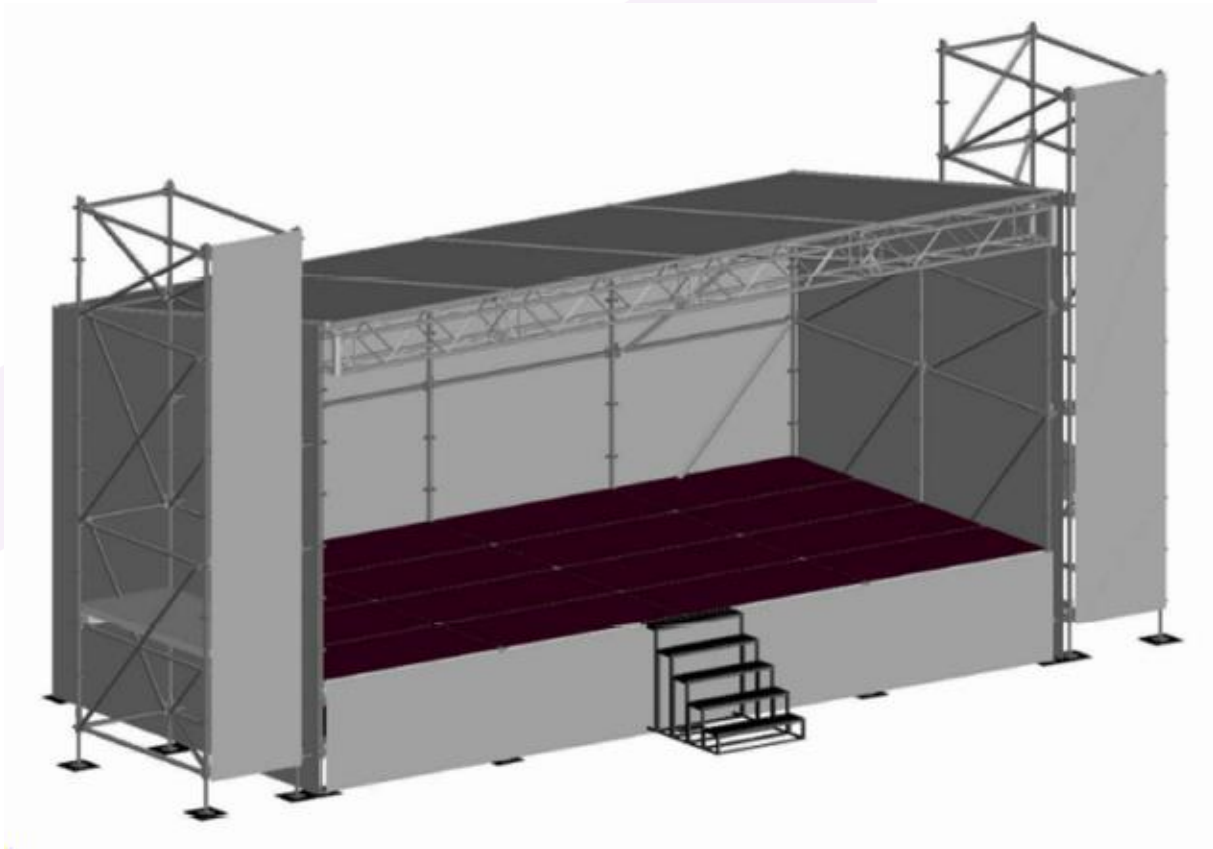


PODIUM – BOEK

GE

Eekels Verhuur 112023-08



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Voorwoord

Opdrachtgevers en organisatoren, alsmede gemeentelijke diensten hebben behoefte aan handvatten voor de beoordeling van kwaliteit en specificaties van overdekte podia die tijdelijk geplaatst worden. Met als doel het inzichtelijk krijgen van waar gehuurde overdekte podia aan moeten voldoen op gebied van onder meer brandveiligheid- en constructieve veiligheid. Een van de is om een podiumboek op te stellen waarin deze zaken overzichtelijk en begrijpelijk worden weergegeven, dit op een vergelijkbare manier hoe een tentboek wordt samengesteld.

In het veld worden diverse termen gebruikt voor het overdekken van een podium; kap, dak, stage, overkapping. In essentie betreft het in dit bouwboek een podium wat voorzien is van een constructie welke zorgdraagt voor (gedeeltelijke) beschutting van de elementen.

In de bijlagen komen zaken aan de orde als tekeningen, kwaliteitsverklaringen, constructieve berekenen en andere informatie welke verder relevant is.

In de normen welke gaan over de overdekte podia worden kwaliteitsverklaringen, constructieve berekeningen en andere relevante stukken genoemd. Hierin staat gesteld dat deze stukken niet in de Nederlandse taal opgesteld hoeven te zijn, eventuele aanvullende toelichtingen en handleidingen wel. Het voorwoord en handleidingen die minimaal in het podium-boek moeten staan worden gezien als toelichting. Andere zaken dan de toelichting(en) in het podium-boek mogen in het Duits, Frans of Engels aangeleverd worden.

Het gebruik van het overdekte podium is geen onderwerp van het podium-boek.

Binnen het NEN lopen nog een aantal andere trajecten die te maken hebben met evenementen, allemaal beginnende met: 8020-

Een aantal, al dan niet Europese, algemeen gehanteerde normen en richtlijnen die te maken hebben met overdekte podia welke tijdelijk geplaatst worden zijn o.a.:

- NPR 8020-50 Evenementen – Podiumconstructies – Verantwoordelijkheden
- NPR 8020-51 Evenementen – Podiumconstructies – Belastingen en constructieve uitgangspunten
- NEN-EN 13814 Machines en constructies op kermisterreinen en amusementsparken – Veiligheid
- NEN-EN 1990 Grondslagen van het constructief ontwerp
- NEN-EN 1991 Belastingen op constructies
- NEN-EN 1993 Staalconstructies

Bovenstaande normen- en richtlijnen refereren o.a. aan de Eurocodes NEN-EN 1991-1-4/NB;

Deel 1: Belastingen op constructies

Deel 1-4: Algemene belastingen – Windbelasting.

Een tijdelijk geplaatst overdekt podium is in beginsel geen bouwwerk in de zin van het bouwbesluit. Hieruit voortvloeiende kan er daarom niet automatisch naar het bouwbesluit of andere zaken worden gekeken als het gaat om beoordeling van een tijdelijk geplaatst overdekt podium. Hier moeten dus ook de eerder genoemde normen- en richtlijnen naast gehouden worden.

Keuringsrapporten voor zeil, bijvoorbeeld bepaald volgens B1 of M1, zijn doorgaans voorzien van een geldigheidsdatum. Deze datum heeft alleen betrekking op het productieproces van het zeil en niet op het product. Het zegt niets over het (brand)verloop van de kwaliteit van het materiaal. Zeil dat voldoet aan de gestelde eisen blijft zelfdovend. Dit gegeven is mede onderschreven door het LNB, cluster brandveilig gebruik.

Overdekte podia zijn onder te verdelen in:

- (gedeeltelijk) met zijwanden van harde panelen of zeil
- zonder zijwanden
- voorzien van meer bouwlagen

Het gebruik van dit podium-boek is slechts voorbehouden aan Eekels Verhuur B.V..

Hallenstraat 20

P.O. Box 175

5530 AB Bladel

T: +31 0 73 6136867

E: info@eekelsverhuur.nl

I: www.eekelsverhuur.nl

NOODNUMMER: +31 0 467 870 112

1. Algemene informatie

In dit hoofdstuk worden alle gegevens van de fabrikant en algemene gegevens overdekte podia indien deze buiten Europa is geproduceerd, tevens naam van importeur.

1.1 Algemene gegevens fabrikant(en);

Zeil	POLYMAR – FR COLOR 700
Constructie	H40V Truss
Type zeil	PVC; artikel 8509 5240

1.2 Algemene gegevens;

Naam	GE
Type	GE 24 - 32
Configuratie(s)	8.28x3.11 – 8.28x4.14 meter

2 Gegevens verhuurder of leverancier

Hieronder wordt alle huidige en relevante informatie weergegeven van de verhuurder/leverancier.

Rechtsvorm	Besloten Vennootschap
Handelsnaam	Eekels Verhuur B.V.
Bezoekadres	Hallenstraat 20 5531 AB BLADEL
Postadres	P.O. Box 175 5530 AD BLADEL
Telefoonnummer	0031 73 6136867
Website	www.eekelsverhuur.nl
Mailadres	info@eekelsverhuur.nl
K.v.K. nummer	84151722
Omzetbelasting nummer	NL863114192B01
Bank	Rabobank de Kempen
IBAN Rekening nummer	NL43RABO0374476608
BIC	RABONL2U

3 Algemene technische gegevens van de overdekte podia

Waar dient de huurder ten alle tijden rekening mee te houden bij de ingebruikname van het overdekte podium.

3.1 Algemeen

- Geen sneeuw- en/of hagelbelasting gerekend
- Podiumvloer is geschikt voor een belasting tot 750 kg/m²
- Obstakels moeten ten minste 0,5 meter van het doek verwijderd zijn (zowel binnen als buiten).

3.2 Bijzonderheden

Voor de berekeningen is aangehouden:

- Onbebouwde omgeving;
- Tekeningen volgens het bouwboek;
- Toetsing volgens NEN-EN 13814;
- Afmeting van de constructie: 8.28x3.11 – 8.28x4.14 meter

4 Basis instandhouding- en ontruimingsprotocol

Er zijn zaken welke in basis ten alle tijden van toepassing zijn bij een overdekt podium.

- De constructie van de overdekte podia mogen na oplevering nooit zo worden aangetast dat de constructieve veiligheid in het geding komt.
- Organisator moet grondankers, ballast, windverbanden, spanbanden, palen, wandpanelen, zeilen of andere zaken na losmaken voor welk doel dan ook direct weer terugplaatsen/vastmaken.
- Bij het verlaten van het terrein en/of afsluiten van dagelijkse werkzaamheden en/of na afloop van het evenement moet organisator waar mogelijk de toegang tot het overdekte podia sluiten of niet toegankelijk maken.
- Het overdekte podia moet(en) te allen tijde door organisator sneeuw- en of hagelvrij gehouden worden.
- Cumulatie van water, z.g. waterzakken, moeten door organisator direct verwijderd worden, indien dit niet lukt moet verhuurder meteen verwittigd worden.
- Eventuele loskomende grondverankering of verschuivende ballast moet door organisator direct gemeld worden aan verhuurder.
- Voor opgave gemiddelde wind in Bft. en windstoten. (piekwind) in relatie tot de grenswaarden, het sluiten of buiten gebruik stellen van het overdekte podium zie windtabel(len) elders in dit stuk. Daarbij dienen de beheersmaatregelen uit bijlage 4 in acht genomen te worden.
- Equipotentiaalverbinding. Al het blootliggende metaalwerk binnen een structuur dat in contact zou kunnen komen met een bron van elektrische stroom moet op adequate wijze geaard zijn. Er moet rekening worden gehouden met de mate van blootstelling en het risico op blikseminslag en, waar van toepassing, moet de constructie voldoende worden beschermd. Advies over verlichtingsniveaus voor normaal en noodgebruik valt buiten het toepassingsgebied van deze norm en is elders beschikbaar.
- Blikseminslag in de constructie die voldoet aan gestelde (brandveiligheidseisen levert geen schade op aan de overdekte podia).
- Bij acute dreiging van zwaar onweer gepaard gaande met z.g. valwind en/of hagel moet het overdekte podium en directe omgeving ontruimd-, en indien mogelijk gesloten worden. Het overdekte podium is hierin van ondergeschikt belang.
- Organisator moet het lokale weer tijdens het evenement adequaat bewaken en actie ondernemen waar eigen organisatieprotocollen of overdekte podiumspecificaties dit aangeven.

5 Verklaring weeromstandigheden

Met welke weersomstandigheden dient de huurder rekening te houden.

- Een constructie wordt berekend op een stuwdruk (de windbelasting per m²). De stuwdruk ontstaat door de windsnelheid. De windsnelheid is opgebouwd uit een stationair deel en een turbulent deel. Hierdoor ontstaan er pieken in de windsnelheid.
- Windsnelheid wordt standaard gemeten op 10 meter hoogte in het vrije veld, zonder obstakels. Er kan gesproken worden over een piekwindsnelheid, een 10-minuten gemiddelde windsnelheid of een uurgemiddelde windsnelheid. Hoe langer de tijd is, hoe lager het gemiddelde.
- De in de berekeningen gehanteerde beaufort-windschaal wordt in Nederland weergegeven in een 10-minuten **gemiddelde windsnelheid** op 10 meter hoogte in het vrije veld.
- **De stuwdruk waarop een overkapping berekend is, is bepalend voor de sterkte van de overkapping. Het gaat er dus om dat op de juiste manier wordt vastgesteld welke windsnelheid moet worden aangehouden om te kunnen bepalen of de stuwdruk overschreden wordt.**
- Als er niet op locatie gemeten wordt, moet gebruik worden gemaakt van de dichtstbijzijnde meteostation en moet de 10-minuten-gemiddelde windsnelheid op 10 meter hoogte worden opgevraagd. Als de grens-10 minutengemiddelde snelheid wordt bereikt, is de grens-stuwdruk bereikt. De opgegeven waarden gelden voor onbebouwd terrein (buiten de bebouwde kom) en niet voor het strand.
- Onderscheid tussen gemiddelde- en piekwindsnelheid in acht nemen.

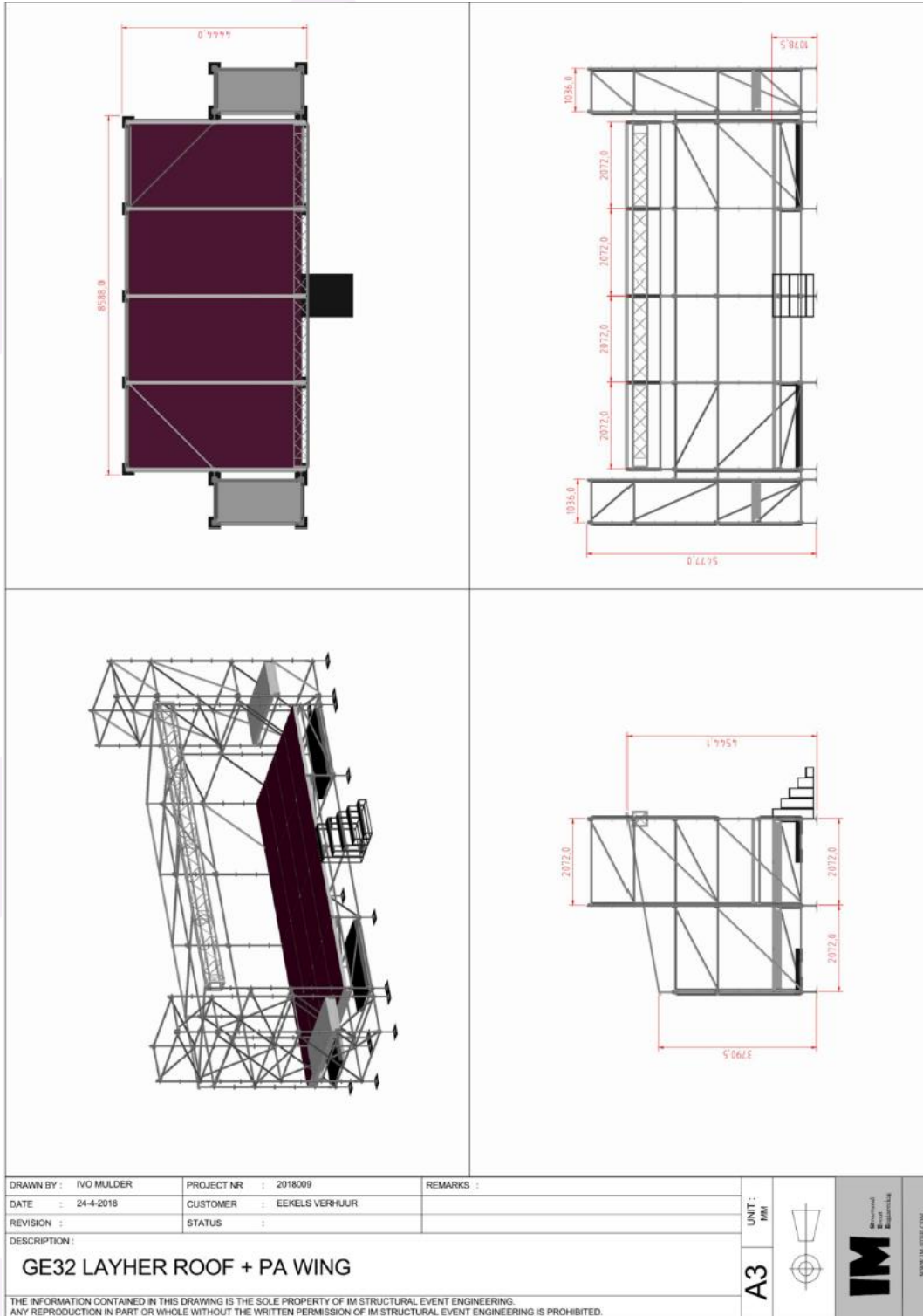
De windkracht volgens de Schaal van Beaufort (bron: KNMI). De schaal van Beaufort wordt gebruikt voor de gemiddelde windsnelheid, over minstens 10 minuten gemeten, niet voor de snelheid van rukwinden/windstoten (piekwind).

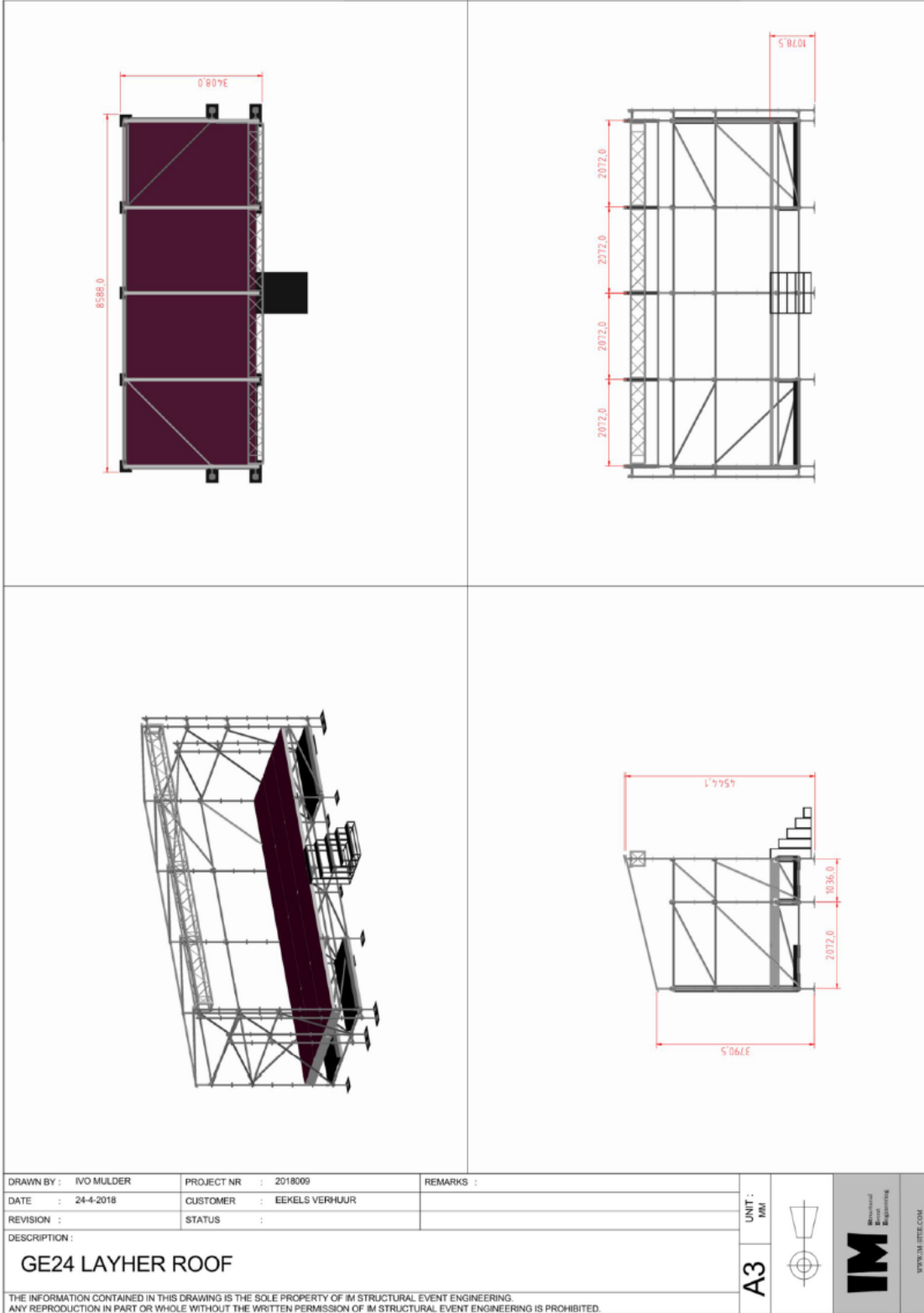
Kracht	Benaming van KNMI	Benaming in Zeevaart	Snelheid in km/h*	Snelheid in m/s*	Snelheid in knopen
0	Stil	Windstil	0-1	0-0,2	0-1
1	Zwak	Flauw en stil	1-5	0,3-1,5	1-3
2	Zwak	Flauwe koelte	6-11	1,6-3,3	4-6
3	Matig	Lichte koelte	12-19	3,4-5,4	7-10
4	Matig	Matige koelte	20-28	5,5-7,9	11-16
5	Vrij krachtig	Frisse bries	29-38	8,0-10,7	17-21
6	Vrij krachtig	Stijve bries	39-49	10,8-13,8	22-27
7	Hard	Harde wind	50-61	13,9-17,1	28-33
8	Stormachtig		62-74	17,2-20,7	34-40
9	Storm		75-88	20,8-24,4	41-47
10	Zware storm		89-102	24,5-28,4	48-55
11	Zeer zware storm / orkaanachtig		103-117	28,5-32,6	56-63
12	Orkaan		>117	>32,7	>63

De Nederlandse weerstations onder andere vinden op: www.meteovista.nl, www.knmi.nl, www.meteoconsult.nl en www.meteostation.nl.

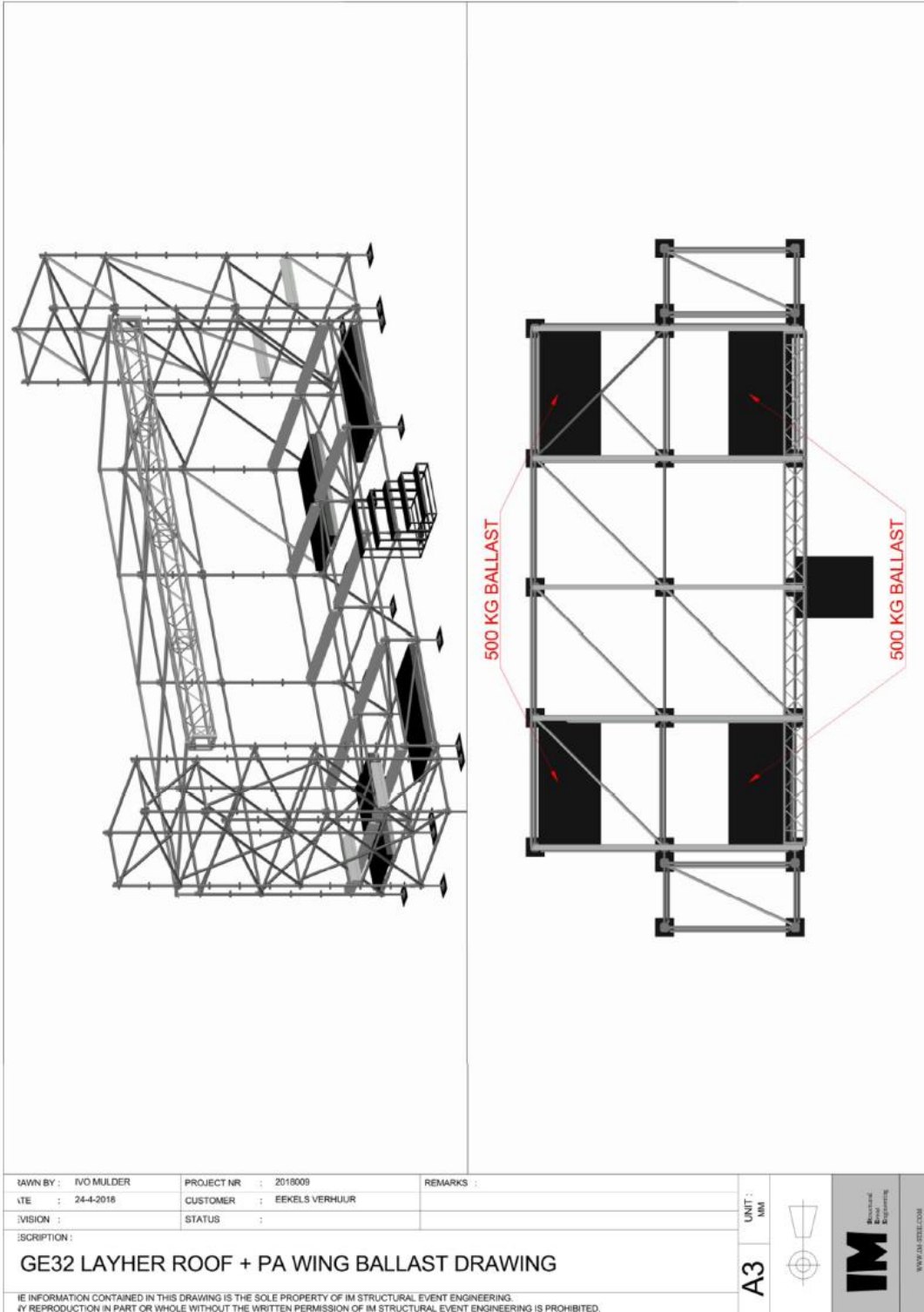
Organisator kan ook bij onder andere Meteovista en Meteoconsult gedurende de duur van het evenement een weerbewakingscontract aangaan om nog beter op de hoogte te zijn van de lokale weersomstandigheden.

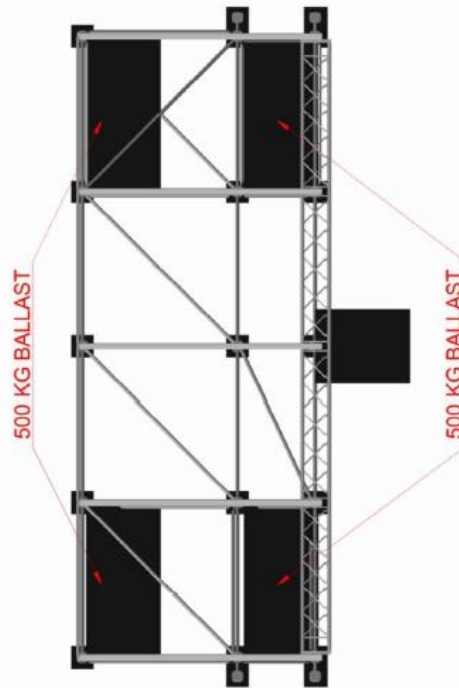
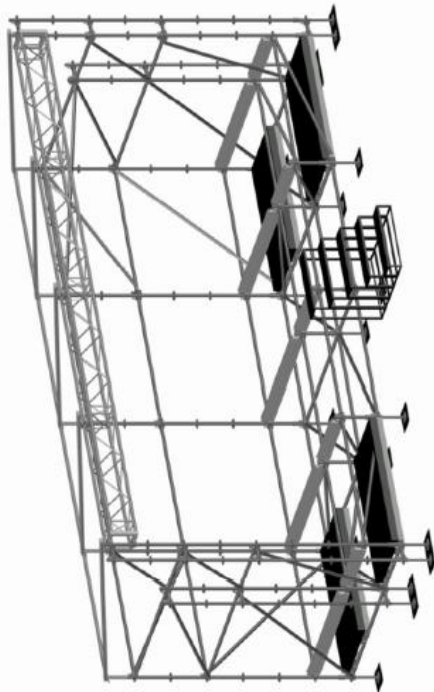
6 Bijlage I: Tekening(en)






7 Bijlage II: Ballastplan



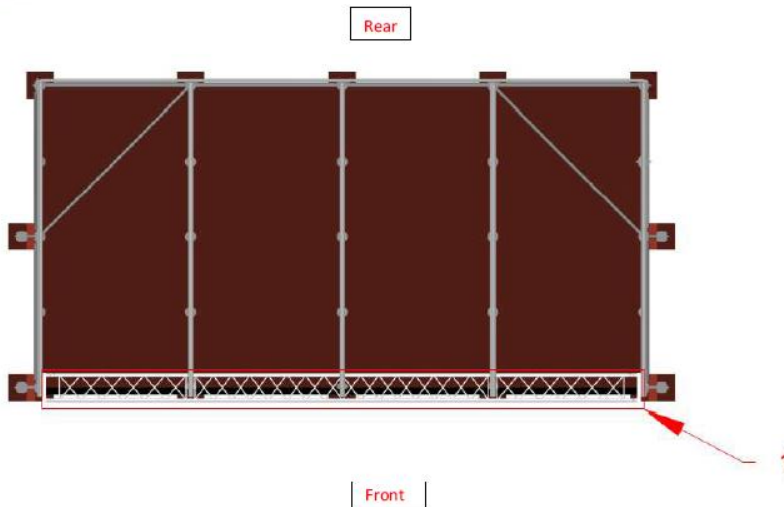


DRAWN BY : IVO MULDER	PROJECT NR : 2018009	REMARKS :
DATE : 24-4-2018	CUSTOMER : EEKELS VERHUUR	
VISION :	STATUS :	
DESCRIPTION :		
GE24 LAYHER ROOF BALLAST DRAWING		
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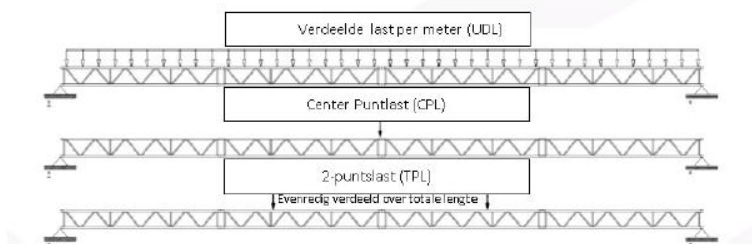
8 Bijlage III: Riggingscapaciteit



Riggingscapaciteit GE 32/24



Naam	Waarde	Maximale Gebruiksbelasting per punt
		1
A. Verdeelde last per meter (UDL)	kg/m	50
B. Center puntlast (CPL)	kg	500
C. 2-puntlast (TPL)	kg	500
D. 4-puntlast (FPL)	kg	300



Figuur 1

Let op:
Bij Dynamische lasten dient een extra veiligheidsfactor gehanteerd te worden in overleg met constructeur Eekels verhuur!

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9 Bijlage IV: Beheersmaatregelen (WMP; Wind Management Plan)

In dit Beheersplan wordt kort omschreven welke stappen bij welke windsnelheid gezet dienen te worden. De waarde waarbij deze stappen gezet dienen te worden verschillen per windgebied.

Hieronder een opsomming van de 10-minuten gemiddelde windsnelheid per locatie (omschreven in de NEN-EN 1991-1-4:2005)

In de bovenstaande hoofdstukken is uitgelegd hoe de berekening is opgebouwd. Conform de Geldende normen dient dan het onderstaande Beheersingsplan toegepast te worden.

1. Zij- en achterzeilen dienen verwijderd te zijn bij het bereiken van onderstaande waarde;

Gebied	10 minuten gemiddelde windsnelheid (m/s)	Beaufort (Bft)	Piekwindsnelheid (m/s)	Stuwdruk (kN/m ²)
Kust	10.58	5	17.89	0.20 kN/m ²
Onbebouwd	12.03	6	17.89	0.20 kN/m ²
Bebouwd	17.57	7	17.89	0.20 kN/m ²

2. Het podium dient UIT-SERVICE (out-service) gesteld te zijn bij het bereiken van onderstaande waarde;
- Tevens dient de directe omgeving ontruimd te zijn

Gebied	10 minuten gemiddelde windsnelheid (m/s)	Beaufort (Bft)	Piekwindsnelheid (m/s)	Stuwdruk (kN/m ²)
Kust	15.65	7	26.46	0.4375kN/m ²
Onbebouwd	17.79	8	26.46	0.4375kN/m ²
Bebouwd	25.99	10	26.46	0.4375kN/m ²

3. Bij acute dreiging van zwaar onweer gepaard gaande met z.g. valwind en/of hagel moet de constructie en directe omgeving ontruimd-, en indien mogelijk, gesloten worden. De overkapping is hierin van ondergeschikt belang.

NOTE; de 10-minuten gemiddelde windsnelheid wordt alleen weergegeven als referentie windsnelheid. Acties omtrent de constructie dienen ondernomen te worden aan de hand van de piekwindsnelheid.

Voor andere configuraties of bij vragen of twijfel over dit plan kunt u altijd contact opnemen met Eekels Verhuur B.V.

10 Bijlage V: Zeilcertificaat



Technisches Datenblatt Nr.: **1017.14**
 Produkt: **POLYMAR®** FR COLOR 700
 Artikel Nr.: **8509 5240**

Beschichtung und Ausrüstung			
Beschichtungsart	PVC		
Ausrüstung	beidseitig mit Acryllack, mikrobiozid, UV-geschützt		
Brennverhalten	BS 7837, D.M. 26.06.84 (UNI 9177): CL 2, DIN 4102: B1, NFP 92507: M2, GOST: G1, NFPA 701 Test 2, EN 13501-1: B-s2-d0		
zu Brennverhalten	stets die Aktualität der FR-Zulassung, sowie länderspezifische Gültigkeit prüfen		
Gesamtgewicht	680 g/m ²	DIN EN ISO 2286-2	
Reißkraft Kette/Schuss	3000 / 3000 N/50 mm	DIN EN ISO 1421/V1	
Weiterreißfestigkeit Kette/Schuss	300 / 300 N	DIN 53363	
Hafffestigkeit	20 N/cm	PA 09.03 (item)	
Kältebeständigkeit.	-40 °C	DIN EN 1876-1	
Wärmebeständigkeit	+70 °C	PA 07.04 (item)	
Lichtechtheit	>6 Note, Value	DIN EN ISO 105 B02	
Knickfestigkeit	keine Risse	100000 x	DIN 53359 A
Trägergewebe			
Material	PES	DIN EN ISO 2076	
Fadenstärke	1100 dtex	DIN EN ISO 2060	
Bindung	L 1/1	ISO 3572	

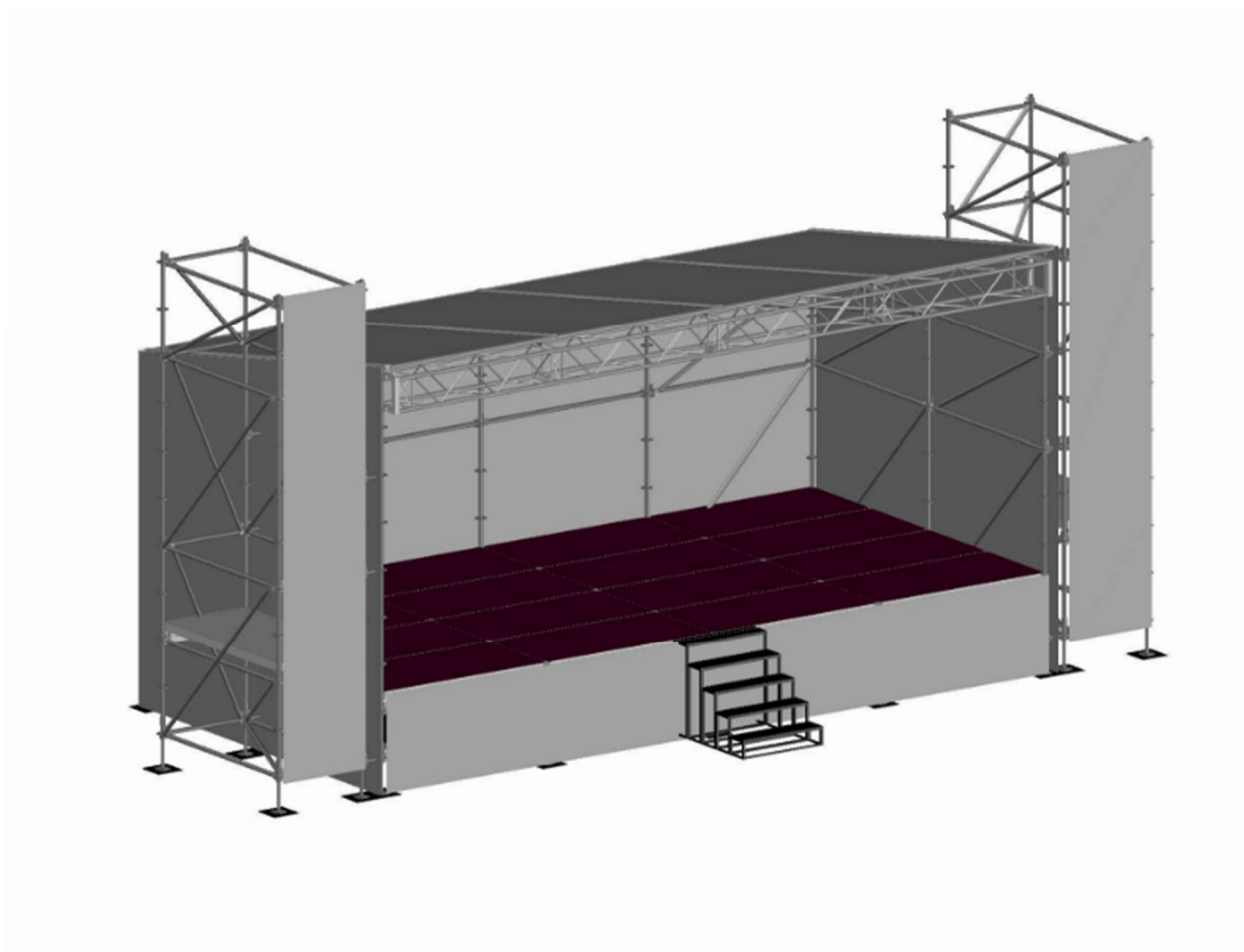
Bei den technischen Daten handelt es sich um ca. Werte, die auf Basis von ermittelten Durchschnittswerten erstellt wurden. Aus fertigungstechnischen Gründen sind Abweichungen bis zu -5% möglich. Diese technischen Angaben entsprechen dem heutigen Stand der Kenntnisse und sollen über unsere Produkte ohne Rechtsverbindlichkeit informieren. Diese Daten gelten für neue Ware. Einsatzvorschläge entbinden den Käufer nicht, selbst zu prüfen, ob das Material für den von ihm gewünschten Einsatz geeignet ist.

11 Bijlage VI: Berekening



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Project number: 2018009
Structural calculation Report
GE24 and GE32 Layher roof
Eekels verhuur

This calculation report has been specific prepared for the company Eekels verhuur based at Gruttostraat 9 5212 VM 's-Hertogenbosch. It is not allowed to copy or print any part of this calculation other than for the intern use at Eekels verhuur. The first chapter of this calculation report can be passed on as annex to a permit application. In all other situations it is obligated to obtain a written permission from the company IM Structural Event Engineering.

Date: 25-04-2018

Ivo Mulder BCs



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Truss information.

1 General Preliminary notes.

1.1 Project description.

This project concerns the calculation of The Layher roof systems GE24 and GE32. These roof systems are constructed from Layher all-round material.

The dimensions are
GE32 = 8x4 meter.
GE24 = 8x3 meter.

The GE32 can also be built with a PA wing with a minimum depth of 2.07 meter.

The stage is calculated with a floor height of 1 meter, it is also possible to build the Layher roof with a stage height of 1.5 or 2 meter.

The main rigging loads in the main roof need to be suspended from the H40V Truss.

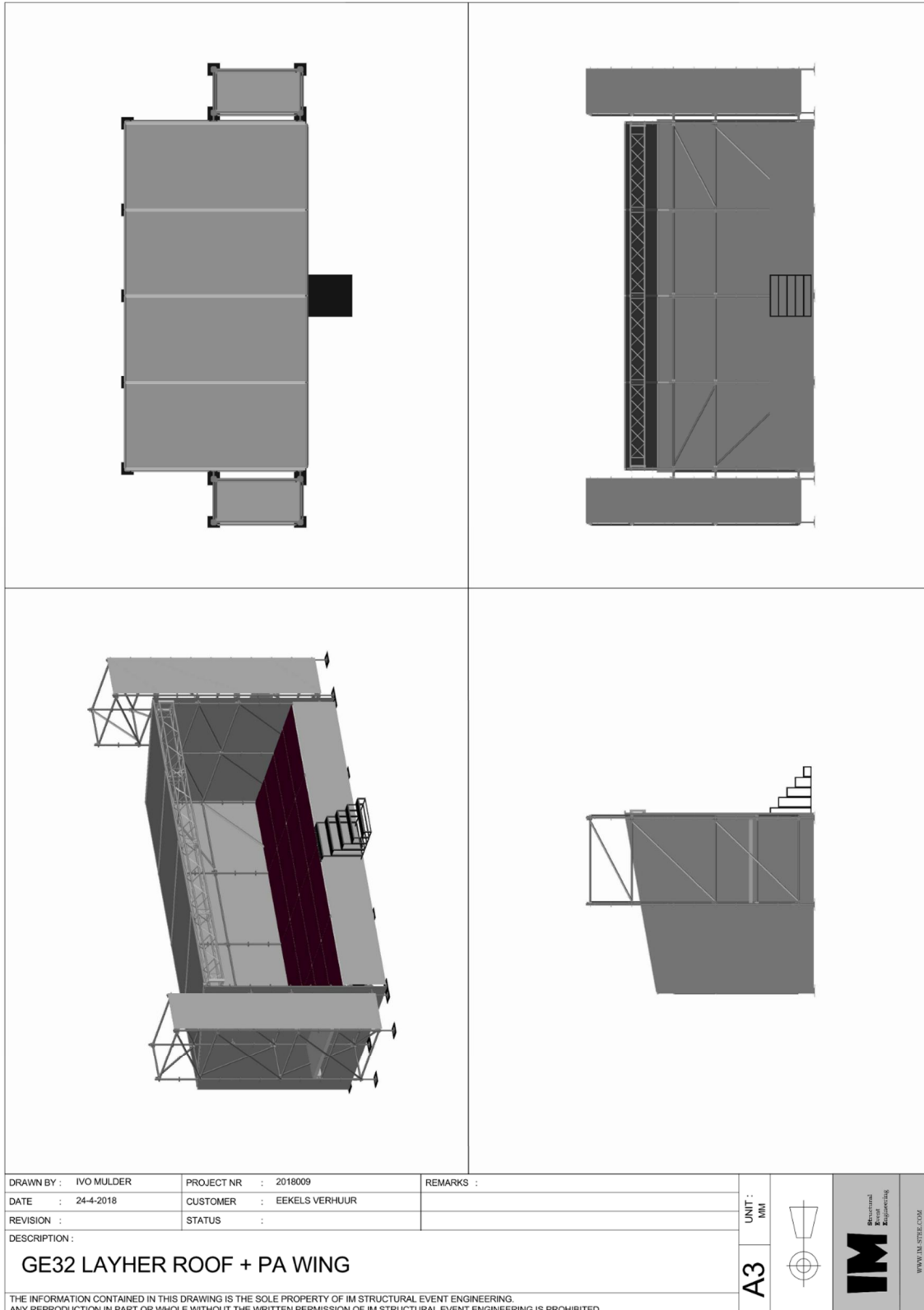
The roof canopy of the GE32 is mounted by the use of a Layher keder profile. Part number 5574600. This keder profile has the dimensions of 65x74 mm.

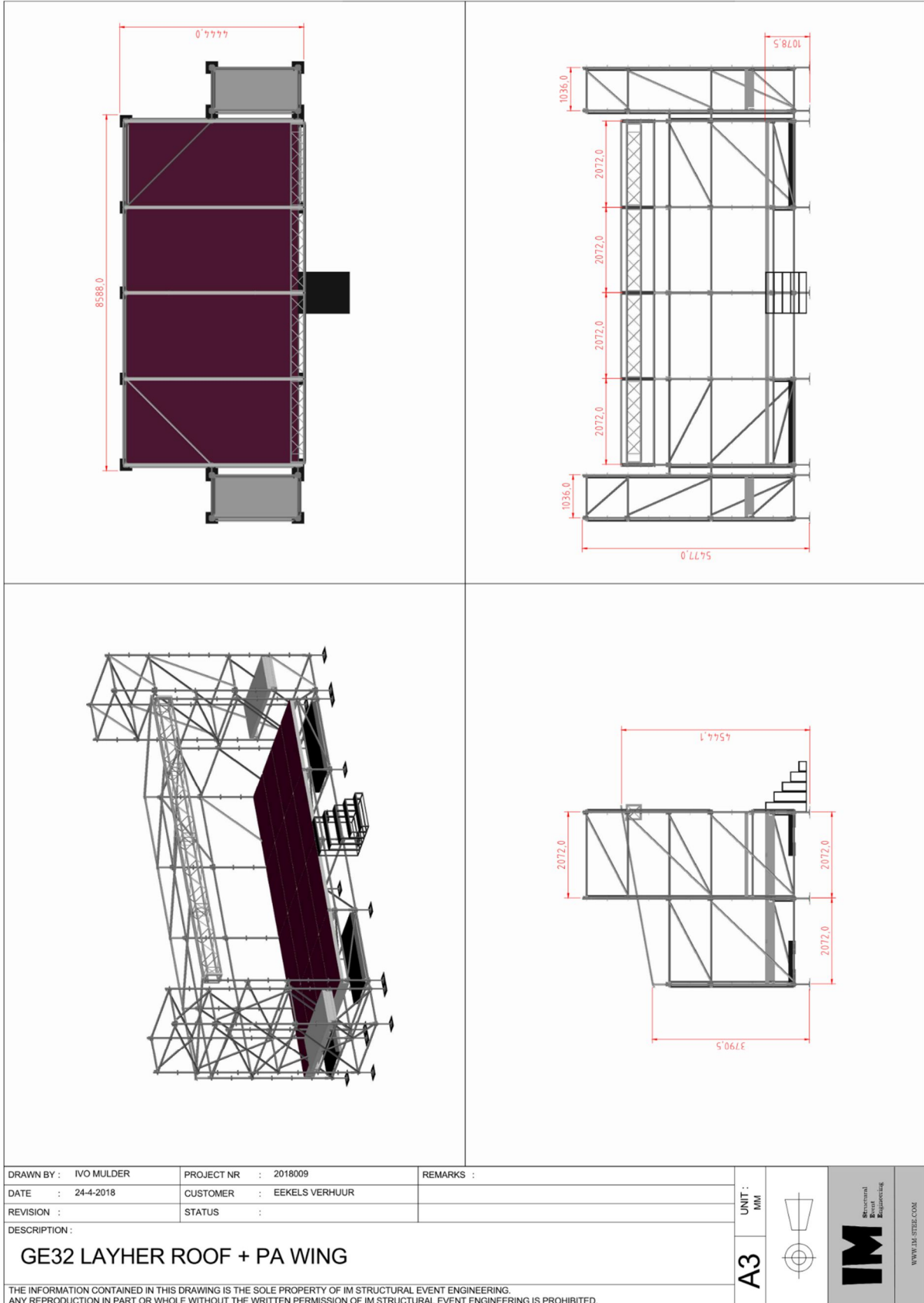
The roof canopy of the GE24 is mounted by the use of a Layher keder profile. Part number 4200400. This keder profile has the dimensions of 51x76 mm.

Before the wind gust exceeds the maximum In-service wind speed of 21 m/s the back and side walls and big scenery objects need to be removed, so the wind can pass underneath the roof.

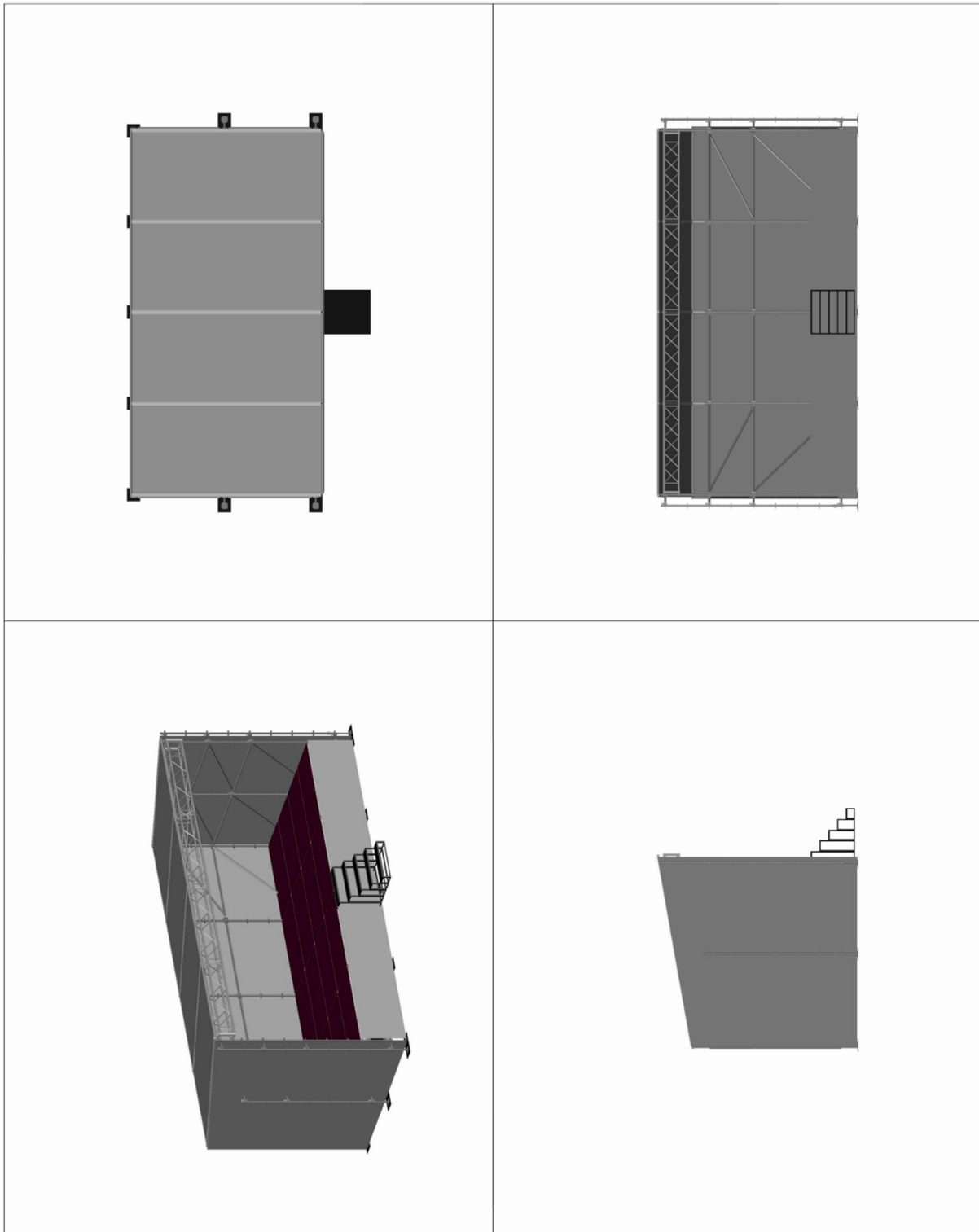
1.2 Construction drawing of the different Layher roof systems.



1.2.1 GE32 Layher roof + PA wings.

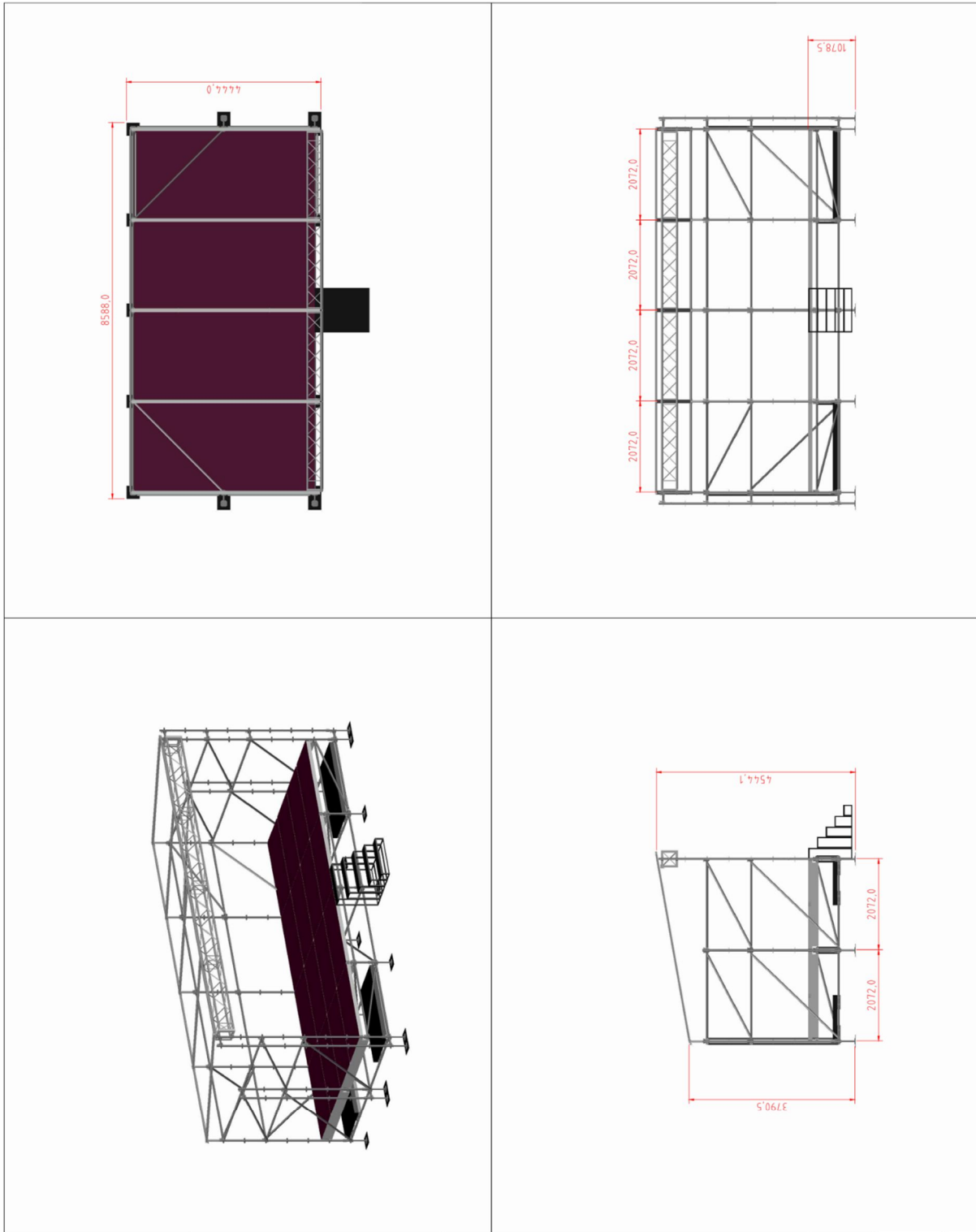




1.2.2 GE32 Layher roof

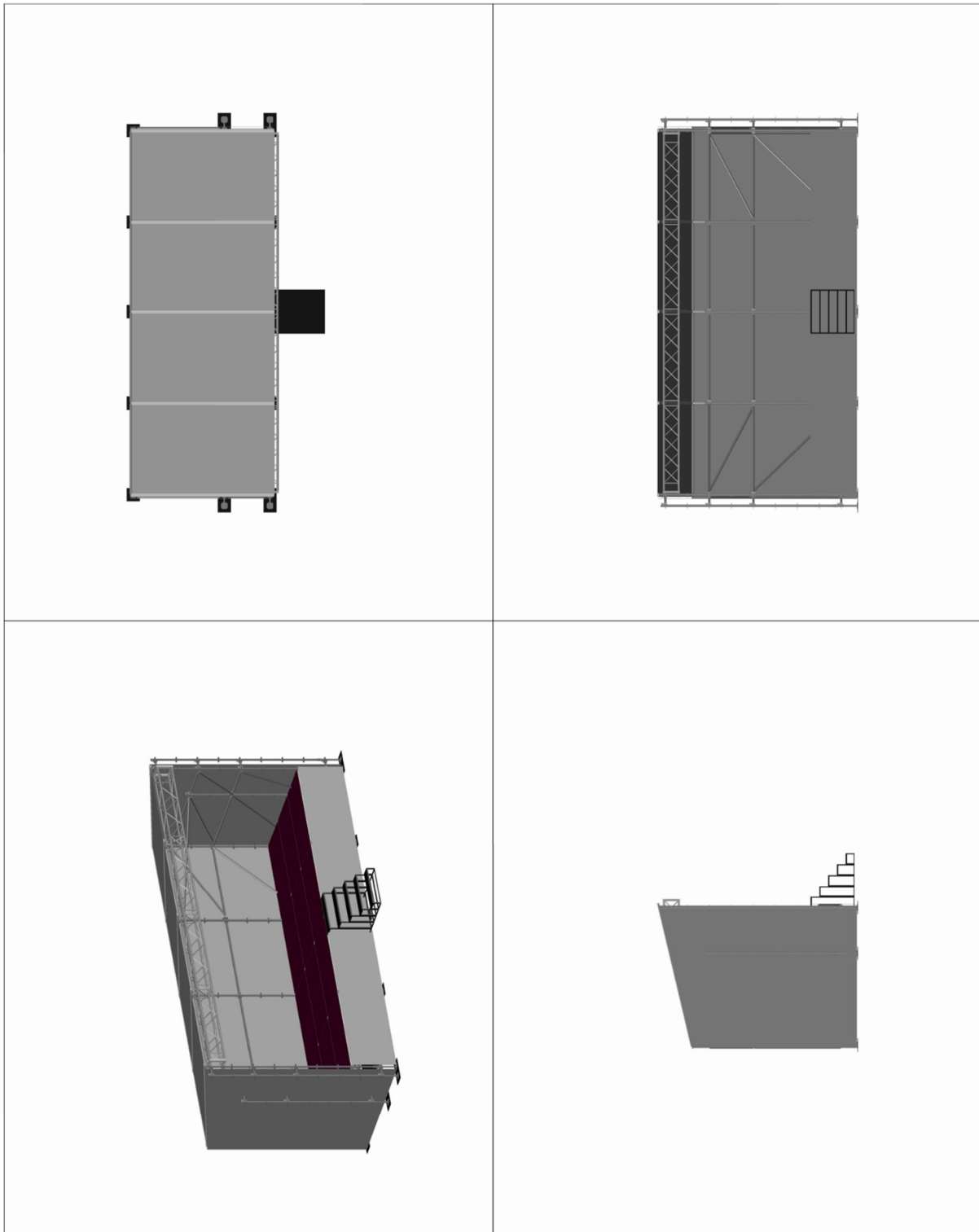


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DATE : 24-4-2018	CUSTOMER : EEKELS VERHUUR			
REVISION :	STATUS :			
DESCRIPTION :				
GE32 LAYHER ROOF				
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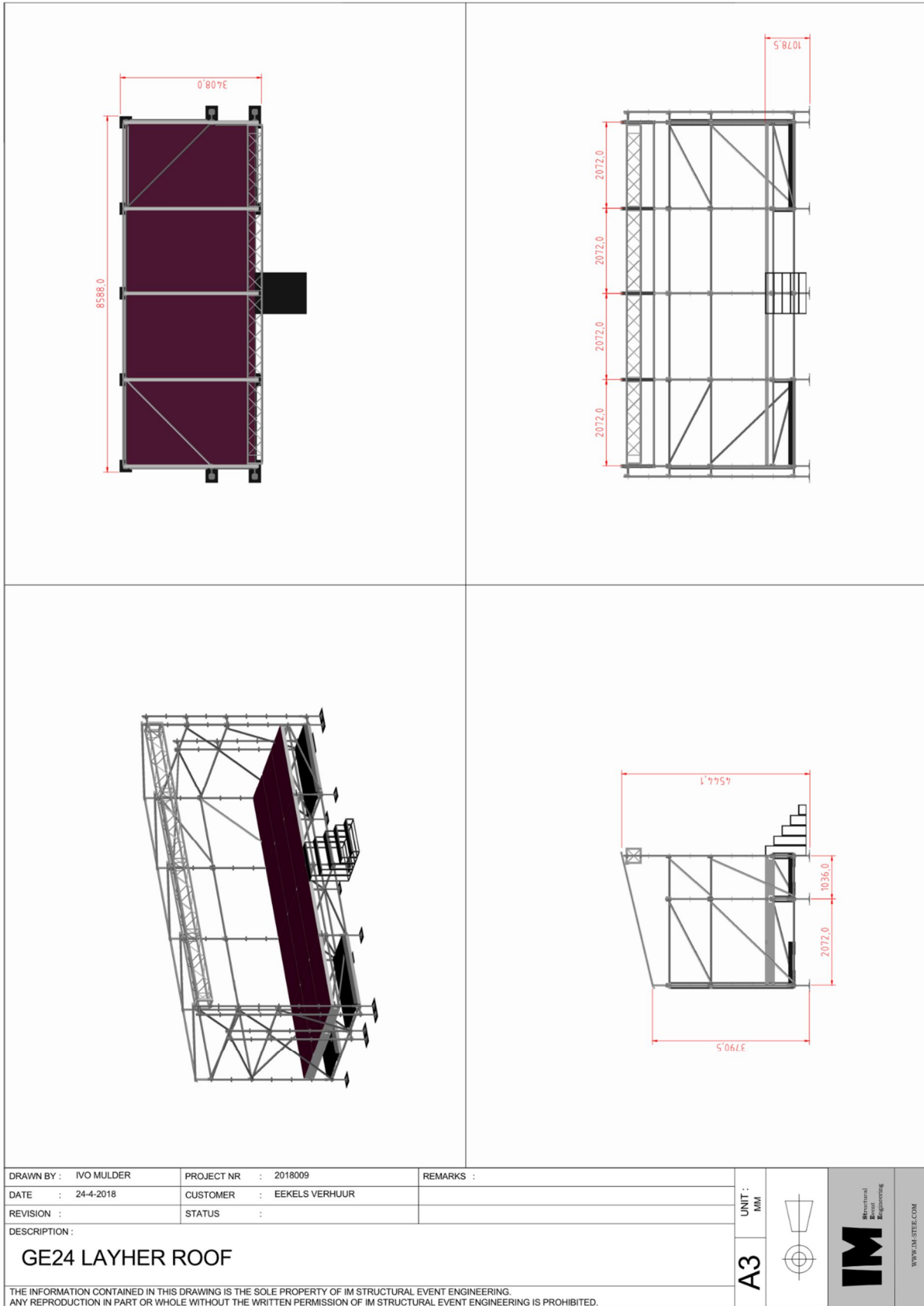


DRAWN BY : IVO MULDER	PROJECT NR : 2018009	REMARKS :	UNIT : MM A3	
DATE : 24-4-2018	CUSTOMER : EEKELS VERHUUR			
REVISION :	STATUS :			
DESCRIPTION :				
GE32 LAYHER ROOF				
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1.2.3 GE24 Layher roof



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REVISION :	STATUS :					
DESCRIPTION :						
GE24 LAYHER ROOF						
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1.3 Used normalisation.

This calculation is based on the next parts of the Eurocodes.

NEN-EN 1990	(Eurocode 0) Basis of structural design.
NEN-EN 1991	(Eurocode 1) Action on structures.
NEN-EN 1993	(Eurocode 3) Design of steel structures.
NEN-EN 1999	(Eurocode 9) Design of Aluminium structures.
NEN-EN 13814	Fair ground and amusement park machinery and structures
NEN-EN 13782	Temporary Structures-Tents-Safety.
NEN-EN 12385	Steel wire ropes.

1.4 General load assumption explanation.

The loads which are taken into account in this calculation are based on the information gathered from the different parts of the Eurocodes. Some of the loading information's from the Eurocode are based on permanent building constructions which makes it not feasible to use these information for a temporary demountable construction. In these specific cases there will be an explanation of a well weighted decision why the calculation deviates from the information presented in the Eurocode.

1.5 Used materials.

Stage Support system	Layher Event system K2000
Flooring system	Layher event system
Back and side wall	Layher Event system K2000
Front Truss bridge	Prolyte H40V truss

Information about the truss could be found in the Annex of this report.

1.6 Load assumptions.

1.6.1 Wind loading.

According to the Eurocode 13814, two wind situation calculations have to be made for a temporary demountable structure. The first situation has a wind speed from 0 to 21 m/s and is called the In-service situation and the second situation has a wind speed from 21 m/s to 28 m/s and is called the Out-service situation. These maximum wind speeds are the maximum wind gust measured at 10 meters high in a free environment. The In-service situation is the situation where the construction can be used for events. In this situation the back and side walls are mounted. There is no danger concerning the structural integrity of the temporary demountable structure. Before the wind gust exceeds the maximum In-service wind speed of 21 m/s the back and side walls and big scenery objects need to be removed, so the wind can pass underneath the roof. All these actions, and how they are executed need to be written in a method statement. When all the actions are finished the Out-service situation is in place. In the Out-service situation the only people who can be in the neighbourhood of the stage are professionals who know and understand the risk involved in temporary demountable structures and are well aware of the method statement. When there are wind gusts higher than the 28 m/s the construction site need to be completely cleared from all people.

The values of the extreme thrust are based on area's which have a reference wind speed of $V_{b,o}$, less or equal to 28 m/s with a return period of 5 years according to the NEN-EN 13814. If the construction will be used in an area which requires a higher extreme thrust, the user need to be aware that using the same extreme thrust value the return period will be less than 5 years.

In the NEN-EN 1991 there are 5 different terrain categories determined. In the tables on the next pages the maximum wind gust is presented which the construction can withstand in the In-service and the Out-service situations, in conjunction with the height and the terrain category. The figure in the column with the head V_b in m/s is the mean wind velocity measured on 10m height in the concerning terrain category, it is recommended to use a professional weather station near to the place where the construction is build. The column with the head Max. wind gust is the maximum peak wind which is determined from the peak wind velocity by the law of Bernoulli.

Because the maximum height of the construction with a stage of 2-meter floor level is just below 8 meters, only the table from $0 < 8$ m is presented on the next page.

1.6.2 In-service situation.

The 21 m/s which is mentioned as the maximum wind gust for the In-service situation is based on an average between the wind gust of 17.89 m/s for $0 < 8$ m and the wind gust 21.91 m/s for $8 < 20$ m.

$0 < 8$ meter 0.20 kN/m²

Terrain category	Vb in m/s (1)	Max. wind gust (2)
Sea or coastal area exposed to open sea	10.58	17.89
Lakes or flat and horizontal area with negligible vegetation and without obstacles	11.02	17.89
Area with low vegetation such as grass and isolated obstacles (trees, buildings) with separations of at least 20 obstacle heights	12.03	17.89
Area with regular cover of vegetation or buildings with isolated obstacles with separations of maximum 20 obstacles heights (such as villages, suburban terrain permanent forest)	14.29	17.89
Area in which at least 15% of the surface is covered with buildings and their average heights exceeds 15 m.	17.57	17.89

1.6.3 Out-service situation.

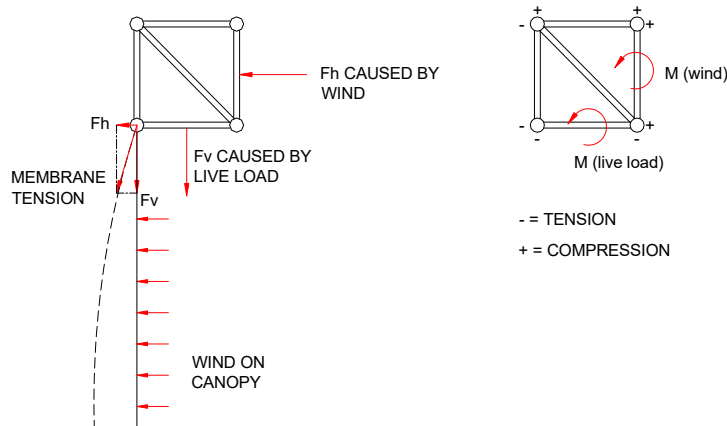
The 28m m/s which is mentioned as the maximum wind gust for the Out-service situation is based on an average between the wind gust 26.46 m/s for $0 < 8$ m and the wind gust 31.62 m/s for $8 < 20$ m. The wind pressure which is mentioned in the table below is increased with 20 % in comparison to the Eurocode 13814. This because the factor C_{tem} , which is 0.80 is taken out of the wind pressure values. Intentionally the factor C_{tem} is applied due to the fact that protection, reinforcement and sheltering is possible. In the case of these kind of structure's this is not possible to do.

$0 < 8$ meter 0.4375 kN/m²

Terrain category	Vb in m/s (1)	Max. wind gust (2)
Sea or coastal area exposed to open sea	15.65	26.46
Lakes or flat and horizontal area with negligible vegetation and without obstacles	16.3	26.46
Area with low vegetation such as grass and isolated obstacles (trees, buildings) with separations of at least 20 obstacle heights	17.79	26.46
Area with regular cover of vegetation or buildings with isolated obstacles with separations of maximum 20 obstacles heights (such as villages, suburban terrain permanent forest)	21.14	26.46
Area in which at least 15% of the surface is covered with buildings and their average heights exceeds 15 m.	25.99	26.46

1.6.4 Membrane tension of the canopy due to wind influences.

If there is a wind pressure applied to a membrane this membrane will have reaction forces in two directions on the connection to the construction. This phenomenon is called membrane tension. And in some cases, this extra loading need to be applied.



With a dynamic loading $q=0.50 \text{ kN/m}^2$ applying an aerodynamic coefficient $C_f=0.40$ and a span of $l=5.00 \text{ m}$ a resulting membrane tension of $Z=0.80 \text{ kN/m}$ is derived.

$$Z=(Z_y^2+Z_z^2)^{1/2}=0.80 \text{ kN/m with}$$

$$Z_z=0.5*0.4*5.0/2=0.50 \text{ kN/m}$$

$$Z_y=(Z^2-Z_z^2)^{1/2}=(0.80^2-0.50^2)^{1/2}=0.624$$

$$Z_y/Z_z=0.624/0.50=1.25 = 1 / 0.8$$

1.6.5 Snow Loads.

Snow loads are not taken into account in this calculation. Erection of the construction is initially intended to be in appropriate weather conditions. If the construction should be built in winter season, the construction need to be reinforced or kept free from snow, the method how the structure will be kept free from snow need to be written in the method statement.

1.6.6 Live load.

In this structural report there are Live load configurations presented. These are intended to give an indication of the Rigging possibilities in the construction. If the actual loading of the construction deviates from these Rigging plots an additional calculation need to be made.

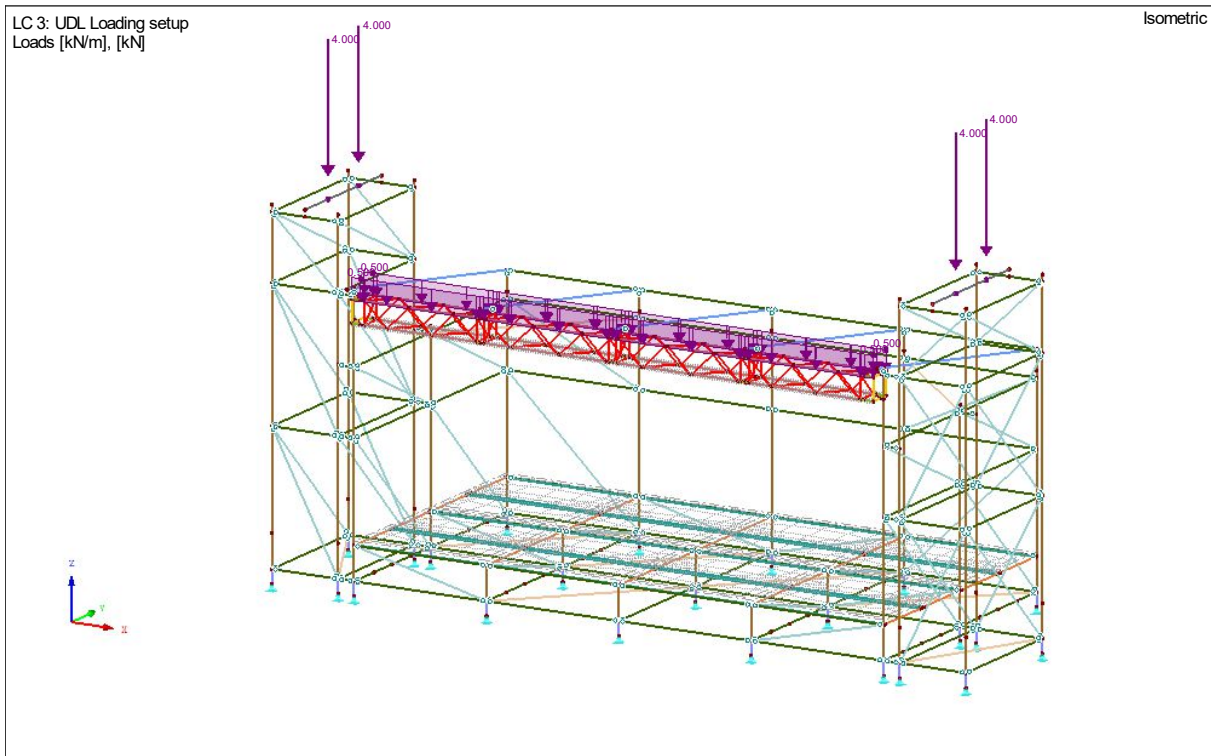
The shifting of Rigging point can influence the maximum loading of the construction.

Each Rigging point need to be attached to the node point of the truss.

1.7 Loading Configurations.

In the next 4 paragraphs the different live load configurations are presented. These loads are possible in all the roof setup options.

1.7.1 UDL Loading setup.



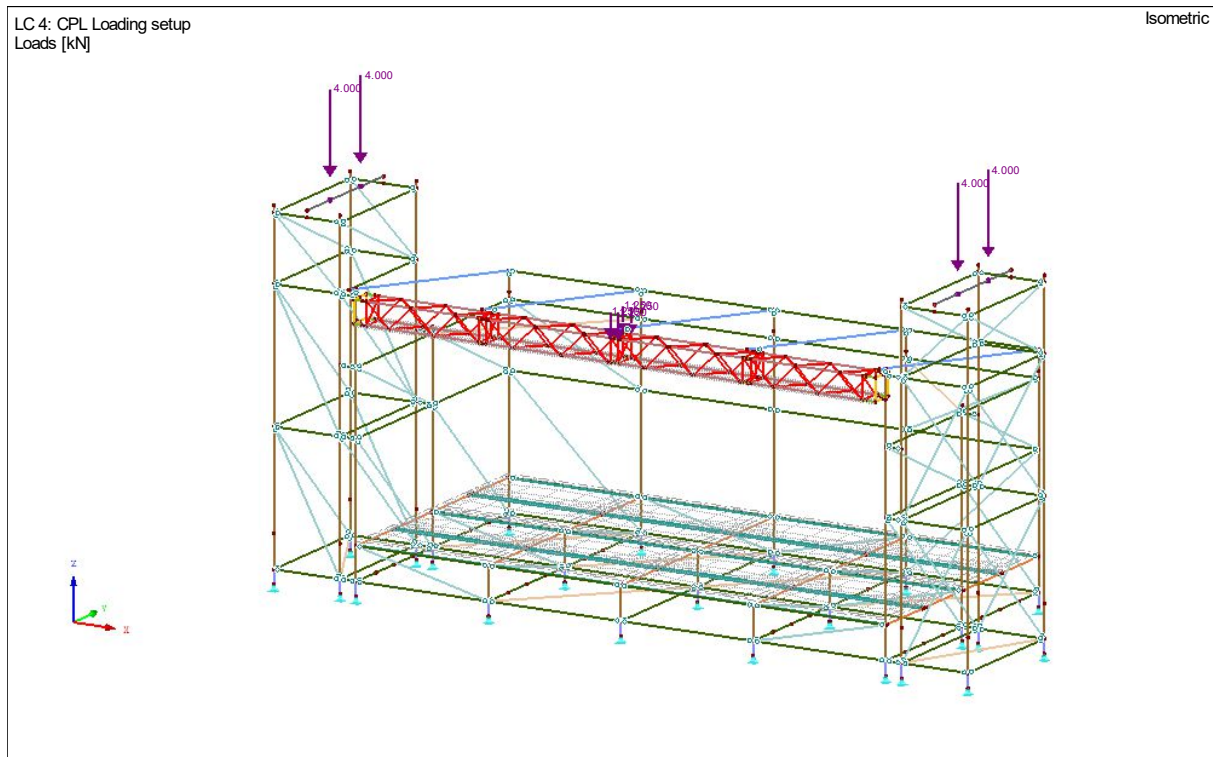
The loading which is taken into account in the UDL Loading setup are:

Truss = 50 kg/m

The total load on the main system is ~ 800 kg

PA wing per side = 800 kg (2x 400 kg)

1.7.2 Center point loading setup.



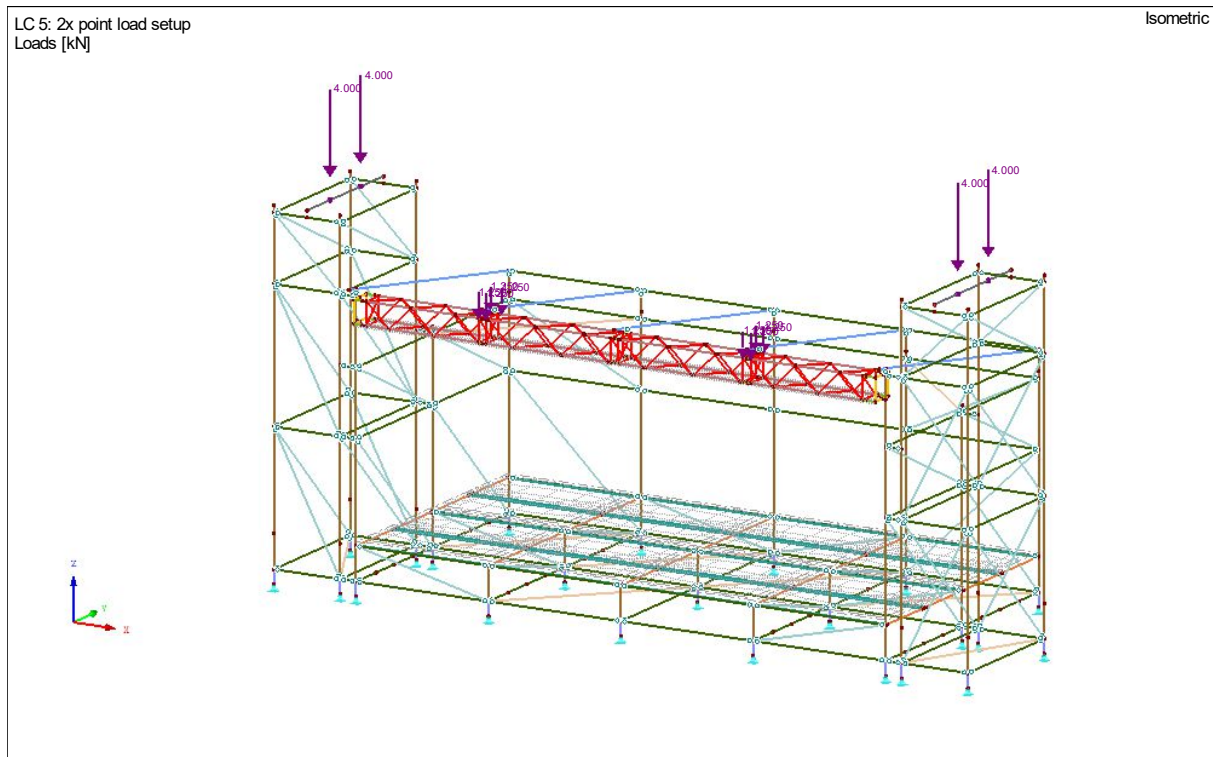
The loading which is taken into account in the Centre point Load setup are:

Truss = 500 kg/m

The total load on the main system is ~ 500 kg

PA wing per side = 800 kg (2x 400 kg)

1.7.3 2x Point load setup.



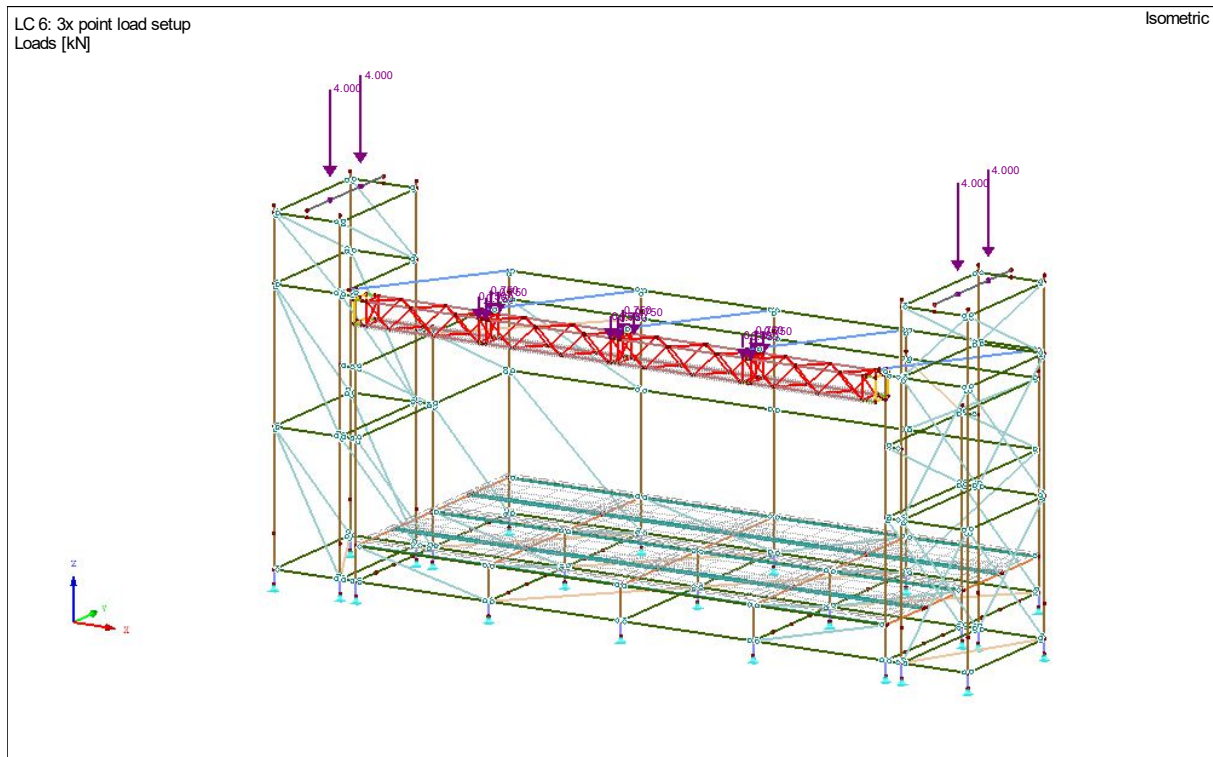
The loading which is taken into account in 2x point load setup:

Truss = 2x 500 kg/m

The total load on the main system is ~ 1000 kg

PA wing per side = 800 kg (2x 400 kg)

1.7.4 3x Point load setup.



The loading which is taken into account in 3x point load setup:

Truss = 3x 300 kg/m

The total load on the main system is ~ 900 Kg

PA wing per side = 800 Kg (2x 400 Kg)

1.8 Necessary Ballast loading.

The ballast is checked for overturning and sliding. The Layher stage which is designed as a ridged stage will be taken into account. The uplift of the system is not limited due to the high self-weight in comparison with the relative small area.

All permanent installed loading can be subtracted from the nearest Ballast position

The safety factor for the ballast calculation against slipping is set to 1.2 according to the NEN-EN 13814. This is based on a horizontal load which is relying on friction.

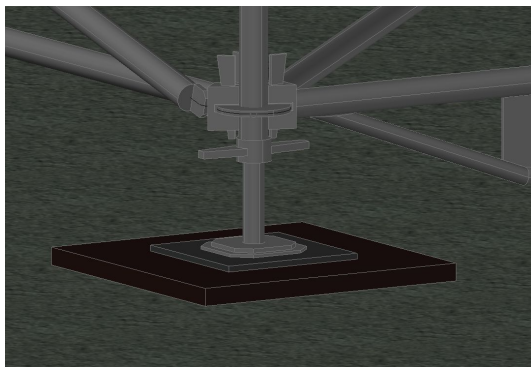
For the friction coefficient the factor of 0.6 has been taken into account.

The Ballast calculation with factor 0.6 can be justified because rubber underlayment plate is used.

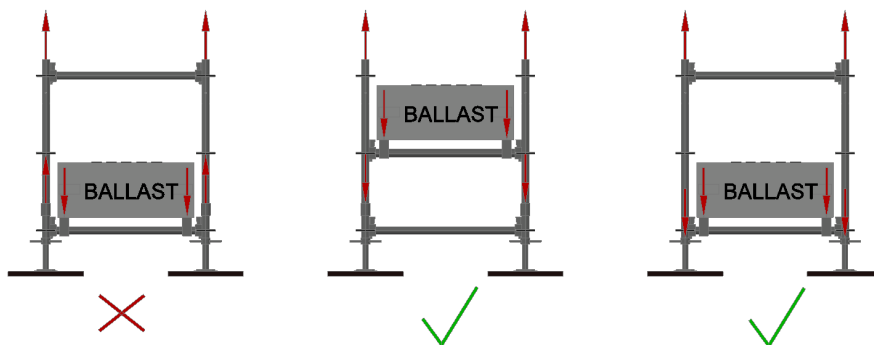
Table 3 — Coefficients of friction μ

	Wood	Steel	Concrete
Wood	0,4	0,4	0,6
Steel	0,4	0,1	0,2
Concrete	0,6	0,2	0,5
Clay ^a	0,25	0,2	0,25
Loam ^a	0,4	0,2	0,4
Sand and gravel	0,65	0,2	0,65

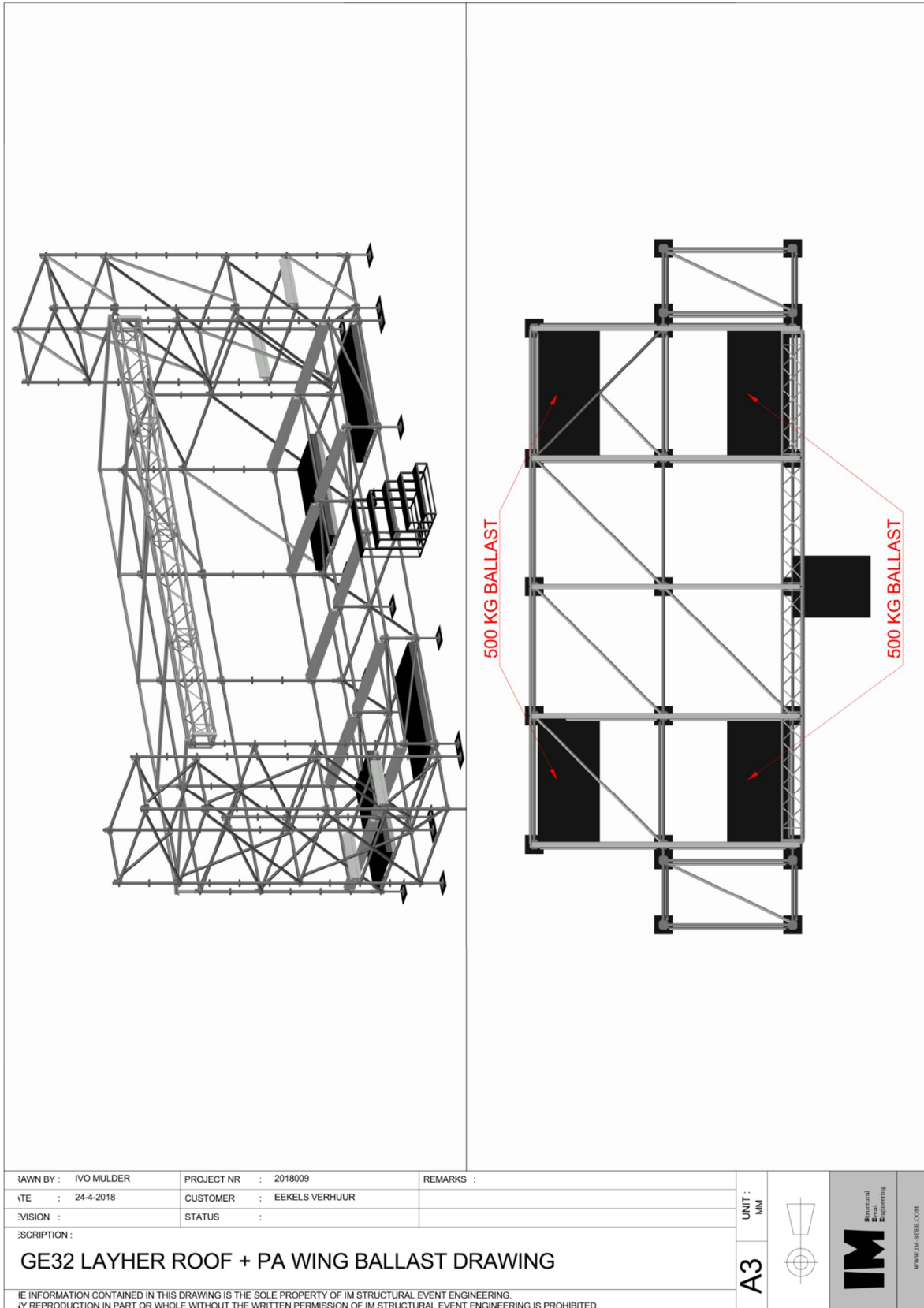
^a At least of stiff consistency in accordance with ENV 1997-1.



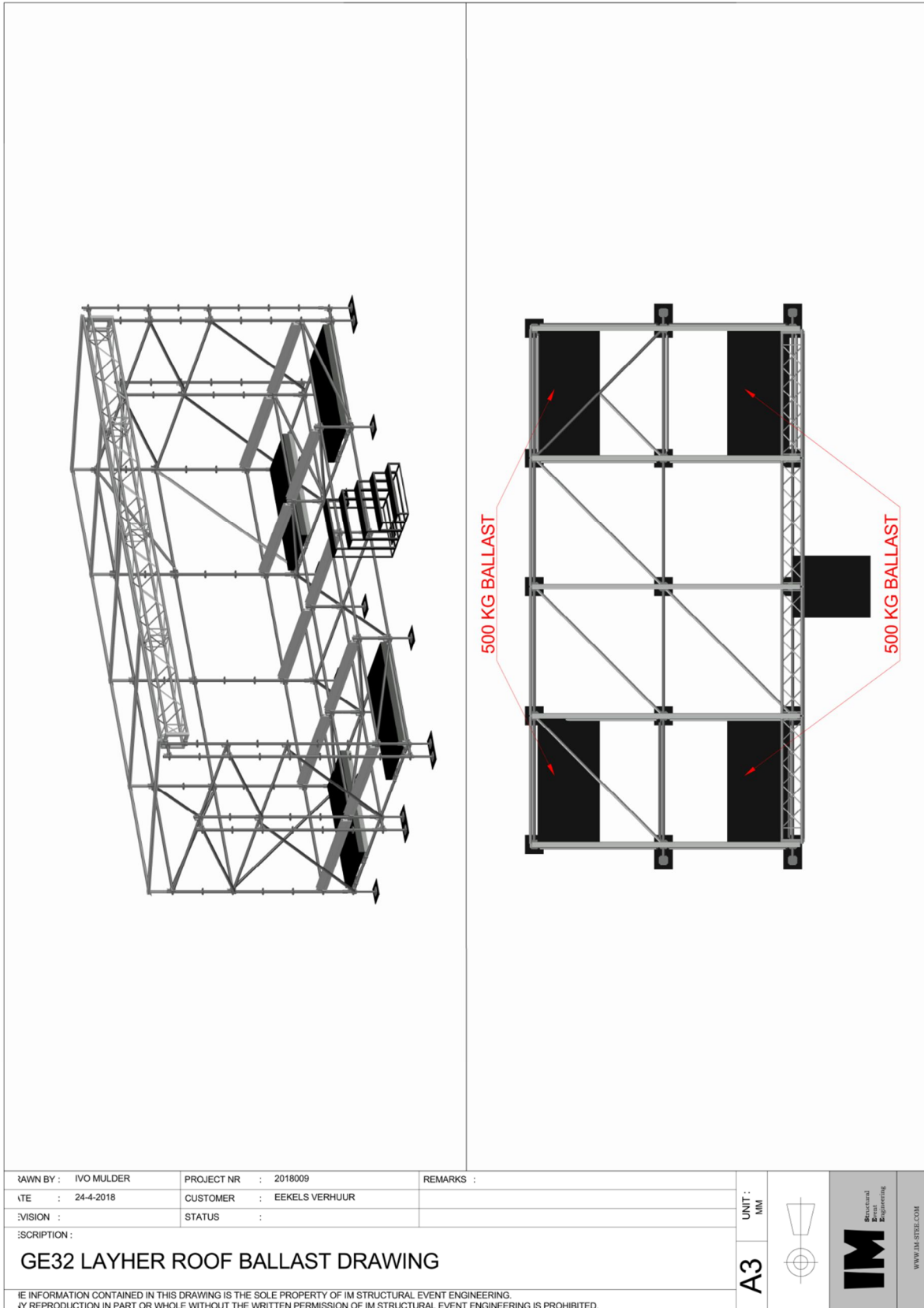
The ballast need to be placed in such a way that it will be activated when lifting forces are applied. If the ballast is placed on the bottom level the use of Layher uprights with connected base collar or connection pieces between the bottom two rosettes is necessary.



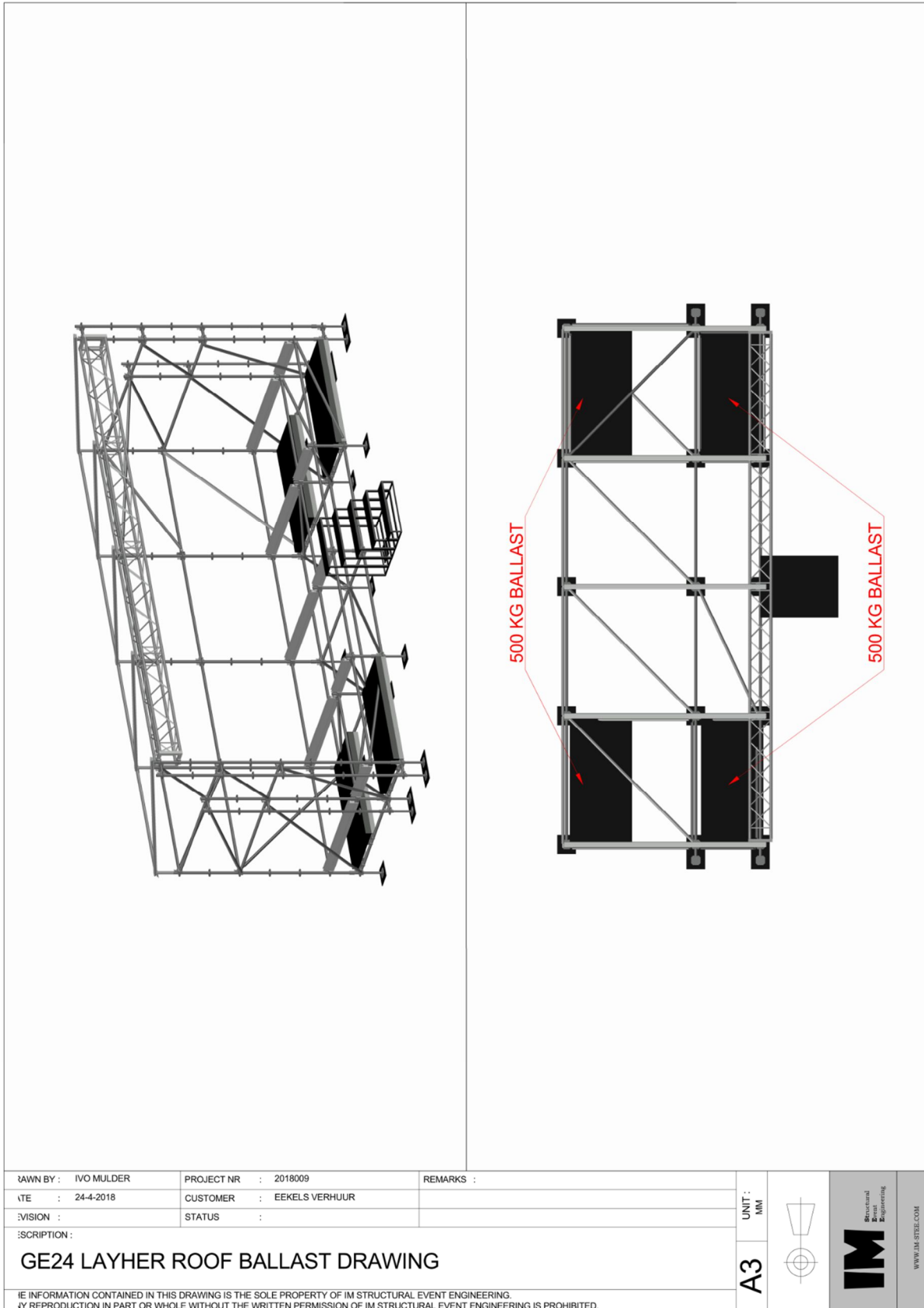
1.8.1 Ballast drawing GE32 Layher Roof + PA wings



1.8.2 Ballast drawing GE32 Layher Roof



1.8.3 Ballast drawing GE24 Layher Roof

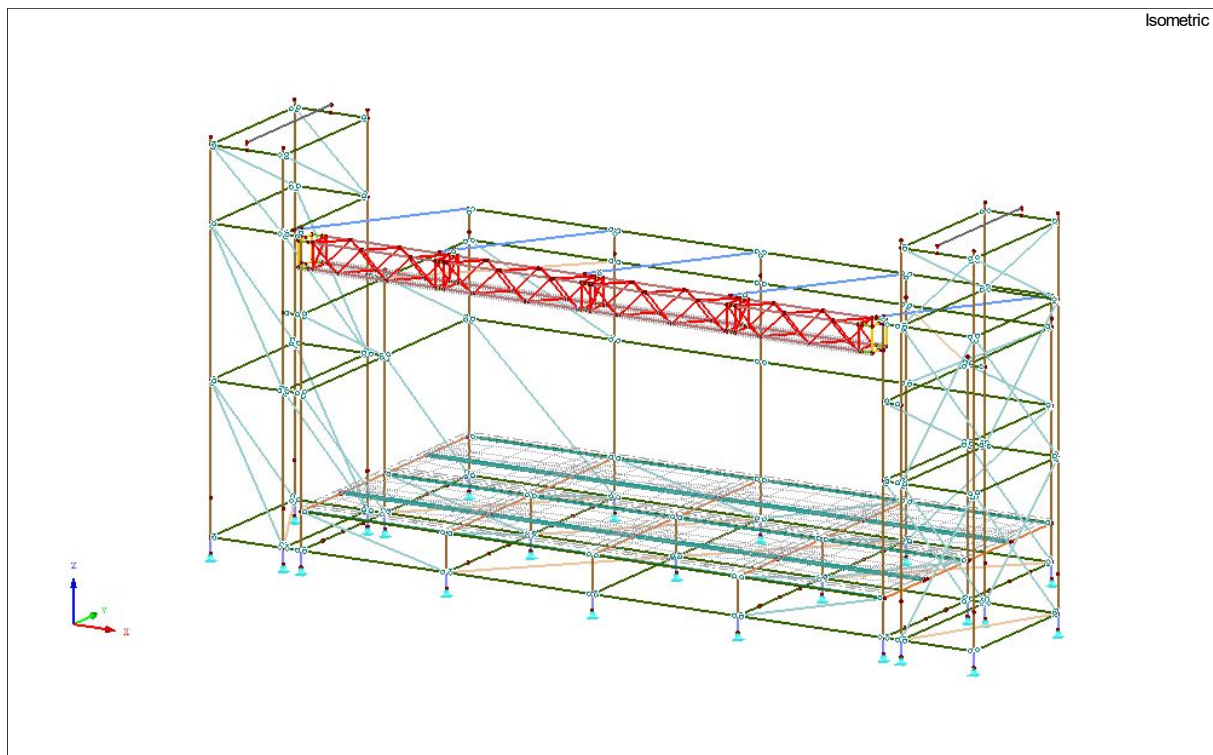


2.0 General calculation input.

2.1 Information About the calculation program.

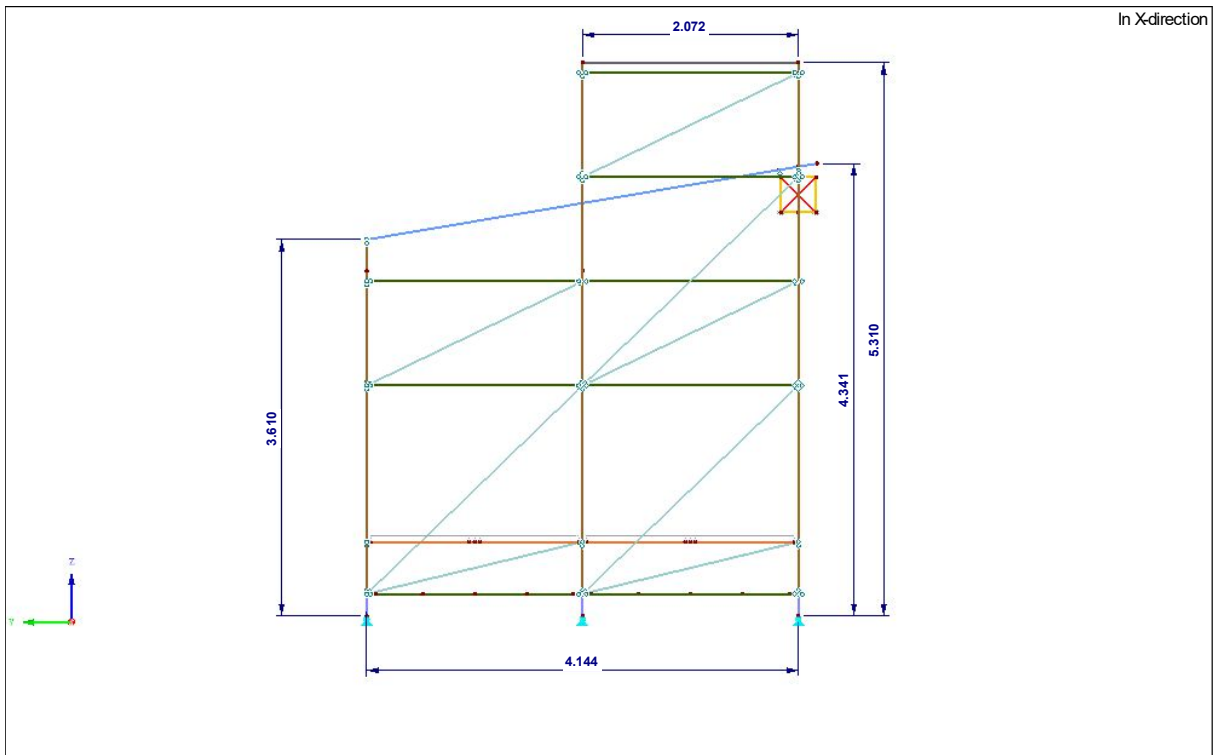
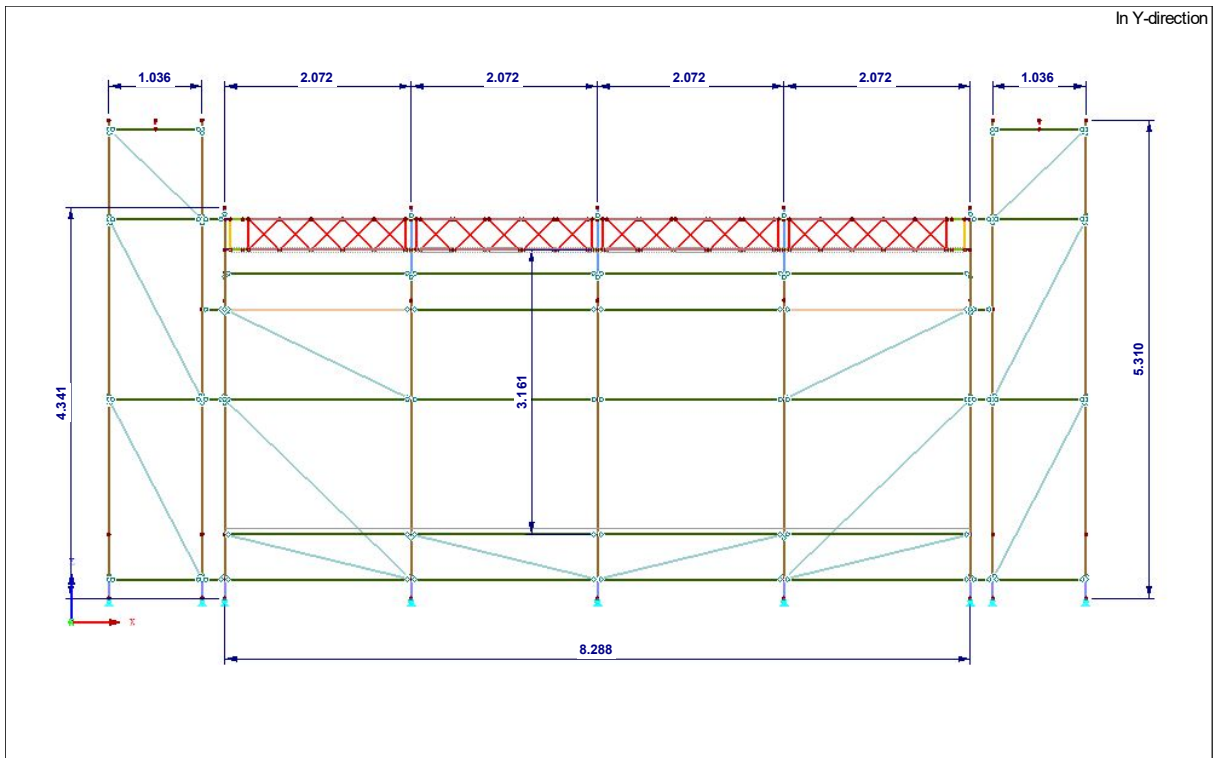
For the calculation of the construction the program RFem from Dlubal software GmbH has been used. The calculation of the Load cases has been made according to the Geometrically Linear analyses principle. The calculation of the Load combinations has been made according to the second order analysis (nonlinear) principle. For all three different roof systems there is a model. The wind loading on the three different models is calculated all in the same way. Therefor the wind loading calculation of the GE32 Layher Roof + pa wings is only printed.

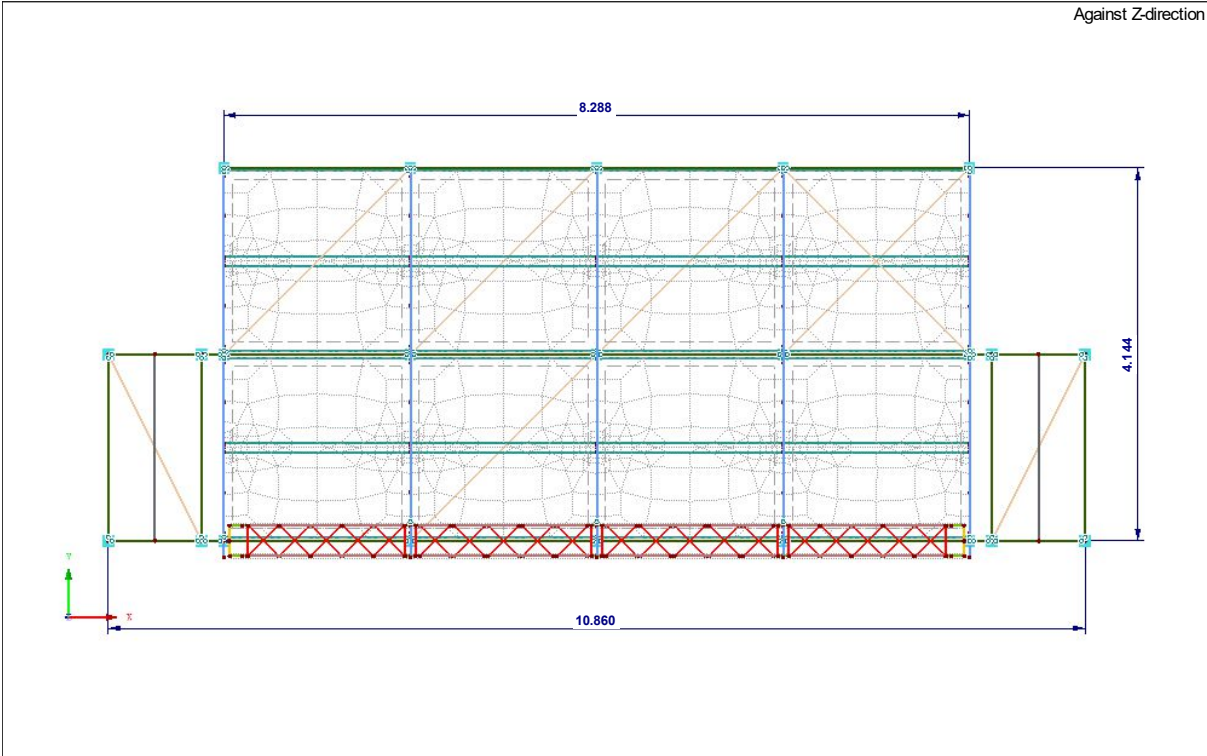
2.2 Construction model of the GE32 Layher Roof + PA wings.



Cross-Sections

- 1: SHAPE-THIN KEDER PROFIEL 3000; Aluminum EN-AW 6082 (EP,ET) T6
- 2: QRO 50x4 (Hot Formed); Aluminum EN-AW 6082 (EP,ET) T6
- 3: Ring 48/3; Aluminum EN-AW 6082 (EP,ET) T6
- 4: Ring 48/6; Aluminum EN-AW 6082 (EP,ET) T6
- 5: Ring 20/2; Aluminum EN-AW 6082 (EP,ET) T6
- 6: RO 38x4.5 | DIN EN 10220; Steel S 355 JR
- 7: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 8: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 9: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 10: RO 48.3x2.6 (Hot Formed); Steel S 235 JR
- 11: EV transom; Aluminum EN-AW 6005A (EP/O,ER/B) T6
- 12: HK 50/30/4/4/4/4; Aluminum EN-AW 6005A (EP/O,ER/B) T6
- 13: IPE 160; Steel S 235 JR
- 16: Rectangle 50/50; Aluminum EN-AW 6082 (EP,ET) T6





2.3 Single Load cases for the different Layher roofs.

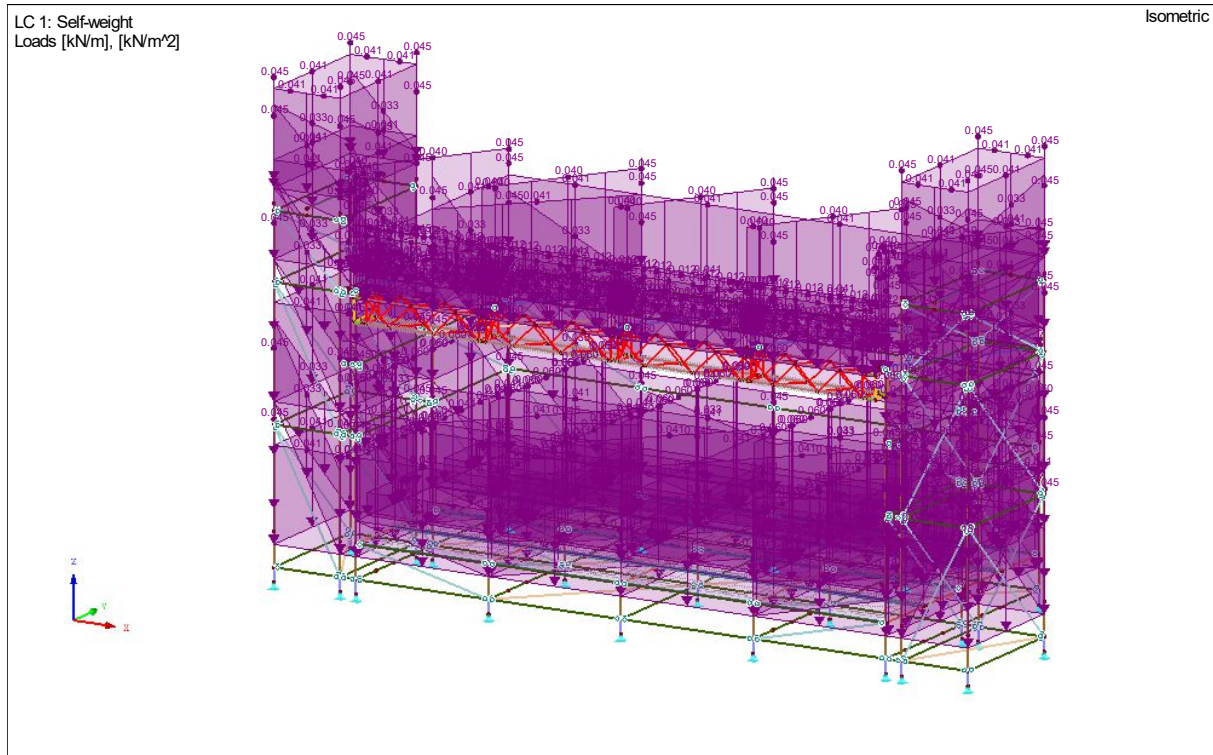
For the calculation different load cases have been constructed in the program.

Load Case	Description	To Solve	EN 1990 CEN Action Category	Self-Weight - Factor in Direction			
				Active	X	Y	Z
LC1	Self-weight	+	Permanent	-	0,000	0,000	-1,000
LC2	ballast loading	+	Permanent/Imposed	-	0,000	0,000	0,000
LC3	UDL Loading setup	+	Permanent/Imposed	-	0,000	0,000	-1,000
LC4	CPL Loading setup	+	Permanent/Imposed	-	0,000	0,000	0,000
LC5	2x point load setup	+	Permanent/Imposed	-	0,000	0,000	0,000
LC6	3x point load setup	+	Permanent/Imposed	-	0,000	0,000	0,000
LC7	floor loading wind 0°	+	Permanent/Imposed	-	0,000	0,000	0,000
LC8	floor loading wind 90°	+	Permanent/Imposed	-	0,000	0,000	0,000
LC9	floor loading wind 180°	+	Permanent/Imposed	-	0,000	0,000	0,000
LC10	In-service wind 0°	-	Wind	-	0,000	0,000	0,000
LC11	In-service wind 90°	-	Wind	-	0,000	0,000	0,000
LC12	In-service wind 180°	-	Wind	-	0,000	0,000	0,000
LC13	Out-service wind 0°	-	Wind	-	0,000	0,000	0,000
LC14	Out-service wind 90°	-	Wind	-	0,000	0,000	0,000
LC15	Out-service wind 180°	-	Wind	-	0,000	0,000	-1,000

2.4 Load case input for the GE32 Layher roofs + Pa wing.

The presented load calculation of the GE32 Layher roofs + Pa wing is also used for the other Layher roof systems.

2.4.1 LC1 Self-Weight.



Layher pole = 0.045 kN/m^{-1}

Layher Ledger = 0.041 kN/m^{-1}

Layher Diagonal = 0.033 kN/m^{-1}

Layher event Ledger = 0.06 kN/m^{-1}

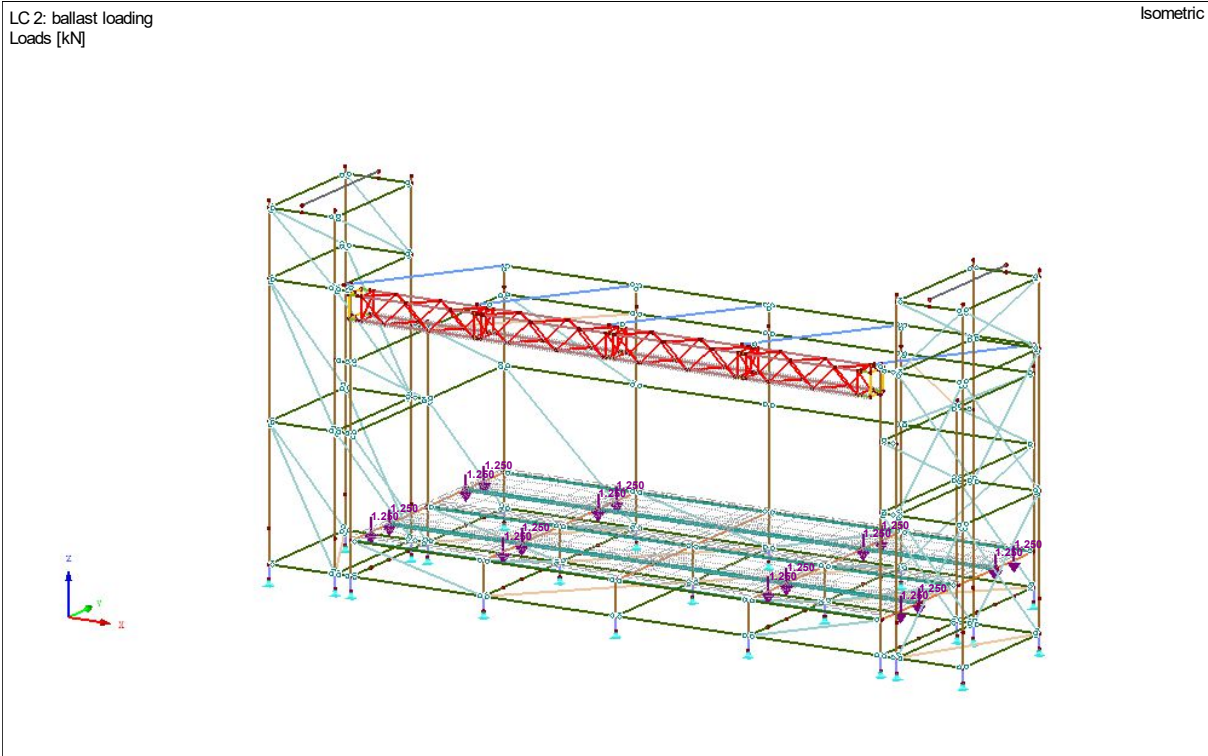
Truss Main tube 48x3 = 0.012 kN/m^{-1}

Truss diagonal tube 20x2 = 0.003 kN/m^{-1}

Layher event deck 18 kg/m^2

Total self-weight complete Layher state 23 kN

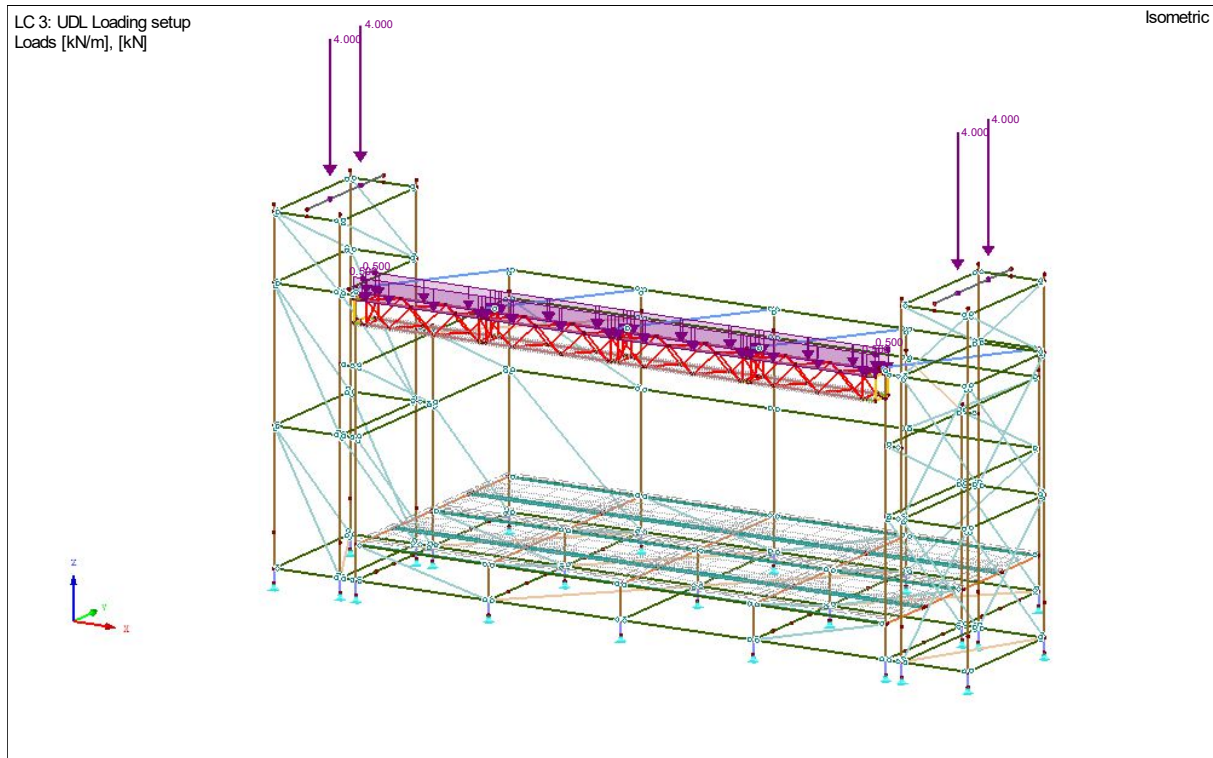
2.4.2 LC2 ballast loading



The loading which is taken into account in the UDL Loading setup are:

16 points of 1.25 kN = 20 kN total

2.4.3 LC3 UDL Loading setup.



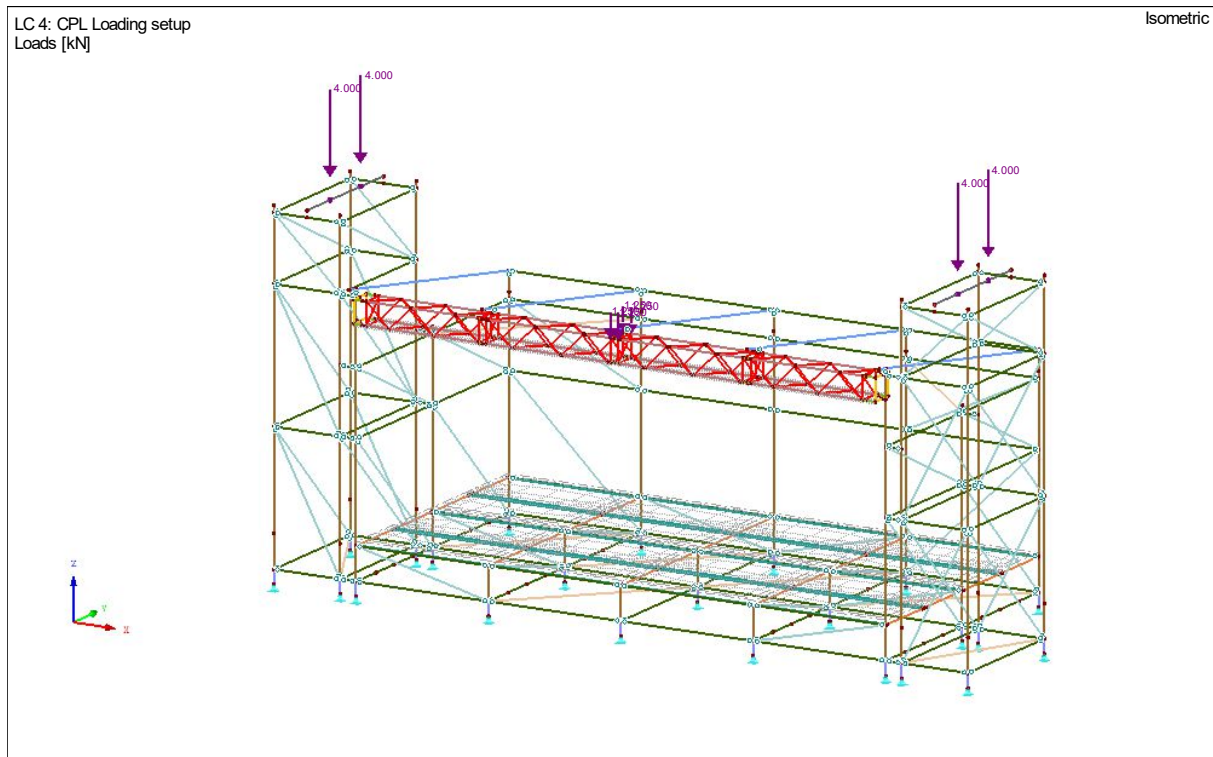
The loading which is taken into account in the UDL Loading setup are:

Truss = 0.50 kN/m

The total load on the main system is ~ 8.0 kN

PA wing per side = 8.0 kN (2x 4.0 kN)

2.4.4 LC4 Center point loading Setup



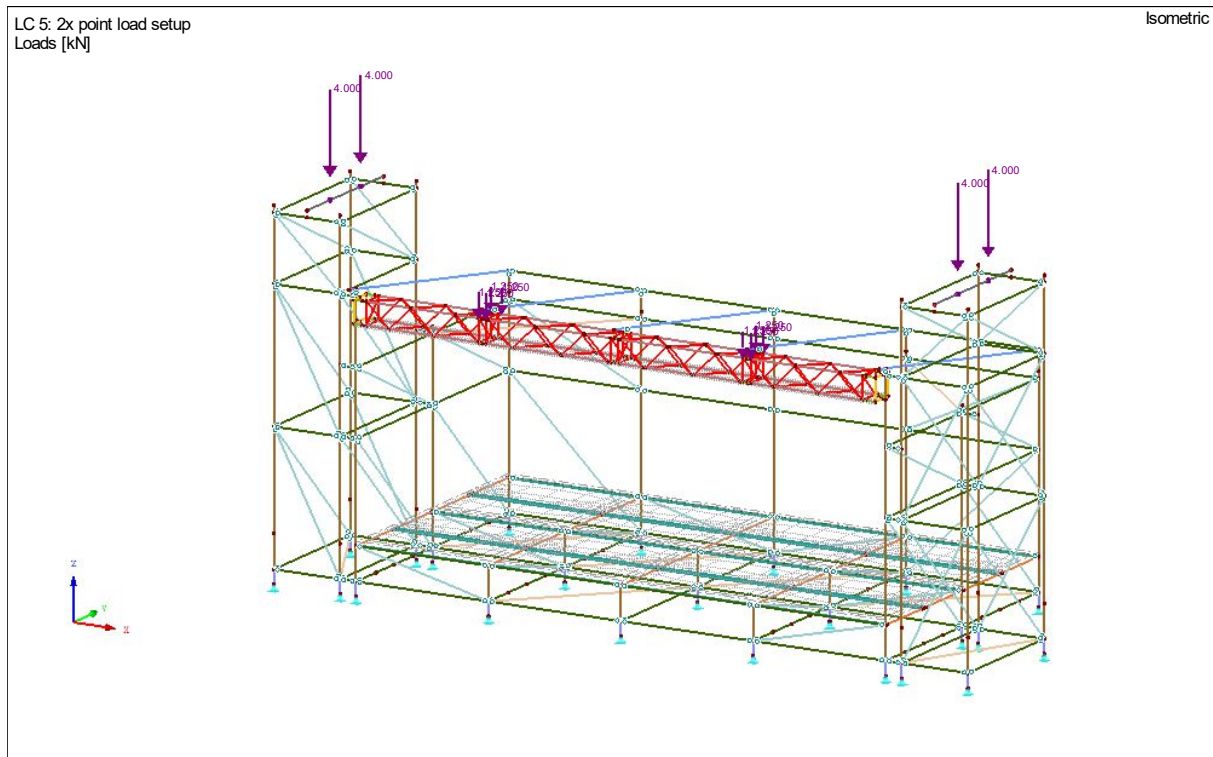
The loading which is taken into account in the Centre point Load setup are:

Truss = 5.00 kN/m

The total load on the main system is ~ 5.00 kN

PA wing per side = 8.0 kN (2x 4.0 kN)

2.4.5 LC5 2x Point load Setup



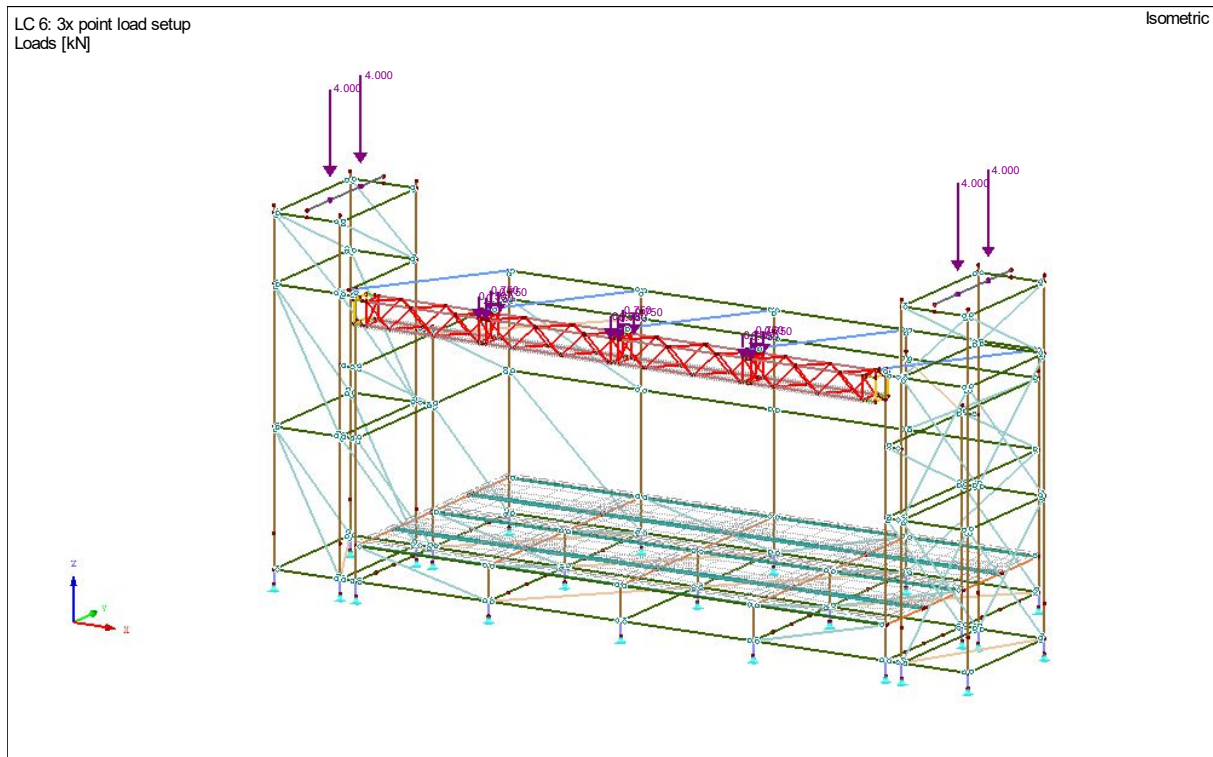
The loading which is taken into account in 2x point load setup:

Truss = 2x 5.00 kN/m

The total load on the main system is ~ 10.00 kN

PA wing per side = 8.0 kN (2x 4.0 kN)

2.4.6 LC6 3x Point load setup.



The loading which is taken into account in 2x point load setup:

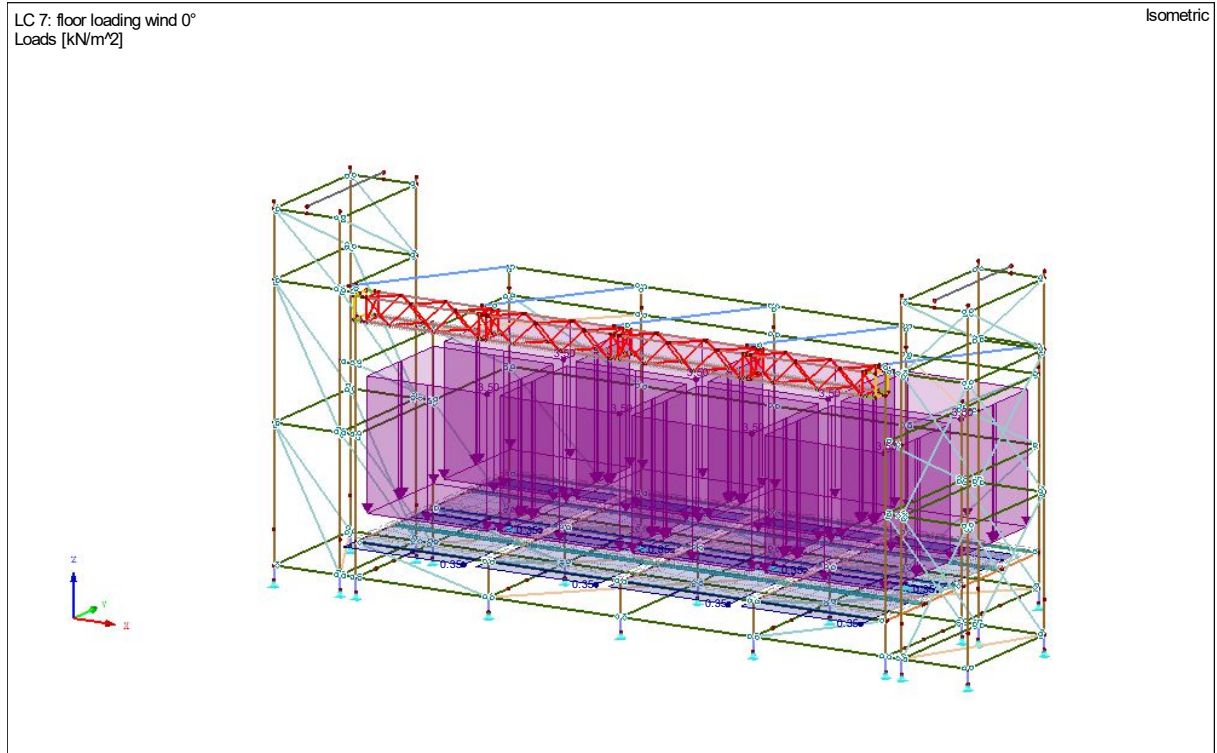
$$\text{Truss} = 3 \times 3.00 \text{ kN/m}$$

The total load on the main system is $\sim 9.00 \text{ kN}$

$$\text{PA wing per side} = 8.0 \text{ kN} (2 \times 4.0 \text{ kN})$$

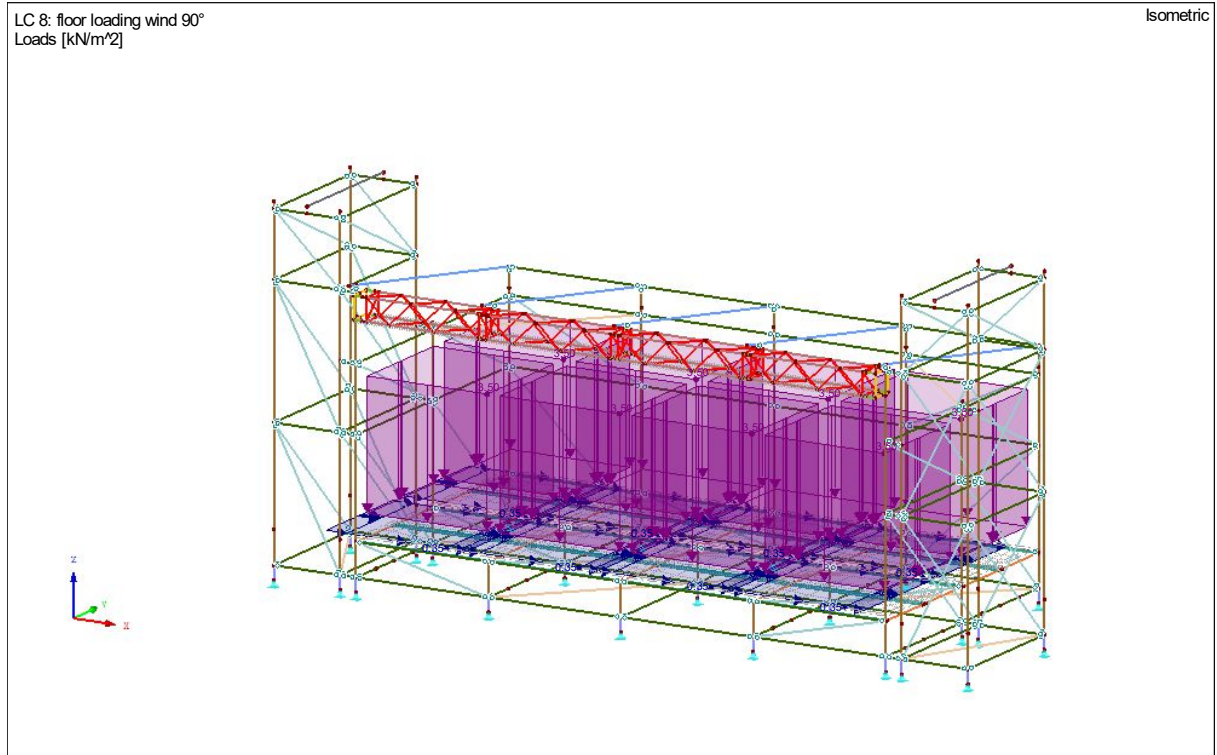
2.4.7 LC7: Floor loading wind 0°.

The floor loading which is taken into account is 350 kg/m² which is according to the NEN-EN 13814. For the horizontal stability check an extra loading of 10% of the vertical loading is set as an extra horizontal force. This horizontal force has been set in the direction of the wind.



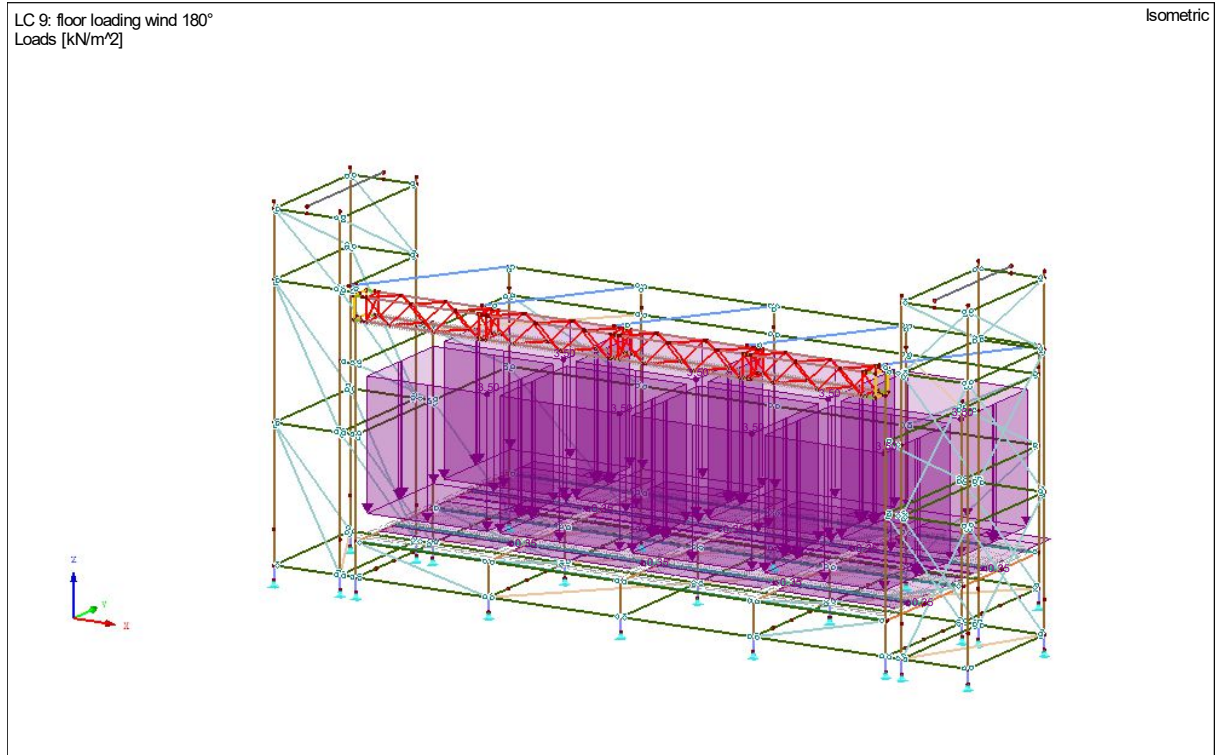
2.4.8 LC8: Floor loading wind 90°.

The floor loading which is taken into account is 350 kg/m² which is according to the NEN-EN 13814. For the horizontal stability check an extra loading of 10% of the vertical loading is set as an extra horizontal force. This horizontal force has been set in the direction of the wind.



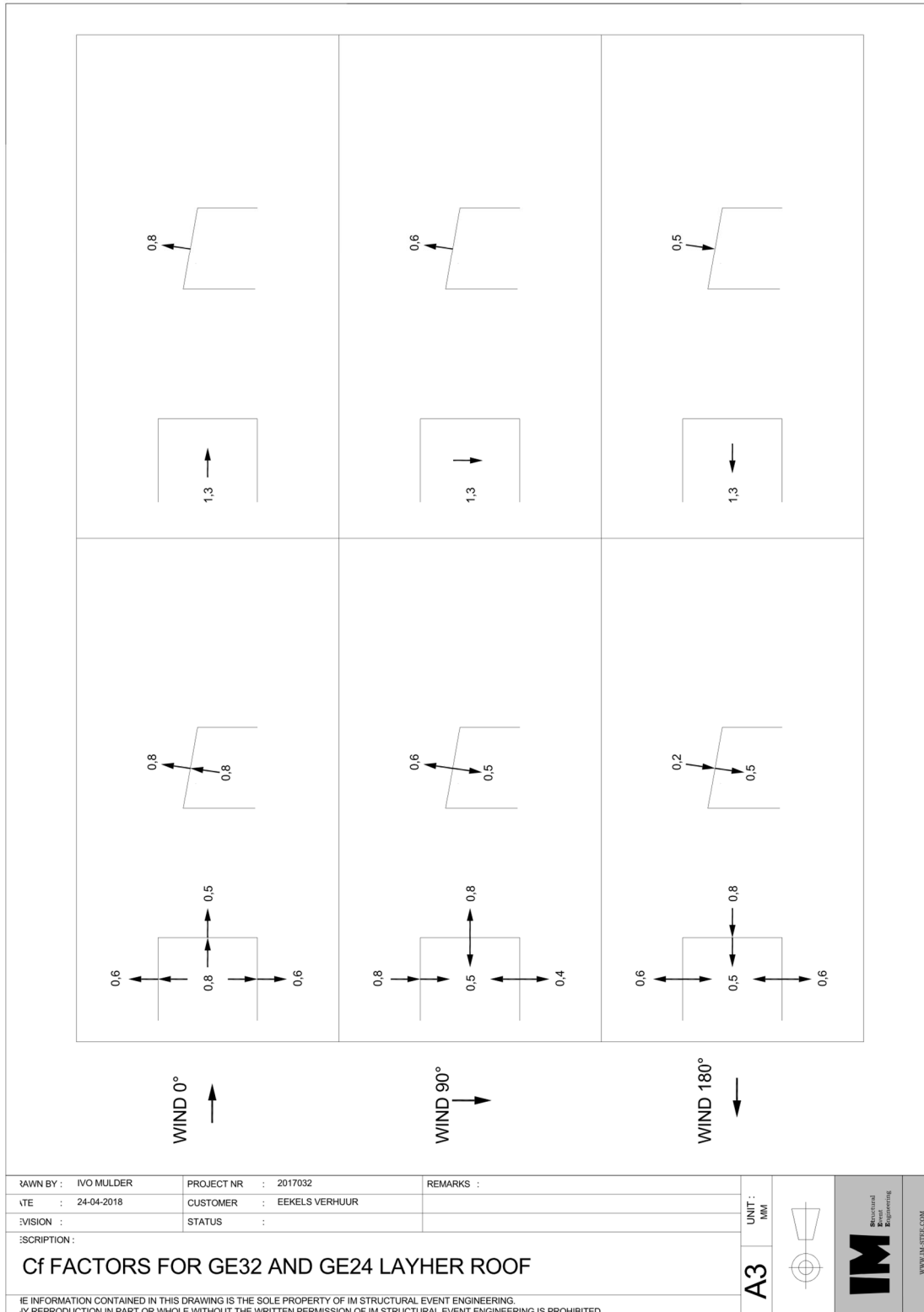
2.4.9 LC9: Floor loading wind 180°.

The floor loading which is taken into account is 350 kg/m² which is according to the NEN-EN 13814. For the horizontal stability check an extra loading of 10% of the vertical loading is set as an extra horizontal force. This horizontal force has been set in the direction of the wind.

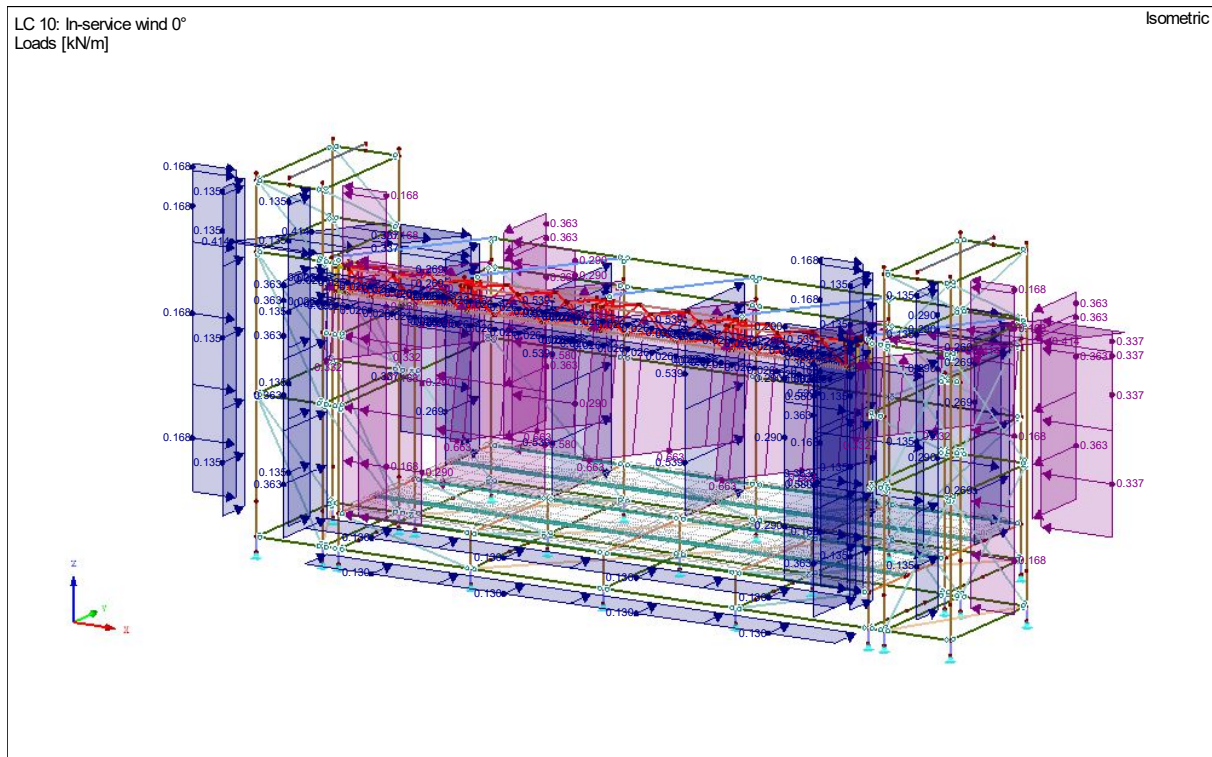


2.5 Load cases concerning wing loading for the GE32 Layher roofs + Pa wing.

For the calculation of the wind loading the next wind coefficient are used. These factors are subtracted from the Eurocode NEN-EN 1991-1 1-4: general actions – wind actions and NEN-EN 13814: Fairground and amusement park machinery and structures safety.



2.5.1 load case 10 In-service wind 0°.



Wind calculations of the main roof canopy.

$$q_w, \text{ roof profile 1 and 4} = 1.6 * 0.2 * 1.036 = 0.332 \text{ kN/m}$$

$$q_w, \text{ roof profile 2 and 3} = 1.6 * 0.2 * 2.072 = 0.663 \text{ kN/m}$$

Membrane tension of the main roof canopy.

$$q_{mt}, \text{ roof profile 1 and 4} = 0.332 / 0.8 = 0.414 \text{ kN/m}$$

$$q_{mt}, \text{ roof profile 2 and 3} = 0 \text{ kN/m}$$

Wind on the back-wall canopy.

$$q_w, \text{ back wall mid} = 1.3 * 0.2 * 2.072 = 0.539 \text{ kN/m}$$

$$q_w, \text{ back wall side} = 1.3 * 0.2 * 1.036 = 0.269 \text{ kN/m}$$

Membrane tension of the back-wall canopy.

$$q_{mt}, \text{ back wall mid} = 0 \text{ kN/m}$$

$$q_{mt}, \text{ back wall side} = 0.269 / 0.8 = 0.337 \text{ kN/m}$$

Wind on the side-wall canopy.

$$q_w, \text{ side wall mid} = 1.4 * 0.2 * 2.072 = 0.580 \text{ kN/m}$$

$$q_w, \text{ side wall side} = 1.4 * 0.2 * 1.036 = 0.290 \text{ kN/m}$$

Membrane tension of the back-wall canopy.

$$q_{mt}, \text{ side wall mid} = 0 \text{ kN/m}$$

$$q_{mt}, \text{ side wall side} = 0.290 / 0.8 = 0.363 \text{ kN/m}$$

Wind on the PA wing canopy.

$$q_w, \text{ PA Wing} = 1.3 * 0.2 * 1.036 = 0.135 \text{ kN/m}$$

Membrane tension of PA wing canopy.

$$q_{mt}, \text{ PA Wing} = 0.135 / 0.8 = 0.168 \text{ kN/m}$$

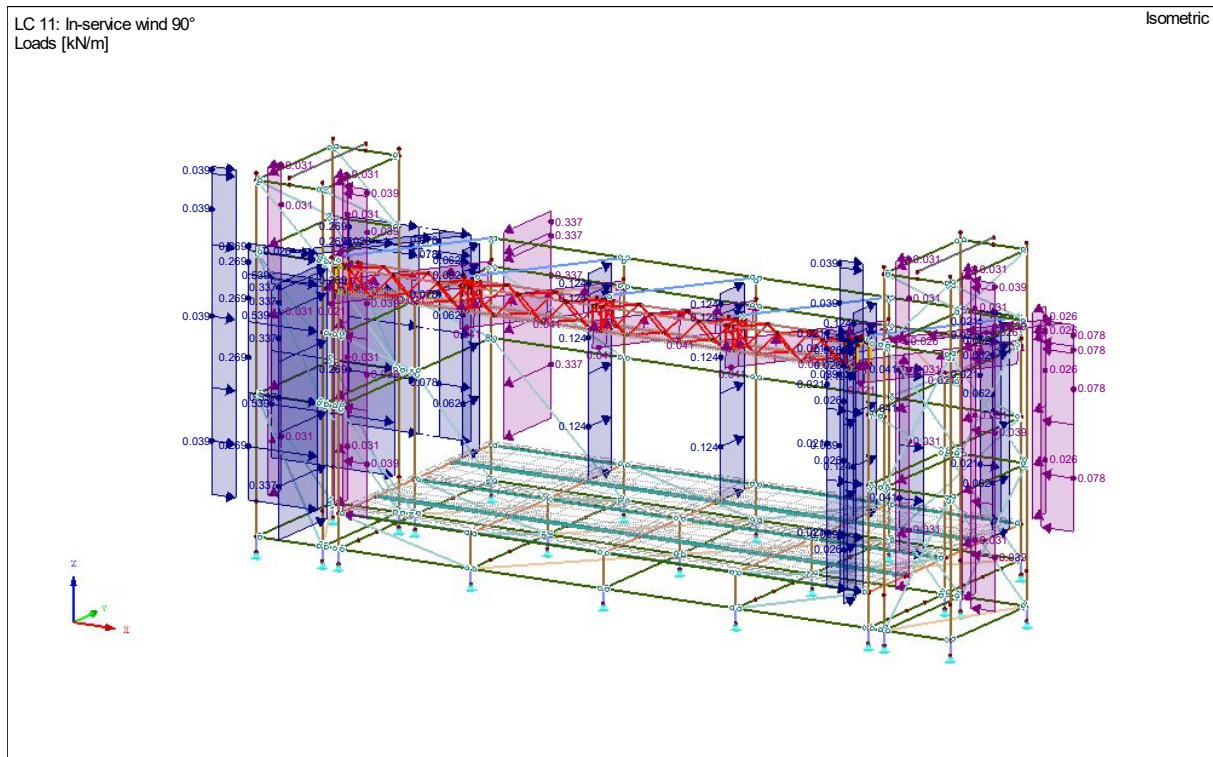
Wind on Truss.

$$q_w, \text{ Truss} = 1.3 * 0.2 * (0.4 / 2) * 0.5 = 0.026 \text{ kN/m}$$

Wind on Stage

$$q_w, \text{ stage} = 1.3 * 0.2 * 1 * 0.5 = 0.13 \text{ kN/m}$$

2.5.2 load case 11 In-service situation wind direction 90°.



Wind calculations of the main roof canopy.

$$q_w, \text{ roof profile 1 and 4} = 0.1 * 0.2 * 1.036 = 0.021 \text{ kN/m}$$

$$q_w, \text{ roof profile 2 and 3} = 0.1 * 0.2 * 2.072 = 0.124 \text{ kN/m}$$

Membrane tension of the main roof canopy.

$$q_{mt}, \text{ roof profile 1 and 4} = 0.021 / 0.8 = 0.026 \text{ kN/m}$$

$$q_{mt}, \text{ roof profile 2 and 3} = 0 \text{ kN/m}$$

Wind on the back-wall canopy.

$$q_w, \text{ back wall mid} = 0.3 * 0.2 * 2.072 = 0.124 \text{ kN/m}$$

$$q_w, \text{ back wall side} = 0.3 * 0.2 * 1.036 = 0.062 \text{ kN/m}$$

Membrane tension of the back-wall canopy.

$$q_{mt}, \text{ back wall mid} = 0 \text{ kN/m}$$

$$q_{mt}, \text{ back wall side} = 0.062 / 0.8 = 0.078 \text{ kN/m}$$

Wind on the side-wall canopy 1

$$q_w, \text{ side wall mid} = 1.3 * 0.2 * 2.072 = 0.539 \text{ kN/m}$$

$$q_w, \text{ side wall side} = 1.3 * 0.2 * 1.036 = 0.269 \text{ kN/m}$$

Membrane tension of the back-wall canopy1

$$q_{mt}, \text{ side wall mid} = 0 \text{ kN/m}$$

$$q_{mt}, \text{ side wall side} = 0.269 / 0.8 = 0.337 \text{ kN/m}$$

Wind on the side-wall canopy 2

$$q_w, \text{ side wall mid} = 0.1 * 0.2 * 2.072 = 0.041 \text{ kN/m}$$

$$q_w, \text{ side wall side} = 0.1 * 0.2 * 1.036 = 0.021 \text{ kN/m}$$

Membrane tension of the back-wall canopy1

$$q_{mt}, \text{ side wall mid} = 0 \text{ kN/m}$$

$$q_{mt}, \text{ side wall side} = 0.021 / 0.8 = 0.026 \text{ kN/m}$$

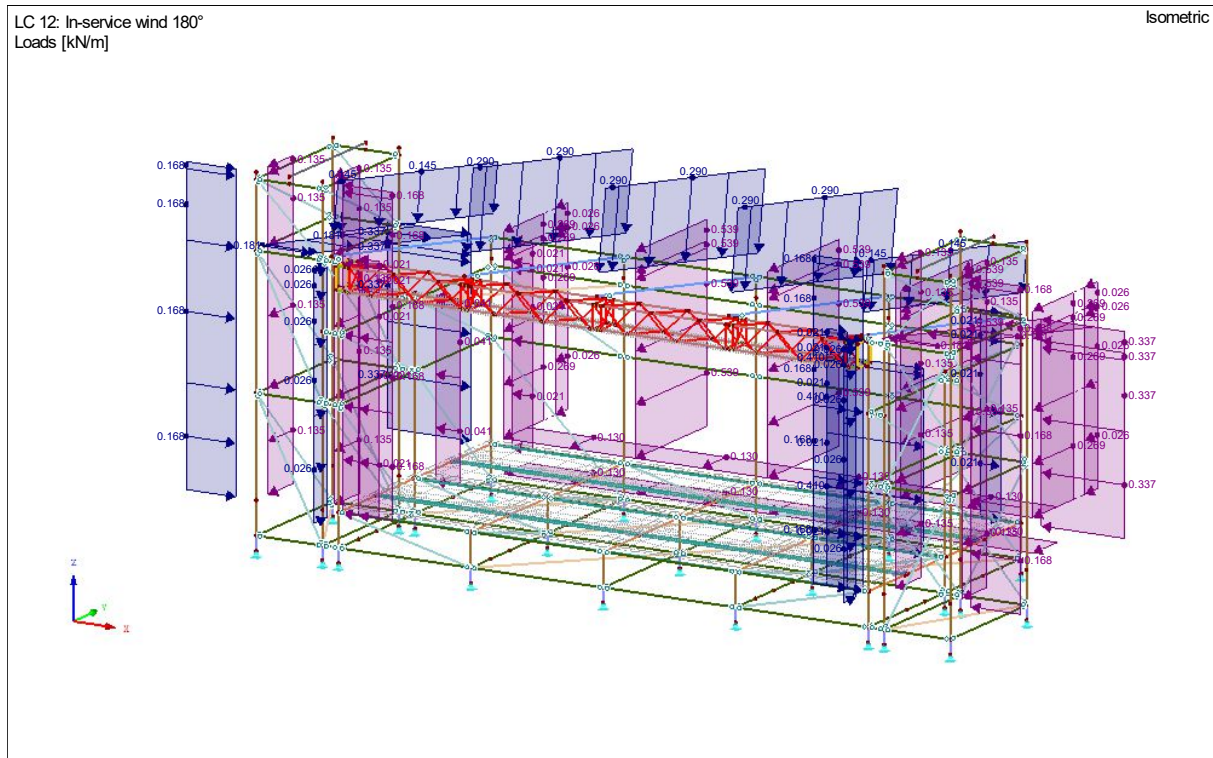
Wind on the PA wing canopy.

$$q_w, \text{ PA Wing} = 0.3 * 0.2 * 1.036 = 0.031 \text{ kN/m}$$

Membrane tension of PA wing canopy.

$$q_{mt}, \text{ PA Wing} = 0.031 / 0.8 = 0.039 \text{ kN/m}$$

2.5.3 load case 12 In-service wind 180°.



Wind calculations of the main roof canopy.

$$q_w, \text{ roof profile 1 and 4} = 0.7 * 0.2 * 1.036 = 0.145 \text{ kN/m}$$

$$q_w, \text{ roof profile 2 and 3} = 0.7 * 0.2 * 2.072 = 0.290 \text{ kN/m}$$

Membrane tension of the main roof canopy.

$$q_{mt}, \text{ roof profile 1 and 4} = 0.145 / 0.8 = 0.181 \text{ kN/m}$$

$$q_{mt}, \text{ roof profile 2 and 3} = 0 \text{ kN/m}$$

Wind on the back-wall canopy.

$$q_w, \text{ back wall mid} = 1.3 * 0.2 * 2.072 = 0.539 \text{ kN/m}$$

$$q_w, \text{ back wall side} = 1.3 * 0.2 * 1.036 = 0.269 \text{ kN/m}$$

Membrane tension of the back-wall canopy.

$$q_{mt}, \text{ back wall mid} = 0 \text{ kN/m}$$

$$q_{mt}, \text{ back wall side} = 0.269 / 0.8 = 0.337 \text{ kN/m}$$

Wind on the side-wall canopy.

$$q_w, \text{ side wall mid} = 0.1 * 0.2 * 2.072 = 0.041 \text{ kN/m}$$

$$q_w, \text{ side wall side} = 0.1 * 0.2 * 1.036 = 0.021 \text{ kN/m}$$

Membrane tension of the back-wall canopy.

$$q_{mt}, \text{ side wall mid} = 0 \text{ kN/m}$$

$$q_{mt}, \text{ side wall side} = 0.021 / 0.8 = 0.026 \text{ kN/m}$$

Wind on the PA wing canopy.

$$q_w, \text{ PA Wing} = 1.3 * 0.2 * 1.036 = 0.135 \text{ kN/m}$$

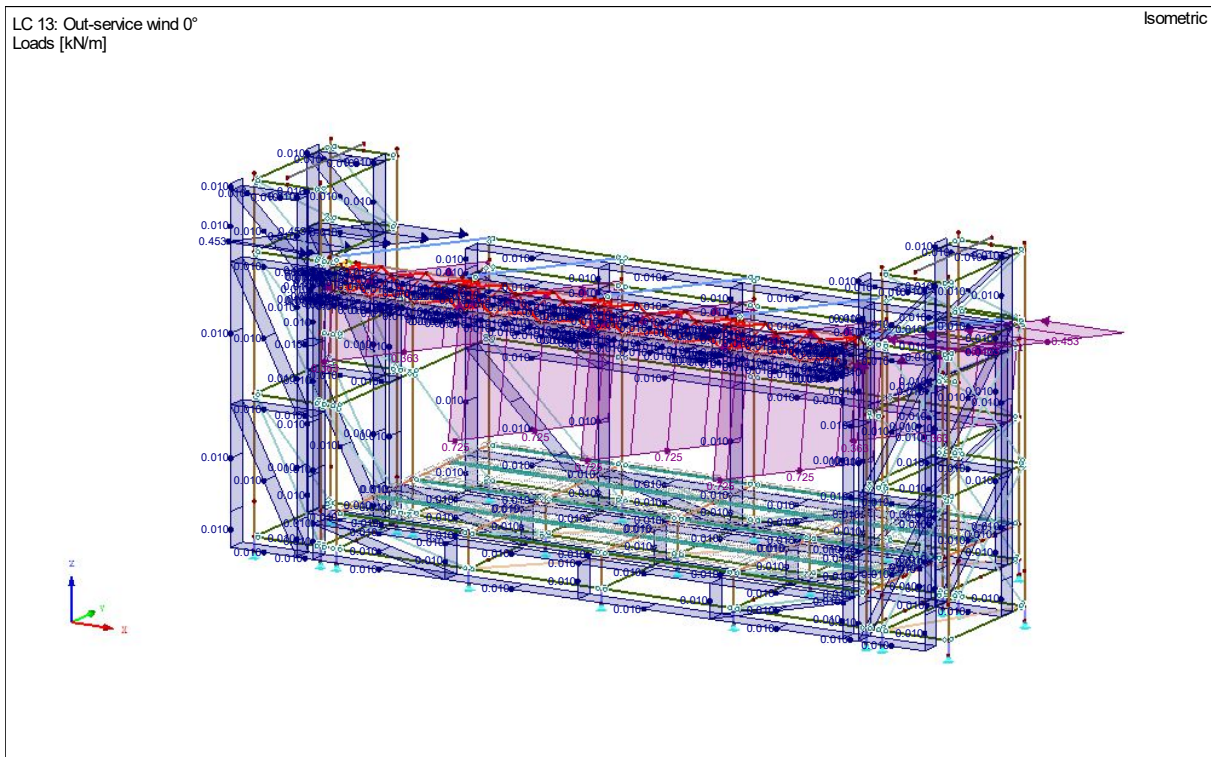
Membrane tension of PA wing canopy.

$$q_{mt}, \text{ PA Wing} = 0.135 / 0.8 = 0.168 \text{ kN/m}$$

Wind on Stage

$$q_w, \text{ stage} = 1.3 * 0.2 * 1 * 0.5 = 0.13 \text{ kN/m}$$

2.5.4 load case 13 Out-service wind 0°.



Wind calculations of the main roof canopy.

$$q_w, \text{ roof profile 1 and 4} = 0.8 * 0.4375 * 1.036 = 0.363 \text{ kN/m}$$

$$q_w, \text{ roof profile 2 and 3} = 0.8 * 0.4375 * 2.072 = 0.725 \text{ kN/m}$$

Membrane tension of the main roof canopy.

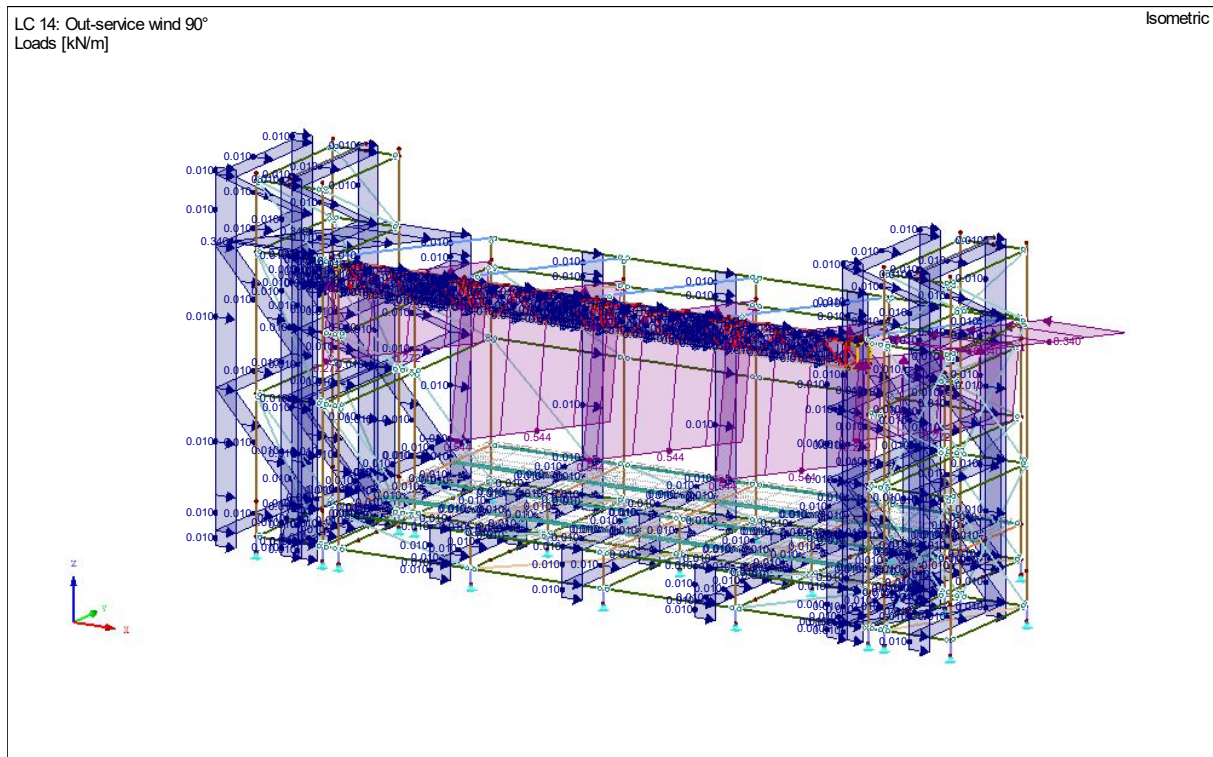
$$q_{mt}, \text{ roof profile 1 and 4} = 0.363 / 0.8 = 0.453 \text{ kN/m}$$

$$q_{mt}, \text{ roof profile 2 and 3} = 0 \text{ kN/m}$$

In the Out-service situation all the wall canopy's need to be removed.

A wind loading of 0.01 kN/m is set to all the profiles which lays perpendicular to the wind direction.

2.5.5 load case 14 Out-service situation wind direction 90°.



Wind calculations of the main roof canopy.

$$q_w, \text{ roof profile 1 and 4} = 0.6 * 0.4375 * 1.036 = 0.272 \text{ kN/m}$$

$$q_w, \text{ roof profile 2 and 3} = 0.6 * 0.4375 * 2.072 = 0.544 \text{ kN/m}$$

Membrane tension of the main roof canopy.

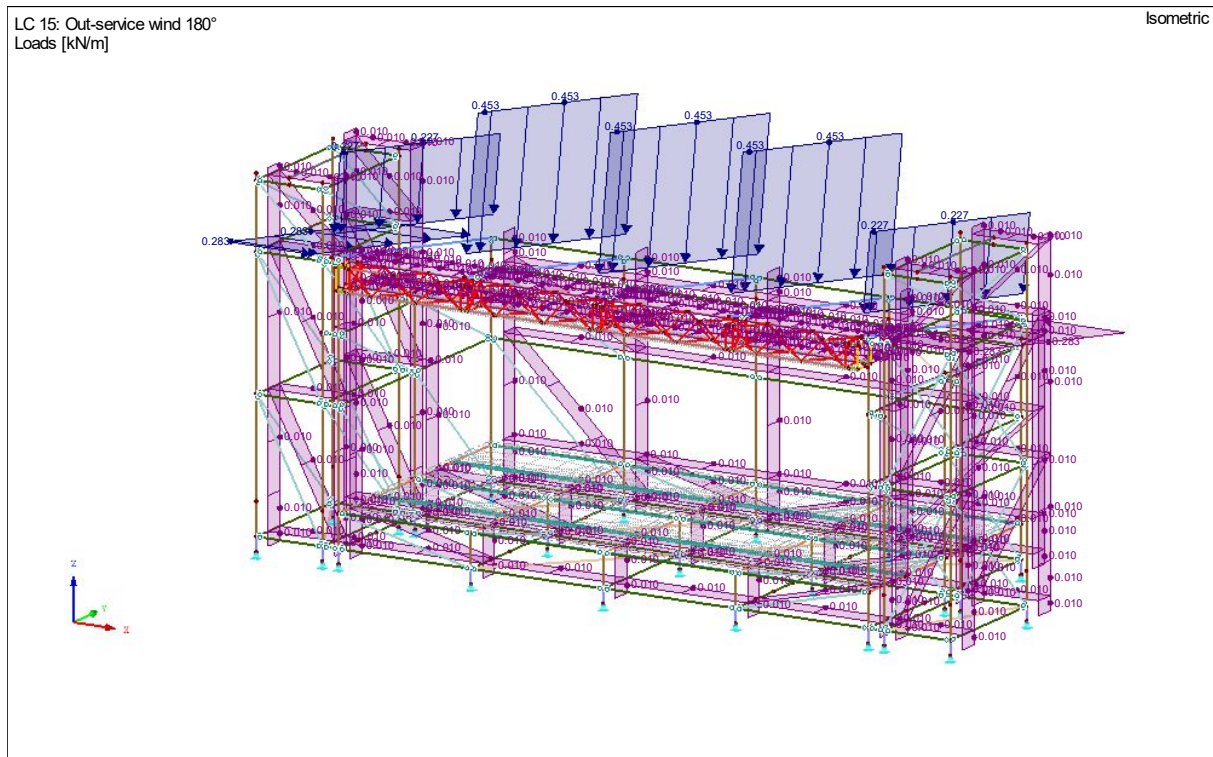
$$q_{mt}, \text{ roof profile 1 and 4} = 0.272 / 0.8 = 0.340 \text{ kN/m}$$

$$q_{mt}, \text{ roof profile 2 and 3} = 0 \text{ kN/m}$$

In the Out-service situation all the wall canopy's need to be removed.

A wind loading of 0.01 kN/m is set to all the profiles which lays perpendicular to the wind direction.

2.5.6 load case 15 Out-service wind 180°.



Wind calculations of the main roof canopy.

$$q_{w, \text{ roof profile 1 and 4}} = 0.5 * 0.4375 * 1.036 = 0.227 \text{ kN/m}$$

$$q_{w, \text{ roof profile 2 and 3}} = 0.5 * 0.4375 * 2.072 = 0.453 \text{ kN/m}$$

Membrane tension of the main roof canopy.

$$q_{mt, \text{ roof profile 1 and 4}} = 0.227 / 0.8 = 0.283 \text{ kN/m}$$

$$q_{mt, \text{ roof profile 2 and 3}} = 0 \text{ kN/m}$$

In the Out-service situation all the wall canopy's need to be removed.

A wind loading of 0.01 kN/m is set to all the profiles which lays perpendicular to the wind direction.

2.6 load combinations.

For all the models the same load combinations are generated.

CO1-CO4 Live load without wind
 CO10-CO38 Design Values In-service situation
 CO50-CO74 Characteristic Values In-service situation
 CO100-CO124 Design Values Out-service situation
 CO150-CO174 Characteristic Values Out-service situation

Load Combin.	DS	Load Combination Description	To Solve	LC.1		LC.2		LC.3		LC.4		LC.5	
				Factor	No.	Factor	No.	Factor	No.	Factor	No.	Factor	No.
CO1	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3	+	1,150	LC1	1,150	LC2	1,350	LC3				
CO2	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4	+	1,150	LC1	1,150	LC2	1,350	LC4				
CO3	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5	+	1,150	LC1	1,150	LC2	1,350	LC5				
CO4	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6	+	1,150	LC1	1,150	LC2	1,350	LC6				
CO10	0	1.15*LC1 + 1.15*LC2 + 1.35*LC10	+	1,150	LC1	1,150	LC2	1,350	LC10				
CO11	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC10	+	1,150	LC1	1,150	LC2	1,350	LC3	1,350	LC10		
CO12	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC10	+	1,150	LC1	1,150	LC2	1,350	LC4	1,350	LC10		
CO13	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC10	+	1,150	LC1	1,150	LC2	1,350	LC5	1,350	LC10		
CO14	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC10	+	1,150	LC1	1,150	LC2	1,350	LC6	1,350	LC10		
CO15	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC7 + 1.35*LC10	+	1,150	LC1	1,150	LC2	1,350	LC3	1,350	LC7	1,350	LC10
CO16	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC7 + 1.35*LC10	+	1,150	LC1	1,150	LC2	1,350	LC4	1,350	LC7	1,350	LC10
CO17	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC7 + 1.35*LC10	+	1,150	LC1	1,150	LC2	1,350	LC5	1,350	LC7	1,350	LC10
CO18	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC7 + 1.35*LC10	+	1,150	LC1	1,150	LC2	1,350	LC6	1,350	LC7	1,350	LC10
CO20	0	1.15*LC1 + 1.15*LC2 + 1.35*LC11	+	1,150	LC1	1,150	LC2	1,350	LC11				
CO21	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC11	+	1,150	LC1	1,150	LC2	1,350	LC3	1,350	LC11		
CO22	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC11	+	1,150	LC1	1,150	LC2	1,350	LC4	1,350	LC11		
CO23	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC11	+	1,150	LC1	1,150	LC2	1,350	LC5	1,350	LC11		
CO24	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC11	+	1,150	LC1	1,150	LC2	1,350	LC6	1,350	LC11		
CO25	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC8 + 1.35*LC11	+	1,150	LC1	1,150	LC2	1,350	LC3	1,350	LC8	1,350	LC11
CO26	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC8 + 1.35*LC11	+	1,150	LC1	1,150	LC2	1,350	LC4	1,350	LC8	1,350	LC11
CO27	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC8 + 1.35*LC11	+	1,150	LC1	1,150	LC2	1,350	LC5	1,350	LC8	1,350	LC11
CO28	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC8 + 1.35*LC11	+	1,150	LC1	1,150	LC2	1,350	LC6	1,350	LC8	1,350	LC11
CO30	0	1.15*LC1 + 1.15*LC2 + 1.35*LC12	+	1,150	LC1	1,150	LC2	1,350	LC12				
CO31	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC12	+	1,150	LC1	1,150	LC2	1,350	LC3	1,350	LC12		
CO32	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC12	+	1,150	LC1	1,150	LC2	1,350	LC4	1,350	LC12		
CO33	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC12	+	1,150	LC1	1,150	LC2	1,350	LC5	1,350	LC12		
CO34	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC12	+	1,150	LC1	1,150	LC2	1,350	LC6	1,350	LC12		
CO35	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC9 + 1.35*LC12	+	1,150	LC1	1,150	LC2	1,350	LC3	1,350	LC9	1,350	LC12
CO36	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC9 + 1.35*LC12	+	1,150	LC1	1,150	LC2	1,350	LC4	1,350	LC9	1,350	LC12
CO37	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC9 + 1.35*LC12	+	1,150	LC1	1,150	LC2	1,350	LC5	1,350	LC9	1,350	LC12
CO38	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC9 + 1.35*LC12	+	1,150	LC1	1,150	LC2	1,350	LC6	1,350	LC9	1,350	LC12
CO50	0	LC1 + LC2 + LC10	+	1,000	LC1	1,000	LC2	1,000	LC10				
CO51	0	LC1 + LC2 + LC3 + LC10	+	1,000	LC1	1,000	LC2	1,000	LC3	1,000	LC10		
CO52	0	LC1 + LC2 + LC4 + LC10	+	1,000	LC1	1,000	LC2	1,000	LC4	1,000	LC10		
CO53	0	LC1 + LC2 + LC5 + LC10	+	1,000	LC1	1,000	LC2	1,000	LC5	1,000	LC10		
CO54	0	LC1 + LC2 + LC6 + LC10	+	1,000	LC1	1,000	LC2	1,000	LC6	1,000	LC10		
CO60	0	LC1 + LC2 + LC11	+	1,000	LC1	1,000	LC2	1,000	LC11				
CO61	0	LC1 + LC2 + LC3 + LC11	+	1,000	LC1	1,000	LC2	1,000	LC3	1,000	LC11		
CO62	0	LC1 + LC2 + LC4 + LC11	+	1,000	LC1	1,000	LC2	1,000	LC4	1,000	LC11		
CO63	0	LC1 + LC2 + LC5 + LC11	+	1,000	LC1	1,000	LC2	1,000	LC5	1,000	LC11		
CO64	0	LC1 + LC2 + LC6 + LC11	+	1,000	LC1	1,000	LC2	1,000	LC6	1,000	LC11		
CO70	0	LC1 + LC2 + LC12	+	1,000	LC1	1,000	LC2	1,000	LC12				
CO71	0	LC1 + LC2 + LC3 + LC12	+	1,000	LC1	1,000	LC2	1,000	LC3	1,000	LC12		
CO72	0	LC1 + LC2 + LC4 + LC12	+	1,000	LC1	1,000	LC2	1,000	LC4	1,000	LC12		
CO73	0	LC1 + LC2 + LC5 + LC12	+	1,000	LC1	1,000	LC2	1,000	LC5	1,000	LC12		
CO74	0	LC1 + LC2 + LC6 + LC12	+	1,000	LC1	1,000	LC2	1,000	LC6	1,000	LC12		
CO100	0	1.15*LC1 + 1.15*LC2 + 1.35*LC13	+	1,150	LC1	1,150	LC2	1,350	LC13				
CO101	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC13	+	1,150	LC1	1,150	LC2	1,350	LC3	1,350	LC13		
CO102	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC13	+	1,150	LC1	1,150	LC2	1,350	LC4	1,350	LC13		
CO103	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC13	+	1,150	LC1	1,150	LC2	1,350	LC5	1,350	LC13		
CO104	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC13	+	1,150	LC1	1,150	LC2	1,350	LC6	1,350	LC13		
CO110	0	1.15*LC1 + 1.15*LC2 + 1.35*LC14	+	1,150	LC1	1,150	LC2	1,350	LC14				
CO111	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC14	+	1,150	LC1	1,150	LC2	1,350	LC3	1,350	LC14		
CO112	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC14	+	1,150	LC1	1,150	LC2	1,350	LC4	1,350	LC14		
CO113	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC14	+	1,150	LC1	1,150	LC2	1,350	LC5	1,350	LC14		

CO114	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC14	+	1,150	LC1	1,150	LC2	1,350	LC6	1,350	LC14		
CO120	0	1.15*LC1 + 1.15*LC2 + 1.35*LC15	+	1,150	LC1	1,150	LC2	1,350	LC15				
CO121	0	1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC15	+	1,150	LC1	1,150	LC2	1,350	LC3	1,350	LC15		
CO122	0	1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC15	+	1,150	LC1	1,150	LC2	1,350	LC4	1,350	LC15		
CO123	0	1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC15	+	1,150	LC1	1,150	LC2	1,350	LC5	1,350	LC15		
CO124	0	1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC15	+	1,150	LC1	1,150	LC2	1,350	LC6	1,350	LC15		
CO150	0	LC1 + LC2 + LC13	+	1,000	LC1	1,000	LC2	1,000	LC13				
CO151	0	LC1 + LC2 + LC3 + LC13	+	1,000	LC1	1,000	LC2	1,000	LC3	1,000	LC13		
CO152	0	LC1 + LC2 + LC4 + LC13	+	1,000	LC1	1,000	LC2	1,000	LC4	1,000	LC13		
CO153	0	LC1 + LC2 + LC5 + LC13	+	1,000	LC1	1,000	LC2	1,000	LC5	1,000	LC13		
CO154	0	LC1 + LC2 + LC6 + LC13	+	1,000	LC1	1,000	LC2	1,000	LC6	1,000	LC13		
CO160	0	LC1 + LC2 + LC14	+	1,000	LC1	1,000	LC2	1,000	LC14				
CO161	0	LC1 + LC2 + LC3 + LC14	+	1,000	LC1	1,000	LC2	1,000	LC3	1,000	LC14		
CO162	0	LC1 + LC2 + LC4 + LC14	+	1,000	LC1	1,000	LC2	1,000	LC4	1,000	LC14		
CO163	0	LC1 + LC2 + LC5 + LC14	+	1,000	LC1	1,000	LC2	1,000	LC5	1,000	LC14		
CO164	0	LC1 + LC2 + LC6 + LC14	+	1,000	LC1	1,000	LC2	1,000	LC6	1,000	LC14		
CO170	0	LC1 + LC2 + LC15	+	1,000	LC1	1,000	LC2	1,000	LC15				
CO171	0	LC1 + LC2 + LC3 + LC15	+	1,000	LC1	1,000	LC2	1,000	LC3	1,000	LC15		
CO172	0	LC1 + LC2 + LC4 + LC15	+	1,000	LC1	1,000	LC2	1,000	LC4	1,000	LC15		
CO173	0	LC1 + LC2 + LC5 + LC15	+	1,000	LC1	1,000	LC2	1,000	LC5	1,000	LC15		
CO174	0	LC1 + LC2 + LC6 + LC15	+	1,000	LC1	1,000	LC2	1,000	LC6	1,000	LC15		

2.7 Result combinations.

Different Result calculation have been generated in the program.

RC1 - Live loading without wind	: 1 * (CO1 - CO4)
RC2 - Design Values In-service	: 1 * (CO10 – CO38)
RC3 - Characteristic Values In-service	: 1 * (CO50 – CO74)
RC4 - Design Values Out-service	: 1 * (CO100 – CO124)
RC5 - Characteristic Values Out-service	: 1 * (CO150 – CO174)

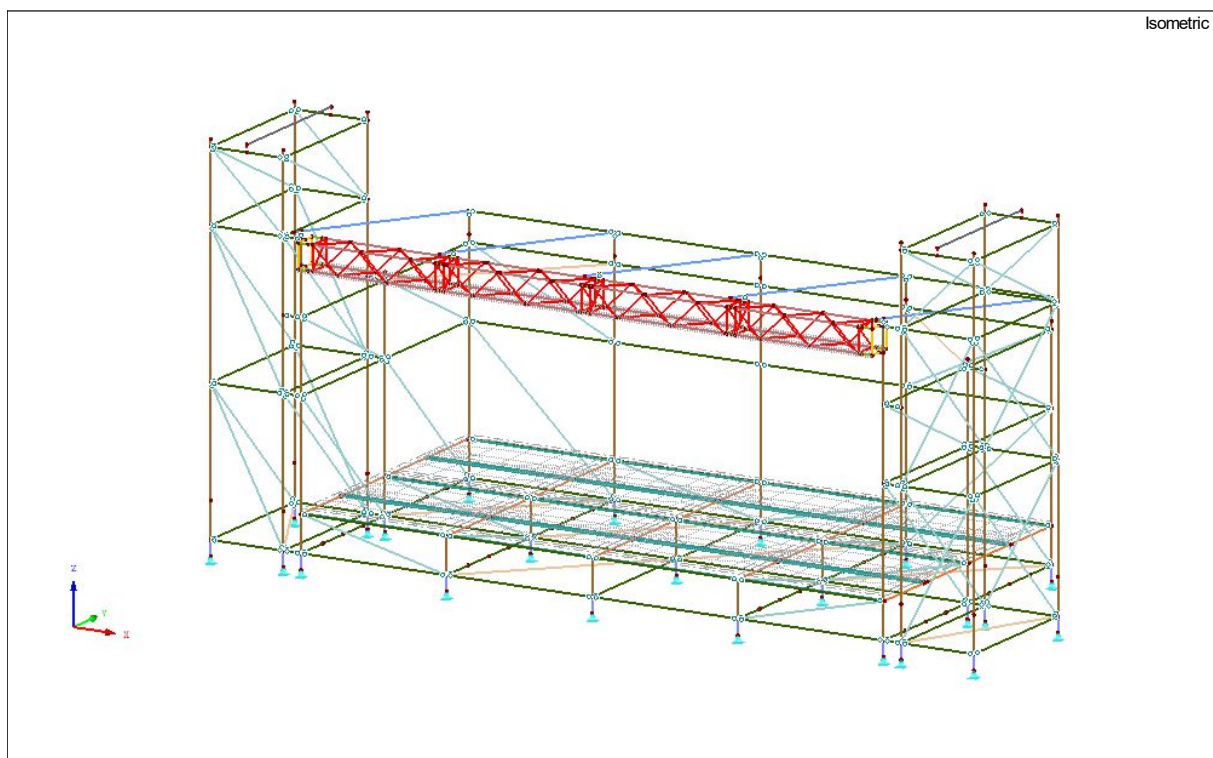
In the RC2 there are extra load combinations which includes the floor loading, these are not calculated in RC3. These are for the structural integrity check of the flooring system.

3 Calculation results for different Load Cases and Load Combinations.

In this chapter the results of the different load cases and load combinations of the GE32 Layher roof + pa wing are presented. The design calculations will be used to check the structural integrity of separate parts of the structure. The results for the characteristic calculations will be used to determine the deflection of the system and the steel wires which need to be used. These results will not be presented for each load combination. If the use of these results is necessary, the particular information will be given. For each different system there is also a stress analyse calculation.

3.1 General calculation of the GE32 Layher Roof + PA wings

3.1.1 construction scheme.



Cross-Sections

- 1: SHAPE-THIN KEDER PROFIEL 3000; Aluminum EN-AW 6082 (EP,ET) T6
- 2: QRO 50x4 (Hot Formed); Aluminum EN-AW 6082 (EP,ET) T6
- 3: Ring 48/3; Aluminum EN-AW 6082 (EP,ET) T6
- 4: Ring 48/6; Aluminum EN-AW 6082 (EP,ET) T6
- 5: Ring 20/2; Aluminum EN-AW 6082 (EP,ET) T6
- 6: RO 38x4.5 | DIN EN 10220; Steel S 355 JR
- 7: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 8: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 9: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 10: RO 48.3x2.6 (Hot Formed); Steel S 235 JR
- 11: EV transom; Aluminum EN-AW 6005A (EP/O,ER/B) T6
- 12: HK 50/30/4/4/4/4; Aluminum EN-AW 6005A (EP/O,ER/B) T6
- 13: IPE 160; Steel S 235 JR
- 16: Rectangle 50/50; Aluminum EN-AW 6082 (EP,ET) T6

3.1.2 Used Materials.

Material No.	Material Description	Modulus of Elasticity E [kN/cm ²]	Shear Modulus G [kN/cm ²]	Poisson's Ratio ν [-]	Specific Weight γ [kN/m ³]	Coeff. of Th. Exp. α [1/°C]	Partial Factor γ_M [-]	Material Model
1	Steel S 235 JR EN 10025-2:2004-11	21000,00	8076,92	0,300	78,50	1,20E-05	1,000	Isotropic Linear Elastic
2	S320GD 1.0250 EN 10346:2009-03	21000,00	8076,92	0,300	78,50	1,20E-05	1,000	Isotropic Linear Elastic
3	Steel S 355 JR EN 10025-2:2004-11	21000,00	8076,92	0,300	78,50	1,20E-05	1,000	Isotropic Linear Elastic
4	Plywood, Class F20/10 E40/20, Plate Stress, Perpendicular EN 12369-2:2011-06	200,00	3,50	3,286	5,00	5,00E-06	1,200	Orthotropic Elastic 2D...
5	Aluminum EN-AW 6005A (EP/O,ER/B) T6 EN 1999-1-1:2007	7000,00	2700,00	0,296	27,00	2,30E-05	1,000	Isotropic Linear Elastic
6	Aluminum EN-AW 6082 (EP,ET) T6 EN 1999-1-1:2007	7000,00	2700,00	0,296	27,00	2,30E-05	1,000	Isotropic Linear Elastic

3.1.3 Used cross sections.

Section No.	Cross-Section Description [mm]	Material No.	Moments of inertia [cm ⁴]			Cross-Sectional Areas [cm ²]			Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm]	
			Torsion J	Bending I _y	Bending I _z	Axial A	Shear A _y	Shear A _z			Width b	Depth h
1	SHAPE-THIN KEDER PROFIEL 3000	6	39,02	60,82	62,04	11,33	3,25	3,65	0,00	0,00	73,9	65,0
2	QRO 50x4 (Hot Formed)	6	40,40	25,00	25,00	7,19	3,12	3,12	0,00	0,00	50,0	50,0
3	Ring 48/3	6	21,57	10,78	10,78	4,24	2,14	2,14	0,00	0,00	48,0	48,0
4	Ring 48/6	6	35,63	17,81	17,81	7,92	4,09	4,09	0,00	0,00	48,0	48,0
5	Ring 20/2	6	0,93	0,46	0,46	1,13	0,58	0,58	0,00	0,00	20,0	20,0
6	RO 38x4.5 DIN EN 10220	3	13,53	6,76	6,76	4,74	2,38	2,38	0,00	0,00	38,0	38,0
7	RO 48.3x3.2 (Hot Formed)	2	23,20	11,60	11,60	4,53	2,26	2,26	0,00	0,00	48,3	48,3
8	RO 48.3x3.2 (Hot Formed)	2	23,20	11,60	11,60	4,53	2,26	2,26	0,00	0,00	48,3	48,3
9	RO 48.3x3.2 (Hot Formed)	2	23,20	11,60	11,60	4,53	2,26	2,26	0,00	0,00	48,3	48,3
10	RO 48.3x2.6 (Hot Formed)	1	19,60	9,78	9,78	3,73	1,85	1,85	0,00	0,00	48,3	48,3
11	EV transom	5	50,00	554,00	70,00	18,78	18,00	18,00	0,00	0,00	49,0	172,5
12	HK 50/30/4/4/4/4	5	16,87	17,67	7,52	5,76	1,62	3,48	0,00	0,00	30,0	50,0
13	IPE 160	1	3,60	869,30	68,31	20,09	10,17	7,33	0,00	0,00	82,0	160,0
14	Rectangle 50/50	6	87,92	52,08	52,08	25,00	20,83	20,83	0,00	0,00	50,0	50,0

3.2 Calculation summary GE32 Layher Roof + PA wings

Description	Value	Unit	Comment
Summary			
Calculation Status	OK		
Maximum displacement in X-direction	-27,3	mm	CO104, Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	34,4	mm	CO10, Member No. 170, x: 0.100 m
Maximum displacement in Z-direction	77,6	mm	CO100, Member No. 243, x: 2.009 m
Maximum vectorial displacement	79,1	mm	CO100, Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-59,3	mrاد	CO100, Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-46,2	mrاد	CO30, Member No. 662, x: 0.250 m
Maximum rotation about Z-axis	-82,7	mrاد	CO10, Member No. 710, x: 0.250 m
Number of 1D finite elements (member elements)	1408		
Number of 2D finite elements (surface elements)	1040		
Number of 3D finite elements (solid elements)	0		
Number of FE mesh nodes	1587		
Number of equations	9522		
Matrix solver method	Direct		
Maximum number of iterations	100		
Number of divisions for member results	10		
Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic	10		
Activate shear stiffness of members (A-y, A-z)	+		
Plate bending theory	Mindlin		
Activate ineffective supports	+		
Precision of convergence criteria of nonlinear calculation	1,0		

3.3 Calculation result of the separate load cases.

Description	Value	Unit	Comment
LC1 - Self-weight			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-23,04	kN	
Sum of support forces in Z	-23,04	kN	Deviation: 0.00 %
Resultant of reactions about X	-0,588	kNm	At center of gravity of model (X: 5.175, Y: -2.268, Z: 0.955 m)
Resultant of reactions about Y	-0,478	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	-0,7	mm	Member No. 738, x: 1.440 m
Maximum displacement in Y-direction	-1,6	mm	Member No. 726, x: 1.440 m
Maximum displacement in Z-direction	-4,1	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	4,1	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	2,9	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	1,4	mrاد	Member No. 703, x: 2.930 m
Maximum rotation about Z-axis	0,2	mrاد	Member No. 863, x: 0.266 m
Method of analysis	Linear		Geometrically Linear Analysis
LC2 - ballast loading			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-20,00	kN	
Sum of support forces in Z	-20,00	kN	Deviation: 0.00 %
Resultant of reactions about X	-3,928	kNm	At center of gravity of model (X: 5.175, Y: -2.268, Z: 0.955 m)
Resultant of reactions about Y	0,107	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	0,0	mm	Member No. 223, x: 0.375 m
Maximum displacement in Y-direction	0,0	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-16,3	mm	Member No. 219, x: 0.444 m
Maximum vectorial displacement	16,3	mm	Member No. 219, x: 0.444 m
Maximum rotation about X-axis	-26,0	mrاد	Member No. 664, x: 0.000 m
Maximum rotation about Y-axis	0,0	mrاد	Member No. 707, x: 0.000 m
Maximum rotation about Z-axis	0,0	mrاد	Member No. 400, x: 0.031 m
Method of analysis	Linear		Geometrically Linear Analysis
LC3 - UDL Loading setup			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-24,17	kN	
Sum of support forces in Z	-24,21	kN	Deviation: -0.17 %
Resultant of reactions about X	28,743	kNm	At center of gravity of model (X: 5.175, Y: -2.268, Z: 0.955 m)
Resultant of reactions about Y	0,130	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	1,6	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	-1,9	mm	Member No. 45, x: 0.368 m
Maximum displacement in Z-direction	-19,0	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	19,1	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	4,7	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	11,3	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	-1,6	mrاد	Member No. 710, x: 0.250 m
Method of analysis	Linear		Geometrically Linear Analysis
LC4 - CPL Loading setup			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-21,00	kN	
Sum of support forces in Z	-21,00	kN	Deviation: -0.01 %
Resultant of reactions about X	22,818	kNm	At center of gravity of model (X: 5.175, Y: -2.268, Z: 0.955 m)
Resultant of reactions about Y	0,112	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	1,4	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	-1,7	mm	Member No. 45, x: 0.368 m
Maximum displacement in Z-direction	-18,9	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	19,0	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	4,7	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	11,2	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	-1,2	mrاد	Member No. 878, x: 0.239 m
Method of analysis	Linear		Geometrically Linear Analysis
LC5 - 2x point load setup			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	

Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-26,00	kN	
Sum of support forces in Z	-26,05	kN	Deviation: -0.20 %
Resultant of reactions about X	32,181	kNm	At center of gravity of model (X: 5.175, Y: -2.268, Z: 0.955 m)
Resultant of reactions about Y	0,196	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	2,2	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	-2,4	mm	Member No. 45, x: 0.368 m
Maximum displacement in Z-direction	-24,8	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	24,9	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	6,1	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	11,3	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	-2,1	mrاد	Member No. 710, x: 0.250 m
Method of analysis	Linear		Geometrically Linear Analysis
LC6 - 3x point load setup			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-25,00	kN	
Sum of support forces in Z	-25,00	kN	Deviation: -0.02 %
Resultant of reactions about X	30,324	kNm	At center of gravity of model (X: 5.175, Y: -2.268, Z: 0.955 m)
Resultant of reactions about Y	0,168	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	2,2	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	-2,4	mm	Member No. 45, x: 0.368 m
Maximum displacement in Z-direction	-26,2	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	26,3	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	6,5	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	11,3	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	-2,0	mrاد	Member No. 710, x: 0.250 m
Method of analysis	Linear		Geometrically Linear Analysis
LC7 - floor loading wind 0°			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	11,60	kN	
Sum of support forces in Y	11,60	kN	Deviation: 0.00 %
Sum of loads in Z	-116,03	kN	
Sum of support forces in Z	-116,05	kN	Deviation: -0.02 %
Resultant of reactions about X	-10,245	kNm	At center of gravity of model (X: 5.175, Y: -2.268, Z: 0.955 m)
Resultant of reactions about Y	0,508	kNm	At center of gravity of model
Resultant of reactions about Z	0,062	kNm	At center of gravity of model
Maximum displacement in X-direction	-0,9	mm	FE Mesh Node No. 228 (X: 7.523, Y: -1.527, Z: -0.186 m)
Maximum displacement in Y-direction	1,9	mm	Member No. 172, x: 0.000 m
Maximum displacement in Z-direction	-9,1	mm	FE Mesh Node No. 247 (X: 8.289, Y: -1.631, Z: -0.186 m)
Maximum vectorial displacement	9,2	mm	FE Mesh Node No. 125 (X: 8.289, Y: -2.513, Z: -0.186 m)
Maximum rotation about X-axis	-13,4	mrاد	Member No. 813, x: 1.036 m
Maximum rotation about Y-axis	-16,8	mrاد	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	-4,1	mrاد	Member No. 710, x: 0.250 m
Method of analysis	Linear		Geometrically Linear Analysis
LC8 - floor loading wind 90°			
Sum of loads in X	11,60	kN	
Sum of support forces in X	11,60	kN	Deviation: 0.00 %
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-116,03	kN	
Sum of support forces in Z	-116,40	kN	Deviation: -0.31 %
Resultant of reactions about X	-22,105	kNm	At center of gravity of model (X: 5.175, Y: -2.268, Z: 0.955 m)
Resultant of reactions about Y	-10,325	kNm	At center of gravity of model
Resultant of reactions about Z	-2,279	kNm	At center of gravity of model
Maximum displacement in X-direction	1,4	mm	FE Mesh Node No. 704 (X: 2.836, Y: -1.528, Z: -0.186 m)
Maximum displacement in Y-direction	-1,2	mm	Member No. 274, x: 1.250 m
Maximum displacement in Z-direction	-9,1	mm	FE Mesh Node No. 1146 (X: 2.073, Y: -2.513, Z: -0.186 m)
Maximum vectorial displacement	9,1	mm	FE Mesh Node No. 1146 (X: 2.073, Y: -2.513, Z: -0.186 m)
Maximum rotation about X-axis	-13,4	mrاد	Member No. 828, x: 1.036 m
Maximum rotation about Y-axis	-16,8	mrاد	FE Mesh Node No. 100 (X: 9.052, Y: -2.616, Z: -0.186 m)
Maximum rotation about Z-axis	-1,2	mrاد	Member No. 666, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC9 - floor loading wind 180°			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-11,60	kN	
Sum of support forces in Y	-11,60	kN	Deviation: 0.00 %
Sum of loads in Z	-116,03	kN	
Sum of support forces in Z	-116,03	kN	Deviation: 0.00 %
Resultant of reactions about X	-35,336	kNm	At center of gravity of model (X: 5.175, Y: -2.268, Z: 0.955 m)
Resultant of reactions about Y	0,621	kNm	At center of gravity of model
Resultant of reactions about Z	-0,062	kNm	At center of gravity of model

Maximum displacement in X-direction	0,9	mm	FE Mesh Node No. 1032 (X: 2.836, Y: -2.616, Z: -0.186 m)
Maximum displacement in Y-direction	-2,5	mm	Member No. 190, x: 0.000 m
Maximum displacement in Z-direction	-9,1	mm	FE Mesh Node No. 1146 (X: 2.073, Y: -2.513, Z: -0.186 m)
Maximum vectorial displacement	9,1	mm	FE Mesh Node No. 725 (X: 2.073, Y: -1.631, Z: -0.186 m)
Maximum rotation about X-axis	-13,4	mrاد	Member No. 813, x: 1.036 m
Maximum rotation about Y-axis	-16,8	mrاد	FE Mesh Node No. 100 (X: 9.052, Y: -2.616, Z: -0.186 m)
Maximum rotation about Z-axis	5,9	mrاد	Member No. 710, x: 0.250 m
Method of analysis	Linear		Geometrically Linear Analysis

3.4 Calculation result of RC1 - General loading without wind 1 * (CO1 – CO4)

Description	Value	Unit	Comment
CO1 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-82,12	kN	
Sum of support forces in Z	-82,12	kN	Deviation: 0.00 %
Maximum displacement in X-direction	2,4	mm	Member No. 23, x: 0.330 m
Maximum displacement in Y-direction	-2,3	mm	Member No. 45, x: 0.368 m
Maximum displacement in Z-direction	-27,1	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	27,2	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,3	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	1,9	mrاد	Member No. 863, x: 0.239 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO2 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-77,85	kN	
Sum of support forces in Z	-77,85	kN	Deviation: 0.00 %
Maximum displacement in X-direction	2,2	mm	Member No. 23, x: 0.330 m
Maximum displacement in Y-direction	2,4	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-27,0	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	27,0	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,8	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,3	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	-1,8	mrاد	Member No. 878, x: 0.239 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO3 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-84,60	kN	
Sum of support forces in Z	-84,60	kN	Deviation: 0.00 %
Maximum displacement in X-direction	3,2	mm	Member No. 23, x: 0.330 m
Maximum displacement in Y-direction	-3,0	mm	Member No. 45, x: 0.368 m
Maximum displacement in Z-direction	-34,9	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	35,1	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,4	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	2,4	mrاد	Member No. 863, x: 0.239 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO4 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-83,25	kN	
Sum of support forces in Z	-83,25	kN	Deviation: 0.00 %
Maximum displacement in X-direction	3,2	mm	Member No. 23, x: 0.330 m
Maximum displacement in Y-direction	-3,1	mm	Member No. 45, x: 0.368 m
Maximum displacement in Z-direction	-36,8	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	36,9	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,4	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	-2,2	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T

3.5 Calculation result of RC2 – Design Values In-service: 1 * (CO10 – CO38)

Description	Value	Unit	Comment
CO10 - 1.15*LC1 + 1.15*LC2 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	18,58	kN	
Sum of support forces in Y	18,58	kN	Deviation: 0.00 %
Sum of loads in Z	-34,01	kN	
Sum of support forces in Z	-34,01	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,3	mm	Member No. 833, x: 1.681 m
Maximum displacement in Y-direction	34,4	mm	Member No. 170, x: 0.100 m
Maximum displacement in Z-direction	68,8	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	71,2	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-53,1	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	44,6	mrاد	Member No. 706, x: 0.000 m
Maximum rotation about Z-axis	-82,7	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO11 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	18,58	kN	
Sum of support forces in Y	18,58	kN	Deviation: 0.00 %
Sum of loads in Z	-66,63	kN	
Sum of support forces in Z	-66,63	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,6	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	15,9	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	60,0	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	61,6	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	52,0	mrاد	Member No. 992, x: 0.000 m
Maximum rotation about Y-axis	-15,2	mrاد	Member No. 246, x: 0.518 m
Maximum rotation about Z-axis	-19,7	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO12 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	18,58	kN	
Sum of support forces in Y	18,58	kN	Deviation: 0.00 %
Sum of loads in Z	-62,36	kN	
Sum of support forces in Z	-62,36	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,6	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	16,1	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	60,6	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	62,2	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	51,6	mrاد	Member No. 992, x: 0.000 m
Maximum rotation about Y-axis	-15,1	mrاد	Member No. 246, x: 0.518 m
Maximum rotation about Z-axis	-19,6	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO13 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	18,58	kN	
Sum of support forces in Y	18,58	kN	Deviation: 0.00 %
Sum of loads in Z	-69,11	kN	
Sum of support forces in Z	-69,11	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,8	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	15,9	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	57,4	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	59,0	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	54,0	mrاد	Member No. 992, x: 0.000 m
Maximum rotation about Y-axis	-15,3	mrاد	Member No. 246, x: 0.518 m
Maximum rotation about Z-axis	-19,7	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO14 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	18,58	kN	
Sum of support forces in Y	18,58	kN	Deviation: 0.00 %
Sum of loads in Z	-67,76	kN	
Sum of support forces in Z	-67,76	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,8	mm	Member No. 833, x: 2.101 m

Maximum displacement in Y-direction	16,0	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	57,3	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	59,0	mm	Member No. 244, x: 2.009 m
Maximum rotation about X-axis	53,9	mrاد	Member No. 992, x: 0.000 m
Maximum rotation about Y-axis	-15,3	mrاد	Member No. 246, x: 0.518 m
Maximum rotation about Z-axis	-19,7	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO15 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	34,24	kN	
Sum of support forces in Y	34,24	kN	Deviation: 0.00 %
Sum of loads in Z	-223,27	kN	
Sum of support forces in Z	-223,27	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,7	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	16,6	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	60,0	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	61,7	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	52,1	mrاد	Member No. 992, x: 0.000 m
Maximum rotation about Y-axis	-30,0	mrاد	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	19,7	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO16 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	34,24	kN	
Sum of support forces in Y	34,24	kN	Deviation: 0.00 %
Sum of loads in Z	-219,00	kN	
Sum of support forces in Z	-219,00	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,6	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	16,7	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	60,6	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	62,3	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	51,6	mrاد	Member No. 992, x: 0.000 m
Maximum rotation about Y-axis	-30,0	mrاد	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	19,7	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO17 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	34,24	kN	
Sum of support forces in Y	34,24	kN	Deviation: 0.00 %
Sum of loads in Z	-225,75	kN	
Sum of support forces in Z	-225,75	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,9	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	16,5	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	57,3	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	59,1	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	54,0	mrاد	Member No. 992, x: 0.000 m
Maximum rotation about Y-axis	-30,0	mrاد	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	19,8	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO18 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	34,24	kN	
Sum of support forces in Y	34,24	kN	Deviation: 0.00 %
Sum of loads in Z	-224,40	kN	
Sum of support forces in Z	-224,40	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,9	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	16,7	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	57,3	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	59,1	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	53,9	mrاد	Member No. 992, x: 0.000 m
Maximum rotation about Y-axis	-30,0	mrاد	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	19,8	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO20 - 1.15*LC1 + 1.15*LC2 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %

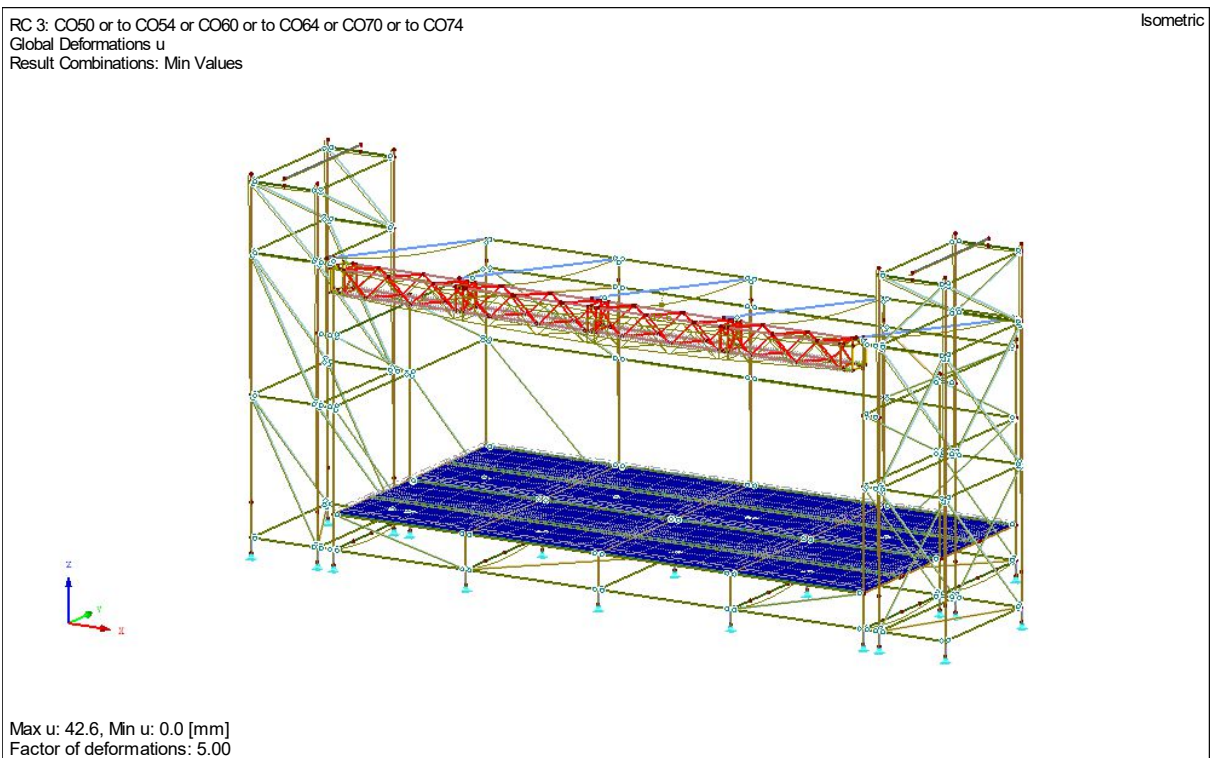
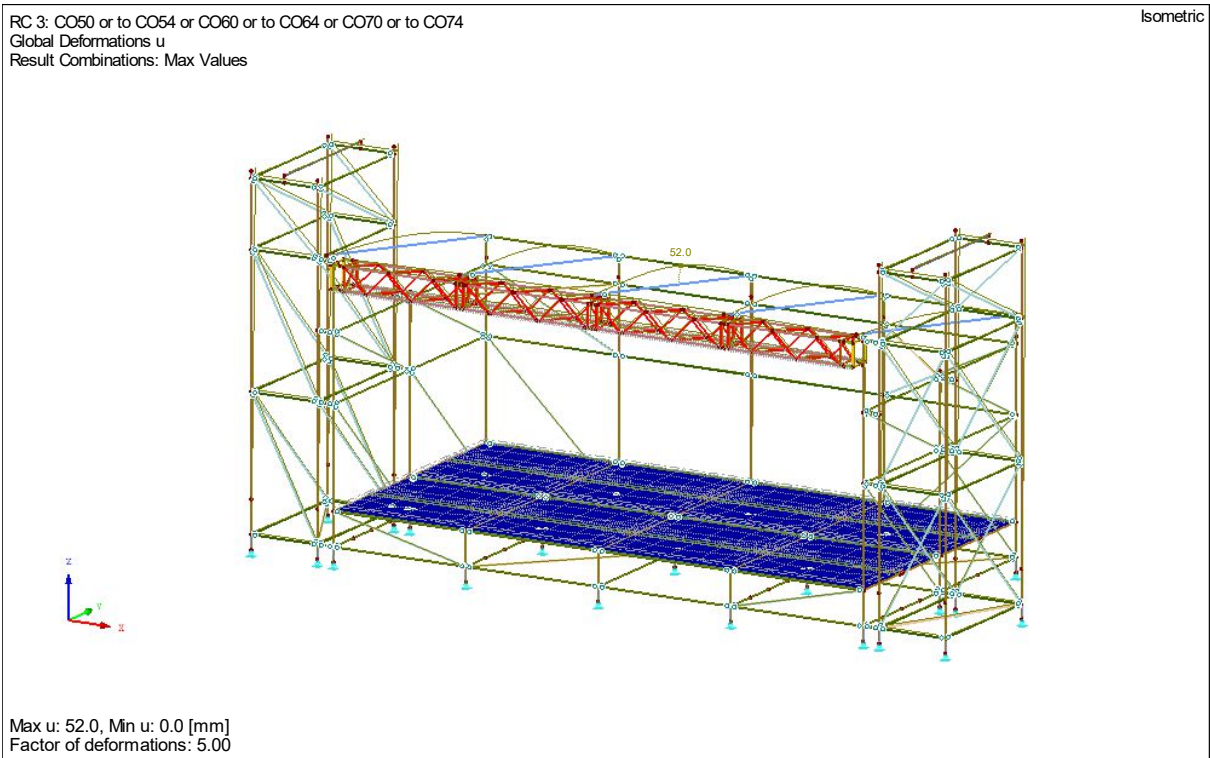
Sum of loads in Y	1,68	kN	
Sum of support forces in Y	1,68	kN	Deviation: 0.00 %
Sum of loads in Z	-48,53	kN	
Sum of support forces in Z	-48,53	kN	Deviation: 0.00 %
Maximum displacement in X-direction	5,5	mm	Member No. 173, x: 0.000 m
Maximum displacement in Y-direction	4,2	mm	Member No. 227, x: 0.375 m
Maximum displacement in Z-direction	-19,2	mm	Member No. 202, x: 0.444 m
Maximum vectorial displacement	19,2	mm	Member No. 202, x: 0.444 m
Maximum rotation about X-axis	30,6	mrاد	Member No. 647, x: 0.000 m
Maximum rotation about Y-axis	-2,6	mrاد	Member No. 659, x: 0.250 m
Maximum rotation about Z-axis	5,4	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO21 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	1,68	kN	
Sum of support forces in Y	1,68	kN	Deviation: 0.00 %
Sum of loads in Z	-81,16	kN	
Sum of support forces in Z	-81,16	kN	Deviation: 0.00 %
Maximum displacement in X-direction	3,9	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	4,5	mm	Member No. 285, x: 0.750 m
Maximum displacement in Z-direction	-27,6	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	27,6	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,8	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,7	mrاد	Member No. 193, x: 0.000 m
Maximum rotation about Z-axis	3,5	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO22 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	1,68	kN	
Sum of support forces in Y	1,68	kN	Deviation: 0.00 %
Sum of loads in Z	-76,88	kN	
Sum of support forces in Z	-76,88	kN	Deviation: 0.00 %
Maximum displacement in X-direction	3,5	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	4,6	mm	Member No. 285, x: 0.750 m
Maximum displacement in Z-direction	-27,4	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	27,5	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,7	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,6	mrاد	Member No. 193, x: 0.000 m
Maximum rotation about Z-axis	3,7	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO23 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	1,68	kN	
Sum of support forces in Y	1,68	kN	Deviation: 0.00 %
Sum of loads in Z	-83,63	kN	
Sum of support forces in Z	-83,63	kN	Deviation: 0.00 %
Maximum displacement in X-direction	5,2	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	5,0	mm	Member No. 285, x: 0.875 m
Maximum displacement in Z-direction	-35,5	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	35,6	mm	FE Mesh Node No. 485 (X: 5.180, Y: -4.325, Z: 3.445 m)
Maximum rotation about X-axis	30,8	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,9	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	3,2	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO24 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	1,68	kN	
Sum of support forces in Y	1,68	kN	Deviation: 0.00 %
Sum of loads in Z	-82,28	kN	
Sum of support forces in Z	-82,28	kN	Deviation: 0.00 %
Maximum displacement in X-direction	5,1	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	5,2	mm	Member No. 479, x: 2.072 m
Maximum displacement in Z-direction	-37,4	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	37,5	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,8	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,9	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	3,2	mrاد	Member No. 710, x: 0.250 m

Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO25 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	20,24	kN	
Sum of support forces in X	20,24	kN	Deviation: 0.00 %
Sum of loads in Y	1,68	kN	
Sum of support forces in Y	1,68	kN	Deviation: 0.00 %
Sum of loads in Z	-237,80	kN	
Sum of support forces in Z	-237,80	kN	Deviation: 0.00 %
Maximum displacement in X-direction	4,7	mm	Member No. 173, x: 0.000 m
Maximum displacement in Y-direction	4,1	mm	Member No. 28, x: 0.300 m
Maximum displacement in Z-direction	-27,7	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	27,8	mm	FE Mesh Node No. 485 (X: 5.180, Y: -4.325, Z: 3.445 m)
Maximum rotation about X-axis	30,4	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	-30,3	mrاد	FE Mesh Node No. 100 (X: 9.052, Y: -2.616, Z: -0.186 m)
Maximum rotation about Z-axis	3,8	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO26 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	20,24	kN	
Sum of support forces in X	20,24	kN	Deviation: 0.00 %
Sum of loads in Y	1,68	kN	
Sum of support forces in Y	1,68	kN	Deviation: 0.00 %
Sum of loads in Z	-233,53	kN	
Sum of support forces in Z	-233,53	kN	Deviation: 0.00 %
Maximum displacement in X-direction	4,4	mm	Member No. 173, x: 0.000 m
Maximum displacement in Y-direction	4,2	mm	Member No. 28, x: 0.300 m
Maximum displacement in Z-direction	-27,6	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	27,7	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,3	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	-30,3	mrاد	FE Mesh Node No. 100 (X: 9.052, Y: -2.616, Z: -0.186 m)
Maximum rotation about Z-axis	4,1	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO27 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	20,24	kN	
Sum of support forces in X	20,24	kN	Deviation: 0.00 %
Sum of loads in Y	1,68	kN	
Sum of support forces in Y	1,68	kN	Deviation: 0.00 %
Sum of loads in Z	-240,28	kN	
Sum of support forces in Z	-240,28	kN	Deviation: 0.00 %
Maximum displacement in X-direction	5,8	mm	Member No. 173, x: 0.000 m
Maximum displacement in Y-direction	4,9	mm	Member No. 28, x: 0.300 m
Maximum displacement in Z-direction	-35,7	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	35,8	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,4	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,3	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	3,5	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO28 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	20,24	kN	
Sum of support forces in X	20,24	kN	Deviation: 0.00 %
Sum of loads in Y	1,68	kN	
Sum of support forces in Y	1,68	kN	Deviation: 0.00 %
Sum of loads in Z	-238,93	kN	
Sum of support forces in Z	-238,93	kN	Deviation: 0.00 %
Maximum displacement in X-direction	5,8	mm	Member No. 173, x: 0.000 m
Maximum displacement in Y-direction	5,1	mm	Member No. 28, x: 0.300 m
Maximum displacement in Z-direction	-37,6	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	37,7	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,4	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,3	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	3,6	mrاد	Member No. 710, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO30 - 1.15*LC1 + 1.15*LC2 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-15,79	kN	
Sum of support forces in Y	-15,79	kN	Deviation: 0.00 %
Sum of loads in Z	-56,27	kN	
Sum of support forces in Z	-56,27	kN	Deviation: 0.00 %
Maximum displacement in X-direction	12,3	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-29,4	mm	Member No. 170, x: 0.100 m

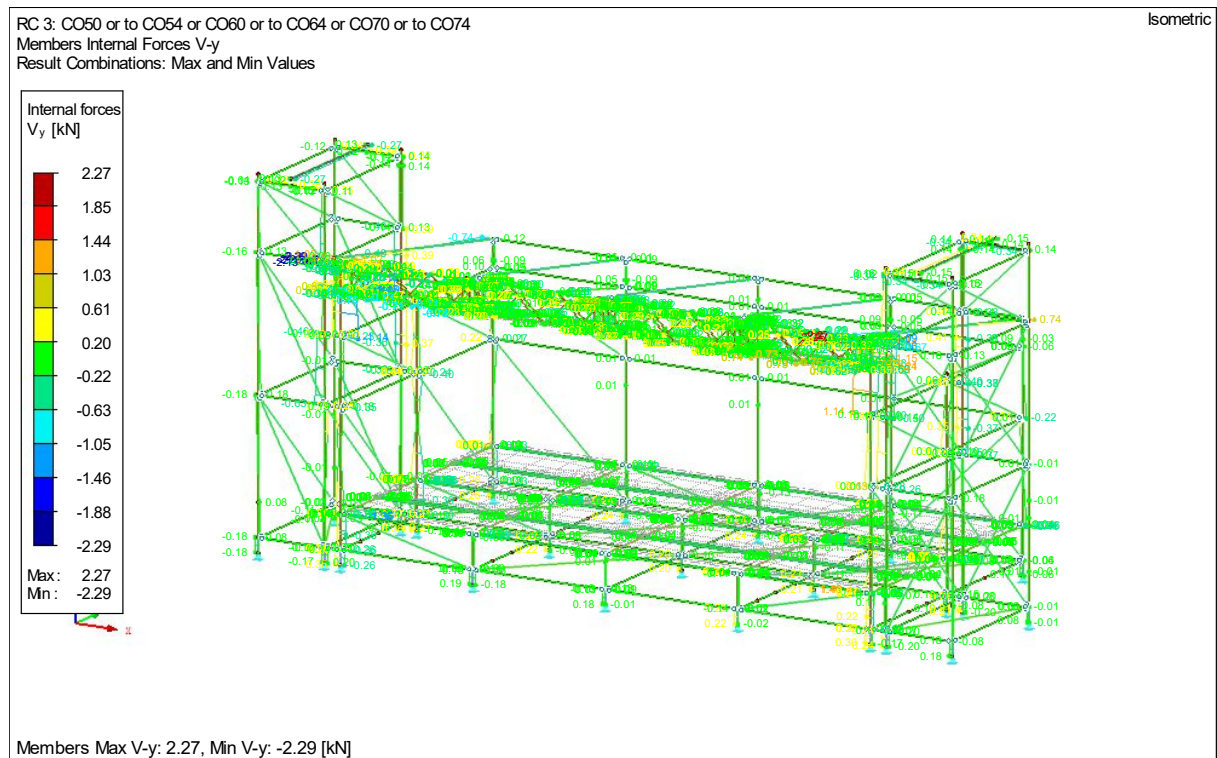
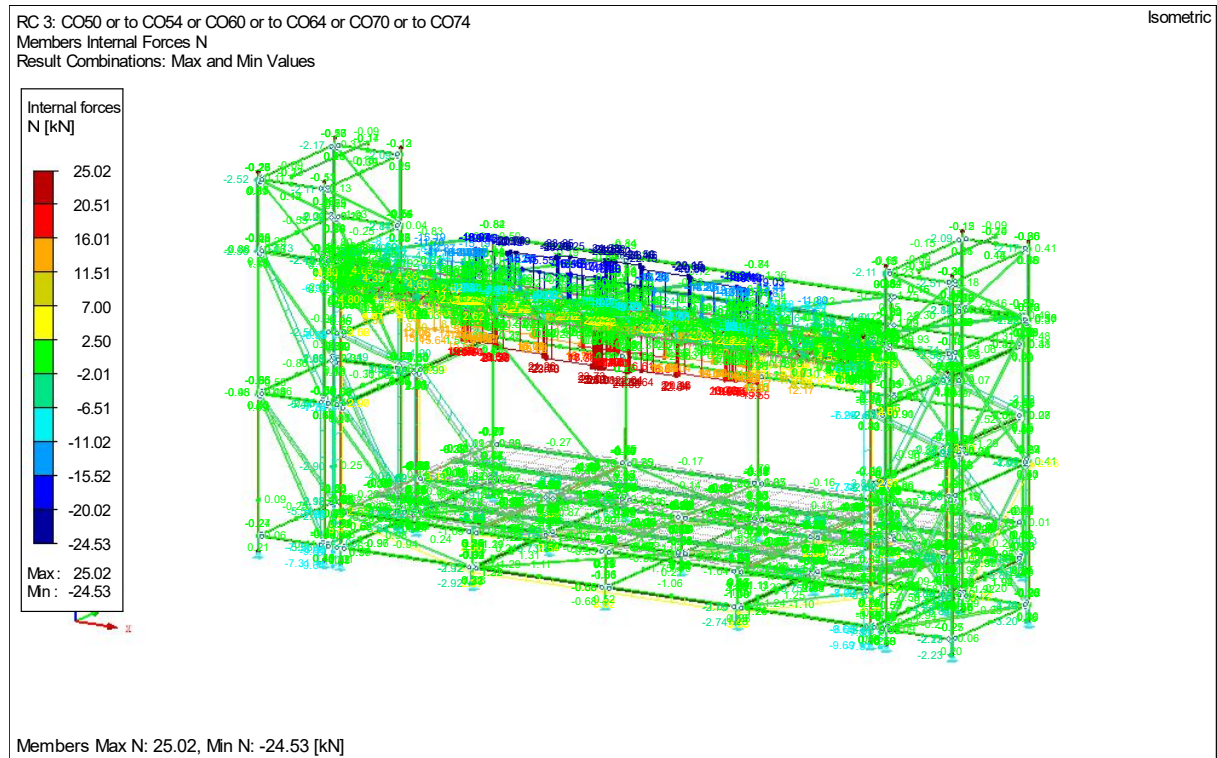
Maximum displacement in Z-direction	-37,5	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	39,5	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-31,6	mrاد	Member No. 664, x: 0.000 m
Maximum rotation about Y-axis	-46,2	mrاد	Member No. 662, x: 0.250 m
Maximum rotation about Z-axis	-80,6	mrاد	Member No. 666, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO31 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-15,79	kN	
Sum of support forces in Y	-15,79	kN	Deviation: 0.00 %
Sum of loads in Z	-88,89	kN	
Sum of support forces in Z	-88,89	kN	Deviation: 0.00 %
Maximum displacement in X-direction	12,9	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-12,7	mm	Member No. 285, x: 0.125 m
Maximum displacement in Z-direction	-50,5	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	51,7	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	33,9	mrاد	Member No. 243, x: 0.000 m
Maximum rotation about Y-axis	15,4	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	9,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO32 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-15,79	kN	
Sum of support forces in Y	-15,79	kN	Deviation: 0.00 %
Sum of loads in Z	-84,62	kN	
Sum of support forces in Z	-84,62	kN	Deviation: 0.00 %
Maximum displacement in X-direction	12,8	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-12,6	mm	Member No. 285, x: 0.125 m
Maximum displacement in Z-direction	-50,3	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	51,5	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	33,8	mrاد	Member No. 243, x: 0.000 m
Maximum rotation about Y-axis	15,4	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	9,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO33 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-15,79	kN	
Sum of support forces in Y	-15,79	kN	Deviation: 0.00 %
Sum of loads in Z	-91,37	kN	
Sum of support forces in Z	-91,37	kN	Deviation: 0.00 %
Maximum displacement in X-direction	13,1	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-12,6	mm	Member No. 285, x: 0.125 m
Maximum displacement in Z-direction	-54,7	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	55,8	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	35,5	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	17,2	mrاد	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	9,6	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO34 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-15,79	kN	
Sum of support forces in Y	-15,79	kN	Deviation: 0.00 %
Sum of loads in Z	-90,02	kN	
Sum of support forces in Z	-90,02	kN	Deviation: 0.00 %
Maximum displacement in X-direction	13,1	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-12,4	mm	Member No. 285, x: 0.125 m
Maximum displacement in Z-direction	-55,6	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	56,7	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	35,8	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	16,9	mrاد	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	9,6	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO35 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-31,46	kN	

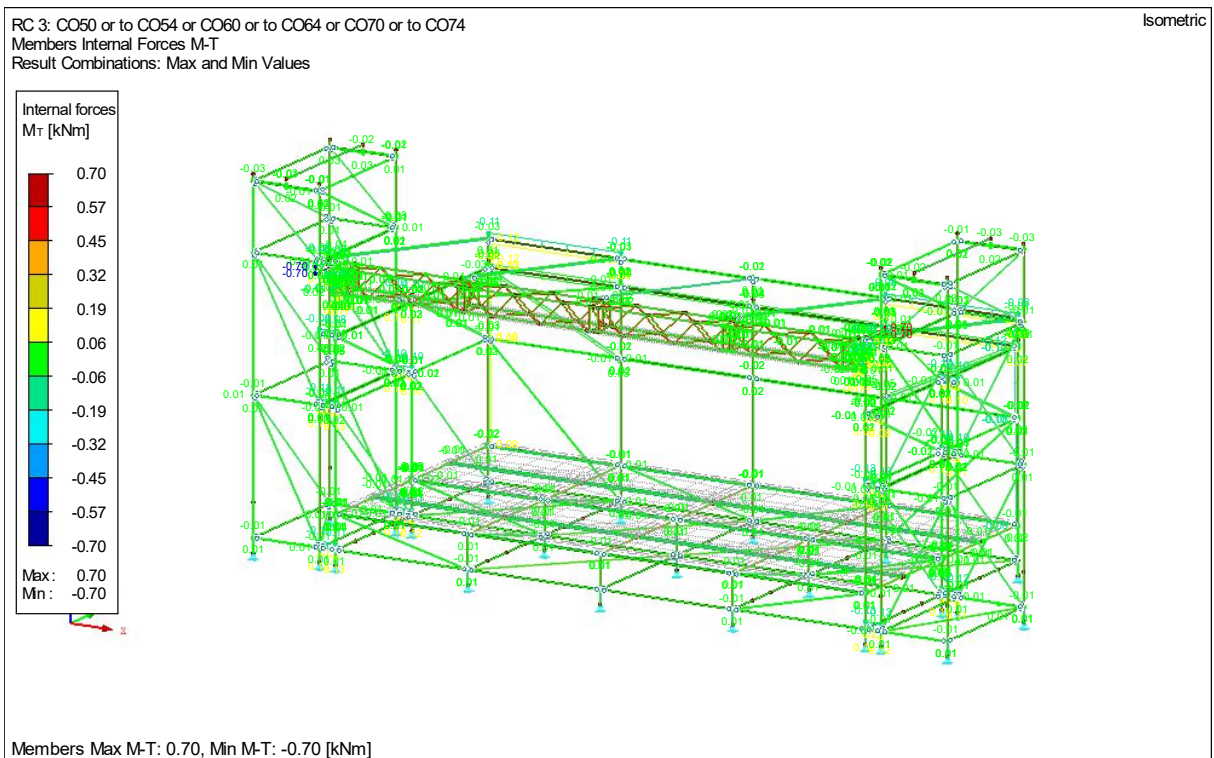
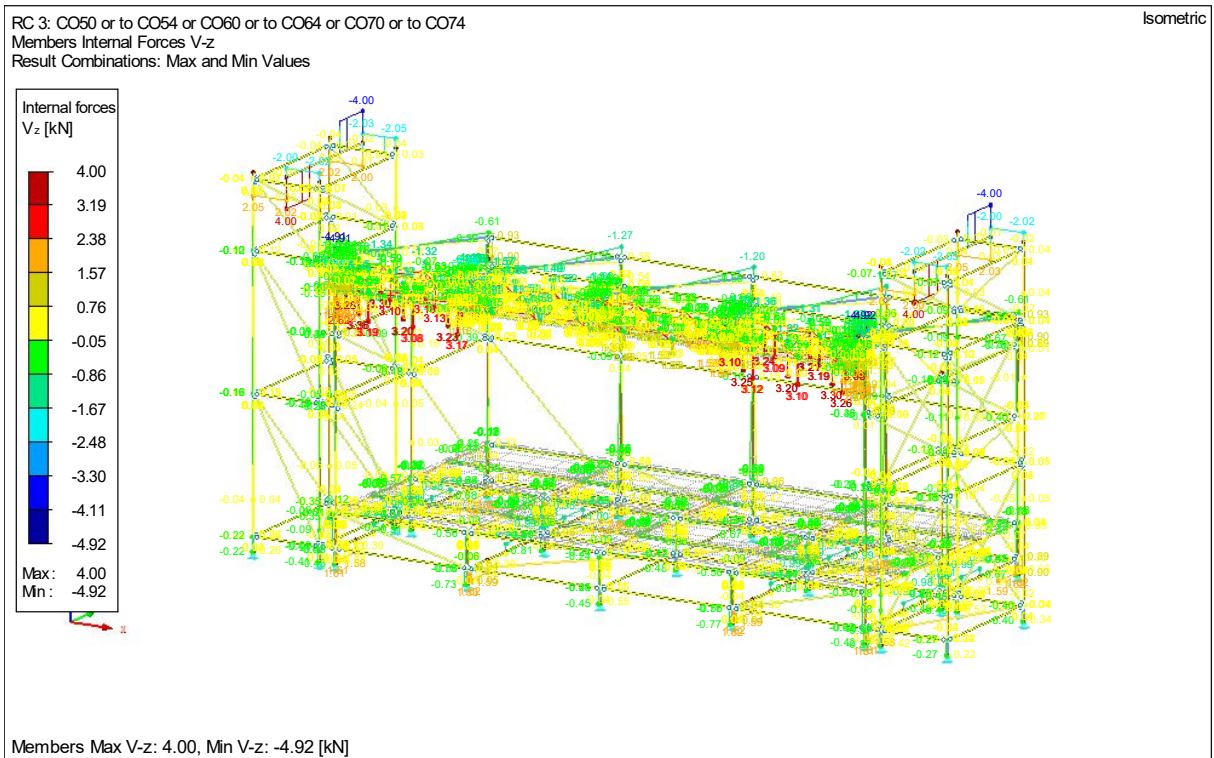
Sum of support forces in Y	-31,46	kN	Deviation: 0.00 %
Sum of loads in Z	-245,54	kN	
Sum of support forces in Z	-245,54	kN	Deviation: 0.00 %
Maximum displacement in X-direction	12,9	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-15,3	mm	Member No. 285, x: 0.125 m
Maximum displacement in Z-direction	-50,5	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	51,9	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	33,9	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,2	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	9,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO36 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-31,46	kN	
Sum of support forces in Y	-31,46	kN	Deviation: 0.00 %
Sum of loads in Z	-241,26	kN	
Sum of support forces in Z	-241,26	kN	Deviation: 0.00 %
Maximum displacement in X-direction	12,8	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-15,2	mm	Member No. 285, x: 0.125 m
Maximum displacement in Z-direction	-50,4	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	51,7	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	33,8	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,2	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	9,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO37 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-31,46	kN	
Sum of support forces in Y	-31,46	kN	Deviation: 0.00 %
Sum of loads in Z	-248,01	kN	
Sum of support forces in Z	-248,01	kN	Deviation: 0.00 %
Maximum displacement in X-direction	13,1	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-15,1	mm	Member No. 285, x: 0.125 m
Maximum displacement in Z-direction	-54,7	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	56,0	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	35,5	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,2	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	9,6	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r
CO38 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-31,46	kN	
Sum of support forces in Y	-31,46	kN	Deviation: 0.00 %
Sum of loads in Z	-246,66	kN	
Sum of support forces in Z	-246,66	kN	Deviation: 0.00 %
Maximum displacement in X-direction	13,1	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-15,0	mm	Member No. 285, x: 0.125 m
Maximum displacement in Z-direction	-55,6	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	56,9	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	35,8	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,2	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	9,6	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _r

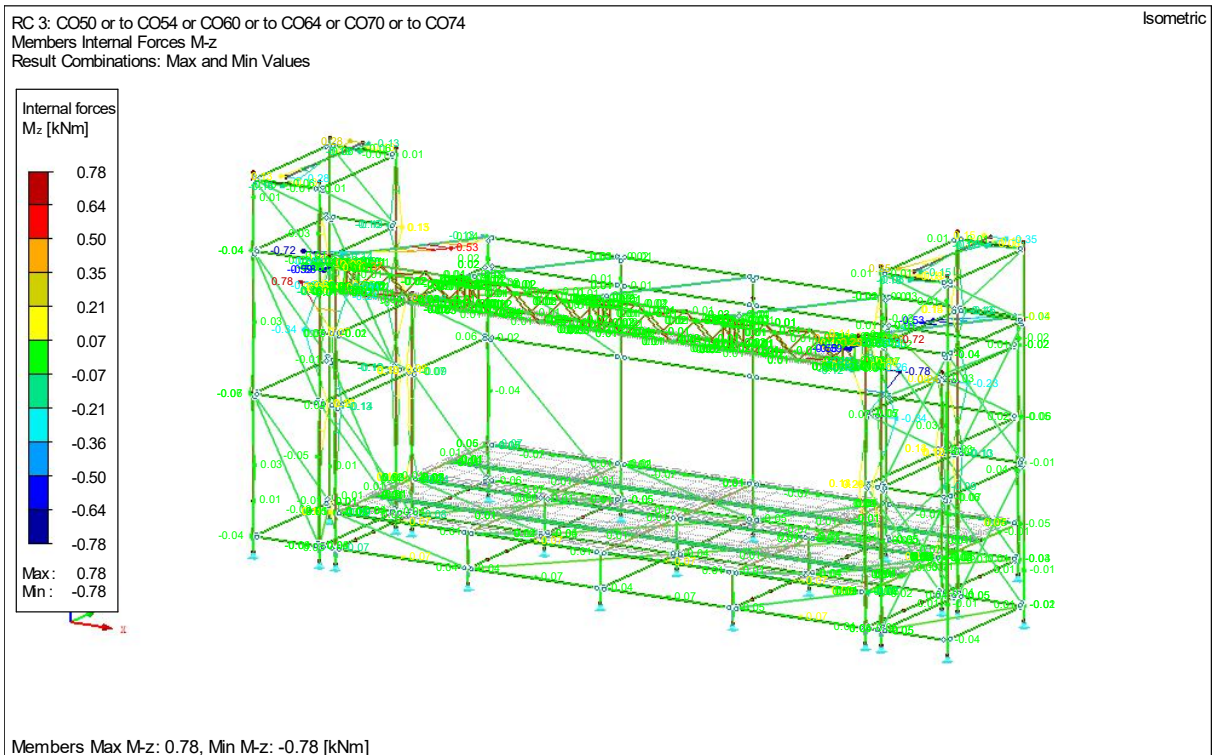
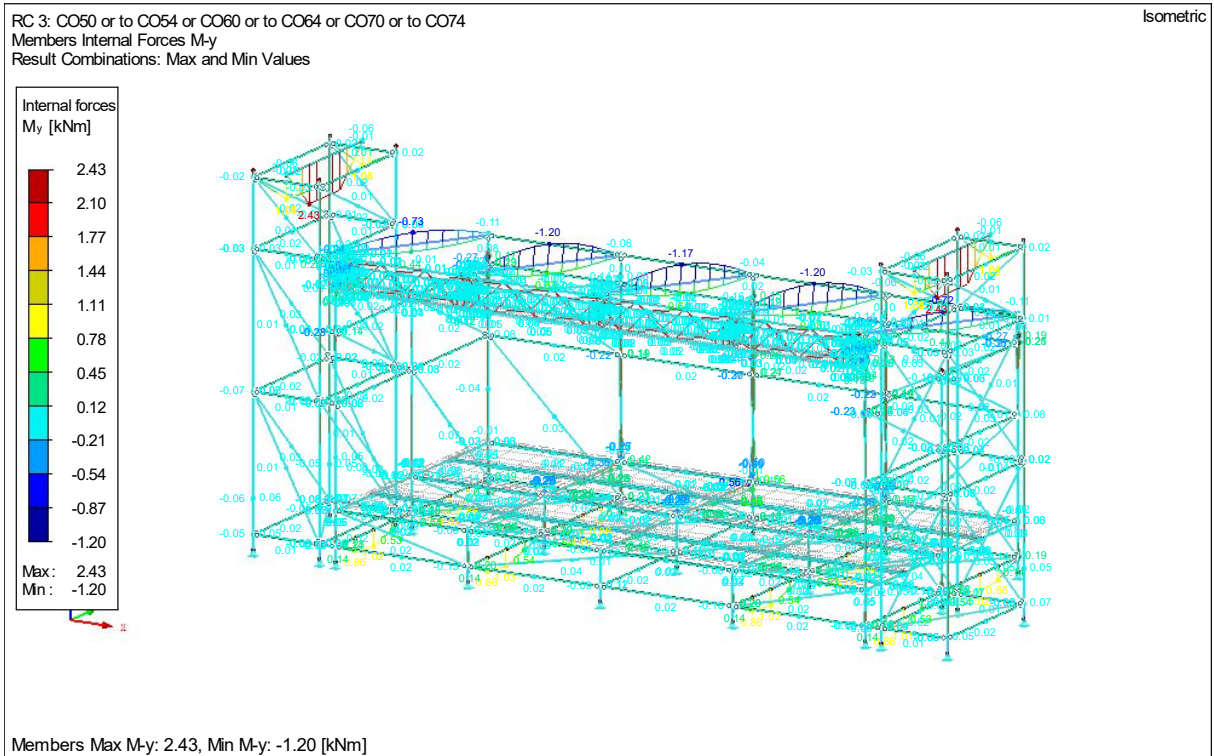
3.5.1 Deformation of the In-service situation characteristic max and min values.



3.5.2 Internal force diagram RC2 Design values In-service.







3.6 Calculation result of RC4 - Design Values Out-service: 1 * (CO100 – CO124)

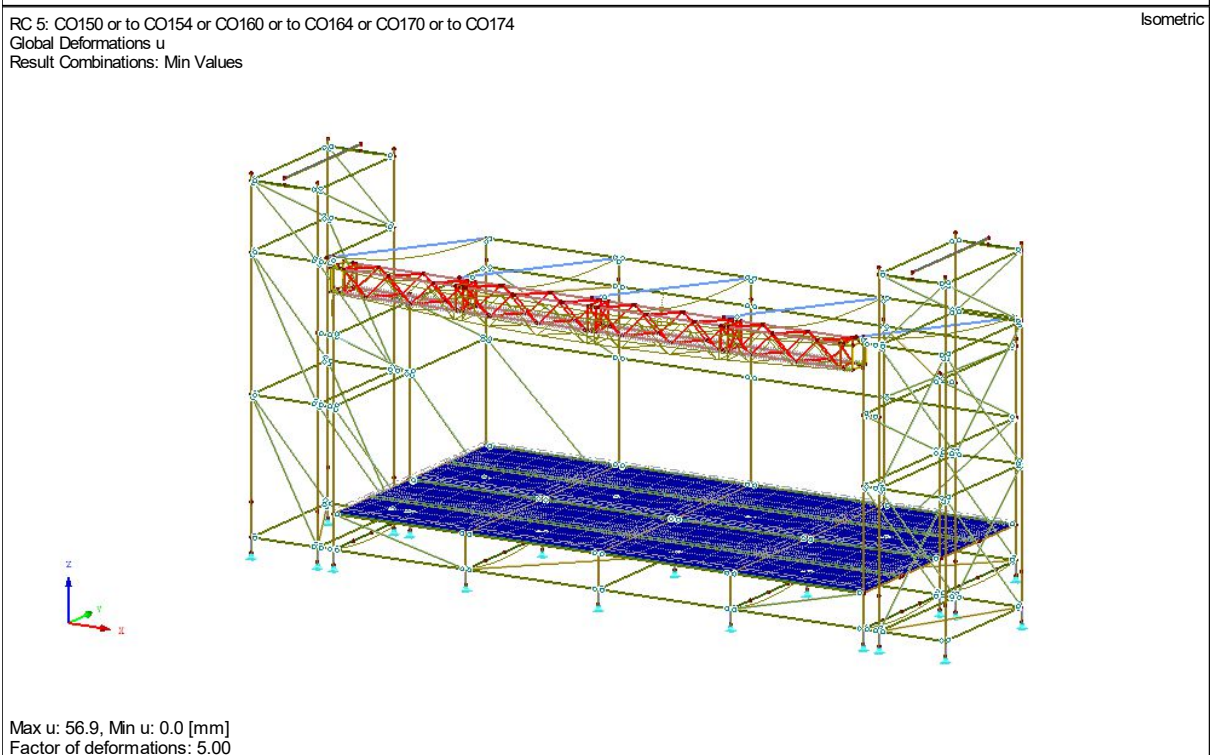
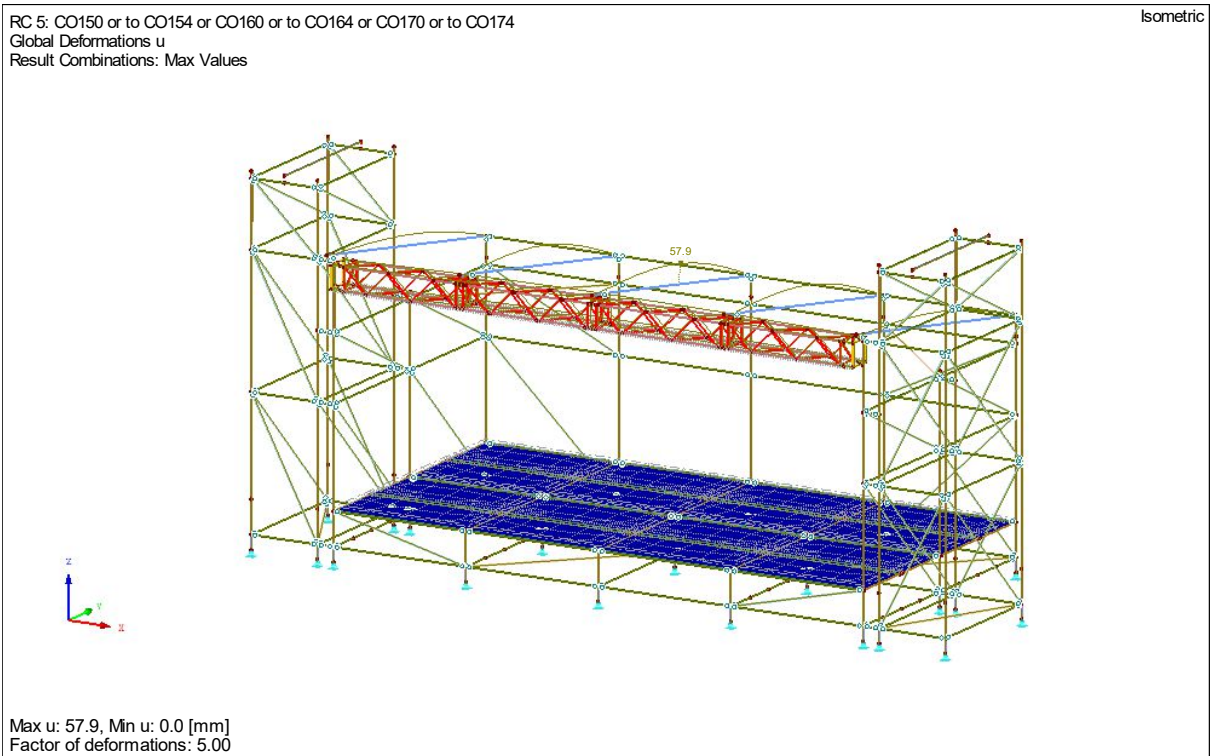
Description	Value	Unit	Comment
CO100 - 1.15*LC1 + 1.15*LC2 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	6,27	kN	
Sum of support forces in Y	6,27	kN	Deviation: 0.00 %
Sum of loads in Z	-32,56	kN	
Sum of support forces in Z	-32,56	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-26,6	mm	Member No. 833, x: 1.681 m
Maximum displacement in Y-direction	15,0	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	77,6	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	79,1	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-59,3	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-6,8	mrاد	Member No. 837, x: 3.362 m
Maximum rotation about Z-axis	-21,5	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO101 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	6,27	kN	
Sum of support forces in Y	6,27	kN	Deviation: 0.00 %
Sum of loads in Z	-65,18	kN	
Sum of support forces in Z	-65,18	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-27,1	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	14,3	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	66,3	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	67,8	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	56,6	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-15,1	mrاد	Member No. 246, x: 0.518 m
Maximum rotation about Z-axis	-21,6	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO102 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	6,27	kN	
Sum of support forces in Y	6,27	kN	Deviation: 0.00 %
Sum of loads in Z	-60,91	kN	
Sum of support forces in Z	-60,91	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-27,0	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	14,5	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	66,5	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	67,9	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	56,6	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-15,1	mrاد	Member No. 246, x: 0.518 m
Maximum rotation about Z-axis	-21,6	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO103 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	6,27	kN	
Sum of support forces in Y	6,27	kN	Deviation: 0.00 %
Sum of loads in Z	-67,66	kN	
Sum of support forces in Z	-67,66	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-27,3	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	14,3	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	63,2	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	64,5	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	58,5	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-15,2	mrاد	Member No. 246, x: 0.518 m
Maximum rotation about Z-axis	-21,7	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO104 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	6,27	kN	
Sum of support forces in Y	6,27	kN	Deviation: 0.00 %
Sum of loads in Z	-66,31	kN	
Sum of support forces in Z	-66,31	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-27,3	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	14,4	mm	Member No. 243, x: 2.009 m

Maximum displacement in Z-direction	63,1	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	64,4	mm	Member No. 244, x: 2.009 m
Maximum rotation about X-axis	59,0	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-15,2	mrاد	Member No. 246, x: 0.518 m
Maximum rotation about Z-axis	-21,7	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO110 - 1.15*LC1 + 1.15*LC2 + 1.35*LC14			
Sum of loads in X	3,96	kN	
Sum of support forces in X	3,96	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-36,79	kN	
Sum of support forces in Z	-36,79	kN	Deviation: 0.00 %
Maximum displacement in X-direction	23,5	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	9,5	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	57,2	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	58,1	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-43,8	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-5,2	mrاد	Member No. 659, x: 0.250 m
Maximum rotation about Z-axis	17,6	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO111 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC14			
Sum of loads in X	3,96	kN	
Sum of support forces in X	3,96	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-69,41	kN	
Sum of support forces in Z	-69,41	kN	Deviation: 0.00 %
Maximum displacement in X-direction	21,2	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	9,7	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	46,6	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	47,4	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	43,8	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	15,4	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	16,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO112 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC14			
Sum of loads in X	3,96	kN	
Sum of support forces in X	3,96	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-65,14	kN	
Sum of support forces in Z	-65,14	kN	Deviation: 0.00 %
Maximum displacement in X-direction	21,1	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	9,8	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	47,2	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	47,9	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	43,9	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	15,3	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	16,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO113 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC14			
Sum of loads in X	3,96	kN	
Sum of support forces in X	3,96	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-71,89	kN	
Sum of support forces in Z	-71,89	kN	Deviation: 0.00 %
Maximum displacement in X-direction	21,7	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	9,8	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	43,9	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	44,7	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	45,8	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	15,6	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	16,7	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO114 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC14			
Sum of loads in X	3,96	kN	
Sum of support forces in X	3,96	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-70,54	kN	
Sum of support forces in Z	-70,54	kN	Deviation: 0.00 %
Maximum displacement in X-direction	21,7	mm	Member No. 837, x: 2.101 m

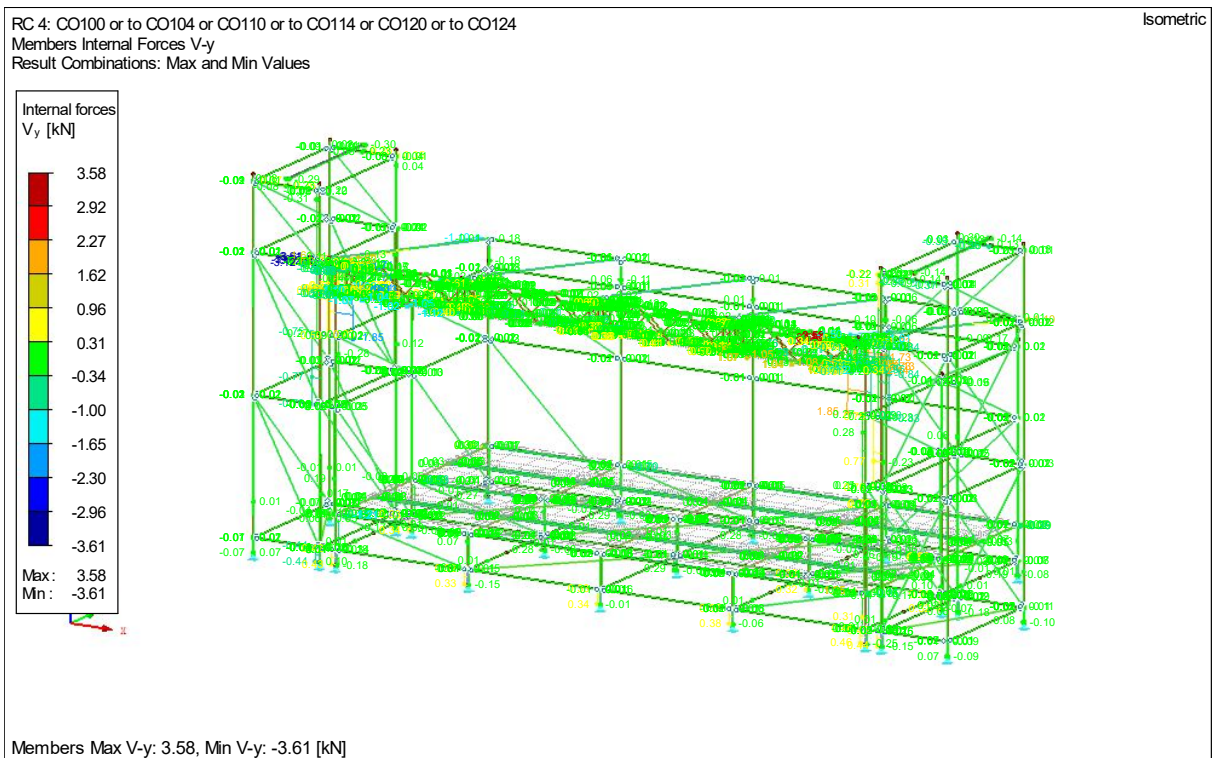
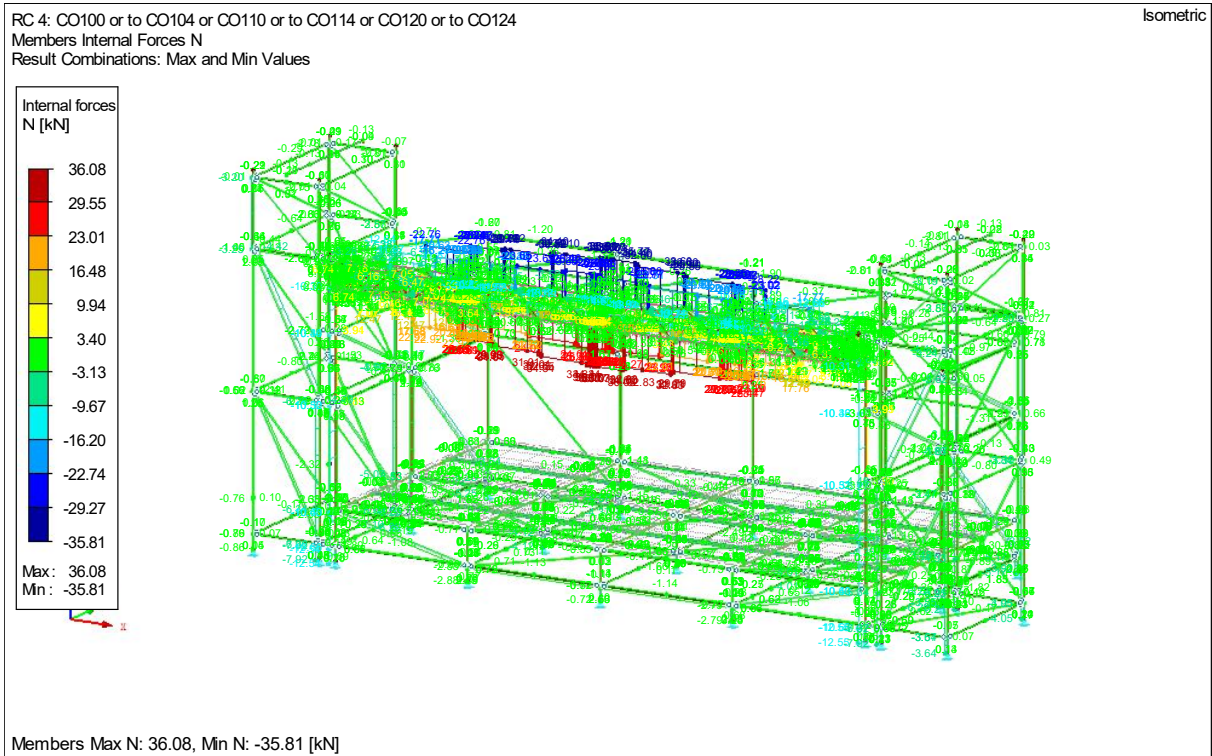
Maximum displacement in Y-direction	9,9	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	43,8	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	44,7	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	46,3	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	15,6	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	16,7	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO120 - 1.15*LC1 + 1.15*LC2 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-5,11	kN	
Sum of support forces in Y	-5,11	kN	Deviation: 0.00 %
Sum of loads in Z	-60,08	kN	
Sum of support forces in Z	-60,08	kN	Deviation: 0.00 %
Maximum displacement in X-direction	18,5	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-11,9	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	-57,4	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	58,6	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	43,6	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	6,0	mrاد	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	14,4	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO121 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-5,11	kN	
Sum of support forces in Y	-5,11	kN	Deviation: 0.00 %
Sum of loads in Z	-92,71	kN	
Sum of support forces in Z	-92,71	kN	Deviation: 0.00 %
Maximum displacement in X-direction	19,1	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-12,1	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-69,9	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	71,0	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	48,7	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	16,0	mrاد	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	14,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO122 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-5,11	kN	
Sum of support forces in Y	-5,11	kN	Deviation: 0.00 %
Sum of loads in Z	-88,43	kN	
Sum of support forces in Z	-88,43	kN	Deviation: 0.00 %
Maximum displacement in X-direction	19,0	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-11,9	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-69,8	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	70,8	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	48,5	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	15,4	mrاد	Member No. 192, x: 0.000 m
Maximum rotation about Z-axis	14,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO123 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-5,11	kN	
Sum of support forces in Y	-5,11	kN	Deviation: 0.00 %
Sum of loads in Z	-95,18	kN	
Sum of support forces in Z	-95,18	kN	Deviation: 0.00 %
Maximum displacement in X-direction	19,3	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-12,1	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-74,2	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	75,2	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	50,3	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	19,3	mrاد	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	14,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO124 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-5,11	kN	
Sum of support forces in Y	-5,11	kN	Deviation: 0.00 %
Sum of loads in Z	-93,83	kN	
Sum of support forces in Z	-93,83	kN	Deviation: 0.00 %

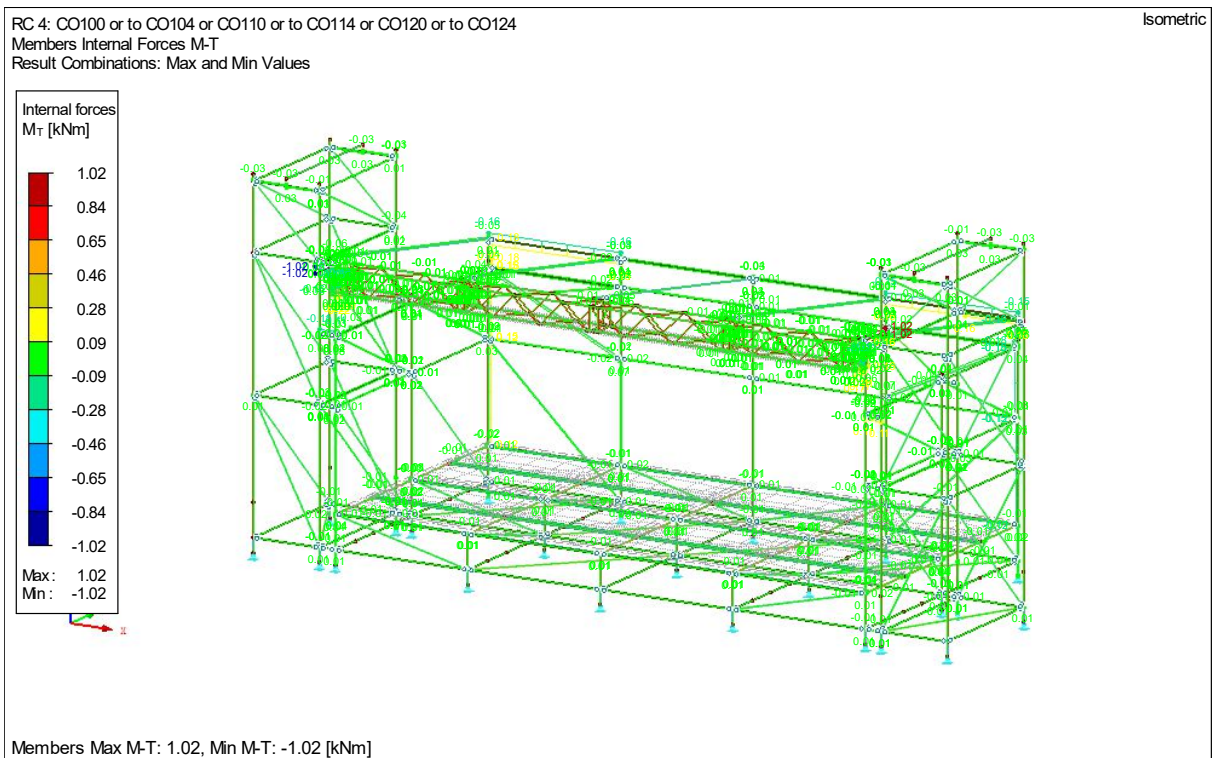
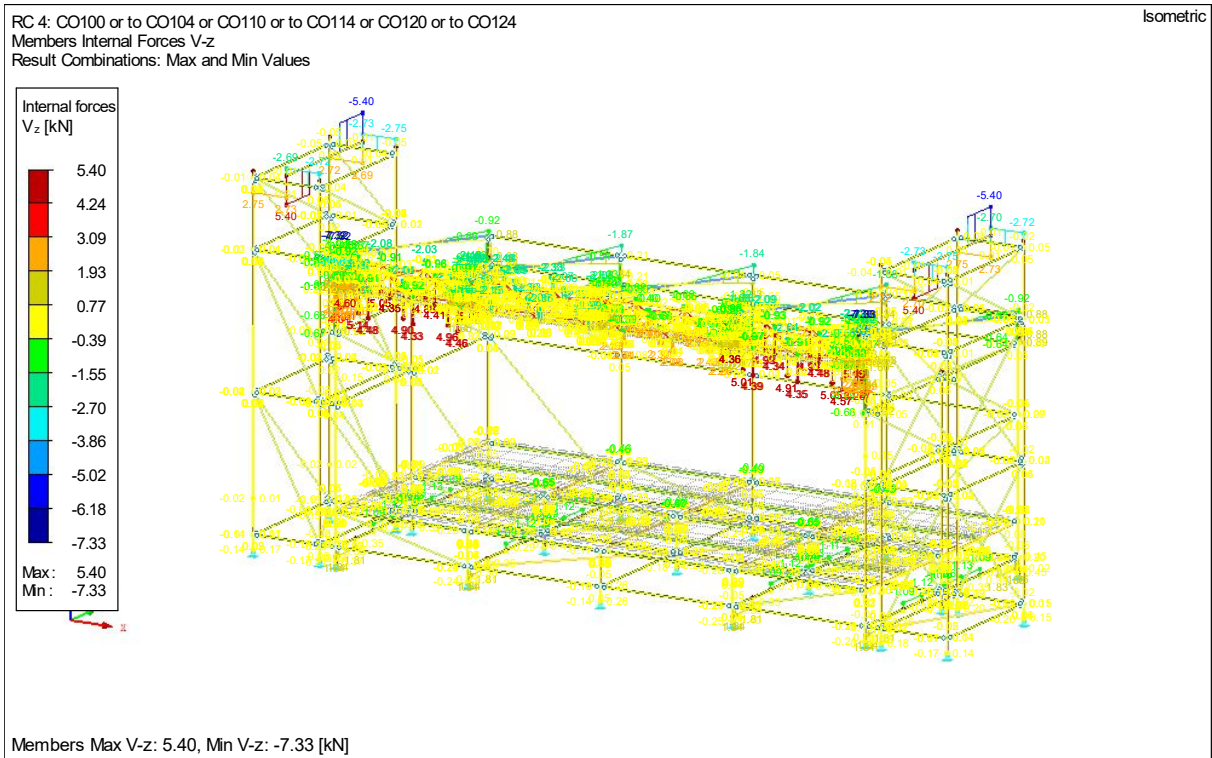
Maximum displacement in X-direction	19,3	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-12,0	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-75,1	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	76,1	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	50,6	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	19,0	mrاد	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	14,5	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T

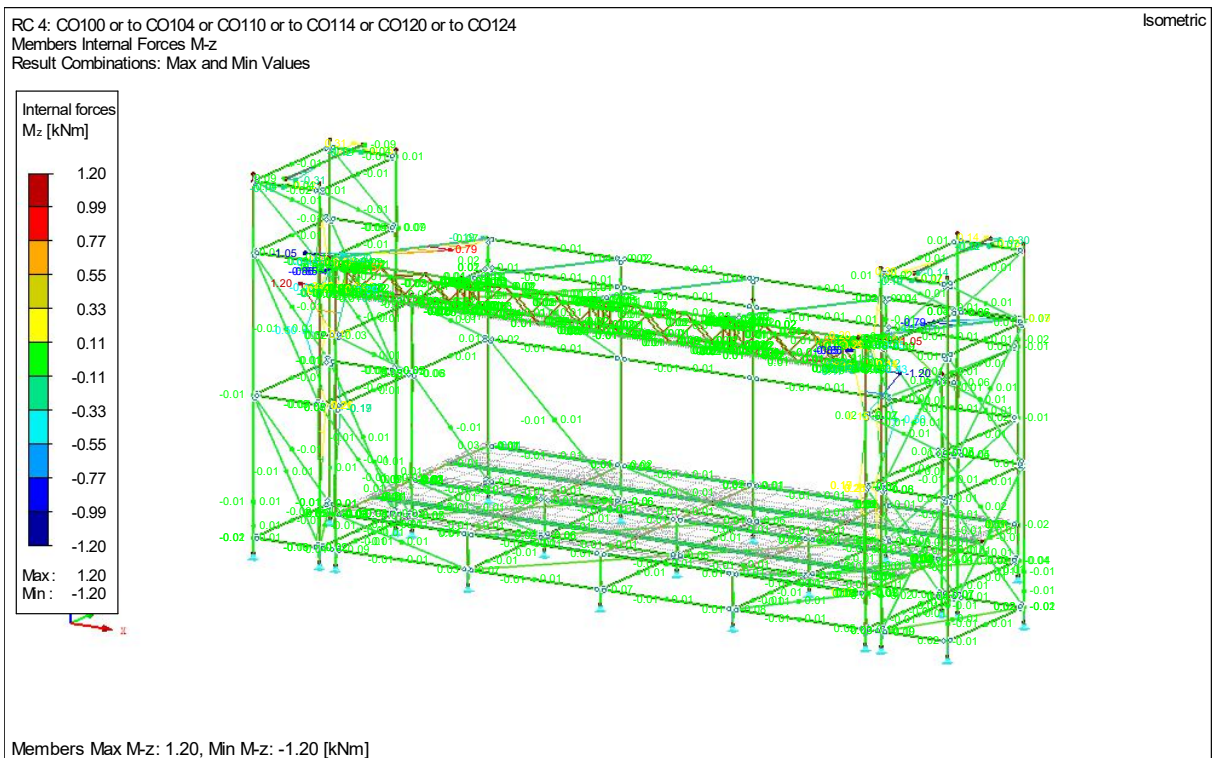
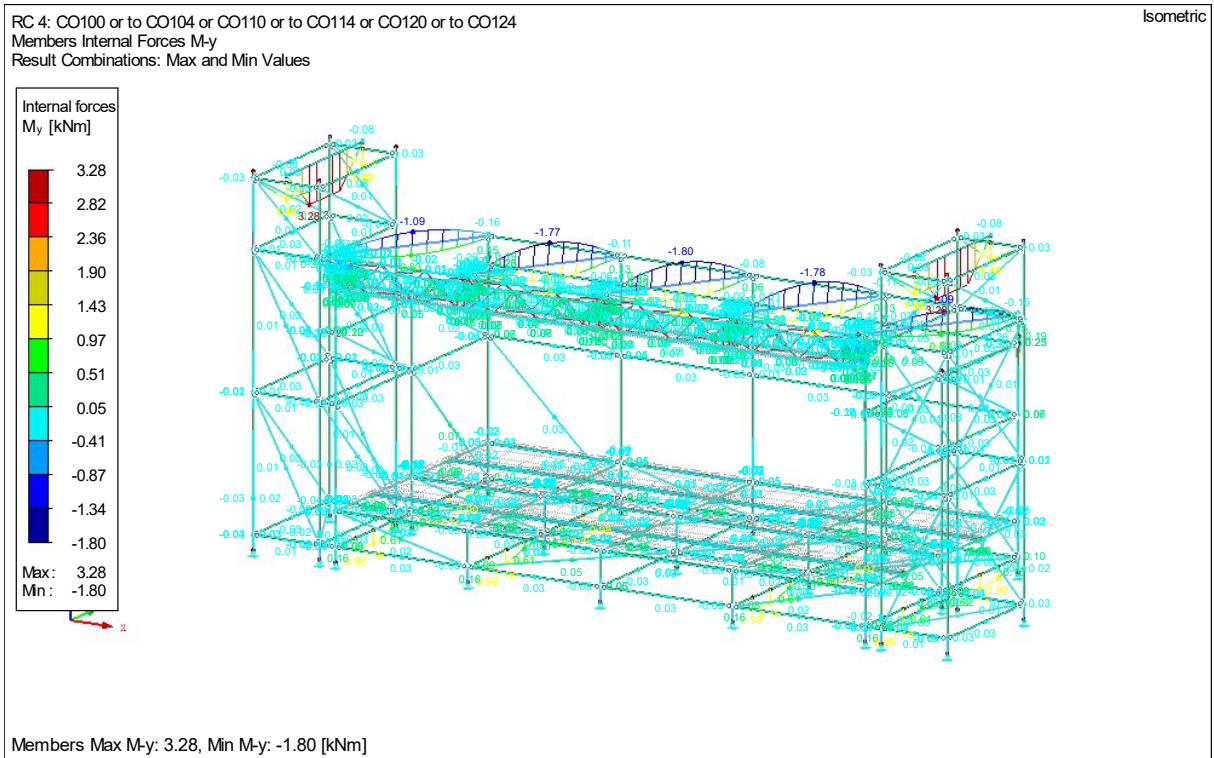
3.6.1 Deformation of the Out-service situation characteristic max and min values.



3.6.2 Internal force diagram RC4 Design Values Out-service.

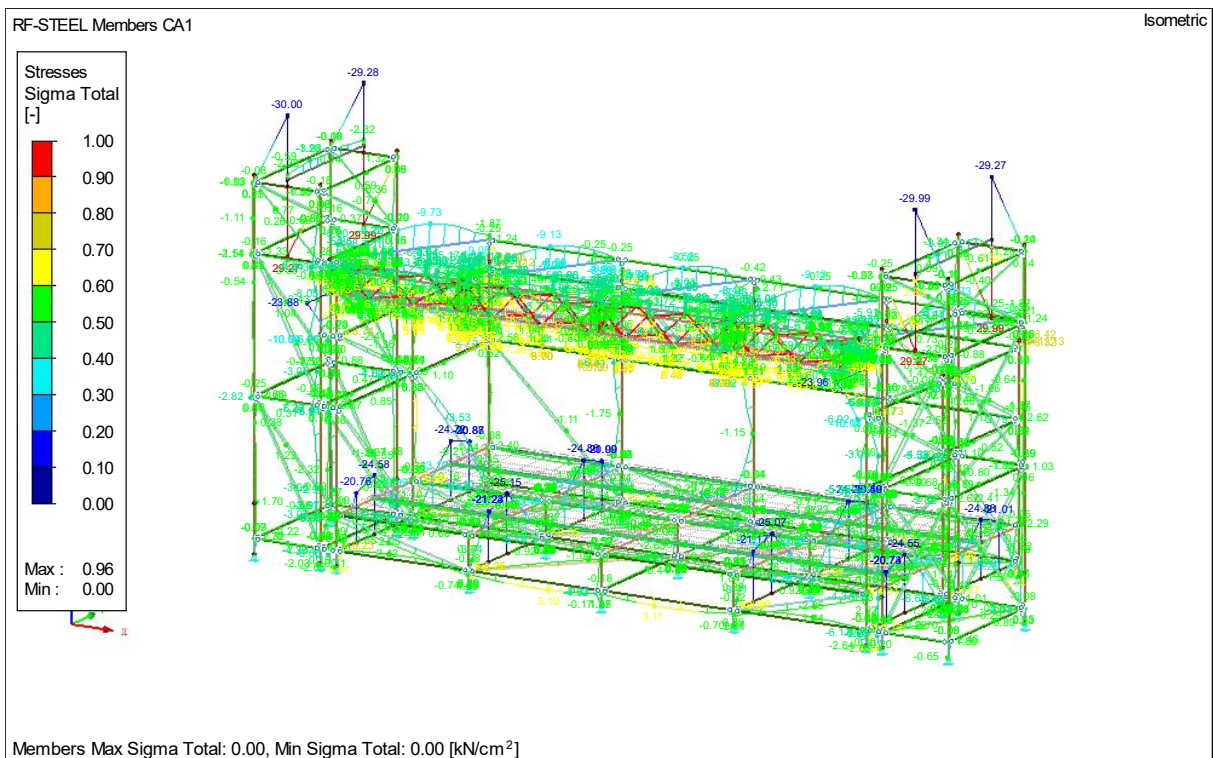
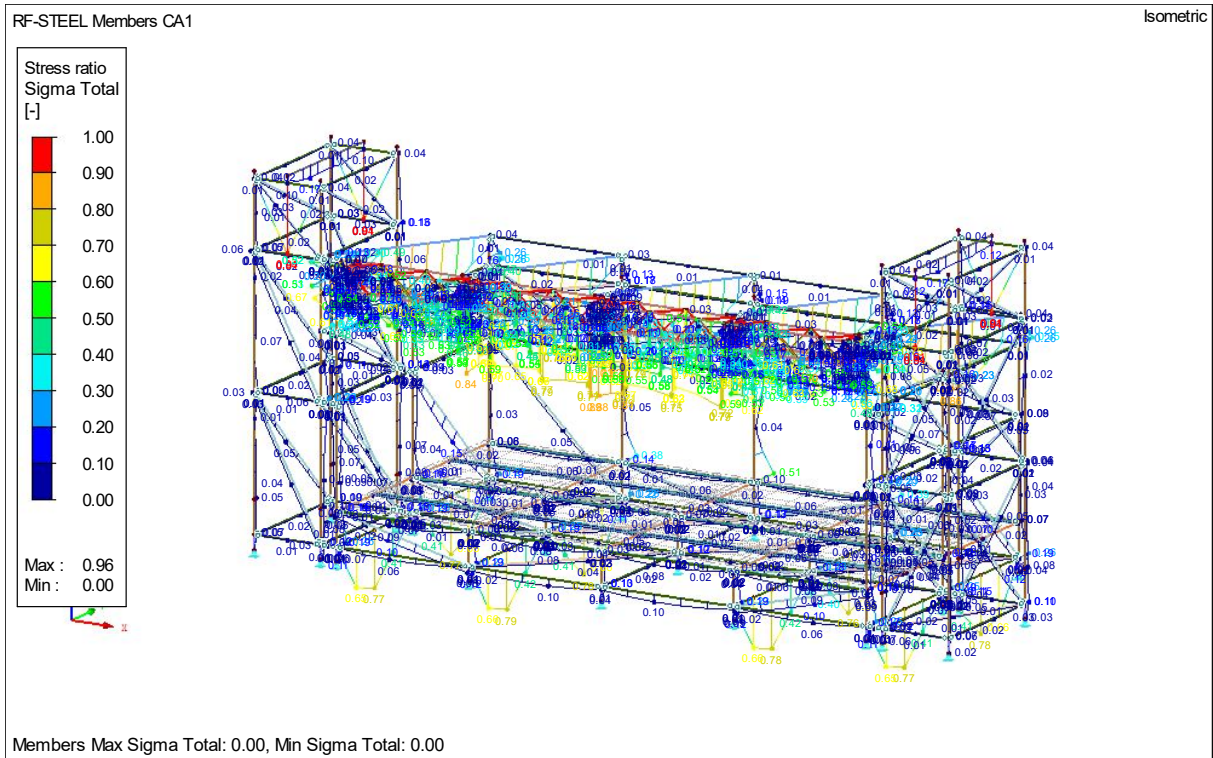






3.7 Stress analyse GE32 Layher roof + PA wing.

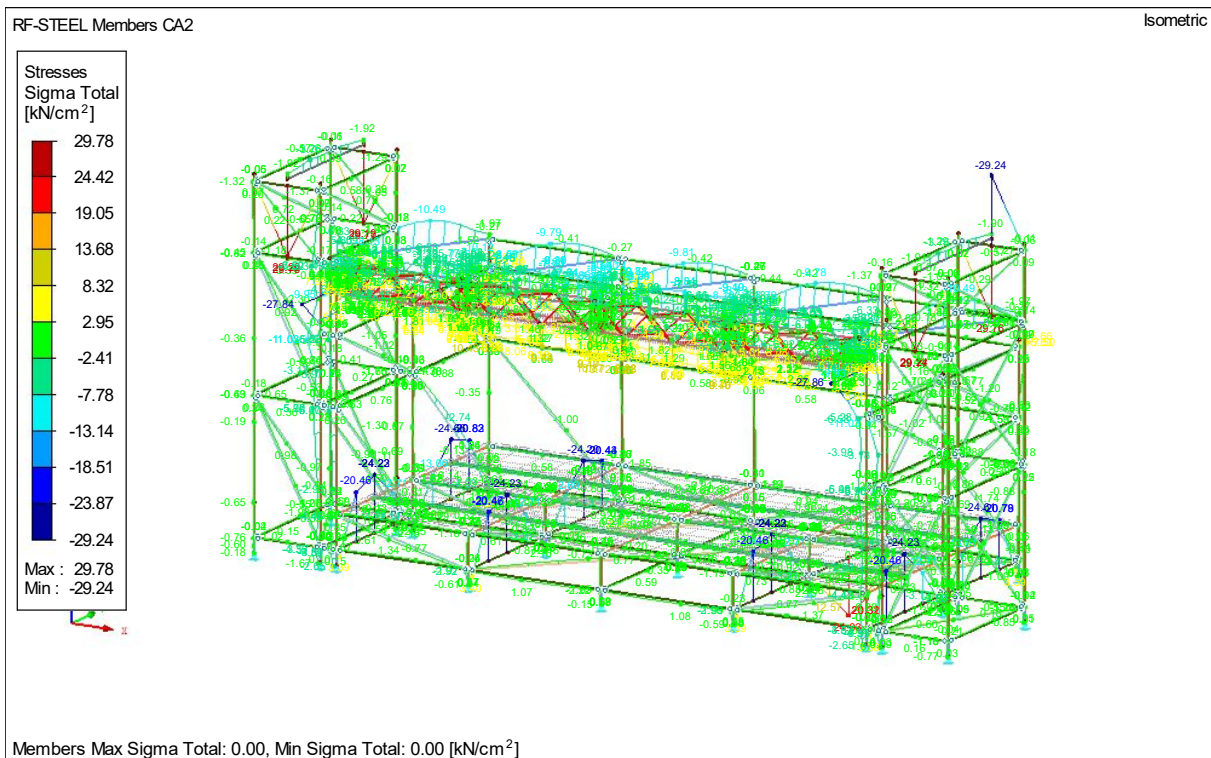
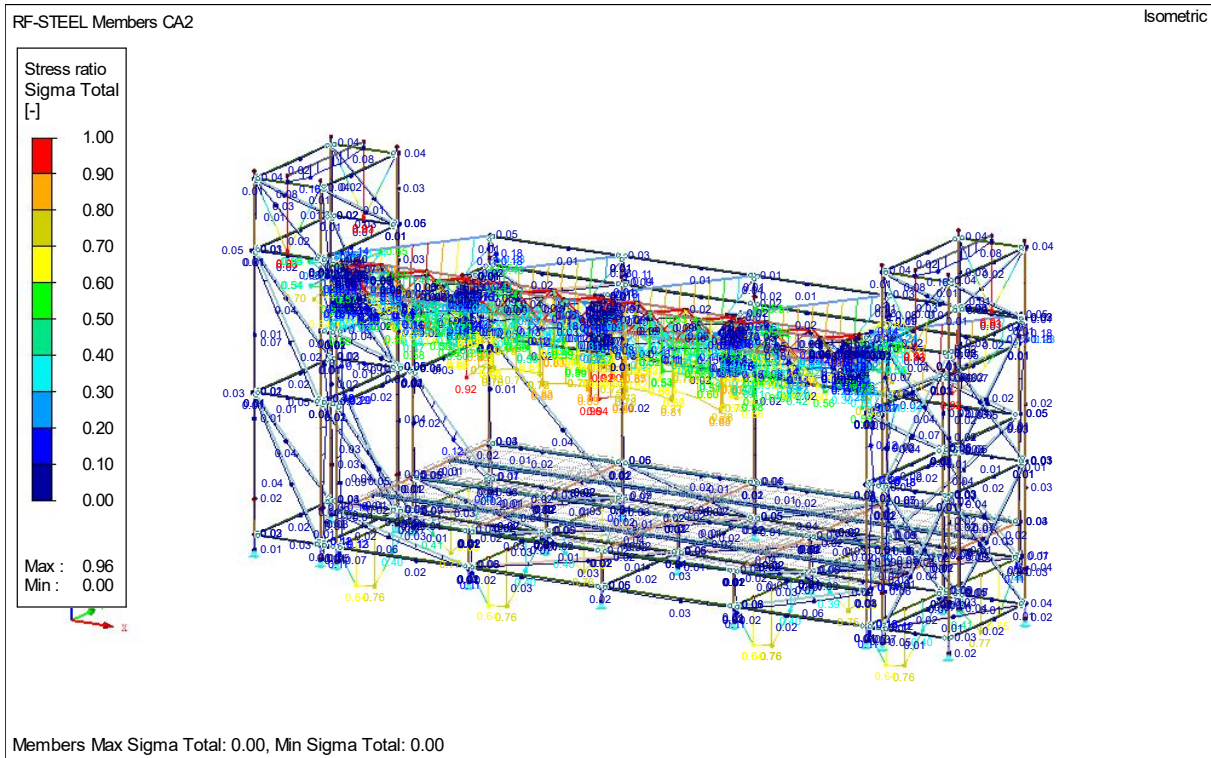
3.7.1 In service Stress calculation



3.7.2 Utilisation per cross section in the In service.

Section No.	Member No.	Location x [m]	S-Point No.	Load-ing	Stress Type	Stress [kN/cm ²]		Stress Ratio
						Existing	Limit	
1	SHAPE-THIN KEDER PROFIEL 3000							
	833	1,681	143	CO10	Sigma Total	-9,73	11,36	0,86
	833	4,203	19	CO13	Tau Total	1,04	6,56	0,16
	833	1,681	143	CO10	Sigma-equiv	9,73	11,36	0,86
2	QRO 50x4 (Hot Formed)							
	968	0,169	11	CO33	Sigma Total	-5,49	11,36	0,48
	42	0,169	15	CO33	Tau Total	2,19	6,56	0,33
	968	0,169	2	CO33	Sigma-equiv	5,67	11,36	0,50
3	Ring 48/3							
	144	0,000	12	CO34	Sigma Total	10,13	11,36	0,89
	67	0,000	2	CO33	Tau Total	2,15	6,56	0,33
	144	0,000	12	CO34	Sigma-equiv	10,13	11,36	0,89
4	Ring 48/6							
	129	0,060	31	CO34	Sigma Total	-5,69	23,64	0,24
	842	0,000	19	CO33	Tau Total	-0,66	13,65	0,05
	129	0,060	31	CO34	Sigma-equiv	5,69	23,64	0,24
5	Ring 20/2							
	868	0,479	10	CO33	Sigma Total	7,76	11,36	0,68
	892	0,000	11	CO33	Tau Total	0,24	6,56	0,04
	868	0,479	10	CO33	Sigma-equiv	7,76	11,36	0,68
6	RO 38x4.5 DIN EN 10220							
	212	0,210	10	CO10	Sigma Total	-9,42	35,50	0,27
	211	0,000	1	CO10	Tau Total	0,76	20,50	0,04
	212	0,210	10	CO10	Sigma-equiv	9,42	35,50	0,27
7	RO 48.3x3.2 (Hot Formed)							
	23	0,661	20	CO33	Sigma Total	-23,96	32,00	0,75
	41	0,100	31	CO10	Tau Total	-11,37	18,48	0,62
	23	0,661	20	CO33	Sigma-equiv	23,97	32,00	0,75
8	RO 48.3x3.2 (Hot Formed)							
	192	0,518	11	CO33	Sigma Total	-30,00	32,00	0,94
	711	0,250	19	CO10	Tau Total	3,01	18,48	0,16
	192	0,518	11	CO33	Sigma-equiv	30,01	32,00	0,94
9	RO 48.3x3.2 (Hot Formed)							
	699	1,674	10	CO10	Sigma Total	-1,56	32,00	0,05
	703	2,930	19	CO34	Tau Total	0,24	18,48	0,01
	699	1,674	10	CO10	Sigma-equiv	1,56	32,00	0,05
10	RO 48.3x2.6 (Hot Formed)							
	726	1,646	10	CO10	Sigma Total	-3,53	23,50	0,15
	746	0,000	19	CO10	Tau Total	-0,94	13,57	0,07
	726	1,646	10	CO10	Sigma-equiv	3,53	23,50	0,15
12	HK 50/30/4/4/4/4							
	813	0,000	10	CO10	Sigma Total	-1,10	20,45	0,05
	350	0,000	8	CO10	Tau Total	0,14	11,81	0,01
	813	0,000	10	CO10	Sigma-equiv	1,11	20,45	0,05
13	IPE 160							
	1910	0,622	1	CO33	Sigma Total	-3,93	23,50	0,17
	1910	1,450	13	CO33	Tau Total	-0,78	13,57	0,06
	1910	0,622	1	CO33	Sigma-equiv	3,93	23,50	0,17
14	Rectangle 50/50							
	1022	0,000	4	CO13	Sigma Total	4,31	21,27	0,20
	996	0,000	1	CO11	Tau Total	0,91	12,28	0,07
	1022	0,000	4	CO13	Sigma-equiv	4,31	21,27	0,20

3.7.3 Out service Stress calculation

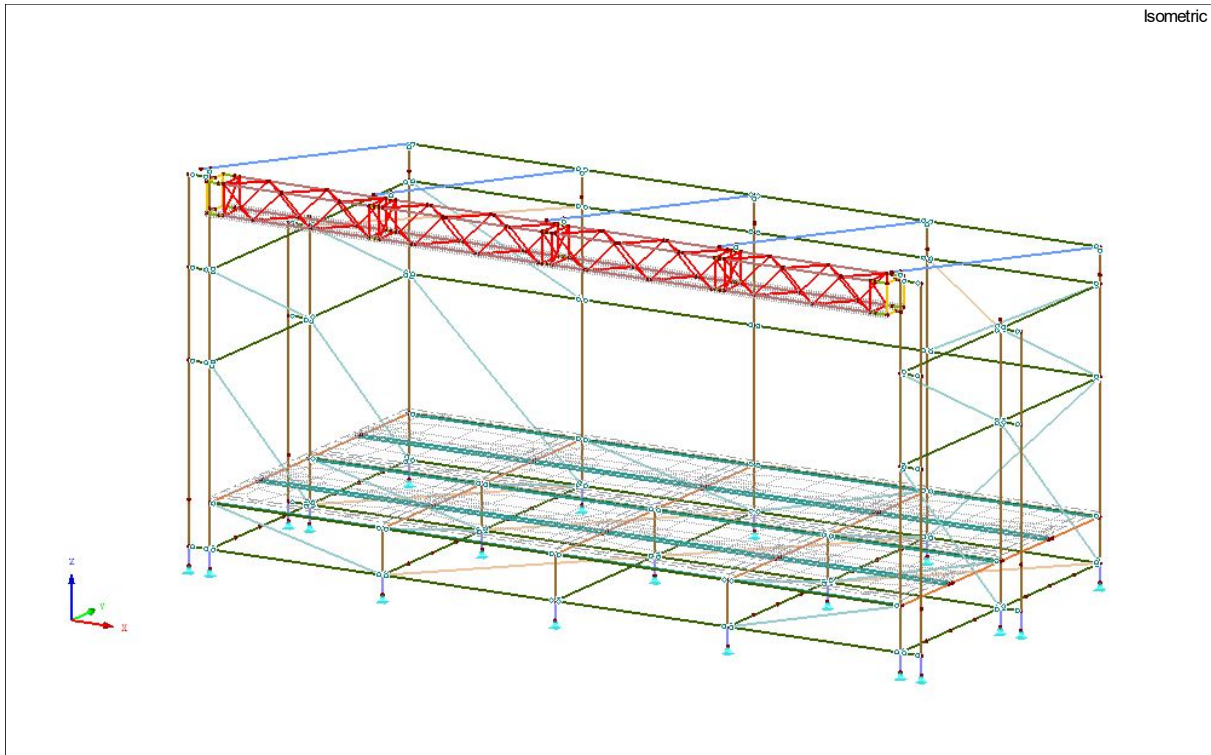


3.7.4 Utilisation per cross section in the Out service.

Section No.	Member No.	Location x [m]	S-Point No.	Load-ing	Stress Type	Stress [kN/cm ²]		Stress Ratio
						Existing	Limit	
1	SHAPE-THIN KEDER PROFIEL 3000							
	833	1,681	143	CO100	Sigma Total	-10,49	11,36	0,92
	833	4,203	19	CO103	Tau Total	1,13	6,56	0,17
	833	1,681	143	CO100	Sigma-equiv	10,49	11,36	0,92
2	QRO 50x4 (Hot Formed)							
	968	0,169	10	CO123	Sigma Total	-6,62	11,36	0,58
	42	0,169	15	CO123	Tau Total	2,59	6,56	0,39
	968	0,169	11	CO123	Sigma-equiv	6,79	11,36	0,60
3	Ring 48/3							
	144	0,000	12	CO124	Sigma Total	10,87	11,36	0,96
	67	0,000	1	CO123	Tau Total	2,50	6,56	0,38
	144	0,000	12	CO124	Sigma-equiv	10,87	11,36	0,96
4	Ring 48/6							
	843	0,000	8	CO123	Sigma Total	-6,48	23,64	0,27
	842	0,000	18	CO123	Tau Total	-0,75	13,65	0,05
	843	0,000	8	CO123	Sigma-equiv	6,49	23,64	0,27
5	Ring 20/2							
	868	0,479	10	CO123	Sigma Total	8,90	11,36	0,78
	892	0,000	11	CO123	Tau Total	0,30	6,56	0,05
	868	0,479	10	CO123	Sigma-equiv	8,90	11,36	0,78
6	RO 38x4.5 DIN EN 10220							
	574	0,210	23	CO123	Sigma Total	-4,54	35,50	0,13
	211	0,000	1	CO100	Tau Total	0,36	20,50	0,02
	574	0,210	23	CO123	Sigma-equiv	4,54	35,50	0,13
7	RO 48.3x3.2 (Hot Formed)							
	23	0,661	20	CO123	Sigma Total	-27,86	32,00	0,87
	31	0,100	27	CO103	Tau Total	12,16	18,48	0,66
	23	0,661	20	CO123	Sigma-equiv	27,87	32,00	0,87
8	RO 48.3x3.2 (Hot Formed)							
	192	0,518	29	CO124	Sigma Total	29,78	32,00	0,93
	481	0,000	10	CO100	Tau Total	-1,77	18,48	0,10
	192	0,518	29	CO124	Sigma-equiv	29,79	32,00	0,93
9	RO 48.3x3.2 (Hot Formed)							
	702	1,256	10	CO110	Sigma Total	-1,25	32,00	0,04
	702	0,000	1	CO110	Tau Total	0,18	18,48	0,01
	702	1,674	10	CO110	Sigma-equiv	1,28	32,00	0,04
10	RO 48.3x2.6 (Hot Formed)							
	726	1,646	10	CO100	Sigma Total	-2,74	23,50	0,12
	746	0,000	17	CO100	Tau Total	-0,89	13,57	0,07
	726	1,646	10	CO100	Sigma-equiv	2,74	23,50	0,12
12	HK 50/30/4/4/4/4							
	813	0,000	10	CO100	Sigma Total	-0,61	20,45	0,03
	441	0,000	8	CO100	Tau Total	0,12	11,81	0,01
	813	0,000	10	CO100	Sigma-equiv	0,63	20,45	0,03
13	IPE 160							
	1910	0,622	1	CO124	Sigma Total	-3,76	23,50	0,16
	1910	0,000	13	CO124	Tau Total	0,78	13,57	0,06
	1910	0,622	1	CO124	Sigma-equiv	3,76	23,50	0,16
14	Rectangle 50/50							
	1022	0,000	4	CO103	Sigma Total	4,52	21,27	0,21
	994	0,062	1	CO100	Tau Total	0,86	12,28	0,07
	1022	0,000	4	CO103	Sigma-equiv	4,52	21,27	0,21

3.8 General calculation of the GE32 Layher Roof

3.8.1 construction scheme.



Cross-Sections

- 1: SHAPE-THIN KEDER PROFIEL 3000; Aluminum EN-AW 6082 (EP,ET) T6
- 2: QRO 50x4 (Hot Formed); Aluminum EN-AW 6082 (EP,ET) T6
- 3: Ring 48/3; Aluminum EN-AW 6082 (EP,ET) T6
- 4: Ring 48/6; Aluminum EN-AW 6082 (EP,ET) T6
- 5: Ring 20/2; Aluminum EN-AW 6082 (EP,ET) T6
- 6: RO 38x4.5 | DIN EN 10220; Steel S 355 JR
- 7: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 8: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 9: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 10: RO 48.3x2.6 (Hot Formed); Steel S 235 JR
- 11: EV transom; Aluminum EN-AW 6005A (EP/O,ER/B) T6
- 12: HK 50/30/4/4/4/4; Aluminum EN-AW 6005A (EP/O,ER/B) T6
- 13: IPE 160; Steel S 235 JR
- 16: Rectangle 50/50; Aluminum EN-AW 6082 (EP,ET) T6

3.8.2 Used Materials.

Material No.	Material Description	Modulus of Elasticity E [kN/cm ²]	Shear Modulus G [kN/cm ²]	Poisson's Ratio ν [-]	Specific Weight γ [kN/m ³]	Coeff. of Th. Exp. α [1/°C]	Partial Factor γ_M [-]	Material
								Model
1	Steel S 235 JR EN 10025-2:2004-11	21000,00	8076,92	0,300	78,50	1,20E-05	1,000	Isotropic Linear Elastic
2	S320GD 1.0250 EN 10346:2009-03	21000,00	8076,92	0,300	78,50	1,20E-05	1,000	Isotropic Linear Elastic
3	Steel S 355 JR EN 10025-2:2004-11	21000,00	8076,92	0,300	78,50	1,20E-05	1,000	Isotropic Linear Elastic
4	Plywood, Class F20/10 E40/20, Plate Stress, Perpendicular EN 12369-2:2011-06	200,00	3,50	3,286	5,00	5,00E-06	1,200	Orthotropic Elastic 2D...
5	Aluminum EN-AW 6005A (EP/O,ER/B) T6 EN 1999-1-1:2007	7000,00	2700,00	0,296	27,00	2,30E-05	1,000	Isotropic Linear Elastic
6	Aluminum EN-AW 6082 (EP,ET) T6 EN 1999-1-1:2007	7000,00	2700,00	0,296	27,00	2,30E-05	1,000	Isotropic Linear Elastic

3.8.3 Used cross sections.

Section No.	Cross-Section Description [mm]	Material No.	Moments of inertia [cm ⁴]			Cross-Sectional Areas [cm ²]			Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm]	
			Torsion J	Bending I_y	Bending I_z	Axial A	Shear A_y	Shear A_z			Width b	Depth h
1	SHAPE-THIN KEDER PROFIEL 3000	6	39,02	60,82	62,04	11,33	3,25	3,65	0,00	0,00	73,9	65,0
2	QRO 50x4 (Hot Formed)	6	40,40	25,00	25,00	7,19	3,12	3,12	0,00	0,00	50,0	50,0
3	Ring 48/3	6	21,57	10,78	10,78	4,24	2,14	2,14	0,00	0,00	48,0	48,0
4	Ring 48/6	6	35,63	17,81	17,81	7,92	4,09	4,09	0,00	0,00	48,0	48,0
5	Ring 20/2	6	0,93	0,46	0,46	1,13	0,58	0,58	0,00	0,00	20,0	20,0
6	RO 38x4.5 DIN EN 10220	3	13,53	6,76	6,76	4,74	2,38	2,38	0,00	0,00	38,0	38,0
7	RO 48.3x3.2 (Hot Formed)	2	23,20	11,60	11,60	4,53	2,26	2,26	0,00	0,00	48,3	48,3
8	RO 48.3x3.2 (Hot Formed)	2	23,20	11,60	11,60	4,53	2,26	2,26	0,00	0,00	48,3	48,3
9	RO 48.3x3.2 (Hot Formed)	2	23,20	11,60	11,60	4,53	2,26	2,26	0,00	0,00	48,3	48,3
10	RO 48.3x2.6 (Hot Formed)	1	19,60	9,78	9,78	3,73	1,85	1,85	0,00	0,00	48,3	48,3
11	EV transom	5	50,00	554,00	70,00	18,78	18,00	18,00	0,00	0,00	49,0	172,5
12	HK 50/30/4/4/4/4	5	16,87	17,67	7,52	5,76	1,62	3,48	0,00	0,00	30,0	50,0
13	IPE 160	1	3,60	869,30	68,31	20,09	10,17	7,33	0,00	0,00	82,0	160,0
14	Rectangle 50/50	6	87,92	52,08	52,08	25,00	20,83	20,83	0,00	0,00	50,0	50,0

3.9 Calculation summary GE32 Layher Roof

Description	Value	Unit	Comment
Summary			
Calculation Status	OK		
Maximum displacement in X-direction	37,0	mm	CO113, Member No. 837, x: 2.522 m
Maximum displacement in Y-direction	20,2	mm	CO18, Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	78,0	mm	CO100, Member No. 243, x: 2.009 m
Maximum vectorial displacement	79,5	mm	CO100, Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-59,5	mrاد	CO100, Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,7	mrاد	CO28, FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	-23,7	mrاد	CO37, Member No. 720, x: 0.000 m
Number of 1D finite elements (member elements)	1190		
Number of 2D finite elements (surface elements)	1040		
Number of 3D finite elements (solid elements)	0		
Number of FE mesh nodes	1425		
Number of equations	8550		
Matrix solver method	Direct		
Maximum number of iterations	100		
Number of divisions for member results	10		
Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic	10		
Activate shear stiffness of members (A-y, A-z)	+		
Plate bending theory	Mindlin		
Activate ineffective supports	+		
Precision of convergence criteria of nonlinear calculation	1,0		

3.10 Calculation result of the separate load cases.

Description	Value	Unit	Comment
LC1 - Self-weight			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-17,95	kN	
Sum of support forces in Z	-17,95	kN	Deviation: 0.00 %
Resultant of reactions about X	0,392	kNm	At center of gravity of model (X: 5.173, Y: -1.981, Z: 0.499 m)
Resultant of reactions about Y	-0,472	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	-0,7	mm	Member No. 738, x: 1.440 m
Maximum displacement in Y-direction	-1,6	mm	Member No. 726, x: 1.440 m
Maximum displacement in Z-direction	-4,2	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	4,2	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	3,0	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-1,4	mrاد	Member No. 702, x: 0.000 m
Maximum rotation about Z-axis	0,3	mrاد	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC2 - ballast loading			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-20,00	kN	
Sum of support forces in Z	-20,00	kN	Deviation: 0.00 %
Resultant of reactions about X	1,825	kNm	At center of gravity of model (X: 5.173, Y: -1.981, Z: 0.499 m)
Resultant of reactions about Y	0,144	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	0,0	mm	Member No. 223, x: 0.375 m
Maximum displacement in Y-direction	0,0	mm	Member No. 710, x: 0.000 m
Maximum displacement in Z-direction	-16,3	mm	Member No. 219, x: 0.444 m
Maximum vectorial displacement	16,3	mm	Member No. 219, x: 0.444 m
Maximum rotation about X-axis	-26,0	mrاد	Member No. 664, x: 0.000 m
Maximum rotation about Y-axis	0,0	mrاد	Member No. 707, x: 0.000 m
Maximum rotation about Z-axis	0,0	mrاد	Member No. 723, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC3 - UDL Loading			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-8,17	kN	
Sum of support forces in Z	-8,17	kN	Deviation: 0.00 %
Resultant of reactions about X	17,667	kNm	At center of gravity of model (X: 5.173, Y: -1.981, Z: 0.499 m)
Resultant of reactions about Y	0,059	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	3,4	mm	Member No. 360, x: 0.625 m
Maximum displacement in Y-direction	2,3	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-20,4	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	20,4	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	5,0	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	-8,0	mrاد	Member No. 847, x: 0.030 m
Maximum rotation about Z-axis	2,1	mrاد	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC4 - CPL Loading setup			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-5,00	kN	
Sum of support forces in Z	-5,00	kN	Deviation: -0.07 %
Resultant of reactions about X	10,823	kNm	At center of gravity of model (X: 5.173, Y: -1.981, Z: 0.499 m)
Resultant of reactions about Y	0,035	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	3,0	mm	Member No. 360, x: 0.625 m
Maximum displacement in Y-direction	2,3	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-20,1	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	20,2	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	5,0	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	-6,7	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	1,9	mrاد	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC5 - 2x point load per truss			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	

Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-10,00	kN	
Sum of support forces in Z	-10,00	kN	Deviation: 0.00 %
Resultant of reactions about X	21,635	kNm	At center of gravity of model (X: 5.173, Y: -1.981, Z: 0.499 m)
Resultant of reactions about Y	0,129	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	4,6	mm	Member No. 360, x: 0.625 m
Maximum displacement in Y-direction	3,0	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-26,6	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	26,7	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	6,6	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	-10,6	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	2,9	mrاد	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC6 - 3x point load per truss			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-9,00	kN	
Sum of support forces in Z	-9,00	kN	Deviation: -0.01 %
Resultant of reactions about X	19,471	kNm	At center of gravity of model (X: 5.173, Y: -1.981, Z: 0.499 m)
Resultant of reactions about Y	0,104	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	4,6	mm	Member No. 360, x: 0.625 m
Maximum displacement in Y-direction	3,2	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-28,0	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	28,0	mm	FE Mesh Node No. 485 (X: 5.180, Y: -4.325, Z: 3.445 m)
Maximum rotation about X-axis	6,9	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	-10,4	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	2,9	mrاد	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC7 - floor loading wind 0°			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	11,60	kN	
Sum of support forces in Y	11,60	kN	Deviation: 0.00 %
Sum of loads in Z	-116,03	kN	
Sum of support forces in Z	-116,03	kN	Deviation: 0.00 %
Resultant of reactions about X	17,841	kNm	At center of gravity of model (X: 5.173, Y: -1.981, Z: 0.499 m)
Resultant of reactions about Y	0,838	kNm	At center of gravity of model
Resultant of reactions about Z	0,084	kNm	At center of gravity of model
Maximum displacement in X-direction	-1,0	mm	Member No. 351, x: 0.750 m
Maximum displacement in Y-direction	2,0	mm	Member No. 725, x: 0.000 m
Maximum displacement in Z-direction	-9,1	mm	FE Mesh Node No. 247 (X: 8.289, Y: -1.631, Z: -0.186 m)
Maximum vectorial displacement	9,2	mm	FE Mesh Node No. 125 (X: 8.289, Y: -2.513, Z: -0.186 m)
Maximum rotation about X-axis	-13,4	mrاد	Member No. 813, x: 1.036 m
Maximum rotation about Y-axis	-16,8	mrاد	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	-6,1	mrاد	Member No. 725, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC8 - floor loading wind 90°			
Sum of loads in X	11,60	kN	
Sum of support forces in X	11,60	kN	Deviation: 0.00 %
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-116,03	kN	
Sum of support forces in Z	-116,03	kN	Deviation: 0.00 %
Resultant of reactions about X	10,589	kNm	At center of gravity of model (X: 5.173, Y: -1.981, Z: 0.499 m)
Resultant of reactions about Y	-6,414	kNm	At center of gravity of model
Resultant of reactions about Z	1,059	kNm	At center of gravity of model
Maximum displacement in X-direction	1,6	mm	Member No. 225, x: 0.750 m
Maximum displacement in Y-direction	-1,2	mm	Member No. 274, x: 1.250 m
Maximum displacement in Z-direction	-9,1	mm	FE Mesh Node No. 1055 (X: 2.073, Y: -2.513, Z: -0.186 m)
Maximum vectorial displacement	9,1	mm	FE Mesh Node No. 1055 (X: 2.073, Y: -2.513, Z: -0.186 m)
Maximum rotation about X-axis	-13,4	mrاد	Member No. 828, x: 1.036 m
Maximum rotation about Y-axis	-16,8	mrاد	FE Mesh Node No. 100 (X: 9.052, Y: -2.616, Z: -0.186 m)
Maximum rotation about Z-axis	-2,3	mrاد	Member No. 666, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC9 - floor loading wind 180°			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-11,60	kN	
Sum of support forces in Y	-11,60	kN	Deviation: 0.00 %
Sum of loads in Z	-116,03	kN	
Sum of support forces in Z	-116,03	kN	Deviation: 0.00 %
Resultant of reactions about X	3,337	kNm	At center of gravity of model (X: 5.173, Y: -1.981, Z: 0.499 m)
Resultant of reactions about Y	0,838	kNm	At center of gravity of model
Resultant of reactions about Z	-0,084	kNm	At center of gravity of model

Maximum displacement in X-direction	1,0	mm	Member No. 225, x: 0.750 m
Maximum displacement in Y-direction	-2,5	mm	Member No. 710, x: 0.000 m
Maximum displacement in Z-direction	-9,1	mm	FE Mesh Node No. 1055 (X: 2.073, Y: -2.513, Z: -0.186 m)
Maximum vectorial displacement	9,2	mm	FE Mesh Node No. 725 (X: 2.073, Y: -1.631, Z: -0.186 m)
Maximum rotation about X-axis	13,4	mrاد	Member No. 459, x: 1.036 m
Maximum rotation about Y-axis	-16,9	mrاد	FE Mesh Node No. 100 (X: 9.052, Y: -2.616, Z: -0.186 m)
Maximum rotation about Z-axis	7,9	mrاد	Member No. 710, x: 0.094 m
Method of analysis	Linear		Geometrically Linear Analysis

3.11 Calculation result of RC1 - General loading without wind 1 * (CO1 – CO4)

Description	Value	Unit	Comment
CO1 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-54,66	kN	
Sum of support forces in Z	-54,66	kN	Deviation: 0.00 %
Maximum displacement in X-direction	5,2	mm	Member No. 360, x: 0.625 m
Maximum displacement in Y-direction	3,8	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-29,3	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	29,3	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	11,9	mrاد	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	3,3	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO2 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-50,39	kN	
Sum of support forces in Z	-50,39	kN	Deviation: 0.00 %
Maximum displacement in X-direction	4,6	mm	Member No. 360, x: 0.625 m
Maximum displacement in Y-direction	3,8	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-29,0	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	29,0	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,8	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	10,1	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	3,0	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO3 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-57,14	kN	
Sum of support forces in Z	-57,14	kN	Deviation: 0.00 %
Maximum displacement in X-direction	6,9	mm	Member No. 360, x: 0.625 m
Maximum displacement in Y-direction	4,8	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-37,8	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	37,8	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,4	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	4,4	mrاد	Member No. 681, x: 0.829 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO4 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-55,79	kN	
Sum of support forces in Z	-55,79	kN	Deviation: 0.00 %
Maximum displacement in X-direction	6,8	mm	Member No. 360, x: 0.625 m
Maximum displacement in Y-direction	5,0	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-39,6	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	39,7	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	15,1	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	4,4	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T

3.12 Calculation result of RC2 – Design Values In-service: 1 * (CO10 – CO38)

Description	Value	Unit	Comment
CO10 - 1.15*LC1 + 1.15*LC2 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-28,15	kN	
Sum of support forces in Z	-28,15	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,1	mm	Member No. 833, x: 1.681 m
Maximum displacement in Y-direction	19,2	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	68,3	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	71,0	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-52,7	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	8,4	mrاد	Member No. 666, x: 0.000 m
Maximum rotation about Z-axis	-19,5	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO11 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-39,17	kN	
Sum of support forces in Z	-39,17	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,4	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	18,9	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	58,0	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	60,2	mm	Member No. 244, x: 2.009 m
Maximum rotation about X-axis	51,0	mrاد	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-8,5	mrاد	Member No. 362, x: 1.000 m
Maximum rotation about Z-axis	-19,5	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO12 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-34,90	kN	
Sum of support forces in Z	-34,90	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,4	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	19,0	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	58,7	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	60,9	mm	Member No. 244, x: 2.009 m
Maximum rotation about X-axis	50,6	mrاد	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-8,4	mrاد	Member No. 362, x: 1.000 m
Maximum rotation about Z-axis	-19,5	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO13 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-41,65	kN	
Sum of support forces in Z	-41,65	kN	Deviation: 0.00 %
Maximum displacement in X-direction	24,7	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	19,3	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	54,9	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	57,4	mm	Member No. 244, x: 2.009 m
Maximum rotation about X-axis	52,8	mrاد	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-9,4	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	19,6	mrاد	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO14 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-40,30	kN	
Sum of support forces in Z	-40,30	kN	Deviation: 0.00 %
Maximum displacement in X-direction	24,7	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	19,4	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	54,9	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	57,3	mm	Member No. 244, x: 2.009 m

Maximum rotation about X-axis	52,8	mrad	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-9,1	mrad	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	19,6	mrad	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO15 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	30,89	kN	
Sum of support forces in Y	30,89	kN	Deviation: 0.00 %
Sum of loads in Z	-195,81	kN	
Sum of support forces in Z	-195,81	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,5	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	19,7	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	57,9	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	60,4	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	50,9	mrad	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-29,9	mrad	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	19,6	mrad	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO16 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	30,89	kN	
Sum of support forces in Y	30,89	kN	Deviation: 0.00 %
Sum of loads in Z	-191,54	kN	
Sum of support forces in Z	-191,54	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,5	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	19,8	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	58,6	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	61,0	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	50,4	mrad	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-29,9	mrad	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	19,6	mrad	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO17 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	30,89	kN	
Sum of support forces in Y	30,89	kN	Deviation: 0.00 %
Sum of loads in Z	-198,29	kN	
Sum of support forces in Z	-198,29	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,7	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	20,1	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	54,8	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	57,5	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	52,7	mrad	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-29,9	mrad	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	19,7	mrad	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO18 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	30,89	kN	
Sum of support forces in Y	30,89	kN	Deviation: 0.00 %
Sum of loads in Z	-196,94	kN	
Sum of support forces in Z	-196,94	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-24,7	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	20,2	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	54,8	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	57,5	mm	Member No. 244, x: 2.009 m
Maximum rotation about X-axis	52,8	mrad	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-29,9	mrad	FE Mesh Node No. 226 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	19,7	mrad	Member No. 837, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO20 - 1.15*LC1 + 1.15*LC2 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-42,68	kN	
Sum of support forces in Z	-42,68	kN	Deviation: 0.00 %
Maximum displacement in X-direction	21,1	mm	Member No. 44, x: 0.368 m
Maximum displacement in Y-direction	7,8	mm	Member No. 227, x: 0.500 m
Maximum displacement in Z-direction	-19,2	mm	Member No. 239, x: 0.444 m

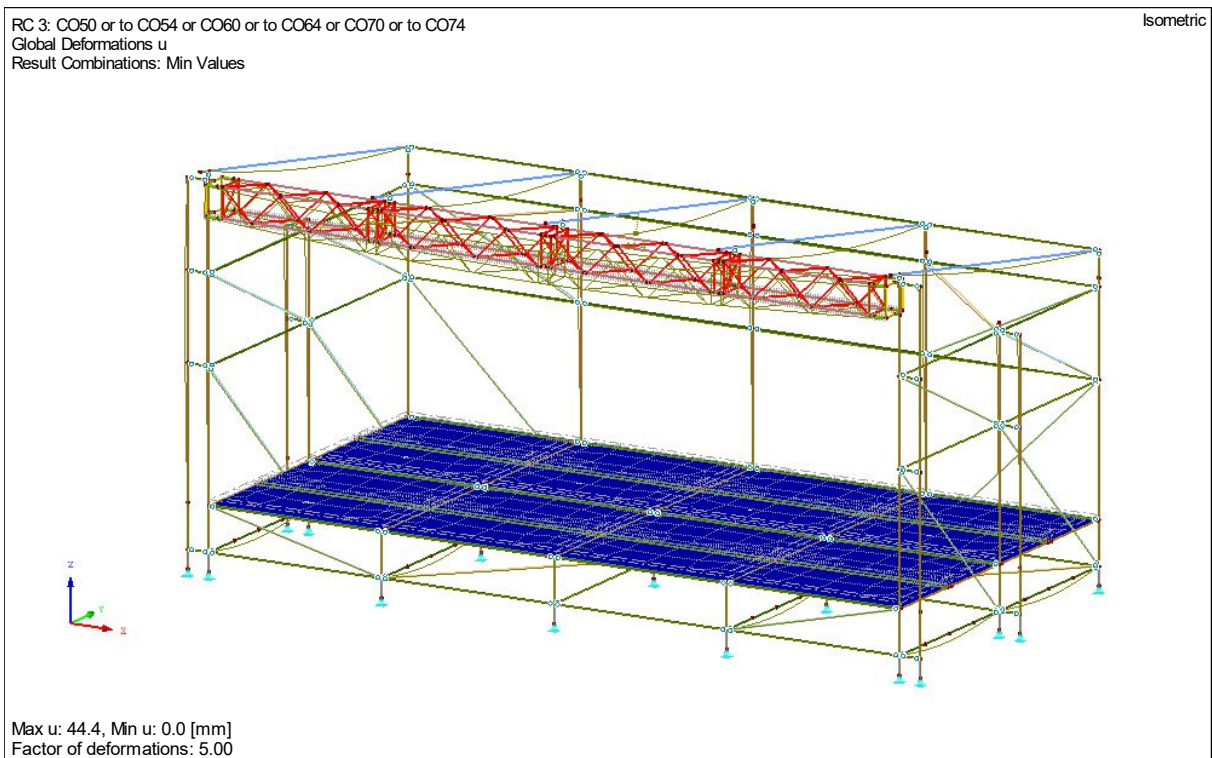
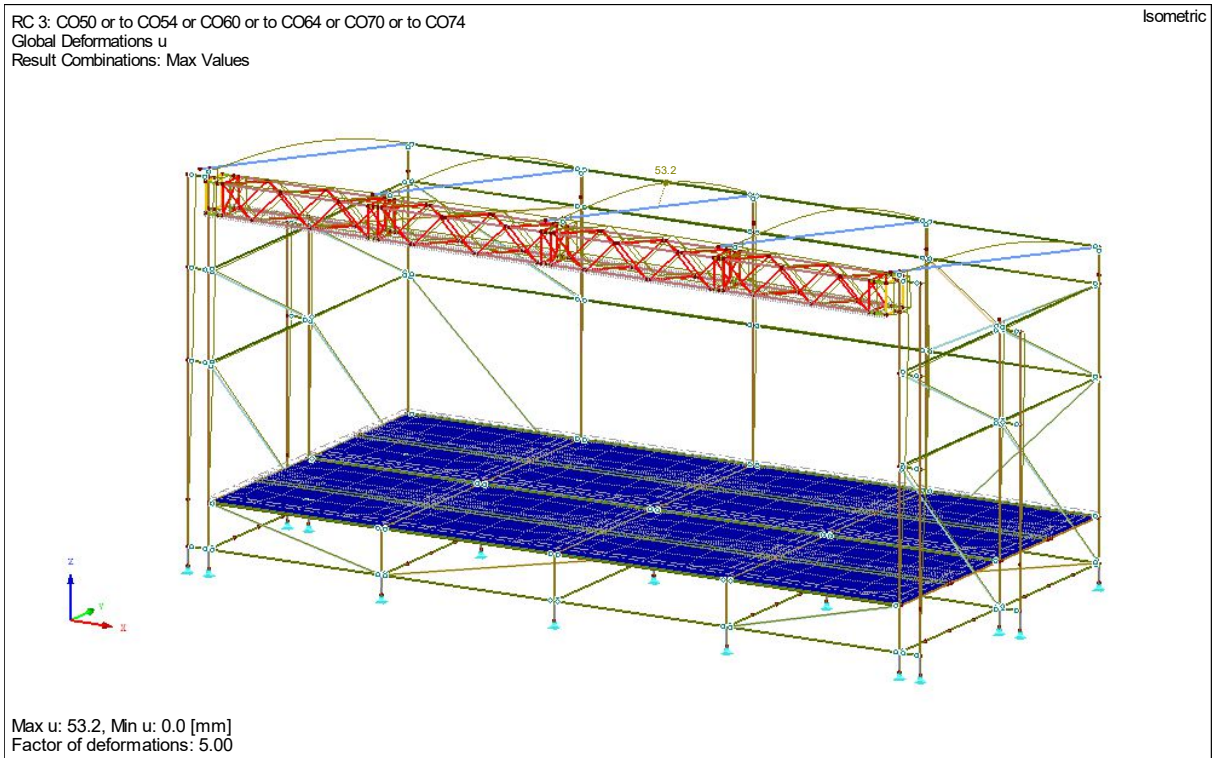
Maximum vectorial displacement	21,6	mm	Member No. 44, x: 0.368 m
Maximum rotation about X-axis	30,6	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	10,6	mrاد	Member No. 226, x: 1.000 m
Maximum rotation about Z-axis	10,0	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO21 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-53,70	kN	
Sum of support forces in Z	-53,70	kN	Deviation: 0.00 %
Maximum displacement in X-direction	25,5	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,2	mm	Member No. 227, x: 0.625 m
Maximum displacement in Z-direction	-29,5	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	37,5	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,8	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	13,0	mrاد	Member No. 355, x: 1.000 m
Maximum rotation about Z-axis	13,8	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO22 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-49,43	kN	
Sum of support forces in Z	-49,43	kN	Deviation: 0.00 %
Maximum displacement in X-direction	24,4	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,0	mm	Member No. 227, x: 0.625 m
Maximum displacement in Z-direction	-29,2	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	36,8	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,8	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	12,2	mrاد	Member No. 355, x: 1.000 m
Maximum rotation about Z-axis	13,1	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO23 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-56,18	kN	
Sum of support forces in Z	-56,18	kN	Deviation: 0.00 %
Maximum displacement in X-direction	26,9	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,7	mm	Member No. 227, x: 0.750 m
Maximum displacement in Z-direction	-38,0	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	44,7	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	15,1	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	15,0	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO24 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-54,83	kN	
Sum of support forces in Z	-54,83	kN	Deviation: 0.00 %
Maximum displacement in X-direction	26,6	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,7	mm	Member No. 227, x: 0.750 m
Maximum displacement in Z-direction	-39,8	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	46,2	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	14,8	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	14,9	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO25 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	20,24	kN	
Sum of support forces in X	20,24	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-210,34	kN	
Sum of support forces in Z	-210,34	kN	Deviation: 0.00 %
Maximum displacement in X-direction	27,0	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	8,6	mm	Member No. 227, x: 0.750 m

Maximum displacement in Z-direction	-29,4	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	38,4	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,4	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,7	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	13,9	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO26 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	20,24	kN	
Sum of support forces in X	20,24	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-206,07	kN	
Sum of support forces in Z	-206,07	kN	Deviation: 0.00 %
Maximum displacement in X-direction	25,9	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	8,5	mm	Member No. 227, x: 0.750 m
Maximum displacement in Z-direction	-29,1	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	37,7	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,3	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,7	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	13,3	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO27 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	20,24	kN	
Sum of support forces in X	20,24	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-212,82	kN	
Sum of support forces in Z	-212,82	kN	Deviation: 0.00 %
Maximum displacement in X-direction	28,5	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,2	mm	Member No. 227, x: 0.875 m
Maximum displacement in Z-direction	-37,9	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	45,5	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,5	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,7	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	15,2	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO28 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	20,24	kN	
Sum of support forces in X	20,24	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-211,47	kN	
Sum of support forces in Z	-211,47	kN	Deviation: 0.00 %
Maximum displacement in X-direction	28,2	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,4	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-39,8	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	47,0	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,5	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,7	mrاد	FE Mesh Node No. 1034 (X: 1.307, Y: -2.617, Z: -0.186 m)
Maximum rotation about Z-axis	15,1	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO30 - 1.15*LC1 + 1.15*LC2 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-50,41	kN	
Sum of support forces in Z	-50,41	kN	Deviation: 0.00 %
Maximum displacement in X-direction	13,8	mm	Member No. 21, x: 0.100 m
Maximum displacement in Y-direction	-18,3	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	-37,4	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	41,6	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-31,5	mrاد	Member No. 664, x: 0.000 m
Maximum rotation about Y-axis	8,3	mrاد	Member No. 351, x: 0.750 m
Maximum rotation about Z-axis	-10,5	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO31 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-61,44	kN	
Sum of support forces in Z	-61,44	kN	Deviation: 0.00 %
Maximum displacement in X-direction	13,8	mm	Member No. 837, x: 2.101 m

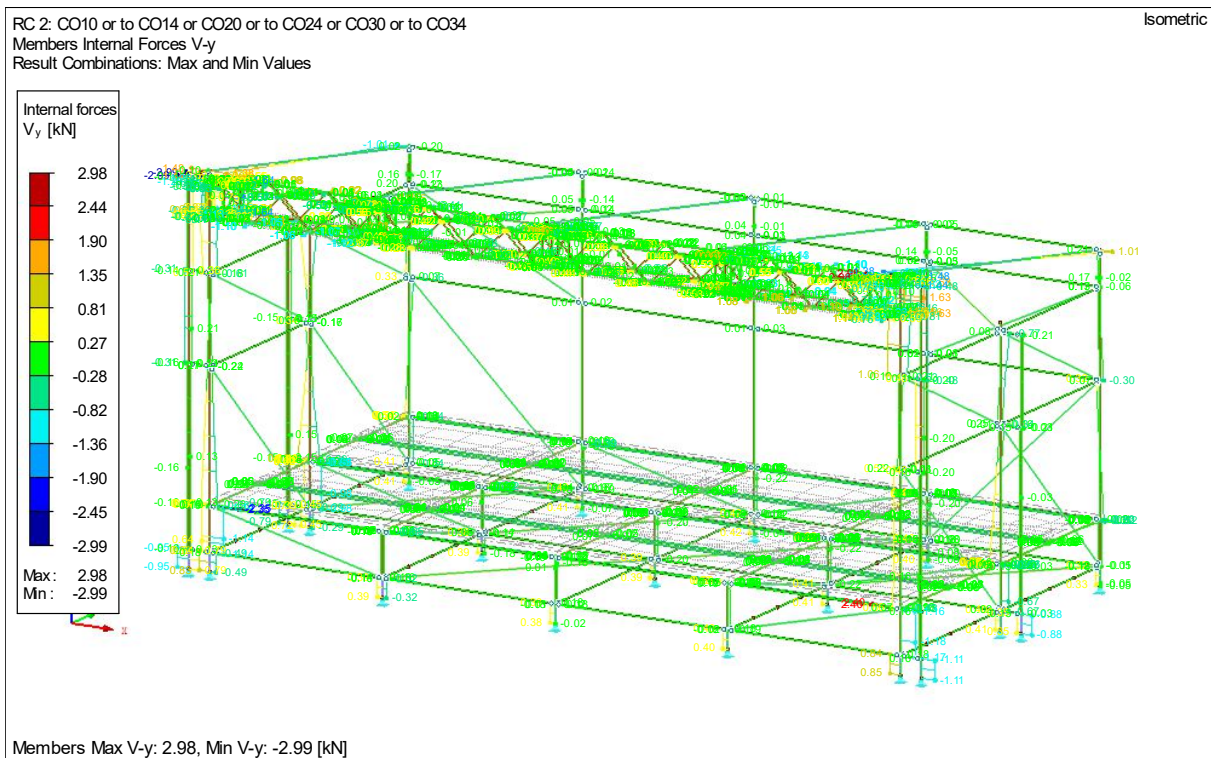
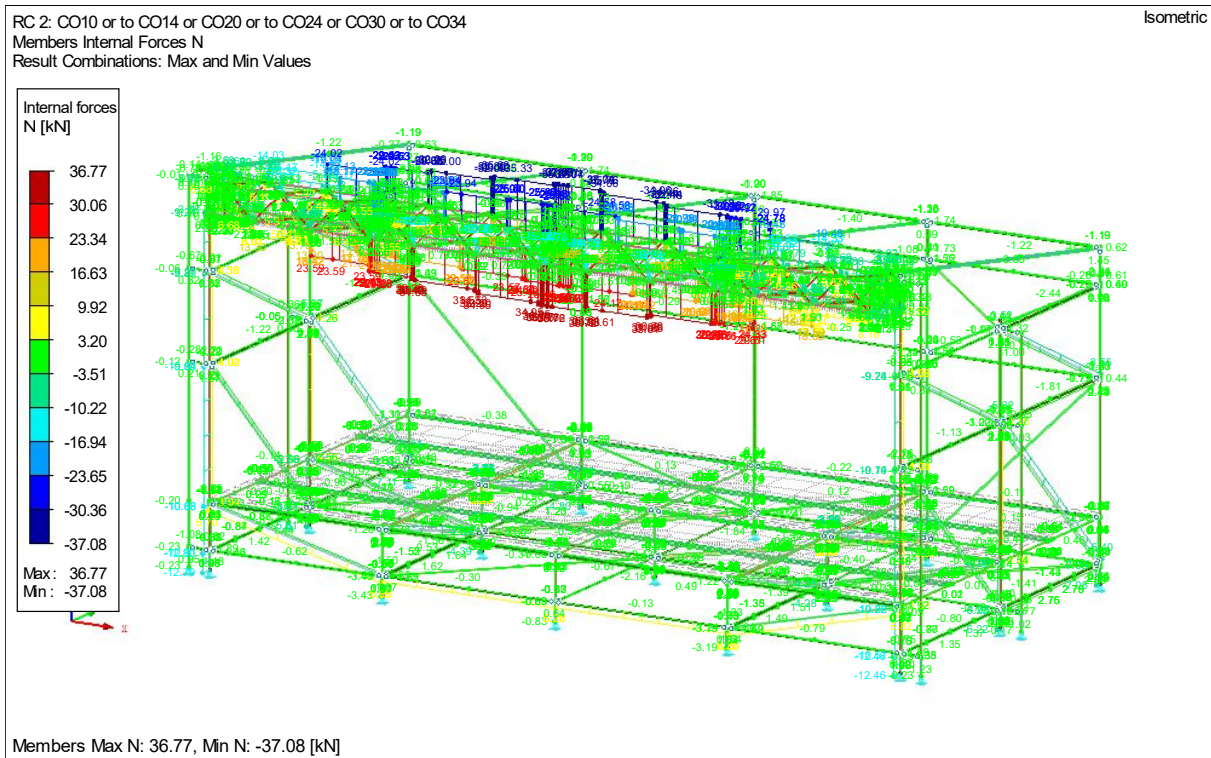
Maximum displacement in Y-direction	-17,5	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-51,1	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	54,0	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	34,1	mrاد	Member No. 243, x: 0.000 m
Maximum rotation about Y-axis	-14,8	mrاد	Member No. 847, x: 0.030 m
Maximum rotation about Z-axis	-11,4	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO32 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-57,16	kN	
Sum of support forces in Z	-57,16	kN	Deviation: 0.00 %
Maximum displacement in X-direction	13,7	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-17,4	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-50,9	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	53,8	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	33,9	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-13,0	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	-11,3	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO33 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-63,91	kN	
Sum of support forces in Z	-63,91	kN	Deviation: 0.00 %
Maximum displacement in X-direction	14,0	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-17,3	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-55,7	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	58,3	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	35,9	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-18,3	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	-11,8	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO34 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-62,56	kN	
Sum of support forces in Z	-62,56	kN	Deviation: 0.00 %
Maximum displacement in X-direction	14,0	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-17,2	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-56,6	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	59,1	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	36,1	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-18,0	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	-11,8	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO35 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-28,11	kN	
Sum of support forces in Y	-28,11	kN	Deviation: 0.00 %
Sum of loads in Z	-218,08	kN	
Sum of support forces in Z	-218,08	kN	Deviation: 0.00 %
Maximum displacement in X-direction	13,8	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-18,8	mm	Member No. 285, x: 0.250 m
Maximum displacement in Z-direction	-51,1	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	54,2	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	34,1	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,1	mrاد	FE Mesh Node No. 706 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	-23,2	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO36 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-28,11	kN	
Sum of support forces in Y	-28,11	kN	Deviation: 0.00 %
Sum of loads in Z	-213,81	kN	
Sum of support forces in Z	-213,81	kN	Deviation: 0.00 %

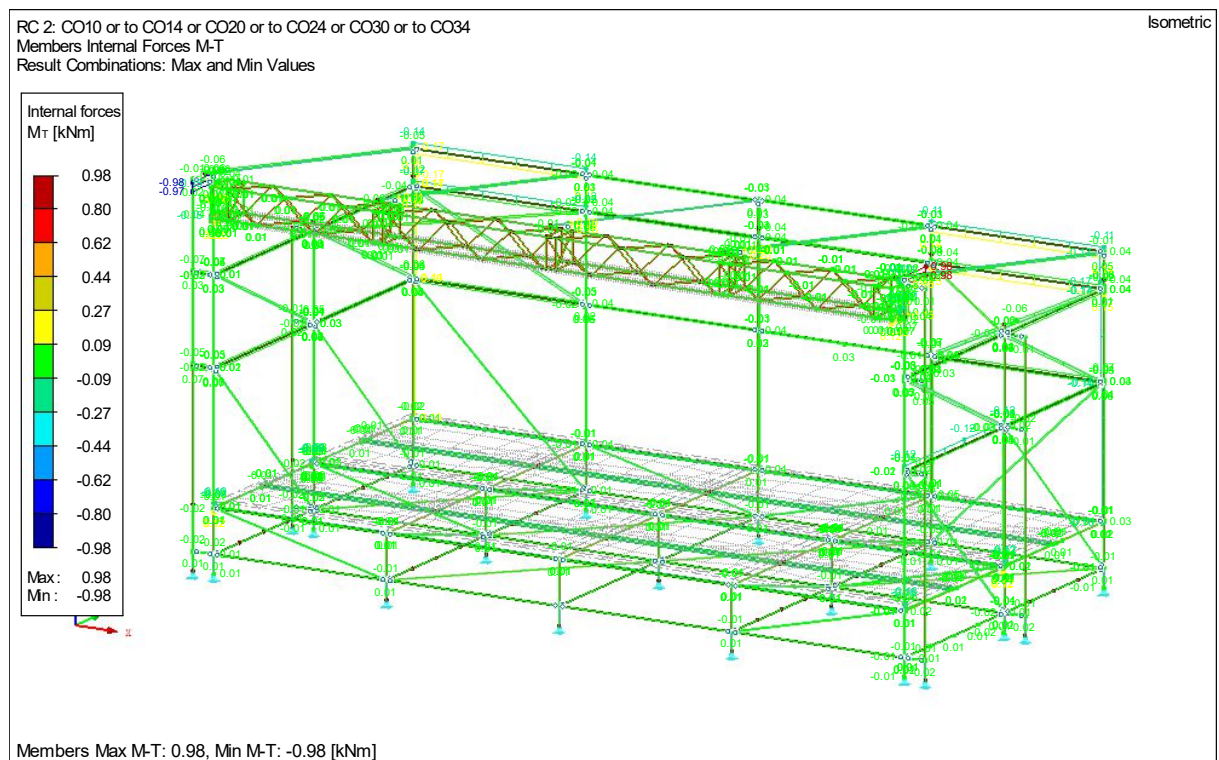
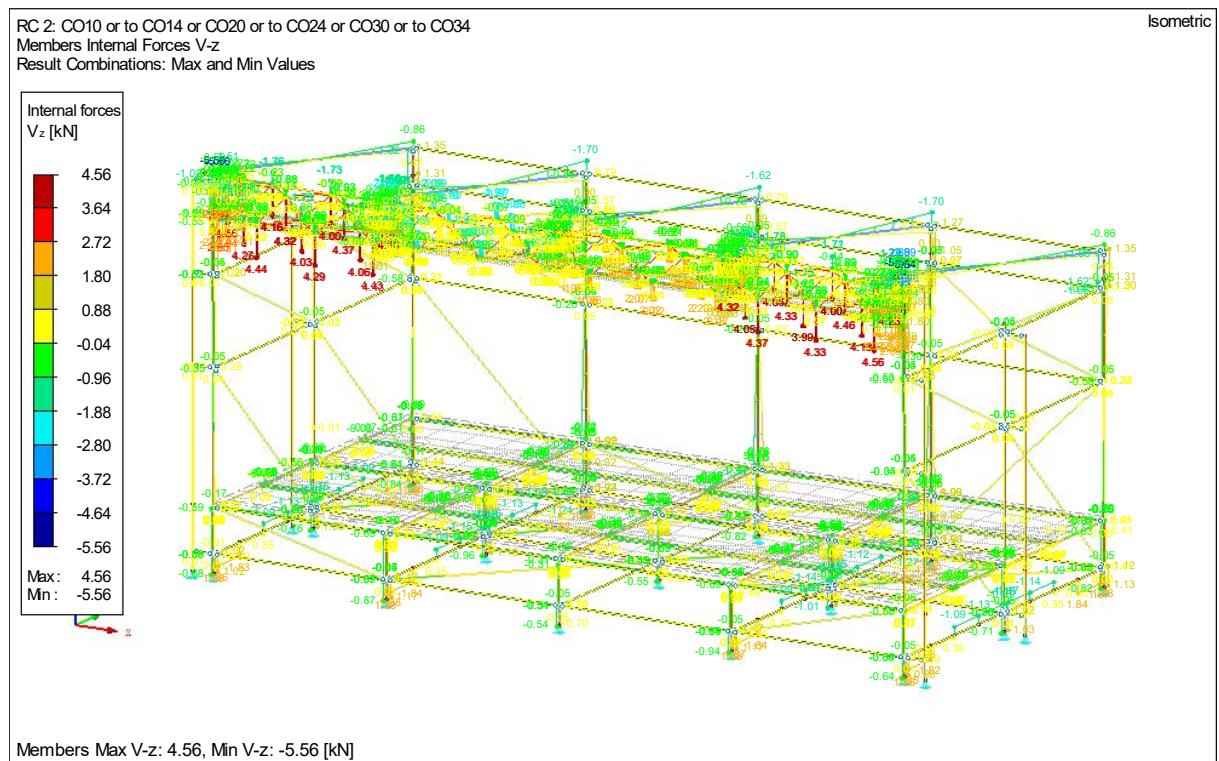
Maximum displacement in X-direction	13,7	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-18,7	mm	Member No. 285, x: 0.250 m
Maximum displacement in Z-direction	-50,8	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	54,0	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	33,9	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,1	mrاد	FE Mesh Node No. 706 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	-23,1	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO37 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-28,11	kN	
Sum of support forces in Y	-28,11	kN	Deviation: 0.00 %
Sum of loads in Z	-220,56	kN	
Sum of support forces in Z	-220,56	kN	Deviation: 0.00 %
Maximum displacement in X-direction	14,0	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-18,3	mm	Member No. 285, x: 0.250 m
Maximum displacement in Z-direction	-55,6	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	58,4	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	35,8	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,1	mrاد	FE Mesh Node No. 706 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	-23,7	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO38 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-28,11	kN	
Sum of support forces in Y	-28,11	kN	Deviation: 0.00 %
Sum of loads in Z	-219,21	kN	
Sum of support forces in Z	-219,21	kN	Deviation: 0.00 %
Maximum displacement in X-direction	14,0	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-18,2	mm	Member No. 285, x: 0.250 m
Maximum displacement in Z-direction	-56,5	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	59,3	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	36,1	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,1	mrاد	FE Mesh Node No. 706 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	-23,7	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T

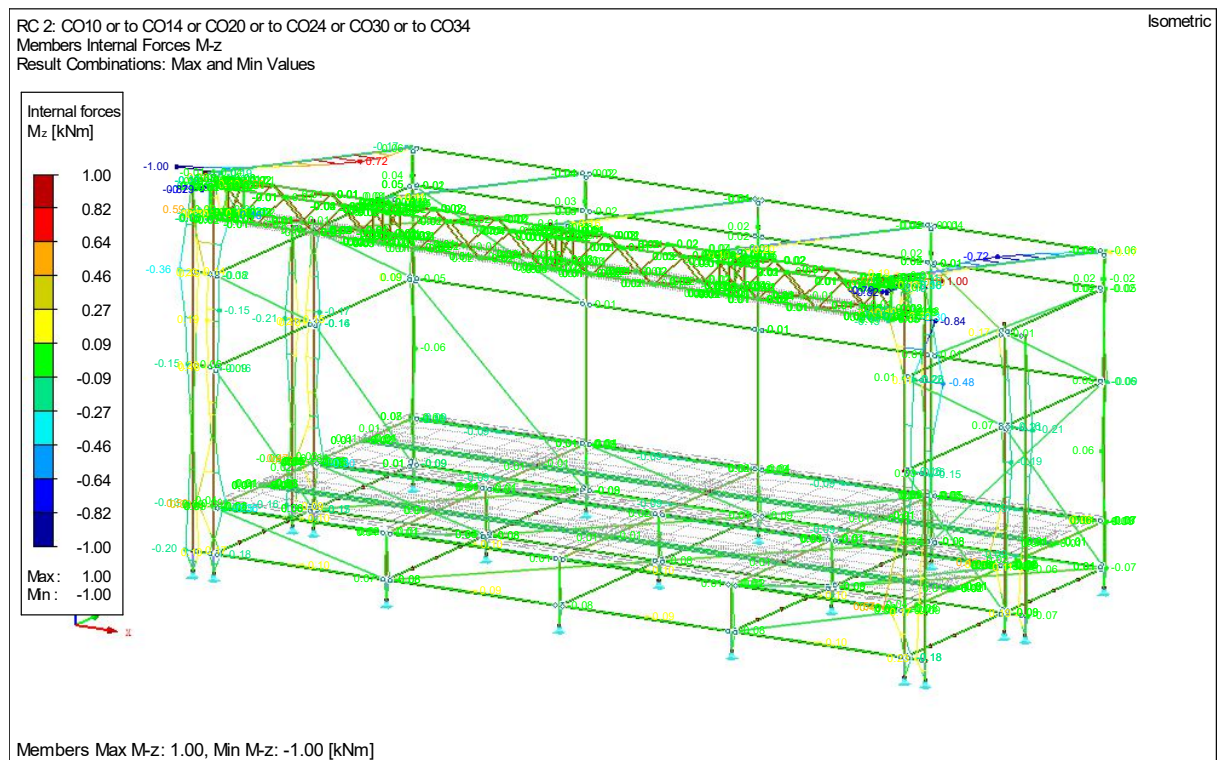
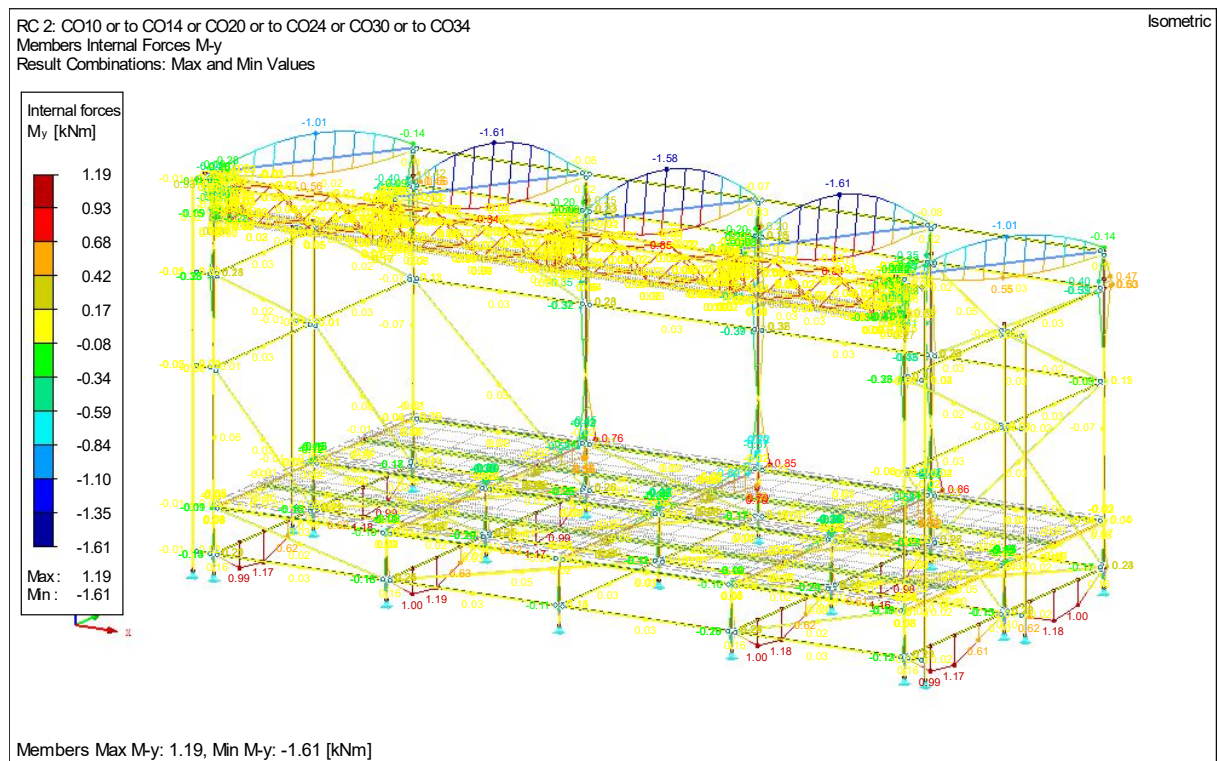
3.12.1 Deformation of the In-service situation characteristic max and min values.



3.12.2 Internal force diagram RC2 Design values In-service.







3.13 Calculation result of RC4 - Design Values Out-service: 1 * (CO100 – CO124)

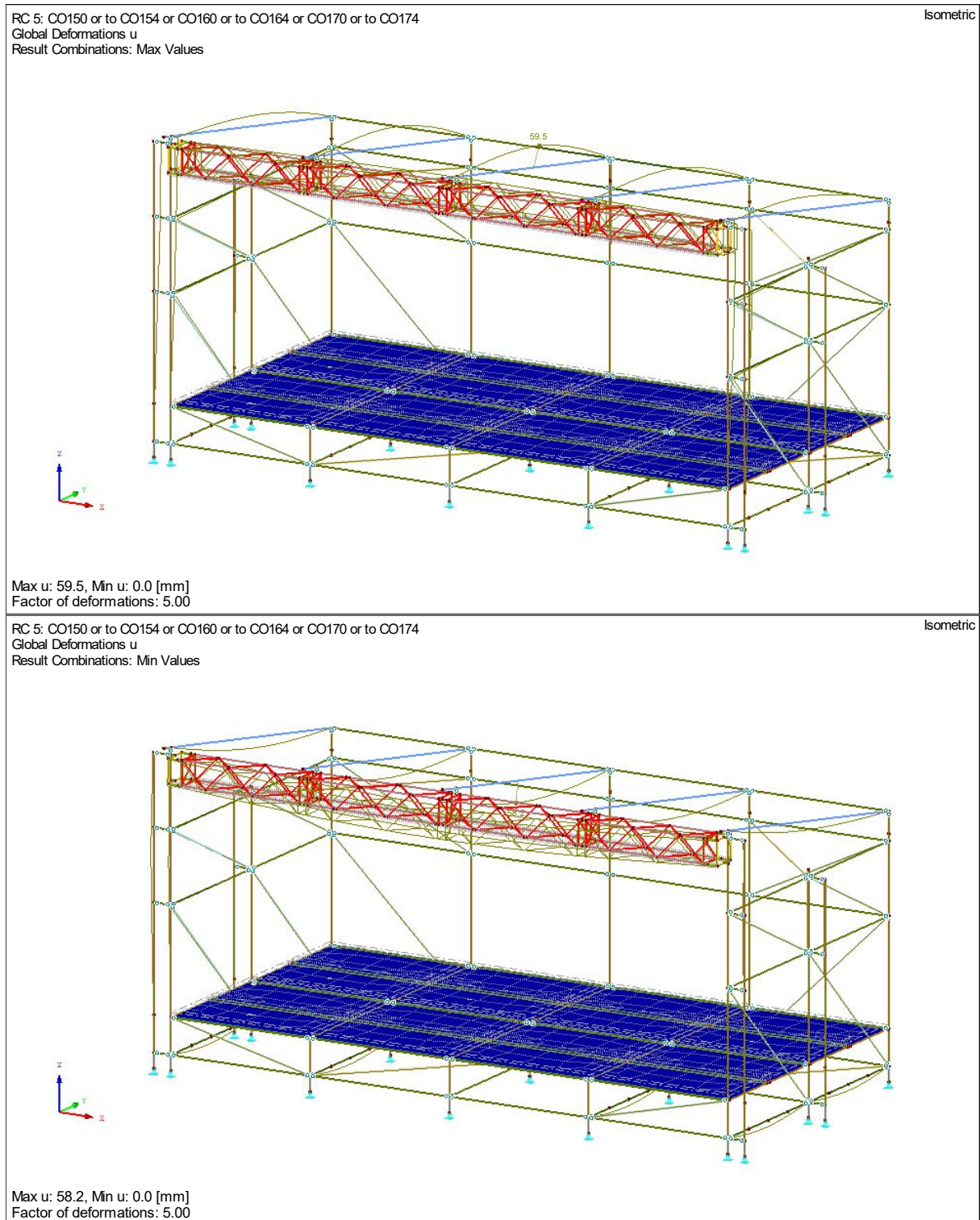
Description	Value	Unit	Comment
CO100 - 1.15*LC1 + 1.15*LC2 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-26,70	kN	
Sum of support forces in Z	-26,70	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-26,7	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	15,4	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	78,0	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	79,5	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-59,5	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-7,2	mrاد	Member No. 837, x: 3.362 m
Maximum rotation about Z-axis	-21,6	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO101 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-37,72	kN	
Sum of support forces in Z	-37,72	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-27,1	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	15,8	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	65,7	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	67,6	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	56,8	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-4,8	mrاد	Member No. 847, x: 0.038 m
Maximum rotation about Z-axis	21,7	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO102 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-33,45	kN	
Sum of support forces in Z	-33,45	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-27,0	mm	Member No. 833, x: 2.101 m
Maximum displacement in Y-direction	15,9	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	65,9	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	67,8	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	56,8	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	3,7	mrاد	Member No. 164, x: 0.034 m
Maximum rotation about Z-axis	-21,6	mrاد	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO103 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-40,20	kN	
Sum of support forces in Z	-40,20	kN	Deviation: 0.00 %
Maximum displacement in X-direction	27,3	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	16,1	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	62,0	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	64,1	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	58,9	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-8,3	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	22,1	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO104 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-38,85	kN	
Sum of support forces in Z	-38,85	kN	Deviation: 0.00 %
Maximum displacement in X-direction	27,3	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	16,3	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	61,8	mm	Member No. 244, x: 2.009 m
Maximum vectorial displacement	63,4	mm	Member No. 244, x: 2.009 m

Maximum rotation about X-axis	59,4	mrad	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-8,0	mrad	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	22,1	mrad	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO110 - 1.15*LC1 + 1.15*LC2 + 1.35*LC14			
Sum of loads in X	2,64	kN	
Sum of support forces in X	2,64	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-30,93	kN	
Sum of support forces in Z	-30,93	kN	Deviation: 0.00 %
Maximum displacement in X-direction	34,1	mm	Member No. 837, x: 2.522 m
Maximum displacement in Y-direction	9,3	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	57,4	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	59,9	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	-43,9	mrad	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	11,1	mrad	Member No. 226, x: 1.125 m
Maximum rotation about Z-axis	22,4	mrad	Member No. 837, x: 0.420 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO111 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC14			
Sum of loads in X	2,64	kN	
Sum of support forces in X	2,64	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-41,96	kN	
Sum of support forces in Z	-41,96	kN	Deviation: 0.00 %
Maximum displacement in X-direction	36,3	mm	Member No. 837, x: 2.522 m
Maximum displacement in Y-direction	10,4	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	46,3	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	49,6	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	44,1	mrad	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	12,4	mrad	Member No. 355, x: 1.125 m
Maximum rotation about Z-axis	23,0	mrad	Member No. 837, x: 0.420 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO112 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC14			
Sum of loads in X	2,64	kN	
Sum of support forces in X	2,64	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-37,69	kN	
Sum of support forces in Z	-37,69	kN	Deviation: 0.00 %
Maximum displacement in X-direction	35,6	mm	Member No. 837, x: 2.522 m
Maximum displacement in Y-direction	10,4	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	47,0	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	50,1	mm	Member No. 245, x: 2.009 m
Maximum rotation about X-axis	44,1	mrad	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	11,7	mrad	Member No. 355, x: 1.125 m
Maximum rotation about Z-axis	22,7	mrad	Member No. 837, x: 0.420 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO113 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC14			
Sum of loads in X	2,64	kN	
Sum of support forces in X	2,64	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-44,44	kN	
Sum of support forces in Z	-44,43	kN	Deviation: 0.00 %
Maximum displacement in X-direction	37,0	mm	Member No. 837, x: 2.522 m
Maximum displacement in Y-direction	10,7	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	43,2	mm	Member No. 245, x: 2.009 m
Maximum vectorial displacement	49,3	mm	Member No. 837, x: 2.101 m
Maximum rotation about X-axis	46,2	mrad	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	13,7	mrad	Member No. 355, x: 1.000 m
Maximum rotation about Z-axis	23,1	mrad	Member No. 837, x: 0.420 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO114 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC14			
Sum of loads in X	2,64	kN	
Sum of support forces in X	2,64	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-43,08	kN	
Sum of support forces in Z	-43,08	kN	Deviation: 0.00 %
Maximum displacement in X-direction	36,8	mm	Member No. 837, x: 2.522 m
Maximum displacement in Y-direction	10,8	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	43,2	mm	Member No. 245, x: 2.009 m

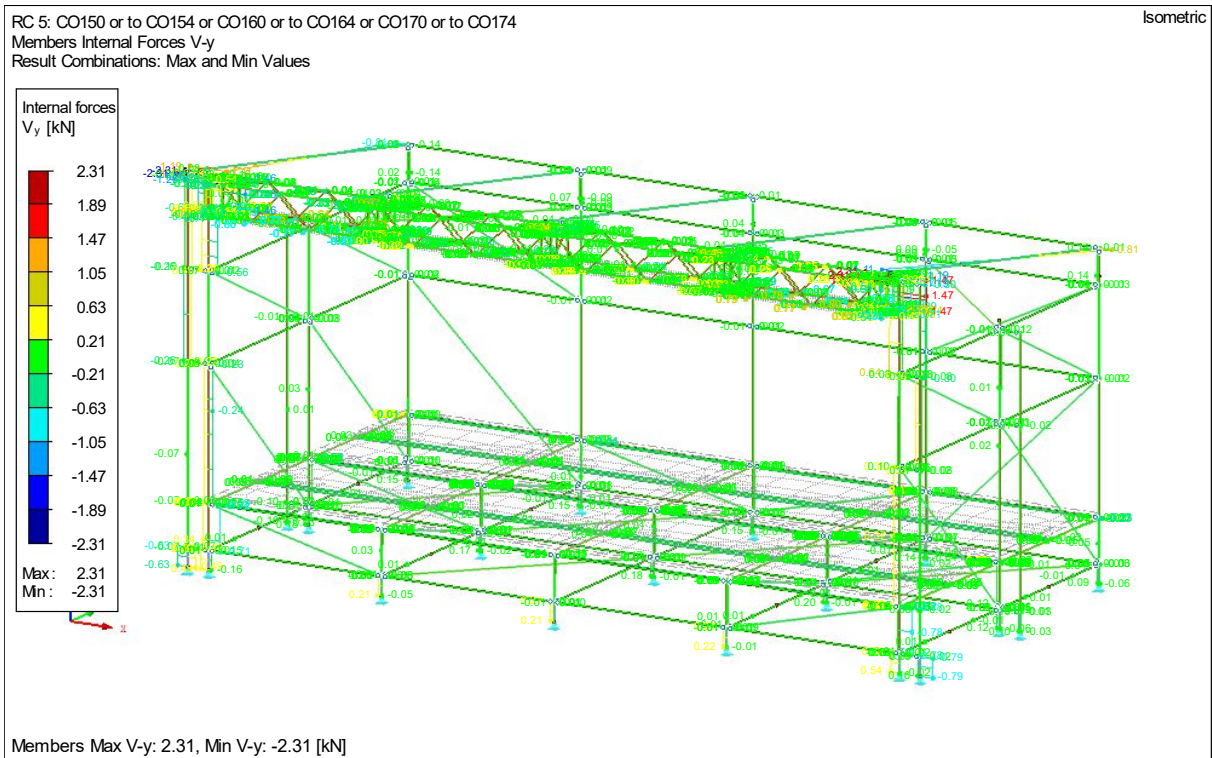
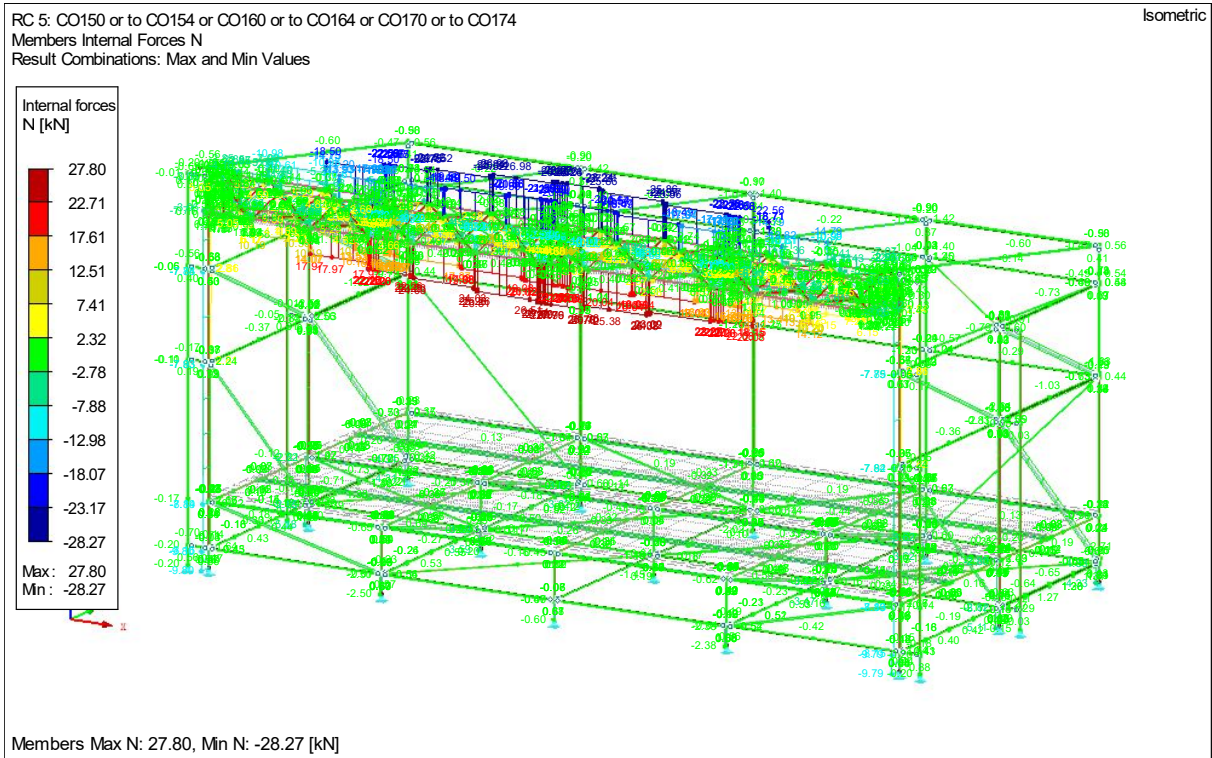
Maximum vectorial displacement	49,2	mm	Member No. 837, x: 2.101 m
Maximum rotation about X-axis	46,7	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	13,6	mrاد	Member No. 355, x: 1.000 m
Maximum rotation about Z-axis	23,0	mrاد	Member No. 837, x: 0.420 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO120 - 1.15*LC1 + 1.15*LC2 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-54,23	kN	
Sum of support forces in Z	-54,23	kN	Deviation: 0.00 %
Maximum displacement in X-direction	18,7	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-12,8	mm	Member No. 243, x: 2.009 m
Maximum displacement in Z-direction	-57,8	mm	Member No. 243, x: 2.009 m
Maximum vectorial displacement	59,2	mm	Member No. 243, x: 2.009 m
Maximum rotation about X-axis	43,7	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	6,3	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	-20,7	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO121 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-65,25	kN	
Sum of support forces in Z	-65,25	kN	Deviation: 0.00 %
Maximum displacement in X-direction	19,3	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-11,9	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-71,5	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	72,4	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	49,2	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	17,2	mrاد	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	-21,7	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO122 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-60,98	kN	
Sum of support forces in Z	-60,98	kN	Deviation: 0.00 %
Maximum displacement in X-direction	19,3	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-11,8	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-71,2	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	72,2	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	49,1	mrاد	Member No. 243, x: 0.000 m
Maximum rotation about Y-axis	15,4	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	-21,6	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO123 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-67,73	kN	
Sum of support forces in Z	-67,73	kN	Deviation: 0.00 %
Maximum displacement in X-direction	19,6	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-11,7	mm	Member No. 243, x: 2.411 m
Maximum displacement in Z-direction	-76,0	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	76,9	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	51,0	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	20,7	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	22,1	mrاد	Member No. 723, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO124 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-66,38	kN	
Sum of support forces in Z	-66,38	kN	Deviation: 0.00 %
Maximum displacement in X-direction	19,6	mm	Member No. 837, x: 2.101 m
Maximum displacement in Y-direction	-11,6	mm	Member No. 243, x: 2.411 m

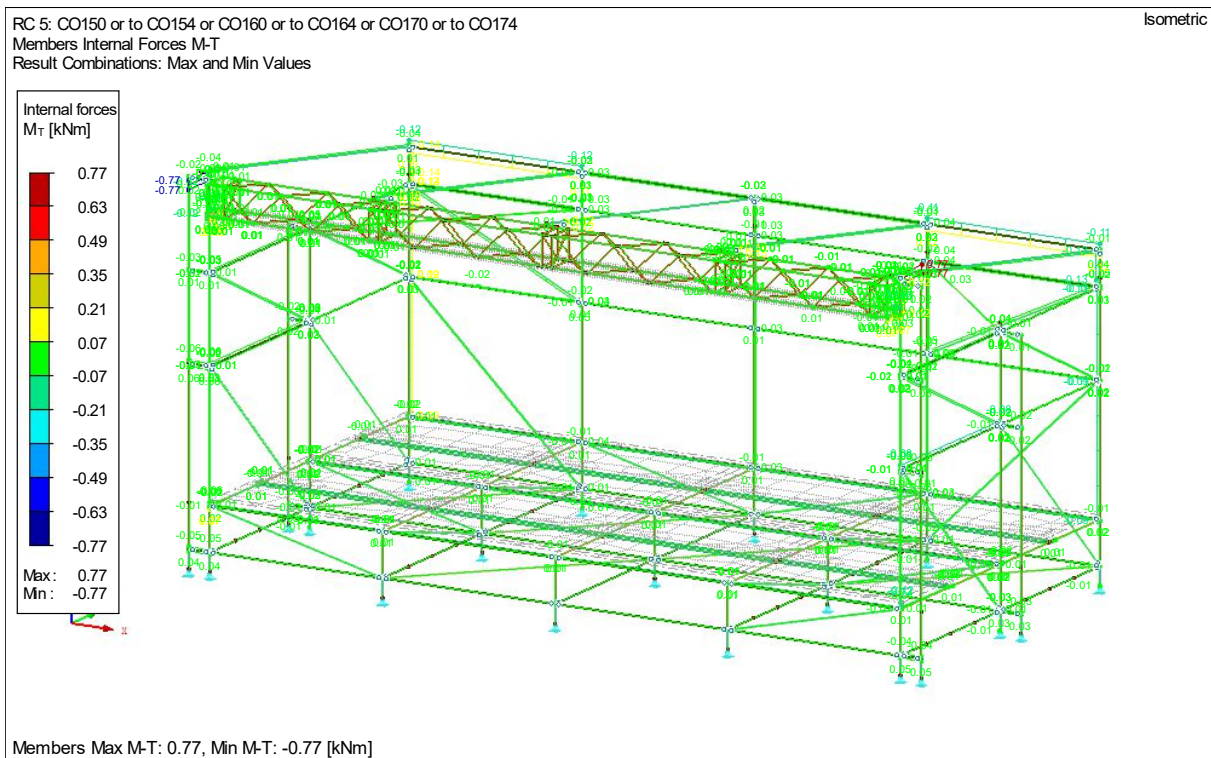
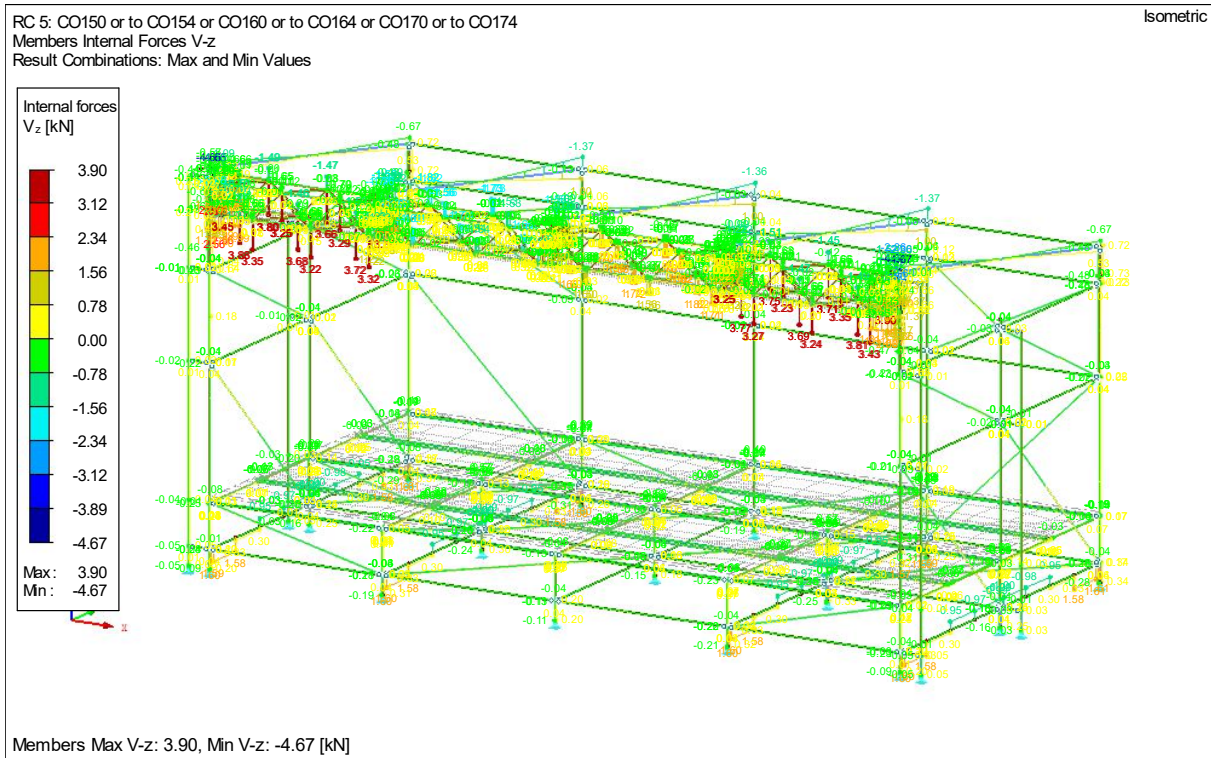
Maximum displacement in Z-direction	-76,9	mm	Member No. 243, x: 2.411 m
Maximum vectorial displacement	77,8	mm	Member No. 243, x: 2.411 m
Maximum rotation about X-axis	51,3	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	20,4	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	-22,1	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T

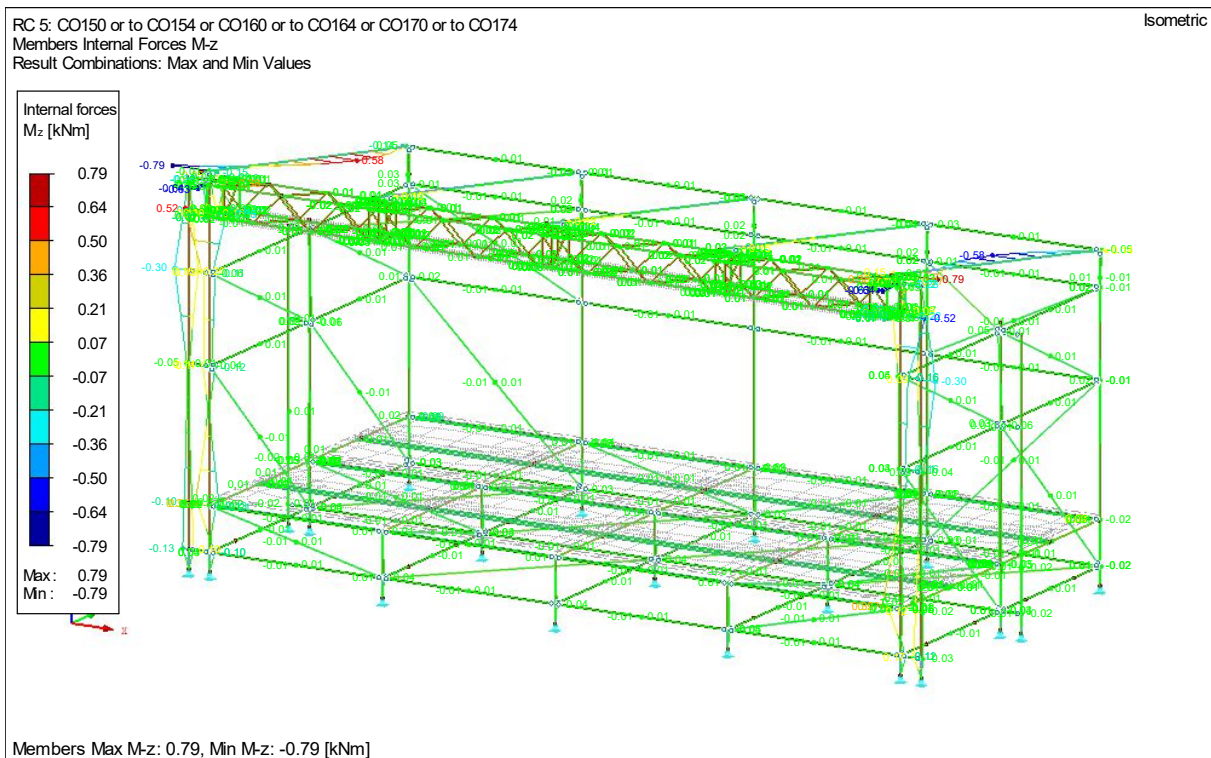
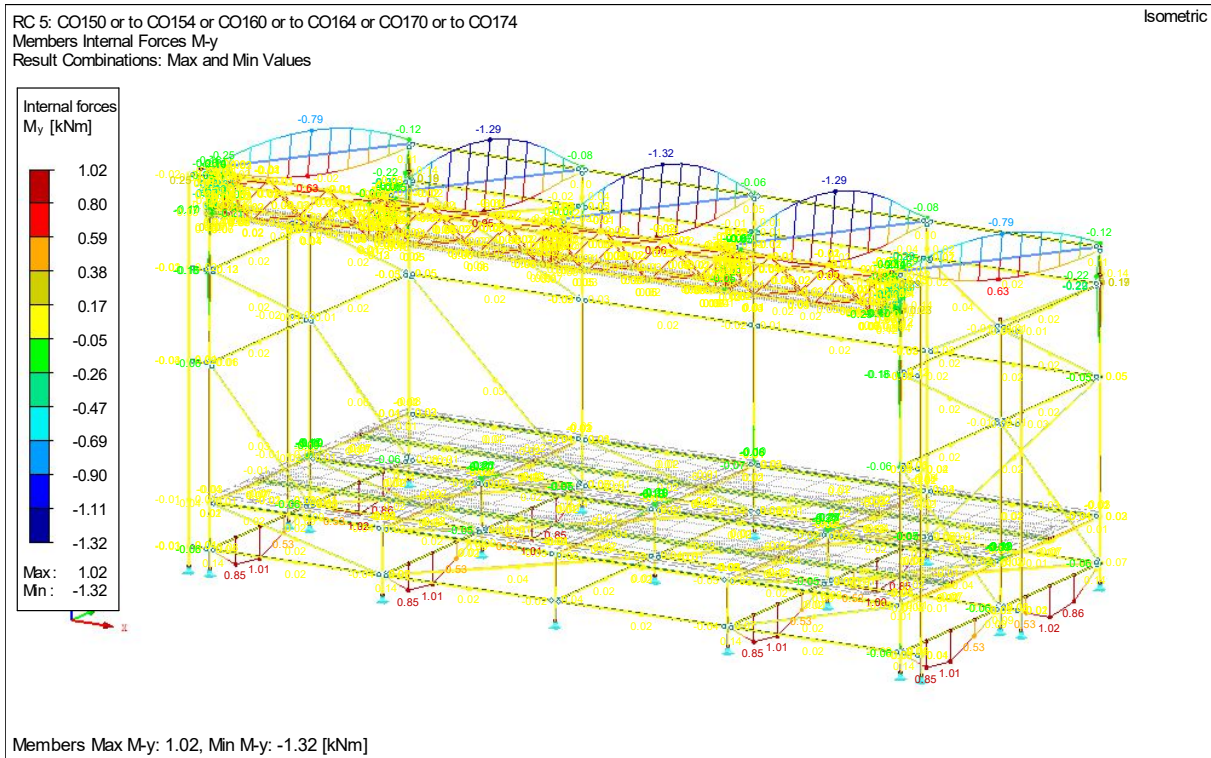
3.13.1 Deformation of the Out-service situation characteristic max and min values.



3.13.2 Internal force diagram RC4 Design Values Out-service.

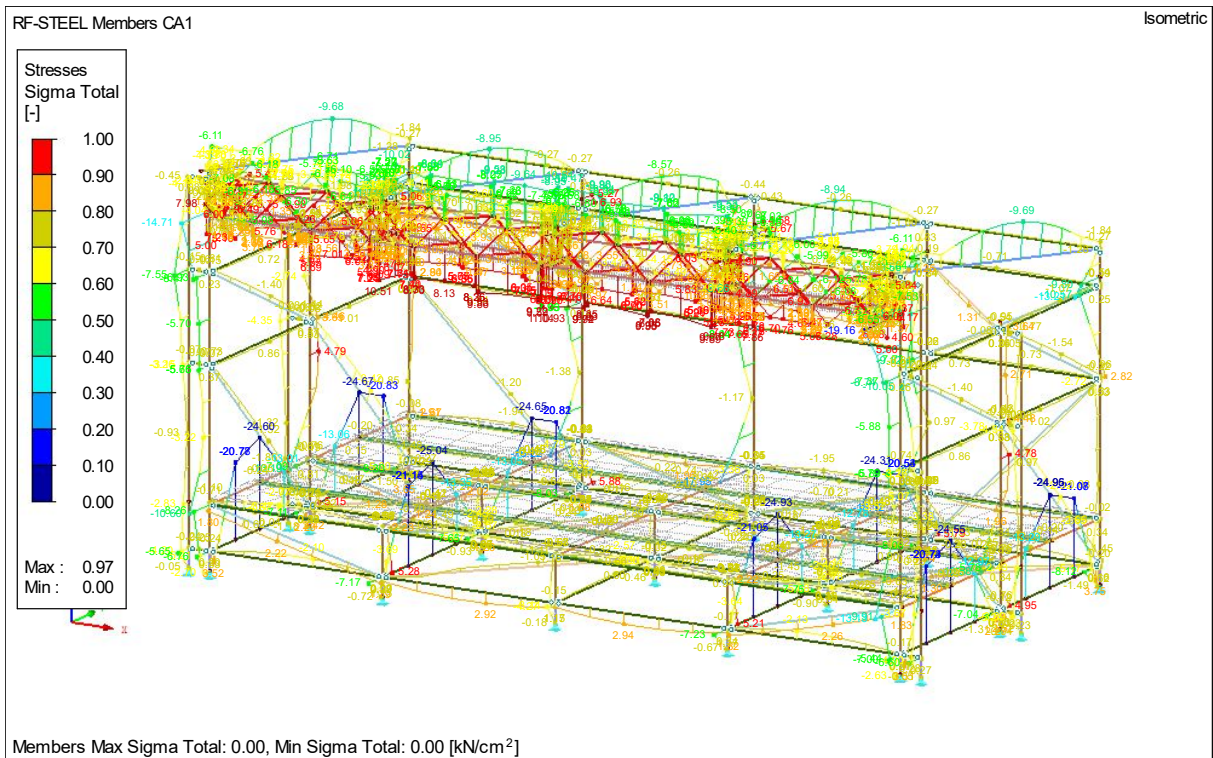
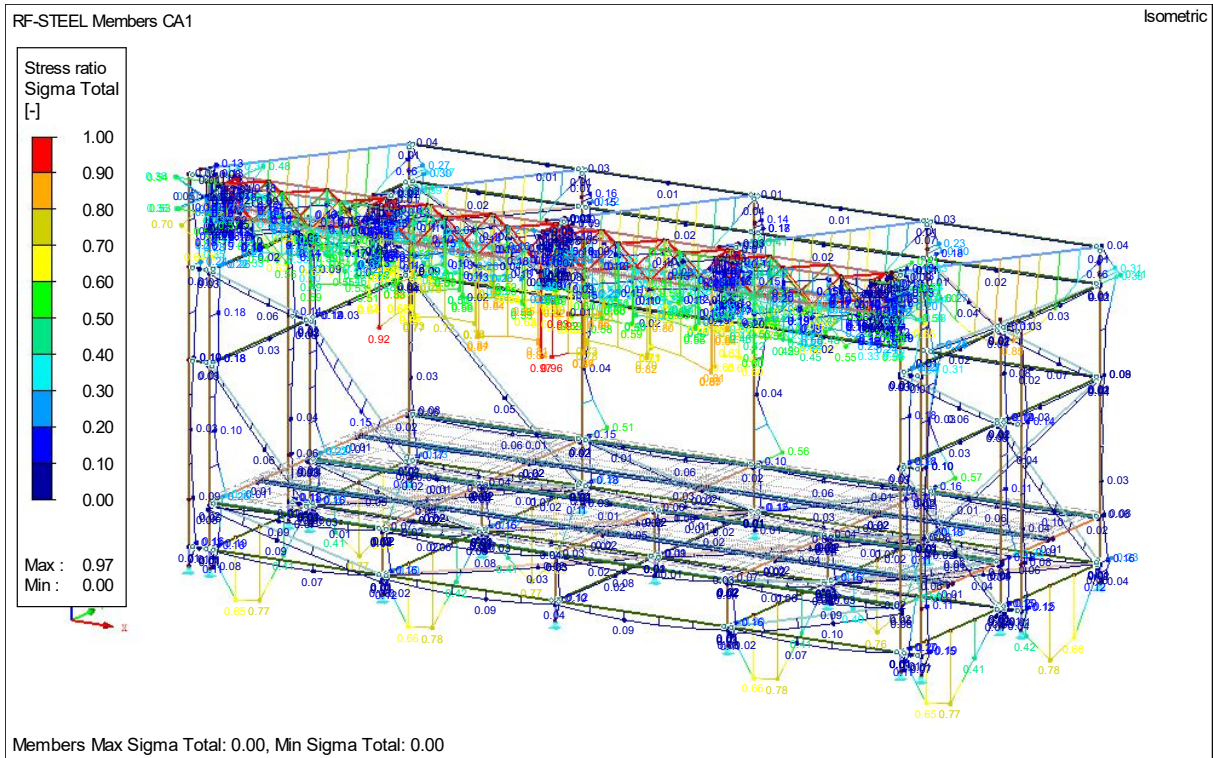






3.14 stress analyse GE32 Layher roof.

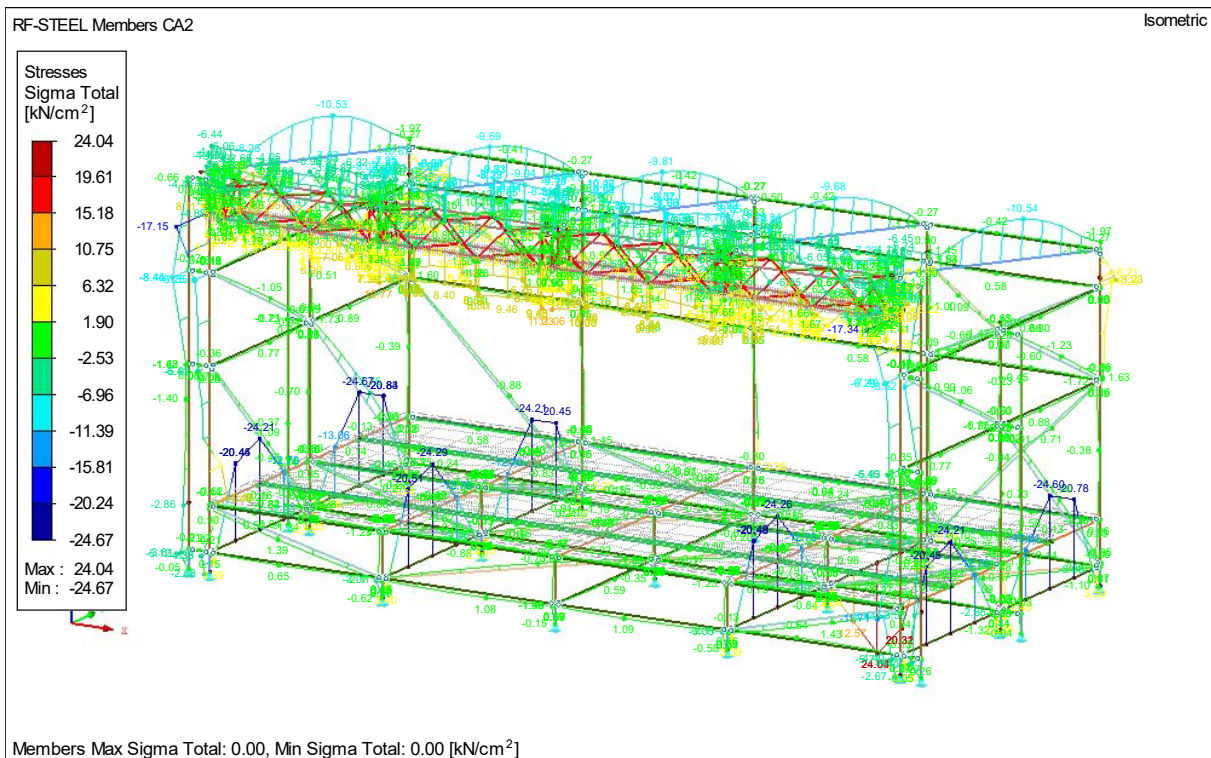
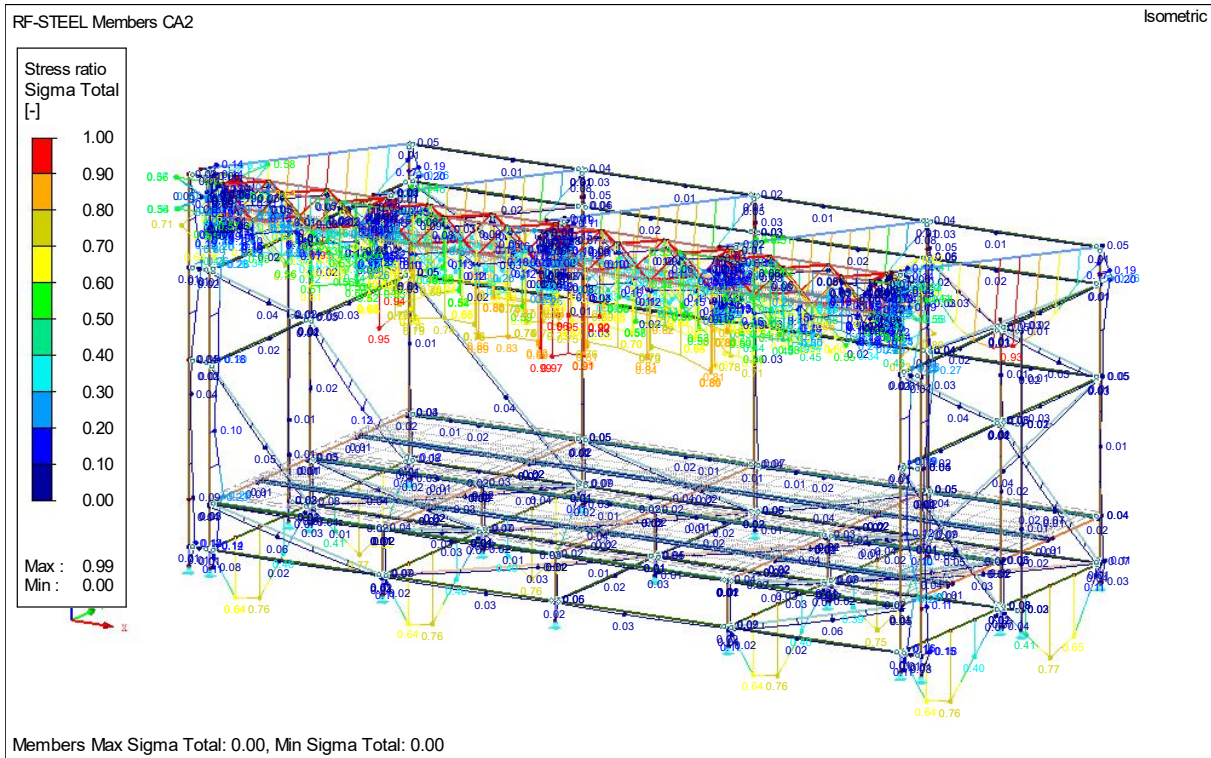
3.14.1 In service Stress calculation



3.14.2 Utilisation per cross section in the In service.

Section No.	Member No.	Location x [m]	S-Point No.	Load-ing	Stress Type	Stress [kN/cm ²]		Stress Ratio
						Existing	Limit	
1	SHAPE-THIN KEDER PROFIEL 3000							
	833	1,681	143	CO10	Sigma Total	-9,69	11,36	0,85
	833	4,203	19	CO13	Tau Total	1,08	6,56	0,16
	833	1,681	143	CO10	Sigma-equiv	9,69	11,36	0,85
2	QRO 50x4 (Hot Formed)							
	35	0,000	7	CO13	Sigma Total	6,02	11,36	0,53
	39	0,000	16	CO23	Tau Total	1,64	6,56	0,25
	35	0,000	7	CO13	Sigma-equiv	6,03	11,36	0,53
3	Ring 48/3							
	144	0,000	12	CO34	Sigma Total	11,04	11,36	0,97
	95	0,006	36	CO33	Tau Total	2,21	6,56	0,34
	144	0,000	12	CO34	Sigma-equiv	11,04	11,36	0,97
4	Ring 48/6							
	129	0,060	31	CO34	Sigma Total	-6,26	23,64	0,26
	839	0,000	2	CO33	Tau Total	0,62	13,65	0,05
	129	0,060	31	CO34	Sigma-equiv	6,26	23,64	0,26
5	Ring 20/2							
	884	0,479	10	CO33	Sigma Total	7,98	11,36	0,70
	960	0,479	15	CO33	Tau Total	0,23	6,56	0,03
	884	0,479	10	CO33	Sigma-equiv	7,98	11,36	0,70
6	RO 38x4.5 DIN EN 10220							
	212	0,210	10	CO10	Sigma Total	-8,30	35,50	0,23
	211	0,000	18	CO30	Tau Total	0,70	20,50	0,03
	212	0,210	10	CO10	Sigma-equiv	8,31	35,50	0,23
7	RO 48.3x3.2 (Hot Formed)							
	23	0,661	19	CO23	Sigma Total	-19,16	32,00	0,60
	31	0,100	25	CO13	Tau Total	11,71	18,48	0,63
	31	0,100	23	CO13	Sigma-equiv	20,51	32,00	0,64
8	RO 48.3x3.2 (Hot Formed)							
	214	0,500	10	CO34	Sigma Total	-25,04	32,00	0,78
	476	0,000	1	CO34	Tau Total	1,66	18,48	0,09
	214	0,500	10	CO34	Sigma-equiv	25,04	32,00	0,78
9	RO 48.3x3.2 (Hot Formed)							
	699	1,256	10	CO12	Sigma Total	-1,49	32,00	0,05
	703	0,000	1	CO34	Tau Total	0,49	18,48	0,03
	699	1,256	10	CO12	Sigma-equiv	1,49	32,00	0,05
10	RO 48.3x2.6 (Hot Formed)							
	726	1,646	10	CO10	Sigma Total	-3,42	23,50	0,15
	746	0,000	19	CO10	Tau Total	-0,84	13,57	0,06
	726	1,646	10	CO10	Sigma-equiv	3,43	23,50	0,15
12	HK 50/30/4/4/4/4							
	813	0,000	10	CO10	Sigma Total	-1,11	20,45	0,05
	813	0,000	8	CO23	Tau Total	0,16	11,81	0,01
	813	0,000	10	CO10	Sigma-equiv	1,12	20,45	0,05
13	Rectangle 50/50							
	1022	0,000	2	CO13	Sigma Total	-4,68	21,27	0,22
	996	0,000	1	CO13	Tau Total	0,88	12,28	0,07
	1022	0,000	2	CO13	Sigma-equiv	4,68	21,27	0,22

3.14.3 Out service Stress calculation

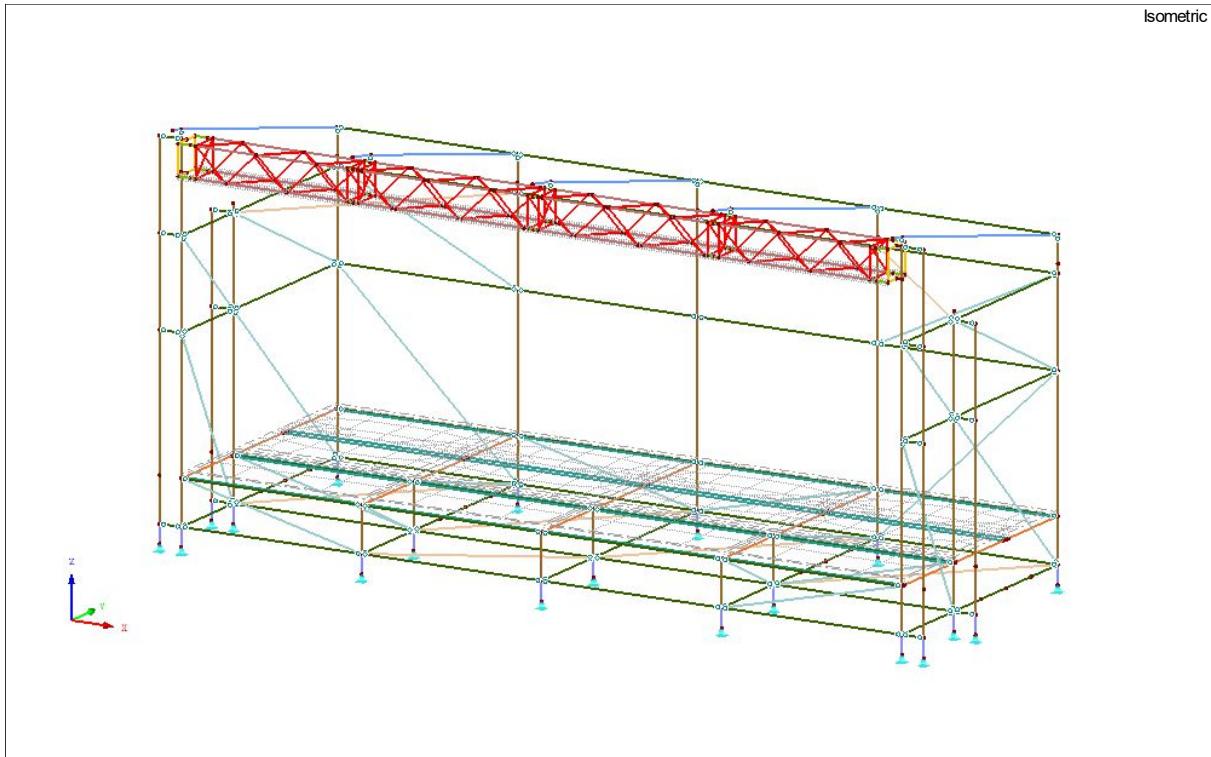


3.14.4 Utilisation per cross section in the Out service.

Section No.	Member No.	Location x [m]	S-Point No.	Load-ing	Stress Type	Stress [kN/cm ²]		Stress Ratio
						Existing	Limit	
1	SHAPE-THIN KEDER PROFIEL 3000							
	833	1,681	143	CO100	Sigma Total	-10,54	11,36	0,93
	833	4,203	19	CO103	Tau Total	1,16	6,56	0,18
	833	1,681	143	CO100	Sigma-equiv	10,54	11,36	0,93
2	QRO 50x4 (Hot Formed)							
	35	0,000	7	CO103	Sigma Total	5,71	11,36	0,50
	42	0,169	16	CO123	Tau Total	1,77	6,56	0,27
	970	0,169	7	CO103	Sigma-equiv	5,74	11,36	0,51
3	Ring 48/3							
	144	0,000	12	CO124	Sigma Total	11,23	11,36	0,99
	67	0,000	1	CO123	Tau Total	2,52	6,56	0,38
	144	0,000	12	CO124	Sigma-equiv	11,23	11,36	0,99
4	Ring 48/6							
	129	0,060	30	CO124	Sigma Total	-6,58	23,64	0,28
	108	0,000	18	CO124	Tau Total	-0,72	13,65	0,05
	129	0,060	30	CO124	Sigma-equiv	6,58	23,64	0,28
5	Ring 20/2							
	868	0,479	10	CO123	Sigma Total	9,08	11,36	0,80
	892	0,000	11	CO123	Tau Total	0,29	6,56	0,04
	868	0,479	10	CO123	Sigma-equiv	9,08	11,36	0,80
6	RO 38x4.5 DIN EN 10220							
	654	0,210	1	CO113	Sigma Total	-6,41	35,50	0,18
	654	0,210	28	CO113	Tau Total	0,45	20,50	0,02
	654	0,210	1	CO113	Sigma-equiv	6,41	35,50	0,18
7	RO 48.3x3.2 (Hot Formed)							
	23	0,661	21	CO123	Sigma Total	-17,34	32,00	0,54
	31	0,100	26	CO103	Tau Total	12,36	18,48	0,67
	31	0,100	24	CO103	Sigma-equiv	21,54	32,00	0,67
8	RO 48.3x3.2 (Hot Formed)							
	239	0,500	10	CO123	Sigma Total	-24,67	32,00	0,77
	481	0,000	10	CO100	Tau Total	-1,76	18,48	0,10
	239	0,500	10	CO123	Sigma-equiv	24,67	32,00	0,77
9	RO 48.3x3.2 (Hot Formed)							
	699	1,674	10	CO100	Sigma Total	-1,19	32,00	0,04
	703	0,000	1	CO114	Tau Total	0,15	18,48	0,01
	699	1,674	10	CO100	Sigma-equiv	1,19	32,00	0,04
10	RO 48.3x2.6 (Hot Formed)							
	726	1,646	10	CO100	Sigma Total	-2,75	23,50	0,12
	746	0,000	17	CO100	Tau Total	-0,91	13,57	0,07
	726	1,646	10	CO100	Sigma-equiv	2,75	23,50	0,12
12	HK 50/30/4/4/4/4							
	813	0,000	14	CO113	Sigma Total	-1,04	20,45	0,05
	813	0,000	8	CO113	Tau Total	0,15	11,81	0,01
	813	0,000	14	CO113	Sigma-equiv	1,07	20,45	0,05
13	Rectangle 50/50							
	1022	0,000	2	CO103	Sigma Total	-4,70	21,27	0,22
	996	0,000	1	CO103	Tau Total	0,82	12,28	0,07
	1022	0,000	2	CO103	Sigma-equiv	4,70	21,27	0,22

3.15 General calculation of the GE24 Layher Roof.

3.15.1 construction scheme.



Cross-Sections

- 1: SHAPE-THIN KEDER PROFIEL ZEILREGEL; Aluminum EN-AW 6063 (EP,ET,ER/B) T66
- 2: QRO 50x4 (Hot Formed); Aluminum EN-AW 6082 (EP,ET) T6
- 3: Ring 48/3; Aluminum EN-AW 6082 (EP,ET) T6
- 4: Ring 48/6; Aluminum EN-AW 6082 (EP,ET) T6
- 5: Ring 20/2; Aluminum EN-AW 6082 (EP,ET) T6
- 6: RO 38x4.5 | DIN EN 10220; Steel S 355 JR
- 7: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 8: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 9: RO 48.3x3.2 (Hot Formed); S320GD 1.0250
- 10: RO 48.3x2.6 (Hot Formed); Steel S 235 JR
- 11: EV transom; Aluminum EN-AW 6005A (EP/O,ER/B) T6
- 12: HK 50/30/4/4/4/4; Aluminum EN-AW 6005A (EP/O,ER/B) T6
- 13: Rectangle 50/50; Aluminum EN-AW 6082 (EP,ET) T6

3.15.2 Used Materials.

Material No.	Material Description	Modulus of Elasticity E [kN/cm ²]	Shear Modulus G [kN/cm ²]	Poisson's Ratio ν [-]	Specific Weight γ [kN/m ³]	Coeff. of Th. Exp. α [1/°C]	Partial Factor γ_M [-]	Material Model
1	Steel S 235 JR EN 10025-2:2004-11	21000,00	8076,92	0,300	78,50	1,20E-05	1,000	Isotropic Linear Elastic
2	S320GD 1.0250 EN 10346:2009-03	21000,00	8076,92	0,300	78,50	1,20E-05	1,000	Isotropic Linear Elastic
3	Steel S 355 JR EN 10025-2:2004-11	21000,00	8076,92	0,300	78,50	1,20E-05	1,000	Isotropic Linear Elastic
4	Plywood, Class F20/10 E40/20, Plate Stress, Perpendicular EN 12369-2:2011-06	200,00	3,50	3,286	5,00	5,00E-06	1,200	Orthotropic Elastic 2D...
5	Aluminum EN-AW 6005A (EP/O,ER/B) T6 EN 1999-1-1:2007	7000,00	2700,00	0,296	27,00	2,30E-05	1,000	Isotropic Linear Elastic
6	Aluminum EN-AW 6082 (EP,ET) T6 EN 1999-1-1:2007	7000,00	2700,00	0,296	27,00	2,30E-05	1,000	Isotropic Linear Elastic
7	Aluminum EN-AW 6063 (EP,ET,ER/B) T66 EN 1999-1-1:2007	7000,00	2700,00	0,296	27,00	2,30E-05	1,000	Isotropic Linear Elastic

3.15.3 Used cross sections.

Section No.	Cross-Section Description [mm]	Material No.	Moments of inertia [cm ⁴]			Cross-Sectional Areas [cm ²]			Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm]	
			Torsion J	Bending I_y	Bending I_z	Axial A	Shear A_y	Shear A_z			Width b	Depth h
1	SHAPE-THIN KEDER PROFIEL ZEILREGEL	7	0,50	18,36	46,49	10,04	2,43	2,74	0,00	0,00	75,5	48,5
2	QRO 50x4 (Hot Formed)	6	40,40	25,00	25,00	7,19	3,12	3,12	0,00	0,00	50,0	50,0
3	Ring 48/3	6	21,57	10,78	10,78	4,24	2,14	2,14	0,00	0,00	48,0	48,0
4	Ring 48/6	6	35,63	17,81	17,81	7,92	4,09	4,09	0,00	0,00	48,0	48,0
5	Ring 20/2	6	0,93	0,46	0,46	1,13	0,58	0,58	0,00	0,00	20,0	20,0
6	RO 38x4.5 DIN EN 10220	3	13,53	6,76	6,76	4,74	2,38	2,38	0,00	0,00	38,0	38,0
7	RO 48.3x3.2 (Hot Formed)	2	23,20	11,60	11,60	4,53	2,26	2,26	0,00	0,00	48,3	48,3
8	RO 48.3x3.2 (Hot Formed)	2	23,20	11,60	11,60	4,53	2,26	2,26	0,00	0,00	48,3	48,3
9	RO 48.3x3.2 (Hot Formed)	2	23,20	11,60	11,60	4,53	2,26	2,26	0,00	0,00	48,3	48,3
10	RO 48.3x2.6 (Hot Formed)	1	19,60	9,78	9,78	3,73	1,85	1,85	0,00	0,00	48,3	48,3
11	EV transom	5	50,00	554,00	70,00	18,78	18,00	18,00	0,00	0,00	49,0	172,5
12	HK 50/30/4/4/4/4	5	16,87	17,67	7,52	5,76	1,62	3,48	0,00	0,00	30,0	50,0
13	IPE 160	1	3,60	869,30	68,31	20,09	10,17	7,33	0,00	0,00	82,0	160,0
14	Rectangle 50/50	6	87,92	52,08	52,08	25,00	20,83	20,83	0,00	0,00	50,0	50,0

3.16 Calculation summary GE24 Layher Roof

Description	Value	Unit	Comment
Summary			
Calculation Status	OK		
Maximum displacement in X-direction	22,6	mm	CO113, Member No. 837, x: 2.230 m
Maximum displacement in Y-direction	24,3	mm	CO18, Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	72,9	mm	CO100, Member No. 243, x: 1.501 m
Maximum vectorial displacement	75,3	mm	CO100, Member No. 243, x: 1.501 m
Maximum rotation about X-axis	78,3	mrاد	CO104, Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	30,8	mrاد	CO28, FE Mesh Node No. 382 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	26,1	mrاد	CO23, Member No. 681, x: 0.000 m
Number of 1D finite elements (member elements)	982		
Number of 2D finite elements (surface elements)	552		
Number of 3D finite elements (solid elements)	0		
Number of FE mesh nodes	993		
Number of equations	5958		
Matrix solver method	Direct		
Maximum number of iterations	100		
Number of divisions for member results	10		
Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic	10		
Activate shear stiffness of members (A-y, A-z)	+		
Plate bending theory	Mindlin		
Activate ineffective supports	+		
Precision of convergence criteria of nonlinear calculation	1,0		

3.17 Calculation result of the separate load cases.

Description	Value	Unit	Comment
LC1 - Self-weight			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-15,30	kN	
Sum of support forces in Z	-15,30	kN	Deviation: 0.00 %
Resultant of reactions about X	0,245	kNm	At center of gravity of model (X: 5.173, Y: -1.541, Z: 0.530 m)
Resultant of reactions about Y	-0,468	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	-0,7	mm	Member No. 738, x: 1.440 m
Maximum displacement in Y-direction	-1,6	mm	Member No. 726, x: 1.440 m
Maximum displacement in Z-direction	-4,1	mm	Member No. 243, x: 1.668 m
Maximum vectorial displacement	4,1	mm	Member No. 243, x: 1.668 m
Maximum rotation about X-axis	4,0	mrad	Member No. 833, x: 0.000 m
Maximum rotation about Y-axis	-1,4	mrad	Member No. 702, x: 0.000 m
Maximum rotation about Z-axis	0,7	mrad	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC2 - ballast loading			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-20,00	kN	
Sum of support forces in Z	-20,00	kN	Deviation: 0.00 %
Resultant of reactions about X	2,933	kNm	At center of gravity of model (X: 5.173, Y: -1.541, Z: 0.530 m)
Resultant of reactions about Y	0,133	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	0,0	mm	Member No. 223, x: 0.300 m
Maximum displacement in Y-direction	0,0	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-16,3	mm	Member No. 234, x: 0.438 m
Maximum vectorial displacement	16,3	mm	Member No. 234, x: 0.438 m
Maximum rotation about X-axis	26,0	mrad	Member No. 647, x: 0.000 m
Maximum rotation about Y-axis	0,0	mrad	Member No. 707, x: 0.000 m
Maximum rotation about Z-axis	0,0	mrad	Member No. 723, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC3 - UDL Loading			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-8,17	kN	
Sum of support forces in Z	-8,17	kN	Deviation: -0.02 %
Resultant of reactions about X	12,796	kNm	At center of gravity of model (X: 5.173, Y: -1.541, Z: 0.530 m)
Resultant of reactions about Y	0,047	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	3,4	mm	Member No. 360, x: 0.667 m
Maximum displacement in Y-direction	2,9	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-21,1	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	21,2	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	7,2	mrad	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	-8,0	mrad	Member No. 847, x: 0.030 m
Maximum rotation about Z-axis	4,7	mrad	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC4 - CPL Loading setup			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-5,00	kN	
Sum of support forces in Z	-5,00	kN	Deviation: -0.02 %
Resultant of reactions about X	7,835	kNm	At center of gravity of model (X: 5.173, Y: -1.541, Z: 0.530 m)
Resultant of reactions about Y	0,029	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	3,0	mm	Member No. 360, x: 0.667 m
Maximum displacement in Y-direction	3,0	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-20,9	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	21,0	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	7,2	mrad	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	-6,7	mrad	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	4,2	mrad	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC5 - 2x point load per truss			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	

Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-10,00	kN	
Sum of support forces in Z	-10,00	kN	Deviation: -0.02 %
Resultant of reactions about X	15,670	kNm	At center of gravity of model (X: 5.173, Y: -1.541, Z: 0.530 m)
Resultant of reactions about Y	0,114	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	4,6	mm	Member No. 360, x: 0.667 m
Maximum displacement in Y-direction	3,8	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-27,6	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	27,7	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	9,4	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	-10,6	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	6,3	mrاد	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC6 - 3x point load per truss			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-9,00	kN	
Sum of support forces in Z	-9,00	kN	Deviation: -0.02 %
Resultant of reactions about X	14,103	kNm	At center of gravity of model (X: 5.173, Y: -1.541, Z: 0.530 m)
Resultant of reactions about Y	0,086	kNm	At center of gravity of model
Resultant of reactions about Z	0,000	kNm	At center of gravity of model
Maximum displacement in X-direction	4,6	mm	Member No. 360, x: 0.667 m
Maximum displacement in Y-direction	4,1	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-29,0	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	29,2	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	9,9	mrاد	Member No. 991, x: 0.000 m
Maximum rotation about Y-axis	-10,4	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	6,3	mrاد	Member No. 681, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC7 - floor loading wind 0°			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	8,56	kN	
Sum of support forces in Y	8,56	kN	Deviation: 0.00 %
Sum of loads in Z	-85,57	kN	
Sum of support forces in Z	-85,57	kN	Deviation: 0.00 %
Resultant of reactions about X	4,999	kNm	At center of gravity of model (X: 5.173, Y: -1.541, Z: 0.530 m)
Resultant of reactions about Y	0,568	kNm	At center of gravity of model
Resultant of reactions about Z	0,057	kNm	At center of gravity of model
Maximum displacement in X-direction	1,1	mm	FE Mesh Node No. 269 (X: 2.590, Y: -2.583, Z: -0.186 m)
Maximum displacement in Y-direction	1,6	mm	Member No. 666, x: 0.250 m
Maximum displacement in Z-direction	-9,3	mm	FE Mesh Node No. 135 (X: 8.289, Y: -1.631, Z: -0.186 m)
Maximum vectorial displacement	9,3	mm	FE Mesh Node No. 135 (X: 8.289, Y: -1.631, Z: -0.186 m)
Maximum rotation about X-axis	13,8	mrاد	Member No. 459, x: 1.036 m
Maximum rotation about Y-axis	17,2	mrاد	FE Mesh Node No. 11 (X: 7.770, Y: -2.583, Z: -0.186 m)
Maximum rotation about Z-axis	4,8	mrاد	Member No. 666, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC8 - floor loading wind 90°			
Sum of loads in X	8,56	kN	
Sum of support forces in X	8,56	kN	Deviation: 0.00 %
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-85,57	kN	
Sum of support forces in Z	-85,57	kN	Deviation: 0.00 %
Resultant of reactions about X	-0,613	kNm	At center of gravity of model (X: 5.173, Y: -1.541, Z: 0.530 m)
Resultant of reactions about Y	-5,044	kNm	At center of gravity of model
Resultant of reactions about Z	-0,061	kNm	At center of gravity of model
Maximum displacement in X-direction	1,5	mm	FE Mesh Node No. 269 (X: 2.590, Y: -2.583, Z: -0.186 m)
Maximum displacement in Y-direction	-1,5	mm	Member No. 274, x: 1.200 m
Maximum displacement in Z-direction	-9,3	mm	FE Mesh Node No. 768 (X: 2.073, Y: -1.631, Z: -0.186 m)
Maximum vectorial displacement	9,3	mm	FE Mesh Node No. 768 (X: 2.073, Y: -1.631, Z: -0.186 m)
Maximum rotation about X-axis	13,8	mrاد	Member No. 441, x: 1.036 m
Maximum rotation about Y-axis	-17,2	mrاد	FE Mesh Node No. 269 (X: 2.590, Y: -2.583, Z: -0.186 m)
Maximum rotation about Z-axis	-1,4	mrاد	Member No. 724, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis
LC9 - floor loading wind 180°			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-8,56	kN	
Sum of support forces in Y	-8,56	kN	Deviation: 0.00 %
Sum of loads in Z	-85,57	kN	
Sum of support forces in Z	-85,57	kN	Deviation: 0.00 %
Resultant of reactions about X	-6,225	kNm	At center of gravity of model (X: 5.173, Y: -1.541, Z: 0.530 m)
Resultant of reactions about Y	0,568	kNm	At center of gravity of model
Resultant of reactions about Z	-0,057	kNm	At center of gravity of model

Maximum displacement in X-direction	1,1	mm	FE Mesh Node No. 269 (X: 2.590, Y: -2.583, Z: -0.186 m)
Maximum displacement in Y-direction	-2,1	mm	Member No. 274, x: 1.200 m
Maximum displacement in Z-direction	-9,3	mm	FE Mesh Node No. 768 (X: 2.073, Y: -1.631, Z: -0.186 m)
Maximum vectorial displacement	9,3	mm	FE Mesh Node No. 768 (X: 2.073, Y: -1.631, Z: -0.186 m)
Maximum rotation about X-axis	13,8	mrاد	Member No. 459, x: 1.036 m
Maximum rotation about Y-axis	17,1	mrاد	FE Mesh Node No. 11 (X: 7.770, Y: -2.583, Z: -0.186 m)
Maximum rotation about Z-axis	5,4	mrاد	Member No. 725, x: 0.000 m
Method of analysis	Linear		Geometrically Linear Analysis

3.18 Calculation result of RC1 - General loading without wind 1 * (CO1 – CO4)

Description	Value	Unit	Comment
CO1 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-51,62	kN	
Sum of support forces in Z	-51,62	kN	Deviation: 0.00 %
Maximum displacement in X-direction	5,1	mm	Member No. 360, x: 0.667 m
Maximum displacement in Y-direction	4,9	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-29,8	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	29,9	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrad	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	11,8	mrad	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	7,1	mrad	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO2 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-47,35	kN	
Sum of support forces in Z	-47,35	kN	Deviation: 0.00 %
Maximum displacement in X-direction	4,5	mm	Member No. 360, x: 0.667 m
Maximum displacement in Y-direction	5,0	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-29,5	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	29,6	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,8	mrad	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	10,0	mrad	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	6,5	mrad	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO3 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-54,10	kN	
Sum of support forces in Z	-54,10	kN	Deviation: 0.00 %
Maximum displacement in X-direction	6,8	mm	Member No. 360, x: 0.571 m
Maximum displacement in Y-direction	6,2	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-38,6	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	38,7	mm	FE Mesh Node No. 485 (X: 5.180, Y: -3.289, Z: 3.445 m)
Maximum rotation about X-axis	31,0	mrad	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	-15,3	mrad	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	9,5	mrad	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO4 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	0,00	kN	
Sum of support forces in Y	0,00	kN	
Sum of loads in Z	-52,75	kN	
Sum of support forces in Z	-52,75	kN	Deviation: 0.00 %
Maximum displacement in X-direction	6,7	mm	Member No. 360, x: 0.571 m
Maximum displacement in Y-direction	6,5	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-40,5	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	40,6	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrad	Member No. 670, x: 0.000 m
Maximum rotation about Y-axis	-15,0	mrad	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	9,4	mrad	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T

3.19 Calculation result of RC2 – Design Values In-service: 1 * (CO10 – CO38)

Description	Value	Unit	Comment
CO10 - 1.15*LC1 + 1.15*LC2 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-28,82	kN	
Sum of support forces in Z	-28,82	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-10,0	mm	Member No. 833, x: 1.274 m
Maximum displacement in Y-direction	23,3	mm	Member No. 243, x: 1.501 m
Maximum displacement in Z-direction	64,0	mm	Member No. 245, x: 1.501 m
Maximum vectorial displacement	67,5	mm	Member No. 245, x: 1.501 m
Maximum rotation about X-axis	-66,8	mrad	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	8,7	mrad	Member No. 666, x: 0.000 m
Maximum rotation about Z-axis	-10,7	mrad	Member No. 833, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO11 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-39,84	kN	
Sum of support forces in Z	-39,84	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,4	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	22,9	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	55,1	mm	Member No. 244, x: 1.501 m
Maximum vectorial displacement	58,7	mm	Member No. 245, x: 1.501 m
Maximum rotation about X-axis	67,3	mrad	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-8,6	mrad	Member No. 362, x: 1.000 m
Maximum rotation about Z-axis	11,6	mrad	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO12 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-35,57	kN	
Sum of support forces in Z	-35,57	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,3	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	23,1	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	55,8	mm	Member No. 244, x: 1.501 m
Maximum vectorial displacement	59,3	mm	Member No. 245, x: 1.501 m
Maximum rotation about X-axis	66,6	mrad	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-8,5	mrad	Member No. 362, x: 1.000 m
Maximum rotation about Z-axis	10,9	mrad	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO13 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-42,32	kN	
Sum of support forces in Z	-42,32	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,6	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	23,5	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	52,3	mm	Member No. 244, x: 1.334 m
Maximum vectorial displacement	56,1	mm	Member No. 245, x: 1.334 m
Maximum rotation about X-axis	70,0	mrad	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-10,8	mrad	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	13,9	mrad	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO14 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	15,22	kN	
Sum of support forces in Y	15,22	kN	Deviation: 0.00 %
Sum of loads in Z	-40,97	kN	
Sum of support forces in Z	-40,97	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,6	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	23,7	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	52,2	mm	Member No. 244, x: 1.334 m
Maximum vectorial displacement	56,1	mm	Member No. 245, x: 1.334 m

Maximum rotation about X-axis	69,9	mrاد	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-10,5	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	13,8	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO15 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	26,77	kN	
Sum of support forces in Y	26,77	kN	Deviation: 0.00 %
Sum of loads in Z	-155,36	kN	
Sum of support forces in Z	-155,36	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-10,4	mm	Member No. 833, x: 1.593 m
Maximum displacement in Y-direction	23,5	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	55,0	mm	Member No. 245, x: 1.501 m
Maximum vectorial displacement	58,8	mm	Member No. 245, x: 1.501 m
Maximum rotation about X-axis	67,1	mrاد	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-30,1	mrاد	FE Mesh Node No. 114 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	-17,1	mrاد	Member No. 723, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO16 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	26,77	kN	
Sum of support forces in Y	26,77	kN	Deviation: 0.00 %
Sum of loads in Z	-151,09	kN	
Sum of support forces in Z	-151,09	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-10,3	mm	Member No. 833, x: 1.593 m
Maximum displacement in Y-direction	23,6	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	55,6	mm	Member No. 244, x: 1.501 m
Maximum vectorial displacement	59,3	mm	Member No. 245, x: 1.501 m
Maximum rotation about X-axis	66,4	mrاد	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-30,1	mrاد	FE Mesh Node No. 114 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	-16,9	mrاد	Member No. 723, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO17 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	26,77	kN	
Sum of support forces in Y	26,77	kN	Deviation: 0.00 %
Sum of loads in Z	-157,84	kN	
Sum of support forces in Z	-157,84	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,6	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	24,1	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	52,1	mm	Member No. 245, x: 1.334 m
Maximum vectorial displacement	56,3	mm	Member No. 245, x: 1.334 m
Maximum rotation about X-axis	69,8	mrاد	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-30,1	mrاد	FE Mesh Node No. 114 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	-17,5	mrاد	Member No. 723, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO18 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC7 + 1.35*LC10			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	26,77	kN	
Sum of support forces in Y	26,77	kN	Deviation: 0.00 %
Sum of loads in Z	-156,49	kN	
Sum of support forces in Z	-156,49	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,6	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	24,3	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	52,1	mm	Member No. 244, x: 1.334 m
Maximum vectorial displacement	56,2	mm	Member No. 245, x: 1.334 m
Maximum rotation about X-axis	69,7	mrاد	Member No. 992, x: 0.070 m
Maximum rotation about Y-axis	-30,1	mrاد	FE Mesh Node No. 114 (X: 9.052, Y: -1.528, Z: -0.186 m)
Maximum rotation about Z-axis	-17,4	mrاد	Member No. 723, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO20 - 1.15*LC1 + 1.15*LC2 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-39,86	kN	
Sum of support forces in Z	-39,86	kN	Deviation: 0.00 %
Maximum displacement in X-direction	16,9	mm	Member No. 44, x: 0.368 m
Maximum displacement in Y-direction	8,0	mm	Member No. 227, x: 0.571 m
Maximum displacement in Z-direction	-19,2	mm	Member No. 202, x: 0.438 m

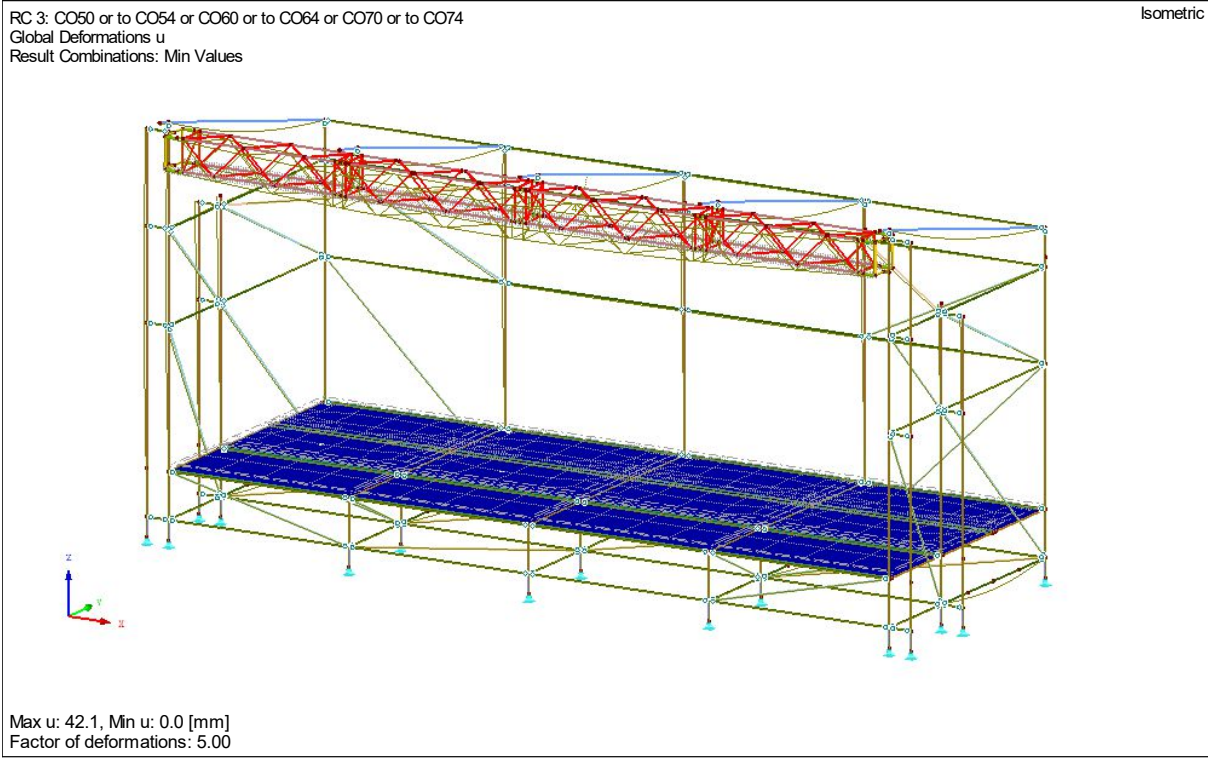
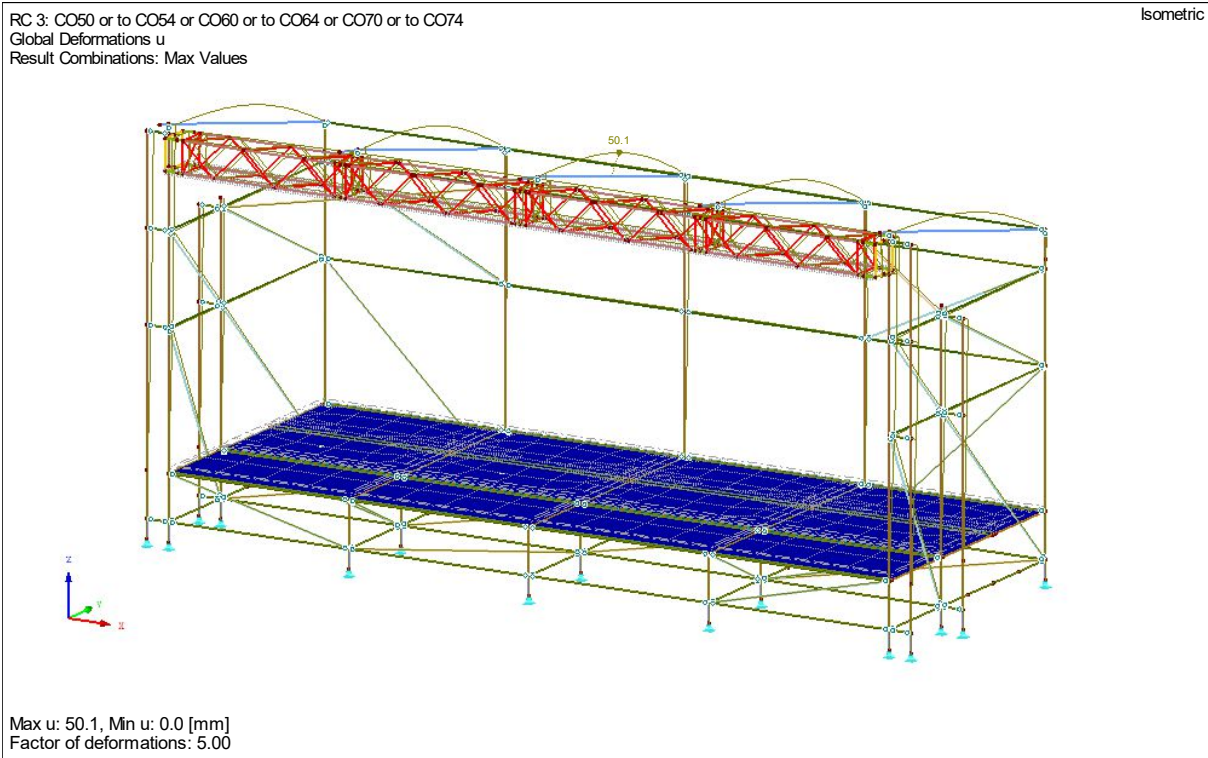
Maximum vectorial displacement	19,2	mm	Member No. 202, x: 0.438 m
Maximum rotation about X-axis	30,6	mrاد	Member No. 647, x: 0.000 m
Maximum rotation about Y-axis	9,6	mrاد	Member No. 749, x: 1.440 m
Maximum rotation about Z-axis	16,5	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO21 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-50,88	kN	
Sum of support forces in Z	-50,88	kN	Deviation: 0.00 %
Maximum displacement in X-direction	20,2	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,8	mm	Member No. 227, x: 0.714 m
Maximum displacement in Z-direction	-30,5	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	35,4	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,8	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	12,0	mrاد	Member No. 749, x: 1.440 m
Maximum rotation about Z-axis	23,6	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO22 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-46,61	kN	
Sum of support forces in Z	-46,61	kN	Deviation: 0.00 %
Maximum displacement in X-direction	19,5	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,7	mm	Member No. 227, x: 0.714 m
Maximum displacement in Z-direction	-30,3	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	34,9	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,7	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	11,6	mrاد	Member No. 749, x: 1.440 m
Maximum rotation about Z-axis	22,6	mrاد	Member No. 681, x: 0.296 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO23 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-53,36	kN	
Sum of support forces in Z	-53,36	kN	Deviation: 0.00 %
Maximum displacement in X-direction	21,4	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	10,6	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-39,3	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	43,2	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	15,2	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	26,1	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO24 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC11			
Sum of loads in X	4,58	kN	
Sum of support forces in X	4,58	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-52,01	kN	
Sum of support forces in Z	-52,01	kN	Deviation: 0.00 %
Maximum displacement in X-direction	21,2	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	11,0	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-41,3	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	45,0	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,9	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	14,9	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	26,0	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO25 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	16,13	kN	
Sum of support forces in X	16,13	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-166,41	kN	
Sum of support forces in Z	-166,41	kN	Deviation: 0.00 %
Maximum displacement in X-direction	21,2	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,3	mm	Member No. 483, x: 2.072 m

Maximum displacement in Z-direction	-30,5	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	35,8	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,5	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,8	mrاد	FE Mesh Node No. 382 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	23,4	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO26 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	16,13	kN	
Sum of support forces in X	16,13	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-162,14	kN	
Sum of support forces in Z	-162,14	kN	Deviation: 0.00 %
Maximum displacement in X-direction	20,4	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	9,4	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-30,2	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	35,4	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,4	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,8	mrاد	FE Mesh Node No. 382 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	22,4	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO27 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	16,13	kN	
Sum of support forces in X	16,13	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-168,89	kN	
Sum of support forces in Z	-168,89	kN	Deviation: 0.00 %
Maximum displacement in X-direction	22,3	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	10,6	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-39,3	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	43,6	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,5	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,8	mrاد	FE Mesh Node No. 382 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	25,9	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO28 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC8 + 1.35*LC11			
Sum of loads in X	16,13	kN	
Sum of support forces in X	16,13	kN	Deviation: 0.00 %
Sum of loads in Y	2,45	kN	
Sum of support forces in Y	2,45	kN	Deviation: 0.00 %
Sum of loads in Z	-167,54	kN	
Sum of support forces in Z	-167,54	kN	Deviation: 0.00 %
Maximum displacement in X-direction	22,1	mm	Member No. 47, x: 0.184 m
Maximum displacement in Y-direction	11,0	mm	Member No. 483, x: 2.072 m
Maximum displacement in Z-direction	-41,2	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	45,3	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	30,5	mrاد	Member No. 581, x: 0.000 m
Maximum rotation about Y-axis	30,8	mrاد	FE Mesh Node No. 382 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	25,8	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO30 - 1.15*LC1 + 1.15*LC2 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-45,75	kN	
Sum of support forces in Z	-45,75	kN	Deviation: 0.00 %
Maximum displacement in X-direction	13,4	mm	Member No. 21, x: 0.100 m
Maximum displacement in Y-direction	-19,5	mm	Member No. 243, x: 1.501 m
Maximum displacement in Z-direction	-35,0	mm	Member No. 243, x: 1.501 m
Maximum vectorial displacement	40,1	mm	Member No. 243, x: 1.501 m
Maximum rotation about X-axis	36,5	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	8,3	mrاد	Member No. 351, x: 0.750 m
Maximum rotation about Z-axis	-11,5	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO31 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-56,77	kN	
Sum of support forces in Z	-56,77	kN	Deviation: 0.00 %
Maximum displacement in X-direction	11,0	mm	Member No. 21, x: 0.100 m

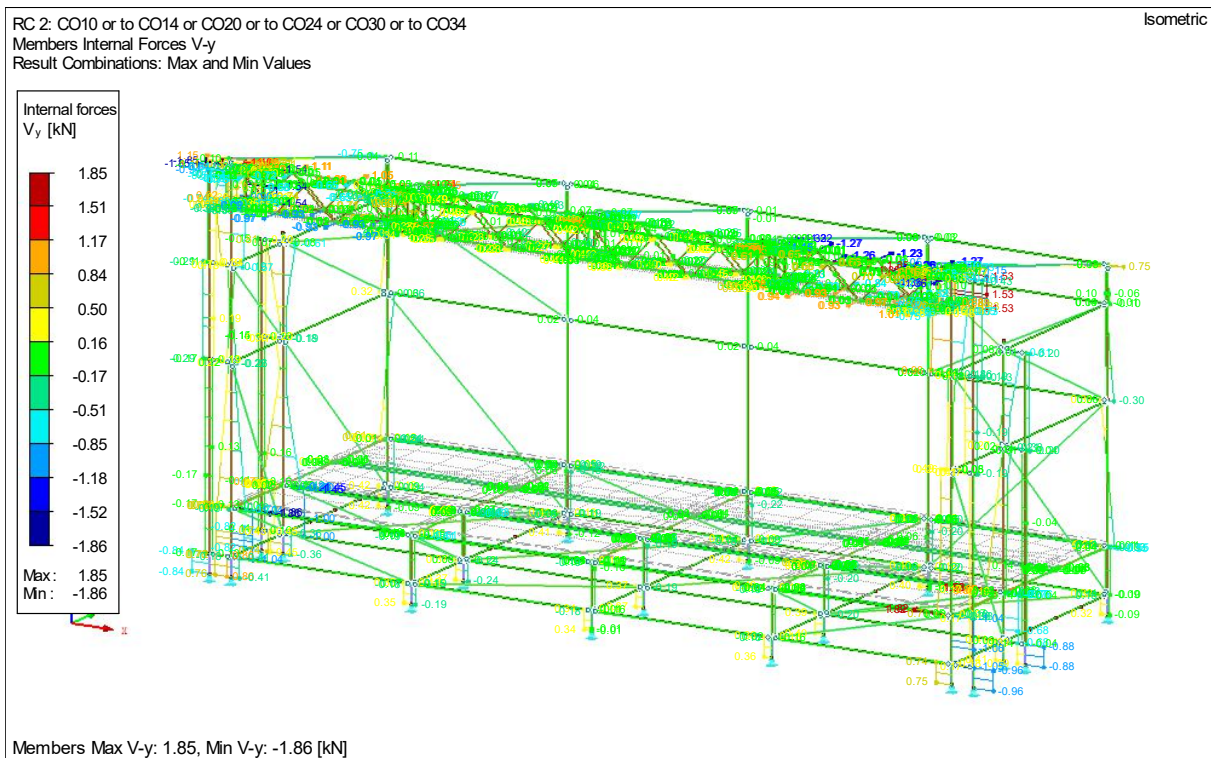
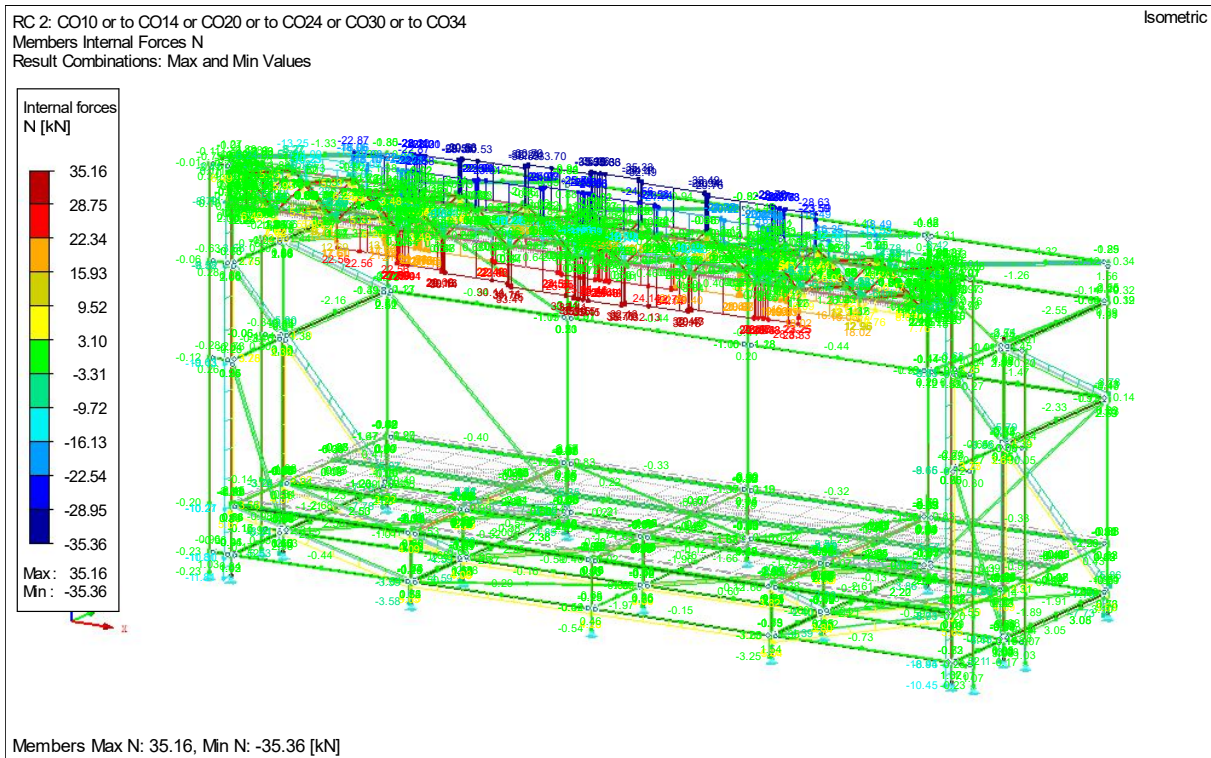
Maximum displacement in Y-direction	-18,2	mm	Member No. 243, x: 1.668 m
Maximum displacement in Z-direction	-47,6	mm	Member No. 243, x: 1.668 m
Maximum vectorial displacement	51,0	mm	Member No. 243, x: 1.668 m
Maximum rotation about X-axis	42,9	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-13,9	mrاد	Member No. 847, x: 0.030 m
Maximum rotation about Z-axis	-11,2	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO32 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-52,50	kN	
Sum of support forces in Z	-52,50	kN	Deviation: 0.00 %
Maximum displacement in X-direction	11,2	mm	Member No. 21, x: 0.100 m
Maximum displacement in Y-direction	-18,1	mm	Member No. 243, x: 1.668 m
Maximum displacement in Z-direction	-47,4	mm	Member No. 243, x: 1.668 m
Maximum vectorial displacement	50,7	mm	Member No. 243, x: 1.668 m
Maximum rotation about X-axis	42,7	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-12,1	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	-11,1	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO33 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-59,25	kN	
Sum of support forces in Z	-59,25	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,1	mm	Member No. 21, x: 0.100 m
Maximum displacement in Y-direction	-18,0	mm	Member No. 243, x: 2.002 m
Maximum displacement in Z-direction	-52,3	mm	Member No. 243, x: 2.002 m
Maximum vectorial displacement	55,3	mm	Member No. 243, x: 2.002 m
Maximum rotation about X-axis	45,0	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-17,4	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	-11,6	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO34 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-12,44	kN	
Sum of support forces in Y	-12,44	kN	Deviation: 0.00 %
Sum of loads in Z	-57,90	kN	
Sum of support forces in Z	-57,90	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,1	mm	Member No. 21, x: 0.100 m
Maximum displacement in Y-direction	-17,9	mm	Member No. 243, x: 2.002 m
Maximum displacement in Z-direction	-53,3	mm	Member No. 243, x: 2.002 m
Maximum vectorial displacement	56,2	mm	Member No. 243, x: 2.002 m
Maximum rotation about X-axis	45,3	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-17,1	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	-11,6	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO35 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-23,99	kN	
Sum of support forces in Y	-23,99	kN	Deviation: 0.00 %
Sum of loads in Z	-172,29	kN	
Sum of support forces in Z	-172,29	kN	Deviation: 0.00 %
Maximum displacement in X-direction	11,5	mm	Member No. 21, x: 0.100 m
Maximum displacement in Y-direction	-18,7	mm	Member No. 243, x: 1.668 m
Maximum displacement in Z-direction	-47,5	mm	Member No. 243, x: 1.668 m
Maximum vectorial displacement	51,1	mm	Member No. 243, x: 1.668 m
Maximum rotation about X-axis	42,8	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,2	mrاد	FE Mesh Node No. 382 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	-17,3	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO36 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-23,99	kN	
Sum of support forces in Y	-23,99	kN	Deviation: 0.00 %
Sum of loads in Z	-168,02	kN	
Sum of support forces in Z	-168,02	kN	Deviation: 0.00 %

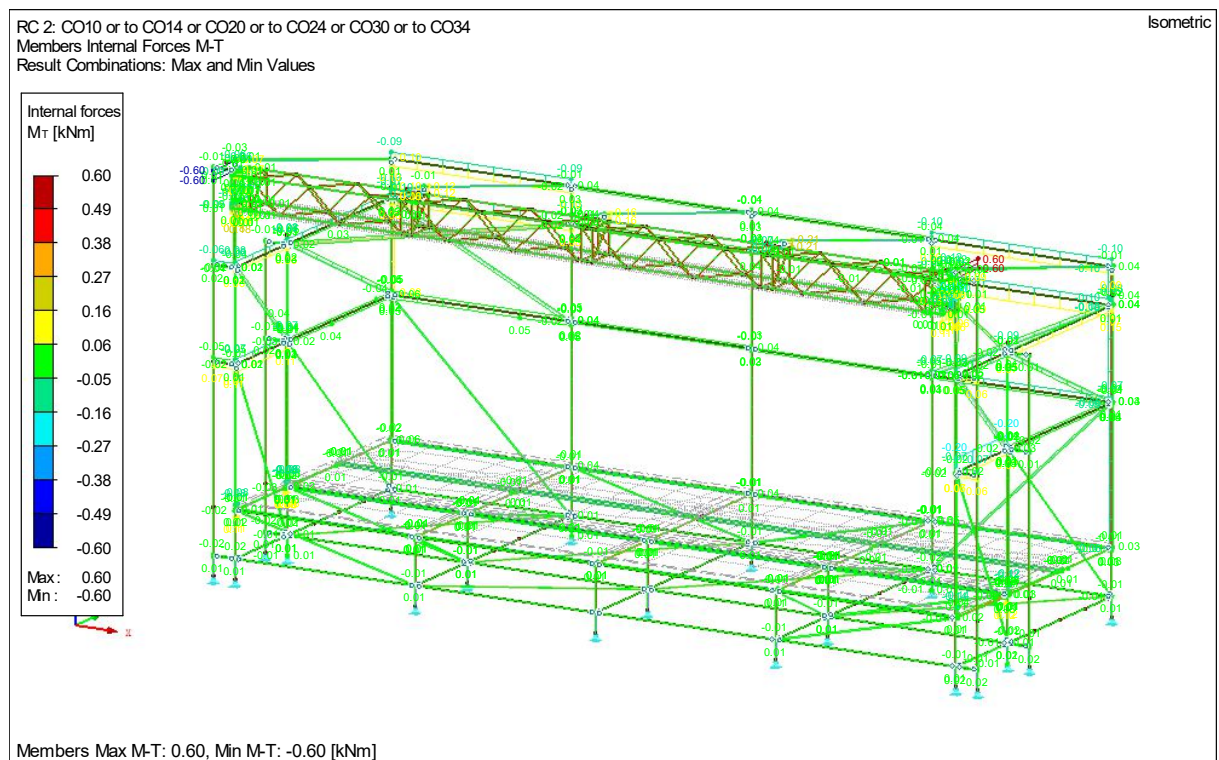
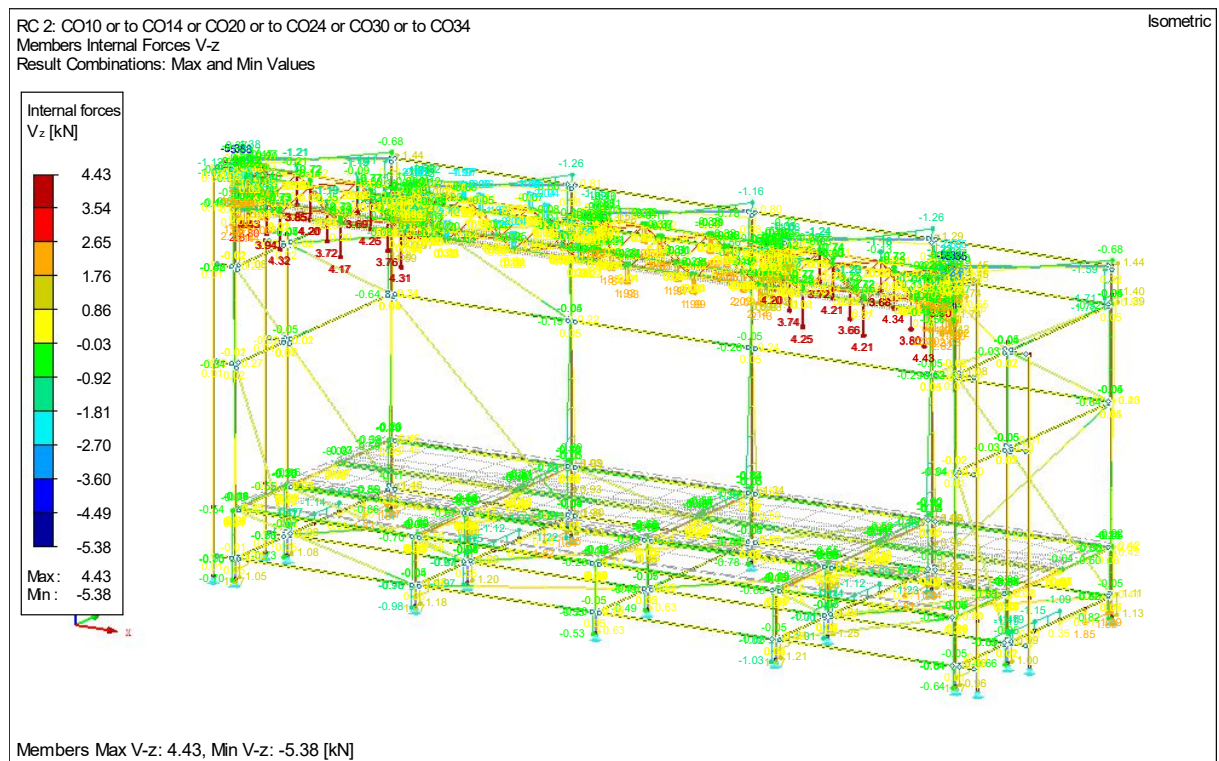
Maximum displacement in X-direction	11,7	mm	Member No. 21, x: 0.100 m
Maximum displacement in Y-direction	-18,5	mm	Member No. 243, x: 1.668 m
Maximum displacement in Z-direction	-47,3	mm	Member No. 243, x: 1.668 m
Maximum vectorial displacement	50,8	mm	Member No. 243, x: 1.668 m
Maximum rotation about X-axis	42,6	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,2	mrاد	FE Mesh Node No. 382 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	-17,2	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
C037 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-23,99	kN	
Sum of support forces in Y	-23,99	kN	Deviation: 0.00 %
Sum of loads in Z	-174,77	kN	
Sum of support forces in Z	-174,77	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,6	mm	Member No. 21, x: 0.100 m
Maximum displacement in Y-direction	-18,4	mm	Member No. 243, x: 2.002 m
Maximum displacement in Z-direction	-52,2	mm	Member No. 243, x: 2.002 m
Maximum vectorial displacement	55,4	mm	Member No. 243, x: 2.002 m
Maximum rotation about X-axis	44,9	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	30,2	mrاد	FE Mesh Node No. 382 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	-17,8	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
C038 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC9 + 1.35*LC12			
Sum of loads in X	1,30	kN	
Sum of support forces in X	1,30	kN	Deviation: 0.00 %
Sum of loads in Y	-23,99	kN	
Sum of support forces in Y	-23,99	kN	Deviation: 0.00 %
Sum of loads in Z	-173,42	kN	
Sum of support forces in Z	-173,42	kN	Deviation: 0.00 %
Maximum displacement in X-direction	10,6	mm	Member No. 21, x: 0.100 m
Maximum displacement in Y-direction	-18,3	mm	Member No. 243, x: 2.002 m
Maximum displacement in Z-direction	-53,2	mm	Member No. 243, x: 2.002 m
Maximum vectorial displacement	56,3	mm	Member No. 243, x: 2.002 m
Maximum rotation about X-axis	45,2	mrاد	Member No. 243, x: 0.000 m
Maximum rotation about Y-axis	30,2	mrاد	FE Mesh Node No. 382 (X: 1.307, Y: -1.527, Z: -0.186 m)
Maximum rotation about Z-axis	-17,8	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T

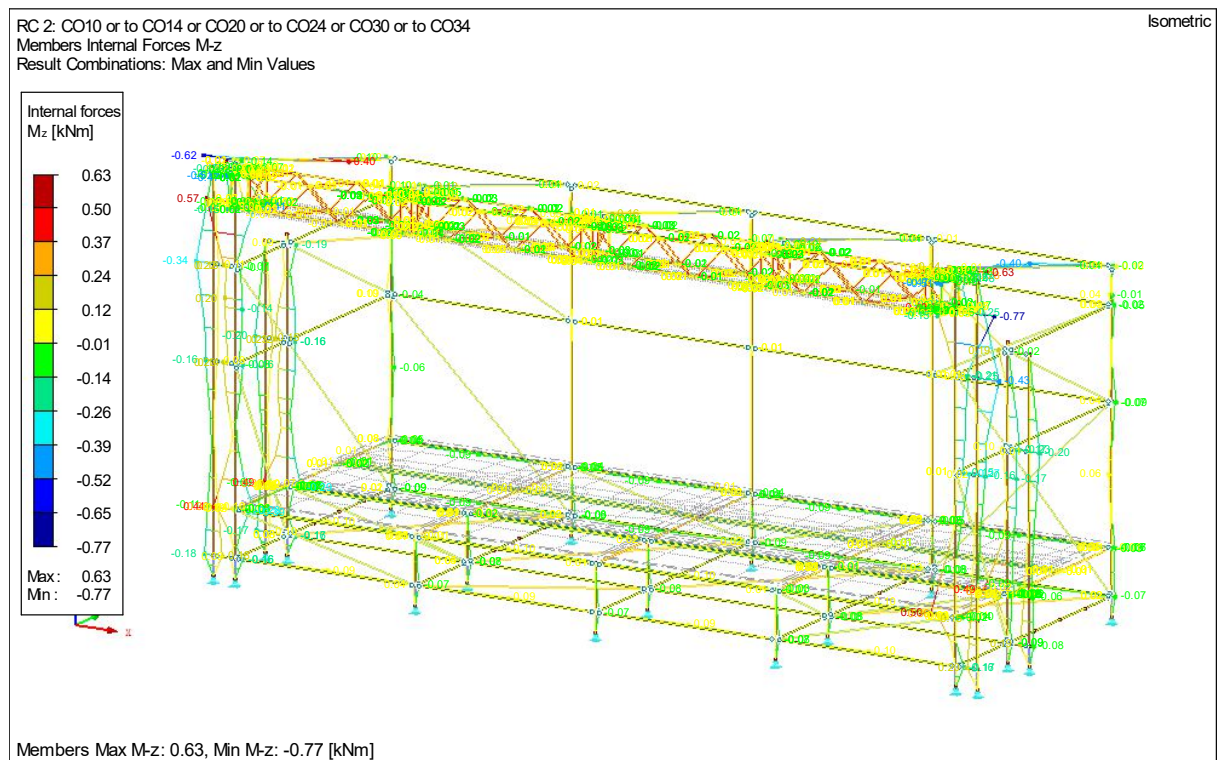
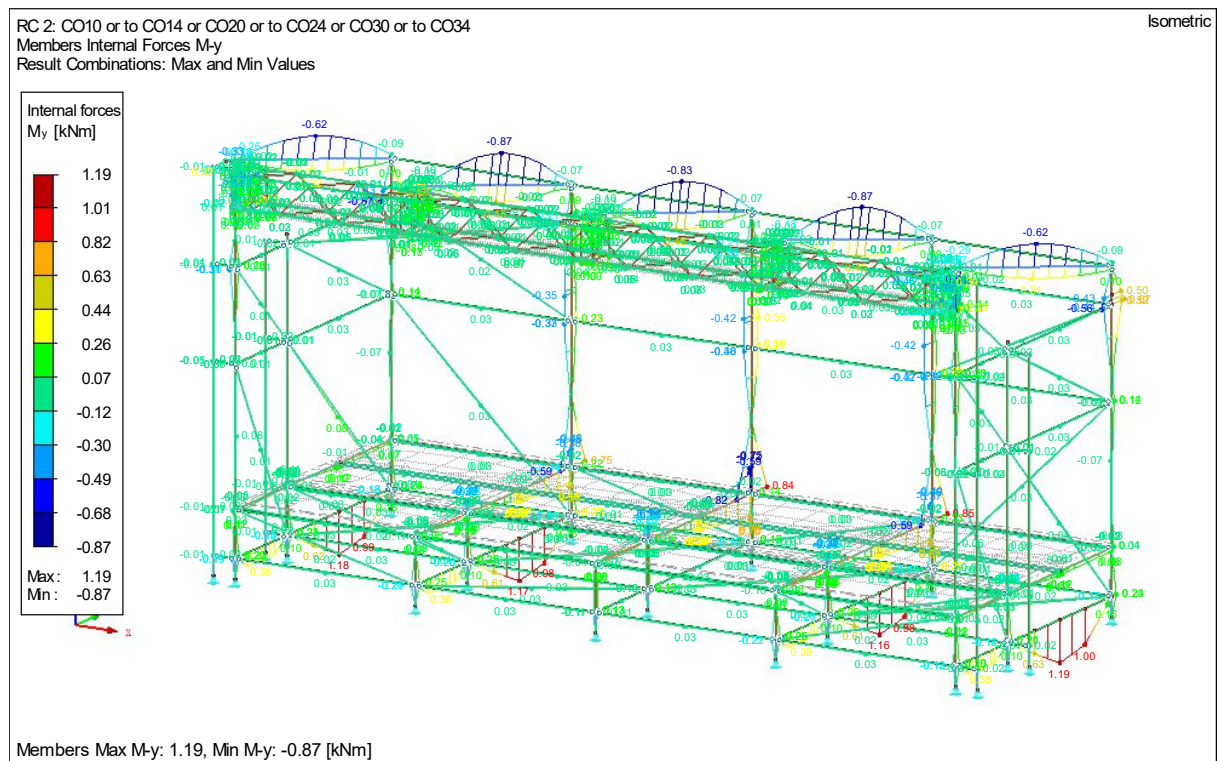
3.19.1 Deformation of the In-service situation characteristic max and min values.



3.19.2 Internal force diagram RC2 Design values In-service.







3.20 Calculation result of RC4 - Design Values Out-service: 1 * (CO100 – CO124)

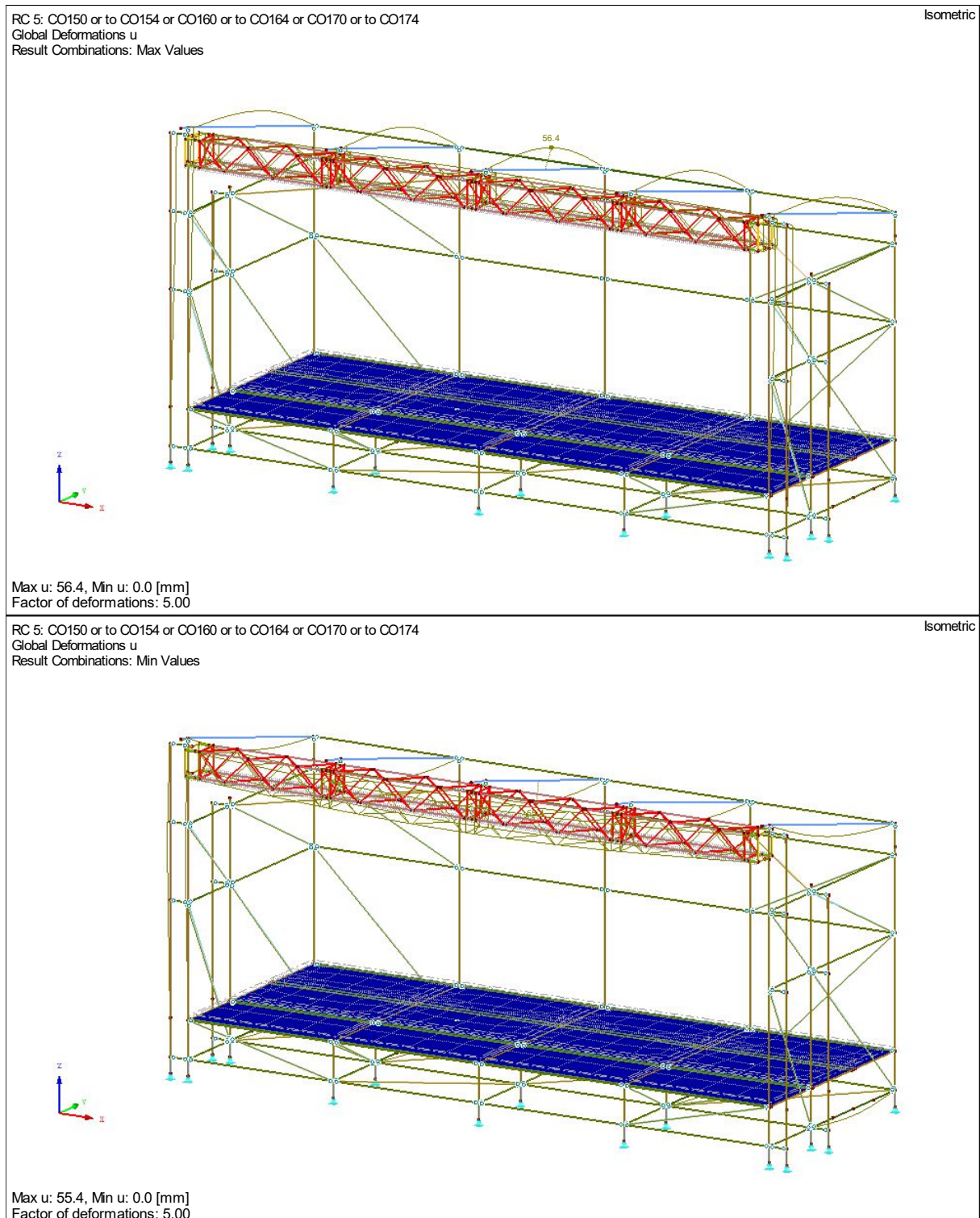
Description	Value	Unit	Comment
CO100 - 1.15*LC1 + 1.15*LC2 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-27,71	kN	
Sum of support forces in Z	-27,71	kN	Deviation: 0.00 %
Maximum displacement in X-direction	-11,2	mm	Member No. 833, x: 1.274 m
Maximum displacement in Y-direction	19,1	mm	Member No. 243, x: 1.501 m
Maximum displacement in Z-direction	72,9	mm	Member No. 243, x: 1.501 m
Maximum vectorial displacement	75,3	mm	Member No. 243, x: 1.501 m
Maximum rotation about X-axis	-75,7	mrad	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	-5,5	mrad	Member No. 837, x: 2.549 m
Maximum rotation about Z-axis	-20,9	mrad	Member No. 723, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO101 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-38,74	kN	
Sum of support forces in Z	-38,74	kN	Deviation: 0.00 %
Maximum displacement in X-direction	11,6	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	20,3	mm	Member No. 243, x: 1.501 m
Maximum displacement in Z-direction	61,5	mm	Member No. 244, x: 1.501 m
Maximum vectorial displacement	64,7	mm	Member No. 243, x: 1.501 m
Maximum rotation about X-axis	74,6	mrad	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-6,3	mrad	Member No. 847, x: 0.038 m
Maximum rotation about Z-axis	22,5	mrad	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO102 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-34,46	kN	
Sum of support forces in Z	-34,46	kN	Deviation: 0.00 %
Maximum displacement in X-direction	11,6	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	20,4	mm	Member No. 243, x: 1.501 m
Maximum displacement in Z-direction	62,1	mm	Member No. 244, x: 1.501 m
Maximum vectorial displacement	64,9	mm	Member No. 243, x: 1.501 m
Maximum rotation about X-axis	74,6	mrad	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	4,8	mrad	Member No. 164, x: 0.039 m
Maximum rotation about Z-axis	22,4	mrad	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO103 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-41,21	kN	
Sum of support forces in Z	-41,21	kN	Deviation: 0.00 %
Maximum displacement in X-direction	11,9	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	20,8	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	58,6	mm	Member No. 244, x: 1.501 m
Maximum vectorial displacement	61,7	mm	Member No. 243, x: 1.334 m
Maximum rotation about X-axis	77,6	mrad	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-9,8	mrad	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	22,9	mrad	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO104 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC13			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	5,37	kN	
Sum of support forces in Y	5,37	kN	Deviation: 0.00 %
Sum of loads in Z	-39,86	kN	
Sum of support forces in Z	-39,86	kN	Deviation: 0.00 %
Maximum displacement in X-direction	11,9	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	21,0	mm	Member No. 243, x: 1.334 m

Maximum displacement in Z-direction	58,5	mm	Member No. 244, x: 1.501 m
Maximum vectorial displacement	61,4	mm	Member No. 244, x: 1.501 m
Maximum rotation about X-axis	78,3	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	-9,5	mrاد	Member No. 847, x: 0.023 m
Maximum rotation about Z-axis	22,9	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO110 - 1.15*LC1 + 1.15*LC2 + 1.35*LC14			
Sum of loads in X	2,38	kN	
Sum of support forces in X	2,38	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-30,93	kN	
Sum of support forces in Z	-30,93	kN	Deviation: 0.00 %
Maximum displacement in X-direction	20,1	mm	Member No. 837, x: 1.912 m
Maximum displacement in Y-direction	12,2	mm	Member No. 243, x: 1.501 m
Maximum displacement in Z-direction	54,0	mm	Member No. 243, x: 1.501 m
Maximum vectorial displacement	56,4	mm	Member No. 243, x: 1.501 m
Maximum rotation about X-axis	-56,1	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	9,2	mrاد	Member No. 751, x: 1.440 m
Maximum rotation about Z-axis	16,0	mrاد	Member No. 683, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO111 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC14			
Sum of loads in X	2,38	kN	
Sum of support forces in X	2,38	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-41,96	kN	
Sum of support forces in Z	-41,96	kN	Deviation: 0.00 %
Maximum displacement in X-direction	22,0	mm	Member No. 837, x: 2.230 m
Maximum displacement in Y-direction	13,9	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	44,2	mm	Member No. 245, x: 1.501 m
Maximum vectorial displacement	47,4	mm	Member No. 245, x: 1.501 m
Maximum rotation about X-axis	58,5	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	11,2	mrاد	Member No. 749, x: 1.440 m
Maximum rotation about Z-axis	19,0	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO112 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC14			
Sum of loads in X	2,38	kN	
Sum of support forces in X	2,38	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-37,68	kN	
Sum of support forces in Z	-37,68	kN	Deviation: 0.00 %
Maximum displacement in X-direction	21,5	mm	Member No. 837, x: 2.230 m
Maximum displacement in Y-direction	14,0	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	44,9	mm	Member No. 245, x: 1.501 m
Maximum vectorial displacement	47,9	mm	Member No. 245, x: 1.501 m
Maximum rotation about X-axis	58,4	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	10,8	mrاد	Member No. 749, x: 1.440 m
Maximum rotation about Z-axis	18,0	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO113 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC14			
Sum of loads in X	2,38	kN	
Sum of support forces in X	2,38	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-44,43	kN	
Sum of support forces in Z	-44,43	kN	Deviation: 0.00 %
Maximum displacement in X-direction	22,6	mm	Member No. 837, x: 2.230 m
Maximum displacement in Y-direction	14,5	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	-45,6	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	49,7	mm	FE Mesh Node No. 485 (X: 5.180, Y: -3.289, Z: 3.445 m)
Maximum rotation about X-axis	61,4	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	12,0	mrاد	Member No. 749, x: 1.440 m
Maximum rotation about Z-axis	21,5	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO114 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC14			
Sum of loads in X	2,38	kN	
Sum of support forces in X	2,38	kN	Deviation: 0.00 %
Sum of loads in Y	2,15	kN	
Sum of support forces in Y	2,15	kN	Deviation: 0.00 %
Sum of loads in Z	-43,08	kN	
Sum of support forces in Z	-43,08	kN	Deviation: 0.00 %
Maximum displacement in X-direction	22,5	mm	Member No. 837, x: 2.230 m

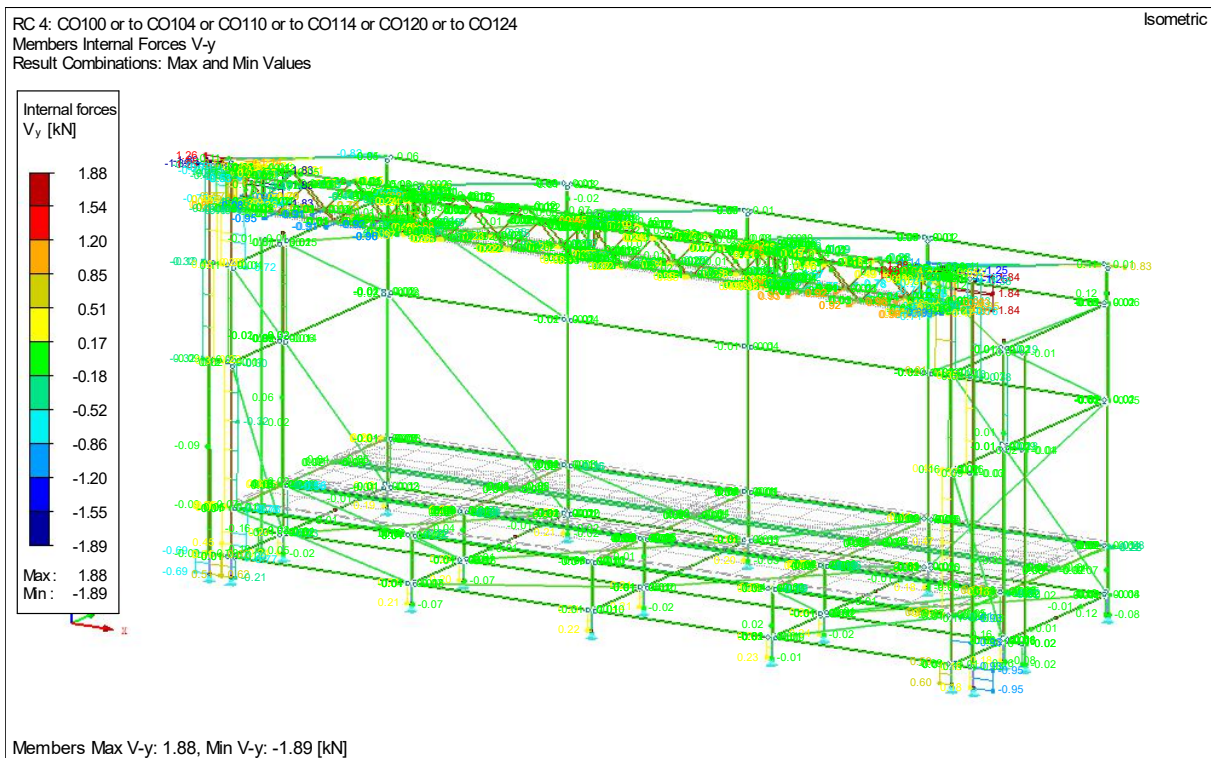
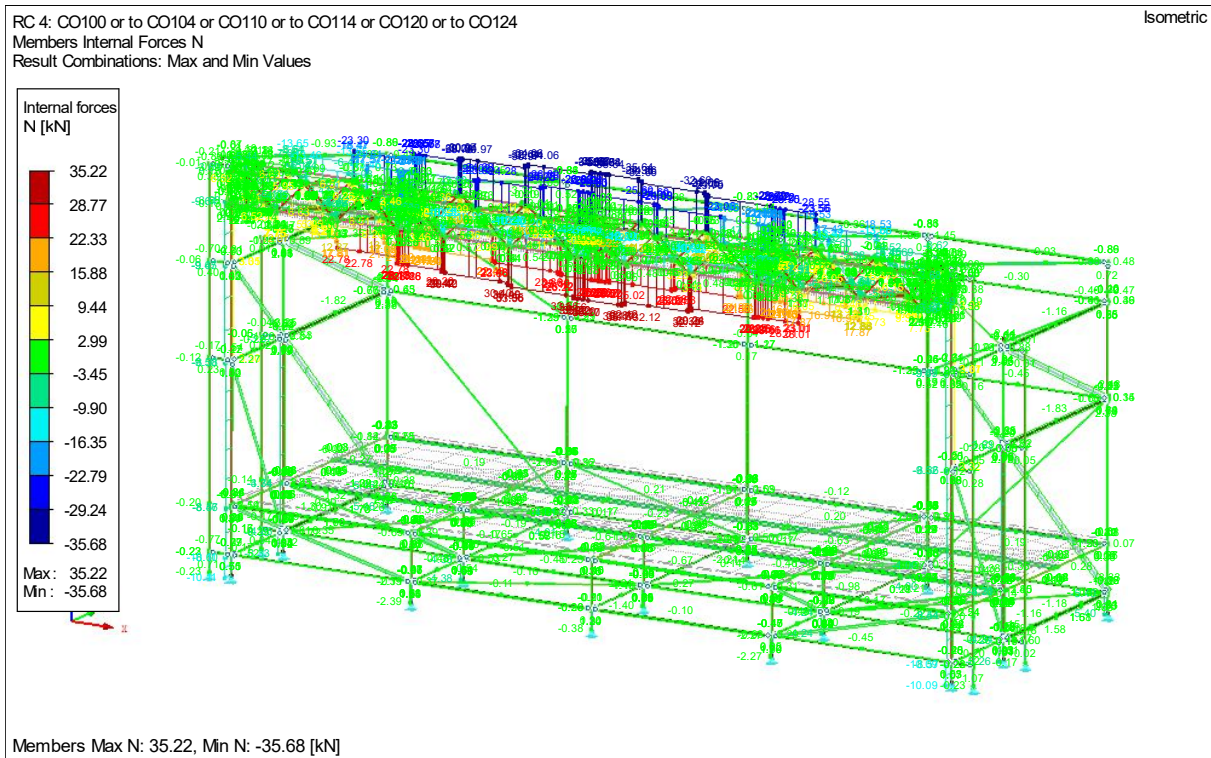
Maximum displacement in Y-direction	14,6	mm	Member No. 243, x: 1.334 m
Maximum displacement in Z-direction	-47,5	mm	Member No. 45, x: 0.368 m
Maximum vectorial displacement	51,5	mm	Member No. 45, x: 0.368 m
Maximum rotation about X-axis	62,1	mrاد	Member No. 991, x: 0.070 m
Maximum rotation about Y-axis	11,9	mrاد	Member No. 749, x: 1.440 m
Maximum rotation about Z-axis	21,4	mrاد	Member No. 681, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO120 - 1.15*LC1 + 1.15*LC2 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-48,65	kN	
Sum of support forces in Z	-48,65	kN	Deviation: 0.00 %
Maximum displacement in X-direction	8,7	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	-14,6	mm	Member No. 243, x: 1.501 m
Maximum displacement in Z-direction	-55,1	mm	Member No. 243, x: 1.501 m
Maximum vectorial displacement	57,0	mm	Member No. 243, x: 1.501 m
Maximum rotation about X-axis	56,4	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	5,0	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	20,6	mrاد	Member No. 723, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO121 - 1.15*LC1 + 1.15*LC2 + 1.35*LC3 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-59,67	kN	
Sum of support forces in Z	-59,67	kN	Deviation: 0.00 %
Maximum displacement in X-direction	9,5	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	-13,3	mm	Member No. 243, x: 1.668 m
Maximum displacement in Z-direction	-67,9	mm	Member No. 243, x: 1.668 m
Maximum vectorial displacement	69,2	mm	Member No. 243, x: 1.668 m
Maximum rotation about X-axis	62,9	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	15,8	mrاد	Member No. 851, x: 0.030 m
Maximum rotation about Z-axis	-21,6	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO122 - 1.15*LC1 + 1.15*LC2 + 1.35*LC4 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-55,40	kN	
Sum of support forces in Z	-55,40	kN	Deviation: 0.00 %
Maximum displacement in X-direction	9,4	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	-13,2	mm	Member No. 243, x: 1.668 m
Maximum displacement in Z-direction	-67,7	mm	Member No. 243, x: 1.668 m
Maximum vectorial displacement	68,9	mm	Member No. 243, x: 1.668 m
Maximum rotation about X-axis	62,7	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	14,1	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	-21,5	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO123 - 1.15*LC1 + 1.15*LC2 + 1.35*LC5 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-62,15	kN	
Sum of support forces in Z	-62,15	kN	Deviation: 0.00 %
Maximum displacement in X-direction	9,7	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	-12,9	mm	Member No. 243, x: 1.668 m
Maximum displacement in Z-direction	-71,9	mm	Member No. 243, x: 1.668 m
Maximum vectorial displacement	73,1	mm	Member No. 243, x: 1.668 m
Maximum rotation about X-axis	65,0	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	19,4	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	22,1	mrاد	Member No. 723, x: 0.250 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T
CO124 - 1.15*LC1 + 1.15*LC2 + 1.35*LC6 + 1.35*LC15			
Sum of loads in X	0,00	kN	
Sum of support forces in X	0,00	kN	
Sum of loads in Y	-4,19	kN	
Sum of support forces in Y	-4,19	kN	Deviation: 0.00 %
Sum of loads in Z	-60,80	kN	
Sum of support forces in Z	-60,80	kN	Deviation: 0.00 %

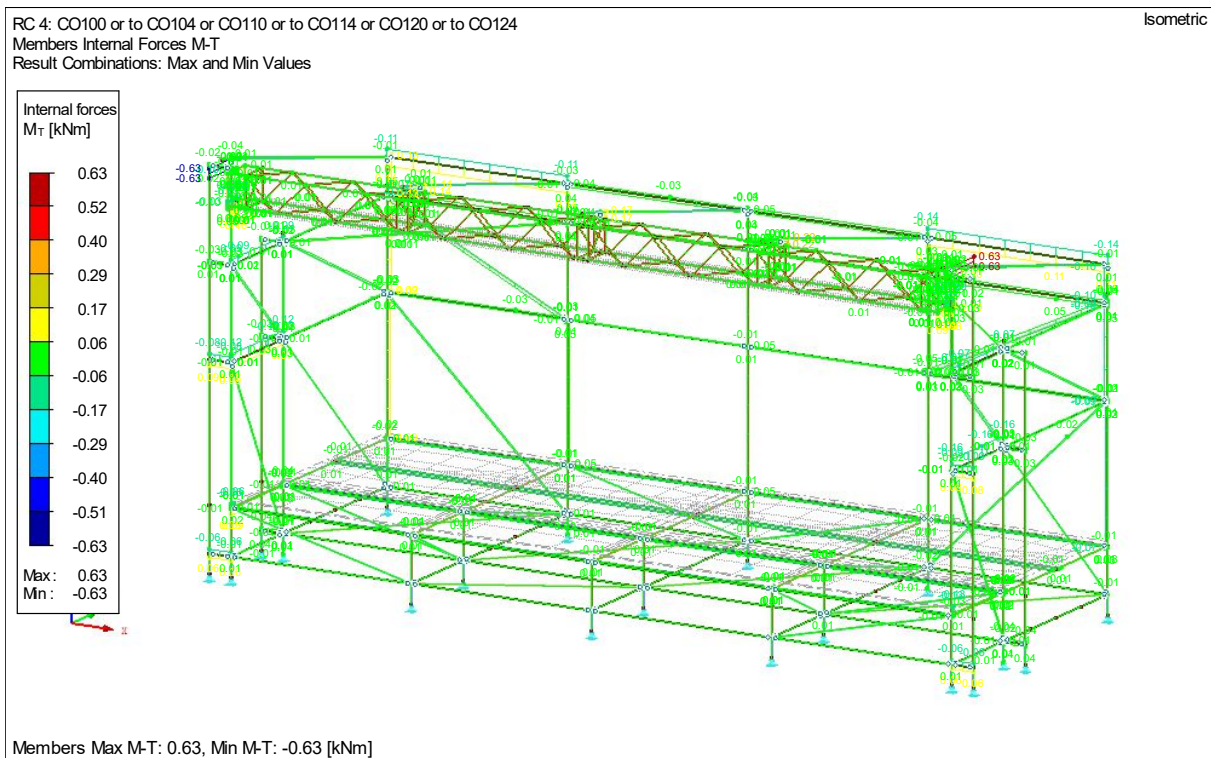
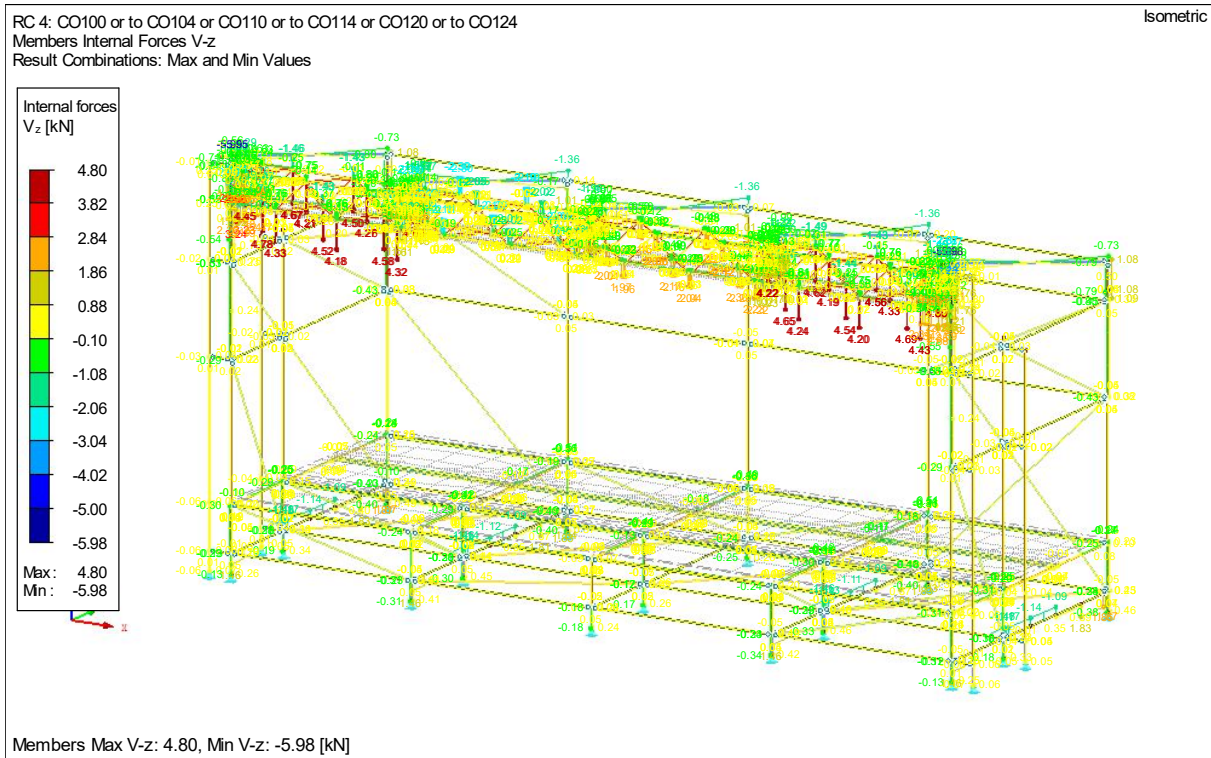
Maximum displacement in X-direction	9,7	mm	Member No. 837, x: 1.593 m
Maximum displacement in Y-direction	-12,7	mm	Member No. 243, x: 1.668 m
Maximum displacement in Z-direction	-72,7	mm	Member No. 243, x: 1.668 m
Maximum vectorial displacement	73,8	mm	Member No. 243, x: 1.668 m
Maximum rotation about X-axis	65,3	mrاد	Member No. 483, x: 2.072 m
Maximum rotation about Y-axis	19,1	mrاد	Member No. 851, x: 0.023 m
Maximum rotation about Z-axis	-22,1	mrاد	Member No. 720, x: 0.000 m
Method of analysis	2nd Order		Second order analysis (Nonlinear)
Internal forces referred to deformed system for...	+		N, V _y , V _z , M _y , M _z , M _T

3.20.1 Deformation of the Out-service situation characteristic max and min values.



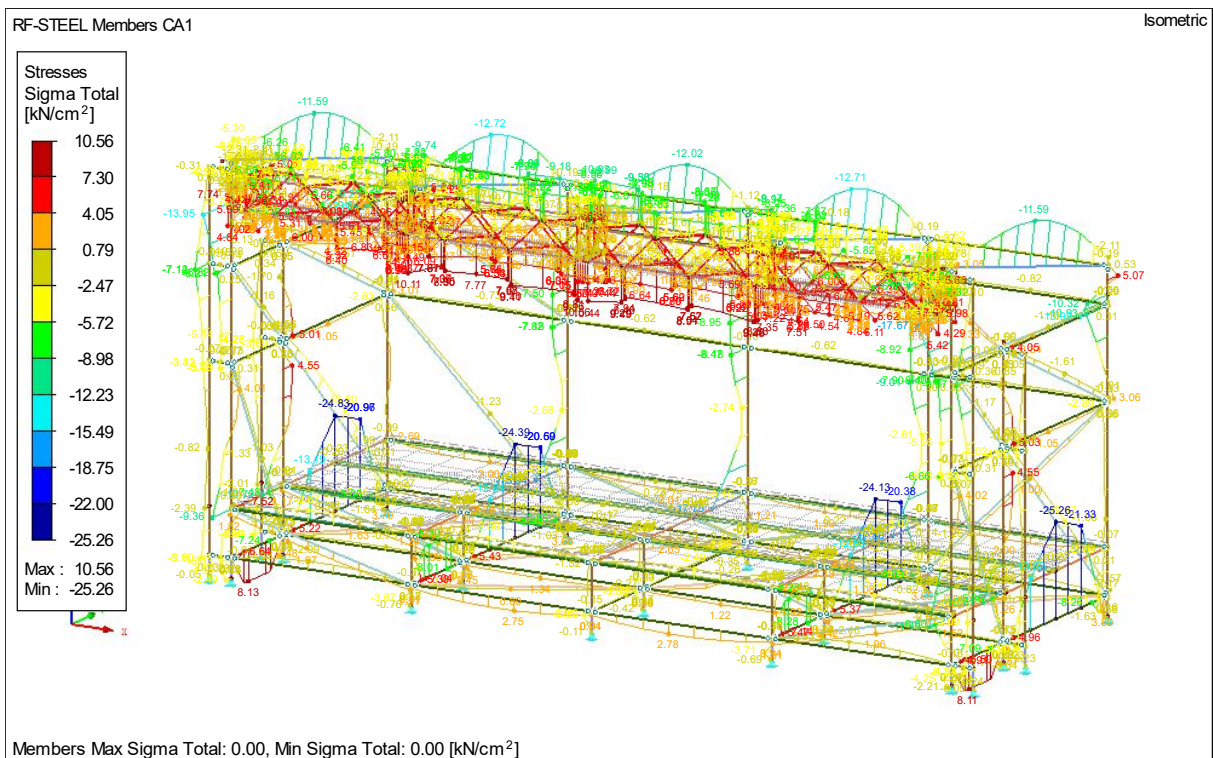
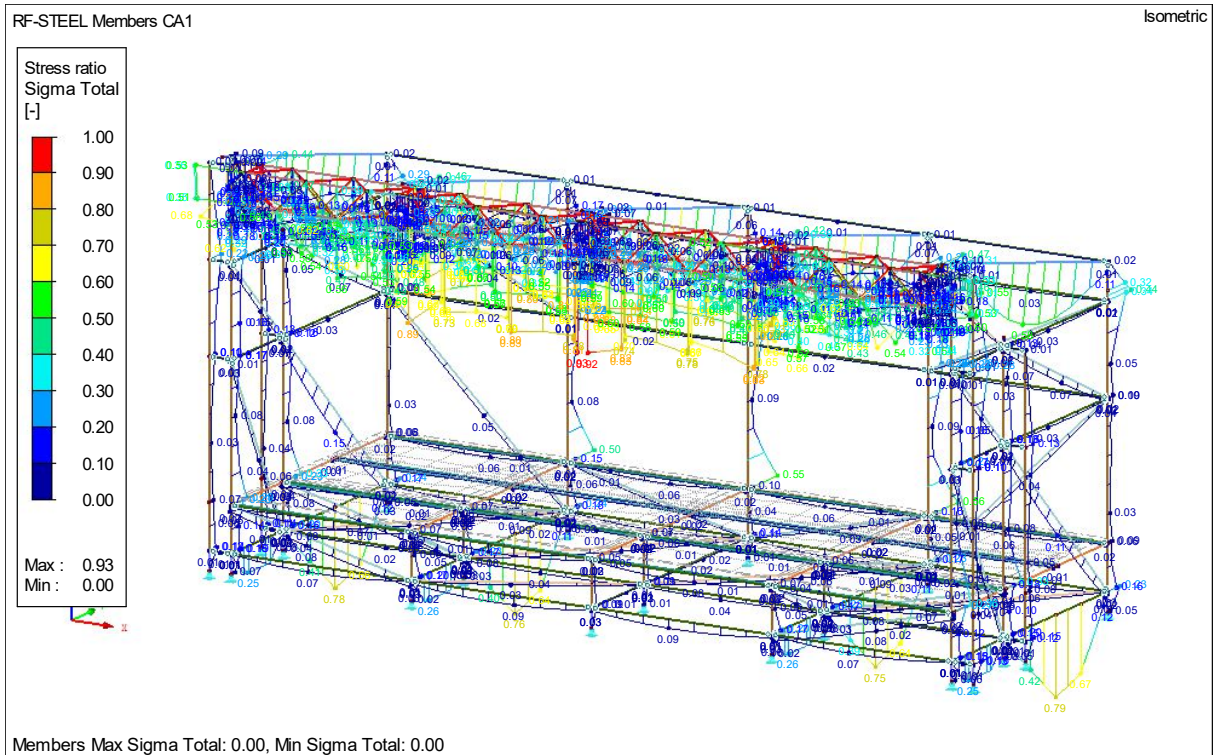
3.20.2 Internal force diagram RC4 Design Values Out-service.





3.21 stress analyse GE24 Layher roof.

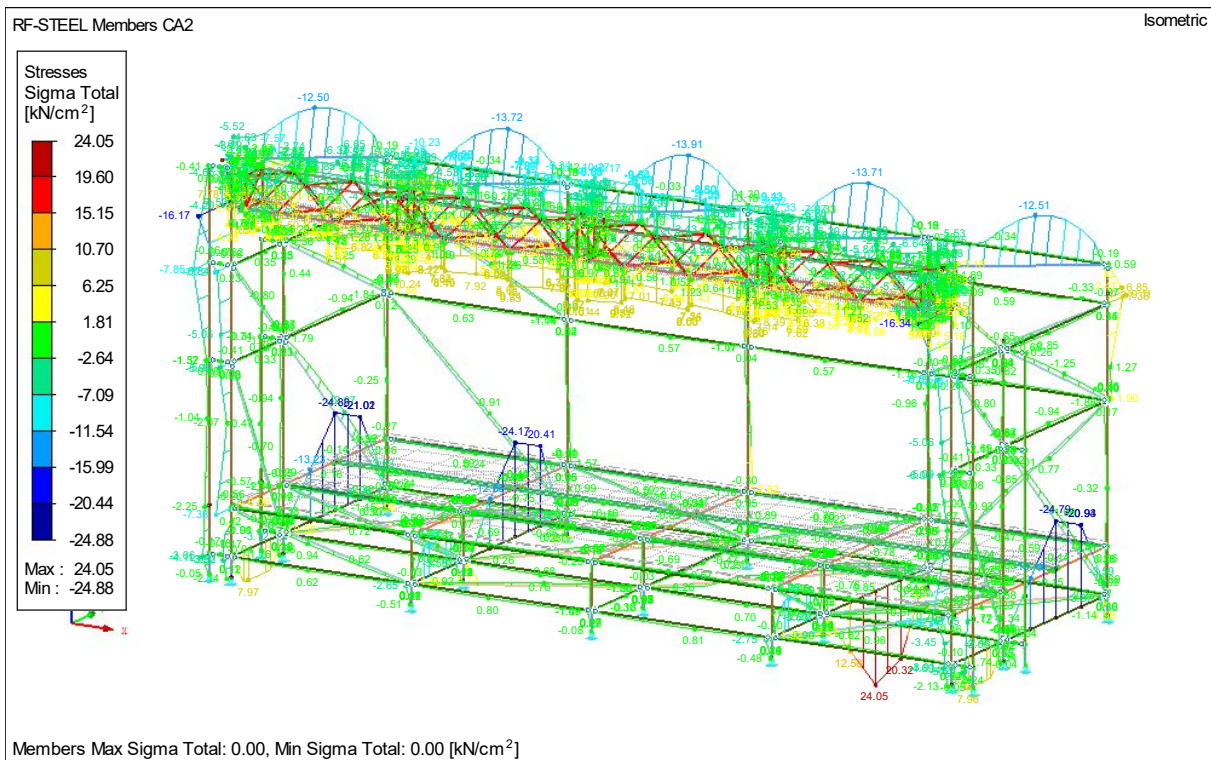
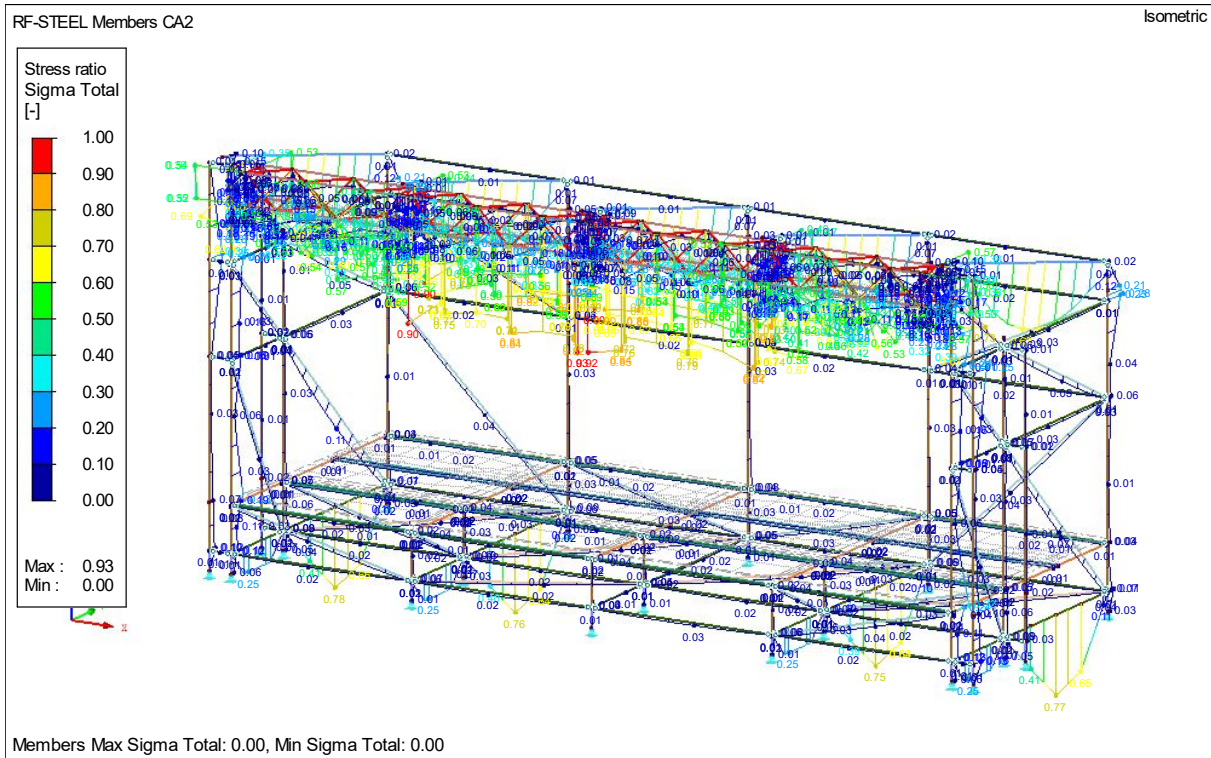
3.21.1 In service Stress calculation.



3.21.2 Utilisation per cross section in the In service.

Section No.	Member No.	Location x [m]	S-Point No.	Load-ing	Stress Type	Stress [kN/cm ²]		Stress Ratio
						Existing	Limit	
1	SHAPE-THIN KEDER PROFIEL ZEILREGEL							
	244	1,668	79	CO13	Sigma Total	-12,72	20,00	0,64
	833	3,186	49	CO13	Tau Total	-3,60	11,55	0,31
	244	1,668	79	CO13	Sigma-equiv	12,74	20,00	0,64
2	QRO 50x4 (Hot Formed)							
	35	0,000	6	CO13	Sigma Total	4,44	11,36	0,39
	39	0,000	16	CO23	Tau Total	1,55	6,56	0,24
	35	0,000	6	CO13	Sigma-equiv	4,44	11,36	0,39
3	Ring 48/3							
	144	0,000	12	CO34	Sigma Total	10,56	11,36	0,93
	95	0,006	36	CO33	Tau Total	2,19	6,56	0,33
	144	0,000	12	CO34	Sigma-equiv	10,56	11,36	0,93
4	Ring 48/6							
	129	0,060	32	CO34	Sigma Total	-5,92	23,64	0,25
	846	0,060	20	CO33	Tau Total	-0,59	13,65	0,04
	129	0,060	32	CO34	Sigma-equiv	5,92	23,64	0,25
5	Ring 20/2							
	884	0,479	10	CO33	Sigma Total	7,74	11,36	0,68
	876	0,339	2	CO33	Tau Total	0,23	6,56	0,03
	884	0,479	10	CO33	Sigma-equiv	7,74	11,36	0,68
6	RO 38x4.5 DIN EN 10220							
	212	0,210	10	CO10	Sigma Total	-8,56	35,50	0,24
	211	0,000	19	CO30	Tau Total	0,65	20,50	0,03
	212	0,210	10	CO10	Sigma-equiv	8,56	35,50	0,24
7	RO 48.3x3.2 (Hot Formed)							
	282	0,000	10	CO30	Sigma Total	-17,86	32,00	0,56
	31	0,100	24	CO13	Tau Total	7,42	18,48	0,40
	282	0,000	10	CO30	Sigma-equiv	17,86	32,00	0,56
8	RO 48.3x3.2 (Hot Formed)							
	207	0,500	10	CO33	Sigma Total	-25,26	32,00	0,79
	680	1,036	1	CO23	Tau Total	-2,20	18,48	0,12
	207	0,500	10	CO33	Sigma-equiv	25,26	32,00	0,79
9	RO 48.3x3.2 (Hot Formed)							
	699	1,302	10	CO14	Sigma Total	-1,49	32,00	0,05
	703	0,000	1	CO33	Tau Total	0,56	18,48	0,03
	703	1,628	28	CO33	Sigma-equiv	1,50	32,00	0,05
10	RO 48.3x2.6 (Hot Formed)							
	726	1,600	10	CO10	Sigma Total	-3,60	23,50	0,15
	750	0,000	19	CO13	Tau Total	-0,70	13,57	0,05
	726	1,600	10	CO10	Sigma-equiv	3,60	23,50	0,15
12	HK 50/30/4/4/4/4							
	473	2,072	10	CO10	Sigma Total	-1,00	20,45	0,05
	467	0,000	8	CO23	Tau Total	0,15	11,81	0,01
	473	2,072	10	CO10	Sigma-equiv	1,01	20,45	0,05
13	Rectangle 50/50							
	1022	0,000	2	CO13	Sigma Total	-3,18	21,27	0,15
	992	0,000	1	CO24	Tau Total	0,81	12,28	0,07
	1022	0,000	2	CO13	Sigma-equiv	3,20	21,27	0,15

3.21.3 Out service Stress calculation



3.21.4 Utilisation per cross section in the Out service.

Section No.	Member No.	Location x [m]	S-Point No.	Load-ing	Stress Type	Stress [kN/cm ²]		Stress Ratio
						Existing	Limit	
1	SHAPE-THIN KEDER PROFIEL ZEILREGEL							
	243	1,334	79	CO104	Sigma Total	-13,91	20,00	0,70
	833	3,186	49	CO103	Tau Total	-4,04	11,55	0,35
	243	1,334	79	CO104	Sigma-equiv	13,91	20,00	0,70
2	QRO 50x4 (Hot Formed)							
	973	0,000	6	CO123	Sigma Total	-4,53	11,36	0,40
	42	0,169	16	CO123	Tau Total	1,67	6,56	0,25
	973	0,000	6	CO123	Sigma-equiv	4,54	11,36	0,40
3	Ring 48/3							
	144	0,000	12	CO124	Sigma Total	10,61	11,36	0,93
	67	0,000	1	CO123	Tau Total	2,30	6,56	0,35
	144	0,000	12	CO124	Sigma-equiv	10,61	11,36	0,93
4	Ring 48/6							
	129	0,060	30	CO124	Sigma Total	-6,09	23,64	0,26
	839	0,000	2	CO123	Tau Total	0,66	13,65	0,05
	129	0,060	30	CO124	Sigma-equiv	6,09	23,64	0,26
5	Ring 20/2							
	868	0,479	10	CO123	Sigma Total	8,35	11,36	0,73
	892	0,000	11	CO123	Tau Total	0,26	6,56	0,04
	868	0,479	10	CO123	Sigma-equiv	8,35	11,36	0,73
6	RO 38x4.5 DIN EN 10220							
	654	0,210	1	CO113	Sigma Total	-5,67	35,50	0,16
	654	0,210	28	CO113	Tau Total	0,39	20,50	0,02
	654	0,210	1	CO113	Sigma-equiv	5,67	35,50	0,16
7	RO 48.3x3.2 (Hot Formed)							
	23	0,661	21	CO123	Sigma Total	-16,34	32,00	0,51
	31	0,100	25	CO103	Tau Total	7,68	18,48	0,42
	23	0,661	21	CO123	Sigma-equiv	16,36	32,00	0,51
8	RO 48.3x3.2 (Hot Formed)							
	239	0,500	10	CO123	Sigma Total	-24,88	32,00	0,78
	680	1,036	35	CO113	Tau Total	-1,82	18,48	0,10
	239	0,500	10	CO123	Sigma-equiv	24,88	32,00	0,78
9	RO 48.3x3.2 (Hot Formed)							
	699	1,302	10	CO100	Sigma Total	-1,20	32,00	0,04
	703	0,000	1	CO114	Tau Total	0,20	18,48	0,01
	699	1,302	10	CO100	Sigma-equiv	1,20	32,00	0,04
10	RO 48.3x2.6 (Hot Formed)							
	726	1,600	10	CO100	Sigma Total	-2,67	23,50	0,11
	746	0,000	17	CO100	Tau Total	-0,68	13,57	0,05
	726	1,600	10	CO100	Sigma-equiv	2,67	23,50	0,11
12	HK 50/30/4/4/4/4							
	467	0,000	14	CO113	Sigma Total	-0,87	20,45	0,04
	467	0,000	8	CO113	Tau Total	0,14	11,81	0,01
	467	0,000	14	CO113	Sigma-equiv	0,90	20,45	0,04
13	Rectangle 50/50							
	1022	0,000	2	CO103	Sigma Total	-3,09	21,27	0,15
	992	0,000	1	CO114	Tau Total	0,83	12,28	0,07
	1022	0,000	2	CO103	Sigma-equiv	3,09	21,27	0,15

4.0 Detail calculations for different parts.

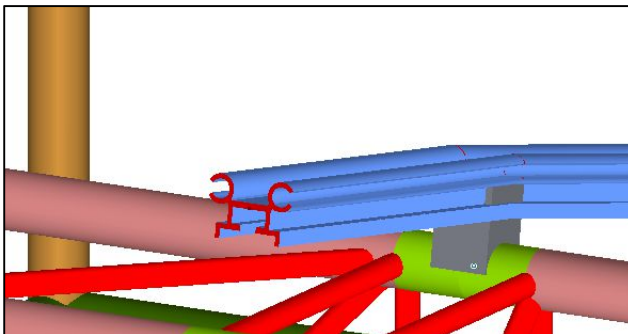
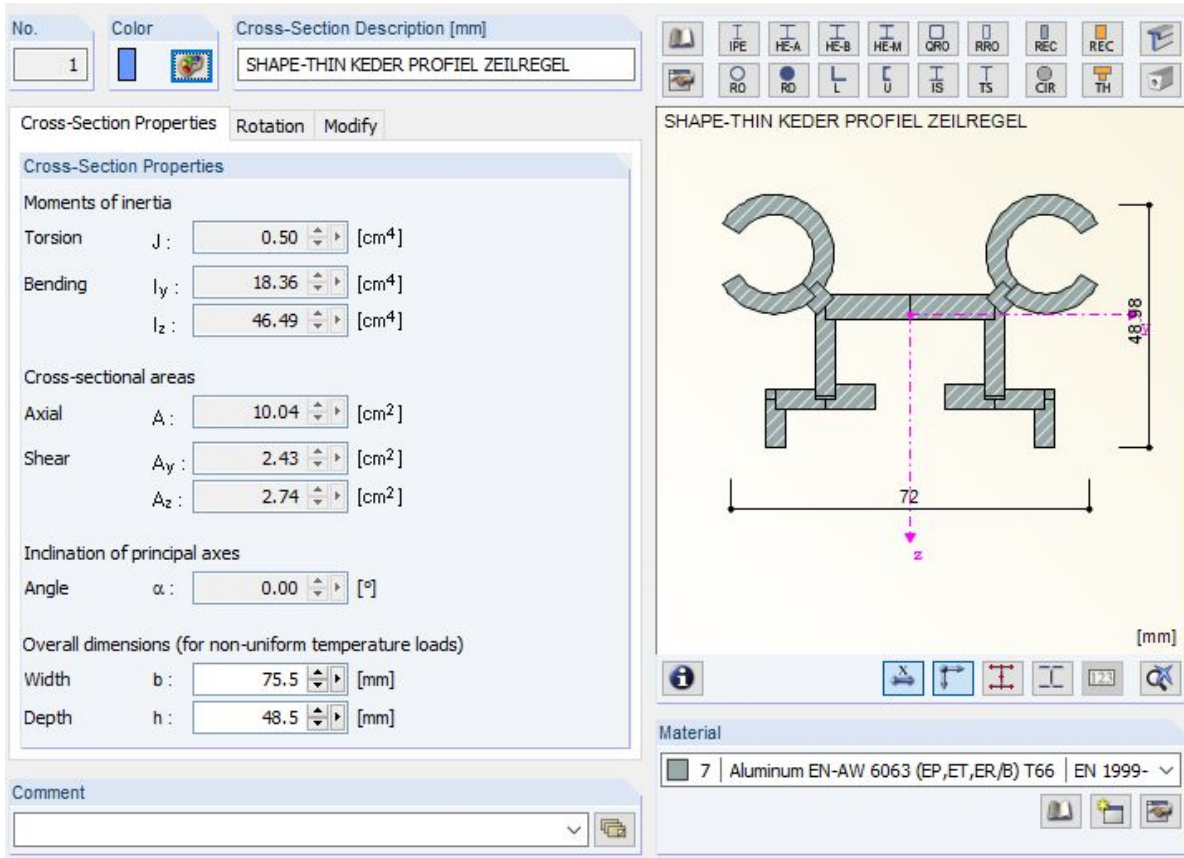
In this chapter, necessary detail calculations of different parts for the roof are made.

4.1 Check of the Keder profile for the roof canopy.

The GS24 and the GE32 Layher roofs have different keder profiles to mount the Roof canopy. The used keder profiles are designed and delivered by Layher. These profiles have been taken into account in the calculation of the different systems.

4.1.1 Check of the GE24 keder profile.

The keder profile of the GE24 Layher roof system is the profile 4200400 of Layher

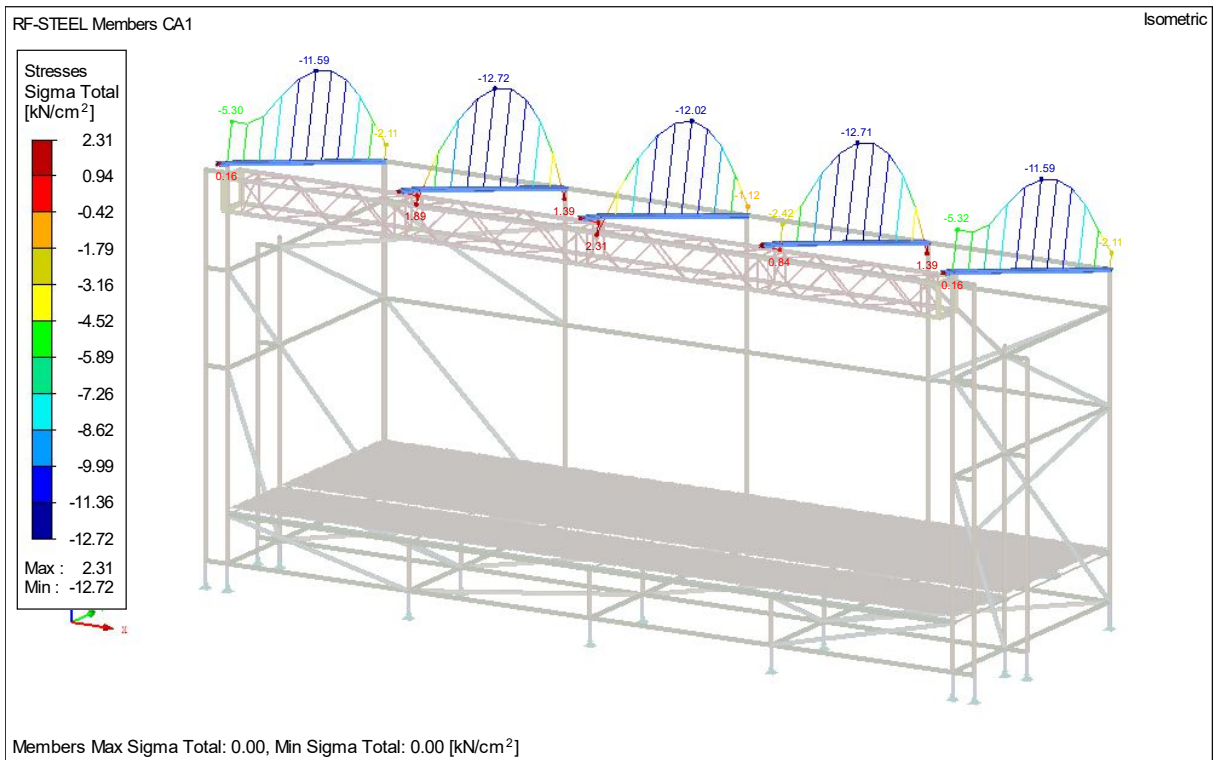
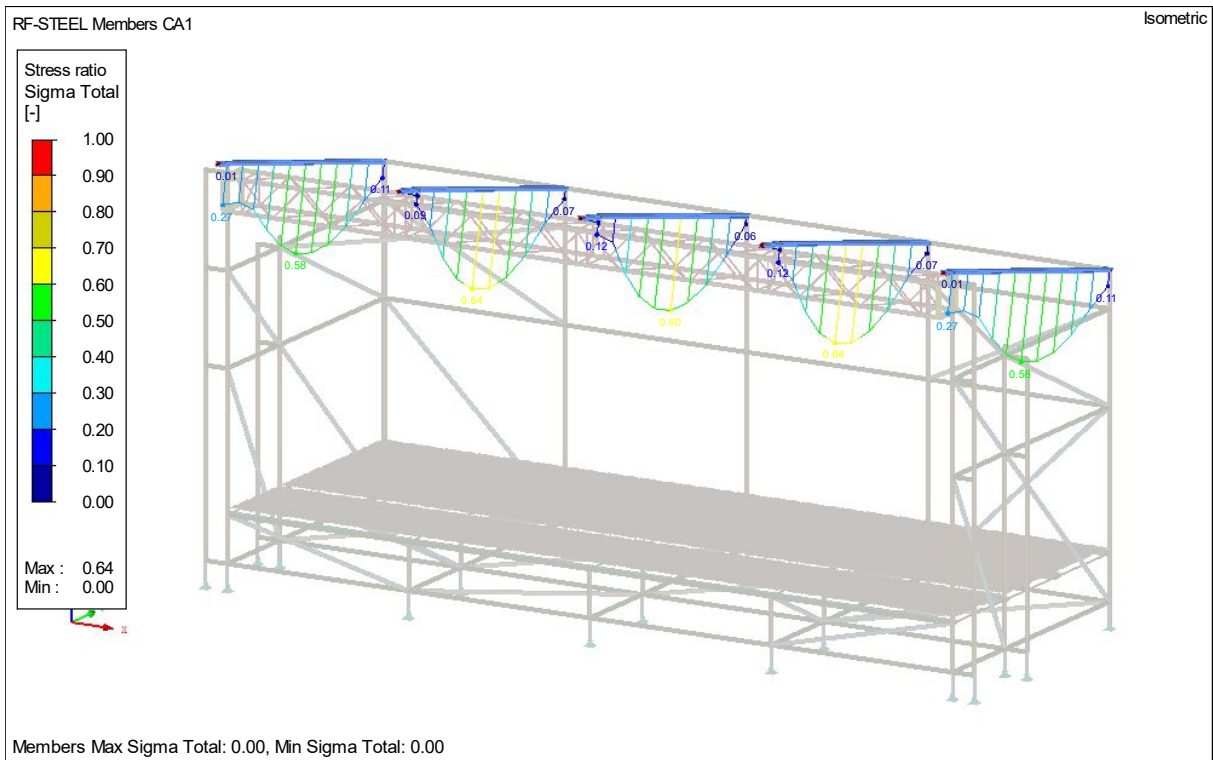
Cross-Section Description [mm]	
SHAPE-THIN KEDER PROFIEL ZEILREGEL	

Cross-Section Properties	
Rotation Modify	
Cross-Section Properties	
Moments of inertia	
Torsion	J : 0.50 [cm ⁴]
Bending	I _y : 18.36 [cm ⁴]
	I _z : 46.49 [cm ⁴]
Cross-sectional areas	
Axial	A : 10.04 [cm ²]
Shear	A _y : 2.43 [cm ²]
	A _z : 2.74 [cm ²]
Inclination of principal axes	
Angle	α : 0.00 [°]
Overall dimensions (for non-uniform temperature loads)	
Width	b : 75.5 [mm]
Depth	h : 48.5 [mm]

SHAPE-THIN KEDER PROFIEL ZEILREGEL

Material: 7 | Aluminum EN-AW 6063 (EP,ET,ER/B) T66 | EN 1999-

The maximum utilisation in the stress analyse calculation of the GE24 in CA1

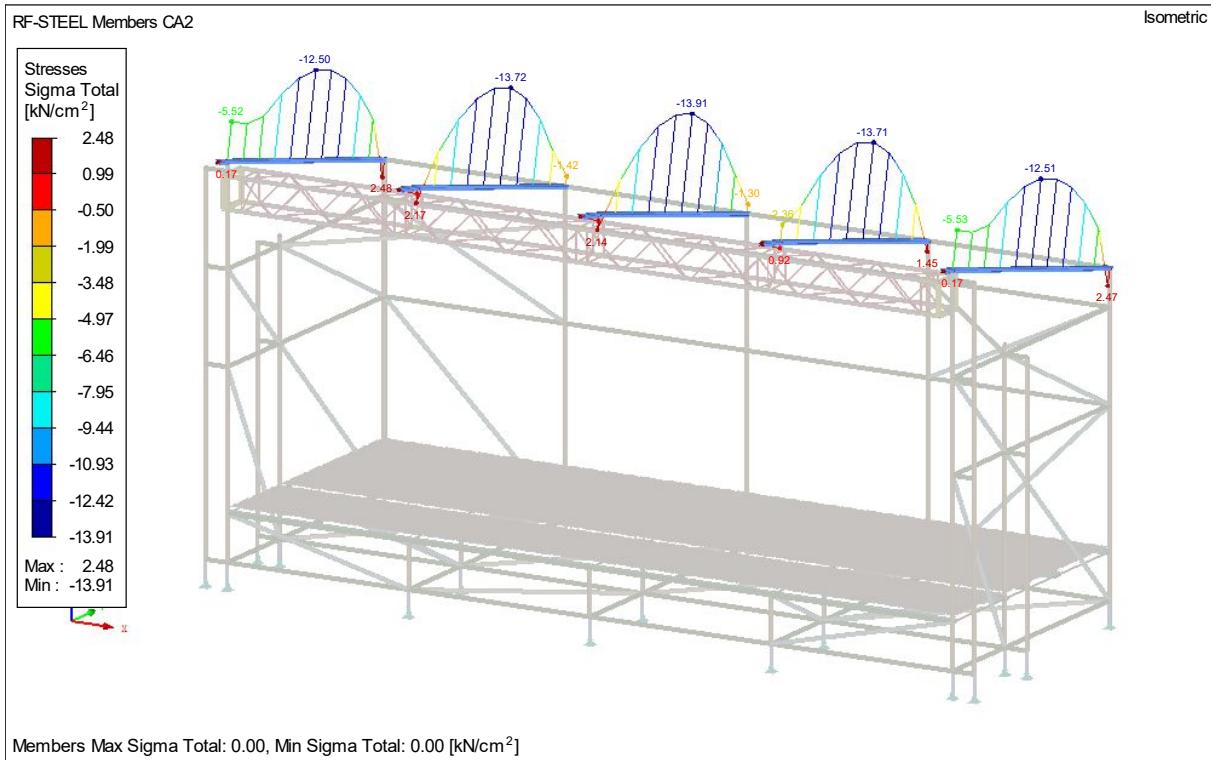


Utilisation of the different members of the GE24 in CA1

Member No.	Location x [m]	S-Point No.	Load-ing	Stress Type	Stress [kN/cm ²] Existing	Limit	Stress Ratio
243	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,334	79	CO14	Sigma Total	-12,02	20,00	0,60
	3,002	41	CO14	Tau Total	-0,52	11,55	0,04
	1,334	79	CO14	Sigma-eqv	12,02	20,00	0,60
244	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,668	79	CO13	Sigma Total	-12,72	20,00	0,64
	3,002	109	CO14	Tau Total	-1,10	11,55	0,10
	1,668	79	CO13	Sigma-eqv	12,74	20,00	0,64
245	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,668	20	CO14	Sigma Total	-12,71	20,00	0,64
	3,002	49	CO14	Tau Total	-1,07	11,55	0,09
	1,668	20	CO14	Sigma-eqv	12,72	20,00	0,64
833	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,593	79	CO10	Sigma Total	-11,59	20,00	0,58
	3,186	49	CO13	Tau Total	-3,60	11,55	0,31
	1,593	79	CO10	Sigma-eqv	11,70	20,00	0,58
837	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,593	20	CO10	Sigma Total	-11,59	20,00	0,58
	3,186	109	CO13	Tau Total	-3,59	11,55	0,31
	1,593	20	CO10	Sigma-eqv	11,70	20,00	0,59

The maximum utilisation in the stress analyse calculation of the GE24 in CA2



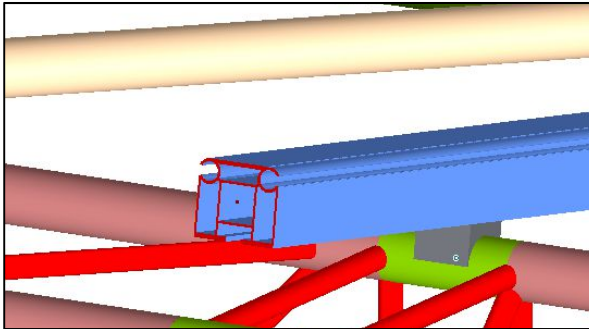


Utilisation of the different members of the GE24 in CA2

Member No.	Location x [m]	S-Point No.	Load-ing	Stress Type	Stress [kN/cm ²]		Stress Ratio
					Existing	Limit	
243	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,334	79	CO104	Sigma Total	-13,91	20,00	0,70
	3,002	49	CO113	Tau Total	-1,33	11,55	0,12
	1,334	79	CO104	Sigma-equiv	13,91	20,00	0,70
244	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,334	79	CO103	Sigma Total	-13,72	20,00	0,69
	3,002	41	CO104	Tau Total	-1,01	11,55	0,09
	1,668	79	CO103	Sigma-equiv	13,73	20,00	0,69
245	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,334	20	CO103	Sigma Total	-13,71	20,00	0,69
	3,002	49	CO114	Tau Total	-1,63	11,55	0,14
	1,334	20	CO104	Sigma-equiv	13,71	20,00	0,69
833	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,593	79	CO100	Sigma Total	-12,51	20,00	0,63
	3,186	49	CO103	Tau Total	-4,04	11,55	0,35
	1,593	79	CO100	Sigma-equiv	12,64	20,00	0,63
837	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL ZEILREGEL						
	1,593	20	CO100	Sigma Total	-12,50	20,00	0,63
	3,186	109	CO103	Tau Total	-4,03	11,55	0,35
	1,593	20	CO100	Sigma-equiv	12,64	20,00	0,63

4.1.2 Check of the GE32 keder profile.

The keder profile of the GE32 Layher roof system is the profile 5574600 of Layher



The screenshot displays the software interface for defining a cross-section. The main window shows the following data:

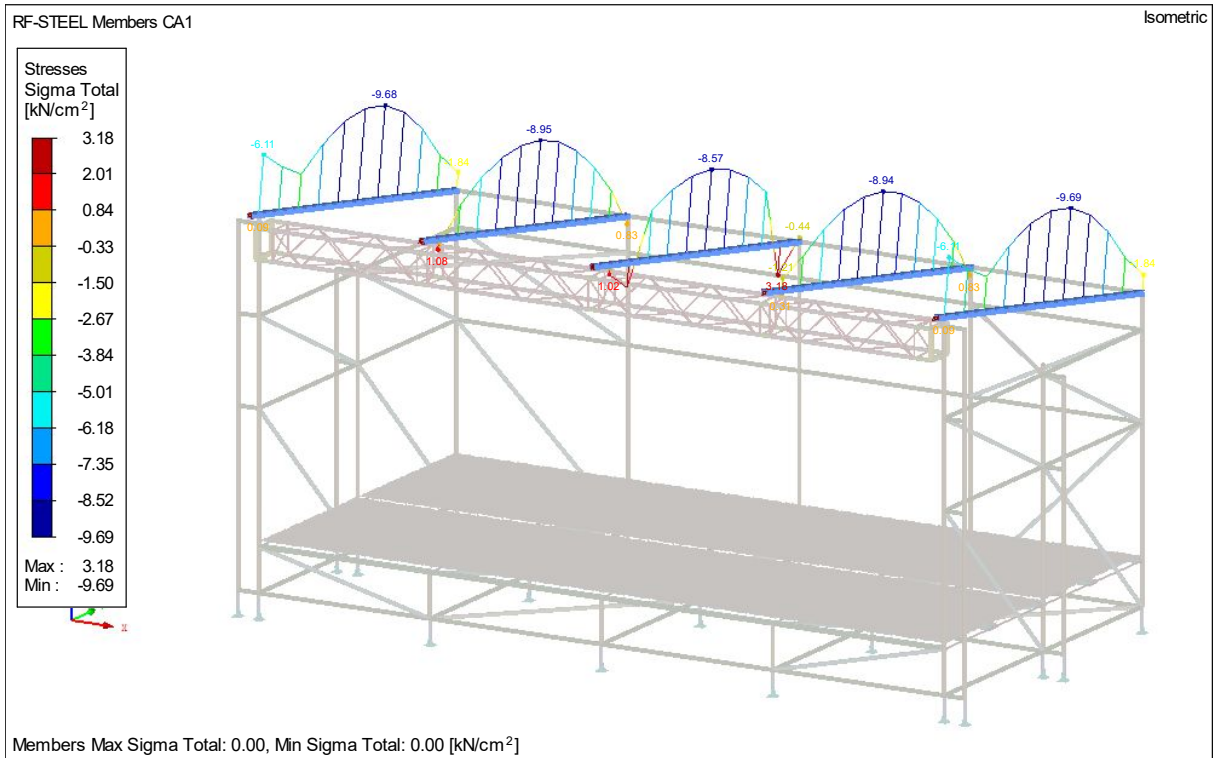
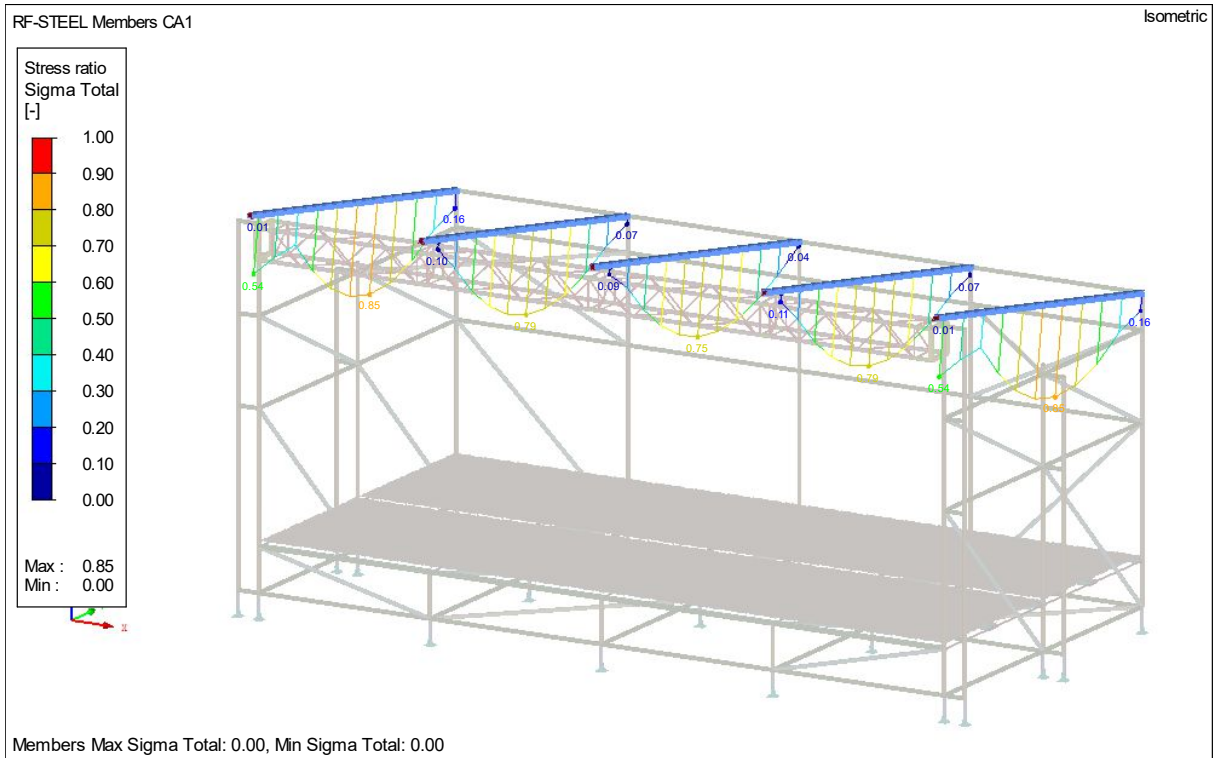
Property	Value	Unit
Cross-Section Description [mm]		
SHAPE-THIN KEDER PROFIEL 3000		
Cross-Section Properties		
Rotation Modify		
Moments of inertia		
Torsion	J :	39.02 [cm ⁴]
Bending	I _y :	60.82 [cm ⁴]
	I _z :	62.04 [cm ⁴]
Cross-sectional areas		
Axial	A :	11.33 [cm ²]
Shear	A _y :	3.25 [cm ²]
	A _z :	3.65 [cm ²]
Inclination of principal axes		
Angle	α :	0.00 [°]
Overall dimensions (for non-uniform temperature loads)		
Width	b :	73.9 [mm]
Depth	h :	65.0 [mm]

The right-hand side of the interface shows a 2D cross-section diagram of the profile. The diagram is labeled 'SHAPE-THIN KEDER PROFIEL 3000' and includes the following dimensions:

- Overall width: 71.93 mm
- Overall depth: 61.75 mm

The material is defined as: 6 Aluminum EN-AW 6082 (EP,ET) T6 | EN 1999-: |

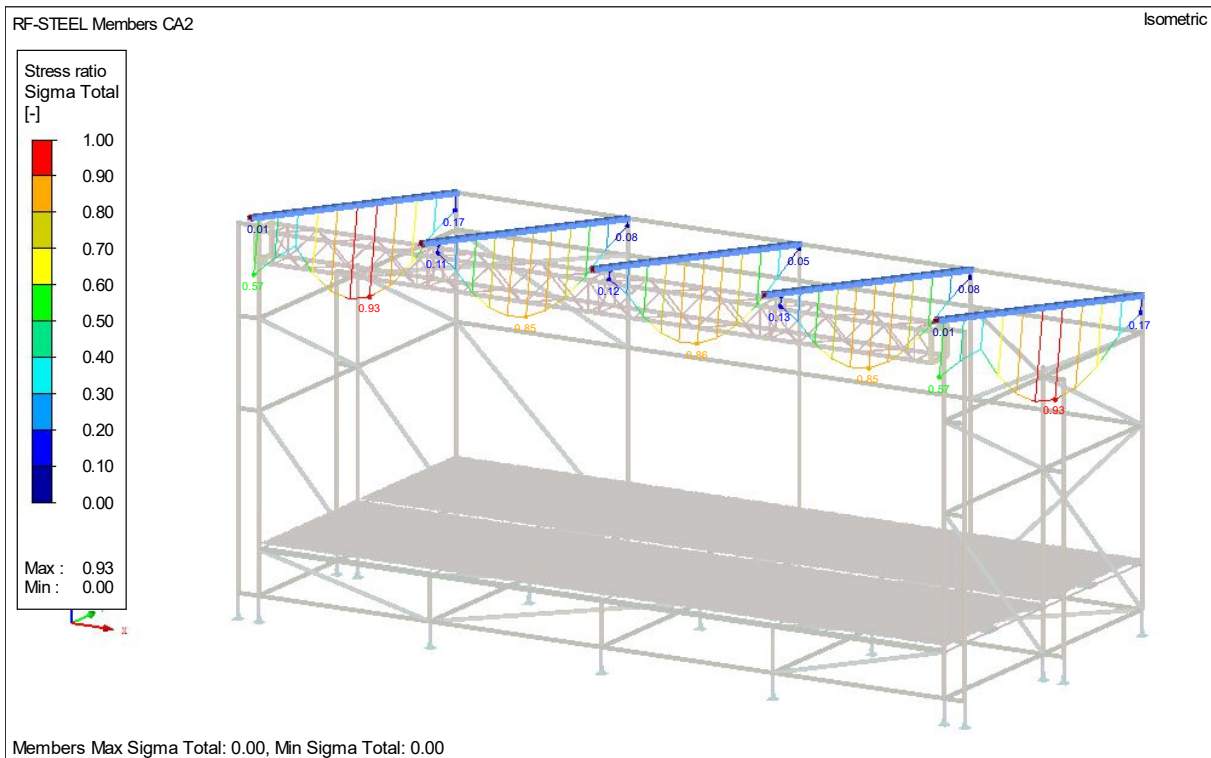
The maximum utilisation in the stress analyse calculation of the GE32 in CA1

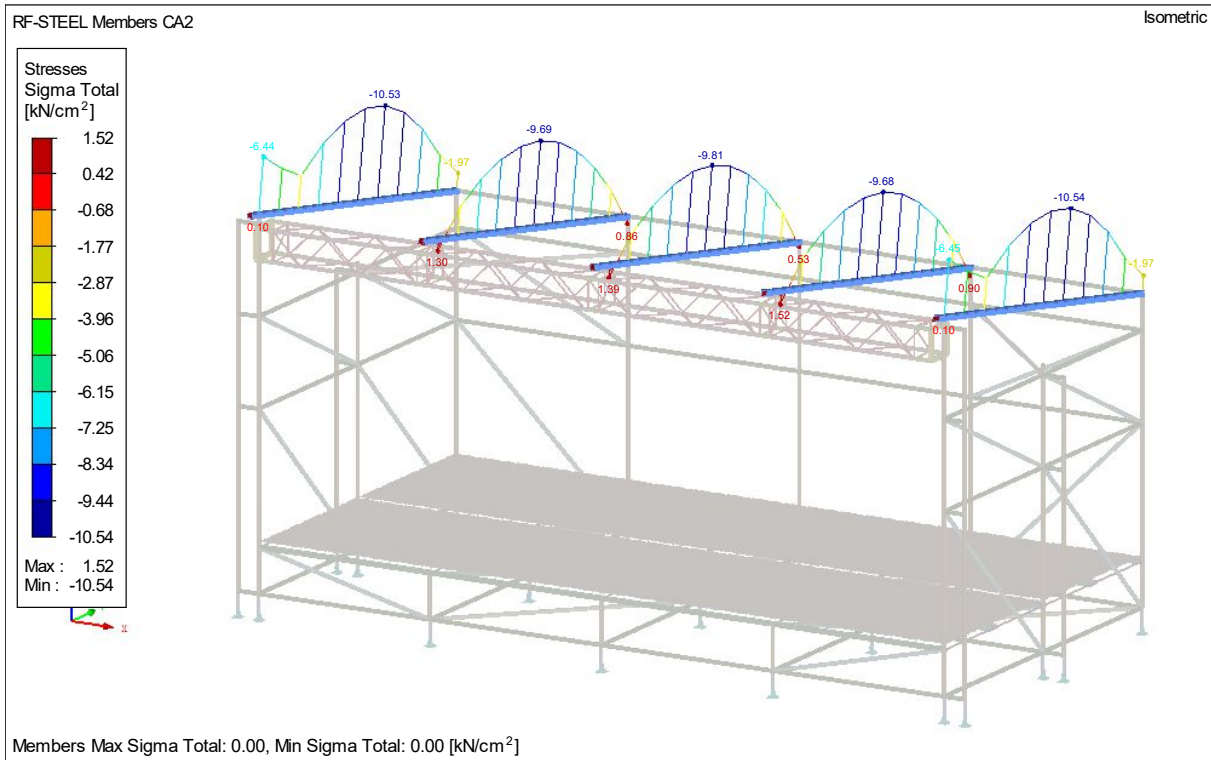


Utilisation of the different members of the GE32 in CA1

Member No.	Location x [m]	S-Point No.	Load-ing	Stress Type	Stress [kN/cm ²]		Stress Ratio
					Existing	Limit	
243	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	2,009	143	CO104	Sigma Total	-9,81	11,36	0,86
	4,019	131	CO104	Tau Total	0,53	6,56	0,08
	2,009	143	CO104	Sigma-equiv	9,81	11,36	0,86
244	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	2,009	143	CO103	Sigma Total	-9,69	11,36	0,85
	0,000	131	CO124	Tau Total	0,62	6,56	0,09
	2,009	143	CO103	Sigma-equiv	9,69	11,36	0,85
245	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	2,009	78	CO104	Sigma Total	-9,68	11,36	0,85
	0,000	65	CO124	Tau Total	0,62	6,56	0,09
	2,009	78	CO104	Sigma-equiv	9,68	11,36	0,85
833	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	1,681	143	CO100	Sigma Total	-10,54	11,36	0,93
	4,203	19	CO103	Tau Total	1,16	6,56	0,18
	1,681	143	CO100	Sigma-equiv	10,54	11,36	0,93
837	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	1,681	78	CO100	Sigma Total	-10,53	11,36	0,93
	4,203	23	CO103	Tau Total	-1,16	6,56	0,18
	1,681	78	CO100	Sigma-equiv	10,53	11,36	0,93

The maximum utilisation in the stress analyse calculation of the GE32 in CA2





Utilisation of the different members of the GE32 in CA2

Member No.	Location x [m]	S-Point No.	Loading	Stress Type	Stress [kN/cm ²]		Stress Ratio
					Existing	Limit	
243	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	2,009	143	CO104	Sigma Total	-9,81	11,36	0,86
	4,019	131	CO104	Tau Total	0,53	6,56	0,08
	2,009	143	CO104	Sigma-equiv	9,81	11,36	0,86
244	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	2,009	143	CO103	Sigma Total	-9,69	11,36	0,85
	0,000	131	CO124	Tau Total	0,62	6,56	0,09
	2,009	143	CO103	Sigma-equiv	9,69	11,36	0,85
245	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	2,009	78	CO104	Sigma Total	-9,68	11,36	0,85
	0,000	65	CO124	Tau Total	0,62	6,56	0,09
	2,009	78	CO104	Sigma-equiv	9,68	11,36	0,85
833	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	1,681	143	CO100	Sigma Total	-10,54	11,36	0,93
	4,203	19	CO103	Tau Total	1,16	6,56	0,18
	1,681	143	CO100	Sigma-equiv	10,54	11,36	0,93
837	Cross-section No. 1 - SHAPE-THIN KEDER PROFIEL 3000						
	1,681	78	CO100	Sigma Total	-10,53	11,36	0,93
	4,203	23	CO103	Tau Total	-1,16	6,56	0,18
	1,681	78	CO100	Sigma-equiv	10,53	11,36	0,93

4.2 Layher information design values.

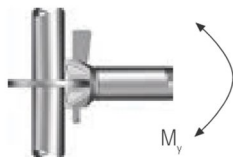
The used Layher system is the Layher K2000+ system.

When parts need to be replaced by Layher Variant II system, take care that these will be in places with less internal forces.

For the check of the Layher system the calculation results of the GE32 Layher roof + pa wings will be used.

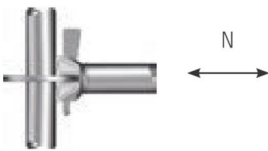
Z-8.22-64: K 2000+

Biegemoment



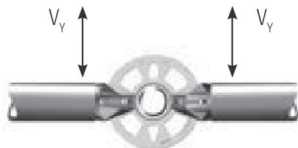
Biegemoment
 $M_{y,Rd} = \pm 101,0 \text{ kNcm}$

Normalkraft

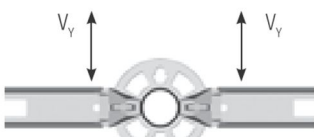


$N_{Rd} = \pm 31,0 \text{ kN}$

Horizontale Querkraft



O-Riegel: $V_{y,Rd} = \pm 10,0 \text{ kN}$



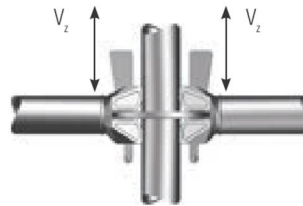
U-Riegel: $V_{y,Rd} = \pm 5,9 \text{ kN}$

Torsionsmoment



$M_{t,Rd} = \pm 52,5 \text{ kNcm}$

Vertikale Querkraft



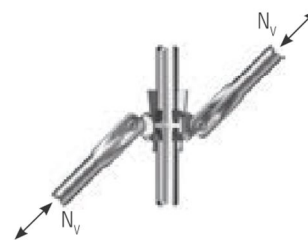
Vertikale Querkraft, Einzelanschluss

$V_{z,Rd} = \pm 26,4 \text{ kN}$

Vertikale Querkraft je Lochscheibe

$\sum V_{z,Rd} = \pm 105,6 \text{ kN}$

Normalkraft, Diagonale



Beanspruchbarkeiten der Vertikaldiagonalen für
 Feldhöhe 2,00 m für **K 2000+**:

	Druck								Zug
Feldlänge [m]	0,73	1,09	1,40	1,57	2,07	2,57	3,07	4,14	alle Feldlängen
$N_{v,Rd}$ [kN]	-16,1	-16,8	-15,5	-14,8	-12,4	-10,2	-8,3	-5,3	+17,9

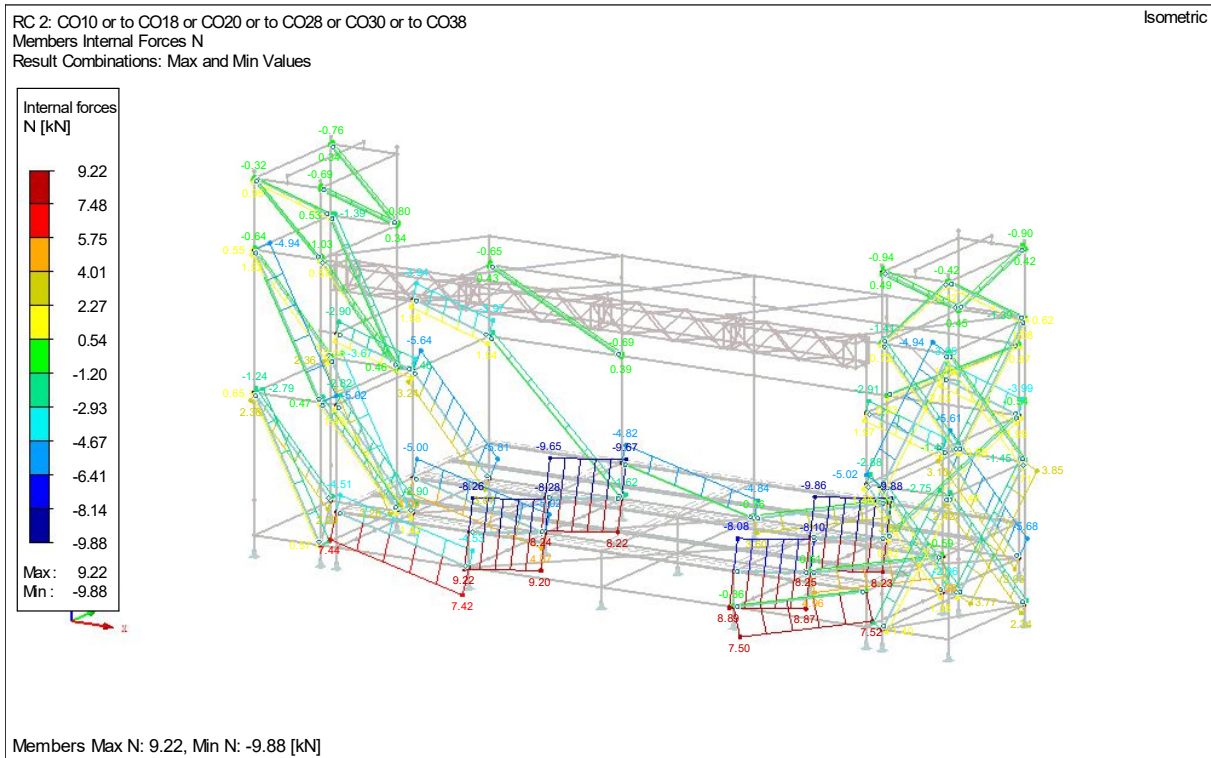
K 2000+ Bauteile können mit Bauteilen der Variante LW, Variante II und Variante I vermischt werden. Beanspruchbarkeiten siehe Zulassung Z-8.22-64 und Z-8.22-949.

Rd = Beanspruchbarkeit,
 (enthält Teilsicherheitsbeiwert γ_M)

*„Zulässige Lasten“ bzw. „Gebrauchslasten“ erhält man durch
 Division der Beanspruchbarkeit durch 1,5 (= γ_f)

4.5 Check of the Layher diagonals.

The Maximum compression of the Layher K2000+ diagonals is according to the figure in chapter 4.2. In the next figure the minimum and maximum forces are displayed.



The maximum N_{ed} in a diagonal is 9.88 kN. According to the table on page 134 the maximum design force for this diagonal is 12.4 kN

Check of the diagonals

$$N_{ed} / N_{rd} < 1$$

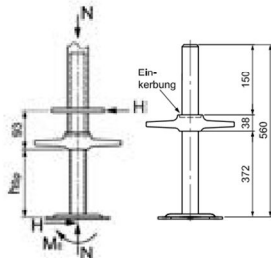
$$9.88 / 12.4 = 0.79 < 1$$

4.7 Check of the Layher Spindle's.

In the next table the spindle loading capacity in conjunction with height is given

Fußspindeln – Belastungstabellen

FUSSSPINDEL 60



Ersatzquerschnittswerte der Spindel

- A = 3,84 cm²
- W_{el} = 2,61 cm³
- W_{pl} = 3,26 cm³
- I = 3,74 cm⁴

Material: EN 10219-S235JRH

→ Rollgewinde: f_{y,k} = 280,0 N/mm²

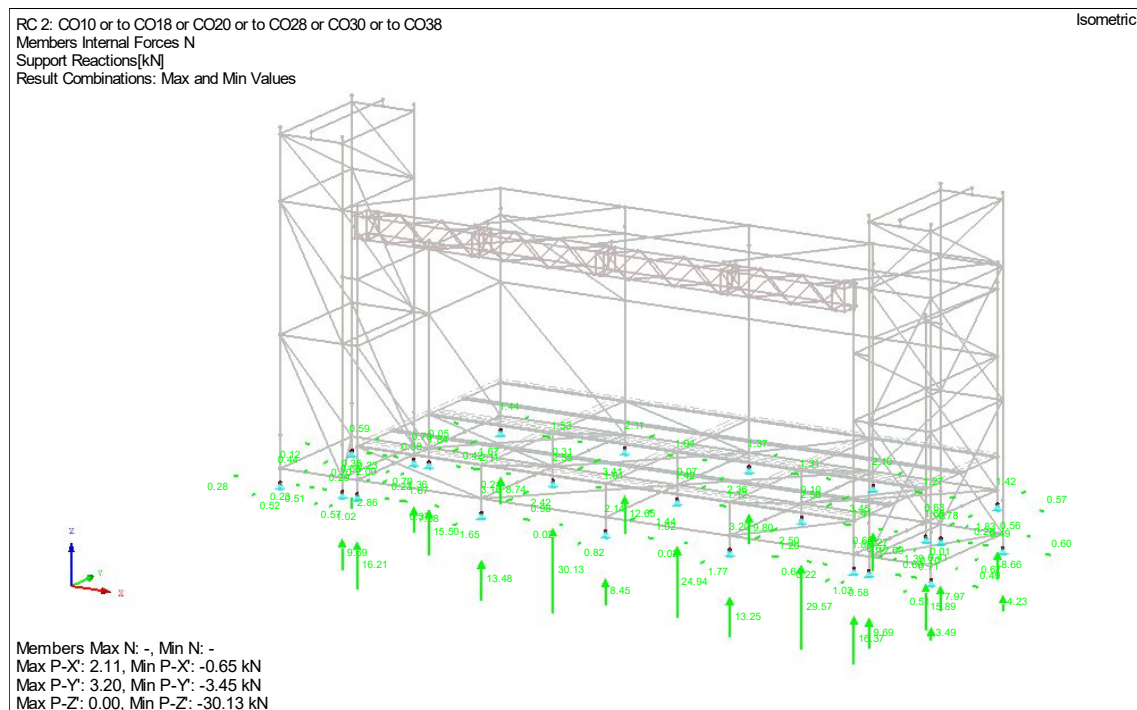
Tab. 12 Belastung Fußspindeln

Aus-spindel-länge h _{sp} [cm]	Zulässige Vertikallast N [kN]* bei gleichzeitiger Wirkung einer Horizontallast H [kN]														Zul. Horizontallast H [kN] wenn N = 0														
	H = 0,0		H = 0,5		H = 1,0		H = 1,5		H = 2,0		H = 2,5		H = 3,0			H = 3,5		H = 4,0		H = 4,5		H = 5,0		H = 5,5		H = 6,0			
	N ₁	N ₂	N ₁	N ₂	N ₁	N ₂	N ₁	N ₂	N ₁	N ₂	N ₁	N ₂	N ₁	N ₂		N ₁	N ₂	N ₁	N ₂	N ₁	N ₂	N ₁	N ₂	N ₁	N ₂	N ₁	N ₂	N ₁	N ₂
0	39	53	39	51	39	51	39	51	39	51	39	50	39	49	39	49	38	—	38	—	37	—	36	—	36	—	35	—	26,3
5	39	52	39	51	39	50	39	48	38	—	37	—	36	—	34	—	33	—	30	—	29	—	28	—	26	—	25	—	7,8
10	39	51	39	49	38	—	37	—	36	—	34	—	33	—	30	—	29	—	28	—	26	—	25	—	—	—	—	—	4,6
15	39	49	38	—	36	—	35	—	33	—	31	—	29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3,2	
20	38	—	36	—	34	—	32	—	29	—	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2,5	
25	37	—	34	—	31	—	28	—	23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2,0	
30	35	—	31	—	27	—	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,7	
35	32	—	27	—	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,5	
37	30	—	25	—	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,4	

*Die zulässigen Vertikallasten wurden berechnet unter Anwendung des Berechnungsmodells nach DIN EN 12811-1, Abs. 10.2.3.2. Zur Erfassung der Biegesteifigkeit des Ständerrohres, der Schnittgrößenanteile aus Theorie II. Ordnung und der maximalen Beanspruchbarkeit der Ständer wurden folgende Raumgerüste mit Rastermaß 2,57 x 2,57 m berücksichtigt:
2,00 m Lagenhöhe für Stieldruckkräfte N₁ ≤ 39 kN
1,50 m Lagenhöhe für Stieldruckkräfte 39 kN < N₂ ≤ 54 kN

(-) Bei dieser Kombination von Ausspindellänge und Horizontallast ist die Biegebeanspruchbarkeit der Spindel überschritten.

In the next figure the maximum support forces for Result combination are presented.

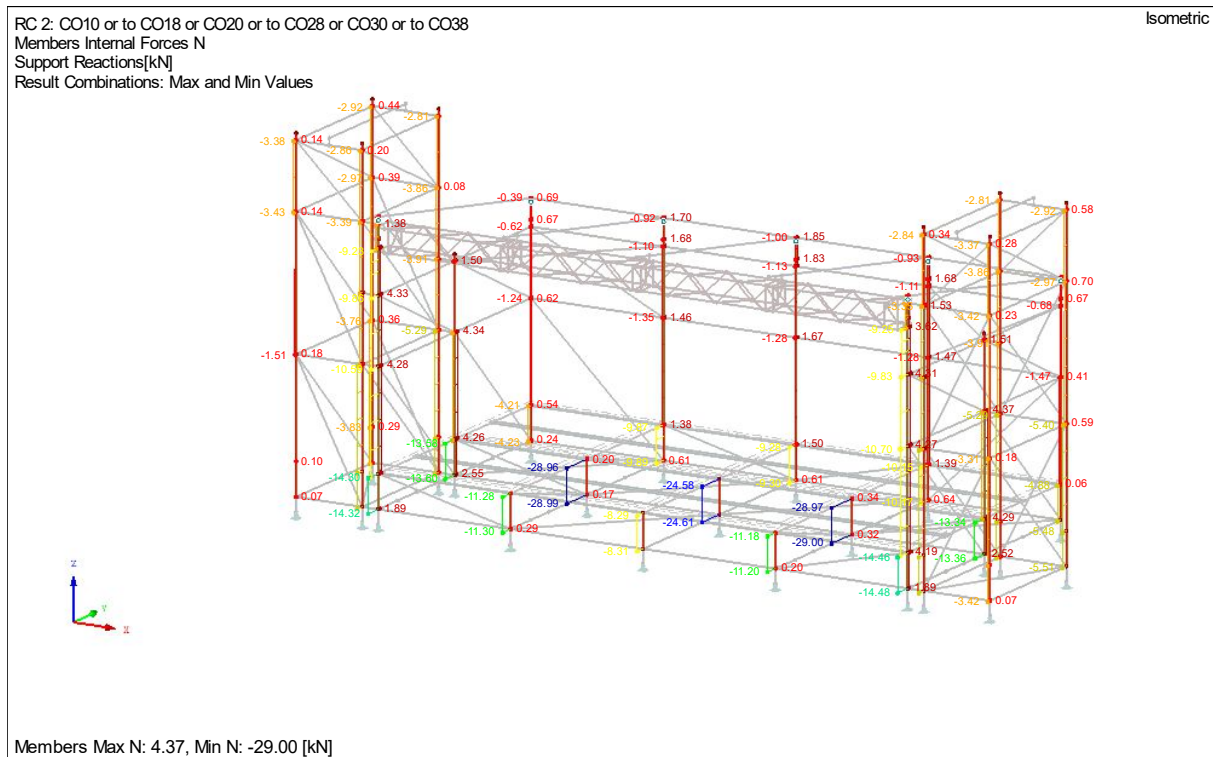


The maximum support force is 30.13 kN.

The maximum total horizontal force is 18.58 kN. This force will be divided over the 23 spindles.

18.58 / 23 = 0.80 kN of horizontal force per spindle. According to the table of the Layher spindle the combination between the vertical and the horizontal force allows for a maximum spindle length of 25 cm on the highest loaded spindles.

4.8 Check of the Layher columns.



Proof against buckling.

$$\beta = 0.9$$

$$L_{cr} = 0.9 * 200 = 180 \text{ cm Maximum free tube}$$

$$A = 4.53 \text{ cm}^2$$

$$I = 11.60 \text{ cm}^4$$

$$W = 4.80 \text{ cm}^3$$

$$i = 1.60 \text{ cm}$$

$$\lambda_1 = \pi * \sqrt{(210000/320)} = 80,48$$

$$\bar{\lambda} = 180 / (1.6 * 80.48) = 1.39$$

Buckling curve for hollow section line c (table 6.2 from en-1993-1-1)

$$\alpha = 0,49$$

$$\Phi = 0.5 * (1 + \alpha * (\bar{\lambda} - 0.2) + \bar{\lambda}^2)$$

$$\Phi = 0.5 * (1 + 0.49 * (1.393 - 0.2) + 1.393^2) = 1.763$$

$$\chi_{\min} = 1 / (\Phi + \sqrt{(\Phi^2 - \bar{\lambda}^2)})$$

$$\chi_{\min} = 1 / (1.393 + \sqrt{(1.763^2 - 1.393^2)}) = 0.352$$

$$N_{b,rd} = \chi * A * f_0 / 1.1$$

$$N_{b,rd} = 0.352 * 4.53 * 32 / 1.1 = 43.68 \text{ kN}$$

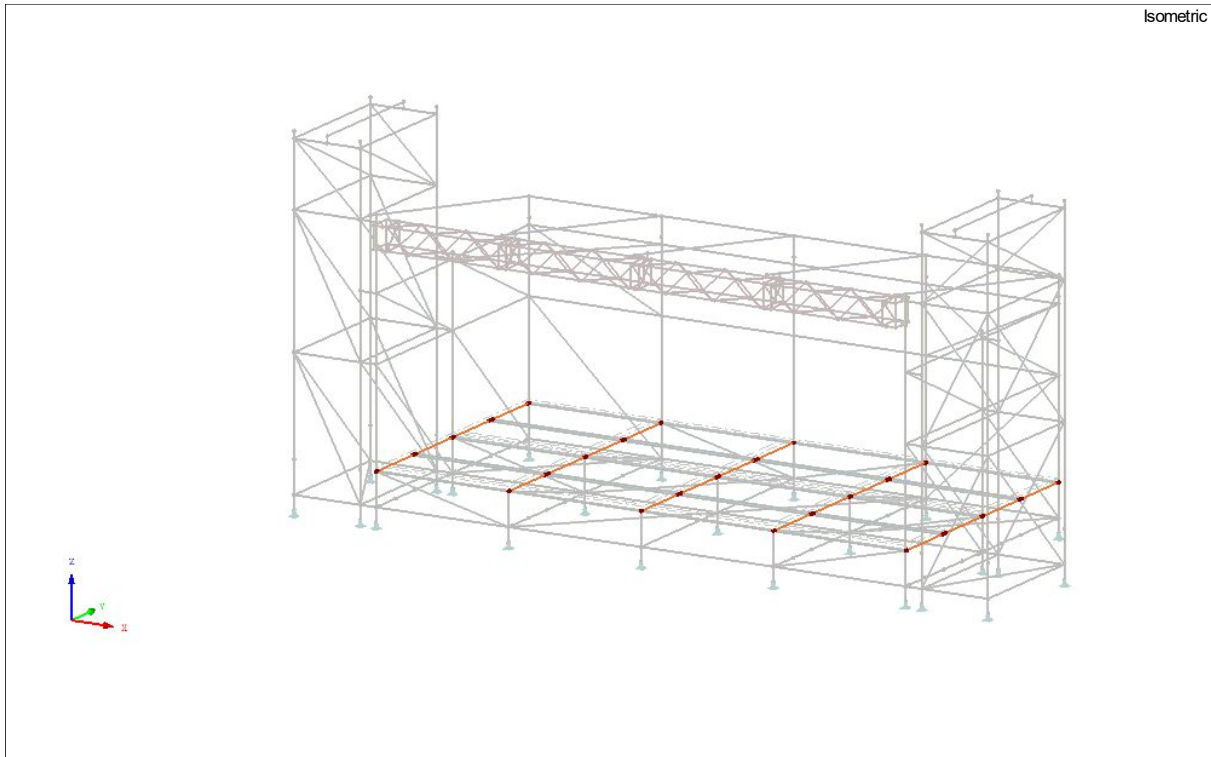
$$N_{ed, \max} = 29.00 \text{ kN}$$

$$\text{check} = N_{ed, \max} / N_{b,rd} < 1$$

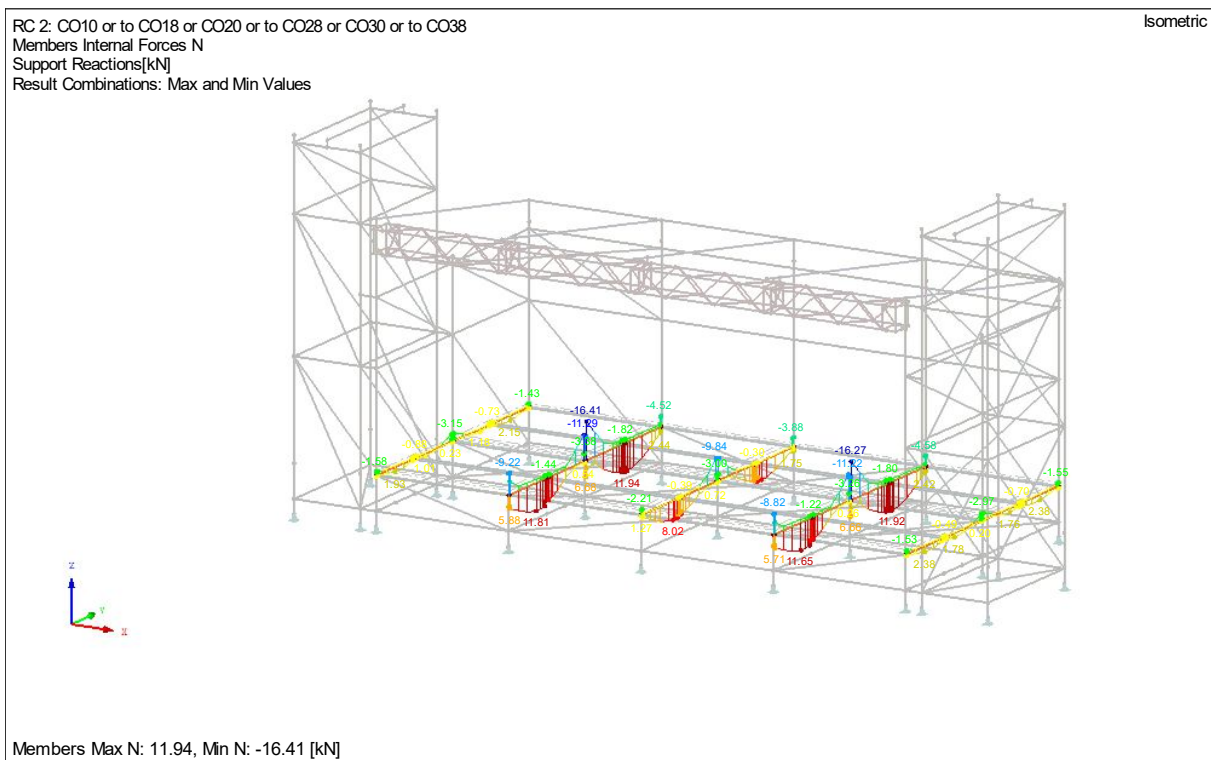
$$29.00 / 43.68 = 0.66 < 1$$

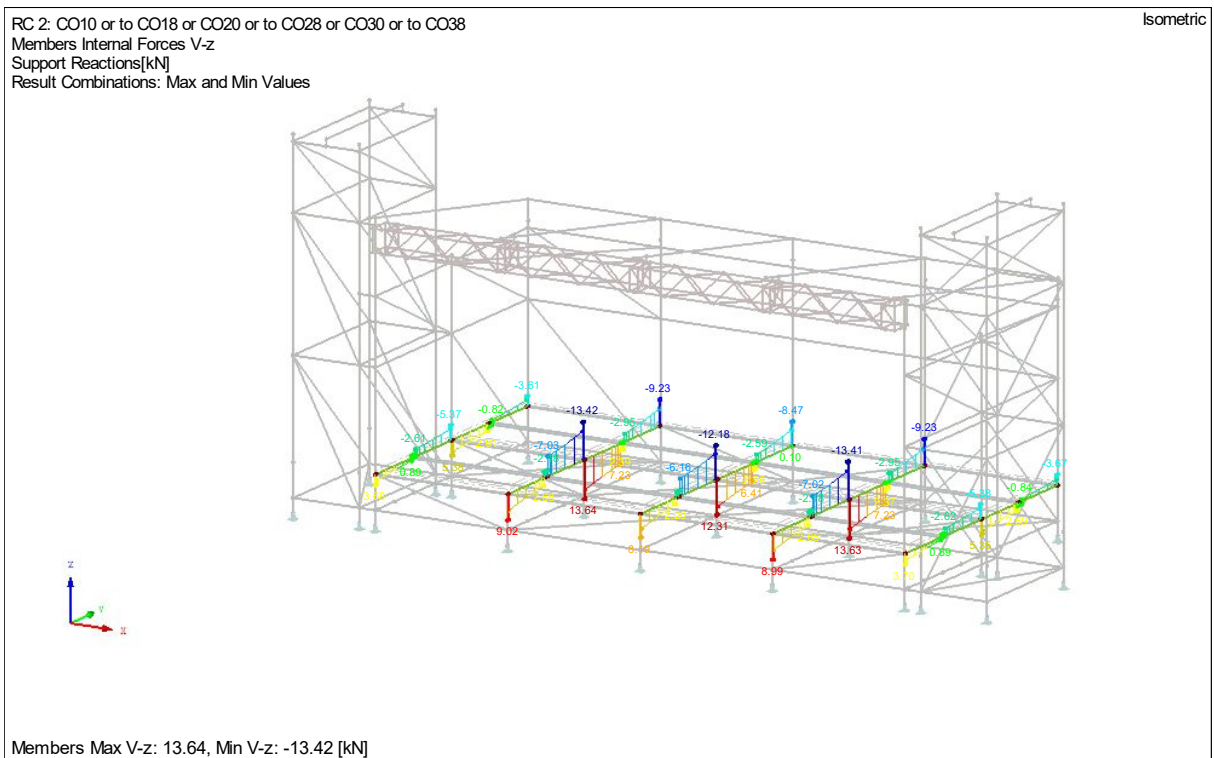
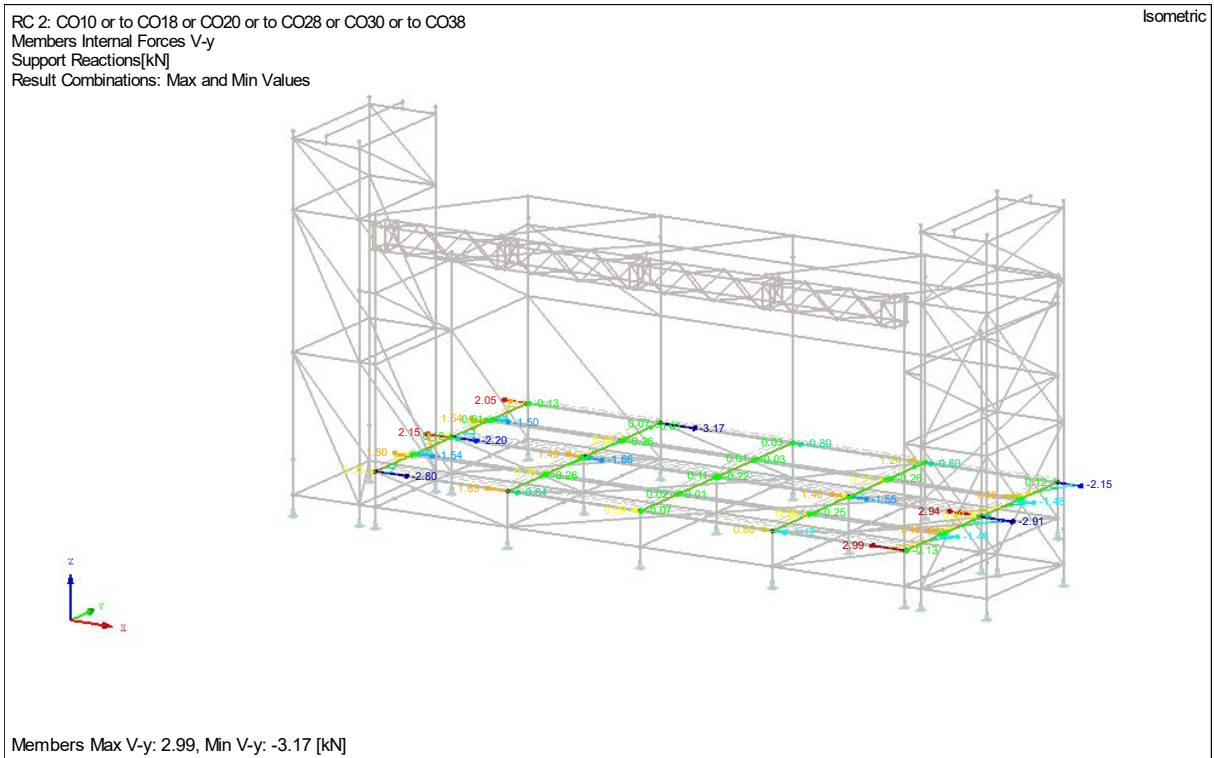
4.9 Check of the Event Layher staging system.

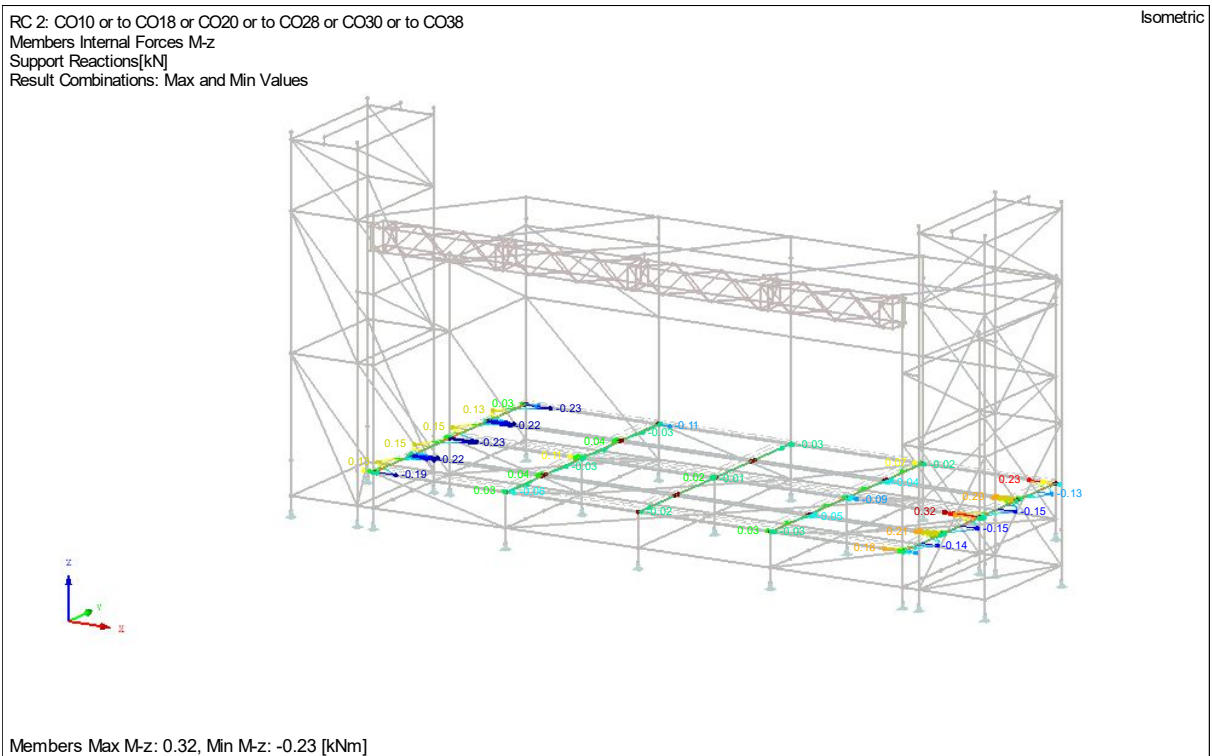
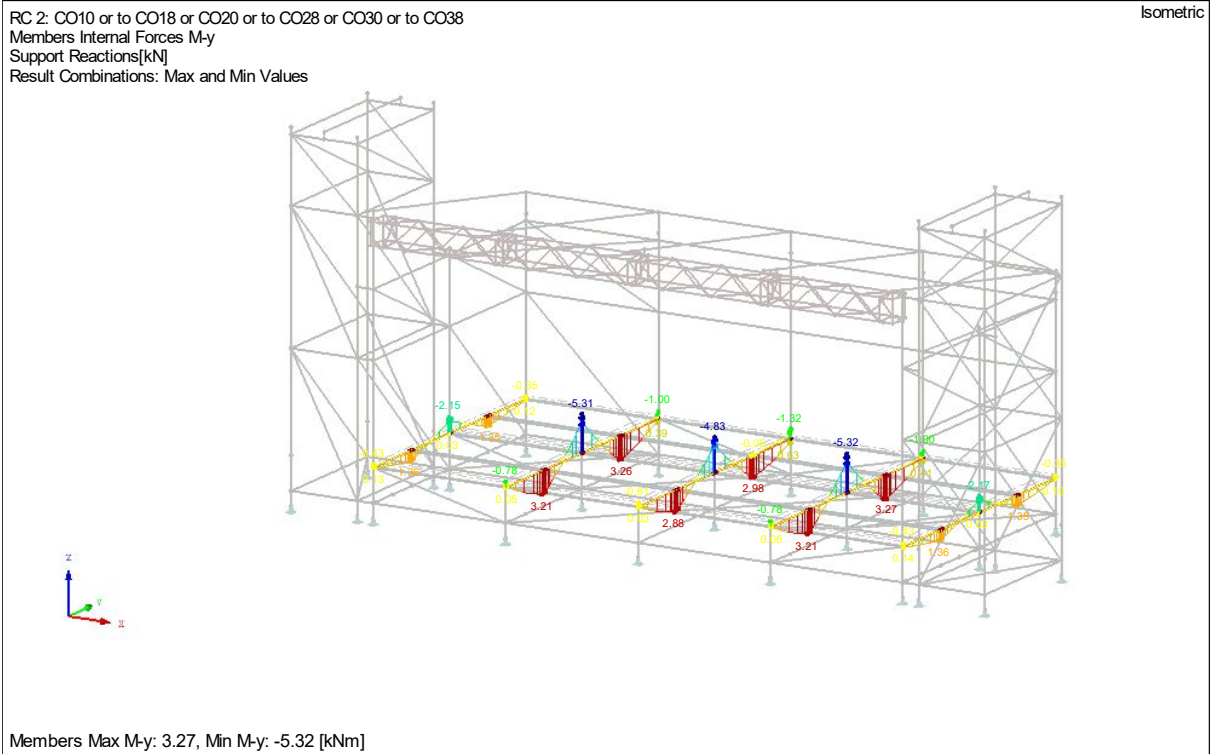
The event Layher staging system exist of Layher transom beams with a decking system on top.



In the next figures the internal forces of the floor beam are shown.





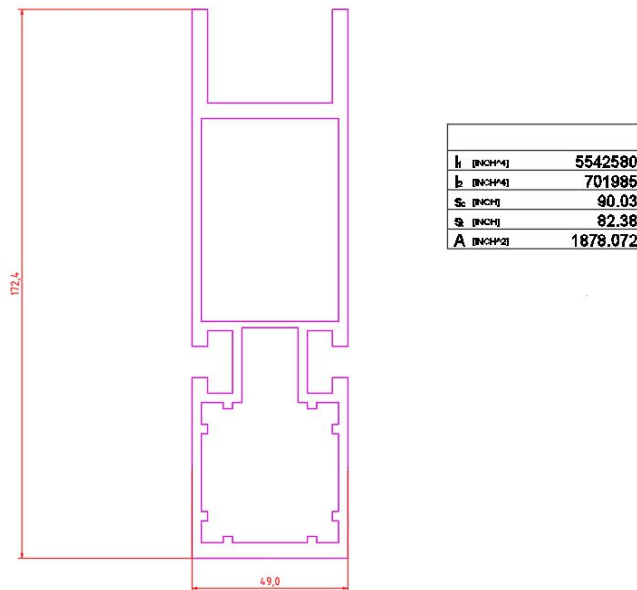


Profil berekening.

Layher Event Beam

speciaal profiel

Aluminium 6005A T6



$$W_y = I_y / e_y = 554 / 8.25 = 67.15 \text{ cm}^3$$

$$W_z = I_z / e_z = 70.2 / 2.5 = 28.08 \text{ cm}^3$$

$$N_{ed} = 16.41 \text{ kN}$$

$$\sigma N_{ed} = N_{ed} / A = 16.41 / 18.78 = 0.87 \text{ kN/cm}^2$$

$$V_{y,ed} = 3.17 \text{ kN}$$

$$\sigma V_{z,ed} = V_{y,ed} / A = 3.17 / 18.78 = 0.17 \text{ kN/cm}^2$$

$$V_{z,ed} = 13.46 \text{ kN}$$

$$\sigma V_{z,ed} = V_{z,ed} / A = 13.46 / 18.78 = 0.72 \text{ kN/cm}^2$$

$$M_{y,ed} = 5.32 \text{ kNm}$$

$$\sigma M_{y,ed} = M_{y,ed} / W_y = 532 / 67.15 = 7.92 \text{ kN/cm}^2$$

$$M_{z,ed} = 0.32 \text{ kNm}$$

$$\sigma M_{z,ed} = M_{z,ed} / W_z = 32 / 28.08 = 1.14 \text{ kN/cm}^2$$

$$\sigma_{tot} = \sigma N_{ed} + 0,58 * \sigma V_{z,ed} + 0,58 * \sigma V_{z,ed} + \sigma M_{y,ed} + \sigma M_{y,ed}$$

$$0.87 + 0.58 * 0.17 + 0.58 * 0.72 + 7.92 + 1.14 = 10.45 \text{ kN/cm}^2$$

Check

$$\sigma_{tot} / (f_y / \gamma) < 1$$

$$10.45 / (22.5 / 1.1) = 0.51 < 1$$

5.0 Necessary Ballast.

5.1 Ballast calculation

The ballast will be checked for overturning and sliding. The Layher stage which is designed as a ridged stage will be taken into account. The uplift of the system is not limited due to the high self-weight in comparison with the relative small area.

All permanent installed loading can be subtracted from the nearest Ballast position

The safety factor for the ballast calculation against slipping is set to 1.2 according to the NEN-EN 13814. This is based on a horizontal load which is relying on friction.

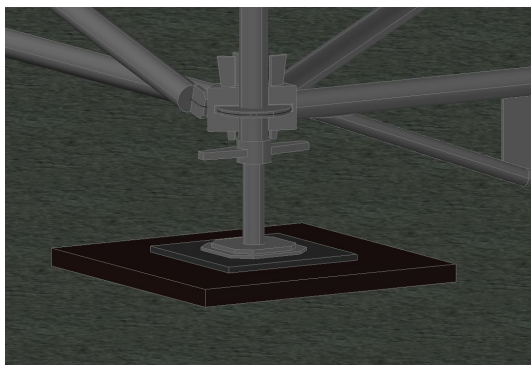
For the friction coefficient the factor of 0.6 has been taken into account.

The Ballast calculation with factor 0.6 can be justified because rubber underlayment plate is used.

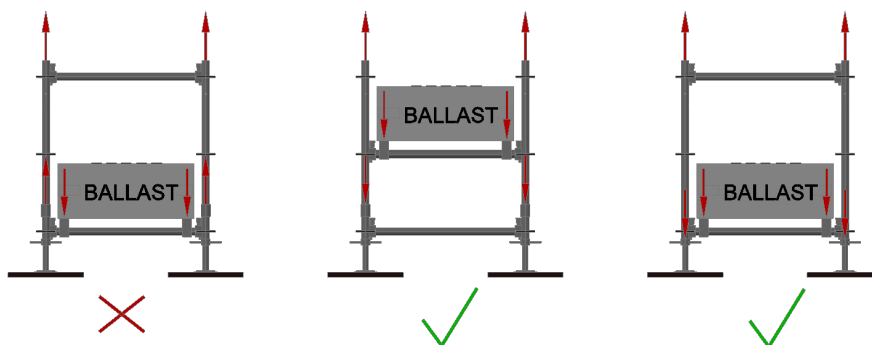
Table 3 — Coefficients of friction μ

	Wood	Steel	Concrete
Wood	0,4	0,4	0,6
Steel	0,4	0,1	0,2
Concrete	0,6	0,2	0,5
Clay ^a	0,25	0,2	0,25
Loam ^a	0,4	0,2	0,4
Sand and gravel	0,65	0,2	0,65

^a At least of stiff consistency in accordance with ENV 1997-1.

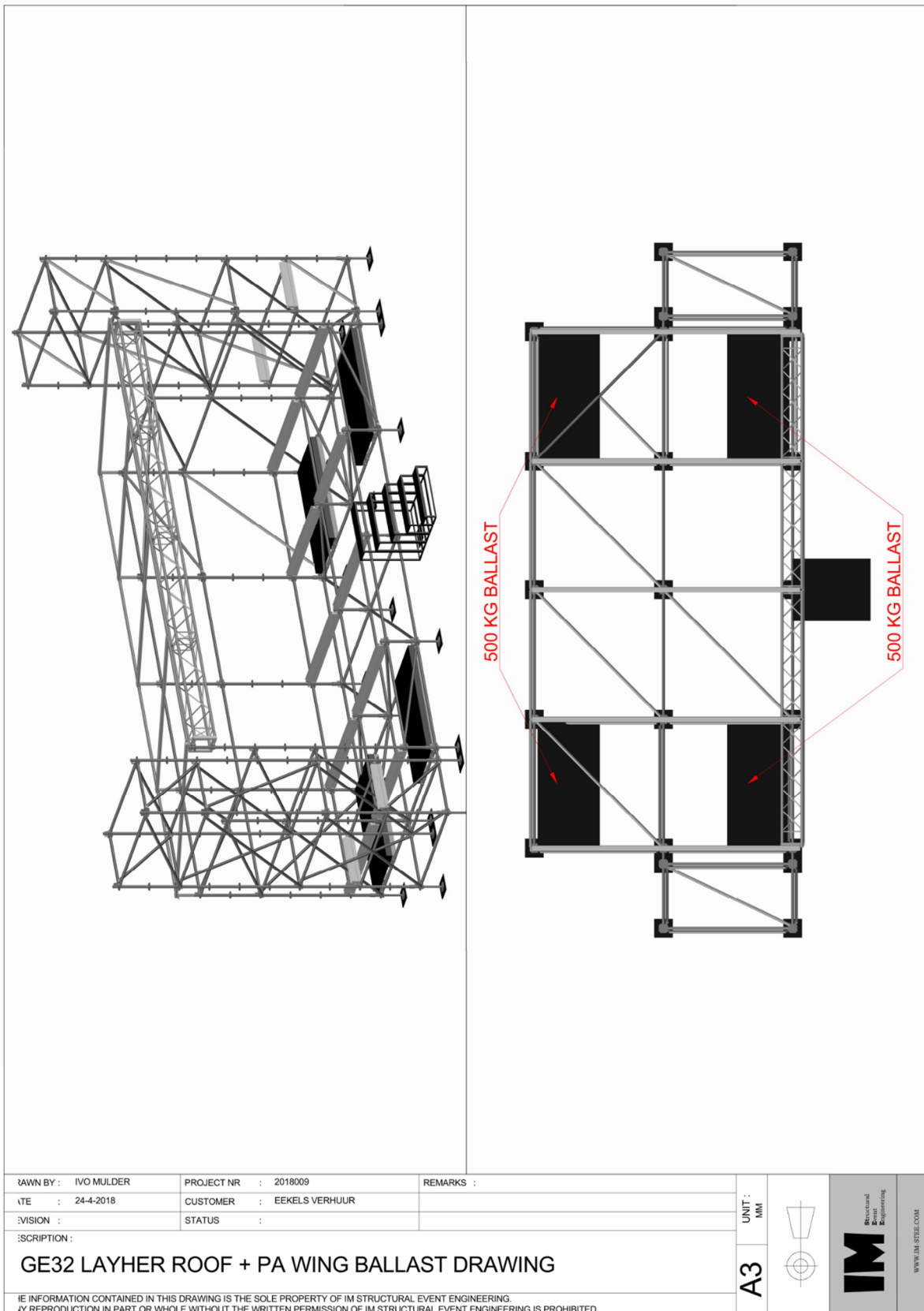


The ballast need to be placed in such a way that it will be activated when lifting forces are applied. If the ballast is placed on the bottom level the use of Layher uprights with connected base collar is necessary.

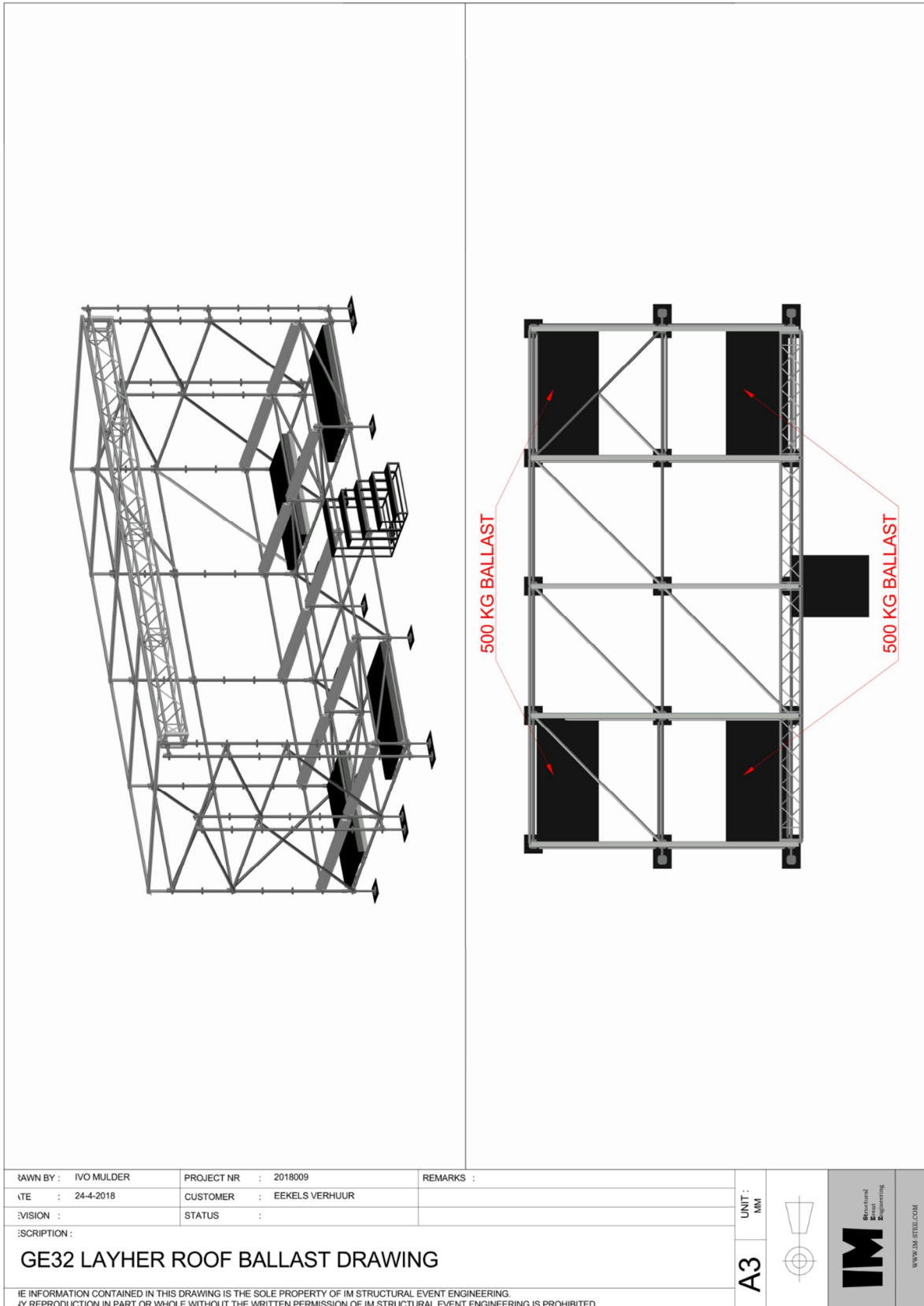


5.2 Ballast drawing

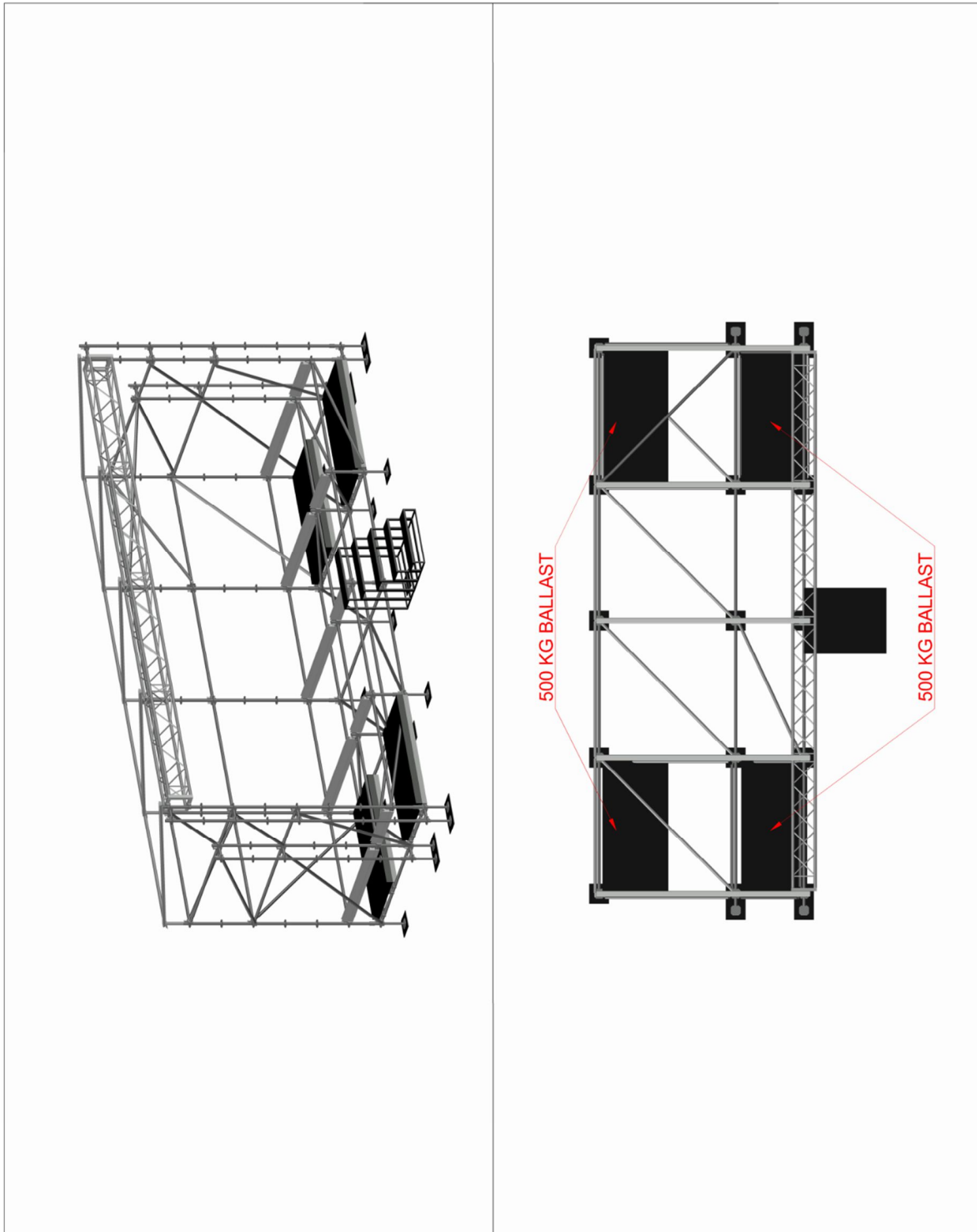
Ballast drawing GE32 Layher Roof + PA wings





Ballast drawing GE32 Layher Roof



Ballast drawing GE24 Layher Roof



DRAWN BY : IVO MULDER	PROJECT NR : 2018009	REMARKS :
DATE : 24-4-2018	CUSTOMER : EEKELS VERHUUR	
REVISION :	STATUS :	
DESCRIPTION :		
GE24 LAYHER ROOF BALLAST DRAWING		
<small>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF IM STRUCTURAL EVENT ENGINEERING. ANY REPRODUCTION IN PART OR WHOLE WITHOUT THE WRITTEN PERMISSION OF IM STRUCTURAL EVENT ENGINEERING IS PROHIBITED.</small>		
A3	UNIT : MM	
		
		<small>WWW.IM-STEEL.COM</small>

5.3 Calculation of ballast against overturning and slipping.

For the calculation of the ballast against overturning and sliding of the system the results of the GE32 Layher roof + Pa wing calculation will be used.

Description	Value	Unit	Description	Value	Unit
CO50 - LC1 + LC2 + LC10			CO150 - LC1 + LC2 + LC13		
Sum of loads in X	0,00	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	13,76	kN	Sum of loads in Y	4,65	kN
Sum of loads in Z	-31,57	kN	Sum of loads in Z	-30,49	kN
CO51 - LC1 + LC2 + LC3 + LC10			CO151 - LC1 + LC2 + LC3 + LC13		
Sum of loads in X	0,00	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	13,76	kN	Sum of loads in Y	4,65	kN
Sum of loads in Z	-55,73	kN	Sum of loads in Z	-54,66	kN
CO52 - LC1 + LC2 + LC4 + LC10			CO152 - LC1 + LC2 + LC4 + LC13		
Sum of loads in X	0,00	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	13,76	kN	Sum of loads in Y	4,65	kN
Sum of loads in Z	-52,57	kN	Sum of loads in Z	-51,49	kN
CO53 - LC1 + LC2 + LC5 + LC10			CO153 - LC1 + LC2 + LC5 + LC13		
Sum of loads in X	0,00	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	13,76	kN	Sum of loads in Y	4,65	kN
Sum of loads in Z	-57,57	kN	Sum of loads in Z	-56,49	kN
CO54 - LC1 + LC2 + LC6 + LC10			CO154 - LC1 + LC2 + LC6 + LC13		
Sum of loads in X	0,00	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	13,76	kN	Sum of loads in Y	4,65	kN
Sum of loads in Z	-56,57	kN	Sum of loads in Z	-55,49	kN
CO60 - LC1 + LC2 + LC11			CO160 - LC1 + LC2 + LC14		
Sum of loads in X	3,39	kN	Sum of loads in X	2,93	kN
Sum of loads in Y	1,24	kN	Sum of loads in Y	1,59	kN
Sum of loads in Z	-42,33	kN	Sum of loads in Z	-33,63	kN
CO61 - LC1 + LC2 + LC3 + LC11			CO161 - LC1 + LC2 + LC3 + LC14		
Sum of loads in X	3,39	kN	Sum of loads in X	2,93	kN
Sum of loads in Y	1,24	kN	Sum of loads in Y	1,59	kN
Sum of loads in Z	-66,49	kN	Sum of loads in Z	-57,79	kN
CO62 - LC1 + LC2 + LC4 + LC11			CO162 - LC1 + LC2 + LC4 + LC14		
Sum of loads in X	3,39	kN	Sum of loads in X	2,93	kN
Sum of loads in Y	1,24	kN	Sum of loads in Y	1,59	kN
Sum of loads in Z	-63,33	kN	Sum of loads in Z	-54,63	kN
CO63 - LC1 + LC2 + LC5 + LC11			CO163 - LC1 + LC2 + LC5 + LC14		
Sum of loads in X	3,39	kN	Sum of loads in X	2,93	kN
Sum of loads in Y	1,24	kN	Sum of loads in Y	1,59	kN
Sum of loads in Z	-68,33	kN	Sum of loads in Z	-59,63	kN
CO64 - LC1 + LC2 + LC6 + LC11			CO164 - LC1 + LC2 + LC6 + LC14		
Sum of loads in X	3,39	kN	Sum of loads in X	2,93	kN
Sum of loads in Y	1,24	kN	Sum of loads in Y	1,59	kN
Sum of loads in Z	-67,33	kN	Sum of loads in Z	-58,63	kN
CO70 - LC1 + LC2 + LC12			CO170 - LC1 + LC2 + LC15		
Sum of loads in X	0,96	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	-11,70	kN	Sum of loads in Y	-3,79	kN
Sum of loads in Z	-48,06	kN	Sum of loads in Z	-50,88	kN
CO71 - LC1 + LC2 + LC3 + LC12			CO171 - LC1 + LC2 + LC3 + LC15		
Sum of loads in X	0,96	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	-11,70	kN	Sum of loads in Y	-3,79	kN
Sum of loads in Z	-72,22	kN	Sum of loads in Z	-75,05	kN
CO72 - LC1 + LC2 + LC4 + LC12			CO172 - LC1 + LC2 + LC4 + LC15		
Sum of loads in X	0,96	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	-11,70	kN	Sum of loads in Y	-3,79	kN
Sum of loads in Z	-69,06	kN	Sum of loads in Z	-71,88	kN
CO73 - LC1 + LC2 + LC5 + LC12			CO173 - LC1 + LC2 + LC5 + LC15		
Sum of loads in X	0,96	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	-11,70	kN	Sum of loads in Y	-3,79	kN
Sum of loads in Z	-74,06	kN	Sum of loads in Z	-76,88	kN
CO74 - LC1 + LC2 + LC6 + LC12			CO174 - LC1 + LC2 + LC6 + LC15		
Sum of loads in X	0,96	kN	Sum of loads in X	0,00	kN
Sum of loads in Y	-11,70	kN	Sum of loads in Y	-3,79	kN
Sum of loads in Z	-73,06	kN	Sum of loads in Z	-75,88	kN

Decisive load combination CO50 Characteristic values wind 0° In service.

5.3.1 Calculation of ballast against overturning.

Check: $M_{stab} / M_{ov} > 1.2$

Used info for the stability calculation.

Sum of vertical forces = 31.57 kN

Sum of horizontal load = 13.76 kN

The center of gravity of the complete system lays on a height of 2.60 meter.

Overturning moment

$$M_{ov} = 13.76 * (2.60) = 35.77 \text{ kNm}$$

Stabilization moment

$$M_{stab} = (\text{Ballast} + \text{Layher self-weight} + \text{down force}) * \text{depth} / 2$$

$$M_{stab} = (31.57) * 4.144 / 2 = 65.41$$

$$M_{stab} / M_{ov} = 65.41 / 35.77 = 1.82 > 1.2$$

5.3.2 Calculation of ballast against slipping.

Sum of vertical forces = 31.57 kN

Sum of horizontal load = 13.76 kN

Ballast calculation with the friction coefficient 0.6

$$(\text{ballast} + \text{Self-weight} + \text{down force}) * \text{friction coefficient} / \text{sum of horizontal} > 1.2$$

$$(31.57) * 0.6 / 13.76 = 1.37 > 1.2$$

Prolyte H40V Truss

Truss series	Prolyte H40V
Truss manufacturer	Prolyte Group
Truss series calculated by:	Krasenbrink + Bastians.
Structural report number:	12500-4

Design internal forces for the complete truss

Normal force main chord	+/- 50.22 kN
Normal force coupling system	+/- 52.58 kN
Normal force diagonals	+/- 13.39 kN
Bending moment $M_{yR,d}$	34.05 kNm
Bending moment $M_{zR,d}$	34.05 kNm
Normal Force $N_{R,d}$	200.86 kN
Transversal Force $V_{yR,d}$	18.94 kN
Transversal Force $V_{zR,d}$	18.94 kN

Truss geometry

Main chords	48x3	EN AW-6082T6
Diagonals	20x2	EN AW-6082T6
Coupling system	CCS7	
Height	339 mm	Centre to centre distance main chords
Width	339 mm	Centre to centre distance main chords
A	16.96 cm ²	
I_y	4179.54 cm ⁴	
I_z	4179.54 cm ⁴	
i_y	15.70 cm	
i_z	15.70 cm	
I_T	900 cm ⁴	