

2033 by EURAL LEAD FREE



FREE CUTTING Aluminum alloy

EURAL

GNUTTI S.p.A.

According to:

RoHS II, ELV, REACH directives

Applications

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

2033 LEAD FREE by EURAL is also suggested as an alternative to alloys 2011, 2007, 2030 after latest RoHS/REACH restrictions (Pb \leq 0.1%).

RoHS and REACH

The latest RoHS directive (2018/740/EU) reduces the limit of lead allowed in aluminum alloys for machining purposes To 0.1% starting from 05/18/2021.

REACH has recently mentioned lead in SVHC list as toxic element for human health and subject to specific authorization whenever its presence is more than 0.1%.

EURAL Gnutti SpA is ready with alloy **2033 LEAD FREE by EURAL**.

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 that offers more benefits than those 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 alloys from 2000 series aluminum + tin (Sn) which, as is well known, causes weakness and cracking of machined parts when submitted to stress, low or high temperatures ($< 55^{\circ}\text{F}$ or $> 320^{\circ}\text{F}$).

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"

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 are also available in h9 tolerance.

Alternative alloy to:

2033 LEAD FREE by EURAL is the best alternative to several alloys such as 2007, 2030, 2011, 2017, 2028, 2028A, 2041, 2044, 7020.

RoHS and other metals - Pb \leq 0.1%

The latest restrictions on lead (RoHS Pb \leq 0.1) concern also those products made from machining of steel and brass.

Steel from Pb \leq 0.35 to Pb \leq 0.1

Brass from Pb \leq 4 to Pb \leq 0.1

For these metals today the only alternative for machinability is aluminum and the best option is **2033 LEAD FREE by EURAL**



Color code
EU pink



PRODUCTION PROGRAM

Unit: in	●	■	■	◆
Drawn	.197" - 3"	.394" - 2.559"	Thick .472" - 2.165"	.394" - 2.5"
Extruded	1.181" - 10"	1.181" - 6.5"	Thick 1.181" - 5"	-

According to EU directives:
2000/53/EU (ELV) - 2018/740/EU (RoHS II)



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 with any tool
- Excellent chip forming performance (thin chip)
- Longer life tools
- High mechanical properties
- Better anodizing and weldability attitude compared to alloys 2011, 2007, 2030.

This alloy does not contain lead or tin and is therefore the best solution for the production of parts under the latest restriction on this topic (2018/740/EU RoHS: **Pb ≤ 0.1** starting from 05/18/2021).

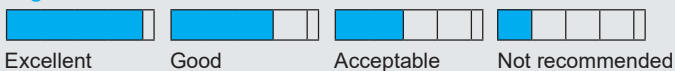
Main applications: automotive industry, electric and electronic industry, precision machining, defense, forging, screws, bolts, nuts, threaded parts of thin thickness.

Samples of finished products made of Eural bars



Properties	T3/T6	T8
Machinability	Excellent	Excellent
Protective anodizing	Good	Good
Decorative anodizing	Acceptable	Acceptable
Hard anodizing	Not recommended	Not recommended
Resistance to atmospheric corrosion	Good	Good
Resistance to marine corrosion	Acceptable	Acceptable
MIG-TIG weldability	Good	Good
At resistance weldability	Excellent	Excellent
Brazing weldability	Good	Good
Plastic formability when cold	Acceptable	Acceptable
Plastic formability when hot	Good	Good

Legend



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 .1001 in ²
Modulus of elasticity	Ksi 10.2
Coefficient of thermal expansion	x10 ⁻⁶ °F 12.7
Thermal conductivity at 68°F	Btu T3: 86.7 ft h °F T8: 99.4
Typical electrical resistivity at 68°F	Ω mm ² T6: 0.044 m T8: 0.045

Minimum mechanical properties				
Temper	Diam. in	Rm	Rp0.2	HBW
		Ksi	Ksi	A% Typical
Drawn	T3	≤ 1.2"	53.7 34.8	7 95
	T3	1.2" < D ≤ 3"	49.3 31.9	7 95
	T351	≤ 3"	53.7 34.8	5 95
Extruded	T8	≤ 3"	53.7 39.2	8 95
	T6	≤ 3"	53.7 36.3	8 95
	T6	3" < D ≤ 10"	49.3 31.9	8 95