

LEAD FREE
ALUMINIUM BARS

Aluminium

~~Lead~~

Sustainable

Recyclable

Future

LEAD-FREE ALLOY BARS

WHY?

REGULATIONS

After several years of extension, European directive 2018/740/EU, known as RoHS 3, is expected to come into force in 2021. This regulation, applied to electrical and electronic products, restricts the permitted amount of various elements in materials. As far as aluminium alloys are concerned, the main one affected is Lead, whose quantity is limited to a maximum of 0.1%.

On the other hand, the REACH regulation has included lead in its list of elements that are toxic to human health, which will require a specific authorisation for its use whenever its presence exceeds 0.1%.



SAFETY AND THE ENVIRONMENT

Lead is a highly polluting element and has adverse effects on both health and the environment.

Their restriction makes it possible to increase the safety of both people and the environment throughout the entire chain of use of the materials, from manufacture to transformation.

For this reason, the use of lead-free materials is seen as a sustainable alternative for the future.

MARKET

The main bar manufacturers in the market tend to reduce the production of lead alloys and replace them with lead-free alternatives, which will limit the options for the continued use of alloys outside the RoHS regulations.



LEAD FREE ALLOY BARS

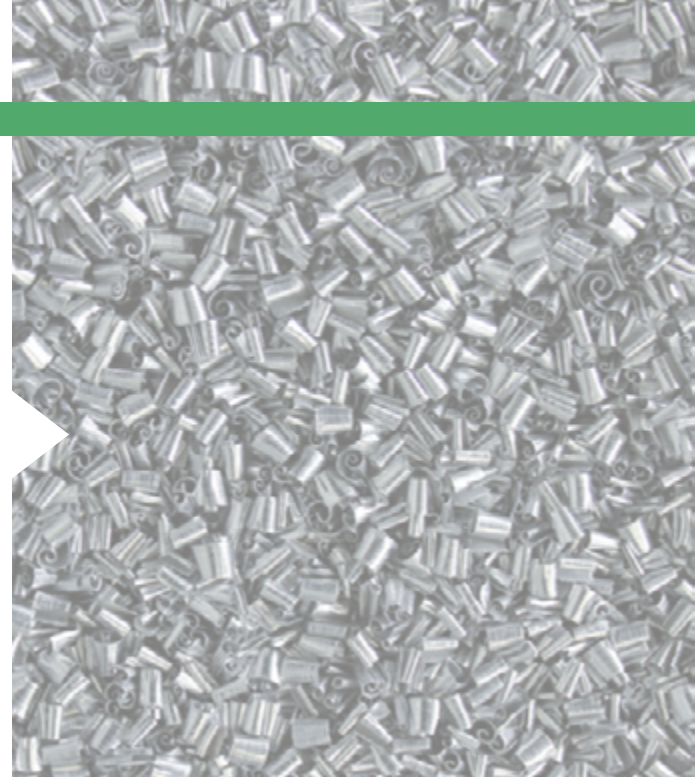
LEAD FREE ALLOY 2033

The 2033 Lead-Free alloy has many potential applications; it is highly machinable due to its fine chip formation, high mechanical properties and comparatively better anodizing and soldering capabilities than other alloys such as 2011, 2007 or 2030.

Alloy 2033 Lead-Free is the alternative to alloys 2011, 2007 or 2030.

It is a tin-free alloy, which avoids the fragility that this element brings to the material and also the weakening or breakage of machined parts when subjected to fatigue or extreme temperatures (< -13°C or > 160°C).

Its main applications are in the following sectors: automotive, electrical and electronic industry, precision machining, defence, forging, screws, nuts, threaded parts...



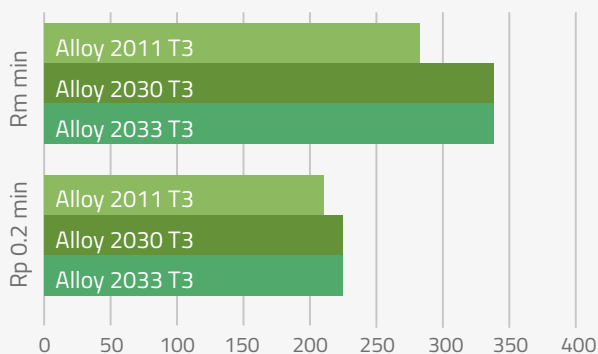
CHEMICAL COMPOSITION

	Si	Fe	Cu	Mn	Mg	Cr	Ti	Zn	Bi	Ni	Other indiv.	Other conj.	Rest
Min.	0.1		2.2	0.4	0.2				0.05				
Max.	1.2	0.7	2.7	1.0	0.6	0.15	0.1	0.5	0.8	0.15	0.05	0.15	Al

MECHANICAL PROPERTIES

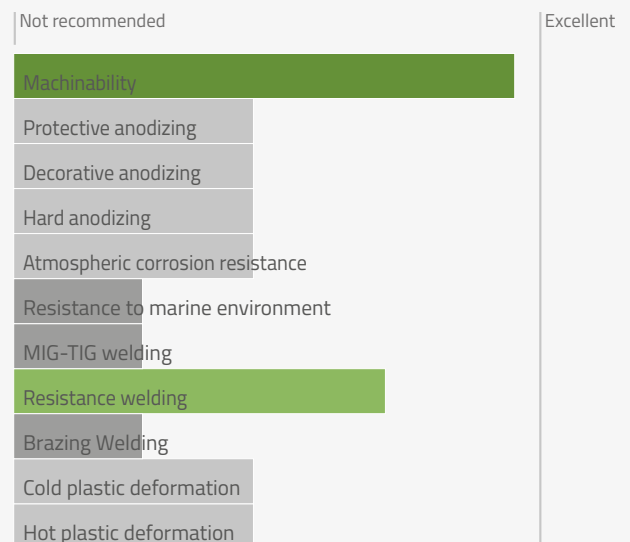
The following is a comparison of the mechanical characteristics of the alloys 2033 Lead-Free, 2011 and 2007/2030.

**The data shown refers to calibrated bars and diameters less than 80 mm. Data may vary depending on condition and diameter.*



RESPONSE

The qualitative assessments of the alloy behaviour in different parameters for the T3/T6 state are detailed below.





LEAD FREE ALLOY BARS

6026 LF LEAD-FREE ALLOY

6026 LF Lead-Free alloy is a versatile alloy due to its medium-high mechanical characteristics, its suitability for anodizing, welding and forging, as well as its good resistance to corrosion.

6026 LF Lead-Free alloy is the alternative to leaded alloys 2007, 2011, 2030, 6012 or 6026.

It is a tin-free alloy, which avoids the fragility that this element brings to the material and also the weakening or breakage of machined parts when subjected to fatigue or extreme temperatures (<-13°C or > 160°C).

6026 LF Lead-Free alloy is suitable for components in various industries such as automotive, electrical and electronics, valves, oil-hydraulics, pneumatics and defence.

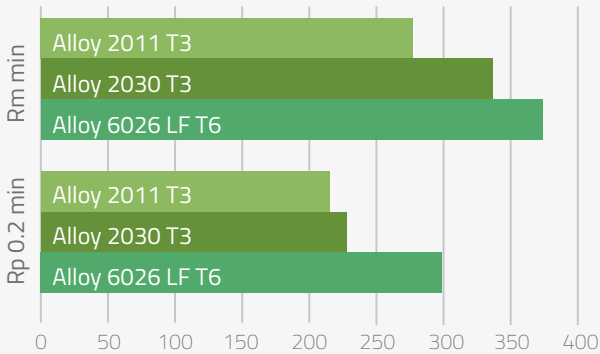
CHEMICAL COMPOSITION

	Si	Fe	Cu	Mn	Mg	Cr	Ti	Sn	Pb	Zn	Bi	Other indiv.	Other conj.	Rest
Min.	0.6		0.2	0.2	0.6						0.5			
Max.	1.4	0.7	0.5	1.0	1.2	0.3	0.2	0.05	0.05	0.3	1.5	0.05	0.15	Al

MECHANICAL PROPERTIES

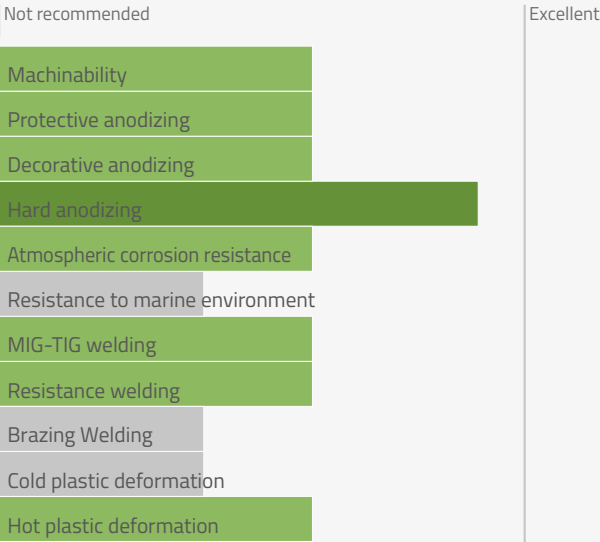
Below is a comparison of the mechanical characteristics of the 2007/2030, 2011 and 6026 LF lead-free alloys.

**The data shown refers to calibrated bars and diameters less than 80 mm. Data may vary depending on condition and diameter.*



RESPONSE

The qualitative assessments of the alloy behaviour in different parameters for the T6 state are detailed below.



LEAD FREE ALLOY BARS

RECOMMENDATIONS FOR MACHINING LEAD-FREE BARS

LUBRICANTS

It is recommended to use pure oil as a lubricant whenever possible to improve the performance of machining. The use of emulsions can negatively affect chip formation and chip breakage, as well as excessive water could increase cooling by limiting the proper heat spread necessary for chip breakage.

TOOLS

The use of positive cutting inserts is recommended, as well as tools designed for steel (P) or stainless steel (M) and not so much the specific ones for non-ferrous materials (N). P or M inserts are recommended for roughing and M inserts for finishing.



Positive cutting inserts
- Type B/C 5-7° according to ISO 1832
- Reduced shear forces and vibrations
- Better finish



RECOMMENDED MACHINING PARAMETERS

Operation	Cutting speed v_c	Feed rate f
Turning	150 - 600 m/min	0.15 - 0.80 mm / revolution
Drilling	150 - 600 m/min	0.20 - 0.80 mm / revolution
Milling of faces	150 - 300 m/min	0.08 - 0.45 mm / tooth
Milling of grooves	250 - 2,000 m/min	0.08 - 0.30 mm / tooth



BARRAS DE ALUMINIO
ALEACIONES SIN PLOMO