EURAL

GNUTTI S.p.A.

2033 & 2077 & 6026LF
LEAD FREE

by **Eural**

Free-Cutting Aluminium Alloys

REACH

ELV **RoHS**

COMPLIANTS

GREEN

GREEN 2033 & 2077 & 6026^{LF}

Free-Cutting Aluminium Alloys by Eural
LEAD FREE & HIGH RECYCLED CONTENT

EURAL GNUTTI S.p.A.

Aluminium is a key factor for a circular economy transition. **#EUGreenDeal**

Aluminium can be recycled multiple times without losing its original properties, with lower energy costs and significant benefits for the environment (7 times less CO2 emissions than using primary aluminium produced by non-renewable energy sources).

EURAL has developed a range of free-cutting aluminium alloys, **LEAD FREE**, with a high content of recycled material.

GREEN 2033 & 2077 & 6026^{LF} LEAD FREE

These alloys have a large content of pre & post consumers recycled material. Scraps from Eural's own production plants combined with selected scraps from the end user market drastically reduces the percentage of pure aluminium needed to cast such alloys. Thanks to the very high technological capability in casting and extrusion equipment, EURAL therefore maximizes the circular economy benefits by using scrap material.

LEAD FREE

Lead is considered highly toxic. Past and current European directives focus more and more the reduction of lead in aluminium alloys with new restrictions on the content of lead in metals for machining on the way.
Alloys **2033 & 2077 & 6026^{LF}** will always comply to any limits that RoHS, ELV, REACH or any other directive or regulation could impose in the future.

LEAD

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GREEN

alu

GREEN 2033 by EURAL LEAD FREE

- Easy machining
- Outstanding chip forming performance (machinability)
- Longer tool life
- High mechanical properties (Rm ≥ 370 MPa)
- Excellent surface finishing
- Good anodizing and weldability attitude

GREEN 2077 by EURAL LEAD FREE

- Easy machining
- Excellent chip forming performance (machinability)
- Very-High mechanical properties (Rm ≥ 480 MPa)
- For structural and high stressed machined parts
- Excellent surface finishing
- The first and only hard alloy with excellent machinability

GREEN 6026LF by EURAL LEAD FREE

- Easy machining
- Very good chip forming performance (machinability)
- Excellent attitude to protective, decorative and hard anodizing
- High mechanical properties (Rm ≥ 370 MPa)
- Excellent surface finishing
- Excellent corrosion resistance

FREE

2033 by EURAL LEAD FREE

EURAL GNUTTI S.p.A.

This new alloy is the result of extensive work by EURAL's R & D department.

2033 LEAD FREE by EURAL is an alloy for multiple applications; it gives an outstanding machinability thanks to very thin chip formation, high mechanical properties (Rm ≥370 MPa), an excellent surface finish after turning and better anodizing and weldability compared to alloys such as 2011, 2007 and 2030.

2033 LEAD FREE by EURAL is also suggested as alternative to alloy 2011 once lead will be restricted. Having the same minimum mechanical properties, 2033 can also replace alloys such as 2007 & 2030.

REACH recently included lead in the SVHC list as toxic element for human health. That makes alloy **2033 LEAD FREE by EURAL** the best option.

MAIN APPLICATIONS
Automotive, electric and electronic, precision machining, forging, screws, bolts, nuts, threaded parts, etc.

2033 LEAD FREE by EURAL does not contain tin (Sn) which, as has been proved, causes weakness and cracking of machined parts when submitted to high stress or at high temperatures (>160°C).
Tin, due to its brittle nature, has the dangerous tendency to suddenly break without significant previous deformation (strain).

Chemical composition

Si	Fe	Cu	Mn	Mg	Cr
0,10 ÷ 1,20	≤ 0,70	2,20 ÷ 2,70	0,40 ÷ 1,00	0,20 ÷ 0,60	≤ 0,15

2033 by EURAL LEAD FREE F37

Minimum mechanical properties

	Temper	Diam. mm	Rm MPa	Rp0,2 MPa	A%	HBW Typical
Drawn	T3	≤ 30	370	240	7	95
	T3	30 < D ≤ 80	340	220	7	95
	T351	≤ 80	370	240	5	95
	T8	≤ 80	370	270	8	95
Extruded	T6	≤ 80	370	250	8	95
	T6	80 < D ≤ 250	340	220	8	95

EURAL GNUTTI S.p.A.

REACH

ELV RoHS

COMPLIANTS

Ni	Zn	Ti	Bi	Others	Al
≤ 0,15	≤ 0,50	≤ 0,10	0,05 ÷ 0,80	0,05 each 0,15 tot.	Rem.

Production program

Unit: mm	●	■	▬	⬢
Drawn	5 ÷ 76,2	10 ÷ 65	Thick. 12 ÷ 55	10 ÷ 63,5
Extruded	30 ÷ 254	30 ÷ 165	Thick. 30 ÷ 127	-

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	Acceptable	Acceptable
MIG-TIG weldability	Acceptable	Acceptable
Resistance weldability	Excellent	Excellent
Brazing weldability	Acceptable	Acceptable
Plastic formability when cold	Good	Acceptable
Plastic formability when hot	Good	Good

Legend

Excellent

Good

Acceptable

Not recommended

FREE CUTTING
Aluminium alloy

GREEN

Colour code
EU pink

2077 by EURAL LEAD FREE

EURAL GNUTTI S.p.A.

This alloy is the latest project by EURAL who have developed the strongest free-cutting aluminium alloy ever.

2077 LEAD FREE by EURAL has very high mechanical properties and, at the same time, ensures excellent chip forming performance.
Having Rm ≥480MPa (ultimate tensile strength), high fatigue strength, easy machinability with any tool and a good attitude for forging it is the perfect choice to replace hard alloys such as 2024, 2014, 2014A, 2017A, 7020 and 7075 and be machined on high-speed automatic lathes.

Thanks also to high Rp0,2 (ultimate yield strength), alloy **2077 LEAD FREE by EURAL** can also be considered an alternative material for certain machined parts made in stainless steel and cast iron.
The typical thin chip formation is comparable to other free-cutting solutions such as 2011 and 2033 alloys, thus achieving very high productivity.

MAIN APPLICATIONS
Valves, bolts and nuts, threaded bars, structural and high resistance components.

2077 LEAD FREE by EURAL does not contain tin (Sn) which, as has been proved, causes weakness and cracking of machined parts when submitted to high stress or at high temperatures (>160°C).
Tin, due to its brittle nature, has the dangerous tendency to suddenly break without significant previous deformation (strain).

Chemical composition

Si	Fe	Cu	Mn	Mg	Cr
0,40 ÷ 1,00	≤ 0,70	4,00 ÷ 5,00	0,60 ÷ 1,20	0,60 ÷ 1,20	≤ 0,20

2077 by EURAL LEAD FREE F48

Minimum mechanical properties

	Temper	Diam. mm	Rm MPa	Rp0,2 MPa	A%	HBW Typical
Drawn	T6	≤ 80	480	400	5	130
Extruded	T4/T4511	≤ 75	400	270	10	105
	T4/T4511	75 < D ≤ 150	390	260	9	105
	T4/T4511	150 < D ≤ 200	370	240	8	105
	T4/T4511	200 < D ≤ 254	360	220	7	105
	T6/T6511	≤ 150	455	380	5	130
	T6/T6511	150 < D ≤ 200	420	280	8	120
	T6/T6511	200 < D ≤ 254	400	270	8	110

EURAL GNUTTI S.p.A.

REACH

ELV RoHS

COMPLIANTS

Ni	Zn	Ti, Ag, Li, Zr	Bi	Others	Al
≤ 0,20	≤ 0,25	≤ 0,15 each	0,20 ÷ 0,90	0,05 each 0,15 tot.	Rem.

Production program

Unit: mm	●	■	▬	⬢
Drawn	10 ÷ 76,2	To be defined	To be defined	To be defined
Extruded	30 ÷ 254	30 ÷ 165	Thick. 30 ÷ 127	-

Properties	T6	T4
Machinability	●●●●●	●●●●●
Protective anodizing	●○○○○	●○○○○
Decorative anodizing	●○○○○	●○○○○
Hard anodizing	●○○○○	●○○○○
Resistance to atmospheric corrosion	●○○○○	●○○○○
Resistance to marine corrosion	●○○○○	●○○○○
MIG-TIG weldability	●○○○○	●○○○○
Resistance weldability	●●○○○	●●○○○
Brazing weldability	●○○○○	●○○○○
Plastic formability when cold	●○○○○	●○○○○
Plastic formability when hot	●○○○○	●●○○○

Legend

- ●●●●● Excellent
- ●●●●○ Good
- ●○○○○ Acceptable
- ●○○○○ Not recommended

FREE CUTTING
Aluminium alloy

GREEN

Colour code
EU sand

6026LF by EURAL LEAD FREE

EURAL GNUTTI S.p.A.

This innovative alloy has been conceived and developed in Eural Gnutti's R&D laboratories to meet the most recent standards for the protection of the environment.

6026LF LEAD FREE by EURAL gives excellent chip forming performance; has good corrosion resistance, medium-high mechanical properties (Rm ≥370MPa), excellent surface finishing after turning, good suitability for protective, decorative / hard anodizing and is also suitable for hot forging.

REACH recently included lead in SVHC list as toxic element for human health. This makes alloy **6026LF LEAD FREE by EURAL** the best option.

MAIN APPLICATIONS
Automotive, electric and electronic industry, precision machining, furniture, lighting, forging, etc.

6026LF LEAD FREE by EURAL does not contain tin (Sn) which, as has been proved, causes weakness and cracking of machined parts when submitted to high stress or at high temperatures (>160°C).
Tin, due to its brittle nature, has the dangerous tendency to suddenly break without significant previous deformation (strain).

Chemical composition

Si	Fe	Cu	Mn	Mg	Cr
0,6 ÷ 1,40	≤ 0,70	0,20 ÷ 0,50	0,2 ÷ 1,00	0,6 ÷ 1,20	≤ 0,30

6026LF by EURAL LEAD FREE F37

Minimum mechanical properties

	Temper	Diam. mm	Rm MPa	Rp0,2 MPa	A%	HBW Typical
Drawn	T6	≤ 80	370	300	8	95
	T8	≤ 80	345	315	4	95
	T9	≤ 80	360	330	4	95
Extruded	T6	≤ 140	370	300	8	95
	T6	140 < D ≤ 200	340	250	8	90
	T6	200 < D ≤ 250	300	200	8	90

EURAL GNUTTI S.p.A.

REACH

ELV RoHS

COMPLIANTS

Zn	Ti	Sn	Pb	Bi	Others	Al
≤ 0,30	≤ 0,20	≤ 0,05	0,05* (traces)	0,50 ÷ 1,50	0,05 each 0,15 tot.	Rem.

*EN AW6026 is registered with Pb ≤ 0,40

Production program

Unit: mm	●	■	▬	⬢
Drawn	6 ÷ 76,2	10 ÷ 65	Thick. 12 ÷ 55	10 ÷ 63,5
Extruded	30 ÷ 254	30 ÷ 165	Thick. 30 ÷ 157	-

Properties	T6	T8/T9
Machinability	●●●●●	●●●●●
Protective anodizing	●●●●●	●●●●●
Decorative anodizing	●●●●●	●●●●●
Hard anodizing	●●●●●	●●●●●
Resistance to atmospheric corrosion	●●●●●	●●●●●
Resistance to marine corrosion	●●○○○	●●○○○
MIG-TIG weldability	●●●●●	●●●●●
Resistance weldability	●●●●●	●●●●●
Brazing weldability	●●○○○	●●○○○
Plastic formability when cold	●●○○○	●○○○○
Plastic formability when hot	●●●●●	●●●●●

Legend

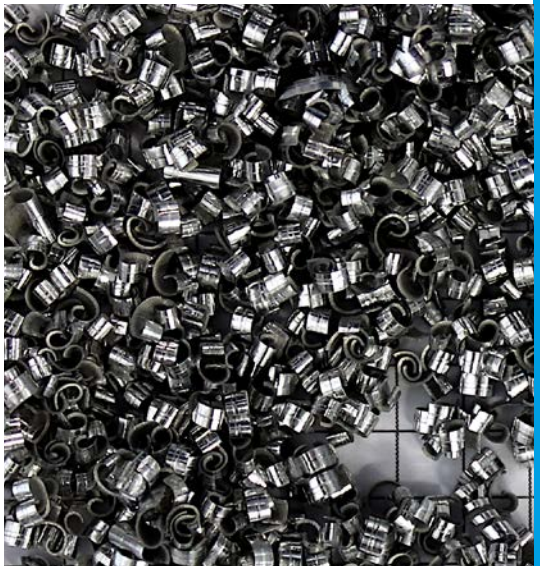
Excellent

Good

Acceptable

Not recommended

FREE CUTTING
Aluminium alloy



GREEN

Colour code
EU white

2033 & 2077 & 6026^{LF} LEAD FREE

by Eural

"How to machine"

EURAL has been a leading producer of aluminium bars since 1968 and one of the keys to its great success is being close to all customers, understanding their requirements and meeting their expectations. After 50 years of industry knowledge **EURAL** can now also create new solutions to support and improve the production of our customers.

EURAL's technicians travel worldwide wherever support is needed to understand, cooperate and to share the benefits of using Eural products.

For these reasons, we have produced a technical guide:
"How To Machine - Useful tips for excellent machining performance".

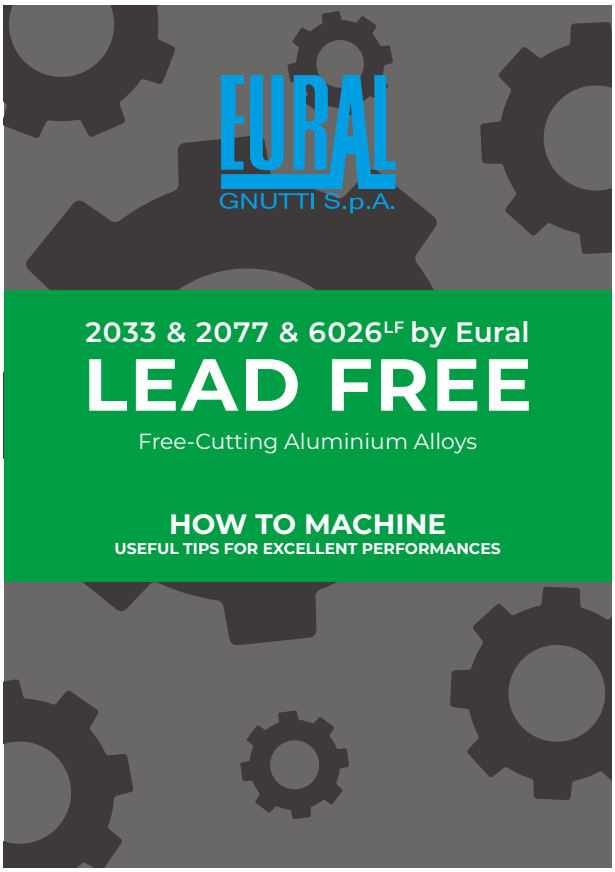
In this guide you will find tips on how to approach the machining of free-cutting **LEAD FREE** solutions from **EURAL**. It's full of all our experience into this business.

EURAL supplies aluminium with technology.

EURAL GNUTTI S.p.A.

In "**How to Machine**" catalog:

- What is FREE-CUTTING and how such solutions can play a crucial role for any successful project
- How to achieve small chips and reduce cycle times
- Chip-breaking elements, lubricants and coolants, turning, drilling and milling inserts
- How chip formation changes by switching to different machining inserts with 2033, 2077 & 6026^{LF} alloys
- possible machining parameters by choosing free-cutting **LEAD FREE** aluminium alloys by Eural



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www.eural.com

NOTES

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QUALITY SYSTEM CERTIFICATION DNV ISO 9001 AS/EN/JISQ 9100
QUALITY SYSTEM CERTIFICATION DNV IATF 16949
QUALITY SYSTEM CERTIFICATION DNV ISO 9001
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EURAL GNUTTI S.P.A.
25038 Rovato (Brescia) Italy
Via S.Andrea, 3
Capitale sociale - *Company's capital* € 10.000.000
Partita IVA - *Vat Reg.* IT 00566100988

Telefono - *Phone* +39 030 7725011

Vendita barre - ***Bars department*** Fax. +39 030 7702847 - bars@eural.com
Vendita profilati - ***Sections department*** Fax +39 030 7701228 - sections@eural.com
Amministrazione - ***Administration*** Fax +39 030 7702837 - accounts@eural.com
Fonderia - ***Foundry*** Fax +39 030 9930036 - foundry@eural.com

www.eural.com e-mail: eural@eural.com

Eural USA Inc.
4631 North Lincoln Avenue
60625 Chicago, IL - **USA**
usa@eural.com
Tel/Ph. +1 (312) 6830668

Eural Deutschland GmbH
Friedrichstrasse 15
70174 Stuttgart - **Germany**
germany@eural.com
Tel/Ph. +49 (173) 6155362