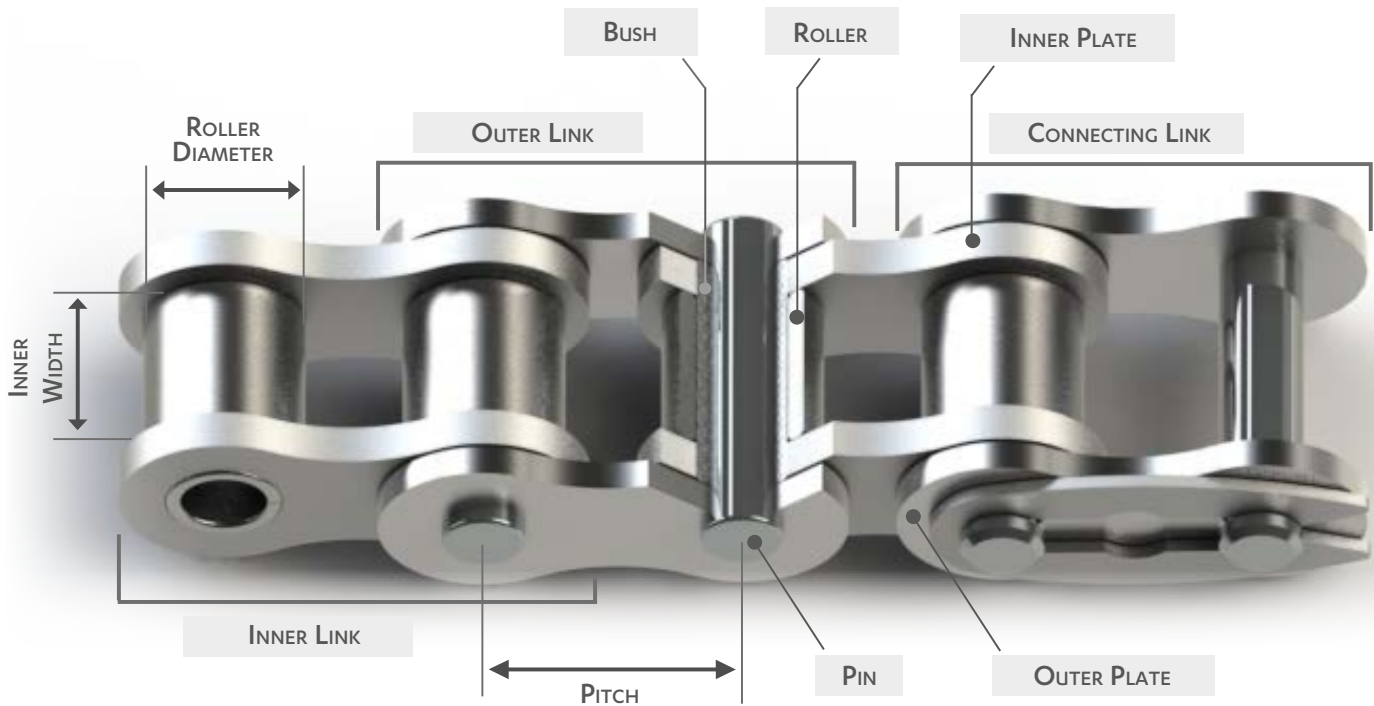


WHITE PAPER

Transmission

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- **COMPONENTS OF A TRANSMISSION ROLLER CHAIN**
 - **GENERAL DESIGN OF THE INSTALLATION**
 - **DRIVE ACCURACY**
 - **LUBRICATION**
 - **PRODUCT IMPLEMENTATION - SAFETY**
 - **MAINTENANCE**
 - **CHAIN LENGTH ADJUSTMENT**
 - **SEDIS RANGES**

COMPONENTS OF A TRANSMISSION ROLLER CHAIN



SEDIS chains, both standard and non-standard, are made of:

- o **High quality steels:** dimensions and adapted chemical composition for the different chain parts
- o **The most efficient manufacturing processes:**
 - Special technique for the production of bushes improving the chain wear resistance (**SEDIS** know-how)
 - Plates produced by multi-stage processing tools ensuring a regular pitch (**SEDIS** technology)
- o **Adequate mechanical and heat treatments of chain parts:**
 - Shot peening
 - Surface finishing
 - Case hardening, carbonitriding, quenching, tempering ...
 - DELTA®treatment
 - Freezing treatment
 - Corrosion protection coatings (GEOMET, zinc, nickel plating, ...)



SEDIS is certified ISO 9001 since 1989:

- First chain manufacturer in the world to be certified ISO 9001
- Eleventh French company to be certified ISO 9001

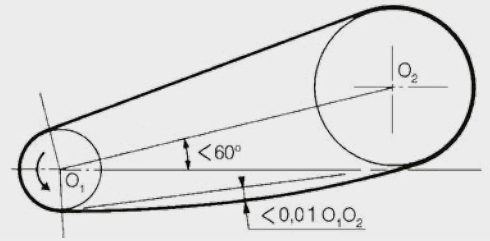
ISO 9001 version 2008

A sign of trust for our customers

1 - GENERAL DESIGN OF THE INSTALLATION

1.1 - TRANSMISSION

The centerline of the sprockets O_1O_2 should be horizontal or have a small inclination to the horizontal.



Where the angle of inclination exceeds 60° , and where a vertical drive cannot be avoided, precautions must be taken to ensure proper chain-to-sprocket gearing on the power sprocket:

- ▶ **The tensioned strand** of the chain should preferably **be on the top**
- ▶ **The number of sprocket teeth should be selected from the standard range whenever possible** (preferably a odd number). **The normal transmission ratio must not exceed 1/8. Allow for two chain drives in series for higher ratios.** It is preferable if the number of sprocket teeth and the number of links are prime numbers.
- ▶ **Provide shaft center adjustment** to ensure that the slack section of the chain is around 1% of the drive centers, provide a further 3% adjustment to compensate for chain wear.
- ▶ **Tension** : initially, the chain will not require any tensioning. But, in certain applications: reciprocation drive direction, frequent stop/start operations... it is necessary to have **a tensioning force on the slack strand** that does not exceed **10% of the driving force on the tight strand or 1% of the minimal breaking load** of the chain. This can be automatically adjusted or periodically regulated manually. When either the motor torque or the driven machine loading are irregular, in addition to providing a tensioning device on the slack strand, it may be necessary to **mount a guiding device on the tight strand to control vibration.**

1.2 - LIFTING WITH LEAF CHAINS

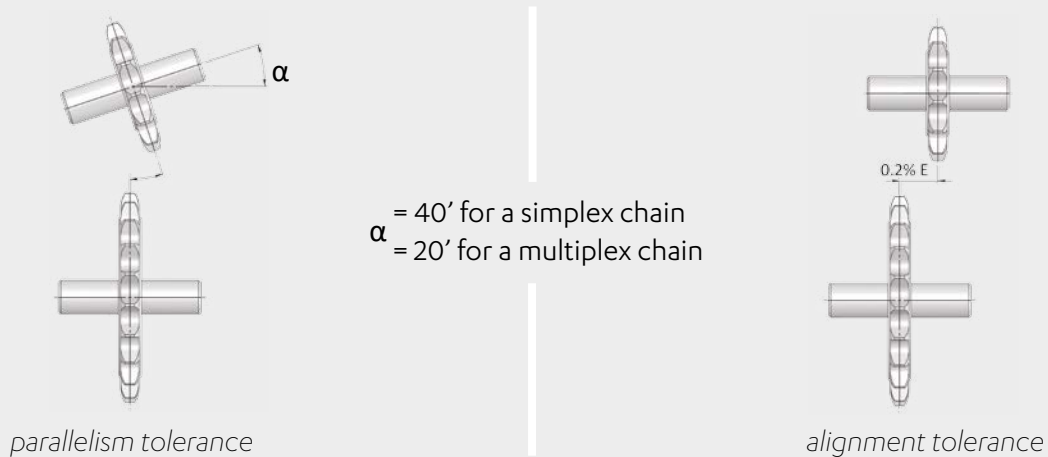
- ▶ In case where **two or more chains work in parallel**, the forces should be well distributed between them, generally by using adjustable fixing clevises to compensate for the dispersion of chain length and the other tolerances in the installation.
- ▶ All the **fixing devices** (clevises, pins, compensator, etc.) must have a **strength at least equal to that of the chain.**
- ▶ It is preferable that the **linear speed of the chain** is **less than 0,5 m/s.**
- ▶ The **dimensions of the reversing rollers** should satisfy the standard ISO 4347 giving some precise details such as: the diameter of the **minimum support $D_f > 5 p$** . European regulations do however make it possible to reduce the diameter to 3 times the pitch, but by risking quicker wear of the chain and the roller/wheel.
- ▶ **The hardness of the roller/wheel** should be able to resist wear caused by pivoting under the load of the chain plates at the moment of its arrival on the roller and when it leaves. As a guide, the hardness should be somewhere **between 300 et 400 HB.**

Using roller chains in lifting, please consult us. It is to be noted however, that in the majority of cases matched chains should be planned for.

2 - DRIVE ACCURACY

2.1 - TRANSMISSION

- ▶ **Defects in shaft parallelism** should be less than 40' for a simplex chain and 20' for a multiple row chain.
- ▶ **Defects in alignment** must be less than 0,2% out of line of the shaft centers. This limit falls to 0,1% for rapid transmissions. If it is impossible to avoid transverse shaft movement, the sprockets must be aligned in a median position. Sprocket alignment is especially important for multiple strand chains, because of their reduced transverse flexibility.



The consequences of geometry defects are:

- ▶ A **noisy and vibrating** transmission
- ▶ A **side wearing** of the sprocket teeth and/or the chain inner plates
- ▶ **Stresses** which may lead to the complete destruction of the chain
- ▶ **Improper distribution of the forces** on the chain plates when resistance and particularly fatigue limit can be considerably reduced
- ▶ Sprocket teeth concentricity and runout tolerances lies within limits laid down by the standard ISO 606 and **should not be altered by assembly** (for example when keying a sprocket to a shaft).
- ▶ The **rigidity of assembly** should be such that sprockets alignment and shaft parallelism are **not affected by driving forces** of the chain when operating.

2.1 - LEAF CHAINS

Defects in the alignment and parallelism of fixings and counter motion apparatus should be reduced as much as possible.

3 - LUBRICATION

3.1- THE AIM OF LUBRICATION

- To introduce **lubricating fluid between contacting surfaces** (pin/bush, pin/plate, bush/roller, inner linkplate/outer linkplate, etc.) to **reduce wear and to avoid joint seizure**.
- To **protect the chain against corrosion**.
- To **reduce noise** by introducing the lubricant between surfaces subject to shock loading.
- To **evacuate heat**, generally caused by friction between components.

3.2 - FACTORY PRE-LUBRICATION ALLOWS :

The chain to be protected against corrosion until it is installed by the user, provided it is not exposed to the elements. Prelubrication remains effective **six months** for chains stored under shelter. It should be **complemented with lubrication by the user's maintenance department** as soon as the drive is started up. Note pre-lubrication is compatible with all mineral oils.

We are able to propose suited lubrications depending on your specific constraints.

3.2- LUBRICATION METHOD

This should be chosen according to the criteria and characteristics of the installation, depending on its use. There are 3 main ways:

<p>MANUAL LUBRICATION (by brush ,oil can, etc...)</p> 	<p>CONTINUOUS DRIP FEED LUBRICATION</p> 	<p>CHAIN PASSING THROUGH AN OIL TANK</p> 
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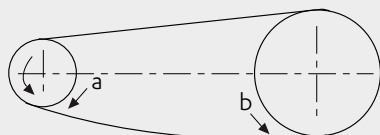
In transmission, any of these methods can be used, although the choice depends on the **type and speed of the chain**. When lifting, manual or continuous drip lubrication is usually employed, although automatic brushes can equally be used.

3.3- FREQUENCY OF LUBRICATION

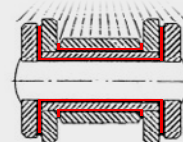
Quantity and frequency of lubrication should be established with care and according to the specifications of lubrication devices manufacturers.

3.4- WHERE TO LUBRICATE ?

► **Longitudinally**: in an area where the chain load is low in order to help the lubricant penetration (a & b: recommended areas)



► **Transversally**: between the plates to feed the lubricant towards the joints and between the inner plates, the rollers and the wheels.



3.5- WHAT LUBRICANT TO CHOOSE?

Lubricant must be suitable to operating conditions. In general a good quality clean mineral oil, free from detergent is suitable. Its viscosity must suit the ambient temperature shown in the table hereafter:

Recommended viscosity depending on operating temperature

Operating temperature (°C)	Recommended viscosity (ISO VG)
-15 to 0°C	15 to 32
0 to 50°C	46 to 150
50 to 80°C	220 to 320

The operator must achieve a compromise between a low viscosity lubricant which would centrifuge off the chain without properly lubricating it, and a substance with too high viscosity, which would prevent the lubricant reaching contacting surfaces. For special cases, and in particular where lubrication is impossible, please contact us.

UNLESS RECOMMENDED BY US, THE USE OF GREASE IS COMPLETELY PROHIBITED.

4 - PRODUCT IMPLEMENTATION – SAFETY

4.1 - STORAGE, HANDLING

The storage of products before their installation should be such that their initial quality is retained. The following rules must be obeyed:

- Keep products **away from a damp, corrosive or dusty atmosphere** or where they may come into contact with **harmful chemicals**

- Protect against **mechanical damages** or accidents
- **Do not exceed the stipulated storage period** suitable with the original factory lubrication (read 3.2)
- The product should be **handled with care**, and operators should be advised on how to avoid its deterioration.

In particular, shocks and forces applied perpendicular to the linkplates can cause kinks in the chain.

4.2 - ASSEMBLY

Before using the chain, it must be ensured that the quality of the installation conforms to advice given here above (read 1 – general design of the installation). When all the checks have been made, adjust chain length.

When assembling, the following safety rules should be obeyed:

- ▶ **Wear safety glasses, safety gloves and safety shoes.**
- ▶ **Remove motor fuses, clamp motor starters of I.C. engines etc., to ensure no accidental premature start up.**
- ▶ **Use suitable, good quality tools.**

In addition, the following rules apply to all chain drive installations:

- **Take care when unrolling the chain, not to twist it.**
- Chain must be **properly handled** to protect the chain itself or some of its components from damage.
- **Transverse forces** during assembly must **be controlled by guides** to avoid deforming the chain.
- Place the **connecting link** on the **slack strand** and take notice to **fit it the right way**.
- **Do not fit new links into a worn chain** or a new chain onto worn sprockets.
- When a **link is damaged, replace it completely**, and not just the damaged part. Change any link which may have been accidentally heated by a blow lamp or torch near the chain.

4.3 - OPERATION

Before starting-up :

- ▶ Check the **connecting link assembly**, the **fitting of spring clips** with the closed end pointing in the direction of chain travel, that **nuts are properly tightened** and that there are **no tight joints**.
- ▶ **Check the absence of nuts, tools and spanners** on the chain or trapped in the installation.

Upon starting-up :

- ▶ **Start off slowly and gradually**, keeping a close watch during the first revolution or first cycle of the process
- ▶ Run the drive **under a light load** or none at all for a while.
- ▶ **Check** the complete drive after a few hours or days of use.
- ▶ Check that the **forces on the chain are like those in the calculation** used for the chain selection.
- ▶ The **state and position of the lubricant nozzles** should be checked. The **color and degree** of lubricant contamination enables the efficiency of the lubricant to be measured, and also whether it is sufficient and when it should be renewed. If this is the case, apply once again or empty the installation using a lubricant of the same quality or superior quality. First it is necessary to get rid of the lubricant and clean the chain in order to get rid of deposits of dirty oil which could prevent the lubricant from penetrating the contacting surfaces (between the plates).

5 - MAINTENANCE

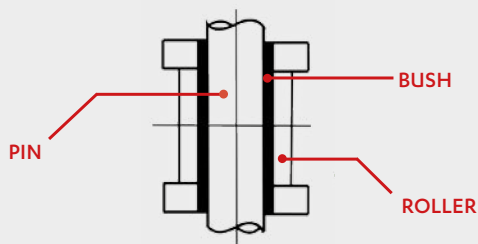
In a well assembled construction that is correctly lubricated, maintenance is restricted to ensuring that the whole assembly and lubrication methods remain satisfactory.

Periodically check :

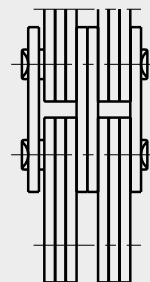
► **The installation geometry**, and particularly the sprocket alignment and tooth wear

► **The state of the chain**, particularly to detect traces of rubbing indicating a geometrical failure or accidental structural contact and to assess the amount of wear:

- **Wear of the chain articulations** is measured directly by its length (using a measuring instrument or a control ruler), either by appreciation or measurement of its slack or moving the tensioning device.



- **Wear of the linkplates** of leaf chains



► **If necessary, find out the cause of wear and rectify it.** If it is necessary to change a sprocket or a chain due to excessive wear (more than 2% for the length of a chain, or more than 5% for the height of the plate), then it is better to change both the chain and sprocket or rollers at the same time.

WARNING !



Given the high resistance of its components, **the chain is susceptible to being weakened by hydrogen**. Oxidising and corrosive environments must therefore be avoided. **An acidic environment is also to be avoided at all costs**. The most stringent precautions should be taken when removing grease from the chain.

All superficial treatments to the chain, and in particular electrolytic treatments, are to be avoided.

For these types of environments, consult us for an eventual solution..

6 - CHAIN LENGTH ADJUSTMENT

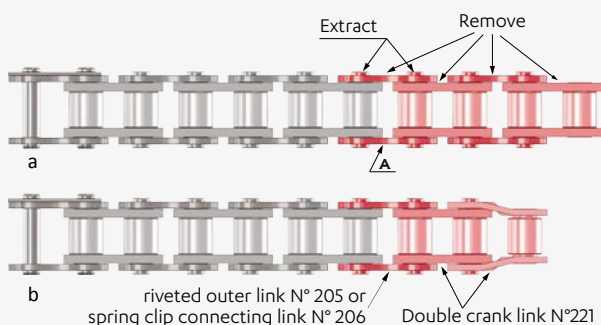
If the installation does not involve adjusting the shaft center of the slack section, chain adjustment should be carried out either at the beginning, or after normal wear has occurred.

CHAINS WITH AN EVEN NUMBER OF PITCHES

► SHORTENING BY ONE PITCH

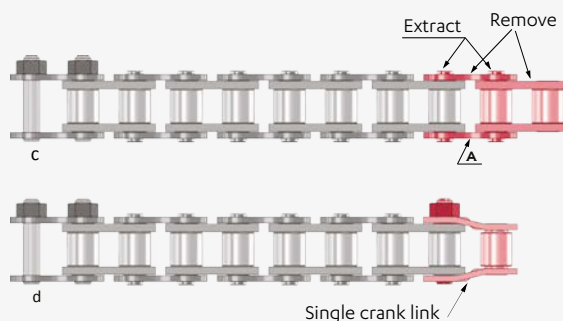
• Chains up to and including 25,4 mm pitch:

First remove four pitches of chain from one end, that is two inners and two outers by extracting outer link A (Fig.a). Then fit a double offset link N°221, a spring clip connecting link N° 206 or a riveting outer link N°205 (Fig.b).



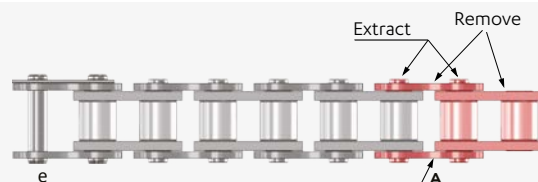
• Chains with a pitch of 31,75 mm or above:

First remove two pitches of chain from one end, that is one inner and one outer link by extracting the outer link A (Fig.c). Then fit a single offset link (Fig.d).



► SHORTENING BY TWO PITCHES

Remove two pitches from one end, that is an inner and outer link by extracting the outer link A.



CHAINS WITH AN ODD NUMBER OF PITCHES

► SHORTENING BY ONE PITCH

• Chains up to and including 25,4 mm pitch:

The chain ends with an offset link. Remove the cranked link.



• Chains with a pitch of 31,75 mm or above:

The chain ends with a single offset link which also serves as a connecting link. Extract the the outer link A and replace it with a connecting link N° 209 to reassemble the chain.



► SHORTENING BY TWO PITCHES

• For all chains:

Extract one inner link removing the outer link at the opposite end of the offset link.

NOTE : Leaf chains and conveyor chains don't have any crank links, as a consequence they are only concerned by the shortening of 2 pitches.



SEDIS RANGES



DELTA® HR

FOR SEVERE WORKING CONDITIONS
(ABRASION, SHOCKS, JERKS)

BS & ASA chains with high resistance to abrasion and wear:

TECHNICAL SPECIFICATIONS:

- DELTA® articulations
- Shot peened plates
- Preformed bi-conic bushes
- Solid rollers
- Chains pre-tensioned at 30-45% of the breaking load
- New generation pre-lubrication with technical wax from 12.7mm to 25.4mm pitch (08B to 16B)
- Other chains are pre-lubricated with initial plant lubrication



SERVICES:

- **Technical assistance** (analysis of the customer's specifications, definition and recommendation)
- **Adaptations** (attachments, extended pins...) and development of **specific products** on request
- **Matched pairs** on request for chains working in parallel
- Cut and manufacture of **chains of any length**
- Many references **available in stock**

DELTA® TITANIUM 2

RESISTANCE IN CORROSIVE ENVIRONMENTS

BS & ASA chains with high resistance to abrasion, wear and corrosion:

TECHNICAL SPECIFICATIONS:

- DELTA® Articulations
- Shot peened plates and coated with a GEOMET® treatment
- Solid rollers coated with a GEOMET® treatment
- Chains pre-tensioned at 30-45% of the breaking load
- New generation pre-lubrication with technical wax from 12.7mm to 25.4mm pitch (08B to 16B)
- Other chains are pre-lubricated with initial plant lubrication



SERVICES:

- **Technical assistance** (analysis of the customer's specifications, definition and recommendation)
- **Adaptations** (attachments, extended pins...) and development of **specific products** on request
- **Matched pairs** on request for chains working in parallel
- Cut and manufacture of **chains of any length**
- Many references **available in stock**

CHAINES VERTES

(«Green» chains) A MAINTENANCE-FREE RANGE

TECHNICAL SPECIFICATIONS:

LUB FREE VERTE chains:

Anticorrosion BS chains from 12.7mm to 25.4mm pitch with sintered bushes:

- Pins with hard surface treatment
- Nickel plated plates and solid rollers
- Sintered bushes

DELTA® VERTE® chains:

BS anticorrosion chains from 31.75mm to 25.4mm pitch with composite bushes:

- DELTA® Articulations
- Shot peened and GEOMET® treated plates
- GEOMET® treated solid steel rollers (or in composite on demand)
- Composite bushes admitting functioning in water or humid environments
- Temperature of use between -30 et +80°C (up to 250°C please consult us)



SERVICES:

- **Technical assistance** (analysis of the customer's specifications, definition and recommendation)
- **Adaptations** (attachments, extended pins...) and development of **specific products** on request
- **Matched pairs** on request for chains working in parallel
- Cut and manufacture of **chains of any length**
- Many references **available in stock**



ALPHA Premium
A HIGH QUALITY CHAIN WITH PROVEN RESULTS

High Quality BS and ASA chains :

TECHNICAL SPECIFICATIONS:

- Case hardened articulations
- Shot peened plates
- BS chains: Preformed bi-conic bushes
ASA chains : Solid bushes
- Solid rollers
- Chains pre-tensioned at 30-45% of the breaking load
- New generation pre-lubrication with technical wax from 12.7mm to 25.4mm pitch (08B to 16B)
- Other chains are pre-lubricated with initial plant lubrication



SERVICES:

- **Technical assistance** (analysis of the customer's specifications, definition and recommendation)
- **Adaptations** (attachments, extended pins...) and development of **specific products** on request
- **Matched pairs** on request for chains working in parallel
- Cut and manufacture of **chains of any length**
- Many references **available in stock**

ALPHA Premium STAINLESS STEEL

AN IMPROVED RANGE FOR BETTER WEAR RESISTANCE AND HIGHER BREAKING LOADS !

These chains are designed to work in a food application, or in aggressive chemical environments, :

TECHNICAL SPECIFICATIONS:

From 08B to 16B :

- Pins and plates in stainless steel series 300
- Solid bushes in stainless steel series 300
- Extruded rollers in stainless steel series 300
- Chains pre-lubricated with H1 food lube or other lubrication on request

Other chains of the range :

- Articulations and plates in Stainless steel series 300
- Solid rollers in stainless steel series 300
- Chains without initial lubrication or lubrication on request



SERVICES:

- **Technical assistance** (analysis of the customer's specifications, definition and recommendation)
- **Adaptations** (attachments, extended pins...) and development of **specific products** on request
- **Matched pairs** on request for chains working in parallel
- Cut and manufacture of **chains of any length**
- Many references **available in stock**



RECORD®
SEDIS EXPERTISE FOR YOUR STANDARD APPLICATIONS

Chaînes BS & ASA :

TECHNICAL SPECIFICATIONS:

- Shot peened plates
- Solid cold extruded roller
- Chains pre-tensioned at 30% of the breaking load
- Chains pre-lubricated with initial plant lubrication



SERVICES:

- Chains cut **in any length**
- Many references **available in stock**

