

# Aluminum 2A12 and LY12: The Chinese Aerospace Standards (GB/T)

## Aluminum 2A12 and LY12: The Chinese Aerospace Standards (GB/T)

### Designation History and Relationship

For US-based engineers and procurement managers, **2A12** and **LY12** are often sources of confusion. They are effectively the Chinese equivalents of **AA2024**, governed by the **GB/T 3190** standard.<sup>3</sup>

- **LY12 (Old Designation):** Derived from the Chinese Pinyin system—"Lü" (Aluminum) and "Ying" (Hard). This designation was used in older standards (YZ/T) and Soviet-influenced nomenclature.
- **2A12 (Current Designation):** The modern designation under GB/T 3190. The "2" indicates the Al-Cu series, and "A" indicates the original alloy composition.
- **Equivalence:**  $LY12 = 2A12 \approx AA2024$ .<sup>45</sup>

### Chemical Composition: GB/T 2A12 vs. AA2024

While 2A12 is the "equivalent" of 2024, there are subtle differences in impurity limits that can affect certification for western aerospace projects (e.g., FAA/EASA parts).

| Element        | 2A12 (GB/T 3190) | 2024 (ASTM B209 / AMS) | Difference Analysis                         |
|----------------|------------------|------------------------|---|
| Copper (Cu)    | 3.8 – 4.9        | 3.8 – 4.9              | Identical range.                            |
| Magnesium (Mg) | 1.2 – 1.8        | 1.2 – 1.8              | Identical range.                            |
| Manganese (Mn) | 0.3 – 0.9        | 0.3 – 0.9              | Identical range.                            |
| Iron (Fe)      | $\leq 0.50$      | $\leq 0.50$            | Identical limit.                            |
| Silicon (Si)   | $\leq 0.50$      | $\leq 0.50$            | Identical limit.                            |
| Zinc (Zn)      | $\leq 0.30$      | $\leq 0.25$            | 2A12 allows slightly more Zn. <sup>46</sup> |
| Nickel (Ni)    | $\leq 0.10$      | Not Specified          | 2A12 explicitly limits Ni. <sup>46</sup>    |
| Titanium (Ti)  | $\leq 0.15$      | $\leq 0.15$            | Identical limit.                            |

Data Source: <sup>38</sup>

**Certification Risk:** While the chemistry is nearly identical, a material certified *only* as 2A12 may not automatically meet AMS 4037 specifications required for Boeing/Airbus parts without re-certification, particularly regarding the specific controls on trace elements and the rigorous batch testing protocols required by AMS.<sup>38</sup>

## Mechanical Properties (2A12-T4)

The mechanical performance of 2A12-T4 mirrors 2024-T4, confirming its suitability as a direct substitute in non-certified or domestic (Chinese) aviation applications.

| Property                  | 2A12-T4   | Unit              |
|---------------------------|-----------|-------------------|
| Ultimate Tensile Strength | 415 – 470 | MPa <sup>48</sup> |
| Yield Strength            | 265 – 300 | MPa <sup>48</sup> |
| Elongation                | 10 – 15%  | % <sup>48</sup>   |
| Hardness                  | 120 HB    | HB <sup>38</sup>  |

## Applications of 2A12/LY12

- **Chinese Aerospace:** Structural skins, bulkheads, and wing ribs for domestic aircraft (e.g., COMAC) and military aviation.<sup>46</sup>
- **General Manufacturing:** High-load components, rivets (used in annealed condition), and molds where 2024 would be specified.<sup>2</sup>