

7 Key Ingredients Necessary For Any Construction Grade Extension Cord



*How The New Solid Ground Extension Cord
Technology Will Revolutionize the Extension
Cord Industry, Save Construction Companies
Money, and Eliminate OSHA Safety Violations*

Products



100 ft. extension cords – 12/3, 15 Amp, 125 Volts, NEMA 5-15P

SJTOOW – Oil, Water and Flame Resistant PVC Jacket
Weight 14lbs. – **Product #SGC 1100G**



50 ft. extension cords – 12/3, 15 Amp, 125 Volts, NEMA 5-15P

SJTOOW – Oil, Water and Flame Resistant PVC Jacket
Weight 7lbs. – **Product #SGC 1050**



25 ft. extension cords – 12/3, 15 Amp, 125 Volts, NEMA 5-15P

SJTOOW – Oil, Water and Flame Resistant PVC Jacket
Weight 3.5lbs. – **Product #SGC 1025**



10 ft. extension cords – 12/3, 15 Amp, 125 Volts, NEMA 5-15P

SJTOOW – Oil, Water and Flame Resistant PVC Jacket
Weight 1.5lbs. – **Product #SGC 1010**



Power Cords

20 ft. 16/3 SJTOOW – Oil, Water and Flame Resistant PVC Jacket – **Product #SGC 1020**



50ft. Inline GFCI extension cords – 12/3, 15 Amp GFCI, 125 Volts

SJTOOW – Oil, Water and Flame Resistant PVC Jacket
– **Product #SGC 1050GFCI**

7 Key Ingredients Necessary For Any Construction Grade Extension Cord

How The New Solid Ground Extension Cord Technology Will Revolutionize the Extension Cord Industry, Save Construction Companies Money, and Eliminate OSHA Safety Violations

By: Davis Ratcliff and Rick Gilliland, Owners of Solid Ground Cords, LLC

The extension cord is a vital tool used by the construction industry on a daily basis. Construction workers depend upon extension cords to provide power to an array of electrical power tools on job sites in order to start and complete construction projects.

For the past three decades, extension cord products have been sold with advertising labels using adjectives like "Construction Grade", "Heavy Duty", "Long-lasting" and "Durable". In reality, the construction workers using these cords have found that many times the extension cords are far from construction grade and do not perform as advertised when used for normal construction site tasks.

The majority of extension cords purchased by construction companies have ground pins that break within 30 to 45 days of use and blades that bend and detach with very little force. Many cords experience jacket separation from the plug within weeks of use exposing the electrical conductors and creating unsafe working conditions. After just a few months of use the outer cord undergoes jacket degradation because of outside temperature variations, rough surface conditions, and oily environments.

Unfortunately, the construction worker and the owners of the construction companies end up in an endless cycle of repairing and replacing their "construction grade" extension cords on almost a monthly basis.

Not to mention the endless cycle of fines imposed by local safety inspectors and OSHA each time damaged extension cords are found on the job site.

This expensive cycle can be stopped and millions of dollars can be saved on yearly expenses of extension cords across the construction industry if the worker and his management become knowledgeable about the attributes (ingredients) that are needed to make a truly durable, heavy duty, long-lasting, construction grade, extension cord.

Below, the seven key ingredients needed to create a cord worthy of a construction worker's time and money will be described, as well as a brief history about the company determined to make such a product available to the construction industry across America.

The combination of these seven essential components has resulted in a truly durable and long-lasting CONSTRUCTION GRADE extension cord.

The cord is long-lasting (12 months under normal wear and tear), economic (saves at least 50% per year on total extension cord expenses), and includes important diagnostic safety features designed to keep the construction worker informed of the safety conditions of the electrical outlets that are being utilized.

History of Solid Ground Cords, LLC

In January 2016, inventor Rick Gilliland and businessman Davis Ratcliff formed a company with one goal: creating and marketing a construction grade extension cord that would revolutionize the extension cord industry.

Although Rick knew there were many problems with the "construction grade" extension cords currently on the market, the first problem he aimed to solve was the age-old issue with extension cords: ground pins breaking off from the plug.

After years of thought and thousands of broken ground pins, Rick invented the anchored solid ground pin technology that has significantly improved extension cord technology. Now, he has launched a new company, Solid Ground Cords, LLC. The company slogan is "IT'S ALL ABOUT THE PIN" and our purpose is to produce *truly* durable and long-lasting CONSTRUCTION GRADE extension cords.

"IT'S ALL ABOUT THE PIN"



Anchored, solid ground pin for construction grade extension cords.

This high-tech product is American made and designed to accomplish daily construction tasks over an extended period of time. Simultaneously, this cord costs less on an annual basis than the “repair and replace” extension cord spending frenzy that has occurred at most construction companies for the last three decades.

After much research and extensive extension cord testing, Solid Ground Cords, LLC was formed and currently has offices in Knoxville, TN and Dallas, TX. The first production of construction grade extension cords was delivered to our customers on April 11, 2016 and those cords are still in use after over one year of service.

7 Key Ingredients Necessary for Any Construction Grade Extension Cord

The seven key ingredients that make up every Solid Ground extension cord are described below.

1. An Anchored, Solid Ground Pin

The number one problem with extension cords is the conventional ground pin. Its weak design is responsible for the ground pin detaching from the plug, often within a few weeks of purchase.

Concurrently, the most cited OSHA violations associated with extension cords on construction job sites are related to the ground pin. Safety inspectors routinely find that ground pins are either damaged or altogether missing (Figure 1) and fine the company for a safety violation.

With the anchored, solid ground pin technology invented by Rick Gilliland of Solid Ground Cords, LLC, the problem of broken ground pins has been completely solved.

Figure 1. Three “construction grade” extension cords all with missing ground pins.



The comparison between the conventional ground pin and the Solid Ground pin can be seen in Figure 2. Conventional ground pins are typically made of hollow sheet metal that has been rolled to form the pin geometry (silver ground pin below). Notice the seam down the center of the pin which makes the pin non-water resistant and non-waterproof.

Figure 2. Anchored, solid ground pin versus conventional, hollow ground pin.



Also, notice the obvious hole punched through the end of the pin that is connected to the ground conductor (wire). This hole is the reason the conventional ground pin breaks or detaches so often. The pin base is embedded in the plastic plug only about $\frac{1}{4}$ inch. Any repeated up and down force, followed by side-to-side force at the pin base, will result in detachment from the plug.

Remember: *the ground pin is the safety lifeline on any extension cord. No worker should ever use a cord without a ground pin.*

In comparison, the bronze, anchored ground pin in Figure 2 is solid. It's not prone to break under normal construction tasks and it is anchored over $\frac{3}{4}$ inch into a patent pending anchoring device that prevents detachment of the ground pin from the electrical plug. The Solid Ground pin is a construction grade device that is built to last.

This technology eliminates ground pins from breaking off within the electrical outlet like the one seen in Figure 3. Thus far, the roofing companies and construction companies that have purchased and used these extension cords with anchored solid ground pins have reported ZERO occurrences of broken ground pins over 12 months of use.

Even better, the companies also report a 100% reduction in citations associated with damaged or missing ground pins by local safety inspectors and OSHA representatives.

The significantly improved solid ground pin and anchoring device have solved a problem that has plagued the extension cord industry for thirty years!

Figure 3. Conventional Ground Pin Broken off in electrical outlet.

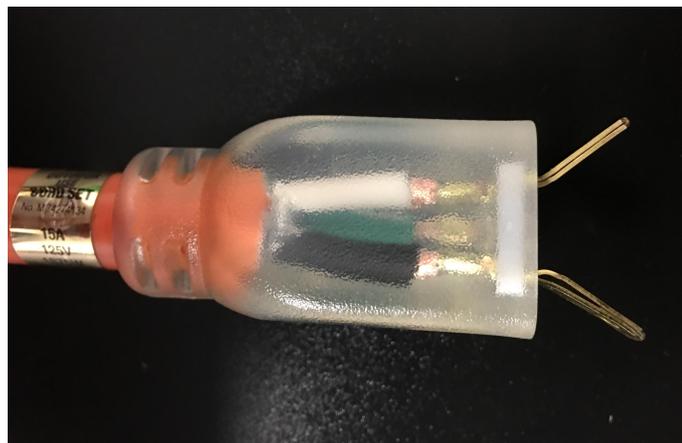


2. Solid Blades That Are Crimped And Soldered Onto The Electrical Conductors.

In order to increase durability and electrical connectivity, every construction grade extension cord should be equipped with solid blades that are both crimped and soldered onto the electrical conductors.

Many extension cords currently on the market are equipped with thin, weak, and folded blades that are barely anchored into the plug. These blades are not up to the everyday construction tasks. They bend with very little force as depicted on the extension cord plug in Figure 4.

Figure 4. Extension cord plug with folded blades that bend easily. Notice the gap on the bottom blade and that the blades are not soldered to the electrical conductors.



There is also a narrow gap that exists between the folded blades, which can be a source of connectivity reduction after just a few weeks of use. The Solid Ground Cord in Figure 5 is equipped with thicker, solid blades that are crimped and soldered to the conductors. This increases both electrical connectivity and connection strength thus contributing to increased durability.

Figure 5. Solid blades that are crimped and soldered to the conductors.

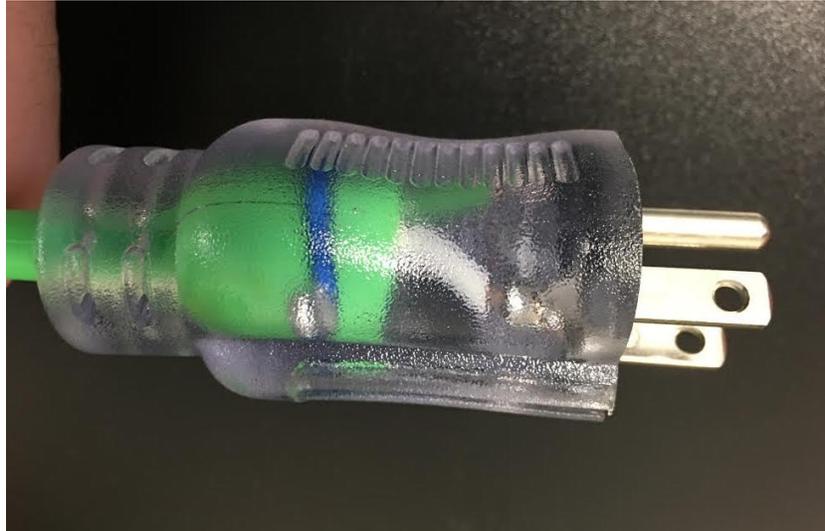
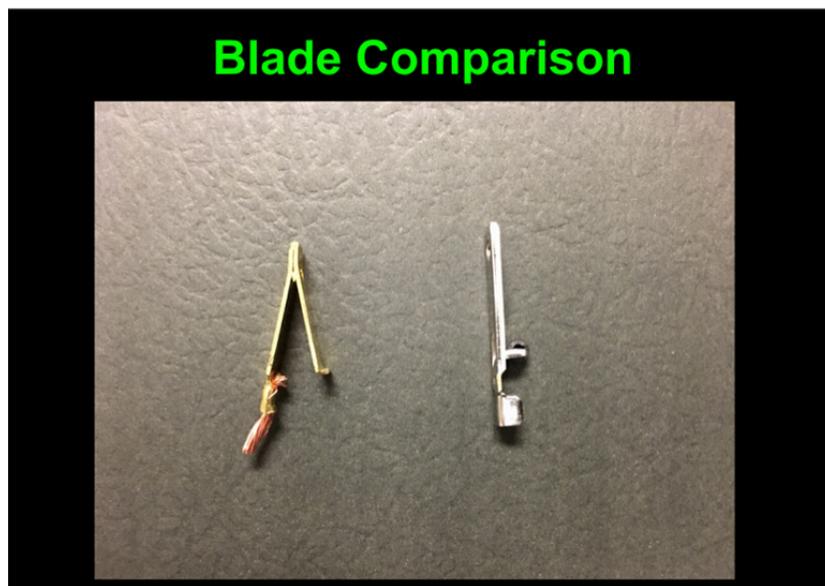


Figure 6 shows a close-up comparison of blade types. The folded blades are clearly inferior to the solid blades, in terms of metal strength and anchoring strength within the plug.

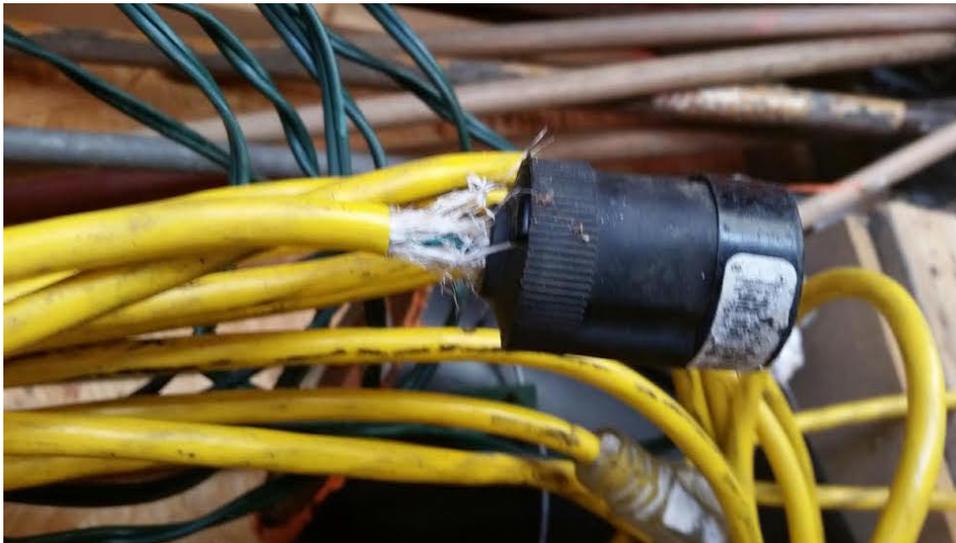
Figure 6. Thin, easily bendable, folded blades versus solid blades.



3. Heavy Duty Jacket Retention Device Built Inside the Plug Ends

Today's jacket retention devices are ineffective at preventing the jacket from separating from the plug housing. When the jacket separates from the housing the conductors are exposed, creating an unsafe working condition for the construction worker (Figure 7).

Figure 7. Conventional extension cord showing jacket separation from the plug due to an insufficient jacket retention device.



The jacket separated from the plug because most conventional cords have an inadequate jacket retention device. The jacket end has degraded (expanded and contracted) due to temperature variations over time. Jacket separation from the plug is OSHA's second most common safety violation associated with extension cords.

Every Solid Ground Cord is equipped with a red jacket retention device. The device is built inside the housing with a 360-degree hold on the extra durable PVC Jacket that is in the housing. This retention device helps prevent jacket separation on both ends of the cord. After more than 12 months of construction jobsite use, there has not been one report of cord separation from the plug on a Solid Ground Cord.

Figure 8 shows a comparison of the Solid Ground retention device (red ring) versus the conventional plug with very little retention on the outer part of the plug. Conventional extension cords are less expensive but do not last very long, especially if your company is safety compliant.

With this new anchored ground pin and jacket retention technology now available, there is no excuse for repairing and replacing cords every 30 days, and there is no excuse for receiving a safety violation from OSHA for a broken ground pin or a separated jacket EVER again!

Figure 8. Comparison of jacket retention device (Red Ring) versus conventional cord with inadequate retention technology.



4. A 12/3 Extension Cord With An Minimum SJT00W Outer Cord Jacket And Inner Insulating Conductor Jackets To Combat Untimely Jacket Degredation

The third most common OSHA violation associated with extension cords is damaged cord jackets, as seen in Figure 9.

Most conventional inexpensive extension cords are equipped with jackets that are rated SJTW. These jackets types are just not suitable for outdoor construction conditions and usually end up cut, nicked, or split within just a few months of use. Temperature variations, rough surface conditions, oily environments, and long exposure to sunlight wreak havoc on these jacket types and result in companies having to repair or purchase a new cord in just a short period of time.

Figure 9. Conventional extension cord with a split SJTW jacket due to jacket degradation.



Purchasing extension cords with jacket ratings of SJTOOW is more expensive initially, but the costs are significantly less than the conventional SJTW cords on an annualized basis. Thanks to their enhanced jacket durability, these cords are stronger and typically last much longer under the normal wear and tear of construction tasks.

Figure 10 shows two extension cords left in a gravel driveway and driven over by cars and pick-up trucks over different periods of time. The yellow extension cord has a SJTW jacket and shows the damage caused by two months of outside exposure and 200 vehicles driving over it.

The green Solid Ground Extension Cord shows no cord damage after seven months and 1000 vehicles driving over it. The premium PVC SJTOOW jacket is much more durable than the SJTW jacket and is well worth the added cost. The SJTOOW jacket can also endure temperatures up to 221 degrees Fahrenheit, while the SJTW jacket is rated only up to 140 degrees Fahrenheit.

Figure 10. The yellow SJTW jacket vs. the green SJTOOW jacket.



Figure 11 shows a Solid Ground Extension cord with the SJTOOW Jacket that has been used on a construction job for the last 14 months. Although dirty, it is still in excellent working condition with no significant cord degradation, no jack separation from the plug, no broken ground pin and NO citations from OSHA.

The company that purchased these cords, Southern Constructors Inc., has realized an annual savings in extension cord expenses of over 45% simply because they have not had to repair or replace cords as often as they used to.

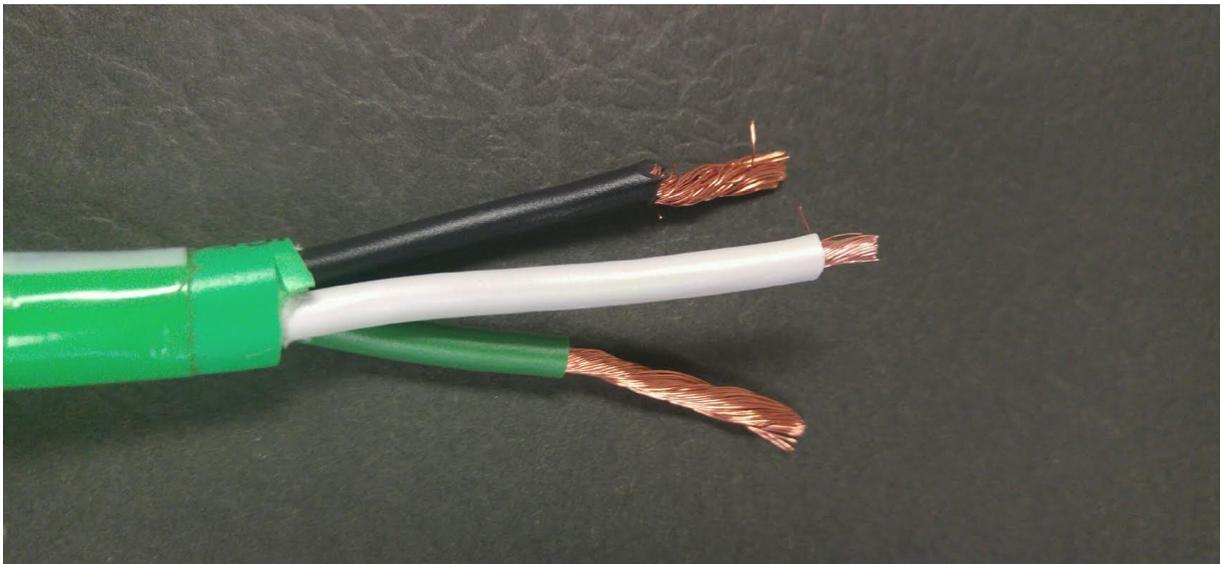
Figure 11. This Solid Ground extension cord with SJTOOW Jacket is still being used on a construction job site after 14 months of operation.



The SJTOOW letters stand for the following: SJ = Junior Hard Service (300 Volts), T = Thermoplastic (PVC) Jacketing, OO = Oil resistant outer jacket and oil resistant PVC insulation over each conductor (Figure 12) and W = Outdoor water resistant and weather resistant.

The SJTOOW rating is truly a necessity for every construction grade extension cord.

Figure 12. Individual conductors insulated with SJTOOW Jacketing.



5. A Ground Light Indicator and A Normal Polarity Light Indicator

These safety features help construction workers to better understand safety conditions of the electrical outlet being utilized in an indoor or outdoor environment. Workers often assume that the outlets provided on a job site are in good working order and safe to use. However, this assumption is sometimes wrong and can result in unsafe conditions.

Every Solid Ground construction grade extension cord is equipped with a patent-pending Ground Light Indicator (GLI) Figure 13 and a Normal Polarity Light Indicator (NPLI) Figure 14.

When the GLI is on it indicates to the worker that the outlet that is being used is grounded and therefore the extension cord is grounded. It also immediately indicates to any safety inspector who sees that the GLI is on that the extension cord is grounded and has a fully functional ground pin. If the GLI does not come on after being plugged in, then the outlet is NOT grounded, it is unsafe to use, and it needs to be repaired by a trained professional.

Using outlets that are not grounded or are reverse polarity can result in injury or death of the worker who uses outlets in these unsafe conditions.

When the NPLI is on it indicates that the outlet and source panel have been wired correctly i.e. Normal Polarity (normal current direction). If the NPLI does not come on when the cord is plugged in, there is either no power or the outlet is wired Reverse Polarity (reverse current direction.) In this case the outlet is unsafe to use and must be correctly wired by a trained professional.

Figure 13. Ground Light Indicator



Figure 14. Normal Polarity Light Indicator



6. Full Surface Area Coverage Receptacles On The Female End Of The Extension Cord Plug

This feature maximizes amperage provided to the expensive power tools plugged into the cords. Many inexpensive “contractor grade” extension cords have very little blade area coverage on the receptacle contact clips of the female end of the cord where power tools are plugged in.

Figure 15a shows an example of the female plug of a cheap extension cord. Notice that it is very difficult to see any blade receptacle at all upon inspection. Figure 15b shows the receptacle clip extracted from the plug of figure 15a. Less than 15% of the receptacle contact covers the surface area of the incoming power tool blade.

Figure 16a shows the female plug end of a Solid Ground construction grade extension cord. It is easy to see that the receptacle is loaded with metal that gives full blade surface area coverage to the power tool blades that will be connected to the cord. Figure 16b shows that the Solid Ground receptacle clip extracted from the plug in Figure 16a has 100% blade surface area coverage for your expensive power tools, ensuring maximum electrical connectivity and maximum amperage to the power tools. This feature alone will improve power tool efficiency and power tool longevity, saving construction companies money in the long run.

Figure 16c is a final comparison of a partial clip contact receptacle versus a Solid Ground full surface area blade contact receptacle. Which receptacle would you want to use with your expensive power tool?

Figure 15a. Female end of inexpensive extension cord showing lack of metal.



Figure 15b. Receptacle clip covering about 15% of the incoming power tool blade.

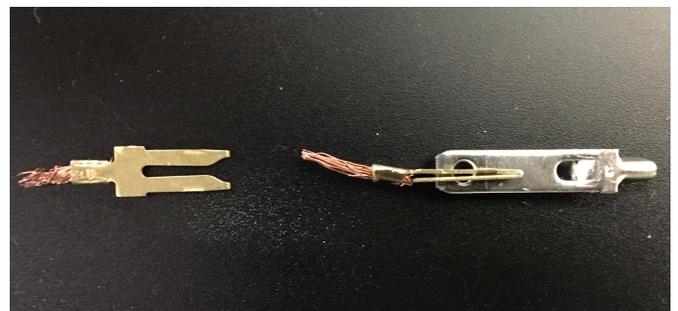


Figure 16a. Female end of the Solid Ground extension cord showing plenty of metal blade receptacle for incoming power tool blades.



Figure 16b. Solid Ground receptacle clip with 100% surface area coverage for incoming power tool blade.

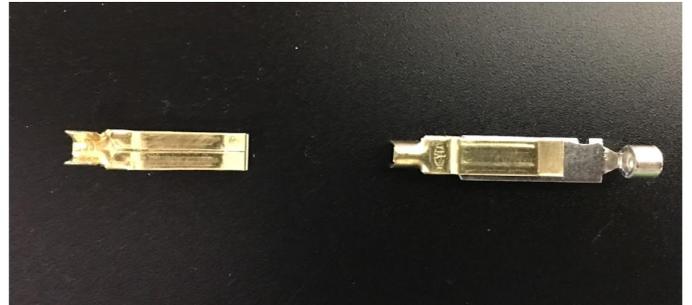


Figure 16c. Final comparison of partial clip versus full blade surface area coverage clip.



7. Affordable

Cheaply made, inexpensive extension cords DO NOT equal economic savings for construction companies and certainly do not mean construction grade, durable, or long lasting. To the contrary, these inferior cords are costing construction companies at least six times the original price of the inexpensive extension cord on an annual basis.

When analyzing yearly extension cord costs of less durable cords, one needs to account for the following:

1. *Cord equipment repair costs,*
2. *Cord replacement costs (at least 4 cords per year) due to broken ground pins, jacket separation and jacket degradation,*
3. *Yearly citation costs from safety inspectors,*
4. *Electrician costs and salary costs of safety managers who spend unnecessary time cutting extension cords due to broken ground pins and jacket separation, and*
5. *Costs associated with premature power tool damage and reduced longevity of power tools due to insufficient amperage.*

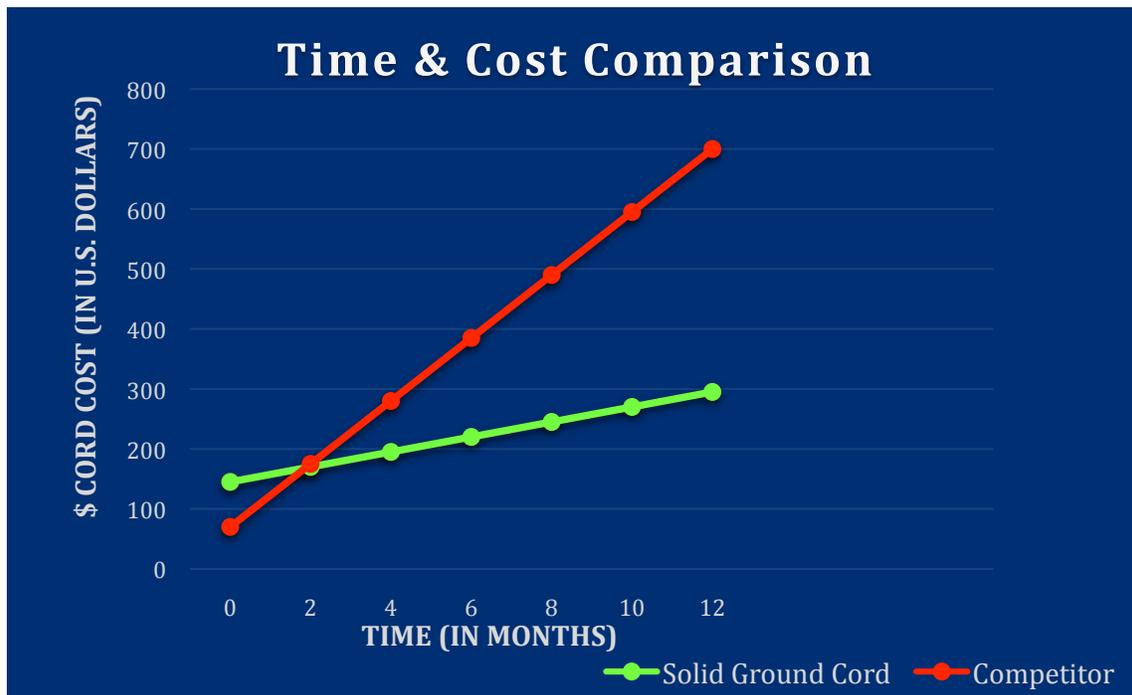
The Solid Ground CONSTRUCTION GRADE, HEAVY DUTY, LONG-LASTING extension cords have saved our clients at least 50% per year on extension cord expenses, simply because the companies are not repairing or replacing the extension cord as often. Our clients report that their power tools are operating at peak performance and last longer when our extension cords are used.

Over the last year, their OSHA citations and local safety inspector fines on extension cords with broken ground pins has been reduced to ZERO on extension cord violations. Now that the broken ground pin issue has been solved, safety managers have more time to devote to other unsolved safety concerns related to the job site because.

Figure 17 shows a graph of the estimated yearly costs of maintaining ONE conventional SJTW extension cord while being a safety compliant construction company with the mindset to buy and replace cords, treating them as a consumable. This mindset costs the construction company over \$700/year for *each cord* that is required at the job site (red line).

Although Solid Ground extension cords cost more initially, they save the construction company over 50% per year on extension cord expenses, having an annualized cost of less than \$290/ year (blue line).

Figure 17. Annualized Economic Analysis of Solid Ground Cords versus Conventional Cords.



Summary

The extension cord is a basic and fundamental tool required on all construction job sites. Over the past three decades, the majority of manufactured extension cords have not measured up to the normal everyday construction tasks required of them. They are NOT construction grade and they are NOT long lasting. The ground pins are hollow and break off in the plug within weeks of use, the jackets separate from the plug after a few months, and the outer cord undergoes rapid jacket degradation due to temperature variations, rough surface conditions, and oily environments.

One of OSHA's "Focused Four" safety emphases for the last several years has been Electrical Hazards. A category in the electrical hazards group deals with the safety problems related to extension cords like damaged or missing ground pins, jackets separated from plug housings, and jacket damage due to cord degradation.

The Solid Ground CONSTRUCTION GRADE extension cord with the anchored, solid ground pin technology and solid blades has solved the broken pin problem. Our Jacket Retention Device built inside the plug housing has significantly improved the jacket restraint system to help prevent jack separation from the plug. The durable SJTOOW jacket also makes the cord less prone to rapid jacket degradation, cuts and nicks. Added safety features like the Ground Light Indicator and the Normal Polarity Light Indicator allow the construction worker now to

have a better understanding of the safety conditions of the electrical outlet that is being used. These technologies no doubt will have a positive impact on OSHA'S quest for improved safety in the Electrical Hazard Category of OSHA's Focused Four.

Lastly, the annual costs of Solid Ground's more durable and long-lasting American Made extension cords are more affordable when compared to the buy and replace "spending frenzy" on extension cords that exists in today's construction industry. The extension cord can now take its place as a long-lasting tool rather than a consumable.

About the Authors



Davis Ratcliff is currently a Co-Owner and Business Consultant of Solid Ground Cords, LLC. Davis previously served as Co-Owner and President of Riverbend Energy Partners and Co-Owner and President of Diamond Geophysical Services Corporation. Davis received his Bachelor of Science Degree in Mathematics from the University of New Orleans.



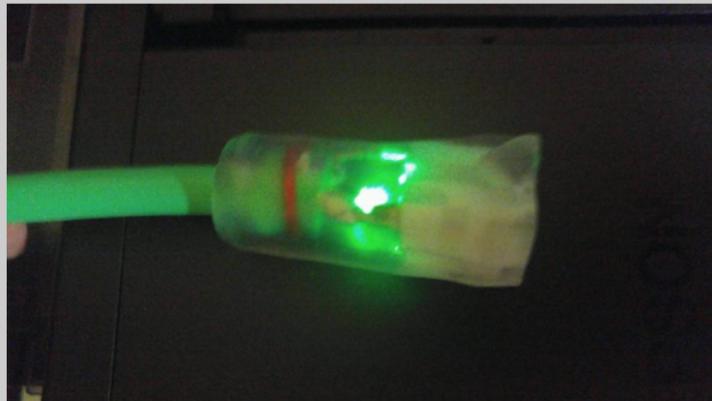
Rick Gilliland is currently a Co-Owner and CEO of Solid Ground Cords, LLC. Mr. Gilliland is also the Inventor of the anchored, solid ground pin technology used in every Solid Ground extension cord product. Rick previously served as a Construction Superintendent for over 25 years. Mr. Gilliland is the Founder of Solid Ground Cords, LLC.

Safety Features



Ground Light Indicator showing that the OUTLET and cord are grounded.

- Anchored solid ground pin that does not detach from plug
- “Grounded” safety light indicator
- Normal polarity light indicator
- Reinforced jacket retention technology which reduces jacket/plug separation
- SJTOOW outdoor oil resistant and water resistant jacket
- Meets NEC’s FT2 Flame – Resistance Standard



Normal Polarity Light Indicator showing that the OUTLET has normal polarity (normal current direction).

Warning: NEVER Use An Extension Cord Without A Ground Pin.

Solid Ground Cords

“IT’S ALL ABOUT THE PIN”

- We sell the **best**, most durable and **long lasting** extension cord made in **America**
- Our **patent pending** Solid Ground pin technology prevents the ground pin from **breaking** off the plug thereby saving you time, **money** and **safety violations** on the job site
- Our **patent pending** plug technology includes **safety features** that indicate when the extension cord is **grounded**

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