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Electrician apprentice salary illinois

1/14 herjua/ShutterstockThe most important thing any electrician wants you to do is never, ever ignore warning signals indicating problems in your electrical system. Whether it's a popping sound from a socket, a switch that goes extremely hot, or a switch that won't be reset, when you have an electrical problem, it's important that you take it seriously. Fortunately, most electrical issues can be solved relatively quickly, as long as they don't get parties and become an increasing danger over time. There is a reason why awareness of electrical issues is an important step in preventing fires in the home. 2/14 Family HandymanOne of the most common service call electricians get is about what appears to be a failure in a bathroom circuit. By code, all abstractions within 6 feet of a water source are required to be protected by a land miscircuit (GFCI). These are important safety devices that turn off power if a circuit loses amperage, so GFCIs are most common in bathrooms and exterior outlets. What your electrician wants you to remember is that a single GFCI device protects everything else downstream of that circuit. Since bathrooms are often not on an isolated circuit, that means a triggered GFCI will kill the power to outlets and lights that may seem unrelated. And things can be even more confusing when the GFCI is installed at the electric switch box itself. This service call is especially common for outdoor circuits and in homes where multiple bathrooms are on a single circuit, and that's why checking the GFCI is an important part of troubleshooting dead outlets. 4/14 Steve Heap/ShutterstockOverhead lines are normally NOT isolated. When you see birds or squirrels on them, they are just alive because they don't fill out a circuit by touching the ground or offering the current one an easier route than following the cable itself. Most of the outdoor power lines you see are weather coated at its most, with no insulation other than spacers at utility poles. Because they are so high above the ground, this is not a problem unless the lines fall, or a worker comes into contact with them while trimming a tree. And while lines that can be touched from a roof or tree are isolated, that insulation breaks down over time, eventually crumpling and revealing bare wire. Approach all overhead lines with full knowledge of what they are potentially deadly objects best kept to a licensed electrician or utility worker. 5/14 Elnur/ShutterstockThe DIY mind-set is wonderful thing. It's a great way to learn about your home and develop your skills and self-reliance. However, it is equally important to know the limits and limitations of your skills. If you are a DIY newbie, a good rule of thumb is to just work on electrical components that are off the wall. As you develop your skills as an amateur electrician, you can do more advanced work, including fishing cable and add (as long as your local department allows it). The problem arises when DIY enthusiasts who have more enthusiasm than experience deal with an electrical project, and then bury their less than perfect work behind a layer of plaster. Working with wires outdoors is a big intermediate step, as much of the work is easy to access during the troubleshooting stage. 9/14 Kekyayaynen/ShutterstockMany people know that rubber is a great insulator, and so sometimes DIYers wrap themselves in rubber boots and gloves before dealing with electrical issues that make them nervous. The problem is that most domestic robbers are not clean. To keep the price down, manufacturers mix in additives that lower the cost and increase sustainability. If you rely on rubber to keep yourself safe from an electric charge, make sure you use actual safety equipment. Have you ever seen a TV show of firm where an electric line falls on a car, but the passengers are safe? That's actually correct, but not because the tires isolate the vehicle. It is because the tires are such good conductors that the electricity takes the path of least resistance, travels to the ground through the tires and bypasses the interior completely. Take a tip from your electrician, and make quality insulators part of your standard kit of protective equipment. 10/14 Family HandymanIf you have two-slot outlets, it's tempting to replace them with three-slot withdrawals so you can plug in three-prong plugs. But don't do this unless you're sure there's a location available. Use a tester to see if your outlet is grounded. A series of lights indicates whether the outlet is connected correctly or what error is available. These testers are readily available at home centers and hardware stores. If you notice a socket with three slots on an unfused box, the easiest solution is simply to replace it with a two-slot socket as shown. Dead outlet? 12/14 Family HandymanTamper-resistant vessels are designed to stop a child from inserting an object, such as a paper clip. They are required for all places, indoors and outdoors. Tamper-resistant vessels are a great invention, so use them — it's national electrical code. We'll show you how to correctly install a tamper socket. 13 / 14 Family HandymanOn outdoor vessels, flat covers provide protection only when a vessel is not in use, but it is not uncommon for extension cords to be connected for longer periods of time; for example, holiday lights. In-use or bubble covers provide protection at all times. The National Electrical Code defines a wet place as an area subject to saturation with water or other liquids, and unprotected places exposed to the weather. The national electrical code has a different definition for damp places that are more subjective, but if you think the vessel will get wet, use a lid in use. And don't forget the weather-resistant vessel. The national electricity code requires that all 15- and 20-amp-vessels be classified as and tamper resistant when installed in both wet and damp places. Learn how to install outdoor lighting and an outlet here. 14/14 SpeedKingz/ShutterstockMany of these tips are cautionary tales. But they're not meant to scare you away! In fact, many electricians are eager to encourage homeowners to learn how to do basic electrical work on their own. Whether it's something as simple as repairing a cut extension cord or roughing-in the electric for a new add-on, if you have the patience and stamina to learn a new skill, Family Handyman has the know-how to help you get it done! Each product is independently selected by our editors. If you buy something through our links we can earn an affiliate commission. Originally published as May 15, 2019 Dan has been a licensed travel-level electrician for about 17 years. He has extensive experience in most areas of the electrical trade. It takes more than one channel bender to make an electrician, even if it's a start. WildernessQuality and electrician's hand toolsA set someone just become an electrician probably has a greatly limited budget, the set of electricians hand tools can be the right place to reduce costs by buying cheap tools. Cheap tools will not last and are much harder to use; a simple rubber handle on a screwdriver can make a big difference if you have to use it all day. Make sure that high-quality tools fill the new electrician's tool bag. The same basic tool can come in many different brands with many different prices, so I will recommend brands as well as the actual tool where applicable. Klein makes high quality electrician tools, as well as Knipex, Ideal and Greenlee. Milwaukee, Dewalt, and Bosch make professional quality power tools. Below I'll discuss some very specific recommendations, with some links to sites you can look at them and buy them. Pliers: Primary Electrician toolsThere are dozens of different styles of pliers available and well-equipped electrician tools bag will contain several of them. Needle-Nose PliersA good set of needle-nose pliers is indispensable for electricians. Klein and Knipex both make a very good set, with built-in wire cutters, and even a stripper hole for #12 thread, both of which are practical options. Needle-nose pliers for the electrician should always have the wire-cutter option. The Knipex set also contains crimpers for ferrules. Personally, I prefer Klein J203-BN pliers. Lineman's TiotarA good heavy set of lineman pliers will often be needed. Again, Klein makes a very good set with an optional fish-tape-pulling arrangement on the side of them; a very handy option for electricians. The arrangement on the side is far preferable to the same type of option where the fish band fits between the handles; it's way too easy to receive a very nasty pinch with that style. Side-Cutting PliersPliers, or dikes are common to each electrician's tool kit. These are used to not only cut wire, but nails, nuts, MC cable, and other items. Make sure that the jaws are specially hardened for such use, not only for cutting copper or aluminum wire. Klein makes two different sets; one with red handles and one (see below) with blue handles and hardened jaws. Knipex also makes a good set of side-cutting pliers. These pliers should be in 8 - 10 length. Slip-Joint PliersCommonly called channellock pliers (a trade name) an 8 or 10 pair of slip-joint pliers will be required. Recommended here is the Knipex Cobra 10 pliers, or even three-piece set of 7, 10 and 12 lengths. Wire StrippersAlthough not quite seaweed, a couple of wire strippers is a necessary item in the electrician's tool belt. Wire strippers are available for Romex wire, but far more common are simple strippers for #10 and less solid (not stranded) wire. Ability to tape #8 and #6 is a plus, where there is. Recommended are either Ideal or Klein strippers; Ideas are usually a little cheaper, but Klein is more comfortable to use. Recommended is Klein 11055 wire stripper. Do not buy the automatic style of wire stripper, just a simple pair of wire strippers for several sizes of solid wire. GB offers a set of wire strippers with a built-in voltage tester, but they cost significantly more. As wire strippers are considered a throw-away tool (they wear out often) the extra cost is really not worth it. Razor KnifeIn addition to wire strippers, get a razor knife. One of its many uses is to cut the loop on the NM/C wire used in homes. Using wire strippers for this will sooner or later damage a thread. Drivers such as electrician hand tools included in this section are screwdrivers, nut drivers, and similar tightening tools for the electrician. ScrewdriversA top quality set of screwdrivers will be in every electrician's tool bag. You need to include a cabinet tip flat leaf, a larger flat blade, a #2 Phillips, a #1 Phillips, and a #2 square tip. Klein is recommended, but Ideal also makes an acceptable screwdriver set. Nut DriversYou will want a good set of nut drivers, from 1/4 to at least 7/16. I recommend Klein, in the medium axis. The Klein set with long hollow shoulders is useful in some circumstances, but not worth the extra hassle of carrying the long handles in the electrician's tool belt. Allen Wrens (Hex Keys)Allen wrenches are a must. Electricians typically prefer sets of Allen wrenches, as they Klein does; they use both large and small sets, in SAE sizes. Very sometimes it would be nice to have individual allen keys, but it is not worth extra problems and cost, and individual wrenches are often forgotten and lost. Socket SetAn electrician will use a socket set, if he/she is a strict residential electrician. This is not a high use object, nor is it used to tighten to extremes. Deep sockets are more valuable than shallow, and 1/4 and 3/8 ratchet is useful. A Craftsman brand set or equivalent is enough here, but be sure it there a good selection of deep sockets. Adjustable wrenchA pair of adjustable wrenches, perhaps 8 and 10 length, will be available in the electrician's tool kit. Again, absolutely the highest quality is not needed because they will get light duty only; brands like Craftsman are quite sufficient. Stir WrenchSometimes a pipe key is priceless; Ridgid makes a good pipe key in about 10 size that will work fine. A second wrench of the same size is advisable to work with rigid wiring. Conduit ReamerAlthough not strictly a screwdriver, a channel-reaming tool is necessary for any electrician running the wire. Klein is recommended with its dedicated tool. Reapers are available for square shaft screwdrivers, but they don't work nearly as well, because the long screwdriver blade prevents the reamer tool from entering a wire that has a bend near the end of the wire blade. Importantly safety tools for electricians use a tick tester, or non-contact voltage detector. Find warm threads before cutting or stripping them. WildernessVoltmeter in use. Know what tension you will be dealing with, and if it is hot. WildernessElectrical Meters and TestersEvery electrical tool bag needs to include several meters and testers. MultimeterYou need a multimeter that can read up to 600 volts; it should also be able to detect continuity. A clamp-on style of multimeter with ampera capacity is preferred. Fluke is the preferred brand, although cheaper brands are available and will be sufficient for apprentices who just become an electrician. The Fluke 322 AC Clamp Meter is a great choice for top electricians. Tick TesterEach electrician should be equipped with a non-contact tester (tick tester), and many have a spare tester in the truck as well as one in their pocket. Testers using standard AAA batteries are preferred. Fluke again makes a good tester. Plug TesterA plug tester with a built-in GFI tester is necessary and quite inexpensive. Almost all brands will work just fine here. Specialized Voltage TesterDees are simple testers that will test for the presence of various specific voltages as well as continuity. They make an excellent replacement for a true multimeter, and most electricians will have one in their tool bag whether they have a multimeter or not. If funds are available, either Fluke T+PRO Tester or Klein ET200 is a great addition to the toolkit. Drill KitA good cordless drill kit is a necessity. As cordless tools have grown in popularity, sawzall has become almost a requirement for an electrician, although a regular hacksaw will still be enough. Recommended drill kits are either Milwaukee or Dewalt drill and sawzall kits. The kit battery should produce at least 18 volts, and the kit should contain at least two batteries, but three is very practical. A single-battery charger is sufficient for most people, although dual battery chargers are available if possible, get a kit with a flashlight. The new batteries are a big plus, and far superior to the older nicad batteries if you have money. Bought separately they are expensive and require a special charger, so they should be purchased with the kit if at all possible. Avoid cheaper brands for drill kits if possible, as their life span is limited, their batteries are generally lower quality, and the charge does not last as long. Cheaper kits like Ryobi and Makita are an option, if you keep this limitation in mind, but the new electrician needs to realize that they will need compensation in just a year or so. The newer cordless impact drivers are a very, very nice addition to the tool bag, and again should be considered if funding is available. If possible, the drill itself should be a hammer drill, as the electrician is often required to drill masonry or concrete. Conduit BendersIf an electrician expects to work in the commercial or industrial field, they will need conduit benders in 1/2 and 3/4 sizes and maybe 1 as well. These are not common tools found in every household. It may take some time to learn how to bend the wire properly, but it is well spent time. LevelA good torpedo level is an absolute necessity; don't get the cheapest. Strong earth magnets to keep the level of wire or other metal surfaces will delay the moment when you release the level and need to replace it. A plastic case will come off over time and result in poor readings: make sure your level has a metal case. A level with a 30° vial can be very useful, so consider paying a few more dollars for that feature. Checkpoint brand is recommended, and 300PL is a reasonable choice in that brand. Measuring TapeA good quality tape measure in either a 25' or 30' length is mandatory. Get a tape measure at least one inch wide: less width means less strength, which means the strap won't extend that far out without bending (standout length). Stanley makes a very good tape measure (their fat max series) as I recommendTools Belt and BagTool BeltYou can see that an electrician will need a tool belt, to keep some of the items above. There are many styles of tool belt for different business. An electrician tool belt should have multiple pockets on one side for small parts and supplies, and pockets on the other side for hand tools. It should include a place to hang electrical tape and a loop for a hammer. However, too many pockets can become an obstacle. The more tools and parts are added, the heavier the belt and the more work it is to wear it all day. Many electricians use a tool belt with just a couple of pockets for parts, but three are four pockets can be handy to keep parts from getting mixed up. Several pockets will be needed for hand tools, with loops on both the inside and outside for pliers. For special work, such as installing a large number of switches or plugs, a small leather for just one and a seaweed can be very handy, to pare down the weight on days when the electrician knows they will only a few hand tools. Think of a set of braces for the belt, as they allocate the weight to the shoulders and make wearing the belt an easier job. They are spendy, however, and can wait if necessary. Whether your tool belt is leather or nylon is a matter of personal taste. However, make sure that the belt buckle is adjustable and long enough to accommodate winter clothing. A tool belt constructed with sturdy seams and rivets should last for several years. An electrician tool belt should be available at your local home improvement store such as Home Depot, and they are widely available online, including on Amazon. Tool BagA tool bag is also quite desirable, to transport tools to the job site every morning and remove them in the evening. Theft of tools is quite common in job places during the night and most electricians will not risk losing their precious hand tools. The electrician's tool bag, however, is one place where some money can be saved: many use nothing more elaborate than a five-gallon bucket, even if a nylon tool bag has the advantage of pockets inside and/or outside for smaller tools. Second HandTools for the ElectricianA variety of tools are useful for the electrician, but the tools above are the primary tools every electrician needs. Some suggestions for the future may include a hose cutter of the type plumbers use because it is useful for removing wire from around wire without damaging the wire. Ratcheting cable cutters are nice but very spendy (almost as much as required drill kit). More and more work is being done with mc cable, so cutters and strippers for it are useful too. A cheap calculator is nice, but most mobile phones now have enough capacity for most electricians. Additions to the cordless drill package such as a circular saw or a peanut grinder can be handy, but can be added later and are of only limited use in all cases. Most electricians will eventually own a 100' roll-type tape measure. The list can, and will, go on and on. You need pens and sharpies (indelible markers), some kind of knife (razor, drawer cutter or large pocket knife), and other common household items. As you progress towards journeyman level, you unfortunately need more exotic tools often more expensive. But the tools listed above should start the apprentice just become an electrician on the way they need to follow, well filled with electrician hand tools. This article is accurate and true to the best of the author's knowledge. Content is for informational or entertainment purposes only and does not replace personal or professional advice on business, financial, legal or technical matters. Q & AAnswersQuestion: My son has put cobra grip on his Christmas list. Is a set of 3 best or would some of them not get used? Answer: They definitely have different uses, and if he does a lot of work with seaweed he will certainly have a use for all three. I that the larger pair is the used, but they can be invaluable when needed and it is quite possible that your son would find the biggest couple to be the most used. It just depends on what he uses them for. If it's in the budget I'd suggest the set of three. © 2010 Dan HarmonCommentsBoris Arriola on September 23, 2019: Thank you, Dan Harmon. This is a complete list of tools for an electrician. You have categorized all the items that made the list easy to find the tools needed tools. Dan Harmon (author) from Boise, Idaho, July 29, 2016: I that's correct, Sean – I don't recommend isolated tools except in special circumstances. They are significantly more expensive, and to maintain their insulation value may not have even a small nod on the surface of this insulation. Since there is rarely a need to work hot (although we all do), better to use an effective tester than to try to maintain isolated tools through knobs of daily use. It's also not uncommon to work with uninsulated tools: I've never seen an electrician at work (under 500 volts) with a tool belt made of insulated tools. They're just not that useful, and I'm going to go so far as say that no new apprentice (the target of this article) has any company working hot on anything other than maybe 120 volts. Dan Harmon (author) from Boise, Idaho, July 29, 2016: I seventeen years of using the tool almost daily I have never had a false negative. That is, it has never reported any tension but the line is hot. I've had it report a thrill when there was none, but I can live with that happening a lot sometimes. Sean, July 18, 2016: I should have specified that I was referring to the ads placed for uninsulated tools of the same brand mentioned after each paragraph. This should be monitored because it is misleading and seems to me that you support these tools. SeanSean, July 18, 2016: The information here seems simply irresponsible to those who don't know. Volt stick is not reliable enough to trust that you will not get a belt that can be good tools but not ones of them seems to be isolated. Someone asked what is the need? - When you cut through a live cable under a brain fart you will find out! Then you buy some isolated tools :)Hemanta sasmal on August 2, 2015: Thank you for providing the valuable information! Dean Walsh from Birmingham, England on November 2, 2013: Useful list - it's the test equipment that costs the money, but there are also some pretty cool products out there. Fluke is good, and has some advanced stuff. Dan Harmon (author) from Boise, Idaho, May 24, 2013: Brandon, it should be. Depending on the details of what you will do, there may be some other items not included here: a punch down tools or low voltage scissors, for example. On the whole, however, it should do well. I suggest you check with the center, and come specific recommendations on type or brand. Brandon L on April 24th, 2013: I'm going to career center for this and would like to know if this is a good list for Harmon (author) from Boise, Idaho, May 2, 2013: I don't know – the Klein strippers are the ones I use too, and I wear out a couple a year or so. They get boring and won't cut anymore, even if they do last better than anything else I use. Maybe cutting lots of #10 and 8 solid wire is what hurts – I do it a lot as more commercial jobs require solid wire. It's true that I usually destroy them first, though – just as you say, cut a live wire. Still, I have a couple in the toolbox right now that is simply boring – I'm holding them in case I destroy the good couple and need something for a day or two until I can replace the ruined couple. Robert Monk on May 02, 2013: Great information in general. I have to disagree if wire strippers are a throw away. My typical Klein comfort kure wire strippers (with 14/2 and 12/2 romex jacket strippers, #14 and #12 wire strippers, and use #14 stripper jacket for #10 wire stripper, threaded screw cutter, wire looping hole, and wire cutter... what else...) in recent years. Usually they fail when I sit on them step on them and bend them, or I cut into a live circuit one many times. Luckily, I do it once a year maybe, compared to a month as when I started residential renovation – and so does the 10x volume of work as before as well. In my opinion, the Kleins will last at least until you screw up and lose them, step on them, or otherwise do something stupid to break them or knock them out of alignment. Well worth \$40 (\$28 or whatever you can get them for). Dan Harmon (author) from Boise, Idaho, October 24, 2012: I don't know about Texas, but around here a journeyman license is good for about double the money. Worth the effort to get, in other words. I absolutely agree that a variety of marketable skills are extremely valuable in today's world. You just never know when you will be laid off or a company will fold and you will find yourself one more time in the unemployment line. Wesman Todd Shaw from Kaufman, Texas on October 24, 2012: Oh you are very kind! I'm not a real electrician, but I pretend to be one this fall/winter... my brother and myself... are the only two males in the extended Shaw family who are not VERY real electricians. I know you're the real thing. I'm just an apprentice with... lots of miles on him! I can go test for a Texas Journeyman license soon though – I'm good at passing tests... and diversifying our marketable skills is forever a very good idea! Dan Harmon (author) from Boise, Idaho, October 24, 2012: Good Catch, Wesman. I've even seen journeymen do it, and I even tried it myself. For about two wires; it didn't take long to realize that injuries were almost inevitable. A razor knife (box cutter) just doesn't do the damage that wire cutters will remove Romex capes. Thank you - I have changed the list to include it Wesman Todd Shaw from Kaufman, Texas on October 24, 2012: One thing I keep running into the fall... are the mistakes of someone who Fired. The individual used his set of strippers to peel off the outer insulation of the Romex wire... and rather too often, he would bite into one of the wires, or even break it... leaves it hanging by its own insulation. Oh gee... just never do it. Get a good razor blade knife to cut the outer insulation when you cut Romex into a box.)Dan Harmon (author) from Boise, Idaho on October 23, 2012: This would vary a lot state to the state. Child labour laws will come into force, as will the requirements for becoming an apprentice. I would think that 17-year-olds should have no problem starting an apprenticeship, but at 16 it can be problematic. The best I can offer is to check with the authorities in your state. Maybe a building security department, or where a builder would get a building permit – they can certainly direct you to the right place. Anonymous on 22 October 2012: Is it possible to become an apprentice or even apprentice before the age of 18? In the future, I plan to work as a residential electrician. I want to get some college credits as well as work experience to get a head start in life. I live in Oahu, Hawaii and want to know if there are any apprenticeships (or pre-apprenticeships) in the near future that accept 16-17 year olds. Thanks.Dan Harmon (author) from Boise, Idaho on October 05, 2012: Not sure here, apprentice. I've used two bags, but one of them is just a little thing to carry strippers and screwdrivers for tuning switches and plugs. Not actually a bag at all. I have always simply re-filled my usual bag as the job went from one phase to another. Won't run pipes? Dump the barrel reamer and parts for it - filling with wire nuts and nut spinner. Or what the next task takes. Yes, I have to do it several times as I can go back to the pipe the next day, but it saves buying a separate set of bags, and good ones are not cheap. Plus, I always carry some of the same tools – screwdrivers, channel locks, etc. – is he expecting you to double up on them too? I do not know anyone who carries two complete sets of bags - never heard of such a thing. Always good to hear from a new apprentice starting - here wish you luck in your career!Apprentice in October 05, 2012: hi, just wondering what a good rough-in bag would consist of, which I about to start as an apprentice electrician and my employer said I'm going to need an electrician's bag/belt, which I have, and another bag/belt for rough workDan Harmon (author) from Boise, Idaho June 08, 2012: I have owned and used Dewalt, Milwaukee and Makita power tools, although the Makita brand was quite a while back. I've never used a Milwaukee tool I don't like and in terms of longevity and power Dewalt compares favorably. Milwaukee has generally won in terms of ergonomics but not always. Makita always seemed to be a lighter weight tool, not really suited for long, hard Significantly cheaper, but without power or longevity. At the same time, I have borrowed several Makita tools in recent years for short term use and was impressed – Makita has made long progress in producing a quality tool. Unfortunately, they have also increased the price to around the equivalent of the best tools. Mike on June 08, 2012: Have you used all the tools you recommend? I have both a Milwaukee and a makita impact that, and makita has both survived and surpassed Milwaukee by father Dan Harmon (author) from Boise, Idaho on May 18, 2012:Niall, you make me jealous, go tool shopping for more than just one or two items. It's been a long time since I've done that. Niall on May 17, 2012: Thank you so much for this! I am in high school and will start a CO-OP program next year to become an electrician. I already have many of the basic tools (most aren't that big though) plus a drill/stroke and clamp meter, but this definitely helped! Looks like I'll be in for some tool shopping, one of my favorite activities! Dan Harmon (author) from Boise, Idaho on April 21, 2012: aman, I am student in electrical engineering and I'm doing a project at linemen stc. I am trying to fint the correct tools and where usagae for a linerow in his ever day use in pole work.can any1 have something to say about this thanks.amanDan Harmon (author) from Boise, Idaho on December 11, 2011: Oh I can tell you that in our case it is to the point that they need to be installed NOW. Which means we have to fix them at our expense. We get ballasts for free, but all the work and small parts are ours to cover. Manufacturers know we can't wait – given that, why try at a high speed of perfection? It doesn't cost them anything to outsource crappy work – engineers and architects choose the fixture based on appearance and price, and we fix them for free. Wesman Todd Shaw from Kaufman, Texas on December 11, 2011: I had been working for several years for a contractor who had decided to sell Nordyne equipment... Westinghouse, Tappan, and their other brands. Guy... the contractor I worked for... was the SINGLE MOST HONEST and... really, one of the most mechanically inclined individuals that I've ever met anywhere. The systems he had sold... was poor to terrible from the factory, and although he was in a position to where he could retire at any time... that crappy equipment cost him some face or reputation. So he stopped selling Nordyne... and started selling Rheem. Now... Rheem is GOOD equipment at large – it's equal to Trane, Lennox, or Carrier/Bryant... at least it is in my personal experience. But there was a customer who had bout an expensive 14 SEER system... and after many hours of warranty work where I had looked every last possible thing that anyone wont think of... I found it. about three or more recall - TINY leaks on the larger of the two copper pipes inside the condenser. The super small refrigerant leaks were so small that no refrigerant oil could be seen, and they were so small that the brand new \$300 digital leak detector – an instrument that can detect 1/4 pound refrigerant leak per year... Ostensibly... don't sniff them. It could only find them within six to eight inches of space that had copper pipes going everywhere. I ended up finding leaks from the pressurization system past running capacity... with my hands from the touch. That would never have passed quality control... but it did, and it was an above-minimum condenser from one of the best manufacturers. Negative story... but all trueDan Harmon (author) from Boise, Idaho on December 11, 2011: Don't get me started on manufacturer defects; it's a rare school or store that we build that does not have at least 10% of the new fixtures defective in one way or another. Wired faults, defective ballasts, broken or missing parts; it's always something. That's why I recommend only top quality tools for artisans - you can generally trust them and many carry a lifetime warranty. Wesman Todd Shaw from Kaufman, Texas on December 11, 2011: You only ever need a recovery machine if there is gas in a system, and you either change the compressor, filter, or plan to repair a leak – then you need to use a vacuum pump to not only remove oxygen or atmospheric air from the system... but holding in vacuum or suppression is a second or third confirmation that a leak is actually fixed. The thing is... most a/c or heat pump refrigerant leaks occur in very freaking thin copper pipes of the indoor coil – and none... will repair these leaks, because they are often microscopic ... or extremely difficult to find. Also... was someone to take the time to repair an indoor coil refrigerant leak – that in itself is not a profitable thing for tech or entrepreneur – but it won't be cost effective for you either. Then... the nature of these types of leaks, formed from vibrations and rust ... pretty much decide that another will soon follow – and so there's never misery for everyone involved to even mess with it. Much better to have a leak develop at the condenser!!! Or to simply pay someone to take it out... until the leak becomes large enough that

than a plastic one for example. True insulated tools are quite a bit more expensive and rarely necessary. My own tool kit has all the rubber handles, but zero insulated ones. The rubber, or even a plastic handle, will insulate from electrical voltages well enough in the voltage range I treat, which is typically up to 480 volts. Work with screwdrivers, pliers or wire strippers all day long, however, and that comfort provided by the rubber handle quickly becomes worth twice as much as it costs. Daniel on December 09, 2011:Hey . I see a lot of isolated toolsets. They're expensive. What is the need? Dan Harmon (author) from Boise, Idaho on November 05, 2011:You may be right about the HVAC hub. I will be working on my heat pump until the point that I have to deal with Freon. I just don't have the knowledge or tools for it, and I doubt that many do. I'm a little more fortunate in that everyone has a screwdriver and can change a switch or something with just a little help, and I can give it. Wesman Todd Shaw from Kaufman, Texas November 05, 2011:You've kind of reminded me here of a hub I'm going to write. I wrote one about the worst service call I ever went on. - yes, I have another installment for that. I've been disappointed in most of my hvac hubs – I've been determined that people aren't too interested in reading about it there – I think most people just hit the phone book, or call the people they already know when there's a problem! Dan Harmon (author) from Boise, Idaho on November 05, 2011:While I can enjoy the challenge of a service call (usually something has gone wrong somewhere and it's often not electric at all), not in housing. I'm not much of a rafter rat and don't enjoy crawling around crawling areas rats, snakes and spiders, either. No, give me a nice clean, warm commercial job. I'm going to put up with madness of customers. I once had a woman and her little girl sit down to rest on the elevator I was working from 20 feet above her head (she jumped up pretty quickly when the elevator moved a few inches) but it's better than the snakes. Wesman Todd Shaw from Kaufman, Texas on November 5, 2011:yes – it's my thoughts on wiring home, hanging lights, and sling plugs and switches – it's kind of mindless busy work that gets you some exercise in. Of course my dad and his two brothers and brother-in-law (and then – all their sons except me and my brother) – are pretty much all with Master's licenses. It my dad in the way they changed the laws here in Texas - making it easier to get that master's license. I like electrical troubleshooting in residential air conditioning – I'm not so talented at it that I can do much more than light commercial. I really like that stuff because you're constantly moving – and can end up going to five to ten different service calls on a good day. Dan Harmon (author) from Boise, Idaho on November 05, 2011:Really? I usually enjoy the work. However, I don't need to wire homes – all my work is either commercial or industrial and it's much more varied and interesting than residential work. Always something new and different, whereas once you've made a home you've pretty much done them all. Wesman Todd Shaw from Kaufman, Texas on November 05, 2011:I used to do that job. I hated it. My brother and ... are the only men in the Shaw family who are not electricians – half of the laws electricians too. My dad... like nothing better than drilling holes and pulling wire in a home built. I can't figure out why I dislike electrical work so much... when I actually enjoy running plumbing service calls. Dan Harmon (author) from Boise, Idaho on September 02, 2011:I my (very) limited in industrial maintenance the company has provided virtually all the tools. I would suggest saving up for when you graduate and get a job so you can, if necessary, buy the tools you need. It can vary considerably from company to company as actual maintenance could be very different. One can include installing a lot of new equipment with all new wire and wire while the next one may be full of high-tech electronics and requires a laptop as a primary instrument. Just a further thought of the field; if you are interested in one day owning your own business it will be very unlikely in the maintenance area. Construction and installation may well turn into a private company one day. Very risky (most small businesses fail) but it can be very rewarding as well. Good luck! Daniel on September 01, 2011:That's pretty much in line with what I've been thinking. Thanks again for the dialogue. I have a family and was already leaning towards manufacturing maintenance. What kind of tool do you think is crucial to someone who starts within it Dan Harmon (author) from Boise, Idaho on September 01, September, provided that your degree will put you in the field with tools in your hands and not behind a desk designing either a construction job or maintenance program. Given that, construction will put you everywhere and perhaps across the country. Every few months you will have a new job to work with very different challenges. You may well be unemployed part of the time while between jobs. Maintenance, even at a large plant, will soon be the same day after day. You will be more stable in both employment and location (I spent 20 years doing most of the electrical maintenance, including in one place). Pay per hour is probably better in construction, but maintenance probably won't see the joint layoffs. They are two very different areas, with very different advantages and disadvantages. Either one can offer advancement into the monitor and/or management. Both have individual challenges there. If you have a family maintenance may well be better because it is more stable, but the salary probably isn't as good. It's a hard choice. I've found I like construction much better, but getting laid off periodically hurts. Daniel on August 31, 2011:Thanks for the feedback. Im in technical school now. In 9months I will graduate with a degree in electrical maintenance and construction engineering. The way I see it, I have two possible paths. Construction / Installation and manufacturing maintenance. Which direction would you recommend? Dan Harmon (author) from Boise, Idaho on August 27, 2011:I is not familiar with that model. However, I must say that 12V just won't be enough. Although the drill is designed to produce high enough torque at low speed to drill large holes the battery simply won't last at low a voltage. I often drill 1+ holes in both wood and steel with my cordless set, and a 12V unit just won't be able to do it with any consistency. Although it could drill that size hole through a 2x4 or a panel, it won't drill that many and the drill probably won't last long either. On the other hand, it would probably do well if all you do is run screws. An impact driver with 18V will run many, many screws before you need to be charged and it doesn't overwork the driver at all even with large screws in 2 lumber – I don't understand why a lower voltage wouldn't work nearly as well. If this is what you do, check the impact drivers. I just added a link in the drill section of this hub to a hub on impact drivers – you might check it out. You can buy smaller drill bits to drill wood that will fit into the driver, and I've used a shovel a little up to around an inch with an impact driver, but wouldn't want to do it on a frequent basis.daniel on August 27, 2011:Wilderness are you familiar with the Milwaukee M 12compact line? Is 12 volts enough? Dan Harmon (writer) Boise, Idaho, September 20, 2010:It's always a question for the apprentice – just what to buy and what's necessary vs. what's nice to have. Thanks for for - Gold Coast Electricians september 19, 2010:Great review of the tools needed. Nice work! Dan Harmon (author) from Boise, Idaho on August 25, 2010:Thanks for the compliment. If you're interested, I've written several hubs on the use of handbinders, as well as one on non-contact voltage testers. SteveoMc from Pacific NorthWest on August 24, 2010:Great information, I'm pretty much a handiman and I was very interested in the tools... I love them and have most of the ones you talked about. Would even like some more information on how to use some of them. Well done! Dan Harmon (author) from Boise, Idaho on August 23, 2010:Sorry no award, but thanks for the comment. Yes, about the same time at HP – I hope you enjoy it as much as I am. Denise Handlon from North Carolina on August 23, 2010:Wow, this could have given you a hubnugget award (did it?) Very cool. You've been a member here about as long as I have... nice meeting up with you. :)

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