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## Thread Lock and Sealing

Non-reactive coatings



"The connection elements with integrated safety open up new horizons."

## NON-REACTIVE COATINGS

# Thread Lock and Sealing

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Non-reactive coatings from Bossard make a simple screw into a multifunctional connection element with new properties with respect to function, safety and rationality.

### Multifunctionality

Connection elements with functional coatings combine several functions and are thus extremely economical.

What this means for you:

- Multifunctional applications
- Less individual parts
- Faster and safer processing
- Over 30% of the rationalization potential in the entire value added chain of a connection
- Faster throughput time
- Reduced assembly time
- Increased productivity

### Comprehensive expertise

Bossard has its own systems that are used to create coatings according to various standards or according to customer specifications.

What this means for you:

- A high level of consultation expertise
- A high level procurement security
- Tailor-made solutions
- Short delivery times
- Samples and small series possible

### Availability, worldwide

Due to the decades of cooperation with qualified specialists in coating technologies and thanks to our own production, we can ensure that our products meet the highest standards of quality, reliability, availability and safety.

## COATINGS

# A question of safety and economic efficiency

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Functional coatings save time during assembly, costs during procurement and make the application safe.



### Application-related

There is a suitable coating for every application, whether it is for securing against vibrations, for securing against loss, for sealing in the thread, for sealing under the head and much more.

The coating:

- is a captive component of the connection element. The retaining element cannot get lost or forgotten.
- replaces additional securing elements, such as circlips, adhesives, etc. The material management is simplified.
- occurs in series with sophisticated systems. Strict manufacturing specifications and ongoing inspections ensure consistent quality.
- do not damage the surfaces of joining parts. Signs of corrosion occurring later are thus minimized.
- can seal and secure the thread, seal under the head, etc.

## TufLok® – "the blue patch"

Reliable and economic system for securing and sealing screw connections. Screws and other threaded parts receive a highly-elastic, abrasion-resistant, blue polyamide coating on part of the thread.

The TufLok® spot causes a high frictional connection when screwing in the screw in that the opposing uncoated flanks between the screw and nut thread are firmly pressed together during assembly. In addition, it fills the axial clearance between the screw and nut threads. This creates a connection that prevents loosening in the event of dynamic loads.

As a round coating, TufLok® creates an effective seal in the thread.

## Nytemp® – the high-temperature screw lock

Nytemp® generally exhibits the same properties as TufLok®, but works in the temperature range up to 200°C continuous load (higher loads are also possible in the short term). Due to the higher coating temperature, application is only possible on plain or phosphated threaded parts and stainless steel, whereby discolorations of the base material must be expected.

## Nystay®

Nystay®, the plastic coating that is applied directly to the shaft of connection elements to protect them during transport or assembly in the respective application / assembly group. The element also cannot get lost after assembly (e.g. in the sense of the machine construction guideline).

## Nyseal®

With Nyseal®, elastic coatings are already applied to screws and other threaded parts prior to use: directly under the head, on the flange or on the thread outlet. There is no more use of manually applied washers, seals or O-rings.

## Nyplas®

Nyplas® is applied to screws or other threaded elements directly on the planar surface of the component to be coated. Sealing material: Plastisol/PVC. There is no more need for manually applied washers, seals or O-rings.

## FOR SELF-LOCKING EXTERNAL THREAD

# TufLok® / Nytemp®

### TufLok®

TufLok® has proven itself worldwide: in the automotive industry, in heavy machines, fittings and apparatus construction, in hydraulic systems, in electrical and precision mechanics and in optics.

The TufLok® spot is also ideal where other systems fail technically or economically:

- for very small screws – from M1
- for screws made of hard material
- for screws that cannot be weakened in the cross-section
- also for threaded pins
- for almost all metallic, rotationally-symmetrical parts (customer-specific parts)

### Assembly

The assembly of a TufLok®-coated screw occurs mechanically or manually with conventional tools. The TufLok®-coated screw increases productivity, because it can be supplied and screwed in completely automatically. It is not necessary for the nut thread to be free of oil and grease (friction values or torques are reduced by oil or grease).

### Properties

- TufLok® is temperature-resistant from -56°C to +120°C. Applications of up to +150°C are possible according to prior practical testing.
- Nytemp® is suitable for high-temperature screw locking with up to 200°C continuous loads.
- TufLok® does not dry out, does not shrink, does not disintegrate and is dry and can be stored at room temperature. It is resistant to alcohol, oil, gasoline and commercially available thinners.
- TufLok® coating is also suitable for food processing companies.



### Product Features

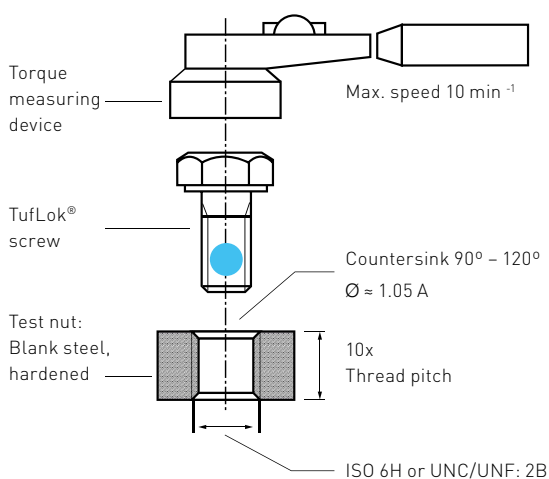
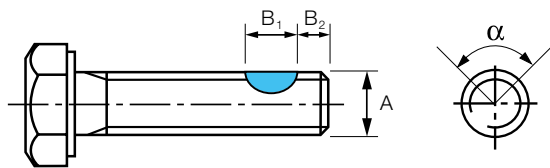
- High locking effect compared to other methods.
- Vibration-resistant in any screw-in position. The TufLok®-coated screw is therefore also ideal as an adjusting screw.
- Seals against liquids and gases. The coating firmly presses into the thread flanks, thus preventing the ingress of media. All-around coating is recommended for these applications.
- Replaces other locking elements that are often forgotten or get lost during assembly. The blue TufLok® spot is a captive component of the screw.
- It can be reused several times. The highly-elastic blue TufLok® spot attempts to always take its original shape. Its system-typical spraying edge zone protects the coating from shearing.
- No curing time – can be stressed immediately. It's also no problem if the TufLok® screw is tightened during the final assembly.
- It is suitable for all metallic materials, even for threaded parts made of non-rusting steels, light alloy metals and brass, as well as for almost all surface-treated parts.

## Coating

To produce ready-to-install, self-locking and sealing screws and threaded parts from M1 to M68.

The coating occurs according to company standard 900.1 or according to DIN 267 part 28. Deviations in the position of the coating and the amount of the torques may largely be taken into consideration. Inspections according to customer-specific information or in customer test parts are also possible.

- Coating angle  $\alpha$  in the core area of about  $90^\circ$
- Edge zone (spray transition) up to about  $180^\circ$ .
- Coating length  $B_1$  4 to 6 thread turns.
- About 2 to 3 thread turns ( $B_2$ ) remain uncoated for trouble-free screwing in.



Test coatings are recommended in the event of deviating coating lengths, different coating positions, test methods and screw tolerances.

## Torque testing according to Works standard WN 900.1 (for screws)

The values named in the table require screws that are homogeneous with respect to the material and surface quality.

1. Check the cleanliness of the test nuts prior to the testing.
2. Screw the screw into the test nut – on the marked side – (with max  $10 \text{ min}^{-1}$ ) until the coating point is entirely within the nut. In the process, measure the maximum screw-in torque (see the tables for max value).
3. Unscrew the screw by  $90^\circ$ , then measure the greatest torque during the following  $360^\circ$  (see the table for the setpoint).
4. Unscrew the screw all the way out of the test nut and screw it back in four times. During the fifth unscrewing, measure the greatest torque again during the first  $360^\circ$  (see the table for the setpoint).

Dia- meter ISO 6g	1. Screwing max. Nm	1. Un- screwing min. Nm	5. Un- screwing min. Nm
up to M2	0.2	0.04	0.02
M 3	0.45	0.1	0.05
M 3.5	0.7	0.2	0.1
M 4	0.9	0.28	0.17
M 5	1.6	0.4	0.23
M 6	3	0.8	0.4
M 8	6	1.5	0.8
M 10	9.5	2.3	1.2
M 12	13	3.4	1.7
M 14	19	4.5	2.3
M 16	28	7	3.5
M 18	36	9	4
M 20	44	11	5.5
M 22	60	15	7.5
M 24	80	20	10

## FOR SELF-LOCKING INTERNAL THREAD

# TufLok® / Nytemp®

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### TufLok®

The self-locking internal threads are coated with the highly elastic blue TufLok®.

When screwing on the internal thread, this blue TufLok® spot causes a high surface pressure in the opposite thread flanks. In addition, the nylon layer fills the axial clearance between the screw and nut threads. This creates a vibration-proof connection, which prevents loosening during dynamic loads, but that can always be released at any time.



### Product Features

- The TufLok® internal thread coating achieves a high locking effect.
- The self-locking TufLok® nut can be quickly and easily assembled, either manually or with fully automatic screwing devices. It is ideal for precise adjustment work.
- Unlike lock nuts with deformed threads or with teething on the contact surface, the TufLok® nut reduces the surface damage to the workpiece, the erosion in the thread as well as abrasion or damage to the screw thread.
- Additional securing elements can be eliminated. This results in cost savings due to less effort for warehousing, scheduling and assembly.
- The installed locking effect cannot be forgotten during assembly and is not lost during repair work. This means increased safety.
- TufLok® internal threads can be reused.
- TufLok®: Temperature resistant from -56 °C to +120 °C.
- Nytemp®: For higher temperature loads up to 200 °C continuous load.



## Coating

To produce ready-to-install, self-locking and sealing nuts in the size from M 5 to M 16.

The coating occurs according to company standard 945 as a spot or round coating. The coating occurs on the thread center (spray transition at the start and end of the thread).

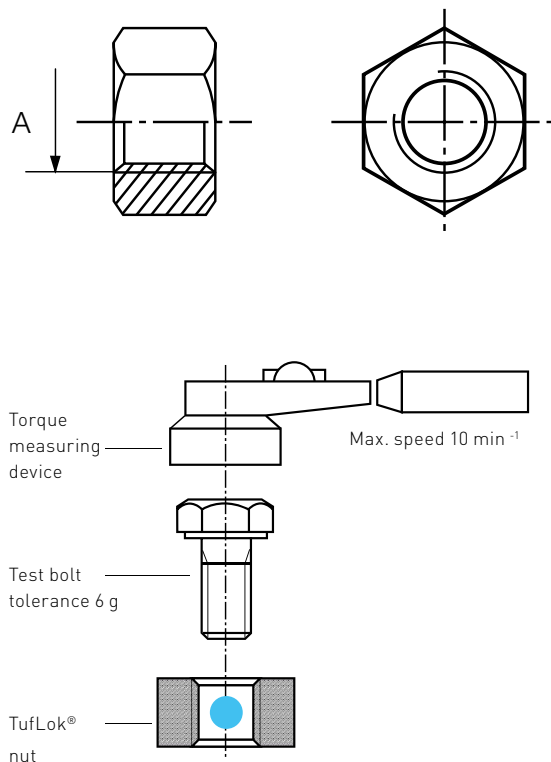
## Application

Self-locking TufLok® internal threads have proven themselves everywhere in industry, such as in vehicle construction, as well as with all kinds of equipment and structures – everywhere that there is the risk of machine or vehicle parts becoming loose during operation.

## Torque testing according to Works standard WN 945 (for nuts)

The values named in the table require nuts that are homogeneous with respect to the material and surface quality.

1. Check the cleanliness of the test bolt prior to the testing.
2. Screw the test bolt into the nut to be tested until the coating is completely covered. The test bolt may not protrude more than 1-2 turns over the coating. In the process, measure the maximum screw-in torque (see the tables for max value).
3. Unscrew the test bolt by 90°, then measure the greatest torque during the following 360° (see the table for the setpoint).
4. Unscrew the test bolt all the way out of the nut to be tested and screw it back in four times. During the fifth unscrewing, measure the greatest torque again during the first 360° (see the table for the setpoint).



Dia- meter A	1. Screwing max. Nm	1. Un- screwing min. Nm	5. Un- screwing min. Nm
M 5	1.6	0.29	0.2
M 6	3	0.45	0.3
M 8	6	0.85	0.6
M 10	10.5	1.5	1
M 12	15.5	2.3	1.6
M 14	24	3.1	2.3
M 16	32	4.5	3

Deviating coating lengths, spot or all-around coating and/or other coating points, deviating torques as well as values for other test methods (similar to DIN EN ISO 2320) or other nut tolerances: Test coating required.

## KEEPS THE CONNECTION ELEMENTS IN THEIR PLACE

# Nystay®

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### Nystay®

The plastic coating that is applied directly to the shaft or to the thread of connection elements to protect them during transport or assembly in the respective application / assembly group.

### Area of application

Nystay® can be applied to all connection elements – with thread or without thread. Nystay® allows for a pre-assembly, especially with automatic feeds and robot applications. The application range of course not only includes screws, but also all connection elements such as shafts, rivets, bolts, press parts and turned parts, etc.

### Advantages for the user

Screws coated with Nystay® on the thread area can already be inserted in the component beforehand. The coating reliably affixes the screw in the bore hole. The end user thus already receives a component pre-assembled with screws and does not have to spend time selecting and assembling the correct screws.

This can also reduce and simplify the warehousing of connection elements. The work and cycle times are significantly reduced during the final assembly by already pre-assembled components.



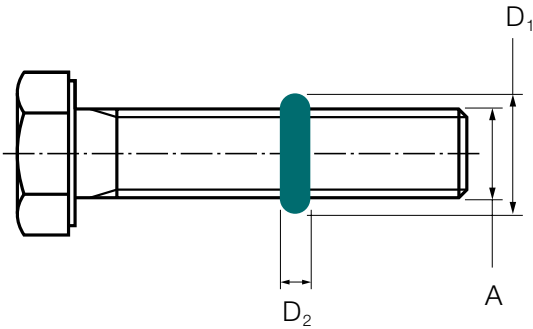
### Product Features

- Affixes connection elements in their place during transport, assembly or installation.
- Non-toxic and environmentally friendly, since the plastic coating is based on polyolefins.
- No chemical reaction during assembly.
- Can be positioned anywhere on the shaft or on the thread of a connection element.
- Shortens assembly times for the end user.
- Interesting solution for the safety requirements in the sense of the Machinery Directive 2006/42/EC.
- Material based on polyolefins.
- Temperature resistant from -40 °C to +90 °C.
- Green color.
- The desired piercing force is to be determined via practical testing.

## Coating

To produce safeguards against losing parts in the range from diameter 3 to diameter 10, respectively M 3 to M 10.

The coating occurs according to company standard 903 4 as a ring coating.



## Application

Nystay® is melted directly onto the shaft of connection elements. This creates a flexible, ring-shaped coating that is a reliable safeguard against parts being lost for pre-assembled components during transport or storage.

## Works standard WN 903 4 (affixing coating)

Diameter of screw A	Diameter of bolt A	Ring diameter $D_1$	Ring width $D_2$
M 3	3	3.3	3
M 3.5	3.5	3.8	3.5
M 4	4	4.4	4
M 5	5	5.5	4
M 6	6	6.6	4
M 8	8	8.8	5
M 10	10	11	5

- The ring diameter and width are guide values.
- The diameter of the through boring is about 0.1 to 0.2 mm smaller than the ring diameter, depending on the desired piercing force.

## SEALS THE CONTACT SURFACE UNDER THE HEAD

# Nyseal®

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### Nyseal®

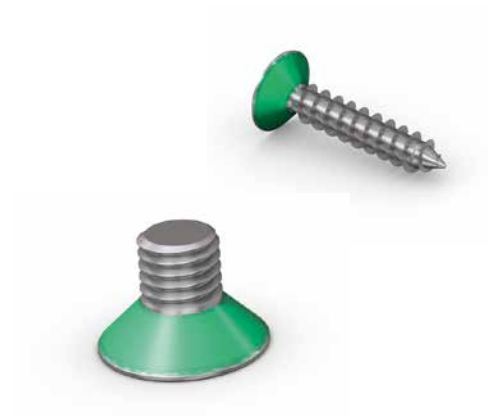
Nyseal® makes it possible to apply elastic seals directly under the head, on the flange or on the thread outlet on screws and other threaded parts. And this can be done already prior to use. There is no more use of manually applied washers, seals or O-rings.

### Area of application

Nyseal® is a green, optionally transparent, plastic coating that is melted directly on the bottom side of the screw head. This makes it possible to achieve an excellent seal against fluids and gases. At the same time, this coating acts as a buffer for sensitive surfaces on workpieces that are to be screwed together.

### Advantages for the user

The sealing melted under the screw head cannot be forgotten. The warehousing of additional sealing elements is eliminated, which simplifies internal processes and saves money. The assembly times are also shortened by the already pre-assembled components. The seal can be re-used up to 10 times (depending on the application). The good chemical resistance opens up applications in many specialized areas (application-specific tests by the customers are recommended).



### Product Features

- Non-toxic and environmentally friendly, since the plastic coating is based on polyolefins.
- No chemical reaction during assembly.
- Cost-effective pre-coating.
- Prevents contact corrosion under screw head.
- Excellent sealing properties.
- No additional washers or seals.
- No dirty workplaces or installation places, no waste.
- Polyolefin material.
- Temperature resistant from -40 °C to +70 °C.
- Layer thickness 0.2 to 0.4 mm.
- Green color (transparent also possible after consultation).
- Shore hardness A: 54.
- Oil-resistant.

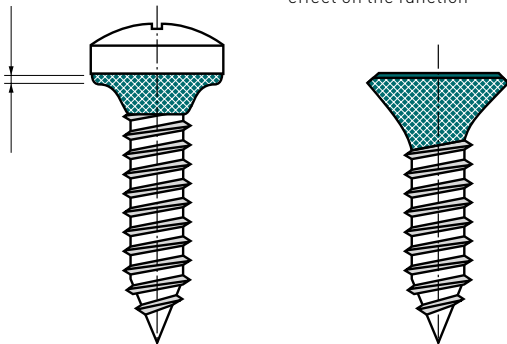
## Coating

To produce underhead seals on screws, rivets, threaded inserts with collar and other connection elements in the range from diameter 3 to diameter 10, respectively M 3 to M 10, minimum length 8 mm.

The coating occurs according to company standard 903 2 as an underhead coating.

Layer thickness 0.2 – 0.4 mm

Spray mist has no effect on the function



## Application

Melted directly on the surface of a metal part, Nyseal® forms a reusable seal. It makes using expensive, manually-applied products superfluous.

The underhead coating is an additional locking feature on self-tapping and thread-forming screws that is resistant to vibrations. Threaded inserts for plastic parts that are set in retrospect can also be coated.

## Works standard WN 903 2 (sealing coating)

Diameter of connection element mm	Maximum tightening torque (guide values) Nm
3	0.6
4	1.4
5	2.6
6	4.5
8	11
10	22

- In general before using the Nyseal® coating, a practical test is to be carried out using samples to test the tightening torques and also the possible reusability in application.
- If higher maximum tightening torques or application temperatures are required, TufLok® can also be designed as an underhead coating. Application-specific tests by the customer are indispensable.

## SEALS THE CONTACT SURFACE UNDER THE HEAD

# Nyplas®

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### Nyplas®

Nyplas® is applied to screws or other threaded elements directly on the planar surface of the component to be coated. Sealing material: Plastisol/PVC. There is no more need for manually applied washers, seals or O-rings.

### Area of application

Nyplas® is a black PVC/plastisol coating that is coated directly on the bottom side of the screw head. This makes it possible to achieve an excellent seal against fluids and gases. At the same time, this coating acts as a buffer for sensitive surfaces on workpieces that are to be screwed together. Unlike the Nyseal® coating, significantly larger layer thicknesses are achieved with Nyplas®. In general, a practical test is recommended prior to series use to check the function and compatibility of the coating in application.

### Advantages for the user

The sealing melted under the screw head cannot be forgotten. The warehousing of additional sealing elements is eliminated, which simplifies internal processes and saves money. The assembly times are also shortened by the already pre-assembled components. The good chemical resistance opens up applications in many specialized areas (application-specific tests by the customers are recommended).



### Product Features

- Sealing/noise insulation immediately after bolting.
- No use of O-rings, washers, etc. is required.
- Reusable.
- Very good sealing properties.
- Long service life. No shrinking or drying out.
- Operating temperature range: -40 °C to +150 °C.
- Black color.

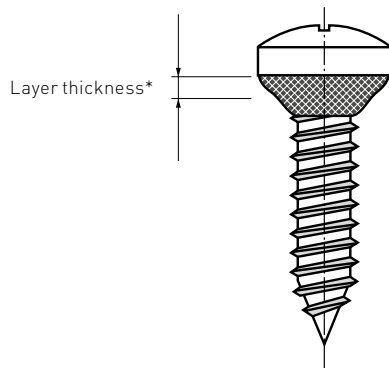
The following automobile specifications are met:

- GM 6086M type 3
- GM 1131M type D
- Ford ESN800688-S100
- Ford WSK M4G70C
- Daimler Chrysler MSCD43

## Coating

To produce seals on planar surfaces in the range from diameter 3 to diameter 10, respectively M 3 to M 10.

The coating occurs according to company standard 903 3 as a ring coating. Can only be used on planar surfaces (e.g. countersunk screws cannot be coated with Nyplas®).



\* In general, a practical test is recommended prior to series use in order to determine the required layer thickness.

## Application

The coating can be applied to all metallic materials. The surface to be coated must be free of oil and grease.

Any possible reusability greatly depends on the counterlayer and the tightening parameters (the friction in the system should always be as low as possible).

## Works standard WN 903 3 (sealing coating)

**Diameter of the connection element, respectively of the planar surface**

**mm**

3 - 10

- In general, a practical test is recommended prior to series use to check the function, compatibility and reusability of the coating in application.
- The Nyplas® coating should not be used in combination with plastic surfaces (counterlayer), especially ABS, acrylic or polycarbonate! Nyplas® consists of plastisol and in unfavorable cases may impair the material properties of plastics.

## THE SYSTEMS BY COMPARISON

# Effect of the clamping coating

### Vibration resistance

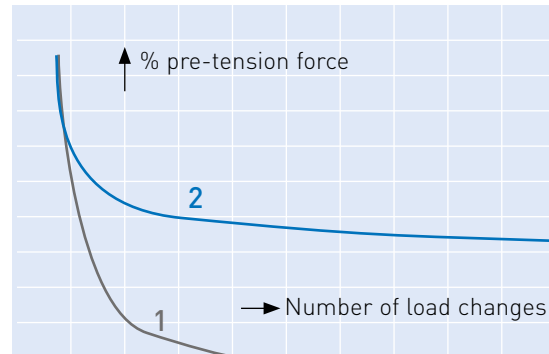
Two plates braced against each other with a screw are subjected to a forced vibration (relative movement). Unsecured screws completely loosen within a short period of time.

#### 1. Uncoated screws:

After a few load changes, unsecured screws lose the pre-tension, the connection loosens, the screw unscrews and can get lost.

#### 2. Screws coated with TufLok®/Nytemp®:

Screws with clamping coating only lose part of the pre-tension force under continuous load. The anti-rotation securing prevents the complete loosening and loss of the connection element.



Pre-tension force under continuous load (schematic representation)

### Friction value measurement

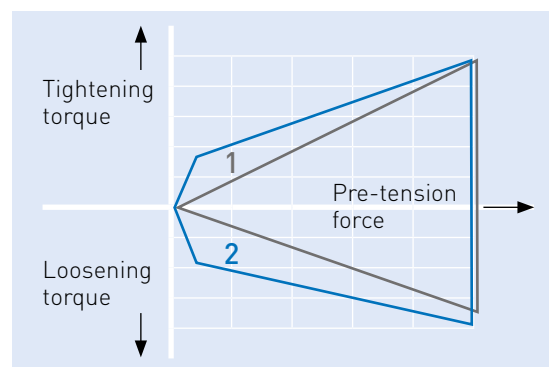
When tightening a screw, torque and pre-tension force increase depending on the thread friction value. Depending on the friction value, different pre-tension forces are generated with the same tightening torque.

#### 1. Uncoated screws:

The loosening torque reaches about 70 to 80% of the tightening torque. There is no resistance when unscrewing. The torque and the pre-tension force reach a zero point.

#### 2. Screws coated with TufLok®/Nytemp®:

Screws with a clamping coating are released at about 80% of the tightening torque. When unscrewing, the coating generates increased friction in the thread flanks through surface pressure. The loss protection is active.



Torque curve (schematic representation)



## OVERVIEW

# Properties

Coating		TufLok®		Nytemp®		Nystay®	Nyseal®	Nyplas®
		spot	round	spot	round			
Chemical base		Polyamide		Polyamide		Polyolefin	Polyolefin	Plastisol
Color		blue		orange		green	green	black
Application range diameter	mm	1 - 68		1 - 68		3 - 10	3 - 10	3 - 10
Application range of nuts	M	5 - 16		5 - 16				[3 - 10]
Retainer		X	(X)	X	(X)			
Loss protection		X	(X)	X	(X)			
Mounting bracket						X		
Thread seal		(X)	X	(X)	X			
Underhead seal			(X)		(X)		X	X
Reusable		X	(X)	X	(X)	X	(X)	
Usage temperature	°C	-56 - +120		-56 - +200		-40 - +90	-40 - +70	-40 - +150
Oil resistance		X		X			X	
Water resistance		X		X		X	X	X
Applicable for								
Screw heads		X		X		X	X	X <sup>1)</sup>
Stud bolts		X		X				
Sealing plugs		X		X			X	X
Bolts		X		X				
Rivets							X	X
Metric and inch threads		X		X		X	X	X
Self-tapping screws							X	X
Adjusting screws		X		X				

All specifications are guide values and must be taken into consideration in use through practical tests.

<sup>1)</sup> Not applicable for countersunk heads.



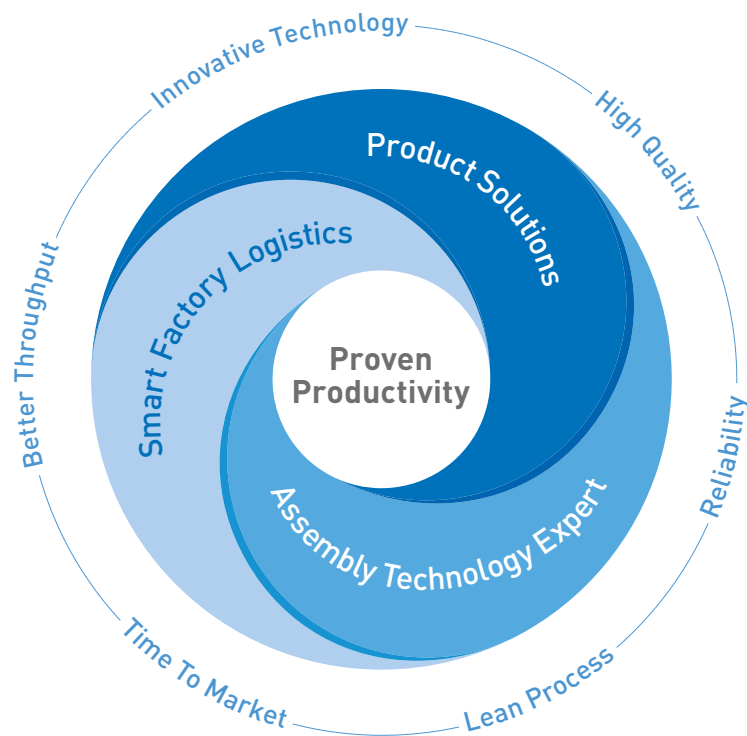
"Innovation creates perspectives:  
Simplified assembly thanks to  
multifunctional products."



## PROVEN PRODUCTIVITY – A PROMISE TO OUR CUSTOMERS

# The strategy for success

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From years of cooperation with our customers we know what achieves proven and sustainable impact. We have identified what it takes to strengthen the competitiveness of our customers. Therefore we support our customers in three strategic core areas.

Firstly, when finding optimal **Product Solutions**, that is in the evaluation and use of the best fastening part for the particular function intended in our customers' products.

Second, our **Assembly Technology Expert** services deliver the smartest solutions for all possible fastening challenges. Our services cover from the moment our customers developing a new product, to

assembly process optimization as well as fastening technology education for our customers' employees.

And thirdly, optimising our clients' productions in a smart and lean way with **Smart Factory Logistics**, our methodology, with intelligent logistics systems and tailor-made solutions.

Understood as a promise to our customers, "Proven Productivity" contains two elements: Firstly, that it demonstrably works. And secondly, that it sustainably and measurably improves the productivity and competitiveness of our customers.

And this for us is a philosophy which motivates us every day to always be one step ahead.

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