A. A. Barnes & Coy Pty Ltd

Consulting Engineers

41 Evans Court
Toorak Vic 3142

Tel: 03 9822 5889

ABN 16-004-919-340 aabarnes2@bigpond.com

TuffLift Imports P/L 20 Jun 17

Machinery description:

4 Post Hoist

Mark machinery:

Plant model, EE-6435V2(48L) 4.0 T

Rated capacity, 4.00 t

Engineer's Certification:

This machinery has been checked for compliance with:

AS 1418.1 - 2002	Cranes code
AS 1418.9 - 1996	Vehicle hoists
AS 3990 - 1993	Mechanical Equipment - Steelwork
Occupational Health & Safety Regulations 2007, Victoria	

From the information provided, this design adequately complies with the current codes & regulations as required by WorkSafe Victoria & is capable of safely & effectively carrying out the functions for which it was designed.

A copy of the calculations & drawings is attached.

Alex A.Barnes

ENGINEERS AUSTRALIA
Alex A Barnes
FIEAust CPEng NER
Chartered Professional Engineer
Membership No. 336698

4. Design Verifier's Statement (Design verifier must not have paricipated in the design)

Please complete the verifier's signature in blue ink and include original, signed copy in the submission.

Verifier details complete? Y N

Name: Alex A Barnes

Qualifications: FIEAust; CPEng NER

Employed by: A.A.Barnes & Coy P/L

Business Address: 41 Evans Ct Toorak Vic — Postcode: 3142

Postal Address: 41 Evans Ct Toorak Vic — Postcode: 3142

Telephone: 03 9822 5889 — Facsimile: 03 9822 5542 — Mobile:

Email: aabarnes2@bigpond.com

I hereby verify that the design portrayed on this registration has been produced in accordance with the record of published technical standards and/or engineering principles recorded by the designer.

Signature: [signature] — Date: 24/6/17

Print Name: Alex A Barnes

Engineers Australia

Alex A Barnes
FIEAust CPEng NER
Chartered Professional Engineer
Membership No: 336698

NOTE: The Code of Practice for Plant states that Design Verifiers should have acquired, through academic qualifications or design experience, the knowledge and skills to independently verify the tasks performed by the designer.

5. Attached Representational Drawings

Drawings? Y N

Title of Drawing	Drawing Number	Revision
General arrangement	EE-6435V2	
Platform	Csect02G	
Column	Column03AH	

NOTE: Any drawings submitted may be subject to Freedom of Information requests. Information relating to trade secrets or other matters of commercial or financial nature should be marked "TRADE SECRET".

6. Proposed Location of Plant (if known)

Location? Y N

Owner:

Address: — Postcode:

7. Company/Person Responsible for Importing Plant into or Supplying Plant within Victoria

Import company? Y N

Must be completed if Designer and Design Verifier are located overseas

Name: Tufflift Imports Pty Ltd

Telephone: 03 8375 3600 — Facsimile: 03 8353 2525 — Mobile: 0407 224 990

Address: 46 Saintly Drive, Truganina Vic 3029 — Postcode: 3058

Email: david@tufflift.com.au

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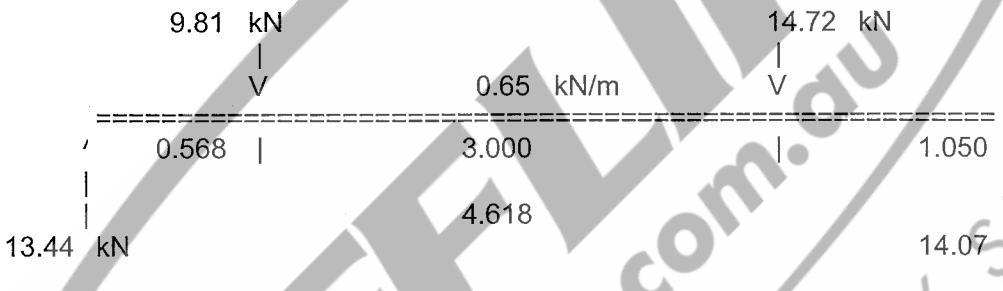
4 Post Hoist

Plant model = EE-6435V2(48L) 4.0 T

Ø1	=	1.10					
Ø2	=	1.25					
Lifted load	=	4.00	t	Design load	=	49.05	kN
Heavy axle ratio	=	60.00	%	Light axle ratio	=	40.00	%
				Heavy axle load	=	29.43	kN
				Light axle load	=	19.62	kN

Check platforms:



BM = 14.67 kNm

See drawing " Csect02G "

D	=	140.0	mm	D3	=	115.0	mm
D1	=	60.0	mm	D4	=	35.0	mm
D2	=	27.0	mm	D5	=	47.5	mm
B	=	675.0	mm	Beff	=	253.0	mm
				B3	=	605.0	mm
B1	=	27.0	mm	B4	=	14.5	mm
B2	=	50.0	mm	B5	=	25.0	mm
t	=	5.00	mm	Ri/T	=	1.50	
			Corners,	Ri	=	7.5	mm
Fy	=	250.00	MPa	Ro	=	12.5	mm
				Ac	=	78.54	mm^2
				yc	=	6.0	mm
				Ic	=	4.17	x10^3mm^4

Calculate properties about X--X axis:

	A	Aef	1st mt about top	Y	A x Y^2	2nd mt	Ix
B3, flat	3025	1265	3162	29.7	1.112	0.003	1.12
2 Corners	157	157	943	26.2	0.107	0.008	0.12
D3, flat	575	575	40250	37.8	0.823	0.634	1.46
D4, flat	175	175	5250	2.2	0.001	0.018	0.02
D5, flat	238	238	5641	8.4	0.017	0.045	0.06
B4, flat	73	73	9969	87.9	0.56	0.000	0.56
B5, flat	125	125	7188	7.9	0.008	0.000	0.01
2 Corners	157	157	8482	4.4	0.003	0.008	0.01
1 Corner	79	79	10524	84.4	0.560	0.004	0.56
	4603	2843	91408				3.91

Ytop = 32.2 mm

Plus twin RHS:

D = 120.0 mm

B = 50.0 mm

t = 5.0 mm

Corners,

d2 = 95.0 mm

b2 = 25.0 mm

Ro/t = 2.50

Ro = 12.5 mm

Ri = 7.5 mm

Ac = 79 mm^2

yc = 6.0 mm

Ic = 0.0042 x10^6mm^4

Calculate properties about X--X axis:

	Area	1st mt about top	Y	A x Y^2	2nd mt	Ix
B2 flat	125	313	57.5	0.41	0.000	0.41
2 corners	157	943	54.0	0.46	0.008	0.47
D2 flats	950	57000	0.0	0.00	0.714	0.71
2 corners	157	17907	54.0	0.46	0.008	0.47
B2 flat	125	14688	57.5	0.41	0.000	0.41
	1514	90850				2.474

Ytop = 60.0 mm

Ybot = 60.0 mm

Properties of combined section: (3)

DB = 155.0 mm

	Area	Aef	1st mt about top	Y	A x Y^2	2nd mt	Ix
Platform	4603	2843	91408	32.4	2.99	3.912	6.90
2 x RHS	3028	3028	287690	30.4	2.80	4.949	7.75
	7631	5871	379098				14.65

Ytop = 64.6 mm

Ybot = 90.4 mm

Ztop = 226.91 x10^3mm^3

Zbot = 162.03 x10^3mm^3

Ae = 5871 mm^2

Mass = 59.90 kg/m

Fy = 235.00 MPa

Fbc = 141.00 MPa

BM = 14.67 kNm

*** Fbc = 141.00 MPa

*** fc = 64.64 MPa

*** ft = 90.53 MPa

Beam O.K. in bending

Maximum allowable SHEAR stress:

Effective area = 2888 mm^2

d1/tw = 19.0

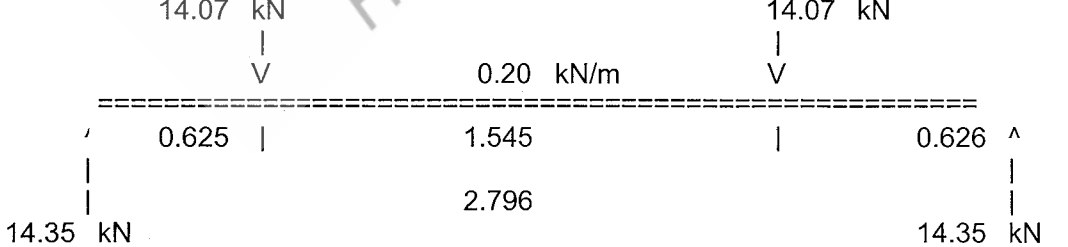
V = 14.07 kN

*** Fv = 86.95 MPa

*** fv = 4.87 MPa

Beam O.K. shear

Check cross beams: Per wheel, Design load = 14.07 kN



BM = 8.94 kNm

D	=	140.0	mm		d2	=	110.0	mm
B	=	80.0	mm		b2	=	50.0	mm
t	=	6.0	mm	(	Ro/t	=	2.50	
			Corners,	(	Ro	=	15.0	mm
				(	Ri	=	9.0	mm
				(	Ac	=	113	mm^2
				(	yc	=	7.2	mm
Fy	=	235.00	MPa	(	Ic	=	0.0087	x10^6mm^4

Calculate properties about X--X axis:

	Area	1st mt about top	Y	A x Y^2	2nd mt	Ix
B2 flat	300	900	67.0	1.35	0.001	1.35
2 corners	226	1629	62.8	0.89	0.017	0.91
D2 flats	1320	92400	-0.0	0.00	1.331	1.33
2 corners	226	30038	62.8	0.89	0.017	0.91
B2 flat	300	41100	67.0	1.35	0.001	1.35
	2372	166067				5.845

Ytop	=	70.0	mm
Ybot	=	70.0	mm
Zx	=	83.50	x10^3mm^3
A	=	2372	mm^2
Mass	=	18.62	kg/m

Calculate properties about Y--Y axis:

	Area	Moment about LHS	Y	A x Y^2	2nd mt	Iy
D2 flat	660	1980	37.0	0.90	0.002	0.91
2 corners	226	1629	32.8	0.24	0.017	0.26
B2 flats	600	24000	-0.0	0.00	0.125	0.13
2 corners	226	16467	32.8	0.24	0.017	0.26
D2 flat	660	50820	37	0.90	0.002	0.91
	2372	94896				2.457

				Ylhs	=	40.0 mm
				Yrhs	=	40.0 mm
				Zy	=	61.43 x10^3mm^3
				ry	=	32.2 mm
Maximum allowable BENDING stress:				Fb	=	155.10 MPa
	(			Fbc	=	Fy x 0.60
	(					
	(			Fbc	=	141.00 MPa
Compression,	(					
	(	*** OR ***		Fbc	=	163.53 MPa
	(					
	(	Maximum,		Fbc	=	163.53 MPa
				BM	=	8.94 kNm
Minimum of Fb & Fbc,			***	Fbc	=	155.10 MPa
			***	fc	=	107.02 MPa

Beam O.K. in bending

Maximum allowable SHEAR stress:			Effective area	=	1320.00 mm^2	
				d1/t	=	18.33
				V	=	14.35 kN
			***	Fv	=	86.95 MPa
			***	fv	=	10.87 MPa

Beam O.K. in shear

Check columns:	See drawing " Column03AH ":			Pa	=	14.35 kN
D	=	180.0 mm				
D1	=	25.0 mm		D2	=	165.0 mm
B	=	180.0 mm		D3	=	17.5 mm
B1	=	35.0 mm		B2	=	165.0 mm
T	=	3.0 mm		B3	=	20.0 mm
				Ri/T	=	1.50
			Corners,	Ri	=	4.5 mm
				Ro	=	7.5 mm
				Ac	=	28.27 mm^2
				ey	=	4.1 mm
				b/T	=	6.7

Calculate properties about X--X axis:

	A	Aef	1st mt about top	Y	A x Y^2	2nd mt	Ix
B2, flat	495	495	743	77.5	2.977	0.000	2.98
2 Corners	57	57	231.1	75.0	0.318	0.000	0.32
D2, flats	990	990	89100	11.0	0.119	2.246	2.36
D3, flats	105	105	17194	67.2	0.474	0.003	0.48
B3, flats	120	120	21420	99.5	1.187	0.000	1.19
4 Corners	113	113	19895	96.9	1.061	0.000	1.06
	1880	1880	148583				8.38

Ytop	=	79.0	mm
Ybot	=	101.0	mm
Ztop	=	106.07	x10^3mm^3
Zbot	=	83.06	x10^3mm^3
A	=	1880	mm^2
Ae	=	1880	mm^2
Mass	=	14.76	kg/m
rx	=	66.8	mm

Calculate properties about Y--Y axis:

	Aef	1st mt about LHS	Y	A x Y^2	2nd mt	Iy
B2, flat	495	44550	-0.0	0.000	1.123	1.12
L Corner	28	116	85.9	0.209	0.000	0.21
R Corner	28	4974	85.9	0.209	0.000	0.21
D2, flat L	495	743	88.5	3.877	0.000	3.88
D2, flat R	495	88358	88.5	3.877	0.000	3.88
B3 flat L	60	1050	72.5	0.315	0.002	0.32
B3 flat R	60	9750	72.5	0.315	0.002	0.32
L Corner L	28	116	85.9	0.209	0.000	0.21
L Corner R	28	874	50.9	0.073	0.000	0.07
R Corner L	28	4215	50.9	0.073	0.000	0.07
R Corner R	28	4974	85.9	0.209	0.000	0.21

						(7)
D3, flat L	53	1759	53.5	0.150	0.000	0.15
D3, flat R	53	7691	53.5	0.150	0.000	0.15
	1880	169168				10.79

YLHS = 90.0 mm

YRHS = 90.0 mm

Zy = 119.94 x10^3mm^3

Fy = 235.00 MPa

ry = 75.8 mm

Strut length X - X = 1830.0 mm

Length ratio X - X = 1.00

Effective length = 1830.0 mm

l/rx = 27.40

Length ratio Y - Y = 1.00

Effective length = 1830.0 mm

l/ry = 24.15

Design, l/r = 27.40

Maximum allowable compressive stress:

Euler critical stress, Foc = 2629.30 MPa

[Fy + (n+1)Foc]/2 = 1461.76

Pa = 14.35 kN

*** Fac = 137.60 MPa

*** fac = 7.63 MPa

Direct stress O.K.

Check column bending due to eccentrticity,

Beam Design to AS 3990

Lever arm = 90.0 mm

P = 14.35 kN

BM = 1.29 kNm

Fbc = 141.00 MPa

Calculate bending stress:

BM = 1.29 kNm

*** Fbc = 141.00 MPa

*** fc = 15.55 MPa

*** ft = 12.18 MPa

Bending stress O.K.

Check combined stress: fac/Fac = 0.06 (8)

Formula 8.3.1 (a)(2) applies

fb/Fb = 0.09

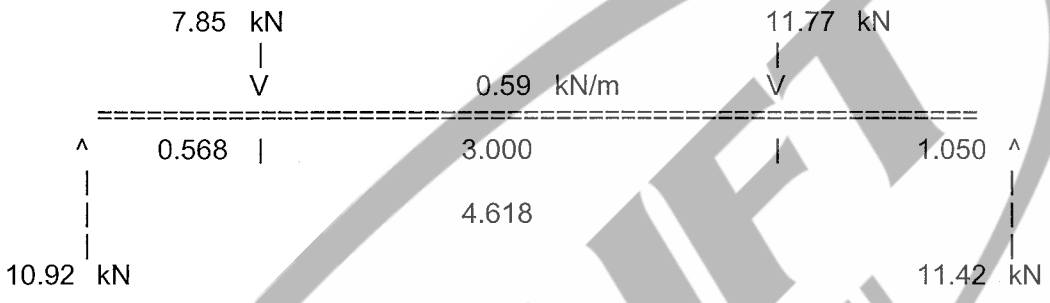
Cmx fb / {(1 - fac / 0.6Foc)Fb} = 0.09

Combined stresses <= 1.00

Combined stresses = 0.14

Combined Stresses O.K.

Check steel wire rope: Unfactored design loads.



Unfactored line pull = 11.42 kN

Steel wire rope: Design line pull = 11.42 kN

Factor of safety = 6

Minimum breaking force = 68.51 kN

Is SWR, wire rope core ? Yes

Fu = 1770.00 MPa As/Ag = 0.45

Minimum diameter, dia = 10.4 mm

Actual dia = 12.0 mm

Steel wire rope O.K.

Check pins: Line pull, Vertical = 14.35 kN

Horiz = 14.35 kN

In shear: Grade C25 steel. Design load = 20.29 kN

Fuf = 440.00 MPa

Fyf = 230.00 MPa

df = 40.0 mm Area = 1256.64 mm^2

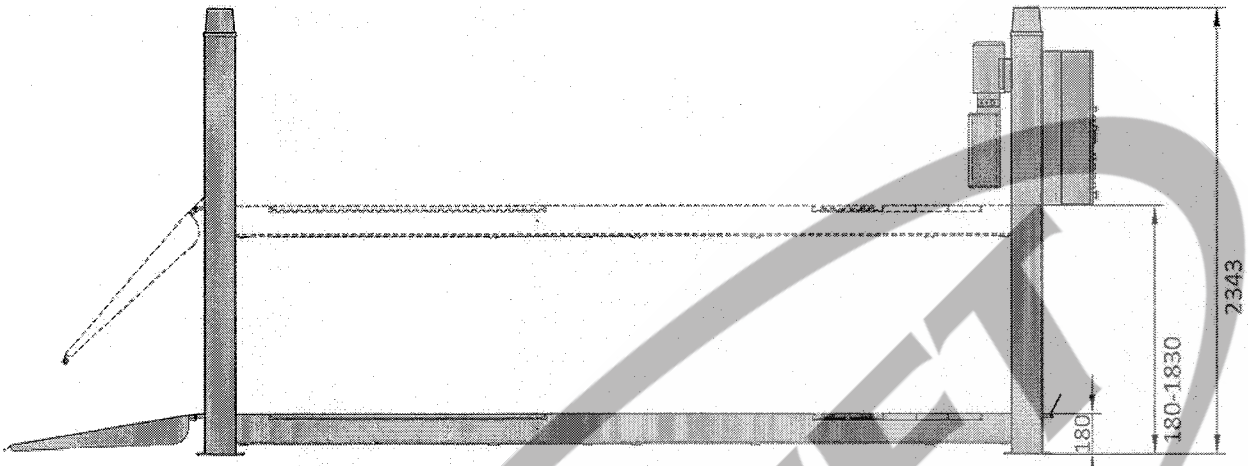
*** Fvf = 75.90 MPa

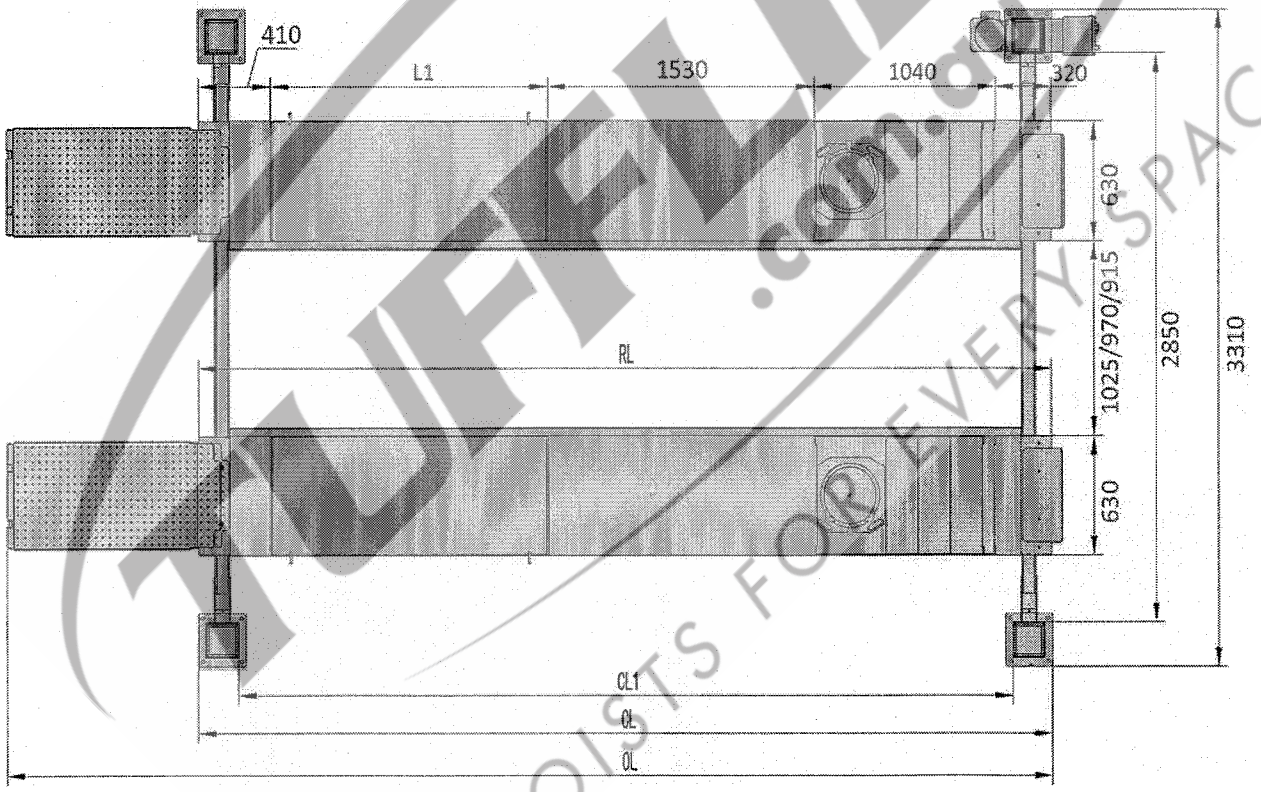
*** fvf = 8.07 MPa (twin shear)

Pin O.K. in shear

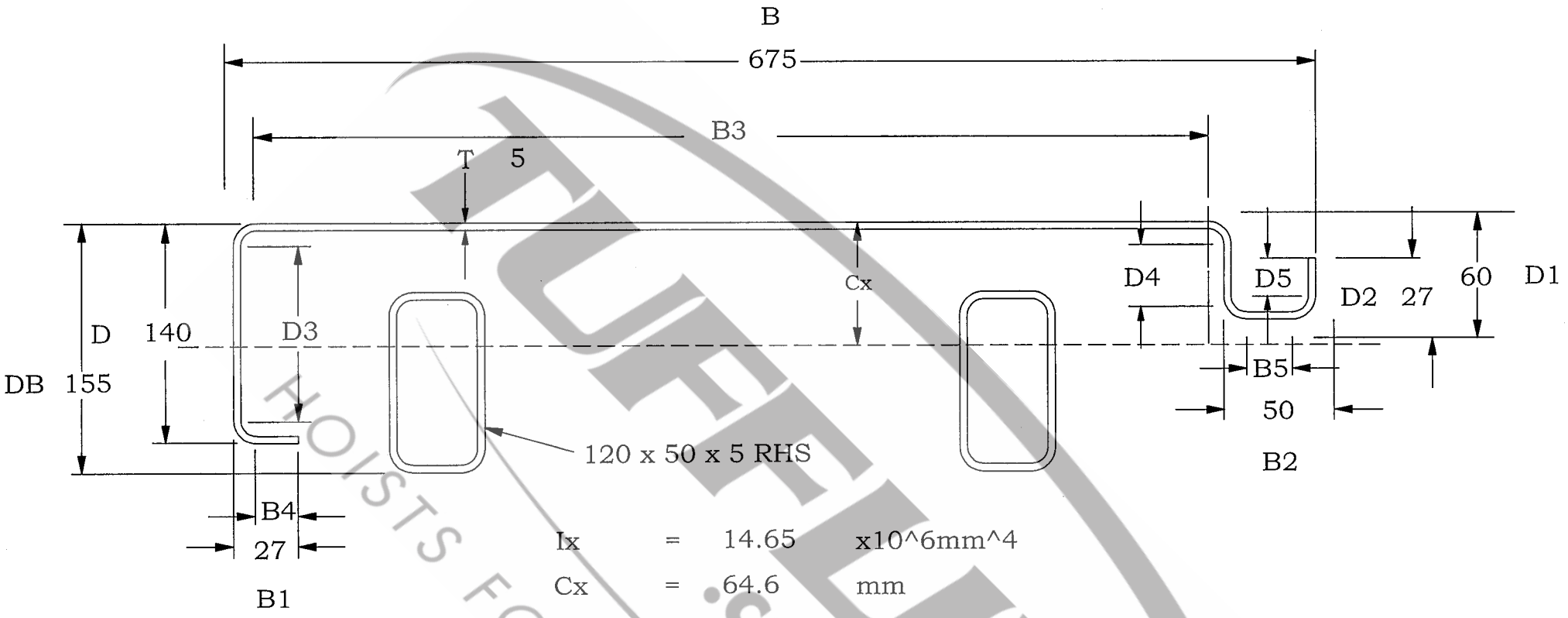
General Arrangement

(EE-6435V2)





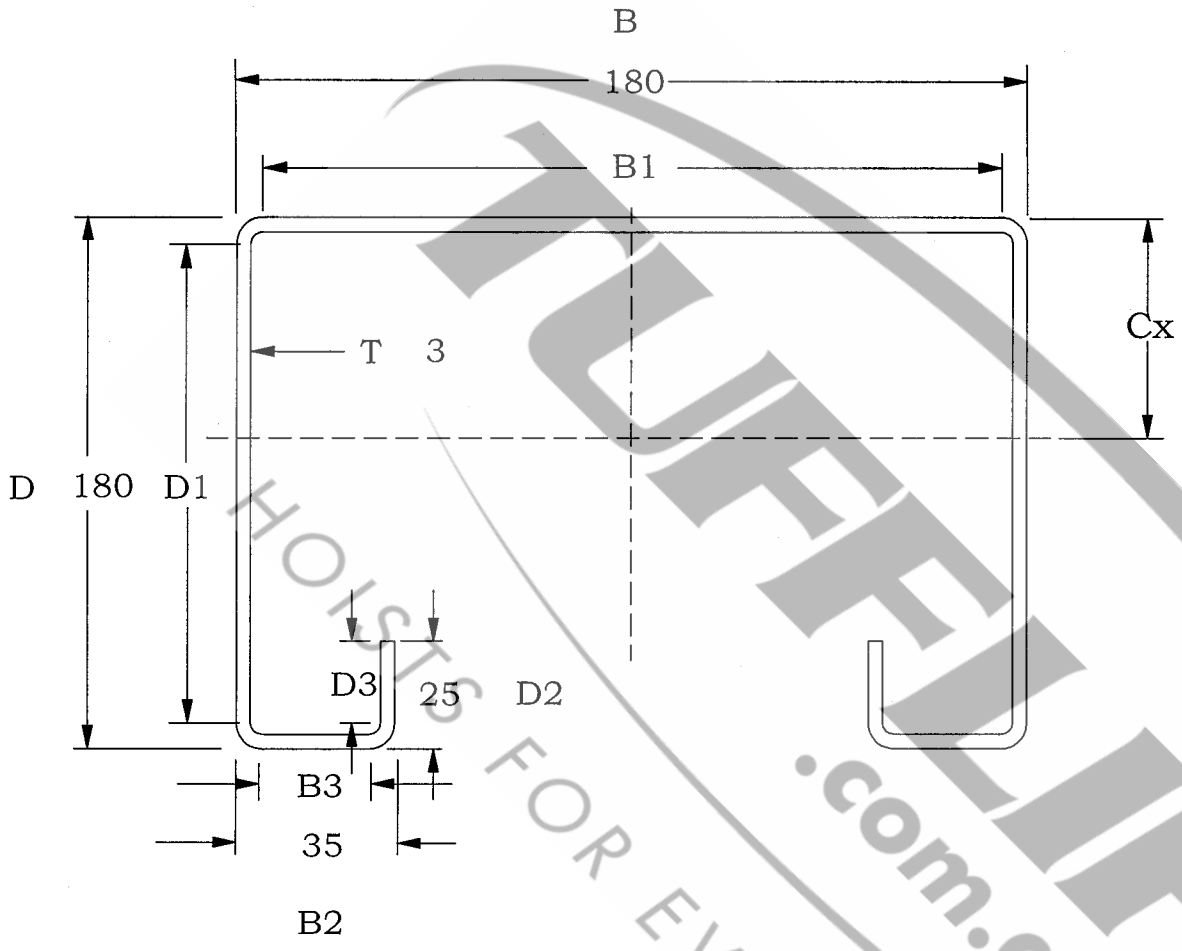
NO.	Item No.	EE-6435V2(48L)	EE-6435V2(52L)
Overall dimension	L1	1580	1980
	CL1	4438	4838
	CL	4888	5288
	OL	5948	6348
	RL	4880	5280
Specification	Lifting Capacity	Max Lifting Height	Min Lifting Height
	4000kg	1830mm	180mm



Ix	=	14.65	x10^6mm^4
Cx	=	64.6	mm
Ztop	=	226.91	x10^3mm^3
Zbot	=	162.03	x10^3mm^3
A	=	7,631	mm^2
Ae	=	5,871	mm^2
Mass	=	59.90	kg/m
rx	=	50.0	mm

Platform, Fy = 235 MPa

A.A.Barnes & Coy.Pty.Ltd 41 Evans Ct, Toorak 3142	Tel: (03) 9822 5889 aabarnes2@bigpond.com	NOT to scale	Csect02G	20 Jun 17



Ix	=	8.38	x10^6mm^4
Cx	=	79.0	mm
Zweb	=	106.7	x10^3mm^3
Ztoe	=	83.6	x10^3mm^3
A	=	1,880	mm^2
Ae	=	1,880	mm^2
Mass	=	14.76	kg/m
rx	=	66.8	mm
Iy	=	10.79	x10^6mm^4
Zy	=	119.94	x10^3mm^3
ry	=	75.8	mm

Column, Fy = 235 MPa

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NOT to scale

Column03AH

20 Jun 17