Stainless UK Ltd

Stainless Steel for Civil Engineering & Geotechnical

Grip-Bar® Anchor Systems

Grip-Bar® is a unique high bond, high strength Stainless Steel threaded bar for Rock Anchors, Soil Nails, Masonry and Concrete Fixing.

The Grip-Bar® Anchor System has been developed to service Civil Engineering and Geotechnical applications.

Benefits

- High strength thread rolled stainless steel bars
- Proven high bond strength
- Easily cut on site without any damage to the thread form
- Unique corrosive resistant product
- 6 metre lengths
- Superior ductility for seismic activity

Applications

- Rock bolts
- Soil nails
- Docks and harbours
- Building and bridge cross ties
- Ground anchors
- Holding down bolts
- Coastal defence walls, slopes and slabs

Technical Data

Grip-Bar® installed for supporting rockface.

Ultimate Tensile Stress (minimum)	750 N/mm2
0.2% proof stress (minimum)	650 N/mm2
Minimum elongation	15%
Typical lengths	6 m
Straightness	2 in 1000
Standard bundle weight	1 tonne max.

Ref	Nom. Dia. mm	C.S.A mm2	0.2% proof load kN	Ultimate tensile load kN	Weight per metre Kg/m	Torque to develop 0.15% of UTS Nm
GB10	10	62	40	46	0.49	50
GB12	12	91	54	64	0.73	60
GB16	16	167	108	124	1.30	90
GB20	20	261	170	196	2.10	135
GB22	22	322	203	235	2.60	155
GB24	24	378	246	283	2.90	180
GB27	27	492	320	368	3.90	220
GB30	30	596	388	446	4.70	265
GB33	33	737	480	552	5.75	325
GB36	36	873	568	653	7.00	375
GB39	39	1037	674	776	8.25	440
GB42	42	1197	778	896	9.50	495
GB45	45	1388	903	1038	10.90	570
GB48	48	1562	1016	1168	12.40	625

Manufacturing Process

The high strength Grip-Bar® is made from cold drawn bar feedstock. It benefits from superior strength, whilst retaining the elevated ductility associated with stainless steel.

Grip-Bar® is manufactured in 6m fully threaded lengths or by special order, with a bespoke thread on the ends of the bar.

All the Grip-Bar® range of threaded products utilise the thread rolling principle, which benefits from not removing any material from the bar whilst generating the coarse thread. It is in principle a cold forging process, and hence the grain flow caused by this process improves the strength of the thread relative to that of a cut thread of the same size.

Corrosive Considerations

The selection of the correct grade of stainless steel must take account of the following features

- The environment
- Structural requirements
- Maintenance
- Life of structure
- Surface finish

Factors, which may influence the selection within an environment, are temperature, pollutants, humidity and presence of chloride ions. The strength of the bar to be used is a structural matter to be decided by the project designer.

In general it is reasonable to use grade 304 for most non-marine applications, however highways and marine structures generally call for grade 316 because of the high chloride concentrations. Duplex grade 1.4462 can be used in high chloride environments for increased resistance to stress corrosion, pitting and crevice corrosion.

Bond

The development of the Grip-Bar® thread has over the years been supported by research, both by Stainless UK and at Sheffield University. Bond tests in accordance with BS 8110 - type 2 bond reinforcing bar have shown that the Grip-Bar® thread provides a bond well in excess of that required.

Further research has been completed to investigate the performance of Grip-Bar® in a rock bolting environment, with varying free and bonded lengths.
On each occasion the performance significantly out performed reinforcing bar comparator and both systems are in excess of the codes minimum recommendations.

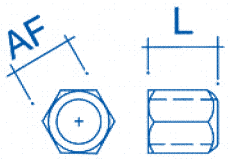
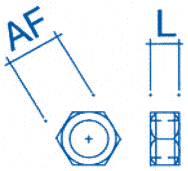
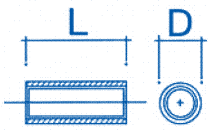
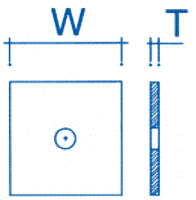
Site Performance

Grip-Bar® is produced using a cold rolled thread which not only enhances the strength of the bar, but also provides a robust, self cleaning and user friendly thread which is easy to use on construction sites.

The coarse pitch thread is less susceptible to galling than the traditional metric thread; the large pitch significantly speeds up assembly.

The large flank angle on this bespoke thread design ensures that the crown of the thread is supported and will withstand significant site abuse and still remain serviceable.

Grip-Bar® Anchor Systems

Load Nut - GBLN	Lock Nut - GBN	Coupler - GBCR	Plate Washer
			

GB Dia	AF mm	Length mm	Weight kg	AF mm	Length mm	Weight kg	Dia. mm	Length mm	Weight kg	Size mm	T mm	Weight kg	GB Dia
GB10	17	18	0.02	17	9	0.01	18	41	0.06	100 x 100	8	0.62	GB10
GB12	19	20	0.03	19	10	0.02	18	51.5	0.07	100 x 100	8	0.62	GB12
GB16	24	26	0.06	24	13	0.03	25	64	0.14	100 x 100	8	0.62	GB16
GB20	30	32	0.12	30	16	0.06	30	76	0.23	125 x 125	10	1.22	GB20
GB22	36	35	0.23	36	17	0.12	33	85	0.32	150 x 150	10	1.74	GB22
GB24	36	38	0.21	36	19	0.11	36	91	0.41	150 x 150	10	1.74	GB24
GB27	42	44	0.35	42	23	0.18	41	104	0.69	150 x 150	10	1.74	GB27
GB30	46	48	0.45	46	24	0.22	45	107	0.79	200 x 200	12	3.75	GB30
GB33	50	60	0.65	50	27	0.29	50	115	1.07	210 x 210	15	5.20	GB33
GB36	56	66	0.93	56	29	0.41	55	122	1.34	225 x 225	20	7.99	GB36
GB39	60	68	1.08	60	32	0.51	59	130	1.67	250 x 250	20	9.87	GB39
GB42	65	70	1.32	65	34	0.64	64	137	2.04	250 x 250	20	9.87	GB42
GB45	70	72	1.58	70	36	0.79	68	145	2.48	300 x 300	30	21.42	GB45
GB48	75	76	1.93	75	38	0.96	73	152	2.95	300 x 300	30	21.42	GB48

Fittings

All the fittings have been designed to provide a strength of anchorage equal to the theoretical minimum required by the threaded bar.

Fittings are made as small as possible to ensure that the strength of the Grip-Bar® can fully be utilised, by selecting the smallest cored hole for the application, saving on drilling time, reducing the size of drilling plant required, both resulting in the optimum cost solution.

Couplers, load nuts and lock nuts are stocked in grade 316 stainless steel only.

Comparison of Grip-Bar® Against Threaded Reinforcement Bar

Traditional methods of rock anchoring have involved the use of reinforcement bar with a threaded section. This system has suffered from a number of disadvantages which the use of Grip-Bar® helps overcome.

Tensile Strength

Reinforcement bar to BS 6744 has a proof strength of 500N/mm². To produce a thread on this bar requires reducing the bar section with a consequent reduction in strength. Grip-Bar® is manufactured from bar with a proof strength of around 600N/mm² which after being work hardened by thread rolling gives a minimum proof strength of 650 N/mm².

Bond Strength

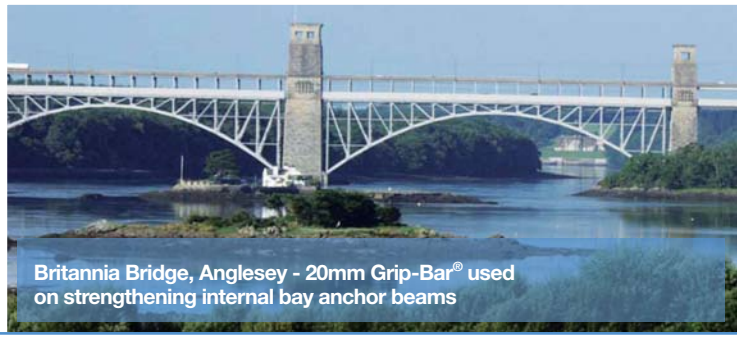
Comparative testing carried out by the University of Sheffield has shown that across a range of grout strengths, Grip-Bar® has bond strength up to first slip of at least 2.8 times that of equivalent reinforcement bar.

Thread Strength

Threading a reinforcement bar involves cutting a fine thread into the material which disrupts the surface and can make installing fixings more difficult. The course thread on Grip-Bar® is cold rolled which hardens the surface making fixings easier to apply.

Flexible Installation

With reinforcement bars, the threaded end has a fixed specified length. Variations on site may require changes to embedment length. This requires reforming the thread off site causing delays and possible thread damage. Grip-Bar® is fully threaded and can but cut to length on site without damage.



Britannia Bridge, Anglesey - 20mm Grip-Bar® used on strengthening internal bay anchor beams

System Accessories

Grip-Bar® is available with full strength couplers, load nuts, lock nuts, and standard plates, however plates and end connections can be manufactured to meet individual contract requirements.

1. Nuts and Couplers

Load nuts and couplers have been designed to provide a strength of anchorage equal to the theoretical minimum required by the threaded bar. Lock nuts are for locking purpose only.

2. Pattress Plates

Available in ductile iron or fabricated to customers specific requirements. Please see Pattress Plates Data sheet.

3. Stainless Plate Washers

Manufactured either flat which can take up to 8 degree misalignments or dished to suit up to 45 degree misalignment.

Can be supplied with a hemi nut or washer to suit.

4. Eye nut

To be fitted to the end of grip bar for passing rock netting wire through and many other applications.

5. Turnbuckle

To be used for adjusting the tension or length of a bar system.

6. Lantern Spacers

Centralisation of single bar within a bore hole enables an even flow of grout around the bar.

7. Grip Sock

A flexible sock which fits over the anchor bar. As it is filled with grout it expands into cracks and holes.

8. Homing Cap

Can be manufactured in either stainless steel or nylon. The cap keeps the bar end central in the bottom of the hole.

9. Wire rope

Can be used for securing rock netting.

10. Grout

Chemical mortars and accessories for fixing Grip-Bar anchors into concrete and masonry.

MADE IN SHEFFIELD

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