WRT CONSULTANTS
URMSTON
MANCHESTER M41 8SG
TEL 0161 748 1527

CALCULATION SHEET

CLIENT Anybody

SECTION Steel profile

PROJECT

CALCULATION SHEET 1

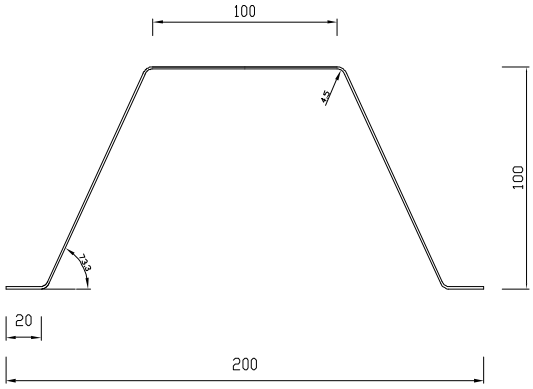
JOB No

DRAWING NO

CALCULATION

DATE

Effective Section Properties Steel Profile 100mm deep profile 0.64mm Production Thickness



$E := 210000$	$\frac{N}{mm^2}$	
$fty := 320$	$\frac{N}{mm^2}$	
$t := 0.66$	mm	production thickness
$b := 100$	mm	top flange
$btf := 40$	mm	bottom flange tension
$ko := 4$		buckeling coefficient
$Dp := 100$		

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$\alpha := 73.5$

$cov := b + btf + 2 \times Dp \times \cos\left(\alpha \times \frac{\pi}{180}\right)$ $cov = 196.8$

$Sw := \frac{Dp}{\sin\left(\alpha \times \frac{\pi}{180}\right)}$ $Sw = 104.295$

$\lambda p := \frac{2}{ko^{0.5}} \times \frac{b}{t} \times \left(\frac{fty}{E}\right)^{0.5}$ $\lambda p = 5.915$

$bef := \frac{1.9 \times b}{\lambda p} \times \left(1 - \frac{0.42}{\lambda p}\right)$ $bef = 29.843$

$Dw := \frac{Dp}{\sin\left(\alpha \times \frac{\pi}{180}\right)}$ $Dw = 104.295$

$Aeff := btf \times t + bef \times t + 2 \times Dw \times t$ $Aeff = 183.766$

$ybar := \frac{btf \times t \times (Dp) + 2 \times Dw \times t \times \frac{Dp}{2}}{Aeff}$ $ybar = 51.824$

$bt := \frac{Dp - ybar}{\sin\left(\alpha \times \frac{\pi}{180}\right)}$ $bt = 50.245$

$bef1 := 0.76 \times t \times \left(\frac{E}{fty}\right)^{0.5}$ $bef1 = 12.85$

$bef3 := (1.5 \times bef1) + bt$ $bef3 = 69.52$

$Efflen := bef1 + bef3$ $bef1 + bef3 = 82.369$

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Efflen = 82.369 Dw = 104.295 ok

$$beft1 := if\left(Efflen > Dw, \frac{bef3 \times Dw}{Efflen}, bef1\right) \qquad beft1 = 12.85$$

$$beft3 := if\left(Efflen > Dw, \frac{bef3 \times Dw}{Efflen}, bef3\right) \qquad beft3 = 69.52$$

Plate	Length	Position centriod	Height	Number off
bottom flange	$l1 := btf$	$y1 := Dp$	$h1 := 0$	$n1 := 1$
top flange	$l2 := bef$	$y2 := 0$	$h2 := 0$	$n2 := 1$
lower web	$l3 := beft3$	$y3 := Dp - beft3 \times \left(\frac{\sin\left(\alpha \times \frac{\pi}{180}\right)}{2}\right)$	$h3 := l3 \times \sin\left(\alpha \times \frac{\pi}{180}\right)$	$n3 := 2$
upper web	$l4 := bef1$	$y4 := beft1 \times \left(\frac{\sin\left(\alpha \times \frac{\pi}{180}\right)}{2}\right)$	$h4 := l4 \times \sin\left(\alpha \times \frac{\pi}{180}\right)$	$n4 := 2$

$$Aef2 := [(n1 \times l1) + (n2 \times l2) + (n3 \times l3) + (n4 \times l4)] \times t \qquad Aef2 = 154.824$$

$$yc := \frac{[(n1 \times l1 \times y1) + (n2 \times l2 \times y2) + (n3 \times l3 \times y3) + (n4 \times l4 \times y4)] \times t}{Aef2} \qquad yc = 57.244$$

$$Ix1 := \left[\left(n1 \times l1 \times 1h^2\right) + \left(n2 \times l2 \times h2^2\right) + \left(n3 \times l3 \times h3^2\right) + \left(n4 \times l4 \times h4^2\right)\right] \times \frac{t}{12}$$

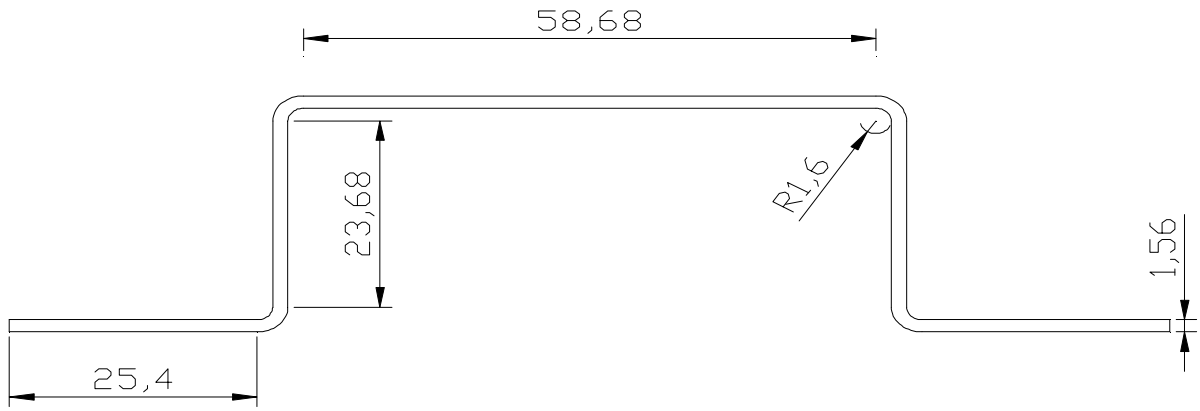
$$Ix2 := \left(n1 \times t \times l1 \times y1^2\right) + \left(n2 \times t \times l2 \times y2^2\right) + \left(n3 \times t \times l3 \times y3^2\right) + \left(n4 \times t \times l4 \times y4^2\right)$$

$$Ixx := Ix1 + Ix2 \qquad Ixx = 7.067 \times 10^5$$

$$Ieff := \left(Ixx - Aef2 \times yc^2\right) \times \frac{1000}{cov} \qquad Ieff = 1.013 \times 10^6$$

$$Mfail := fty \times \frac{Ieff}{yc} \times 10^{-6} \qquad Mfail = 5.664 \quad \frac{kNm}{m}$$

SECTION PROPERTIES DX 51 STEEL TOP HAT



ELEMENT NO	TYPE (1) (2)	LENGTH mm	ANGLE DEGS	BEND ANGLE DEGS	INSIDE RAD mm	X-END COORD	Y-END COORD
1.00	1.00	25.40	0.00	0.00	0.00	25.40	0.00
2.00	2.00	3.74	-90.00	-90.00	1.60	27.78	-2.38
3.00	1.00	23.68	-90.00	0.00	0.00	27.78	-26.06
4.00	2.00	3.74	0.00	90.00	1.60	30.16	-28.44
5.00	1.00	58.68	0.00	0.00	0.00	88.84	-28.44
6.00	2.00	3.74	90.00	90.00	1.60	91.22	-26.06
7.00	1.00	23.68	90.00	0.00	0.00	91.22	-2.38
8.00	2.00	3.74	0.00	-90.00	1.60	93.60	0.00
9.00	1.00	25.40	0.00	0.00	0.00	119.00	0.00

T(mm)	AREA(mm^2)	Ixx(cm^4)	Iyy(cm^4)	Ixy(cm^4)	XBAR(mm)	YBAR(mm)
1.56	268.00	4.21	30.20	0.00	59.50	-14.87

SI(deg)	Iuu(cm^4)	Ivv(cm^4)	SCx(mm)	SCy(mm)	J(cm^4)	Cw(cm^6)
0.00	4.21	30.20	-0.00	-23.56	0.02	17.80

Max section width in mm is	:-	119.00
Max section depth in mm is	:-	30.00
Developed width in mm is	:-	171.79
Axis xx from bottom fibres is in mm	:-	14.35
Axis yy from extreme left fibres is in mm	:-	59.50
Radius of gyration Rxx in mm is	:-	12.53
Radius of gyration Ryy in mm is	:-	33.57
Polar radius of gyration Ro in mm is	:-	35.83
Zxx (minimum) in cm^3 units is	:-	2.69
Zyy (minimum) in cm^3 units is	:-	5.07
Polar second moment of area in cm^4 is	:-	34.40
Yield strength N/mm^2	:-	280.00
Mc top flange kNm	:-	0.71kNm
Mc feet kNm	:-	0.60kN/m

W R T Consultants
2 Eastway
Urmston
Manchester M41 8SG