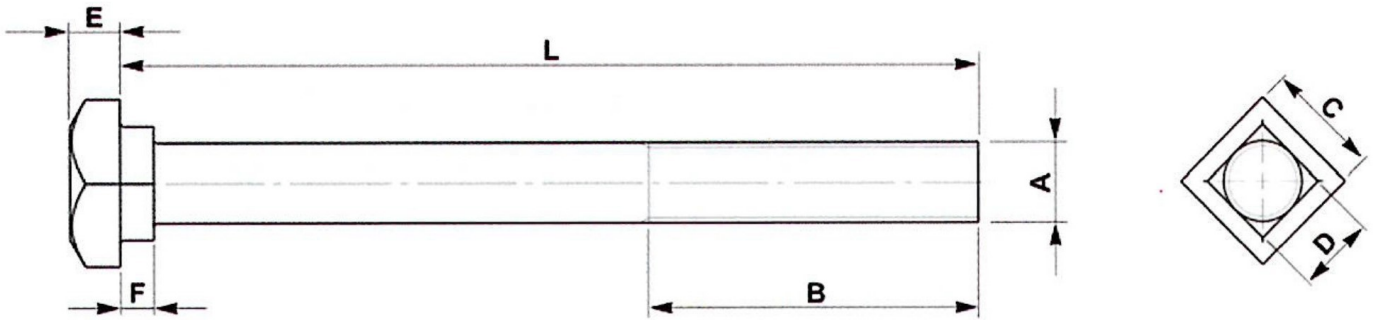


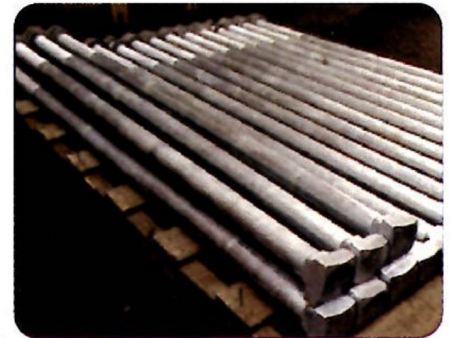
SQ SQ HOLDING DOWN BOLTS



THREAD DIA	A	M16	M20	M24	M30	M36	M42	M48	M56	M64
B	MAX	122	127.5	133	140.5	148	155.5	163	172.5	182
	MIN	116	120	124	130	136	142	148	156	164
SHANK DIA	MAX	16.7	20.84	24.84	30.84	37	43	49	57.2	65.2
	MIN	15.3	19.16	23.16	29.16	35	41	47	54.8	62.8
C	MAX	24	30	36	46	55	65	75	85	95
	MIN	23.16	29.16	35	45	53.8	63.1	73.1	82.8	92.8
D	MAX	16.7	20.84	24.84	30.84	37	43	49	57.2	65.2
	MIN	15.3	19.16	23.16	29.16	35	41	47	54.8	62.8
E	NOM	10	12.5	15	18.7	22.5	26	30	35	40
	MIN	9.25	11.6	14.1	17.65	21.45	24.95	28.95	33.75	38.75
	MAX	10.75	13.4	15.9	19.75	23.55	27.05	31.05	36.25	41.25
F	NOM	8	10	12	15	18	21	24	28	32
	MIN	7.25	9.25	11.1	14.1	17.1	19.95	22.95	26.95	30.75
	MAX	8.75	10.75	12.9	15.9	18.9	22.05	25.05	29.05	33.25

L

**FOR DIMENSIONS SEE TABLE OPPOSITE
NON STANDARD LENGTHS AVAILABLE UPON REQUEST**



SQ SQ HOLDING DOWN BOLTS

M16 - M72 UPTO 6000MM LENGTH IN 8.8 GRADE

NOMINAL LENGTH (L) OF PREFERRED SIZES INCLUDING WEIGHTS

THREAD DIAMETERS

M16		M20		M24		M30		M36	
mm	Weight (kg)	mm	Weight (kg)	mm	Weight (kg)	mm	Weight (kg)	mm	Weight (kg)
300	0.53	300	0.85	---	---	---	---	---	---
375	0.64	375	1.03	375	1.51	---	---	---	---
450	0.76	450	1.22	450	1.78	450	2.90	450	4.22
525	0.88	525	1.43	525	2.04	525	3.35	525	4.82
600	1.00	600	1.58	600	2.31	600	3.77	600	5.42
---	---	750	1.95	750	2.84	750	4.60	750	6.62
---	---	1000	2.00	1000	3.72	1000	5.95	1000	8.62
---	---	---	---	1250	4.61	1250	7.34	1250	10.62

TOLERANCES ON NOMINAL LENGTH (L)

NOMINAL LENGTH (mm)	TOLERANCE (mm)
250 < L ≤ 315	± 5.2
315 < L ≤ 400	± 5.7
400 < L ≤ 500	± 6.3
500 < L ≤ 630	± 7.0
630 < L ≤ 800	± 8.0
800 < L ≤ 1000	± 9.0
1000 < L ≤ 1250	± 10.5
> 1250	PER AGREEMENT

EXTRA TOLERANCE

Square square bolts are designed to be used with washer plates.

When located in position the square under head slots into the hole, preventing rotation when tightening.

This application also gives tolerance for lining up with structural stanchion base plates.

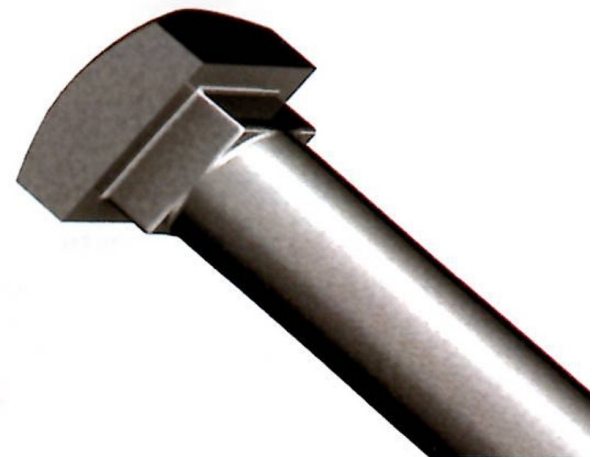
NON STANDARD LENGTHS BOTH SHORTER AND LONGER THAN SHOWN ARE AVAILABLE

UP TO 6000MM LONG ON REQUEST

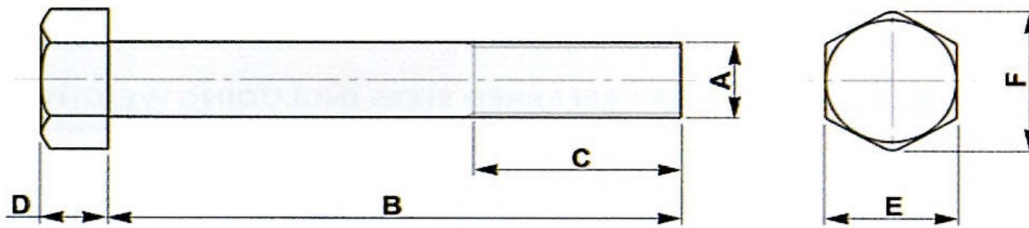


MATERIAL
CARBON STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8

FINISH
SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING



HEXAGON BOLTS - METRIC



WASHER FACE ON REQUEST

STANDARD THREAD LENGTHS	
Normal length of bolt B	Length of thread C
Up to and including 125mm	2A + 6mm
Over 125mm up to and including 200mm	2A + 12mm
Over 200mm	2A + 25mm

THREAD DIA	PITCH OF THREAD	DIA OF SHANK UNTHREADED		WIDTH ACROSS FLATS		WIDTH ACROSS CORNERS		HEIGHT OF HEAD		RADIUS UNDER HEAD
		A	Coarse Pitch Series	E		F		D		
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
mm		mm	mm	mm	mm	mm	mm	mm	mm	mm
M5	0.8	4.52	5.48	7.64	8	8.63	9.2	3.13	3.88	0.35
M6	1	5.52	6.48	9.64	10	10.89	11.5	3.63	4.38	0.40
M8	1.25	7.42	8.58	12.57	13	14.20	15.0	5.13	5.88	0.80
M10	1.5	9.42	10.58	16.57	17	18.72	19.6	6.55	7.45	0.80
M12	1.75	11.30	12.70	18.48	19	20.88	21.9	7.55	8.45	1.25
M16	2	15.30	16.70	23.16	24	26.17	27.7	9.55	10.45	1.25
M20	2.5	19.16	20.84	29.16	30	32.95	34.6	12.10	13.90	1.78
(M22)	2.5	21.16	22.84	31.00	32	35.03	36.9	13.10	14.90	1.78
M24	3	23.16	24.84	35.00	36	39.55	41.6	14.10	15.90	1.78
(M27)	3	26.16	27.84	40.00	41	45.20	47.3	16.10	17.90	2.28
M30	3.5	29.16	30.84	45.00	46	50.85	53.1	17.95	20.05	2.28
(M33)	3.5	32.00	34.00	49.00	50	55.37	57.7	19.95	22.05	2.28
M36	4	35.00	37.00	53.80	55	60.79	63.5	21.95	24.05	2.70
(M39)	4	38.00	40.00	58.80	60	66.44	69.3	23.95	26.05	2.70
M42	4.5	41.00	43.00	63.80	65	72.09	75.1	24.95	27.05	2.80
(M45)	4.5	44.00	46.00	68.80	70	77.74	80.8	26.95	29.05	3.30
M48	5	47.00	49.00	73.80	75	83.39	86.6	28.95	31.05	3.80
(M52)	5	50.80	53.20	78.80	80	89.04	92.4	31.75	34.25	4.70
M56	5.5	54.80	57.20	83.60	85	94.47	98.1	33.75	36.25	4.90
(M60)	5.5	58.80	61.20	88.60	90	100.12	103.9	36.75	39.25	4.90
M64	6	62.80	65.20	93.60	95	105.77	109.7	38.75	41.25	4.90
(M68)	6	66.80	69.20	98.60	100	111.42	115.5	41.75	44.25	4.90

MATERIAL

GRADE 4.6, 5.6, 6.9
STAINLESS STEELS
AVAILABLE IN BS3692
GRADES 8.8, 10.9, 12.9

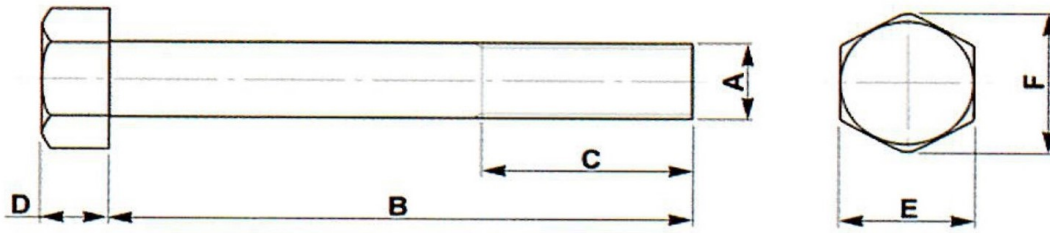
FINISH

SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING

**NON STANDARD
THREAD LENGTH AVAILABLE
LENGTHS UP TO 3000MM**

() = DENOTES NON PREFERRED SIZES

HEXAGON BOLTS - METRIC



WASHER FACE ON REQUEST

STANDARD THREAD LENGTHS	
Normal length of bolt B	Length of thread C
Up to and including 125mm	2A + 8mm
Over 125mm up to and including 200mm	2A + 12mm
Over 200mm	2A + 25mm

THREAD DIA A	PITCH OF THREAD	DIA OF SHANK UNTHREADED		WIDTH ACROSS FLATS		WIDTH ACROSS CORNERS		HEIGHT OF HEAD		RADIUS UNDER HEAD	
				E		F		D			
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
mm	Coarse Pitch Series	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
M5	0.8	4.82	5.0	7.85	8.0	8.87	9.2	3.35	3.66	0.2	0.35
M6	1	5.82	6.0	9.78	10.0	11.05	11.5	3.85	4.15	0.25	0.4
M8	1.25	7.78	8.0	12.73	13.0	14.38	15.0	5.35	5.65	0.4	0.6
M10	1.5	9.78	10.0	16.73	17.0	18.90	19.6	6.82	7.18	0.4	0.6
M12	1.75	11.73	12.0	18.67	19.0	21.10	21.9	7.82	8.18	0.6	1.1
(M14)	2	13.73	14.0	21.67	22.0	24.49	25.4	8.82	9.18	0.6	1.1
M16	2	15.73	16.0	23.67	24.0	26.75	27.7	9.82	10.18	0.6	1.1
(M18)	2.5	17.73	18.0	26.67	27.0	30.14	31.2	11.79	12.22	0.6	1.1
M20	2.5	19.67	20.0	29.67	30.0	33.53	34.6	12.79	13.22	0.8	1.2
(M22)	2.5	21.67	22.0	31.61	32.0	35.72	36.9	13.79	14.22	0.8	1.2
M24	3	23.67	24.0	35.38	36.0	39.98	41.6	14.79	15.22	0.8	1.2
(M27)	3	26.67	27.0	40.38	41.0	45.63	47.3	16.79	17.22	1.0	1.7
M30	3.5	29.67	30.0	45.38	46.0	51.28	53.1	18.74	19.26	1.0	1.7
(M33)	3.5	32.61	33.0	49.38	50.0	55.80	57.7	20.74	21.26	1.0	1.7
M36	4	35.61	36.0	54.26	55.0	61.31	63.5	22.74	23.26	1.0	1.7
(M39)	4	38.61	39.0	59.26	60.0	66.96	69.3	24.74	25.26	1.0	1.7
M42	4.5	41.61	42.0	64.26	65.0	72.61	75.1	25.74	26.26	1.2	1.8
(M45)	4.5	44.61	45.0	69.26	70.0	78.26	80.8	27.74	28.26	1.2	1.8
M48	5	47.61	48.0	74.26	75.0	83.91	86.6	29.74	30.26	1.6	2.3
(M52)	5	51.54	52.0	79.26	80.0	89.56	92.4	32.69	33.21	1.6	2.3
M56	5.5	55.54	56.0	84.13	85.0	95.07	98.1	34.69	35.31	2.0	3.5
(M60)	5.5	59.54	60.0	89.13	90.0	100.72	103.9	37.69	38.31	2.0	3.5
M64	6	63.54	64.0	94.13	95.0	106.37	109.7	39.69	40.31	2.0	3.5
(M68)	6	67.54	68.0	99.13	100.0	112.02	115.5	42.69	43.31	2.0	3.5

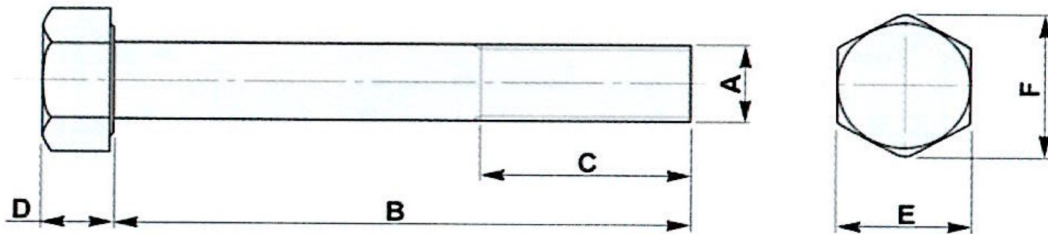
MATERIAL
GRADE 4.6, 5.6, 6.9
STAINLESS STEELS
AVAILABLE IN BS3692
GRADES 8.8, 10.9, 12.9

FINISH
SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING

NON STANDARD
THREAD LENGTH AVAILABLE
LENGTHS UP TO 3000MM
() = DENOTES NON PREFERRED SIZES

ISO 4014 / DIN 931 - HEXAGON BOLTS

- TO ISO 4014
- PART THREADED



**ALL SIZES SHOWN ARE GRADE B ISO4014
GRADE A SIZES ALSO AVAILABLE ON REQUEST**

STANDARD THREAD LENGTHS	
Normal length of bolt B	Length of thread C
Up to and including 125mm	2A + 6mm
Over 125mm up to and including 200mm	2A + 12mm
Over 200mm	2A + 25mm

THREAD DIA	PITCH OF THREAD	DIA OF SHANK UNTHREADED		E		F	D			RADIUS UNDER HEAD
		GRADE B		GRADE B		GRADE B	GRADE B			
		MIN	MAX	MIN	MAX	MIN	MIN	MAX	NOM	MIN
mm		mm	mm	mm	mm	mm	mm	mm	mm	mm
M12	1.75	11.57	12.00	17.57	18.00	19.85	7.21	7.79	7.50	0.60
M16	2	15.57	16.00	23.16	24.00	26.17	9.71	10.29	10.00	0.60
M20	2.5	19.48	20.00	29.16	30.00	32.95	12.15	12.85	12.50	0.80
(M22)	2.5	21.48	22.00	33.00	34.00	37.29	13.65	14.35	14.00	0.80
M24	3	23.48	24.00	35.00	36.00	39.55	14.65	15.35	15.00	0.80
(M27)	3	26.48	27.00	40.00	41.00	45.20	13.65	17.35	17.00	1.00
M30	3.5	29.48	30.00	45.00	46.00	50.85	18.28	19.12	18.70	1.00
(M33)	3.5	32.38	33.00	49.00	50.00	55.37	20.58	21.42	21.00	1.00
M36	4	35.38	36.00	53.8	55.00	60.79	22.08	22.92	22.50	1.00
(M39)	4	38.38	39.00	58.80	60.00	66.44	24.58	25.42	25.00	1.00
M42	4.5	41.38	42.00	63.10	65.00	71.30	25.58	26.42	26.00	1.20
(M45)	4.5	44.38	45.00	68.10	70.00	76.95	27.58	28.42	28.00	1.20
M48	5	47.38	48.00	73.10	75.00	82.60	29.58	30.42	30.00	1.60
(M52)	5	51.26	52.00	78.10	80.00	88.25	32.50	33.50	33.00	1.60
M56	5.5	55.26	56.00	82.80	85.00	93.56	34.50	35.50	35.00	2.00
(M60)	5.5	59.26	60.00	87.80	90.00	99.21	37.50	38.50	38.00	2.00
M64	6	63.26	64.00	92.80	95.00	104.86	39.50	40.50	40.00	2.00

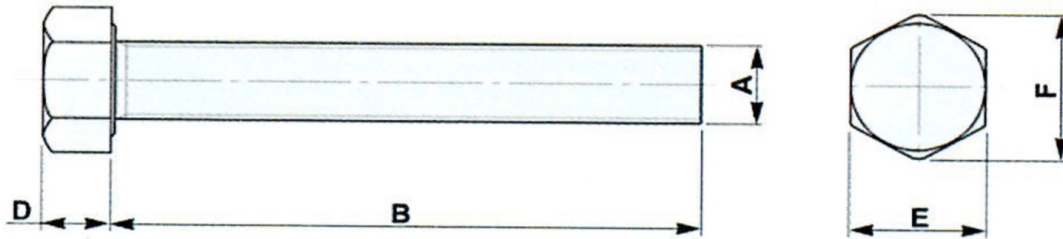
MATERIAL GRADES
4.6, 5.6, 6.9, 8.8, 10.9, 12.9
STAINLESS STEELS

FINISH
SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING

**NON STANDARD
THREAD LENGTH AVAILABLE
LENGTHS UP TO 3000MM
() = DENOTES NON PREFERRED SIZES**

ISO 4017 / DIN 933 - HEXAGON BOLTS

**- TO ISO 4017
- FULLY THREADED**



**ALL SIZES SHOWN ARE GRADE B ISO4017
GRADE A SIZES ALSO AVAILABLE ON REQUEST**

THREAD DIA	PITCH OF THREAD	E		F	D			RADIUS UNDER HEAD
		GRADE B		GRADE B	GRADE B			
		MIN	MAX	MIN	MIN	MAX	NOM	MIN
mm	Coarse Pitch Series	mm	mm	mm	mm	mm	mm	mm
M12	1.75	17.57	18.00	19.85	7.21	7.79	7.50	0.60
M16	2	23.16	24.00	26.17	9.71	10.29	10.00	0.60
M20	2.5	29.16	30.00	32.95	12.15	12.85	12.50	0.80
(M22)	2.5	33.00	34.00	37.29	13.65	14.35	14.00	0.80
M24	3	35.00	36.00	39.55	14.65	15.35	15.00	0.80
(M27)	3	40.00	41.00	45.20	13.65	17.35	17.00	1.00
M30	3.5	45.00	46.00	50.85	18.28	19.12	18.70	1.00
(M33)	3.5	49.00	50.00	55.37	20.58	21.42	21.00	1.00
M36	4	53.8	55.00	60.79	22.08	22.92	22.50	1.00
(M39)	4	58.80	60.00	66.44	24.58	25.42	25.00	1.00
M42	4.5	63.10	65.00	71.30	25.58	26.42	26.00	1.20
(M45)	4.5	68.10	70.00	76.95	27.58	28.42	28.00	1.20
M48	5	73.10	75.00	82.60	29.58	30.42	30.00	1.60
(M52)	5	78.10	80.00	88.25	32.50	33.50	33.00	1.60
M56	5.5	82.80	85.00	93.56	34.50	35.50	35.00	2.00
(M60)	5.5	87.80	90.00	99.21	37.50	38.50	38.00	2.00
M64	6	92.80	95.00	104.86	39.50	40.50	40.00	2.00

MATERIAL

GRADES

4.6, 5.6, 6.9, 8.8, 10.9, 12.9

STAINLESS STEELS

FINISH

SELF COLOUR

GALVANISED

ELECTROPLATED

PTFE COATING

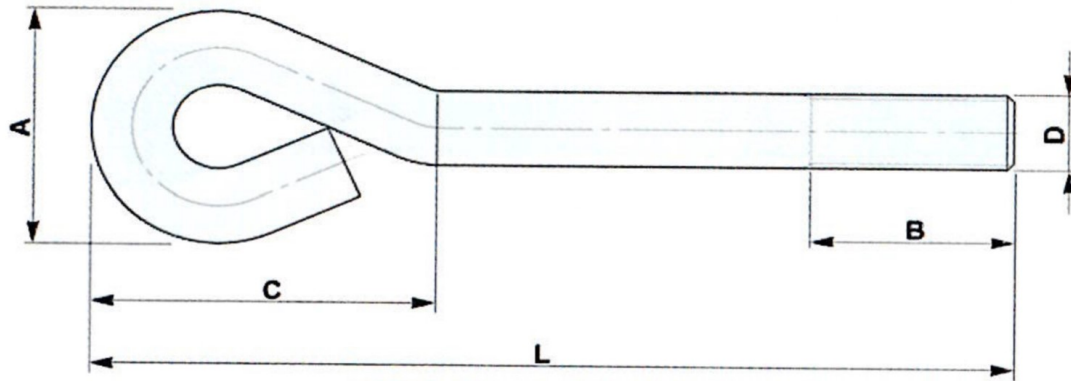
NON STANDARD

THREAD LENGTH AVAILABLE

LENGTHS UP TO 3000MM

() = DENOTES NON PREFERRED SIZES

DIN 529 - TYPE A



D	A	C
mm	mm	mm
M8	24	45
M10	30	55
M12	36	65
M16	48	85
M20	60	105
M24	75	125
M30	95	155
M36	115	190
M42	135	220
M48	155	250
M56	180	290
M64	200	335
M72	240	370

**THREAD AND OVERALL LENGTHS TO
SUIT CUSTOMER REQUIREMENTS**

**NON STANDARDS MANUFACTURED
ON REQUEST**

MATERIAL

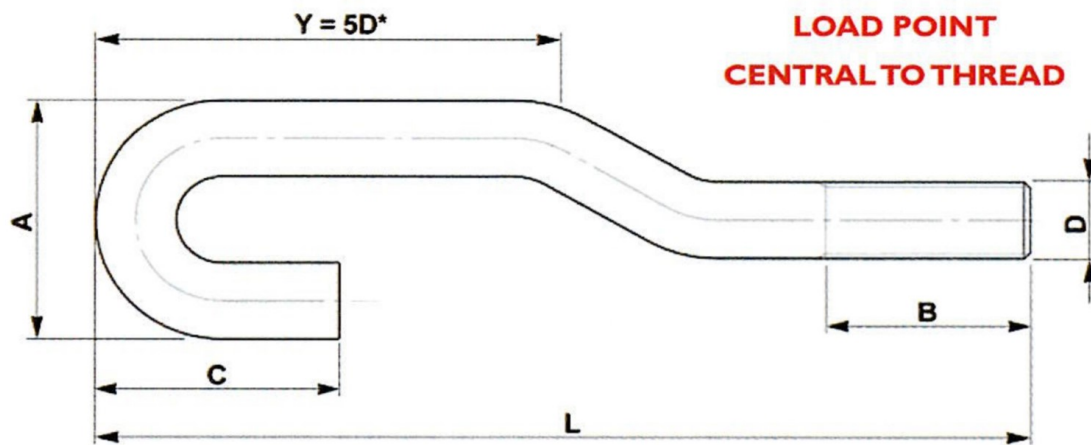
CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8

FINISH

SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING



DIN 529 - TYPE B



D	A	C
mm	mm	mm
M8	24	20
M10	30	25
M12	36	30
M16	48	40
M20	60	50
M24	75	60
M30	95	75
M36	115	90
M42	135	105
M48	155	120
M56	180	140
M64	200	160
M72	240	180



MATERIAL

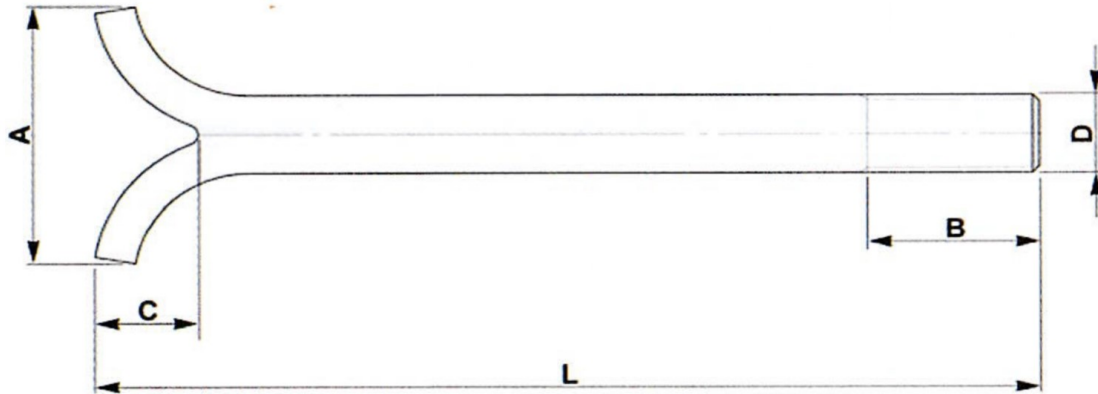
CARBON STEELS
 STAINLESS STEELS
 ALLOY STEELS
 B7, 4.6, 5.6, 8.8

FINISH

SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING



DIN 529 - TYPE C



D	A	C
mm	mm	mm
M8	16	12
M10	20	15
M12	24	18
M16	32	24
M20	40	30
M24	48	36
M30	60	45
M36	72	54
M42	85	63
M48	98	72
M56		
M64		
M72		

NON STANDARD SIZES ON REQUEST



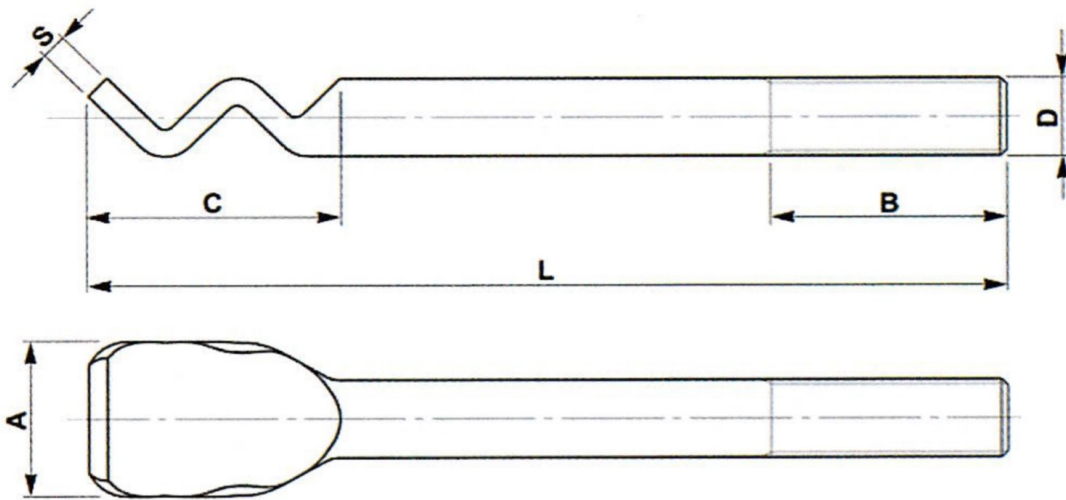
MATERIAL

CARBON STEELS
 STAINLESS STEELS
 ALLOY STEELS
 B7, 4.6, 5.6, 8.8

FINISH

SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING

DIN 529 - TYPE D



D	A	C	S
mm	mm	mm	mm
M8	16	24	3
M10	20	30	3.5
M12	24	36	4
M16	32	48	5
M20	40	60	6
M24	48	72	8

**THREAD AND OVERALL LENGTHS TO
SUIT CUSTOMER REQUIREMENTS**

**NON STANDARDS MANUFACTURED
ON REQUEST**

MATERIAL

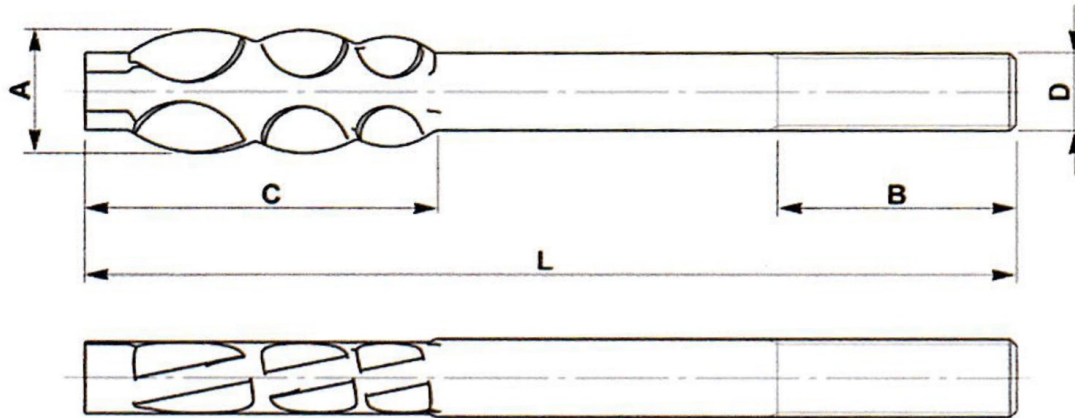
CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8

FINISH

SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING



DIN 529 - TYPE E



D	A	C
mm	mm	mm
M8	16	45
M10	20	55
M12	24	70
M16	32	90
M20	40	100
M24	48	135
M30	60	150
M36	72	180
M42	85	260
M48	98	260



**SHORTER AND LONGER
LENGTHS AVAILABLE
UPON REQUEST**



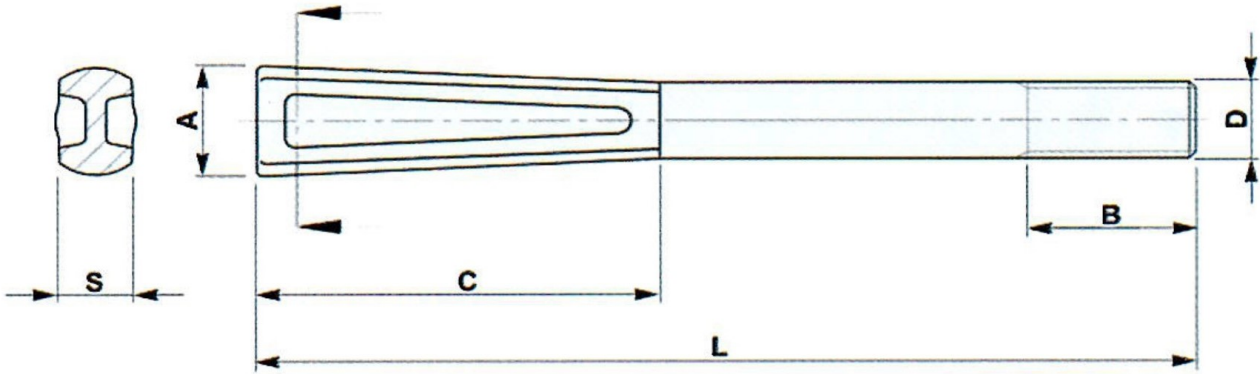
MATERIAL

**CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8**

FINISH

**SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING**

DIN 529 - TYPE F



D	A	C	S
mm	mm	mm	mm
M8	14	50	6
M10	16	50	8
M12	20	55	10
M16	25	85	14
M20	30	95	18
M24	35	120	22
M30	45	130	26
M36	55	190	30
M42	65	200	36
M48	75	220	42

MATERIAL

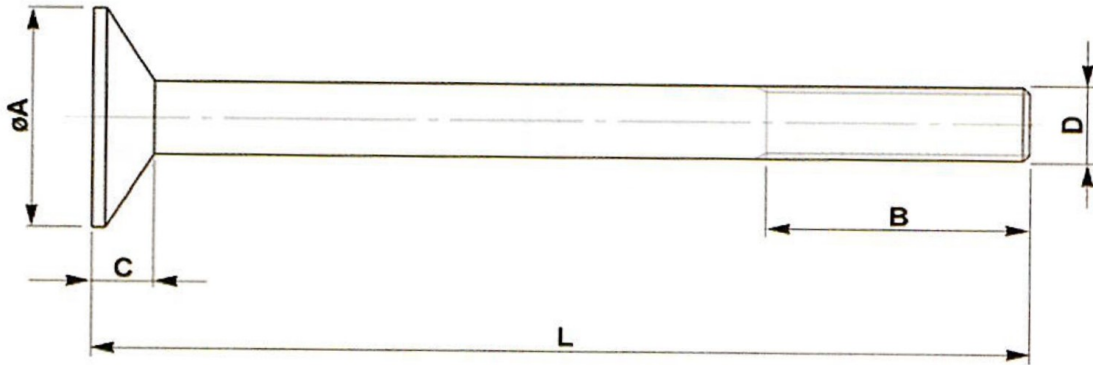
CARBON STEELS
 STAINLESS STEELS
 ALLOY STEELS
 B7, 4.6, 5.6, 8.8

FINISH

SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING



DIN 529 - TYPE G



D	A	C
mm	mm	mm
M8	20	5
M10	25	6
M12	30	7
M16	40	10
M20	50	12
M24	60	14
M30	75	18
M36	90	22
M42	105	25
M48	120	29
M56	140	34
M64	160	38
M72	180	43



THREAD AND OVERALL LENGTHS TO SUIT CUSTOMER REQUIREMENTS

NON STANDARDS MANUFACTURED ON REQUEST



MATERIAL

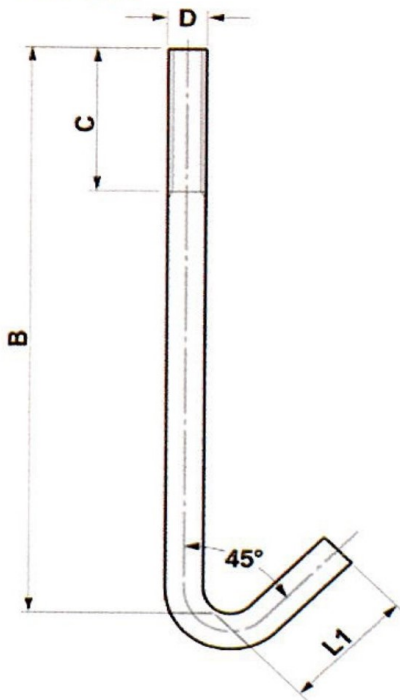
CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8

FINISH

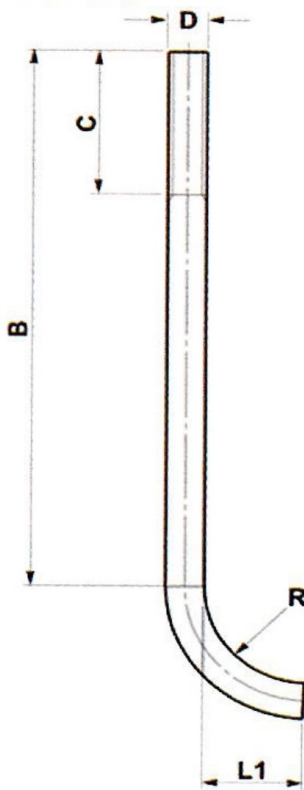
SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING

ANCHOR BOLTS - MISCELLANEOUS

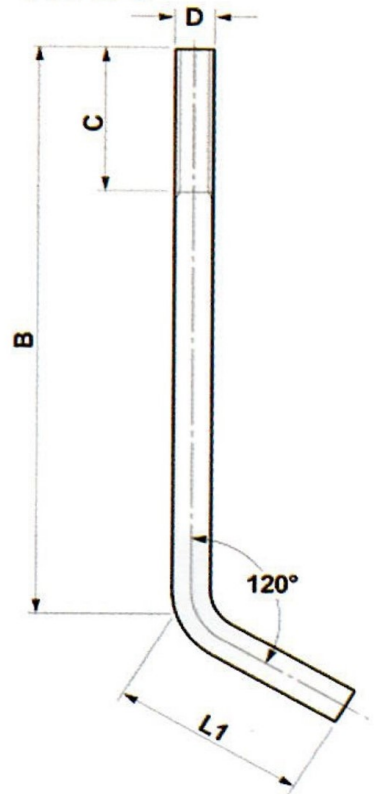
TYPE A



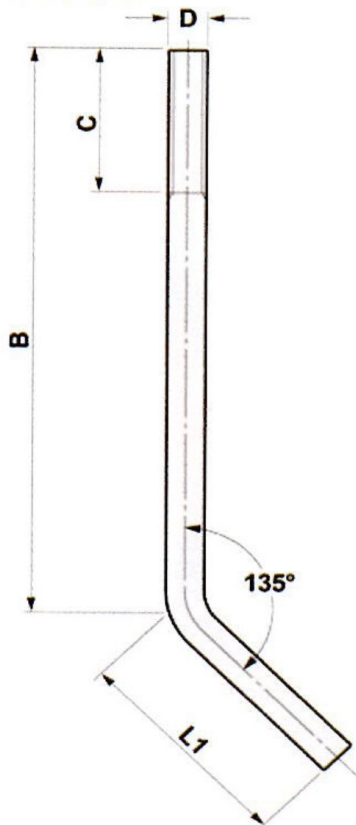
TYPE B



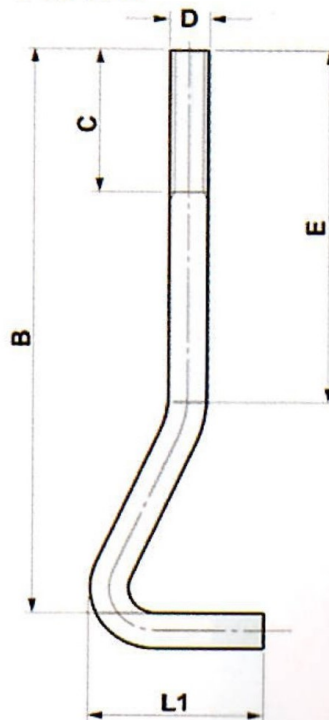
TYPE C



TYPE D



TYPE E



**NON STANDARDS
MADE TO SUIT
CUSTOMER
REQUIREMENTS
M16 - M100**

MATERIAL

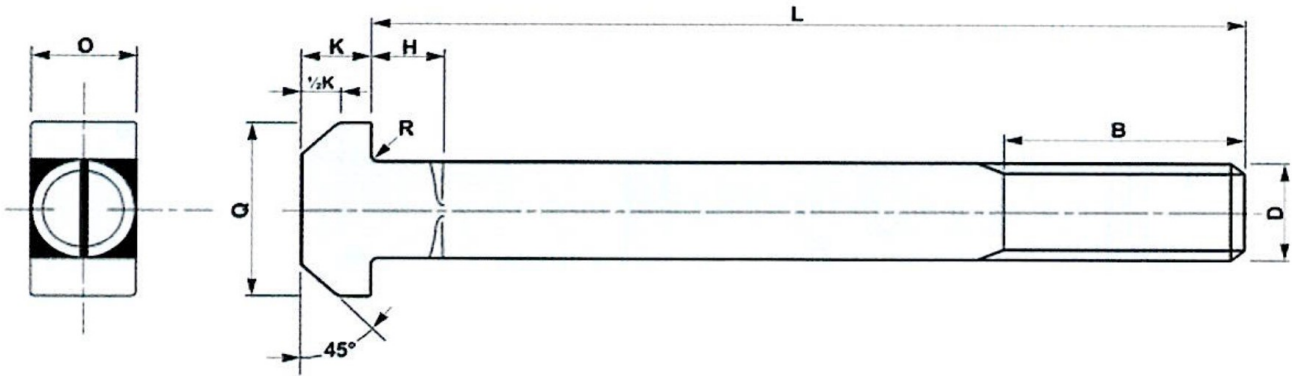
**CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8**

FINISH

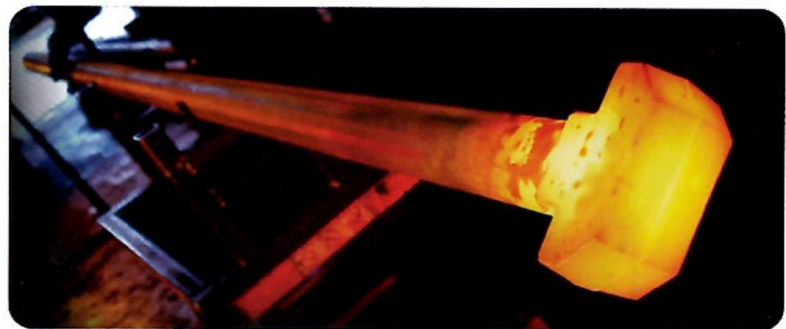
**SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING**

DIN 7992 - HAMMERHEAD T BOLTS

BOLTS ARE MANUFACTURED TO REQUIRED LENGTHS IN ACCORDANCE TO DIN 7992



d	B	H	K	O	Q	R
mm \varnothing	mm	mm	mm	mm	mm	mm
M24	100	18	18	24	65	1.6
M30	120	20	22	30	75	1.6
M36	140	25	25	36	85	2
M42	170	30	30	42	95	2
M48	200	30	35	48	110	2
M56	220	30	40	56	125	3
M64	240	30	50	64	140	3
M72 X 6	260	30	55	72	155	4
M80 X 6	290	30	60	80	170	4
M90 X 6	320	30	70	90	185	4
M100 X 6	350	30	75	100	205	5

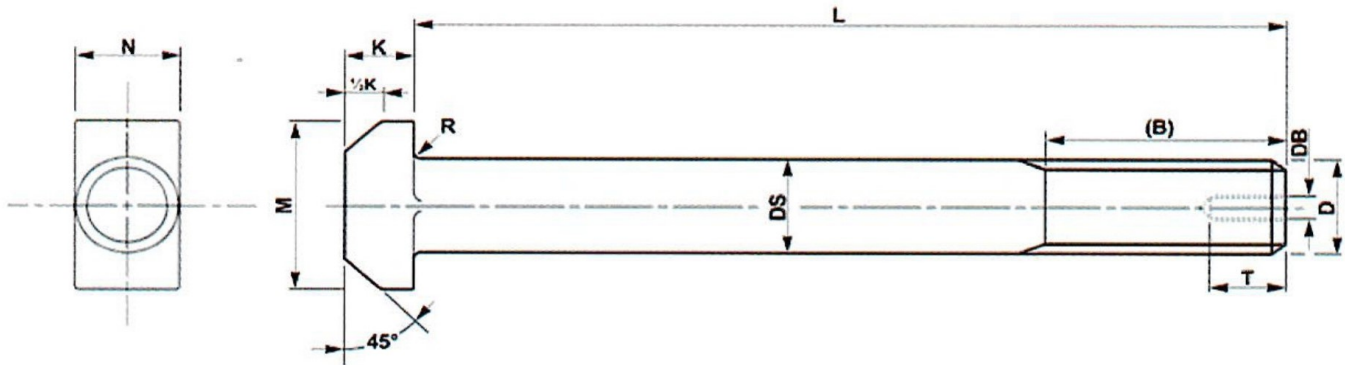


MATERIAL
 CARBON STEELS
 STAINLESS STEELS
 ALLOY STEELS
 B7, 4.6, 5.6, 8.8

FINISH
 SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING

DIN 261 - HAMMERHEAD T BOLTS

BOLTS ARE MANUFACTURED TO REQUIRED LENGTHS IN ACCORDANCE TO DIN 261



d	PI	B2 ≤ 120	B3 ≤ 200	B4 > 200	db	ds	K	N	M	R min	T min
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
M24	3	54	60	73	-	24	15	24	43	0.8	-
M30	3.5	66	72	85	-	30	19	30	54	1.0	-
M36	4	78	84	97	M12	36	23	36	66	1.0	22
M42	4.5	90	96	109	M12	42	26	42	80	1.2	22
M48	5	-	108	121	M12	48	30	48	88	1.6	22
M56	5.5	-	124	137	M16	56	35	56	102	2.0	26
M64	6	-	130	143	M16	64	40	64	115	2.0	26
M72	6	-	-	169	M16	72	45	72	128	2.0	26
M80	6	-	-	185	M20	80	50	80	140	2.0	33
M90	6	-	-	205	M20	90	55	90	155	2.5	33
M100	6	-	-	225	M20	100	62	100	170	2.5	33

DIN 261 WITH REDUCED SHANK ALSO AVAILABLE ON REQUEST

PI - Pitch of thread (coarse)

B2 - For overall length underhead up to and including 120mm

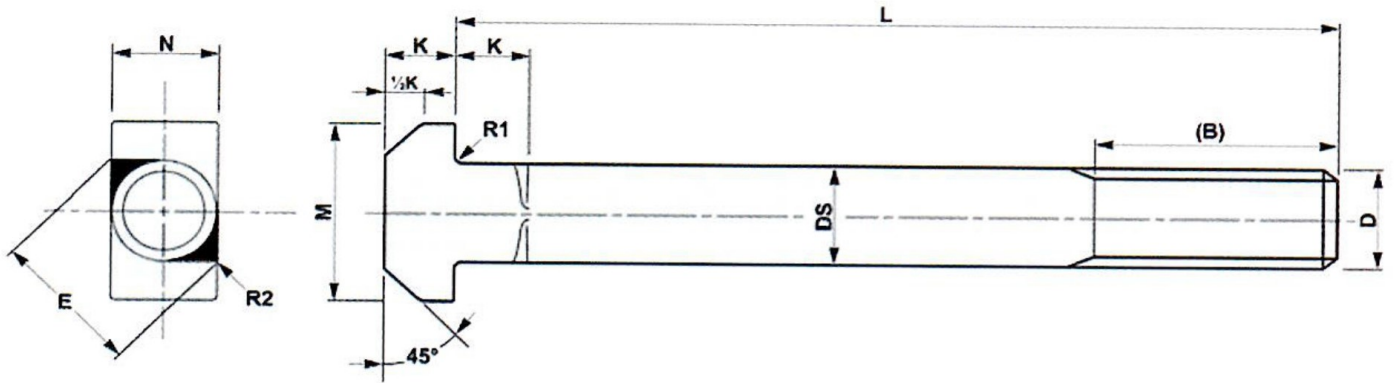
B3 - For overall length underhead up to and including 200mm

B4 - For overall length underhead exceeding 200mm



DIN 188 - HAMMERHEAD T BOLTS

BOLTS ARE MANUFACTURED TO REQUIRED LENGTHS IN ACCORDANCE TO DIN 188



d	PI	B2 ≤ 120	B3 ≤ 200	B4 > 200	ds	K	N	M	RI	R2 max
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
M24	3	54	60	-	24	15	24	43	1.6	3.6
M30	3.5	66	72	-	30	19	30	54	1.6	4.5
M36	4	78	84	97	36	23	36	66	2	5.4
M42	4.5	-	96	109	42	26	42	80	2	6.3
M48	5	-	108	121	48	30	48	88	2	7.2
M56	5.5	-	124	137	56	35	56	102	3	8.4
M64	6	-	130	143	64	40	64	115	3	9.6
M72	6	-	156	169	72	45	72	128	4	10.8
M80	6	-	172	185	80	50	80	140	4	12

PI - Pitch of thread (coarse)

B2 - For overall length underhead up to and including 120mm

B3 - For overall length underhead up to and including 200mm

B4 - For overall length underhead exceeding 200mm

MATERIAL

CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8

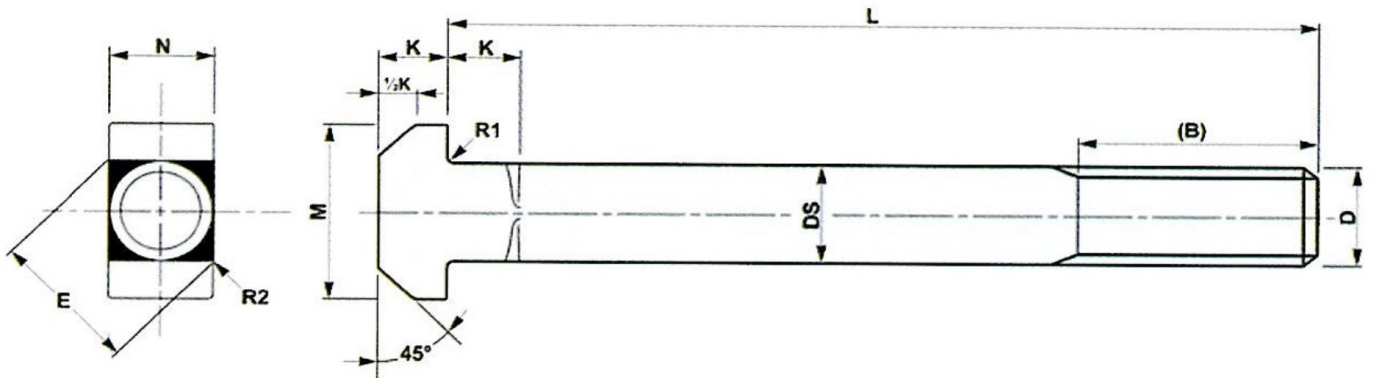
FINISH

SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING



DIN 186 - HAMMERHEAD T BOLTS

BOLTS ARE MANUFACTURED TO REQUIRED LENGTHS IN ACCORDANCE TO DIN 186



TYPE A - THREADED END

d	P1	ds	B2 ≤ 120	B3 ≤ 200	B4 > 200	E	K	N	M	R1	R2 max
mm	mm	mm	mm	mm	mm	min	mm	mm	mm	mm	mm
M24	3	24	54	60	73	29.48	15	24	43	1.6	3.6
M30	3.5	30	66	72	85	37.20	19	30	54	1.6	4.5
M36	4	36	78	84	97	44.57	23	36	66	2	5.4
M42	4.5	42	-	96	109	52.29	26	42	80	2	6.3
M48	5	48	-	108	128	60.00	30	48	88	2	7.2

TYPE B - FULLY THREADED ALSO AVAILABLE ON REQUEST

P1 - Pitch of thread (coarse)

B2 - For overall length underhead up to and including 120mm

B3 - For overall length underhead up to and including 200mm

B4 - For overall length underhead exceeding 200mm

MATERIAL

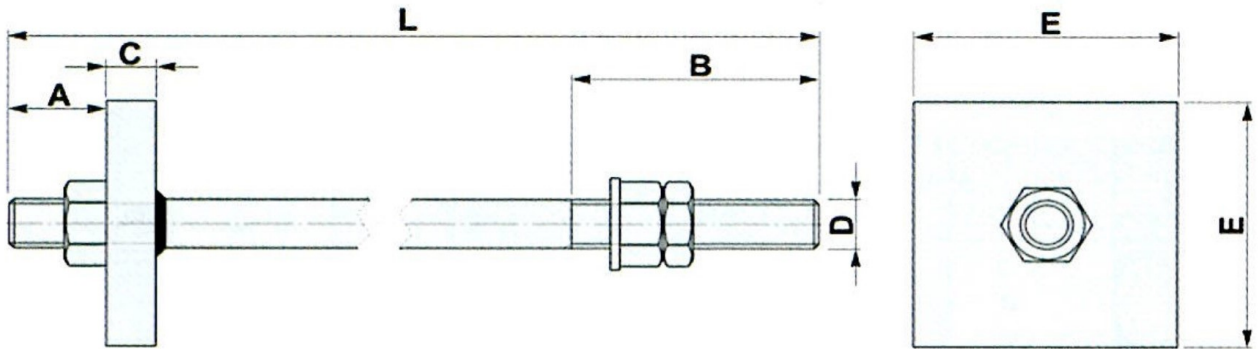
CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8

FINISH

SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING



BOLT ASSEMBLIES - WITHOUT TUBE



D	A	C	E	L	B
mm	mm	mm	mm	mm	mm
M16	45	15	80		
M20	45	15	100		
M24	55	20	125		
M30	75	30	125		
M36	80	30	125		
M42	95	30	150		
M48	100	30	150		
M56	115	35	175		
M64	140	40	200		

**TO SUIT
CUSTOMER
REQUIREMENTS**

SIZES UP TO M100

MATERIAL
CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8

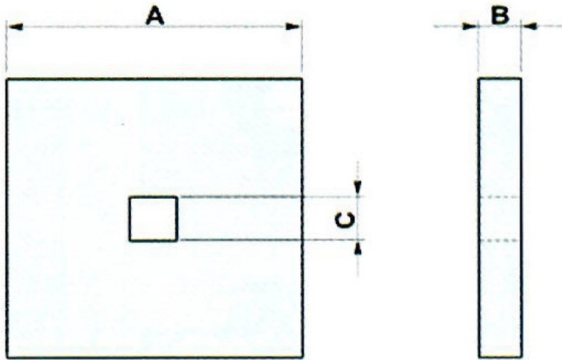
FINISH
SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING



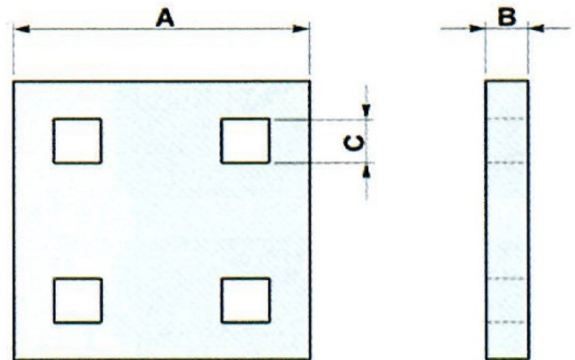
WASHER PLATES

TYPE A TO TYPE D ARE DESIGNED TO BE USED WITH SQ SQ HOLDING DOWN BOLTS TO BS 7419

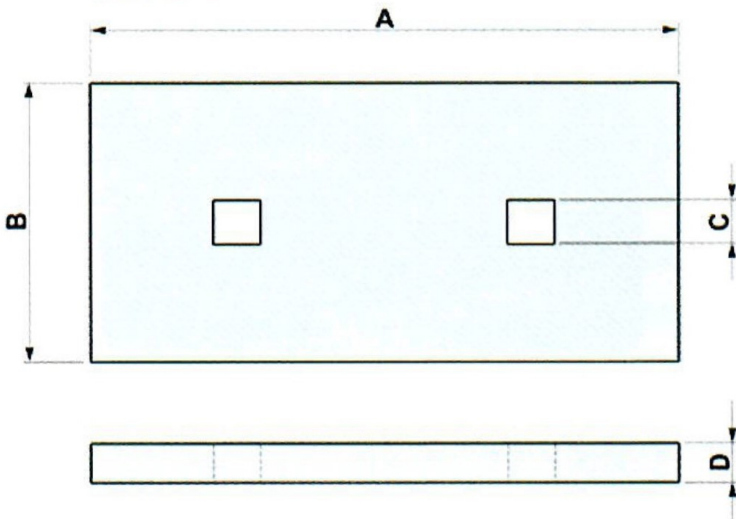
TYPE A



TYPE B

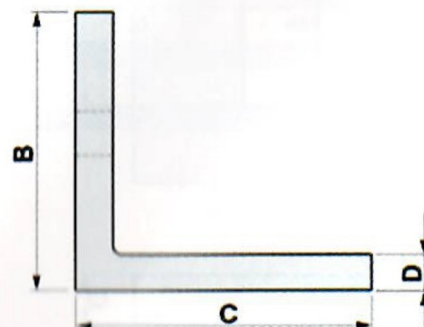
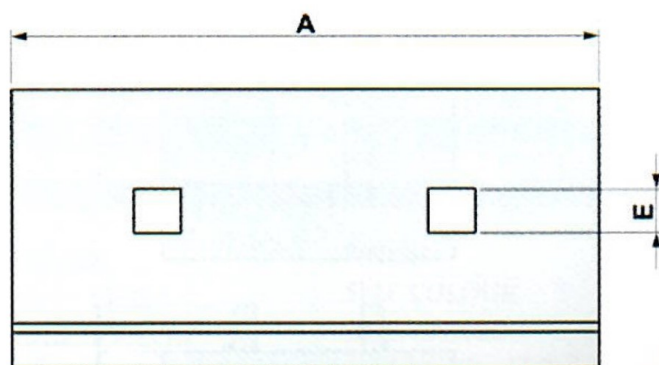


TYPE C



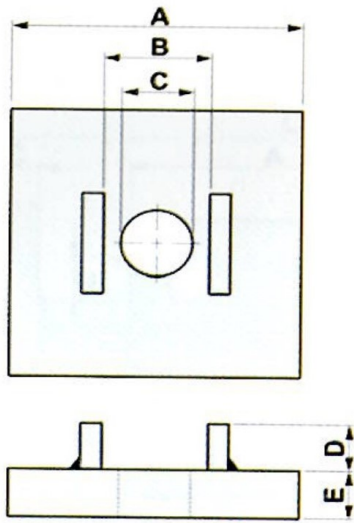
**PLATES AVAILABLE WITH
ROUND OR SQUARE HOLES
& LOCKING CAP IF
REQUIRED FOR USE WITH
HEXAGON BOLTS**

TYPE D



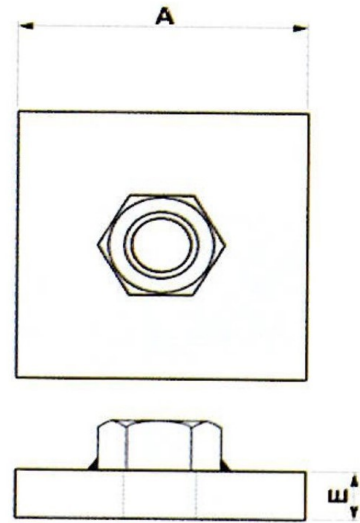
WASHER PLATES

TYPE E

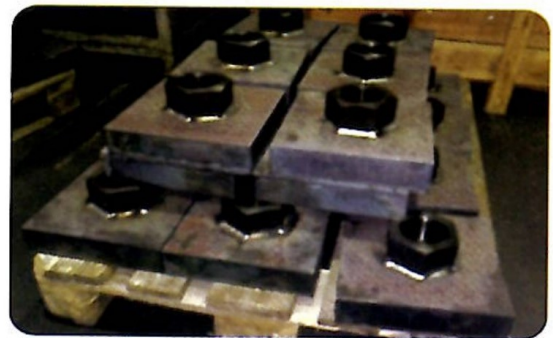


TYPE E FOR USE WITH TIE RODS AND NUTS

TYPE H

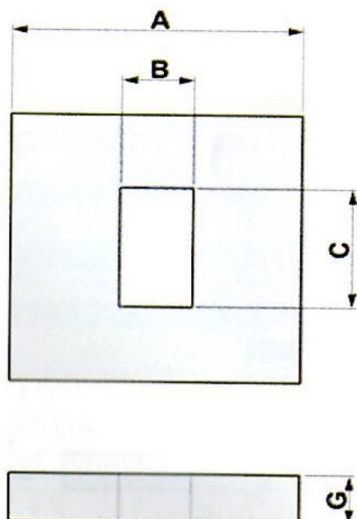


TYPE H WITH WELDED NUT TO REQUIREMENTS

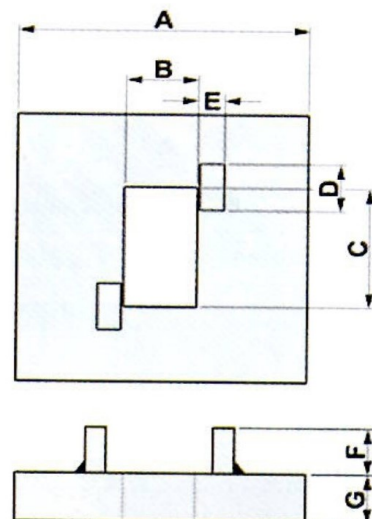


TYPE F & TYPE G FOR REMOVABLE FOUNDATION SYSTEMS

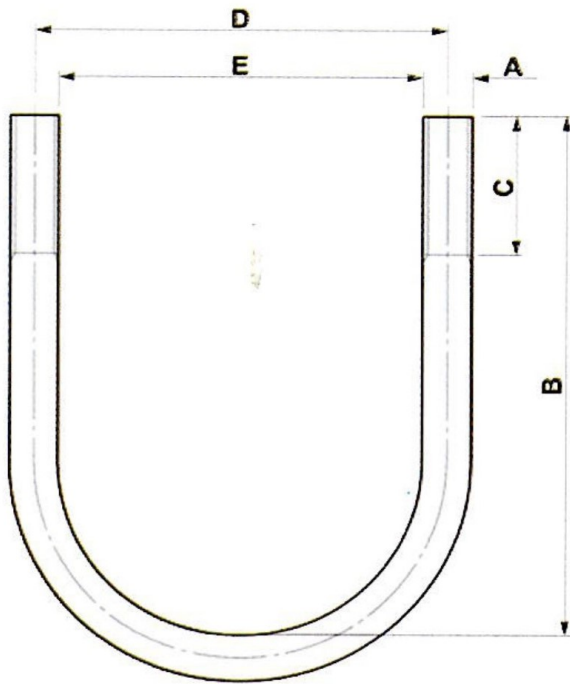
TYPE F



TYPE G



U BOLTS - GRIP TYPE



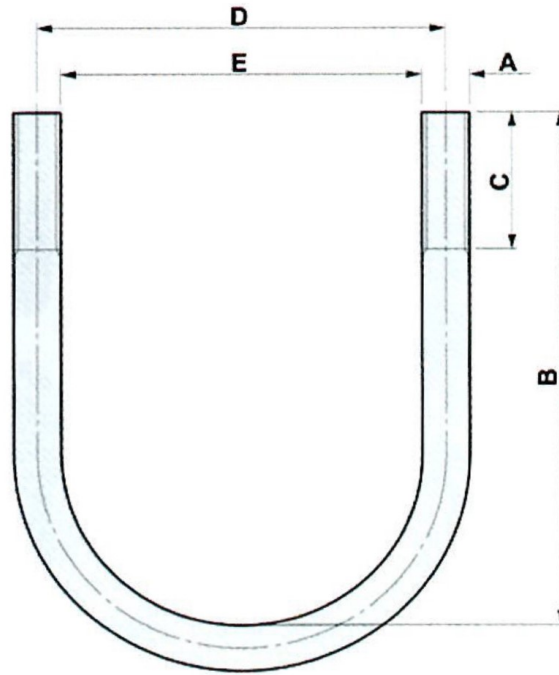
Nom Pipe Size	Pipe O.D	A	B	C	D	E
mm	mm	mm	mm	mm	mm	mm
15	21.3	M8	46	25	30	22
20	26.9	M8	56	25	35	27
25	33.7	M8	61	25	45	37
32	42.4	M8	71	25	55	47
40	48.3	M10	85	35	60	50
50	60.3	M10	95	35	75	65
65	76.1	M12	124	45	90	78
80	88.9	M16	142	50	105	89
100	114.3	M16	167	50	135	119
125	139.7	M16	192	50	160	144
150	168.3	M20	225	55	190	170
175	193.7	M20	250	55	215	195
200	219.1	M20	285	55	245	225
225	244.5	M20	300	55	270	250
250	273.0	M20	340	60	300	280
300	323.9	M20	390	60	350	330
350	355.6	M24	428	65	385	361
400	406.4	M24	488	65	435	411
450	457.0	M24	528	70	485	461
500	508.0	M24	588	70	540	516
550	559.0	M24	638	70	590	566
600	610.0	M24	688	70	640	616

MATERIAL
 CARBON STEELS
 STAINLESS STEELS
 ALLOY STEELS
 B7, 4.6, 5.6, 8.8

FINISH
 SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING

**NON STANDARDS
 MADE TO SUIT
 CUSTOMER
 REQUIREMENTS
 M12 - M100**

U BOLTS - NON GRIP TYPE



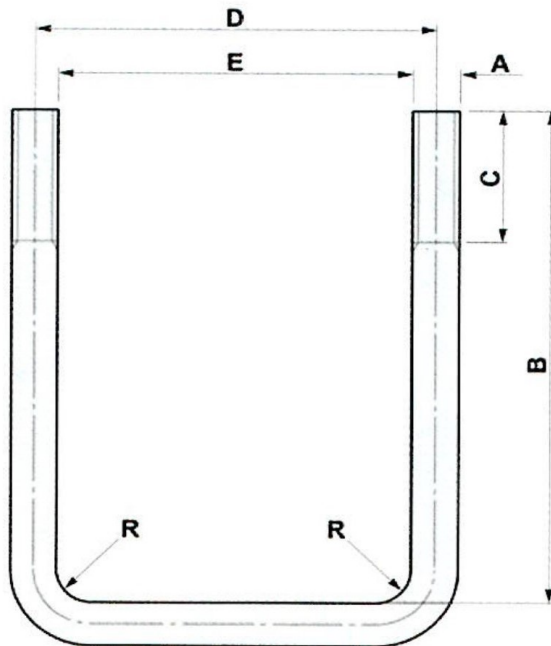
Nom Pipe Size	Pipe O.D	A	B	C	D	E
mm	mm	mm	mm	mm	mm	mm
15	21.3	M8	41	25	40	32
20	26.9	M8	51	30	45	37
25	33.7	M8	56	30	50	42
32	42.4	M8	66	30	60	52
40	48.3	M10	80	40	65	55
50	60.3	M10	95	40	80	70
65	76.1	M12	114	50	95	83
80	88.9	M16	132	55	110	94
100	114.3	M16	157	55	140	124
125	139.7	M16	182	55	165	149
150	168.3	M20	215	65	195	175
175	193.7	M20	240	65	220	200
200	219.1	M20	265	65	250	230
225	244.5	M20	290	65	275	255
250	273.0	M20	325	75	305	285
300	323.9	M20	375	75	355	335
350	355.6	M24	413	80	390	366
400	406.4	M24	463	80	440	416
450	457.0	M24	513	80	495	471
500	508.0	M24	563	80	545	521
550	559.0	M24	613	80	595	571
600	610.0	M24	663	80	645	621

MATERIAL
 CARBON STEELS
 STAINLESS STEELS
 ALLOY STEELS
 B7, 4.6, 5.6, 8.8

FINISH
 SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING

**NON STANDARDS
 MADE TO SUIT
 CUSTOMER
 REQUIREMENTS
 M12 - M100**

U BOLTS - STRAIGHT BACK



**FLATTENED STRAIGHT
BACK VARIANT ALSO
AVAILABLE ON REQUEST**



A	B	C	D	E	R
mm	mm	mm	mm	mm	mm
M8	46	25	30	22	
M8	56	25	35	27	
M8	61	25	45	37	
M8	71	25	55	47	
M10	85	35	60	50	
M10	95	35	75	65	
M12	124	45	90	78	
M16	142	50	105	89	
M16	167	50	135	119	
M16	192	50	160	144	
M20	225	55	190	170	
M20	250	55	215	195	
M20	285	55	245	225	
M20	300	55	270	250	
M20	340	60	300	280	
M20	390	60	350	330	
M24	428	65	385	361	
M24	488	65	435	411	
M24	528	70	485	461	
M24	588	70	540	516	
M24	638	70	590	566	
M24	688	70	640	616	

**TO SUIT
CUSTOMER
REQUIREMENTS**

MATERIAL

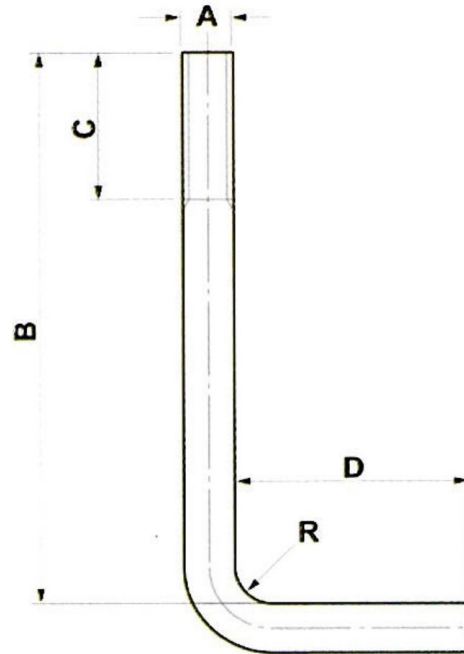
**CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8**

FINISH

**SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING**

**NON STANDARDS
MADE TO SUIT
CUSTOMER
REQUIREMENTS
M12 - M100**

L BOLTS



A	D	B	C	R
mm	mm	mm	mm	mm
M12	48	124	110	30
M16	84	192	115	40
M20	100	225	120	50
M24	199	428	125	50
M30	250	510	130	75
M36	300	645	150	75

SIZES UP TO M100 AND 3000MM LENGTHS - DIMENSIONS TO CUSTOMER REQUIREMENTS

NON STANDARDS MADE TO SUIT CUSTOMER REQUIREMENTS

MATERIAL

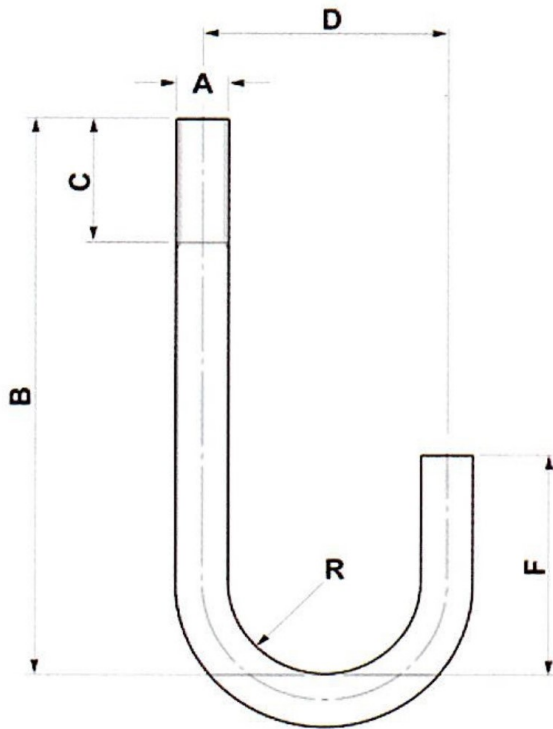
CARBON STEELS
 STAINLESS STEELS
 ALLOY STEELS
 B7, 4.6, 5.6, 8.8

FINISH

SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING



J BOLTS



A	B	C	D	F	R
mm	mm	mm	mm	mm	mm
M12	124	110	72	66	30
M16	167	115	96	88	40
M20	225	120	120	110	50
M24	428	125	124	123	50
M30	472	130	180	135	75
M36	640	150	186	183	75

SIZES UP TO M100 AND 3000MM LENGTHS - DIMENSIONS TO CUSTOMER REQUIREMENTS

MATERIAL

CARBON STEELS
 STAINLESS STEELS
 ALLOY STEELS
 B7, 4.6, 5.6, 8.8

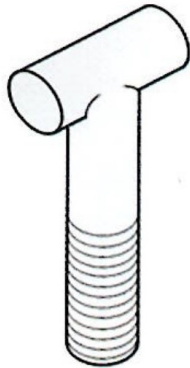
FINISH

SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING

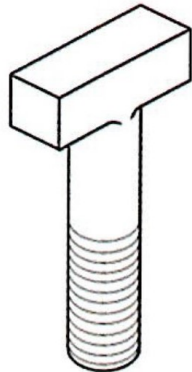
**NON STANDARDS MADE
 TO SUIT CUSTOMER
 REQUIREMENTS
 M12 - M100
 LENGTHS UP TO 3000MM**

EXAMPLES OF SPECIAL BOLTS

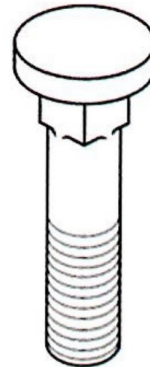
SIZES UP TO M100



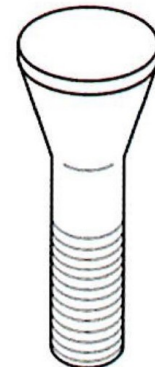
**TEE BOLT
ROUND HEAD**



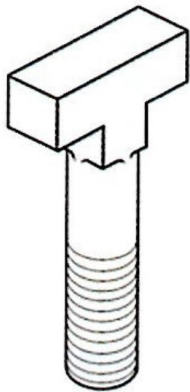
**TEE BOLT
SQUARE HEAD**



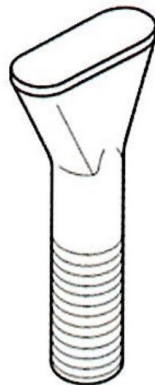
**CHEESE HEAD
SQUARE BOLT**



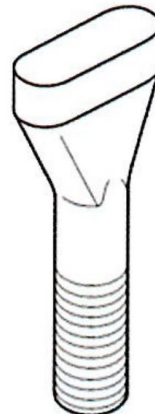
**ROUND
TAPERED BOLT**



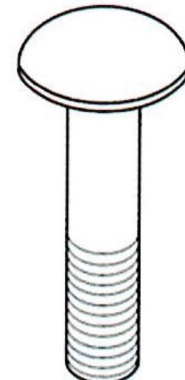
**TEE SQUARE
BOLT**



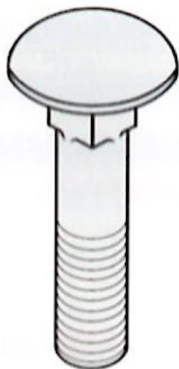
**TAPERED OVAL
BOLT**



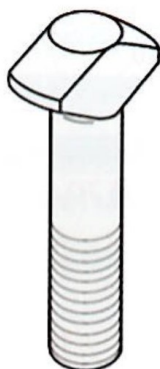
**RAISED TAPERED
OVAL BOLT**



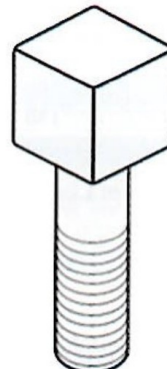
**CUP HEADED
BOLT**



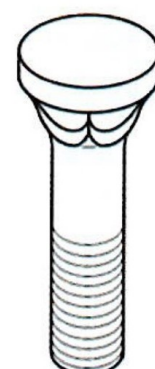
**CUP SQUARE
BOLT**



**SPILL PLATE
BOLT**



**HEAVY DUTY
SQUARE BOLT**



**COUNTERSUNK
SQUARE BOLT**

MATERIAL

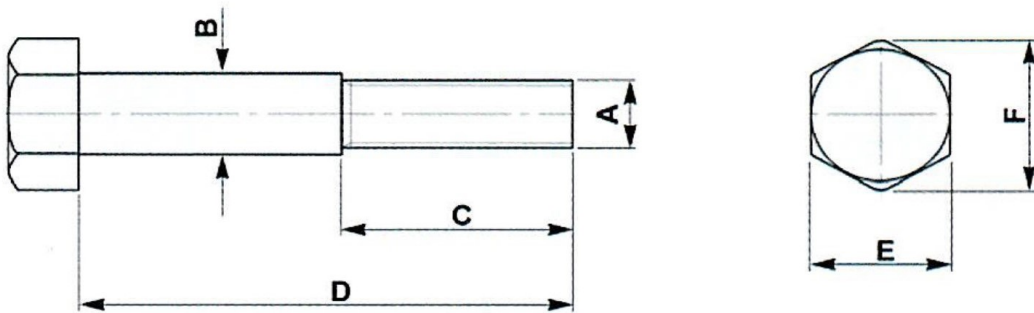
**CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8**

FINISH

**SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING**

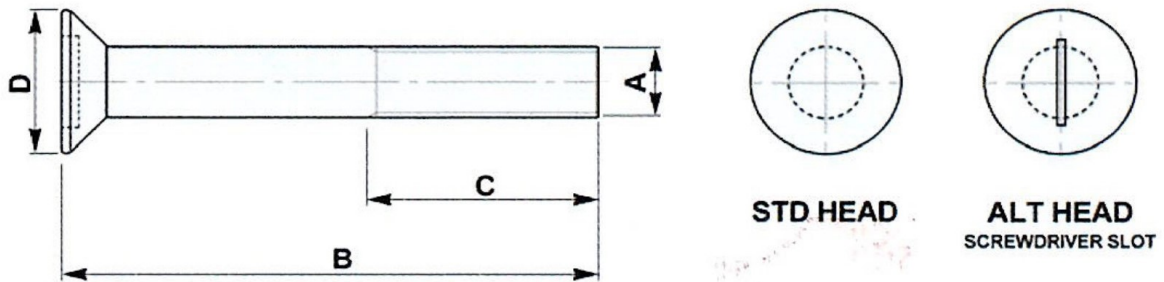
**NON STANDARDS
MANUFACTURED TO SUIT
CUSTOMER REQUIREMENTS**

SHOULDER BOLTS



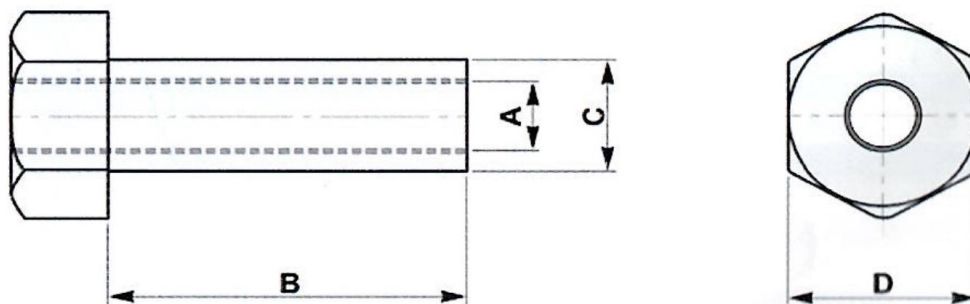
(A) M6 - M48 THREAD DIAMETER

COUNTERSUNK BOLTS



(A) M6 - M48 THREAD DIAMETER

EXTENSION BOLTS



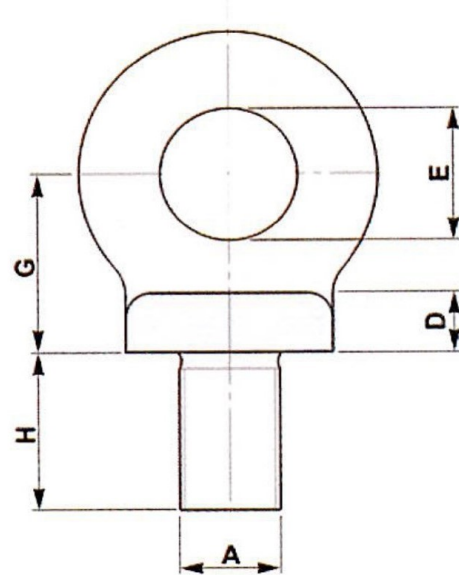
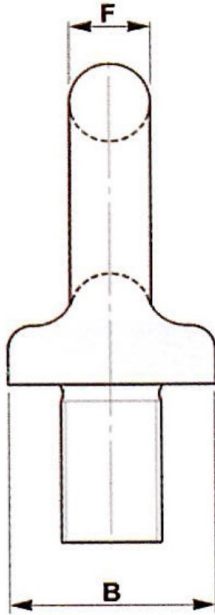
(A) M6 - M48 THREAD DIAMETER

MATERIAL
 CARBON STEELS
 STAINLESS STEELS
 ALLOY STEELS
 B7, 4.6, 5.6, 8.8

FINISH
 SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING

NON STANDARDS
 MANUFACTURED TO SUIT
 CUSTOMER REQUIREMENTS

COLLARED EYEBOLTS - IMPERIAL



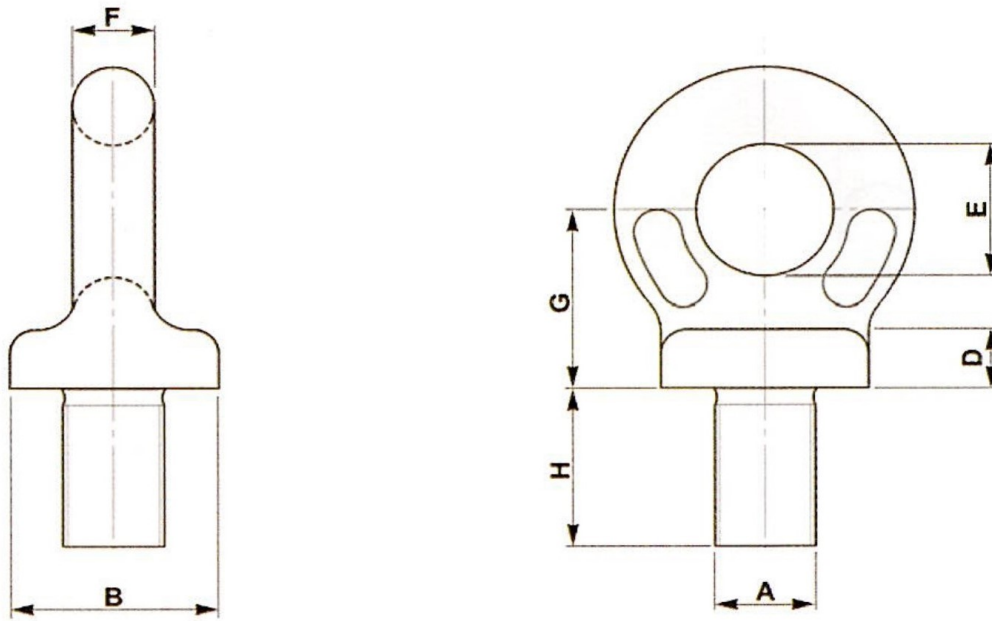
A	B	D	E	F	G	H	SWL		Weight Each
							TONNES	CWT	kgs
3/8	21	7	14	9	19	17	0	5	0.1
1/2	28	10	19	11	25	22	0	10	0.1
5/8	36	12	24	14	32	28	0	18	0.3
3/4	43	14	28	17	38	33	1	8	0.5
7/8	50	17	33	20	44	39	2	0	0.6
1	57	19	38	22	51	44	2	15	1.1
1. 1/8	64	21	42	25	57	50	3	10	1.6
1. 1/4	71	24	48	28	64	55	4	10	2.1
1. 3/8	85	28	57	33	76	67	5	10	3.6
1. 1/2	85	28	57	33	76	67	6	10	3.6
1. 3/4	101	33	67	39	89	77	9	0	5.6
2	115	38	76	44	102	89	12	0	9.1
2. 1/4	128	42	85	50	115	101	15	0	15.0
2. 1/2	143	48	95	55	127	111	20	0	17.7
3	172	57	115	67	152	133	30	0	30.4

MATERIAL
 STAINLESS STEELS
 ALLOY STEELS

FINISH
 SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING

**SWL IS SHOWN FOR
 VERTICAL LIFT**
**LONGER SHANK AVAILABLE
 UPON REQUEST**

COLLARED EYEBOLTS - METRIC



A	B	D	E	F	G	H	SWL 1968	SWL 1984	Weight Each
mm	mm	mm	mm	mm	mm	mm	tonnes	tonnes	kgs
M8	22	7	15	9	20	18	0.15	---	0.06
M10	22	7	15	9	20	18	0.25	---	0.07
M12	22	7	15	9	20	18	0.32	0.40	0.07
M14	29	10	20	12	26	23	0.50	---	0.15
M16	29	10	20	12	26	23	0.63	0.80	0.16
M18	36	12	24	14	32	28	1.00	---	0.28
M20	40	14	27	16	36	32	1.25	1.60	0.44
M22	45	15	30	18	40	35	1.60	---	0.56
M24	52	17	35	21	46	40	2.00	2.50	0.84
M27	58	20	39	23	52	46	2.50	---	1.14
M30	65	22	44	26	58	51	3.20	4.00	1.66
M33	72	24	48	29	64	56	4.00	---	2.24
M36	81	27	54	32	72	63	5.00	6.30	3.17
M39	90	30	60	36	80	70	6.30	---	3.92
M42	90	30	60	36	80	70	7.00	8.00	3.92
M45	101	34	68	40	90	79	8.00	---	6.00
M48	101	34	68	40	90	79	9.00	10.00	6.00
M52	115	38	76	46	102	89	10.00	12.50	9.00
M56	128	43	86	51	114	100	12.50	16.00	13.00
M64	144	48	96	58	128	112	16.00	20.00	17.50
M70	172	54	108	65	144	126	20.00	---	31.00
M72	172	54	108	65	144	126	22.00	25.00	31.00
M74	172	54	108	65	144	126	25.00	---	31.00

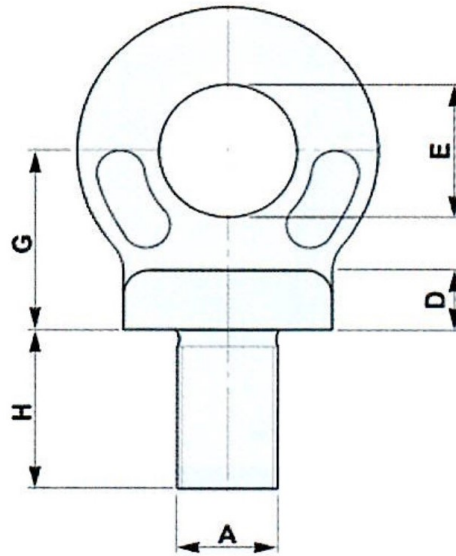
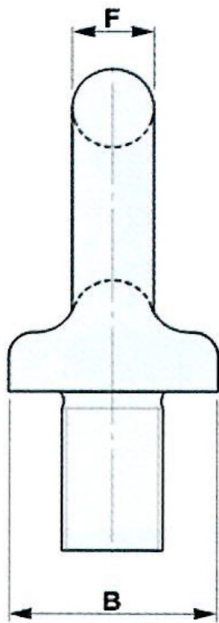
MATERIAL
STAINLESS STEELS
ALLOY STEELS

FINISH
SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING

**SWL IS SHOWN FOR
VERTICAL LIFT**

**LONGER SHANK AVAILABLE
UPON REQUEST**

COLLARED EYEBOLTS - IMPERIAL



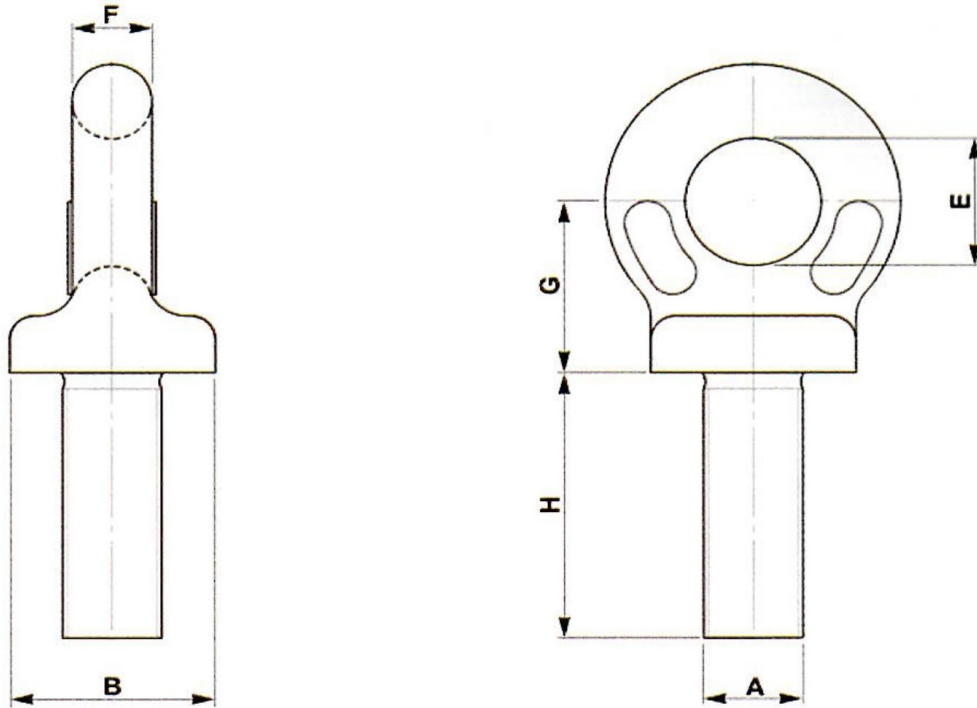
A	B	D	E	F	G	H	SWL	Weight Each
mm	mm	mm	mm	mm	mm	mm	tonnes	kgs
3/4	22	7	15	9	20	18	0.25	0.08
1/2	29	10	20	12	26	23	0.50	0.14
5/8	36	12	24	14	32	28	0.90	0.38
3/4	45	15	30	18	40	35	1.40	0.60
7/8	52	17	35	21	46	40	2.00	0.78
1	58	20	39	23	52	46	2.75	1.67
1. 1/8	65	22	44	26	58	51	3.50	1.78
1. 1/4	72	24	48	29	64	56	4.50	2.24
1. 1/2	86	29	57	33	76	67	6.50	3.17
1. 3/4	101	34	68	40	90	79	9.00	6.00
2	115	38	76	46	102	89	12.00	9.00
2. 1/4	128	43	86	51	114	100	15.00	15.00
2. 1/2	144	48	96	58	128	112	20.00	18.20
3	172	57	114	67	153	133	30.00	30.40

MATERIAL
 STAINLESS STEELS
 ALLOY STEELS

FINISH
 SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING

**SWL IS SHOWN FOR
 VERTICAL LIFT**
**LONGER SHANK AVAILABLE
 UPON REQUEST**

LONG SHANK COLLARED EYEBOLTS - METRIC



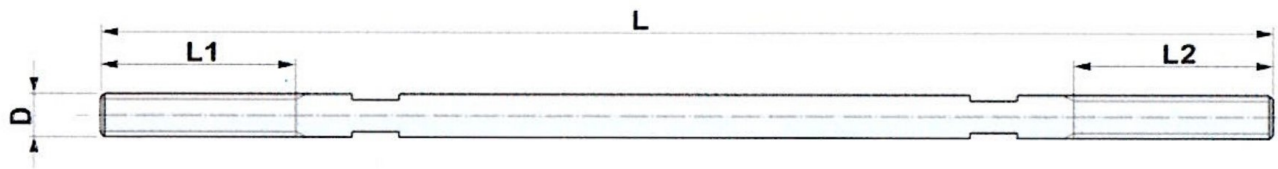
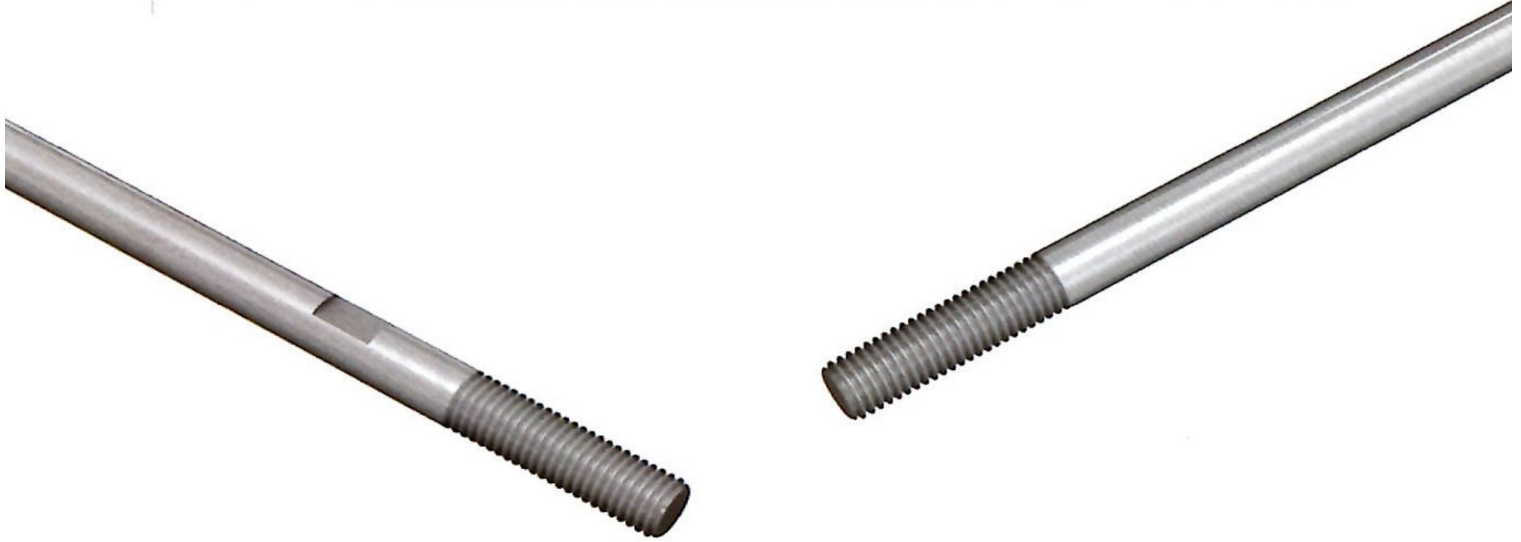
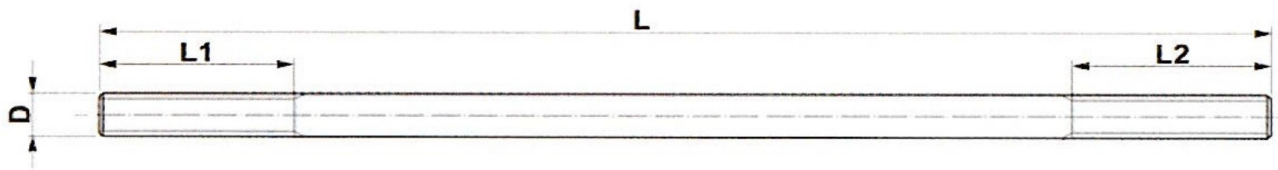
A	B	E	F	G	H	SWL	Weight Each
mm	mm	mm	mm	mm	mm	tonnes	kgs
M10	22	15	9	20	178	0.25	0.2
M12	28	19	11	25	178	0.40	0.2
M14	36	24	14	32	178	0.50	0.5
M16	36	24	14	32	178	0.80	0.5
M18	43	29	17	38	178	1.00	0.8
M20	43	29	17	38	178	1.60	0.8
M22	50	33	20	44	178	1.60	1.0
M24	57	38	22	51	178	2.50	1.5
M30	71	48	28	63	178	4.00	2.9

MATERIAL
 STAINLESS STEELS
 ALLOY STEELS

FINISH
 SELF COLOUR
 GALVANISED
 ELECTROPLATED
 PTFE COATING

**SWL IS SHOWN FOR
 VERTICAL LIFT**

TIE BARS



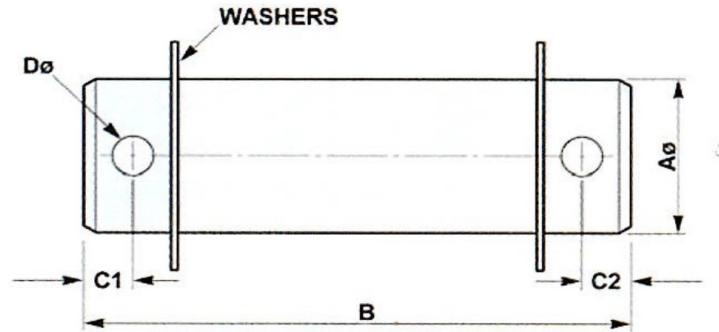
THREADS M8 - M100

BAR LENGTHS UP TO 6 METRES

MADE TO SUIT CUSTOMER REQUIREMENTS

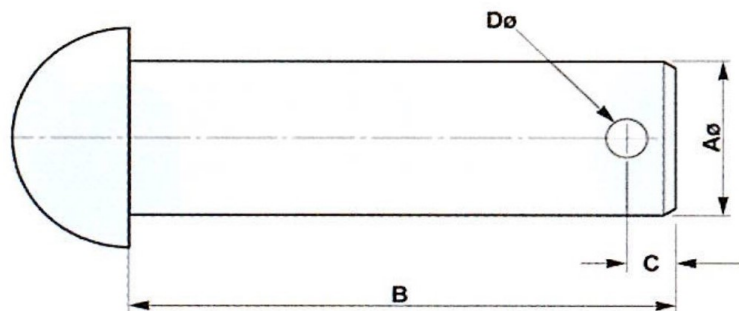


PIVOT PINS



6MM - 100MM DIA SHANK

DOME HEAD PINS



6MM - 100MM DIA SHANK

MATERIAL

CARBON STEELS
STAINLESS STEELS
ALLOY STEELS
B7, 4.6, 5.6, 8.8

FINISH

SELF COLOUR
GALVANISED
ELECTROPLATED
PTFE COATING

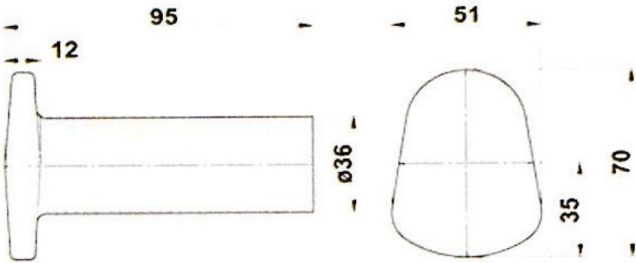
**TO SUIT CUSTOMER
REQUIREMENTS**

**OTHER VARIANTS ON
REQUEST**

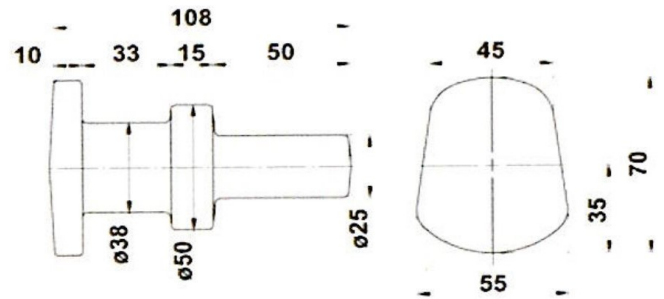
SKIP LUGS

All dimensions in millimetres unless otherwise stated.

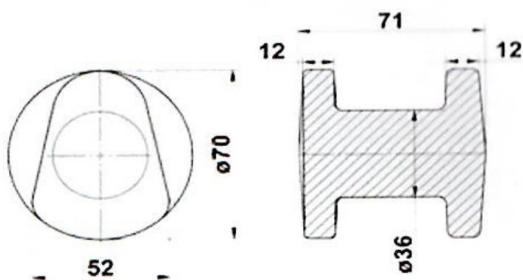
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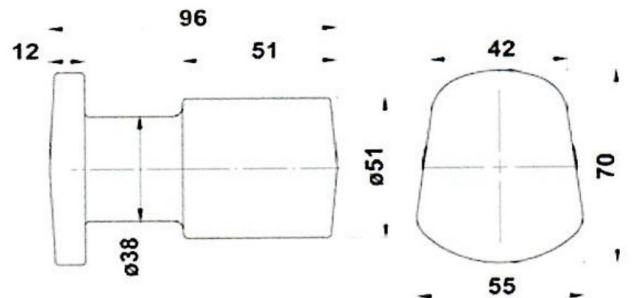
SKIPLUG/REF/BFD2658



SKIPLUG/REF/BFD5045



SKIPLUG



MECHANICAL PROPERTIES OF STEEL BOLTS & SCREWS

TABLE 1 MECHANICAL OR PHYSICAL PROPERTY		PROPERTY CLASS									
		4.6	4.8	5.6	5.8	6.8	8.8		9.8	10.9	12.9
							$d \leq 16\text{mm}^a$	$d > 16\text{mm}^b$	$d \leq 16\text{mm}$		
Tensile strength, R_m , MPa	nom. ^c	400		500		600	800		900	1000	1200
	min.	400	420	500	520	600	800	830	900	1040	1220
Lower yield strength, R_{eL}^d , MPa	nom. ^c	240	---	300	---	---	---	---	---	---	---
	min.	240	---	300	---	---	---	---	---	---	---
Stress at 0,2 % non-proportional elongation, $R_{p0,2}$, MPa	nom. ^c	---	---	---	---	---	640	640	720	900	1080
	min.	---	---	---	---	---	640	660	720	940	1100
Stress at 0,0048d non-proportional elongation for full-size fasteners, R_{pf} , MPa	nom. ^c	---	320	---	400	480	---	---	---	---	---
	min.	---	340 ^e	---	420 ^e	480 ^e	---	---	---	---	---
Stress under proof load, S_p^f , MPa	nom.	225	310	280	380	440	580	600	650	830	970
Proof strength ratio	$S_{p, \text{nom}} / R_{eL, \text{min}}$ or $S_{p, \text{nom}} / R_{p0,2, \text{min}}$ or $S_{p, \text{nom}} / R_{pf, \text{min}}$	0,94	0,91	0,93	0,90	0,92	0,91	0,91	0,90	0,88	0,88
Percentage elongation after fracture for machined test pieces, A , %	min.	22	---	20	---	---	12	12	10	9	8
Percentage reduction of area after fracture for machined test pieces, Z , %	min.			---			52		48	48	44
Elongation after fracture for full-size fasteners, A_r (see also Annex C)	min.	---	0,24	---	0,22	0,20	---	---	---	---	---
Head soundness							No fracture				
Vickers hardness, HV $F \geq 98 \text{ N}$	min.	120	130	155	160	190	250	255	290	320	385
	max.			220 ^g		250	320	335	360	380	435
Brinell hardness, HBW $F = 30 D^2$	min.	114	124	147	152	181	245	250	286	316	380
	max.			209 ^g		238	316	331	355	375	429
Rockwell hardness, HRB	min.	67	71	79	82	89			---		
	max.			95,0 ^g		99,5			---		
Rockwell hardness, HRC	min.			---			22	23	28	32	39
	max.			---			32	34	37	39	44
Surface hardness, HV 0,3	max.			---			---	---		390	435
Non-carburization, HV 0,3	max.			---				h		h	h
Height of non-decarburized thread zone, E , mm	min.			---				$\frac{1}{2} H_1$		$\frac{2}{3} H_1$	$\frac{3}{4} H_1$
Depth of complete decarburization in the thread, G , mm	max.			---					0,015		
Reduction of hardness after retempering, HV	max			---					20		
Breaking torque, M_b , Nm	min.										In accordance with ISO 898-7
Impact strength, K_v ^h , J	min.	---		27	---		27	27	27	27	k
Surface integrity in accordance with											ISO 6157 - 1 ⁱ ISO 6157-3

(a) - Values do not apply to structural bolting. (b) - For structural bolting $d \geq M12$. (c) - Nominal values are specified only for the purpose of the designation system for property classes. Refer to clause 5 in the official standard. (d) - In cases where the lower yield strength R_{eL} , cannot be determined, it is permissible to measure the stress at 0,2% non-proportional elongation $R_{p0,2}$. (e) - For the property classes 4.8, 5.8 and 6.8, the values for R_{pf} min are under investigation. The values at the time of publication of this part of ISO 898 are given for calculation of the proof stress ratio only. They are not test values. (f) - Proof loads are specified in Table 3 (page 38) and 7 in the official standard. (g) - Hardness determined at the end of a fastener shall be 250 HV, 238 HB or 99,5 HRB maximum. (h) - Surface hardness shall not be more than 30 Vickers points above the measured base metal hardness of the fastener when the determination of both surface hardness and base metal hardness are carried out with HV 0,3. See 9.11 in official standard. (i) - Values are determined at a test temperature of -20°C . See 9.14 in official standard. (j) - Applies to $d \geq 16\text{mm}$. (k) - Value for K_v is under investigation. (l) - Instead of ISO 6157-1, ISO 6157-3 may apply by agreement between the manufacturer and the purchaser.

ULTIMATE TENSILE & PROOF LOADS - METRIC COARSE

TABLE 2
MINIMUM ULTIMATE TENSILE LOADS - ISO METRIC COARSE PITCH THREAD

Thread ^a <i>d</i>	Nomial Stress Area <i>A_{s,nom}</i> ^b mm ²	PROPERTY CLASS								
		4.6	4.8	5.6	5.8	6.8	8.8	9.8	10.9	12.9
		MINIMUM ULTIMATE TENSILE LOAD, $F_{m,min}$ ($A_{s,nom} \times R_{m,min}$), N								
M3	5,03	2 010	2 110	2 510	2 620	3 020	4 020	4 530	5 230	6 140
M3,5	6,78	2 710	2 850	3 390	3 530	4 070	5 420	6100	7 050	8 270
M4	8,78	3 510	3 690	4 390	4 570	5 270	7 020	7 900	9 130	10 700
M5	14,2	5 680	5 960	7 100	7 380	8 520	11 350	12 800	14 800	17 300
M6	20,1	8 040	8 440	10 000	10 400	12 100	16 100	18 100	20 900	24 500
M7	28,9	11 600	12 100	14 400	15 000	17 300	23 100	26 000	30 100	35 300
M8	36,6	14 600 ^c	15 400	18 300 ^c	19 000	22 000	29 200 ^c	32 900	38 100 ^c	44 600
M10	58	23 200 ^c	24 000	29 000 ^c	30 200	34 800	46 400 ^c	52 200	60 300 ^c	70 800
M12	84,3	33 700	35 400	42 200	43 800	50 600	67 400 ^d	75 900	87 700	103 000
M14	115	46 000	48 300	57 500	59 800	69 000	92 000 ^d	104 000	120 000	140 000
M16	157	62 800	65 900	78 500	81 600	94 000	125 000 ^d	141 000	163 000	192 000
M18	192	76 800	80 600	96 000	99 800	115 000	159 000	--	200 000	234 000
M20	245	98 000	103 000	122 000	127 000	147 000	203 000	--	255 000	299 000
M22	303	121 000	127 000	152 000	158 000	182 000	252 000	--	315 000	370 000
M24	353	141 000	148 000	176 000	184 000	212 000	293 000	--	367 000	431 000
M27	459	184 000	193 000	230 000	239 000	275 000	381 000	--	477 000	560 000
M30	561	224 000	236 000	280 000	292 000	337 000	466 000	--	583 000	684 000
M33	694	278 000	292 000	347 000	361 000	416 000	576 000	--	722 000	847 000
M36	817	327 000	343 000	408 000	425 000	490 000	678 000	--	850 000	997 000
M39	976	390 000	410 000	488 000	508 000	586 000	810 000	--	1 020 000	1 200 000

(a) - Where no thread pitch is indicated in a thread designation, coarse pitch is specified. (b) - To calculate $A_{s,nom}$, refer to 9.1.6.1 in the official standard. (c) - For fasteners with thread tolerance 6az in accordance with ISO 965-4 subject to hot dip galvanising, reduced values in accordance with ISO 10684:2004, Annex A, apply. (d) - For structural bolting 70 000 N (for M12), 95 500 N (for M14) and 130 000 N (for M16).

TABLE 3
PROOF LOADS - ISO METRIC COARSE PITCH THREAD

Thread ^a <i>d</i>	Nomial Stress Area <i>A_{s,nom}</i> ^b mm ²	PROPERTY CLASS								
		4.6	4.8	5.6	5.8	6.8	8.8	9.8	10.9	12.9
		MINIMUM ULTIMATE TENSILE LOAD, F_p ($A_{s,nom} \times S_{p,nom}$), N								
M3	5,03	1 130	1 560	1 410	1 910	2 210	2 920	3 270	4 180	4 880
M3,5	6,78	1 530	2 100	1 900	2 580	2 980	3 940	4 410	5 630	6 580
M4	8,78	1 980	2 720	2 460	3 340	3 860	5 100	5 710	7 290	8 520
M5	14,2	3 200	4 400	3 980	5 400	6 250	8 230	9 230	11 800	13 800
M6	20,1	4 520	6 230	5 630	7 640	8 840	11 600	13 100	16 700	19 500
M7	28,9	6 500	8 960	8 090	11 000	12 700	16 800	18 800	24 000	28 000
M8	36,6	8 240 ^c	11 400	10 200 ^c	13 900	16 100	21 200 ^c	23 800	30 400 ^c	35 500
M10	58	13 000 ^c	18 000	16 200 ^c	22 000	25 500	33 700 ^c	37 700	48 100 ^c	56 300
M12	84,3	19 000	26 100	23 600	32 000	37 100	48 900 ^d	54 800	70 000	81 800
M14	115	25 900	35 600	32 200	43 700	50 600	66 700 ^d	74 800	95 500	112 000
M16	157	35 300	48 700	44 000	59 700	69 100	91 000 ^d	102 000	130 000	152 000
M18	192	43 200	59 500	53 800	73 000	84 500	115 000	--	159 000	186 000
M20	245	55 100	76 000	68 600	93 100	108 000	147 000	--	203 000	238 000
M22	303	68 200	93 900	84 800	115 000	133 000	182 000	--	252 000	294 000
M24	353	79 400	109 000	98 800	134 000	155 000	212 000	--	293 000	342 000
M27	459	103 000	142 000	128 000	174 000	202 000	275 000	--	381 000	445 000
M30	561	126 000	174 000	157 000	213 000	247 000	337 000	--	466 000	544 000
M33	694	156 000	215 000	194 000	264 000	305 000	416 000	--	576 000	673 000
M36	817	184 000	253 000	229 000	310 000	359 000	490 000	--	678 000	792 000
M39	976	220 000	273 000	273 000	371 000	429 000	586 000	--	810 000	947 000

(a) - Where no thread pitch is indicated in a thread designation, coarse pitch is specified. (b) - To calculate $A_{s,nom}$, refer to 9.1.6.1 in the official standard. (c) - For fasteners with thread tolerance 6az in accordance with ISO 965-4 subject to hot dip galvanising, reduced values in accordance with ISO 10684:2004, Annex A, apply. (d) - For structural bolting 50 700 N (for M12), 68 800 N (for M14) and 94 500 N (for M16).

THREAD COMPARISONS

METRIC COARSE THREAD TO BS3643				IMPERIAL THREADS THREADS PER INCH			
PITCH	MM	INCHES	BSW	UNC	BSF	UNF	
1.00	M6	6.4	1/4	20	20	26	28
		7.9	5/16	18	18	22	24
1.25	M8	9.5	3/8	16	16	20	24
		11.1	7/16	14	14	18	20
1.50	M10	12.7	1/2	12	13	16	20
		14.2	9/16	12	12	16	18
1.75	M12	15.8	5/8	11	11	14	18
		19.0	3/4	10	10	12	16
2.00	M14	22.2	7/8	9	9	11	14
		25.4	1	8	8	10	12
2.00	M16	28.5	1. 1/8	7	7	9	12
		31.7	1. 1/4	7	7	9	12
2.50	M20	34.9	1. 3/8	6	6	8	12
		38.1	1. 1/2	6	6	8	12
2.50	M22	41.2	1. 5/8	5	---	8	---
		44.4	1. 3/4	5	5	7	---
3.00	M24	44.4	1. 3/4	5	5	7	---
		50.8	2	4. 1/2	4. 1/2	7	---
3.00	M27	53.9	2. 1/8	4. 1/2	---	---	---
		57.1	2. 1/4	4	4. 1/2	6	---
3.50	M30	60.3	2. 3/8	4	---	---	---
		63.5	2. 1/2	4	4	6	---
4.00	M36	69.8	2. 3/4	3. 1/2	4	6	---
		76.2	3	3. 1/2	4	5	---
4.00	M39	82.5	3. 1/4	3. 1/4	4	5	---
		88.9	3. 1/2	3. 1/4	4	4. 1/2	---
4.50	M42	95.2	3. 3/4	3	4	4. 1/2	---
		101.6	4	3	4	4. 1/2	---
4.50	M45						
5.00	M48						
5.00	M52						
5.50	M56						
6.00	M64						
6.00	M72						
6.00	M80						
6.00	M90						
6.00	M100						

VALUES AND EQUIVALENT ARE APPROXIMATE

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WEIGHT CHARTS FOR STEEL BAR

ROUND BAR



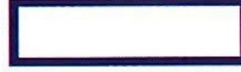
DIA OF BAR MM	KGS PER METER
6	0.22
8	0.40
9	0.50
10	0.62
11	0.75
12	0.89
13	1.04
14	1.21
15	1.39
16	1.58
18	2.00
19	2.23
20	2.47
22	2.98
24	3.55
25	3.85
27	4.49
28	4.83
30	5.55
32	6.31
33	6.71
35	7.55
36	7.99
38	8.90
40	9.86
42	10.87
45	12.48
48	14.20
50	15.41
52	16.67
55	18.65
56	19.33
58	20.74
60	22.19
62	23.70
64	25.25
65	26.05
68	28.51
70	30.21
72	31.96
75	34.68
80	39.45
85	44.54
90	49.93
95	55.64
100	61.65

SQUARE BAR



SIZE MM	KGS PER METER
13	1.33
14	1.54
15	1.77
16	2.01
18	2.54
19	2.83
20	3.14
22	3.80
25	4.91
28	6.15
30	7.06
32	8.04
35	9.62
38	11.33
40	12.56
45	15.89
50	19.62
57	25.50
65	33.16
70	38.46
75	44.15
83	54.07
90	63.58
95	70.84
102	81.66
110	94.97
115	103.80
130	132.65
140	153.84
150	176.60
160	200.93
165	213.69
170	226.84
180	254.31
190	283.35
200	313.96
220	379.89
230	415.21
240	452.10
255	510.38

FLAT BAR



SIZE MM	KGS PER METER	SIZE MM	KGS PER METER
20 X 5	0.79	80 X 5	3.14
20 X 10	1.57	80 X 10	6.28
20 X 15	2.36	80 X 15	9.42
25 X 5	0.98	80 X 20	12.60
25 X 10	1.96	80 X 25	15.70
25 X 15	2.94	90 X 5	3.53
30 X 5	1.12	90 X 10	7.07
30 X 10	2.36	90 X 15	10.60
30 X 15	3.53	90 X 20	14.10
35 X 5	1.37	90 X 25	17.70
35 X 10	2.75	100 X 5	3.93
35 X 15	4.12	100 X 10	7.85
40 X 5	1.57	100 X 15	11.80
40 X 10	3.14	100 X 20	15.70
40 X 15	4.71	100 X 25	19.60
40 X 20	6.28	100 X 40	31.40
40 X 25	7.85	120 X 10	9.42
45 X 5	1.77	120 X 15	14.10
45 X 10	3.53	120 X 20	18.80
45 X 15	5.30	120 X 25	23.60
45 X 20	7.07	120 X 40	37.70
45 X 25	8.83	130 X 10	10.20
50 X 5	1.96	130 X 15	15.30
50 X 10	3.93	130 X 20	20.40
50 X 15	5.89	130 X 25	25.50
50 X 20	7.85	130 X 40	40.80
50 X 25	9.81	140 X 10	11.00
60 X 5	2.36	140 X 15	16.50
60 X 10	4.71	140 X 20	22.00
60 X 15	7.07	140 X 25	27.50
60 X 20	9.42	140 X 40	44.00
60 X 25	11.80	150 X 10	11.80
65 X 5	2.55	150 X 15	17.70
65 X 10	5.10	150 X 20	23.60
65 X 15	7.65	150 X 25	29.40
65 X 20	10.20	150 X 40	47.10
65 X 25	12.80	160 X 10	12.60
70 X 5	2.75	160 X 15	18.80
70 X 10	5.50	160 X 20	25.10
70 X 15	8.24	160 X 25	31.40
70 X 20	11.00	160 X 40	50.20
70 X 25	13.70	160 X 50	62.80
75 X 5	2.94		
75 X 10	5.89		
75 X 15	8.83		
75 X 20	11.80		
75 X 25	14.70		

HEXAGON BAR



SIZE AF MM	KGS PER METER
10	0.68
11	0.82
12	0.98
13	1.15
14	1.33
15	1.53
16	1.74
17	1.96
18	2.20
19	2.45
20	2.72
22	3.29
24	3.92
25	4.25
27	4.96
30	6.12
32	9.96
36	8.81
40	10.90
41	11.40
46	14.40
48	15.70
50	17.00
52	18.40
55	20.60
60	24.50
65	28.70
70	33.30
76	39.30

VALUES AND EQUIVALENT ARE APPROXIMATE

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STEEL SPECIFICATION COMPARISONS

BS970 : 1970/72 BS970 : 1983	BS970 : 1955 EN SERIES	BS970 : 1970/72 BS970 : 1983	BS970 : 1955 EN SERIES	BS970 : 1970/72 BS970 : 1983	BS970 : 1955 EN SERIES
040A04	2A, 2A/1, 2B	250A53	45	605A37	16C
040A10	2A, 2A/1, 2B	250A58	45A	605M30	16D
040A12	2A, 2A/1, 2B	250A61	45B	605M36	16
040A22	2C, 2D	302S25	5BA	606M36	16M
045M10	32A	303S21	58M	608M38	17
050A20	2C, 2D	303S41	58M	635M15	351
055M15	2	304S15	58E	637M17	352
060A62	43D	315S16	58H	640A35	111A
060A96	44, 44B	316S16	58J	640M40	111
070A72	42	320S17	58J	653M31	23
070A78	42	321S12	58B, 58C	655M13	36A
070M20	3A, 3C	321S20	58B, 58C	659M15	39A
070M55	9	325S21	58M	665A22	35A
080M15	32C	331S40	54	665A24	35B
080A27	5A	331S42	54A	665M17	34
080A30	5B	347S17	54F, 58G	665M23	35
080A32	5C	401S45	52	708A37	19B
080A35	8A	410S21	56A	708A42	19C
080A37	8B	416S21	56AM	708M40	19A
080A40	8C	416S29	56BM	709M40	19
080A42	8D	416S37	56CM	722M24	40B
080A47	43B	416S41	56AM	735A50	47
080A52	43C	420S29	56B	785M19	13
080A67	43E	420S37	56C	805M17	361
080M15	32C	420S45	56D	805M20	362
080M30	5	430S17	60	805M25	363
080M40	8	431S29	57	815M17	353
080M50	43A	443S65	509	816M40	110
120M36	15B	503A37	12B	817M40	24
130M15	201	503A42	12C	820M17	354
150M19	14A, 14B	503M40	12	822M17	355
150M28	14A, 14B	523A14	206	826M31	25
150M36	15	526M60	11	826M40	26
210M15	32M	527A19	207	830M31	27
212A37	8BM	527A60	48	832M13	36C
212A42	8DM	530A30	18A	835M15	39B
212M36	8M	530A32	18B	835M30	30B
212M44	8M	530A36	18C	897M39	40C
214M15	202	530A40	18D	905M31	41A
216M36	15AM	530M40	18	905M39	41B
220M07	1A	534A99	31	945A40	100C
230M07	1A	535A99	31	945M38	100
240M07	1B	605A32	16B		

REFERENCE SYMBOLS FOR TENSILE STRENGTH RANGES OF HARDENED AND TEMPERED MATERIAL

the various tensile strength rates for the different specifications have been designated with the reference symbols P to Z.

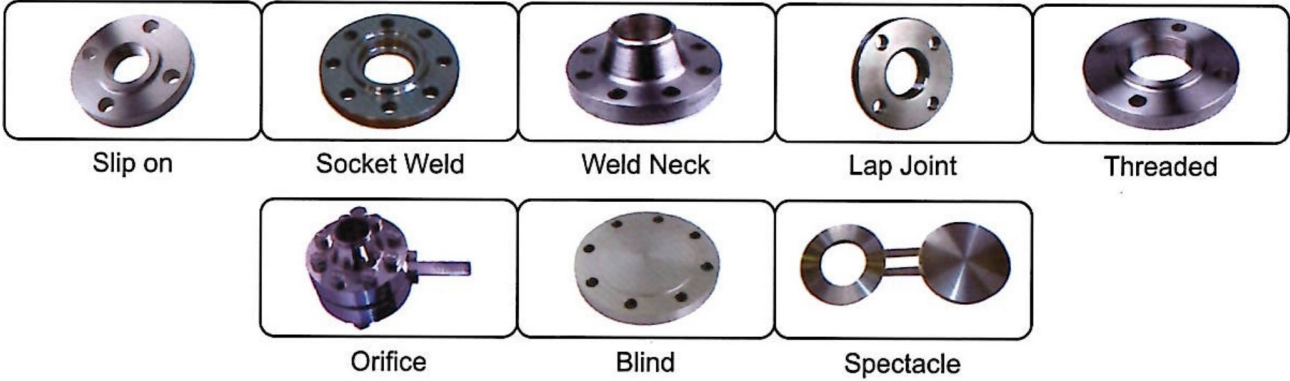
NOTE: Tensile strength is governed by ruling section of bar when being heat treated.

REFERENCE SYMBOL	TENSILE STRENGTH N/mm ²
P	550 - 700
Q	625 - 775
R	700 - 850
S	775 - 925
T	850 - 1000
U	925 - 1075

REFERENCE SYMBOL	TENSILE STRENGTH N/mm ²
V	1000 - 1150
W	1075 - 1225
X	1150 - 1300
Y	1225 - 1375
Z	1550 MIN

WE ALSO MANUFACTURE FLANGES CONFORMING TO INTERNATIONAL STANDARDS AND FABRICATION OF STRUCTURAL ROLLED, WELDED PIPE AND PIPE SPOOLING

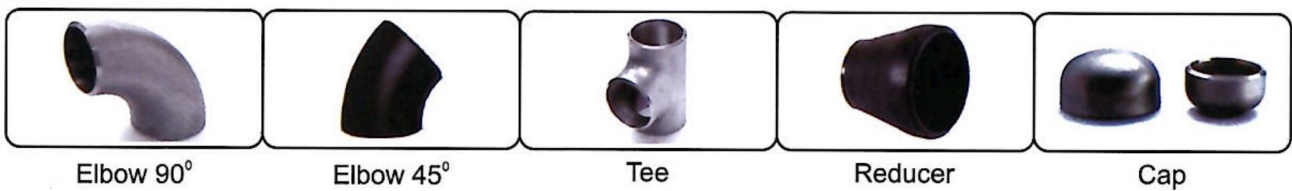
FLANGES



FITTINGS : THREADED & SOCKETWELD



FITTINGS : BUTTWELD



FABRICATION

