

**Non-Ferrous: Stainless Steel & Hi-Temp Alloys**

**Stainless Steel - Level 1**

- **Description**

- Stainless steel is a non-corrosive alloy containing a mixture of steel, chromium, and nickel. This material is found in both residential and commercial applications.



### Hi-Temp

- 304 Stainless Steel [Sabot]
  - **Description**
    - 304 or 18/8 is the most common stainless steel grade due to its versatility in residential and commercial applications. It can be challenging to distinguish stainless from aluminum visually. Hence, it is important to handle the material to physically test the flexibility and see if a stamp exists indicating a stainless grade. A handheld analyzer is well suited to distinguish between different stainless grades if no markings are readily available.
  - **Upgrade potential**
    - Stainless steel has a variety of higher value grades than 304, such as 316, so it is essential to sort each piece to recognize these upgrades. The most efficient tool available is a handheld analyzer. It can recognize the difference between stainless grades and high-temp alloys in seconds.
  - **ISRI definition**
    - **Sabot** Stainless Steel Scrap
      - Shall consist of clean 18-8 type stainless steel clips and solids containing a minimum 7% nickel, 16% chrome, and have a maximum of .50% molybdenum, .50% copper, .045% phosphorous, and .03% sulfur, and otherwise free of harmful contaminants. Particulars concerning physical description, grading, additional analysis, and preparation to be agreed upon between buyer and seller.



### Hi-Temp

- 316 Stainless
  - **Description**
    - 316 stainless steel is found in more industrial applications and will often come as pipes or valves. A stamp or engraving with 316 is quite common, so an analyzer is not entirely necessary to distinguish this material; however, it may be time-consuming searching for markings.
  - **Upgrade potential**
    - While 316 is upgraded from 304, several high-temp alloys may coexist within a truckload of 316. This further reiterates the importance of a metal analyzer.



**Hi-Temp**

**Stainless Steel - Level 2**

- 2205 Stainless
  - **Description**
    - 2205 Stainless comes in a variety of forms, such as plate pipe or castings. It can easily be mistaken for a ferrous product due to its magnetic pull. Don't be quick to judge magnetic stainless as 2205 has a similar composition to 304 (Chromium & Nickel) and 316 (molybdenum). An analyzer should be used with all stainless steel to ensure quality and capture upgrades.
  - **Upgrade potential**
    - This material is often upgraded from the yard's ferrous side as it may have been purchased as chrome coated steel. Another upgrade might come out of dirty/irony stainless.





### Hi-Temp

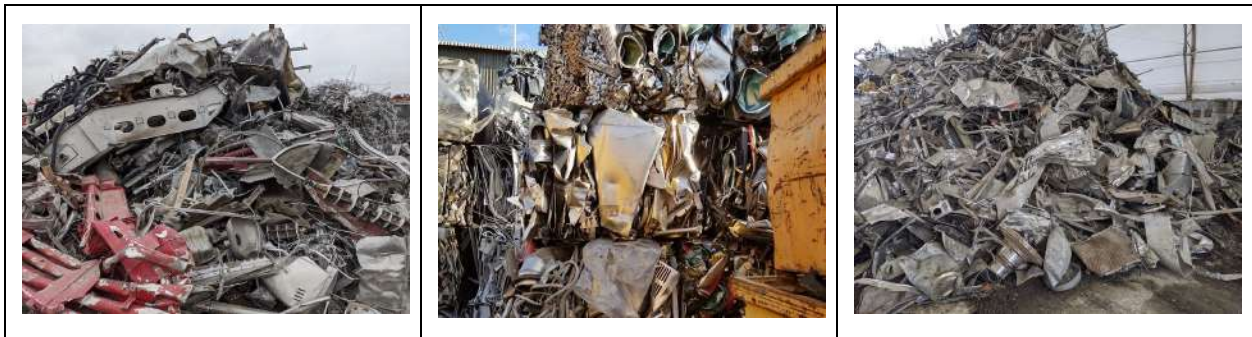
- 400 Series
  - **Description**
    - The 400 series stainless steel is magnetic, so it can easily be mistaken for steel. Checking for a stamp or using an analyzer is essential to sort this material from another ferrous scrap. 409 stainless steel is used to contain the catalyst in a catalytic converter.
  - **Upgrade potential**
    - This material is often upgraded from ferrous scrap.



**Hi-Temp**

**Stainless Steel - Level 3**

- Dirty [Irony] Stainless Steel
  - **Description**
    - Similar to Dirty/irony Aluminum, Dirty/irony Stainless Steel is stainless that has ferrous or other contaminants still attached to it. Grading Irony Stainless Steel properly is easier than grading Irony aluminum. Stainless Steel has a similar density to iron and hence is similar in weight, making it easier to assess the percentage of iron or other contaminants attached to the stainless. Most often, if the material is not too large and/or bulky, it will be shredded and end up in the Zorba and Zurik piles at shredder locations. For larger type material, irony/dirty stainless steel can be cleaned and upgraded to clean stainless steel and sorted by grade, by either torching or shearing the material, and removing the non-conforming attachments.
  - **Upgrade potential**
    - Making use of a shear or other tools to remove attachments can result in clean stainless steel. Using an analyzer might find 304 or higher value stainless steel.



### Hi-Temp

- Shredded Aluminum [Zorba]
  - **Description**
    - Zorba is primarily composed of shredded aluminum with trace amounts of red metals. The main variables that dictate the value of this material are metallic content (should be 95%+), the size of each piece (fraction size), and the amount of copper & brass (red metal).
  - **Upgrade potential**
    - It is very important to take regular samples of this material to determine the composition. Correctly sampling this material can result in a higher value. Proper sampling should make use of statistical analysis where a 95% confidence interval is applied.
  - **ISRI Definition**
    - **Zorba** Shredder Non-Ferrous Scrap (predominantly aluminum)
      - Shall be made up of a combination of the nonferrous metals: aluminum, copper, lead, magnesium, stainless steel, nickel, tin, and zinc, in elemental or alloyed (solid) form. The percentage of each metal within the nonferrous concentrate shall be subject to agreement between buyer and seller. Material generated by eddy current, air separation, flotation, screening, other segregation Technique(s), or a combination thereof. Shall have passed one or more magnets to reduce or eliminate free iron and/or large iron attachments. Shall be free of radioactive material, dross, or ash. Material to be bought/sold under this guideline shall be identified as “Zorba” with a number to follow indicating the estimated percentage nonferrous metal content of the material (e.g., “Zorba 90” means the material contains approximately 90% nonferrous metal content). May also be screened to permit description by specific size ranges. (Refer also to Zorba under Mixed Metals.)



### Hi-Temp

#### Hi-Temp Alloys

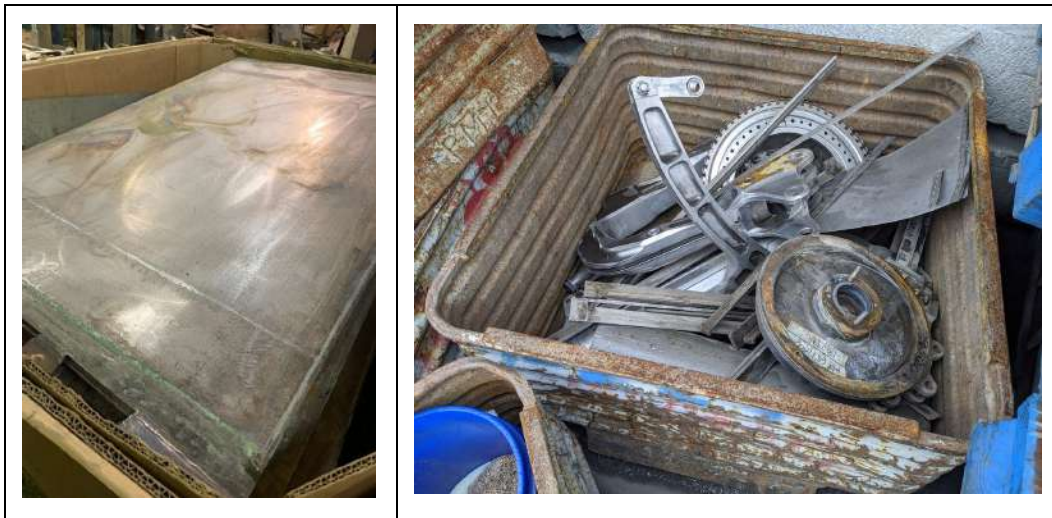
- High Temperature Alloys (Hi-temp)
  - **Description**
    - There are various Hi-temp alloys such as Titanium, Inconel, Tungsten/Carbide, and Cupronickel, to name a few.
  - **Upgrade potential**
    - Most of these Hi-temp alloys look like stainless steel, so it is important to test any stainless like material with an analyzer to determine its type. These types of upgrades will add value due to the significant price difference from stainless steel.





### Hi-Temp

- Titanium
  - **Description**
    - Titanium is a hard silver-gray metal used in strong, light, corrosion-resistant alloys. It is as strong as steel but much less dense, essentially 30% stronger but 45% lighter than steel. Therefore, it is important as an alloying agent with many metals, including aluminum, molybdenum, vanadium, tin, and iron. There are two types of titanium, wrought and cast titanium. Wrought titanium makes up the majority of material found in the scrap market in the shape of flat and round bar stock and tubing. Titanium alloys are mainly found in the aircraft, marine, and space industries but are also used in the production of recreational tools/toys such as golf clubs, bicycles, and crutches. 6-4 Titanium is the most widely used grade of scrap titanium, which can be either solids or turnings. Another common grade of titanium is CP Titanium, which stands for Commercially Pure. When grinding titanium, a white spark is emitted.
  - **Upgrade potential**
    - This material will often come in with attachments, so it can easily be upgraded using hand tools by removing iron and other attachments.



### Hi-Temp

- Inconel
  - **Description**
    - Inconel is a nickel alloy, with the most common types being 617, 625, and 718. Nickel's percentage ranges from 40-60%, so this material is one of the most expensive alloys.
  - **Upgrade potential**
    - Since this material looks similar to stainless, it can be found and sorted with an analyzer. The value difference is significant, so it is certainly worthwhile sorting.
  
- Tungsten Carbide
  - **Description**
    - Tungsten Carbide (WC) is found in machining operations in the form of drill bits, inserts, and tips. Small chunks are also added to large pieces of steel for drilling/tunneling.
  - **Upgrade potential**
    - Tunnelling equipment that contains Tungsten Carbide will often be purchased as steel however this material is worth exponentially more due to the Tungsten Carbide.



### Hi-Temp

- Cupronickel
  - **Description**
    - Cupronickel is most often found as a heat exchanger. There are three common types: 90/10, 80/20, and 70/30. Each number represents the split of Copper and Nickel, with Copper being the higher percentage.
  - **Upgrade potential**
    - This material looks like stainless steel, so it is important to use an analyzer as Cupronickel is a significant upgrade from stainless steel.

