HOBSON ENGINEERING

BUMAX®

Bumax® vs A4-70

A4-70 vs BUMAX® 88

in ammonium nitrate environment

BUMAX® THE WORLD'S STRONGEST STAINLESS STEEL BOLT

Steel grades

Bulten Stainless	EN	ASTM
Bumax® 88	1.4435	316L
316 A4-70	1.4401	316

Purpose of document

To Show the major differences between A4-70 and BUMAX® 88

General characteristics

Both grades are molybdenum-containing austenitic stainless steel to get improved corrosion resistance. The addition of molybdenum provides improved resistance to pitting and crevice corrosion.

By choosing a low carbon content material the risk of getting chromium carbide precipiation is significant reduced.

Chemical composition — Typical composition[1], %

Bulten Stainless	EN	ASTM	C	Cr	Ni	Mo
Bumax® 88	1.4435	316L	0,02	17,3	12,7	2,7
316 A4-70	1.4401	316	0,04	16,8	10,2	2,1

1 Based upon facts from Avesta Sheffield Corrosion Handbook (ISBN 91-630-8118-0)

Pitting Resistance Equivalent (PRE)[2]

Bulten Stainless	EN	ASTM	Average	Min	Max
Bumax® 88	1.4435	316L	26,2	24,7	28,4
316 A4-70	1.4401	316	23,7	23,1	24,7

2 PRE = %Cr + 3.3 x %Mo + 16 x %N

Mechanical composition — Typical value' MPa

Bulten Stainless	EN	ASTM	Tensile	Yield	Elongation
Bumax® 88	1.4435	316L	950*	856*	0,73*
316 A4-70	1.4401	316	770	559	0,78

* Based upon the actual average from more than 4000 batches produced by Bufab Bulten Stainless

Mechanical composition — Minimum Value' MPa

Bulten Stainless	EN	ASTM	Tensile	Yield	Elongation
Bumax® 88	1.4435	316L	800	640	0,3 x D
316 A4-70	1.4401	316	700	450	0,6 x D

Calculation to utilize the strength of BUMAX® 88

Bulten Stainless	EN	ASTM	Yield	Load, MPa	Recc. Preload, %
Bumax® 88	1.4435	316L	640	512	80
316 A4-70	1.4401	316	450	292	65

Bumax® vs A4-70

Chemical Resistance Chart

These recommendations are based upon information from material suppliers and careful examination of available published information and are believed to be accurate. However, since the resistance of metals, can be affected by concentration, temperature, presence of other chemicals and other factors, this information should be considered as a general guide rather than an unqualified guarantee. Ultimately, the customer must determine the suitability of material used in various solutions. Extra material added for reference
All recommendations assume ambient temperatures unless otherwise noted.

	302 Stainless	304 Stainless	316 Stainless	BUMAX® 88	Titanium
Ammonia, Nitrate	C	B	B	A	A
Sulfuric Acid (to 10%)	-	D	C	A	A
Carbonated Water	B	A	A	A	A
Ethylene Chloride	-	A	A	A	B
Benzyl	-	A	A	A	B
Ammonium Sulfate	C	D	B	B	A

RATINGS - CHEMICAL EFFECT
A: No effect - Excellent
B: Minor effect - Good
C: Moderate effect - Fair
D: Severe effect - Not Recommended

Conclusion

Fasteners in BUMAX® 88 have an increased resistance against crevice corrosion, stress corrosion and intergranular corrosion in general than fasteners made from 316 material. One of the reasons is the higher molybdenum content, as well as the low carbon content. Bufab Bulten Stainless is the only manufacturer in the world that makes BUMAX® .

By utliizing the strength of BUMAX® 88 there is also a very good opportunity to reduce the dimension, and/or reduce the qty of fasteners needed wich will make an overall better economy. There is also a very good opportunity to reduce the maintanence of the bolts, where BUMAX® may be up to 8** times better against corrosion.

By choosing BUMAX® for the specific environment around ammonium nitrate there is a drasticly improved safety factor for the future, with a secure result.

** Test made by Sandvik in 10 % H_2SO_4 environment

Member of BUFAB Group

Quality Fasteners Since 1935