


 ODTÜ METU	ODTÜ A BLOK ÇATI GES PROJESİ TAŞIYICI SİSTEM STATİK HESAP RAPORU	 SAYHAN
A4	P1333-C-CA-001	Rev.A

ODTÜ A BLOK ÇATI GES PROJESİ TAŞIYICI SİSTEM STATİK HESAP RAPORU



PROJE : ODTÜ A BLOK GES PROJESİ

MEVKİİ : ANKARA / ÇANKAYA

A	06/01/2023	Onay İçin	Oda No Tic.Sic.No	G. YÜKSEL		
Rev. No.	(G/A/Y)	Revizyon Açıklaması	84788 261367	Sorumlu	Revizyon	Onay



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İşbu hesap raporu 79 sayfadan oluşmaktadır.

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1 Yapı Tasarım Kriterleri

1.1 Genel Bilgiler

Projenin Adı : ODTÜ A BLOK GES PROJESİ
Yapının Yapılacağı Bölge : Ankara / Çankaya
Birim Sistemi : SI birim sistemi

1.2 Tasarıma Esas Şartnameler

Yapısal tasarım hesapları, işveren gereksinimleri ve TS (Türk Standardlarına) dayanmaktadır. Esas alınan yönetmelik ve standartlar aşağıda verilmiştir.

- TBDY 2018, Deprem Bölgelerinde Yapılacak Yapılar Hakkında Yönetmelik.
- TS 648 Çelik yapılar hakkında yönetmelik
- TS 498 Yapı yüklemeleri hakkında yönetmelik
- AA-ASD 2000 Alüminyum Yönetmeliği

1.3 Birimler

SI Uluslar arası birim sistemi kullanılacaktır..

Uzunluk : mm, cm, m
Kuvvetler : N, kN
Gerilmeler : MPa, kPa
Momentler : kN.m
Birik yükler : kN/m³
Ağırlıklar : ton

1.4 Malzeme Özellikleri



TABLE: Material Properties 03c - Aluminum Data							
Material	AlumType	Alloy	Fcy	Fty	Ftu	Fsu	SSHysType
Text	Text	Text	N/mm ²	N/mm ²	N/mm ²	N/mm ²	Text
6063T6	Wrought	6063-T6	172,37	172,37	206,84	131	Kinematic

1.5 Birim ağırlıklar

Yapı çelik ağırlığı, SAP 2000 programı tarafından, otomatik olarak hesaplanmaktadır ve bazı yapı malzemelerinin birim ağırlıkları aşağıdaki tabloda verilmiştir.

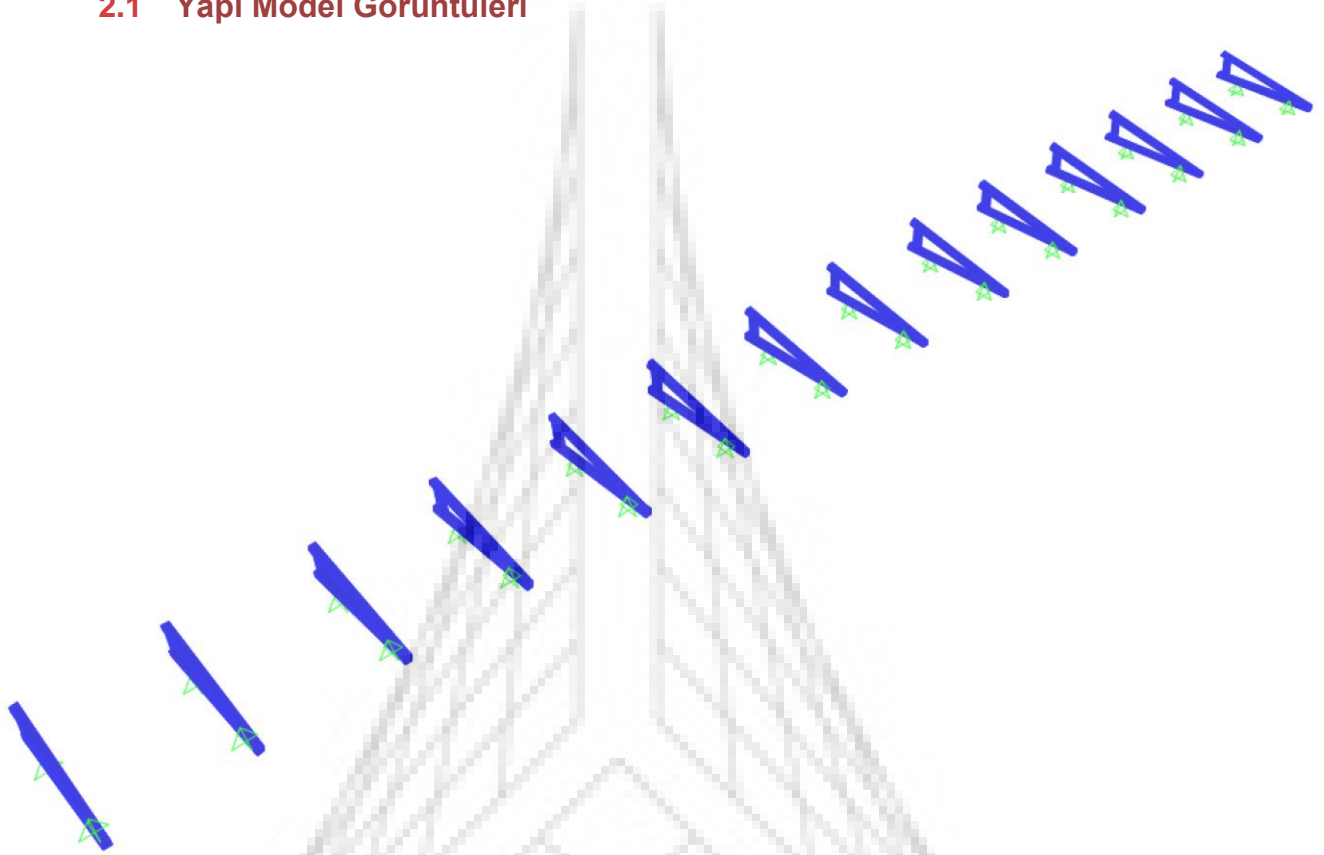
1.6 Yapı tasarımında kullanılan bilgisayar programları

“SAP 2000 v. 19.0.0” yazılımı analiz ve tasarımda kullanılmıştır.

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2 Modelin Tanımı


2.1 Yapı Model Görüntüleri



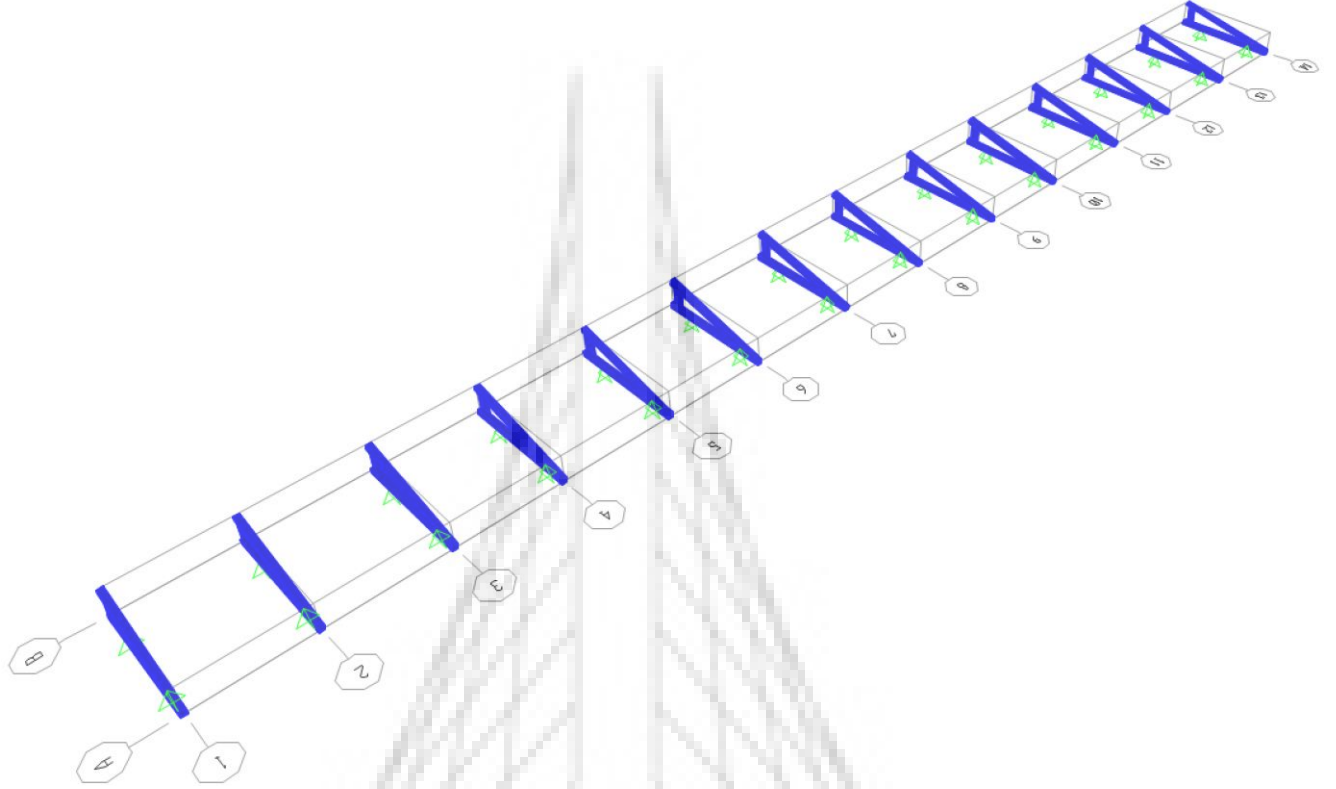
Resim 1: Taşıyıcı Sistem 3 Boyutlu Görünüş



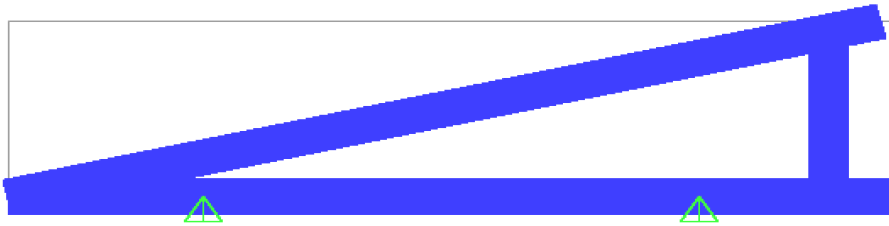
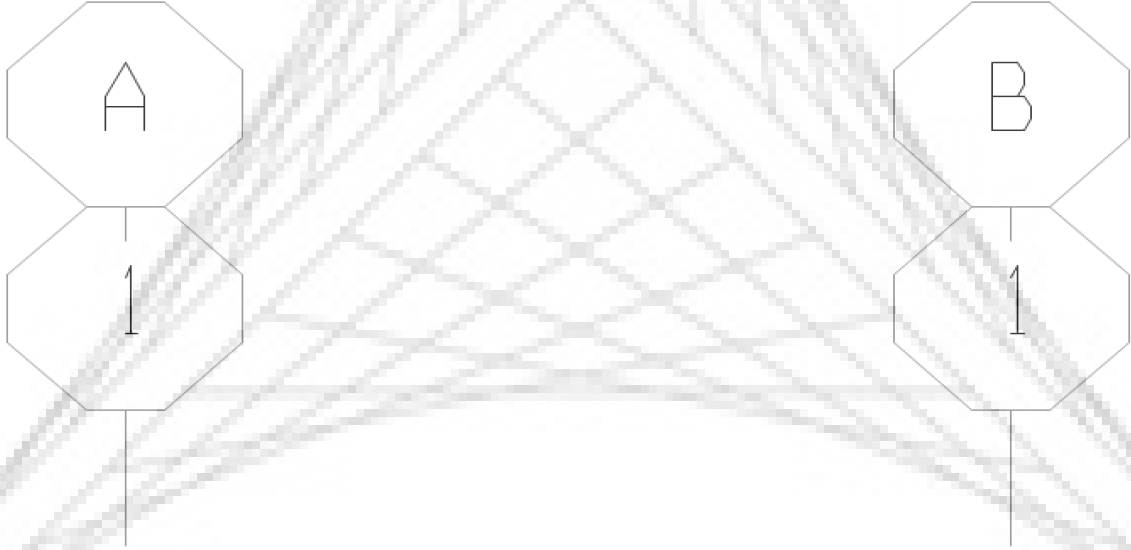
Resim 2: Taşıyıcı Sistem Yan Görünüş

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2.2 Yapı Grid Bilgileri



Resim 3: Model Grid Sistemi

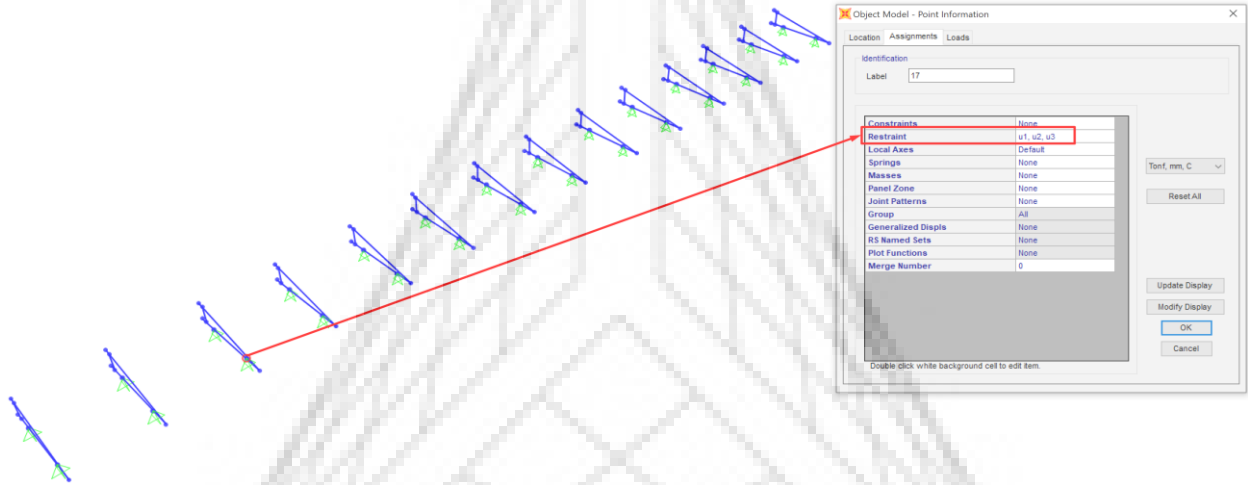


Resim 4: Model Yan Görünüş Grid Referansı





TABLE: Grid Lines							
CoordSys	AxisDir	GridID	XRYZCoord	LineType	LineColor	Visible	BubbleLoc
Text	Text	Text	mm	Text	Text	Yes/No	Text
GLOBAL	X	1	0	Primary	Gray8Dark	Yes	Start
GLOBAL	X	2	956	Primary	Gray8Dark	Yes	Start
GLOBAL	X	3	2000	Primary	Gray8Dark	Yes	Start
GLOBAL	X	4	2956	Primary	Gray8Dark	Yes	Start
GLOBAL	X	5	4000	Primary	Gray8Dark	Yes	Start
GLOBAL	X	6	4956	Primary	Gray8Dark	Yes	Start
GLOBAL	X	7	6000	Primary	Gray8Dark	Yes	Start
GLOBAL	X	8	6956	Primary	Gray8Dark	Yes	Start
GLOBAL	X	9	8000	Primary	Gray8Dark	Yes	Start
GLOBAL	X	10	8956	Primary	Gray8Dark	Yes	Start
GLOBAL	X	11	10000	Primary	Gray8Dark	Yes	Start
GLOBAL	X	12	10956	Primary	Gray8Dark	Yes	Start
GLOBAL	X	13	12000	Primary	Gray8Dark	Yes	Start
GLOBAL	X	14	12956	Primary	Gray8Dark	Yes	Start
GLOBAL	Y	A	0	Primary	Gray8Dark	Yes	Start
GLOBAL	Y	B	1137,1	Primary	Gray8Dark	Yes	Start
GLOBAL	Z	Z1	0	Primary	Gray8Dark	Yes	Start
GLOBAL	Z	Z2	258,29	Primary	Gray8Dark	Yes	Start

2.3 Model Mesnet Tanımı

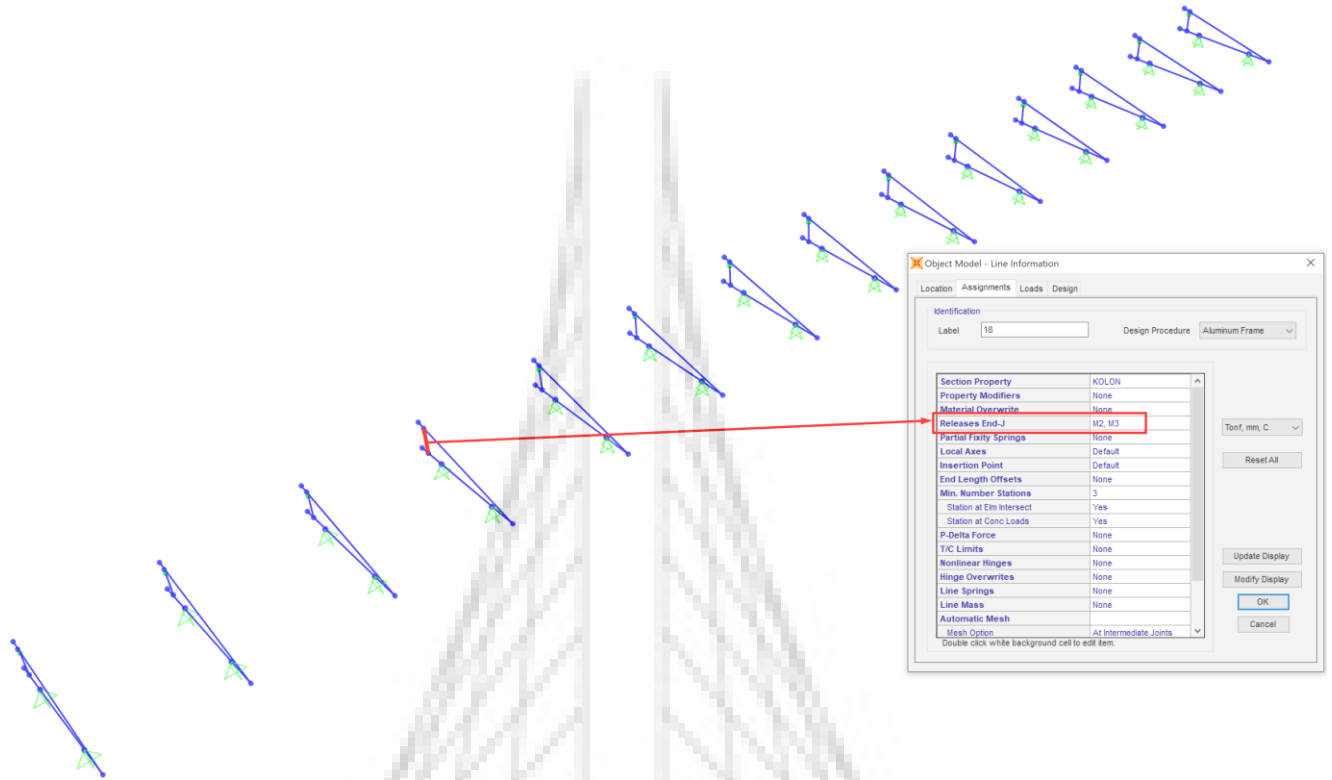


Resim 5: Mesnet Tanımı

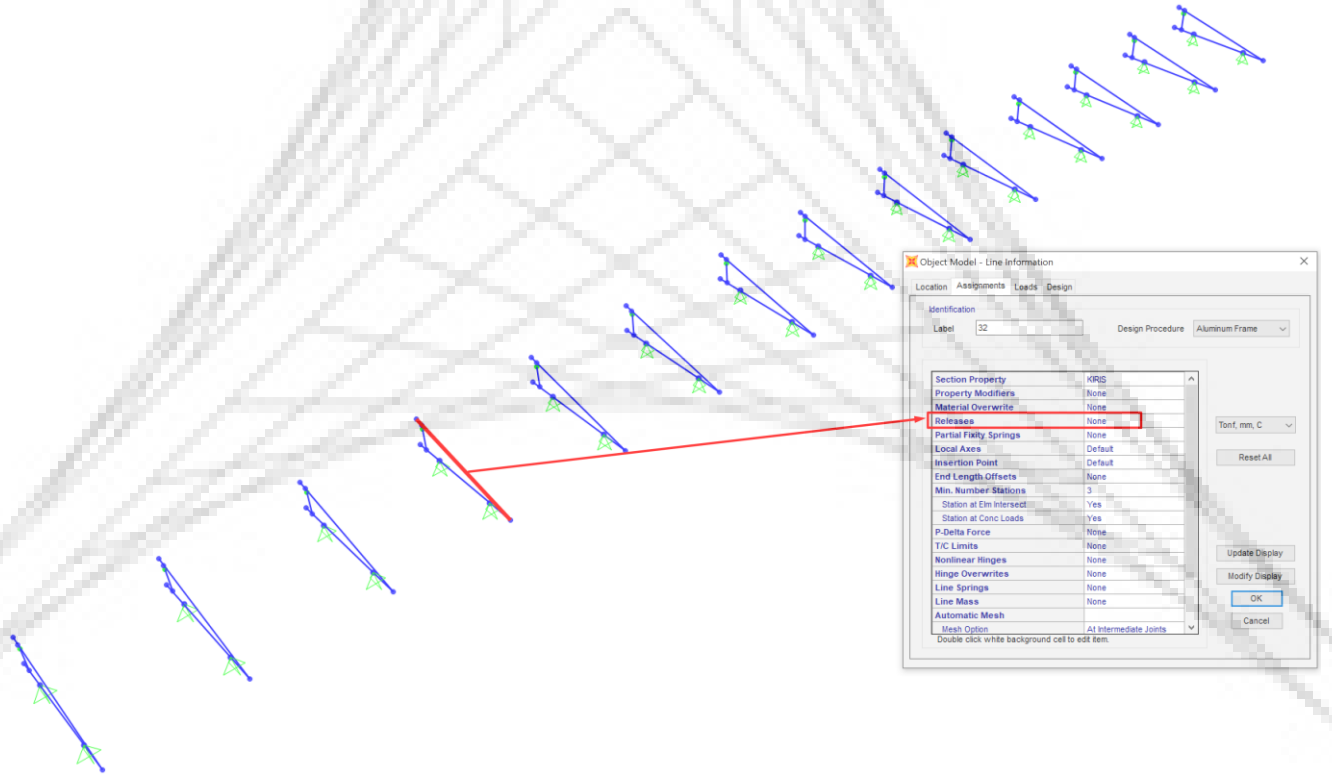
TABLE: Joint Restraint Assignments						
Joint	U1	U2	U3	R1	R2	R3
Text	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
15	Yes	Yes	Yes	No	No	No
16	Yes	Yes	Yes	No	No	No
17	Yes	Yes	Yes	No	No	No
18	Yes	Yes	Yes	No	No	No
19	Yes	Yes	Yes	No	No	No
20	Yes	Yes	Yes	No	No	No
21	Yes	Yes	Yes	No	No	No
22	Yes	Yes	Yes	No	No	No
23	Yes	Yes	Yes	No	No	No
24	Yes	Yes	Yes	No	No	No
25	Yes	Yes	Yes	No	No	No
26	Yes	Yes	Yes	No	No	No
27	Yes	Yes	Yes	No	No	No
28	Yes	Yes	Yes	No	No	No
29	Yes	Yes	Yes	No	No	No
30	Yes	Yes	Yes	No	No	No
31	Yes	Yes	Yes	No	No	No
32	Yes	Yes	Yes	No	No	No
33	Yes	Yes	Yes	No	No	No
34	Yes	Yes	Yes	No	No	No
35	Yes	Yes	Yes	No	No	No
36	Yes	Yes	Yes	No	No	No
37	Yes	Yes	Yes	No	No	No
38	Yes	Yes	Yes	No	No	No
39	Yes	Yes	Yes	No	No	No
40	Yes	Yes	Yes	No	No	No
41	Yes	Yes	Yes	No	No	No
42	Yes	Yes	Yes	No	No	No

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2.4 Yapı Model Serbestlik Bilgileri



Resim 6: Kolon Serbestlik Tanımı

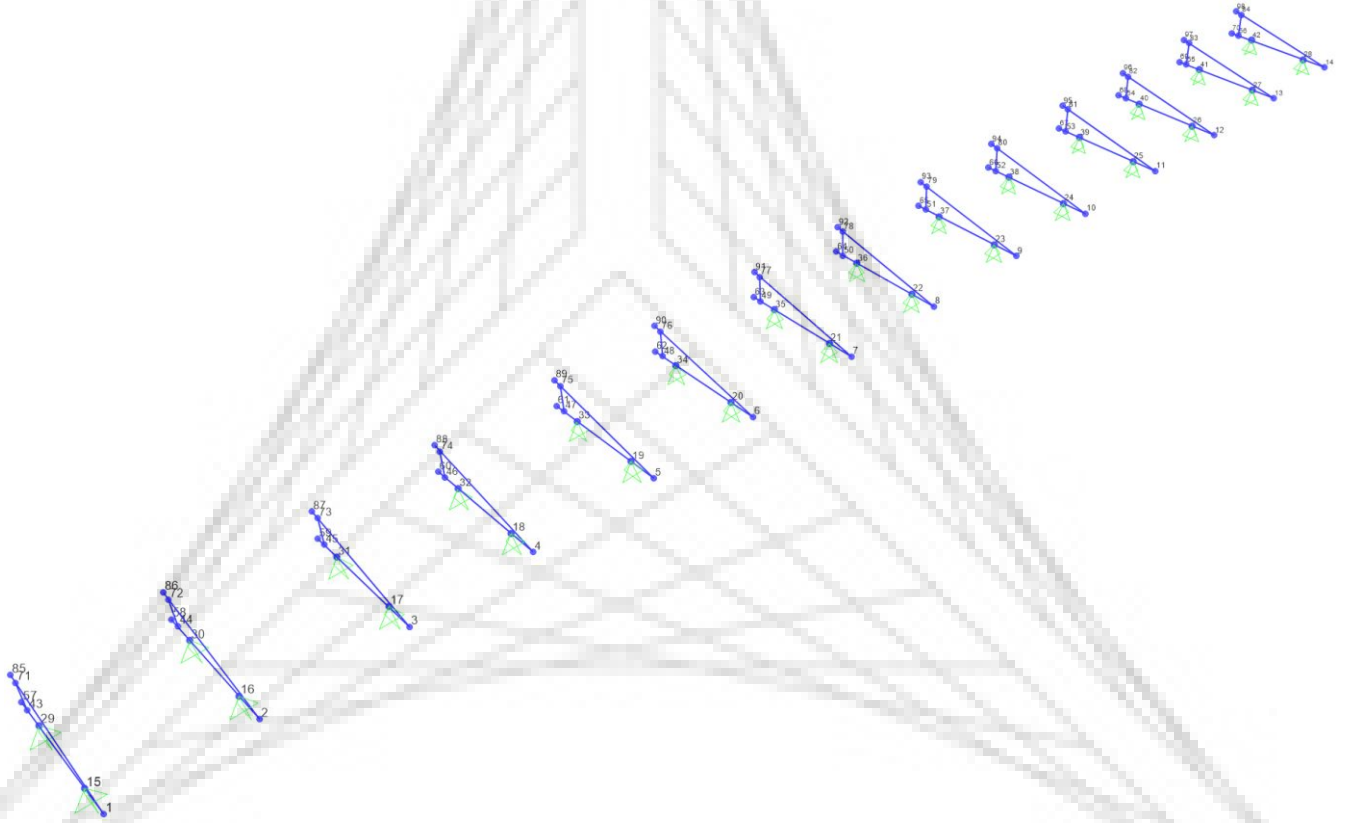


Resim 7: Kiriş Serbestlik Tanımı





TABLE: Frame Release Assignments 1 - General													
Frame	PI	V2I	V3I	T1	M2I	M3I	PJ	V2J	V3J	TJ	M2J	M3J	PartialFix
Text	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
15	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
16	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
17	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
18	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
19	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
20	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
21	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
22	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
23	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
24	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
25	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
26	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
27	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
28	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No

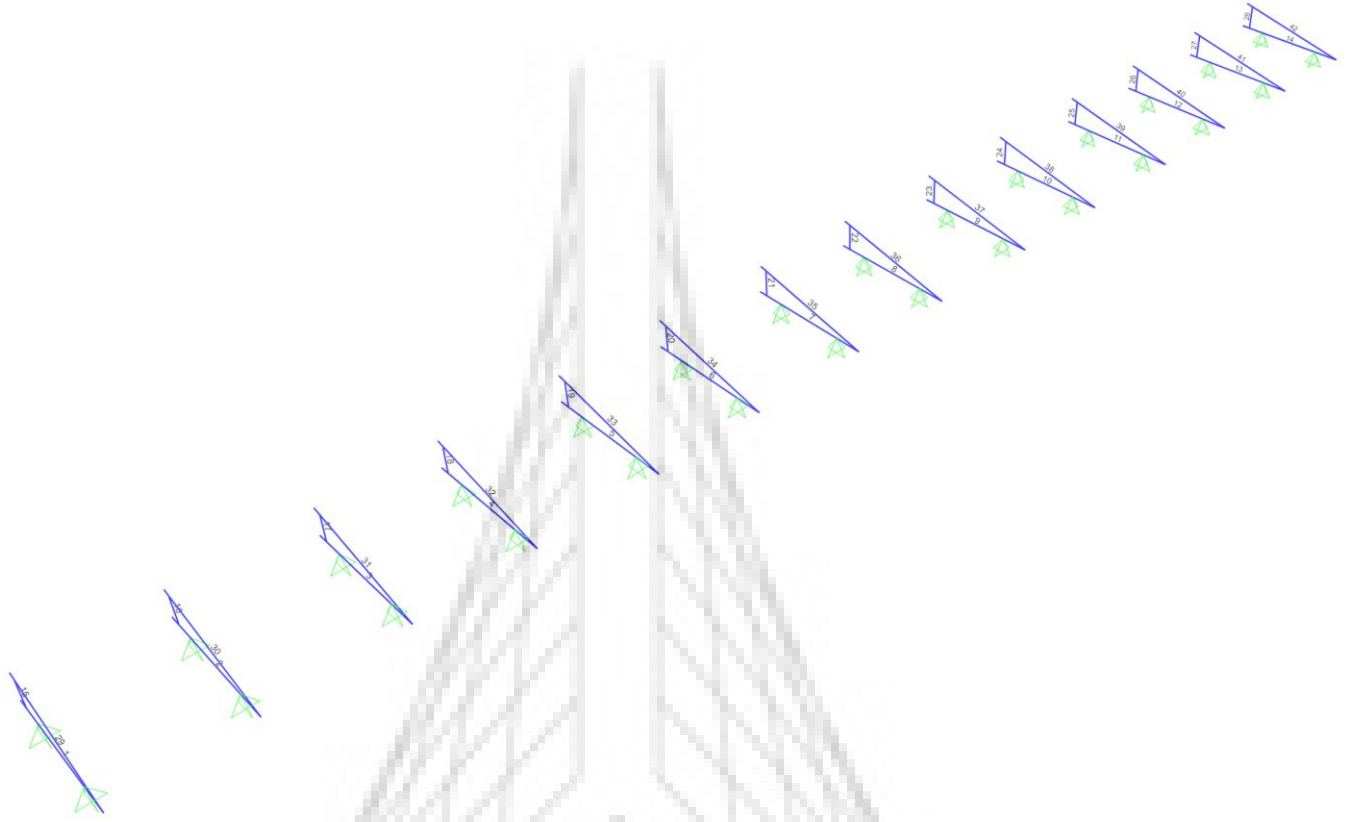
2.5 MESNET ve DÜĞÜM NOKTALARI NUMARALARI





Resim 8: Nokta Numaralari

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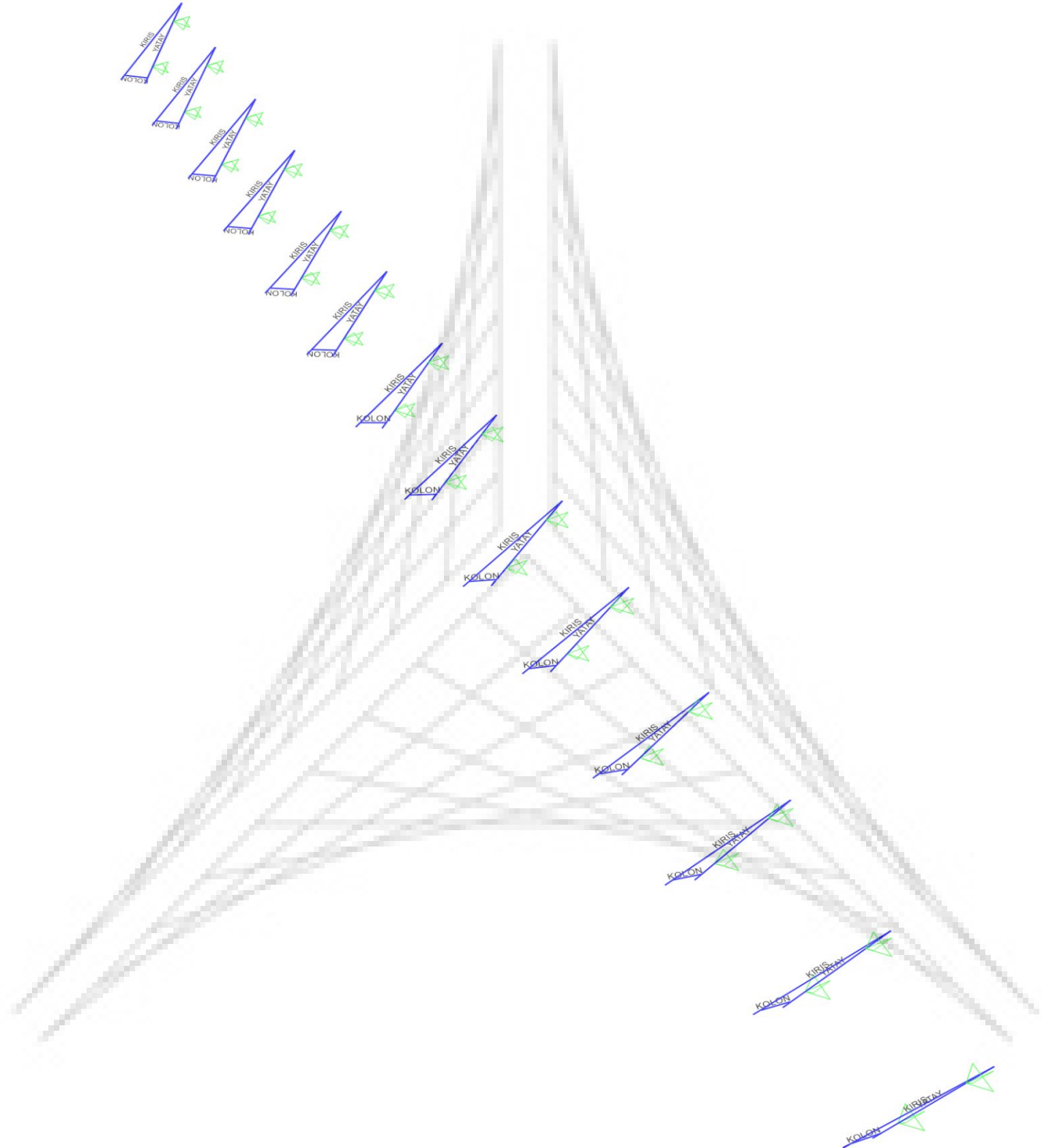
2.6 ÇUBUK ELEMAN NUMARALARI



Resim 9: Çubuk Eleman Numaralari

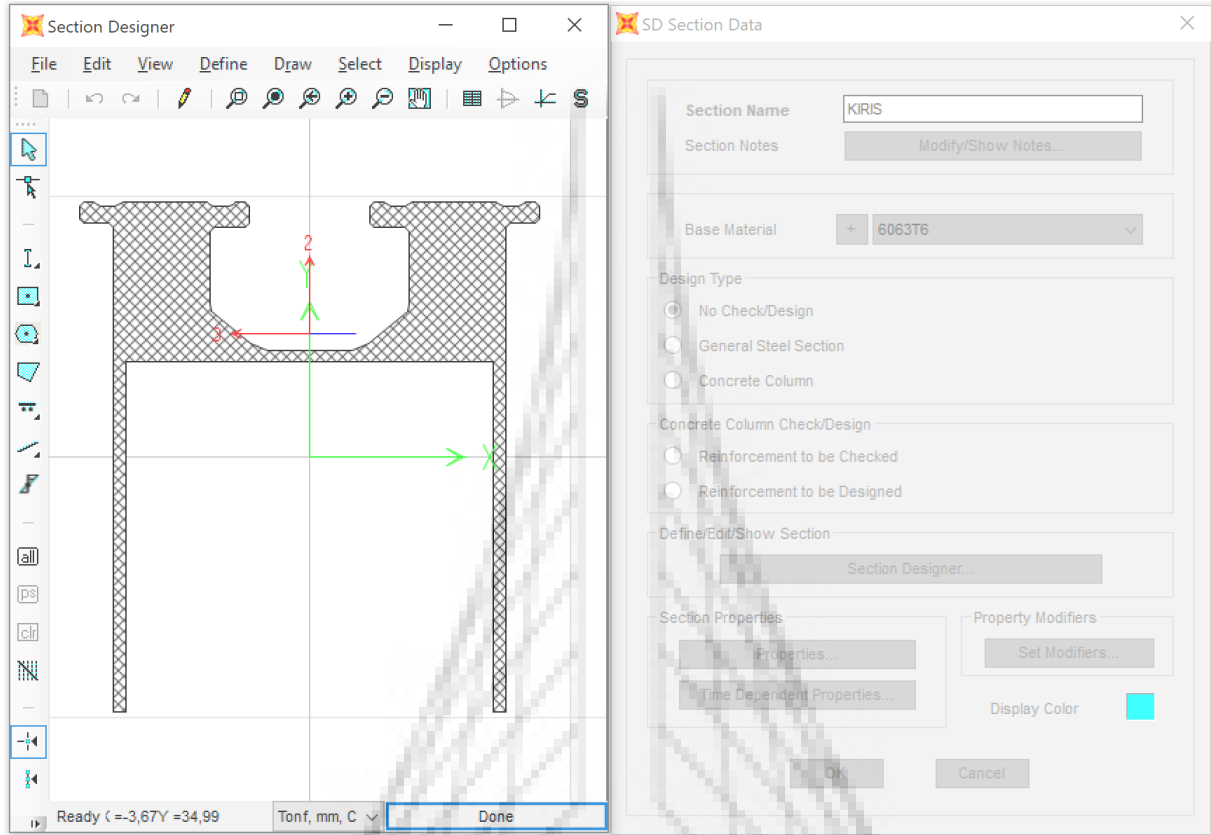
 ODTÜ METU	ODTÜ A BLOK ÇATI GES PROJESİ TAŞIYICI SİSTEM STATİK HESAP RAPORU	 SAYHAN
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2.7 Profil Kesitleri

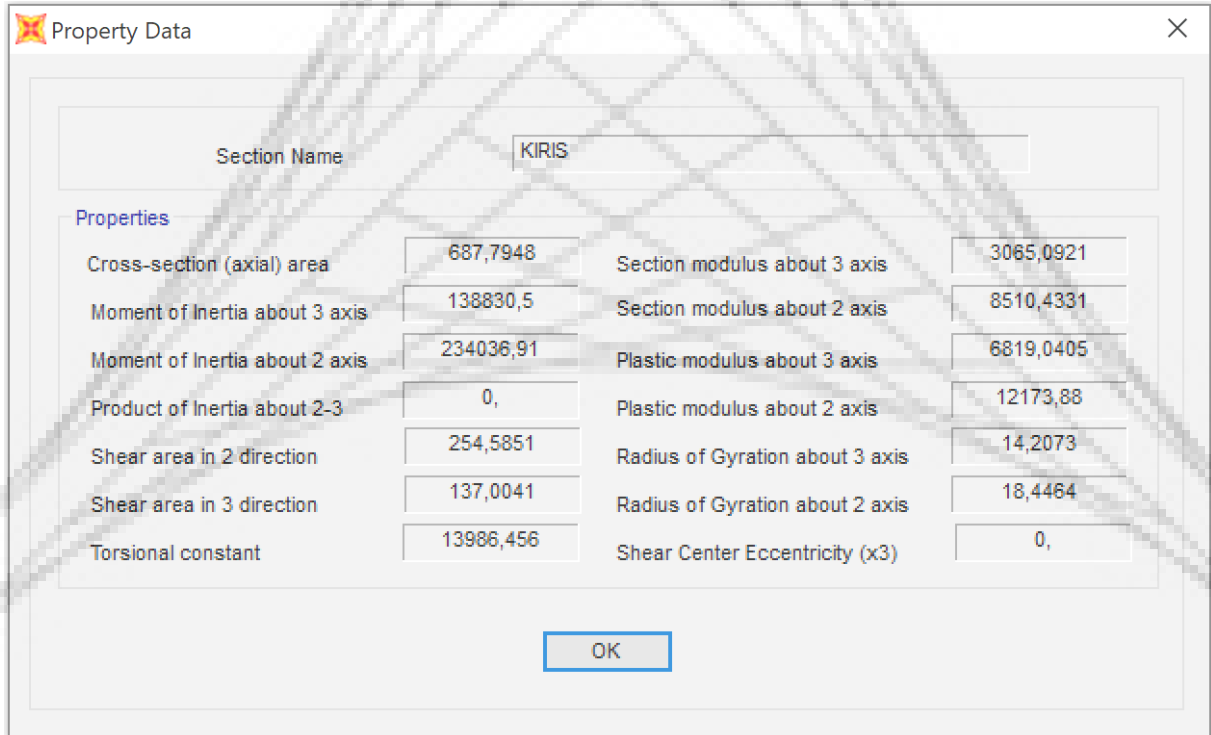


Resim 10: Kesit Detayları

ALÜMİNYUM KİRİŞ PROFİL DETAYI

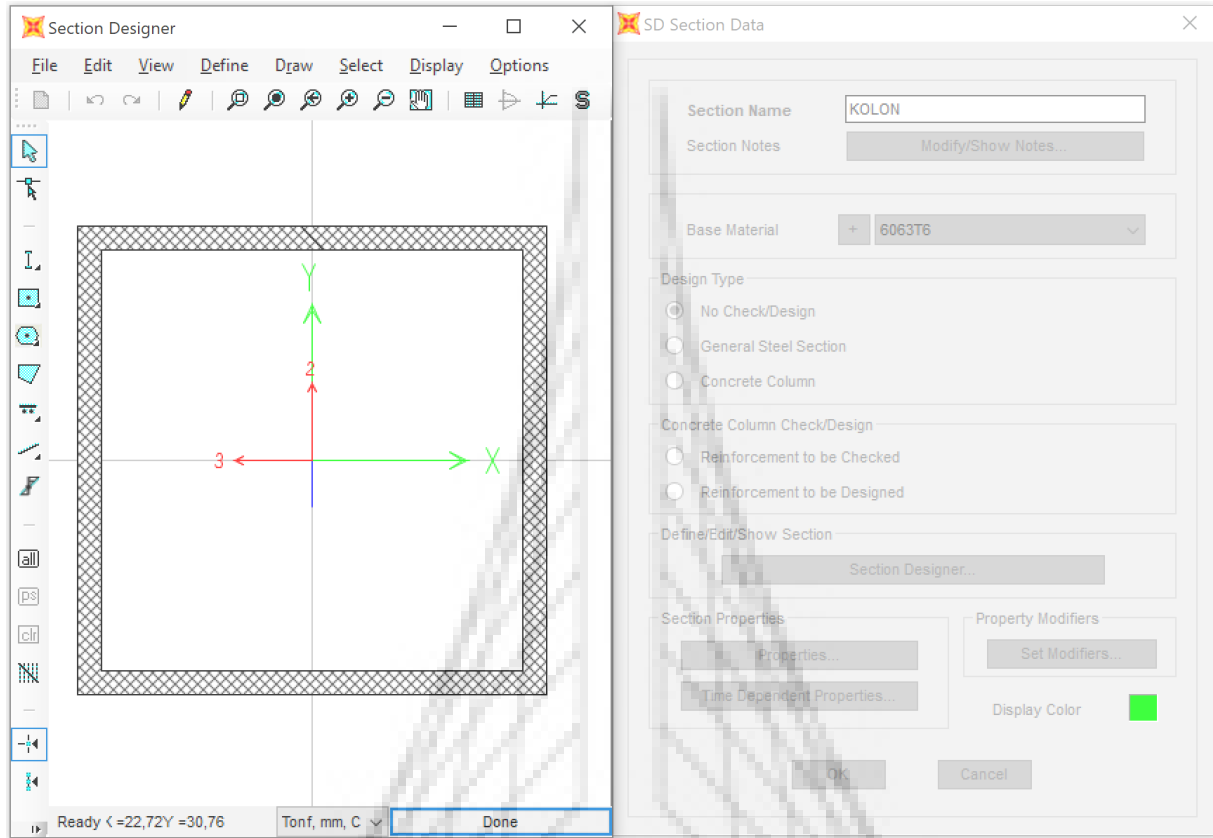


Resim 11: ALÜMİNYUM KİRİŞ Profil Kesiti

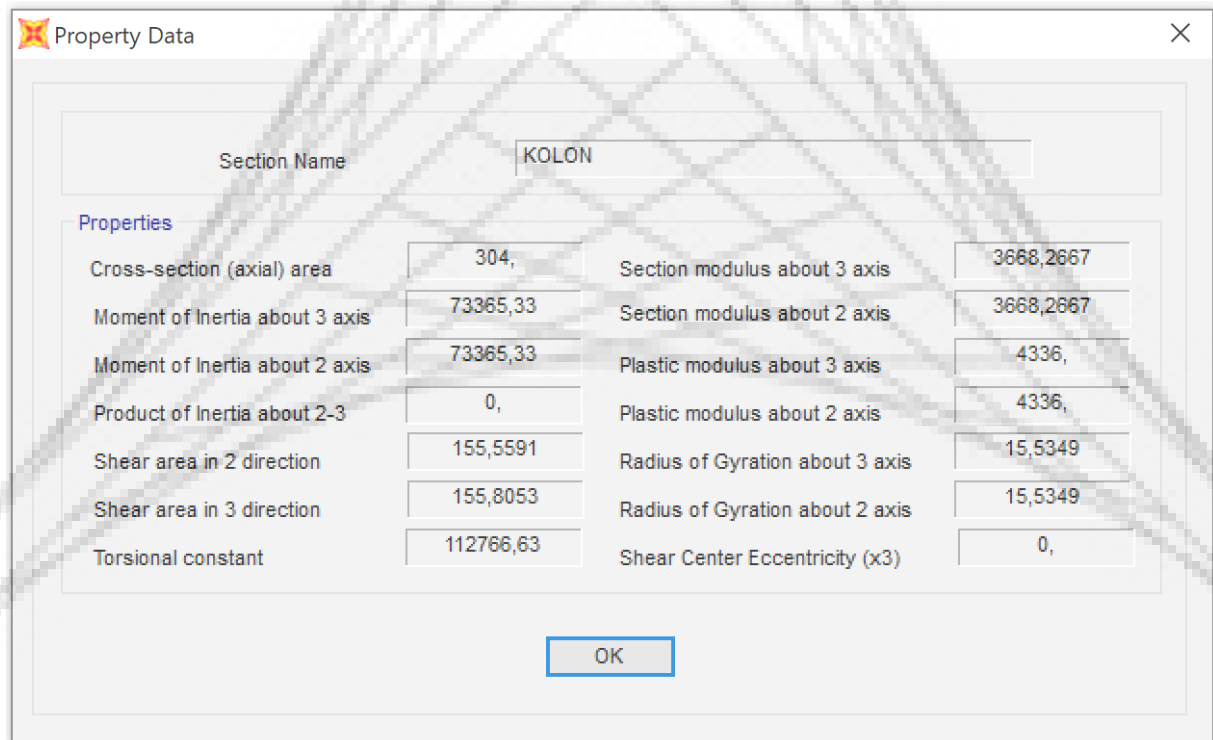


Resim 12: ALÜMİNYUM KİRİŞ Eleman Özellikleri

ALÜMİNYUM KOLON PROFİL DETAYI

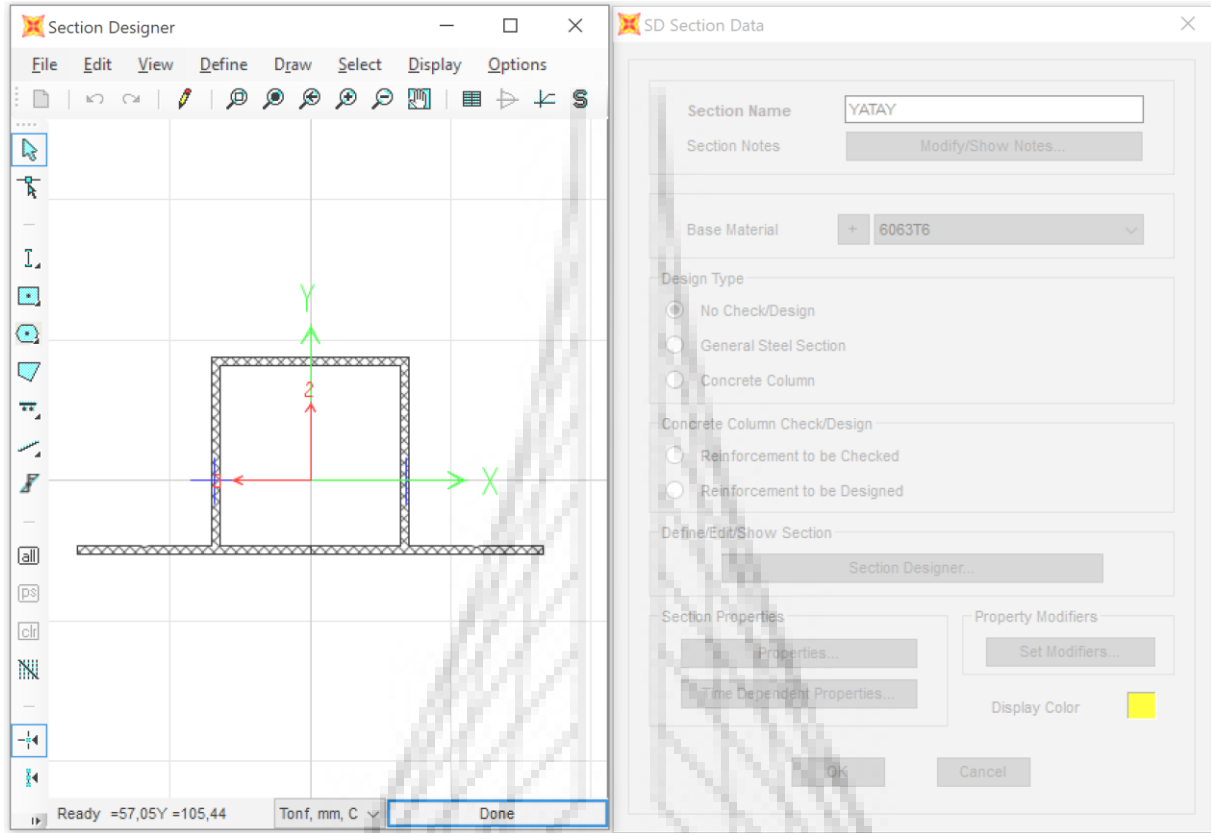


Resim 13: ALÜMİNYUM KOLON Profil Kesiti

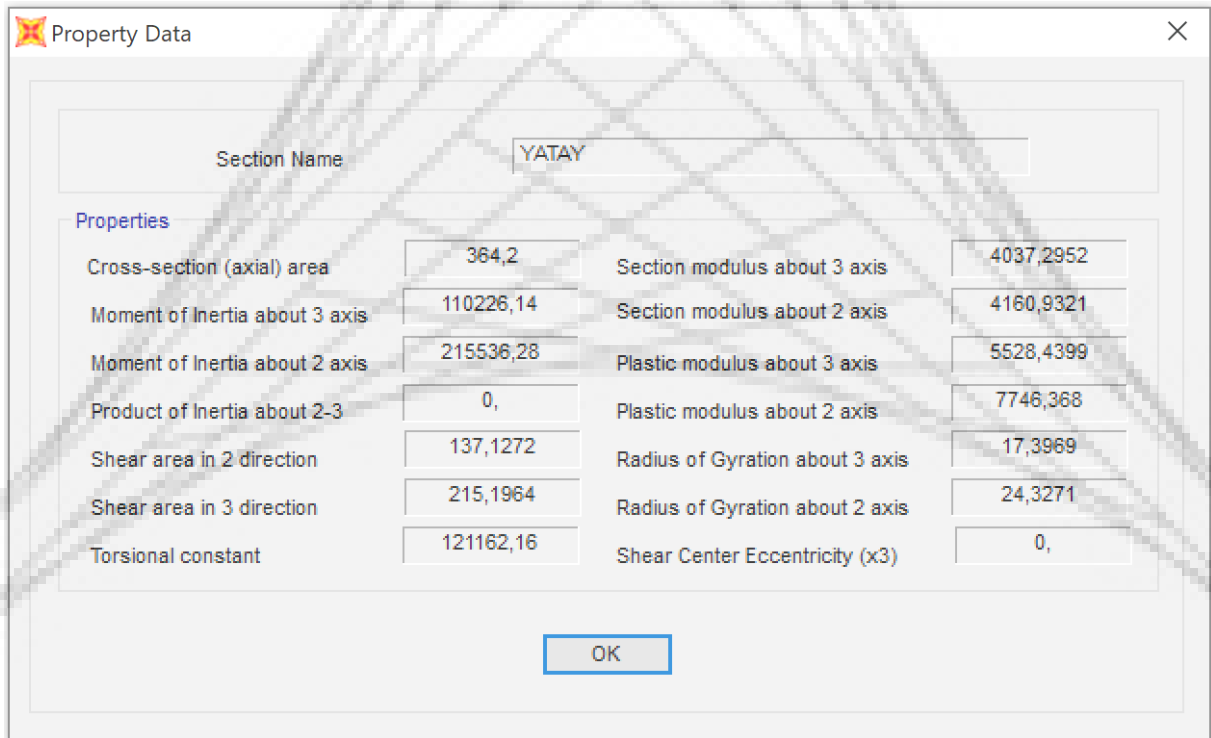


Resim 14: ALÜMİNYUM KOLON Eleman Özellikleri



ALÜMİNYUM YATAY PROFİL DETAYI



Resim 15: ALÜMİNYUM YATAY Profil Kesiti



Resim 16: ALÜMİNYUM YATAY Eleman Özellikleri

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3 Yüklemler

3.1 Zati yük yüklemesi (ZATI)

Kolon, kiriş, çapraz v.s gibi yapısal elemanların ağırlıkları, program tarafından otomatik olarak hesaplanmaktadır.

3.2 Güneş Panel Yüğü (GPY)

Yapı üzerinde güneş panelleri bulunmaktadır. Panel yüğü 22,5 kg/adet olarak belirtilmiş panel boyutları 1980 mm X 1002 mm verilmiştir. Bu yükler yatay profillere yayılı yük olarak verilmiştir.

$$22,5/(1,98*1,002)=11,34 \text{ kg/m}^2$$

$$\rightarrow q = 11,34 * (1,98/2) = 11,20 \text{ kg/m}$$

3.3 Kar Yüğü (SNOW)

Yapının yapılacağı bölge Ankara İli Çankaya İlçesi'dir. Bölgenin rakımı 934 m dir. TS 498 çizelge 4 den yararlanılarak bölgenin kar yüğü belirlenmiştir.

ÇİZELGE 4 - Zati Karyüğü (P_{ko}) Değerleri kN/m² (*)



	1	2	3	4	5
1	Yapı yerinin denizden yüksekliği	BÖLGELER			
	m	I	II	III	IV
	≤ 200	0,75	0,75	0,75	0,75
2	300	0,75	0,75	0,75	0,80
	400	0,75	0,75	0,75	0,80
	500	0,75	0,75	0,75	0,85
3	600	0,75	0,75	0,80	0,90
	700	0,75	0,75	0,85	0,95
	800	0,80	0,85	1,25	1,40
4	900	0,80	0,95	1,30	1,50
	1000	0,80	1,05	1,35	1,60
5	> 1000	1000 m'ye tekabül eden değerler, 1500 m'ye kadar %10, 1500 m'den yukarı yüksekliklerde %15 artırılır.			

* Kar yağmayan yerlerde kar yüğü hesap değeri sıfır alınır.

ANKARA	
Altındağ	II
Ayaş	I
Bala	III
Beypazarı	I
Çamlıdere	IV
Çankaya	III
Çubuk	II
Delice	III
Elmadığı	IV
Etimesgut	I
Güdül	III
Haymana	II
Kalecik	II
Keskin	III
Kırıkkale	I
Kızılcihamam	II
Nallıhan	III
Polatlı	II
Yenimahalle	I

$$q = 0,95 \text{ kN/m}^2 = 96,84 \text{ kg/m}^2 \text{ olarak belirlenmiştir.}$$

$$\rightarrow q = 96,84 * (1,98/2) = 95,90 \text{ kg/m}$$

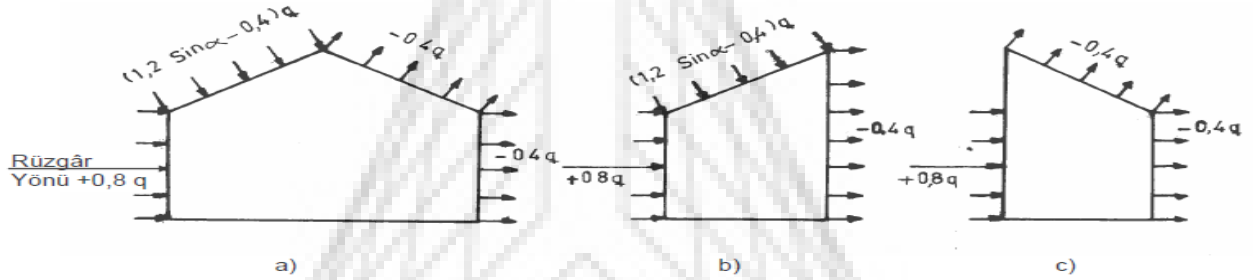
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3.4 Rüzgar Yükleri (WIND)

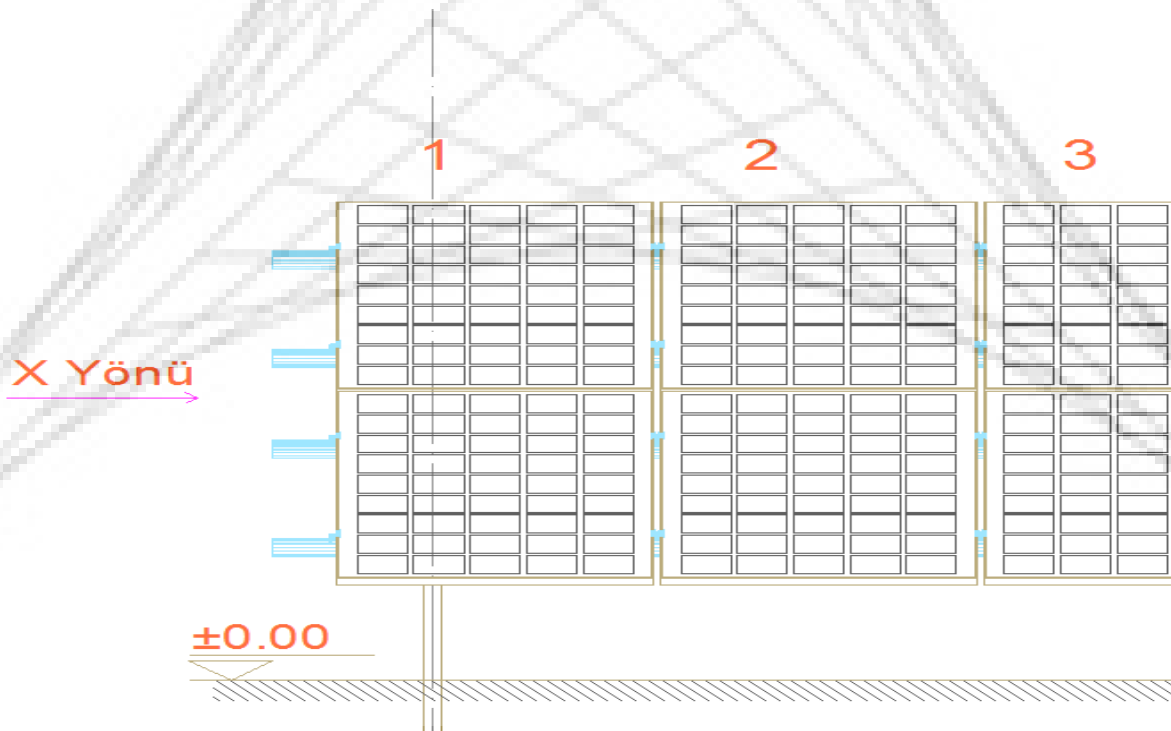
Yapının yerden yüksekliği 9-20 m aralığındadır. TS 498 çizelge 5 den yararlanılarak bölgenin rüzgar yükü belirlenmiştir.

ÇİZELGE 5 - Yüksekliğe Bağlı Olarak Rüzgar Hızı ve Emme

Zeminden Yükseklik m	Rüzgar Hızı v m/s	Emme q (kN/m ²)
0 - 8	28	0,5
9 - 20	36	0,8
21 - 100	42	1,1
> 100	46	1,3



ŞEKİL 1 - Planda Kare Kesitli ve Eğik Çatılı Kapalı Yapılarda Rüzgar Yükünün Ana Taşıyıcı Sistem Doğrultusunda Dağıtımı



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X Yönü İçin

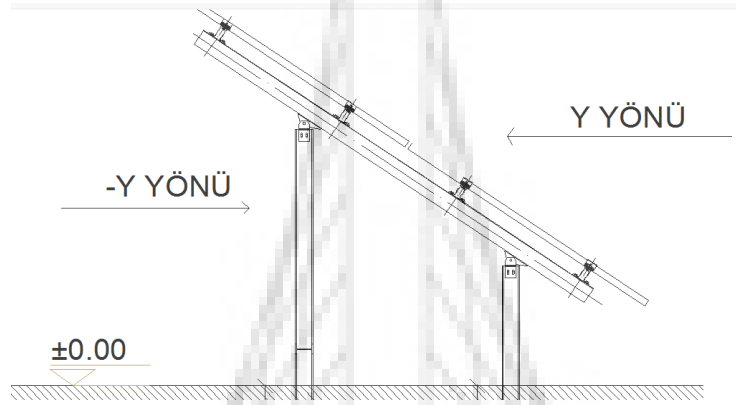
$$0,96 \cdot 0,4 = 0,384 \text{ kN/m}^2 = 39,14 \text{ kg/m}^2$$

$$\rightarrow q = 39,14 \cdot (1,98/2) = \mathbf{38,70 \text{ kg/m}}$$

(-)X Yönü İçin

$$0,96 \cdot 0,4 = 0,384 \text{ kN/m}^2 = 39,14 \text{ kg/m}^2$$

$$\rightarrow q = 39,14 \cdot (1,98/2) = \mathbf{38,70 \text{ kg/m}}$$



Y Yönü İçin

$$[1,2 \cdot \sin(13) - 0,4] \cdot 0,96 = -0,125 \text{ kN/m}^2 = -12,73 \text{ kg/m}^2$$

$$\rightarrow q = 12,73 \cdot (1,98/2) = \mathbf{12,60 \text{ kg/m}}$$

(-)Y Yönü İçin

$$0,96 \cdot 0,4 = 0,384 \text{ kN/m}^2 = 39,14 \text{ kg/m}^2$$

$$\rightarrow q = 39,14 \cdot (1,98/2) = \mathbf{38,70 \text{ kg/m}}$$

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3.5 Deprem yükü (EQ-X / EQ-Y)

29.11.2022 10:27

Sismik Tehlike Haritası Detay Raporu



Türkiye Deprem Tehlike Haritaları İnteraktif Web Uygulaması

Kullanıcı Girdileri

Rapor Başlığı:	ODTÜ A - F BLOK GES	
Deprem Yer Hareketi Düzeyi	DD-2	50 yılda aşılma olasılığı %10 (tekrarlanma periyodu 475 yıl) olan deprem yer hareketi düzeyi
Yerel Zemin Sınıfı	ZD	Orta sıkı - sıkı kum, çakıl veya çok katı kil tabakaları
Enlem:	39.895579°	
Boylam	32.781327°	

Çıktılar



$S_s = 0.335$	$S_1 = 0.119$	$PGA = 0.146$	$PGV = 10.003$
---------------	---------------	---------------	----------------

S_s : Kısa periyot harita spektral ivme katsayısı [boyutsuz]

S_1 : 1.0 saniye periyot için harita spektral ivme katsayısı [boyutsuz]

PGA : En büyük yer ivmesi [g]

PGV : En büyük yer hızı [cm/sn]

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Sismik Tehlike Haritası Detay Raporu

Yerel Zemin Sınıfları

Yerel Zemin Sınıfı	Zemin Cinsi	Üst 30 metrede ortalama		
		$(V_s)_{30}$ [m/s]	$(N_{60})_{30}$ [darbe/30 cm]	$(C_u)_{30}$ [kPa]
ZA	Sağlam, sert kayalar	> 1500	-	-
ZB	Az ayrılmış, orta sağlam kayalar	760 - 1500	-	-
ZC	Çok sıkı kum, çakıl ve sert kil tabakaları veya ayrılmış, çok çatlaklı zayıf kayalar	360 - 760	> 50	> 250
ZD	Orta sıkı - sıkı kum, çakıl veya çok katı kil tabakaları	180 - 360	15 - 50	70 - 250
ZE	Gevşek kum, çakıl veya yumuşak - katı kil tabakaları veya $PI > 20$ ve $w > \% 40$ koşullarını sağlayan toplamda 3 metreden daha kalın yumuşak kil tabakası ($C_u < 25$ kPa) içeren profiller	< 180	< 15	< 70
ZF	Sahaya özel araştırma ve değerlendirme gerektiren zeminler : 1) Deprem etkisi altında çökme ve potansiyel göçme riskine sahip zeminler (sıvılaşabilir zeminler, yüksek derecede hassas kiler, göçebilir zayıf çimentolu zeminler vb.), 2) Toplam kalınlığı 3 metreden fazla turba ve/veya organik içeriği yüksek kiler, 3) Toplam kalınlığı 8 metreden fazla olan yüksek plastisiteli ($PI > 50$) kiler , 4) Çok kalın (> 35 m) yumuşak veya orta katı kiler.			

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Sismik Tehlike Haritası Detay Raporu

Yerel Zemin Etki Katsayıları


Yerel Zemin Sınıfı	Kısa periyot bölgesi için Yerel Zemin Etki Katsayısı F_S					
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S = 1.25$	$S_S \geq 1.50$
ZA	0.8	0.8	0.8	0.8	0.8	0.8
ZB	0.9	0.9	0.9	0.9	0.9	0.9
ZC	1.3	1.3	1.2	1.2	1.2	1.2
ZD	1.6	1.4	1.2	1.1	1.0	1.0
ZE	2.4	1.7	1.3	1.1	0.9	0.8
ZF	Sahaya özel zemin davranış analizi yapılacaktır.					

Yerel Zemin Sınıfı ZD ve $S_S=0.335$ için $F_S=1.532$

Yerel Zemin Sınıfı	1.0 saniye periyot için Yerel Zemin Etki Katsayısı F_1					
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 = 0.50$	$S_1 \geq 0.60$
ZA	0.8	0.8	0.8	0.8	0.8	0.8
ZB	0.8	0.8	0.8	0.8	0.8	0.8
ZC	1.5	1.5	1.5	1.5	1.5	1.4
ZD	2.4	2.2	2.0	1.9	1.8	1.7
ZE	4.2	3.3	2.8	2.4	2.2	2.0
ZF	Sahaya özel zemin davranış analizi yapılacaktır.					

Yerel Zemin Sınıfı ZD ve $S_1=0.119$ için $F_1=2.362$

Tasarım Spektral İvme Katsayıları

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Sismik Tehlike Haritası Detay Raporu

$$S_{DS} = S_S F_S = 0.335 \times 1.532 = 0.513$$

$$S_{D1} = S_1 F_1 = 0.119 \times 2.362 = 0.281$$

S_{DS} : Kısa periyot tasarım spektral ivme katsayısı [boyutsuz]

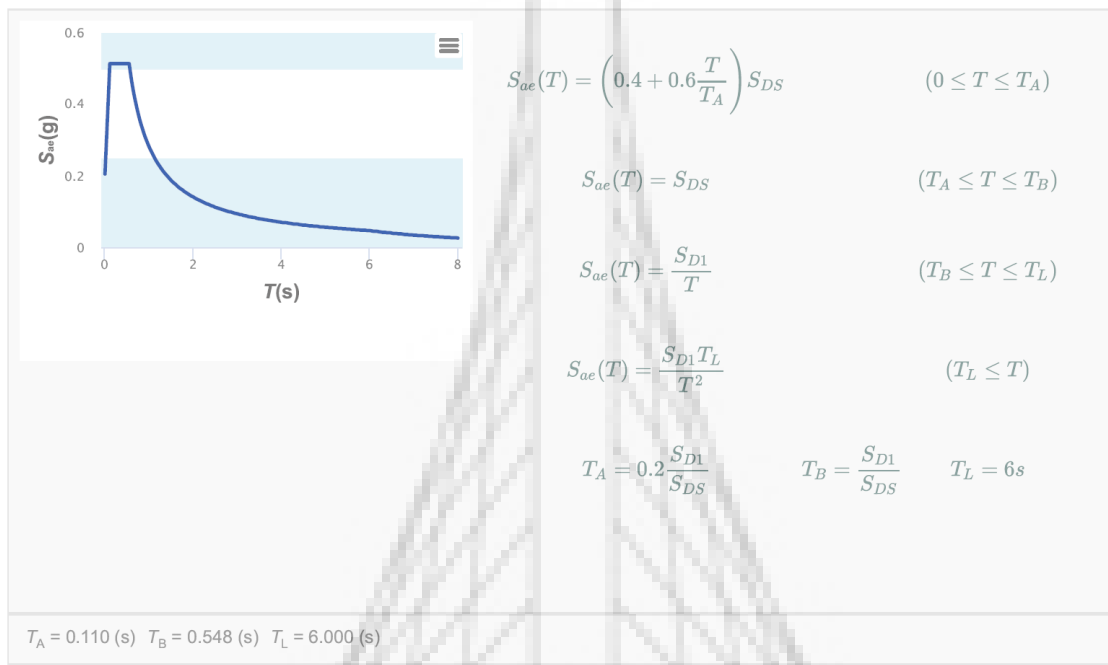
S_{D1} : 1.0 saniye periyot için tasarım spektral ivme katsayısı [boyutsuz]

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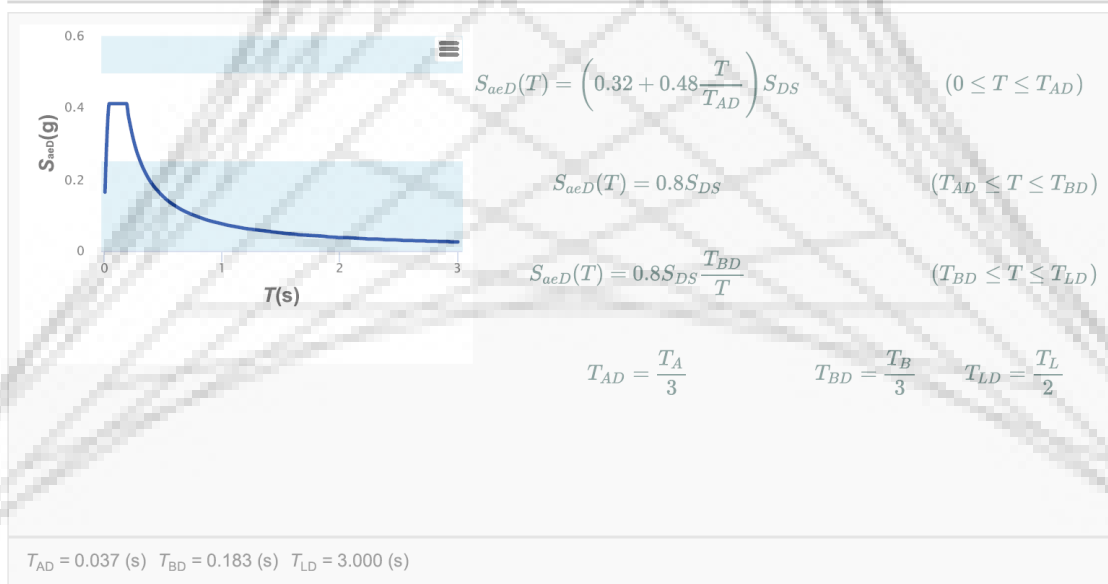
29.11.2022 10:27

Sismik Tehlike Haritası Detay Raporu

Yatay Elastik Tasarım Spektrumu



Düşey Elastik Tasarım Spektrumu



Load Case Data - Response Spectrum

Load Case Name: RESX Set Def Name Modify/Show...

Load Case Type: Response Spectrum Design...

Modal Combination

☒ CQC GMC f1: 1,
☐ SRSS GMC f2: 0,
☐ Absolute
☐ GMC
☐ NRC 10 Percent
☐ Double Sum

Periodic + Rigid Type: SRSS

Modal Load Case

Use Modes from this Modal Load Case: MODAL

☒ Standard - Acceleration Loading
☐ Advanced - Displacement Inertia Loading

Loads Applied

Load Type	Load Name	Function	Scale Factor
Accel	U1	2018 YATAY	9810,
Accel	U1	2018 YATAY	9810,

Add Modify Delete

☐ Show Advanced Load Parameters

Other Parameters

Modal Damping: Constant at 0,05 Modify/Show...

Directional Combination

☒ SRSS
☐ CQC3
☐ Absolute

Scale Factor:

Mass Source

Previous (MSSSRC1):

Diaphragm Eccentricity

Eccentricity Ratio: 0,
Override Eccentricities Override...

OK Cancel

Resim 17: X – Yönü Deprem Kuvvetinin SAP2000 Programında Response Spectrum Tanımlanması

Load Case Data - Response Spectrum

Load Case Name: RESY Set Def Name Modify/Show...

Load Case Type: Response Spectrum Design...

Modal Combination

☒ CQC GMC f1: 1,
☐ SRSS GMC f2: 0,
☐ Absolute
☐ GMC
☐ NRC 10 Percent
☐ Double Sum

Periodic + Rigid Type: SRSS

Modal Load Case

Use Modes from this Modal Load Case: MODAL

☒ Standard - Acceleration Loading
☐ Advanced - Displacement Inertia Loading

Loads Applied

Load Type	Load Name	Function	Scale Factor
Accel	U2	2018 YATAY	9810,
Accel	U2	2018 YATAY	9810,

Add Modify Delete

☐ Show Advanced Load Parameters

Other Parameters

Modal Damping: Constant at 0,05 Modify/Show...

Directional Combination

☒ SRSS
☐ CQC3
☐ Absolute

Scale Factor:

Mass Source


Previous (MSSSRC1):

Diaphragm Eccentricity

Eccentricity Ratio: 0,
Override Eccentricities Override...

OK Cancel

Resim 18: Y – Yönü Deprem Kuvvetinin SAP2000 Programında Response Spectrum Tanımlanması

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3.6 Yükleme ve yük tanımları

TABLE: Load Case Definitions								
Case Text	Type Text	InitialCond Text	ModalCase Text	BaseCase Text	MassSource Text	DesTypeOpt Text	DesignType Text	DesActOpt Text
SW	LinStatic	Zero				Prog Det	Dead	Prog Det
MODAL	LinModal	Zero				Prog Det	Other	Prog Det
G	LinStatic	Zero				Prog Det	Dead	Prog Det
Q	LinStatic	Zero				Prog Det	Live	Prog Det
QR	LinStatic	Zero				Prog Det	Roof Live	Prog Det
EXP	LinStatic	Zero				Prog Det	Quake	Prog Det
EXN	LinStatic	Zero				Prog Det	Quake	Prog Det
EYP	LinStatic	Zero				Prog Det	Quake	Prog Det
EYN	LinStatic	Zero				Prog Det	Quake	Prog Det
RESX	LinRespSpec		MODAL			Prog Det	Quake	Prog Det
RESY	LinRespSpec		MODAL			Prog Det	Quake	Prog Det
RESZ	LinRespSpec		MODAL			Prog Det	Quake	Prog Det
WXP	LinStatic	Zero				Prog Det	Wind	Prog Det
WXN	LinStatic	Zero				Prog Det	Wind	Prog Det
WYP	LinStatic	Zero				Prog Det	Wind	Prog Det
WYN	LinStatic	Zero				Prog Det	Wind	Prog Det
S	LinStatic	Zero				Prog Det	Snow	Prog Det
T	LinStatic	Zero				Prog Det	Temperature	Prog Det
H	LinStatic	Zero				Prog Det	Other	Prog Det
R	LinStatic	Zero				Prog Det	Other	Prog Det
F	LinStatic	Zero				Prog Det	Other	Prog Det

3.7 Yükleme Kombinasyonları

TABLE: Combination Definitions						
ComboName Text	ComboType Text	AutoDesign Yes/No	CaseType Text	CaseName Text	ScaleFactor Unitless	ColdDesign Text
YDKT01	Linear Add	No	Linear Static	SW	1,4	Strength
YDKT01			Linear Static	G	1,4	
YDKT01			Linear Static	F	1,4	
YDKT01			Linear Static	T	1	
YDKT02	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT02			Linear Static	G	1,2	
YDKT02			Linear Static	Q	1,6	
YDKT02			Linear Static	QR	0,5	
YDKT02			Linear Static	F	1,2	
YDKT02			Linear Static	T	1	
YDKT03	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT03			Linear Static	G	1,2	
YDKT03			Linear Static	Q	1,6	
YDKT03			Linear Static	S	0,5	
YDKT03			Linear Static	F	1,2	
YDKT03			Linear Static	T	1	
YDKT04	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT04			Linear Static	G	1,2	
YDKT04			Linear Static	Q	1,6	
YDKT04			Linear Static	R	0,5	
YDKT04			Linear Static	F	1,2	
YDKT04			Linear Static	T	1	
YDKT05	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT05			Linear Static	G	1,2	
YDKT05			Linear Static	Q	1	
YDKT05			Linear Static	QR	1,6	
YDKT05			Linear Static	F	1,2	
YDKT05			Linear Static	T	1	
YDKT06	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT06			Linear Static	G	1,2	
YDKT06			Linear Static	Q	1	
YDKT06			Linear Static	S	1,6	
YDKT06			Linear Static	F	1,2	
YDKT06			Linear Static	T	1	
YDKT07	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT07			Linear Static	G	1,2	
YDKT07			Linear Static	Q	1	
YDKT07			Linear Static	R	1,6	
YDKT07			Linear Static	F	1,2	
YDKT07			Linear Static	T	1	
YDKT08	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT08			Linear Static	G	1,2	



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Text	Text	Yes/No	Text	Text	Unitless	Text
YDKT08			Linear Static	QR	1,6	
YDKT08			Linear Static	WXP	0,8	
YDKT08			Linear Static	F	1,2	
YDKT08			Linear Static	T	1	
YDKT09	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT09			Linear Static	G	1,2	
YDKT09			Linear Static	QR	1,6	
YDKT09			Linear Static	WXN	0,8	
YDKT09			Linear Static	F	1,2	
YDKT09			Linear Static	T	1	
YDKT10	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT10			Linear Static	G	1,2	
YDKT10			Linear Static	QR	1,6	
YDKT10			Linear Static	WYP	0,8	
YDKT10			Linear Static	F	1,2	
YDKT10			Linear Static	T	1	
YDKT11	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT11			Linear Static	G	1,2	
YDKT11			Linear Static	QR	1,6	
YDKT11			Linear Static	WYN	0,8	
YDKT11			Linear Static	F	1,2	
YDKT11			Linear Static	T	1	
YDKT12	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT12			Linear Static	G	1,2	
YDKT12			Linear Static	S	1,6	
YDKT12			Linear Static	WXP	0,8	
YDKT12			Linear Static	F	1,2	
YDKT12			Linear Static	T	1	
YDKT13	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT13			Linear Static	G	1,2	
YDKT13			Linear Static	S	1,6	
YDKT13			Linear Static	WXN	0,8	
YDKT13			Linear Static	F	1,2	
YDKT13			Linear Static	T	1	
YDKT14	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT14			Linear Static	G	1,2	
YDKT14			Linear Static	S	1,6	
YDKT14			Linear Static	WYP	0,8	
YDKT14			Linear Static	F	1,2	
YDKT14			Linear Static	T	1	
YDKT15	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT15			Linear Static	G	1,2	
YDKT15			Linear Static	S	1,6	
YDKT15			Linear Static	WYN	0,8	
YDKT15			Linear Static	F	1,2	
YDKT15			Linear Static	T	1	
YDKT16	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT16			Linear Static	G	1,2	
YDKT16			Linear Static	R	1,6	
YDKT16			Linear Static	WXP	0,8	
YDKT16			Linear Static	F	1,2	
YDKT16			Linear Static	T	1	
YDKT17	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT17			Linear Static	G	1,2	
YDKT17			Linear Static	R	1,6	
YDKT17			Linear Static	WXN	0,8	
YDKT17			Linear Static	F	1,2	
YDKT17			Linear Static	T	1	
YDKT18	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT18			Linear Static	G	1,2	
YDKT18			Linear Static	R	1,6	
YDKT18			Linear Static	WYP	0,8	
YDKT18			Linear Static	F	1,2	
YDKT18			Linear Static	T	1	
YDKT19	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT19			Linear Static	G	1,2	
YDKT19			Linear Static	R	1,6	
YDKT19			Linear Static	WYN	0,8	
YDKT19			Linear Static	F	1,2	
YDKT19			Linear Static	T	1	
YDKT20	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT20			Linear Static	G	1,2	
YDKT20			Linear Static	Q	1	
YDKT20			Linear Static	QR	0,5	
YDKT20			Linear Static	WXP	1,6	
YDKT20			Linear Static	F	1,2	



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TABLE: Combination Definitions						
ComboName	ComboType	AutoDesign	CaseType	CaseName	ScaleFactor	ColdDesign
Text	Text	Yes/No	Text	Text	Unitless	Text
YDKT20			Linear Static	T	1	
YDKT21	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT21			Linear Static	G	1,2	
YDKT21			Linear Static	Q	1	
YDKT21			Linear Static	QR	0,5	
YDKT21			Linear Static	WXN	1,6	
YDKT21			Linear Static	F	1,2	
YDKT21			Linear Static	T	1	
YDKT22	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT22			Linear Static	G	1,2	
YDKT22			Linear Static	Q	1	
YDKT22			Linear Static	QR	0,5	
YDKT22			Linear Static	WYP	1,6	
YDKT22			Linear Static	F	1,2	
YDKT22			Linear Static	T	1	
YDKT23	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT23			Linear Static	G	1,2	
YDKT23			Linear Static	Q	1	
YDKT23			Linear Static	QR	0,5	
YDKT23			Linear Static	WYN	1,6	
YDKT23			Linear Static	F	1,2	
YDKT23			Linear Static	T	1	
YDKT24	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT24			Linear Static	G	1,2	
YDKT24			Linear Static	Q	1	
YDKT24			Linear Static	S	0,5	
YDKT24			Linear Static	WXP	1,6	
YDKT24			Linear Static	F	1,2	
YDKT24			Linear Static	T	1	
YDKT25	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT25			Linear Static	G	1,2	
YDKT25			Linear Static	Q	1	
YDKT25			Linear Static	S	0,5	
YDKT25			Linear Static	WXN	1,6	
YDKT25			Linear Static	F	1,2	
YDKT25			Linear Static	T	1	
YDKT26	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT26			Linear Static	G	1,2	
YDKT26			Linear Static	Q	1	
YDKT26			Linear Static	S	0,5	
YDKT26			Linear Static	WYP	1,6	
YDKT26			Linear Static	F	1,2	
YDKT26			Linear Static	T	1	
YDKT27	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT27			Linear Static	G	1,2	
YDKT27			Linear Static	Q	1	
YDKT27			Linear Static	S	0,5	
YDKT27			Linear Static	WYN	1,6	
YDKT27			Linear Static	F	1,2	
YDKT27			Linear Static	T	1	
YDKT28	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT28			Linear Static	G	1,2	
YDKT28			Linear Static	Q	1	
YDKT28			Linear Static	R	0,5	
YDKT28			Linear Static	WXP	1,6	
YDKT28			Linear Static	F	1,2	
YDKT28			Linear Static	T	1	
YDKT29	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT29			Linear Static	G	1,2	
YDKT29			Linear Static	Q	1	
YDKT29			Linear Static	R	0,5	
YDKT29			Linear Static	WXN	1,6	
YDKT29			Linear Static	F	1,2	
YDKT29			Linear Static	T	1	
YDKT30	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT30			Linear Static	G	1,2	
YDKT30			Linear Static	Q	1	
YDKT30			Linear Static	R	0,5	
YDKT30			Linear Static	WYP	1,6	
YDKT30			Linear Static	F	1,2	
YDKT30			Linear Static	T	1	
YDKT31	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT31			Linear Static	G	1,2	
YDKT31			Linear Static	Q	1	
YDKT31			Linear Static	R	0,5	
YDKT31			Linear Static	WYN	1,6	



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ComboName	ComboType	AutoDesign	CaseType	CaseName	ScaleFactor	ColdDesign
Text	Text	Yes/No	Text	Text	Unitless	Text
YDKT31			Linear Static	F	1,2	
YDKT31			Linear Static	T	1	
YDKT32	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT32			Linear Static	G	1,2	
YDKT32			Linear Static	Q	1	
YDKT32			Linear Static	S	0,2	
YDKT32			Linear Static	EXP	1	
YDKT32			Linear Static	EYP	0,3	
YDKT32			Linear Static	T	1	
YDKT33	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT33			Linear Static	G	1,2	
YDKT33			Linear Static	Q	1	
YDKT33			Linear Static	S	0,2	
YDKT33			Linear Static	EXP	1	
YDKT33			Linear Static	EYP	-0,3	
YDKT33			Linear Static	T	1	
YDKT34	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT34			Linear Static	G	1,2	
YDKT34			Linear Static	Q	1	
YDKT34			Linear Static	S	0,2	
YDKT34			Linear Static	EXP	-1	
YDKT34			Linear Static	EYP	0,3	
YDKT34			Linear Static	T	1	
YDKT35	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT35			Linear Static	G	1,2	
YDKT35			Linear Static	Q	1	
YDKT35			Linear Static	S	0,2	
YDKT35			Linear Static	EXP	-1	
YDKT35			Linear Static	EYP	-0,3	
YDKT35			Linear Static	T	1	
YDKT36	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT36			Linear Static	G	1,2	
YDKT36			Linear Static	Q	1	
YDKT36			Linear Static	S	0,2	
YDKT36			Linear Static	EXN	1	
YDKT36			Linear Static	EYN	0,3	
YDKT36			Linear Static	T	1	
YDKT37	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT37			Linear Static	G	1,2	
YDKT37			Linear Static	Q	1	
YDKT37			Linear Static	S	0,2	
YDKT37			Linear Static	EXN	1	
YDKT37			Linear Static	EYN	-0,3	
YDKT37			Linear Static	T	1	
YDKT38	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT38			Linear Static	G	1,2	
YDKT38			Linear Static	Q	1	
YDKT38			Linear Static	S	0,2	
YDKT38			Linear Static	EXN	-1	
YDKT38			Linear Static	EYN	0,3	
YDKT38			Linear Static	T	1	
YDKT39	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT39			Linear Static	G	1,2	
YDKT39			Linear Static	Q	1	
YDKT39			Linear Static	S	0,2	
YDKT39			Linear Static	EXN	-1	
YDKT39			Linear Static	EYN	-0,3	
YDKT39			Linear Static	T	1	
YDKT40	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT40			Linear Static	G	1,2	
YDKT40			Linear Static	Q	1	
YDKT40			Linear Static	S	0,2	
YDKT40			Linear Static	EYP	1	
YDKT40			Linear Static	EXP	0,3	
YDKT40			Linear Static	T	1	
YDKT41	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT41			Linear Static	G	1,2	
YDKT41			Linear Static	Q	1	
YDKT41			Linear Static	S	0,2	
YDKT41			Linear Static	EYP	1	
YDKT41			Linear Static	EXP	-0,3	
YDKT41			Linear Static	T	1	
YDKT42	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT42			Linear Static	G	1,2	
YDKT42			Linear Static	Q	1	
YDKT42			Linear Static	S	0,2	



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TABLE: Combination Definitions						
ComboName	ComboType	AutoDesign	CaseType	CaseName	ScaleFactor	ColdDesign
Text	Text	Yes/No	Text	Text	Unitless	Text
YDKT42			Linear Static	EYP	-1	
YDKT42			Linear Static	EXP	0,3	
YDKT42			Linear Static	T	1	
YDKT43	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT43			Linear Static	G	1,2	
YDKT43			Linear Static	Q	1	
YDKT43			Linear Static	S	0,2	
YDKT43			Linear Static	EYP	-1	
YDKT43			Linear Static	EXP	-0,3	
YDKT43			Linear Static	T	1	
YDKT44	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT44			Linear Static	G	1,2	
YDKT44			Linear Static	Q	1	
YDKT44			Linear Static	S	0,2	
YDKT44			Linear Static	EYN	1	
YDKT44			Linear Static	EXN	0,3	
YDKT44			Linear Static	T	1	
YDKT45	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT45			Linear Static	G	1,2	
YDKT45			Linear Static	Q	1	
YDKT45			Linear Static	S	0,2	
YDKT45			Linear Static	EYN	1	
YDKT45			Linear Static	EXN	-0,3	
YDKT45			Linear Static	T	1	
YDKT46	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT46			Linear Static	G	1,2	
YDKT46			Linear Static	Q	1	
YDKT46			Linear Static	S	0,2	
YDKT46			Linear Static	EYN	-1	
YDKT46			Linear Static	EXN	0,3	
YDKT46			Linear Static	T	1	
YDKT47	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT47			Linear Static	G	1,2	
YDKT47			Linear Static	Q	1	
YDKT47			Linear Static	S	0,2	
YDKT47			Linear Static	EYN	-1	
YDKT47			Linear Static	EXN	-0,3	
YDKT47			Linear Static	T	1	
YDKT48	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT48			Linear Static	G	1,2	
YDKT48			Linear Static	Q	1	
YDKT48			Linear Static	S	0,2	
YDKT48			Response Spectrum	RESX	1	
YDKT48			Response Spectrum	RESY	0,3	
YDKT48			Linear Static	T	1	
YDKT48			Response Spectrum	RESZ	0,3	
YDKT49	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT49			Linear Static	G	1,2	
YDKT49			Linear Static	Q	1	
YDKT49			Linear Static	S	0,2	
YDKT49			Response Spectrum	RESX	1	
YDKT49			Response Spectrum	RESY	-0,3	
YDKT49			Linear Static	T	1	
YDKT49			Response Spectrum	RESZ	0,3	
YDKT50	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT50			Linear Static	G	1,2	
YDKT50			Linear Static	Q	1	
YDKT50			Linear Static	S	0,2	
YDKT50			Response Spectrum	RESX	-1	
YDKT50			Response Spectrum	RESY	0,3	
YDKT50			Linear Static	T	1	
YDKT50			Response Spectrum	RESZ	0,3	
YDKT51	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT51			Linear Static	G	1,2	
YDKT51			Linear Static	Q	1	
YDKT51			Linear Static	S	0,2	
YDKT51			Response Spectrum	RESX	-1	
YDKT51			Response Spectrum	RESY	-0,3	
YDKT51			Linear Static	T	1	
YDKT51			Response Spectrum	RESZ	0,3	
YDKT52	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT52			Linear Static	G	1,2	
YDKT52			Linear Static	Q	1	
YDKT52			Linear Static	S	0,2	
YDKT52			Response Spectrum	RESY	1	
YDKT52			Response Spectrum	RESX	0,3	



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TABLE: Combination Definitions						
ComboName	ComboType	AutoDesign	CaseType	CaseName	ScaleFactor	ColdDesign
Text	Text	Yes/No	Text	Text	Unitless	Text
YDKT52			Linear Static	T	1	
YDKT52			Response Spectrum	RESZ	0,3	
YDKT53	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT53			Linear Static	G	1,2	
YDKT53			Linear Static	Q	1	
YDKT53			Linear Static	S	0,2	
YDKT53			Response Spectrum	RESY	1	
YDKT53			Response Spectrum	RESX	-0,3	
YDKT53			Linear Static	T	1	
YDKT53			Response Spectrum	RESZ	0,3	
YDKT54	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT54			Linear Static	G	1,2	
YDKT54			Linear Static	Q	1	
YDKT54			Linear Static	S	0,2	
YDKT54			Response Spectrum	RESY	-1	
YDKT54			Response Spectrum	RESX	0,3	
YDKT54			Linear Static	T	1	
YDKT54			Response Spectrum	RESZ	0,3	
YDKT55	Linear Add	No	Linear Static	SW	1,2	Strength
YDKT55			Linear Static	G	1,2	
YDKT55			Linear Static	Q	1	
YDKT55			Linear Static	S	0,2	
YDKT55			Response Spectrum	RESY	-1	
YDKT55			Response Spectrum	RESX	-0,3	
YDKT55			Linear Static	T	1	
YDKT55			Response Spectrum	RESZ	0,3	
YDKT56	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT56			Linear Static	G	0,9	
YDKT56			Linear Static	WXP	1,6	
YDKT56			Linear Static	T	1	
YDKT57	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT57			Linear Static	G	0,9	
YDKT57			Linear Static	WXN	1,6	
YDKT57			Linear Static	T	1	
YDKT58	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT58			Linear Static	G	0,9	
YDKT58			Linear Static	WYP	1,6	
YDKT58			Linear Static	T	1	
YDKT59	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT59			Linear Static	G	0,9	
YDKT59			Linear Static	WYN	1,6	
YDKT59			Linear Static	T	1	
YDKT60	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT60			Linear Static	G	0,9	
YDKT60			Linear Static	EXP	1	
YDKT60			Linear Static	EYP	0,3	
YDKT60			Linear Static	T	1	
YDKT61	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT61			Linear Static	G	0,9	
YDKT61			Linear Static	EXP	1	
YDKT61			Linear Static	EYP	-0,3	
YDKT61			Linear Static	T	1	
YDKT62	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT62			Linear Static	G	0,9	
YDKT62			Linear Static	EXP	-1	
YDKT62			Linear Static	EYP	0,3	
YDKT62			Linear Static	T	1	
YDKT63	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT63			Linear Static	G	0,9	
YDKT63			Linear Static	EXP	-1	
YDKT63			Linear Static	EYP	-0,3	
YDKT63			Linear Static	T	1	
YDKT64	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT64			Linear Static	G	0,9	
YDKT64			Linear Static	EXN	1	
YDKT64			Linear Static	EYN	0,3	
YDKT64			Linear Static	T	1	
YDKT65	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT65			Linear Static	G	0,9	
YDKT65			Linear Static	EXN	1	
YDKT65			Linear Static	EYN	-0,3	
YDKT65			Linear Static	T	1	
YDKT66	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT66			Linear Static	G	0,9	
YDKT66			Linear Static	EXN	-1	
YDKT66			Linear Static	EYN	0,3	



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TABLE: Combination Definitions						
ComboName	ComboType	AutoDesign	CaseType	CaseName	ScaleFactor	ColdDesign
Text	Text	Yes/No	Text	Text	Unitless	Text
YDKT66			Linear Static	T	1	
YDKT67	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT67			Linear Static	G	0,9	
YDKT67			Linear Static	EXN	-1	
YDKT67			Linear Static	EYN	-0,3	
YDKT67			Linear Static	T	1	
YDKT68	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT68			Linear Static	G	0,9	
YDKT68			Linear Static	EYP	1	
YDKT68			Linear Static	EXP	0,3	
YDKT68			Linear Static	T	1	
YDKT69	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT69			Linear Static	G	0,9	
YDKT69			Linear Static	EYP	1	
YDKT69			Linear Static	EXP	-0,3	
YDKT69			Linear Static	T	1	
YDKT70	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT70			Linear Static	G	0,9	
YDKT70			Linear Static	EYP	-1	
YDKT70			Linear Static	EXP	0,3	
YDKT70			Linear Static	T	1	
YDKT71	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT71			Linear Static	G	0,9	
YDKT71			Linear Static	EYP	-1	
YDKT71			Linear Static	EXP	-0,3	
YDKT71			Linear Static	T	1	
YDKT72	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT72			Linear Static	G	0,9	
YDKT72			Linear Static	EYN	1	
YDKT72			Linear Static	EXN	0,3	
YDKT72			Linear Static	T	1	
YDKT73	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT73			Linear Static	G	0,9	
YDKT73			Linear Static	EYN	1	
YDKT73			Linear Static	EXN	-0,3	
YDKT73			Linear Static	T	1	
YDKT74	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT74			Linear Static	G	0,9	
YDKT74			Linear Static	EYN	-1	
YDKT74			Linear Static	EXN	0,3	
YDKT74			Linear Static	T	1	
YDKT75	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT75			Linear Static	G	0,9	
YDKT75			Linear Static	EYN	-1	
YDKT75			Linear Static	EXN	-0,3	
YDKT75			Linear Static	T	1	
YDKT76	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT76			Linear Static	G	0,9	
YDKT76			Response Spectrum	RESX	1	
YDKT76			Response Spectrum	RESY	0,3	
YDKT76			Linear Static	T	1	
YDKT77	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT77			Linear Static	G	0,9	
YDKT77			Response Spectrum	RESX	1	
YDKT77			Response Spectrum	RESY	-0,3	
YDKT77			Linear Static	T	1	
YDKT78	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT78			Linear Static	G	0,9	
YDKT78			Response Spectrum	RESX	-1	
YDKT78			Response Spectrum	RESY	0,3	
YDKT78			Linear Static	T	1	
YDKT79	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT79			Linear Static	G	0,9	
YDKT79			Response Spectrum	RESX	-1	
YDKT79			Response Spectrum	RESY	-0,3	
YDKT79			Linear Static	T	1	
YDKT80	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT80			Linear Static	G	0,9	
YDKT80			Response Spectrum	RESY	1	
YDKT80			Response Spectrum	RESX	0,3	
YDKT80			Linear Static	T	1	
YDKT81	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT81			Linear Static	G	0,9	
YDKT81			Response Spectrum	RESY	1	
YDKT81			Response Spectrum	RESX	-0,3	
YDKT81			Linear Static	T	1	



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TABLE: Combination Definitions						
ComboName	ComboType	AutoDesign	CaseType	CaseName	ScaleFactor	ColdDesign
Text	Text	Yes/No	Text	Text	Unitless	Text
YDKT82	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT82			Linear Static	G	0,9	
YDKT82			Response Spectrum	RESY	-1	
YDKT82			Response Spectrum	RESX	0,3	
YDKT82			Linear Static	T	1	
YDKT83	Linear Add	No	Linear Static	SW	0,9	Strength
YDKT83			Linear Static	G	0,9	
YDKT83			Response Spectrum	RESY	-1	
YDKT83			Response Spectrum	RESX	-0,3	
YDKT83			Linear Static	T	1	
ENVEYDKT	Envelope	No	Response Combo	YDKT01	1	None
ENVEYDKT			Response Combo	YDKT02	1	
ENVEYDKT			Response Combo	YDKT03	1	
ENVEYDKT			Response Combo	YDKT04	1	
ENVEYDKT			Response Combo	YDKT05	1	
ENVEYDKT			Response Combo	YDKT06	1	
ENVEYDKT			Response Combo	YDKT07	1	
ENVEYDKT			Response Combo	YDKT08	1	
ENVEYDKT			Response Combo	YDKT09	1	
ENVEYDKT			Response Combo	YDKT10	1	
ENVEYDKT			Response Combo	YDKT11	1	
ENVEYDKT			Response Combo	YDKT12	1	
ENVEYDKT			Response Combo	YDKT13	1	
ENVEYDKT			Response Combo	YDKT14	1	
ENVEYDKT			Response Combo	YDKT15	1	
ENVEYDKT			Response Combo	YDKT16	1	
ENVEYDKT			Response Combo	YDKT17	1	
ENVEYDKT			Response Combo	YDKT18	1	
ENVEYDKT			Response Combo	YDKT19	1	
ENVEYDKT			Response Combo	YDKT20	1	
ENVEYDKT			Response Combo	YDKT21	1	
ENVEYDKT			Response Combo	YDKT22	1	
ENVEYDKT			Response Combo	YDKT23	1	
ENVEYDKT			Response Combo	YDKT24	1	
ENVEYDKT			Response Combo	YDKT25	1	
ENVEYDKT			Response Combo	YDKT26	1	
ENVEYDKT			Response Combo	YDKT27	1	
ENVEYDKT			Response Combo	YDKT28	1	
ENVEYDKT			Response Combo	YDKT29	1	
ENVEYDKT			Response Combo	YDKT30	1	
ENVEYDKT			Response Combo	YDKT31	1	
ENVEYDKT			Response Combo	YDKT32	1	
ENVEYDKT			Response Combo	YDKT33	1	
ENVEYDKT			Response Combo	YDKT34	1	
ENVEYDKT			Response Combo	YDKT35	1	
ENVEYDKT			Response Combo	YDKT36	1	
ENVEYDKT			Response Combo	YDKT37	1	
ENVEYDKT			Response Combo	YDKT38	1	
ENVEYDKT			Response Combo	YDKT39	1	
ENVEYDKT			Response Combo	YDKT40	1	
ENVEYDKT			Response Combo	YDKT41	1	
ENVEYDKT			Response Combo	YDKT42	1	
ENVEYDKT			Response Combo	YDKT43	1	
ENVEYDKT			Response Combo	YDKT44	1	
ENVEYDKT			Response Combo	YDKT45	1	
ENVEYDKT			Response Combo	YDKT46	1	
ENVEYDKT			Response Combo	YDKT47	1	
ENVEYDKT			Response Combo	YDKT48	1	
ENVEYDKT			Response Combo	YDKT49	1	
ENVEYDKT			Response Combo	YDKT50	1	
ENVEYDKT			Response Combo	YDKT51	1	
ENVEYDKT			Response Combo	YDKT52	1	
ENVEYDKT			Response Combo	YDKT53	1	
ENVEYDKT			Response Combo	YDKT54	1	
ENVEYDKT			Response Combo	YDKT55	1	
ENVEYDKT			Response Combo	YDKT56	1	
ENVEYDKT			Response Combo	YDKT57	1	
ENVEYDKT			Response Combo	YDKT58	1	
ENVEYDKT			Response Combo	YDKT59	1	
ENVEYDKT			Response Combo	YDKT60	1	
ENVEYDKT			Response Combo	YDKT61	1	
ENVEYDKT			Response Combo	YDKT62	1	
ENVEYDKT			Response Combo	YDKT63	1	
ENVEYDKT			Response Combo	YDKT64	1	
ENVEYDKT			Response Combo	YDKT65	1	
ENVEYDKT			Response Combo	YDKT66	1	



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
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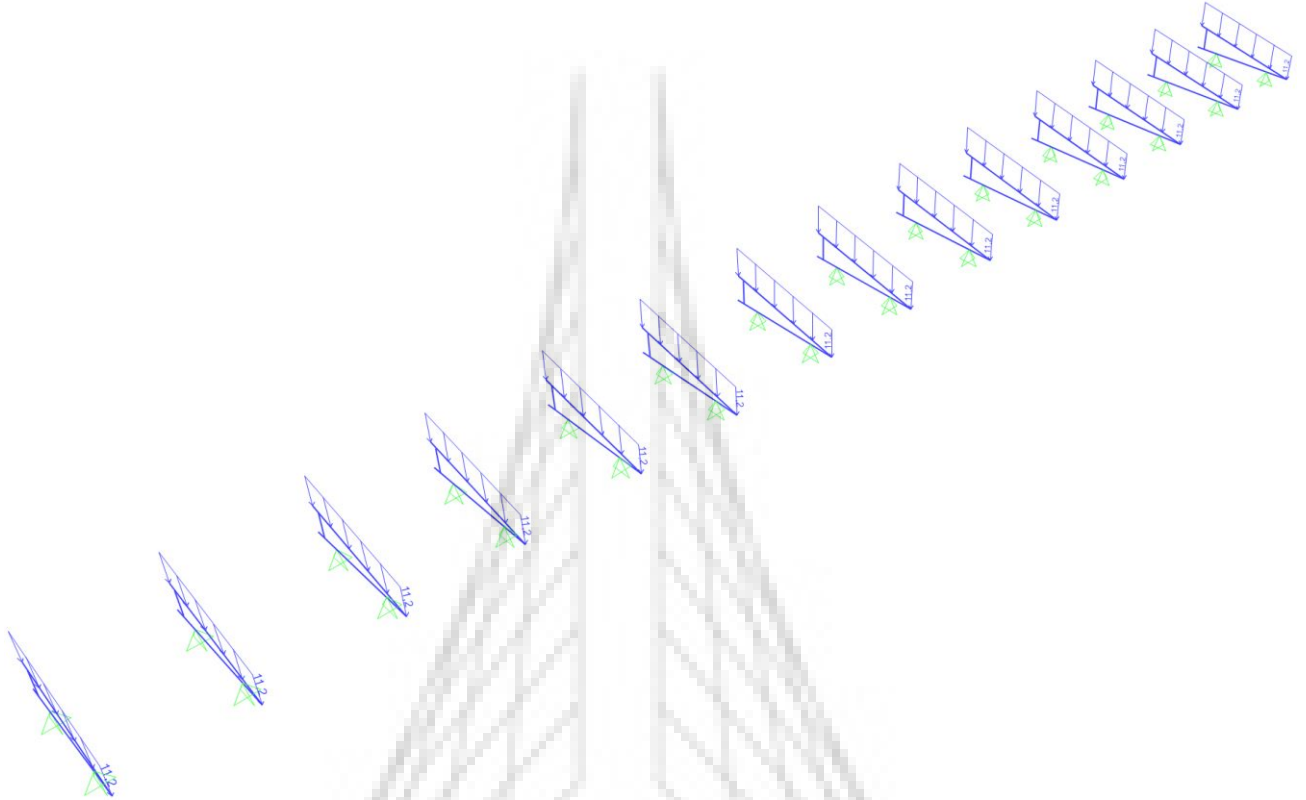
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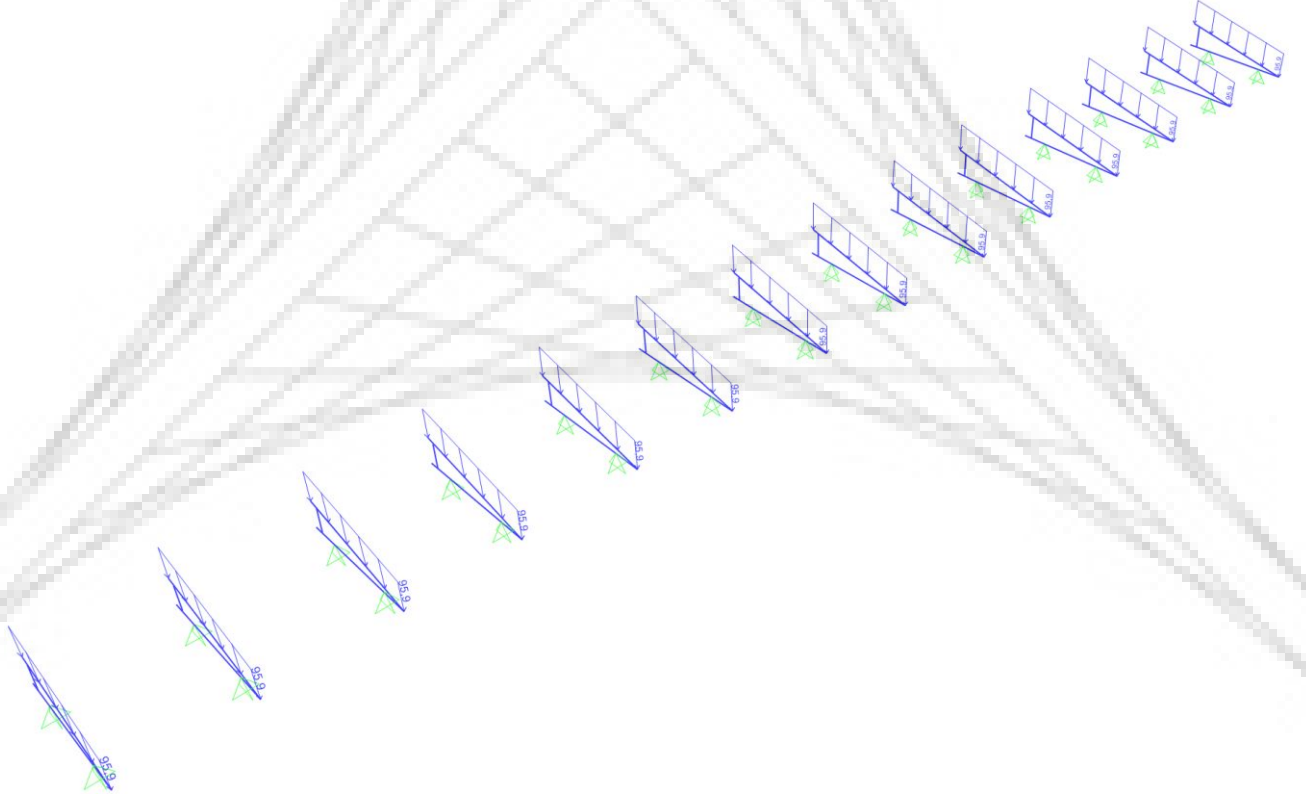
TABLE: Combination Definitions						
ComboName	ComboType	AutoDesign	CaseType	CaseName	ScaleFactor	ColdDesign
Text	Text	Yes/No	Text	Text	Unitless	Text
ENVEYDKT			Response Combo	YDKT67	1	
ENVEYDKT			Response Combo	YDKT68	1	
ENVEYDKT			Response Combo	YDKT69	1	
ENVEYDKT			Response Combo	YDKT70	1	
ENVEYDKT			Response Combo	YDKT71	1	
ENVEYDKT			Response Combo	YDKT72	1	
ENVEYDKT			Response Combo	YDKT73	1	
ENVEYDKT			Response Combo	YDKT74	1	
ENVEYDKT			Response Combo	YDKT75	1	
ENVEYDKT			Response Combo	YDKT76	1	
ENVEYDKT			Response Combo	YDKT77	1	
ENVEYDKT			Response Combo	YDKT78	1	
ENVEYDKT			Response Combo	YDKT79	1	
ENVEYDKT			Response Combo	YDKT80	1	
ENVEYDKT			Response Combo	YDKT81	1	
ENVEYDKT			Response Combo	YDKT82	1	
ENVEYDKT			Response Combo	YDKT83	1	

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
3.8 Yükleme Görüntüleri

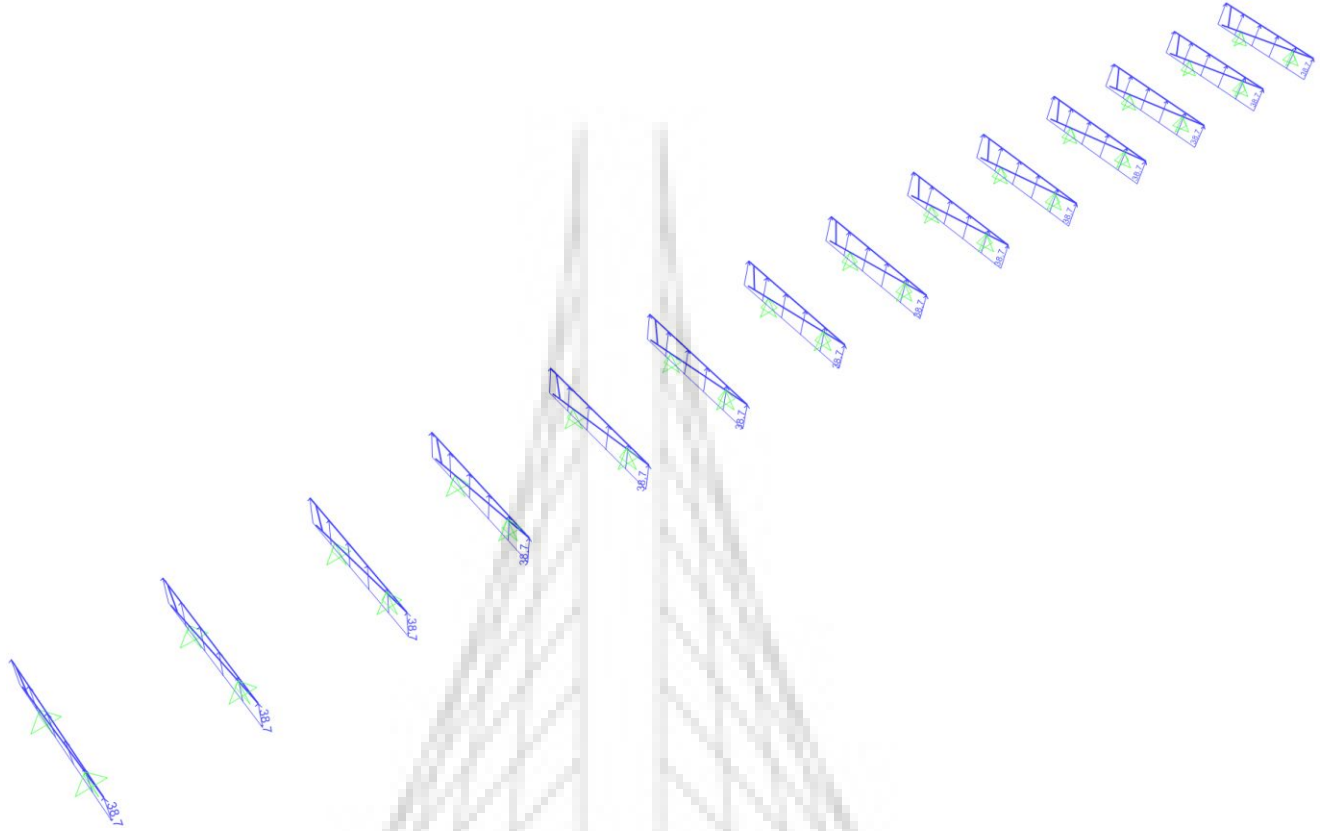


Resim 19: GPY Yükleme Durumu (kg/m)

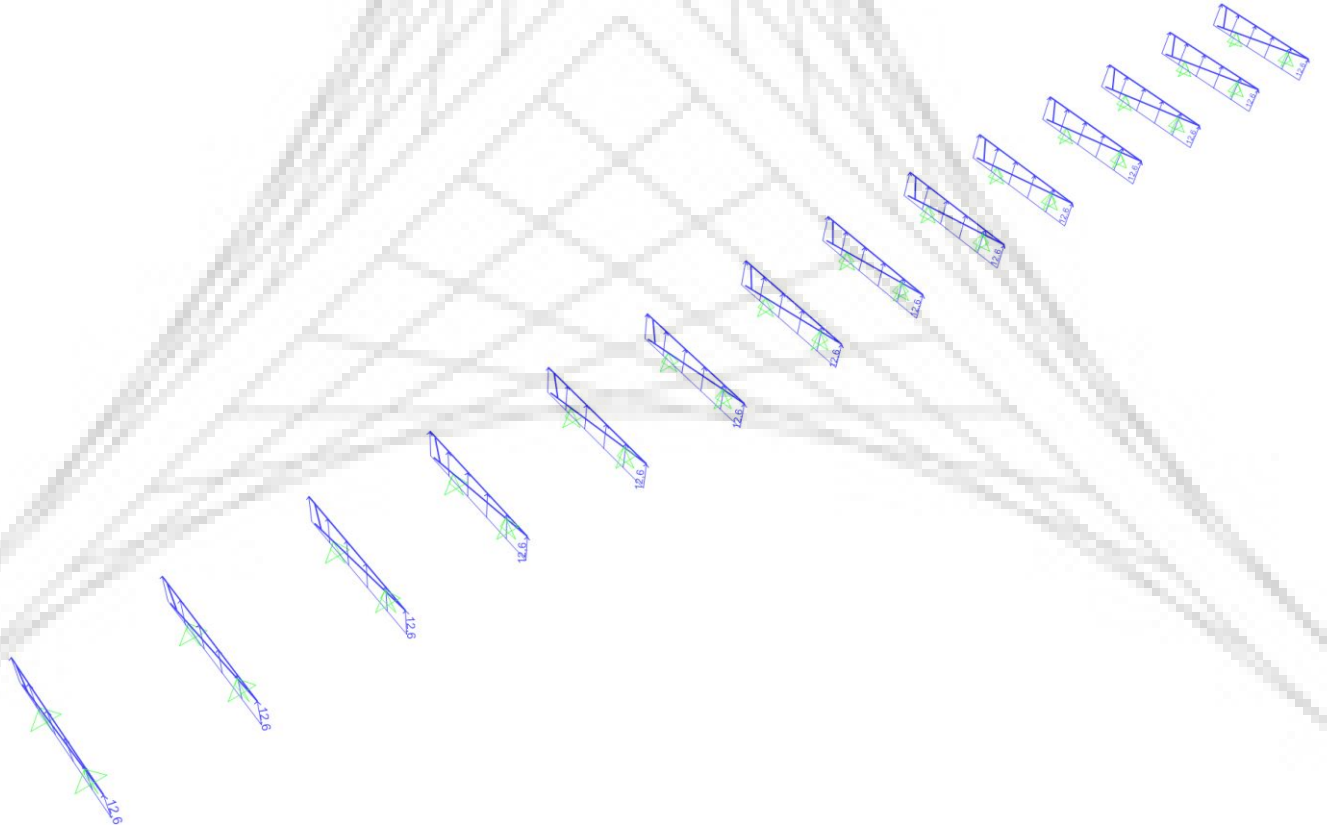


Resim 20: SNOW Yükleme Durumu (kg/m)



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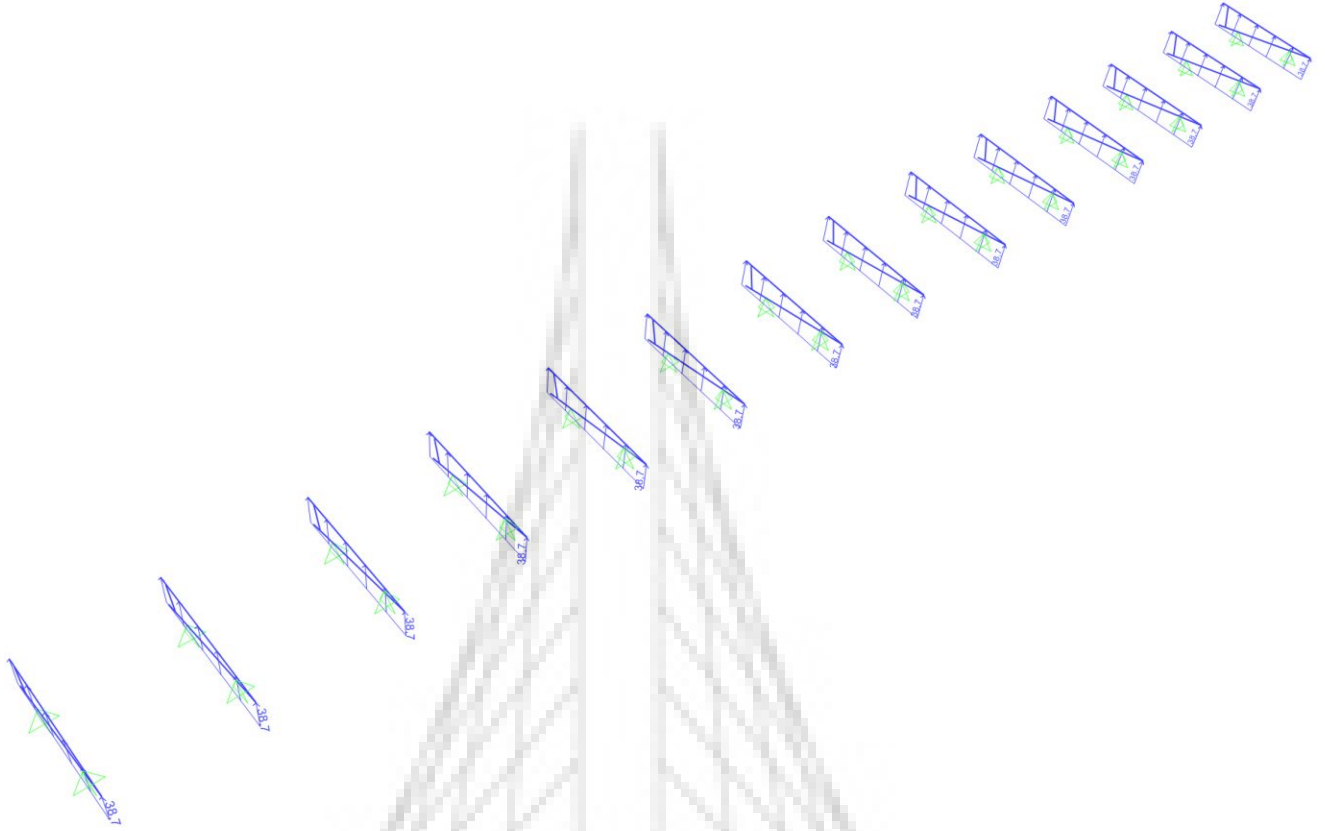


Resim 21: WIND X ve WIND -X Yükleme Durumu (kg/m)



Resim 22: WIND Y Yükleme Durumu (kg/m)

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Resim 23: WIND -Y Yükleme Durumu (kg/m)

3.9 Çubuk Elemanlardaki Yükleme Tablosu

TABLE: Frame Loads - Distributed								
Frame	LoadPat	CoordSys	Type	Dir	DistType	AbsDistB	FOverLA	FOverLB
Text	Text	Text	Text	Text	Text	m	Kgf/m	Kgf/m
29	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
29	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
29	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
29	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
29	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
29	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
30	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
30	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
30	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
30	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
30	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
30	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
31	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
31	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
31	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
31	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
31	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
31	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
32	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
32	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
32	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
32	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
32	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
32	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
33	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
33	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
33	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
33	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
33	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
33	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
34	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
34	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
34	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
34	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
34	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7




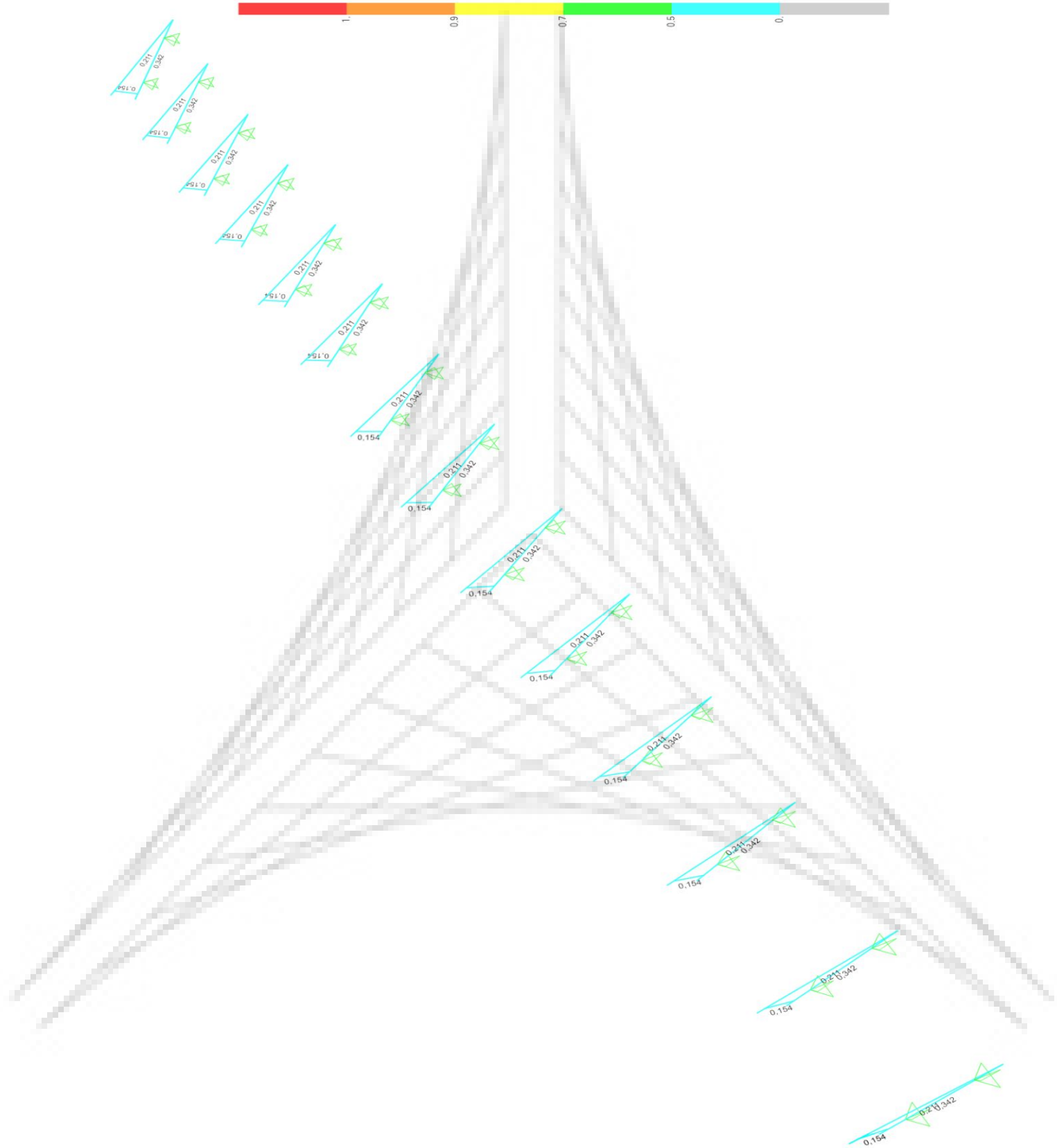
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TABLE: Frame Loads - Distributed								
Frame	LoadPat	CoordSys	Type	Dir	DistType	AbsDistB	FOverLA	FOverLB
Text	Text	Text	Text	Text	Text	m	Kgf/m	Kgf/m
34	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
35	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
35	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
35	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
35	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
35	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
35	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
36	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
36	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
36	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
36	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
36	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
36	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
37	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
37	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
37	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
37	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
37	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
37	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
38	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
38	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
38	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
38	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
38	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
38	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
39	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
39	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
39	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
39	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
39	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
39	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
40	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
40	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
40	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
40	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
40	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
40	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
41	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
41	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
41	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
41	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
41	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
41	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6
42	G	GLOBAL	Force	Gravity	RelDist	1,14821	11,2	11,2
42	S	GLOBAL	Force	Gravity	RelDist	1,14821	95,9	95,9
42	WXN	Local	Force	2	RelDist	1,14821	38,7	38,7
42	WXP	Local	Force	2	RelDist	1,14821	38,7	38,7
42	WYN	Local	Force	2	RelDist	1,14821	38,7	38,7
42	WYP	Local	Force	2	RelDist	1,14821	12,6	12,6

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4 ANALİZ SONUÇLARI



Resim 24: Çubuk Elemanların Analiz Sonuçları





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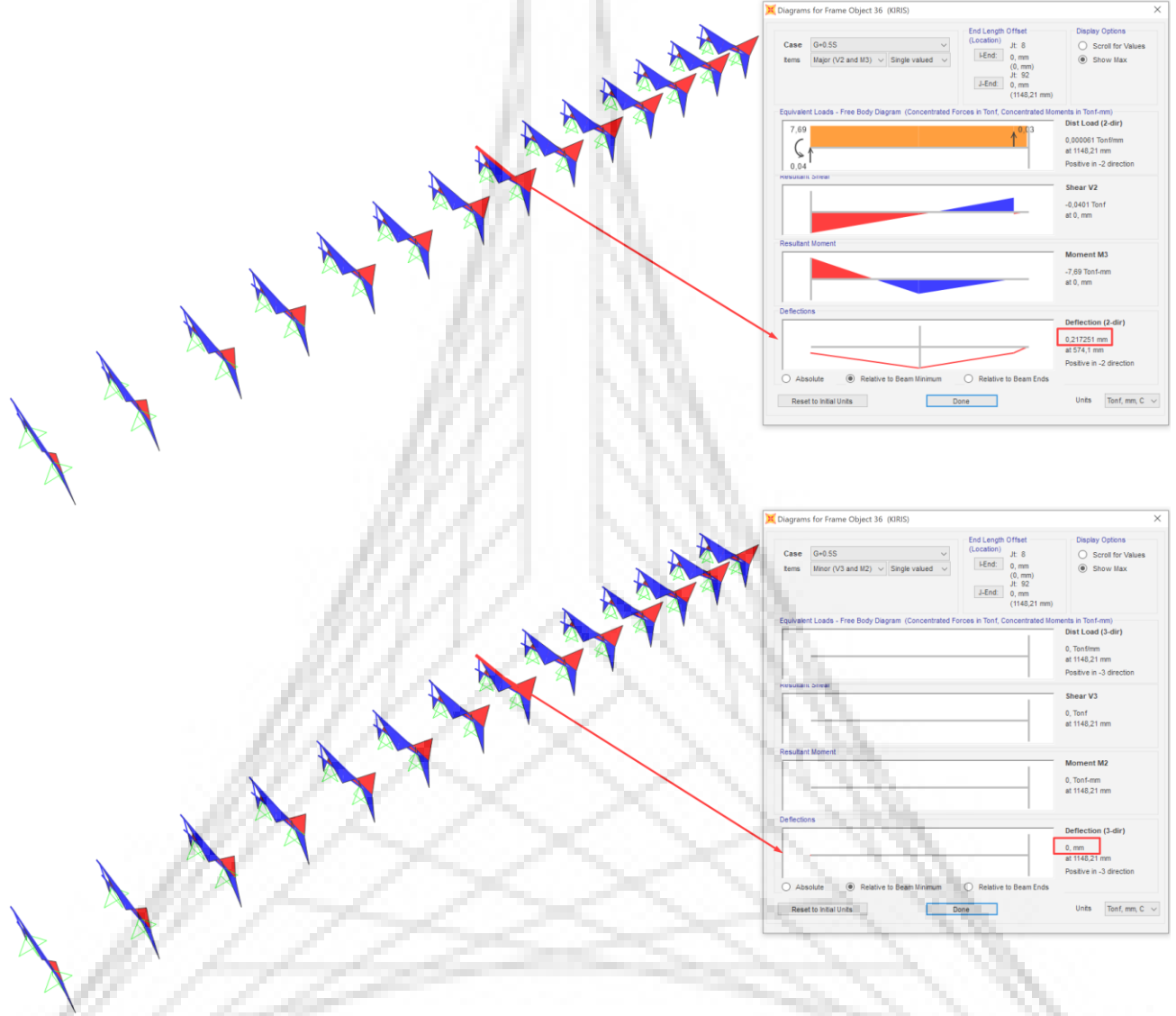
TABLE: Aluminum Design 1 - Summary Data - AA-LRFD 2000									
Frame	DesignSect	DesignType	Status	Ratio	RatioType	Combo	Location	ErrMsg	WarnMsg
Text	Text	Text	Text	Unitless	Text	Text	m	Text	Text
1	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
29	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
15	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
2	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
30	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
16	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
3	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
31	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
17	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
4	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
32	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
18	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
5	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
33	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
19	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
6	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
34	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
20	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
7	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
35	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
21	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
8	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
36	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
22	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
9	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
37	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
23	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
10	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
38	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
24	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
11	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
39	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
25	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
12	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
40	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
26	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
13	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
41	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
27	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages
14	YATAY	Beam	No Messages	0,341723	PMM	YDKT06	0,8871	No Messages	No Messages
42	KIRIS	Brace	No Messages	0,210855	PMM	YDKT06	0	No Messages	No Messages
28	KOLON	Column	No Messages	0,153695	PMM	YDKT06	0	No Messages	No Messages

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5 DEPLASMAN KONTROLÜ

5.1 Aşık Sehîm Tahkiki



D+0,5S (KAR yükü ve Ölü Yükle Altındaki Deplasmanlar)



Resim 25: Kar Ve Ölü Yükleme Kiriş Deplasmanı (mm)

$$\delta_{max} = (0,22^2 + 0^2)^{0,5} \text{ mm} < 1100/300$$

$$0,22 \text{ mm} < 3,67 \text{ mm} \rightarrow \text{OK}$$

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6 BİRLEŞİM HESAPLARI

6.1 ANKRAJ HESABI



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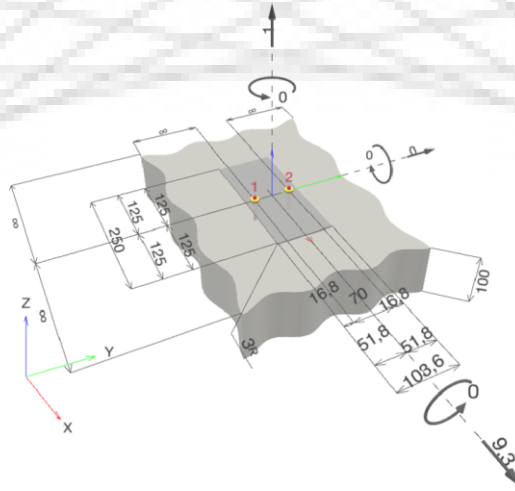
Specifler's comments:

1 Veriler



Ankraj tipi ve çapı:	HSC-I M6x40
Return period (service life in years):	50
Ürün kodu:	31142 HSC-I M6x40
Sismik/Dolgu seti veya olası boşluk doldurma çözümleri	
Efektif gömme derinliği:	$h_{ef} = 40,0 \text{ mm}$, $h_{nom} = 40,0 \text{ mm}$
Malzeme:	8.8
Değerlendirme Servisi Raporu:	ETA 02/0027
Verildiği Tarih / Geçerlilik:	4.07.2018 / -
Kanıt:	Dizayn metodu EN 1992-4, Mechanical
Standlı montaj:	$e_b = 0,0 \text{ mm}$ (stand yok); $t = 3,0 \text{ mm}$
Ankraj plakası ^R :	$l_x \times l_y \times t = 250,0 \text{ mm} \times 103,6 \text{ mm} \times 3,0 \text{ mm}$; (Önerilen plaka kalınlığı: Hesaplanmadı)
Profil:	profil yok
Ana malzeme:	çatıaklı beton, C25/30, $f_{c,cyl} = 25,00 \text{ N/mm}^2$, $h = 100,0 \text{ mm}$, Kullanıcı tarafından belirlenen kısmi malzeme güvenlik faktörü $\gamma_c = 1,500$
Uygulama:	matkap ile açılmış delik, uygulama şartları: kuru
Donatı:	Donatı yok veya donatı aralığı $\geq 150 \text{ mm}$ (tüm \emptyset) veya $\geq 100 \text{ mm}$ ($\emptyset \leq 10 \text{ mm}$) Boyuna kenar donatısı yok EN 1992-4, 7.2.1.7 (2) b) 2)'ye göre parçalanma kontrol donatısı vardır

^R - Ankraj hesaplaması sert bir ankraj plakası varsayımına dayanır.

Geometri [mm] & Yükleme [kN, kNm]



Input bilgilerinin ve sonuçların mevcut koşullara uygunluğu ve doğruluğu kontrol edilmelidir.
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1.1 Yük kombinasyonu

Durum	Tanım	Kuvvetler [kN] / Momentler [kNm]	Sismik	Yangın	Max. Util. Anchor [%]
1	Kombinasyon 1	N = 1,000; $V_x = 9,300$; $V_y = 0,000$; $M_x = 0,000$; $M_y = 0,000$; $M_z = 0,000$;	Hayır	hayır	73

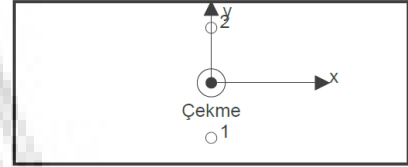
2 Yük durumu/Çıkan Ankraj kuvvetleri

Ankraj reaksiyonları [kN]



Çekme kuvveti: (+Çekme, - Basınç)

Ankraj	Çekme kuvveti	Kesme kuvveti	Kesme kuvveti x	Kesme kuvveti y
1	0,500	4,650	4,650	0,000
2	0,500	4,650	4,650	0,000

Maks.Beton basınç gerilmesi: - [%]
Maks. Beton basınç dayanımı: - [N/mm²]
Çıkan çekme kuvveti (x/y)=(0,0/0,0): 1,000 [kN]
Çıkan basınç kuvveti (x/y)=(0,0/0,0): 0,000 [kN]



Ankraj kuvvetleri, sert bir ankraj plakasının varsayımına dayanarak hesaplanır.

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3 Çekme yükü (EN 1992-4, Section 7.2.1)

	Yük [kN]	Kapasite [kN]	Kullanılanlar β_N [%]	Durum
Çelik Dayanımı*	0,500	10,733	5	Tamam
Beton kopma dayanımı**	1,000	10,281	10	Tamam
Ana malzemenin parçalanması hatası**	N/A	N/A	N/A	N/A



*en yüksek yükü alan ankrajlar **ankraj grubu(çekme altındaki ankrajlar)

3.1 Çelik Dayanımı

$N_{Rk,s}$ [kN]	$\gamma_{M,s}$	$N_{Rd,s}$ [kN]	N_{Ed} [kN]
16,100	1,500	10,733	0,500

3.2 Beton kopma dayanımı

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	$f_{c,cyl}$ [N/mm ²]		
22.800	14.400	60,0	120,0	25,00		
$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$	
0,0	1,000	0,0	1,000	1,000	1,000	
z [mm]	$\psi_{M,N}$	k_1	$N_{Rk,c}^0$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Ed} [kN]
0,0	1,000	7,700	9,740	1,500	10,281	1,000
Group anchor ID						
1, 2						

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4 Kesme yükü (EN 1992-4, Section 7.2.2)

	Yük [kN]	Kapasite [kN]	Kullanılanlar β_v [%]	Durum
Çelik Dayanımı (moment kolu olmadan)*	4,650	6,400	73	Tamam
Çelik kopması (moment kolu ile)*	N/A	N/A	N/A	N/A
Kanıtma dayanımı**	9,300	20,562	46	Tamam
Bu doğrultuda beton kenarının kopması **	N/A	N/A	N/A	N/A



*en yüksek yükü alan ankrajlar **ankraj grubu(İlgili ankrajlar)

4.1 Çelik Dayanımı (moment kolu olmadan)

$V_{Rk,s}^0$ [kN]	k_7	$V_{Rk,s}$ [kN]	$\gamma_{M,s}$	$V_{Rd,s}$ [kN]	V_{Ed} [kN]
8,000	1,000	8,000	1,250	6,400	4,650

4.2 Kanıtma dayanımı

$A_{c,N}$ [mm ²]	$A_{c,N}^0$ [mm ²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k_8	$f_{c,cyl}$ [N/mm ²]	
22.800	14.400	60,0	120,0	2,000	25,00	
$e_{c1,v}$ [mm]	$\psi_{ec1,N}$	$e_{c2,v}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$	$\psi_{M,N}$
0,0	1,000	0,0	1,000	1,000	1,000	1,000
k_1	$N_{RK,c}^0$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	V_{Ed} [kN]		
7,700	9,740	1,500	20,562	9,300		
Group anchor ID						
1, 2						

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5 Çekme ve kesme yüklerinin kombinasyonu (EN 1992-4, Section 7.2.3)

Çelik kopması

β_N	β_V	α	Kullanılanlar $\beta_{N,V}$ [%]	Durum
0,047	0,727	2,000	54	Tamam

$$\beta_N^\alpha + \beta_V^\alpha \leq 1,0$$

Beton göçmesi

β_N	β_V	α	Kullanılanlar $\beta_{N,V}$ [%]	Durum
0,097	0,452	1,500	34	Tamam

$$\beta_N^\alpha + \beta_V^\alpha \leq 1,0$$

6 Deplasmanlar (en fazla yük alan ankraj)

Kısa süreli yükleme:

$N_{Sk} = 0,370$ [kN]	$\delta_N = 0,0218$ [mm]
$V_{Sk} = 3,444$ [kN]	$\delta_V = 2,2464$ [mm]
	$\delta_{NV} = 2,2465$ [mm]

Uzun süreli yükleme:

$N_{Sk} = 0,370$ [kN]	$\delta_N = 0,0667$ [mm]
$V_{Sk} = 3,444$ [kN]	$\delta_V = 3,3696$ [mm]
	$\delta_{NV} = 3,3702$ [mm]


Yorumlar: Çekme deplasmanları, beton için gereken uygulama torkunun yarı değerlerinde çatlaksız beton için geçerlidir ! Kesme deplasmanları beton ile ankraj plakasının arasındaki sürtünme yokmuş gibi geçerlidir! Delikle olan mesafe ve delik toleransları bu hesaba dahil edilmemiştir!

Kabul edilebilir ankraj deplasmanı bağlanan yapıya bağlıdır ve tasarlayan kişi tarafından belirtilmelidir.

7 Uyarılar

- Ankraj plakasının göçmesini engelleyecek gerekli kalınlık hesabı PROFIS Engineering da yapılabilir. Ankraj plakasının elastik deformasyonundan kaynaklanacak yük aktarımları göz önüne alınmamaktadır. Yük altında plakanın deforme olmaması için ankraj plakası tam rijit olarak kabul edilmektedir.
- Design is only valid if hole is filled to remove clearance, clearance as per EN 1992-4 Table 6.1
- EN 1992-1-1, Annex A'ye göre yüklerin ana malzemeye aktarımı kontrol edilmelidir!
- Dizayn sadece fiktürdeki boşluk deliği EN 1992-4'te Tablo 6.1'de verilen değerden daha büyük değilse geçerlidir! Boşluk deliğinin daha büyük çapları için EN 1992-4!
- Bu rapordaki aksesuar listesi sadece kullanıcının bilgisine sunmak içindir. Herhangi bir durumda, düzgün uygulama için ürünün kullanım talimatlarına uyulmalıdır.
- For the determination of the $\psi_{re,v}$ (concrete edge failure) the minimum concrete cover defined in the design settings is used as the concrete cover of the edge reinforcement.
- Load transfer from supplementary reinforcement to the structural member shall be verified by the responsible structural engineer.
- With supplementary reinforcement and post-installed anchors, please ensure that in the jobsite the rebars are not drilled through.
- Karakteristik yapışma dayanımları geri dönüş zamanına bağlıdır. (yıl olarak servis ömrü): 50

Input bilgilerinin ve sonuçların mevcut koşullara uygunluğu ve doğruluğu kontrol edilmelidir.
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Şirket:

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Telefon I Faks:

Dizayn:

Alt Proje I Pos. No.:

ODTÜ A - F BLOK GES

Sayfa:

Öneren:



E-posta:

Tarih:

6

29.11.2022

Bağlantı dizayn kriterlerini sağlamaktadır!

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ODTÜ A - F BLOK GES

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Öneren:
E-posta:
Tarih: 29.11.2022

8 Uygulama datası

Ankraj Plakası, Çelik: S 235; E = 210.000,00 N/mm²; $f_{yk} = 235,00$ N/mm²

Profil: profil yok

Bağlanacak malzemedeki delik çapı: $d_f = 7,0$ mm

Plaka kalınlığı (veri): 3,0 mm

Önerilen plaka kalınlığı: Hesaplanmadı

Delim metodu: Matkapla delinmiş

Temizleme: Açılmış olan deliğin elle temizlenmesi gerekmektedir.

Ankraj tipi ve çapı: HSC-I M6x40

Ürün kodu: 31142 HSC-I M6x40

Maximum installation torque: 10 Nm

Ana malzemedeki delik çapı: 14,0 mm

Ana malzemedeki delik derinliği: 46,0 mm

Ana malzemenin minimum kalınlığı: 100,0 mm

Hilti HSC Altan kesme ankraj 40 mm gömme derinliğinde, M6x40, Galvanize kaplı çelik, uygulama ETA 02/0027 göre, delikler Hilti Dinamik set veya uygun herhangi bir çözümle doldurulmalıdır.

8.1 Gerekli aksesuarlar

Delme

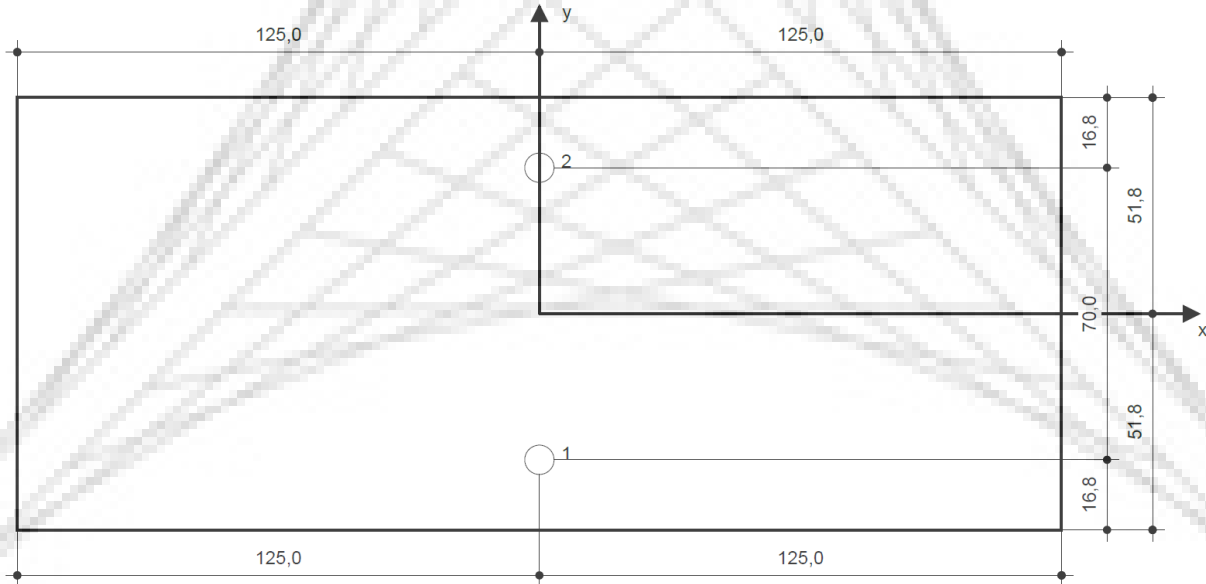
- Uygun delici makineler
- Gerekli delim derinliği için delim ayar çubuğu

Temizleme

- Elle temizleme pompası

Uygulama



- HSC-MW ayarlama aparatı
- Tork Anahtarı



Ankraj koordinatları [mm]

Ankraj	x	y	c _x	c _{+x}	c _y	c _{+y}
1	0,0	-35,0	-	-	-	-
2	0,0	35,0	-	-	-	-

Input bilgilerinin ve sonuçların mevcut koşullara uygunluğu ve doğruluğu kontrol edilmelidir.
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Öneren:
E-posta:
Tarih: 29.11.2022

9 Gözlemler; İşbirliği Görevleriniz

- Bu programda bulunan tüm bilgiler ve tüm veriler yalnızca Hilti ürünlerin kullanılması ile ilgilidir, prensipler,formüller ve güvenlik yönetmeliklerini temel olarak kullanmaktadır.Hiltinin teknik yönlendirme,işletme,montaj ve birleştirme talimatları ve benzerlerine kullanıcı tarafından kesinlikle uyulması gerekmektedir.Programda bulunan tüm figürler ortalama değerlerdir ve bu sebeple ilgili Hilti Ürünlerini kullanmadan önce özel testler yapılmalıdır.Programın yardımıyla hesaplanan sonuçlar aslında sizin girmiş olduğunuz bilgilere dayanmaktadır.Bu yüzden,girmiş olduğunuz verilerin eksiksiz olmasının ,bütünlüğünün ve uygunluğunun kontrolü sizin sorumluluğunuz altındadır. Ek olarak,çözümlerde elde edilen sonuçların kontrolü ve bir uzman tarafından düzeltilmesinin sorumluluğu da kullanıcıdır.Özellikle kullanmadan önce özel tesisler için uygulama normlarına ve onaylara uyulmalıdır.Program sadece normların ve onayların yorumlanmasına yardımcı olurken, hataların giderilmesi,sonuçların uygunluğun kontrolü veya düzeltilmesinde veya özel uygulamalar için kullanılabilirliği konusunda garanti vermez.
- Program tarafından yaratılabilecek tüm hasarların engellenmesi veya sınırlandırılması adına tüm gerekli ve mantıklı adımlar atılmalıdır.Özellikle,programların ve dataların bir yedeğinin ayarlanması ve eğer mümkünse Hilti tarafından sunulan güncellemelerin düzenli aralıklarla yapılması gerekmektedir.Eğer otomatik güncelleme fonksiyonunu kullanmıyorsanız,Hilti web sitesinden ulaşabileceğiniz elle güncelleme seçenekleriyle,programınızın son güncellemelerinin yapılmış olduğundan emin olunuz.Hilti kullanıcı hatalarından kaynaklanabilecek,sililmiş veya bozuk dosyalardan sorumlu değildir.

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6.2 TABAN PROFİLİ – KOLON BİRLEŞİMİ

Project:
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Author:





Project data

Project name
Project number
Author
Description
Date 5.01.2023
Design code EN

Material

Steel S 235
Concrete C25/30

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Project item CON1

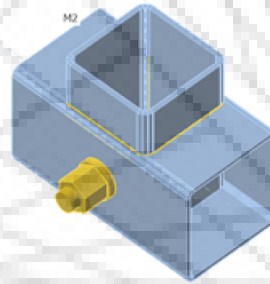
Design

Name CON1
Description
Analysis Stress, strain/ simplified loading

Members

Geometry

Name	Cross-section	β - Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]	Forces in
M1	1 - RHS43x43	0,0	0,0	0,0	0	0	0	Node
M2	2 - RHS40x40	0,0	-90,0	0,0	-18	0	0	Node



Cross-sections

Name	Material
1 - RHS43x43	S 235
2 - RHS40x40	S 235

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm ²]
M8 8.8	M8 8.8	8	800,0	50

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Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	M2	0,2	0,0	0,1	0,0	-0,1	0,0

Check

Summary

Name	Value	Status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	0,0 < 100%	OK
Welds	98,9 < 100%	OK
Buckling	Not calculated	
GMNA	Calculated	

Plates


Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ϵ_{pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
M1	1,6	LE1	161,1	0,0	0,0	OK
M2	2,0	LE1	36,4	0,0	0,0	OK

Design data

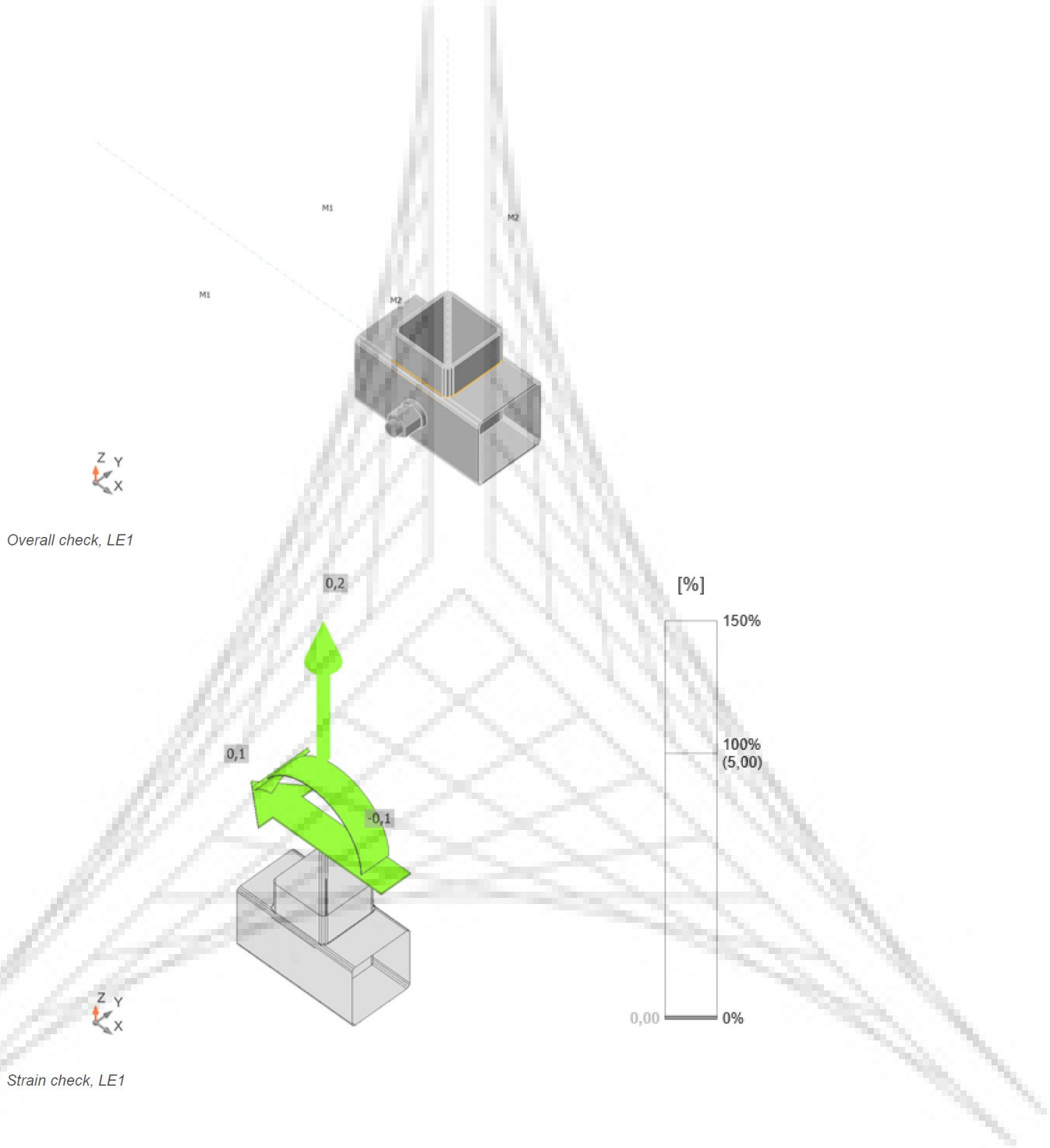
Material	f_y [MPa]	ϵ_{lim} [%]
S 235	235,0	5,0



Symbol explanation

ϵ_{pl}	Strain
σ_{Ed}	Eq. stress
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ϵ_{lim}	Limit of plastic strain

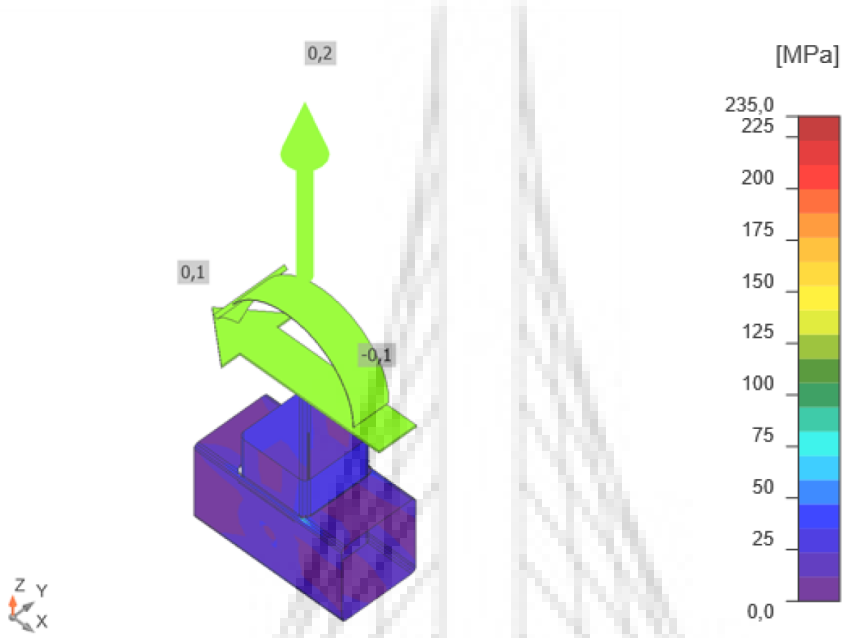
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Equivalent stress, LE1

Bolts


	Name	Loads	$F_{t,Ed}$ [kN]	V [kN]	$F_{b,Rd}$ [kN]	U_{t_t} [%]	U_{t_s} [%]	$U_{t_{ts}}$ [%]	Status
	B1	LE1	0,0	0,0	6,8	0,0	0,0	0,0	OK

Design data

Name	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M8 8.8 - 1	40,3	11,3	26,9

Symbol explanation

$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$F_{t,Ed}$	Tension force
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
V	Resultant of bolt shear forces V_y and V_z in shear planes
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
U_{t_t}	Utilization in tension
U_{t_s}	Utilization in shear
$U_{t_{ts}}$	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4

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Detailed result for B1

Tension resistance check (EN 1993-1-8 tab 3.4)

$$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} = 40,3 \text{ kN} \geq F_t = 0,0 \text{ kN}$$

where:

- $k_2 = 0,90$ – Factor
 $f_{ub} = 800,0 \text{ MPa}$ – Ultimate tensile strength of the bolt
 $A_s = 70 \text{ mm}^2$ – Tensile stress area of the bolt
 $\gamma_{M2} = 1,25$ – Safety factor

Punching resistance check (EN 1993-1-8 tab 3.4)

$$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} = 11,3 \text{ kN} \geq F_t = 0,0 \text{ kN}$$

where:

- $d_m = 13 \text{ mm}$ – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller
 $t_p = 2 \text{ mm}$ – Thickness
 $f_u = 360,0 \text{ MPa}$ – Ultimate strength
 $\gamma_{M2} = 1,25$ – Safety factor

Shear resistance check (EN 1993-1-8 tab 3.4)

$$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} = 26,9 \text{ kN} \geq V = 0,0 \text{ kN}$$

where:

- $\beta_p = 1,00$ – Reducing factor
 $\alpha_v = 0,60$ – Reducing factor
 $f_{ub} = 800,0 \text{ MPa}$ – Ultimate tensile strength of the bolt
 $A = 70 \text{ mm}^2$ – Gross cross-section area of the bolt
 $\gamma_{M2} = 1,25$ – Safety factor

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Bearing resistance check (EN 1993-1-5 tab 8.4)

$$F_{b,Rd} = \frac{2.5 \alpha_b k_t f_u d t}{\gamma_{M2}} = 6,8 \text{ kN} \geq V = 0,0 \text{ kN}$$

where:

$$k_t = \min\left(\frac{0.8t+1.5}{2.5}, 1.0\right) = 1,00 \quad \text{– Thickness factor}$$

$$\alpha_b = \min\left(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1\right) = 0,59 \quad \text{– Factor for end distance and bolt spacing in direction of load transfer}$$

$$e_2 = 16 \text{ mm} \quad \text{– Distance to the plate edge perpendicular to the shear force}$$

$$p_2 = \infty \text{ mm} \quad \text{– Distance between bolts perpendicular to the shear force}$$

$$d_0 = 9 \text{ mm} \quad \text{– Bolt hole diameter}$$

$$e_1 = 16 \text{ mm} \quad \text{– Distance to the plate edge in the direction of the shear force}$$

$$p_1 = \infty \text{ mm} \quad \text{– Distance between bolts in the direction of the shear force}$$

$$f_{ub} = 800,0 \text{ MPa} \quad \text{– Ultimate tensile strength of the bolt}$$

$$f_u = 360,0 \text{ MPa} \quad \text{– Ultimate strength}$$

$$d = 8 \text{ mm} \quad \text{– Nominal diameter of the fastener}$$

$$t = 2 \text{ mm} \quad \text{– Thickness of the plate}$$

$$\gamma_{M2} = 1,25 \quad \text{– Safety factor}$$

Interaction of tension and shear (EN 1993-1-8 tab 3.4)

$$U_{ts} = \frac{F_{t,Ed}}{F_{t,Rd}} + \frac{F_{v,Ed}}{1,4 F_{v,Rd}} = 0,0 \%$$

Utilization in tension

$$U_{tt} = \frac{F_{t,Ed}}{\min(F_{t,Rd}; B_{p,Rd})} = 0,0 \%$$

Utilization in shear

$$U_{ts} = \frac{V_{Ed}}{\min(F_{v,Rd}; F_{b,Rd})} = 0,0 \%$$


Bolts: B1 There is a gap between connected plates. Bolts should be designed as pins. Provided resistances of bolts in shear and plates in bearing may be incorrect

Welds

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ϵ_{pl} [%]	σ_{\perp} [MPa]	$\tau_{ }$ [MPa]	τ_{\perp} [MPa]	Ut [%]	Ut _c [%]	Status
M2-arc 11	M1	▲ 0,1	211	LE1	356,0	2,2	122,4	-178,2	-74,2	98,9	55,0	OK
M1-w 4	M2	▲ 0,1	210	LE1	353,8	0,7	-2,5	-197,6	51,7	98,3	79,0	OK

Design data


	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 235	0,80	360,0	259,2

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Symbol explanation

	Fillet weld
ϵ_{pl}	Strain
$\sigma_{w,Ed}$	Equivalent stress
$\sigma_{w,Rd}$	Equivalent stress resistance
σ_{\perp}	Perpendicular stress
$\tau_{ }$	Shear stress parallel to weld axis
τ_{\perp}	Shear stress perpendicular to weld axis
0.9σ	Perpendicular stress resistance: $0.9 \cdot f_u / \gamma_{M2}$
β_w	Correlation factor EN 1993-1-8 tab. 4.1
U_t	Utilization
U_{tc}	Weld capacity utilization

Detailed result for M2-arc 11 M1

Buckling

Buckling analysis was not calculated.

Bill of material

Manufacturing operations

Name	Plates [mm]	Shape	Nr.	Welds [mm]	Length [mm]	Bolts	Nr.
CUT1				Fillet: a = 0,1	421,2		

Welds



Type	Material	Throat thickness [mm]	Leg size [mm]	Length [mm]
Fillet	S 235	0,1	0,1	421,2

Bolts

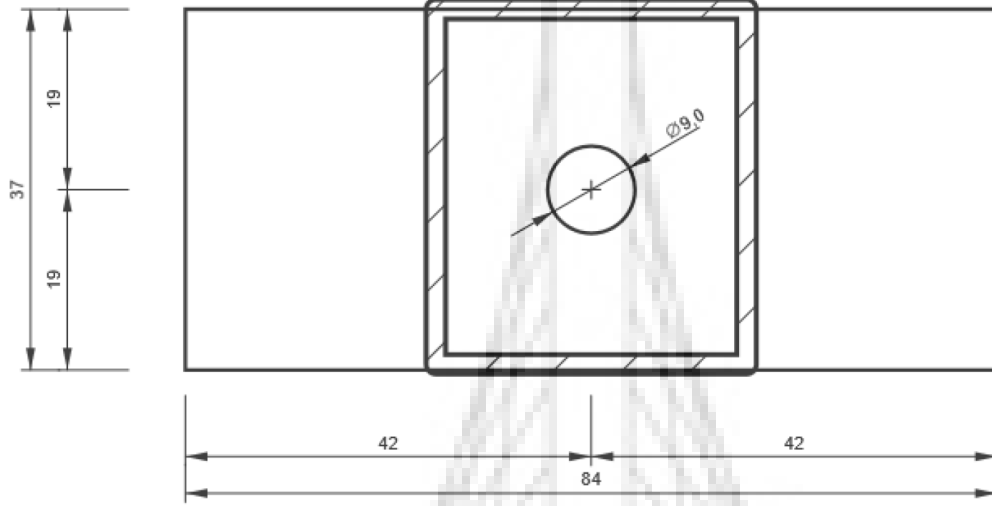
Name	Grip length [mm]	Count
M8 8.8	44	1

Drawing

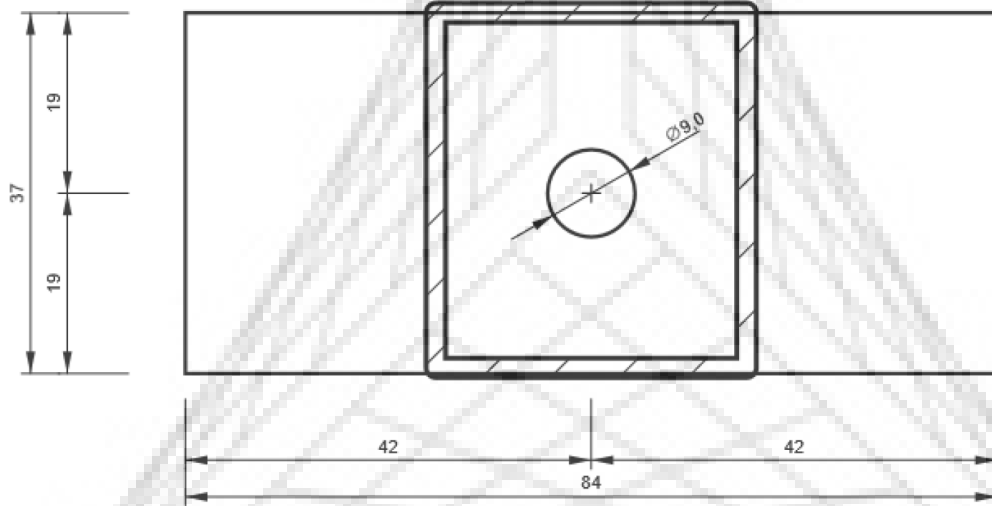
M1, RHS43x43 - Web 2:



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M1, RHS43x43 - Web 4:

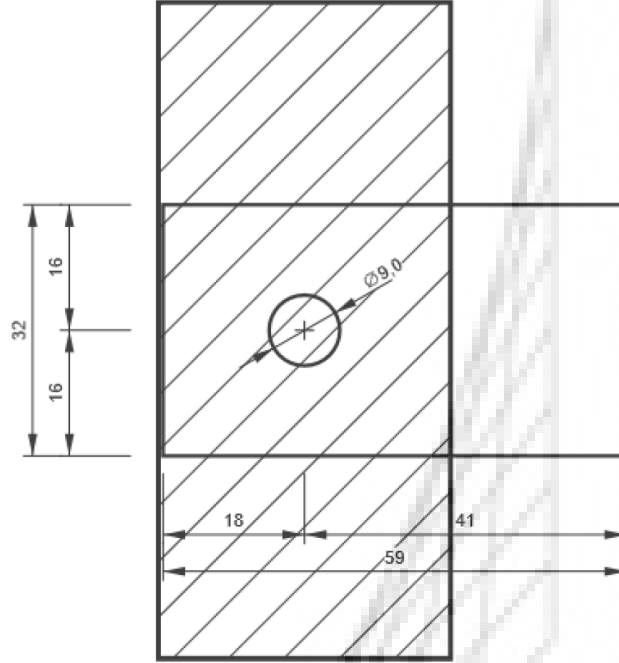


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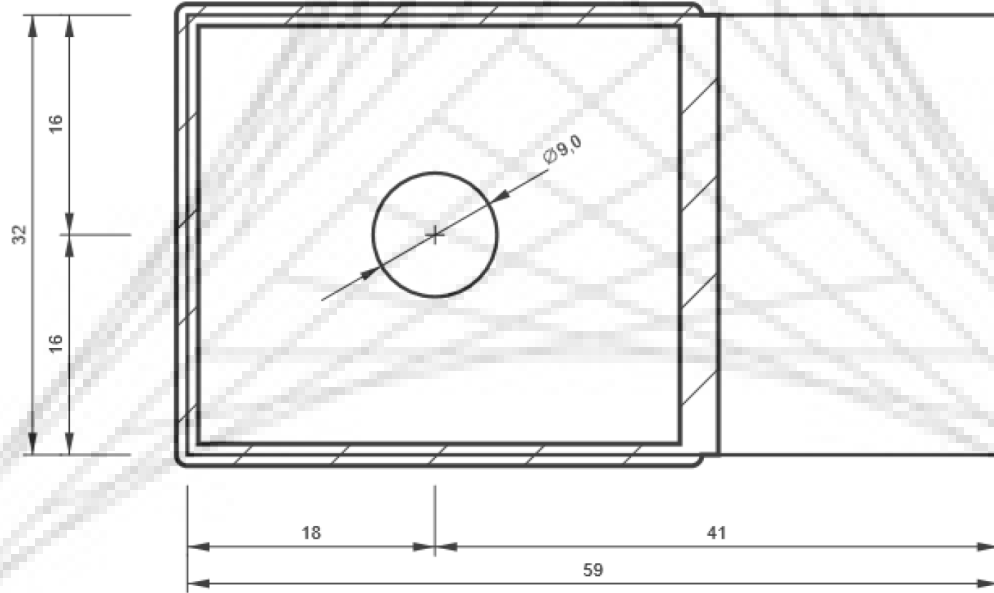
Project:
Project no:
Author:





M2, RHS40x40 - Web 2:



M2, RHS40x40 - Web 4:




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Project:
Project no:
Author:



Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_C	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient β_j	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	No		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated a_b in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	No		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

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6.3 TABAN PROFİLİ – KİRİŞ BİRLEŞİMİ

Project:
Project no:
Author:




Project data

Project name
Project number
Author
Description
Date 5.01.2023
Design code EN

Material

Steel S 235
Concrete C25/30

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Project:
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Author:



Project item CON1

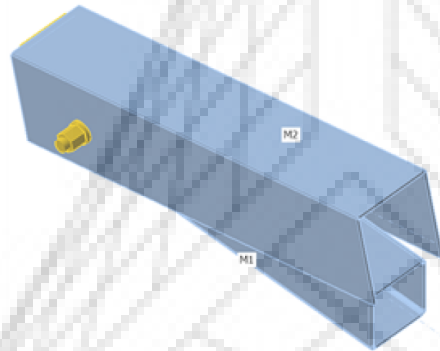
Design

Name CON1
Description
Analysis Stress, strain/ simplified loading

Members

Geometry

Name	Cross-section	β - Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]	Forces in
M1	1 - RHS44x44	0,0	0,0	0,0	0	0	0	Node
M2	2 - U55	0,0	-13,0	-90,0	0	0	0	Node





Cross-sections

Name	Material
1 - RHS44x44	S 235
2 - U55	S 235

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm ²]
M8 8.8	M8 8.8	8	800,0	50

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Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	M2	-0,2	-0,7	0,0	0,0	0,0	-0,1

Check

Summary

Name	Value	Status
Analysis	100,0%	OK
Plates	4,3 < 5,0%	OK
Bolts	22,1 < 100%	OK
Welds	98,2 < 100%	OK
Buckling	Not calculated	
GMNA	Calculated	

Plates



Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ϵ_{pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
M1		2,0 LE1	244,1	4,3	0,0	OK
M2-bfl 1		2,0 LE1	136,7	0,0	0,0	OK
M2-tfl 1		2,0 LE1	54,2	0,0	0,0	OK
M2-w 1		2,0 LE1	87,8	0,0	0,0	OK

Design data

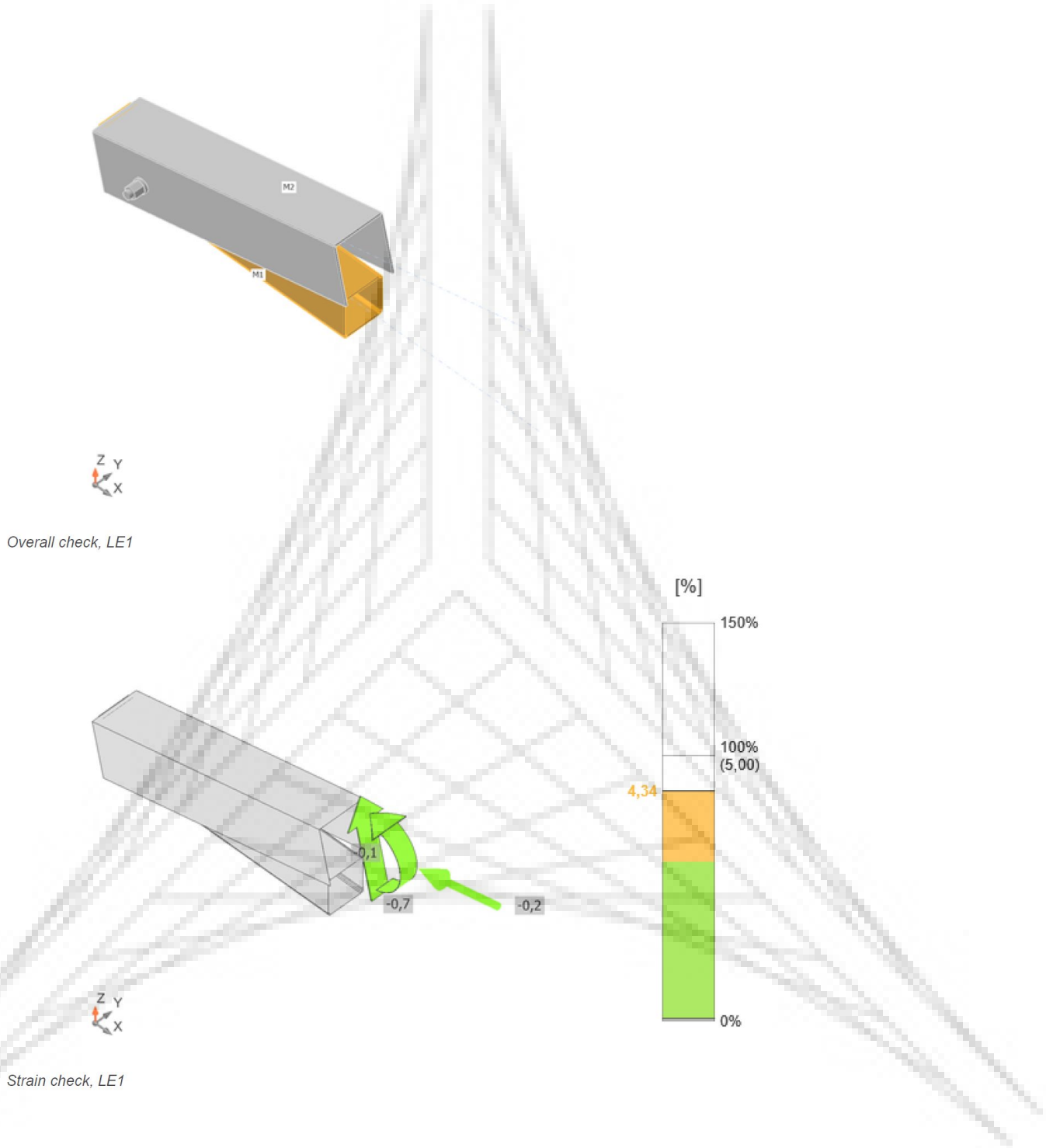
Material	f_y [MPa]	ϵ_{lim} [%]
S 235	235,0	5,0



Symbol explanation

ϵ_{pl}	Strain
σ_{Ed}	Eq. stress
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ϵ_{lim}	Limit of plastic strain

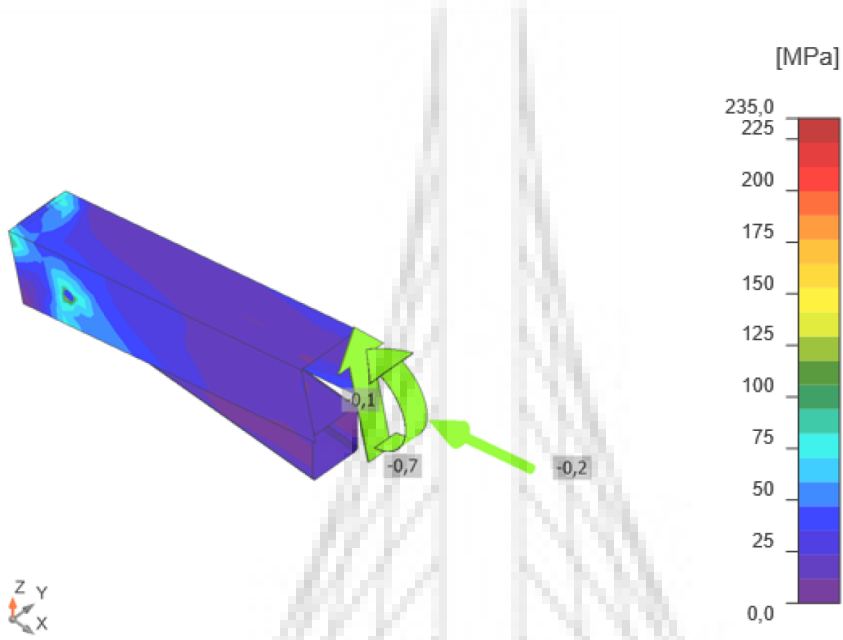
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Equivalent stress, LE1

Bolts

	Name	Loads	$F_{t,Ed}$ [kN]	V [kN]	$F_{b,Rd}$ [kN]	U_{t_t} [%]	U_{t_s} [%]	$U_{t_{ts}}$ [%]	Status
	B1	LE1	0,0	1,6	7,9	0,0	22,1	7,5	OK

Design data

Name	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M8 8.8 - 1	32,3	13,6	21,5

Symbol explanation

$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$F_{t,Ed}$	Tension force
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
V	Resultant of bolt shear forces V_y and V_z in shear planes
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
U_{t_t}	Utilization in tension
U_{t_s}	Utilization in shear
$U_{t_{ts}}$	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4

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Detailed result for B1

Tension resistance check (EN 1993-1-8 tab 3.4)

$$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} = 32,3 \text{ kN} \geq F_t = 0,0 \text{ kN}$$

where:

- $k_2 = 0,90$ – Factor
 $f_{ub} = 800,0 \text{ MPa}$ – Ultimate tensile strength of the bolt
 $A_s = 56 \text{ mm}^2$ – Tensile stress area of the bolt
 $\gamma_{M2} = 1,25$ – Safety factor

Punching resistance check (EN 1993-1-8 tab 3.4)

$$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} = 13,6 \text{ kN} \geq F_t = 0,0 \text{ kN}$$

where:

- $d_m = 13 \text{ mm}$ – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller
 $t_p = 2 \text{ mm}$ – Thickness
 $f_u = 360,0 \text{ MPa}$ – Ultimate strength
 $\gamma_{M2} = 1,25$ – Safety factor

Shear resistance check (EN 1993-1-8 tab 3.4)

$$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} = 21,5 \text{ kN} \geq V = 1,6 \text{ kN}$$

where:

- $\beta_p = 1,00$ – Reducing factor
 $\alpha_v = 0,60$ – Reducing factor
 $f_{ub} = 800,0 \text{ MPa}$ – Ultimate tensile strength of the bolt
 $A = 56 \text{ mm}^2$ – Gross cross-section area of the bolt
 $\gamma_{M2} = 1,25$ – Safety factor

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Bearing resistance check (EN 1993-1-5 tab 8.4)

$$F_{b,Rd} = \frac{2.5 \alpha_b k_t f_u d t}{\gamma_{M2}} = 7,9 \text{ kN} \geq V = 1,7 \text{ kN}$$

where:

$$k_t = \min\left(\frac{0.8t+1.5}{2.5}, 1.0\right) = 1,00 \quad \text{– Thickness factor}$$

$$\alpha_b = \min\left(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1\right) = 0,68 \quad \text{– Factor for end distance and bolt spacing in direction of load transfer}$$

$$e_2 = 18 \text{ mm} \quad \text{– Distance to the plate edge perpendicular to the shear force}$$

$$p_2 = \infty \text{ mm} \quad \text{– Distance between bolts perpendicular to the shear force}$$

$$d_0 = 9 \text{ mm} \quad \text{– Bolt hole diameter}$$

$$e_1 = 18 \text{ mm} \quad \text{– Distance to the plate edge in the direction of the shear force}$$

$$p_1 = \infty \text{ mm} \quad \text{– Distance between bolts in the direction of the shear force}$$

$$f_{ub} = 800,0 \text{ MPa} \quad \text{– Ultimate tensile strength of the bolt}$$

$$f_u = 360,0 \text{ MPa} \quad \text{– Ultimate strength}$$

$$d = 8 \text{ mm} \quad \text{– Nominal diameter of the fastener}$$

$$t = 2 \text{ mm} \quad \text{– Thickness of the plate}$$

$$\gamma_{M2} = 1,25 \quad \text{– Safety factor}$$

Interaction of tension and shear (EN 1993-1-8 tab 3.4)

$$U_{ts} = \frac{F_{t,Ed}}{F_{t,Rd}} + \frac{F_{v,Ed}}{1,4 F_{v,Rd}} = 7,5 \%$$

Utilization in tension

$$U_{tt} = \frac{F_{t,Ed}}{\min(F_{t,Rd}; B_{p,Rd})} = 0,0 \%$$

Utilization in shear

$$U_{ts} = \frac{V_{Ed}}{\min(F_{v,Rd}; F_{b,Rd})} = 22,1 \%$$



Bolts: B1 There is a gap between connected plates. Bolts should be designed as pins. Provided resistances of bolts in shear and plates in bearing may be incorrect

Welds

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ϵ_{pl} [%]	σ_{\perp} [MPa]	τ_{\parallel} [MPa]	τ_{\perp} [MPa]	Ut [%]	Ut _c [%]	Status
M2-w 1	M1	▲ 2,0	43	LE1	353,4	0,4	-167,1	-50,6	172,5	98,2	20,2	OK

Design data


	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 235	0,80	360,0	259,2

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Symbol explanation

	Fillet weld
ϵ_{pl}	Strain
$\sigma_{w,Ed}$	Equivalent stress
$\sigma_{w,Rd}$	Equivalent stress resistance
σ_{\perp}	Perpendicular stress
$\tau_{ }$	Shear stress parallel to weld axis
τ_{\perp}	Shear stress perpendicular to weld axis
0.9σ	Perpendicular stress resistance: $0.9 \cdot f_u / \gamma_{M2}$
β_w	Correlation factor EN 1993-1-8 tab. 4.1
U_t	Utilization
U_{tc}	Weld capacity utilization

Detailed result for M2-w 1 M1

Buckling

Buckling analysis was not calculated.

Bill of material

Manufacturing operations

Name	Plates [mm]	Shape	Nr.	Welds [mm]	Length [mm]	Bolts	Nr.
CUT1				Fillet: a = 2,0 Fillet: a = 2,0	7,2 36,0		

Welds


Type	Material	Throat thickness [mm]	Leg size [mm]	Length [mm]
Fillet	S 235	2,0	2,8	7,2
Fillet	S 235	2,0	2,8	36,0

Bolts

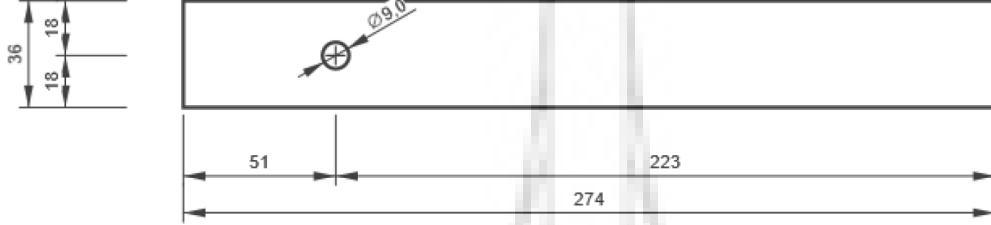
Name	Grip length [mm]	Count
M8 8.8	50	1

Drawing

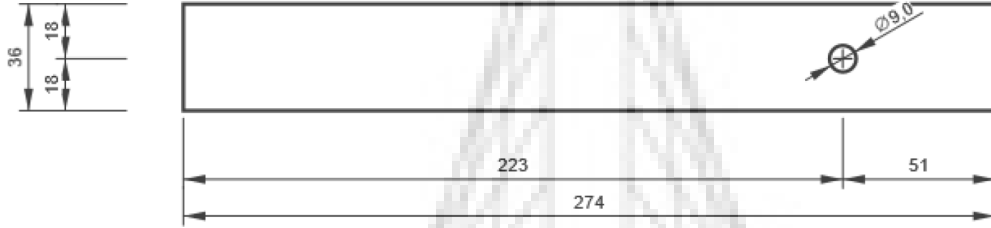
M1, RHS44x44 - Web 2:

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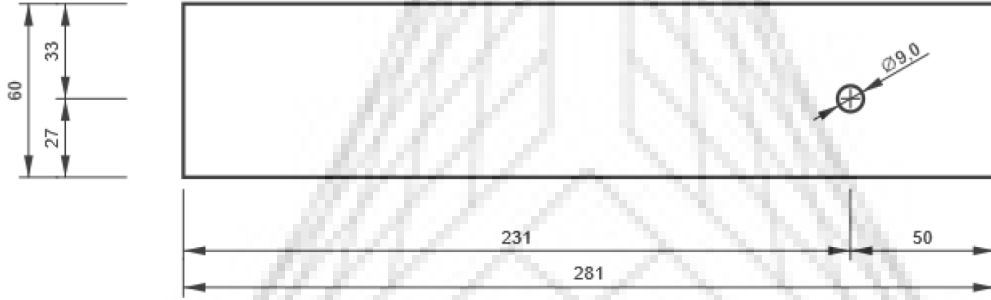
Project:
Project no:
Author:





M1, RHS44x44 - Web 4:



M2, U55 - Bottom flange 1:




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Project:
Project no:
Author:



Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_C	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient β_j	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	No		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated a_b in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	No		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

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6.1 KOLON – KİRİŞ BİRLEŞİMİ

Project:
Project no:
Author:





Project data

Project name
Project number
Author
Description
Date 5.01.2023
Design code EN

Material

Steel S 235
Concrete C25/30

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Project:
Project no:
Author:



Project item CON1

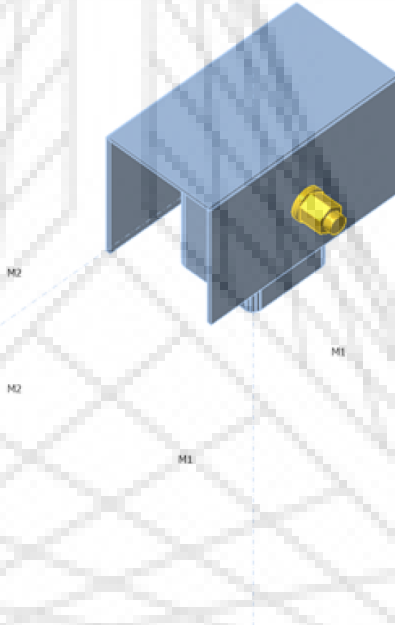
Design

Name CON1
Description
Analysis Stress, strain/ loads in equilibrium

Members

Geometry

Name	Cross-section	β - Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]	Forces in
M1	1 - RHS40x40	0,0	-90,0	0,0	0	0	0	Node
M2	2 - U55	90,0	0,0	-90,0	0	-10	0	Node





Cross-sections

Name	Material
1 - RHS40x40	S 235
2 - U55	S 235

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm ²]
M8 8.8	M8 8.8	8	800,0	50

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Load effects (forces in equilibrium)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	M1	0,0	0,0	0,0	0,0	0,0	0,0
	M1	0,0	0,0	0,0	0,0	0,0	0,0
	M2	0,3	0,4	0,0	0,0	0,0	0,0
	M2	0,3	-0,4	0,0	0,0	0,0	0,0

Check

Summary

Name	Value	Status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	0,9 < 100%	OK
Welds	98,3 < 100%	OK
Buckling	Not calculated	
GMNA	Calculated	

Plates



Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ϵ_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
M1	2,0	LE1	12,9	0,0	0,0	OK
M2-bfl 1	2,0	LE1	11,6	0,0	0,0	OK
M2-tfl 1	2,0	LE1	11,7	0,0	0,0	OK
M2-w 1	2,0	LE1	12,1	0,0	0,0	OK

Design data

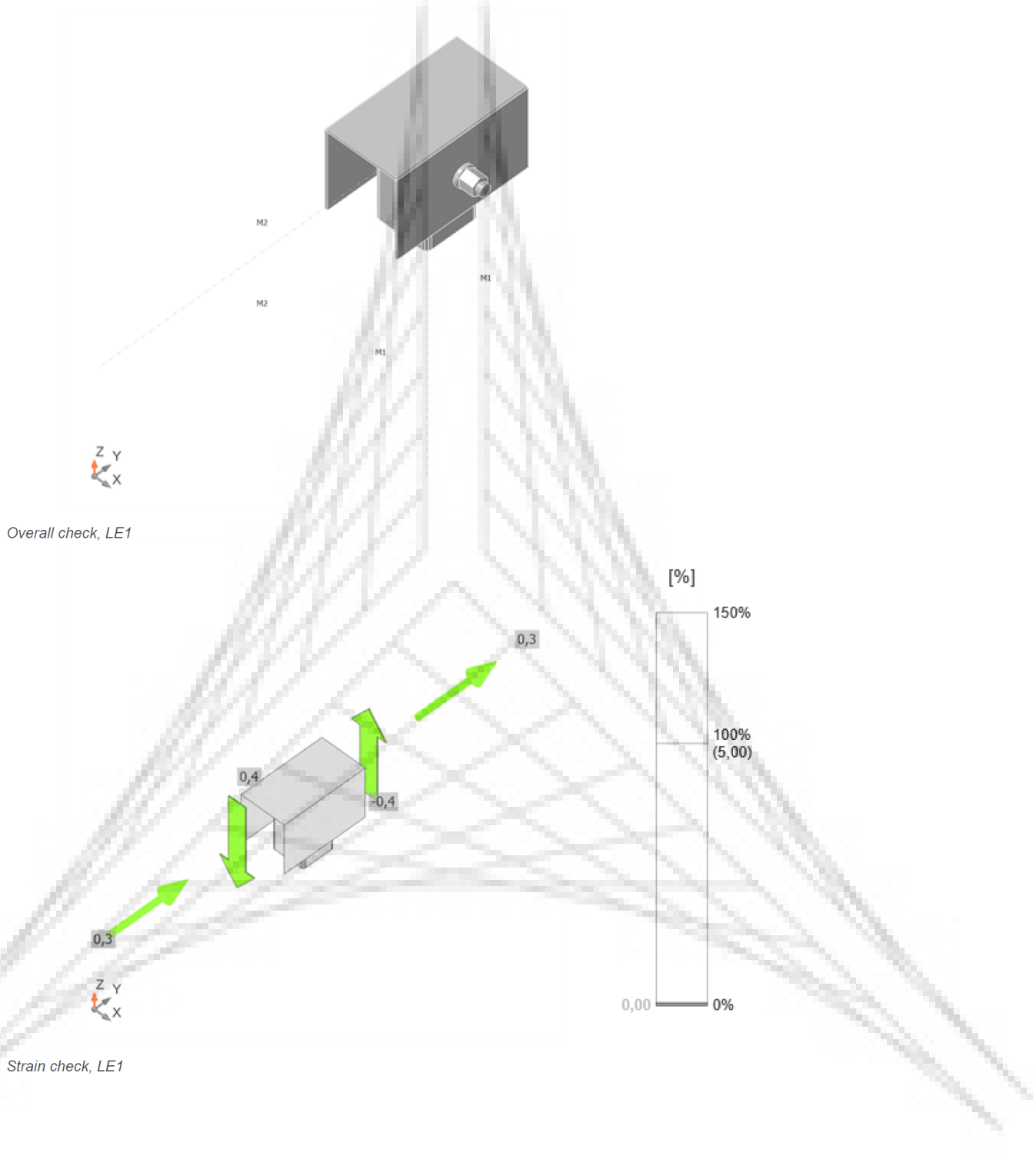
Material	f_y [MPa]	ϵ_{lim} [%]
S 235	235,0	5,0



Symbol explanation

ϵ_{Pl}	Strain
σ_{Ed}	Eq. stress
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ϵ_{lim}	Limit of plastic strain

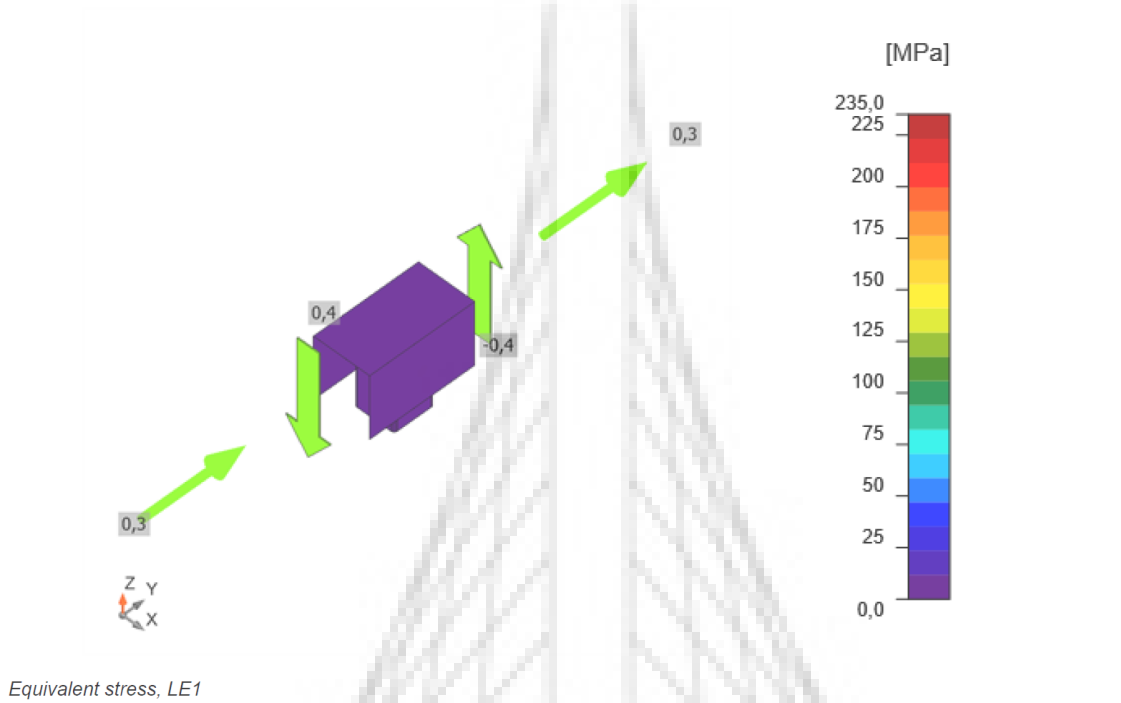
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Bolts

	Name	Loads	$F_{t,Ed}$ [kN]	V [kN]	$F_{b,Rd}$ [kN]	U_{t_t} [%]	U_{t_s} [%]	$U_{t_{ts}}$ [%]	Status
	B1	LE1	0,0	0,1	6,8	0,0	0,9	0,3	OK

Design data

Name	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M8 8.8 - 1	32,3	13,6	21,5

Symbol explanation

$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$F_{t,Ed}$	Tension force
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
V	Resultant of bolt shear forces V_y and V_z in shear planes
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
U_{t_t}	Utilization in tension
U_{t_s}	Utilization in shear
$U_{t_{ts}}$	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4

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Author:



Detailed result for B1

Tension resistance check (EN 1993-1-8 tab 3.4)

$$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} = 32,3 \text{ kN} \geq F_t = 0,0 \text{ kN}$$

where:

- $k_2 = 0,90$ – Factor
 $f_{ub} = 800,0 \text{ MPa}$ – Ultimate tensile strength of the bolt
 $A_s = 56 \text{ mm}^2$ – Tensile stress area of the bolt
 $\gamma_{M2} = 1,25$ – Safety factor

Punching resistance check (EN 1993-1-8 tab 3.4)

$$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} = 13,6 \text{ kN} \geq F_t = 0,0 \text{ kN}$$

where:


- $d_m = 13 \text{ mm}$ – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller
 $t_p = 2 \text{ mm}$ – Thickness
 $f_u = 360,0 \text{ MPa}$ – Ultimate strength
 $\gamma_{M2} = 1,25$ – Safety factor

Shear resistance check (EN 1993-1-8 tab 3.4)

$$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} = 21,5 \text{ kN} \geq V = 0,1 \text{ kN}$$

where:

- $\beta_p = 1,00$ – Reducing factor
 $\alpha_v = 0,60$ – Reducing factor
 $f_{ub} = 800,0 \text{ MPa}$ – Ultimate tensile strength of the bolt
 $A = 56 \text{ mm}^2$ – Gross cross-section area of the bolt
 $\gamma_{M2} = 1,25$ – Safety factor

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Author:

Bearing resistance check (EN 1993-1-5 tab 8.4)

$$F_{b,Rd} = \frac{2.5 \alpha_b k_t f_u d t}{\gamma_{M2}} = 6,8 \text{ kN} \geq V = 0,1 \text{ kN}$$

where:

$$k_t = \min\left(\frac{0.8t+1.5}{2.5}, 1.0\right) = 1,00 \quad \text{– Thickness factor}$$

$$\alpha_b = \min\left(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1\right) = 0,59 \quad \text{– Factor for end distance and bolt spacing in direction of load transfer}$$

$$e_2 = 30 \text{ mm} \quad \text{– Distance to the plate edge perpendicular to the shear force}$$

$$p_2 = \infty \text{ mm} \quad \text{– Distance between bolts perpendicular to the shear force}$$

$$d_0 = 9 \text{ mm} \quad \text{– Bolt hole diameter}$$

$$e_1 = 16 \text{ mm} \quad \text{– Distance to the plate edge in the direction of the shear force}$$

$$p_1 = \infty \text{ mm} \quad \text{– Distance between bolts in the direction of the shear force}$$

$$f_{ub} = 800,0 \text{ MPa} \quad \text{– Ultimate tensile strength of the bolt}$$

$$f_u = 360,0 \text{ MPa} \quad \text{– Ultimate strength}$$

$$d = 8 \text{ mm} \quad \text{– Nominal diameter of the fastener}$$

$$t = 2 \text{ mm} \quad \text{– Thickness of the plate}$$

$$\gamma_{M2} = 1,25 \quad \text{– Safety factor}$$

Interaction of tension and shear (EN 1993-1-8 tab 3.4)

$$U_{ts} = \frac{F_{t,Ed}}{F_{t,Rd}} + \frac{F_{v,Ed}}{1,4 F_{v,Rd}} = 0,3 \%$$

Utilization in tension

$$U_{tt} = \frac{F_{t,Ed}}{\min(F_{t,Rd}; B_{p,Rd})} = 0,0 \%$$

Utilization in shear

$$U_{ts} = \frac{V_{Ed}}{\min(F_{v,Rd}; F_{b,Rd})} = 0,9 \%$$



Bolts: B1 There is a gap between connected plates. Bolts should be designed as pins. Provided resistances of bolts in shear and plates in bearing may be incorrect

Welds

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{pl} [%]	σ_{\perp} [MPa]	τ_{\parallel} [MPa]	τ_{\perp} [MPa]	Ut [%]	U _t [%]	Status
M2-w 1	M1	▲ 0,1	145	LE1	353,8	0,7	-212,4	21,0	162,0	98,3	38,5	OK

Design data


	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 235	0,80	360,0	259,2

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Symbol explanation

	Fillet weld
ϵ_{pl}	Strain
$\sigma_{w,Ed}$	Equivalent stress
$\sigma_{w,Rd}$	Equivalent stress resistance
σ_{\perp}	Perpendicular stress
$\tau_{ }$	Shear stress parallel to weld axis
τ_{\perp}	Shear stress perpendicular to weld axis
0.9σ	Perpendicular stress resistance: $0.9 \cdot f_u / \gamma_{M2}$
β_w	Correlation factor EN 1993-1-8 tab. 4.1
U_t	Utilization
U_{tc}	Weld capacity utilization

Detailed result for M2-w 1 M1

Buckling

Buckling analysis was not calculated.

Bill of material

Manufacturing operations

Name	Plates [mm]	Shape	Nr.	Welds [mm]	Length [mm]	Bolts	Nr.
CUT1				Fillet: a = 0,1	145,1		

Welds


Type	Material	Throat thickness [mm]	Leg size [mm]	Length [mm]
Fillet	S 235	0,1	0,1	145,1

Bolts

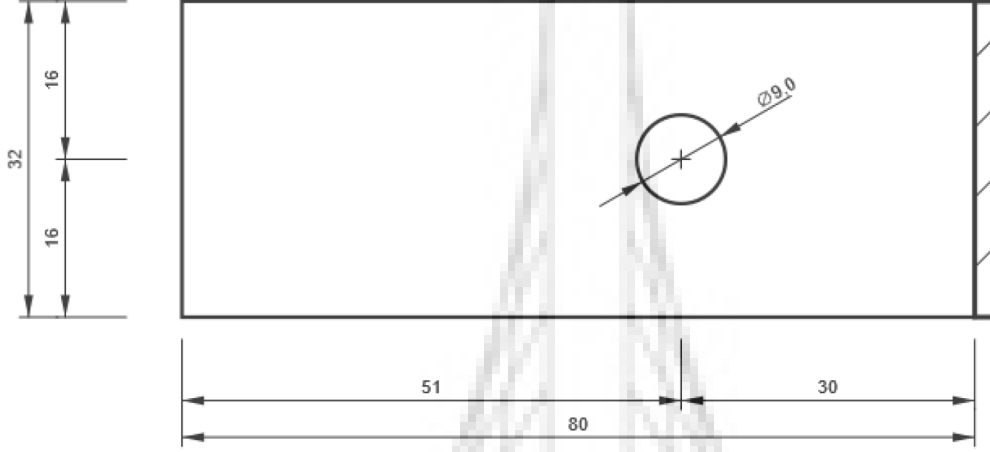
Name	Grip length [mm]	Count
M8 8.8	55	1

Drawing

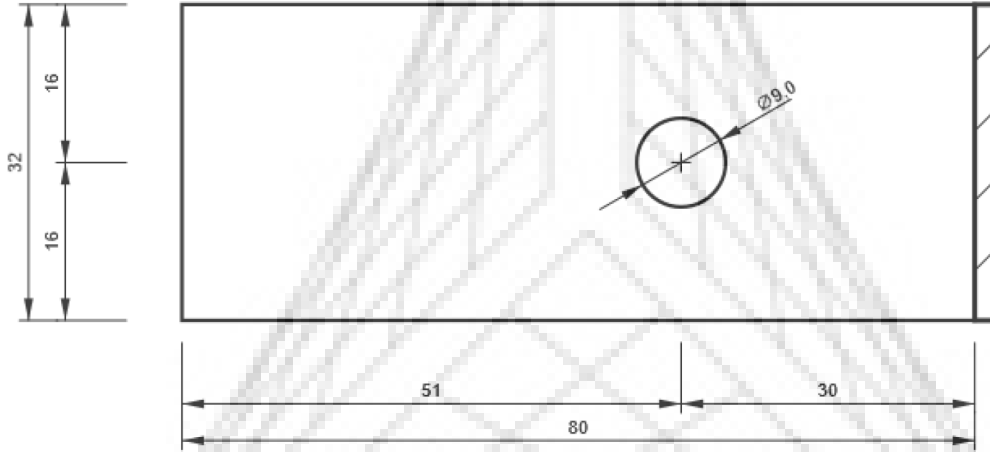
M1, RHS40x40 - Web 1:



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M1, RHS40x40 - Web 3:

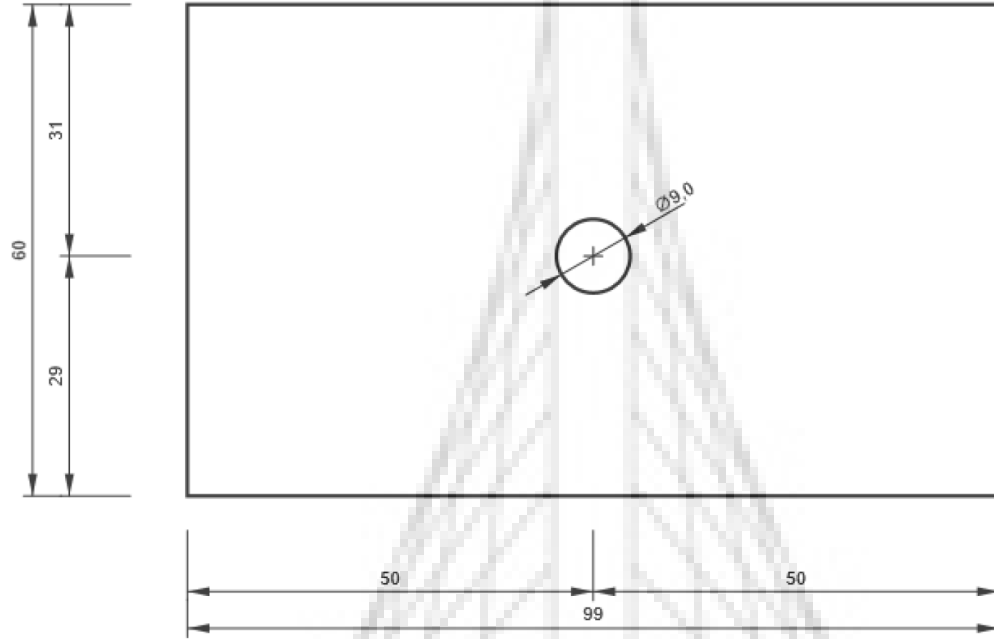


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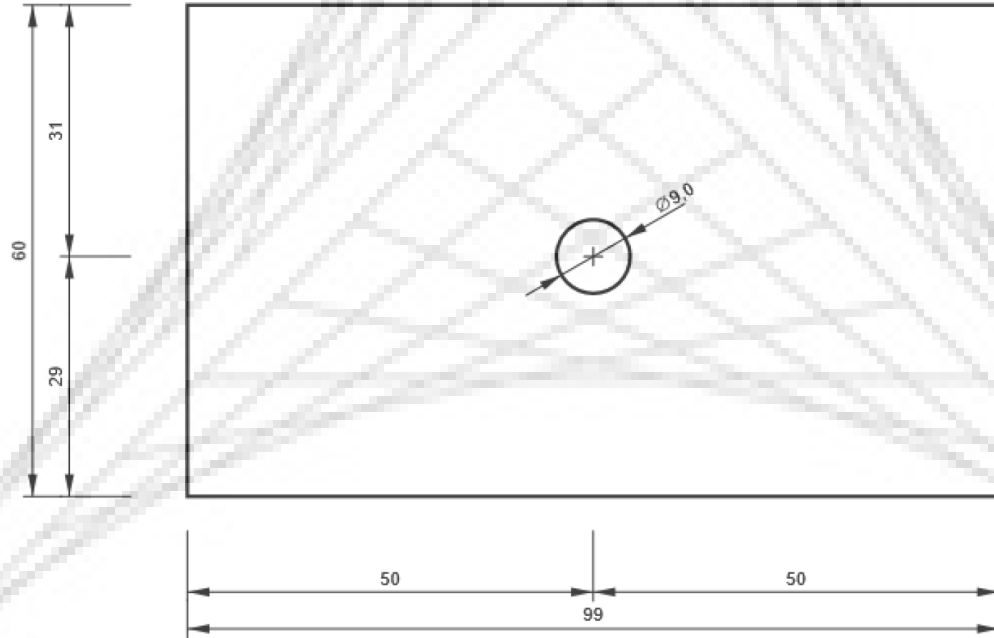
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M2, U55 - Bottom flange 1:



M2, U55 - Top flange 1:



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Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_C	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient β_j	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	No		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated a_b in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	No		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5