



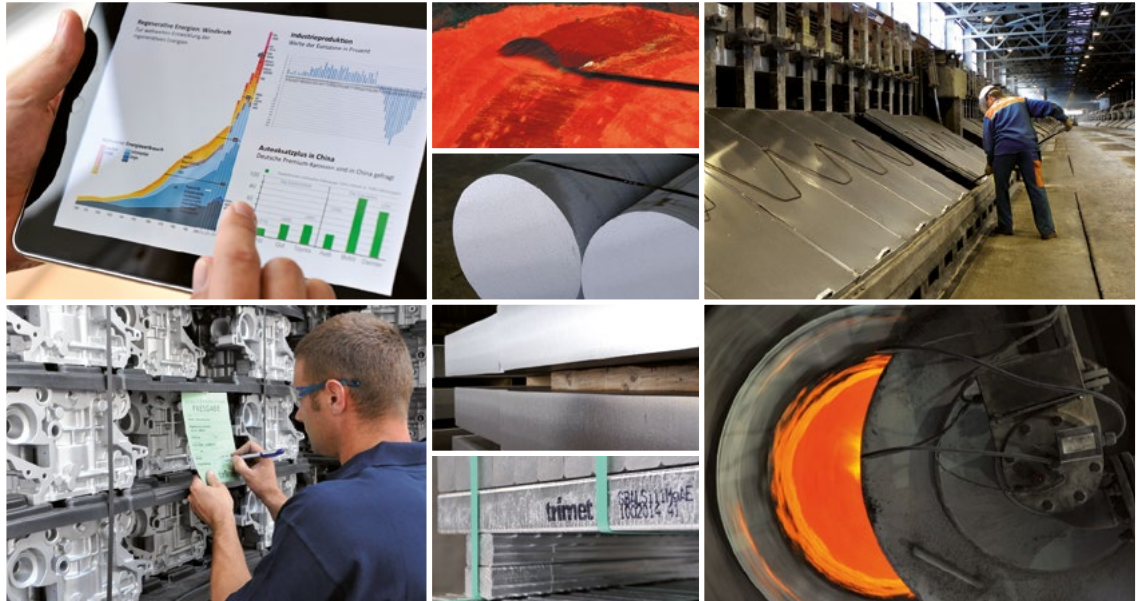
TRIMET Aluminium SE

Aluminium wires for **electrical** and  
**mechanical** applications

**trimet**



# TRIMET Aluminium SE – an independent family-run enterprise for more than 35 years



As an innovative, medium-sized, family-owned company, TRIMET develops, produces, recycles, casts, and sells modern light-metal products made of aluminium at eight locations. A staff of about 2,400 employees, together with our customers, that automobiles are more economical, aircraft are lighter, wind turbines and electricity plants are more efficient, buildings are more modern, and packaging is more ecological.

TRIMET serves and supplies the entire industry-oriented value chain for the aluminium sector with customized products from a single source. With four production plants, two recycling plants, four foundries, a marketing and trading division, and state-of-the-art research and development laboratories, TRIMET offers its customers a broad product portfolio. It ranges from liquid aluminium through aluminium wire, rolling ingots, extrusion billets, and cast alloys to high-quality die-cast components. The medium-sized company is a reliable partner to its customers and a modern and dependable employer for its staff.

## **We provide**

you with aluminium in all formats, qualities and alloys. Short-and long-term price and supply models to meet all your aluminium requirements. We are your local partner in a global marketplace – around the clock.

## **We produce**

special alloys in our smelters exclusively for you according to your requirements and not commodities.

## **We recycle**

your aluminium to be able to offer it back to you in the sizes and qualities you require. We help you bring your recyclables efficiently back into circulation.

## **We cast**

with our joint venture BOHAI TRIMET Automotive sophisticated castings for all applications. From the development, design, model and mould, casting, and finishing right through to the finished casting.

## **We research and develop**

new speciality alloys for you, to make your products even better.

## We produce customized **aluminium wires** for electronic and mechanical applications



TRIMET offers high-quality aluminium wire varieties from in-house production. We always work in accordance with your specifications and requirements regarding the alloy, cross-section, and processing technique.

### **Delivered on time**

Together, the TRIMET plants in Saint-Jean-de-Maurienne and Castelsarrasin supply products predominantly to the energy and automotive industries. These use aluminium wire for various applications, including electrical cables and connecting components. Here as well, TRIMET's basic principle applies: You tell us what delivery form you require for further processing, and we will ensure that your order arrives in the right format and at the specified time. So we have an extensive range for a customized production with enhanced quality focus, thanks to innovative process control equipment.

### **TRIMET guarantees aluminium wire**

- > in reliable top quality
- > in variable diameters and cross-sections
- > as special alloys developed to suit customer specifications

### **Saint-Jean-de-Maurienne:**

- > 180 electrolytic furnaces in 2 production halls
- > 11 casting furnaces, gas-heated
- > 3 wire rod casting lines
- > 145,000 metric tons of primary aluminium produced annually
- > 155,000 metric tons of cast products produced annually
- > 600 employees
- > Aluminium wire, Rolling and Remelting ingots



### **Castelsarrasin:**

- > 1 wire casting plant
- > Various packaging, processing, and packaging plants
- > 10,000 metric tons of cast products produced annually
- > 35 employees
- > Aluminium wire



## ELECTRICAL

### Redraw Rod – Continuously Cast and Rolled Electrical engineering



One of the areas in which TRIMET CCR (Continuously Cast and Rolled) rod is really in its element is electricity. For many years, it has been chosen now by the major cable makers worldwide.

The fields of application for CCR rod are virtually unlimited. They include insulated cables for

low and medium voltage distribution networks, conductors for overhead lines, flexible cables for robotics, welding and railway engineering, cables using nickel-plated wire for aeronautical engineering, enameled wire for windings, etc.

#### Registered brands

ALMELEC<sup>®</sup>

ALUFLEX<sup>®</sup>

CONDUCTAL<sup>®</sup>

Size (Examples)



Ø 7.5 mm\*



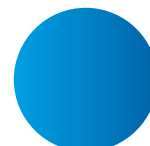
Ø 9.5 mm\*\*



Ø 12.2 mm



Ø 15.2 mm



Ø 19.0 mm

Family	Alloy	Temper
Al	131050**	F
Al	137050	F, R6=O, R7=H10, R8= H11, R10=H12, R11=H13, R12=H14, R13=H15
Al	137072**	R11=H13, R12=H14
AlMgSi	610145**	F, TS
AlMgSi	610155**	F, TS
AlMgSi	610166**	F, TS

\*CONDUCTAL only



## MECHANICAL

### Redraw Rod – Continuously Cast and Rolled

An incomparable range for **mechanical** engineering



The expertise acquired in TRIMET CCR (Continuously Cast and Rolled) rod based on a substantial program of research and development has resulted in the creation of an outstanding range of aluminium alloys geared to mechanical engineering applications.

From rivets, superfine wire, bolts, screws or forging part, TRIMET CCR redraw rod matches a wide variety of requirements.

#### Registered brands

**MECAL**

#### Size (Exampels)



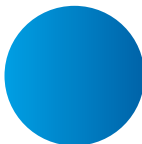
Ø 9.5 mm



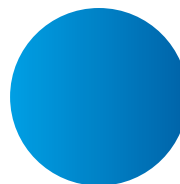
Ø 12.2 mm



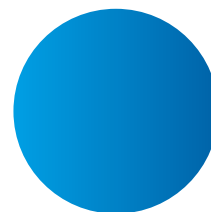
Ø 15.2 mm



Ø 18.5 mm



Ø 23.5 mm



Ø 27.1 mm

Family	Alloy	Temper
Al	1090	F, H
AlCu	2011	F, H
AlCu	2017	F, H
AlCu	2024	F, H
AlCu	2033	F, H
AlMnFe	3003   3103	F, H
AlMg	5005	F, H
AlMg	5019	F, H
AlMg	5051	F, H
AlMg	5052	F, H
AlMg	5154	F, H
AlMg	5754	F, H
AlMgSi	6056	F, H
AlMgSi	6060   6063	F, H
AlMgSi	6061	F, H
AlMgSi	6082	F, H
AlMgSi	610177   610188	F, H
AlZnMg	7075	F, H

## WELDING

### Redraw Rod – Continuously Cast and Rolled

An incomparable range for **welding** engineering



The expertise acquired by TRIMET in CCR (Continuously Cast and Rolled) rod based on a substantial program of research and development

have gone into the creation of an incomparable range of aluminium alloys geared to welding and brazing applications.

#### Size



Ø 9.5 mm

Family	Alloy	Temper
AlSi	4043	F, H
AlSi	4047	F, H
AlMg	5087	F, H
AlMg	5183	F, H
AlMg	5356	F, H

## Index product sheets

**1090**

**2011**

**2017**

**2024**

**2033**

**3003 | 3103**

**4043**

**4047**

**5005**

**5019**

**5051**

**5052**

**5154**

**5087**

**5183**

**5356**

**5754**

**6056**

**6060 | 6063**

**6061**

**6082**

**131050**

**137050**

**137072 TAL**

**610145 | 610155 | 610166**

**610177 | 610188**

**ELECTRICAL**

**MECHANICAL**

**WELDING**

Redraw Rod – Continuously Cast and Rolled

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## 1090

Redraw Rod – Continuously Cast  
and Rolled



# 1090

## Redraw Rod – Continuously Cast and Rolled

Pure aluminum wires with low impurity levels – in general less than 1%. Related to its “cleanliness” level, it offers an excellent electrical conductivity of up to 63 ICAS. Due to its lowest strength level within all aluminium alloy groups, it shows very good workability characteristics, including high corrosion resistance and good weldability.

### Applications

Mainly for metallizing, aluminium capacitor connections, electronics.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others
1090	0.007	0.07	0.02	0.01	0.01	0.01	0.01	0.01	Each 0.01 Total -

For each application, TRIMET can propose composition according to customer's specifications. Other alloys are also available upon request (ex. 1098, 1188).

#### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm\*, 26.5 mm\*\*
- > Usual temper as supplied: 1090
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	80-120	10-30

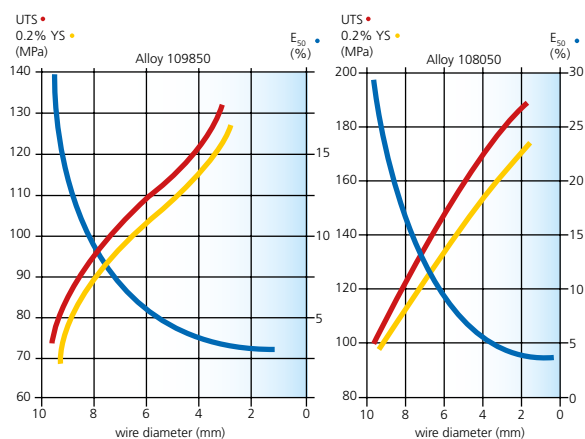
### Process

Recommended wire drawing conditions:

See technical brochure “137050 Conductal®” part “drawing”.

Metallurgical aspects of the wire drawing process.

> Work-hardening curves.



#### Heat treatments:

> Full annealing: 350°C during 3 hours.

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\* Saint-Jean-de-Maurienne

\*\* Castelsarrasin, other diameters on request

**2011**

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# 2011

## Redraw Rod – Continuously Cast and Rolled

Alloy **2011** is a free machining alloy which is comparable with many of the favorable free cutting brass alloys. **2011** is the most versatile alloy if good strength and high machining rates are required. It can be machined to very close tolerances, and the quality of the machined surfaces is excellent. The weldability and its general corrosion characteristic are poor. Our alloy with max 0.3 Pb is RoHS compliant.

### Applications

Screw machining

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Pb	Bi	Others
Min			5.00						0.20	0.20	Each
Max	0.40	0.70	6.00				0.30		0.30	0.60	0.05 0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, other diameters on request
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	160-240	10-25
H	120-170	15-30

### Process

Recommended wiredrawing conditions:

- > Type of wiredrawing machine: non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 75 to 90%.
- > Reduction\* per die: 15 to 30%.
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

Note:

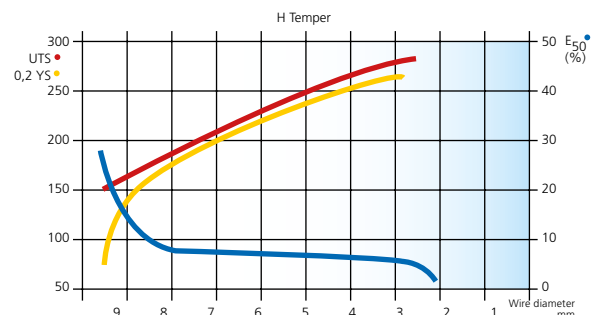
- > Under no circumstances should products be stored for extensive periods in a damp or humid atmosphere.
- > Lubrification with grease.

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

Metallurgical aspects of the wiredrawing process.

> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 375°-410°, 3 to 4 hours followed by slow cooling (25°C to 30°C/hour up to 250°C).
- > Heat solution treatment prior to quenching (T4 - T3 tempers): 510°C +/- 5°C, 1 hour.
- > Artificial ageing (T6 - T8 tempers):
  - T6: 6 to 10 hours at 135°C +/- 5°C.
  - T8: 4 to 8 hours à 135°C +/- 5°C

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
T3	350	290	6
T8	390	310	4

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**2017**

Redraw Rod – Continuously Cast  
and Rolled

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Alloys of this group are used where highest strength levels are required. These alloys contain mainly copper and Magnesium. In order to achieve their strong mechanical properties they need to be solution heat treated. In the soft condition the lower alloyed derivatives offer a very good formability. The general corrosion resistance is poor.

### Applications

Die-forgings – Nuts and bolts – Screw machining.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others
									Each Total
Min	0.20		3.5	0.40	0.40				
Max	0.8	0.7	4.5	1.0	0.8	0.10	0.25	0.15	0.05 0.15

A Zr + Ti limit of 0.20 percent maximum may be used for forged products only.

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm  
other diameters on request
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>100</sub> (%)
F	190-260	80-130	10-30
H	160-210	70-110	18-35

### Process

Recommended wiredrawing conditions:

- > Type of wiredrawing machine: non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 85%.
- > Reduction\* per die: 15 - 30%.
- > Die geometry
  - reduction angle: 16 - 12°
  - bearing length: 0.25 d (d: die diameter).

Note:

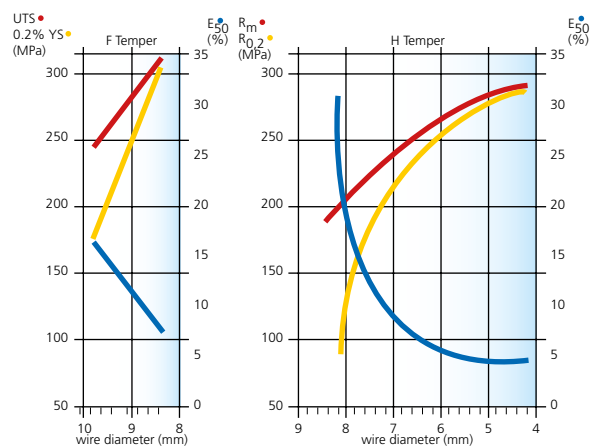
- > Under no circumstances should products be stored for extensive periods in a damp or humid atmosphere.
- > Lubrication with grease.

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

Metallurgical aspects of the wiredrawing process.

> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 375°-410°, 3 to 4 hours, followed by slow cooling (25°C to 30°C/hour up to 250°C).
- > Heat solution treatment prior to quenching (T4 -T3 tempers): 500°C +/- 5°C, 1 hour. Cold water quenching (40°C maximum).
- > Natural ageing (T4 Temper): minimum 4 days at 20°C.

### Typical mechanical properties of drawn wire:

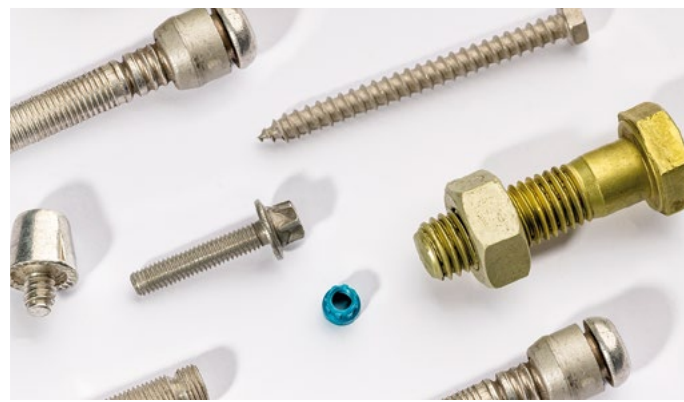
Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
T4	450	280	20*

\* 20% elongation (after quenching).

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**2024**

Redraw Rod – Continuously Cast  
and Rolled

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# 2024

## Redraw Rod – Continuously Cast and Rolled

Alloy 2024 has a higher strength than either alloys 2014 and 2017. Due to its high strength level in the T-temperers it is used in aircraft applications and other pre-tentious applications. It has good machining characteristics, but not as distinguished as 2011. The cold formability in the soft condition is considered fair, although it is one of the most popular alloys for cold heading and thread rolling applications. Corrosion resistance and anodizeability are fair.

### Applications

Rivets, Bicycle Nipples, Screws, Balls

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others
									Each Total
Min			3.8	0.30	1.2				
Max	0.50	0.50	4.9	0.9	1.8	0.10	0.25	0.15	0.05 0.15

A Zr + Ti limit of 0.20 percent maximum may be used for forged products only.

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm  
other diameters on request
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)
F	200-280
H	180-240

### Typical Physical Properties 2024

Density at 20°C 2,77 g/cm<sup>3</sup>

Melting range (with nominal chemical composition) 502°C - 638°C

Specific Heat at 100°C 875 J/kg - °C

Thermal Linear Expansion Coefficient at 100°C 22,9 \* m/m/°C

Thermal Conductivity O Temper 190 W/m - °C

Thermal Conductivity T4, T351 Temper 120 W/m - °C

Thermal Conductivity T6, T851 Temper 150 W/m - °C

Electrical Conductivity O Temper 50% IACS

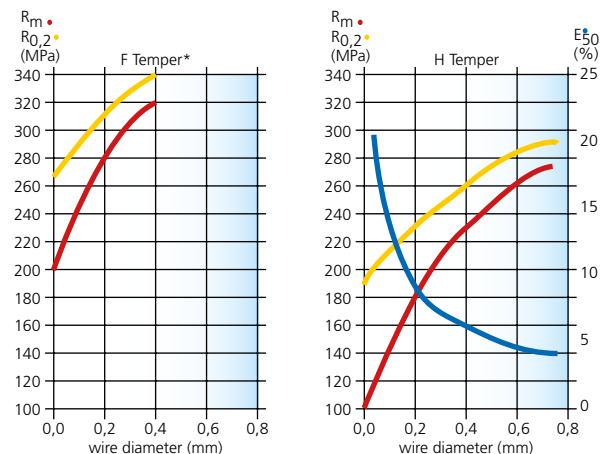
Electrical Conductivity T4, T351 Temper 30% IACS

Electrical Conductivity T6, T851 Temper 40% IACS

### Heat treatments:

- > Full annealing (O temper): 375° - 410°, 3 to 4 hours, followed by slow cooling (25°C to 30°C/hour up to 250°C).
- > Solution Heat treatment prior to quenching (T4 - T3 tempers): 490°C +/- 5°C, 1 hour Cold water quenching (40°C maximum).
- > Natural ageing (T4 Temper): minimum 4 days at 20°C

### Processing / Work hardening



\* Mechanical values may vary significantly due to natural aging effects

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**2033**

Redraw Rod – Continuously Cast  
and Rolled

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# 2033

## Redraw Rod – Continuously Cast and Rolled

2033 is an innovative alloy which fulfills the new European limitation in lead content in aluminum alloys. It has good formability in the solution heat treated state and can reach high mechanical properties via age hardening. The addition of Bismuth (Bi), which replaces Lead (Pb) allows for fast machining with short chip breaking. It is an ideal replacement for alloys such as EN AW-2011 and fulfills the RoHS compliance (Pb free).

### Applications

Die-forgings – Nuts and bolts – Screw machining.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Pb	Bi	Others	
											Each	Total
Min	0.45		2.2	0.55	0.4					0.2		
Max	0.65	0.45	2.7	0.75	0.6	0.1	0.1	0.1	0.015	0.6	0.05	0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 15.2 mm, other diameters on request
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>100</sub> (%)
F	267 - 305	–	2 - 7
H	185	–	20

### Typical Physical Properties 2033

Density at 20°C 2,7 g/cm<sup>3</sup>

Solidus Temperatur (with nominal chemical composition) 563°C

Specific Heat at 100°C 0.896 J/kg - °C

Thermal Linear Expansion Coefficient at 100°C 2\*10<sup>-5</sup> mym/°C

Thermal Conductivity T6 228 W/m - °C

Electrical Conductivity O Temper 45% IACS

Electrical Conductivity T6 40% IACS

Note:

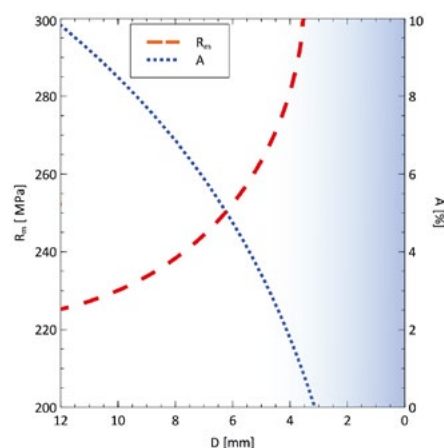
- > Under no circumstances should products be stored for extensive periods in a damp or humid atmosphere.
- > Lubrification with grease.

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

Metallurgical aspects of the wiredrawing process.

> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

> 2033: 2:30 h @ 490 °C -> WQ -> 8 h @ 120 °C

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## 3003 | 3103

Redraw Rod – Continuously Cast  
and Rolled

# 3003 | 3103

## Redraw Rod – Continuously Cast and Rolled

This alloy has mainly manganese as an alloying element. **3003 | 3103** have moderate strength level which is approximately 20% stronger than pure aluminum. Especially at elevated temperatures they perform better than the 1000 series alloys. They have very good resistance to atmospheric corrosion and very good weldability and are widely used in soldered structures like radiators. The formability is very good.

### Applications

Impact extrusion of cartridge cases.  
Tube extrusion by the CONFORM process.  
Miscellaneous.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
3003 Min			0.05	1.00						
3003 Max	0.60	0.70	0.20	1.50			0.10		0.05	0.15
3103 Min				0.9						
3103 Max	0.50	0.7	0.10	1.5	0.30	0.10	0.20		0.05	0.15

Foot note: Zr + Ti max 0.10

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, 15.2 mm, other diameters on request
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>500</sub> (%)
3003 H	110-140	30-40
3103 F	150-190	10-20
3103 H	95-115	30-40

### Process

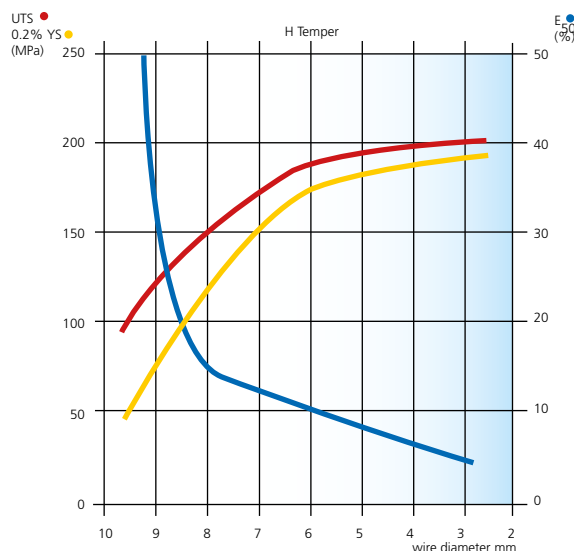
Recommended wiredrawing conditions:

- > Type of wiredrawing machine: slip or non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 95 to 98%.
- > Reduction\* per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

Metallurgical aspects of the wiredrawing process.  
> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (O temper): 350°C to 380°C  
-3 hours for a drawn wire from F temper rod.
- > Part annealing (H2X\* tempers): 250/300°C  
-3 hours for a drawn wire from F temper rod.

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**trimet**

**4043**

Redraw Rod – Continuously Cast  
and Rolled

**trimet**



# 4043

## Redraw Rod – Continuously Cast and Rolled

Alloys which mainly contain Si as an alloying element and are used as welding filler materials. The silicon range varies from 5%-12%. This alloy has excellent fluidity due to its low melting point. The alloy **4043** with the lowest melting temperature is also widely used as a soldering alloy. If structural parts need to be anodized after welding the joint forms a natural dark gray anodic coating. The strength level is low.

### Applications

Welding wire (MIG, TIG, laser).

### Description

Chemical composition from Aluminum Association (with reference to EN ISO 18273)

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
Min	4.5									
Max	6.0	0.8	0.30	0.05	0.05	0.05	0.10	0.20	0.05	0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>500</sub> (%)
F	140-195	10-30
H	100-140	20-35

### Process

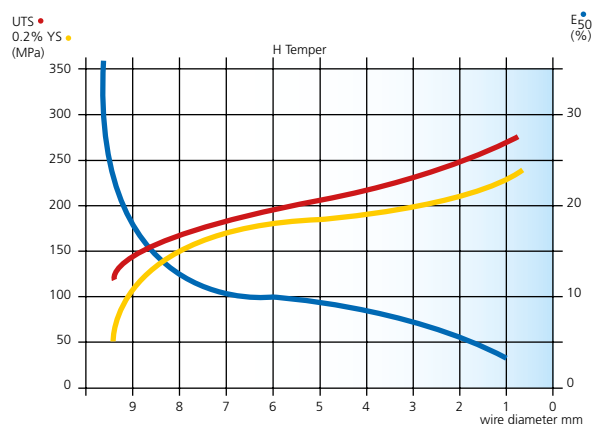
Recommended wiredrawing conditions:

- > Maximum reduction by wiredrawing prior to annealing: 90 to 95%.
- > Reduction per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.15 d (d: die diameter).

Metallurgical aspects of the wiredrawing process.

> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 320°C -3 hours.

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>500</sub> (%)
0	100	45	30
H19	250	210	5

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**trimet**

**4047**

Redraw Rod – Continuously Cast  
and Rolled

**trimet**

# 4047

## Redraw Rod – Continuously Cast and Rolled

Alloys which mainly contain Si as an alloying element and are used as welding filler materials. The silicon range varies from 5%-12%. This alloy has excellent fluidity due to its low melting point. The alloy **4047** with the lowest melting temperature is also widely used as a soldering alloy. If structural parts need to be anodized after welding the joint forms a natural dark gray anodic coating. The strength level is low.

### Applications

Welding wire (MIG, TIG, laser).

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others
									Each Total
Min	11.0								
Max	13.0	0.8	0.30	0.15	0.10	0.05	0.20	0.05	0.05 0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	170-220	15-30
H	125-170	15-35

### Process

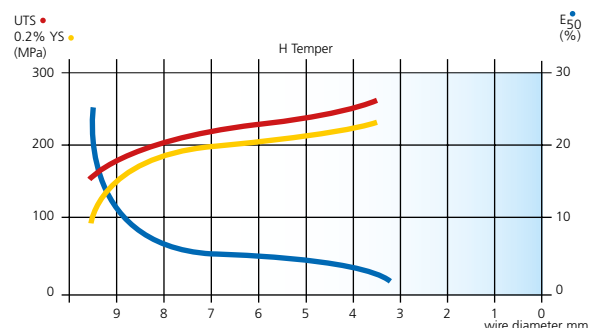
Recommended wiredrawing conditions:

- > Maximum reduction by wiredrawing prior to annealing: 75 to 85%.
- > Reduction per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

Metallurgical aspects of the wiredrawing process.

> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 320°C - 3 hours.

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
0	140	70	30
H18	230	210	4

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**trimet**





## 5005

Redraw Rod – Continuously Cast  
and Rolled

# 5005

## Redraw Rod – Continuously Cast and Rolled

This group of alloys contains increasing levels of the main alloying element magnesium. With the increasing level of magnesium the strength is significantly increased while the formability becomes poor. The general, corrosion resistance is excellent, therefore these alloys are used in maritime environments. Among other aluminum alloys, this series is used for the various applications including welded structures. The lower alloyed derivatives can be easily anodized.

### Applications

Cold heading.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Others
								Each Total
Min					0.5			
Max	0.30	0.7	0.20	0.20	1.1	0.10	0.25	0.05 0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, other diameters on request
- > Usual temper as supplied: F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	130-200	15-30

### Process

Recommended wiredrawing conditions:

- > Type of wiredrawing machine: slip or non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 85 to 95%.
- > Reduction\* per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

Note:

Recommendations for wiredrawing on a slip machine:

Ensure:

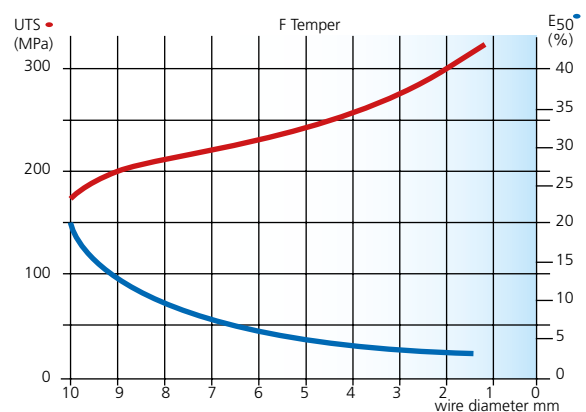
- > proper lubrication (use grease at the first reduction stage)
- > proper wire / die alignment
- > a low slip coefficient,
- > sufficient cooling during wiredrawing.

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

Metallurgical aspects of the wiredrawing process.

> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 350°C to 380°C -3 hours. Minimal deformation before annealing: 20%
- > Part annealing (H2X\* tempers): 240/280°C -3 hours.

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>30</sub> (%)
0	210	100	30
H19	350	320	6
H13*	240	180	15

\*10% reduction \* H2X tempers: H24-H26

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**trimet**

**5019**

Redraw Rod – Continuously Cast  
and Rolled

**trimet**



This group of alloys contains increasing levels of the main alloying element magnesium. With the increasing level of magnesium the strength is significantly increased while the formability becomes poor. The general, corrosion resistance is excellent, therefore these alloys are used in maritime environments. Among other aluminum alloys, this series is used for the various applications including welded structures. The lower alloyed derivatives can be easily anodized.

### Applications

Cold heading (rivets, nails, miscellaneous).  
Zip fasteners, metal screening and wire fencing, staples, miscellaneous.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
Min				0.10	4.5					
Max	0.40	0.50	0.10	0.6	5.6	0.20	0.20	0.20	0.05	0.15

Foot note: 0.10-0.6 Mn+Cr

For each application, TRIMET can propose composition according customer's specifications. Version 5019A available upon request.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, 15.2 mm, other diameters on request
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	280-320	15-30
H	260-310	18-35

### Process

#### Recommended wiredrawing conditions:

- > Type of wiredrawing machine: slip or non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 75 to 90%.
- > Reduction\* per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

#### Note:

Recommendations procedure for wiredrawing on a slip machine:  
> First pass with high reduction value (30-40%)  
> Full annealing

#### Ensure:

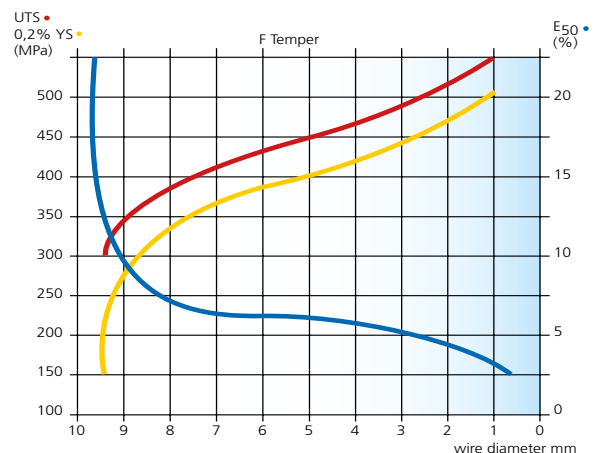
- > correct lubrication (use grease at the first reduction stage)
- > correct wire / die alignment
- > a low slip coefficient at each reduction stage,
- > sufficient cooling during wiredrawing.

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

Metallurgical aspects of the wiredrawing process.

> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 350°C to 380°C -3 hours.
- > Part annealing (H2X\* tempers): 240/280°C -3 hours.
- > Corrosion resistance annealing (tempers H3X\*\*) : 230/240°C during 24 hours

This heat treatment is helpful in case of using at high temperature (65°C) in corrosive atmosphere.

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
0	290	150	30
H19	475	420	5
H38	415	345	10
H13*	325	260	15

+10% reduction \* H2X tempers: H24-H26 \*\* H3X tempers: H38-H36-H34

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**trimet**



## 5051

Redraw Rod – Continuously Cast  
and Rolled



This group of alloys contains increasing levels of the main alloying element magnesium. With the increasing level of magnesium the strength is significantly increased while the formability becomes poor. The general, corrosion resistance is excellent, therefore these alloys are used in maritime environments. Among other aluminum alloys, this series is used for the various applications including welded structures. The lower alloyed derivatives can be easily anodized.

### Applications

Wire fencing, miscellaneous.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others
									Each
Min					1.7				Total
Max	0.40	0.7	0.25	0.20	2.2	0.10	0.25	0.10	0.05
									0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, other diameters on request
- > Usual temper as supplied: F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>100</sub> (%)
F	180-220	100-150	15-30

### Process

#### Recommended wiredrawing conditions:

- > Type of wiredrawing machine: slip or non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 90 to 98%.
- > Reduction\* per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

Note:

Recommendations for wiredrawing on a slip machine:

Ensure:

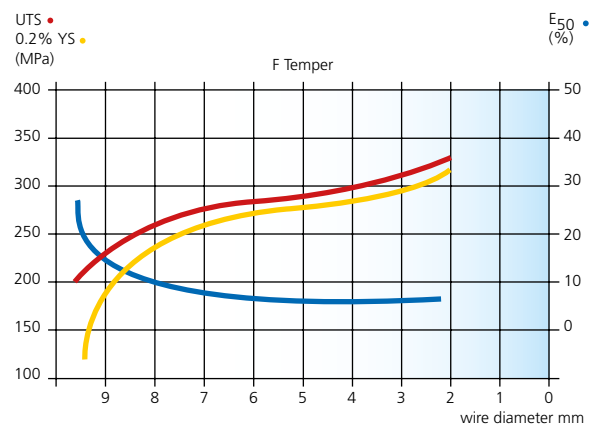
- > proper lubrication (use grease at the first reduction stage)
- > proper wire / die alignment
- > a low slip coefficient,
- > sufficient cooling during wiredrawing.

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

Metallurgical aspects of the wiredrawing process.

> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 350°C to 380°C -3 hours.  
Minimal deformation before annealing: 20%
- > Part annealing (H2X\* tempers): 240/280°C -3 hours.

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
0	190	90	30
H19	320	300	6

\* H2X tempers: H24-H26

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**trimet**





## 5052

Redraw Rod – Continuously Cast  
and Rolled



# 5052

## Redraw Rod – Continuously Cast and Rolled

Aluminium alloy **5052** has very good corrosion resistance to seawater and marine and industrial atmosphere, has a very good weldability and excellent cold formability and middle strength level. Its strength is slightly higher than **5051** and slightly lower than **5754** alloy.

### Applications

Cold heading.  
Zip fasteners.  
Wire fencings, staples, miscellaneous.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others
Min					2.2	0.15			Each
Max	0.25	0.40	0.10	0.10	2.8	0.35	0.10		Total

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, 15.2 mm, 18.2 mm, other diameters on request
- > Usual temper as supplied: F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>100</sub> (%)
F	180-230	100-150	15-30

### Process

#### Recommended wiredrawing conditions:

- > Type of wiredrawing machine: slip or non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 85 to 95%.
- > Reduction\* per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

Note:  
Recommendations for wiredrawing on a slip machine:

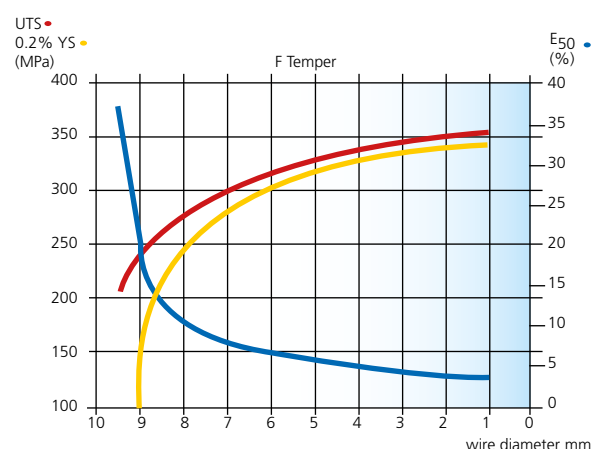
- Ensure:
- > proper lubrication (use grease at the first reduction stage)
  - > proper wire / die alignment
  - > a low slip coefficient,
  - > sufficient cooling during wiredrawing.

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

### Metallurgical aspects of the wiredrawing process.

#### > Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (O temper): 350°C to 380°C -3 hours.  
Minimal deformation before annealing: 20%
- > Part annealing (H2X\* tempers): 240/280°C -3 hours.

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
O	210	100	30
H19	350	320	6
H13*	240	180	15

+10% reduction \* H2X tempers: H24-H26

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**trimet**

**5154**

Reddraw Rod – Continuously Cast  
and Rolled

**trimet**



This group of alloys contains increasing levels of the main alloying element magnesium. With the increasing level of magnesium the strength is significantly increased while the formability becomes poor. The general, corrosion resistance is excellent, therefore these alloys are used in maritime environments. Among other aluminum alloys, this series is used for the various applications including welded structures. The lower alloyed derivatives can be easily anodized.

### Applications

Cold heading.

Wire fencings, staples, miscellaneous.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
Min					3.1	0.15				
Max	0.25	0.40	0.10	0.10	3.9	0.35	0.20	0.20	0.05	0.15

For each application, TRIMET can propose composition according customer's specifications. Versions 5154A and 5154B are available upon request.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, 15.2 mm, other diameters on request
- > Usual temper as supplied: F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	230-280	15-30
H	230-260	15-35

### Process

#### Recommended wiredrawing conditions:

- > Type of wiredrawing machine: slip or non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 85 to 95%.
- > Reduction\* per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

Note:

Recommendations for wiredrawing on a slip machine:

Ensure:

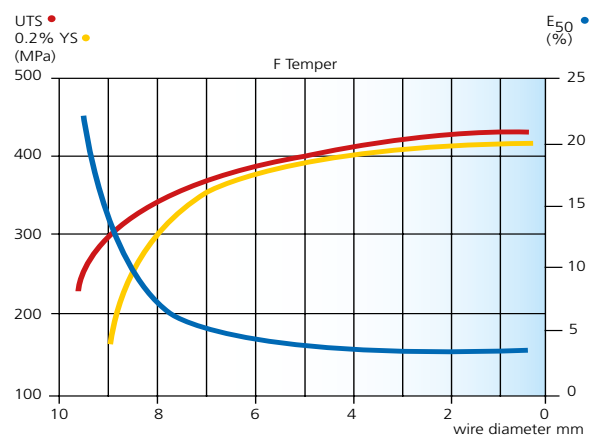
- > proper lubrication (use grease at the first reduction stage)
- > proper wire / die alignment
- > a low slip coefficient,
- > sufficient cooling during wiredrawing.

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

### Metallurgical aspects of the wiredrawing process.

#### > Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper) : 350°C to 380°C -3 hours. Minimal deformation before annealing : 20%
- > Part annealing (H2X\* tempers) : 240/280°C -3 hours.
- > Corrosion resistance annealing (tempers H3X\*\*) : 230/240°C during 24 hours

This heat treatment is helpful in case of using at high temperature (65°C) in corrosive atmosphere.

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
0	240	115	30
H19	400	375	5
H34	290	230	13
H13*	270	210	15

+10% reduction \* H2X tempers: H24-H26 \*\* H3X tempers: H38-H36-H34

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**trimet**

**5087**

Redraw Rod – Continuously Cast  
and Rolled

**trimet**

This group of welding alloys are the best choice if high mechanical properties in welded structures is required, while 5183 has even higher mechanical properties than 5356. They produce welds with higher ductility than those using 4xxx series filler materials but are not as easy to use as the 4xxx series. However, they should not be used with high Si content alloys (i.e. castings) because of magnesium-silicium precipitates ( $Mg_2Si$ ) developed in the weld structure which decrease ductility and increase crack sensitivity.

### Applications

welding wire (MIG, TIG, laser).

### Description

Chemical composition from Aluminum Association (with reference to EN ISO 18273)

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
Min				0.50	4.3	0.05				
Max	0.40	0.40	0.10	1.0	5.2	0.25	0.25	0.15	0.05	0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm
- > Usual temper as supplied: F or H (homogenised).
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)
F	290-350
H	290-350

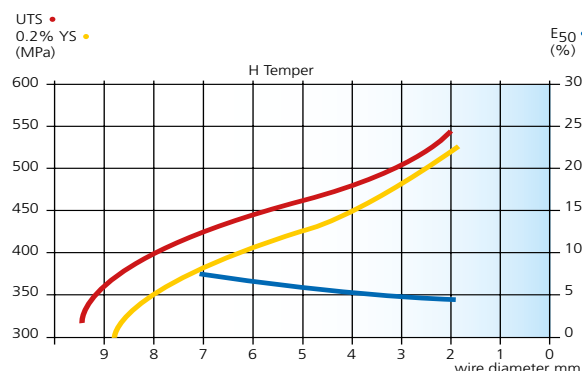
### Process

#### Recommended wiredrawing conditions:

- > Maximum reduction\* by wiredrawing prior to annealing: 75 to 85%.
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

Metallurgical aspects of the wiredrawing process.  
> Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2% YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 360°C -3 hours.

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**5183**

Redraw Rod – Continuously Cast  
and Rolled

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This group of welding alloys are the best choice if high mechanical properties in welded structures is required, while 5183 has even higher mechanical properties than 5356. They produce welds with higher ductility than those using 4xxx series filler materials but are not as easy to use as the 4xxx series. However, they should not be used with high Si content alloys (i.e. castings) because of magnesium-silicium precipitates (Mg<sub>2</sub>Si) developed in the weld structure which decrease ductility and increase crack sensitivity.

### Applications

welding wire (MIG, TIG, laser).

### Description

Chemical composition from Aluminum Association (with reference to EN ISO 18273)

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
Min				0.50	4.3	0.05				
Max	0.40	0.40	0.10	1.0	5.2	0.25	0.25	0.15	0.05	0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm
- > Usual temper as supplied: F or H (homogenised).
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	280-350	15-30
H	280-330	20-30

### Process

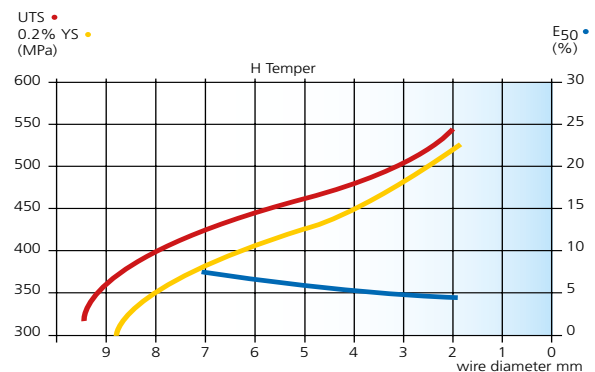
#### Recommended wiredrawing conditions:

- > Maximum reduction\* by wiredrawing prior to annealing: 75 to 85%.
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

### Metallurgical aspects of the wiredrawing process.

#### > Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 360°C -3 hours.

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
0	310	150	30
H18	460	420	6
H19	500	450	4

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**5356**

Redraw Rod – Continuously Cast  
and Rolled

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This group of welding alloys are the best choice if high mechanical properties in welded structures is required, while 5183 has even higher mechanical properties than 5356. They produce welds with higher ductility than those using 4xxx series filler materials but are not as easy to use as the 4xxx series. However, they should not be used with high Si content alloys (i.e. castings) because of magnesium-silicium precipitates (Mg<sub>2</sub>Si) developed in the weld structure which decrease ductility and increase crack sensitivity.

### Applications

Welding wire (MIG, TIG, laser).

### Description

Chemical composition from Aluminum Association (with reference to EN ISO 18273)

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
Min				0.05	4.5	0.05		0.06		
Max	0.25	0.40	0.10	0.20	5.5	0.20	0.10	0.20	0.05	0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm
- > Usual temper as supplied: F, H.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	270-330	18-30
H	260-320	20-35

### Process

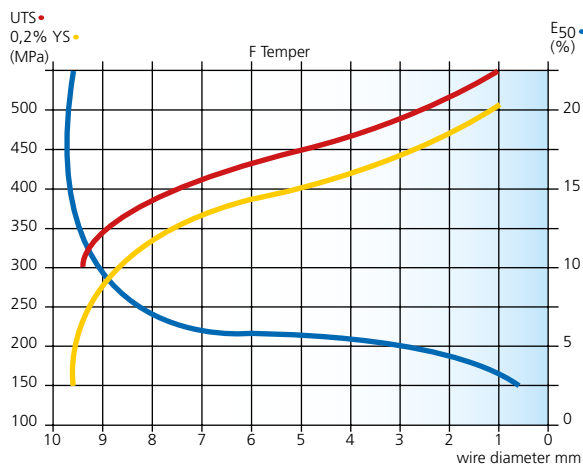
#### Recommended wiredrawing conditions:

- > Maximum reduction by wiredrawing prior to annealing: 75 to 85%.
- > Reduction per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

### Metallurgical aspects of the wiredrawing process.

#### > Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 360°C -3 hours.
- > Partial annealing: 240°/280°C -3 hours.

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
0	300	140	30
H19	480	420	3

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## 5754

Reddraw Rod – Continuously Cast  
and Rolled



# 5754

## Redraw Rod – Continuously Cast and Rolled

Alloy **5754** has a very good general corrosion resistance and thus is one of the best alloys for applications in maritime and seawater conditions and in industrially polluted atmospheres. Its strength is medium / medium-high and it has a very good formability in the lower strength Hxx conditions.

### Applications

Cold heading.  
Staples, sundry.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others
									Each Total
Min					2.6				
Max	0.40	0.40	0.10	0.50	3.6	0.30	0.20	0.15	0.05 0.15

Foot note: 0.10% - 0.6% Mn + Cr

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, 15.2 mm, other diameters on request
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	210-260	15-30
H	215-250	20-35

### Process

#### Recommended wiredrawing conditions:

- > Type of wiredrawing machine: slip or non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 85 to 95%.
- > Reduction\* per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

Note:

Recommendations procedure for wiredrawing on a slip machine:  
Ensure:

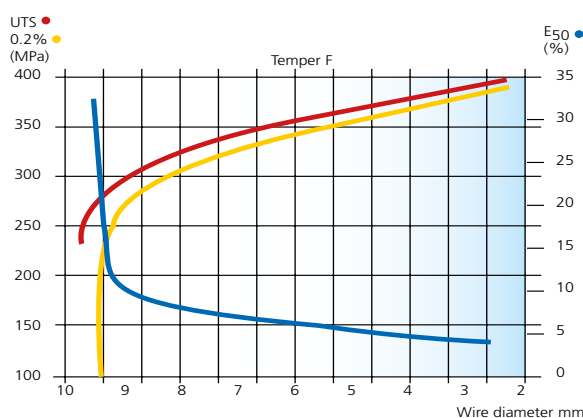
- > proper lubrication (use grease at the first reduction stage)
- > proper wire / die alignment
- > a low slip coefficient,
- > sufficient cooling during wiredrawing.

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

### Metallurgical aspects of the wiredrawing process.

#### > Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

- > Full annealing (0 temper): 350°C to 380°C -3 hours.  
Minimal deformation before annealing: 20%
- > Part annealing (H2X\* tempers): 240/280°C -3 hours.
- > Corrosion resistance annealing (tempers H3X\*\*): 230/240°C during 24 hours

This heat treatment is helpful in case of using at high temperature (65°C) in corrosive atmosphere.

### Typical mechanical properties of drawn wire:

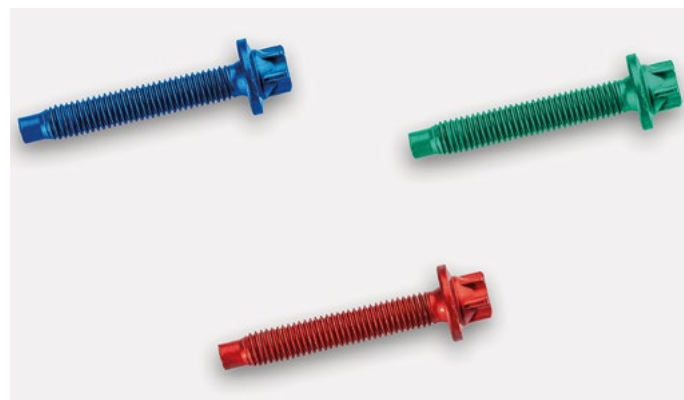
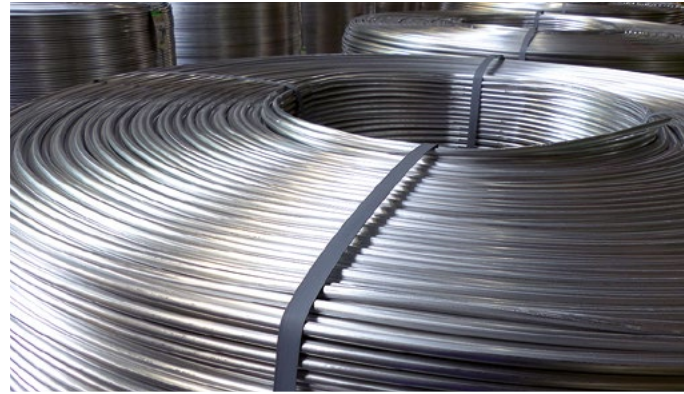
Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
0	230	110	30
H19	390	360	5
H34	270	200	10
H13*	260	200	15

+10% reduction \* H2X tempers: H24-H26 \*\* H3X tempers: H38-H36-H34

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## 6056

Reddraw Rod – Continuously Cast  
and Rolled



# 6056

## Redraw Rod – Continuously Cast and Rolled

Alloy **6056** is an extremely versatile material for applications which require high strength in the T-temper. It has 25-30% higher strength and hardness compared to the 6082 in T6 conditions, higher stability at elevated temperatures (up to 150°C). Its good formability in the H1x-conditions is comparable to 6082, and makes this alloy highly suitable for cold heading and cold impact extrusion processes.

### Applications

Screws, Nuts and bolts, Fittings

### Description

Chemical composition 6056 DIN EN 573-3

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Zr	Ti+Zr
Min	0.7		0.50	0.40	0.6		0.10			
Max	1.3	0.50	1.1	1.0	1.2	0.25	0.7			0.2

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, 15.2 mm, 18.2 mm, other diameters on request
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	160-230	12
H	140-180	20

### Typical Physical Properties 6056

Density at 20°C 2,71 g/cm<sup>3</sup>

Solidus Temperatur (with nominal chemical composition) 550°C

Specific Heat at 100°C 885 J/kg - °C

Thermal Linear Expansion Coefficient at 100°C 23,4 \* mym/°C

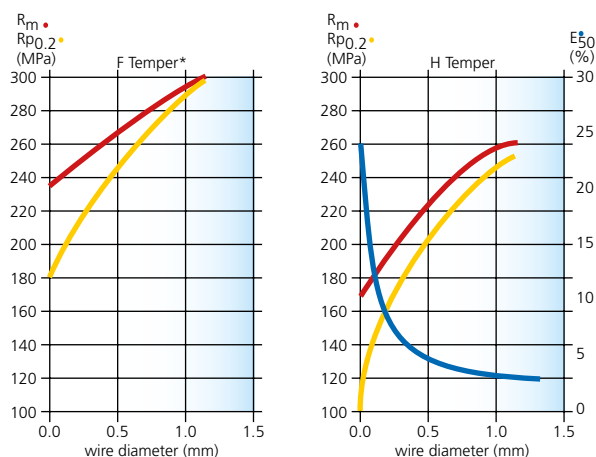
Thermal Conductivity T6 150 W/m - °C

Electrical Conductivity O Temper 40% IACS

Electrical Conductivity T6 35% IACS

### Heat treatments:

- > Full annealing (O temper): 400° - 420°, 3 to 4 hours, moderate cooling recommended (30°C-60°/hour up to 250°C).
- > Solution Heat treatment prior to quenching (T4 - T3 Temper): 545°C +/- 4°C, 1 hour Cold water quenching (50°C maximum).
- > Natural ageing (T4 Temper): minimum 4 days at 20°C
- > Artificial ageing (T6x Temper): Various temperatures and times between 160°-200°C (i.e. 8h/180°)

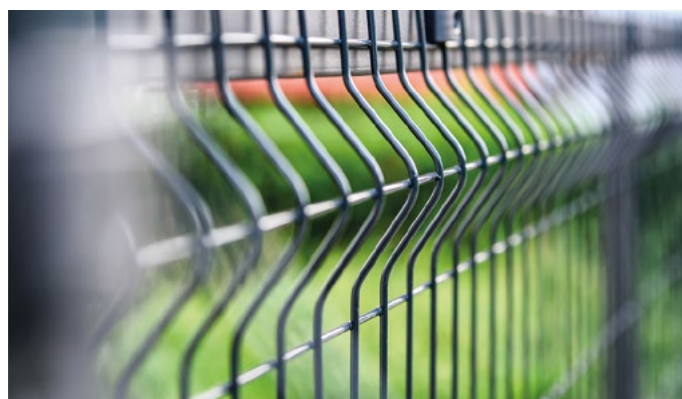


\* Mechanical values may vary significantly due to natural aging effects

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## 6060 | 6063

Redraw Rod – Continuously Cast  
and Rolled



# 6060 | 6063

## Redraw Rod – Continuously Cast and Rolled

The EN AW-6060 | 6063 is a general-purpose aluminum alloy with reasonable mechanical properties, good formability, and weldability. As it is heat treatable its properties can be adjusted for widespread applications in mechanical engineering (e.g., wires, extrusion parts ...). Additionally, it can be processed to very high surface qualities (visible parts in high quality products) that do not need any further handling.

### Applications

mechanical wire, marine applications, railroad applications, heat exchanger.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others
									Each
Min	0.20				0.35				Total
Max	0.60	0.35	0.10	0.10	0.90	0.20	0.15	0.10	0.05

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, 15.2 mm, other diameters on request
- > Usual temper as supplied: F.
- > Mechanical properties (figures given as a rough guide):

	Temper	UTS (MPa)	E <sub>100</sub> (%)
6060	F	120 - 200	18
6063	F	140 - 200	16

### Typical Physical Properties 6056

Density at 20°C 2,7 g/cm<sup>3</sup>

Solidus Temperatur (with nominal chemical composition) 580°C

Specific Heat at 100°C 0.898 J/kg · °C

Thermal Linear Expansion Coefficient at 100°C 23,4\*10<sup>-6</sup> mym/°C

Thermal Conductivity T6 210 W/m · °C

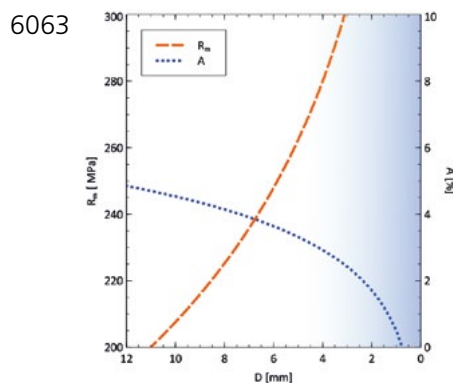
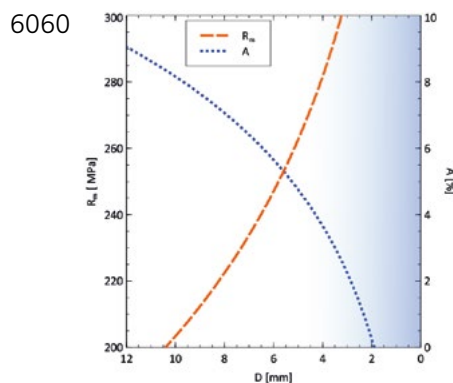
Electrical Conductivity O Temper 53.4% IACS

Electrical Conductivity T6 48.3% IACS

Metallurgical aspects of the wiredrawing process.

### > Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

6060: 1:30 h @ 430 °C -> WQ -> 4:30 h @ 180 °C

6063: 1:30 h @ 430 °C -> WQ -> 4:30 h @ 180 °C

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## 6061

Redraw Rod – Continuously Cast  
and Rolled



# 6061

## Redraw Rod – Continuously Cast and Rolled

EN AW-6061 is an aluminum which contains Si and Mg as major alloying elements. The alloy can be used for applications demanding higher mechanical strength. As the alloy is heat treatable, its mechanical properties can be adjusted to specific needs. Weldability and corrosion resistance makes EN AW-6061 a suitable choice in various engineering applications. Its good formability and machinability allow for the introduction into a broad range of manufacturing processes.

### Applications

mechanical wire, tubes, rods.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
Min	0.40		0.15		0.80	0.04				
Max	0.80	0.70	0.40	0.15	1.20	0.35	0.25	0.15	0.05	0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, other diameters on request
- > Usual temper as supplied: F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	120 - 200	15
H	90 - 140	15

### Typical Physical Properties 6056

Density at 20°C 2.7 g/cm<sup>3</sup>

Solidus Temperatur (with nominal chemical composition) 596 °C

Specific Heat at 100°C 0.897 J/kg - °C

Thermal Linear Expansion Coefficient at 100°C 23.6\*10<sup>-6</sup> m/m/°C

Thermal Conductivity T6 167 W/m - °C

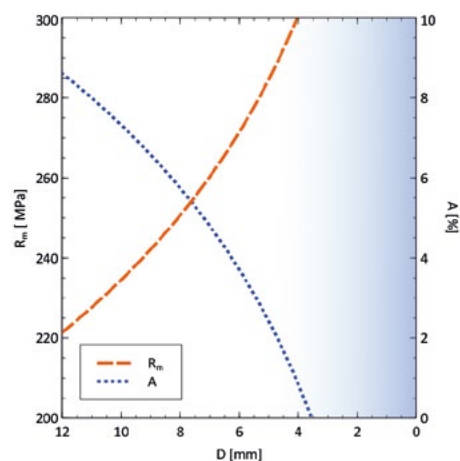
Electrical Conductivity O Temper 46.6% IACS

Electrical Conductivity T6 43.1% IACS

Metallurgical aspects of the wiredrawing process.

### > Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

1 h @ 550 °C -> WQ -> 4:30 h @ 180 °C

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## 6082

Redraw Rod – Continuously Cast  
and Rolled



This alloy is mainly selected where welding or brazing is required together with a high corrosion resistance in all tempers at medium strength level. The formability in H- and O-Tempers is excellent and fairly acceptable in the T4 temper. In comparison to the special designated machining alloys it is more difficult to use. The appearance after anodizing is superior in comparison to other machining alloys.

### Applications

Cold heading, knitting needles.  
Die-forgings.

### Description

Chemical composition from Aluminum Association

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others
									Each Total
Min	0.7			0.40	0.6				
Max	1.3	0.50	0.10	1.0	1.2	0.25	0.20	0.10	0.05 0.15

For each application, TRIMET can propose composition according customer's specifications.

### Material condition (2 tons coils):

- > Usual diameter: 9.5 mm, 12.2 mm, 15.2 mm, 18.2 mm, other diameters on request
- > Usual temper as supplied: H (homogenised) and F.
- > Mechanical properties (figures given as a rough guide):

Temper	UTS (MPa)	E <sub>100</sub> (%)
F	130-220	10-30
H	100-150	15-30

### Process

Recommended wiredrawing conditions:

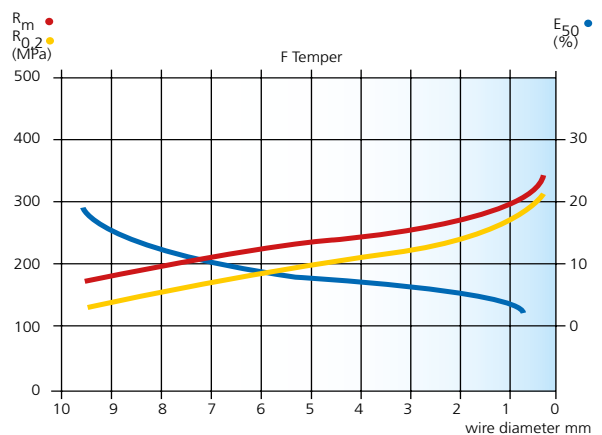
- > Type of wiredrawing machine: slip or non-slip.
- > Maximum reduction\* by wiredrawing prior to annealing: 93%.
- > Reduction\* per die: 15 to 30%
- > Die geometry
  - reduction angle: 16 to 12°
  - bearing length: 0.25 d (d: die diameter).

\*Reduction (%) =  $\frac{S-s}{S} \times 100$  (where "S" is the entry cross-section and "s" the exit cross-section).

Metallurgical aspects of the wiredrawing process.

### > Work-hardening curves.

The work-hardening curves shown below have been constructed for a wiredrawing process carried out one reduction stage at a time. In the normal industrial wiredrawing process, the figures for UTS and 0.2 YS could be lower by 10 to 40 MPa, depending on the process conditions and the diameter of the drawn wire.



### Heat treatments:

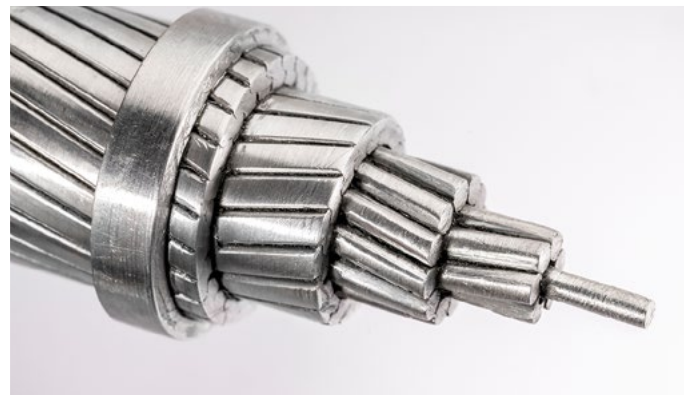
- > Heat solution treatment prior to quenching: 565°C +/- 5°C - 1 hour
- > Critical rate of quenching (500 to 200°C): >5°C/sec (cold water)
- > Artificial ageing for T6 temper (immediately after solution treatment and quenching): 175°C +/- 5°C - 8 hours
- > Full annealing (0 temper): 360°C to 400°C - 3 hours

### Typical mechanical properties of drawn wire:

Temper	UTS (MPa)	0.2% YS (MPa)	E <sub>50</sub> (%)
0	130	80	20
T4	250	150	20
T6	350	280	15

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## 131050

Redraw Rod – Continuously Cast  
and Rolled



# 131050

## Redraw Rod – Continuously Cast and Rolled

The CCR (Continuous Casting and Rolling) **131050 ALUFLEX®** Rod is an Aluminium-Iron-Magnesium alloy used in the manufacture of fine gauge wire for flexible cables for aeronautical engineering, cables for automotive engineering, braids and screens for cables.

### Description

#### Specified composition

As tabulated below:

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	V	Ti	B	Others	
											Each	Total
Min		0.50			0.08							
Max	0.10	0.80	0.035	0.01	0.25	0.007	0.05	0.007	0.02	0.015	0.03	0.10

Works production tolerances with respect to composition are in fact closer than tabulated above.

#### Production process

From primary liquid metal by Continuous Casting and Rolling (PROPERZI or SECIM processes).

#### Material condition

- > Diameter  
9.5 mm  
Tolerance on diameter is  $\pm 4$  %.

#### Mechanical and electrical properties:

- > 131050 ALUFLEX® redraw rod is supplied in the as-rolled condition (Temper F).  
Usual properties in F temper are as tabulated below:

#### Physical properties

Density	2.708 kg/m <sup>3</sup>
Modulus of elasticity,	69.000 MPa
Thermal conductivity at 20°C	220 W/m°C
Coefficient of linear expansion over the range 20 to 100°C	23 x 10 <sup>-6</sup> °C <sup>-1</sup>
Temperature correction factor for resistivity	4.0 x 10 <sup>-3</sup> °C <sup>-1</sup>
Specific heat	960 J/kg°C

	MECHANICAL PROPERTIES		ELECTRICAL PROPERTIES TO 20°C		
	Ultimate tensile strength	Elongation at break	Resistivity	Electrical conductivity	
	UTS MPa (1)	E <sub>200</sub> %	mΩ cm	IACS	mS/mm <sup>2</sup>
Range	120-160	10-25	2.87-2.97	58.0-60.1	33.6-34.9
Typical	140	15	2.92	59.0	34.3

(1) MPa = 0,1 hbar = 0,102 kg/mm<sup>2</sup> = 145 psi

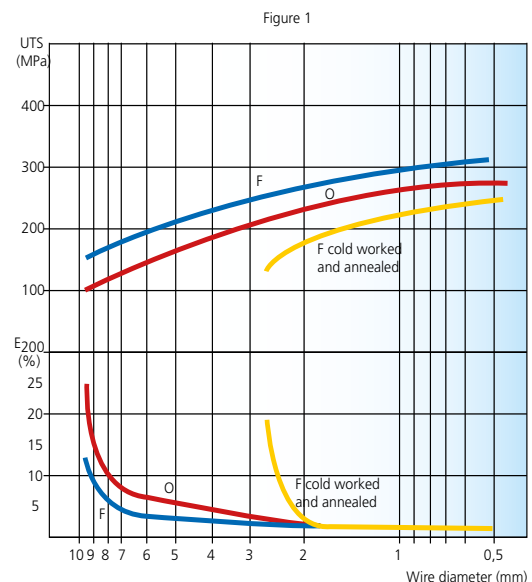
#### Work hardening curves

When alloy 131050 is subjected to an industrial wiredrawing sequence, the mechanical properties of the drawn wire so obtained will be determined by:

- > the reduction in cross-section brought about by wiredrawing;
- > any annealing treatments carried out on the original redraw rod or at some intermediate stage in wiredrawing;
- > the type of wiredrawing machine employed (slip or non-slip).

Figure 1 illustrates how ultimate tensile strength and elongation vary with diameter down to 0.5 mm for:

- > Redraw rod, diameter 9.5 mm, Temper F
- > Redraw rod, diameter 9.5 mm, Temper O
- > Redraw rod, diameter 9.5 mm, Temper F, with inter-stage annealing at diameter 2.5 mm.



#### Work-hardening curves

##### Processing procedure:

- F: work-hardened as-rolled CCR redraw rod.
- O: work-hardened from annealed CCR redraw rod.
- F cold worked and annealed: work-hardened as-rolled CCR redraw rod with inter-stage annealing at a dia. of approx. 2.5mm.

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Telephone +33 4 79201010 • www.trimet.eu



## **137050**

Redraw Rod – Continuously Cast  
and Rolled



# 137050

## Redraw Rod – Continuously Cast and Rolled

The CCR (Continuous Casting and Rolling) **137050 CONDUCTAL®** (equivalent to EC grade) is extensively employed in the manufacture of insulated wires and cables for transport and distribution of electricity and the manufacture of bare conductors for overhead power transmission and distribution lines (of the AAC, ACSR, ...).

The CCR (Continuous Casting and Rolling) 137050 CONDUCTAL® conforms to EN 1715.

### Description

#### Specified composition

The composition guaranteed by TRIMET is as tabulated below:

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ga	Ti+V	B	Others
											Each Total
Min		0.1									
Max	0.07	0.2	0.010	0.005	0.010	0.003	0.03	0.003	0.005	0.006	0.02 0.10

Its composition complies with the European standard EN573-3 and the ALUMINUM ASSOCIATION standards for Alloys 1350 and 1370.

Note: The data tabulated is guaranteed to within the analytical precisions indicated.

#### Production process

The redraw rod is produced from primary liquid metal by continuous casting and rolling (PROPERZI or SECIM processes).

The procedure followed in the foundry ensures excellent metal quality and, inter alia, excellent drawability.

#### Packaging

2 tons coils  
2.4 tons coils

#### Material condition

> Usual diameter: 7.5 mm, 9.5 mm, 12.2 mm, 15.2 mm, 19 mm  
> Mechanical and electrical properties

137050 CCR rod is produced in seven standard tempers or grades:

#### Aluminum Association designation

R6	annealed by suitable heat treatment	0
R7	"as rolled" grades	H10
R8	"as rolled" grades	H11
R10	"as rolled" grades	H12
R11	"as rolled" grades	H13
R12	"as rolled" grades	H14
R13	"as rolled" grades	H15

The table below sets out:

> maximum/minimum tensile strengths and maximum resistivity for each grade.

Temper	Tensile strength MPa (1)			ELECTRICAL PROPERTIES TO 20°C (2)	
	Min	Max	Typical	Resistivity max. mΩ cm	Conductivity minimale IACS mS/mm²
R6	60	75	70	2.725	62.3 36.7
R7	70	85	78	2.760	63.6 36.4
R8	80	95	85	2.785	61.9 35.9
R10	95	110	100	2.801	61.5 35.7
R11	105	120	110	2.801	61.5 35.7
R12	115	130	120	2.801	61.5 35.7
R13	125	135	130	2.801	61.5 35.7

(1) MPa = 0,1 hbar = 0,102 kg/mm² = 145 psi  
(2) see conversion table in appendix 1.

#### Physical properties

Melting point	659 °C
Density	2.703 kg/m³
Modulus of elasticity	69.000 MPa
Coefficient of linear expansion over the range 20 to 100°C	23 x 10 <sup>-6</sup> °C <sup>-1</sup>
Temperature correction factor for resistivity	
> annealed condition	4.07 x 10 <sup>-3</sup> °C <sup>-1</sup>
> work hardened condition	4.03 x 10 <sup>-3</sup> °C <sup>-1</sup>
Thermal conductivity at 20°C	222 W/m°C
Specific heat	920 J/kg°C

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## 137072 TAL

Redraw Rod – Continuously Cast  
and Rolled





# 137072 TAL

## Redraw Rod – Continuously Cast and Rolled

The CCR (Continuous casting and Rolling) **137072 TAL** is employed in the manufacture of wires and cables for transport and distribution of electricity. The advantage of this product lies in its ability to sustain higher temperature and thus higher ampacity. The maximum continuous temperature of use is 150°C and the maximum temperature for pics < 10h is 180°C.

The CCR AT1 conforms to IEC 62004

### Description

#### Specified composition

The composition guaranteed by TRIMET is as tabulated below:

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Ga	Zr	Ti+V	B	Others
Min										0.040			Each
Max	0.07	0.18	0.02	0.03	0.02	0.01	0.03	0.01	0.02	0.052	0.01	0.01	0.02

Note: The data tabulated is guaranteed to within the analytical precision indicated.

#### Production process

The redraw rod is produced from primary liquid metal by continuous casting and rolling (PROPERZI or SECIM processes).

The procedure followed in the foundry ensures excellent metal quality and, inter alia, excellent drawability.

#### Packaging

2 tons coils.

#### Material condition

> Diameter 9.5 mm.

- > Mechanical and electrical properties  
137072 is usually supplied in the partially work-hardened condition R11:  
UTS: 105 to 120 MPa  
Elongation > 10%

Temper	Tensile strength MPa (1)			ELECTRICAL PROPERTIES TO 20°C (2)		
	Min	Max	Typical	Resistivity max. mΩ cm	Conductivity minimale IACS	mS/mm²
R11=H13	105	120	110	2.860	35.0	60.3
R12=H14	115	130	120	2.860	35.0	60.3

(1) MPa = 0,1 hbar = 0,102 kg/mm² = 145 psi

(2) see conversion table in appendix 1.

#### Physical properties at high temperature of drawn 3.29 mm wire

**After 5h at 200°:** IACS = 60.5 +/- 0.3  
UTS > 96% of Initial UTS

**After 400h at 180°:** IACS = 61.1 +/- 0.3  
UTS > 94% of Initial UTS

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## 610145 | 610155 | 610166

Redraw Rod – Continuously Cast  
and Rolled



# 610145 | 610155 | 610166

## Redraw Rod – Continuously Cast and Rolled

The CCR (Continuous Casting and Rolling) **610145 | 610155 | 610166** ALMELEC® rods are aluminium-magnesium-silicon alloys developed specially by TRIMET for the manufacture of conductors for overhead transmission and distribution lines (AAAC type) and the manufacture of the neutral catenary of bundled cables. The **610145 | 610155 | 610166** grades are ideal for electrical applications. For applications where formability is required, please refer to next sheet **610177 | 610188**.

A suitable combination of thermal and mechanical treatments confers twice the mechanical strength of conductor-grade aluminium (137050) with a loss of only 10 to 15% in terms of electrical conductivity.

The 3 grades are able to meet all current requirements and relevant specifications.

### Description

#### Specified composition

3 products grades are currently manufactured, namely: 610145, 610155 and 610166 to standards of composition which comply with the European standard EN-573-3 and the ALUMINUM ASSOCIATION specifications for alloy 6101.

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	V	Ti	Others	
										Each	Total
<b>610145</b>											
Min	0.35				0.40						
Max	0.52	0.32	0.035	0.01	0.52	0.007	0.05	0.007	0.02	0.03	0.10
<b>610155</b>											
Min	0.38				0.44						
Max	0.56	0.32	0.035	0.01	0.56	0.007	0.05	0.007	0.02	0.03	0.10
<b>610166</b>											
Min	0.44				0.48						
Max	0.62	0.32	0.035	0.01	0.60	0.007	0.05	0.007	0.02	0.03	0.10

Works production tolerances on composition are in fact closer than tabulated above.

#### Packaging

Coils of 2 tons.

#### Production process

The redraw rod is produced from primary liquid metal by continuous casting and rolling (PROPERZI or SECIM processes). The procedure employed in the foundry ensures excellent metal quality, hence, excellent drawability and cable-stranding characteristics.

#### Material condition

##### > Diameter

The usual diameter is 9.5 mm.

##### > Temper

The rod is supplied in one of two tempers:

**F:** i.e. as-rolled, provided the cable manufacturer possesses suitable heat treatment and quenching facilities.

**TS:** i.e. heat treated, quenched and dried if such facilities are not available (T4 temper).

Quenching ensures high mechanical strength in the end-product after final artificial ageing. The purpose of drying is to avoid the risk of any undue oxidation of the rod in the centre of the coil.

#### IMPORTANT

As a general rule, the redraw rod should preferably be drawn within 4 to 6 months of quenching in view of the slight hardening which results from natural ageing.

The sooner the wiredrawing operation is carried out, the easier it is.

#### Mechanical and electrical properties

> Rod supplied in temper F: TRIMET offers no guarantee as to tensile strength.

> Rod supplied in temper TS (T4 temper): quenching procedure employed by TRIMET for ALMELEC redraw rod in this temper ensures uniform characteristics throughout coils weighing from 1.500 to 1.800 kg, according to rod diameter. These characteristics meet the European standard EN1715-2: Aluminium and aluminium alloys. Drawing stock. Part 2-Specific requirement for electrical applications.

This being so, mechanical and electrical properties as measured on the redraw rod cannot be employed for production control purposes and are given here merely for the sake of illustration.

# 610145 | 610155 | 610166

## Redraw Rod – Continuously Cast and Rolled

### Physical properties

Density	2.700 kg/m <sup>3</sup>
Modulus of elasticity,	69.000 MPa
Thermal conductivity at 20°C	220 W/m°C
Coefficient of linear expansion over the range 20 to 100°C	23 x 10 <sup>-6</sup> °C <sup>-1</sup>
Temperature correction factor for resistivity	3.6 x 10 <sup>-3</sup> °C <sup>-1</sup>
Specific heat	960 J/kg°C

Grade	Ultimate tensile strength MPa*		Resistivity mΩ cm	Electrical conductivity	
	10 days after quenching	6 months after quenching		IACS	mS/mm <sup>2</sup>
610145	150-175	165-190	3.35	51.4	29.8
610155	155-195	175-200	3.40	50.7	29.4
610166	170-205	195-220	3.50	50.0	29.0

\* MPa = 0,1 hbar = 0,102 kg/mm<sup>2</sup> = 145 psi

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## 610177 | 610188

Redraw Rod – Continuously Cast  
and Rolled



# 610177 | 610188

## Redraw Rod – Continuously Cast and Rolled

The CCR (Continuous Casting and Rolling) 610177 | 610188 rod is an aluminum, magnesium and silicon alloy developed specially by TRIMET France for mechanical applications.

### Description

#### Specified composition

610177 | 610188 products grade is currently manufactured, it's standards composition complies with the European standard EN-573-3 and the ALUMINUM ASSOCIATION specifications for alloy 6101.

Elements %	Si	Fe	Cu	Mn	Mg	Cr	Zn	V	Ti	Others	
										Each	Total
Min	0.30				0.40				0.01		
Max	0.60	0.41	0.04	0.01	0.60	0.007	0.05	0.007	0.02	0.03	0.10

#### Packaging

Coils of 2 tons.

#### Production process

The redraw rod is produced from primary liquid metal by continuous casting and rolling (PROPERZI or SECIM processes). The procedure employed in the foundry ensures excellent metal quality, hence, excellent drawability and cable-stranding characteristics.

#### Material condition

##### > Diameter

The usual diameter is 9.5 mm.

##### > Temper

**TS:** ie heat treated, quenched and dried if such facilities are not available (T4 temper).

Solution heat treatment followed by a cold water quench ensures high mechanical strength in the end-product after final artificial ageing. The purpose of drying is to avoid the risk of any undue oxidation of the rod towards the middle of the coil.

### IMPORTANT

As a general rule, the redraw rod should preferably be drawn within 4 to 6 months of quenching in view of the slight hardening which results from natural ageing.

The sooner the wiredrawing operation is carried out, the easier it is.

#### Mechanical and electrical properties

> Rods supplied in temper TS (T4 temper):

TRIMET offer no guarantee as to tensile strength for quenched rod in the TS condition. This is because some lack of uniformity arises from slight deviations from the chemical composition aimed at, plus the fact that natural ageing causes the rod to harden significantly over six days and then much more slowly and asymptotically.

#### Physical properties

Density	2.700 kg/m <sup>3</sup>
Modulus of elasticity,	69.000 MPa
Thermal conductivity at 20°C	220 W/m°C
Coefficient of linear expansion over the range 20 to 100°C	23 x 10 <sup>-6</sup> °C <sup>-1</sup>
Temperature correction factor for resistivity	3.6 x 10 <sup>-3</sup> °C <sup>-1</sup>
Specific heat	960 J/kg°C

Grade	Ultimate tensile strength MPa*		Resistivity	Electrical conductivity	
	10 days after quenching	6 months after quenching	mΩ cm	IACS	mS/mm <sup>2</sup>
T4	155-195	175-210	3.48	49.5	28.7

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## ELECTRICAL

Redraw Rod – Continuously Cast  
and Rolled



# ELECTRICAL

## Redraw Rod – Continuously Cast and Rolled Electrical engineering

One of the areas in which CCR (Continuously Cast and Rolled) rod is really in its element is electricity. For many years, it has been chosen now by the major cable makers worldwide.

The fields of application for CCR\* rod are virtually unlimited. They include insulated cables for low and medium voltage distribution networks, conductors for overhead lines, flexible cables for robotics, welding and railway engineering, cables using nickel-plated wire for aeronautical engineering, enameled wire for windings, etc.

Lightweight, easy to use, high electrical conductivity, corrosion resistance, lending itself well to surface treatments (nickel plating, anodizing, etc), are all some of the desirable features that make CCR\* rod a particularly effective and economic material.

Day after day, TRIMET CCR\* rod, already catering for the bulk of electrical applications, demonstrates its versatility and ability to meet new needs and requirements.

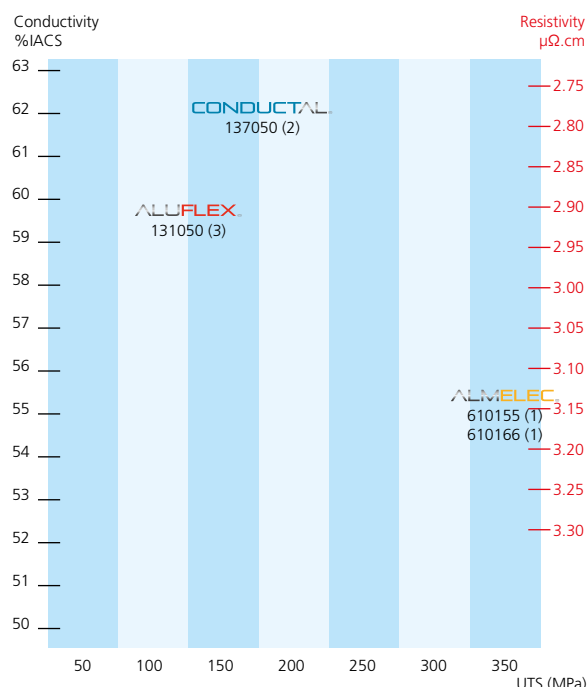
The **CCR\* 137050 CONDUCTAL®** (equivalent to EC Grade) is extensively employed in the manufacture of insulated wires and cables for transport and distribution of electricity and the manufacture of bare conductors for overhead power transmission and distribution lines (of the AAC, ACSR, ...).

The **CCR\* 610145, 610155, 610166 ALMELEC®** rods are aluminium, magnesium and silicon alloys developed specially by TRIMET for the manufacture of bare conductors for overhead transmission and distribution lines (AAAC type) and the manufacture of the neutral catenary of bundled cables.

A suitable combination of thermal and mechanical treatments confers twice the mechanical strength of conductor-grade aluminium (137050) with a loss of only 10 to 15% in terms of electrical conductivity.

The **CCR\* 131050 ALUFLEX®** rod is an Aluminium-Iron-Magnesium alloy used in the manufacture of fine gauge wire for:

- > flexible cables for aeronautical engineering
- > cables for automotive engineering
- > braids and screens for cables.



**Our products are delivered in 2 tons coils.**  
Standard diameter of our wire rod is 9.5 mm with other possibilities upon request.

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## MECHANICAL

Redraw Rod – Continuously Cast  
and Rolled

# MECHANICAL

## Redraw Rod – Continuously Cast and Rolled

### An incomparable range for mechanical engineering

The expertise acquired in CCR (Continuously Cast and Rolled) rod based on a substantial program of research and development has resulted in the creation of an outstanding range of aluminium alloys geared to mechanical engineering applications.

From rivets, superfine wire, bolts, screws or forging part, TRIMET CCR redraw rod matches a wide variety of requirements.

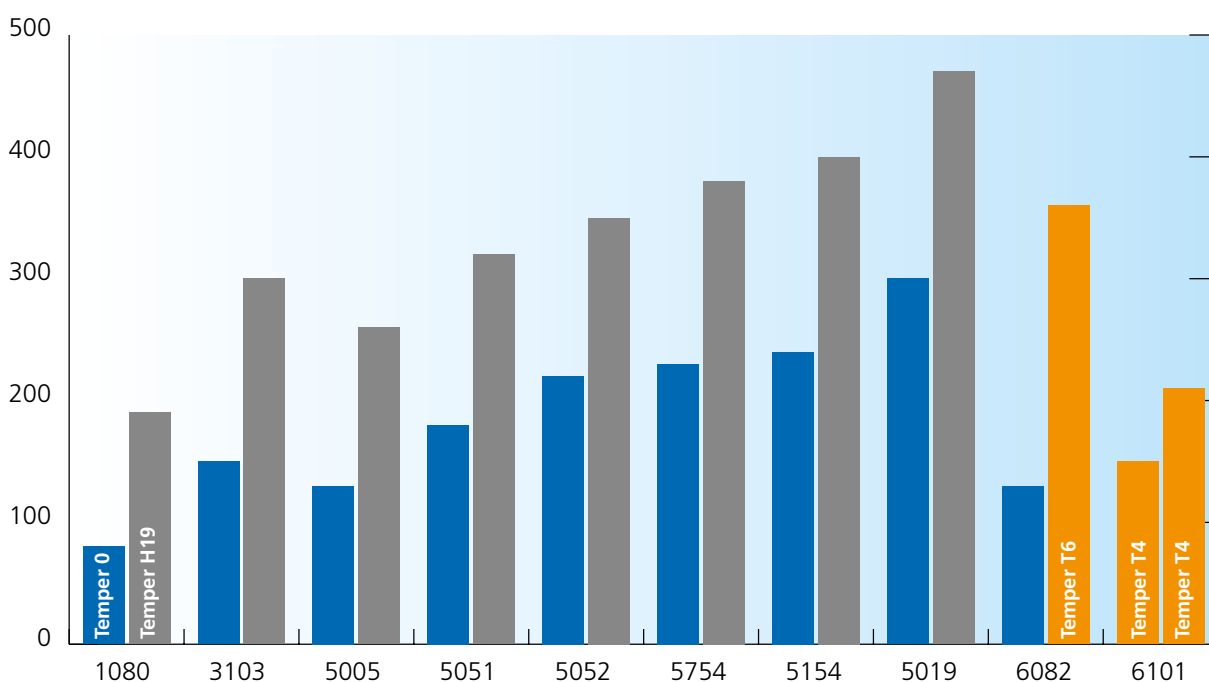
TRIMET CCR rod product range includes all the 1000 to 6000 series alloys, for numerous applications.

**Our products are delivered in 2 tones coils.**  
Standard diameter of our wire rod is 9.5 mm with other possibilities upon request.

#### Main alloying elements according Aluminum Association:

Hardening by:	Alloy series	Main alloying elements
Cold forming	1000	None
	3000	Mn 0.5 to 1.5%
	5000	Mg 0.5 to 5%
Age hardening (+ Cold forming)	2000	Cu 2 to 6%
	6000	Mg & Si 0.5 to 1.5%

#### Mechanical properties of MECAL® alloys (INDICATIVE data) :



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## WELDING



## WELDING

Redraw Rod – Continuously Cast  
and Rolled



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# WELDING

## Redraw Rod – Continuously Cast and Rolled The world of aluminium welding

The expertise acquired by TRIMET in CCR (Continuously Cast and Rolled) rod based on a substantial program of research and development have gone into the creation of an incomparable range of aluminium alloys geared to welding and brazing applications.

Since more than ten years, this know-how has been extended to casting of welding or arc spray alloys.

**Our products are delivered in 2 tons coils.**  
Standard diameter of our wire rod is 9.5 mm.

### Main welding alloys with alloying elements according Aluminum Association:

Hardening by:	Alloy series	Main alloying elements
Cold forming	1XXX	None
	4043	Si 5%
	4047	Si 12%
Age hardening (+ Cold forming)	5356	Mg 5%
	5087   5183	Mg 4.5%, Mn 1%

### INDICATIVE choice for welding alloys according to base material. Please refer to welding wire supplier.

Serie 1000 3000	1XXX				
5005 5050	1XXX	1XXX			
5052 5454 5754	4XXX	4XXX	5XXX (1)		
5083 5087	4XXX	4XXX	5XXX	5XXX	
Serie 6000	4XXX	4XXX	5XXX 4XXX	5XXX 4XXX	5XXX 4XXX
Alloys	Serie 1000 3000	5005 5050	5052 5454 5754	5083 5086	Serie 6000

(1) Attention has to be paid to intercrystalline corrosion of welded part.

### Most common welding alloys are:

- > Serie 1000: 1080
- > Serie 4000: 4043 , 4047
- > Serie 5000: 5356, 5087, 5183

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# Coils Packaging specifications

## Saint-Jean-de-Maurienne



### Typical diameter

Coil

#### A. Hight (coil only):

850 mm

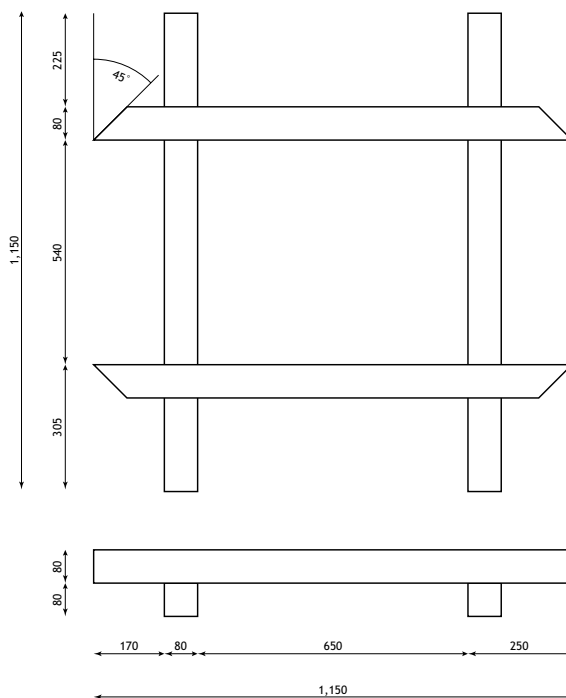
#### B. Outer diameter:

1,200 mm for 1.8 t

1,400 mm for 2.0 t

#### C. Inner diameter:

540 mm



### Typical diameter

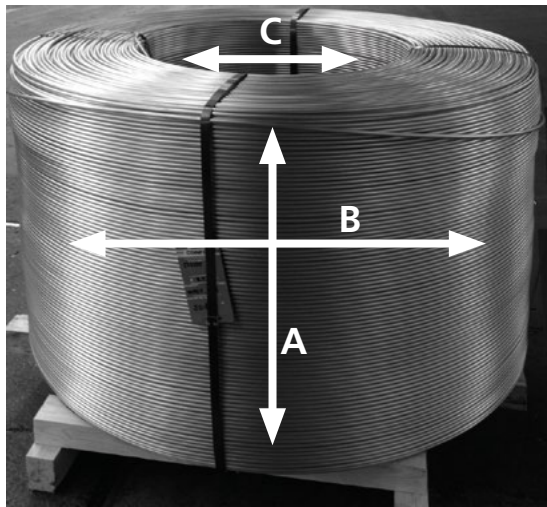
Wooden pallet

All Size in mm  $\pm 5$



# Coils Packaging specifications

## Castelsarrasin

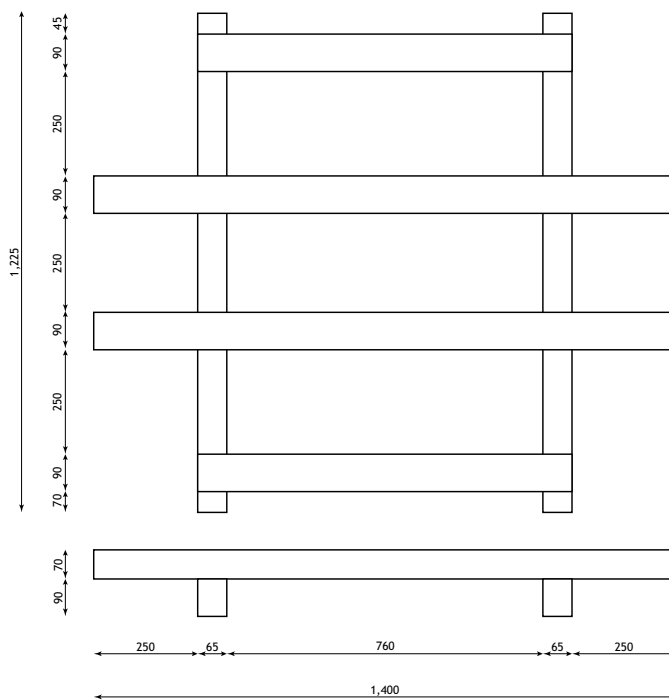


**Typical diameter**  
Coil

**A. Hight (coil only):**  
860 mm

**B. Outer diameter:**  
1,400 mm for 2.0 t  
1,440 mm for 2.2 t

**C. Inner diameter:**  
740 mm



**Typical diameter**  
Wooden pallet  
All Size in mm  $\pm 5$



## Your **contact person**



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