2205

Principal Design Features: 2205 is a duplex stainless steel designed to combine improved resistance to stress corrosion cracking, pitting, crevice corrosion and high strength when compared with other stainless alloys. This alloy resists chloride environments and sulfide stress corrosion. It is also roughly double the strength of standard austenitic stainless steels.

Applications: Most often employed in welded pipe and tube in chemical tanks, flue gas filters, acetic acid distillation components and heat exchangers.

Machinability: Similar in nature to 316 stainless steel. Slow speeds, positive feeds, sharp tooling and rigid mounts are essential. Machinable with either high speed or carbide tooling, with speeds for carbide reduced by roughly 20 %.

Forming: Due to its inherently high strength and work hardening rate, 2205 is difficult to form. It will take a lower radius than 316 stainless and a higher allowance must be made for springback.

Welding: TIG, MIG, SMAW and manual covered electrode methods have been successfully employed. Use caution in the following areas : 1.) Do not preheat the weld piece. 2.) use low heat inputs and 3.) Cool below 300 F between passes.

Hot Working: Hot work should be done in the range of 1750-2100 F, although room temperature forming is recommended whenever possible. When any hot forming is performed, a full anneal with rapid quench is required to retain maximum stability and properties.

Annealing: Anneal at 1868-1958 F(1020-1070 C), water quench

2304

Principal Design Features: This alloy is a duplex stainless steel whose structure is a balance of ferritic and austenitic. It was designed to feature high strength and toughness, resistance to stress corrosion cracking, low thermal expansion, high thermal conductivity and easy fabrication. This alloy is not designed for applications which expose it to temperatures over 570 F for long periods.

Applications: Heat exchangers, feed water tubes, piping and instrumentation tubing for general service. Industries utilizing this alloy include the coal handling, food and beverage, potash, waste water and pulp and paper.

Machinability: Low speeds and constant feeds will minimize this alloy's tendency to work harden. Tougher than 304 and 316 stainless with a long stringy chip, the use of chip breakers is recommended.

Forming: Due its inherently higher yield strength, initial forming pressures must be higher than those required for standard 300 series stainless steel. Low ductility will make forming operations difficult.

Welding: All common methods including GTAW, SAW and GMAW can be successfully employed. Preheating and post weld annealing is not required. Filler metal should be a balanced ferrite/ austenite type like 2205 or 2304.

Hot Working: This is the recommended method of forming. It may commence after heating to 1750-2000 F, followed by rapid cooling after working. For maximum properties material should be fully annealed after working.

Annealing: Heat to 1710-1920 F(930-1050 c), rapid quench.

Hardening: This material is not hardenable by heat treatment.

2507

Principal Design Features: This is a duplex alloy stainless steel designed to feature high strength, resistance to pitting, stress corrosion cracking, erosion corrosion and corrosion fatigue, crevice corrosion and strong weldability.

Applications: Applications include components exposed to strong chloride rich environments. Among them are a variety of components in desalination plants, heat exchanger tubes in sea water cooling plants, drive shafts for ocean going vessels, containers for the pulp and paper industry, tube and pipe systems at petrochemical refineries and human implant components.

Machinability: Low speeds and constant feeds will minimize this alloy's tendency to work harden. Tougher than 304 and 316 stainless with a long stringy chip, the use of chip breakers is recommended.

Forming: Due its inherently higher yield strength, initial forming pressures must be higher than those required for standard 300 series stainless steel. Low ductility will make forming operations difficult.

Welding: All common methods including GTAW, SAW and GMAW can be successfully employed. Preheating and post weld annealing is not required. Filler metal should be a balanced ferrite/ austenite type like 2205, 2507 or 2304.

Hot Working: This is the recommended method of forming. It may commence after heating to 1750-2000 F, followed by rapid cooling after working. For maximum properties material should be fully annealed after working.

Annealing: Heat to 1920-2060 F(1050-1125 C), rapid quench.

Hardening: This material is not hardenable by heat treatment.

301

Principal Design Features: 301 is a commonly available austenitic stainless with good corrosion resistance and elevated carbon to allow for cold working to a variety of tempers. It can be obtained in the annealed, 1/4 hard, 1/2 hard, 3/4 hard, full hard, extra full hard and high yield tempers from both producers and distributors.

Applications: Automotive trim, kitchen equipment, hose clamps, wheel covers, aircraft components and a wide variety of industrial applications.

Machinability: 301 is not available in bar, plate, tube, pipe or forging, therefore no information is available.

Forming: Easily formed in the annealed condition. Care must be taken in forming operations which involve deforming the material in the tempered condition as cracking and tearing can result. Intermediate annealing only serves to reduce the hardness and therefore ultimate properties.

Welding: All popular techniques may be used, however the material will lose temper in the heat affected weld zone.

Forging: Commence forging at 2000-2200 F(1093-1204 C) and finish at 1700 F(927 C).

Hot Working: While cold forming is recommended wherever feasible, forging, upsetting and other operations can be performed at 1800-2100 F. Temperatures above this range will cause scaling and a reduction in the workability of the material. Post-process annealing is required to re-attain maximum corrosion resistant properties.

Cold Working: Most common cold work methods are successful with this alloy. It should be understood however that the material will be more difficult to work than other austenitic stainless steels due its high work hardening rate. The resulting hardening will, however, produce increases in strength and toughness which may be of value in the finished product.

Annealing: 1850-2050 F (101-1121 C) followed by rapid cooling. For thin sections air cooling is acceptable, while heavier sections should be water quenched.

Hardening: This alloy does not respond to heat treatment.

302

Principal Design Features: Type 302 is a slightly higher carbon version of type 304, most commonly found in strip and wire forms. While still used in a variety of industries, many applications have shifted to 304 and 304L due to advances in melting technology, availability and cost.

Applications: Primarily used in the stamping, spinning and wire forming industry. This alloy is formed into all types of washers, springs, screens and cables.

Machinability: Slow speeds and high feeds will overcome this alloys tendency to work harden. Due to gummy chips, it is recommended that chip breakers are used on all tooling.

Welding: This alloy can best be welded by resistance or shielded fusion methods. Filler metals should be AWS E/ER308 or 312. Post weld annealing dissolves the chromium carbide and is recommended for maximum resistance to intergranular attack.

Forging: Commence forging at 2100-2300 F(1149-1260 C). Do not forge below 1700 F(927 C**).**

Hot Working: Uniform heating to 2100 F(1149 C) will allow this allow to be forged, upset and headed successfully. Do not work 302 below 1700 F (927 C). Forgings should be fully annealed after all operations to reattain maximum corrosion resistance.

Cold Working: Cold working will dramatically increase the hardness of this material, however it is quite ductile and may readily be drawn, spun and upset. Any cold work will cause this alloy to become magnetic. Post-fabrication annealing is necessary to reattain maximum corrosion resistance and a non-magnetic condition.

Annealing: 1850-2050 F (1010-1121 C) with cooling at a rapid rate to avoid the precipitation of chromium carbides**.**

Hardening: This alloy does not respond to heat treatment.

303

Principal Design Features: 303 is one of the most popular of all the free machining stainless steels. It offers good strength, corrosion resistance and great machinability. It will resist scaling at temperatures up to 1600 F(871 C).

Applications: sed in an incredibly wide variety of parts both in screw and general machining industries. Applications include hardware, fasteners, valve parts, nozzles and trim.

Machinability: Excellent speeds and feeds are capable with this material. The addition of sulfur causes a very brittle chip. Many companies now offer premium machinability grades, such as CarTech with their Project 70 and 7000 series.

Welding: Although not recommended, welding may be performed if low temperatures are employed. Recommended filler metal is AWS E/ER312. At high temperature, the sulfur in 303 tends to precipitate at the weld boundary resulting in weak and brittle joints.

Hot Working: Forging and upsetting may commence once the workpiece has been thoroughly heated to 2100-2300 F (1149-1260 C). It is not recommended to work this material below 1700 F (927 C). Rapid post-work cooling will optimize corrosion performance.

Cold Working: Minor deformation is possible with this alloy, although it is not its strong point. Type 303 Se is superior in this aspect.

Annealing: 1850-1950 F (1010-1066 C), followed by rapid cooling is the recommended practice.

Hardening: This alloy does not respond to hardening by heat treatment. Cold work will raise both the hardness and strength characteristics

304

Principal Design Features: One of the most widely used and oldest of the stainless steels. This was originally called 18-8 which stood for its chromium and nickel content. It possesses an excellent combination of strength, corrosion resistance and fabricability. It is available in the widest variety of forms and sizes of any stainless steel.

Applications: The list is endless. Almost every conceivable industry uses some of this material in some way. Everything from stovetops to ball point pen barrels to flatware to fasteners has been fabricated from this alloy.

Machinability: Slow speeds and heavy feeds will minimize this alloys tendency to work harden. Due to long stringy chips, the use of chip breakers is advisable. Many companies now offer premium machinability grades, such as CarTech with their Project 70 and 7000 series.

Welding: All fusion and resistance processes have been successfully employed in welding 304. AWS E/ER308 or 312 filler metal is recommended. For cleaner, stronger welds, may users choose 304L which has a controlled low carbon content designed to reduce carbide precipitation at the weld boundaries.

Hot Working: Forging, heading and other hot working should follow uniform heating to 2100-2300 F (1149-1260 C). Rapid cooling is necessary to attain maximum corrosion resistance in finished parts.

Cold Working: Readily fabricated by most cold working methods, 304 may require intermediate annealing to avoid cracking or tearing from radical deformation. Full annealing should follow any operation to reduce internal stress and optimize corrosion resistance.

Annealing: 1850-2050 F (1010-1121 C) followed by rapid cooling.

Hardening This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

304L

Principal Design Features A low carbon version of type 304 stainless. 304L is used almost interchangeably with 304 but is preferred for welding operations. It offers a good combination of strength, corrosion resistance and fabricability.

Applications The list is endless. Almost every conceivable industry uses some of this material in some way. Everything from stovetops to ball point pen barrels to flatware to fasteners has been fabricated from this alloy.

Machinability Slow speeds and heavy feeds will minimize this alloys tendency to work harden. Due to long stringy chips, the use of chip breakers is advisable. Many companies now offer premium machinability grades, such as CarTech with their Project 70 and 7000 series.

Welding All fusion and resistance processes have been successfully employed in welding 304. AWS

E/ER308 or 312 filler metal is recommended. Its low carbon, means that the is less carbide precipitation at the weld boundaries resulting in stronger welds.

Hot Working Forging, heading and other hot working should follow uniform heating to 2100-2300 F (1149-1260 C). Rapid cooling is necessary to attain maximum corrosion resistance in finished parts.

Cold Working Readily fabricated by most cold working methods, 304L may require intermediate annealing to avoid cracking or tearing from radical deformation. Full annealing should follow any operation to reduce internal stress and optimize corrosion resistance.

Annealing 1850-2050 F (1010-1121 C) followed by rapid cooling.

Hardening This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

309

Principal Design Features This alloy is known for good strength and oxidation resistance in continuous service temperatures up to 2000 F (1093 C).It is superior to 304 stainless in both strength and corrosion resistance.

Applications Oven linings, boiler baffles, fire box sheets, furnace components and other high temperature containers.

Machinability This alloy machines similarly to type 304 stainless. Its chips are stringy and it will work harden rapidly. It is necessary to keep the tool cutting at all times and use chip breakers.

Welding Most of the austenitic stainless steels can be readily welded using fusion or resistance methods. Oxyacetylene welding is not recommended. Filler metal should be AWS E/ER 309 or 309L.

Hot Working Working temperatures are 2150 F (1177 C), with reheating necessary at 1800 F (982 C).Rapid quenching is recommended. Full post-work annealing is required to reattain maximum corrosion resistance.

Cold Working Although this alloy has a high work hardening rate, it can be drawn, headed, upset, and stamped. Full annealing is required after cold work to remove internal stress.

Annealing 1900-2050 F (1038-1121 C), water quench.

Hardening This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

309S

Principal Design Features Basically a controlled carbon version of type 309 stainless designed to improve the weld strength of the alloy while benefiting from the alloy's high resistance to heat and corrosion. Superior corrosion resistance to 309 in the range of 800-1500 F (427-816 C).

Applications Oven linings, boiler baffles, fire box sheets, furnace components and other high temperature containers.

Machinability This alloy machines similarly to type 304 stainless. Its chips are stringy and it will work harden rapidly. It is necessary to keep the tool cutting at all times and use chip breakers.

Welding Most of the austenitic stainless steels can be readily welded using fusion or resistance methods. Oxyacetylene welding is not recommended. Filler metal should be AWS E/ER 309L.

Hot Working Working temperatures are 2150 F (1177 C), with reheating necessary at 1800 F (982 C). Rapid quenching is recommended. Full post-work annealing is required to reattain maximum corrosion resistance.

Cold Working Although this alloy has a high work hardening rate, it can be drawn, headed, upset, and stamped. Full annealing is required after cold work to remove internal stress.

Annealing 1900-2050 F (1038-1121 C), water quench.

Hardening This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

310

Principal Design Features The strength of this alloy is a combination of good strength and corrosion resistance in temperatures up to 2100 F (1149 C). Due to its relatively high chromium and nickel content it is superior in most environments to 304 or 309 stainless.

Applications Oven linings, boiler baffles, kilns, lead pots, radiant tubes, annealing covers, saggers, burners, combustion tubes, refractory anchor bolts, fire box sheets, furnace components and other high temperature containers.

Machinability This alloy machines similarly to type 304 stainless. Its chips are stringy and it will work harden rapidly. It is necessary to keep the tool cutting at all times and use chip breakers.

Welding Most of the austenitic stainless steels can be readily welded using fusion or resistance methods.

Oxyacetylene welding is not recommended. Filler metal should be AWS E/ER 310.

Hot Working Most common hot work methods can be successfully performed after uniform heating to 2150 F (1177 C). Do not forge below 1800 F (982 C). Rapid cooling is required to maximize corrosion resistance.

Cold Working Although this alloy has a high work hardening rate, it can be drawn, headed, upset, and stamped. Full annealing is required after cold work to remove internal stress.

Annealing 1900-2050 F (1038-1121 C) water quench.

310S

Principal Design Features The strength of this alloy is a combination of good strength and corrosion resistance in temperatures up to 2100 F (1149 C). Due to its relatively high chromium and nickel content it is superior in most environments to 304 or 309 stainless.

Applications Oven linings, boiler baffles, fire box sheets, furnace components and other high temperature containers.

Machinability This alloy machines similarly to type 304 stainless. Its chips are stringy and it will work harden rapidly. It is necessary to keep the tool cutting at all times and use chip breakers.

Welding Most of the austenitic stainless steels can be readily welded using fusion or resistance methods. Oxyacetylene welding is not recommended. Filler metal should be AWS E/ER 310.

Hot Working Most common hot work methods can be successfully performed after uniform heating to 2150 F (1177 C). Do not forge below 1800 F (982 C). Rapid cooling is required to maximize corrosion resistance.

Cold Working Although this alloy has a high work hardening rate, it can be drawn, headed, upset, and stamped. Full annealing is required after cold work to remove internal stress.

Annealing 1900-2050 F (1038-1121 C) water quench.

Hardening This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

316

Principal Design Features This austenitic stainless steel has an increased molybdenum content to increase its resistance to corrosion when compared to other 300 series alloys. It will resist scaling at temperatures up to 1600 F (871 C) and maintains good mechanical properties and creep strength at high temperatures.

Applications Widely used in industry, it was initially designed for paper mill machinery. It has been used in marine environments and a wide variety of general industrial components.

Machinability Low speeds and constant feeds will minimize this alloy's tendency to work harden. Tougher than 304 stainless with a long stringy chip, the use of chip breakers is recommended. Many companies now offer premium machinability grades, such as CarTech with their Project 70 and 7000 series.

Welding All common fusion and resistance methods except oxyacetylene welding have proven successful. Use AWS E/ER316 or 316L filler metal for best results.

Hot Working All common hot working processes are possible with this alloy. Heat to 2100-2300 F (1149-1260 C). Avoid working this material below 1700 F (927 C). For optimum corrosion resistance, a post-work annealing is recommended.

Cold Working Shearing, stamping, heading and drawing can be successfully performed . To remove internal stresses, a post-work annealing is recommended.

Annealing 1850-2050 F (1010-1121 C), followed by rapid cooling.

Hardening This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

316L

Principal Design Features 316L is often substituted for 316 stainless due to its superior weldability with no appreciable difference in price or properties. It combines good availability in all forms and size ranges with great strength and corrosion resistance.

Applications Components used in marine environments and chemical equipment. Suitable for any application where 316 stainless is used and stronger welds are desirable.

Machinability Low speeds and constant feeds will minimize this alloy's tendency to work harden. Tougher than 304 stainless with a long stringy chip, the use of chip breakers is recommended. Many companies now offer premium machinability grades, such as CarTech with their Project 70 and 7000 series.

Welding All common fusion and resistance methods except oxyacetylene welding have proven successful.

Use AWS E/ER 316L filler metal for best results.

Hot Working All common hot working processes are possible with this alloy. Heat to 2100-2300 F (1149-1260 C). Avoid working this material below 1700 F (927 C). For optimum corrosion resistance, a post-work annealing is recommended.

Cold Working Shearing, stamping, heading and drawing can be successfully performed . To remove internal stresses, a post-work annealing is recommended.

Annealing 1850-2050 F (1010-1121 C), followed by rapid cooling.

Hardening This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

317

Principal Design Features 317 is a higher chromium, nickel and molybdenum version of 316 stainless designed principally for increased strength and corrosion resistance.

Applications Textile, pulp paper and chemical equipment, for corrosion resistance.

Machinability Low speeds and constant feeds will minimize this alloy's tendency to work harden. Tougher than 304 stainless with a long stringy chip, the use of chip breakers is recommended.

Welding All common fusion and resistance methods except oxyacetylene welding have proven successful. Use AWS E/ER317 or 317L filler metal for best results.

Hot Working All common hot working processes are possible with this alloy. Heat to 2100-2300 F (1149-1260 C). Avoid working this material below 1700 F (927 C). For optimum corrosion resistance, a post-work annealing is recommended.

Cold Working Shearing, stamping, heading and drawing can be successfully performed . To remove internal stresses, a post-work annealing is recommended.

Annealing 1850-2050 F (1010-1121 C), followed by rapid cooling.

Hardening This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

317L

Principal Design Features 317L is a low carbon version of 317 stainless. It possesses the same high strength and corrosion resistance and will produce stronger welds due to its low carbon content. Many users are shifting over to this alloy in lieu of 304 and 316 as availability and cost improves.

Applications Chemical and petrochemical process equipment, pulp and paper manufacturing and condensers in fossil and nuclear fueled power generation stations.

Machinability Low speeds and constant feeds will minimize this alloy's tendency to work harden. Tougher than 304 stainless with a long stringy chip, the use of chip breakers is recommended.

Welding All common fusion and resistance methods except oxyacetylene welding have proven successful. Use AWS E/ER 317L filler metal for best results.

Hot Working All common hot working processes are possible with this alloy. Heat to 2100-2300 F (1149-1260 C). Avoid working this material below 1700 F (927 C). For optimum corrosion resistance, a post-work annealing is recommended.

Cold Working Shearing, stamping, heading and drawing can be successfully performed . To remove internal stresses, a post-work annealing is recommended.

Annealing 1850-2050 F (1010-1121 C), followed by rapid cooling.

Hardening This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

321

Principal Design Features The key feature of 321 stainless is its resistance to intergranular corrosion. It employs titanium as a stabilizing element against chromium carbide formation. This alloy also exhibits strength characteristics superior to those of 304 stainless.

Applications Jet engine parts, furnace heat treated parts, expansion joints, turbo superchargers, oil refiners, exhaust manifolds and high temperature chemical production equipment.

Machinability Slightly tougher than 304 stainless, this material will produce the same tough stringy chips. The use of slow speeds and constant positive feeds will minimize this alloy's tendency to work harden.

Welding 321 may be welded by all commonly used fusion and resistance methods. Oxyacetylene welding is not recommended. When necessary, use AWS E/ER347 filler metal.

Hot Working Working temperatures of 2100-2300 F (1149-1260 C) are recommended for forging, upsetting and other hot work processes. Do not work this alloy at temperatures below 1700 F (927 C).

Material must be water quenched or fully annealed after working to reattain maximum corrosion resistance.

Cold Working Although this material requires higher initial forces than 304 stainless, it is quite tough and ductile and can be readily stamped, blanked, spun and drawn.

Annealing 1800-2000 F (928-1093 C), air cool. This procedure will result in maximum ductility. For maximum corrosion resistance, see the note on stabilizing anneal under corrosion.

Hardening This alloy does not harden by heat treating. Elevated properties may only be obtained through cold reduction

347

Principal Design Features Similar to 321 stainless, 347 uses columbium as a stabilizing element to maximize its principal feature: resistance to intergranular corrosion. It can be used in applications requiring repeated heating in the range of 800 and 1650 F (427-899 C).

Applications High temperature gaskets and expansion joints, rocket engine parts, aircraft collector rings and exhaust manifolds and chemical production equipment.

Machinability Slightly tougher than 304 stainless, this material will produce the same tough stringy chips. The use of slow speeds and constant positive feeds will minimize this alloy's tendency to work harden.

Welding 347 may be welded by all commonly used fusion and resistance methods. Oxyacetylene welding is not recommended. When necessary, use AWS E/ER347 filler metal.

Hot Working Working temperatures of 2100-2250 F (1149-1232 C) are recommended for forging, upsetting and other hot work processes. Do not work this alloy at temperatures below 1700 F (927 C). Material must be water quenched or fully annealed after working to reattain maximum corrosion resistance.

Cold Working Although this material requires higher initial forces than 304 stainless, it is quite tough and ductile and can be readily stamped, blanked, spun and drawn.

Annealing 1850-2000 F (1010-1093 C), water quench. This procedure will result in maximum ductility. For maximum corrosion resistance, see the note on stabilizing anneal under corrosion.

Hardening This alloy does not harden by heat treating. Elevated properties may only be obtained through cold reduction

409

Principal Design Features 409 is an alloy designed principally for the automotive exhaust industry, although it has been used successfully in other industrial applications. It combines good elevated temperature corrosion resistance with medium strength, good formability and overall cost. In recent years, however, and with the upcoming US government requirement for a 100,00 mile exhaust capability, other alloys have been becoming more prevalent.

Applications Automobile mufflers, catalytic converters, tailpipes, farm equipment, structural supports and hangers, transformer cases, diamond tread plate and shipping containers.

Machinability Machining this alloy produces tough, draggy chips with heavy build-up. While this alloy can be machined in the annealed condition, it tends to perform better in the cold drawn or heat treated condition.

Forming This alloy is quite ductile in the annealed condition and can be easily formed using all commonly employed practices. Experienced fabricators report that it is similar in formability to soft carbon steel.

Welding Can be successfully welded employing SMA, GMA and GTA processes. When not used in a high temperature environment, filler metal AWS ER309 is acceptable for use. For stronger, more resilient welds at high temperature, use weld filler such as 409 Cb, AWS ER430 or W18 Cr-Cb.

Hot Working Heat to 1500-1600 F(816-871 C) then rapidly heat to 1900-2050 F(1038-1121 C). Do not soak at this temperature and do not work at temperatures below 1500 F(816 C). Air cool forgings.

Cold Working Despite a rather low work hardening rate, this alloy can be easily formed using most common methods.

Annealing Soak material at 1200-1400 F(649-760 C) and air cool.

Hardening This alloy is not hardenable by heat treatment

410

Principal Design Features 410 is the basic martensitic stainless which will attain high mechanical properties after heat treatment. It has good impact strength, corrosion and scaling resistance up to 1200 F (649 C).

Applications Cutlery, steam and gas turbine blades and buckets, bushings, valve components, fasteners, screens and kitchen utensils.

Machinability Tough, draggy chips with heavy build-up. While this alloy can be machined in the annealed condition, it tends to perform better in the cold drawn or heat treated condition.

Welding Most common methods of welding can be successfully employed with this alloy. To reduce the chance of cracking, it is advisable to preheat the workpiece to 350-400 F (177-204 C). Post-weld annealing is recommended to reattain maximum ductility. Filler metal, when required, should be AWS E/ER410.

Hot Working 2000-2200 F (1093-1204 C) is the proper hot work range. Do not work this material below 1650 F (899 C).

Cold Working Readily cold formed using most of the common practices.

Annealing 1200-1400 F (649-760 C), followed by air cooling.

Tempering Temper for desired hardness, air or furnace cool.

Hardening 1750-1850 F (954-1010 C), oil quench for maximum hardness.

430

Principal Design Features A basic ferritic non-heat treatable stainless steel. Its strengths are in ductility, formability, good corrosion and oxidation resistance, thermal conductivity and finish quality.

Applications Appliance, automotive and architectural trim, vaults, heat exchangers, scientific apparatus and vending machine components.

Machinability Rated at 60 % of B1112. Relatively easily machined in all common procedures.

Forming Similar in forming characteristics to 304 stainless steel without the same degree of ductility. It does not, however, work harden greatly.

Welding All common welding methods used for stainless will be successful with 430. Filler metal should be AWS E/ER308 or 312.

Forging Bring the work piece to 1500 F (816 C), then on quickly to 1900 F (1038 C). Prolonged exposure at this temperature will cause grain growth. Do not work this material at less than 1500 F (816 C). Air cool to room temperature and anneal.

Hot Working Generally the recommended method of hot forming is to work the material at between 1300 and 1500 F. Hot forming is only required on heavy sections.

Annealing Soak at 1500 F, furnace cool (50 F/hour) to 1100 F, then air cool.

Hardening 430 does not respond to hardening by heat treatment.