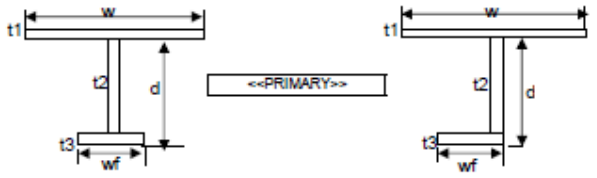
KC#590

KC590

SECTION MODULUS CALCULATION (IRS, Part 3 ,Chapter 3, Section 4)

Project:- aaaaa



For Bracket Design (LR) CLICK>>

For Corossion allowance to SM CLICK>>>

NOTE:Openings in primary WEB to be REINFORCED ALONG EDGE OF OPENING if the Opening depth>d/4 (or) 300mm (AND) Opening length>web depth,d (OR) Opening length >60% Secondary spacing

	INPUTS					
Flange (S,D for Single,Double sided flange)	S	<<<Provide Tripping Brackets>>>				
Type number of equally spaced load point on member	0	<<<Web Stiffening Required>>>				
Input 0 for stiffener/ secondary; 1 for girder/ primary	1	Web Stiff FB (Reqd.)=		56 X 10		
Thickness of attached Plating (t1) mm	10			d/t2 STATUS		
Depth of Web (d)mm	560	d/t2=	56.00	Check d/t2		Max.55
Thickness of Web (t2)mm	10			wf/t3 STATUS		
Width of flange (wf)mm	150	wf/t3,D=	15.00	Wf/t3 OK		N/A
Thickness of flange (t3),mm	10	wf/t3,S=	15.00	Wf/t3 OK		Max. 15
Span of member (mm)	4410	C1Value=	0.77			0.77
Spacing of member (mm)	1830	C2Value=	0.46			0.46
Effective Width of attached plating (w)mm	838.99	C Value=	0.46			

		A (sqmm)	L(mm)	AL	ALL	lown
Width atached pltg (mm)	838.992273	8389.92	565	4740306	2678273082	69916.02
Thk. Attached pltg (mm)	10					
Depth of web (mm)	550	5500.00	285	1567500	446737500	138645833.33
Thk. Of web (mm)	10					
Width of flange (mm)	150	1500.00	5	7500	37500	12500.00
Thk. Of flange (mm)	10					
Area Total		15389.92		6315306	3125048082	138728249.36

Height Of N/A from BaseLine (mm)		410.35	Ymin=	159.6467			
Height Of N/A from TopLine (mm)		159.65	Ymax=	410.3533	Note Kg/m below is EXCLUDING ATTACHED PLTG		
MOI about BaseLine (mm^4)		3263776331.76			55.74	Kg/m (Stiffener OR Primary ONLY)	
MOI about Neutral Axis (mm^4)		672269221.34			67226.92	cm^4	I N/A
Zmax (mm^3)=I NA/Ymin		4210982	mm^3		4210.98	cm^3	
Zmin (mm^3)=I NA/Ymax		1638269	mm^3		1638.27	cm^3	Z min.
Max.Shear Area (Web)		5700	mm^2		57.00	cm^2	A shear
Total sectional area (Web+Fl.)		15390	mm^2		153.90	cm^2	A total

For Clarifications Contact: G.Jayasankar (jayasankar007@yahoo.com)

主要支持部材の取り付け板の有効幅及び断面係数の値に関するCSRの仮定

ABS CSR 2006 for Bulk Carriers, Part 5B, 3 章 6 節 5.4.1 の主要支持部材の有効幅の規定“降伏強度評価においてネット断面係数に考慮される主要支持部材の取り付け板の有効幅については、隣接する 2 つの主要支持部材との心距の平均値としなければならない。”という規定を参照されたい。

ABS Steel Vessels 2007（その他の鋼船規則） Part 3 1 章 2 節 13.3 は、“部材の片側の間隔の合計の半分又は部材の支持されないスパンの 33%のいずれか小さい方の値を超えないものを板の有効幅とする” とある。

主要支持部材の取り付け板の有効幅は、CSRでは、過大評価しているよう思われる。この仮定はより大きな違いを導く場合がある。特に、主要支持部材のスパンが主要支持部材の心距より小さい場合である。

900＊10/150*15 のT型鋼が 3000mm間隔（600mm＊5 フレームスペース）で、スパン 2000mm の主要支持部材で、取り付け板の板厚が 12mmの例では、異なる断面係数の値となる。

A: ABS CSR 2006 に基づく結果

取り付け板の有効幅： 3000mm(主要支持部材の間隔)

断面係数: 4420cm^3

B: ABS Steel Vessel　2007 に基づく結果

取り付け板の有効幅：　660mm（0.33＊2000＝660mmと 3000mmの小さい方）

断面係数　3920cm^3　(CSRの断面係数の 88%)

C: IRS Steel Vesselに基づく結果（有効幅の修正）

取り付け板の有効幅：　437 mm

断面係数 3722 cm3 (CSRの断面係数の 84%)

D: LRS Steel Vessel 2003 Part 3 3 章 9 節

取り付け板の有効幅:　687mm

断面係数:4009cm3　（CSRの断面係数の 90%）

主要支持部材の断面係数の違いが、有意である場合があり、本件に関する見解教示されたい。また、上述について明確にするよう規定し、主要支持部材で考慮すべき有効幅について、明記されたい。

A,B,C,及び D の計算シートを下記に添付する。

(A) ABS CSR 2006 Section Modulus Calculation (Effective width of attached plating 3000mm= Primary Spacing)

	INPUTS				
Flange (S,D for Single,Double sided flange)	D				
Type number of equally spaced load point on member	0	<<<Web Stiffening Required>>>			
(input 0 for stiffener secondary, 1 for girder primary	0	Web Stiff FB (Reqd.)=	90 X 10		
Thickness of attached Plating (t1) mm	12		d/t2 STATUS		
Depth of Web (d)mm	900	d/t2=	90.00	Check d/t2	Max.55
Thickness of Web (t2)mm	10		wf/t3 STATUS		
Width of flange (wf)mm	150	wf/t3,D=	10.00	Wf/t3 OK	Max. 30
Thickness of flange (t3) mm	15	wf/t3,S=	10.00	Wf/t3 OK	NA
Span of member (mm)	2000	C1Value=	0.25		0.25
Spacing of member (mm)	3000	C2Value=	0.15		0.15
Effective Width of attached plating (w)mm	3000.00	C Value=	0.15		

		A (sqmm)	L(mm)	AL	ALL	bwm
Width attached plg (mm)	3000	36000.00	906	32616000	29559096000	432000.00
Thk. Attached plg (mm)	12					
Depth of web (mm)	900	8850.00	457.5	4048875	1852380313	607500000.00
Thk. Of web (mm)	10					
Width of flange (mm)	150	2250.00	7.5	16875	126562.5	42187.50
Thk. Of flange (mm)	15					
Area Total		47100.00		39681750	31402582875	607974187.50

Height Of NA from BaseLine (mm)		778.81	Ymin=	133.1943			
Height Of NA from TopLine (mm)		133.19	Ymax=	778.8057			
MOI about BaseLine (mm^4)		32010557062.50					
MOI about Neutral Axis (mm^4)		3442599884.95			344259.99	cm^4	I NA
Zmax (mm^3)=I NA/Ymin		25845457	mm^3		25845.46	cm^3	
Zmin (mm^3)=I NA/Ymax		4420359	mm^3		4420.36	cm^3	Z min.
Max.Shear Area (Web)		9120	mm^2		91.20	cm^2	A shear
Total sectional area (Web+FL)		47100	mm^2		471.00	cm^2	A total
Stiffener (or) Primary ONLY (Web+FL) Wt/m		97.14	kg/m		97.14	Kg/m	Wt/m

For Clarifications Contact: G.Jayasankar (jayasankar007@yahoo.com)

(B) ABS Steel Vessels 2007 Section Modulus Calculation (Effective width of attached plating =Minimum of 1 Primary Spacing OR 33% of Span=.33x2000=660mm)

	INPUTS				
Flange (S,D for Single,Double sided flange)	D				
Type number of equally spaced load point on member	0	<<<Web Stiffening Required<<<			
(input 0 for stiffener secondary, 1 for girder primary	0	Web Stiff FB (Reqd.)=	90 X 10		
Thickness of attached Plating (t1) mm	12		d/t2 STATUS		
Depth of Web (d)mm	900	d/t2=	90.00	Check d/t2	Max.55
Thickness of Web (t2)mm	10		wf/t3 STATUS		
Width of flange (wf)mm	150	wf/t3,D=	10.00	Wf/t3 OK	Max. 30
Thickness of flange (t3) mm	15	wf/t3,S=	10.00	Wf/t3 OK	NA
Span of member (mm)	2000	C1Value=	0.66		0.66
Spacing of member (mm)	660	C2Value=	0.55		0.55
Effective Width of attached plating (w)mm	660.00	C Value=	0.55		

		A (sqmm)	L(mm)	AL	ALL	bwm
Width attached plg (mm)	660	7920.00	906	7175520	6501021120	95040.00
Thk. Attached plg (mm)	12					
Depth of web (mm)	900	8850.00	457.5	4048875	1852380313	607500000.00
Thk. Of web (mm)	10					
Width of flange (mm)	150	2250.00	7.5	16875	126562.5	42187.50
Thk. Of flange (mm)	15					
Area Total		19020.00		11224270	8353507995	607637227.50

Height Of NA from BaseLine (mm)		591.02	Ymin=	320.9763			
Height Of NA from TopLine (mm)		320.98	Ymax=	591.0237			
MOI about BaseLine (mm^4)		8661145222.50					
MOI about Neutral Axis (mm^4)		2317268691.85			231728.87	cm^4	I NA
Zmax (mm^3)=I NA/Ymin		7219589	mm^3		7219.59	cm^3	
Zmin (mm^3)=I NA/Ymax		3920895	mm^3		3920.89	cm^3	Z min.
Max.Shear Area (Web)		9120	mm^2		91.20	cm^2	A shear
Total sectional area (Web+FL)		19020	mm^2		190.20	cm^2	A total
Stiffener (or) Primary ONLY (Web+FL) Wt/m		97.14	kg/m		97.14	Kg/m	Wt/m

For Clarifications Contact: G.Jayasankar (jayasankar007@yahoo.com)

(C) IRS Steel Vessels (Effective Width of attached plating of primary= 437mm only)

	INPUTS				
Flange (S,D for Single,Double sided flange)	D	<<<Provide Tripping Brackets>>>			
Type number of equally spaced load point on member	0	<<<Web Stiffening Required<<<			
Input 0 for stiffener secondary, 1 for girder primary	1	Web Stiff FB (Reqd.)=		90 X 10	
Thickness of attached Plating (t1) mm	12			d12 STATUS	
Depth of Web (d)mm	900	d12=	90.00	Check d12	Max.55
Thickness of Web (t2)mm	10			wt13 STATUS	
Width of flange (wt)mm	150	wt13_D=	10.00	Wt13 OK	Max. 30
Thickness of flange (t3) mm	15	wt13_S=	10.00	Wt13 OK	N/A
Span of member (mm)	2000	C1Value=	0.25		0.25
Spacing of member (mm)	3000	C2Value=	0.15		0.15
Effective Width of attached plating (e)mm	436.89	C Value=	0.15		

		A (sqmm)	L(mm)	AL	ALL	Ipmm
Width attached pltg (mm)	436.88503	5242.62	906	4749814	4303331505	62911.44
Thk. Attached pltg (mm)	12					
Depth of web (mm)	900	8950.00	457.5	4048875	1852360313	607500000.00
Thk. Of web (mm)	10					
Width of flange (mm)	150	2250.00	7.5	16875	126562.5	42187.50
Thk. Of flange (mm)	15					
Area Total		16342.62		8815564	6155818380	607605098.94

Height Of N/A from BaseLine (mm)		538.42	Ymin=	372.5783			
Height Of N/A from TopLine (mm)		372.58	Ymax=	539.4217			
MOI about BaseLine (mm^4)		6783423478.62					
MOI about Neutral Axis (mm^4)		2008118957.94			200811.70	cm^4	I N/A
Zmax (mm^3)=I N/A/Ymin		5389785	mm^3		5389.79	cm^3	
Zmin (mm^3)=I N/A/Ymax		3722722	mm^3		3722.72	cm^3	Z min.
Max.Shear Area (Web)		9120	mm^2		91.20	cm^2	A shear
Total sectional area (Web+Fl.)		16343	mm^2		163.43	cm^2	A total
Stiffener (or) Primary ONLY (Web+Fl.) Wt/m		87.14	kg/m		87.14	Kg/m	Wt/m

For Clarifications Contact: G.Jayasankar (jayasankar007@yahoo.com)

(D) LRS Steel Vessels 2003 Part 3 Chapter 3 Section 9 (Effective width of attached plating = 687mm)

SECTION MODULUS CALCULATION : LLOYD REGISTER RULES

(Refer LRS 2003 Part 3 Chapter 3 Section 3)

	INPUTS			
				X in doubt ask ....Jay
Primary (OR) Secondary	Primary		Vb (1)	0.67
b(m)=	3	(Half of sum of spacing between adjacent stiffeners)	Vb (2)	0.67
l (m)=	2	(Length of supporting member)	f=	0.23
s(cm^2)=	22.5	(Face plate area in cm^2)		
dw(mm) Clear Inside Depth=	900	(Web depth in mm)		
tw (mm)=	10	(Web plate thickness in mm)		
tp (mm)=	12	(Thickness of attached plating in mm)		

40x tp (mm)=	480	
A (cm^2)=	82.42	<< Effective Area of Attached Plating considered in 800mm X 12mm
Z1=	2026.0	
Z2=	1350.00	
Z3=	1.47	

EFFECTIVE WIDTH OF ATTACHED PLATING CONSIDERED IN SM CALC. (mm)=		Eff. W (m	686.83
AVAILABLE SECTION MODULUS (PLATE WITH ATTACHED STIFFENER) cm^3=		Z (cm^3)	4009.84