

2033 by EURAL LEAD FREE



FREE-MACHINING Aluminum alloy

EURAL

GNUTTI S.p.A.

According to:
EU directives RoHS II, ELV, REACH

Applications

2033 LEAD FREE by EURAL is an alloy with multiple potential applications; it gives excellent machinability thanks to very thin chip forming, high mechanical properties, better anodizing and weldability attitude if compared to alloys such as 2011, 2007, 2030.

2033 LEAD FREE by EURAL is strongly recommended as an alloy to replace 2011, 2007, 2030 in view of the incoming restrictions on lead content (RoHS, ELV, REACH).

Green choice

For many years RoHS II regulations permit, with an exception, a maximum lead content in aluminum alloys up to 0.4% by weight. Such limit is under discussion for a further reduction.

REACH recently included lead in the SVHC list as highly toxic element for human health.

2033 LEAD FREE by EURAL is ready in anticipation of any possible future scenario being free of lead.



Alloy with high recycled aluminum content.

2033 LEAD FREE by EURAL is the result of long and accurate work by EURAL Research & Development Department in order to make available an aluminum alloy with high machinability and having better features than others available in the market today.

High Machinability

2033 LEAD FREE by EURAL has been developed specifically for being machined on high-speed automatic lathes thanks to its excellent chip forming performance.



No tin

Today there are several 2000 series alloys containing tin (Sn) which is well known to cause weakness in machined parts when submitted to high stress or high temperatures ($\geq 320^{\circ}\text{F}$).

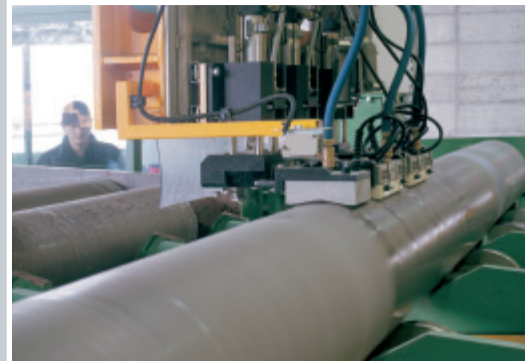
Tin, due to its brittle nature, has the dangerous tendency to suddenly break without significant previous deformation (strain).

2033 LEAD FREE by EURAL does not contain tin.



Ultrasonic tested billets

All semi-finished products in **2033 LEAD FREE by EURAL** are made by Class A ultrasonic tested billets (SAE AMS STD 2154).



Production range

2033 LEAD FREE by EURAL is available both as drawn and extruded condition.

Drawn round bars \varnothing .197" - 3.15"

Tempers T3, T351 and T8.

Extruded round bars \varnothing 1.181" - 10"

Tempers T6

Available also in square, flat and hexagonal bars.

A wide range of drawn bars is also available in h9 tolerance.

Alternative to:

2033 LEAD FREE by EURAL is the best alternative to several alloys such as 2007, 2030, 2011, 2028A, 2041, 2044, 7020.

2033 LEAD FREE by EURAL is the best replacement of brass, due to its excellent machinability and high mechanical properties. Moreover, due to future drastic reduction of lead (Pb) content in any metals for machining and, having a specific gravity of 1/3 compared to brass, it results extremely convenient costwise.

RoHS & REACH and other metals

The imminent restrictions about maximum lead content allowed will affect all products obtained by mechanical processing, including steel and brass. These metal, without the lead which was a guarantee of good or acceptable machinability, will not be allowed anymore. For all these cases, the only option in terms of machinability is aluminum and the best choice available today is **2033 LEAD FREE by EURAL**.

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Colour code
pink



PRODUCTION PROGRAM

Unit: in.	●	■	■	◆
Drawn	0.197 - 3.15	0.394 - 2.559	Thick. 0.472 - 2.165	0.394 - 2.5
Extruded	1.181 - 10	1.181 - 6.5	Thick. 1.181 - 5	-

According to EU directives:
2000/53/EU - 2011/65/EU (RoHS II)
Ready to imminent restrictions on lead content
because LEAD FREE

PRESENTATION

This alloy has been developed by EURAL and it is one of the best for high speed automatic lathes. It gives the following advantages:

- Easy machining
- Outstanding chip forming performance (thin chip)
- Longer tool life
- High mechanical properties
- Better anodizing and weldability attitude compared to alloys 2011, 2007, 2030.

This alloy does not contain neither lead (Pb) nor tin (Sn) and therefore it is the best option for the production of parts complying current, incoming possible and confirmed restrictions of lead (RoHS, ELV, REACH).

Main applications: automotive industry, electric and electronic industry, precision machining, forging, screws, bolts, nuts, threaded parts of thin thickness.



Properties	T3/T6	T8
Machinability	Excellent	Excellent
Protective anodizing	Good	Good
Decorative anodizing	Good	Good
Hard anodizing	Good	Good
Resistance to atmospheric corrosion	Good	Good
Resistance to marine corrosion	Good	Good
MIG-TIG weldability	Good	Good
Resistance weldability	Good	Good
Brazing weldability	Good	Good
Plastic formability when cold	Good	Good
Plastic formability when hot	Good	Good

Legend



Samples of finished products made of Eural bars



Chemical composition	
Si	0.10 - 1.20
Fe	≤ 0.70
Cu	2.20 - 2.70
Mn	0.40 - 1.00
Mg	0.20 - 0.60
Cr	≤ 0.15
Ni	≤ 0.15
Zn	≤ 0.50
Ti	≤ 0.10
Bi	0.05 - 0.80
Others	Each 0.05 Total 0.15
Al	Remainder

Physical properties			
Density	lb	0.1001	
	in ³		
Modulus of elasticity	ksi	10,152	
Coefficient of thermal expansion	x10 ⁻⁶	12.7	
	°F		
Thermal conductivity at 68°F	Btu	T3: 86.7	
	ft h °F	T8: 99.4	
Typical electrical resistivity at 68°F	Ω mm ²	T3: 0.046	
	m	T8: 0.046	

Minimum mechanical properties						
	Temper	Diam. in	UTS		YTS	
			ksi	ksi	A%	Typical
Drawn	T3	≤ 1.2	53.7	34.8	7	95
	T3	1.2 < D ≤ 3.15	49.3	31.9	7	95
	T351	≤ 3.15	53.7	34.8	5	95
Extruded	T8	≤ 3.15	53.7	34.8	8	95
	T6	≤ 3.15	53.7	36.3	8	95
Extruded	T6	3.15 < D ≤ 10	49.3	31.9	8	95