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ANC'OS SA and AFFEL'M SAS are 2 manufacturing companies run by J-M LAMBERT – 2 companies now grouped under the Holding Company **AAAL'TO SAS** which supervises managing, purchasing and investing.

ANC'OS SA and AFFEL'M SAS can produce **3 000 tons a year** with workshop covering 13 000m². They both share the same philosophy of quality and service and have their own specificities :

- ❖ **ANC'OS SA (ANCrages et Ouvrages Spécifiques)** is specialised in **heavy fixings**, ranging from **M8 to M160** for up to **14m long** :
 - **Anchors for steel construction** – Hangars for AIRBUS A380, TGV station in Orleans, MUCEM Museum in Marseilles, ...
 - **Forks and steel axes for structures** – ALLIANZ RIVIERA Stadium in Nice, Jean BOUIN Stadium in Paris.
 - **Tie rods and tie-rod systems for bridges and infrastructures** – Bridge in Bordeaux, Bridge over the River Loire, Bridge over the River Herault.
 - **Anchor systems** for catenary poles, steel frameworks, sound barriers.
 - **Special anchors** according to specific demands from customers.
 - Our customers are **international groups** – BOUYGUES and subsidiaries, VINCI, EIFFAGE, ALSTOM, CEGELEC, etc.



AAAL'TO : COMPETENCE IN EXCELLENCE



❖ **AFFEL'M SAS (Ancrage – Fixation – Forge – Ex. Lenoir et Mernier)** benefits from the many years of mining experience with the Lenoir & Mernier Company and is specialised in **anchor bolts**, supporting loads from **12 to 92 tons** :

- Large variety of **solutions to secure rockmass** (underground mines, cliffs, dams and tunnels):

- ❖ Series **A'THLON – Bi-A'THLON – Tri-A'THLON**
- ❖ Series **A'LSYON C – A'LSYON F – A'LSYON R**

- **special bolts** for chemistry, mine, oil, cement and railway industries.
- 70% of its production is dedicated to **export** : Europe, Africa, Maghreb, South America.

PRODUIT EN FRANCE



AFFEL'M, AAAL'TO Group, presents :

- ✓ **Intelligent and high quality products for much security.**
- ✓ **Competitive price for unique performance.**
- ✓ **French manufacturing with the ISO 9001V8 certification in progress.**

ANCHOR BOLTS

A'THLON series : high performance mechanical anchor bolts

Mechanical bolting was first introduced in mines in the early 50's, allowing to secure the roof via the suspended method. The expansion head is anchored in the stable strata of the rockmass (punctual anchor), the different layers are compressed between the anchored head and the bearing plate. Mechanical rock bolting holds the rockmass together. It immediately secures galleries and excavations.

AFFEL'M presents two different shapes for the **A'THLON** shells.

- The « U » type shells - U for Universal - are suitable for hard to soft rocks, even very soft ones.
- The « L » type shells are only for rocks with hardness superior to 300 bars.

Compression of the rockmass must be chosen according to what is expected :

- Sliding to blocking effect with the « U » type head which ideally absorbs the movement of the rockmass.
- Blocking effect with the « L » type head with only slight punching.



The « U »-Universal- head, rigid design and stamped shape to guarantee reliable and efficient anchoring in any type of rock.

« L » heads, same design but circular pattern.



AFFEL'M presents a range of 10 anchor heads for drillholes from 32 to 76 mm supporting loads from 12 to 92 tons. The **A'THLON** heads 41-46-56 and 66 can be fitted with groutable tubes (concrete or resin grouting) to be used as:

- ✓ distributed load anchors : **Bi-A'THLON** series
- ✓ dynamic anchors : **Tri-A'THLON** series.



*A large range of heads for ultimate load from **12 to 92 tons**.
Mines – Tunnels – Dams – Cliffs – Machine anchoring.*

The **A'THLON** bolts are known for their unquestioned and reliable performances. Both shells fit the borehole and when loaded, the concentric expansion of the head guarantees the contact of the whole face of the shells with the rock thus limiting its punching while ensuring at the same time important ultimate load.

A'THLON = mechanical punctual anchor

Advantages :

- ✓ Mechanical performance
- ✓ Immediate security of the rockmass
- ✓ Quick and easy implementation
- ✓ Competitive price
- ✓ Suitable solutions for any operating conditions

- The **A'THLON** bolts can accept the dynamic expansion of the rock : the bolt acts as a shock absorber.
- The **A'THLON** bolt offers better resistance for shear strength than a grouted bolt because of the larger space between the rod and the borehole.

Bi-A'THLON series: high performance distributed loading anchor bolts.

The **Bi-A'THLON** bolts derive from the **A'THLON** bolts and have the same heads, so they have the same capacities. They also have the advantage of being grouted either with cement or resin.

Characteristics:

- ✓ Combination of a mechanical anchor head and a groutable tube
- ✓ Choice between different tubes to match the characteristics of the other components
- ✓ Double lock : loading of the head then loading of the rod
- ✓ Very quick injection: less than 60 seconds to grout a 3.5m long bolt, from start to end
- ✓ Injection can be done long after bolting
- ✓ Choice of the part to be grouted : partial or total length
- ✓ Guarantee a complete coating of the rod for a perfect loading
- ✓ Quick and easy implementation : less than 2 minutes to set a 3.5m long bolt, including torquing
- ✓ 2-in1 concept with the advantage of immediately securing the site no matter how long it takes for the grouting to set
- ✓ Competitive price
- ✓ Suitable solutions for any operating conditions : rigid and modular capacity of the bolts to be used in very deep-low galleries

Bi-A'THLON = an intelligent bolt of unique conception : matching immediate security and grouting → distributed loading anchor

- **A 2-in-1 bolt** : mechanical anchor and partial or total grouting improve the corrosion resistance of the bolt and assure the sealing of blocks in fractured areas.
- **Competitiveness** : adaptability, rigidity, modularity, rapidity and facility to set, capacity and mechanical characteristics all give the **Bi-A'THLON** bolt a great competitiveness for maximum security.

+++ If total grouting is not necessary it is also possible to only partially inject on the nut/plate side. Contact us in that case.



*Choosing the right tube is essential to calibrate the ultimate load the bolt can support.
Ex : for a head 46U there are 4 possible R32 tubes, from **210 to 360kN**.*

Tri-A'THLON series : dynamic high performance anchor bolts.

With the same anchor head as the **Bi-A'THLON** bolts which they derive from, the **Tri-A'THLON** bolts have the same capacities and characteristics.

They are cement or resin groutable but in that case coating is only partial so as to keep absorbing shocks if there is any dynamic process in rocks.

Characteristics :

- ✓ Combination of a mechanical anchor head and a groutable tube
- ✓ Choice between different tubes to match the characteristics of the other components
- ✓ Double lock : loading of the head then loading of the rod
- ✓ Very quick injection: less than 60 seconds to grout a 3.5m long bolt, from start to end
- ✓ Injection (cement or resin) can be done long after bolting
- ✓ Choice of the part to be coated
- ✓ Quick and easy implementation : less than 2 minutes to set a 3.5m long bolt, including torquing
- ✓ 3-in1 concept with the advantage of immediately securing the site no matter how long it takes for the grouting to set
- ✓ Competitive price
- ✓ Suitable solutions for any operating conditions : rigid and modular capacity of the bolts to be used in very deep-low galleries

Tri-A'THLON : an intelligent bolt of unique conception matching immediate security and partial coating → **distributed dynamic loading anchor**

- **A 3-in-1 bolt** : mechanical anchor and partial grouting assure the capacity to absorb dynamic shocks.
- **Competitiveness** : adaptability, rigidity, modularity, rapidity and facility to set, capacity and mechanical characteristics all give the **Tri-A'THLON** bolt a great competitiveness for maximum security.



A'LSYON series : high performance concrete or resin grouting bolts.

AAAL'TO, via AFFEL'M, offers a very large range of groutable bolts :
Diameter from 16 to 56 mm with tensile strength from 110 to 1 100 kN.

The **A'LSYON series** presents 3 versions:

- **A'LSYON C** :
(C for common) = threaded head

- ✓ Standard: reinforced steel FeE B500B acc. to NFA 35016
- ✓ Diameter of the rods from **16 to 56 mm** for tensile strength from **110 to 1 100kN**



☹ the thread resistance is weaker by 15 to 30% than the rod's

- **A'LSYON F** :
(F for forged) = forged head

- ✓ Standard: reinforced steel FeE B500B acc. to NFA 35016
- ✓ The bolt can be hex-headed or square-headed forged



☺ the resistance of the head is **stronger** than the rod's



➤ **A'LSYON R** :

(R for reinforced) = forged threaded head

- ✓ Standard: reinforced steel FeE B500B acc. to NFA 35016
- ✓ Diameter of the rods from **18 to 32 mm** for tensile strength from **170 to 530kN**



© the thread resistance is **stronger** by 10 to 20% than the rod's

To obtain the same resistance as with a standard bolt, it would mean :

- steel saving of 20 to 65%, according to diameters.
- smaller borehole which also means grouting saving.

Conclusion :

To achieve the same results as with a **A'LSYON 25R** bolt, a standard bolt $\varnothing 32$ thread M30 would be necessary. It would mean :

- 65% more steel with bolt $\varnothing 32$.
- borehole $\varnothing 42$ for a bolt $\varnothing 32$ (compared to borehole $\varnothing 34$ for **A'LSYON 25R**).
- grouting volume 9 times larger with rod $\varnothing 32$.



Several options are available :

A'LSYON series is produced in 3 different steel grades :

- ✓ Steel FeE B500B acc. to NFA 35016 (reinforced steel)
- ✓ Steel E360 acc. to EN 10025-2 (smooth steel)
- ✓ Stainless steel (smooth or reinforced steel)



- ✓ Dished or beveled cut to mix up resin



- ✓ Forged square or flat parts to rotate the bolt

- ✓ Distance holder for cement grouting



- ✓ HDG or other possibilities against corrosion

AAAL'TO presents :

- ✓ Intelligent and high quality products for much security.
- ✓ Competitive price for unique performance.
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