

## Sheet Pan Material Characteristic and Properties

At a glance the aluminum used for sheet pans looks the same for all pan manufacturers or brands. This is not the case. Vollrath uses a **3000 series aluminum** alloy. Competitors use a **1100 series aluminum**.

The **3000 series aluminum** is made of aluminum and several other elements. This produces an alloy with yield strength, fatigue properties, and elongation properties superior than those of **1100 series aluminum**. This makes Vollrath sheet pans much more durable in all conditions and an excellent value.

**1100 series aluminum** is 99% pure aluminum and is considerably softer than **3000 series**. Additionally, **1100 series aluminum** is more porous which makes staining and cleaning more of an issue.

### BASIC OVERVIEW OF MATERIALS AND USES

#### 1100 Series Aluminum Sheet (competitor's material choice)

A low strength aluminum alloy with excellent corrosion resistance and satisfactory anodizing and conversion coating finishing characteristics. It is unmatched by any other commercial aluminum alloy in workability. Non-heat treatable. Typical applications include processing equipment, kitchen utensils, general sheet metal work and household foil e.g. Reynolds Wrap®.

#### 3003/3004 Series Aluminum Sheet (Vollrath's material choice)

Approximately 20% higher strength than the **1100 series**, but retaining an excellent workability rating. May show some slight discoloration when anodized, but reacts well to mechanical and organic finishing. Typical applications include food and chemical equipment, appliance components, truck and trailer roofing, heat exchangers, lawn furniture components, truck/trailer parts.

### MATERIAL PROPERTIES

Mechanical Properties						
	Wrought Aluminium: 1100 (Al99,0)		Wrought Aluminium: 3003 (AlMn1)		Wrought Aluminium: 3004 (AlMn1,2Mg1)	
	Value	Unit	Value	Unit	Value	Unit
Yield strength	15,229	PSI	18,130	PSI	24,656	PSI
Fatigue	5,946	PSI	7,977	PSI	15,228	PSI
Elongation	12	%	10	%	10	%

Source: Metabase <[http://www.efunda.com/materials/alloys/aluminum/show\\_aluminum.cfm?ID=AA\\_3003&show\\_prop=all&Page](http://www.efunda.com/materials/alloys/aluminum/show_aluminum.cfm?ID=AA_3003&show_prop=all&Page)>

**Yield Strength:** The larger the value, the stronger and more durable the material is. The load on a material that causes the initial indication of permanent distortion. It is the stress point at which a material exhibits a specified deviation from the proportionality of the stress and strain.

**Fatigue Property:** The larger the value, the more durable the material is to heat cycles and repetitive stresses.

**Elongation Property:** The lower the percentage, the more the material resists warping.

### MATERIAL MAKEUP

Material Type	Si (silica)	Fe (iron)	Cu (copper)	Mn (manganese)	Mg (magnesium)	Zn (zinc)	Al (aluminium)
<b>1100</b>	1		0.05-0.20	0.05		0.1	99.0 min.
<b>3003</b>	0.6	0.7	0.05-0.20	1.0- 1.5		0.1	Remainder
<b>3004</b>	0.3	0.7	0.25	1.0-1.5	0.8-1.3	0.25	Remainder

Chemical Composition : (% max except where a range is given) Other elements

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