DECIMAL EQUIVALENT CHART

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/64</td>
<td>.015625</td>
</tr>
<tr>
<td>1/32</td>
<td>.03125</td>
</tr>
<tr>
<td>3/64</td>
<td>.0625</td>
</tr>
<tr>
<td>5/64</td>
<td>.09375</td>
</tr>
<tr>
<td>7/64</td>
<td>.125</td>
</tr>
<tr>
<td>9/64</td>
<td>.140625</td>
</tr>
<tr>
<td>11/64</td>
<td>.171875</td>
</tr>
<tr>
<td>13/64</td>
<td>.1875</td>
</tr>
<tr>
<td>15/64</td>
<td>.203125</td>
</tr>
<tr>
<td>17/64</td>
<td>.21875</td>
</tr>
<tr>
<td>19/64</td>
<td>.234375</td>
</tr>
<tr>
<td>21/64</td>
<td>.25</td>
</tr>
<tr>
<td>23/64</td>
<td>.265625</td>
</tr>
<tr>
<td>25/64</td>
<td>.28125</td>
</tr>
<tr>
<td>27/64</td>
<td>.296875</td>
</tr>
<tr>
<td>29/64</td>
<td>.3125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>17/32</td>
<td>.53125</td>
</tr>
<tr>
<td>35/64</td>
<td>.546875</td>
</tr>
<tr>
<td>37/64</td>
<td>.5625</td>
</tr>
<tr>
<td>39/64</td>
<td>.59375</td>
</tr>
<tr>
<td>41/64</td>
<td>.625</td>
</tr>
<tr>
<td>43/64</td>
<td>.640625</td>
</tr>
<tr>
<td>45/64</td>
<td>.65625</td>
</tr>
<tr>
<td>47/64</td>
<td>.671875</td>
</tr>
<tr>
<td>49/64</td>
<td>.6875</td>
</tr>
<tr>
<td>51/64</td>
<td>.703125</td>
</tr>
<tr>
<td>53/64</td>
<td>.71875</td>
</tr>
<tr>
<td>55/64</td>
<td>.734375</td>
</tr>
<tr>
<td>57/64</td>
<td>.75</td>
</tr>
<tr>
<td>59/64</td>
<td>.765625</td>
</tr>
<tr>
<td>61/64</td>
<td>.78125</td>
</tr>
<tr>
<td>63/64</td>
<td>.796875</td>
</tr>
<tr>
<td>65/64</td>
<td>.8125</td>
</tr>
</tbody>
</table>
Stainless Steel


Stainless Steel is defined as a steel alloy with a minimum of 11.5 wt% chromium content. Stainless steel does not stain, corrode or rust as easily as ordinary steel (it "stains less"), but it is not stain-proof.

**100 Series—**austenitic chromium-nickel-manganese alloys
- Type 101—austenitic that is hardenable through cold working for furniture
- Type 102—austenitic general purpose stainless steel working for furniture

**200 Series—**austenitic chromium-nickel-manganese alloys
- Type 201—austenitic that is hardenable through cold working
- Type 202—austenitic general purpose stainless steel

**300 Series—**austenitic chromium-nickel alloys
Type 301—highly ductile, for formed products. Also hardens rapidly during mechanical working. Good weld ability. Better wear resistance and fatigue strength than 304.
Type 302—same corrosion resistance as 304, with slightly higher strength due to additional carbon
Type 303—free machining version of 304 via addition of sulfur and phosphorus. Also referred to as "A1" in accordance with ISO 3506.[9]
Type 304—the most common grade; the classic 18/8 stainless steel. Also referred to as "A2" in accordance with ISO 3506.[9]
Type 304L—same as the 304 grade but contains less carbon to increase weld ability. Is slightly weaker than 304
Type 304LN—same as 304L, but also nitrogen is added to obtain a much higher yield and tensile strength than 304L
Type 308—used as the filler metal when welding 304
Type 309—better temperature resistance than 304, also sometimes used as filler metal when welding dissimilar steels, along with inconel.
Type 316—the second most common grade (after 304); for food and surgical stainless steel uses; alloy addition of molybdenum prevents specific forms of corrosion. 316 steel is used in the manufacture and handling of food and pharmaceutical products where it is often required in order to minimize metallic contamination. It is also known as marine grade stainless steel due to its increased resistance to chloride corrosion compared to type 304. SS316 is often used for building nuclear reprocessing plants. Most watches that are made of stainless steel are made of Type 316L; Rolex is an exception in that they use Type 904L. Also referred to as "A4" in accordance with ISO 3506.[9] 316Ti (which includes titanium for heat resistance) is used in flexible chimney liners, and is able to withstand temperatures up to 2000 degrees Fahrenheit, the hottest possible temperature of a chimney fire.
Type 321—similar to 304 but lower risk of weld decay due to addition of titanium. See also 347 with addition of niobium for desensitization during welding.
400 Series—ferritic and martensitic chromium alloys
Type 405—a ferritic especially made for welding applications
Type 408—heat-resistant; poor corrosion resistance; 11% chromium, 8% nickel
Type 409—cheapest type; used for automobile exhausts; ferritic (iron/chromium only).
Type 410—martensitic (high-strength iron/chromium). Wear-resistant, but less corrosion-resistant.
Type 416—easy to machine due to additional sulfur
Type 420—Cutlery Grade martensitic; similar to the Brearley's original rustless steel. Excellent polishability.
Type 430—decorative, e.g., for automotive trim; ferritic. Good formability, but with reduced temperature and corrosion resistance
Type 440—a higher grade of cutlery steel, with more carbon in it, which allows for much better edge retention when the steel is heat-treated properly. It can be hardened to around Rockwell 58 hardness, making it one of the hardest stainless steels. Due to its toughness and relatively low cost, most display-only and replica swords or knives are made of 440 stainless. Also known as razor blade steel. Available in four grades: 440A, 440B, 440C, and the uncommon 440F (free machinable). 440A, having the least amount of carbon in it, is the most stain-resistant; 440C, having the most, is the strongest and is usually considered a more desirable choice in knife making than 440A except for diving or other salt-water applications.
Type 446—For elevated temperature service
500 Series—heat-resisting chromium alloys
600 Series—martensitic precipitation hardening alloys
601 through 604: Martensitic low-alloy steels.
610 through 613: Martensitic secondary hardening steels.
614 through 619: Martensitic chromium steels.
630 through 635: Semiaustenitic and martensitic precipitation-hardening stainless steels.
Type 630 is most common PH stainless, better known as 17-4; 17% chromium, 4% nickel
650 through 653: Austenitic steels strengthened by hot/cold work.
660 through 665: Austenitic superalloys; all grades except alloy 661 are strengthened by second-phase precipitation
Type 2205 — 2205 is the most widely used duplex (ferritic/austenitic) stainless steel grade. It finds applications due to both excellent corrosion resistance and high strength.

**Stainless Steel Finishes**

No. 0 - Hot rolled, annealed, thicker plates
No. 1 - Hot rolled, annealed and passivated
No. 2D - Cold rolled, annealed, pickled and passivated
No. 2B - Same as above with additional pass-through highly polished rollers
No. 2BA - Bright annealed (BA or 2R) same as above then Bright annealed under Oxygen-free atmospheric condition
No. 3 - Coarse abrasive finish applied mechanically
No. 4 - Brushed finish
No. 5 - Satin finish
No. 6 - Matte finish
No. 7 - Reflective finish
No. 8 - Mirror finish
No. 9 - Bead blast finish
No. 10 - heat colored finish-wide range of electropolished & heat colored surface

**AISI Steel Grades**


Carbon steels and low alloy steels are designated by a four digit number, where the first two digits indicate the alloying elements and the last two digits indicate the amount of carbon, in hundredths of a percent by weight. For example, a 1060 steel is a plain carbon steel containing 0.60 wt% C.

**Carbon Steels**

10xx - Plain Carbon (Mn 1.00% max)
11xx - Resulfurized
12xx - Resulfurized and Rephosphorized
15xx - Plain Carbon (Mn 1.00% to 1.65%)

### Manganese Steels
13xx - Mn 1.75%

### Nickel Steels
23xx - Ni 3.50%
25xx - Ni 5.00%

### Nickel-Chromium Steels
31xx - Ni 1.25%, Cr 0.65% or 0.80%
32xx - Ni 1.25%, Cr 1.07%
33xx - Ni 3.50%, Cr 1.50% or 1.57%
34xx - Ni 3.00%, Cr 0.77%

### Molybdenum Steels
40xx - Mo 0.20% or 0.25%
44xx - Mo 0.40% or 0.52%

### Chromium-Molybdenum (Chromoly) Steels
41xx - Cr 0.50% or 0.80% or 0.95%, Mo 0.12% or 0.20% or 0.25% or 0.30%

### Nickel-Chromium-Molybdenum Steels
43xx - Ni 1.82%, Cr 0.50% or 0.80%, Mo 0.25%
43BVxx - Ni 1.82%, Cr 0.50%, Mo 0.12% or 0.35%, V 0.03% min
47xx - Ni 1.05%, Cr 0.45%, Mo 0.20% or 0.35%
81xx - Ni 0.30%, Cr 0.40%, Mo 0.12%
86xx - Ni 0.55%, Cr 0.50%, Mo 0.20%
87xx - Ni 0.55%, Cr 0.50%, Mo 0.25%
88xx - Ni 0.55%, Cr 0.50%, Mo 0.35%
93xx - Ni 3.25%, Cr 1.20%, Mo 0.12%
94xx - Ni 0.45%, Cr 0.40%, Mo 0.12%
97xx - Ni 0.55%, Cr 0.20%, Mo 0.20%
98xx - Ni 1.00%, Cr 0.80%, Mo 0.25%

### Nickel-Molybdenum Steels
46xx - Ni 0.85% or 1.82%, Mo 0.20% or 0.25%
48xx - Ni 3.50%, Mo 0.25%
Chromium Steels
50xx - Cr 0.27% or 0.40% or 0.50% or 0.65%
51xx - Cr 0.80% or 0.87% or 0.92% or 1.00% or 1.05%
50xxx - Cr 0.50%, C 1.00% min
51xxx - Cr 1.02%, C 1.00% min
52xxx - Cr 1.45%, C 1.00% min

Chromium-Vanadium Steels
61xx - Cr 0.60% or 0.80% or 0.95%, V 0.10% or 0.15% min

Tungsten-Chromium Steels
72xx - W 1.75%, Cr 0.75%

Silicon-Manganese Steels
92xx - Si 1.40% or 2.00%, Mn 0.65% or 0.82% or 0.85%, Cr 0.00% or 0.65%

High-Strength Low-Alloy Steels
9xx - Various SAE grades
xxBxx - Boron steels
xxLxx - Leaded steels

Structural Steel (ATSM International)
Structural steel is steel construction material, a profile, formed with a specific shape or cross section and certain standards of chemical composition and strength. Structural steel shape, size, composition, strength, storage, etc, is regulated in most industrialised countries.

Carbon steels
* A36 - structural shapes and palet
* A53 - structural pipe and tubing
* A500 - structural pipe and tubing
* A501 - structural pipe and tubing
* A529 - structural shapes and palet

High strength low alloy steels
* A441 - structural shapes and plates
* A572 - structural shapes and plates
* A618 - structural pipe and tubing
* A992 - W shapes beams only

Corrosion resistant high strength low alloy steels
* A242 - structural shapes and plates
* A588 aka Cor-ten - structural shapes and plates
Quenched and tempered alloy steels
* A514 - structural shapes and plates
* A517 - boilers and pressure vessels

**Aluminum Alloy**


Aluminium alloys are alloys of aluminium, often with copper, zinc, manganese, silicon, or magnesium. They are much lighter and more corrosion resistant than plain carbon steel, but not quite as corrosion resistant as pure aluminium. Bare aluminium alloy surfaces will keep their apparent shine in a dry environment due to the formation of a clear, protective oxide layer.

**Common Aerospace Alloys**

**7075 Aluminum** - aluminium alloy, with zinc as the alloying element. It is strong, with good fatigue strength and average machinability, but is not weldable and has less resistance to corrosion than many other alloys. It's relatively high cost limit it's use to applications where cheaper alloys are not


**6061 Aluminum** - aluminium alloy, with magnesium and silicon as the alloying elements. It has generally good mechanical properties and is heat treatable and weldable. It is one of the most common alloys of aluminum for general purpose use.


**6063 Aluminum** - aluminium alloy, with magnesium and silicon as the alloying elements. It has generally good mechanical properties and is heat treatable and weldable. 6063 is mostly used in extruded shapes for architecture, particularly window frames, door frames, and roofs. It is typically produced with very smooth surfaces fit for anodizing.


**2024 Aluminum** - aluminium alloy, with copper and magnesium as the alloying elements. It is used in applications requiring high strength to weight ratio, as well as good fatigue resistance. It is not weldable, and has average machinability. Due to poor corrosion resistance, it is often clad with aluminium or Al 1Zn for protection, although this may reduce the fatigue strength. Due to its high strength and fatigue resistance, 2024 is widely used in aircraft structures, especially wing and fuselage structures under tension

Definitions:

**Annealing** - is a technique used to recover cold work and relax stresses within a metal. Annealing typically results in a soft, ductile metal. When an annealed part is allowed to cool in the furnace, it is called a "full anneal" heat treatment. When an annealed part is removed from the furnace and allowed to cool in air, it is called a "normalizing" heat treatment. During annealing, small grains recrystallize to form larger grains.

**Galvenizing** - a metallurgical process that is used to coat steel or iron with zinc. This is done to prevent galvanic corrosion (specifically rusting) of the ferrous item; while it is accomplished by non-electrochemical means, it serves an electrochemical purpose.

**Passivation** - the process of making a material "passive" in relation to another material prior to using the materials together.

**Pickling** - a treatment of metallic surfaces in order to remove impurities, stains, rust or scale.

**Quenching** - Refers to rapid cooling. In metallurgy, it is most commonly used to harden steel by introducing martensite, in which case the steel must be rapidly cooled through its eutectoid point, the temperature at which austenite becomes unstable.

**Cold Rolling** - a metal working process in which metal is deformed by passing it through rollers at a temperature below its recrystallization temperature. Cold rolling increases the yield strength and hardness of a metal by introducing defects into the metal's crystal structure. These defects prevent further slip and can reduce the grain size of the metal, resulting in Hall-Petch hardening. Cold rolling is most often used to decrease the thickness of plate and sheet metal.

**Hot Rolling** - used mainly to produce sheet metal or simple cross sections from billets describes the method of when industrial metal is passed or deformed between a set of work rolls and the temperature of the metal is generally above its recrystallization temperature, as opposed to cold rolling, which takes place below this temperature. Hot rolling permits large deformations of the metal to be achieved with a low number of rolling cycles.
**Heat Treating**: Heat treatment involves the use of heating or chilling, normally to extreme temperatures, to achieve a desired result such as hardening or softening of a material. 

**Cold Forming**: is a type of cold working that involves forging operations, such as extrusion, drawing or coining, performed at low temperatures. Cold working generally results in a higher yield strength as a result of the increased number of dislocations and the Hall-Petch effect of the sub-grains, and a decrease in ductility.

**Ductility**: is a mechanical property used to describe the extent to which materials can be deformed without fracture.