

## Reinforcement Bars With Cut-and-Bend Services

### NatSteel Holdings Pte Ltd

22 Tanjong Kling Road  
Singapore 628048  
T: +65 6265 1233  
F: +65 6265 8317  
E: [sales@natsteel.com.sg](mailto:sales@natsteel.com.sg)  
W: [www.natsteel.com.sg](http://www.natsteel.com.sg)

Co. Reg. No. 200810196Z

© 2007 NatSteel Holdings Pte Ltd. All rights reserved.  
No portion of this publication may be produced or  
copied in any form or by any means without the  
written permission of NatSteel Holdings Pte Ltd.



Cert no:  
82-23081  
SS ISO 9001:2000



Cert no:  
2008-0105  
SS ISO 14001:2004



Cert no:  
OHS-2008-0067  
OHSAS 18001:1999



Australian Certification  
Authority for  
Reinforcing Steel

# NatSteel Holdings –

partnering the construction industry for over 40 years



Reinforcement bars (rebars) are used for concrete reinforcement of buildings

**NatSteel Holdings**, a wholly-owned subsidiary of **Tata Steel** — the world's top ten largest steel producer, has supported the construction industry in Singapore for over 40 years.

We are the only steel mill in Singapore. Our downstream boasts one of the largest single prefabrication operations in the world, with a capacity of 400,000 metric tonnes for cut-and-bend and precaging. We supply to over 300 projects per month for a variety of prefabricated reinforcement products, such as cut-and-bent reinforcement, mesh and caged reinforcement. These orders can comprise up to 15,000 different designs per day.

Our steel products are widely used in the construction of residential, institutional, industrial and commercial buildings, as well as infrastructural works.

The NatSteel Holdings Group employs over 3,500 employees across Singapore, Australia, China, Malaysia, Philippines, Thailand and Vietnam. We have an annual production capacity of more than 2 million tonnes of high quality steel products that cater to the construction industry.

Today, NatSteel Holdings is well-placed to tap into Tata Steel's extensive resources to further expand in the region and achieve our vision of becoming a world-class steel producer.



Cut-and-bent (CAB) products are reinforcement bars that have been cut and bent to your specific needs



### Advantages of using Cut-and-Bend Reinforcement Bars

- Reduces...
  - reliance on site labour
  - site congestion
  - inventory carrying cost
  - on-site logistics
- Improves buildability and productivity
- Controls material wastage
- Better planning and coordination of material flow
- Facilitates verification of work done for progress claims

### Our Value-Add

As a socially responsible organisation, we are committed to providing you quality products, service and support.

### We provide...

- Radiation-free steel that complies with radiation specifications of SS32:1999 (Part 2), assuring the public of their health and safety
- Consistent quality
- In-house processes and procedures that ensure traceability down to the order level
- Strong after-sales service to manage orders
- Just-In-Time (JIT) delivery
- Mechanised production process
- A complete size mix of rebars
- Products that can comply with SS2:1999, BS 4449:1997, BS 4466:1989, ASTM A 615 / A 615M or AS/NZS 4671:2001
- Rebars which can be welded by conventional welding procedures



CAB rebars ready for delivery



NatSteel Holdings' double-bending machine

### Specifications: Reinforcement Bars and CAB Products

Table 1: Physical properties of reinforcement bars

Specification	Grade	Yield min N/mm <sup>2</sup>	Tensile min N/mm <sup>2</sup>	Ratio min	Cal. method	Elong 5D min%	Agt min%	Bend (size:mm)	Rebend (size:mm)
SS2: 1999	500	500	550	1.05	Nominal	14	2.5 12:-4D	6/8/10:-3D 16:-6D 16&20:5D 25/32/40:-6D (160° to 180°)	6/8/10/12:-5D 20&25:8D 32/40:10D (90° - 30min - 20°)
	300	300	330	1.10	Nominal	16	—	6/8/10:-2D 12:-2.5D 16/20:-3D (160° to 180°)	—
BS 4449: 2005	B500B	500 – 650	Y*1.08	1.08	Nominal	—	5	—	≤16mm:4D >16mm:7D (90° - 1hr - 20°)
BS 4449: 1997	460	460	Y*1.08	1.08	Effective	14	5 (not for non-conformity)	—	≤16mm:5D >16mm:7D (45° - 30min - 23°)
	250	250	Y*1.15	1.15	Effective	22	—	—	all sizes:2D (45° - 30min - 23°)
AS/NZS 4671:2001	500N	500 – 650	Y*1.08	1.08	Nominal	—	5	all sizes:4D (≤16 bend 90° ≥20 bend 180°)	≤16mm:4D ≥20mm:N.A. (90° - 1hr - straight)
	250N	250	Y*1.08	1.08	Nominal	—	5	same as 500N	same as 500N
	500E	500 – 600	≥Y*1.15 ≤Y*1.40	≥1.15 ≤1.40	Nominal	—	10	same as 500N	same as 500N
	300E	300 – 380	≥Y*1.15 ≤Y*1.50	≥1.15 ≤1.50	Nominal	—	15	same as 500N	same as 500N
	500L	500 – 750	Y*1.03	1.03	Nominal	—	1.5	≤16:3D bend90° ≥20:NA	≤16:3D ≥20:NA (90° - 1hr - 20°)
ASTM A 615	G60	PSI 60,000 (420N/mm <sup>2</sup> )	PSI 90,000 (620N/mm <sup>2</sup> )	—	Nominal	G.L.:8* <7/8":9% 7/8" to <9/8":8% ≥9/8":7%	—	<6/8":3.5D 6/8"to<9/8":5D 9/8"to<14/8":7D >14/8":9D	—
	G40	40,000 (280N/mm <sup>2</sup> )	60,000 (420N/mm <sup>2</sup> )	—	Nominal	3/8":11% >3/8":12%	—	<6/8":3.5D 6/8":5D	—

Table 2: Steel mass for various reinforcement bar sizes, and piece count of each standard NatSteel bundle

Mild steel round bar				
Diameter (mm)	6	8	10	13
Mass (kg/m)	0.222	0.395	0.617	1.042
Length (m)	6	6	12	12
No. of pieces per bundle	752	424	271	161
Weight per bundle (mt)	1.002	1.005	2.005	2.016

  

Deformed bars	Diameter (mm)	Mass (kg/m)	Length (m)	No. of pieces per bundle	Weight per bundle (mt)
	10	0.617	12	137	1.014
	12	0.888	12	188	2.004
	13	1.042	12	81	1.013
	16	1.579	12	54	1.023
	20	2.466	12	70	2.071
	22	2.984	12	56	2.006
	25	3.854	12	46	2.127
	28	4.834	12	36	2.088
	32	6.313	12	28	2.121
	40	9.864	12	18	2.131
	50	15.413	12	6	1.110



## Shape Code Chart For Steel Reinforcement Bars

BS 4466:1 989 SHAPES		Shapes outside BS 4466:1 989	
Shape Code	Measurement Method for Bent Dimensions	Shape Code	Measurement Method for Bent Dimensions
20		41	
37		43	
38		45	
51		39	
61		49	
62		52	
82		54	
41		55	
43		53	
45		54	
39		55	
49		79	
52		85	
54		87	
55		88	
53		76	
54		38A	
55		92	
79		93	
85		98	
87		99	
88		99	
76		99	
38A		99	
92		99	
93		99	
98		99	
99		99	

Fig.1 : Dimensioning of angled bars

When dimensioning an acute angle, the tangential lines are used.

When dimensioning an obtuse angle, the perpendicular bisectors of tangential lines are used.

Notes:  
 1) d = bar diameter  
 r = standard bend radius  
 h = standard hook allowance

2. Measurement method for bent dimensions of acute and obtuse angles are explained in Fig.1.

3. Unless otherwise stated, all dimensions are outside-to-outside of bar.

NatSteel Holdings Plc Ltd makes no representation or warranty regarding the accuracy, quality, suitability or reliability of the information contained herein. NatSteel Holdings Plc Ltd is not responsible for any errors, omissions, or inaccuracies contained in any information provided by such third parties. While efforts have been made to ensure the accuracy of the information set out herein, there may be inadvertent technical or factual inaccuracies and typographical errors. NatSteel Holdings Plc Ltd reserves the right to make changes and corrections at any time, without notice. NatSteel Holdings Plc Ltd does not accept any liability or responsibility for the accuracy, completeness or timeliness of the information contained herein. Neither NatSteel Holdings Plc Ltd nor any of its employees, agents or officers shall be held liable for any improper or incorrect use of the information described and/or contained herein and assumes no responsibility for anyone's use of the information. In no event shall NatSteel Holdings Plc Ltd or its employees, agents or officers be liable for any loss or damage of whatever nature (direct, indirect, special, exemplary or consequential damages) howsoever caused whether arising in contract, tort or otherwise, which may arise as a result of your use of or reliance on any content or information contained herein.