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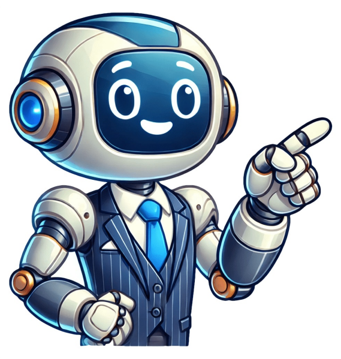

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OK you bought a tig welder, you bought a tig welding torch, and you got some tungsten electrodes. Now its time to get some Tig Welding Rods. Its kind of hard to find information on what tig welding rod to use for what metal. So I will give you some down and dirty advice on what rods you need to handle most anything. Disclaimer.... I am not an engineer or metallurgist.But I do have over 45 years of experience and I enjoy sharing what I have learned and resources that help with tig welding rod selection for certain jobs.Here is what I do... For Carbon Steels, and even 4130 chromoly, get some ER70S2 tig welding rod or ER70S6 E70s2 mild steel tig welding rod - use for welding 4130 chromoly tubing, all mild steel, and even cast steel. (tip....if you have a roll of bare mig wire like e70s3 or e70s6, it will work great in a pinch...just snip some off and straighten...or better yet if its too small, double it up and chuck it up in a cordless drill and twist it tight so you wont have to feed so much wire) Dont use coat hanger wire and dont use gas welding rods. both will cause porosity and give you problems.Since gas welding rods like RG45 are often copper coated and look almost the same as tig rods, I have seen numerous situations where a welder was troubleshooting gas connections and changing cup size, where the only problem was using rg45 gas welding rods.Its always a good idea to look for an ID stamp or look at the package the rods came in to make sure you have er70s-2 or 6 rather than rg45 or rg65 gas welding rods. (they dont have proper deoxidizers for tig welding)ER70S-2 is cheap anyway. so why skimpER70S-6 is an alternative to ER70S-2 and flows better in certain applications due to higher silicon content For Stainless Steels, the most commonly welded stainless is 304L and its welded using er308L Chart for Selecting Stainless Steel filler rod ER308L tig welding rod ER308L stainless tig rod - when you know that you are welding 300 series stainless steel, (304 is the most common 300 series stainless used), you cant go wrong with er308L rods. there are a lot of other stainless steel filler rods, like 316L, 321 and others and if you know what you are welding, its best to use a match. ER308L is also one of the best rods for free machining 303 stainless. Hastelloy W tig welding rod (the W doesnt stand for "wonder rod" but maybe it Should! Hastelloy W - this is all I need for welding steels that I am not sure of and a whole bunch of other stuff like... stainless steel of unknown grade to carbon steel? use Hast W Tool steel welded to Stellite? use Hast W. get the picture? When you know it is some type of steel, but you are not completely sure exactly what grade of steel...., Hastelloy W covers a multitude of sins. CYA note: if it is a critical weld, you need to know what kind of steel you are welding update.....since I originally posted this page hastelloy W has gone way up in price. 2 other really good all purpose rods for welding most stainless to most carbon steel are ER309 and er312.309 filler rod is also a great rod to use for when you know its steel but not sure exactly what grade.IF you take at look at this stainless filler metal chart, you will see 309 recommended a whole bunch for joining different stainless alloys.***for critical work, you really need to determine the metal type and weld with the correct filler metal Aluminum Tig Welding Rods There is a really good chart for selecting aluminum filler rods here 4043 aluminum tig rod - the most versatile for 3003, 6061, a355 aluminum castings etc. and do yourself a favor and get some 4047 aluminum filler rod for castings where porosity rares its ugly head. 4047 aluminum filler rod contains 12% silicon. That makes it flow better, with less porosity. use 5356 for 6061 aluminum when the weld will be anodized after weldingThere is a really good chart for selecting aluminum filler rods here Tig Welding Rods for Dissimilar metals and more - ER309 er309L stainless - when mild steel is just too dirty and you need to tig it. 309 stainless will weld hot rolled steel without porosity. This is not for critical welds that will kill somebody if the weld fails...but it works. 309 stainless is used routinely for making critical welds in the power generation industry. It is designed for welding stainless steel to carbon steel. Common sense would dictate that if that is the case , the resulting welds would be of a different chemistry on the carbon side of the weld than on the stainless side. Still, they hold up for years even under stress and thermal cycles... So a bracket on your car should be no problem. ER312 Stainless TIG rod and SuperMissile Weld ER312 stainless TIG welding rod is a very crack resistant versatile rod for dissimilar metals as well as crack prone welding tasks Tig Welding Rods for pot metal Alladin 3 in 1 for tig welding pot metal jobs. and remember, when you are welding pot metal and things start to flow good, its about to go south. so when things start to flow really good...its probably time to STOP and let cool. Cast Iron Tig rod Chronatron makes some pretty good nickel tig rod for welding cast iron.No tig welding rod works every time because cast iron comes it different grades and is kind of a crap shoot when it comes to making a weld repair.But I found a tig welding rod that has given me really good results. Its aluminum bronze ERCuAl-A2 for tig brazing cast iron repair jobs using A/C....What??? don't laugh it works great. Short and free Tig Welding videos - Welding Stainless, Aluminum, Steel, and more Case Study and Video of Gas Tungsten Arc Welding GTAW Tungsten Electrodes - thoriated vs ceriated vs lanthanated vs pure vs zirconiated Here's a tip for Tig welding Stainless steel to any other steel Enjoy this page? Please pay it forward. Here's how...Would you prefer to share this page with others by linking to it?Click on the HTML link code below.Copy and paste it, adding a note of your own, into your blog, a Web page, forums, a blog comment, your Facebook account, or anywhere that someone would find this page valuable. var l = window.location.href, d = document; document.write(''+d.title+''); TIG (tungsten inert gas) welding is a popular and versatile form of arc welding that creates strong, reliable bonds between two pieces of metal.When it comes to TIG welding, your choice of filler rod can significantly impact the quality of your final weld.To ensure you get the best results when performing TIG welding, it's important to select the right type and size filler rod for the job.In this guide, we'll explore each aspect that goes into proper TIG welding filler rod selection from material types and sizes to strength charts so you have everything you need to make an informed decision about what will work best for your project!TIG welding filler rods are essential for precise and clean welds. To pick the right size, you must think about the material, joint design, and thickness. It's important to match the rod material to the base metal. For example, using stainless steel filler on mild steel can contaminate and weaken the weld.Recently, a welder used the wrong filler rod size and caused problems with the finished product. This shows how important it is to choose and use TIG welding filler rods correctly. Selecting the right filler rod size is like trying to pick a perfect avocado – one bad choice and you could be in trouble.To choose the right filler rod size for TIG welding, you need to consider certain variables. These variables include welding material thickness, base metal composition, joint configuration, and welding position. In this section on "Variables Affecting Filler Rod Selection Size," we'll explore these sub-sections to help you make the right selection for your next TIG welding project.When welding, material thickness is important. It affects weldability, strength, and looks. This difference needs the right filler rod. A table shows how the diameter of the rod changes with the thickness:Weld Material ThicknessFiller Rod Diameter1/8″1/8″ – 5/32″3/16″3/16″ – 7/32″1/4″1/4″ – 5/16″3/8″3/8″ – 7/16″A good filler rod ensures welding is done efficiently. It leads to a quality weld and reduces errors. Joint geometry and base metal composition also play roles. In conclusion, thick materials need bigger rods for strong welds. Choose wisely! Otherwise, your weld will be sad.The makeup of the base metal is a critical factor when choosing a filler rod. Different metals and alloys require specific filler rods to guarantee the best results. See the table below for examples.Metal/AlloyFiller RodAluminumAluminum alloy ER4043 or ER5356 filler rodSteelER70S-3, ER70S-4, or ER70S-6 filler rodStainless SteelER308, ER309, or ER316 filler rodMoreover, you should also consider the thickness of the base metal. This affects the heat input and deposition rate. Additionally, the welding position requires distinct filler rods with diverse composition characteristics.Pro Tip: Test the material to be welded with chemical analysis or magnetic particle testing before deciding on the compatible filler rod. Why go for a weak joint when you can make it stronger than your morning coffee?Joint Type Selection:When choosing a welding joint type, it's key to take into account various factors that can affect the filler rod size. Common joint types are: butt, lap, tee and corner joints.Check out this table for an in-depth look at each joint type's characteristics and the recommended filler rod size.Joint TypeCharacteristicsRecommended Filler Rod SizeButt JointTwo metal parts flatly joined end-to-end.Like base metal thickness (1:1 ratio)Lap JointTwo pieces of metal overlapping, making a T-joint.Slightly thicker than base metal thickness (1:1.5 ratio)Corner JointTwo pieces joining perpendicularly.Recommended Filler Rod Size: Depends on MaterialsNo matter which joint type, understanding how to pick the right filler rod size is essential for a good weld.From my experience as a welder, I once made the mistake of not picking the right filler rod size and ended up having to redo the entire job. After that, I always made sure to assess all the factors before deciding on a size.If welding has you feeling 'blue', remember, it's all about perspective (and a steady hand).The welding position is key for the welding process. It decides the type and size of the filler rod. Check out the table below!Welding PositionFiller Rod SizeFlat1/8 inchHorizontal3/32 inchVertical1/8 inchOverhead1/8 inchFlat and horizontal positions need smaller filler rods than vertical and overhead positions. This is because the weld angle changes depending on the position, affecting the weld quality.Welding Tips and Tricks declare, "Different welding positions require different filler rod sizes for better penetration and weld quality."In conclusion, the welding position must be taken into account when selecting a filler rod size. The size should be determined by the angle during the welding process. Why not choose the perfect size and wow all the other welders?To select the appropriate diameter of filler rods for your TIG welding needs, you must consider the type of material being welded and the level of precision required. Choosing the Right Diameter and Common Filler Rod Sizes are the key sub-sections that provide a solution to this.Each sub-section will give you important insights that will help you determine the ideal filler rod diameter for your TIG welding project.Choosing the right filler rod diameter for welding is key. It's important to look at things like base metal thickness, joint type, and weld position. The filler metal should also be compatible with the base material and weld conditions for good results.Check out the table below for guidelines on common welding applications. It lists suggested filler rod diameters in mm for different metals and configurations.Welding ApplicationBase Metal Thickness(s)Joint TypeFiller Rod Diameter (mm)Sheet MetalUp to 3 mmButt & Lap Joints0.8 – 1.0T-Joint1.6Light FabricationUp to 12 mmButt Joint1.6Lap or Corner Joint2.0 – 2.4Heavy FabricationOver 12 mmButt Joint3.2Fillet Weld4.0Going too big or too small can have an effect on weld strength and quality. Technique and amperage settings can also influence the choice of filler rod. When in doubt, seek professional help.The American Welding Society conducted a study and found that using undersized rods needed lower welding currents, but resulted in weaker welds than the correctly sized rods.Be sure to pick the right diameter of filler rod when you weld. It can make a real difference in the durability and strength of the finished product. Don't settle for ordinary – go big and make something unique!Filler rods are essential for welding projects. Here are some of the most used sizes and their applications:See the table below:Filler Rod SizeApplication1/16″Thin sheets3/32″Medium-thick sheets1/8″Thick sheets, pipes, and plates5/32″Heavy-duty projectsIt is important to know that there are many other sizes. However, these four are the most commonly used.When selecting a size, consider the material thickness, amps required for welding and joint design. A wrong diameter can cause incorrect weld bead shape or cracking.Pro Tip: Always use filler rods that match or exceed the base materials' strength capabilities. Doing so will lead to success.To ensure successful filler rod selection and usage with TIG welding, you need to follow simple tips like preheating base material, maintaining proper tungsten electrode size, avoiding overheating and ensuring proper storage and handling. In this section, we will introduce you to these sub-sections, providing a brief overview of the essential aspects of each.Achieving Perfect Temperature for Base MaterialGetting the base material to an ideal temperature is key for selecting and using the right filler rod. It should be warm enough to prevent condensation, but not too hot to cause warping. Here's a 6-step guide for this:Preheat the material to the recommended temp.Measure with a thermometer.Reheat with a heat gun or propane torch if it cools down.Monitor and adjust the temp while welding.When done, cool down gradually.Test samples to verify weld performance.Note that the optimal temp may differ depending on the type of material used. So, check the manufacturers' instructions before starting any welding project.Keep the heat and cool down times balanced, to avoid cracking and distortion. This way, you'll get longer-lasting welds and ensure the work meets industry standards.Back in World War Two, welders were essential for making military machines like airplanes and tanks. Filler rods had to be carefully chosen, as military hardware needed strong welding to survive harsh combat conditions.Size matters when it comes to tungsten electrodes.Maintaining the Optimum Size of Tungsten ElectrodesSelecting the right size of tungsten electrode is key for welding project quality and productivity. Here are 4 steps to help you:Step 1: Determine the correct diameter based on base metal thickness.Step 2: Use a grinder or sandpaper to sharpen the electrode with one point.Step 3: Use a taper gauge for distance between tip and workpiece.Step 4: Keep the electrode free of oil, dirt, or grease.Temperature changes can affect diameter. Safety gear like gloves and goggles should be considered.To avoid complications during welding, understand how conditions can affect optimal tungsten electrode size. Taking precautions early on avoids added stressors.History shows mistakes in maintaining tungsten electrode sizes have caused disasters. For example, an incomplete penetrator accident due to inadequate size. This emphasizes the need for accurate tools and better care.Remember, overheating your filler rod will ruin the end result.When selecting and using filler rods, it's important to consider the metal's melting point and composition. High heat input can cause warping, cracking, or bad weld quality. Use a filler rod with a lower melting point than the parent metal, and with similar composition.To avoid overheating, use welding techniques like pulse welding or lowering amperage. Preheating the metal beforehand may help. Also, bear in mind that thicker metal needs more filler rod and longer welding time.This is why choosing the right filler rod size is so crucial! A welding professional once had a bad experience with inadequate filler rod compatibility and failed welds, which only emphasizes the importance of proper selection. So, handle your rods properly – you don't want to be 'filling up' more than just the welding joints!Filler rods must be stored carefully for them to work properly. Here're 5 tips for proper storage and handling:Dryness and moisture-proof containers are a must to avoid rusting.Don't overload the storage area to keep the rods from getting damaged.Heat and flames must be kept far away from the rods to avert bending, warping, or weakening.Label each container with details of its contents, manufacturing date, and expiry date.Clean out contaminants before reusing old oil cans.Also, take into account the ambient temperature for successful storage. Poor storage could ruin welds. A contractor used old filler rods exposed to moisture, leading to shoddy alignments and surface fractures in only two days. Get the wrong size rod and you'll end up with a disaster!Picking the right filler rod size is key when it comes to TIG welding. This helps keep the weld pool strong, makes it easy to work with and increases the lifespan of the final product.The table below shows the commonly used rod sizes for different base metal thicknesses.Base Metal ThicknessFiller Rod Size0.5mm to 3mm1.6mm3mm to 6mm2.4mm6mm upwards3.2mmIt's worth noting that these are only suggestions and the size may differ depending on the situation. Things like joint design, base metal type and welding position all play a role in picking the optimal size.Furthermore, using a high-quality rod is essential as low-quality rods can cause defects in the end product.To get the best results, it's best to ask an expert or read the manufacturer's guidelines to select the correct filler rod size for each use case. When welding different metals, it's suggested to choose a larger diameter rod than what the thickness would suggest, as this compensates for the differences in thermal conductivity.Overall, accurately selecting the right filler rod size is essential for achieving high-quality TIG welds and making sure the finished product is durable.TIG welding filler rod selection size is the process of choosing the right diameter of filler rod to use for your TIG welding job.The correct size of filler rod to use for your TIG welding job depends on several variables including the thickness of the metal being welded, the type of metal, and the welding position. Generally, a filler rod diameter of 1/16 inch to 1/8 inch is commonly used for TIG welding.Yes, it is recommended to have different sizes of filler rods on hand for different welding jobs. This ensures that you have the right size of filler rod for the specific welding job you are performing.Yes, using the wrong size of filler rod can affect the quality of your TIG welding. Using a filler rod that is too thick or too thin can result in weld bead inconsistencies, poor penetration and weld strength.ER70S-2 and ER70S-6 are two commonly used filler rods for TIG welding. ER70S-2 is used for welding on a metal that has a higher tensile strength than ER70S-6. ER70S-6 is used for welding on a metal that has a lower tensile strength than ER70S-2.No, it is not recommended to reuse TIG welding filler rods. Reusing filler rods can result in impurities in the weld and decrease the strength of your weld.Paul Dixon Welding involves the use of extremely high temperatures to fuse two metal workpieces together. Most metals melt when exposed to such high heat. However, tungsten has an impressively high melting point, coming in at over 3,400°C. This makes it an excellent substitute for the consumable metal electrodes typically used in metal inert gas welding, and has given rise to the practice of tungsten inert gas or TIG welding. In TIG welding, however, you need to use a separate rod that supplies the filler metal to the weld pool. Before you buy TIG welding rods, you need to know how to choose the right options for your specific TIG welding project. Using the wrong kind of TIG welding rods can lead to poor quality welds, and may even compromise the strength of the joint. So, if you want to learn how to pick the right welding supplies, check out this comprehensive guide on choosing the right TIG welding rods for your project. 4 Tips to Help You Choose the Right Type of TIG Welding Rod Finding suitable TIG welding rods for your weld job is fairly easy if you know what you are looking for. However, if you are a beginner, you may be a bit clueless about where to get started. The summary is that the material and the size of the TIG welding rods matter the most. Once you learn how to check and identify TIG rods of the right material and size, you can get better at choosing suitable welding supplies for your needs. Here are some essential tips to help you understand what to look for. The base metals you are going to be working with play a crucial role in TIG welding rod selection. Basically, the material used to make the TIG filler rod you choose should be compatible with the metal workpieces you intend to join. Given the wide variety of materials in which TIG welding rods are available, it should be fairly easy to find a suitable rod no matter what base metals you are working with. Some common TIG welding rod materials include steel, stainless steel, aluminum, titanium and even cast iron. Generally, it is advisable to use a TIG rod made of the same material as the base metal workpieces. For example, if you are planning to join two or more pieces of aluminum, an aluminum TIG welding rod would be the ideal choice for your weld job. Choosing the right TIG welding rod material is only the first step of the process. Next comes the question selecting the right variant of the rod. Even within each category of rods of a certain material, the composition of the metals and alloys may vary, leading to several variants. Take a look at some common variants of different types of TIG rods below. Variants of Steel TIG rods: ER70S-6 used to weld mild steel ER80SD-2 that is suitable for single and multi-pass welding ER70S-2 for high X-ray quality welds Variants of Stainless Steel TIG rods: ER308 and ER308L for commonly welding stainless steel ER309 and ER309L with higher heat and corrosion resistance, suitable for welding dissimilar base metals ER316 and ER316L used in welding chemical and marine equipment Variants of Aluminum TIG rods: ER4043 used in joining weldable wrought or cast aluminum alloys ER5356 used to weld 5xxx series aluminum alloys ER4047 with higher silicon content, suitable for use at lower temperatures As you can see, there are different kinds of TIG rods even within the same material category. So, the next important step is to identify which kind of rod best aligns with the application you want to use it for. Once you have determined the overall material as well as the specific variant of the TIG welding rods required, you need to focus on the size of the rod. This includes the length as well as the diameter of the welding consumables. The length requirement can typically be easily met. What you'll want to pay particular attention to is the diameter. TIG welding rods are available in different standard diameters. Common options include the following sizes: 1.6 millimeters 2.4 millimeters 3.2 millimeters 4.0 millimeters 4.8 millimeters 6.4 millimeters You can choose the TIG rod that is suitable for the thickness of the metal workpieces you wish to weld. The size and length of the filler TIG welding rods will also depend on the type of joint, namely a butt or a fillet weld. If the two metal surfaces are to be joined on the same plane, it's called a butt weld. On the other hand, if the workpieces are to be joined at a 90° angle, it's a perpendicular fillet weld. Lastly, it's also important to pay attention to the quality of the TIG welding rods you purchase. To avoid any issues due to poor quality, always opt for a brand that you trust. In case you are unable to source the materials from a trusted brand, you may have to source the filler rods locally. Should such a situation arise, make sure you pay attention to the design and build of the rods, check for signs or rust or damage, and inspect the rods thoroughly before you purchase them. Conclusion The pointers outlined above can help you identify which TIG welding rods can contribute the most to your welding job. Take into account all the parameters discussed in this guide before you zero in on the TIG welding rods to use for a particular weld. With time, you will be able to identify the right welding rods for your TIG welding more quickly and naturally. But if you are a beginner, you can use a checklist to make sure you've factored in all the important parameters. buy TIG welding rods, TIG Welding Rods Two of the setup variables you must get right when TIG welding involves the choice of filler material and the tungsten electrode in your torch. Both topics are substantial, so let's focus on the filler material first (tungsten electrodes are covered here). With TIG welding, you feed the puddle with filler material using a handheld rod. But these "rods" come in different sizes and compositions. Knowing which filler rod to use, and when, makes your welds strong and aesthetically pleasing. But with thousands of products on the market, even experienced welders struggle at times to find the right filler rod. So, for your quick reference, below I have compiled answers to the most common questions and guidelines to finding the right filler rod. Do I Need a Filler Rod? Yes, you probably do need a filler rod. But you can fusion weld with a TIG welder without a filler rod. But it is limited to welds where: The butt joint between the two pieces of metal has no gaps. The base metal is on the thicker side (e.g., 1/8 inch or thicker). You need more heat to fuse the metal (which risks burn-throughs). Strength is not important (fusion welds are weaker and are typically only used to tack pieces together). This list also highlights the reasons that the majority of TIG welds incorporate a filler rod. Filler Rod Basics This filler material is a metal alloy specifically designed to withstand the high heat of welds and to fuse the two pieces of stock together as a composite. So, not surprisingly, the alloy and size of filler rods vary for the varying stock thicknesses and types of base metals people weld. TIG filler rods typically come in 3-foot lengths, packed in 10 or 50-pound boxes (or tubes). The diameter usually ranges from 1/16 to 1/4 inch. The filler rods are also made with several alloys to handle different metals. Since the TIG filler rod composition needed is often the same as that used for MIG filler material, some of the MIG wires are also sold for TIG welding. These are identified as "TIG cut lengths." Choosing a Filler Rod Unfortunately, there is no definitive answer for the filler rod you "must" use for a weld. However, the weld you need to make defines certain parameters. This criterion can then be used to follow certain guidelines. Also, manufacturers usually have detailed charts to help select a filler rod. In general, the important parameters include the base metal thickness, its composition, and the type of weld joint (butt vs. fillet). Using this criterion, you can use certain guidelines to zero in on the filler rod alloys and diameters you might want to use. Filler Rod Alloys ("Composition") The American Welding Society ("AWS") has categorized the various alloys and assigned special AWS "ER" numbers to more easily identify them. Each number represents a "recipe" of chemical additives in the filler metal to address specific base metals and weld conditions. The number of alloys available can be overwhelming. Below you can find some simple guidelines to help you zero in on some common compositions of the filler rod. Also, manufacturers often have charts you can consult to find their best product for a given weld. Steel ER70S-2, ER70S-6, and several other ER70S-series options with different digits at the end to address specific conditions of the metal (e.g., dirty or clean) or the type of joint being welded. ER70S-6 is generally used for mild steel welding. Stainless Steel ER308 & ER308L: One of the most common welding rods. It's the choice for TIG welding 304 stainless steel, which is widely used in manufacturing. In addition, this filler rod alloy is used with 200-series and other 300-series stainless steels. ER309 & ER309L: Used for welding dissimilar metals. It can handle higher heat and has good corrosion resistance. ER316 & ER316L: Commonly used for pressure vessels, valves, chemical equipment, and marine applications. (The "L" refers to extra low carbon in the rod, less than 0.08%, which adds corrosion resistance.) The numbers above are some of the more popular, but the roster of stainless steel base metals manufactured today is vast. Also read: Can you weld stainless steel? Aluminum ER4043: is a good general filler material for most aluminum applications. However, welding of 2xxx and 7xxx series aluminum is generally not recommended. ER5356: is used for 5xxx series aluminum and is generally preferred if the finished piece will be anodized. Chrome Moly Tubing ER70S-2: is highly recommended for welding 4130 chrome-moly tubing in many applications. ER80S-D2: is recommended for welding 4130 chrome-moly tubing if a higher strength, less ductile weld is required. If your weld will be heat treated to obtain optimum strength, then use a filler metal that matches the chemistry of your tubing. Neither the 70S-2 nor 80S-D2 rods work in this instance. Titanium When welding titanium, you generally want to match the filler rod alloy to the base metal. Below are some of the common alloys you may run into: ERTi-2 – best for use with grade 2 titanium. ERTi-3 – best for use with grade 3 titanium. ERTi-5 – best for use with grade 5 titanium. ERTi-7 – same mechanical properties as ErTi-2 except with the addition of 0.12% palladium which imparts better corrosion resistance. Protects against crevice or under-deposit corrosion when ErTi-2 type Titanium wire is insufficient. ERTi-7 can be considered for welding Grade 2 or Grade 16. ERTi-9 and ERTi-9ELI – best for use with grade 9 titanium. ERTi-23 – best for use with grade 23 titanium. Filler Rod Diameter The thickness of the stock you TIG weld will suggest a filler rod diameter. There are all kinds of opinions on the right filler rod diameter. Below I have assembled some guidelines to help you cut through the static. In general, use a filler rod with a diameter less than the thickness of the metal being welded. With a base metal thickness under 1/8 inch, the rod diameter should be slightly thinner than the metal being welded. For stainless sheet metal, use one size lower than you would use for carbon steel. This helps because you typically use less amperage on stainless steel thin stock, compared to carbon steel. At low amperage, a large rod chills the puddle and can cause an irregular bead. For aluminum, the same rules that you would use for steel sheet metal apply. In my experience, 1/16″ (1.6mm) wire can be used for sheet aluminum as thin as 0.040 inches. For thicker aluminum, sometimes the rod balls before it even reaches the puddle. If that happens, try a tighter arc and less torch angle. If that does not work, go up one size with your filler rod. Also, there are numerous "calculators" online you can use. They vary a little from one to another, but in general, they follow these guidelines in the table below for mild steel: Metal Thickness (inches) Filler Rod Diameter (inches) 1/16 0.045 or 1/16 3/32 1/16 or 3/32 1/8 1/16 or 3/32 3/16 1/8 1/4 3/16 1/2 1/4 Joint Type Whether you are welding a butt or fillet joint may impact your TIG weld. You will usually need more amps (i.e., heat) when welding a fillet joint. Additional Considerations Only use bare, uncoated rods designated for TIG welding. Never use electrodes made for shielded metal arc welding ("SMAW") stick welding. Filler Rod Size & TIG Welder Settings Assuming you have identified the right alloy for the base metal you want to weld, not only do you need to get the right diameter rod, you will need to "dial-in" your welder settings. The amperage, gas flow, torch travel speed, and cup size vary, too. The following guidelines provide you with good starting points for the filler rod diameter and welder settings. But keep in mind you may need to tweak these settings depending on your welder and welding technique. Check out these TIG tips and tricks if you're struggling to with your TIG welds. 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Tungsten Inert Gas (TIG) welding, also known as Gas Tungsten Arc Welding (GTAW), is a process that involves using a non-consumable tungsten electrode to produce the weld. The TIG filler rods are a critical component in this process. They are used to fill the weld joint with additional metal, providing strength and durability to the welded structure. The choice of TIG filler rod significantly impacts the quality of the weld, its properties, and its suitability for the specific application.Selecting the right filler rod is influenced by various factors. Primarily, the base metal or metals being welded dictate the choice of filler rod. The filler metal should be compatible with the base metal's properties, ensuring a strong and reliable weld. Other factors that might influence the choice of filler rod include the welding position (e.g., flat, horizontal, vertical, or overhead), the welding procedure, and the desired properties of the finished weld, such as corrosion resistance, ductility, and tensile strength.Huge Savings on TIG Filler Rods! We offer a comprehensive selection of TIG welding filler rods designed for a wide range of applications and industries. The table below shows a comprehensive overview of TIG filler rods and their common applications:TIG Filler RodCommon ApplicationsHigh Strength SteelStructural components, heavy machinerySuper Duplex Stainless SteelOffshore structures, chemical processingHard FacingWear-resistant overlays, mining equipmentAluminiumAerospace components, automotive partsMagnesiumAircraft and automotive componentsMild SteelGeneral fabrication, constructionStainless SteelFood processing equipment, architectural featuresBrazing/Bronze WeldingJoining dissimilar metals, plumbing applicationsCopper/Copper-NickelHeat exchangers, marine applicationsDissimilar SteelsJoining different steel grades, repair workDuplex Stainless SteelPulp and paper industry, water treatmentNickel AlloyPetrochemical plants, power generationTitaniumMedical implants, aerospace componentsUnderstanding the roles and importance of TIG filler rods is crucial for anyone involved in TIG welding. As we move forward in this guide, we will discuss different types of TIG filler rods, their characteristics, and their suitable applications, providing valuable information for both novice and experienced welders.TIG filler rods for high strength steel are an essential component for any welder working with this durable material. High strength steel is often utilized in applications where strength and durability are paramount, such as in the construction, automotive, and shipbuilding industries.Characteristics of these filler rods are typically defined by their superior tensile strength and toughness, making them ideal for welding high strength steel structures. Moreover, these filler rods are designed to deliver a weld metal capable of achieving high impact toughness at low temperatures, which is often a requirement for high strength steel applications.The selection of the appropriate TIG filler rod for high strength steel depends on various factors. These include the type of steel, the specific application, and the desired properties of the completed weld. Factors such as the steel's yield strength, its chemical composition, and the welding position can also influence the selection of the appropriate filler rod.When it comes to welding with TIG filler rods for high strength steel, there are several tips that can ensure a successful outcome. First, it is crucial to ensure that the steel surface is clean and free from contaminants, such as rust, oil, or paint, before starting the welding process. Second, preheating the steel can be beneficial in reducing the risk of cracking in the weld and the heat-affected zone. Finally, it's important to remember that the cooling rate can impact the properties of the weld, so controlling the rate of cooling post-welding might be necessary in some instances.TIG filler rods for super duplex stainless steel have unique features that make them ideal for welding this particular type of steel. Super duplex stainless steel is known for its superior strength and excellent corrosion resistance, particularly in environments with high chloride levels. It also has good resistance to stress corrosion cracking, pitting, and crevice corrosion.When selecting a filler rod for super duplex stainless steel, it's crucial to opt for one that matches the base material's chemical composition. This can ensure a weld deposit that provides equivalent properties in terms of strength, corrosion resistance, and durability. Often, these filler rods are over-alloyed with higher percentages of nickel, chromium, and molybdenum to maintain the favorable properties of the super duplex stainless steel after welding.In terms of use, TIG welding with super duplex filler rods requires a high level of skill and control. Since super duplex stainless steel has a higher thermal expansion rate and lower thermal conductivity compared to austenitic stainless steel, careful control of heat input is crucial. This can help prevent detrimental effects such as loss of corrosion resistance, changes in the microstructure, and distortion. Furthermore, it's crucial to clean the workpiece before welding to remove any contaminants that could compromise the weld quality.TIG filler rods for super duplex stainless steel play an integral role in welding this high-performance material. Understanding their properties, appropriate selection, and proper welding techniques can ensure a high-quality, durable weld that leverages the full potential of super duplex stainless steel.Hard facing refers to the process of adding a layer of wear-resistant material to the surface of a metal component to increase its lifespan by reducing wear and tear. TIG filler rods for hard facing have specific characteristics that make them suitable for this purpose.The choice of TIG filler rods for hard facing is often driven by the wear conditions the finished piece will be exposed to, such as high temperature, abrasion, impact, or a combination of these. They are typically made of complex carbides in a matrix, with different types designed to withstand different kinds of wear.The selection and use of these rods require a thorough understanding of the base metal and the expected wear conditions. Some common considerations when choosing a rod include the hardness of the overlay, the toughness required, and the potential for cracking. These rods are often used in industries like mining, agriculture, or any other industry where equipment is exposed to severe wear conditions.When welding with TIG filler rods for hard facing, it is crucial to maintain the appropriate temperature and travel speed. Because hardfacing materials tend to be more brittle than the base metal, they can be susceptible to cracking if cooled too quickly. It's also important to take into account the number of layers required; in some instances, two layers of hardfacing material may provide longer wear life than a single layer.TIG filler rods for hard facing play a crucial role in extending the life of metal parts exposed to harsh wear conditions. Understanding the properties of these rods, and how to properly use them, can significantly enhance the performance and longevity of the finished piece.Aluminium, known for its lightweight and high thermal conductivity, is a common material in various industries such as automotive, aerospace, and construction. TIG filler rods for aluminium play a crucial role in joining and repairing aluminium structures.These rods possess key properties that align with aluminium's distinct characteristics. They typically exhibit a lower melting point compared to steel rods, ensuring compatibility with the base aluminium's melting behaviour. The rods also demonstrate excellent corrosion resistance, mirroring one of aluminium's renowned properties.The application areas for these filler rods are vast, considering the extensive use of aluminium in manufacturing. From engine parts and aircraft structures to aluminium frames and structures in construction, these filler rods are fundamental in creating sturdy, reliable joints.When it comes to best practices for welding, it's important to remember that aluminium requires a clean surface to ensure a successful weld. Hence, any oxide layer should be removed before welding. Additionally, preheating the aluminium can be beneficial, especially for thicker pieces, to prevent cracking. The choice of the specific type of aluminium TIG filler rod, whether a 4043 or a 5356 alloy, for instance, should depend on the specific application, the desired mechanical properties, and the base aluminium alloy being welded.TIG filler rods for aluminium are invaluable tools in the welding world, particularly considering the ubiquitous use of aluminium. Understanding their properties, applications, and best practices for use can significantly improve the quality of the welding process and its resultant output.TIG filler rods for magnesium possess a set of unique characteristics that make them particularly well-suited to welding this lightweight, yet robust metal. The filler rods share the intrinsic properties of magnesium, including its strength-to-weight ratio and its excellent machinability, among other attributes. When using these filler rods, welders can achieve seamless, high-quality welds that retain the integrity and beneficial characteristics of magnesium.These filler rods have applications in various sectors where the use of magnesium is prevalent. For example, in the aerospace and automotive industries, magnesium is favored for its lightweight nature, which significantly contributes to fuel efficiency without compromising strength. Similarly, it's used in the manufacturing of electronic devices and sports equipment due to its weight and durability.When it comes to welding magnesium with TIG filler rods, certain practices can help optimize results. For instance, thorough pre-cleaning of the base metal is crucial, as magnesium is highly reactive and can form an oxide layer that hinders proper fusion. Using a brush made of stainless steel to clean the area to be welded can effectively remove this oxide layer. Another tip is to ensure the appropriate shielding gas—typically argon—is used. Additionally, it's recommended to keep the welding heat as low as possible to prevent warping and distortion, given that magnesium has a lower melting point compared to many other metals.TIG filler rods for magnesium allow welders to effectively join magnesium parts, leveraging the metal's beneficial properties. By following best welding practices, these filler rods can be used to create high-quality, durable welds for a wide range of applications.When it comes to welding mild steel, which is one of the most commonly used materials in various industries, TIG filler rods designed specifically for this purpose are essential. These rods possess specific features that make them well-suited for working with mild steel. The characteristics of these filler rods typically include a high level of tensile strength and excellent ductility, enabling them to form a strong, durable bond with the mild steel base metal.Mild steel TIG filler rods find applications across a wide range of industries, including automotive, construction, and general fabrication. They're perfect for tasks that require the joining of mild steel components or for repair and maintenance work on mild steel structures. These rods can also be used effectively for sheet metal work due to their versatility.The use of these rods requires a clear understanding of welding guidelines to ensure the desired results. For instance, it's crucial to match the filler rod's diameter with the thickness of the mild steel base metal being welded. Moreover, the rods should be kept clean and dry to prevent contamination that could weaken the weld. It's also necessary to adopt the right welding technique, with the preferred method for TIG welding being the 'dip and dab' technique, where the rod is dipped into the weld pool and then withdrawn to allow for cooling.The choice of TIG filler rod can significantly influence the quality of a mild steel weld. By understanding the specific properties of these rods and following the recommended welding guidelines, welders can ensure the durability and strength of their mild steel welding projects.Stainless steel is an alloy renowned for its corrosion resistance, strength, and wide range of applications, making it a common material in many welding projects. The selection of TIG filler rods for stainless steel requires a clear understanding of the unique properties and types of stainless steel.Stainless steel TIG filler rods typically share the same corrosion resistance, ductility, and toughness as the base metal. They come in various grades, each designed for specific types of stainless steel. For instance, 308L rods are often used for 304 stainless steel, while 316L rods are compatible with 316 stainless steel. The choice of rod depends on the type of stainless steel being welded and the desired characteristics of the weld.The use cases for stainless steel TIG filler rods span various industries, including food service, healthcare, and construction. They are commonly employed in situations requiring high corrosion resistance, such as in the production of kitchen utensils, hospital equipment, and outdoor structures.Welding stainless steel presents unique challenges due to its lower thermal conductivity and higher coefficient of thermal expansion compared to carbon steel. Therefore, when welding with stainless steel TIG filler rods, it's essential to control the heat input carefully to prevent warping or distortion. Using a backing gas is also recommended to ensure the back of the weld is protected from oxidation.TIG filler rods for stainless steel play a crucial role in many welding applications. Understanding their properties and the specific use cases they're designed for is key to producing high-quality, durable welds. Always remember to follow appropriate welding practices to ensure the integrity and longevity of your welds.TIG filler rods used for brazing or bronze welding possess a unique set of characteristics and applications. They are typically comprised of copper and zinc alloys and are used primarily for brazing or bronze welding tasks. These rods provide excellent fluidity, solidification strength, and are distinguished by their superior anti-corrosion properties. They can be used in a wide range of applications, including the repair of cast iron components, sheet metal fabrication, and when working with dissimilar metals.The selection criteria for these filler rods largely depend on the specific requirements of the task at hand. This might include factors such as the base metals being joined, the joint design, and the desired strength and appearance of the final weld. It's worth noting that proper cleaning and preparation of the base material are crucial steps when using these rods, as this can significantly impact the quality of the resultant weld.When it comes to welding with TIG filler rods for brazing or bronze welding, there are a few best practices to keep in mind. Firstly, the welding process should be carried out at a lower temperature compared to traditional welding. This is because brazing involves melting the filler metal to a liquid state and allowing it to flow into the joint via capillary action. Moreover, proper control of the heat input is essential to prevent overheating and to ensure an even and strong weld. Lastly, post-weld cleaning is a necessary step to remove any residual flux and to inspect the weld for any defects.TIG filler rods for brazing or bronze welding provide a versatile solution for joining a variety of base metals. By understanding their characteristics and following the correct welding procedures, one can achieve effective and high-quality welds with these specialized filler rods.TIG filler rods designed for copper and copper-nickel alloys hold unique properties that make them suitable for specific welding applications. These filler rods are often used to weld copper and its alloys due to their ability to create strong, high-quality welds with excellent thermal conductivity and corrosion resistance.The selection of copper/copper-nickel TIG filler rods should be primarily guided by the composition of the base metals being welded. When welding pure copper, it is typically best to use a filler rod that closely matches the base metal. For copper-nickel alloys, selecting a filler rod with a similar alloy content can ensure a homogenous weld deposit that matches the corrosion resistance and mechanical properties of the base metal.Typical applications of copper/copper-nickel TIG filler rods include welding copper piping in the plumbing industry, electrical components due to copper's excellent conductivity, and marine applications, where copper-nickel alloys are widely used for their superior resistance to seawater corrosion.To achieve effective welding results with these filler rods, a few tips can be beneficial. Firstly, maintaining a clean work environment is paramount, as copper and its alloys are susceptible to contamination. Therefore, the welding area, base metal, and filler rod should be thoroughly cleaned before starting the welding process. Secondly, considering copper's high thermal conductivity, managing heat input to prevent overheating or warping of the base metal is crucial. Lastly, using a shielding gas like argon can help prevent oxidation and ensure a smooth, clean weld.Dissimilar steel welding refers to the process of joining two different types of steel together. It presents unique challenges due to the varying properties and compositions of the base metals. TIG filler rods specifically designed for dissimilar steels play a crucial role in achieving strong and reliable welds in such applications.The selection and use of TIG filler rods for dissimilar steels require careful consideration. One of the primary factors to consider is the compatibility of the filler rod with the base metals. Filler rods with similar composition and mechanical properties to the base metals are typically preferred to ensure a compatible and homogeneous weld.Additionally, the difference in thermal expansion coefficients between dissimilar steels can lead to distortion and residual stresses in the weld. Choosing a filler rod with a composition that minimizes this difference can help mitigate these issues and improve the overall weld quality.Welding dissimilar steels often involves dealing with different melting points and heat input requirements. Thus, selecting a filler rod with a suitable melting point and heat transfer characteristics is crucial to achieving a balanced and controlled welding process. It is important to consult welding procedure specifications (WPS) and follow the recommended welding parameters to ensure proper fusion and minimize the risk of defects.Proper joint preparation, including cleaning and removal of contaminants, is essential when welding dissimilar steels. Thoroughly cleaning the base metals and using appropriate pre-weld cleaning methods can help ensure sound welds with good penetration.TIG filler rods designed for dissimilar steels are indispensable when joining different types of steel. Through careful selection and consideration of compatibility, composition, melting point, and heat transfer characteristics, these filler rods enable welders to achieve strong and reliable welds in dissimilar steel applications. Adhering to proper joint preparation and following recommended welding parameters are equally important to ensure successful outcomes.Duplex stainless steel is a popular material choice for its excellent corrosion resistance and high strength. When it comes to TIG welding duplex stainless steel, using the appropriate filler rod is crucial to maintain the desired mechanical properties and corrosion resistance of the weld.TIG filler rods for duplex stainless steel are specifically designed to match the composition and properties of this material. These filler rods typically have a balanced composition of austenite and ferrite to ensure a proper weld structure and maintain the duplex characteristics.When selecting TIG filler rods for duplex stainless steel, consider the grade and chemical composition of the base material. Match the filler rod's grade to that of the base material to achieve optimal weld integrity. It's essential to refer to the material specifications and consult with welding experts or suppliers to ensure the correct filler rod is chosen.During welding, maintaining a balanced heat input is crucial to prevent the formation of detrimental phases and maintain the desired microstructure. Controlling the interpass temperature and using appropriate preheating and post-weld heat treatment techniques can help achieve the desired mechanical and corrosion properties in the weld joint.Proper cleaning and preparation of the base material are essential to prevent contamination during the welding process. Thoroughly remove any surface contaminants, such as oils, grease, or oxides, before starting the TIG welding process. This ensures a clean and defect-free weld joint.Welding parameters, such as welding current, travel speed, and shielding gas composition, should be optimized for the specific duplex stainless steel grade and filler rod combination being used. Fine-tuning these parameters, along with maintaining proper shielding gas coverage, can help minimize the risk of defects like porosity and ensure a sound weld.Regular inspection and testing of the welded joints are crucial to ensure the quality and integrity of the weld. Non-destructive testing methods such as visual inspection, dye penetrant testing, and ultrasonic testing can be employed to detect any potential defects or discontinuities in the weld.When TIG welding duplex stainless steel, selecting the appropriate filler rod is essential for achieving welds with the desired mechanical properties and corrosion resistance. Consider the base material's grade and chemical composition, maintain proper heat input, clean and prepare the base material thoroughly, optimize welding parameters, and conduct regular inspections to ensure high-quality welds in duplex stainless steel applications.Nickel alloys offer excellent resistance to high temperatures, corrosion, and wear, making them ideal for a wide range of applications in industries such as aerospace, chemical processing, and power generation. TIG welding with the appropriate filler rod is commonly used to join nickel alloys, ensuring strong and durable welds.Nickel alloys are known for their exceptional heat and corrosion resistance, along with high strength and excellent mechanical properties. They are often used in environments with extreme temperatures or aggressive chemical conditions. Common applications of nickel alloys include turbine components, chemical reactors, and equipment for the oil and gas industry.When selecting TIG filler rods for nickel alloy welding, it is crucial to choose a rod that matches the base metal's composition. Nickel alloy filler rods are available in various grades, such as Inconel, Hastelloy, and Monel, each designed for specific nickel alloy compositions. Consult the material specifications or seek guidance from the manufacturer to ensure the correct filler rod selection.Cleanliness is essential when working with nickel alloys, as contaminants can lead to porosity and reduced weld quality. Thoroughly clean the base metal before welding, and use a dedicated stainless steel wire brush or designated cleaning solution to remove any surface contaminants, such as oils, greases, or oxides.Welding nickel alloys requires careful attention to welding parameters and techniques to achieve high-quality results. Here are some best practices:Preheating: Preheating the base metal can help minimize cracking and improve the weld's integrity. The preheating temperature depends on the specific nickel alloy being welded, and it is important to follow the recommended preheat values provided by the material manufacturer. Shielding Gas: Utilize an appropriate shielding gas, such as argon or argon-helium mixtures, to protect the weld pool from atmospheric contamination. The shielding gas flow rate should be adjusted to provide adequate coverage and protection. Welding Technique: Employ proper welding techniques, including maintaining a consistent travel speed and maintaining a stable arc length. Nickel alloys tend to have a lower thermal conductivity than other metals, so it is crucial to control the heat input and avoid overheating the base metal. Post-Weld Heat Treatment: Depending on the specific nickel alloy and the application requirements, post-weld heat treatment may be necessary to relieve residual stresses and enhance the material's properties. Refer to the material specifications or consult with experts to determine the appropriate post-weld heat treatment procedures.By adhering to these welding best practices and using the correct TIG filler rod for the specific nickel alloy, welders can achieve high-quality and reliable welds in nickel alloy applications, ensuring the desired performance and longevity of the welded components.TIG filler rods for titanium play a critical role in welding applications involving this lightweight and corrosion-resistant metal. Titanium requires filler rods with specific properties to achieve strong and reliable welds. These filler rods are specifically designed to match the characteristics and chemistry of titanium, ensuring optimal results.One of the key features of TIG filler rods for titanium is their high purity. Impurities can compromise the integrity of the weld and cause issues such as porosity and reduced mechanical strength. Therefore, it is crucial to select filler rods that have low levels of impurities, ensuring clean and high-quality welds.When using TIG filler rods for titanium, it is important to consider the grade of titanium being welded. Different grades of titanium have varying compositions and mechanical properties, requiring corresponding filler rods that match those specific characteristics. This ensures that the filler metal can seamlessly integrate with the base metal, resulting in a strong and reliable weld joint.Proper handling and storage of TIG filler rods for titanium are essential. Titanium filler rods are highly sensitive to moisture and contaminants, which can negatively impact the weld quality. It is important to store these rods in a dry environment and protect them from exposure to moisture, oils, and other contaminants that may be present in the welding environment.Welding titanium requires precise control over the welding parameters, including heat input, travel speed, and shielding gas flow. The use of suitable filler rods is critical in maintaining the desired mechanical properties and preventing the formation of undesirable intermetallic compounds. It is recommended to refer to the manufacturer’s guidelines and specifications for the specific grade of titanium being welded to ensure the proper selection and use of TIG filler rods.TIG filler rods for titanium are specifically formulated to match the unique properties and chemistry of titanium. Their high purity, compatibility with different grades of titanium, and proper handling ensure clean and reliable welds. By using the appropriate TIG filler rods and following recommended welding parameters, welders can achieve strong and durable weld joints in titanium applications.Correct selection and utilization of TIG filler rods are crucial aspects of achieving successful and high-quality welds. The variety of available filler rods cater to specific materials and applications, providing welders with the versatility necessary to meet diverse welding needs.Throughout this article, we have explored various types of TIG filler rods, including those designed for high-strength steel, super duplex stainless steel, hard facing, aluminium, magnesium, mild steel, stainless steel, brazing/bronze welding, copper/copper-nickel, dissimilar steels, duplex stainless steel, nickel alloy, and titanium.By understanding the characteristics, applications, and selection criteria of each type, welders can make informed decisions to ensure optimal welding results. Following recommended welding techniques, including appropriate amperage settings, gas shielding, and electrode manipulation, further contributes to achieving strong and durable welds.It is essential for welders to familiarize themselves with the specific properties and requirements of the materials they are working with, as well as the corresponding filler rods. This knowledge allows for the best match between filler rod and base metal, promoting proper fusion and minimizing the risk of defects such as cracks, porosity, or inadequate penetration.To enhance welding proficiency and expertise, ongoing education and practice are highly recommended. Manufacturers’ guidelines, industry standards, and welding resources can provide valuable insights into the selection, handling, and utilization of TIG filler rods.In conclusion, the proper selection and use of TIG filler rods are critical in achieving high-quality welds with superior strength and integrity. By considering the characteristics and requirements of the base metal, welders can make informed decisions regarding the most suitable filler rod for each welding application. Continuous learning and adherence to best practices will contribute to the welder’s proficiency and the overall success of welding projects. Selecting the right filler rod for TIG welding can be a game-changer. With so many options available, it can be tricky to know which filler rod best suits your project, material, and welding goals. Having worked with TIG welding for a while, I know firsthand how important it is to make the right choice. A good filler rod can make the difference between a strong, smooth weld and one that’s brittle or prone to cracking. Let’s walk through what you need to know to make the right filler rod selection, backed by a handy filler rod chart to simplify your choice. In TIG (Tungsten Inert Gas) welding, the filler rod is essential for creating strong, clean welds. The rod fills the weld joint, ensuring the material is fused solidly together. The right filler rod should complement the material you’re welding, so it’s critical to choose a rod compatible with your base metals. Different filler rods have distinct melting points, properties, and chemical compositions that affect how they bond with specific metals. Choosing a rod that doesn’t match your material can result in a weak or inconsistent weld. That’s why the TIG welding filler rod selection chart is such a valuable tool—helping you choose the perfect rod with ease. A filler rod selection chart typically lists the material types alongside recommended filler rod options. By cross-referencing your base material with the chart, you’ll see which rods are best suited to your project. Identify Your Base Metal: Look for your primary material on the chart. Common options include steel, stainless steel, aluminum, and titanium. Match the Filler Rod: The chart will list filler rods that bond effectively with that metal, showing options based on common applications. Consider the Application: If your project involves high strength or ductility, choose a rod designed for those qualities. Understanding some of the most popular TIG filler rods and when to use them is a great way to feel more confident in your choice. This rod is excellent for mild steel and is often used in welding shops and automotive applications. It’s a versatile option for general-purpose work, especially on metal that might have surface contaminants. The ER70S-2 rod includes small amounts of deoxidizers, which help keep impurities out of your weld. “ER70S-2 is a welder’s best friend for its flexibility and ease of use on mild steels,” says welding expert James Carter. ER308L is ideal for stainless steel, particularly the 300-series stainless steel alloys. It’s known for its low carbon content, which helps reduce the risk of weld cracking, especially in high-heat applications. If you’re welding stainless steel in food service or chemical industries, ER308L rod is a common choice. This filler rod is specifically designed for aluminum alloys, especially the 6000 series. Its high silicon content gives it excellent fluidity, allowing for smooth, attractive welds. ER4043 welding rod is a popular choice for aluminum welding because it’s easy to use and produces consistent results, even for beginners. Another aluminum filler rod, ER5356, has high magnesium content, making it particularly strong and corrosion-resistant. It’s suitable for marine applications or any project where your weld will face environmental challenges. This rod also produces a shiny finish, which is often desirable for visible welds. See also What are the Different Types of Welding Rods? Here’s a straightforward chart to guide you in selecting the correct filler rod for various materials. Base MaterialRecommended Filler Rod(s)Application NotesMild SteelER70S-2, ER70S-6General purpose, automotive, repairStainless SteelER308L, ER316LChemical, food service, corrosion-resistantAluminum 6000 SeriesER4043, ER5356Marine, outdoor, aesthetic weldingCopper and Copper AlloysERCu, ERCuSi-APlumbing, electrical, high conductivityTitaniumERTi-1, ERTi-5Aerospace, high strength-to-weight There are several factors that go into selecting a TIG filler rod, beyond just matching the base metal. Let’s dive into a few key considerations. Some applications require a filler rod that provides high strength and ductility. For instance, aerospace projects often demand a high-strength filler rod, like ERTi-5 for titanium, to ensure the welded parts can withstand extreme conditions. For projects exposed to harsh environments—think marine or chemical industry applications—choosing a corrosion-resistant filler rod is essential. ER316L, for example, provides enhanced corrosion resistance when welding stainless steel for use in seawater or chemical tanks. Aesthetic considerations can also influence filler rod choice. If you’re welding aluminum parts for visible structural work, ER5356’s shiny finish may be preferable to ER4043. Both rods are excellent for aluminum, but ER5356 gives a slightly cleaner look. Let’s say you’re working on an aluminum structure, maybe a trailer or boat that will face outdoor conditions. Aluminum can be tricky to weld due to its oxide layer and high thermal conductivity. In this scenario, a popular choice is ER5356, which offers high strength, good corrosion resistance, and a shiny finish that’s appealing in visible applications. If you’re a beginner, you might prefer ER4043, which flows well and is a bit easier to control. Both are excellent choices for aluminum, but each has unique strengths that suit different applications. See also How to TIG Weld Stainless Steel for Beginners? Here are a few practical tips to get the most out of your filler rod selection and TIG welding projects: Using a filler rod that’s too thick or thin for your material can lead to uneven welds. Generally, rods range from 1/16 to 3/32 inches in diameter, with thicker rods for thicker materials. For metals that are over ½ inch thick, preheating can improve weld penetration, especially for high-strength alloys. Contaminants on filler rods can affect weld quality. Keep rods stored in a clean, dry place and avoid touching the end of the rod that will enter the weld pool. For stainless steel, ER308L is commonly used due to its corrosion resistance and compatibility with the 300-series alloys. It’s not recommended, as stainless steel filler rods like ER308L are designed to complement the properties of stainless steel, not mild steel. ER4043 and ER5356 are popular choices for aluminum, with ER4043 providing easier control and ER5356 offering higher strength. A rough finish can be caused by poor technique or the wrong filler rod selection. Make sure to select a rod designed for the specific metal and conditions of your project. For thicker metals or certain alloys, preheating can be helpful to ensure good weld penetration, especially with high-strength filler rods. Selecting the right TIG welding filler rod is crucial for achieving a strong, clean, and durable weld. With the right filler rod selection chart at your side, you can feel more confident in choosing a rod that matches your material, application, and skill level. Each filler rod has unique qualities that make it suitable for specific tasks, from the corrosion resistance of ER316L for stainless steel to the shiny finish of ER5356 for aluminum. I hope this guide and filler rod selection chart make it easier for you to navigate the options and choose the best filler rod for your next TIG welding project. By considering the base metal, desired strength, and environmental exposure, you’ll be able to make a choice that results in high-quality welds every time. If you’re tackling a big fabrication project or a small repair job, the right filler rod can make all the difference. If you’re just getting into TIG welding or even if you’ve been doing it for a while, choosing the right filler rod can sometimes feel a bit confusing. I totally understand that. I’ve been there—standing in front of a shelf full of different rods, scratching my head, and wondering which one to grab for the job I had at hand. I want to walk you through everything I’ve learned about TIG welding filler rods. I’ll explain what they are, how they work, and most importantly, how to choose the right one. I’ve also put together a simple, easy-to-read selection chart you can always refer back to. It’s the kind of guide I wish I had when I first started. TIG welding, also known as Gas Tungsten Arc Welding (GTAW), is a precise and clean method used mainly for welding thinner materials or making delicate welds. The filler rod is the metal wire you add to the weld pool to build up the joint. Now, not all filler rods are created equal. Choosing the wrong type can lead to weak welds, cracks, or even corrosion down the line. So yeah, picking the right filler rod is more than just a guess—it’s essential for the strength, appearance, and durability of your welds. One of the first things I learned was that your base metal—the material you’re welding—plays a big role in what filler rod you should use. Steel, stainless steel, aluminum, bronze, and other metals all require specific rods for best results. Let’s break it down by material type so it’s easier to follow. When I’m welding mild or low carbon steel, the most common and reliable filler rod I reach for is ER70S-2 or ER70S-6. Both offer great ductility and strength. ER70S-2: Ideal when you’re welding on dirty or rusty surfaces. It has deoxidizers that help keep your welds clean. ER70S-6: Gives smoother welds on clean material and is more popular overall. These rods work best with DCEN polarity and pure argon shielding gas. SaleBestseller No. 1 YESWELDER Mild Steel TIG Welding Rod ER70S-6 1/16″x16″ 5LB ER70S-6 is a gas shield copper coated carbon steel welding rod for fabrication of mild steel. SHIELD GAS: ER70S-6 has the highest combination of manganese and silicon deoxidizers, permitting higher welding currents with 100% CO2 shielding gas and leaving a smoother weld bead with little to zero post-weld cleanup. And the greater the argon content of the shielding gas the smoother the bead appearance with less spatter. APPLICATION: For a variety of mild and low alloy steel. MULTIPLE USAGE: Great for construction work, farm implement fabrication, shaft buildup, tanks, truck bodies and general shop applications with poor fit-up or rusty, oily plates. SPECIFICATION: Length: 16″; Diameter: 1/16″, 3/32″, 1/8″; Weight: 5 Pound per box. Note: There are two kinds of package in stock, the item inside are the same. Welding stainless steel is a little more precise. You’ve got to match your filler rod closely to the base metal. Here are the ones I use the most: ER308L: Perfect for 304 stainless steel, which is super common in food and medical-grade equipment. ER309L: Great when you’re welding dissimilar metals, like stainless to carbon steel. ER316L: Best choice when corrosion resistance is super important, like in marine or chemical environments. SaleBestseller No. 1 YESWELDER Stainless Steel TIG Welding Rod ER308L 1/16″x16″ 5LB ER308L: Most popular stainless rod for general-purpose applications where corrosion is moderate and applications at cryogenic temperatures. SHIELD GAS: Use 100% Argon or Argon/Helium for greater penetration and higher speeds. CORROSION RESISTANCE: Low carbon content (0.03 percent maximum) increase weld metal resistance to intergranular corrosion. APPLICATION: Filler metal for TIG welding process in stainless steel 304, 304L, 308, 308L, 321 and 347. MULTIPLE USAGE: Welding, petrochemical, pressure vessels, food processing machinery, medical equipment, etc. Stainless steel filler rods usually work best with argon or an argon-helium mix to improve heat input and fluidity. Aluminum is a totally different beast in TIG welding. You need AC polarity and a high-frequency start for clean arcs. Here are the aluminum filler rods I keep in my shop: ER4045: Gives a smooth finish and helps reduce cracking. ER4043: Common for general aluminum work—great for castings or when the metal has a lot of silicon. ER5356: Offers higher strength and is good for structural aluminum. Bestseller No. 1 ARCCAPTAIN Silicon Aluminum Welding Wire ER4043 .035″ Mig Welding Wire, 1 Pound Spool Smooth Welding Experience: With ARCCAPTAIN ER4043 Aluminum Welding Wire, expect smooth and stable arc characteristics, ensuring easy control and excellent weld bead appearance. ER4043 Aluminum Welding Wire: This filler metal contains 5% silicon aluminum (AlSi5), tailored for the MIG welding process. Versatile Application: Suitable for welding various aluminum grades including 3003, 3004, 5052, 6061, 6063, and casing alloys 43, 355, 356, and 214. Melting Range and Density: Melting range from 1065 °F to 1170 °F, with a density of 0.097 lbs/in^3. Post anodizing color is gray. Specification: Weight: 1 lb / Diameter: 0.035 inch. For less common metals, it gets a bit more specific: Silicon Bronze (ERCuSi-A): I use this when brazing copper or welding on galvanized steel. It’s ideal for joining dissimilar metals. Nickel Alloys (ENiCrFe-3): Needed for high-temp or chemical-resistant work. Titanium and Magnesium rods: Only use these when you’re specifically working with those materials, and make sure you’re using the right shielding gas and environment. Here’s the filler rod chart I’ve built and refined over the years. Keep this handy—it really helps simplify the selection process. Base Metal Common Filler Rod Rod Type Shielding Gas Notes Mild/Carbon Steel ER70S-2, ER70S-6 Steel Argon (100%) ER70S-6 gives better arc starts and smoother beads on clean material Stainless Steel (304) ER308L Stainless Argon (100%) Use for kitchen, medical, or decorative stainless steel Stainless to Carbon ER309L Stainless Argon (100%) Designed for welding dissimilar metals Stainless Steel (316) ER316L Stainless Argon (100%) Ideal for marine and chemical resistance Aluminum (General) ER4043 Aluminum Argon (100%) Great for castings and general aluminum projects Aluminum (High Strength) ER5356 Aluminum Argon (100%) Better tensile strength, not ideal for anodizing Copper, Bronze ERCuSi-A Bronze Argon (100%) Great for artistic welds and joining copper to steel Nickel Alloys ENiCrFe-3 Nickel Alloy Argon (100%) For high-temp or corrosion resistant welds Another key point I want to highlight is filler rod thickness. If the rod is too thick, it might cause puddle issues. If it’s too thin, it may melt too fast. Here’s a general guide I stick to: 1/16” (1.6 mm): Great for sheet metal or really thin work. 3/32” (2.4 mm): My go-to for most jobs—especially in the 1/8” base metal range. 1/8” (3.2 mm): Works well for thicker plates and heavy-duty welds. Match the diameter to your base metal thickness and the amount of filler you’ll need. It also helps to adjust your amperage accordingly. You might be wondering if a filler rod is always necessary. The short answer is: not always. When I’m welding two very thin pieces together or doing fusion welds (especially on stainless), I skip the filler rod altogether. This is often called “autogenous welding.” But in most structural or load-bearing welds, using the right filler rod is a must. Filler rods don’t like moisture. I learned that the hard way after leaving a batch of ER70S-2 rods in my garage. They absorbed humidity and started to corrode. The best way to store them is in a dry rod container or sealed tube, preferably with desiccant packs inside. And remember—contaminated rods lead to dirty welds. Always keep your rods clean and handle them with gloves when possible. Ever look at those codes and think, “What the heck does ER70S-6 mean?” Let me break it down simply: E = Electrode (even if we’re not using it as one) R = Rod (specifically for TIG) 70 = Tensile strength (70,000 psi) S = Solid wire 6 = Chemical composition and deoxidizers Each digit or letter tells you something about what the rod is made of or how it performs. Once you understand the code, it gets easier to make quick decisions at the store or on the job. No matter how good your filler rod is, without the right gas, your welds will suffer. I always use pure argon for almost every TIG job. It’s clean, stable, and easy to control. For thicker aluminum or stainless, sometimes a helium mix can help get deeper penetration. But for beginners or general work, stick with 100% argon. It’s reliable and easier to manage. Over the years, I’ve made a few filler rod mistakes. Let me help you avoid them: Using the wrong rod for dissimilar metals: Always double-check compatibility. Guessing rod type based on color: Don’t do it. Always read the label. Using old or rusted rods: Toss them and grab fresh ones. Welding without enough gas coverage: Can cause porosity or oxidation. If there’s one thing I’ve learned over the years, it’s that the right filler rod can make or break your weld. Don’t rush this step. Take a minute to match your rod to your material and the job at hand. Over time, you’ll start to get a feel for it, and selecting the right rod will become second nature. And don’t be afraid to experiment a little. Try different rods, observe how they behave, and keep notes if you need to. That’s how I built my own go-to chart, and now I can walk into any job with confidence. What is the most commonly used TIG filler rod for mild steel?The most commonly used filler rods for mild steel are ER70S-2 and ER70S-6. ER70S-6 is especially popular for clean base metals. Can I use the same filler rod for stainless and carbon steel?Yes, ER309L is designed for joining stainless steel to carbon steel. It’s a great choice for dissimilar metal welding. What is the difference between ER4043 and ER5356 for aluminum?ER4043 provides better flow and less cracking, while ER5356 offers higher strength but can be harder to weld with. Do TIG filler rods expire?They don’t have a strict expiration date, but exposure to moisture and contaminants can ruin them. Store them properly to keep them in good shape. How do I know what diameter filler rod to use?It depends on the thickness of your base metal. Use smaller diameters for thinner materials and thicker rods for heavy-duty welds. Can I use MIG wire as a TIG filler rod?Sometimes, yes. MIG wire and TIG rods can be made of the same alloy. But make sure it’s clean, solid wire, and the composition matches your needs. There are many “rules” welders live by when it comes to TIG filler rod selection. But it all comes down to this: Match your filler rod with the material you are welding (not always!) Match your filler rod with the USE CASE of the welded piece (always!) These rules and others you may hear from welders are sometimes ignored (but you must know what you are doing!) This article will teach you the basics of TIG filler rods and help you establish your filler rod collection because 99% of the jobs are done with the rods we will discuss soon. Additionally, we will give you TIG filler rod charts for all standard and less often used rods, including titanium. So let’s start with the essentials. The TIG rods can vary in size and thickness. The thickness of the rod determines the amount of filler metal deposited after you dab it in the weld pool, but it also determines the amount of energy needed to melt that rod diameter. It’s necessary to match the thickness of the rod with the thickness of the welded metal. For example, if you are making TIG welds on a very thin sheet metal and using a thick rod, you will need more amps on your TIG welder to melt the rod than the metal itself. This will lead to burn-through of the metal, or if you use lower amps, inefficient melting of the rod, and poor penetration. You can also get MIG wires specifically cut in “TIG cut lengths” because the composition of MIG wires and rods for TIG is the same. Do You Even Need a Filler Rod? You can’t use any root opening for a successful TIG fuse weld. The metal can’t be very thin, or you are risking burn-through, and the fuse weld will be weaker than if you used a filler rod. That’s because you “borrow” metal from both pieces to create a joint, and the joint is thinner than the rest of the section. Additionally, most of the time, the added chemicals to the filler rod are necessary to make a TIG weld with optimum strength. Fusion welds are usually made when tack welding the pice together. They aren’t structural and serve only to hold the piece while you lay the actual weld with a filler material. Filler Rod Classification And Composition Now, let’s proceed with charts before we explain each TIG filler rod and what it’s meant for. We will also outline which filler metal you need to have in your shop at all times because these will get the job done most of the time. Filler Rod Diameter Chart Metal ThicknessFiller Rod Diameter 1/16 in.0.045 or 1/16 in. 3/32 in.1/16 or 3/32 in. 1/8 in.1/16 or 3/32 in. 3/16 in.1/8 in. 1/4 in.3/16 in. 1/2 in.1/4 in. Filler Rod Size & TIG Welder Settings Low And Mild Carbon Steel Metal GaugeTungsten DiameterFiller Rod DiameterCupArgon Gas Flow @ 20 PSI (CFH)AmperageTravel Speed in IPM 1/16″ (1.6mm)1.6mm1.6mm4, 5, 615 (7)95 – 13515 1/8″ (3.2mm)1.6mm - 2.4mm2.4mm4, 5, 615 (7)145 – 20011 3/16″ (4.8mm)2.4mm3.2mm7, 816 (6.5)200 – 26010 1/4″ (6.4mm)3.2mm4.0mm8, 1018 (8.5)250 – 30010 Stainless Steel Metal GaugeTungsten DiameterFiller Rod DiameterCupArgon Gas Flow @ 20 PSI (CFH)AmperageTravel Speed in IPM 1/16″ (1.6mm)1.6mm1.6mm4, 5, 611 (5.5)80 – 10010 - 12 1/8″ (3.2mm)1.6mm2.4mm4, 5, 611 (5.5)120 – 15010 - 12 3/16″ (4.8mm)2.4mm - 3.2mm3.2mm5, 6, 713 (6)200 – 25010 - 12 1/4″ (6.4mm)3.2mm4.8mm8, 1013 (6275 – 3508 - 10 Aluminum Metal GaugeTungsten DiameterFiller Rod DiameterCupArgon Gas Flow @ 20 PSI (CFH)AmperageTravel Speed in IPM 1/16″ (1.6mm)1.6mm1.6mm4, 5, 615 (7)60 – 9010 - 12 1/8″ (3.2mm)2.4mm2.4mm - 3.2mm6, 717 (8)125 – 16010 - 12 3/16″ (4.8mm)3.2mm3.2mm7, 821 (10)200 – 25010 - 11 1/4″ (6.4mm)4.8mm3.2mm8, 1025 (12)250 – 3208 - 10 Titanium Metal GaugeTungsten DiameterFiller Rod DiameterCupArgon Gas Flow @ 20 PSI (CFH)AmperageTravel Speed in IPM 1/16″ (1.6mm)1.6mm1.6mm or no filler rod4, 5, 615 (7)90 – 1508 - 10 1/8″ (3.2mm)2.4mm1.6mm5, 6, 717 (8)150 – 2107 - 9 3/16″ (4.8mm)2.4mm3.2mm6, 7, 821 (10)210 – 2807 - 8 1/4″ (6.4mm)3.2mm3.2mm8, 1025 (12)270 – 3207 - 8 Selecting Your TIG Welding Rods Eastwood company sells some of the best filler rods out there, and they package them in excellent plastic tubes you can use as storage containers in your shop. So, I can recommend their rods for beginners and pros. Mild Steel (Low Carbon Steel) The most popular TIG welding rods for mild steel are ER70S-2, ER70S-3, and ER70S-6. Any of these will be a good choice for basic welding tasks, but I recommend getting a batch of ER70S-2 and others only if needed. Stainless Steel The most commonly welded stainless steel is 304L, and the ER308L is the TIG rod for it. So, I recommend getting a nice batch of ER308L if you weld 300 series stainless steels. There are many stainless TIG rods, so you should definitely do some further research if you are welding something unorthodox. Aluminum For aluminum, the most commonly used filler rod is a 4043 aluminum alloy rod, and that’s the one I would recommend for most aluminum welding applications. However, aluminum is a tricky metal, so make sure you know what alloy you are welding and what the part will be used for. Silicon Bronze The silicon bronze TIG filler rod is not meant for structural work. However, it’s beneficial to have it in your garage. If you are not doing any critical welds that require higher strength, the silicon bronze filler rod can be used for brazing and combining dissimilar metals like copper to steel and others. It can also achieve a more ductile weld if needed. Titanium When welding this metal, you should correctly match the titanium filler rod with the grade of the welded base material. There are exceptions to this rule. For example, if you need to improve the ductility of the weld, you could use a filler rod with a lower yield strength than the base titanium alloy. But such actions should be thoroughly tested because titanium is a tricky metal to weld. Two of the setup variables you must get right when TIG welding involves the choice of filler material and the tungsten electrode in your torch. Both topics are substantial, so let’s focus on the filler material first (tungsten electrodes are covered here). With TIG welding, you feed the puddle with filler material using a handheld rod. But these “rods” come in different sizes and compositions. Knowing which filler rod to use, and when, makes your welds strong and aesthetically pleasing. But with thousands of products on the market, even experienced welders struggle at times to find the right filler rod. So, for your quick reference, below I have compiled answers to the most common questions and guidelines to finding the right filler rod. Do I Need a Filler Rod? Yes, you probably do need a filler rod. But you can fusion weld with a TIG welder without a filler rod. But it is limited to welds where: The butt joint between the two pieces of metal has no gaps. The base metal is on the thicker side (e.g., 1/8 inch or thicker). You need more heat to fuse the metal (which risks burn-throughs). Strength is not important (fusion welds are weaker and are typically only used to tack pieces together). This list also highlights the reasons that the majority of TIG welds incorporate a filler rod. Filler Rod Basics This filler material is a metal alloy specifically designed to withstand the high heat of welds and to fuse the two pieces of stock together as a composite. So, not surprisingly, the alloy and size of filler rods vary for the varying stock thicknesses and types of base metals people weld. TIG filler rods typically come in 3-foot lengths, packed in 10 or 50-pound boxes (or tubes). The diameter usually ranges from 1/16 to 1/4 inch. The filler rods are also made with several alloys to handle different metals. Since the TIG filler rod composition needed is often the same as that used for MIG filler material, some of the MIG wires are also sold for TIG welding. These are identified as “TIG cut lengths.” Choosing a Filler Rod Unfortunately, there is no definitive answer for the filler rod you “must” use for a weld. However, the weld you need to make defines certain parameters. This criterion can then be used to follow certain guidelines. Also, manufacturers usually have detailed charts to help select a filler rod. In general, the important parameters include the base metal thickness, its composition, and the type of weld joint (butt vs. fillet). Using this criterion, you can use certain guidelines to zero in on the filler rod alloys and diameters you might want to use. Filler Rod Alloys (“Composition”) The American Welding Society (“AWS”) has categorized the various alloys and assigned special AWS “ER” numbers to more easily identify them. Each number represents a “recipe” of chemical additives in the filler metal to address specific base metals and weld conditions. The number of alloys available can be overwhelming. Below you can find some simple guidelines to help you zero in on some common compositions of the filler rod. Also, manufacturers often have charts you can consult to find their best product for a given weld. Steel ER70S-2, ER70S-6, and several other ER70S-series options with different digits at the end to address specific conditions of the metal (e.g., dirty or clean) or the type of joint being welded. ER70S-6 is generally used for mild steel welding. Stainless Steel ER308 & ER308L: One of the most common welding rods. It’s the choice for TIG welding 304 stainless steel, which is widely used in manufacturing. In addition, this filler rod alloy is used with 200-series and other 300-series stainless steels. ER309 & ER309L: Used for welding dissimilar metals. It can handle higher heat and has good corrosion resistance. ER316 & ER316L: Commonly used for pressure vessels, valves, chemical equipment, and marine applications. (The “L” refers to extra low carbon in the rod, less than 0.08%, which adds corrosion resistance.) The numbers above are some of the more popular, but the roster of stainless steel base metals manufactured today is vast. Also read: Can you weld stainless steel? Aluminum ER4043: is a good general filler material for most aluminum applications. However, welding of 2xxx and 7xxx series aluminum is generally not recommended. ER5356: is used for 5xxx series aluminum and is generally preferred if the finished piece will be anodized. Chrome Moly Tubing ER70S-2: is highly recommended for welding 4130 chrome-moly tubing in many applications. ER80S-D2: is recommended for welding 4130 chrome-moly tubing if a higher strength, less ductile weld is required. If your weld will be heat treated to obtain optimum strength, then use a filler metal that matches the chemistry of your tubing. Neither the 70S-2 nor 80S-D2 rods work in this instance. Titanium When welding titanium, you generally want to match the filler rod alloy to the base metal. Below are some of the common alloys you may run into: ERTi-2 – best for use with grade 2 titanium. ERTi-3 – best for use with grade 3 titanium. ERTi-5 – best for use with grade 5 titanium. ERTi-7 – same mechanical properties as ErTi-2 except with the addition of 0.12% palladium which imparts better corrosion resistance. Protects against crevice or under-deposit corrosion when ErTi-2 type Titanium wire is insufficient. ERTi-7 can be considered for welding Grade 2 or Grade 16. ERTi-9 and ERTi-9ELI – best for use with grade 9 titanium. ERTi-23 – best for use with grade 23 titanium. Filler Rod Diameter The thickness of the stock you TIG weld will suggest a filler rod diameter. There are all kinds of opinions on the right filler rod diameter. Below I have assembled some guidelines to help you cut through the static. In general, use a filler rod with a diameter less than the thickness of the metal being welded. With a base metal thickness under 1/8 inch, the rod diameter should be slightly thinner than the metal being welded. For stainless sheet metal, use one size lower than you would use for carbon steel. This helps because you typically use less amperage on stainless steel thin stock, compared to carbon steel. At low amperage, a large rod chills the puddle and can cause an irregular bead. For aluminum, the same rules that you would use for steel sheet metal apply. In my experience, 1/16″ (1.6mm) wire can be used for sheet aluminum as thin as 0.040 inches. For thicker aluminum, sometimes the rod balls before it even reaches the puddle. If that happens, try a tighter arc and less torch angle. If that does not work, go up one size with your filler rod. Also, there are numerous “calculators” online you can use. They vary a little from one to another, but in general, they follow these guidelines in the table below for mild steel: Metal Thickness (inches) Filler Rod Diameter (inches) 1/16 0.045 or 1/16 3/32 1/16 or 3/32 1/8 1/16 or 3/32 3/16 1/8 1/4 3/16 1/2 1/4 Joint Type Whether you are welding a butt or fillet joint may impact your TIG weld. You will usually need more amps (i.e., heat) when welding a fillet joint. Additional Considerations Only use bare, uncoated rods designated for TIG welding. Never use electrodes made for shielded metal arc welding (“SMAW”) stick welding. Filler Rod Size & TIG Welder Settings Assuming you have identified the right alloy for the base metal you want to weld, not only do you need to get the right diameter rod, you will need to “dial-in” your welder settings. The amperage, gas flow, torch travel speed, and cup size vary, too. The following guidelines provide you with good starting points for the filler rod diameter and welder settings. But keep in mind you may need to tweak these settings depending on your welder and welding technique. Check out these TIG tips and tricks if you’re struggling to with your TIG welds. Stainless Steel Metal Gauge Joint Type Tungsten Size Filler Rod Size Cup Size Argon Gas Flow @ 20 PSI (CFH) Welding Amps Travel Speed (IPM) 1/16″ (1.6mm) Butt 1.6mm 1.6mm 4, 5, 6 11 (5.5) 80 – 100 12″ Fillet 90 – 100 10″ 1/8″ (3.2mm) Butt 1.6mm 2.4mm 4, 5, 6 11 (5.5) 120 – 140 12″ Fillet 130 – 150 10″ 3/16″ (4.8mm) Butt 2.4mm 3.2mm 5, 6, 7 13 (6) 200 – 250 12″ Fillet 2.4mm, 3.2mm 225 – 275 10″ 1/4″ (6.4mm) Butt 3.2mm 4.8mm 8, 10 13 (6) 275 – 350 10″ Fillet 300 – 375 8″ Low and Mild Carbon Steel Metal Gauge Joint Type Tungsten Size Filler Rod Size Cup Size Argon Gas Flow @ 20 PSI (CFH) Welding Amps Travel Speed (IPM) 1/16″ (1.6mm) Butt 1.6mm 1.6mm 4, 5, 6 15 (7) 95 – 135 15″ Fillet 95 – 135 15″ 1/8″ (3.2mm) Butt 1.6mm / 2.4mm 2.4mm 4, 5, 6 15 (7) 145 – 205 11″ Fillet 145 – 205 11″ 3/16″ (4.8mm) Butt 2.4mm 3.2mm 7, 8 16 (6.5) 210 – 260 10″ Fillet 210 – 260 10″ 1/4″ (6.4mm) Butt 3.2mm 4.0mm 8, 10 18 (8.5) 240 – 300 10″ Fillet 240 – 300 10″ Aluminum Metal Gauge Joint Type Tungsten Size Filler Rod Size Cup Size Argon Gas Flow @ 20 PSI (CFH) Welding Amps Travel Speed (IPM) 1/16″ (1.6mm) Butt 1.6mm 1.6mm 4, 5, 6 15 (7) 60 – 80 12″ Fillet 70 – 90 10″ 1/8″ (3.2mm) Butt 2.4mm 2.4mm, 3.2mm 6, 7 17 (8) 125 – 145 12″ Fillet 2.4mm, 1.6mm 140 – 160 10″ 3/16″ (4.8mm) Butt 3.2mm 3.2mm 7, 8 21 (10) 195 – 220 11″ Fillet 210 – 240 9″ 1/4″ (6.4mm) Butt 4.8mm 3.2mm 8, 10 25 (12) 260 – 300 10″ Fillet 280 – 320 8″ Titanium Metal Gauge Joint Type Tungsten Size Filler Rod Size Cup Size Argon Gas Flow @ 20 PSI (CFH) Welding Amps Travel Speed (IPM) 1/16″ (1.6mm) Butt 1.6mm None 4, 5, 6 15 (7) 90 – 110 10″ Fillet 110 – 150 8″ 1/8″ (3.2mm) Butt 2.4mm 1.6mm 5, 6, 7 17 (8) 190 – 220 9″ Fillet 210 – 250 7″ 3/16″ (4.8mm) Butt 2.4mm 3.2mm 6, 7, 8 21 (10) 220 – 250 8″ Fillet 240 – 280 7″ 1/4″ (6.4mm) Butt 3.2mm 3.2mm 8, 10 25 (12) 275 – 310 8″ Fillet 290 – 340 7″ Conclusion Choosing a TIG filler rod depends on a number of variables. The base metal composition, joint type, stock thickness, cleanliness of the stock, and thermal properties of the metal can all play into your selection. It can be confusing at times. But by using the guidelines in this article and, if needed, some information from the filler rod manufacturers, you can zero in on a good choice. Of course, with experience, you will get more comfortable with the filler rods that work best with your TIG welder and your welding technique. Also, be sure to determine the correct current (amperage) range for the rod. Plus, check the polarity, gas flow, cup size, torch speed, etc. before you strike an arc and start welding with a specific filler rod. The process of selecting and using a filler rod feels overwhelming at times. But with experience and practice, it will become second nature. It’s worth the effort since getting the variables right, including the filler rod, allows you to create strong, beautiful TIG welds on a consistent basis. Two of the setup variables you must get right when TIG welding involves the choice of filler material and the tungsten electrode in your torch. Both topics are substantial, so let’s focus on the filler material first (tungsten electrodes are covered here). With TIG welding, you feed the puddle with filler material using a handheld rod. But these “rods” come in different sizes and compositions. Knowing which filler rod to use, and when, makes your welds strong and aesthetically pleasing. But with thousands of products on the market, even experienced welders struggle at times to find the right filler rod. So, for your quick reference, below I have compiled answers to the most common questions and guidelines to finding the right filler rod. Do I Need a Filler Rod? Yes, you probably do need a filler rod. But you can fusion weld with a TIG welder without a filler rod. But it is limited to welds where: The butt joint between the two pieces of metal has no gaps. 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Also, there are numerous “calculators” online you can use. They vary a little from one to another, but in general, they follow these guidelines in the table below for mild steel: Metal Thickness (inches) Filler Rod Diameter (inches) 1/16 0.045 or 1/16 3/32 1/16 or 3/32 1/8 1/16 or 3/32 3/16 1/8 1/4 3/16 1/2 1/4 Joint Type Whether you are welding a butt or fillet joint may impact your TIG weld. You will usually need more amps (i.e., heat) when welding a fillet joint. Additional Considerations Only use bare, uncoated rods designated for TIG welding. Never use electrodes made for shielded metal arc welding (“SMAW”) stick welding. Filler Rod Size & TIG Welder Settings Assuming you have identified the right alloy for the base metal you want to weld, not only do you need to get the right diameter rod, you will need to “dial-in” your welder settings. The amperage, gas flow, torch travel speed, and cup size vary, too. The following guidelines provide you with good starting points for the filler rod diameter and welder settings. But keep in mind you may need to tweak these settings depending on your welder and welding technique. Check out these TIG tips and tricks if you’re struggling to with your TIG welds. Stainless Steel Metal Gauge Joint Type Tungsten Size Filler Rod Size Cup Size Argon Gas Flow @ 20 PSI (CFH) Welding Amps Travel Speed (IPM) 1/16″ (1.6mm) Butt 1.6mm 1.6mm 4, 5, 6 11 (5.5) 80 – 100 12″ Fillet 90 – 100 10″ 1/8″ (3.2mm) Butt 1.6mm 2.4mm 4, 5, 6 11 (5.5) 120 – 140 12″ Fillet 130 – 150 10″ 3/16″ (4.8mm) Butt 2.4mm 3.2mm 5, 6, 7 13 (6) 200 – 250 12″ Fillet 2.4mm, 3.2mm 225 – 275 10″ 1/4″ (6.4mm) Butt 3.2mm 4.8mm 8, 10 13 (6) 275 – 350 10″ Fillet 300 – 375 8″ Low and Mild Carbon Steel Metal Gauge Joint Type Tungsten Size Filler Rod Size Cup Size Argon Gas Flow @ 20 PSI (CFH) Welding Amps Travel Speed (IPM) 1/16″ (1.6mm) Butt 1.6mm 1.6mm 4, 5, 6 15 (7) 95 – 135 15″ Fillet 95 – 135 15″ 1/8″ (3.2mm) Butt 1.6mm / 2.4mm 2.4mm 4, 5, 6 15 (7) 145 – 205 11″ Fillet 145 – 205 11″ 3/16″ (4.8mm) Butt 2.4mm 3.2mm 7, 8 16 (6.5) 210 – 260 10″ Fillet 210 – 260 10″ 1/4″ (6.4mm) Butt 3.2mm 4.0mm 8, 10 18 (8.5) 240 – 300 10″ Fillet 240 – 300 10″ Aluminum Metal Gauge Joint Type Tungsten Size Filler Rod Size Cup Size Argon Gas Flow @ 20 PSI (CFH) Welding Amps Travel Speed (IPM) 1/16″ (1.6mm) Butt 1.6mm 1.6mm 4, 5, 6 15 (7) 60 – 80 12″ Fillet 70 – 90 10″ 1/8″ (3.2mm) Butt 2.4mm 2.4mm, 3.2mm 6, 7 17 (8) 125 – 145 12″ Fillet 2.4mm, 1.6mm 140 – 160 10″ 3/16″ (4.8mm) Butt 3.2mm 3.2mm 7, 8 21 (10) 195 – 220 11″ Fillet 210 – 240 9″ 1/4″ (6.4mm) Butt 4.8mm 3.2mm 8, 10 25 (12) 260 – 300 10″ Fillet 280 – 320 8″ Titanium Metal Gauge Joint Type Tungsten Size Filler Rod Size Cup Size Argon Gas Flow @ 20 PSI (CFH) Welding Amps Travel Speed (IPM) 1/16″ (1.6mm) Butt 1.6mm None 4, 5, 6 15 (7) 90 – 110 10″ Fillet 110 – 150 8″ 1/8″ (3.2mm) Butt 2.4mm 1.6mm 5, 6, 7 17 (8) 190 – 220 9″ Fillet 210 – 250 7″ 3/16″ (4.8mm) Butt 2.4mm 3.2mm 6, 7, 8 21 (10) 220 – 250 8″ Fillet 240 – 280 7″ 1/4″ (6.4mm) Butt 3.2mm 3.2mm 8, 10 25 (12) 275 – 310 8″ Fillet 290 – 340 7″ Conclusion Choosing a TIG filler rod depends on a number of variables. The base metal composition, joint type, stock thickness, cleanliness of the stock, and thermal properties of the metal can all play into your selection. It can be confusing at times. But by using the guidelines in this article and, if needed, some information from the filler rod manufacturers, you can zero in on a good choice. Of course, with experience, you will get more comfortable with the filler rods that work best with your TIG welder and your welding technique. Also, be sure to determine the correct current (amperage) range for the rod. Plus, check the polarity, gas flow, cup size, torch speed, etc. before you strike an arc and start welding with a specific filler rod. The process of selecting and using a filler rod feels overwhelming at times. But with experience and practice, it will become second nature. It’s worth the effort since getting the variables right, including the filler rod, allows you to create strong, beautiful TIG welds on a consistent basis. Tig welding is a complex and precise process that requires the right tools and techniques to be used correctly. Knowing which filler rod to use during the welding process is an important part of achieving successful welds. This article provides an overview of tig welding filler rod chart pdf (you can download it free), which can help users find the right type of rod for their particular job needs. The chart contains detailed descriptions of the different types of rods available for use in TIG welding processes, as well as their respective characteristics and applications. To ensure an optimal welding job, it is important for welders to understand which type of filler rod should be used for different materials. Tig welding is a widely used form of welding that allows for precise control over the weld and the type of filler rod being used. To achieve the desired result, it is important to understand what makes different types of Tig welding rods unique. The type of rod used in Tig welding will depend on the metal and application being welded, as well as the desired outcome. The most common types of Tig filler rods are mild steel, stainless steel, aluminum, nickel-based alloys, magnesium alloys and copper-based alloys. Each has its own characteristics that affect how they handle heat and their ability to bond metals together. Mild steel rods are ideal for general purpose welding jobs but will not work well on aluminum or stainless-steel or other non-ferrous metals applications. Tig welding is a popular welding technique used in the fabrication of many different products across industries. A major component of tig welding involves the use of filler rods to add additional material to areas where two distinct metals are joined together. The use of Autogenous TIG welding is limited for sheet metals only. There are a variety of different types of filler rods used when tig welding, each with its own unique properties and applications. The first type of filler rod commonly used in tig welding is mild steel, which is easy to use and relatively inexpensive compared to other materials. Mild steel has low levels of carbon and offers good strength with easy weldability. Mild steel TIG welding rods are classified in AWS A5.18 Specification and CSA W48. The most commonly mild steel TIG welding rods are: AWS A5.18 ER70S-2 (CSA W48 ER495-2). AWS A5.18 ER70S-3 (CSA W48 ER495-3) AWS A5.18 ER70S-6 (CSA W48 ER495-3). ER70S-4, ER70S-5 & ER70S-7 (not commonly used TIG wires). Mild Steel TIG welding Rod: Their Mechanical properties & chemical Compositions A second type of filler rod often used in tig welding is stainless steel. Stainless steel TIG welding rods, classified in AWS A5.9 specification, are widely used for fabricating and repairing metal structures. Among the most common types of tig welding rods are ER308L, ER309L, ER310, ER316L, ER321 and ER347. ER308L is primarily used for welding austenitic stainless steels such as 304 and 304L. ER309L suitable for joining dissimilar metals such as mild steel to stainless steel. On the other hand, ER310 can be employed when welding high-temperature materials such as heat-resistant chromium or nickel alloys. See also Melting Point of MetalsBelow is chart to select tig welding rod for different stainless steel grades. On X-axis & Y-axis, base metals are given. By matching them as shown in grey color, you can find the suitable tig welding rod for any stainless steel material grade. Stainless Steel TIG Welding Rods Chart Low alloy steel TIG welding rods are specialized filler metals that are used in TIG welding to join together different low alloy steel grades. These welding rods are classified according to the AWS A5.28 specification, which establishes the requirements for their composition and mechanical properties. The rods are designed for use with low alloy steel materials such as Cr-Mo, Manganese, Nickel, C-Mo, Military, and other high strength low alloy steel grades such as AISI 4140 and AISI 8620. Below are the most commonly used low alloy steel TIG welding rod chart highlighting the type of alloy welding, they can be used. Low alloy steel TIG welding Rods Compared to traditional mild steel welding rods, low alloy steel TIG welding rods offer several benefits in terms of strength, toughness, and crack resistance. These welding rods offer improved strength, toughness, and crack resistance compared to mild steel welding rods, making them suitable for use in applications that require high levels of strength and durability. This makes them an ideal choice for welding applications that require exceptional levels of durability and reliability. For example, they are often used in the construction of structures, pipes, and boilers, as well as for repair and maintenance work. Copper alloy TIG welding rods are a type of filler metal used in TIG welding to join different copper alloys (such as brass, bronze) as well as welding copper alloys to mild steel. Related Reading: Bronze Welding Guide. How to Weld Brass at Home These rods are classified according to the AWS A5.7 specification, which outlines the requirements for their composition and performance. The AWS A5.7 specification includes a variety of different copper alloy TIG welding rods (given in below table), each with specific properties and characteristics that make them suitable for different welding applications. Copper alloy TIG welding rods For example, ERCu is a common copper alloy TIG welding rod that is used for welding copper and copper alloys. It is known for its good electrical and thermal conductivity, making it a popular choice for electrical applications. Another example is ERCuNi, which is a nickel-copper alloy TIG welding rod that is often used for welding nickel alloys and other corrosion-resistant metals. This welding rod offers excellent resistance to corrosion, making it ideal for use in harsh environments. In contrast, ERCuAl-A1 and ERCuAl-A2 are aluminum-copper alloy TIG welding rods that are used for welding aluminum bronze, brass and their dissimilar welding applications. These welding rods are known for their high thermal conductivity, low melting point, and good fluidity, making them suitable for welding thin-walled aluminum components. Another example is ERCuMnNiAl, which is a nickel-copper-manganese-aluminum alloy TIG welding rod that is often used for welding high-temperature alloys. This welding rod offers high strength and resistance to creep, making it ideal for use in high-stress applications. See also How to Weld EN24 AISI 4340-DIN-34CrNiMo6 Aluminum TIG welding rods, classified under the AWS A5.10 specification, are filler rods used for welding aluminum alloys. The two most common aluminum TIG welding rods are ER4043 and ER5356. ER4043 is a general-purpose filler rod that is often used for welding aluminum alloys with a medium to high strength, including the 6xxx series alloys. This filler rod is known for its good fluidity and crack resistance, making it a good choice for welding aluminum in a variety of applications. ER5356, on the other hand, is a higher-strength filler rod that is commonly used for welding aluminum alloys with a high strength, such as the 5xxx series alloys. This filler rod is known for its high strength and good corrosion resistance, making it a popular choice for welding aluminum in harsh environments. Titanium TIG welding rods are characterized by their high strength, low density, and excellent corrosion resistance, making them suitable for use in a wide range of applications, particularly in harsh environments. Related reading: Titanium TIG Welding Guide. These rods are classified according to the AWS A5.16 specification, which outlines the requirements for their composition and performance. The AWS A5.16 specification includes a variety of different titanium TIG welding rods, each with specific properties and characteristics that make them suitable for different welding applications. Titanium TIG welding rods The most common titanium TIG welding rods include ERTi-1, ERTi-2, ERTi-3, and ERTi-4, which are the basic grades of commercially pure titanium. These rods are characterized by their high strength-to-weight ratio, excellent corrosion resistance, and low density, making them ideal for use in various industries, including aerospace, marine, and medical. For example, ERTi-1 is a pure form of titanium with a high level of corrosion resistance and low ductility, making it ideal for welding in corrosive environments. ERTi-2 is a higher strength grade of titanium, offering improved mechanical properties over ERTi-1, while ERTi-3 and ERTi-4 offer even higher strength and improved toughness. In addition to the basic grades, the AWS A5.16 specification also includes a list of other titanium TIG welding rods, each with specific chemical compositions and properties. The exact chemical compositions of these rods, as well as the complete list of titanium TIG welding rods, can be found in the table provided in the AWS A5.16 specification (table shown above). When choosing the right filler rod for TIG welding, consider the following tips: Base metal: The filler rod must match the base metal in terms of composition and welding requirements. For example, if the base metal is a stainless steel, the filler rod must also be a stainless steel. Welding position: The filler rod should be suitable for the welding position, whether it’s flat, horizontal, vertical, or overhead. Welding environment: The filler rod must be able to withstand the environmental conditions of the welding area, such as heat, moisture, and corrosive substances. Welding thickness: The filler rod must have the right diameter and be able to handle the thickness of the base metal being welded. Weld strength: The filler rod must provide the required strength and toughness for the intended application. Weld appearance: The filler rod must produce a visually appealing weld that is free of cracks, porosity, and other defects. Welding costs: The filler rod should be cost-effective, taking into consideration factors such as the price of the rod, the ease of use, and the overall cost of welding. Welding efficiency: The filler rod must be easy to use and promote efficient welding, with minimal wastage and consistent results. See also How to setup a Welding Rig TruckIn conclusion, choosing the right filler rod for TIG welding requires a careful consideration of the welding environment, the base metal, and the desired weld outcome. By taking these factors into account, you can select the best filler rod for your specific TIG welding requirements, ensuring optimal performance and high-quality results. ER70S-3 is a classification of a TIG (Tungsten Inert Gas) filler rod. The “ER” stands for “Electrode Rod,” the “70” refers to the minimum tensile strength of the weld deposit in thousands of pounds per square inch (ksi), and the “S” designates that it is a solid wire. “3” indicates its chemical compositions. Similarly, ER80S-D2 is a classification of a low alloy steel TIG (Tungsten Inert Gas) filler rod. The classification consists of several components, each indicating specific properties of the filler rod: ER: Electrode Rod 80: Minimum tensile strength of the weld deposit in thousands of pounds per square inch (ksi) S: Solid wire D2: weld wire chemistry as explained in table earlier for low alloy steel tig wires. Below is an example for ER308L stainless steel tig welding wire rod. In ER308L, the meaning of each digits are: “ER” mean electrode, “308” means the weld metal type, “L” means Low carbon. You may notice “H” or “Mo” or “Ni” in place of “L“, where H means high carbon, Mo means added molybdenum and Ni means added Nickel in the rod. In the below example, meaning of ER4943 aluminum welding rod meaning is explained. ER means Rod, 4 means aluminum silicon alloy series. 9 refers to alloy modification, 43 is the specific alloy grade. To determine the best amperage and voltage settings for a specific TIG filler rod consider factors such as the welding position, base metal thickness, and desired welding speed. It’s also important to consider the type of shielding gas being used, as this can impact the welding performance and quality. In general, the amperage and voltage settings for TIG welding should be adjusted according to the filler rod diameter, welding position, and base metal thickness. As a starting point, it’s common to use an amperage setting of 80-100 amps for welding with a 1/16-inch filler rod, and to adjust the voltage accordingly to achieve the desired weld penetration and appearance.

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