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Spokes & Nipples
OEM Catalogue

www.sapim.eu
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Introduction

Founded in 1918 by Mr. Herman Schoonhoven, Sapim has been producing spokes and nipples of the highest quality for over a century! This is a significant milestone for which we are all very proud of. Sapim would not have survived over 100 years if it didn't rely on the best and most motivated people. We are a team of professionals dedicated to bicycle spokes and nipples. Everybody is committed to providing top-notch expertise, experience and advice to customers.

At Sapim, customer has always been central to all our activities. From the beginning, Sapim has strived to maintain a close relationship with its customers. This is utmost important for us and this is where we clearly make a difference. We are open to new ideas and listen to the needs and wishes of all our partners, whether professional or amateur.

We constantly monitor each step of our production process. We offer a wide range of products made from the absolute best raw materials only. We call on the services of a unique testing facility to evaluate the performance of our products and those of our customers, because wheels are subject to more and more intensive uses, higher pressures and stronger weight requirements.

Today many professionals rely on Sapim products. It is without surprise that Sapim is considered by many professionals as the leader in the design and production of spokes and nipple. We are proud to bring you this catalogue that will help you discover the world of Sapim.

Your Sapim team
Positioning

Sapim is considered by many professionals in the bicycle industry as one of the leading manufacturers of Spokes and Nipples. This has been the core business of Sapim since its start in 1918. It has always been so and will remain so. The strategy of Sapim is organized around three guidelines.

First, we focus on what we do best, the design and manufacturing of “High-Performance” spokes and nipples for both amateur and professional use. We do not produce any wheels, nor hubs, nor machines or any other products. Just “High-Performance” spokes and nipples.

- Spokes for all types of wheels, made from high-quality inox steel, stainless and zinc materials.
- Nipples in brass and aluminium.

Second, we wish our customers and partners to be successful. Sapim only focus on the success of its customers encourage them to launch new products and develop new ideas. Our team is committed to provide the best advice to improve our customers’ product range. Therefore, Sapim ambitions to provide its partners not only with high quality products but also with all the support, service and advice they need.

Finally, we do not compromise with quality. We use the highest possible grade of material and ensure a perfect traceability of all products it manufactures.

- High tensile, fatigue-resistants spokes following Sapim Forging Technology
- Large range of spokes and nipples available in many lengths
- 50% of our products are custom-made. We give technical assistance to our customers to always find an optimal solution
History

1918
Foundation by Mr Herman Schoonhoven of Sapim (Société Anonyme Pour l’Industrie des Métaux), a company specializing in the production of spokes and nipples

1946
Company taken over by the son-in-law of the founder, Mr Florent Lambrechts

1995
Development of the Polyax nipples

1997
Development of the CX Ray spokes

2001
Start of Sapim USA

2004
Start of Sapim Asia

2005
Acquisition of France Rayon that later became Sapim France

2009
Launch of the D-Light spokes

2010
Launch of the Super spokes

2011
Launch of the CX Super

2012
Secure Lock

2013
Start of Sapim Hungary

2014
Start of production in Taiwan

2015
Move to new headquarter

2016
Development of the E-bike spokes

2017
HBT: Hard Black Treatment

2018
100 year milestone. RES: Re-enforced Spokes

2022
Closing of Sapim France & Sapim Hungary to centralize all operations in Europe
Spokes

Small things matter.
You can define it in different ways: A piece of steel, a wire, a spring or, what we like best, the connection between the hub and the rim. Being the link between the hub and the nipple, the spoke has multiple functions:

- **Carry**: spokes carry the weight of the bicycle as well as it load.
- **Absorb**: spokes absorb the irregularities of the road and ensure the comfort of the rider.
- **Transmit**: spokes transmit acceleration and braking effort of the rider.

When you see professional riders coming downhill at close to 90 km/h on their bike, you realize the vital importance to get the best quality of spokes and nipples.

**Head with bending**
Our standard spokes have a bending length of 2,8 mm. This is optimal for at least 90% of the hubs in the market. But sometimes the standard bendings are wrong. Steel hubs need shorter bend. You can adjust this with our spoke washer (see page about ‘washers’ for more details).

**Material**
Sapim uses only high grade stainless steel specially drawn to our own specification of material and tensile strength. The long term experience and many trials insure that Sapim spokes last long.

Precise definition and small tolerances are constant point of attention in the production process. This guarantees the highest quality for millions of spokes Sapim produces every year.

**Thread**
Spoke thread is rolled and not cut. Rolling the thread improve the strength. The name of the thread on a standard 2mm spoke is called FG 2,3 mm.

**Sapim’s three ranges of spokes:**

- **Aero spokes**
Sapim Aero spokes not only give an aerodynamic edge, but they also make wheels lighter and stronger. Forging the spoke in one go in elliptical dies give much better aerodynamic characteristics than just flat spokes. The forging process brings additional tensile strength into the spoke.

- **Butted spokes**
Sapim butted spokes have two major benefits: less weight and more strength! The SCFT-system (Sapim Cold Forging Technology) ‘stretches’ the spoke while retaining the linear molecular structure of the material, thereby increasing the spoke strength at the middle between 22% - 48% depending on model. The reduced diameter section brings more elasticity and a longer life.

- **Basic spokes**
Intended for everyday use, Basic spokes are produced using top quality materials. These are made from high-tensile, fatigue-resistant stainless steel conforming to Sapim high quality standard specifications. For higher loads and bigger hub holes bigger diameters are available.
Spokes: options

The world of wheel building and the demand of the market can make spokes different to the standard. For some we have to add anti rotation parts, hammer head, torsion control squares (picture), colors (picture) or different bending length to the spokes (picture). Also a lot more different spoke models are available only for manufacturers. Our variety ensures that you can build up wheels with nearly all available rims and hubs and can repair all standard wheels. For repairs of special branded wheels you should contact your local distributor.

Surface treatment

Black oxidation is a chemical process that transfers the first few microns of the stainless steel surface into a black layer. This method has the advantage of being done in a bulk process, which has a positive effect on the price and capacity (availability and delivery time). This process is performed by high quality minded companies specially selected by Sapim to achieve the highest quality possible.
## Usage of spokes

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<td>Strong</td>
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<tr>
<td><strong>City</strong></td>
<td>Leader</td>
<td>Zinc</td>
<td>Black Steel Leader</td>
<td></td>
</tr>
</tbody>
</table>
Basic Spokes:
for everyday use

Intended for everyday use, Basic spokes are produced using top quality materials. Made from high-tensile, fatigue-resistant stainless steel conforming to Sapim high quality standard specifications, the Leader forms the basis for all other spokes. Leader is also available in black.

For higher loads and bigger hub holes bigger diameters are available.
Basic spoke Leader

The Leader is the recommended choice for a day-to-day usage.

**Weight:**

14G: 431 g (64 x 260 mm)
13G: 569 g (64 x 260 mm)

**Length:**

15G/14G/13G: 80 - 310mm
12G: 145 - 310mm

**Strength on middle section:**

1080 - 1180 N/mm²

**Options:**

Rod (without bend) or different bend
Black (oxidised)
Anti-rotation part
Oval head
2-sides threading
TCS

**Diameter:**

<table>
<thead>
<tr>
<th>Gauge</th>
<th>Diameter</th>
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<tbody>
<tr>
<td>15G</td>
<td>1.8 mm</td>
</tr>
<tr>
<td>14G</td>
<td>2.0 mm</td>
</tr>
<tr>
<td>13G</td>
<td>2.3 mm</td>
</tr>
<tr>
<td>12G</td>
<td>2.6 mm</td>
</tr>
</tbody>
</table>
Basic spoke
Zinc

Another spoke for a day-to-day usage. Zinc spokes are better than their image. A big variety of length is available.

**Weight:**
- 14G: 431 g (64 x 260 mm)
- 13G: 569 g (64 x 260 mm)

**Length:**
- 14G/13G: 80-310 mm
- 12G/145-310 mm

**Strength on middle section:**
1100 - 1200 N/mm²

**Options:**
- Rod (without bend) or different bend

---

**Diameter:**

<table>
<thead>
<tr>
<th>Gauge</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>14G</td>
<td>2.0 mm</td>
</tr>
<tr>
<td>13G</td>
<td>2.3 mm</td>
</tr>
<tr>
<td>12G</td>
<td>2.6 mm</td>
</tr>
</tbody>
</table>

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Basic spoke
Black Steel Leader

The Black Steel Leader is another recommended choice for day-to-day usage.

Weight:
14G: 431 g (64 x 260 mm)
13G: 569 g (64x260mm)

Length:
80 - 310 mm

Strength on middle section:
1080 - 1180 N/mm²

Options:
Rod (without bend) or different bend
Butted Spokes:
less weight, more strength.

Sapim butted spokes have two major benefits: less weight and more strength! The SCFT-system (Sapim Cold Forging Technology) ‘stretch’ the spoke while retaining the molecular structure of the material, thereby increasing the spoke strength at the middle by at least 48%.

As an added bonus, the thin middle section of the light Laser and Race spokes also provides better shock absorption. The Strong, with its extra material in the bend, fits more tightly into the hub hole making it ideally suited for tandems and other heavy duty applications.
Butted spoke

Strong

A single butted spoke is drawn to its specific profile, which defines its high strength. The strongest spoke in Sapim’s product range, the Strong is developed for specific and heavy usage such as tandem, e-bikes or heavy load use. In case of large hub holes, the Strong is the recommended choice.

**Weight:**
14G: 446 g (64 pcs x 260 mm)

**Length:**
145 - 310 mm

**Strength on middle section:**
1250 N/mm²

**Options:**
- Rod (without bend) or different bend
- Black (oxidised)
- Anti-rotation part
- Oval head
- TCS
Butted spoke Laser

A double butted spoke is drawn to its specific Laser profile, which defines its high strength. The Laser is a reasonable priced lightweight spoke. The thin middle section of 1,5 mm needs special care while building up the wheel. Only experienced wheel builders should mount up wheels with this spoke. Without Torsion control spokes system (TCS System) not suitable for wheel building robots.

**Weight:**
14G: 283 g (64 pcs x 260 mm)

**Length:**
145 - 310 mm

**Strength on middle section:**
1500 N/mm²

**Options:**
- Rod (without bend) or different bend
- Black (oxidised)
- Anti-rotation part
- Oval head
- 2-sides threading
- TCS
- RES
Butted spoke D-Light

The short 2 mm section of the D-Light reduces weight especially on the threaded side. The 2 mm section starts just at the beginning of the thread. Therefore, the rotating masses at the end of the spoke are especially reduced. This brings benefits to both the acceleration and braking qualities of the wheel. The use of 14G nipples offers a wide variety of combinations. The middle section is increased to 1.65 mm, which makes the spoke much stiffer and brings less torsion during truing than a 1.5 mm middle section. This results in an easier building process of the wheels.

**Weight:**
14G: 307 g (64 pcs x 260 mm)

**Length:**
145 - 310 mm

**Strength on middle section:**
1370 N/mm²

**Options:**
- Rod (without bend) or different bend
- Black (oxidised)
- Anti-rotation part
- Oval head
- 2-sides threading
- RES

**Designed for top quality MTB wheels with:**
- Maximum strength
- Minimum weight
- Disc brake approval
Butted spoke
Race

Race is a very popular double butted spoke. Build up tension is easy. Much less torsion and not as elastic as the Laser spokes are the key points. The Race provides a better shock absorption thanks to a thinner middle section than the one of a non-butted spokes. Dealers say about this traditional spoke: “Never change a winning team…”

**Weight:**
- 14G: 363 g (64 pcs x 260 mm)
- 13G: 385 g (64 pcs x 260 mm)

**Length:**
- 145 - 310 mm

**Strength on middle section:**
- 1370 N/mm²

**Options:**
- Rod (without bend) or different bend
- Black (oxidised)
- Anti-rotation part
- Oval head
- 2-sides threading
- TCS
- RES

**Diameter:**
- 2.0 mm / 1.8 mm / 2.0 mm

**Butted Spoke Race**
Butted spoke
Black Steel Race

The Black Steel Race spoke is the economic version of the very popular Race double butted spoke.

**Weight:**
14G: 363 g (64 pcs x 260 mm)

**Length:**
145 - 310 mm

**Strength on middle section:**
1370 N/mm²

**Options:**
Rod (without bend) or different bend
Butted spoke

Sprint

A double butted spoke is drawn to its specific profile, which defines its high strength. The sprint is a light spoke able to use in truing lines. The Sprint provides a higher shock absorption, thanks to its thin middle section, than non butted spokes.

**Weight:**
14G: 331 g (64 pcs x 260 mm)

**Length:**
140 - 310 mm

**Strength on middle section:**
1300 N/mm²

**Options:**
Rod (without bend) or different bend
Black (oxidised)
Anti-rotation part
Oval head
2-sides threading
TCS
RES

**Diameter:**
2.0 mm / 1.7 mm / 2.0 mm
Butted spoke

Super Spoke

The lightest steel spoke ever made. The Super Spoke has been developed for extra light wheels. A new grade of stainless steel enables Sapim to reduce the diameter of the spoke, whilst increasing its strength and fatigue resistance. Extra assembly instructions are available.

Weight:
15G: 231 g (64 pcs x 260 mm)

Length:
140 - 310 mm

Strength on middle section:
1800 N/mm²

Options:
Rod (without bend) or different bend
Silver and black chromed
Oval head
Butted spoke Force

The well-known triple butted spoke of Sapim has been updated. The New Force is still a triple butted spoke but with a reduced weight without losing any strength. It combines maximum strength at the bending and offers good elasticity in the middle section. Using a 14G thread offers a wider standard range of use.

**Weight:**
14G: 363 g (64 pcs x 260 mm)

**Length:**
140 - 310 mm

**Strength on middle section:**
1370 N/mm²

**Options:**
- Rod (without bend) or different bend
- Black (oxidised)
- Anti-rotation part
- Oval head
- 2-sides threading
- TCS

**Diameter:**
2.2 mm / 2.0 mm / 1.8 mm / 2.0 mm
E-Spokes:  
Will be here forever

The world has realized the need to decrease the usage of carbon. E-mobility like the one provided by e-bikes is definitely a good answer to this major trend. Over the last years, e-bike has become the fastest growing segment within the bicycle industry.

It represents about 20% of the sales in Germany and about 30% in The Netherlands. Long before this trend has become popular, Ryde was already improving its Andra line. The bigger electric hub motors place the spokes under a too big angle for regular rims. This especially puts stress between the nipple and the spoke, leading often to failure of the spokes. By making sure that the nipple could be placed under the same angle as the spoke, this potential tension spot was relieved.

Intended to cover the high specifications for the E-Bike world, SAPIM E-Spokes offer a full range from E-MTB to E-Cargo. With a specific design, the double butted E-spokes are stronger near the hub while the thinner middle section provides a better shock absorption. The extra forces put on the spoke nipples and the rim bottom by the electric assistance are much evenly spread. This leads to even less failure with e-bike wheels.
E-spoke E-Light

The 2.3 mm section of the E-Light reinforces the spoke near the hub. While the 2.0 mm section, starting just at the beginning of thread, reduces the weight on the threaded side. Therefore, it can stand the higher forces on the hub, keeping rotating masses at the end of the spoke specially reduced. This brings benefits to both stiffness, acceleration and braking qualities with the wheel.

Specific design for top quality E-MTB wheels with:

**Weight:**
337 g (64 pcs x 260 mm)

**Length:**
130 - 300 mm

**Strength on middle section:**
1530 N/mm²

**Options:**
Rod (without bend) or different bend
Black (oxidised)
Anti-rotation part
Oval head
TCS
E-spoke
E-Race

The E-Race continues the legacy of the Race double butted spoke in the E-Bike sector. Easy to Build up tension. The E-Race provides a better shock absorption thanks to a thinner middle section than the one of a non-butted spokes.

**Weight:**
608 g (64 pcs x 260 mm)

**Length:**
130 - 300 mm

**Strength on middle section:**
1300 N/mm²

**Options:**
Rod (without bend) or different bend
Black (oxidised)
Anti-rotation part
Oval head
TCS
E-spoke E-Strong

The E-Strong offers an incredible strength at the bending. 2,6 mm has a max strength of 470 kg in the bending. The diameter 2,6 mm in the bending, the 2,3 mm in the middle section and 13G threat is still suitable for most of the standard hub and rims. The E-Strong is specifically developed for heavy load usage such like E-Cargo and E-Tandem.

Weight:
587 g (64 pcs x 260 mm)

Length:
130 - 300 mm

Strength on middle section:
1330 N/mm²

Options:
Rod (without bend) or different bend
Black (oxidised)
Anti-rotation part
Oval head
TCS
Aero Spokes:  
aerodynamic, light and strong

Sapim Aero spokes not only give an aerodynamic edge, they also make wheels lighter and stronger. Forging the spoke in one go in elliptical dies give much better aerodynamic characteristics than just flat spokes. The forging process brings additional tensile strength into the spoke.

Aero spokes are produced from the best suited stainless steel for spokes: high-tensile, fatigue-resistant 18/8 stainless steel conforming to Sapim quality standard specifications. The CX-Ray fit easily into all standard hubs.
Aero spoke
CX-Ray

The CX-Ray still receives one of the best results in fatigue testing of any spoke. Its unique strength and flexibility make the CX-Ray suitable for most bicycle disciplines. The middle section of the spoke is drawn then pressed in a special mold to form its specific profile. CX-Ray spokes are used by top bike racers and triathletes around the world. Even downhillers use them, recognizing their strength and flexibility. Special treatment and sophisticated production make this all possible. The CX-Ray fits in all standard hub holes.

- No extra hub hole design; hub manufacturer’s guarantee is unaffected.
- Almost as light as Titanium.
- More long lasting than any other spokes on the market.
- Extremely high fatigue test results.
- Special aluminium treatment and sophisticated production.
- The best aerodynamic elliptic spoke available.
- Produced from high-tensile, fatigue-resistant 18/8 stainless steel conforming to the Sapim quality standard specifications.

**Weight:**
279 g (64 x 260 mm)

**Length:**
145 - 310 mm

**Strength on middle section:**
1600 N/mm²

**Options:**
- Rod (without bend)
- Black (oxidised)
- Anti-rotation part
- Oval head
- 2-sides threading
- TCS
- RES

**Diameter:**
2.0 mm
(0.9 x 2.2 mm)

**2.0 mm**

**elliptic aero part**

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Aero spoke
CX-Sprint

Similar to the CX-Ray but stiffer. Higher stiffness is due to more material and therefore the spoke is slightly heavier. But still the elliptic shape of 2,3/1,2 fits in all standard hub holes. Some professionals use the CX-Sprint on the drive side and the CX-Ray on the non-drive side. This shall bring a more equal stiffness on right and left side in one wheel.

• No more extra hub hole design; the hub manufacturer’s guarantee is unaffected.
• Aerodynamic elliptic spoke.
• Produced from high-tensile, fatigue-resistant 18/8 stainless steel conforming to the Sapim quality standard specifications.
• Special treatment and sophisticated production.

Weight:
334 g (64 x 260 mm)

Length:
145 - 310 mm

Strength on middle section:
1430 N/mm²

Options:
Rod (without bend) or different bend
Black (oxidised)
Anti-rotation part
Oval head
2-sides threading
TCS
RES
Aero spoke
CX-Delta

The middle section of the spoke is pressed in a special mould to form its specific profile. The CX-Delta is a lightweight spoke with a flat aero section.

**Weight:**
(64 pcs x 260 mm) 272 g

**Length:**
140 - 310 mm

**Strength on middle section:**
1600 N/mm²

**Options:**
Rod (without bend)
Black (oxidised)
Anti-rotation part
Oval head
2-sides threading
TCS
RES
Aero spoke CX

The middle section of the spoke is pressed in a mould to form its specific profile. CX is the entry level aero spoke of Sapim. It provides an optimal aerodynamic shape by its elliptical profile. Because of the pressing in one go it is a very stiff spoke. Specially designed hub holes are required for CX spokes.

**Weight:**
- 14G (64 pcs x 260 mm) 423 g
- 13G (64 pcs x 260 mm) 560 g

**Length:**
- 140 - 310 mm

**Strength on middle section:**
- 1200 Nmm²

**Options:**
- Rod (without bend)
- Black (oxidised)
- Anti-rotation part
- Oval head
- 2-sides threading
- TCS
- RES

**Diameter 14G:**
- 2.0 mm
- (1.3 x 2.8 mm)
- Elliptic aero part

**Diameter 13G:**
- 2.3 mm
- (1.5 x 3.2 mm)
- Elliptic aero part
Aero spoke

CX-Wing

The middle section of the spoke is pressed in a special mould to form its specific profile. The CX-Wing has a very wide flat section which gives the spoke a unique design. Especially the 13G offers the widest section - 4.5mm - we know in the market.

**Weight:**
- 14G (64 pcs x 260 mm) 421 g
- 13G (64 pcs x 260 mm) 559 g

**Length:**
- 140 - 310 mm

**Strength on middle section:**
- 1200 N/mm²

**Options:**
- Rod (without bend) or different bend
- Black (oxidised)
- Anti-rotation part
- Oval head
- 2-sides threading
- TCS
- RES
Aero spoke
CX-Force

The middle section of the spoke is drawn then pressed in a special mould to form its specific profile. It provides an optimal aerodynamic shape by its elliptical profile. The 2.6 mm wide version might fit to some bigger standard flange holes without slot. The 2.2 mm diameter at the bending gives the spoke a higher max. strength and fits better in bigger hub holes.

Weight:
14G (64 pcs x 260 mm) 370 g

Length:
146 - 310 mm

Strength on middle section:
1400 N/mm²

Options:
Rod (without bend) or different bend
Black (oxidised)
Anti-rotation part
Oval head
2-sides threading
TCS
Aero spoke  
CX-Speed

The middle section of the spoke is drawn then pressed in a special mould to form its specific profile. It provides an optimal aerodynamic shape by its elliptical profile. The 2.6mm wide version might fit to some bigger standard flange holes without slot.

**Weight:**
- 14G (64 pcs x 260 mm) 356 g
- 13G (64 pcs x 260 mm) 383 g

**Length:**
- 140 - 310 mm

**Strength on middle section:**
- 1400 N/mm²

**Options:**
- Rod (without bend) or different bend
- Black (oxidised)
- Anti-rotation part
- Oval head
- 2-sides threading
- RES

---

**Diameter 14G:**
- 2.0 mm
- (1.2 x 2.6 mm)
- elliptic aero part

**Diameter 13G:**
- 2.3 mm
- (1.26 x 2.3 mm)
- elliptic aero part
Aero spoke
CX-Ultra

The middle section of the spoke is drawn then pressed in a special mould to form its specific profile. The 2,3 mm diameter at the bending gives an extra strength and high fatigue.

**Weight:**
(64 pcs x 260 mm) 453 g

**Length:**
140 - 310 mm

**Strength on middle section:**
1450 N/mm²

**Options:**
Rod (without bend) or different bend
Black (oxidised)
Anti-rotation part
Oval head
2-sides threading
TCS
Aero spoke
CX-Extra

The middle section of the spoke is drawn then pressed in a special mould to form its specific profile. It provides an optimal aerodynamic shape by its elliptical profile. The 2.3mm diameter at the bending gives an extra strength and high fatigue.

**Weight:**
(64 pcs x 260 mm) 453 g

**Length:**
140 - 310 mm

**Strength on middle section:**
1450 N/mm²

**Options:**
Rod (without bend) or different bend
Black (oxidised)
Anti-rotation part
Oval head
2-sides threading
TCS
Aero spoke
CX-Super

The lightest steel spoke ever made. The CX-Super Spoke has been developed for extra light wheels. A new grade of stainless steel enables Sapim to reduce the diameter of the spoke, whilst increasing its strength and fatigue resistance. Effectively, the CX-Super is 17% lighter than the CX-Ray and its strength is increased by 120N in the middle section versus that of the CX-Ray.

**Weight:**
(64 pcs x 260 mm) 231 g

**Length:**
140 - 310 mm

**Strength on middle section:**
1980 N/mm²

**Options:**
Rod (without bend) or different bend
Silver and black chromed
Oval head
2-sides threading
Surface treatment
Blackening

Sapim offers two different methods of blackening.

**Oxidation**
This is a Chemical Oxidation process. You change the stainless surface with addition of some color elements to black. The process is done in drums and reasonably cheap.

**Black chrome**
This is a chemical oxidation process, especially for Super and CX Super spokes. This process is done on racks and needs more handwork. The result is superior to oxidation, but a lot more expensive.
Modifications
following customized drawings

> Length of bend/neck, suitable for some hubs with special hub flange profiles or for special wheel geometries
> Angle of bend
> Length butted part
> Length flat part
> Width flat part
> Length thread
> Extra length (handmade)
> Short length (handmade)
> Shape head (oval)
> Anti-rotation part
> Diamond head

**Straight spokes**

*Available for special hubs.*

**Oval heads**

**Straight pull spokes**

**Diamond heads**

*Anti-rotational without the need of a spoke handling tool. Available only for 2.0 mm straight pull spokes.*
TCS: Torsion Control Spoke
The perfectly designed spoke.

The Torsion Control Spokes are the best spokes on the market for making a strong wheel. The secret of the spoke is in the unique square just above the thread (patented design). With this square it is possible to hold the spoke during tightening and trueing, so it prevents the spoke from twisting. The TCS Spokes can easily be tightened to more than 200 Nm without twisting.

Advantages of TCS spokes:
• Torsion free no micro-bursts
• Higher tension on spoke possible
• Longer life-time for spokes
• Minimal tension loss in time
• Aerodynamic spokes are positioned correctly

RES: Re-enforced Spoke
Added strength to the head

Used in the 2.0 mm Butted Spokes and Aero Spokes, RES strengthens the spoke where it’s the most requested: the bending. Keeping the dimensions of the body and only increasing the thickness of the head, the properties of the spoke are maintained while also making (E) the spoke strong reducing even the failures. The RES option increases the weight by only 0.5% while increasing the strength at the bending by 10%, a noticeable advantage.
Anti-rotation on spokes

Anti-rotation on spokes work only with a specific hub design. The square part stops the spoke rotating at the hub flange.

- Different for bended spoke and spoke with straight head
- Anti-rotation part: short or long

1. Position towards the flat part:
   - parallel //
   - perpendicular

2. Position towards the bending:
   - parallel //
   - perpendicular

- Head side
- Section A-A
- Section B-B
- Standards
- Screwwhead side

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// to the flattened aero part
⊥ to the flattened aero part

Section C-C
Bends and lengths

Examples

Basic spoke  Double butted spoke  Aero spoke
Bends and lengths
Summary of bend angles and bend lengths

A. Standard Sapim spokes

<table>
<thead>
<tr>
<th>Spoke Type</th>
<th>Extra Short Bend 2.2 mm</th>
<th>Short Bend 2.5 mm</th>
<th>Standard Bend 2.8 mm</th>
<th>Medium Bend 3.3 mm</th>
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B. Custom-made spokes

Also other dimensions are possible, following special requests of the customers.
Nipples: introduction

What is a nipple? You could name it differently as well. A piece of metal, a screw nut, or what we prefer to call is the connecting point between the rim and spoke.

Demand in the market differs a lot. Different mounting systems, rims and colors as well as weight guide you to a wide range of nipples. Producing on most modern machinery, Sapim ensures highest precision and quality. Sapim nipples are designed and manufactures in Belgium. A perfectly designed and manufactured nipples is a secret of a well mounted wheel.
Nipples How to produce a nipple

Nipples are made out of high quality brass or aluminium. They are forged and drilled by high precision machines to ensure meticulousness and quality. Specific control machines ensure the quality of each nipple. Surface treatment is done by carefully chosen partners of Sapim.

Brass
Most common material for nipples, brass nipples are generally nickel plated to ensure good corrosion resistance. Most wheel building robots can only work with brass nipples. Sapim offer brass nipples in silver and black.

Weight
- 64 pcs weight Polyax 12mm 60.48 g
- 64 pcs weight Polyax 14mm 68.19 g
- 64 pcs weight Polyax 16mm 76.42 g

Available colors
Aluminium
Aluminium is the material of choice for higher performance. For this purpose, Sapim has chosen the highest aluminum grade possible (7075 T6) for this sort of usage. It combines light weight, strength and corrosion resistance. The anodized surface treatment provides various color possibilities. We offer aluminium nipples in: silver, black, red, orange, gold, blue, green and purple. Sapim’s state of the art manufacturing process ensures the best quality available on the market. As a consequence Sapim’s Aluminium nipples has become the benchmark in the market.

Weight
- 64 pcs weight Polyax Aluminum 12mm 19.30 g
- 64 pcs weight Polyax Aluminum 14mm 21.82 g
- 64 pcs weight Polyax Aluminum 16mm 24.80 g

Available colors
Polyax nipple

Original Sapim Polyax-Nipples
The round shape of the head of the Polyax nipples works like a ball-join between the rim and the nipple ensuring a better spoke/nipple line.

• Typical head
• Available in brass and aluminium

Sizes:
13G - 14G (15G)

Lengths:
12- 14 -16 mm

Option:
Black (for aluminium nipples different colours)
Hexa Polyax nipple

*Hexagonal head Polyax nipples*
Hexagonal head nipples allow to take higher torque without damaging the four spans of the nipple. Because truing is done from the head side that has a larger diameter. It can take more pressure.

• Typical head
• Available in brass and aluminium

**Sizes:**
13G - 14G (15G)

**Lengths:**
12-14-16 mm

**Option:**
Black *(for aluminium nipples different colours)*
Inverted nipple

Inverted nipples are used in special rims. Because the whole nipple remains in the rim, it gives a better aerodynamic profile as well as a better design. Due to its special use, Sapim offers inverted nipples in 8, 5, 10 and 12 mm.

• Available in brass and aluminium

Sizes:
14G (15G)

Lengths:
8, 5 - 10 - 12 mm
Double Square nipple

Developed for Holland Mechanic robot OT positioned in the Pro Line series. It involves the use of the nipple driver bit from the bedding side of the rim.

The advantage of this assembly is:
• Scratch Free use of coloured brass and aluminium nipples
• Higher Tension: Direct Drive System on Robot (not with nipple hands)
• No Slot: higher torque on nipple

The Holland Mechanics machines are also suited to the use of the double square nipple on Sapim Torsion Control Spokes (TCS).

One can work from both sides of the nipple either by using the standard Sapim nipple driver or from the inside using the inverted straight nipple driver. The nipple is the equivalent of a 12mm nipple used on a 14G nipple hole size in the rim. All colours available on request.

Sizes:
13G - 14G - 15G

Lengths:
14 - 16 - 18mm
Reduction nipple

14G nipple holes in the rim and 13G spokes, 13G nipple holes in the rim and 14G spokes anything goes with the right reduction nipple.
Secure Lock nipple

Special nipple locking system (patented)
The patented Secure Lock nipple of Sapim is a locking mechanism that prevents nipples from untightening.

The advantages of this easy locking system are:
• Can be used on truing machine
• No loose function while truing the wheel
• Available on most current Sapim nipples
• Easy to recognize

Highly precise and accurate punching machines are needed for this type of locking system in order to achieve a stable and well defined deformation on the thread. Standard locking resistance of 12cNm.
Nipple Brass / Aluminium Standard

Polyax GMPO/GAPO

Round GMRO/GARO

Hexa GMHE/GAHE

Hexa Polyax GMHP/GAHP

Flat GMFL

Inverted GMUS/GAUS

Double Square Polyax GMDP/GADP

Double Square GMDS/GADS
# Nipple Brass Standard

## Brass round

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### Nipple Brass Standard

#### Brass Hexagonal Head

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#### Brass Double Square

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#### Brass Double Square Polyax

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## Nipple Aluminium Standard

### Aluminium Inverted Head

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### Aluminium Hexa Head

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### Aluminium Hexa Polyax

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### Aluminium Polyax Head

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## Nipple Aluminium Standard

### Aluminium Double Square

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Coating
Coating is a unique process developed by Sapim to reduce friction on aluminium nipples

Coating is applied on all aluminium nipples. The coating is applied on the thread and on the nipple. Friction between both spoke and nipple and rim and nipple is significantly reduced. Coating also seals the surface reducing corrosion. This is now standard in Sapim’s production.

Advantages:
- Silent, effective truing with no more squeaks.
- Virtually torsion free spokes.
- High tension wheels without problems.
- No over tight nipples on spoke threads.
- No more oily and dirty wheels.
- Just efficient dry working and clean hands.
- No unnecessary cleaning
- Wheels that are easier to true
HBT: Hard black treatment

Special surface treatment for brass nipples. The Hard Black Treatment is a surface treatment that improves the finishing of the nipple.

The advantages of this surface treatment are:
- Improved lifetime of the nipple because of the better corrosion resistance
- Great resilience to impact
- Superior scratch resistance
Washers

There are two kinds of washers:

1. **Nipple washers** increase the strength of the rim and reduce friction between the nipple and the rim.
   - Oval Washers increase strength of rim
   - HM Washers decrease friction of nipple
   - MS and MG washers increase strength of rim and decrease friction of nipple
   - Round Washers increase strength of rim
   Sapim is constantly searching for better washers as the rims are constantly changing

2. **Spoke washers** help to adjust the bending better to the hub. The usage of spoke washers is recommended on steel flange hubs. Our spoke washer fits on 2.3 and 2.0 mm spokes.
Hand Tools

Special Tools for proper wheel assembly

Sapim is not a tool manufacturer but it would like to support its customers by proposing a set of good tools to be used with its spokes and nipples. Therefore we have been trying nearly all different tools in the market and wanted to share with you the best we found. The tools below are mostly made out of existing tools with some slightly different specification. Good tools and good wheel building belong together.

- **Ruler**
- **Nipple Driver**
- **Special Nipple Key**
- **Nipple Clamping Screwdriver**
- **Hexagonal Nipple Key**
- **CX/CX-Ray Key**
- **Nipple Key 3.45mm, 4.20 mm**
Sapim spoke tensiometer

Advantages and features:

- Each tensiometer is calibrated for all Sapim aftermarket spokes, no guessing anymore
- A large measure gauge, easy to read
- Pre-adjustable marks: checking whether tension is within (your) tolerances
- Wide range from 40 kgf to 200 kgf
- Metal stick for testing included, allows to check the status of the calibration
- Delivered in a wooden case, the best storage to prevent damage
- Unique serial number
- Good price/quality ratio, part of our service towards our customers

Digital measure gauge

- The first choice of the most precise wheel builders
- Easy and most accurate measurement reading
- Data can be directly imported straight to your PC (software required)