

How Do the Common End Uses of 3003 Aluminum and 5052 sheet Compare

The **3003** and **5052 aluminum sheets** are commonly referred to as "**Common Alloys**" because they are among the most widely used materials in the aluminum industry. However, even small variations in their chemical composition result in significant differences in properties and performance, making each alloy suitable for different applications.

Alloy Composition: What Are 3003 and 5052 Made Of?

The main alloying element in **3003 aluminum** is **manganese (Mn)**, while in **5052 aluminum**, it is **magnesium (Mg)**.

3003 contains elements such as **silicon, iron, copper, manganese, and zinc**.

5052 is composed of **silicon, copper, magnesium, chromium, and zinc**.

Although these differences may seem small, they greatly influence strength, corrosion resistance, and formability.

Nominal Chemical Compositions

Alloying Elements—Percent								
Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti
3003	0.6	0.7	0.2	1.0-1.5	0.0	0.0	0.1	0.0
5052	.25	0.4	0.1	0.1	2.2	0.15	0.1	0.0

Mechanical Properties: Strength and Performance

The change in alloying composition leads to noticeable variations in mechanical behavior.

3003 H14 aluminum has an **ultimate tensile strength of 20–26 KSI**, a **yield strength of 21 KSI**, an **elongation of 8.3%**, and a **Brinell hardness of 40**.

5052 H32 aluminum, on the other hand, offers an **ultimate tensile strength of 31–38 KSI**, a **yield strength of 28 KSI**, an **elongation of 12%**, and a **Brinell hardness of 60**.

This clearly shows that **5052** provides higher strength and better elongation, making it more suitable for demanding applications.

Mechanical Properties

Alloy & Temper	Strength (KSI)		Elongation % in 2 In.		Brinell Hardness
	Ultimate Min.—Max. (KSI)	Yield Set 0.2%	1/16" Thick	1/2" Dia.	
3003-0	14–19	6	30%	40	28
3003-H12	17–23	18	10%	20	35
3003-H14	20–26	21	8	16	40
3003-H16	24–30	25	5%	14	47
3003-H18	27—	27	4%	10	55
5052-0	25–31	13	25%	30	47
5052-H32	31–38	28	12%	18	60
5052-H34	34–41	31	10	14	68
5052-H36	37–44	35	8%	10	73
5052-H38	39—	37	7%	8	77

Forming and Fabrication Characteristics

Both alloys are known for their excellent **workability** and **corrosion resistance**, but they differ in strength and formability:

3003 aluminum is relatively soft, easily drawn, and offers good corrosion resistance. It is weldable, moderately strong, and ideal for applications requiring formability.

5052 aluminum is stronger, more resistant to corrosion—especially in saltwater—and has superior formability and work-hardening characteristics.

3003 is often selected for general-purpose uses requiring moderate strength and good fabrication properties, while **5052** is preferred when higher strength and corrosion resistance are required.

Corrosion Resistance Ratings

Corrosion resistance ratings (A to E) are based on performance in sodium chloride exposure tests.

A- and B-rated alloys perform well in industrial and coastal environments without protection.

C, D, and E-rated alloys generally require protective coatings on exposed surfaces.

This classification comes from the **Aluminum Standards & Data (2013)** published by the **Aluminum Association**.

Common End Uses of 3003 and 5052 Aluminum

3003 Aluminum Applications:

Cooking utensils, food containers, chemical processing equipment, pressure vessels, general sheet metal fabrication, hardware, tanks, and cabinets.

5052 Aluminum Applications:

High-strength sheet metal fabrication, household appliances, pressure vessels, automotive and marine components, food service, and medical equipment.

Comparative Characteristics and Applications

Alloy	Resistance to Corrosion		Workability (Cold)	Machinability	Brazeability	Weldability		
	General	Stress-Corrosion Cracking				Ga	Ar	Resistance Spot & Seam
3003-0	A	A	A	E	A	A	A	B
3003-H14	A	A	B	D	A	A	A	A
5052-O	A	A	A	D	C	A	A	B
5052-32	A	A	B	D	C	A	A	A

Conclusion

Both **3003** and **5052 aluminum sheets** are reliable and versatile materials offered by **GNEE Aluminum**.

3003 is the go-to choice for projects emphasizing **formability and moderate strength**.

5052 excels where **higher strength and superior corrosion resistance** are essential, particularly in **marine and industrial environments**.

With GNEE's expertise in aluminum processing, you can select the ideal alloy to match your application requirements—ensuring consistent performance, durability, and value.