fields are what is responsible for taming electrical interferences. This is because it is a source of energy. Implementing WeaponX's CORE tech we are able to take the energy introduced in the magnetic field, enhance it and re-harnesses it for use at the spark gap where most typical designs waste the energy.

In a typical wire these stray magnetic fields are called lines of flux. To understand more in the next paragraph it should be noted that magnetic fields are very similar to electricity in that they have preferred mediums to travel through which is part of our CORE TECH system.



For electricity we all know that copper is the best conductor and that stainless is a very poor electrical conductor. For magnetic fields there are materials that are said to be permeable which means that the magnetic lines of flux travel easier and more efficiently through that material without loosing energy. Much like copper is a good conductor for electricity we use a permeable and conductive material around our spiral core to more effectively allow the magnetic fields to maintain their strength. WeaponX's CORE TECH is the only wire to be designed to take advantage of the magnetic energy lost in most other wire designs.

LEFT – a typical wire design. Magnetic field strays outside the wire and can be lost in the environment.



As a side benefit the magnetic lines of flux do not disturb electronic equipment around the wires because they do not travel outside the wire itself. All other wires produced have this magnetic field traveling outside the wire which can allow it to interfere with the electronics in the vehicle, including OEM wire.

LEFT – WeaponX PowerCORE ignition wire with CORETECH more effectively utilizes and controls the magnetic lines of flux emitted by the ignition wire and re-harnesses the energy for the spark event.

Conductor choices
Typically copper seems to be the number one choice for ignition wires, however there are some manufacturers using nickel, carbon and others using stainless steel.

CARBON
Typically carbon is used as a standard suppression ignition cable and comes in resistances of about 1000-5000ohms per foot. Not ideal, but suppresses ignition noise and ignition energy therefore reducing electrical interference noise.

COPPER
The largest choice is the copper conductor. Excellent electrical conductivity, however, copper tends to oxidize easily. Take a look at any penny and it's clear that when the luster is gone oxidization has taken hold of the material. Oxidation creates an electrical barrier and reduces electrical conductivity over time which can result in high resistance connection points and degraded performance. Also, if not crimped just right easily breaks the spiral wound conductor as copper is a weak metal to work with. These issues are why, from wire to wire, there are usually inconsistencies, especially over time, with the copper spiral wound core ignition wire.

NICKEL
Nickel is another conductor choice typically found in 600 ohm spiral wound wires. It is not as conductive as the copper core wire but resists oxidation much better and is much stronger and resistant to core breakage, especially at the crimp near the connectors where copper wire can break.

STAINLESS
Stainless steel also exhibits the same traits as nickel but the carbon composition and other metal alloys used in it's makeup reduce electrical conductivity even further.

WHY RESISTANCE (OHMS) IS NOT THE PURE MEASURE OF PERFORMANCE
To note
Electrical Conductivity of Metals (Higher = better)
Copper 100
Zinc 28.2
Nickel 12-16 (STAINLESS ALLOY)
Steel 3-15 (STAINLESS ALLOY)
Titanium 5 (STAINLESS ALLOY)
Vanadium 6.6 (STAINLESS ALLOY)

To properly detect the conductivity of a metal the above values are measured using eddy current instruments that induce currents in conductive materials. They are used to detect flaws, determine thickness, inspect welds, measure conductivity, and sort alloys. Using these methods we can distinctively see the superiority of copper and nickel as a superior conductor over stainless steel.

There are wires on the market that are 0 ohm, but use a stainless core. All things considered equally there would be no way to distinguish between a piece of copper wire measuring 0 ohms and a piece of stainless steel at 0 ohms when using an ohm meter but clearly the copper wire would be a superior conductor. The resistance check merely tells us the connection is there, not how well the material conducts.

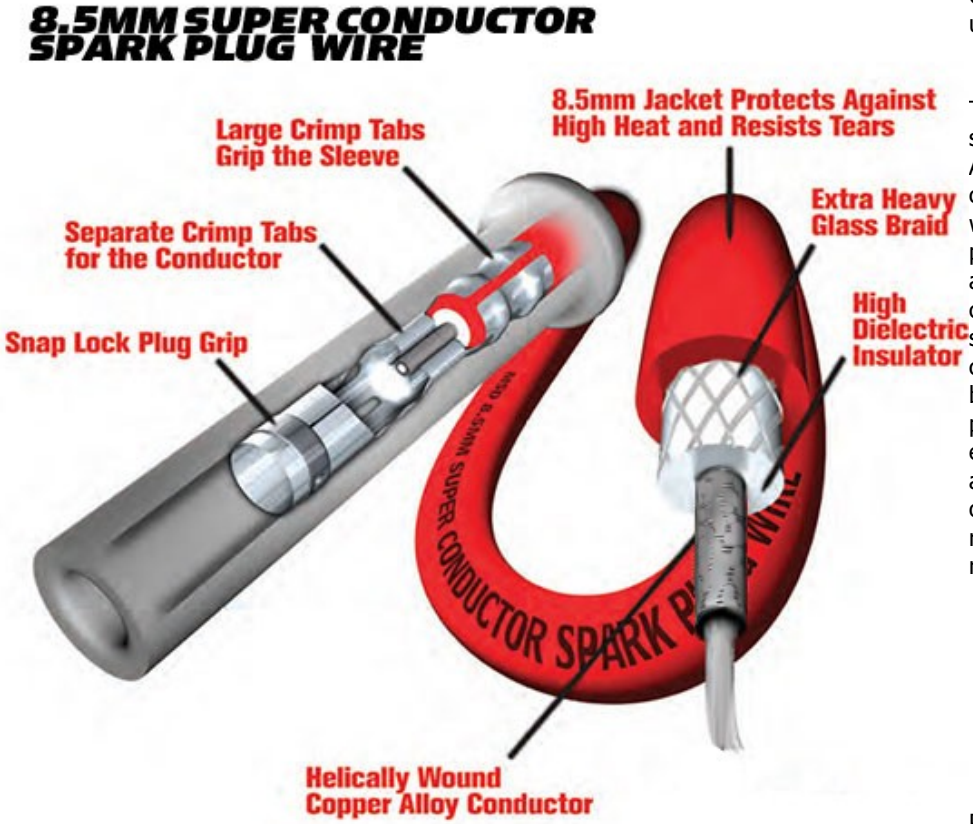
The **WeaponX advantage**

WeaponX uses multiple conductors, but the primary method of electrical conduction is the **nickel plated spiral wound copper core**. Although more expensive this type of conductor offers several advantages over other designs.

1) It conducts just as efficiently as a pure copper conductor
2) It resists oxidation at the connectors just like the nickel based spiral wound wires
3) It has a tensile strength high enough that is does not break when bent or crimped.

Contact Performance

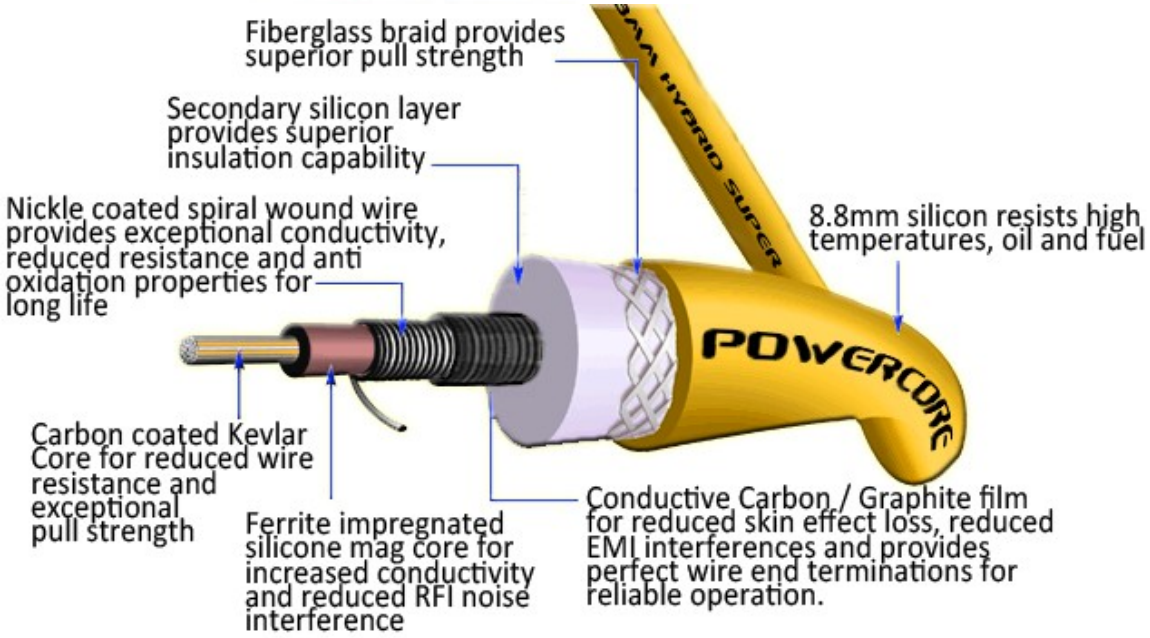
We should all be aware of the issues contacts can have when electricity runs through them. Over time the potential to develop oxidation occurs. We should all know the havoc it causes in an electrical connection such as poor conductivity and eventually failure. An example of this is the green / white oxidation that occurs on our battery connections which eventually prevents the battery from conducting all together. With a copper wire this issue is especially prevalent.



Competitor wires deals with this in a unique way.

Typically, a rubber coating over the spiral wound copper conductor is used. As you can see they left segments of the copper wound conductor open so that when crimped a connection these small points would connect to the terminal and allow electricity to flow to the connection point. While this works at sealing out moisture, trapped air in the connection point oxidizes, much like the battery terminal. Over time connection points degrade, loose performance and eventually fail. On a second note, unlike a battery, if the wire fails due to oxidization it becomes very hard to remove meaning the wire will require replacement.

PowerCORE 8.8mm CORE TECH



ENGINEERED AS THE COMPLETE BALANCED PACKAGE WHICH INCLUDES LOW WIRE RESISTANCE, LONG AND RELIABLE LIFESPAN, REDUCED SKIN EFFECT LOSS WHILE CONDUCTING ENERGY, LOWER EMI / RFI INTERFERENCES, HIGH PULL STRENGTH, EXCEPTIONAL INSULATION AND RESISTANCE TO EXTREME UNDER HOOD ENVIRONMENTS INCLUDING FUEL, OIL, AND HIGH TEMPERATURE.

The PowerCORE 8.8mm wire uses a graphite skin over the spiral wound conductor. While it adds additional cost to the wire, this has several performance advantages.

First it lowers resistance of the wire and the connection point but also creates a protective skin around the entire conductor. Since graphite is inert and does not react to the oxidization process it never oxidizes or decreases in performance over time. Being inert this

Carbon-graphite is resistant to most chemical reagents so it survives where other materials fail meaning not only is it resistant to oxidization, but it is also resistant to chemicals, water and other in engine fluids meaning the connection will stay reliable for the life of the ignition wire.

DIELECTIC PROPERTIES OF A MATERIAL
A dielectric is an electrical insulator that can cause electric charges to shift in the insulating material causing an internal electric field which can effectively reduce the energy efficiency in the system.

Although the term "insulator" implies low electrical conduction, "dielectric" is typically used to describe materials with a high polarizability which cause electrical energy to be absorbed by the insulator.

Here are the dielectric constants of some materials
TEFLON 2.0 (insulator)
SILICONE RUBBER 3.2-9.8 (insulator)
*the higher the number the more susceptible it is to causing energy loss if used as an insulator in direct contact with the conductor.

Commonly the insulating layer of silicon can break down causing it to polarize causing it to drain the energy from the wire. This effect would cause the wire to loose energy as heat or corona discharge.

CORE TECH advantage
1) Rather then just coating the spiral core with silicon rubber much like competitor wires WeaponX PowerCORE uses the carbon-graphite for other reasons. This protective layer behaves very much like a high resistance metal to coat the conductor. Because graphite has a tendency to effectively conduct energy, unlike silicon, it allows conduction of energy that wishes to penetrate it rather then retain it. So if electron movement does happen in this layer, since it is resistive, current in this layer is minimized, as the bulk of energy will run through the spiral core, and electrical losses at the insulating silicon layer are kept at a minimum. Because graphite has a tendency to behave very much like a metal, due to the carbon molecules arranging themselves into a lattice structure, if electrical energy flows to the protective skin it allows the energy to flow to the spark plug rather then hold and waste it as heat or corona much like competitor solutions.

WeaponX PowerCore 8.8mm wire uses protective methods, such as our carbon / graphite coating to isolate and reduce surface current contact on the insulator which increases wire lifespan and reliability over typical solutions but also allows for perfect, long life terminaltions. Also, the thick 8.8mm wire ensures reliable insulation capability in extremely high voltage situations.

OTHER IGNITION WIRE ENHANCEMENTS
As with most other wires WeaponX uses a Teflon inner insulator for pull strength as well as glass braiding on the secondary silicon layer. However, we also add a conductive coating to the inner teflon core. Which further reduces dielectric losses when electricity is conducting in the core and increases conductivity and performance of the wire.

WeaponX also adds a Ferrous inner core, which is a magnetic permeable material as well as conductive. This increases the CORE energy recovery effect of the ignition wire and also allows for conduction of currents through the center of the wire. What it also does is enhance the spiral wires ability to contain and eliminate interference energy surrounding and passing through the wire.

In summary, as seen, our goal is to reduce unwanted resistances to an absolute minimum but there is more to the design of an ignition wire then just resistance. Careful consideration to reducing interferences, insulation and dielectric properties as well termination performance, energy recovery, minimizing overall losses in the ignition wire and ensuring a long, reliable lifespan all play a vital role in a quality wire.

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