



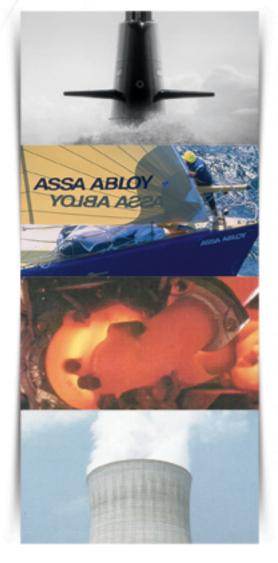
We accept all challenges!

Bufab Bulten Stainless products are use in all kinds of different markets and industrial sectors. Some of our customers operate on the global market, where the most important success factors are safety, reliability and performance/quality.

Bufab Bulten Stainless products are also delivered direct to many countries outside Sweden. In Australia our products are used to

build submarines; in Canada special screws are used in machines for the paper industry; in the USA our products are used by Ericsson's subsidiary to manufacture electronic components; and in Hong Kong we have supplied high-strength screws for tunnel and bridge construction.

We can propose technical solutions for any application.



Shipbuilding

We supply products for submarine yards in countries like Australia, Germany, Italy and Sweden. Our products are also used in other naval defence industry, in chemical tankers and in marine applications with extreme demands on quality, such as propellers and waterjet systems for example.

Boatbuilding Bufab Bulten Stainless has been engaged as a designer/supplier of fasteners for successful yachtmaking projects in the renowned Volvo Ocean Race, for example on the Assa Abloy boat. We also supply products to several European manufacturers of pleasure craft.

Turbochargers

Bufab Bulten Stainless is a supplier to Europe's biggest producer of turbochargers, which in turn counts well-known car manufacturers among its customers. The fasteners have to work under extreme conditions, from +850-900 °C down to -25 °C and lower.

The power industry

At a nuclear power plant, safety is everything. Our products form vital components in nuclear power facilites in Sweden, France, South Korea and other contries.





Brake systems

Major producers of ABS brake systems use Bufab Bulten Stainless as a supplier. For example we supply a pin that holds the brake caliper together - an extremely important safety detail subject to the most stringent demands.

Pumps and valves

Some of the world's biggest manufacturers of pumps and valves use standard and bespoke products from Bufab Bulten Stainless. They specify high demands on functionality in extreme environments.



The paper and pump industry

The first ever acid-proof fasteners were delivered to this industry back in 1926. Today Bufab Bulten Stainless products are delivered to pulp and paper manufacturers all over the world, to be used in machines, pressure vessels, pipeline systems etc.



Offshore

Minimising weight is a crucial factor in the offshore industry. This is why our high-strength products are so popular. Simple, safe assembly is essential for keeping the high labour costs for offshore platforms down. For a project in Norway, we proposed a technilcal solution that saved 7,000 man-hours and large sums of money overall.

Particle science/nuclear physics

Ever since the first particle accelerator was built at CERN in Geneva, Bufab Bulten Stainless has been a specified supplier of high-strength fasteners in vacuum installations. We also supply products for European research centres such as DESY and BESY in Germany, and ESRF in France.



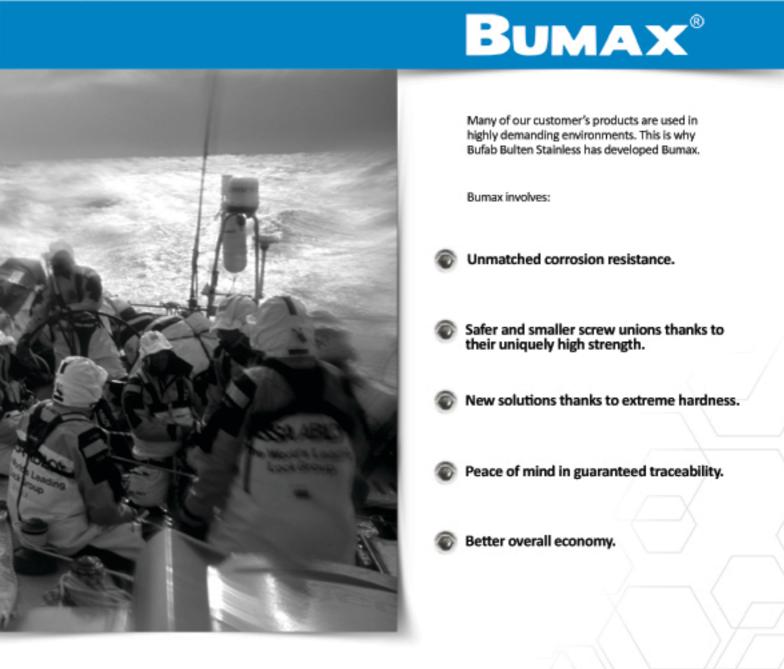
World-class performance!

Bufab Bulten Stainless has long dominated the development of high-strength fasteners made from high-alloy steel. Bumax is, so far, the best we have ever made.

Bumax 88/109 displays peak performance long after other fasteners have reached their limit. This is thanks to its uniquely high strength. The difference in extreme environments is particuly noticable. Bumax Hard has been developed to cope with cutting a thread in stainless steel. This is made possible by its exceptional surface hardness.

All of our Bumax products are made from the best A4 steel

on the market - a variant of the acid-proof Swedish steel SS14.2343. The special characteristic of the composition of this steel is its low carbon content and raised chromium, nickel and molybdenium content. Bumax is a complete range of highstrength fasteners that we always hold in stock. Bufab Bulten Stainless is constantly striving to force the pace of development. This - in combination with our profound knowledge of production processes - means that we are able to offer technical solutions and support that contribute also to the development of the customer's business.





Bumax is Bufab's registered trademark, known as the strongest stainless steel fastener in the world.

Bumax is manufactured in Bufab's own plants in Sweden and meets the requirements of high demanding customers when it comes to quality, corrosion resistance, high strength, fatigue strength, traceability and heat resistance. We deliver safety and reliability. Some of the products in the Bumaxfamily are completely unique that cannot be found anywhere else on the market. All products have full traceability (3.1 certificates available for each item) and are sourced solely from premium European stainless steel manufacturers according to rigid specifications.

BUMAX[®] GRADES Other special grades can be offered on request

BUMAX 88 offers better corrosion resistance than standard A4 due to higher molybdenum content. Bumax 88 is a very consistent material that offers higher yield strength and lower amount of inclusion than standard A4 fasteners, that gives superior mechanical properties and fatigue resistance. Bumax 88 fasteners are used in many applications that demands very low magnetic permeability, it has lower magnetic permeability and less variation from batch to batch compared to standard A4 fasteners.

BUMAX 109 is the strongest A4 bolt on the market. Same material as Bumax 88 but higher strength due to special manufacturing process.

BUMAX Nitro, austenitic stainless steel with high nitrogen content, characterized by very high strength and fatigue resistance, in combination with good corrosion resistance. Excellent material for marine application and can be supplied in strength class 12.9 up to M42.

BUMAX Super Austenite (SA), high-alloy austenitic stainless steel for seawater and other aggressive chloride bearing medias. Excellent resistance to general, crevice, pitting and stress corrosion.

BUMAX Lean Duplex (LDX) offers economical solution for high strength fasteners in medium corrosive environments.

BUMAX Duplex (DX) are characterized by excellent strength, ductility and fatigue resistance in combination with good general, pitting, crevice and stress corrosion properties.

BUMAX Super Duplex (SDX) are characterized by excellent mechanical properties and very good corrosion resistance. Excellent resistance to general crevice, pitting and stress corrosion in chloride bearing medias.

BUMAX Hyper Duplex (HDX), a groundbreaking alloy used in the most demanding applications. Suited for use in severe corrosive environments such as hot chlorinated sea-water and for aggressive acidic chloride containing media in chemical, oil/ gas, marine and petrochemical industry.

BUMAX Ultra, a unique precipitation hardenable stainless steel that can be delivered in ultra high strength levels. Strongest stainless steel fastener on the market. Good corrosion resistance in chloride environments.

BUMAX Heat (HE), high temperature resistant material for applications requiring high strength and good oxidation resistance at temperatures up to 700°C. Can be precipitation hardened.

BUMAX Heat Plus (HEP), precipitation hardenable high temperature resistant material with excellent oxidation resistance and high tensile and creep properties at temperatures up to 815°C.

CHEMICAL COMPOSITION Nominal wt%

GRADE	EN	UNS	Microstructure	C max	Cr	Ni	Мо	Other	PRE ¹⁾
BUMAX 88	1.4432, 1.4436, 1.4435	S31603	Austenitic	0.03	17	11.5	2.7		27
BUMAX 109	1.4432, 1.4436, 1.4435	S31603	Austenitic 0.03		17	11.5	2.7		27
BUMAX Nitro		S31675	Austenitic	0.035	20.5	10	2.4	N 0.4	35
BUMAX SA	1.4547	S31254	Austenitic	0.01	20	18	6.2	N, Cu	43
BUMAX LDX ²⁾	1.4162	S32101	Ferrite-Austenitic		21.5	1.5	0.3	N 0.22, Mn 5	26
BUMAX DX	1.4462	S31803, S32205	Ferrite-Austenitic	0.03	22	5.2	3.2	N 0.18	36
BUMAX SDX	1.4410	S32750	Ferrite-Austenitic	0.03	25	7	4	N 0.3	42
BUMAX HDX	1.4658	S32707	Ferrite-Austenitic	0.03	27	6.5	4.8	N 0.4, Co	49
BUMAX Ultra		S46910	Martensitic	0.02	12	9	4	Al, Ti, Cu	25
BUMAX HE	1.4980	S66286 Austenitic		0.08	15	26	1.5	Ti, V	
BUMAX HEP	2.4952	N07080	Austenitic	0.10	19	>65	-	Al, Ti, Co	

¹ PRE (Pitting Resistance Equivalent) number shows the pitting corrosion resistance of stainless steels. A higher PRE number indicates better corrosion resistance. The PRE is defined as, in weight-%: PRE = % Cr + 3.3 x % Mo + 16 x % N

² Standard offer for Burnax Lean Duplex is 1.4162 (PRE 26), but we have also the possibility to supply 1.4661 (PRE 33)

MECHANICAL PROPERTIES in as delivered condition

Grade	Dimension	Strength Class	Screws an	d stud bolt	5			Nuts	Washers
			Tensile strength R _m , min		Yield strength R _{p0.2} , min		Elongation, min	Stress under proof load, min	Hardness, min
	mm		MPa	ksi	MPa	ksi	mm	MPa	HV
BUMAX 88	M3 - M36	88	800	116	640	92	0.3 d	800	200
BUMAX 88, PED	M6 - M30	88	800	116	640	92	0.4 d	800	200
BUMAX 109	M3 - M12 > M12	109 109	1000 1000	145 145	900 800	130 116	0.2 d	1000	300
BUMAX Nitro	≤M42	109 129	1000 1200	145 174	900 1080	130 156	0.2 d	2)	2)
BUMAX SA	≤ M42	88 109	800 1000	116 145	640 800	92 116	0.2 d	2)	2)
BUMAX LDX	≤ M42	88 109 129	800 1000 1200	116 145 174	640 900 1080	92 130 156	0.3 d	2)	2)
BUMAX DX	≤ M42	88 109 129	800 1000 1200	116 145 174	640 900 1080	92 130 156	0.3 d	2)	2)
BUMAX SDX	≤ M42	88 109 129	800 1000 1200	116 145 174	640 900 1080	92 130 156	0.3 d	2)	2)
BUMAX HDX	≤ M8	88 109 129	800 1000 1200	116 145 174	640 900 1080	92 130 156	0.3 d	2)	2)
BUMAX Ultra ¹⁾	≤ M16	149 159 169	1400 1500 1600	203 217 232	1260 1350 1440	182 195 208	0.2 d	2)	2)

¹Bumax Ultra is a grade that is tailor made to solve customer needs in regards of strength, ductility, fatigue and wear resistance. Values in the table are typical strength values, but even higher strength levels can be achieved on some designs and dimension, up to tensile strength levels of 2500 MPa.

² On request

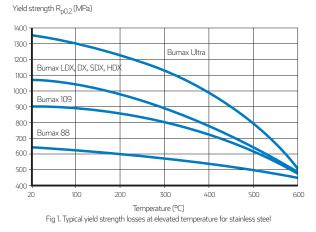
The data shown in the table are typical and are representative for the majority of standard fasteners. May be subject to alterations, depending on size and design.

PROPERTIES AT LOW AND HIGH TEMPERATURES

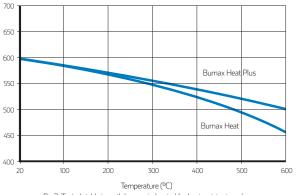
It is important to understand what happens with the fastener material when operating at elevated temperatures for prolonged times. Properties such as thermal expansion, strength, ductility, corrosion resistance and fatigue resistance are affected by high temperatures and its effect on the jointed application must be considered from case to case. The diagram to the right shows typical yield strength losses that instantly occur in the material when exposed to high temperatures. Property changes during prolonged service at elevated temperature must also be considered. Gas corrosion at high temperature is totally different compared to wet corrosion at lower temperatures. Furthermore, changes in mechanical properties might gradually change over time due to ageing and creep deformation. Ageing that occurs in all stainless steel material over time is enhanced by high stresses in the material in combination with high temperature or temperature fluctuations, and can lead to ductility losses in the material. Creep deformation is a slow plastic deformation under the influence of mechanical stresses. It can occur as a result of long-term exposure to stresses that are still under the yield strength of the material and the effect increases at higher temperatures. Bumax HE and Bumax HEP are high temperature resistant grades optimized for high temperature conditions and are much more stable against ageing, gas oxidation, creeping and strength losses compared to regular stainless steels.

An increased brittleness at subzero and especially cryogenic temperatures is characteristic of all steels and metals in general. Some steel grades become more brittle than others at cryogenic temperatures below -150°C. This depends mainly on microstructure, chemical composition and internal stress. Austenitc stainless steels has generally better impact strength at very low temperatures than Duplex, Ferritic and Martensitic stainless steel.

To understand the environment and application requirements is therefore crucial. Your local Bumax sales representative will help you selecting the right material.



Yield strength R_{p0,2} (MPa)





PHYSICAL PROPERTIES at 20°C, unless stated otherwise

Grade	Thermal expansion, mean values in temperature ranges (x10 ⁻⁶) per °C							
	20 to 100°C	20 to 200°C	20 to 300°C	20 to 400°C	20 to 500°C	20 to 600°C		
BUMAX 88	16.5	17	17.5	17.5	18	18	1.006	
BUMAX 109	16.5	17	17.5	17.5	18	18	1.007	
BUMAX Nitro	15	15.5	16	16.5	17	17	1.003	
BUMAX SA	16	16	16.5	16.5	17	17	1.003	
BUMAX LDX	12.5	13	13.5	13.5	14	14.5	100	
BUMAX DX	12.5	13	13.5	13.5	14	14.5	100	
BUMAX SDX	12.5	13	13.5	13.5	14	14.5	100	
BUMAX HDX	12.5	13	13.5	13.5	14	14.5	100	
BUMAX Ultra	11.5	12	12	12.5	12.5	13	1000	
BUMAX HE	16.5	16.5	17	17	17.5	17.5	1.007	
BUMAX HEP	12	13	13	13.5	13.5	14	1.001	

CORROSION RESISTANCE

Grade	Urban	Marine,	salt water	Hydrochloric acid (HCl) at 50°C		Sulphuric acid (H ₂ SO ₄) at 50°C				
	High	Low	High	0.1%	1%	2%	3%	1%	10%	30%
BUMAX 88, 109	ं	\odot	0	0	•	•	•	\odot	•	•
BUMAX Nitro	ं	ं	\odot	0	0	•	•	\diamond	\diamond	0
BUMAX SA	ं	ं	\odot	ं	ं	ं	•	\odot	\odot	\odot
BUMAX LDX	ं	0	0	0	•	•	•	\diamond	\diamond	•
BUMAX DX	ं	ं	\odot	0	0	•	•	\diamond	\diamond	•
BUMAX SDX	ं	ं	ं	\diamond	\diamond	\diamond	•	ं	\diamond	\odot
BUMAX HDX	ं	ं	\diamond	ं	\diamond	ं	\diamond	ं	\diamond	\odot
BUMAX Ultra	ं	0	•	•		•	•	0	•	•

No corrosion under normal conditions 🕒 Not suitable, corrosion is likely to occur

• Possible risk of corrosion, but the steel grade might be suitable depending on requirement, environment, design and maintenance.

Low: Mild condition, such as low concentrations at low temperatures. High: Severe condition, such as high concentrations at elevated temperatures.

PRELOAD AND TIGHTENING TORQUE

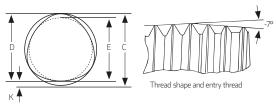
Preload is needed to keep the jointed part together and function correctly for long periods of time, resisting both static and dynamic loads.

The combined stresses in the joint should normally not exceed the yield strength of the fastener. In practical use can the recommended pretension vary between 50-80% of the yield strength $R_{p0.2}$. Tightening torque is needed to achieve the necessary preload. The recommended tightening torque depends on many parameters such as friction, fastener strength, thread diameter, screw type and tightening procedure. The recommendation used for Bumax products are based on a targeted preload of about 65-70% of the yield load and a friction coefficient of 0.14-0.16, which can only be obtained by a burr-free surface and using high quality lubrication. Recommended preload and tightening torque data can be found at www.bumax.se.

BUMAX[®] HARD TAPTITE THREAD-FORMING SCREW

Bumax Hard Taptite is a thread-forming screw which forms its own thread during assembly because of its trilobular shape, its conical entry thread and its excellent surface hardness. Bumax Hard Taptite is suitable for assembly in structural steel and cold rolled stainless steel with hardness up to 200 HV.

Taptite trilobular geometry



C=External circle diameter D=Trilobular diameter E=Internal circle diameter K=Ovality

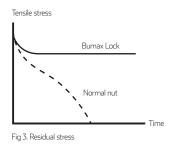
BUMAX[®] HARD SELF-TAPPING SHEET METAL SCREW (ST)

Bumax Hard self-tapping screw with ST thread is designed for use in structural steel and cold rolled stainless steel with a maximum hardness of approximately 200 HV.

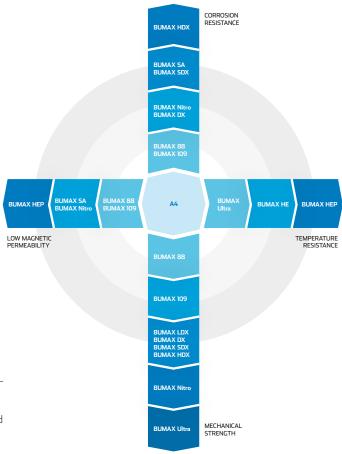
All Bumax Hard products exhibits excellent surface hardness and are made with the same steel grade as Bumax 88. Bumax Hard is a great and cost-efficient solution for fitting to sheet metal and profiles.

BUMAX® LOCK

Bumax Lock is an all-metal lock nut made out of the same steel grade as Bumax 88. It is equipped with a specially designed thread profile that locks when it is tightened, distributing the stresses along the entire nut thread. This allows better load distribution which in turn produces greater gripping strength.



BUMAX[®] GRADE SELECTION CROSS



Stainless steel fasters have properties which make them attractive choices for a wide range of applications. It is essential to consider the required properties such as corrosion resistance, temperature resistance, mechanical strength and magnetic permeability. Correctly chosen material will guarantee a trouble-free life time and low life cycle cost.

Grade selection cross helps you select the best material suited for your needs.

For more information contact your local Bumax salesman or visit www.bumax.se.

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