



Project: Chia

Model: Chia

Date: 18.08.2014

Dach

Dachrahmen

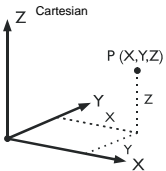
CONTENTS

1	Model - General Data	1	3	Loads	
1.1	Nodes	1		LC1 - Eigengewicht - 3.1 Nodal Loads - By Components - Coordinate System	4
1.2	Materials	1	4	Results - Load Cases, Load Combinations	
1.3	Cross-Sections	1	4.3	Cross-Sections - Internal Forces	4
1.7	Members	1	4.3	Results - Result Combinations	4
1.8	Nodal Supports	1		Cross-Sections - Internal Forces	4
Graphic	Model, In Y-direction	2		STAHl EC3	
Graphic	Querschnitte	2		CA1 - Bemessung nach Eurocode 3	
2	Load Cases and Combinations		1.1	General Data	5
2.1	Load Cases	3	1.2	Materials	5
2.1.1	Load Cases - Calculation Parameters	3	1.3	Cross-Sections	5
Graphic	LF1: Eigengewicht	3	1.5	Effective Lengths - Members	5
2.5	Load Combinations	3	1.12	Parameters - Members	5
2.5.2	Load Combinations - Calculation Parameters	3	2.4	Design by Member	5
2.6	Result Combinations	4			

MODEL - GENERAL DATA

General	Model name	: Chia
	Model description	: Dachrahmen
	Project name	: Chia
	Project description	: Dach
	Type of model	: 2D-XZ (ux/uz/φy)
	Positive direction of global axis Z	: Upward
	Classification of load cases and combinations	: According to Standard: EN 1990 National annex: DIN - Deutschland
	<input checked="" type="checkbox"/> Automatically create combinations	: <input checked="" type="checkbox"/> Load Combinations

1.1 NODES



Node No.	Reference Node	Coordinate System	Node Coordinates		Comment
			X [mm]	Z [mm]	
1	-	Cartesian	0.0	725.0	
2	-	Cartesian	0.0	825.0	
3	-	Cartesian	880.0	1565.0	
4	-	Cartesian	1690.0	1565.0	
5	-	Cartesian	2500.0	1565.0	
6	-	Cartesian	4245.0	100.0	
7	-	Cartesian	4245.0	0.0	

1.2 MATERIALS

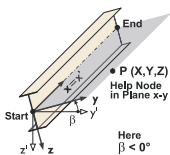
Matl. No.	Modulus E [kN/cm ²]	Modulus G [kN/cm ²]	Spec. Weight γ [kN/m ³]	Coeff. of Th. Exp. α [1/°C]	Partial Factor γ _M [-]	Material Model
1	Steel S 275 EN 1993-1-1:2005-05 21000.00	8076.92	78.50	1.20E-05	1.00	Standard

1.3 CROSS-SECTIONS



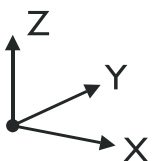
Section No.	Matl. No.	J [cm ⁴]		I _y [cm ⁴]		I _z [cm ⁴]		Principal Axes		Rotation α' [°]	Overall Dimensions [mm]	
		A [cm ²]	A _y [cm ²]	A _z [cm ²]	α [°]	Width b	Height h					
1	RRO 100x50x5 DIN 59410:1974 1	13.80	169.00	8.74	0.00	0.00	50.0	100.0				

1.7 MEMBERS



Mbr. No.	Member	Node		Rotation		Cross-Section		Release No.		Ecc. No.	Div. No.	Length L [mm]	
		Start	End	Type	β [°]	Start	End	Start	End				
1	Beam	1	2	Angle	0.00	1	1	-	-	-	-	100.0	Z
2	Beam	2	3	Angle	0.00	1	1	-	-	-	-	1149.8	XZ
3	Beam	3	4	Angle	0.00	1	1	-	-	-	-	810.0	X
4	Beam	4	5	Angle	0.00	1	1	-	-	-	-	810.0	X
5	Beam	5	6	Angle	0.00	1	1	-	-	-	-	2278.4	XZ
6	Beam	6	7	Angle	0.00	1	1	-	-	-	-	100.0	Z

1.8 NODAL SUPPORTS



Support No.	Nodes No.	Rotation [°] about Y	Support or Spring [kN/m] [kNm/rad]			Comment
			u _x	u _z	φ _y	
1	1	0.00	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2	7	0.00	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	



Project: Chia

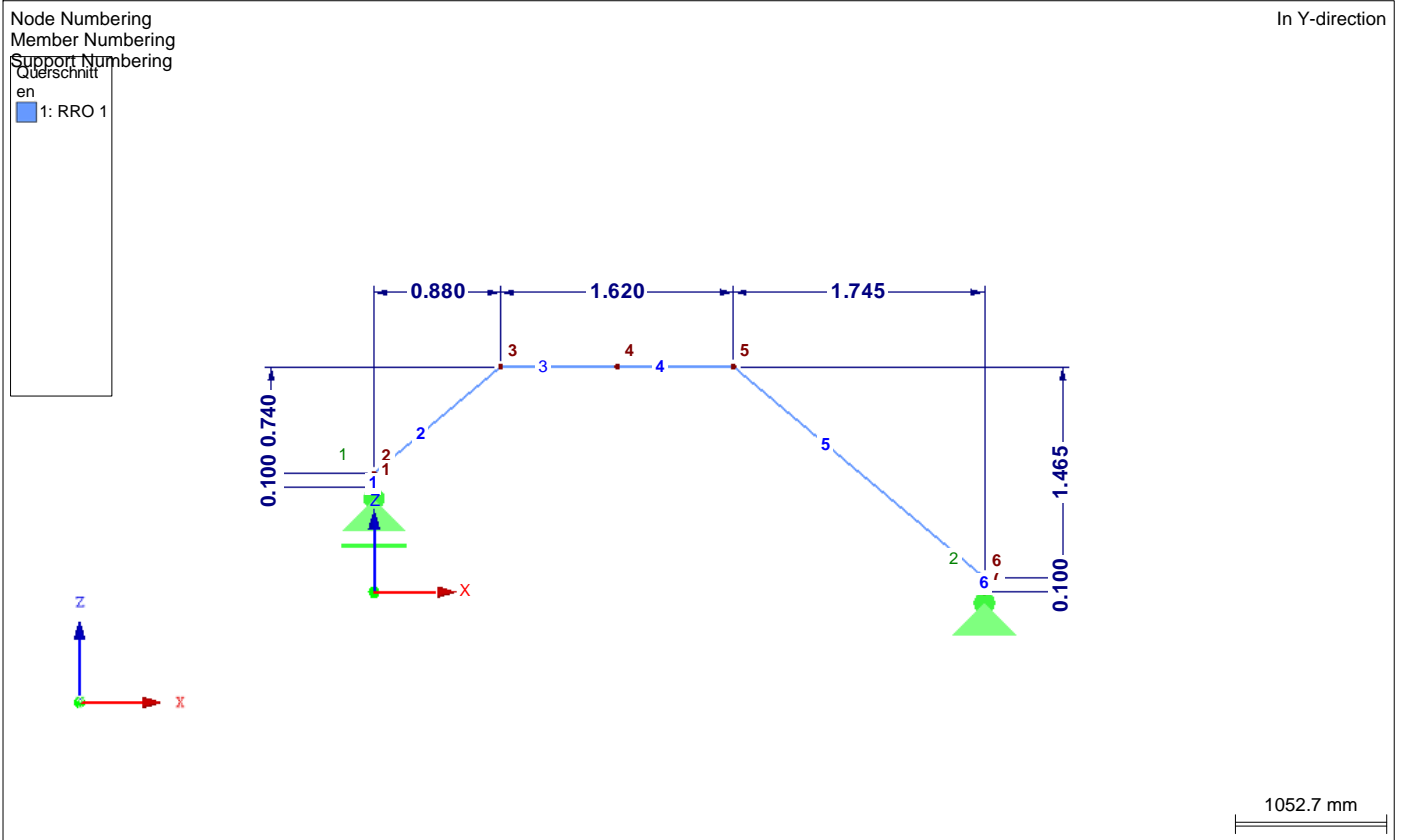
Model: Chia

Date: 18.08.2014

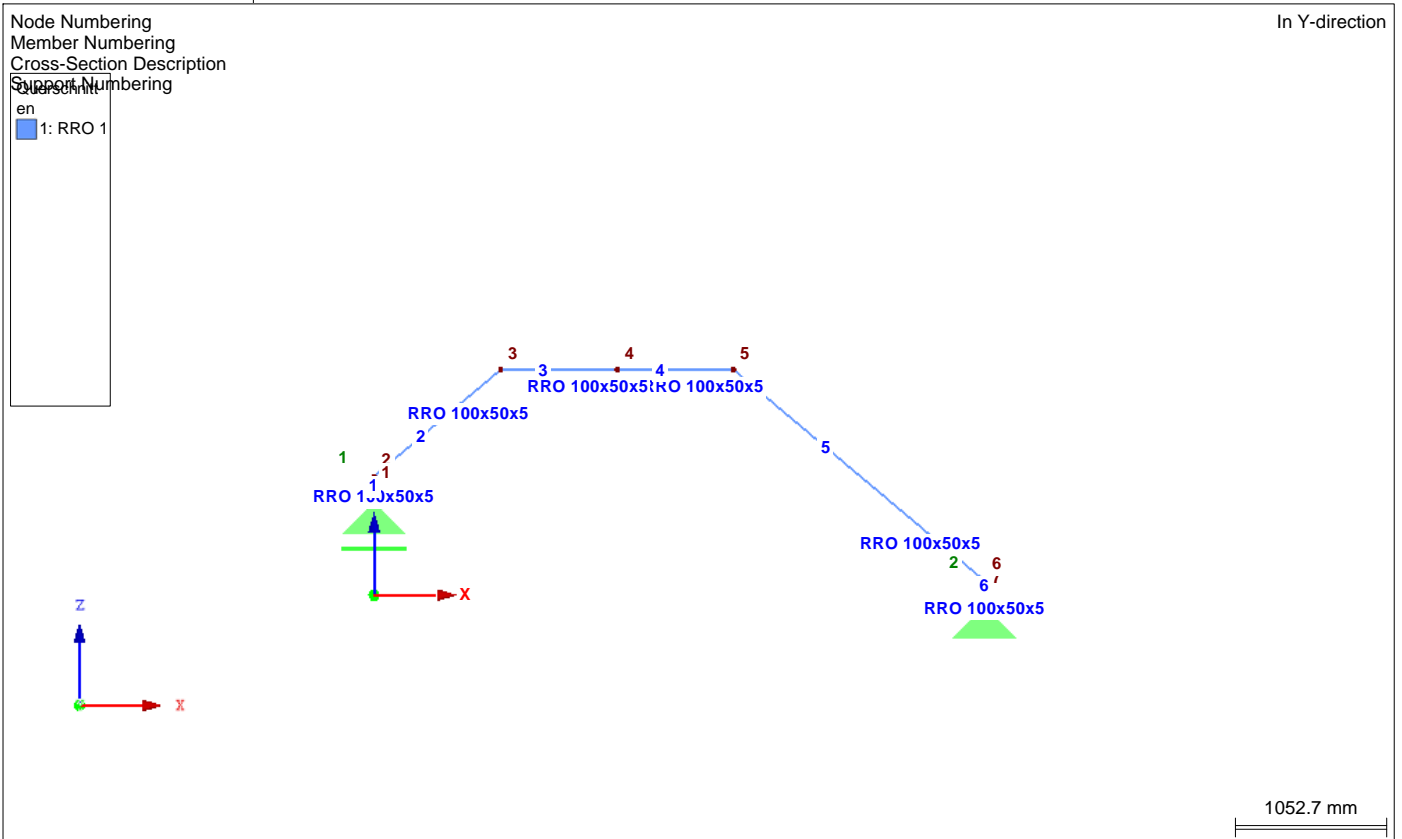
Dach

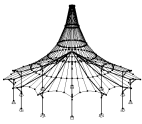
Dachrahmen

MODEL, IN Y-DIRECTION



QUERSCHNITTE





Project: Chia

Model: Chia

Date: 18.08.2014

Dach

Dachrahmen

2.1 LOAD CASES

Load Case	Load Case Description	EN 1990 DIN Action Category	Self-Weight - Factor in Direction			
			Active	X	Y	Z
LC1	Eigengewicht	Permanent	<input checked="" type="checkbox"/>	0.000		-1.000

2.1.1 LOAD CASES - CALCULATION PARAMETERS

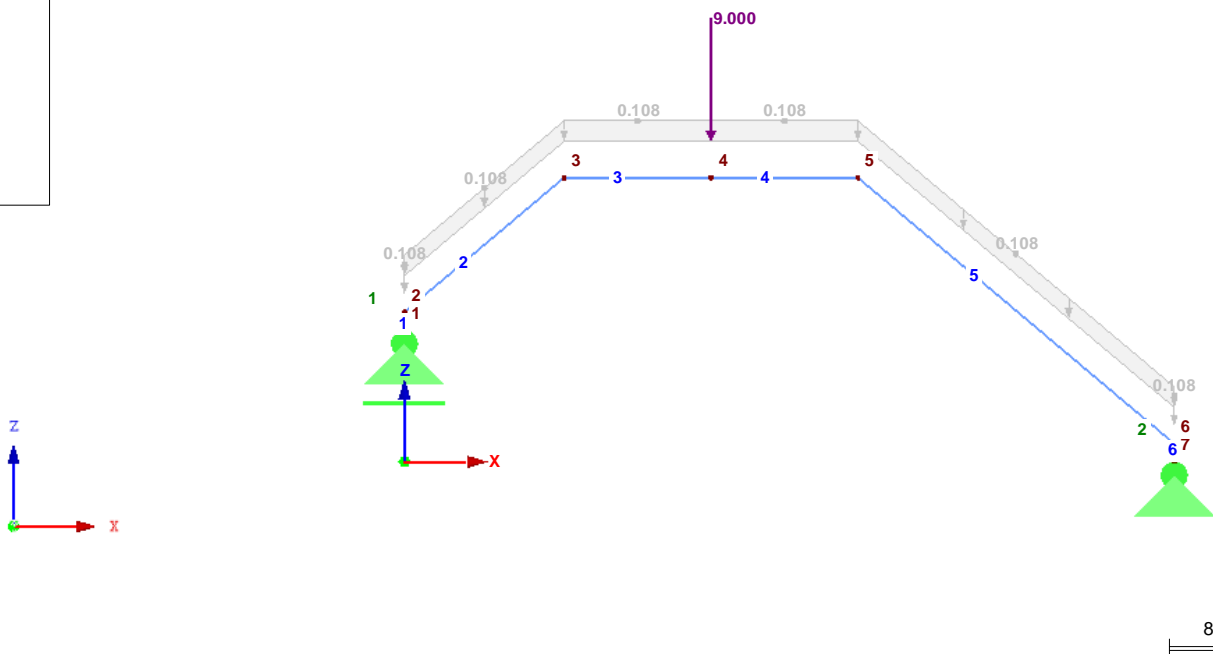
Load Case	Load Case Description	Calculation Parameters
LC1	Eigengewicht	Method of analysis : <input checked="" type="radio"/> Geometrically linear static analysis

LF1: EIGENGEWICHT

LC1: Eigengewicht

In Y-direction

Querschnitte
n
1: RRO 1

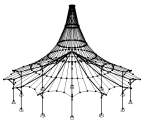


2.5 LOAD COMBINATIONS

Load Combin.	DS	Load Combination Description	No.	Factor	Load Case
CO1	ULS	1.5*LF1	1	1.35	LC1 Eigengewicht
CO2	S Ch	LF1	1	1.00	LC1 Eigengewicht
CO3	S Fr	LF1	1	1.00	LC1 Eigengewicht
CO4	S Qp	LF1	1	1.00	LC1 Eigengewicht

2.5.2 LOAD COMBINATIONS - CALCULATION PARAMETERS

Load Combin.	Description	Calculation Parameters
CO1	1.5*LF1	Method of analysis : <input checked="" type="radio"/> Second order analysis (P-Delta) Options : <input checked="" type="checkbox"/> Consider favorable effects due to tension : <input checked="" type="checkbox"/> Refer internal forces to deformed system for: : <input checked="" type="checkbox"/> Normal forces N : <input checked="" type="checkbox"/> Shear forces V_y and V_z : <input checked="" type="checkbox"/> Moments M_y , M_z and M_T
CO2	LF1	Method of analysis : <input checked="" type="radio"/> Second order analysis (P-Delta) Options : <input checked="" type="checkbox"/> Consider favorable effects due to tension : <input checked="" type="checkbox"/> Refer internal forces to deformed system for: : <input checked="" type="checkbox"/> Normal forces N : <input checked="" type="checkbox"/> Shear forces V_y and V_z : <input checked="" type="checkbox"/> Moments M_y , M_z and M_T
CO3	LF1	Method of analysis : <input checked="" type="radio"/> Second order analysis (P-Delta) Options : <input checked="" type="checkbox"/> Consider favorable effects due to tension : <input checked="" type="checkbox"/> Refer internal forces to deformed system for:



LOADS

Project: Chia

Model: Chia

Date: 18.08.2014

Dach

Dachrahmen

2.5.2 LOAD COMBINATIONS - CALCULATION PARAMETERS

Load Combin.	Description	Calculation Parameters
CO4	LF1	<input checked="" type="checkbox"/> Normal forces N <input checked="" type="checkbox"/> Shear forces V_y and V_z <input checked="" type="checkbox"/> Moments M_y , M_z and M_T Method of analysis : <input checked="" type="checkbox"/> Second order analysis (P-Delta) Options : <input checked="" type="checkbox"/> Consider favorable effects due to tension : <input checked="" type="checkbox"/> Refer internal forces to deformed system for: <input checked="" type="checkbox"/> Normal forces N <input checked="" type="checkbox"/> Shear forces V_y and V_z <input checked="" type="checkbox"/> Moments M_y , M_z and M_T

2.6 RESULT COMBINATIONS

Result Combin.	DS	Result Combination Description	No.	Factor	Loading	Criterion	Alternate Group
RC1	ULS	GZT (STR/GEO) - Ständig / vorübergehend - Gl. 6.10	1	1.00	CO1 1.5*LF1	Permanent	-
RC2	S Ch	GZG - Charakteristisch	1	1.00	CO2	Permanent	-
RC3	S Fr	GZG - Häufig	1	1.00	CO3	Permanent	-
RC4	S Qp	GZG - Quasi-ständig	1	1.00	CO4	Permanent	-

3.1 NODAL LOADS - BY COMPONENTS - COORDINATE SYSTEM

LC1: Eigengewicht

LC1
Eigengewicht

No.	On Nodes		Coordinat System	Force [kN]		Moment M_y [kNm]
	No.			P_x	P_z	
1	4		0 Global XYZ	0.000	-9.000	0.000

4.3 CROSS-SECTIONS - INTERNAL FORCES

Member No.	LC/CO	Node No.	Location x [mm]	Forces [kN]		Moments M_y [kNm]
				N	V_y	
1	Section No. 1: RRO 100x50x5 DIN 59410:1974					
3	CO1	MAX N	0.0	0.26	7.50	6.95
1	CO1	MIN N	0.0	-7.68	0.36	0.00
3	CO1	MAX V_z	0.0	0.26	7.50	6.95
4	CO1	MIN V_z	810.0	0.06	-4.88	9.08
3	CO1	MAX M_y	810.0	0.09	7.38	12.98
1	CO1	MIN M_y	0.0	-7.68	0.36	0.00

4.3 CROSS-SECTIONS - INTERNAL FORCES

Result Combinations

Member No.	RC	Node No.	Location x [mm]	Forces [kN]		Moments M_y [kNm]	Corresponding Load Cases
				N	V_y		
1	Section No. 1: RRO 100x50x5 DIN 59410:1974						
3	RC1		0.0	MAX N	0.26	7.50	6.95
1	RC1		0.0	MIN N	-7.68	0.36	0.00
3	RC1		0.0	MAX V_z	0.26	7.50	6.95
4	RC1		810.0	MIN V_z	0.06	-4.88	9.08
3	RC1		810.0	MAX M_y	0.09	7.38	12.98
1	RC1		0.0	MIN M_y	-7.68	0.36	0.00



STEEL EC3
CA1
Bemessung nach
Eurocode 3

Project: Chia Dach Model: Chia Dachrahmen Date: 18.08.2014

1.1 GENERAL DATA

Members to design:	All
Sets of members to design:	
Ultimate Limit State Design	LC1
Load cases to design:	Eigengewicht

1.2 MATERIALS

Matl. No.	Material Description	E- Modulus E [kN/cm ²]	Shear Modulus G [kN/cm ²]	Poisson's Ratio ν [-]	Yield Stress f_{yk} [kN/cm ²]	Max. Thickness t [mm]
1	Baustahl S 275 EN 1993-1-1:2005-05	21000.00	8076.92	0.300	27.50 25.50	40.0 80.0

1.3 CROSS-SECTIONS



Sect. No.	Matl. No.	Cross-Section Description	Cross-Section Type for Classification	Max Design Ratio	Comment
1	1	RRO 100x50x5 DIN 59410:1974	Box rolled	0.80	

1.5 EFFECTIVE LENGTHS - MEMBERS

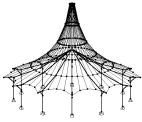
Member No.	Buckling Possible	Buckling About Axis y		Buckling About Axis z			Lateral-Torsional Buckling					
		Possible	$k_{cr,y}$	$L_{cr,y}$ [mm]	Possible	$k_{cr,z}$	$L_{cr,z}$ [mm]	Possible	k_z	k_w	L_w [mm]	L_T [mm]
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.00	100.0	<input checked="" type="checkbox"/>	1.00	100.0	<input type="checkbox"/>	1.0	1.0	100.0	100.0
2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.00	1149.8	<input checked="" type="checkbox"/>	1.00	1149.8	<input type="checkbox"/>	1.0	1.0	1149.8	1149.8
3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.00	810.0	<input checked="" type="checkbox"/>	1.00	810.0	<input type="checkbox"/>	1.0	1.0	810.0	810.0
4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.00	810.0	<input checked="" type="checkbox"/>	1.00	810.0	<input type="checkbox"/>	1.0	1.0	810.0	810.0
5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.00	2278.4	<input checked="" type="checkbox"/>	1.00	2278.4	<input type="checkbox"/>	1.0	1.0	2278.4	2278.4
6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.00	100.0	<input checked="" type="checkbox"/>	1.00	100.0	<input type="checkbox"/>	1.0	1.0	100.0	100.0

1.12 PARAMETERS - MEMBERS

Member No.	Description	Parameter
1	Cross-Section	1 - RRO 100x50x5 DIN 59410:1974
	Shear panel	<input type="checkbox"/>
	Rotational restraint	<input type="checkbox"/>
	Cross-sectional area for tension design	<input type="checkbox"/>
2	Cross-Section	1 - RRO 100x50x5 DIN 59410:1974
	Shear panel	<input type="checkbox"/>
	Rotational restraint	<input type="checkbox"/>
	Cross-sectional area for tension design	<input type="checkbox"/>
3	Cross-Section	1 - RRO 100x50x5 DIN 59410:1974
	Shear panel	<input type="checkbox"/>
	Rotational restraint	<input type="checkbox"/>
	Cross-sectional area for tension design	<input type="checkbox"/>
4	Cross-Section	1 - RRO 100x50x5 DIN 59410:1974
	Shear panel	<input type="checkbox"/>
	Rotational restraint	<input type="checkbox"/>
	Cross-sectional area for tension design	<input type="checkbox"/>
5	Cross-Section	1 - RRO 100x50x5 DIN 59410:1974
	Shear panel	<input type="checkbox"/>
	Rotational restraint	<input type="checkbox"/>
	Cross-sectional area for tension design	<input type="checkbox"/>
6	Cross-Section	1 - RRO 100x50x5 DIN 59410:1974
	Shear panel	<input type="checkbox"/>
	Rotational restraint	<input type="checkbox"/>
	Cross-sectional area for tension design	<input type="checkbox"/>

2.4 DESIGN BY MEMBER

Member No.	Location x [mm]	LC/CO/RC	Design	Acc. to Formula	
1	Cross-section No. 1 - RRO 100x50x5 DIN 59410:1974				
	0.0	LF1	0.02	≤ 1	102) Cross-section check - Compression acc. to 6.2.4
	0.0	LF1	0.02	≤ 1	301) Stability analysis - Flexural buckling about y-axis acc. to 6.3.1.1 and 6.3.1.2(4)
1	0.0	LF1	0.02	≤ 1	311) Stability analysis - Flexural buckling about z-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	Cross-section No. 1 - RRO 100x50x5 DIN 59410:1974				
	0.0	LF1	0.01	≤ 1	102) Cross-section check - Compression acc. to 6.2.4
2	0.0	LF1	0.03	≤ 1	121) Cross-section check - Shear force in z-axis acc. to 6.2.6
	0.0	LF1	0.00	≤ 1	126) Cross-section check - Shear buckling acc. to 6.2.6(6)
	1149.8	LF1	0.42	≤ 1	181) Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
3	Cross-section No. 1 - RRO 100x50x5 DIN 59410:1974				
	810.0	LF1	0.80	≤ 1	111) Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	0.0	LF1	0.04	≤ 1	121) Cross-section check - Shear force in z-axis acc. to 6.2.6
3	0.0	LF1	0.00	≤ 1	126) Cross-section check - Shear buckling acc. to 6.2.6(6)



Project: Chia

Model: Chia

Date: 18.08.2014

Dach

Dachrahmen

■ 2.4 DESIGN BY MEMBER

Member No.	Location x [mm]	LC/CO/RC	Design	Acc. to Formula		
	810.0	LF1	0.80	≤ 1	141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
4	Cross-section No. 1 - RRO 100x50x5 DIN 59410:1974					
	0.0	LF1	0.80	≤ 1	111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	810.0	LF1	0.02	≤ 1	121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	0.0	LF1	0.00	≤ 1	126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	0.0	LF1	0.80	≤ 1	141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
5	Cross-section No. 1 - RRO 100x50x5 DIN 59410:1974					
	2278.4	LF1	0.01	≤ 1	102)	Cross-section check - Compression acc. to 6.2.4
	2278.4	LF1	0.02	≤ 1	121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	0.0	LF1	0.00	≤ 1	126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	0.0	LF1	0.55	≤ 1	181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
6	Cross-section No. 1 - RRO 100x50x5 DIN 59410:1974					
	100.0	LF1	0.01	≤ 1	102)	Cross-section check - Compression acc. to 6.2.4
	100.0	LF1	0.01	≤ 1	301)	Stability analysis - Flexural buckling about y-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	100.0	LF1	0.01	≤ 1	311)	Stability analysis - Flexural buckling about z-axis acc. to 6.3.1.1 and 6.3.1.2(4)