

DIMENZIONIRANJE STRUKTURE TRUPA I IZRADA RAČUNALNOG MODELA ISTRAŽIVAČKOG BRODA / BRODA ZA PODRŠKU RONJENJU

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SVEUČILIŠTE U RIJECI

TEHNIČKI FAKULTET

Preddiplomski svučilišni studij brodogradnje

Završni rad

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Rijeka, rujan 2024.

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Mentori: Prof. dr. sc. Albert Zamarin,

mag. ing. nav. arch. Antonio Filipović

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IZJAVA

Sukladno članku 9. *Pravilnika o završnom radu i završnom ispitu na preddiplomskim sveučilišnim studijima i stručnim studijima* Tehničkog fakulteta Sveučilišta u Rijeci izjavljujem da sam ovaj rad izradila samostalno primjenjujući znanja stečena tijekom studija uz potrebne konzultacije, savjete i koristeći se navedenom literaturom.

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Maria Šuper

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ISTRAŽIVAČKOG BRODA / HULL SCANTLINGS AND STRUCTURAL MODEL OF A
RESEARCH AND DIVE SUPPORT VESSEL**

Opis zadatka:

U okviru zadatka potrebno je izvršiti proračun dimenzija strukture trupa na glavnom rebru predloženog istraživačkog broda / broda za podršku ronilačkim aktivnostima u skladu sa pravilima DNV (Det Norske Veritas) klasifikacijskog društva : - uvodno opisati podjelu, specifičnosti namjene i strukturalne konfiguracije istraživačkih brodova, - identificirati i primijeniti opće i specifične zahtjeve DNV-a za dimenzioniranje glavnog rebra s ciljem osiguranja pouzdanosti i sukladnosti s međunarodnim pomorskim standardima, - primijeniti dostupne programske pakete klasifikacijskih društava za izračun/provjeru strukturnih dimenzija prema kriterijima čvrstoće u skladu sa pravilima i propisima, - izraditi nacrt glavnog rebra sa potrebnim detaljima, - izraditi računalni strukturni model (osnovna geometrija) trupa, kao pripremu za strukturnu analizu, koristeći kombinacije dostupnih programskih paketa za opće modeliranje i modeliranje brodskih konstrukcija. Rad će biti izrađen u suradnji sa firmom Lürssen Design Center Kvarner d.o.o.

Rad mora biti napisan prema Uputama za pisanja diplomskih / završnih radova koje su objavljene na mrežnim stranicama studija.

Zadatak uručen pristupniku: 20.03.2024.

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1. UVOD

1.1. Opis istraživačkog broda

Istraživački brod je plovni objekt izgrađen ili preuređen za oceanografska, meteorološka ili neka druga znanstvena istraživanja. Istraživački brodovi se grade prema potrebama istraživanja tako da mogu imati različite oblike, tehnologije i opremu. Obično raspolažu opremom za određivanje položaja, dubinomjerom, magnetometrom, krmenom sohom, hidrografskim vitlom, dizalicom, laboratorijima, prostorijama za smještaj istraživača i dr.

1.2. Podjela istraživačkih brodova

Istraživački brodovi mogu biti: oceanografski brodovi, hidrografski brodovi, ribarski istraživački brodovi, meteorološki brodovi te polarni istraživački brodovi.

Oceanografski brodovi namjenjeni su za proučavanje fizikalnih, kemijskih, bioloških i geoloških svojstava oceana. Opremljeni su laboratorijima za analizu uzoraka vode, sedimenta i zraka te često imaju i uređaje za uzimanje uzoraka s morskog dna, poput rovera i podvodnih dronova.

Hidrografski brodovi su specijalizirani za kartiranje morskog dna i obalnih područja kako bi se osigurala sigurna plovidba kao i istraživanje karakteristika morskog dna radi eksploatacije nafte i plina. Također provode seizmička istraživanja morskog dna, a za rad im je potrebna oprema poput: sonara, multibeam echosoundera i LIDAR za prikupljanje podataka o dubinama i strukturama podmorja.

Ribolovni istraživački brodovi su fokusirani na proučavanje ribljih populacija i ekosustava. Opremljeni su mrežama, tralima i akustičnim uređajima za praćenje i uzorkovanje ribe.

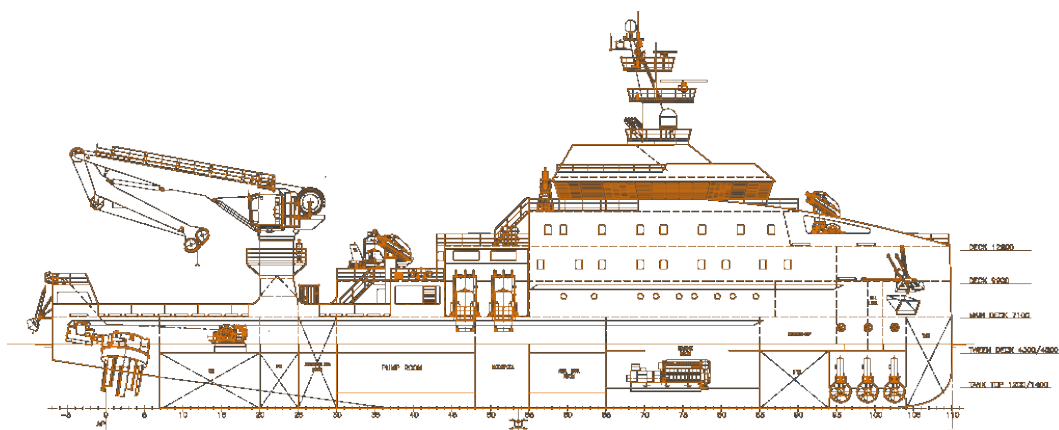
Meteorološki brodovi su namjenjeni prikupljanju podataka o vremenskim uvjetima na moru. Oprema potrebna za rad uključuje: instrumente za mjerenje atmosferskih uvjeta, kao što su barometri, anemometri i radiometri.

Polarni istraživački brodovi su namjenjeni za istraživanje polarnih regija, posebno Arktika i Antarktika. Opremljeni su za rad u ekstremnim uvjetima, često sa sposobnošću probijanja leda.

Prema specifičnosti namjene istraživački brodovi se također mogu podijeliti na brodove u svrhu znanstvenog istraživanja koji prikupljaju podatke o oceanima, atmosferi, klimatskim promjenama, biologiji mora kao i drugim prirodnim znanostima, brodove u svrhu kartiranja i navigacije koji služe za izradu detaljnih karta morskog dna, obalnih linija i pomorskih puteva, brodove za ekološki monitoring koji prate stanje morskih ekosustava i utjecaja ljudskih aktivnosti na iste te na brodove za istraživanje resursa kao što su riba, nafta i plin.

1.3. Strukturalna konfiguracija istraživačkih brodova

Trup istraživačkih brodova često je jači i stabilniji od komercijalnih brodova zbog potrebe za radom u teškim uvjetima. Polarni istraživački brodovi poput broda koji će se analizirati u ovome radu imaju ojačani trup za probijanje leda. Kao što je i prethodno navedeno uz prostorije namjenjene za smještaj znanstvenika i posade potrebno je odrediti i pozicije prostora koje će zauzimati laboratoriji koji mogu biti ugrađeni ili mobilni kao što je prikazano na Slici 1. Prostori za smještaj znanstvenika i posade uključuje kabine, kuhinju, blagavaonicu i rekreativne prostore, napravljeni su za udobnost tijekom dugih boravaka na moru. Potrebna oprema na takvome brodu uključuje navigacijsku i komunikacijsku opremu poput naprednih sustava za precizno pozicioniranje i sustava za komunikaciju s obalnim stanicama i drugim brodovima također je potrebna i oprema za uzorkovanje i istraživanje kao što su sonde za uzimanje uzoraka vode, sedimenta i zraka, ROV (Remote Operated Vehicle) i AUV (Autonomous Underwater Vehicle) za podvodna istraživanja te sonari i echosunderi za kartiranje (prikupljanje značajki reljefa) morskog dna.



Slika 1. Primjer rasporeda prostora trupa istraživačkog broda [3]

2. PRAVILA I PROPISI KLASIFIKACIJSKOG DRUŠTVA

Det Norske Veritas (DNV) jedno je od vodećih svjetskih klasifikacijskih društva koje pruža standarde i smjernice za projektiranje i izgradnju brodova i pomorskih struktura.

Dimenzioniranje glavnog rebra broda kritičan je element projektiranja koji osigurava strukturalni integritet broda. Za osiguranje pouzdanosti i sukladnosti s međunarodnim pomorskim standardima potrebno je primijeniti opće i specifične zahtjeve DNV-a.

DNV je neovisni pružatelj usluga osiguranja i upravljanja rizicima, koji djeluje u više od 100 zemalja s ciljem očuvanja života, imovine i okoliša. Kao pouzdan glas mnogih najuspješnijih organizacija na svijetu, koriste široko iskustvo i duboko stručno znanje kako bi unaprijedili sigurnost i održivu izvedbu, postavili industrijske standarde te inspirirali i osmislili rješenja.

2.1. Opći zahtjevi DNV-a za dimenzioniranje glavnog rebra

Pri izradi broda potrebno je koristiti certificirane materijale koji zadovoljavaju DNV standarde za čelik i druge materijale. Pri dimenzioniranju elemenata potrebno je uzeti u obzir geometriju broda, uključujući oblik trupa i raspored drugih strukturnih elemenata te specifikaciju minimalnih dimenzija za glavno rebro uključujući debljinu, visinu i širinu. Potrebno je provesti analizu različitih vrsta opterećenja koja uključuju statička, dinamička i valna udarna opterećenja. Analiza se provodi koristeći metode kao što je metoda konačnih elementa (FEA) za modeliranje i simulaciju opterećenja. Nužno je provesti proračun minimalne čvrstoće potrebne za glavno rebro kako bi izdržalo predviđena opterećenja kao i uvesti sigurnosne faktore prema DNV-ovim smjernicama kako bi se osigurala dugotrajnost i otpornost na zamor materijala.

2.2. Specifični zahtjevi DNV-a za dimenzioniranje glavnog rebra

Primjena zahtjeva za dimenzioniranje glavnog rebra može se prikazati kroz izbor materijala, proračun dimenzija, strukturnu analizu, implementaciju i inspekciju te dokumentaciju. Pri izboru materijala bitno je odrediti čelik visoke čvrstoće prema DNV standardima, npr. čelik s oznakom DNV GL Grade A. Na temelju opterećenja i razmaka između rebara proračunava se minimalna debljina i druge dimenzije rebra. Provođenjem simulacije analize konačnih elemenata kako bi se analizirala čvrstoća strukture na predviđena opterećenja i identificirale potencijalne kritične točke. Izrada i montaža strukturnih elemenata glavnog rebra i trupa općenito se provodi prema projektu te se sukladno provode inspekcije zavarivanja. Potrebno je provoditi redovitu inspekciju nakon ugradnje kako bi se osigurala dugotrajnost i otkrili potencijalni problemi tijekom vijeka trajanja broda. Kompletna dokumentacija, koja uključuje proračune, crteže, specifikacije materijala i izvješća o inspekciji, se priprema za reviziju od strane DNV-a radi dobivanja certifikata klase. Primjenom ovih koraka i pridržavanjem smjernica klasifikacijskog društva osigurava se da glavno rebro broda zadovoljava sve potrebne standarde za sigurnost i pouzdanost.

2.3. Posebni zahtjevi za plovidbu u području leda

Klasifikacijska društva, kao što su DNV GL, ABS, ili Lloyd's Register, pružaju različite kategorije klase plovidbe u ledenom području koje pokazuju razinu pojačanja za led (Tablica 2). Pravila za klasifikaciju plovidbe u ledenim područjima obuhvaćaju zahtjeve za: čvrstoću trupa broda, propulziju broda te raznu opremu na brodu. Dodatna „ICE“ klasa se odnosi na plovila koja tijekom službi mogu ploviti morima djelomično ili potpuno zaleđenom površinom, uobičajeno su to sjeverna Baltička područja u zimi ili područja sa sličnim uvjetima. Različite klase određene su razlikom debljine leda koji se susreće u plovidbi, Tablica 1.

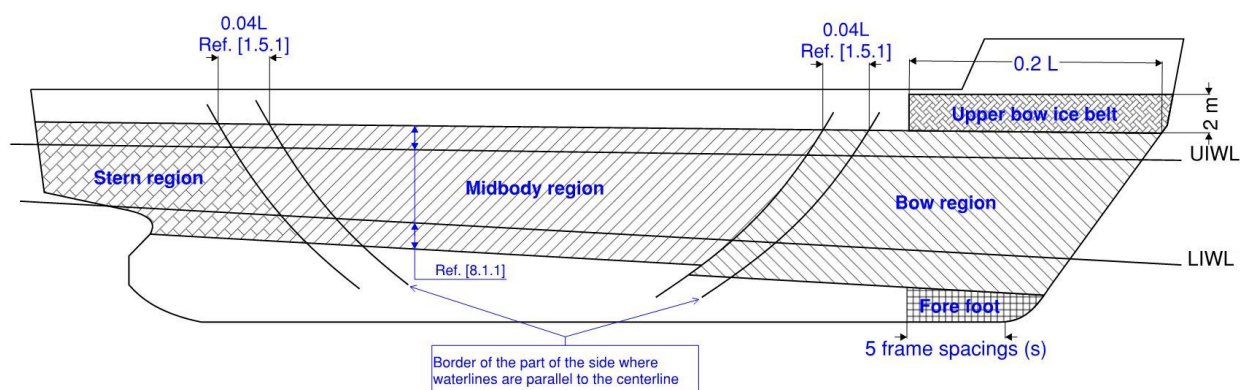
Tablica 1. Klase za područja plovidbe vodom prekrivenom ledom

| Ice class | h_o [m] | h [m] |
|-------------------------------|-----------|---------|
| Ice(1A*F) and Ice(1A*) | 1.0 | 0.35 |
| Ice(1A) | 0.8 | 0.30 |
| Ice(1B) | 0.6 | 0.25 |
| Ice(1C) | 0.4 | 0.22 |

Tablica 2. Definicija klasa za područja plovidbe vodom prekrivenom ledom

| <i>Klasa</i> | <i>Kvalifikacija</i> | <i>Namjena broda</i> | <i>Ekvivalentna Finsko-Švedska klasa led</i> |
|--------------|----------------------|--|--|
| Ice | 1A*F | Brodovi s velikom snagom za opću plovidbu u teškom ledu Baltika. Obično sposobni ploviti u teškim uvjetima leda bez pomoći ledolomaca. | |
| | 1A* | Brodovi namijenjeni plovidbi u vodi s ledom. Jednogodišnji led debljine do 1.0 m. Obično sposobni ploviti u teškim uvjetima leda bez pomoći ledolomaca.. | 1A Super |
| | 1A | Brodovi namijenjeni plovidbi u vodi s ledom. Jednogodišnji led debljine do 0.8 m. Sposobni ploviti u teškim uvjetima leda uz pomoć ledolomaca kada je to potrebno. | 1A |
| | 1B | Brodovi namijenjeni plovidbi u vodi s ledom. Jednogodišnji led debljine do 0.6 m. Sposobni ploviti u umjerenim uvjetima leda uz pomoć ledolomaca kada je to potrebno. | 1B |
| | 1C | Brodovi namijenjeni plovidbi u vodi s ledom. Jednogodišnji led debljine do 0.4 m. Sposobni ploviti u blagim uvjetima leda uz pomoć ledolomaca kada je to potrebno. | 1C |

Granice pojačanja zbog pojave leda u plovidbi su određene gornjom ledenom vodenom linijom (UIWL) i donjom ledenom vodenom linijom (LIWL) koje označuju gazove pri tim ekstremnim uvjetima, Slika 2.



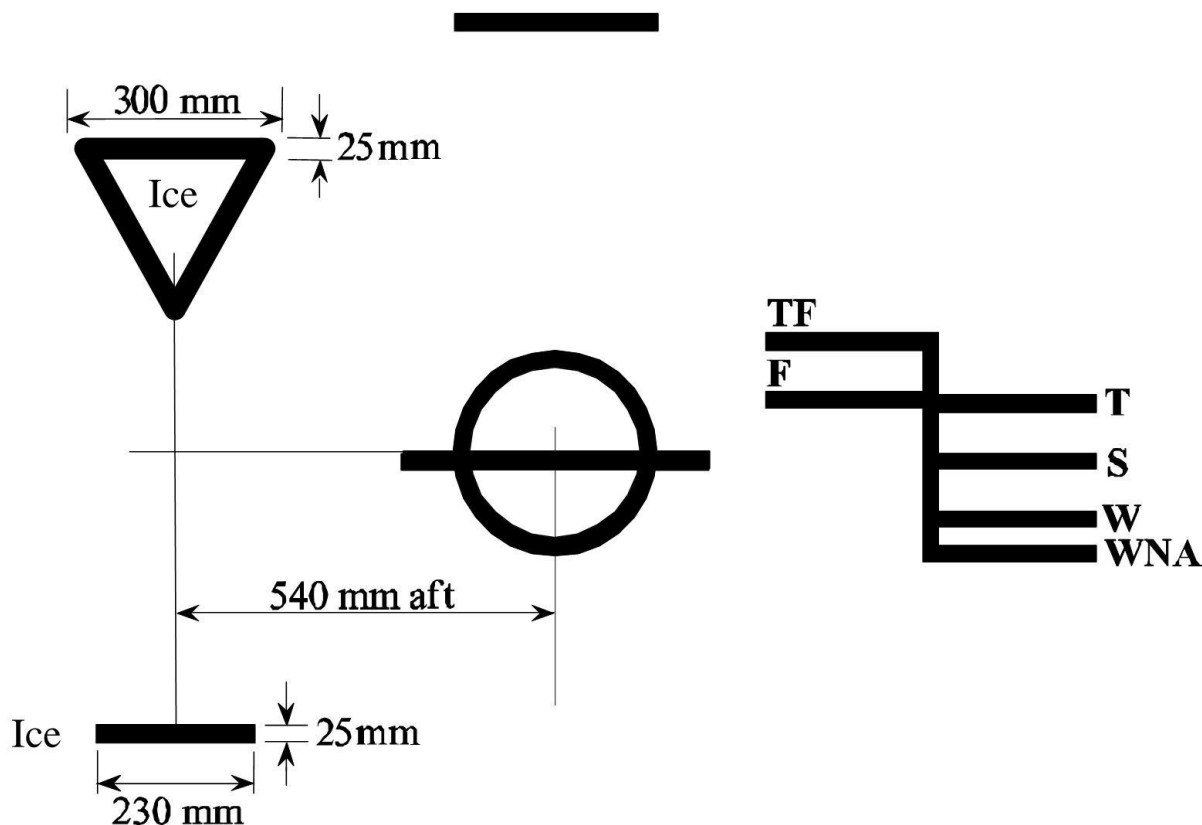
Slika 2. Prikaz područja ledenog pojasa

Posebni zahtjevi koji su određeni „Ice“ klasom obuhvaćaju materijale tako da postavljaju zahtjev da korišteni materijal mora biti otporan na krhkost i degradaciju na niskim temperaturama. Čelik i druge legure se moraju testirati i certificirati za upotrebu u hladnoj klimi. Plovila i strukture moraju biti dizajnirani da izdrže nakupljanje leda, koji može povećati težinu i opterećenje na strukturu, te utjecati na stabilnost i sigurnost. Oprema i infrastruktura trebaju imati sustave za grijanje i izolaciju kako bi spriječili zamrzavanje ključnih komponenti, kao što su motori, cjevovodi, i električni sustavi.

Artička područja i Sjeverni Baltik može imati značajnu debljinu leda tijekom zime, pa plovila moraju biti posebno ojačana kako bi se osiguralo da mogu sigurno prolaziti kroz led i izdržati uvjete poput zbijenog leda ili leda koji se stapa uslijed topljenja i ponovnog zamrzavanja. Brod koji će se promatrati u ovome radu je ledene klase 1C tj. namijenjen je za plovidbu u laganim ledenim uvjetima.

2.3.1. Pojačanje strukture u pojasu leda

Nakon određivanja „Ice“ klase potrebno je pojačati određene djelove strukture unutar ledenog pojasa. Potrebno je ojačati trup broda dodatnom povećanom debljinom čelika, posebno na pramcu i u području kobilice gdje je pritisak leda najveći. Također je potrebno dodati dodatna rebra kako bi se poboljšala čvrstoća trupa i otpornost na udare leda. Propeleri su izrađeni od materijala otpornijih na lom, poput bronce ili posebnih legura čelika kako bi izdržali udare od led. Pramac broda može biti oblikovan ili opremljen kako bi olakšalo probijanje kroz led. Brod s dodjeljenom „Ice“ klasom ima oznaku klase na bokovima koja se naznačava prema Slici 3.



Slika 3. Označavanje „Ice“ klase na trupu broda

Pravila i klasifikacije vezane uz ledena područja su ključna za osiguranje sigurnosti, dugovječnosti i učinkovitosti u izuzetno hladnim uvjetima. Za promatrani brod bitno je naglasiti da pravila postavljaju zahtjeve za plovila namjenjena pružanju podrške ronilačkim operacijama, s posebnim naglaskom na sposobnost sigurnog održavanja pozicije tijekom ronjenja, zahvaljujući ugrađenim azipodima kao glavnom porivnom opremom.

3. DIMENZIONIRANJE STRUKTURE TRUPA

Cilj ove studije je odrediti i dimenzionirati strukturu trupa istraživačkog broda koji plovi u hladnim podnebljima. Dimenzioniranje svih konstrukcijskih elemenata provedeno je u računalnom programu Nauticus Hull. Svi proračunati elementi zadovoljavaju uvjete lokalne i globalne čvrstoće.

3.1. Ulazni podatci za brod

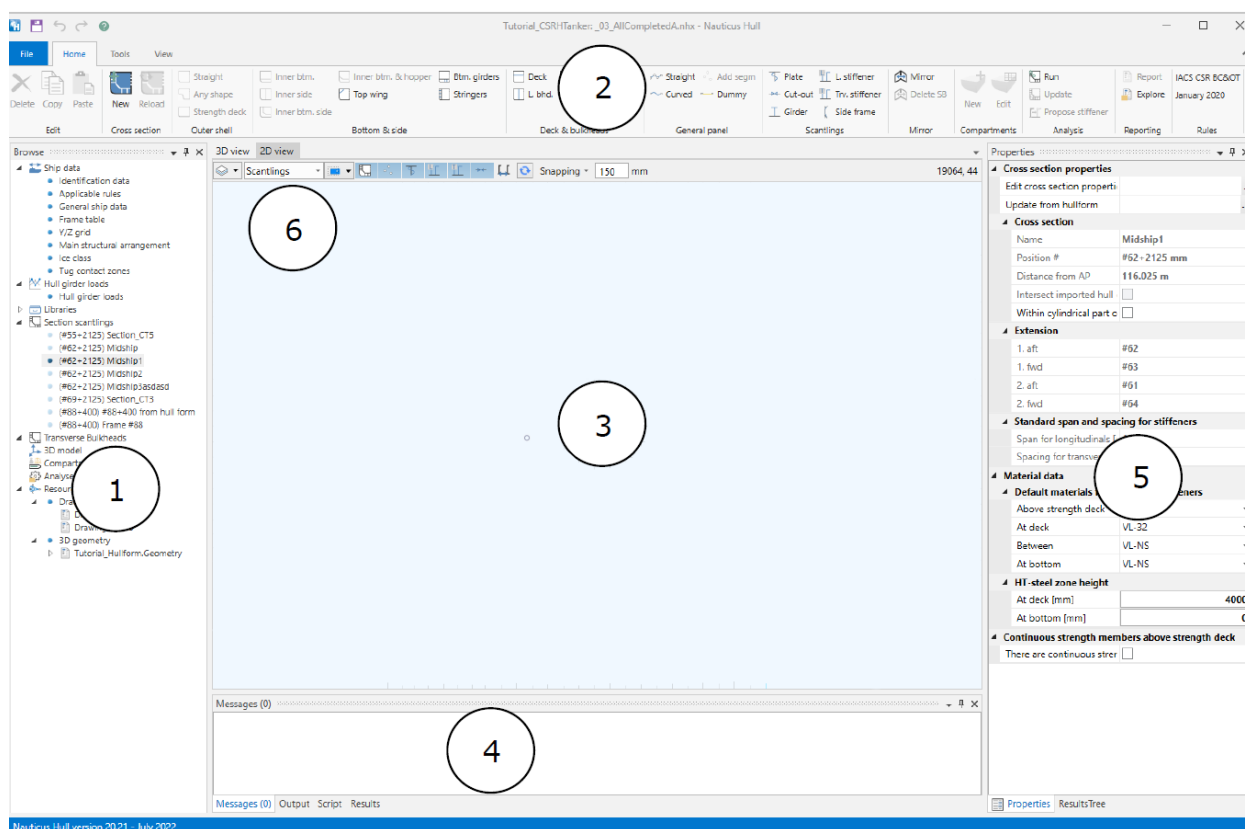
3.1.1. Glavne dimenzije broda

| | | |
|--|-------|---------|
| Duljina između perpendikulara, L_{PP} | [m]: | 123.695 |
| Duljina prema pravilima, L | [m]: | 119.984 |
| Duljina nadvođa, L_{LL} | [m]: | 123.754 |
| X-pozicija za krmeni kraj vodene linije za duljinu nadgrađa..... | [m]: | 115.000 |
| Projektna širina, B | [m]: | 25.000 |
| Projektni gaz, T | [m]: | 7.200 |
| Projektna dubina, D | [m]: | 11.300 |
| Projektna dubina nadvođa, D_{LL} | [m]: | 11.300 |
| Blok koeficijent, C_B | : | 0.650 |
| Maksimalna radna brzina, V | [čv]: | 15.000 |

3.2. Definiranje modela u Nauticus Hull programu

U ovome radu korišten je softver Nauticus Hull razvijen od strane klasifikacijskog društva Det Norske Veritas za izračun i provjeru čvrstoće trupa broda. U softveru su implementirana klasifikacijska pravila za globalnu i lokalnu čvrstoću, pravila za stabilnost i plovnost, pravila za otpornost na led, pravila za dinamička opterećenja i pravila specifična za klase. Osim same provjere čvrstoće, Nauticus Hull je također alat kojim se definira struktura na način koji omogućava da se računalni model koristi u kasnijim fazama projekta. Taj model može poslužiti kao osnova za nastavak izrade klasifikacijske i radioničke dokumentacije, odnosno detaljnih nacrti potrebnih za izradu broda. Također usvojeni model iz Nauticus Hull-a može biti korišten za daljnje analize poput analize metodom konačnih elemenata ukoliko se procijeni da je potrebno dodatno testiranje ili optimizacija strukture.

Pokretanjem računalnog programa Nauticus Hull izabiremo opciju kreiranja novog projekta čime se otvara korisničko sučelje prikazano na slici 4.



Slika 4. Korisničko sučelje u Nauticus Hull-u

Brojčano su označeni djelovi korisničkog sučelja:

- 1 – Navigacijsko stablo
- 2 – Traka s alatima/Izbornik
- 3 – Radna površina
- 4 – Izlazne napomene
- 5 – Svojstva i rezultati
- 6 – Odabir prikaza

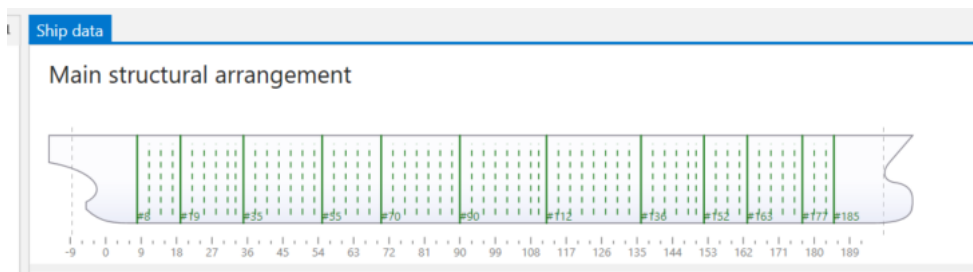
Novi projekt se započinje izborom pravila po kojima će se provoditi analiza te unošenjem podataka o osnovnim značajkama broda prema tablici iz priloga A. Slijedi definiranje materijala modela prema kojemu će se graditi struktura. U ovome radu korišten je isključivo brodograđevni čelik tipa VL-36. Brodograđevni čelik tipa VL-36 poznat je po svojoj visokoj čvrstoći i otpornosti na koroziju, što ga čini pogodnim za izgradnju brodskih trupova, paluba i drugih strukturalnih komponenata koje su izložene morskim uvjetima. Glavna svojstva materijala mogu se iščitati sa slike 5.

| Name | Density (kg/m3) | Yield stress (N/mm2) | Material factor, k (-) | Tensile strength (N/mm2) | Young's modulus (N/mm2) | Shear modulus (N/mm2) | Material type |
|---------|-----------------|----------------------|------------------------|--------------------------|-------------------------|-----------------------|------------------|
| VL-NS | 7850 | 235 | 1 | 400 | 206000 | 79231 | Standard steel ▼ |
| VL-32 | 7850 | 315 | 0.78 | 440 | 206000 | 79231 | Standard steel ▼ |
| VL-36 | 7850 | 355 | 0.72 | 490 | 206000 | 79231 | Standard steel ▼ |
| VL-40 | 7850 | 390 | 0.68 | 510 | 206000 | 79231 | Standard steel ▼ |
| VL-47 | 7850 | 460 | 0.68 | 570 | 206000 | 79231 | Standard steel ▼ |
| VL-40FA | 7850 | 390 | 0.68 | 510 | 206000 | 79231 | Standard steel ▼ |
| | | | | | | | ▼ |

Slika 5. Izbornik sa svojstvima materijala

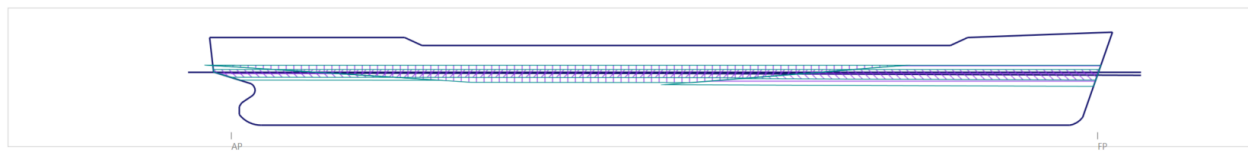
VL-36 je legirani čelik, što znači da sadrži dodatke kao što su nikal, molibden ili mangan, koji poboljšavaju njegove mehaničke osobine i otpornost na koroziju. Brodograđevni čelici s oznakama poput VL-36 prolaze stroge kontrole kvaliteta kako bi se osigurala njihova dugotrajnost i sigurnost u ekstremnim uvjetima na moru.

Prije nego se krene definirati geometrija presjeka potrebno je unijeti podatke o razmaku rebara i poziciji rebara i nepropusnih pregrada po duljini broda kao što je vidljivo na slici 6.



Slika 6. Glavni raspored strukture

Kako bi se lakše definirala geometrija modela za analizu potrebno je napraviti mrežu prema tipičnim razmacima komponenata strukture prema y i z osi. Također je potrebno definirati pozicije nepropusnih pregrada i okvirnih rebara duž broda. Za provjeru zahtjeva za ojačanje protiv leda unose se dodatni podaci o brodu koji moraju biti definirani pod klasom otpornosti na led. Propisani zahtjevi za lokalna opterećenja strukturnih elemenata na led se odnose na limove, ukrepe, poprečne ukrepe i glavne okvire. Kako bi se izračunao tlak uslijed djelovanja leda potrebno je poznavati iznos istisninu i gaz broda. Definiranjem ledenih vodenih linija određuje se koje će se elemente strukture provjeriti prema zahtjevima za pojačanje trupa broda uslijed pojave leda.



Slika 7. Definirani ledeni pojas

3.3. Provjera udužne čvrstoće trupa

Pojam uzdužne granične čvrstoće trupa može se definirati kao stanje naprezanja i deformacije na razini trupa koje odgovara maksimalnom opterećenju koje konstrukcija može izdržati. Svako daljnje povećanje momenta savijanja dovodi do kolapsa trupa broda. To stanje je posljedica kolapsa pojedinačnih strukturnih elemenata od kojih se sastoji brodska konstrukcija. Vrijednost graničnog momenta dobije se zbrajanjem doprinosa svih elemenata koji sudjeluju u uzdužnoj čvrstoći trupa. U obzir se moraju uzeti stupanj deformiranosti i čvrstoća nakon kolapsa pojedinih strukturnih elemenata. S obzirom na način opterećenja, ovisno o tome nalazi li se brod na valnom brijegu ili između dva vala u valnom dolu, konstrukcijski elementi mogu biti u stanju vlačnog ili tlačnog naprezanja, što znači da su neki elementi deformirani na način da su izduženi dok su neki uslijed tlačnog naprezanja skraćeni. Konačni rezultat ovakvog stanja jest određena zakrivljenost trupa.

Globalni momenti savijanja računaju se prema pravilima DNV-a Pt.3.Ch.4.Sec.4. [2.2.2.]:

$$M_{sw-h-min} = f_{sw}(171C_wL^2B(C_B + 0,7) \cdot 10^{-3} - M_{wv-h-mid}) \quad (3.1.)$$

$$M_{sw-s-min} = -0,85f_{sw}(171C_wL^2B(C_B + 0,7) \cdot 10^{-3} + M_{wv-s-mid}) \quad (3.2.)$$

$$M_{wv-h} = 0,19 \frac{f_R}{0,85} f_{nl-vh} f_m f_p C_w L^2 B C_B \quad (3.3.)$$

$$M_{wv-s} = -0,19 \frac{f_R}{0,85} f_{nl-vs} f_m f_p C_w L^2 B C_B \quad (3.4.)$$

$$M_{wh} = f_p \left(0,31 + \frac{L}{2800}\right) f_m C_w L^2 T_{LC} C_B \quad (3.5.)$$

pri čemu:

f_{sw} = distribucijski faktor po duljini broda = 1,0

$M_{wv-h-mid}$ = moment savijanja uslijed horizontalnog vala za procjenu čvrstoće na paralelnom srednjaku u uvjetima progiba

$M_{wv-s-mid}$ = moment savijanja uslijed horizontalnog vala za procjenu čvrstoće na paralelnom srednjaku u uvjetima progiba

f_R = faktor povezan s operativnim profilom

f_{nl-vh} = koeficijent nelinearnih efekata u progibu

f_{nl-vs} = koeficijent nelinearnih efekata u progibu

f_p = faktor opterećenja

f_m = faktor materijala

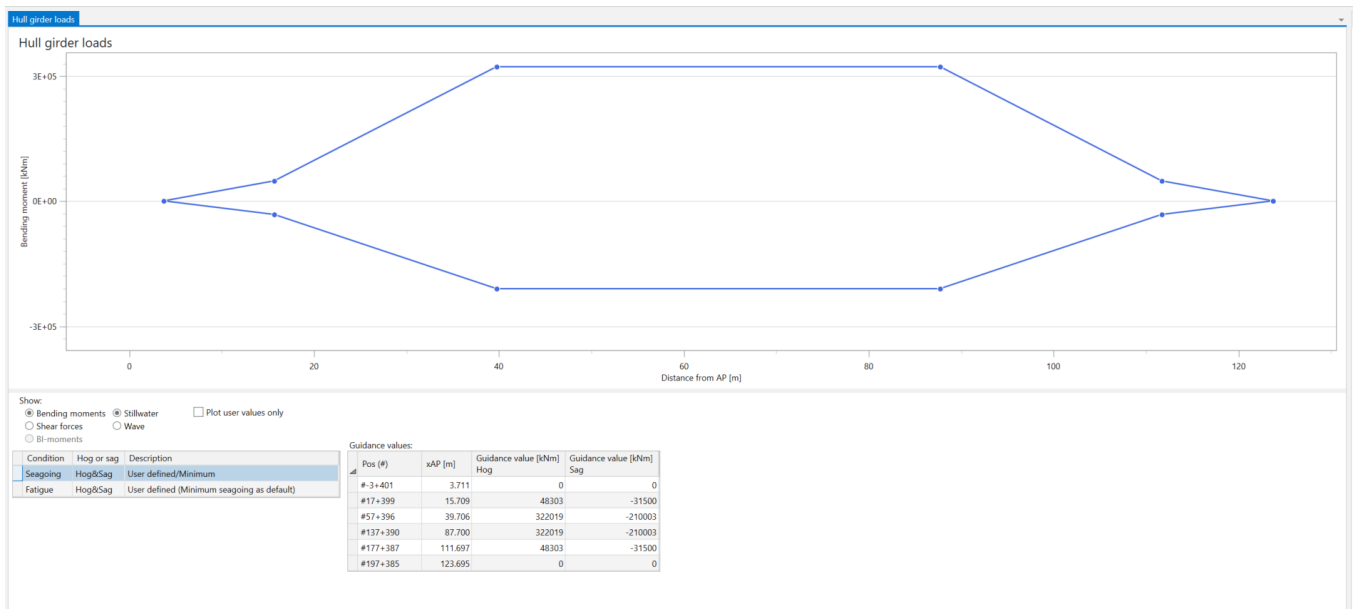
Rezultat je prikazan u Tablicama 3 i 4, te raspodjelom momenata savijanja po duljini broda, Slika 8 i Slika 9.

Tablica 3. Momenti savijanja na mirnoj vodi

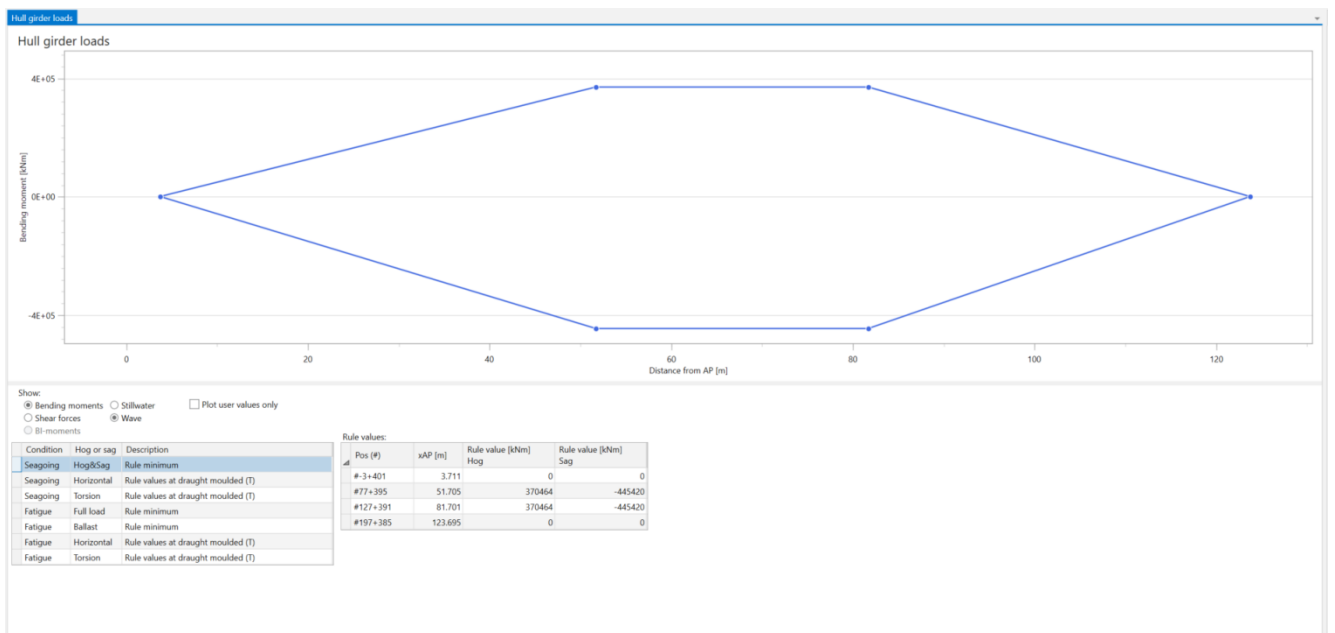
| Momenti savijanja na mirnoj vodi | [kNm] |
|----------------------------------|---------|
| u pregibu (hogging) | 322019 |
| u progibu (sagging) | -210003 |

Tablica 4. Momenti savijanja na valovima

| Momenti savijanja na valovima | [kNm] |
|-------------------------------|---------|
| u pregibu (hogging) | 370464 |
| u progibu (sagging) | -445420 |
| horizontalni | 198142 |



Slika 8. Dijagram momenata savijanja na mirnoj vodi



Slika 9. Dijagram momenata savijanja na valu

Sile smicanja računaju se prema pravilima DNV-a Pt.3.Ch.4.Sec.4. [2.4.2.]:

$$Q_{sw-pos-min} = \frac{5f_{qs}M_{sw-min}}{L} \quad (3.6.)$$

$$Q_{sw-neg-min} = \frac{-5f_{qs}M_{sw-min}}{L} \quad (3.7.)$$

$$Q_{wv-pos} = 0,52f_{q-pos}f_pLBC_B \quad (3.8.)$$

$$Q_{wv-neg} = 0,52f_{q-neg}f_pLBC_B \quad (3.9.)$$

pri čemu:

f_{qs} = distribucijski faktor po duljini broda =0,8

f_{q-pos} = distribucijski faktor po duljini broda za pozitivne smične sile

f_{q-neg} = distribucijski faktor po duljini broda za negativne smične sile

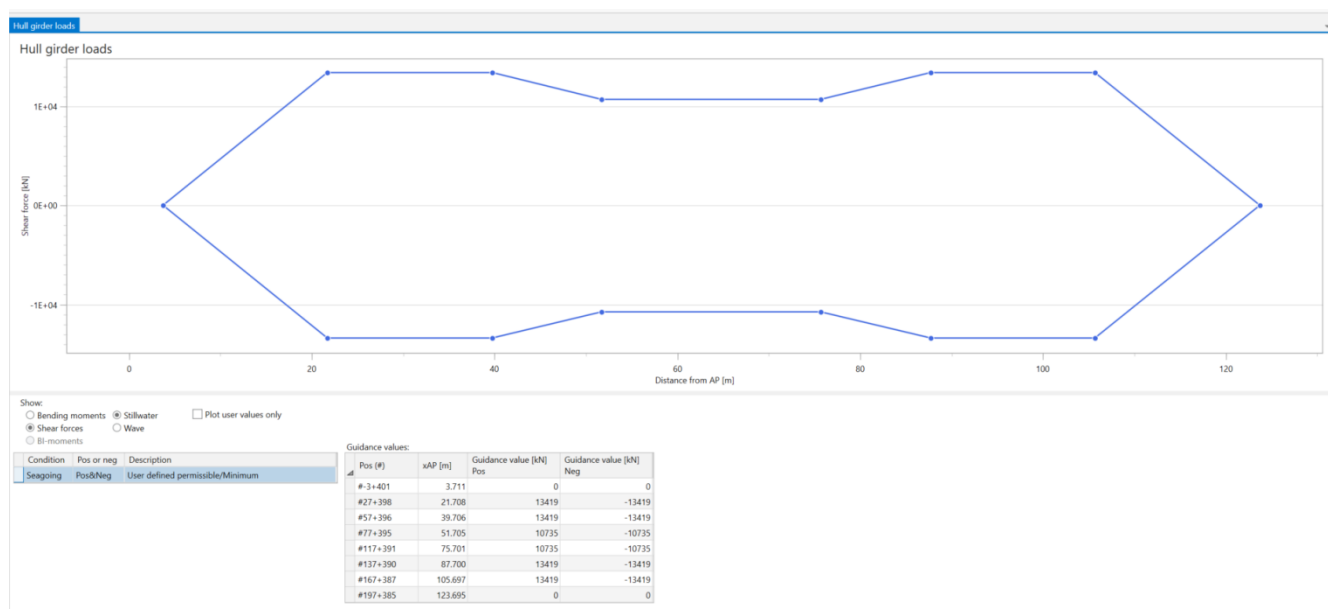
Rezultat je prikazan u Tablicama 5 i 6, te raspodjelom sila smicanja po duljini broda, Slika 10 i Slika 11.

Tablica 5. Sile smicanja na mirnoj vodi

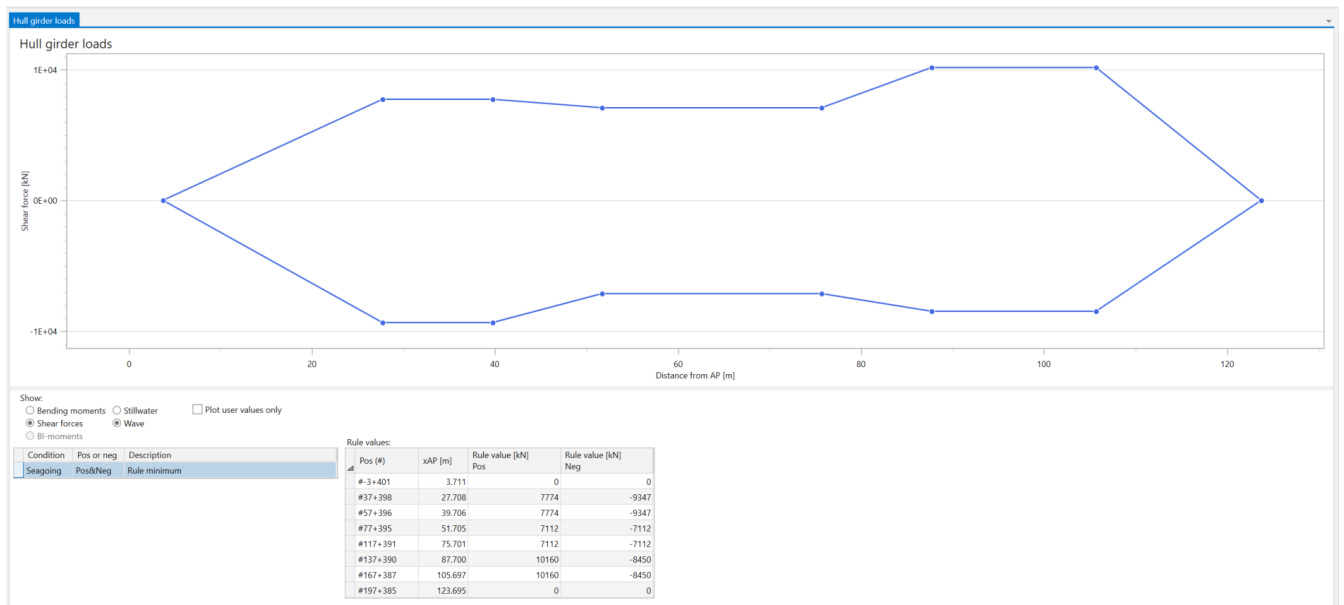
| | |
|------------------------------|--------|
| Sile smicanja na mirnoj vodi | [kN] |
| pozitivne | 10735 |
| negativne | -10735 |

Tablica 6. Sile smicanja na valu

| | |
|-----------------------|-------|
| Sile smicanja na valu | [kN] |
| pozitivne | 7112 |
| negativne | -7112 |

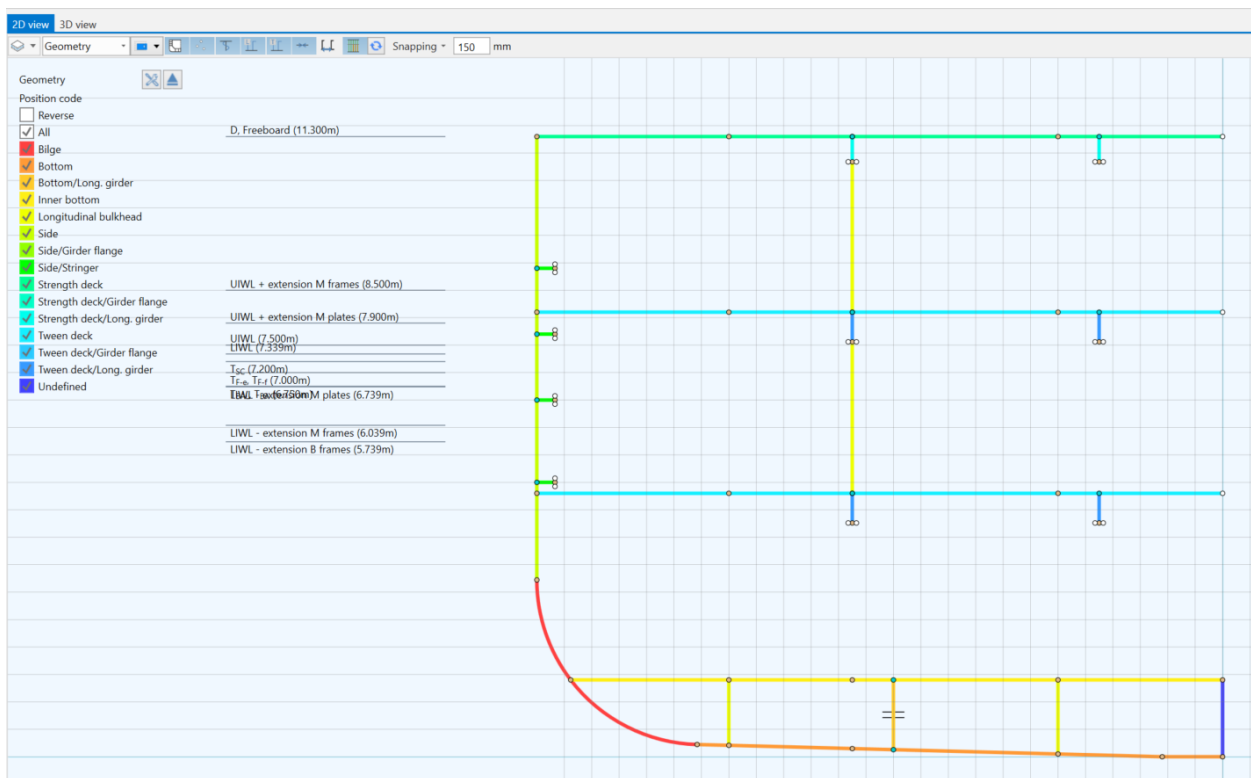


Slika 10. Dijagram sila smicanja na mirnoj vodi



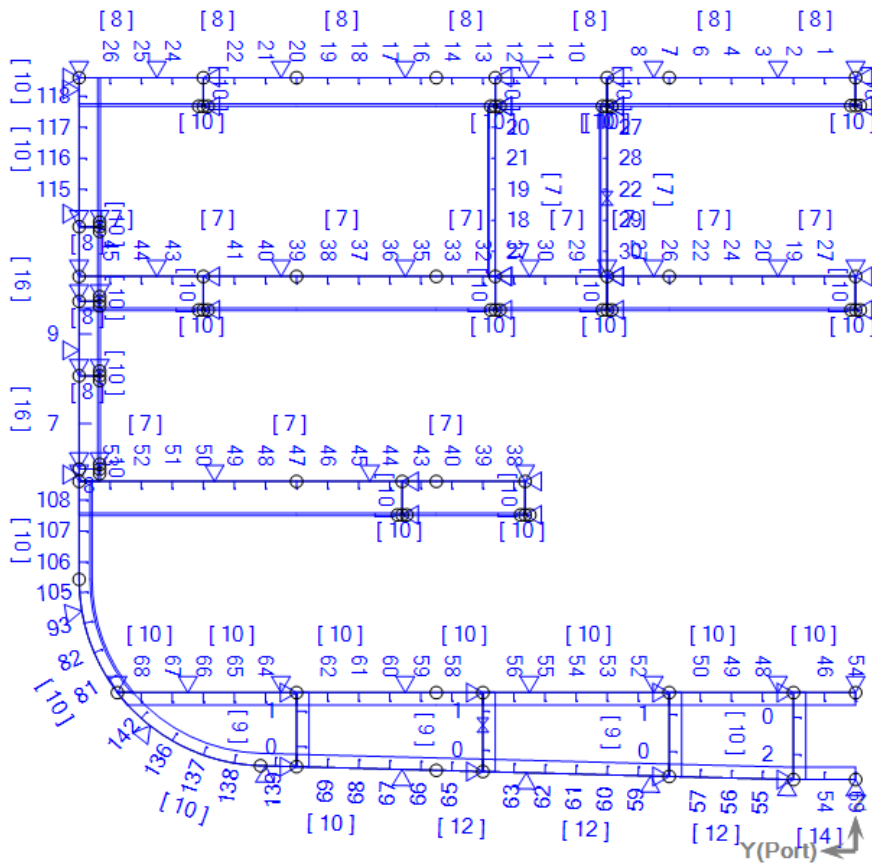
Slika 11. Dijagram sila smicanja na valu

Nakon definiranja materijala koji će se koristiti te opterećenja broda potrebno je generirati presjek glavnog rebra postavljanjem mreže za analizu. Prvo se definira panel vanjske oplata koji se sastoji od dna, uzvoja i boka broda pa se definiraju paneli paluba i prostora na brodu poput tankova u dvodnu i uzdužnih pregrada na palubama.



Slika 12. Definirane pozicije geometrije presjeka

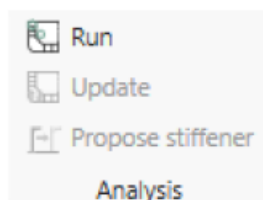
Nakon definiranja panela i njihovih pozicija postavlja se oploćenje određene debljine na koje se postavlja uzdužni strukturni elementi. Poprečni elementi se opisuju nakon definiranja uzdužnih elemenata kako bi dodatno ojačali strukturu kao i u područjima gdje je to potrebno npr. područje ledenog pojasa. Konačno se definiraju rebra kako bi se dobio konačni oblik geometrije presjeka prema Slici 13.



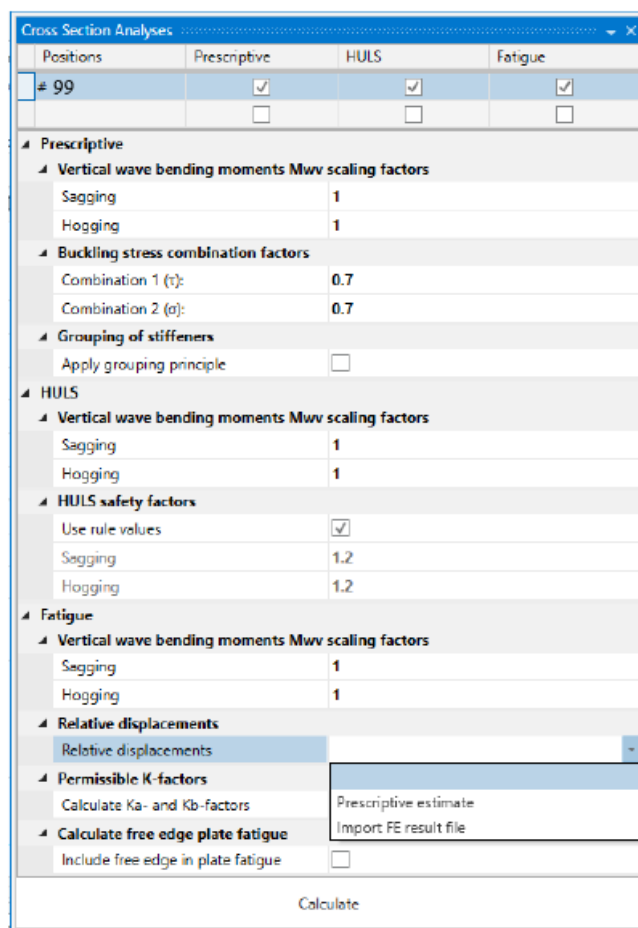
Slika 13. Prikaz geometrije presjeka okvirnog rebra

3.4. Analiza strukture

U Nauticus Hull-u analiza glavnog rebra se provodi pomoću naredbe „Run“. Prije provođenja analize potrebno je u izborniku odabrati po kojim pravilima će se provjeravati modelirana struktura kao što je prikazano slikom 14. „Prescriptive“ se odnosi na čvrstoću jakih nosača, lokalnih uvjeta čvrstoće za opločenje, uzdužnjake, poprečna ukrepljenja i rebra. „HULS“ obuhvaća provjeru granične čvrstoće trupa na savijanje. „Fatigue“ predstavlja procjenu spojeva uzdužnjanka na poprečne elemente.



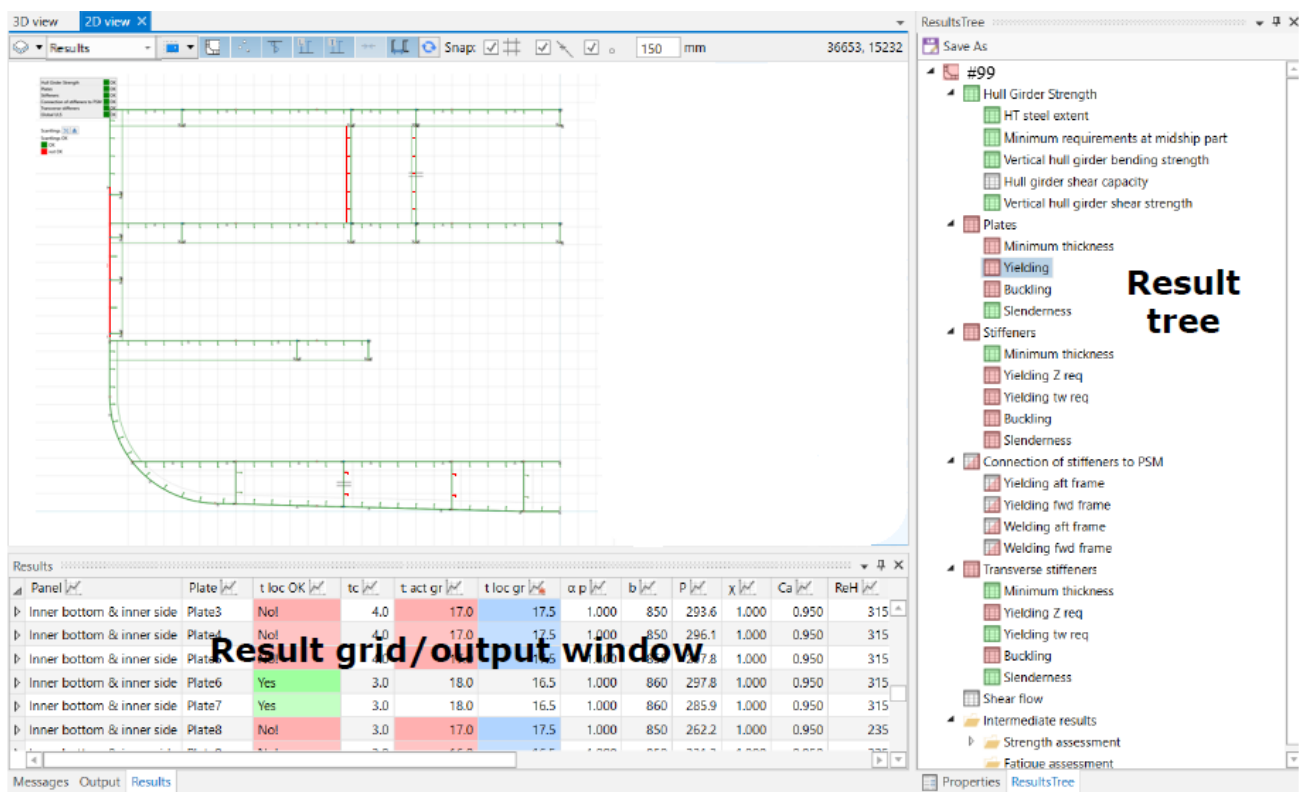
DNV rules



Slika 14. Izbornik pravila za provođenje strukturne analize

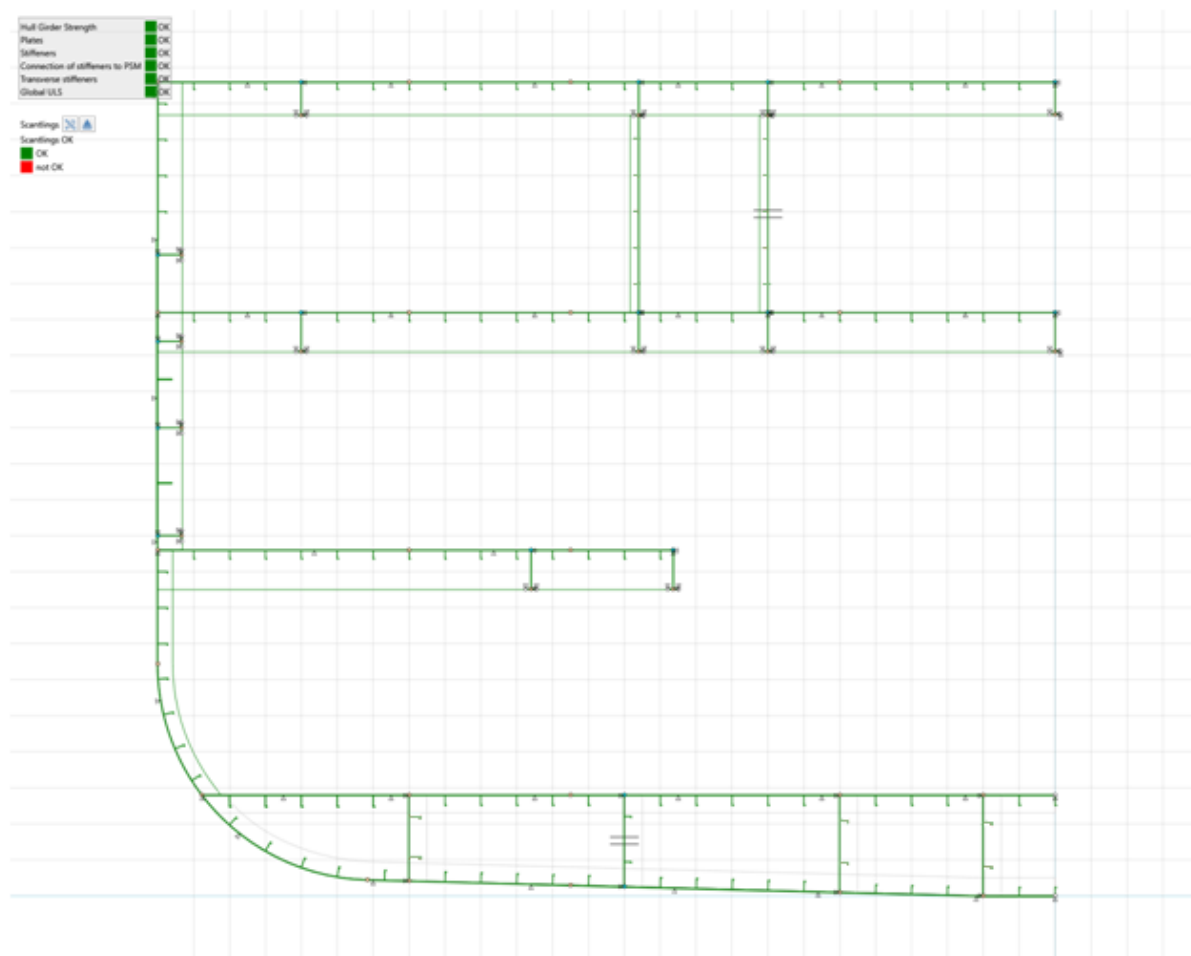
Rezultat strukturne analize vidljiv je u stablu rezultata koje se nalazi na krajnje desnoj strani korisničkog sučelja. U stablu je naznačena podjela po elementima strukture zadanog presjeka sa kvadratićima ispred pojma koji je obojan crvenom ili zelenom bojom ovisno o tome zadovoljavaju li elementi iste skupine sve uvjete za čvrstoću ili ne (Sika 15).

Ako neki od strukturnih elemenata ne zadovoljava sve uvjete čvrstoće potrebno ih je promijeniti. To je moguće iteracijskim putem jer postoji opcija kojom se odabranom ukrućenju mogu zasebno podesiti ključni parametri mjenjajući mu dimenzije i razmake između elemenata kako bi se provjerili lokalni zahtjevi. Analiza će se tako provesti samo za odabrano ukrućenje dok će sva naprezanja trupa broda i svi ostali rezultati ostati nepromijenjeni. Ovaj proces omogućava da se specifični djelovi strukture precizno prilagode i analiziraju bez utjecaja na ostatak strukture čime se olakšava optimizacija i održavanje sigurnosti broda. Proces iteracije potrebno je provoditi sve dok svi elementi ne zadovolje sve zahtjeve čvrstoće.



Slika 15. Korisničko sučelje nakon provedene analize

Kada je analiza provedena i svi elementi poprimu zelenu boju može se zaključiti da je predložena struktura zadovoljava uvjete proračuna. Tada će model presjeka paralelnog srednjaka koji se analizirao izgledati kao na Slici 16.



Slika 16. Prikaz usvojene strukture nakon analize

Rezultati proračuna strukture dobivaju se direktno iz Nauticus Hull-a u obliku izvještaja. U izvještaju su dani podatci o položaju poprečnih pregrada, podatci o rasporedu uzdužnih i poprečnih ukrepa poprečnog presjeka, sažetak težine, poglavlje s detaljnim zahtjevima za čvrstoću trupa broda i rezultate izračuna čvrstoće spojeva. Tablice sa strukturnim elementima koji ne zadovoljavaju kao i tablice za svu strukturu s fokusom na zahtjeve pravila klasifikacijskog društva.

Cross section analyses reports X

Prescriptive report

#99

Summary All

Model input

- Positions of transverse bulkheads
- Deepest equilibrium waterline in damage condition
- Layout of plates and stiffeners
- End connections and slots/lugs
- Weight summary

Requirements

- Include summary plot
- Hull girder strength
- Structure below local requirements
- Local requirements
- Connection strength
- UR S11A
- Rule status plots

Compartments and loads

- Loading conditions
- Compartments
- Compartments for current cross-section only

Generate report

Slika 17. Izbornik za izradu izvještaja

3.5. Rezultati izdvojeni iz izvještaja

3.5.1. Poprečne pregrade

Tablica 7. Pozicije nepropusnih pregrada po duljini broda

| OKVIR | Udaljenost od krmene okomice [m] |
|--------------|---|
| #8 | 9.910 |
| #19 | 16.510 |
| #35 | 26.110 |
| #55 | 38.110 |
| #70 | 47.110 |
| #90 | 59.110 |
| #112 | 72.310 |
| #136 | 86.710 |
| #152 | 96.310 |
| #163 | 102.910 |
| #177 | 111.310 |
| #185 | 116.110 |

3.5.2. Materijali prema poziciji na presjeku

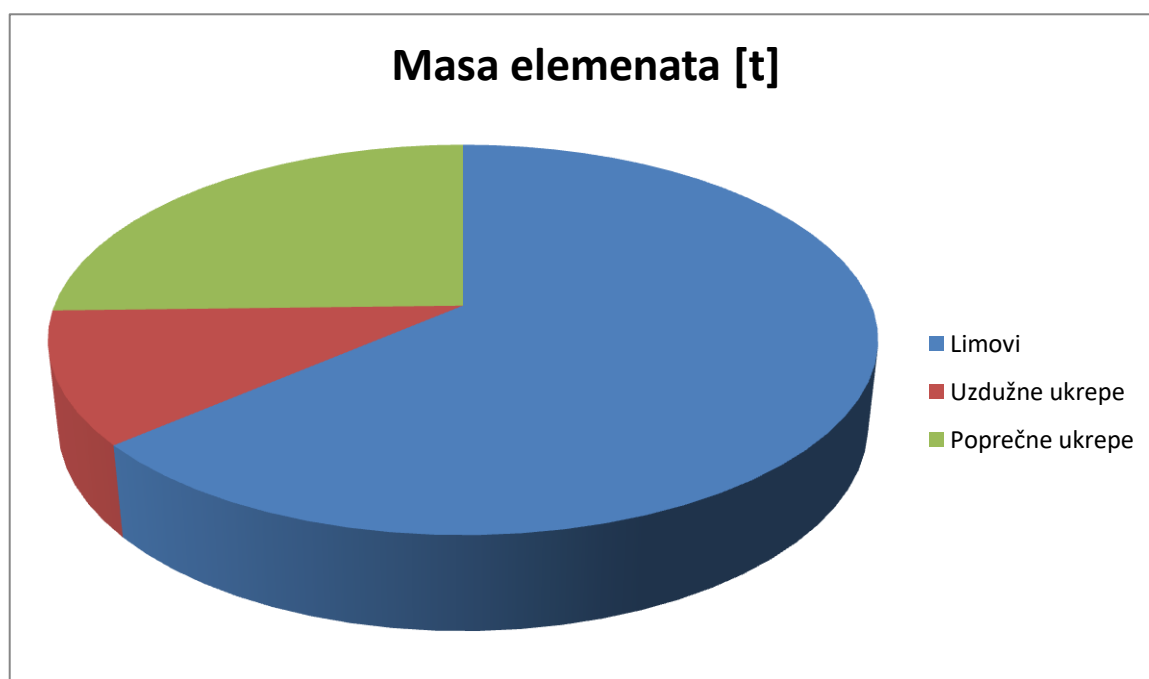
Tablica 8. Definicija materijala po poziciji na brodu

| | | Dno | Bok | Paluba | Iznad palube |
|-------------------------------|----------|------------|------------|---------------|---------------------|
| Grupa materijala | - | VL-36 | VL-36 | VL-36 | VL-36 |
| Granica razvlačenja, R_{eH} | N/mm^2 | 355 | 355 | 355 | 355 |
| Faktor materijala, k | - | 0.72 | 0.72 | 0.72 | 0.72 |
| Vertical extent, Z_{hts} | mm | 6490 | | 5402 | |

3.5.3. Sažetak procjene mase strukture trupa

Tablica 9. Mase elemenata structure

| <u>UZDUŽNI LIMOV I UKREPE</u> | | | |
|-------------------------------|--------------------|--|------------|
| Materijal | Strukturni element | Projektirana površina [cm ²] | Masa [t/m] |
| VL-36 | Limovi | 15645.8 | 12.38 |
| VL-36 | Ukrepe | 2688.1 | 2.11 |
| | % od ukupnog | 100 | 100 |
| Ukupno | | 18333.9 | 14.39 |
| <u>POPREČNE UKREPE</u> | | | |
| Materijal | Masa [t] | % | |
| VL-36 | 4.09 | 100 | |
| Ukupno | 4.09 | 100 | |



Slika 18. Dijagram udjela mase konstrukcijskih elemenata

Napomena: T nosači uvršteni su pod limove kao dva zasebna elementa.

3.5.4. Limovi poprečnog presjeka

Tablica 10. Dimenzije panela na brodu

| Oploćenje | Početak po Y-osi [mm] | Kraj po Y-osi [mm] | Početak po Z-osi [mm] | Kraj po Z-osi [mm] | Širina [mm] | Debljina [mm] | Površina [cm ²] | Granično naprezanje [N/mm ²] |
|-----------|-----------------------|--------------------|-----------------------|--------------------|-------------|---------------|-----------------------------|--|
|-----------|-----------------------|--------------------|-----------------------|--------------------|-------------|---------------|-----------------------------|--|

| Vanjska oplata | | | | | | | | |
|----------------|---------|---------|---------|---------|--------|------|-------|-----|
| Plate0 | 0.0 | 1100.0 | 0.0 | 2.5 | 1100.0 | 14.0 | 154.0 | 355 |
| Plate1 | 1100.0 | 3300.0 | 2.5 | 57.9 | 2200.0 | 12.0 | 264.1 | 355 |
| Plate2 | 3300.0 | 5300.0 | 57.9 | 110.5 | 2000.0 | 12.0 | 240.1 | 355 |
| Plate3 | 5300.0 | 7300.0 | 110.5 | 163.2 | 2000.0 | 12.0 | 240.1 | 355 |
| Plate4 | 7300.0 | 9500.0 | 163.2 | 221.1 | 2200.0 | 10.0 | 220.1 | 355 |
| Plate5 | 9500.0 | 11355.1 | 221.1 | 864.4 | 2000.0 | 10.0 | 200.0 | 355 |
| Plate6 | 11355.1 | 12456.3 | 864.4 | 2712.2 | 2200.0 | 10.0 | 220.0 | 355 |
| Plate7 | 12456.3 | 12500.0 | 2712.2 | 4909.7 | 2200.0 | 10.0 | 220.0 | 355 |
| Plate8 | 12500.0 | 12500.0 | 4909.7 | 6909.7 | 2000.0 | 16.0 | 320.0 | 355 |
| Plate9 | 12500.0 | 12500.0 | 6909.7 | 9109.7 | 2200.0 | 16.0 | 352.0 | 355 |
| Plate10 | 12500.0 | 12500.0 | 9109.7 | 11109.7 | 2000.0 | 10.0 | 200.0 | 355 |
| Plate11 | 12500.0 | 12500.0 | 11109.7 | 11300.0 | 190.3 | 10.0 | 19.0 | 355 |

| Paluba čvrstoće | | | | | | | | |
|-----------------|---------|---------|---------|---------|--------|-----|-------|-----|
| Plate0 | 0.0 | 1250.0 | 11300.0 | 11300.0 | 1250.0 | 8.0 | 100.0 | 355 |
| Plate1 | 1250.0 | 3250.0 | 11300.0 | 11300.0 | 2000.0 | 8.0 | 160.0 | 355 |
| Plate2 | 3250.0 | 5250.0 | 11300.0 | 11300.0 | 2000.0 | 8.0 | 160.0 | 355 |
| Plate3 | 5250.0 | 7250.0 | 11300.0 | 11300.0 | 2000.0 | 8.0 | 160.0 | 355 |
| Plate4 | 7250.0 | 9250.0 | 11300.0 | 11300.0 | 2000.0 | 8.0 | 160.0 | 355 |
| Plate5 | 9250.0 | 11250.0 | 11300.0 | 11300.0 | 2000.0 | 8.0 | 160.0 | 355 |
| Plate6 | 11250.0 | 12500.0 | 11300.0 | 11300.0 | 1250.0 | 8.0 | 100.0 | 355 |

| Paluba 4800 | | | | | | | | |
|-------------|---------|---------|--------|--------|--------|-----|-------|-----|
| Plate0 | 5320.0 | 7820.0 | 4800.0 | 4800.0 | 2500.0 | 7.0 | 175.0 | 355 |
| Plate1 | 7820.0 | 10320.0 | 4800.0 | 4800.0 | 2500.0 | 7.0 | 175.0 | 355 |
| Plate2 | 10320.0 | 12500.0 | 4800.0 | 4800.0 | 2180.0 | 7.0 | 152.6 | 355 |

| Opločenje | Početak po Y-osi [mm] | Kraj po Y-osi [mm] | Početak po Z-osi [mm] | Kraj po Z-osi [mm] | Širina [mm] | Debljina [mm] | Površina [cm ²] | Granično naprežanje [N/mm ²] |
|--------------------|-----------------------|--------------------|-----------------------|--------------------|-------------|---------------|-----------------------------|--|
| <u>Paluba 8100</u> | | | | | | | | |
| Plate0 | 0.0 | 1250.0 | 8100.0 | 8100.0 | 1250.0 | 7.0 | 87.5 | 355 |
| Plate1 | 1250.0 | 3250.0 | 8100.0 | 8100.0 | 2000.0 | 7.0 | 140.0 | 355 |
| Plate2 | 3250.0 | 4000.0 | 8100.0 | 8100.0 | 750.0 | 7.0 | 52.5 | 355 |
| Plate3 | 4000.0 | 5250.0 | 8100.0 | 8100.0 | 1250.0 | 7.0 | 87.5 | 355 |
| Plate4 | 5250.0 | 7250.0 | 8100.0 | 8100.0 | 2000.0 | 7.0 | 140.0 | 355 |
| Plate5 | 7250.0 | 9250.0 | 8100.0 | 8100.0 | 2000.0 | 7.0 | 140.0 | 355 |
| Plate6 | 9250.0 | 11250.0 | 8100.0 | 8100.0 | 2000.0 | 7.0 | 140.0 | 355 |
| Plate7 | 11250.0 | 12500.0 | 8100.0 | 8100.0 | 1250.0 | 7.0 | 87.5 | 355 |

| | | | | | | | | |
|----------------|---------|---------|--------|--------|--------|------|-------|-----|
| <u>Dvodono</u> | | | | | | | | |
| Plate0 | 0.0 | 1250.0 | 1400.0 | 1400.0 | 1250.0 | 10.0 | 125.0 | 355 |
| Plate1 | 1250.0 | 3250.0 | 1400.0 | 1400.0 | 2000.0 | 10.0 | 200.0 | 355 |
| Plate2 | 3250.0 | 5250.0 | 1400.0 | 1400.0 | 2000.0 | 10.0 | 200.0 | 355 |
| Plate3 | 5250.0 | 7250.0 | 1400.0 | 1400.0 | 2000.0 | 10.0 | 200.0 | 355 |
| Plate4 | 7250.0 | 9250.0 | 1400.0 | 1400.0 | 2000.0 | 10.0 | 200.0 | 355 |
| Plate5 | 9250.0 | 10750.0 | 1400.0 | 1400.0 | 1500.0 | 10.0 | 150.0 | 355 |
| Plate6 | 10750.0 | 11883.3 | 1400.0 | 1400.0 | 1133.3 | 10.0 | 113.3 | 355 |

| | | | | | | | | |
|--------------------------------|--------|--------|-------|--------|--------|-----|-------|-----|
| <u>Jaki uzdužni nosač 9000</u> | | | | | | | | |
| Plate0 | 9000.0 | 9000.0 | 207.9 | 1400.0 | 1192.1 | 9.0 | 107.3 | 355 |

| | | | | | | | | |
|--------------------------------|--------|--------|------|--------|--------|-----|-------|-----|
| <u>Jaki uzdužni nosač 3000</u> | | | | | | | | |
| Plate0 | 3000.0 | 3000.0 | 50.0 | 1400.0 | 1350.0 | 9.0 | 121.5 | 355 |

| | | | | | | | | |
|---------------------------|--------|--------|-------|--------|--------|-----|-------|-----|
| <u>Uzdužni nosač 6000</u> | | | | | | | | |
| Plate0 | 6000.0 | 6000.0 | 128.9 | 1400.0 | 1271.1 | 9.0 | 114.4 | 355 |

| | | | | | | | | |
|------------------------|--------|--------|---------|--------|--------|-----|-------|-----|
| <u>General Panel 2</u> | | | | | | | | |
| Plate0 | 4000.0 | 4000.0 | 10840.0 | 8100.0 | 2740.0 | 7.0 | 191.8 | 355 |

| | | | | | | | | |
|------------------------|--------|--------|---------|--------|--------|-----|-------|-----|
| <u>General Panel 3</u> | | | | | | | | |
| Plate0 | 5800.0 | 5800.0 | 10840.0 | 8100.0 | 2740.0 | 7.0 | 191.8 | 355 |

| | | | | | | | | |
|------------------------|--------|--------|-----|--------|--------|------|-------|-----|
| <u>General Panel 4</u> | | | | | | | | |
| Plate0 | 1000.0 | 1000.0 | 0.0 | 1400.0 | 1400.0 | 10.0 | 140.0 | 355 |

T nosači na boku broda – ICE BELT

Tablica 11. Dimenzije T nosača na boku broda

| Oploč nje | Početak po Y-osi [mm] | Kraj po Y-osi [mm] | Početa k po Z- osi [mm] | Kraj po Z-osi [mm] | Širina [mm] | Deblji na [mm] | Površin a [cm²] | Granično naprezanj e [N/mm²] |
|--------------------------------------|--------------------------------------|-----------------------------------|--|-----------------------------------|------------------------|-------------------------------|---|--|
| Single-Skin Girder 4 Web | | | | | | | | |
| Plate0 | 12500.0 | 12170.0 | 8900.0 | 8900.0 | 330. 0 | 8.0 | 26.4 | 355 |
| Single-Skin Girder 4 Flange | | | | | | | | |
| Plate0 | 12170.0 | 12170.0 | 8825.0 | 8975.0 | 150. 0 | 10.0 | 15.0 | 355 |
| Single-Skin Girder 2 Web | | | | | | | | |
| Plate0 | 12500.0 | 12170.0 | 7700.0 | 7700. 0 | 330.0 | 8.0 | 26.4 | 355 |
| Single-Skin Girder 2 Flange | | | | | | | | |
| Plate0 | 12170.0 | 12170.0 | 7625.0 | 7775. 0 | 150.0 | 10.0 | 15.0 | 355 |
| Single-Skin Girder 0 Web | | | | | | | | |
| Plate0 | 12500.0 | 12170.0 | 6500.0 | 6500. 0 | 330.0 | 8.0 | 26.4 | 355 |
| Single-Skin Girder 0 Flange | | | | | | | | |
| Plate0 | 12170.0 | 12170.0 | 6425.0 | 6575. 0 | 150.0 | 10.0 | 15.0 | 355 |
| Single-Skin Girder 8 Web_2 | | | | | | | | |
| Plate0 | 12500.0 | 12170.0 | 5000.0 | 5000. 0 | 330.0 | 8.0 | 26.4 | 355 |
| Single-Skin Girder 8 Flange_2 | | | | | | | | |
| Plate0 | 12170.0 | 12170.0 | 4925.0 | 5075. 0 | 150.0 | 10.0 | 15.0 | 355 |

T nosači na palubi (4800 mm)

Tablica 12. Dimenzije T nosača na palubi (z=4800 mm)

| Opločenje | Početak po Y-osi [mm] | Kraj po Y-osi [mm] | Početak po Z-osi [mm] | Kraj po Z-osi [mm] | Širina [mm] | Debljina [mm] | Površina [cm²] | Granično naprezanje [N/mm²] |
|-------------------------------------|------------------------------|---------------------------|------------------------------|---------------------------|--------------------|----------------------|----------------------------------|---|
| Single-Skin Girder 5 Web | | | | | | | | |
| Plate0 | 7300.0 | 7300.0 | 4800.0 | 4260.0 | 540.0 | 10.0 | 54.0 | 355 |
| Single-Skin Girder 5 Flange | | | | | | | | |
| Plate0 | 7375.0 | 7225.0 | 4260.0 | 4260.0 | 150.0 | 10.0 | 15.0 | 355 |
| Single-Skin Girder 10 Web | | | | | | | | |
| Plate0 | 5320.0 | 5320.0 | 4800.0 | 4260.0 | 540.0 | 10.0 | 54.0 | 355 |
| Single-Skin Girder 10 Flange | | | | | | | | |
| Plate0 | 5395.0 | 5245.0 | 4260.0 | 4260.0 | 150.0 | 10.0 | 15.0 | 355 |

T nosači na palubi (8100 mm)

Tablica 13. Dimenzije T nosača na palubi (z=8100 mm)

| Opločenje | Početak po Y-osi [mm] | Kraj po Y-osi [mm] | Početak po Z-osi [mm] | Kraj po Z-osi [mm] | Širina [mm] | Debljina [mm] | Površina [cm ²] | Grafično naprežanje [N/mm ²] |
|--------------------------------|-----------------------|--------------------|-----------------------|--------------------|-------------|---------------|-----------------------------|--|
| Single-Skin Girder 10 Web_2 | | | | | | | | |
| Plate0 | 10500.0 | 10500.0 | 8100.0 | 7560.0 | 540.0 | 10.0 | 54.0 | 355 |
| Single-Skin Girder 10 Flange_2 | | | | | | | | |
| Plate0 | 10575.0 | 10425.0 | 7560.0 | 7560.0 | 150.0 | 10.0 | 15.0 | 355 |
| Single-Skin Girder 10 Web_3 | | | | | | | | |
| Plate0 | 5800.0 | 5800.0 | 8100.0 | 7560.0 | 540.0 | 10.0 | 54.0 | 355 |
| Single-Skin Girder 10 Flange_3 | | | | | | | | |
| Plate0 | 5875.0 | 5725.0 | 7560.0 | 7560.0 | 150.0 | 10.0 | 15.0 | 355 |
| Single-Skin Girder 11 Web_2 | | | | | | | | |
| Plate0 | 4000.0 | 4000.0 | 8100.0 | 7560.0 | 540.0 | 10.0 | 54.0 | 355 |
| Single-Skin Girder 11 Flange_2 | | | | | | | | |
| Plate0 | 4075.0 | 3925.0 | 7560.0 | 7560.0 | 150.0 | 10.0 | 15.0 | 355 |
| Single-Skin Girder 13 Web | | | | | | | | |
| Plate0 | 0.0 | 0.0 | 8100.0 | 7560.0 | 540.0 | 10.0 | 54.0 | 355 |
| Single-Skin Girder 13 Flange | | | | | | | | |
| Plate0 | 75.0 | -75.0 | 7560.0 | 7560.0 | 150.0 | 10.0 | 15.0 | 355 |

T nosači na palubi čvrstoće (11300 mm)

Tablica 14. Dimenzije T nosača na palubi čvrstoće

| Opločenje | Početak po Y-osi [mm] | Kraj po Y-osi [mm] | Početak po Z-osi [mm] | Kraj po Z-osi [mm] | Širina [mm] | Debljina [mm] | Površina [cm²] | Granično naprezaenje [N/mm²] |
|--------------------------------------|------------------------------|---------------------------|------------------------------|---------------------------|--------------------|----------------------|----------------------------------|--|
| Single-Skin Girder 11 Web | | | | | | | | |
| Plate0 | 10500.0 | 10500.0 | 11300.0 | 10840.0 | 460.0 | 10.0 | 46.0 | 355 |
| Single-Skin Girder 11 Flange | | | | | | | | |
| Plate0 | 10575.0 | 10425.0 | 10840.0 | 10840.0 | 150.0 | 10.0 | 15.0 | 355 |
| Single-Skin Girder 8 Web_3 | | | | | | | | |
| Plate0 | 5800.0 | 5800.0 | 11300.0 | 10840.0 | 460.0 | 10.0 | 46.0 | 355 |
| Single-Skin Girder 8 Flange_3 | | | | | | | | |
| Plate0 | 5875.0 | 5725.0 | 10840.0 | 10840.0 | 150.0 | 10.0 | 15.0 | 355 |
| Single-Skin Girder 8 Web | | | | | | | | |
| Plate0 | 4000.0 | 4000.0 | 11300.0 | 10840.0 | 460.0 | 10.0 | 46.0 | 355 |
| Single-Skin Girder 8 Flange | | | | | | | | |
| Plate0 | 4075.0 | 3925.0 | 10840.0 | 10840.0 | 75.0 | 10.0 | 7.5 | 355 |
| Single-Skin Girder 12 Web | | | | | | | | |
| Plate0 | 0.0 | 0.0 | 11300.0 | 10850.0 | 450.0 | 10.0 | 45.0 | 355 |
| Single-Skin Girder 12 Flange | | | | | | | | |
| Plate0 | 75.0 | -75.0 | 10850.0 | 10850.0 | 150.0 | 10.0 | 15.0 | 355 |

3.5.5. Uzdužne ukrepe poprečnog presjeka

Tablica 15. Dimenzije uzdužnih ukrepa

| ID Od - Do | Tip Profila | Dimenzije | Granično naprezanje [N/mm²] |
|--------------------------------|--------------------|------------------|---|
| <u>Vanjska oplata</u> | | | |
| 69 - 57 | HPBulb | 120 x 7 | 355 |
| 59 - 108 | HPBulb | 140 x 7 | 355 |
| 7 - 9 | Flatbar | 200 x 15 | 355 |
| 115 - 118 | HPBulb | 120 x 7 | 355 |
| <u>Paluba čvrstoće</u> | | | |
| 1 - 26 | HPBulb | 100 x 7 | 355 |
| <u>Paluba 4800</u> | | | |
| 38 - 53 | HPBulb | 120 x 7 | 355 |
| <u>Paluba 8100</u> | | | |
| 27 - 45 | HPBulb | 120 x 7 | 355 |
| <u>Dvodno</u> | | | |
| 54 - 62 | HPBulb | 140 x 7 | 355 |
| 64 - 68 | HPBulb | 160 x 11 | 355 |
| <u>Jaki uzdužni nosač 9000</u> | | | |
| 0 - 1 | HPBulb | 160 x 8 | 355 |
| <u>Jaki uzdužni nosač 3000</u> | | | |
| 0 - 1 | HPBulb | 120 x 9 | 355 |
| <u>Uzdužni nosač 6000</u> | | | |
| 0 - 1 | HPBulb | 100 x 6 | 355 |
| <u>General Panel 2</u> | | | |
| 27 - 30 | Flatbar | 60 x 8 | 355 |
| <u>General Panel 3</u> | | | |
| 20 - 27 | Flatbar | 60 x 8 | 355 |
| <u>General Panel 4</u> | | | |
| 2 - 0 | HPBulb | 120 x 7 | 355 |

3.5.6.Rebra poprečnog presjeka

Tablica 16. Dimenzije rebara poprečnog presjeka

| Tip | Vrsta Profila | Dimenzije | Raspon [mm] | Ramak [mm] | Granično naprezanje [N/mm²] |
|-----------------------|---------------------------|----------------------|------------------------|-----------------------|---|
| <u>Vanjska oplata</u> | | | | | |
| TSTIF | Built up T from plates | 208 x 100 x 8 x 8 | 3465 | 600 | 355 |
| TSTIF | Built up T from plates | 339 x 100 x 9 x 9 | 200 | 600 | 355 |
| TSTIF | Built up T from plates | 339 x 100 x 9 x 9 | 3900 | 300 | 355 |
| TSTIF | Built up T from plates | 339 x 100 x 9 x 9 | 2400 | 600 | 355 |

3.5.7. Sponje poprečnog presjeka

Tablica 17. Dimenzije sponja porečnog presjeka

| Tip | Vrsta Profila | Dimenzije | Raspon [mm] | Ramak [mm] | Granično naprezanje [N/mm²] |
|------------------------|---------------------------|------------------------|------------------------|-----------------------|---|
| <u>Paluba čvrstoće</u> | | | | | |
| TSTIF | Built up T from plates | 460 x 150 x 10 x 10 | 4000 | 600 | 355 |
| TSTIF | Built up T from plates | 460 x 150 x 10 x 10 | 1800 | 600 | 355 |
| TSTIF | Built up T from plates | 460 x 150 x 10 x 10 | 6700 | 600 | 355 |
| <u>Paluba_4800</u> | | | | | |
| TSTIF | Built up T from plates | 550 x 150 x 11 x 10 | 7180 | 600 | 355 |
| <u>Paluba_8100</u> | | | | | |
| TSTIF | Built up T from plates | 550 x 150 x 11 x 10 | 4000 | 600 | 355 |
| TSTIF | Built up T from plates | 550 x 150 x 11 x 10 | 1800 | 600 | 355 |
| TSTIF | Built up T from plates | 550 x 150 x 11 x 10 | 6700 | 600 | 355 |

3.5.8. Rebrenice

Tablica 18. Dimenzije rebrenica poprečnog presjeka

| Tip | Vrsta Profila | Dimenzije | Raspon [mm] | Ramak [mm] | Granično naprezanje [N/mm ²] |
|--------------------------------|---------------|-----------|----------------|---------------|--|
| <u>Dvodno</u> | | | | | |
| TGIRDER | Flatbar | 150 x 10 | 3000 | 1800 | 355 |
| TGIRDER | Flatbar | 150 x 10 | 3000 | 1800 | 355 |
| TGIRDER | Flatbar | 150 x 10 | 3000 | 1800 | 355 |
| TGIRDER | Flatbar | 150 x 10 | 2883 | 1800 | 355 |
| <u>Jaki uzdužni nosač 9000</u> | | | | | |
| TGIRDER | Flatbar | 150 x 10 | 1192 | 1800 | 355 |
| <u>Jaki uzdužni nosač 3000</u> | | | | | |
| TGIRDER | Flatbar | 150 x 10 | 1350 | 1800 | 355 |
| <u>Uzdužni nosač 6000</u> | | | | | |
| TGIRDER | Flatbar | 150 x 10 | 1271 | 1800 | 355 |
| <u>General Panel 2</u> | | | | | |
| TSTIF | HPBulb | 120 x 7 | 2740 | 600 | 355 |
| <u>General Panel 3</u> | | | | | |
| TSTIF | HPBulb | 120 x 7 | 2740 | 600 | 355 |
| <u>General Panel 4</u> | | | | | |
| TGIRDER | Flatbar | 150 x 10 | 1400 | 1800 | 355 |

3.5.9. Napomene nakon proračuna

Nakon provedenog proračuna u izvještaju se ispisuju i napomene kojih se treba držati kako bi projektirana struktura zadovoljavala sva pravila. U analizi danog presjeka zaključuje se da je potrebno koristiti čelik povišene čvrstoće u području ledenog pojasa.

3.6. Provjera uzdužne čvrstoće

Minimalni moment inercije presjeka paralelnog srednjaka za sva plovila duljine veće od 90m računa se u m⁴ prema pravilima DNV-RU-SHIP Pt.3 Ch.5 Sec.2 [1.5]:

$$I_{yR-gr} = 3f_r C_w L^3 B (C_B + 0,7) 10^{-8} \quad (3.10.)$$

f_r = faktor odbitka vezan uz ograničenja službe = 1,0 (10% odbitka)

Moment otpora presjeka paluba računa se prema izrazu:

$$Z_{D-gr} = \frac{I_{y-gr}}{V_D} \quad (3.11.)$$

V_D = udaljenost do palube po z-osi, u m

Udaljenost do palube po z-osi, u m se računa prema:

$$V_D = Z_D - z_{n-gr} \quad (3.12.)$$

Z_D = Z koordinata u m, visine palube čvrstoće

z_{n-gr} = Z koordinata u m, na neutralnoj liniji poprečnog presjeka

Moment otpora presjeka dna računa se prema izrazu:

$$Z_{B-gr} = \frac{I_{y-gr}}{z_{n-gr}} \quad (3.13.)$$

Minimalni dozvoljen moment otpora presjeka paralelnog srednjaka pri ekvivalentnoj palubi i dnu ne smije biti manji od izračunatog u m³ prema izrazu:

$$Z_{R-gr} = k \left(\frac{1+f_r}{2} \right) C_{w0} L^2 B (C_B + 0,7) 10^{-6} \quad (3.14.)$$

Moment otpora presjeka povezan s dnom i palubom, duž pune duljine uzdužnjaka, od krmene do pramčane okomice, u m³ mora zadovoljavati iznos dobiven iz izraza prema DNV-RU-SHIP Pt.3 Ch.5. Sec.2 [1.4]:

$$Z_{gr} = \frac{|M_{sv} + M_{wv}|}{\sigma_{perm}} 10^{-3} \quad (3.15.)$$

gdje:

σ_{perm} = dopušteno naprežanje u N/mm² dobiveno prema:

$$\sigma_{perm} = \frac{125}{k} \quad \text{za } \frac{x}{L} \leq 0.1 \quad (3.16.1.)$$

$$\sigma_{perm} = \frac{175}{k} \quad \text{za } 0.3 \leq \frac{x}{L} \leq 0.7 \quad (3.16.2.)$$

$$\sigma_{perm} = \frac{125}{k} \quad \text{za } \frac{x}{L} \geq 0.9 \quad (3.16.3.)$$

3.6.1. Rezultat proračuna uzdužne čvrstoće

Tablica 19. Rezultati proračuna uzdužne čvrstoće

| | | Ukupno otvori zanemareni | |
|---|-----------------|------------------------------------|-----------------------------|
| | | projektirano | uz korozijski odbitak |
| Površina uzdužnih elemenata poprečnih presjeka | cm ² | 18334 | 17205 |
| Visina neutralne linije, Z _n | m | 5.106 | 5.113 |
| Vertikalni moment inercije, I _y | m ⁴ | 31.270 | 29.539 |
| Horizontalni moment inercije, I _z | m ⁴ | 123.488 | 115.719 |
| Moment otpora broda, Dno | m ³ | 6.125 | 5.777 |
| Moment otpora broda, Paluba čvrstoće (z = 11300mm) | m ³ | 5.048 | 4.775 |
| Moment otpora broda, Bok | m ³ | 9.879 | 9.258 |
| Moment otpora površine iznad neutralne linije, S | m ³ | 3.449 | 3.253 |

Odabrane dimenzije strukturnih elemenata proizlaze iz proračuna čvrstoće koji provjerava dimenzije na postavljene zahtjeve. Proračun strukturnih elemenata kao i zahtjeva koje moraju zadovoljiti moguće je iščitati iz slijedećih tablica priloženih iz izvješća Nauticus Hull-a.

3.6.2.Provjera panela

| | |
|------------------|--|
| Plate | Plate identification |
| ACT | Actual plate properties |
| t | Gross plate thickness [mm] |
| t _c | Corrosion addition [mm] |
| α _p | Correction factor for panel aspect ratio |
| C _a | Permissible bending stress coefficient |
| X | Coefficient |
| B. eff. | Bending effectiveness [%] |
| S. eff. | Shear effectiveness [%] |
| R _{eH} | Minimum yield stress for plate [N/mm ²] |
| LOC | Requirements due to local load and corresponding plate properties |
| Load ref. | Design Load Set, Load Case |
| EPP | EPP identification |
| t _{loc} | Required gross thickness of plate [mm] |
| t _{min} | Minimum gross thickness of plate [mm] |
| Span | Long side length of EPP [m] |
| Spac | Short side length of EPP [mm] |
| p | Lateral pressure [kN/m ²] |
| y _l | Y coordinate of LCP [mm] |
| z _l | Z coordinate of LCP [mm] |
| Draught | Draught [m] |
| σ _{hg} | Hull girder stress [N/mm ²] |
| F _{SC} | Steel coil load if decisive, i.e. BC-9 or BC-10 [kN] |
| OK? | Whether requirement(s) are fulfilled |
| BUC | Requirements due to buckling and corresponding plate properties |
| Load ref. | Design Load Set, Load Case |
| EPP | EPP identification |
| t _{s/t} | Minimum slenderness thickness requirement [mm]. Note: Slenderness requirement is based on proposed steel grade. |

| | |
|------------------------|---|
| $t_{\text{buc}}^{1)}$ | Minimum estimated local gross plate thickness to get $\eta_{\text{actual}} = \eta_{\text{allow}}$ |
| Stress comb | Stress combination case, 1 or 2 |
| Radius | Plate radius [mm] |
| σ_x | Applied σ_x [N/mm ²] |
| σ_y | Applied σ_y [N/mm ²] |
| τ | Applied Shear stress [N/mm ²] |
| σ_E | Reference stress [N/mm ²] |
| Asp. α | Aspect ratio |
| F_{long} | Correction factor |
| Case σ | Relevant case in Table 1 or 2 |
| Case τ | Relevant case in Table 1 or 2 |
| K_x | Buckling factor |
| K_y | Buckling factor |
| K_τ | Buckling factor |
| C_x | Reduction factor |
| C_y | Reduction factor |
| C_τ | Reduction factor |
| γ_c | Stress multiplier at collapse |
| η_{actual} | Eta actual |
| η_{allow} | Eta allowed |
| OK? | Whether requirement(s) are fulfilled |
| Note: 1) | Local scantling estimate without optimisation of the whole cross section |

| Plate | ACT | | t [mm] | t _c [mm] | α _p | C _a | X | | B. eff. [%] | S. eff. [%] | R _{eff} [N/mm ²] | | | |
|-------|-----|-----------|--------|---|--------------------------|--|-------------------------------------|-----------------------------|---------------------|--|--|--------------------------------------|---|-----|
| | LOC | Load ref. | EPP | t _{loc} [mm] | t _{min} [mm] | Span [mm] | Spac [mm] | p [kN/m ²] | y ₁ [mm] | z ₁ [mm] | Draught [m] | σ _{hg} [N/mm ²] | Fsc [kN] | OK? |
| | BUC | Load ref. | EPP | t _{s/t} t _{buc} [mm] | Stress comb. Radius [mm] | σ _x σ _y τ [N/mm ²] | σ _E [N/mm ²] | Asp. α F _{long} | Case σ Case τ | K _x K _y K _τ | C _x C _y C _τ | γ _c | η _{actual} η _{allow} | OK? |

Frame #99 (64510 mm from A.P.)

Outer shell at #99

| | | | | | | | | | | | | | | |
|---------|-----|---------------|-------|------------|-----------|-----------------------|-------|--------------|--------------------|-----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 14.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | SEA-2, Static | EPP1 | 0.0 | 11.5 | 1800.0 | 500.0 | 0.0 | 500 | 0 | 0.000 | 36.4 | | Yes |
| | BUC | HSM_2 | EPP1 | 6.5 5.0 | 1 0 | 119.9 0.0 0.1 | 116.4 | 3.60 1.03 | Case_1 Case_15 | 4.11 1.16 9.78 | 0.98 1.00 1.00 | 2.89 | 0.35 1.00 | Yes |
| Plate1 | ACT | | 12.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | TK-2, Static | EPP8 | 6.0 | 9.5 | 1800.0 | 500.2 | 145.6 | 3500 | 63 | 0.000 | 35.9 | | Yes |
| | BUC | HSM_2 | EPP6 | 6.5 5.5 | 1 0 | 119.3 0.0 -6.5 | 82.1 | 3.60 1.05 | Case_1 Case_15 | 4.19 1.16 9.78 | 0.87 1.00 1.00 | 2.57 | 0.39 1.00 | Yes |
| Plate2 | ACT | | 12.0 | 1.0 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | TK-2, Static | EPP9 | 6.0 | 9.0 | 1800.0 | 500.2 | 145.6 | 3500 | 63 | 0.000 | 35.9 | | Yes |
| | BUC | HSM_2 | EPP13 | 6.0 5.0 | 1 0 | 117.5 0.0 -14.1 | 90.1 | 3.60 1.06 | Case_1 Case_15 | 4.25 1.16 9.78 | 0.91 1.00 1.00 | 2.65 | 0.38 1.00 | Yes |
| Plate3 | ACT | | 12.0 | 1.0 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | TK-2, Static | EPP14 | 6.0 | 9.0 | 1800.0 | 500.2 | 145.1 | 5500 | 116 | 0.000 | 35.5 | | Yes |
| | BUC | HSM_2 | EPP17 | 6.0 5.5 | 1 0 | 116.5 0.0 -17.1 | 90.1 | 3.60 1.07 | Case_1 Case_15 | 4.29 1.16 9.78 | 0.91 1.00 1.00 | 2.64 | 0.38 1.00 | Yes |
| Plate4 | ACT | | 10.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | TK-2, Static | EPP19 | 6.0 | 9.5 | 1800.0 | 500.2 | 144.6 | 7500 | 168 | 0.000 | 35.2 | | Yes |
| | BUC | HSM_2 | EPP24 | 8.0 7.0 | 1 3000 | 114.8 0.0 -27.6 | 30.7 | 2.72 1.09 | Case_1 Case_15 | 4.36 1.29 10.19 | 0.60 1.00 0.79 | 1.66 | 0.60 1.00 | Yes |
| Plate5 | ACT | | 10.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | SEA-2, Static | EPP25 | 0.0 | 9.5 | 1800.0 | 662.1 | 0.0 | 9340 | 217 | 0.000 | 34.8 | | Yes |
| | BUC | HSM_2 | EPP25 | 8.0 7.0 | 1 3000 | 114.8 0.0 -27.6 | 30.7 | 2.72 1.09 | Case_1 Case_15 | 4.36 1.29 10.19 | 0.60 1.00 0.79 | 1.66 | 0.60 1.00 | Yes |
| Plate6 | ACT | | 10.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | SEA-2, Static | EPP29 | 0.0 | 9.5 | 1800.0 | 618.4 | 0.0 | 11000 | 624 | 0.000 | 31.9 | | Yes |
| | BUC | HSM_2 | EPP32 | 7.5 7.5 | 2 3000 | 57.6 0.0 -99.6 | 53.8 | 1.20 1.09 | Case_1 Case_15 | 4.62 2.87 14.06 | 0.78 1.00 1.00 | 1.78 | 0.56 1.00 | Yes |
| Plate7 | ACT | | 10.0 | 1.5 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | SEA-2, Static | EPP35 | 0.0 | 9.5 | 600.0 | 500.0 | 0.0 | 12416 | 2516 | 0.000 | 18.5 | | Yes |
| | BUC | HSM_2 | EPP35 | 6.5 7.5 | 2 3000 | 42.6 0.0 -101.7 | 53.8 | 1.20 1.09 | Case_1 Case_15 | 4.78 2.87 14.06 | 0.80 1.00 1.00 | 1.85 | 0.54 1.00 | Yes |
| Plate8 | ACT | | 16.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 355 | | | |
| | LOC | Ice Class | EPP44 | 9.0 | 9.0 | 670.0 | 300.0 | 839.5 | 12500 | 6500 | 0.000 | 0.0 | | Yes |
| | BUC | HSM_1 | EPP44 | 4.0 6.5 | 2 0 | 0.0 31.9 62.9 | 434.9 | 2.23 1.00 | Case_2 Case_15 | 4.00 1.71 10.64 | 1.00 1.00 1.00 | 3.14 | 0.32 1.00 | Yes |
| Plate9 | ACT | | 16.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 355 | | | |
| | LOC | Ice Class | EPP45 | 9.0 | 9.0 | 600.0 | 600.0 | 839.5 | 12500 | 8900 | 0.000 | 0.0 | | Yes |
| | BUC | HSM_2 | EPP47 | 7.0 6.0 | 2 0 | 0.0 -45.7 -60.9 | 434.9 | 1.33 1.00 | Case_12 Case_16 | 5.71 2.81 15.28 | 1.00 1.00 1.00 | 3.09 | 0.32 1.00 | Yes |
| Plate10 | ACT | | 10.0 | 1.0 | 0.72 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | SEA-2, Static | EPP50 | 0.0 | 8.5 | 600.0 | 600.0 | 0.0 | 12500 | 8900 | 0.000 | -26.9 | | Yes |
| | BUC | HSM_1 | EPP53 | 7.0 6.0 | 1 0 | 130.6 0.0 31.5 | 60.3 | 1.20 1.11 | Case_1 Case_15 | 4.64 2.87 14.06 | 0.81 1.00 1.00 | 2.01 | 0.50 1.00 | Yes |

| Plate | ACT | | t [mm] | t _c [mm] | α _p | C _a | X | | B. eff. [%] | S. eff. [%] | R _{eff} [N/mm ²] | | | |
|---------|-----|---------------|--------|---|--------------------------|--|-------------------------------------|-----------------------------|---------------------|--|--|--------------------------------------|---|-----|
| | LOC | Load ref. | EPP | t _{loc} [mm] | t _{min} [mm] | Span [mm] | Spac [mm] | p [kN/m ²] | y ₁ [mm] | z ₁ [mm] | Draught [m] | σ _{hg} [N/mm ²] | Fsc [kN] | OK? |
| | BUC | Load ref. | EPP | t _{s/t} t _{buc} [mm] | Stress comb. Radius [mm] | σ _x σ _y τ [N/mm ²] | σ _E [N/mm ²] | Asp. α F _{long} | Case σ Case τ | K _x K _y K _τ | C _x C _y C _τ | γ _c | η _{actual} η _{allow} | OK? |
| Plate11 | ACT | | 10.0 | 1.0 | 0.96 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | SEA-2, Static | EPP55 | 0.0 | 8.5 | 600.0 | 300.0 | 0.0 | 12500 | 11000 | 0.000 | -41.9 | | Yes |
| | BUC | HSM_1 | EPP55 | 4.0 4.5 | 1 | 137.3 0.0 30.3 | 167.6 | 2.00 1.26 | Case_1 Case_15 | 5.14 1.56 10.98 | 1.00 1.00 1.00 | 2.38 | 0.42 1.00 | Yes |

Strength Deck at #99

| | | | | | | | | | | | | | | |
|--------|-----|---------------|-------|------------|------|-----------------------|-------|--------------|-------------------|-----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 8.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP56 | 1.0 | 6.5 | 600.0 | 500.0 | 3.4 | 500 | 11300 | 0.000 | -44.0 | | Yes |
| | BUC | HSM_1 | EPP58 | 6.0 5.0 | 1 | 137.3 0.0 -4.5 | 36.5 | 1.20 1.24 | Case_1 Case_15 | 4.96 2.87 14.06 | 0.68 1.00 1.00 | 1.75 | 0.57 1.00 | Yes |
| Plate1 | ACT | | 8.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP59 | 1.0 | 6.5 | 600.0 | 500.0 | 3.4 | 1500 | 11300 | 0.000 | -44.0 | | Yes |
| | BUC | HSM_1 | EPP63 | 6.0 5.0 | 1 | 137.3 0.0 -10.9 | 36.5 | 1.20 1.24 | Case_1 Case_15 | 4.96 2.87 14.06 | 0.68 1.00 1.00 | 1.73 | 0.58 1.00 | Yes |
| Plate2 | ACT | | 8.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP64 | 1.0 | 6.5 | 600.0 | 500.0 | 3.4 | 3500 | 11300 | 0.000 | -44.0 | | Yes |
| | BUC | HSM_1 | EPP68 | 6.0 5.5 | 1 | 137.3 0.0 -16.0 | 36.5 | 1.20 1.24 | Case_1 Case_15 | 4.96 2.87 14.06 | 0.68 1.00 1.00 | 1.71 | 0.59 1.00 | Yes |
| Plate3 | ACT | | 8.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP69 | 1.0 | 6.5 | 600.0 | 500.0 | 3.4 | 5500 | 11300 | 0.000 | -44.0 | | Yes |
| | BUC | HSM_1 | EPP74 | 6.0 5.5 | 1 | 137.3 0.0 -19.6 | 36.5 | 1.20 1.24 | Case_1 Case_15 | 4.96 2.87 14.06 | 0.68 1.00 1.00 | 1.69 | 0.59 1.00 | Yes |
| Plate4 | ACT | | 8.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP75 | 1.0 | 6.5 | 600.0 | 500.0 | 3.4 | 7500 | 11300 | 0.000 | -44.0 | | Yes |
| | BUC | HSM_1 | EPP79 | 6.0 5.5 | 1 | 137.3 0.0 -26.0 | 36.5 | 1.20 1.24 | Case_1 Case_15 | 4.96 2.87 14.06 | 0.68 1.00 1.00 | 1.65 | 0.61 1.00 | Yes |
| Plate5 | ACT | | 8.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP80 | 1.0 | 6.5 | 600.0 | 500.0 | 3.4 | 9500 | 11300 | 0.000 | -44.0 | | Yes |
| | BUC | HSM_1 | EPP84 | 6.0 6.0 | 1 | 137.3 0.0 -34.0 | 36.5 | 1.20 1.24 | Case_1 Case_15 | 4.96 2.87 14.06 | 0.68 1.00 1.00 | 1.60 | 0.62 1.00 | Yes |
| Plate6 | ACT | | 8.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP85 | 1.0 | 6.5 | 600.0 | 500.0 | 3.4 | 11500 | 11300 | 0.000 | -44.0 | | Yes |
| | BUC | HSM_1 | EPP86 | 6.0 6.0 | 1 | 137.3 0.0 -35.6 | 36.5 | 1.20 1.24 | Case_1 Case_15 | 4.96 2.87 14.06 | 0.68 1.00 1.00 | 1.59 | 0.63 1.00 | Yes |

Deck_4800_4800 at #99

| | | | | | | | | | | | | | | |
|--------|-----|---------------|--------|------------|------|--------------------|-------|--------------|-------------------|-----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 7.0 | 1.4 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP89 | 1.5 | 7.0 | 600.0 | 500.0 | 7.8 | 6000 | 4800 | 0.000 | 2.2 | | Yes |
| | BUC | HSM_2 | EPP94 | 3.5 2.4 | 1 | 7.3 0.0 -1.0 | 23.4 | 1.20 1.30 | Case_1 Case_15 | 5.20 2.87 14.06 | 0.58 1.00 0.81 | 26.48 | 0.04 1.00 | Yes |
| Plate1 | ACT | | 7.0 | 1.4 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP95 | 1.5 | 7.0 | 600.0 | 500.0 | 7.8 | 8000 | 4800 | 0.000 | 2.2 | | Yes |
| | BUC | HSM_2 | EPP100 | 3.5 2.4 | 1 | 7.3 0.0 -1.4 | 23.4 | 1.20 1.30 | Case_1 Case_15 | 5.20 2.87 14.06 | 0.58 1.00 0.81 | 25.59 | 0.04 1.00 | Yes |
| Plate2 | ACT | | 7.0 | 1.4 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP101 | 1.5 | 7.0 | 600.0 | 500.0 | 7.8 | 10500 | 4800 | 0.000 | 2.2 | | Yes |
| | BUC | HSM_2 | EPP104 | 3.5 2.4 | 1 | 7.3 0.0 -1.7 | 23.4 | 1.20 1.30 | Case_1 Case_15 | 5.20 2.87 14.06 | 0.58 1.00 0.81 | 25.03 | 0.04 1.00 | Yes |

Deck_8100_8100 at #99

| Plate | ACT | | t [mm] | t _c [mm] | α _p | C _a | X | | B. eff. [%] | S. eff. [%] | R _{eff} [N/mm ²] | | | |
|--------|-----|---------------|--------|---|--------------------------|--|-------------------------------------|-----------------------------|---------------------|--|--|--------------------------------------|---|-----|
| | LOC | Load ref. | EPP | t _{loc} [mm] | t _{min} [mm] | Span [mm] | Spac [mm] | p [kN/m ²] | y ₁ [mm] | z ₁ [mm] | Draught [m] | σ _{hg} [N/mm ²] | Fsc [kN] | OK? |
| | BUC | Load ref. | EPP | t _{s/t} t _{buc} [mm] | Stress comb. Radius [mm] | σ _x σ _y τ [N/mm ²] | σ _E [N/mm ²] | Asp. α F _{long} | Case σ Case τ | K _x K _y K _z | C _x C _y C _z | γ _c | η _{actual} η _{allow} | OK? |
| Plate0 | ACT | | 7.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP106 | 0.5 | 6.5 | 600.0 | 500.0 | 2.5 | 500 | 8100 | 0.000 | -21.2 | | Yes |
| | BUC | HSM_1 | EPP108 | 3.5 3.0 | 1 0 | 66.3 0.0 -2.5 | 26.8 | 1.20 1.24 | Case_1 Case_15 | 4.98 2.87 14.06 | 0.60 1.00 0.87 | 3.19 | 0.31 1.00 | Yes |
| Plate1 | ACT | | 7.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP109 | 0.5 | 6.5 | 600.0 | 500.0 | 2.5 | 1500 | 8100 | 0.000 | -21.2 | | Yes |
| | BUC | HSM_1 | EPP113 | 3.5 3.5 | 1 0 | 66.3 0.0 -5.7 | 26.8 | 1.20 1.24 | Case_1 Case_15 | 4.98 2.87 14.06 | 0.60 1.00 0.87 | 3.13 | 0.32 1.00 | Yes |
| Plate2 | ACT | | 7.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP114 | 0.5 | 6.5 | 600.0 | 500.0 | 2.5 | 3500 | 8100 | 0.000 | -21.2 | | Yes |
| | BUC | HSM_1 | EPP114 | 3.5 3.5 | 1 0 | 66.3 0.0 -5.7 | 26.8 | 1.20 1.24 | Case_1 Case_15 | 4.98 2.87 14.06 | 0.60 1.00 0.87 | 3.13 | 0.32 1.00 | Yes |
| Plate3 | ACT | | 7.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP116 | 0.5 | 6.5 | 600.0 | 500.0 | 2.5 | 4500 | 8100 | 0.000 | -21.2 | | Yes |
| | BUC | HSM_1 | EPP118 | 3.5 4.0 | 1 0 | 66.3 0.0 -18.6 | 26.8 | 1.20 1.24 | Case_1 Case_15 | 4.98 2.87 14.06 | 0.60 1.00 0.87 | 2.83 | 0.35 1.00 | Yes |
| Plate4 | ACT | | 7.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP119 | 0.5 | 6.5 | 600.0 | 500.0 | 2.5 | 5500 | 8100 | 0.000 | -21.2 | | Yes |
| | BUC | HSM_1 | EPP124 | 3.5 4.5 | 1 0 | 66.3 0.0 -33.6 | 26.8 | 1.20 1.24 | Case_1 Case_15 | 4.98 2.87 14.06 | 0.60 1.00 0.87 | 2.45 | 0.41 1.00 | Yes |
| Plate5 | ACT | | 7.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP125 | 0.5 | 6.5 | 600.0 | 500.0 | 2.5 | 7500 | 8100 | 0.000 | -21.2 | | Yes |
| | BUC | HSM_1 | EPP129 | 3.5 4.5 | 1 0 | 66.3 0.0 -36.9 | 26.8 | 1.20 1.24 | Case_1 Case_15 | 4.98 2.87 14.06 | 0.60 1.00 0.87 | 2.38 | 0.42 1.00 | Yes |
| Plate6 | ACT | | 7.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP130 | 0.5 | 6.5 | 600.0 | 500.0 | 2.5 | 9500 | 8100 | 0.000 | -21.2 | | Yes |
| | BUC | HSM_1 | EPP134 | 3.5 5.0 | 2 0 | 46.4 0.0 -58.6 | 26.8 | 1.20 1.24 | Case_1 Case_15 | 4.98 2.87 14.06 | 0.60 1.00 0.87 | 2.25 | 0.44 1.00 | Yes |
| Plate7 | ACT | | 7.0 | 1.0 | 0.80 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP135 | 0.5 | 6.5 | 600.0 | 500.0 | 2.5 | 11500 | 8100 | 0.000 | -21.2 | | Yes |
| | BUC | HSM_1 | EPP137 | 3.5 5.0 | 2 0 | 46.4 0.0 -60.9 | 26.8 | 1.20 1.32 | Case_1 Case_15 | 5.29 2.87 14.06 | 0.61 1.00 0.87 | 2.21 | 0.45 1.00 | Yes |

Inner bottom at #99

| | | | | | | | | | | | | | | |
|--------|-----|---------------|--------|------------|--------|----------------------|-------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP138 | 1.5 | 8.0 | 1800.0 | 500.0 | 7.8 | 500 | 1400 | 0.000 | 26.4 | | Yes |
| | BUC | HSM_2 | EPP138 | 3.5 4.0 | 1 0 | 87.0 0.0 0.1 | 53.8 | 3.60 1.09 | Case_1 Case_15 | 4.34 1.16 9.78 | 0.75 1.00 1.00 | 3.07 | 0.33 1.00 | Yes |
| Plate1 | ACT | | 10.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | TK-2, Static | EPP145 | 6.0 | 8.0 | 1800.0 | 500.0 | 132.2 | 3500 | 1400 | 0.000 | 26.4 | | Yes |
| | BUC | HSM_2 | EPP143 | 5.0 4.5 | 1 0 | 87.0 0.0 -6.4 | 53.8 | 3.60 1.09 | Case_1 Case_15 | 4.34 1.16 9.78 | 0.75 1.00 1.00 | 3.03 | 0.33 1.00 | Yes |
| Plate2 | ACT | | 10.0 | 1.0 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | TK-2, Static | EPP146 | 6.0 | 7.5 | 1800.0 | 500.0 | 132.2 | 3500 | 1400 | 0.000 | 26.4 | | Yes |
| | BUC | HSM_2 | EPP150 | 5.0 4.5 | 1 0 | 87.0 0.0 -14.2 | 60.3 | 3.60 1.11 | Case_1 Case_15 | 4.45 1.16 9.78 | 0.79 1.00 1.00 | 3.08 | 0.33 1.00 | Yes |
| Plate3 | ACT | | 10.0 | 1.0 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | TK-2, Static | EPP151 | 6.0 | 7.5 | 1800.0 | 500.0 | 132.2 | 5500 | 1400 | 0.000 | 26.4 | | Yes |
| | BUC | HSM_2 | EPP155 | 5.0 5.0 | 1 0 | 87.0 0.0 -21.7 | 60.3 | 3.60 1.11 | Case_1 Case_15 | 4.45 1.16 9.78 | 0.79 1.00 1.00 | 2.93 | 0.34 1.00 | Yes |

| Plate | ACT | | t [mm] | t _c [mm] | α _p | C _a | X | | B. eff. [%] | S. eff. [%] | R _{eff} [N/mm ²] | | | |
|--------|-----|---------------|--------|---|--------------------------|--|-------------------------------------|-----------------------------|---------------------|--|--|--------------------------------------|---|-----|
| | LOC | Load ref. | EPP | t _{loc} [mm] | t _{min} [mm] | Span [mm] | Spac [mm] | p [kN/m ²] | y ₁ [mm] | z ₁ [mm] | Draught [m] | σ _{hg} [N/mm ²] | Fsc [kN] | OK? |
| | BUC | Load ref. | EPP | t _{s/t} t _{buc} [mm] | Stress comb. Radius [mm] | σ _x σ _y τ [N/mm ²] | σ _E [N/mm ²] | Asp. α F _{long} | Case σ Case τ | K _x K _y K _τ | C _x C _y C _τ | γ _c | η _{actual} η _{allow} | OK? |
| Plate4 | ACT | | 10.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | TK-2, Static | EPP156 | 6.0 | 8.0 | 1800.0 | 500.0 | 132.2 | 7500 | 1400 | 0.000 | 26.4 | | Yes |
| | BUC | HSM_2 | EPP160 | 5.0 6.0 | 1 0 | 87.0 0.0 -29.6 | 53.8 | 3.60 1.35 | Case_1 Case_15 | 5.40 1.16 9.78 | 0.82 1.00 1.00 | 2.82 | 0.35 1.00 | Yes |
| Plate5 | ACT | | 10.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP161 | 1.5 | 8.0 | 1800.0 | 500.0 | 7.8 | 9500 | 1400 | 0.000 | 26.4 | | Yes |
| | BUC | HSM_2 | EPP164 | 3.5 6.0 | 1 0 | 87.0 0.0 -33.0 | 53.8 | 3.60 1.30 | Case_1 Case_15 | 5.20 1.16 9.78 | 0.81 1.00 1.00 | 2.71 | 0.37 1.00 | Yes |
| Plate6 | ACT | | 10.0 | 1.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | UDL-2, Static | EPP165 | 1.5 | 8.0 | 1800.0 | 500.0 | 7.8 | 11000 | 1400 | 0.000 | 26.4 | | Yes |
| | BUC | HSM_2 | EPP166 | 3.5 6.0 | 1 0 | 87.0 0.0 -34.1 | 53.8 | 3.60 1.30 | Case_1 Case_15 | 5.20 1.16 9.78 | 0.81 1.00 1.00 | 2.69 | 0.37 1.00 | Yes |

LongPlaneBulkhead9000_9000 Split1 at #99

| | | | | | | | | | | | | | | |
|--------|-----|--------------|--------|------------|--------|----------------------|-------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 9.0 | 1.0 | 0.00 | 0 | 0 | | 100 | 100 | 355 | | | |
| | LOC | Sea chest, - | EPP169 | 9.0 | 7.5 | 1800.0 | 570.0 | 200.0 | 9000 | 530 | 7.200 | 0.0 | | Yes |
| | BUC | HSM_2 | EPP169 | 6.5 4.5 | 1 0 | 107.4 0.0 -3.1 | 36.7 | 3.16 1.25 | Case_1 Case_15 | 5.30 1.21 9.94 | 0.71 1.00 0.85 | 2.33 | 0.43 1.00 | Yes |

LongPlaneBulkhead3000_3000 Split1 at #99

| | | | | | | | | | | | | | | |
|--------|-----|--------------|--------|------------|--------|----------------------|-------|--------------|-------------------|-----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 9.0 | 1.0 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | TK-2, Static | EPP172 | 7.0 | 7.5 | 1800.0 | 600.0 | 141.7 | 3000 | 450 | 0.000 | 33.2 | | Yes |
| | BUC | HSM_2 | EPP172 | 7.0 4.5 | 1 0 | 109.3 0.0 -1.1 | 33.1 | 3.00 1.25 | Case_1 Case_15 | 5.31 1.23 10.02 | 0.68 1.00 0.81 | 2.21 | 0.45 1.00 | Yes |

Girder6000 at #99

| | | | | | | | | | | | | | | |
|--------|-----|---------------|--------|------------|--------|----------------------|-------|--------------|-------------------|-----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 9.0 | 0.5 | 1.00 | 1 | 0 | | 100 | 100 | 355 | | | |
| | LOC | INT-1, Static | EPP175 | 2.5 | 7.0 | 1800.0 | 630.0 | 12.0 | 6000 | 470 | 7.200 | 33.0 | | Yes |
| | BUC | HSM_2 | EPP175 | 6.5 4.0 | 1 0 | 108.8 0.0 -2.3 | 33.9 | 2.86 1.08 | Case_1 Case_15 | 4.62 1.26 10.10 | 0.65 1.00 0.82 | 2.11 | 0.47 1.00 | Yes |

General Panel 2 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|----------------------|------|--------------|-------------------|-----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 7.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 5.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP178 | 3.5 4.5 | 1 0 | 119.5 0.0 -4.7 | 31.5 | 1.20 1.00 | Case_1 Case_15 | 4.18 2.87 14.06 | 0.60 1.00 0.94 | 1.78 | 0.56 1.00 | Yes |

General Panel 3 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|----------------------|------|--------------|-------------------|-----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 7.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP184 | 3.5 4.5 | 1 0 | 119.5 0.0 -6.6 | 31.5 | 1.20 1.00 | Case_1 Case_15 | 4.18 2.87 14.06 | 0.60 1.00 0.94 | 1.77 | 0.57 1.00 | Yes |

General Panel 4 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|----------------------|------|--------------|-------------------|-----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP190 | 4.5 5.0 | 1 0 | 110.5 0.0 -0.9 | 37.4 | 3.00 1.09 | Case_1 Case_15 | 4.62 1.23 10.02 | 0.68 1.00 0.86 | 2.17 | 0.46 1.00 | Yes |

Single-Skin Girder 0 Web at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|--------------------|------|--------------|-------------------|----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 8.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.5 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP192 | 5.0 2.5 | 1 0 | 30.8 0.0 0.2 | 72.2 | 5.45 1.40 | Case_1 Case_15 | 5.60 1.07 9.48 | 0.92 1.00 1.00 | 10.64 | 0.09 1.00 | Yes |

Single-Skin Girder 0 Flange at #99

| Plate | ACT | | t [mm] | t _c [mm] | α _p | C _a | X | | B. eff. [%] | S. eff. [%] | R _{eff} [N/mm ²] | | | |
|--------|-----|-----------|-----------|--|-----------------------------------|---|--|-----------------------------|------------------------|--|--|---|---|-----|
| | LOC | Load ref. | EPP | t _{loc} [mm] | t _{min} [mm] | Span [mm] | Spac [mm] | p [kN/m ²] | y ₁ [mm] | z ₁ [mm] | Draught [m] | σ _{hg} [N/mm ²] | Fsc [kN] | OK? |
| | BUC | Load ref. | EPP | t _{s/t} t _{buc} [mm] | Stress comb. Radius [mm] | σ _x σ _y τ [N/mm ²] | σ _E [N/mm ²] | Asp. α F _{long} | Case σ Case τ | K _x K _y K _τ | C _x C _y C _τ | γ _c | η _{actual} η _{allow} | OK? |
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.5 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP194 | 9.0 2.0 | 1 | -32.5 0.0 0.0 | 2391.4 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 10.92 | 0.09 1.00 | Yes |

Single-Skin Girder 2 Web at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|--------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 8.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.5 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP195 | 5.0 2.5 | 1 | 57.4 0.0 0.4 | 72.2 | 5.45 1.40 | Case_1 Case_15 | 5.60 1.07 9.48 | 0.92 1.00 1.00 | 5.71 | 0.18 1.00 | Yes |

Single-Skin Girder 2 Flange at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|---------------------|--------|---------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.5 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP197 | 9.0 2.0 | 1 | -60.6 0.0 0.0 | 2391.4 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 5.85 | 0.17 1.00 | Yes |

Single-Skin Girder 4 Web at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|---------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 8.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP198 | 4.5 1.0 | 1 | -88.8 0.0 0.1 | 96.2 | 5.45 1.40 | Case_1 Case_15 | 5.60 1.07 9.48 | 1.00 1.00 1.00 | 4.00 | 0.25 1.00 | Yes |

Single-Skin Girder 4 Flange at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|---------------------|--------|---------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP200 | 8.0 1.0 | 1 | -88.8 0.0 0.0 | 2987.2 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 4.00 | 0.25 1.00 | Yes |

Single-Skin Girder 5 Web at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|--------------------|------|--------------|-------------------|----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP201 | 8.0 2.5 | 1 | 20.0 0.0 0.1 | 46.1 | 3.33 1.40 | Case_1 Case_15 | 8.02 1.19 9.87 | 0.95 1.00 0.95 | 16.93 | 0.06 1.00 | Yes |

Single-Skin Girder 5 Flange at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|--------------------|--------|---------------|-------------------|----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP202 | 8.5 2.0 | 1 | 20.0 0.0 0.0 | 2391.4 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 17.75 | 0.06 1.00 | Yes |

Single-Skin Girder 8 Web at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|----------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP204 | 5.0 4.0 | 1 | 137.3 0.0 -1.4 | 79.4 | 3.91 1.40 | Case_1 Case_15 | 5.81 1.13 9.70 | 0.97 1.00 1.00 | 2.51 | 0.40 1.00 | Yes |

Single-Skin Girder 8 Flange at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|----------------------|--------|---------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP205 | 7.0 1.0 | 1 | -134.3 0.0 0.0 | 2987.2 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 2.64 | 0.38 1.00 | Yes |
| Plate1 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP206 | 7.0 1.0 | 1 | -134.3 0.0 0.0 | 2987.2 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 2.64 | 0.38 1.00 | Yes |

| Plate | ACT | | t [mm] | t _c [mm] | α _p | C _a | X | | B. eff. [%] | S. eff. [%] | R _{eff} [N/mm ²] | | | |
|-------|-----|-----------|--------|---|--------------------------|--|-------------------------------------|-----------------------------|---------------------|--|--|--------------------------------------|---|-----|
| | LOC | Load ref. | EPP | t _{loc} [mm] | t _{min} [mm] | Span [mm] | Spac [mm] | p [kN/m ²] | y ₁ [mm] | z ₁ [mm] | Draught [m] | σ _{hg} [N/mm ²] | Fsc [kN] | OK? |
| | BUC | Load ref. | EPP | t _{s/t} t _{buc} [mm] | Stress comb. Radius [mm] | σ _x σ _y τ [N/mm ²] | σ _E [N/mm ²] | Asp. α F _{long} | Case σ Case τ | K _x K _y K _τ | C _x C _y C _τ | γ _c | η _{actual} η _{allow} | OK? |

Single-Skin Girder 8 Web_2 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|-------------------|------|--------------|-------------------|----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 8.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP207 | 4.0 2.0 | 1 0 | 2.7 0.0 0.0 | 72.2 | 5.45 1.40 | Case_1 Case_15 | 5.60 1.07 9.48 | 1.00 1.00 1.00 | 88.61 | 0.01 1.00 | Yes |

Single-Skin Girder 8 Flange_2 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|-------------------|--------|---------------|-------------------|----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP208 | 7.5 2.0 | 1 0 | 4.4 0.0 0.0 | 2391.4 | 24.00 1.40 | Case_1 Case_15 | 6.91 1.00 9.26 | 1.00 1.00 1.00 | 53.28 | 0.02 1.00 | Yes |

Single-Skin Girder 8 Web_3 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|----------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP210 | 5.0 4.0 | 1 0 | 137.3 0.0 -2.7 | 79.4 | 3.91 1.40 | Case_1 Case_15 | 5.81 1.13 9.70 | 0.97 1.00 1.00 | 2.51 | 0.40 1.00 | Yes |

Single-Skin Girder 8 Flange_3 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|----------------------|--------|---------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP211 | 7.0 1.0 | 1 0 | -134.3 0.0 0.0 | 2987.2 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 2.64 | 0.38 1.00 | Yes |

Single-Skin Girder 10 Web at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|--------------------|------|--------------|-------------------|----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP213 | 8.0 2.5 | 1 0 | 20.0 0.0 0.1 | 46.1 | 3.33 1.40 | Case_1 Case_15 | 8.02 1.19 9.87 | 0.95 1.00 0.95 | 16.93 | 0.06 1.00 | Yes |

Single-Skin Girder 10 Flange at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|--------------------|--------|---------------|-------------------|----------------------|----------------------|-------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP214 | 8.5 2.0 | 1 0 | 20.0 0.0 0.0 | 2391.4 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 17.75 | 0.06 1.00 | Yes |

Single-Skin Girder 10 Web_2 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|--------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP216 | 8.0 3.5 | 1 0 | 66.3 0.0 0.5 | 46.1 | 3.33 1.40 | Case_1 Case_15 | 6.13 1.19 9.87 | 0.83 1.00 0.95 | 4.42 | 0.23 1.00 | Yes |

Single-Skin Girder 10 Flange_2 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|---------------------|--------|---------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP217 | 8.5 2.0 | 1 0 | -57.4 0.0 0.0 | 2391.4 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 6.19 | 0.16 1.00 | Yes |

Single-Skin Girder 11 Web at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|--------|---------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP219 | 6.0 4.0 | 1 0 | 137.3 0.0 0.9 | 79.4 | 3.91 1.40 | Case_1 Case_15 | 5.81 1.13 9.70 | 0.97 1.00 1.00 | 2.51 | 0.40 1.00 | Yes |

Single-Skin Girder 11 Flange at #99

| Plate | ACT | | t [mm] | t _c [mm] | α _p | C _a | X | | B. eff. [%] | S. eff. [%] | R _{eff} [N/mm ²] | | | |
|-----------------|-----|-----------|-----------|--|-----------------------------------|---|--|-----------------------------|------------------------|--|--|---|---|-----|
| | LOC | Load ref. | EPP | t _{loc} [mm] | t _{min} [mm] | Span [mm] | Spac [mm] | p [kN/m ²] | y ₁ [mm] | z ₁ [mm] | Draught [m] | σ _{hg} [N/mm ²] | Fsc [kN] | OK? |
| | BUC | Load ref. | EPP | t _{s/t} t _{buc} [mm] | Stress comb. Radius [mm] | σ _x σ _y τ [N/mm ²] | σ _E [N/mm ²] | Asp. α F _{long} | Case σ Case τ | K _x K _y K _τ | C _x C _y C _τ | γ _c | η _{actual} η _{allow} | OK? |
| Plate0 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| Provjera panela | BUC | HSM_2 | EPP220 | 7.5 1.0 | 1 | -134.3 0.0 0.0 | 2987.2 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 2.64 | 0.38 1.00 | Yes |

Single-Skin Girder 10 Web_3 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|--------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP222 | 8.0 3.5 | 1 | 66.3 0.0 0.5 | 46.1 | 3.33 1.40 | Case_1 Case_15 | 6.13 1.19 9.87 | 0.83 1.00 0.95 | 4.42 | 0.23 1.00 | Yes |

Single-Skin Girder 10 Flange_3 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|---------------------|--------|---------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP223 | 8.5 2.0 | 1 | -57.4 0.0 0.0 | 2391.4 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 6.19 | 0.16 1.00 | Yes |

Single-Skin Girder 11 Web_2 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|--------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP225 | 8.0 3.5 | 1 | 66.3 0.0 0.5 | 46.1 | 3.33 1.40 | Case_1 Case_15 | 6.13 1.19 9.87 | 0.83 1.00 0.95 | 4.42 | 0.23 1.00 | Yes |

Single-Skin Girder 11 Flange_2 at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|---------------------|--------|---------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP226 | 8.5 2.0 | 1 | -57.4 0.0 0.0 | 2391.4 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 6.19 | 0.16 1.00 | Yes |

Single-Skin Girder 12 Web at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|---------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP228 | 6.0 4.0 | 1 | 137.3 0.0 0.5 | 83.0 | 4.00 1.40 | Case_1 Case_15 | 5.80 1.13 9.68 | 0.99 1.00 1.00 | 2.55 | 0.39 1.00 | Yes |

Single-Skin Girder 12 Flange at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|----------------------|--------|---------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 0.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP229 | 7.5 1.0 | 1 | -134.5 0.0 0.0 | 2987.2 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 2.64 | 0.38 1.00 | Yes |

Single-Skin Girder 13 Web at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|--------------------|------|--------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_1 | EPP231 | 8.0 3.5 | 1 | 66.3 0.0 0.2 | 46.1 | 3.33 1.40 | Case_1 Case_15 | 6.13 1.19 9.87 | 0.83 1.00 0.95 | 4.42 | 0.23 1.00 | Yes |

Single-Skin Girder 13 Flange at #99

| | | | | | | | | | | | | | | |
|--------|-----|-------|--------|------------|------|---------------------|--------|---------------|-------------------|----------------------|----------------------|------|--------------|-----|
| Plate0 | ACT | | 10.0 | 1.5 | 0.00 | 0 | 0 | | 100 | 100 | 0 | | | |
| | LOC | | | 0.0 | 7.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0.000 | 0.0 | | |
| | BUC | HSM_2 | EPP232 | 8.5 2.0 | 1 | -57.4 0.0 0.0 | 2391.4 | 24.00 1.40 | Case_1 Case_15 | 5.60 1.00 9.26 | 1.00 1.00 1.00 | 6.19 | 0.16 1.00 | Yes |

3.6.3. Provjera uzdužnjaka

| | |
|----------------|---|
| Plate | Identifikacija opločenja |
| ACT | Stvarne dimenzije opločenja |
| t | Ukupna debljina opločenja [mm] |
| t_c | Dodatak za koroziju [mm] |
| α_p | Korekcijski faktor |
| C_a | Koeficijent dopuštenog |
| X | Koeficijent |
| B. eff. | Efektivnost savijanja [%] |
| S. eff. | Efektivnost smicanja [%] |
| R_{eH} | Granica ravlačenja [N/mm ²] |
| LOC | Zahtjevi za lokalnu čvrstoću |
| Load ref. | Projektno opterećenje |
| EPP | EPP identifikacija |
| t_{loc} | Zahtjevana debljina [mm] |
| t_{min} | Minimalna debljina [mm] |
| Span | Raspon [m] |
| Spac | Razmak [mm] |
| p | Bočni pritisak [kN/m ²] |
| y_1 | Y koordinata LCP-a [mm] |
| z_1 | Z koordinata LCP-a [mm] |
| Draught | Gazt [m] |
| σ_{hg} | Naprezanje jakog nosača [N/mm ²] |
| F_{SC} | Opterećenje čeličnih vitla [kN] |
| OK? | Jesu li zahtjevi ispunjeni |
| BUC | Zaktjevi zbog uvijanja |
| $t_{s/t}$ | Minimalni zahtjevi za odnos debljine i dužine [mm]. |
| $t_{buc}^{1)}$ | Minimalna procjena debljine ploče da bi bilo $\eta_{actual} = \eta_{allow}$ |
| Stress comb | Slučaj kombinacije naprezanja, 1 or 2 |
| Radius | Radijus [mm] |
| σ_x | Primjenjeno σ_x [N/mm ²] |
| σ_y | Primjenjeno σ_y [N/mm ²] |
| τ | Primjenjeno smično naprezanje [N/mm ²] |

| | |
|-----------------|--|
| σ_E | Referentno naprezanje [N/mm ²] |
| Asp. α | Odnos dimenzija |
| F_{long} | Korekcijski faktor |
| Case σ | Relevantni slučaj 1 or 2 |
| Case τ | Relevantni slučaj 1 or 2 |
| K_x | Faktor uvijanja |
| K_y | Faktor uvijanja |
| K_τ | Faktor uvijanja |
| C_x | Redukcijski faktor |
| C_y | Redukcijski faktor |
| C_τ | Redukcijski faktor |
| γ_c | Koeficijent naprezanja pri kolapsu |
| η_{actual} | Eta stvarno |
| η_{allow} | Eta dopušteno |

| Stiff. No | ACT | Type Dimension | y z [mm] | Z _{net} [cm ³] | Spacing t _{pl,net} [mm] | R _{eH} τ _{eH} [N/mm ²] | t _{ew} t _{ef} [mm] | h _{w,net} b _r [mm] | t _w t _r [mm] | X C _m | C _s C _t | l _{bdg} l _{shr} [mm] | |
|--------------------------------|---------------------------|--|--|-------------------------------------|--|--|---|---|---|---------------------------------------|--|--|-----|
| Group | LOC MIN | Load ref. for Z | Load ref. for t _w | Z _{req} [cm ³] | Z _{Rel,req} [%] | t _{w,min} t _{r,min} [mm] | t _{w,shear} t _{pl,min,net} [mm] | draught _z draught _{t_w} [m] | P _z F _{sc} [kN/m ²] | P _w [kN/m ²] | OK? | | |
| BCU SLN | Span b _{ef} [mm] | Est. Z _{req} [cm ³] | Est. h _{w,req} Est. t _{r,req} [mm] | b _{r,sl} [mm] | I _{buc} I _{req} [cm ⁴] | t _{w,min,sl} t _{r,min,sl} [mm] | P _{lat} [kN/m ²] | σ _x σ _y [N/mm ²] | σ _a σ _b [N/mm ²] | τ σ _w [N/mm ²] | η _{actual} η _{allow} | OK? | |
| Frame #99 (64510 mm from A.P.) | | | | | | | | | | | | | |
| Outer shell at #99 | | | | | | | | | | | | | |
| 69 | ACT | HPBulb 120 x 7 | 0 | 50.64 | 500.0 | 355 | 1.4 | 120.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | LOC MIN | SEA-2, Static | SEA-2, Static | 0.00 | 0 | 7.0 | 0.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 576 8 | 4.0 | 0 | 120 0 | 122 108 | 0 2 | 0.50 1.00 | Yes | |
| 54 | ACT | HPBulb 120 x 7 | 500 | 50.64 | 500.0 | 355 | 1.4 | 120.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | LOC MIN | SEA-2, Static | SEA-2, Static | 0.00 | 0 | 7.0 | 0.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 576 8 | 4.0 | 0 | 120 0 | 121 109 | 0 2 | 0.50 1.00 | Yes | |
| 55 | ACT | HPBulb 120 x 7 | 1500 | 49.51 | 500.2 | 355 | 1.4 | 120.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | LOC MIN | SEA-2, Static | SEA-2, Static | 0.00 | 0 | 7.0 | 0.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 549 5 | 4.0 | 0 | 120 0 | 129 90 | 1 2 | 0.49 1.00 | Yes | |
| 56 | ACT | HPBulb 120 x 7 | 2000 | 49.51 | 500.2 | 355 | 1.4 | 120.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | LOC MIN | SEA-2, Static | SEA-2, Static | 0.00 | 0 | 7.0 | 0.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 549 5 | 4.0 | 0 | 119 0 | 134 87 | -6 2 | 0.50 1.00 | Yes | |
| 57 | ACT | HPBulb 120 x 7 | 2500 | 49.51 | 500.2 | 355 | 1.4 | 120.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | LOC MIN | SEA-2, Static | SEA-2, Static | 0.00 | 0 | 7.0 | 0.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 549 5 | 4.0 | 0 | 119 0 | 131 89 | -7 2 | 0.49 1.00 | Yes | |
| 59 | ACT | HPBulb 140 x 7 | 3500 | 75.95 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | LOC MIN | TK-2, Static | TK-2, Static | 57.06 | 133 | 6.0 | 2.5 | 0.000 | 0.000 | -145.6 | -145.6 | Yes | |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 954 6 | 4.5 | -13 | 118 0 | 126 71 | -10 3 | 0.45 1.00 | Yes | |
| 60 | ACT | HPBulb 140 x 7 | 4000 | 75.95 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | LOC MIN | TK-2, Static | TK-2, Static | 57.01 | 133 | 6.0 | 2.5 | 0.000 | 0.000 | -145.5 | -145.5 | Yes | |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 954 6 | 4.5 | -13 | 118 0 | 128 69 | -11 3 | 0.45 1.00 | Yes | |
| 61 | ACT | HPBulb 140 x 7 | 4500 | 75.95 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | LOC MIN | TK-2, Static | TK-2, Static | 56.96 | 133 | 6.0 | 2.5 | 0.000 | 0.000 | -145.4 | -145.4 | Yes | |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 954 6 | 4.5 | -13 | 118 0 | 128 69 | -12 3 | 0.45 1.00 | Yes | |
| 62 | ACT | HPBulb 140 x 7 | 5000 | 75.95 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | LOC MIN | TK-2, Static | TK-2, Static | 56.91 | 133 | 6.0 | 2.5 | 0.000 | 0.000 | -145.2 | -145.2 | Yes | |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 954 6 | 4.5 | -13 | 117 0 | 127 69 | -14 3 | 0.45 1.00 | Yes | |
| 63 | ACT | HPBulb 140 x 7 | 5500 | 75.95 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | LOC MIN | TK-2, Static | TK-2, Static | 56.85 | 134 | 6.0 | 2.0 | 0.000 | 0.000 | -145.1 | -145.1 | Yes | |
| BCU SLN | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 954 6 | 4.5 | -13 | 117 0 | 124 71 | -15 3 | 0.44 1.00 | Yes | |
| 65 | ACT | HPBulb 140 x 7 | 6500 | 75.95 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | | | 142 | | 11.0 | 205 | 0.5 | 0.0 | 0.0 | 0.00 | 0.950 | 1425 | |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|---------------|-------|-------|-----|-----|-------|-------|-------|--------|--------|-----|
| | LOC MIN | TK-2, Static | | TK-2, Static | | 56.75 | 134 | 6.0 | 2.0 | 0.000 | 0.000 | -144.8 | -144.8 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 954 | | 4.5 | -13 | 117 | 124 | -17 | 0.44 | Yes |
| | | 363.0 | | 0.0 | 0.0 | 6 | | 0.0 | | 0 | 71 | 3 | 1.00 | |
| 66 | ACT | HPBulb 140 x 7 | | 7000 | 75.95 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | | | | 155 | | 11.0 | 205 | 0.5 | 0.0 | 0.0 | 1.000 | 0.950 | 1550 | |
| | LOC MIN | TK-2, Static | | TK-2, Static | | 56.70 | 134 | 6.0 | 2.5 | 0.000 | 0.000 | -144.7 | -144.7 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 929 | | 4.5 | -13 | 116 | 126 | -20 | 0.44 | Yes |
| | | 363.0 | | 0.0 | 0.0 | 4 | | 0.0 | | 0 | 66 | 3 | 1.00 | |
| 67 | ACT | HPBulb 140 x 7 | | 7500 | 73.76 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | | | | 168 | | 8.5 | 205 | 0.5 | 0.0 | 0.0 | 1.000 | 0.950 | 1550 | |
| | LOC MIN | TK-2, Static | | TK-2, Static | | 56.65 | 130 | 6.0 | 2.5 | 0.000 | 0.000 | -144.6 | -144.6 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 902 | | 4.5 | -12 | 116 | 132 | -24 | 0.45 | Yes |
| | | 363.0 | | 0.0 | 0.0 | 3 | | 0.0 | | 0 | 60 | 3 | 1.00 | |
| 68 | ACT | HPBulb 140 x 7 | | 8000 | 73.76 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | | | | 182 | | 8.5 | 205 | 0.5 | 0.0 | 0.0 | 1.000 | 0.950 | 1550 | |
| | LOC MIN | TK-2, Static | | TK-2, Static | | 56.60 | 130 | 6.0 | 2.5 | 0.000 | 0.000 | -144.4 | -144.4 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 902 | | 4.5 | -12 | 116 | 138 | -25 | 0.47 | Yes |
| | | 363.0 | | 0.0 | 0.0 | 3 | | 0.0 | | 0 | 58 | 3 | 1.00 | |
| 69 | ACT | HPBulb 140 x 7 | | 8500 | 73.76 | 500.2 | 355 | 0.5 | 140.3 | 7.0 | 0.00 | 1.000 | 1800 | |
| | | | | 195 | | 8.5 | 205 | 0.5 | 0.0 | 0.0 | 1.000 | 0.950 | 1550 | |
| | LOC MIN | TK-2, Static | | TK-2, Static | | 56.54 | 130 | 6.0 | 2.5 | 0.000 | 0.000 | -144.3 | -144.3 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 902 | | 4.5 | -12 | 115 | 135 | -26 | 0.46 | Yes |
| | | 363.0 | | 0.0 | 0.0 | 3 | | 0.0 | | 0 | 59 | 3 | 1.00 | |
| 139 | ACT | HPBulb 140 x 7 | | 9340 | 66.81 | 501.3 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 217 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1549 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 816 | | 5.0 | 0 | 115 | 146 | -27 | 0.48 | Yes |
| | | 363.4 | | 0.0 | 0.0 | 3 | | 0.0 | | 0 | 48 | 4 | 1.00 | |
| 138 | ACT | HPBulb 140 x 7 | | 10000 | 66.81 | 589.6 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 264 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1505 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 825 | | 5.0 | 0 | 114 | 158 | -29 | 0.52 | Yes |
| | | 386.9 | | 0.0 | 0.0 | 3 | | 0.0 | | 0 | 50 | 4 | 1.00 | |
| 137 | ACT | HPBulb 140 x 7 | | 10500 | 66.81 | 534.2 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 394 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1533 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 820 | | 5.0 | 0 | 111 | 143 | -30 | 0.47 | Yes |
| | | 373.1 | | 0.0 | 0.0 | 3 | | 0.0 | | 0 | 50 | 4 | 1.00 | |
| 136 | ACT | HPBulb 140 x 7 | | 11000 | 66.81 | 584.8 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 624 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1508 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 825 | | 5.0 | 0 | 105 | 144 | -31 | 0.48 | Yes |
| | | 385.9 | | 0.0 | 0.0 | 3 | | 0.0 | | 0 | 51 | 4 | 1.00 | |
| 142 | ACT | HPBulb 140 x 7 | | 11500 | 66.81 | 591.7 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 986 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1504 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 825 | | 5.0 | 0 | 97 | 130 | -32 | 0.44 | Yes |
| | | 387.4 | | 0.0 | 0.0 | 3 | | 0.0 | | 0 | 54 | 4 | 1.00 | |
| 81 | ACT | HPBulb 140 x 7 | | 12024 | 66.81 | 372.8 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 1601 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1614 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 791 | | 5.0 | 0 | 82 | 93 | -69 | 0.32 | Yes |
| | | 311.8 | | 0.0 | 0.0 | 2 | | 0.0 | | 0 | 62 | 3 | 1.00 | |
| 82 | ACT | HPBulb 140 x 7 | | 12258 | 66.81 | 500.0 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 2042 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1550 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 815 | | 5.0 | 0 | 72 | 87 | -70 | 0.32 | Yes |
| | | 363.0 | | 0.0 | 0.0 | 3 | | 0.0 | | 0 | 79 | 3 | 1.00 | |
| 93 | ACT | HPBulb 140 x 7 | | 12416 | 66.81 | 500.0 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 2516 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1550 | |

| | | | | | | | | | | | | | | |
|-----------------------------|---------|------------------|-----|---------------------------|--------|-------|------|------|-------|-------|-------|-------|-------|-----|
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 815 | | 5.0 | 0 | 61 | 73 | -71 | 0.28 | Yes |
| | | 363.0 | | 0.0 | | 3 | | 0.0 | 0 | 0 | 88 | 3 | 1.00 | |
| 105 | ACT | HPBulb 140 x 7 | | 12492 | 66.81 | 495.2 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 3010 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1552 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 815 | | 5.0 | 0 | 49 | 58 | -72 | 0.23 | Yes |
| | | 361.5 | | 0.0 | | 3 | | 0.0 | 0 | 0 | 103 | 3 | 1.00 | |
| 106 | ACT | HPBulb 140 x 7 | | 12500 | 66.81 | 495.2 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 3500 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1552 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 815 | | 5.0 | 0 | 26 | 31 | -103 | 0.20 | Yes |
| | | 361.5 | | 0.0 | | 3 | | 0.0 | 0 | 0 | 198 | 2 | 1.00 | |
| 107 | ACT | HPBulb 140 x 7 | | 12500 | 66.81 | 500.0 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 4000 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1550 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 815 | | 5.0 | 0 | 18 | 21 | -103 | 0.18 | Yes |
| | | 363.0 | | 0.0 | | 3 | | 0.0 | 0 | 0 | 237 | 1 | 1.00 | |
| 108 | ACT | HPBulb 140 x 7 | | 12500 | 66.81 | 400.0 | 355 | 1.4 | 140.0 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 4500 | | 8.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1600 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 798 | | 5.0 | 0 | 10 | 11 | -104 | 0.14 | Yes |
| | | 324.7 | | 0.0 | | 2 | | 0.0 | 0 | 0 | 277 | 1 | 1.00 | |
| 7 | ACT | Flatbar 200 x 15 | | 0 | 0.00 | 0.0 | 0 | 1.5 | 200.0 | 15.0 | 0.00 | 0.000 | 0 | |
| | | | | 0 | | 14.5 | 0 | 1.5 | 0.0 | 0.0 | 0.000 | 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 7.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | N/A |
| BUC SLN | | 0.0 | 0.0 | 0.0 | 0.0 | 0 | | 12.5 | 0 | 0 | 0 | 0 | 0.00 | Yes |
| | | 0.0 | | 0.0 | | 0 | | 0.0 | 0 | 0 | 0 | 0 | 0.00 | |
| 9 | ACT | Flatbar 200 x 15 | | 12500 | 173.19 | 600.0 | 355 | 1.5 | 200.0 | 15.0 | 0.00 | 0.850 | 1800 | |
| | | | | 7170 | | 14.5 | 205 | 1.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1208 | |
| | LOC MIN | SEA-2, Static | | Ice class - web thickness | | 0.00 | 0 | 7.0 | 13.5 | 0.000 | 0.000 | 0.0 | 484.7 | Yes |
| BUC SLN | | 0.0 | 0.0 | 0.0 | 0.0 | 0 | | 12.5 | 0 | 0 | 0 | 0 | 0.00 | Yes |
| | | 0.0 | | 0.0 | | 0 | | 0.0 | 0 | 0 | 0 | 0 | 0.00 | |
| 115 | ACT | HPBulb 120 x 7 | | 12500 | 53.99 | 550.0 | 355 | 0.5 | 120.3 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 9500 | | 9.0 | 205 | 0.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1325 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 6.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 583 | | 4.0 | 0 | 97 | 111 | 35 | 0.41 | Yes |
| | | 377.4 | | 0.0 | | 3 | | 0.0 | 0 | 0 | 84 | 2 | 1.00 | |
| 116 | ACT | HPBulb 120 x 7 | | 12500 | 53.99 | 500.0 | 355 | 0.5 | 120.3 | 7.0 | 0.00 | 0.850 | 1800 | |
| | | | | 10000 | | 9.0 | 205 | 0.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1550 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 6.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 579 | | 4.0 | 0 | 108 | 127 | 34 | 0.46 | Yes |
| | | 363.0 | | 0.0 | | 3 | | 0.0 | 0 | 0 | 73 | 2 | 1.00 | |
| 117 | ACT | HPBulb 120 x 7 | | 12500 | 53.99 | 500.0 | 355 | 0.5 | 120.3 | 7.0 | 0.00 | 0.842 | 1800 | |
| | | | | 10500 | | 9.0 | 205 | 0.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1550 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 6.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 579 | | 4.0 | 0 | 120 | 141 | 32 | 0.50 | Yes |
| | | 363.0 | | 0.0 | | 3 | | 0.0 | 0 | 0 | 72 | 2 | 1.00 | |
| 118 | ACT | HPBulb 120 x 7 | | 12500 | 53.99 | 400.0 | 355 | 0.5 | 120.3 | 7.0 | 0.00 | 0.832 | 1800 | |
| | | | | 11000 | | 9.0 | 205 | 0.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1600 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 6.0 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 567 | | 4.0 | 0 | 131 | 144 | 31 | 0.50 | Yes |
| | | 324.7 | | 0.0 | | 2 | | 0.0 | 0 | 0 | 64 | 2 | 1.00 | |
| Strength Deck at #99 | | | | | | | | | | | | | | |
| 1 | ACT | HPBulb 100 x 7 | | 500 | 36.87 | 500.0 | 355 | 0.5 | 100.3 | 7.0 | 0.00 | 0.828 | 1800 | |
| | | | | 11300 | | 7.0 | 205 | 0.5 | 0.0 | 0.0 | 1.000 | 0.750 | 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.62 | 2270 | 5.5 | 0.0 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 | 0.0 | 0.0 | 0.0 | 323 | | 3.0 | 0 | 137 | 184 | -2 | 0.66 | Yes |
| | | 344.4 | | 0.0 | | 1 | | 0.0 | 0 | 0 | 75 | 2 | 1.00 | |

| | | | | | | | | | | | | | |
|----|------------|-------------------|---------------|------------|--------------|------------|------------|--------------|------------|---------------|----------------|--------------|-----|
| 2 | ACT | HPBulb 100 x 7 | 1000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 340.1 | 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 74 | -4 2 | 0.66 1.00 | Yes |
| 3 | ACT | HPBulb 100 x 7 | 1500 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 340.1 | 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 74 | 1 2 | 0.66 1.00 | Yes |
| 4 | ACT | HPBulb 100 x 7 | 2000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 340.1 | 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 74 | 1 2 | 0.66 1.00 | Yes |
| 6 | ACT | HPBulb 100 x 7 | 2500 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 340.1 | 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 74 | -9 2 | 0.66 1.00 | Yes |
| 7 | ACT | HPBulb 100 x 7 | 3000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 340.1 | 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 74 | -10 2 | 0.67 1.00 | Yes |
| 8 | ACT | HPBulb 100 x 7 | 3500 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1425 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 344.4 | 0.0 | 0.0 0.0 | 323 1 | | 3.0 0.0 | 0 | 137 0 | 184 75 | -12 2 | 0.66 1.00 | Yes |
| 10 | ACT | HPBulb 100 x 7 | 4500 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1425 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 344.4 | 0.0 | 0.0 0.0 | 323 1 | | 3.0 0.0 | 0 | 137 0 | 184 76 | -14 2 | 0.66 1.00 | Yes |
| 11 | ACT | HPBulb 100 x 7 | 5000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 340.1 | 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 75 | -15 2 | 0.67 1.00 | Yes |
| 12 | ACT | HPBulb 100 x 7 | 5500 11300 | 36.87 | 400.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.30 | 2838 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 320.0 | 0.0 | 0.0 0.0 | 318 1 | | 3.0 0.0 | 0 | 137 0 | 162 72 | -17 2 | 0.58 1.00 | Yes |
| 13 | ACT | HPBulb 100 x 7 | 6000 11300 | 36.81 | 350.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.14 | 3238 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 270.0 | 0.0 | 0.0 0.0 | 307 1 | | 3.0 0.0 | 0 | 137 0 | 166 64 | -16 2 | 0.57 1.00 | Yes |
| 14 | ACT | HPBulb 100 x 7 | 6500 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 340.1 | 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 75 | -17 2 | 0.67 1.00 | Yes |
| 16 | ACT | HPBulb 100 x 7 | 7000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 1800.0 340.1 | 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 76 | -19 2 | 0.67 1.00 | Yes |

| | | | | | | | | | | | | | |
|------------------------------|------------|-------------------|----------------|------------|--------------|------------|------------|--------------|------------|---------------|----------------|--------------|-----|
| 17 | ACT | HPBulb 100 x 7 | 7500 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 340.1 | 0.0 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 76 | -21 2 | 0.67 1.00 | Yes |
| 18 | ACT | HPBulb 100 x 7 | 8000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 340.1 | 0.0 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 76 | -22 2 | 0.67 1.00 | Yes |
| 19 | ACT | HPBulb 100 x 7 | 8500 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 340.1 | 0.0 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 76 | -24 2 | 0.67 1.00 | Yes |
| 20 | ACT | HPBulb 100 x 7 | 9000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 340.1 | 0.0 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 77 | -25 2 | 0.67 1.00 | Yes |
| 21 | ACT | HPBulb 100 x 7 | 9500 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 340.1 | 0.0 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 77 | -27 2 | 0.67 1.00 | Yes |
| 22 | ACT | HPBulb 100 x 7 | 10000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1425 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 344.4 | 0.0 0.0 | 0.0 0.0 | 323 1 | | 3.0 0.0 | 0 | 137 0 | 184 78 | -29 2 | 0.67 1.00 | Yes |
| 24 | ACT | HPBulb 100 x 7 | 11000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1425 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 344.4 | 0.0 0.0 | 0.0 0.0 | 323 1 | | 3.0 0.0 | 0 | 137 0 | 184 79 | -33 2 | 0.67 1.00 | Yes |
| 25 | ACT | HPBulb 100 x 7 | 11500 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 340.1 | 0.0 0.0 | 0.0 0.0 | 322 1 | | 3.0 0.0 | 0 | 137 0 | 185 79 | -35 2 | 0.68 1.00 | Yes |
| 26 | ACT | HPBulb 100 x 7 | 12000 11300 | 36.87 | 500.0 7.0 | 355 205 | 0.5 0.5 | 100.3 0.0 | 7.0 0.0 | 0.00 1.000 | 0.828 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 1.62 | 2270 | 5.5 0.0 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| BUC SLN | | 1800.0 344.4 | 0.0 0.0 | 0.0 0.0 | 323 1 | | 3.0 0.0 | 0 | 137 0 | 184 80 | -37 2 | 0.67 1.00 | Yes |
| Deck_4800_4800 at #99 | | | | | | | | | | | | | |
| 38 | ACT | HPBulb 120 x 7 | 5500 4800 | 46.07 | 340.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1630 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 2.46 | 1873 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 234.0 | 0.0 0.0 | 0.0 0.0 | 416 0 | | 4.0 0.0 | 0 | 7 0 | 9 37 | 0 4 | 0.03 1.00 | Yes |
| 39 | ACT | HPBulb 120 x 7 | 6000 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 287.9 | 0.0 0.0 | 0.0 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 41 | 0 5 | 0.04 1.00 | Yes |
| 40 | ACT | HPBulb 120 x 7 | 6500 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |

| | | | | | | | | | | | | | | |
|------------------------------|---------|-------------------|-----|---------------|-------|--------------|------------|------------|--------------|------------|---------------|----------------|--------------|-----|
| BUC SLN | | 1800.0 287.9 | 0.0 | 0.0 0.0 | 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 41 | 0 5 | 0.04 1.00 | Yes |
| 43 | ACT | HPBulb 120 x 7 | | 7000 4800 | 46.24 | 400.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 2.89 | 1598 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 275.6 | 0.0 | 0.0 0.0 | 0.0 | 435 1 | | 4.0 0.0 | 0 | 7 0 | 9 40 | 0 5 | 0.03 1.00 | Yes |
| 44 | ACT | HPBulb 120 x 7 | | 7500 4800 | 46.16 | 350.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 2.53 | 1823 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 244.0 | 0.0 | 0.0 0.0 | 0.0 | 421 1 | | 4.0 0.0 | 0 | 7 0 | 9 38 | 0 4 | 0.03 1.00 | Yes |
| 45 | ACT | HPBulb 120 x 7 | | 8000 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 287.9 | 0.0 | 0.0 0.0 | 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 42 | -1 5 | 0.04 1.00 | Yes |
| 46 | ACT | HPBulb 120 x 7 | | 8500 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 287.9 | 0.0 | 0.0 0.0 | 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 42 | -1 5 | 0.04 1.00 | Yes |
| 47 | ACT | HPBulb 120 x 7 | | 9000 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 287.9 | 0.0 | 0.0 0.0 | 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 43 | -1 5 | 0.04 1.00 | Yes |
| 48 | ACT | HPBulb 120 x 7 | | 9500 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 287.9 | 0.0 | 0.0 0.0 | 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 43 | -1 5 | 0.04 1.00 | Yes |
| 49 | ACT | HPBulb 120 x 7 | | 10000 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 287.9 | 0.0 | 0.0 0.0 | 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 43 | -1 5 | 0.04 1.00 | Yes |
| 50 | ACT | HPBulb 120 x 7 | | 10500 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 287.9 | 0.0 | 0.0 0.0 | 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 43 | -1 5 | 0.04 1.00 | Yes |
| 51 | ACT | HPBulb 120 x 7 | | 11000 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 287.9 | 0.0 | 0.0 0.0 | 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 44 | -2 5 | 0.04 1.00 | Yes |
| 52 | ACT | HPBulb 120 x 7 | | 11500 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 287.9 | 0.0 | 0.0 0.0 | 0.0 | 440 1 | | 4.0 0.0 | 0 | 7 0 | 11 44 | -2 5 | 0.04 1.00 | Yes |
| 53 | ACT | HPBulb 120 x 7 | | 12000 4800 | 46.24 | 500.0 5.6 | 355 205 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.62 | 1279 | 6.5 0.0 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 290.3 | 0.0 | 0.0 0.0 | 0.0 | 441 1 | | 4.0 0.0 | 0 | 7 0 | 11 44 | -2 5 | 0.04 1.00 | Yes |
| Deck_8100_8100 at #99 | | | | | | | | | | | | | | |
| 27 | ACT | HPBulb 120 x 7 | | 500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|---------------|-------|--------------|------------|------------|--------------|------------|---------------|----------------|--------------|-----|
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 303.5 | 0.0 | 0.0 0.0 | 0.0 | 453 1 | | 4.0 0.0 | 0 | 66 0 | 95 44 | 0 4 | 0.31 1.00 | Yes |
| 19 | ACT | HPBulb 120 x 7 | | 1000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 44 | 0 4 | 0.31 1.00 | Yes |
| 20 | ACT | HPBulb 120 x 7 | | 1500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 44 | -3 4 | 0.31 1.00 | Yes |
| 24 | ACT | HPBulb 120 x 7 | | 2000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 44 | 1 4 | 0.31 1.00 | Yes |
| 22 | ACT | HPBulb 120 x 7 | | 2500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 44 | 1 4 | 0.31 1.00 | Yes |
| 26 | ACT | HPBulb 120 x 7 | | 3000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 44 | -5 4 | 0.31 1.00 | Yes |
| 27 | ACT | HPBulb 120 x 7 | | 3500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 303.5 | 0.0 | 0.0 0.0 | 0.0 | 453 1 | | 4.0 0.0 | 0 | 66 0 | 95 45 | -6 4 | 0.31 1.00 | Yes |
| 29 | ACT | HPBulb 120 x 7 | | 4500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 303.5 | 0.0 | 0.0 0.0 | 0.0 | 453 1 | | 4.0 0.0 | 0 | 66 0 | 95 48 | -17 4 | 0.32 1.00 | Yes |
| 30 | ACT | HPBulb 120 x 7 | | 5000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 48 | -18 4 | 0.32 1.00 | Yes |
| 31 | ACT | HPBulb 120 x 7 | | 5500 8100 | 46.45 | 400.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1600 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 0.92 | 5040 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 287.0 | 0.0 | 0.0 0.0 | 0.0 | 447 1 | | 4.0 0.0 | 0 | 66 0 | 84 47 | -19 4 | 0.28 1.00 | Yes |
| 32 | ACT | HPBulb 120 x 7 | | 6000 8100 | 46.37 | 350.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1625 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 0.81 | 5750 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 249.8 | 0.0 | 0.0 0.0 | 0.0 | 432 1 | | 4.0 0.0 | 0 | 66 0 | 83 49 | -32 4 | 0.28 1.00 | Yes |
| 33 | ACT | HPBulb 120 x 7 | | 6500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 56 | -32 4 | 0.33 1.00 | Yes |
| 35 | ACT | HPBulb 120 x 7 | | 7000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |

| | | | | | | | | | | | | | | |
|----------------------------|---------|-------------------|-----|---------------|-------|--------------|------------|------------|--------------|------------|---------------|----------------|--------------|-----|
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 56 | -33 4 | 0.33 1.00 | Yes |
| 36 | ACT | HPBulb 120 x 7 | | 7500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 57 | -34 4 | 0.33 1.00 | Yes |
| 37 | ACT | HPBulb 120 x 7 | | 8000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 57 | -35 4 | 0.33 1.00 | Yes |
| 38 | ACT | HPBulb 120 x 7 | | 8500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 58 | -36 4 | 0.33 1.00 | Yes |
| 39 | ACT | HPBulb 120 x 7 | | 9000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 58 | -37 4 | 0.33 1.00 | Yes |
| 40 | ACT | HPBulb 120 x 7 | | 9500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 59 | -37 4 | 0.33 1.00 | Yes |
| 41 | ACT | HPBulb 120 x 7 | | 10000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1425 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 303.5 | 0.0 | 0.0 0.0 | 0.0 | 453 1 | | 4.0 0.0 | 0 | 66 0 | 95 60 | -38 4 | 0.33 1.00 | Yes |
| 43 | ACT | HPBulb 120 x 7 | | 11000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1425 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 303.5 | 0.0 | 0.0 0.0 | 0.0 | 453 1 | | 4.0 0.0 | 0 | 66 0 | 95 62 | -41 4 | 0.33 1.00 | Yes |
| 44 | ACT | HPBulb 120 x 7 | | 11500 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 299.6 | 0.0 | 0.0 0.0 | 0.0 | 452 1 | | 4.0 0.0 | 0 | 66 0 | 96 62 | -42 4 | 0.33 1.00 | Yes |
| 45 | ACT | HPBulb 120 x 7 | | 12000 8100 | 46.45 | 500.0 6.0 | 355 205 | 1.4 1.5 | 119.8 0.0 | 7.0 0.0 | 0.00 1.000 | 0.850 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.15 | 4032 | 6.5 0.0 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| BUC SLN | | 1800.0 303.5 | 0.0 | 0.0 0.0 | 0.0 | 453 1 | | 4.0 0.0 | 0 | 66 0 | 95 63 | -42 4 | 0.33 1.00 | Yes |
| Inner bottom at #99 | | | | | | | | | | | | | | |
| 54 | ACT | HPBulb 140 x 7 | | 0 1400 | 66.81 | 500.0 8.5 | 355 205 | 1.4 1.5 | 140.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.832 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.70 | 1808 | 6.5 0.0 | 0.0 1.3 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 815 3 | | 5.0 0.0 | 0 | 87 0 | 109 46 | 0 4 | 0.36 1.00 | Yes |
| 46 | ACT | HPBulb 140 x 7 | | 500 1400 | 66.81 | 500.0 8.5 | 355 205 | 1.4 1.5 | 140.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.832 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 3.70 | 1808 | 6.5 0.0 | 0.0 1.3 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 | 0.0 0.0 | 0.0 | 815 3 | | 5.0 0.0 | 0 | 87 0 | 106 47 | 0 4 | 0.35 1.00 | Yes |

| | | | | | | | | | | | | | |
|------------|------------|-------------------|---------------|------------|--------------|------------|------------|--------------|------------|---------------|----------------|--------------|-----|
| 48 | ACT | HPBulb 140 x 7 | 1500 1400 | 66.81 | 500.0 8.5 | 355 205 | 1.4 1.5 | 140.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.832 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.70 | 1808 | 6.5 0.0 | 0.0 4.8 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 815 3 | | 5.0 0.0 | 0 | 87 0 | 106 47 | 1 4 | 0.35 1.00 | Yes |
| 49 | ACT | HPBulb 140 x 7 | 2000 1400 | 66.81 | 500.0 8.5 | 355 205 | 1.4 1.5 | 140.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.832 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.70 | 1808 | 6.5 0.0 | 0.0 4.8 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 815 3 | | 5.0 0.0 | 0 | 87 0 | 109 46 | 1 4 | 0.36 1.00 | Yes |
| 50 | ACT | HPBulb 140 x 7 | 2500 1400 | 66.81 | 500.0 8.5 | 355 205 | 1.4 1.5 | 140.0 0.0 | 7.0 0.0 | 0.00 1.000 | 0.832 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.70 | 1808 | 6.5 0.0 | 0.0 4.8 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 815 3 | | 5.0 0.0 | 0 | 87 0 | 106 47 | 1 4 | 0.35 1.00 | Yes |
| 52 | ACT | HPBulb 140 x 7 | 3500 1400 | 74.23 | 500.0 9.0 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1550 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 143 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 | 0 0 | 0 120 | 0 5 | 0.35 1.00 | Yes |
| 53 | ACT | HPBulb 140 x 7 | 4000 1400 | 74.23 | 500.0 9.0 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1550 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 143 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 | 0 0 | 0 120 | 0 5 | 0.35 1.00 | Yes |
| 54 | ACT | HPBulb 140 x 7 | 4500 1400 | 74.23 | 500.0 9.0 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1550 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 143 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 | 0 0 | 0 120 | 0 5 | 0.35 1.00 | Yes |
| 55 | ACT | HPBulb 140 x 7 | 5000 1400 | 74.23 | 500.0 9.0 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1550 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 143 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 | 0 0 | 0 120 | 0 5 | 0.35 1.00 | Yes |
| 56 | ACT | HPBulb 140 x 7 | 5500 1400 | 74.23 | 500.0 9.0 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1425 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 143 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 | 0 0 | 0 120 | 0 5 | 0.35 1.00 | Yes |
| 58 | ACT | HPBulb 140 x 7 | 6500 1400 | 74.23 | 500.0 9.0 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1425 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 143 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 | 0 0 | 0 120 | 0 5 | 0.35 1.00 | Yes |
| 59 | ACT | HPBulb 140 x 7 | 7000 1400 | 74.23 | 500.0 9.0 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1550 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 143 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 | 0 0 | 0 120 | 0 5 | 0.35 1.00 | Yes |
| 60 | ACT | HPBulb 140 x 7 | 7500 1400 | 73.76 | 500.0 8.5 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1550 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 142 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 | 0 0 | 0 120 | 0 5 | 0.35 1.00 | Yes |
| 61 | ACT | HPBulb 140 x 7 | 8000 1400 | 73.76 | 500.0 8.5 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1550 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 142 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 | 0 0 | 0 120 | 0 5 | 0.35 1.00 | Yes |

| | | | | | | | | | | | | | |
|---|------------|--------------------|---------------|------------|--------------|------------|------------|----------------|-------------|---------------|----------------|--------------|-----|
| 62 | ACT | HPBulb 140 x 7 | 8500 1400 | 73.76 | 500.0 8.5 | 355 205 | 0.5 0.5 | 140.3 0.0 | 7.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1550 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 51.78 | 142 | 6.0 0.0 | 2.0 4.8 | 0.000 | 0.000 | -132.2 | -132.2 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 902 3 | | 4.5 0.0 | -132 0 | 0 120 | 0 5 | 0 1.00 | 0.35 1.00 | Yes |
| 64 | ACT | HPBulb 160 x 11 | 9500 1400 | 119.98 | 500.0 8.5 | 355 205 | 1.5 1.5 | 160.0 0.0 | 11.0 0.0 | 0.00 1.000 | 0.831 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.70 | 3244 | 6.5 0.0 | 0.0 1.3 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 1539 3 | | 5.5 0.0 | 0 87 0 | 87 34 | 100 3 | -30 3 | 0.32 1.00 | Yes |
| 65 | ACT | HPBulb 160 x 11 | 10000 1400 | 119.98 | 500.0 8.5 | 355 205 | 1.5 1.5 | 160.0 0.0 | 11.0 0.0 | 0.00 1.000 | 0.831 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.70 | 3244 | 6.5 0.0 | 0.0 1.3 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 1539 3 | | 5.5 0.0 | 0 87 0 | 87 34 | 101 3 | -31 3 | 0.32 1.00 | Yes |
| 66 | ACT | HPBulb 160 x 11 | 10500 1400 | 119.98 | 500.0 8.5 | 355 205 | 1.5 1.5 | 160.0 0.0 | 11.0 0.0 | 0.00 1.000 | 0.831 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.70 | 3244 | 6.5 0.0 | 0.0 1.3 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 1539 3 | | 5.5 0.0 | 0 87 0 | 87 35 | 101 3 | -33 3 | 0.32 1.00 | Yes |
| 67 | ACT | HPBulb 160 x 11 | 11000 1400 | 119.98 | 500.0 8.5 | 355 205 | 1.5 1.5 | 160.0 0.0 | 11.0 0.0 | 0.00 1.000 | 0.831 0.750 | 1800 1550 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.70 | 3244 | 6.5 0.0 | 0.0 1.3 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 1539 3 | | 5.5 0.0 | 0 87 0 | 87 35 | 101 3 | -34 3 | 0.32 1.00 | Yes |
| 68 | ACT | HPBulb 160 x 11 | 11500 1400 | 119.98 | 441.6 8.5 | 355 205 | 1.5 1.5 | 160.0 0.0 | 11.0 0.0 | 0.00 1.000 | 0.831 0.750 | 1800 1579 | |
| | LOC MIN | UDL-2, Static | UDL-2, Static | | 3.27 | 3672 | 6.5 0.0 | 0.0 1.3 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| BUC SLN | | 1800.0 342.3 | 0.0 0.0 | 0.0 0.0 | 1515 2 | | 5.5 0.0 | 0 87 0 | 87 35 | 94 3 | -35 3 | 0.30 1.00 | Yes |
| LongPlaneBulkhead9000_9000 Split1 at #99 | | | | | | | | | | | | | |
| 0 | ACT | HPBulb 160 x 8 | 9000 530 | 107.11 | 446.1 8.0 | 355 205 | 0.5 0.5 | 160.3 0.0 | 8.0 0.0 | 0.00 1.000 | 0.000 0.950 | 1800 1577 | |
| | LOC MIN | Sea chest, - | TK-2, Static | | 99.89 | 107 | 6.0 0.0 | 2.0 5.7 | 7.200 | 0.000 | 200.0 | -140.9 | Yes |
| BUC SLN | | 1800.0 344.0 | 0.0 0.0 | 0.0 0.0 | 1372 2 | | 5.0 0.0 | -9 107 0 | 107 33 | 123 4 | -3 4 | 0.39 1.00 | Yes |
| 1 | ACT | HPBulb 160 x 8 | 9000 1100 | 107.11 | 435.0 8.0 | 355 205 | 0.5 0.5 | 160.3 0.0 | 8.0 0.0 | 0.00 1.000 | 0.000 0.950 | 1800 1582 | |
| | LOC MIN | Sea chest, - | TK-2, Static | | 97.42 | 110 | 6.0 0.0 | 2.0 5.7 | 7.200 | 0.000 | 200.0 | -135.2 | Yes |
| BUC SLN | | 1800.0 339.7 | 0.0 0.0 | 0.0 0.0 | 1368 2 | | 5.0 0.0 | -3 94 0 | 94 30 | 108 4 | 1 4 | 0.34 1.00 | Yes |
| LongPlaneBulkhead3000_3000 Split1 at #99 | | | | | | | | | | | | | |
| 0 | ACT | HPBulb 120 x 9 | 3000 450 | 56.16 | 500.0 8.0 | 355 205 | 1.5 1.5 | 119.8 0.0 | 9.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1550 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 55.52 | 101 | 7.0 0.0 | 3.0 6.0 | 0.000 | 0.000 | 141.7 | 141.7 | Yes |
| BUC SLN | | 1800.0 363.0 | 0.0 0.0 | 0.0 0.0 | 583 2 | | 4.0 0.0 | 0 109 0 | 109 59 | 132 3 | 0 3 | 0.45 1.00 | Yes |
| 1 | ACT | HPBulb 120 x 9 | 3000 1050 | 56.16 | 475.0 8.0 | 355 205 | 1.5 1.5 | 119.8 0.0 | 9.0 0.0 | 0.00 1.000 | 1.000 0.950 | 1800 1563 | |
| | LOC MIN | TK-2, Static | TK-2, Static | | 50.50 | 111 | 7.0 0.0 | 2.5 6.0 | 0.000 | 0.000 | 135.7 | 135.7 | Yes |
| BUC SLN | | 1800.0 354.7 | 0.0 0.0 | 0.0 0.0 | 580 2 | | 4.0 0.0 | 0 95 0 | 95 57 | 113 2 | -2 2 | 0.38 1.00 | Yes |
| Girder6000 at #99 | | | | | | | | | | | | | |
| 0 | ACT | HPBulb 100 x 6 | 6000 470 | 34.38 | 485.5 8.5 | 355 205 | 0.5 0.5 | 100.0 0.0 | 6.0 0.0 | 0.00 1.000 | 0.807 0.750 | 1800 1557 | |
| | LOC MIN | INT-1, Static | INT-1, Static | | 5.65 | 608 | 5.5 0.0 | 0.5 2.0 | 7.200 | 7.200 | 12.0 | 12.0 | Yes |
| BUC SLN | | 1800.0 358.3 | 0.0 0.0 | 0.0 0.0 | 316 2 | | 3.0 0.0 | 0 109 0 | 109 98 | 135 2 | 0 2 | 0.53 1.00 | Yes |
| 1 | ACT | HPBulb 100 x 6 | 6000 1100 | 34.38 | 465.0 8.5 | 355 205 | 0.5 0.5 | 100.0 0.0 | 6.0 0.0 | 0.00 1.000 | 0.827 0.750 | 1800 1568 | |

| | | | | | | | | | | | | | | |
|---------|---------|-----------------|-----|---------------|-----|----------|-----|------------|------------|---------|-----------|--------|--------------|-----|
| | LOC MIN | INT-1, Static | | INT-1, Static | | 5.29 | 650 | 5.5 0.0 | 0.5 2.0 | 7.200 | 7.200 | 12.0 | 12.0 | Yes |
| BUC SLN | | 1800.0 351.1 | 0.0 | 0.0 0.0 | 0.0 | 315 2 | | 3.0 0.0 | 0 | 94 0 | 118 93 | 1 2 | 0.45 1.00 | Yes |

General Panel 2 at #99

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 27 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 236.5 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 120 0 | 159 77 | -4 0 | 0.57 1.00 | Yes |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 28 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 242.7 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 108 0 | 167 75 | -5 0 | 0.60 1.00 | Yes |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 22 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 242.7 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 97 0 | 149 75 | 1 0 | 0.53 1.00 | Yes |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 29 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 242.7 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 86 0 | 132 75 | 1 0 | 0.47 1.00 | Yes |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 30 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 239.5 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 75 0 | 103 77 | 2 0 | 0.37 1.00 | Yes |

General Panel 3 at #99

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 20 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 236.5 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 120 0 | 159 77 | -6 0 | 0.57 1.00 | Yes |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 21 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 242.7 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 108 0 | 167 75 | -7 0 | 0.60 1.00 | Yes |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 19 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 242.7 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 97 0 | 149 75 | 2 0 | 0.53 1.00 | Yes |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 18 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 242.7 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 86 0 | 132 75 | 2 0 | 0.47 1.00 | Yes |

| | | | | | | | | | | | | | | |
|---------|---------|-------------------|-----|------------|------|---------|---|------------|-------------|------------|---------------|----------------|--------------|-----|
| 27 | ACT | Flatbar 60 x 8 | | 0 | 0.00 | 0.0 | 0 | 0.5 0.5 | 60.0 0.0 | 8.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| BUC SLN | | 600.0 239.5 | 0.0 | 0.0 0.0 | 0.0 | 51 1 | | 4.0 0.0 | 0 | 75 0 | 103 77 | 2 0 | 0.37 1.00 | Yes |

General Panel 4 at #99

| | | | | | | | | | | | | | | |
|---|---------|-------------------|--|---|------|------|---|------------|--------------|------------|---------------|----------------|-----|-----|
| 2 | ACT | HPBulb 120 x 7 | | 0 | 0.00 | 0.0 | 0 | 1.4 1.5 | 120.0 0.0 | 7.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0 | |
| | LOC MIN | | | | | 0.00 | 0 | 6.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |

| | | | | | | | | | | | | | | |
|-----|-----|---------|-----|-----|------|------|---|-----|-------|-------|-------|-------|------|-----|
| BUC | | 1800.0 | 0.0 | 0.0 | 0.0 | 520 | | 4.0 | 0 | 110 | 134 | 0 | 0.47 | Yes |
| SLN | | 363.0 | | 0.0 | | 3 | | 0.0 | | 0 | 68 | 3 | 1.00 | |
| 0 | ACT | HPBulb | | 0 | 0.00 | 0.0 | 0 | 1.4 | 120.0 | 7.0 | 0.00 | 0.000 | 0 | |
| | | 120 x 7 | | 0 | | 8.5 | 0 | 1.5 | 0.0 | 0.0 | 0.000 | 0.000 | 0 | |
| | LOC | | | | | 0.00 | 0 | 6.5 | 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yea |
| | MIN | | | | | | | 0.0 | 0.0 | | | | | |
| BUC | | 1800.0 | 0.0 | 0.0 | 0.0 | 520 | | 4.0 | 0 | 96 | 117 | 0 | 0.41 | Yes |
| SLN | | 363.0 | | 0.0 | | 3 | | 0.0 | | 0 | 68 | 3 | 1.00 | |

3.6.4. Provjera poprečnih nosača

| | |
|------------------|---|
| Stiff. No | Identifikacija uzdužnjaka |
| ACT | Stvarne dimenzije uzdužnjaka |
| Type | Tip profila |
| Dimension | Dimenzije profila |
| y | Y koordinata [mm] |
| z | Z koordinata [mm] |
| Spacing | Razmak između uzdužnjaka [mm] |
| t_{pl_net} | Stvarna ebljina struka [mm] |
| R_{eH} | Granica razvlačenja [N/mm^2] |
| τ_{eH} | $R_{eH} / (3)^{0.5}$ [N/mm^2] |
| t_{cf} | Korozijski dodatak za flanžu [mm] |
| t_{cw} | Korozijski dodatak za struk [mm] |
| h_w | Visina struka [mm] |
| b_f | Širina flanže [mm] |
| t_w | Debljina struka [mm] |
| t_f | Debljina flanže [mm] |
| X | Koeficijent |
| C_m | Koeficijent za kombinaciju aksijalnih, savijajućih i smičnih naprezanja |
| C_s | Dopušteni koeficijent savijanja |
| C_t | Dopušteni koeficijent smicanja |
| l_{bdg} | Efektivni raspon savijanja [mm] |
| l_{shr} | Efektivni raspon smicanja [mm] |
| LOC/MIN | Minimalni zahtjevi za lokalna opterećenja |
| Load ref. | Referenca opterećenja po Z os for Z |
| Load ref. | Referenca opterećenja za debljinu struka for t_w |
| Z_{req} | Minimalni otpor presjeka [cm^3] |
| $Z_{Rel. req}$ | Z Stvarni / zahtjev [%] |
| $t_{w min}$ | Minimalna debljina struka [mm] |
| $t_{f min}$ | Minimalna debljina flanže [mm] |
| $t_{w shear}$ | Minimalna debljina struka (uvijanje) [mm] |
| $t_{pl min net}$ | Zahtjevanja debljina opločenja [mm] |

| | |
|----------------------------------|---|
| draught _Z | Gaz za Z_{net} |
| draught _{t_w} | Gaz za $t_{w\ shear}$ |
| p_Z / F_{sc} | Projektni tlak za Z_{net} [kN/m ²] ili čelična vitla, i.e. BC-9 or BC-10 [kN] |
| p_{t_w} | Projektni tlak za $t_{w\ shear}$ [kN/m ²] |
| OK? | Jesu li zahtjevi ispunjeni |
| BUC/SLN | Zahtjevi za uvijanje i odnos dimenzija |
| Span | Raspon [mm] |
| b_{eff} | Efektivna širina opločenja [mm] |
| $b_{f\ sl}$ | Minimalna debljina flanže (vitkost) [mm] |
| I_{buc} | Stvarni moment inercije prema Ch8, Sec5, 2.3.5. [cm ⁴] |
| I_{req} | Zahtjevani moment inercije prema Ch8, Sec5, 2.3.5. [cm ⁴] |
| I_{slend} | Actual net moment of inertia including plate flange with effective width = $0.8*s$ [cm ⁴] |
| $t_{w\ min\ sl}$ | Minimalna debljina struka (vitkost) [mm] |
| $t_{f\ min\ sl}$ | Minimalna debljina flanže (vitkost) [mm] |
| p_{lat} | Bočni pritisak [kN/m ²] |
| σ_x | Napreznje u smjeru X-osi [N/mm ²] |
| σ_y | Nprezanje u smjeru Y-osi [N/mm ²] |
| σ_a | Aksijalno naprezanje [N/mm ²] |
| σ_b | Savojno naprezanje [N/mm ²] |
| τ | Smično napezanje [N/mm ²] |
| σ_w | Naprezanje zbog uvijanja [N/mm ²] |
| η_{actual} | Eta stvarno |
| η_{allow} | Eta dopušteno |
| FAT | Rezultati zamora |
| ConnType | Vrsta spoja |

| Stiff. No | ACT | Type Dimension | | y z [mm] | Z _{net} [cm ³] | Spacing t _{pl,net} [mm] | R _{eH} τ _{eff} [N/mm ²] | t _{cw} t _{cf} [mm] | h _{w,net} d _r [mm] | t _w t _r [mm] | X C _m | C _s C _t | l _{bdg} l _{shr} [mm] | OK? | |
|-----------|-----|----------------|----------------------------------|---|--|--|--|--|--|--|--|---|--|-----|--|
| | | LOC MIN | Load ref. for Z | | Load ref. for t _w | | Z _{req} [cm ³] | Z _{Rel,req} [%] | t _{w,min} t _{r,min} [mm] | t _{w,shear} t _{pl,min,net} [mm] | draught _Z [m] | draught _{t_w} [m] | p _Z [kN/m ²] | | p _{t_w} [kN/m ²] |
| | | BUC SLN | Span b _{eff} [mm] | Est. Z _{req} [cm ³] | Est. h _{w,req} Est. t _{r,req} [mm] | b _{r,st} [mm] | I _{buc} I _{r,req} [cm ⁴] | t _{w,min,st} t _{r,min,st} [mm] | Plat [kN/m ²] | σ _x σ _y [N/mm ²] | σ _a σ _b [N/mm ²] | τ σ _w [N/mm ²] | η _{actual} η _{allow} | | |

Frame #99 (64510 mm from A.P.)

Outer shell at #99

| | | | | | | | | | | | | | | |
|---|------------|---|-----|------------------------------|--------|---------------|------------|------------|----------------|------------|---------------|----------------|------------------|-----|
| 0 | ACT | Built up T from plates 208 x 100 x 8 x 8 | | 12494 3032 | 209.64 | 600.0 8.5 | 355 205 | 1.5 1.5 | 201.5 100.0 | 8.0 8.0 | 0.00 1.000 | 0.850 0.750 | 3465.2 3165.2 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 7.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 1.5 | 0 0 | 4.0 6.0 | 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0.00 0.00 | Yes |
| 0 | ACT | Built up T from plates 339 x 100 x 9 x 9 | | 12500 4900 | 272.05 | 600.0 8.5 | 355 205 | 1.5 1.5 | 331.5 100.0 | 9.0 9.0 | 0.00 1.000 | 0.850 0.750 | 200.0 0.0 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 7.0 7.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 66.0 | 0 0 | 7.0 6.0 | 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0.00 0.00 | Yes |
| 0 | ACT | Built up T from plates 339 x 100 x 9 x 9 | | 12500 5750 | 477.65 | 300.0 14.5 | 355 205 | 1.5 1.5 | 331.5 100.0 | 9.0 9.0 | 0.00 1.000 | 0.850 0.750 | 1500.0 1350.0 | |
| | LOC MIN | SEA-2, Static | | Ice class - web thickness | | 0.00 | 0 | 7.0 7.0 | 9.0 0.0 | 0.000 | 0.000 | 0.0 | 839.5 | Yes |
| | BUC SLN | 1500.0 254.4 | 0.0 | 0.0 0.0 | 66.0 | 11640 8 | 7.0 6.0 | 0 | 0 0 | 0 0 | 0 0 | 0 25 | 0.07 1.00 | Yes |
| 0 | ACT | Built up T from plates 339 x 100 x 9 x 9 | | 12500 10100 | 556.54 | 600.0 14.5 | 355 205 | 0.5 0.5 | 331.0 100.0 | 9.0 9.0 | 0.00 1.000 | 0.850 0.750 | 2400.0 2100.0 | |
| | LOC MIN | SEA-2, Static | | SEA-2, Static | | 0.00 | 0 | 6.0 6.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | Yes |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 66.0 | 0 0 | 6.0 5.0 | 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0.00 0.00 | Yes |

Strength Deck at #99

| | | | | | | | | | | | | | | |
|---|------------|---|-----|---------------|---------|--------------|------------|------------|----------------|--------------|---------------|----------------|------------------|-----|
| 0 | ACT | Built up T from plates 460 x 150 x 10 x 10 | | 2000 11300 | 1094.20 | 600.0 7.0 | 355 205 | 0.5 0.5 | 450.8 150.0 | 10.0 10.0 | 0.00 1.000 | 0.850 0.750 | 4000.0 3700.0 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 9.10 | 12020 | 5.5 5.5 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 90.0 | 0 0 | 8.0 7.5 | 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0.00 0.00 | Yes |
| 0 | ACT | Built up T from plates 460 x 150 x 10 x 10 | | 4900 11300 | 1025.92 | 600.0 7.0 | 355 205 | 0.5 0.5 | 450.8 150.0 | 10.0 10.0 | 0.00 1.000 | 0.850 0.750 | 1800.0 1500.0 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.84 | 55655 | 5.5 5.5 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 90.0 | 0 0 | 8.0 7.5 | 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0.00 0.00 | Yes |
| 0 | ACT | Built up T from plates 460 x 150 x 10 x 10 | | 8150 11300 | 1094.20 | 600.0 7.0 | 355 205 | 0.5 0.5 | 450.8 150.0 | 10.0 10.0 | 0.00 1.000 | 0.850 0.750 | 4700.0 4400.0 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 12.57 | 8706 | 5.5 5.5 | 0.0 0.7 | 0.000 | 0.000 | 3.4 | 3.4 | Yes |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 90.0 | 0 0 | 8.0 7.5 | 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0.00 0.00 | Yes |

Deck_4800_4800 at #99

| | | | | | | | | | | | | | | |
|---|------------|---|-----|---------------|---------|--------------|-------------|------------|----------------|--------------|---------------|----------------|------------------|-----|
| 0 | ACT | Built up T from plates 550 x 150 x 11 x 10 | | 6310 4800 | 1299.64 | 600.0 5.6 | 355 205 | 1.5 1.5 | 541.5 150.0 | 11.0 10.0 | 0.00 1.000 | 0.850 0.750 | 5200.0 1680.0 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 35.16 | 3696 | 6.5 6.5 | 0.0 1.1 | 0.000 | 0.000 | 7.8 | 7.8 | Yes |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 108.0 | 0 0 | 10.5 8.5 | 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0.00 0.00 | Yes |

Deck_8100_8100 at #99

| | | | | | | | | | | | | | | |
|---|------------|---|-----|---------------|---------|--------------|-------------|------------|----------------|--------------|---------------|----------------|------------------|-----|
| 0 | ACT | Built up T from plates 550 x 150 x 11 x 10 | | 2000 8100 | 1311.58 | 600.0 6.0 | 355 205 | 1.5 1.5 | 541.3 150.0 | 11.0 10.0 | 0.00 1.000 | 0.850 0.750 | 4000.0 3700.0 | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 6.63 | 19788 | 6.5 6.5 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 108.0 | 0 0 | 10.5 8.5 | 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0.00 0.00 | Yes |

| Stiff. No | ACT | Type Dimension | | y z [mm] | Z _{net} [cm ³] | Spacing t _{pl,net} [mm] | R _{eH} τ _{eff} [N/mm ²] | t _{cw} t _{cf} [mm] | h _{w,net} d _r [mm] | t _w t _f [mm] | X C _m | C _s C _t | l _{bdg} l _{shr} [mm] | | |
|-----------|------------|---|----------------------------------|---|--|--|---|--|--|--|--|--|--|--|-----|
| | | LOC MIN | Load ref. for Z | | Load ref. for t _w | | Z _{req} [cm ³] | Z _{Rel,req} [%] | t _{w,min} t _{f,min} [mm] | t _{w, shear} t _{pl,min,net} [mm] | draught _Z [m] | draught _{t_w} [m] | p _Z [kN/m ²] | p _{t_w} [kN/m ²] | OK? |
| | | BUC SLN | Span b _{eff} [mm] | Est. Z _{req} [cm ³] | Est. h _{w,req} Est. t _{f,req} [mm] | b _{r,sl} [mm] | I _{buc} I _{req} [cm ⁴] | | t _{w,min,sl} t _{f,min,sl} [mm] | Plat [kN/m ²] | σ _x σ _y [N/mm ²] | σ _a σ _b [N/mm ²] | τ σ _w [N/mm ²] | η _{actual} η _{allow} | OK? |
| 0 | ACT | Built up T from plates 550 x 150 x 11 x 10 | | 4900 8100 | 1221.22 | 600.0 6.0 | 355 205 | 1.5 1.5 | 541.3 150.0 | 11.0 10.0 | 0.00 1.000 | 0.850 0.750 | 1800.0 1500.0 | | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 1.34 | 90988 | 6.5 6.5 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes | |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 108.0 | 0 0 | 10.5 8.5 | 0 | 0 | 0 | 0 | 0 | 0.00 0.00 | Yes | |
| 0 | ACT | Built up T from plates 550 x 150 x 11 x 10 | | 8150 8100 | 1311.58 | 600.0 6.0 | 355 205 | 1.5 1.5 | 541.3 150.0 | 11.0 10.0 | 0.00 1.000 | 0.850 0.750 | 4700.0 4400.0 | | |
| | LOC MIN | UDL-2, Static | | UDL-2, Static | | 9.15 | 14333 | 6.5 6.5 | 0.0 0.6 | 0.000 | 0.000 | 2.5 | 2.5 | Yes | |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 108.0 | 0 0 | 10.5 8.5 | 0 | 0 | 0 | 0 | 0 | 0.00 0.00 | Yes | |

General Panel 2 at #99

| | | | | | | | | | | | | | | |
|---|------------|-------------------|-----|------------|------|------------|------------|------------|--------------|------------|---------------|----------------|--------------|-----|
| 0 | ACT | HPBulb 120 x 7 | | 0 0 | 0.00 | 0.0 6.5 | 0 0 | 0.5 0.5 | 120.0 0.0 | 7.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0.0 0.0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | N/A |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 0.0 | 0 0 | 4.0 0.0 | 0 | 0 | 0 | 0 | 0 | 0.00 0.00 | Yes |

General Panel 3 at #99

| | | | | | | | | | | | | | | |
|---|------------|-------------------|-----|------------|------|------------|------------|------------|--------------|------------|---------------|----------------|--------------|-----|
| 0 | ACT | HPBulb 120 x 7 | | 0 0 | 0.00 | 0.0 6.5 | 0 0 | 0.5 0.5 | 120.0 0.0 | 7.0 0.0 | 0.00 0.000 | 0.000 0.000 | 0.0 0.0 | |
| | LOC MIN | | | | | 0.00 | 0 | 5.5 0.0 | 0.0 0.0 | 0.000 | 0.000 | 0.0 | 0.0 | N/A |
| | BUC SLN | 0.0 0.0 | 0.0 | 0.0 0.0 | 0.0 | 0 0 | 4.0 0.0 | 0 | 0 | 0 | 0 | 0 | 0.00 0.00 | Yes |

3.6.5. Provjera spojeva elemenata strukture

| | |
|-----------------------------------|---|
| ID | Identifikacija poprečnog nosača |
| End/shear conn | Primjenjeni spoj |
| t_c PSM | Korozijski dodatak spoja [mm] |
| t_c web stiff | Korozijski dodatak strka elementa strukture [mm] |
| PSM web angle | Kut spoja primarnog elementa strukture [deg] |
| S1, S2 | Razmak između primarnog strukturnog elementa prema pramcu i krmi od promatrane pozicije [m] |
| R_{eH} | Granica razvlačenja [N/mm ²] |
| σ_w perm, σ_w | Dozvoljno i stvarno naprezanje struka uzdužnjaka dalje od zavara [N/mm ²] |
| σ_{wc} perm, σ_{wc} | Dozvoljno i stvarno naprezanje struka uzdužnjaka dalje pri zavaru [N/mm ²] |
| τ perm, τ_w | Dopušteno i stvarno smično naprezanje zavara [N/mm ²] |
| W | Ukupno opterećenje zavara [kN] |
| W1, W2 | Preneseno opterećenje zavarom, W1, i opterećenje spojem uzdužnjaka, W2 [kN] |
| l_{leg} web stiff | Dužina zavara za struk uzdužnjaka [mm] |
| l_{leg} brkt | Dužina zavara za struk potpornog nosača [mm] |
| l_{leg} direct | Dužina zavara za direktni smični spoj [mm] |
| l_{leg} lug | Dužina zavara za priključak na smični spoj [mm] |
| f_{weld} | Faktor zavara |
| f_c | Okolišni koeficijent |
| l_s | Ukupna dužina smičnog spoja [mm] |
| d_{wc} | Ukupna dužina spoja struka uzdužnjaka i potpornog nosača [mm] |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t_c PSM [mm] | t_c web stiff [mm] | PSM web angle ϕ_w [deg] | S1 [m] | S2 [m] | R_{eH} PSM [N/mm ²] | R_{eH} web stiff [N/mm ²] | OK? |
|--------------|--------------------------|--------------------------------------|---------------------|---------------------------------|-----------------------|---|--------------------|----------------|----------------------|------------------------------|------------|---------------|-----------------------------------|---|-----|
| | | σ_w perm [N/mm ²] | | σ_w [N/mm ²] | | σ_{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l_{leg} web stiff [mm] | | l_{leg} brkt [mm] | | l_{leg} direct [mm] | | l_{leg} lug [mm] | | f_{weld} | f_c | l_s [mm] | d_{wc} [mm] | OK? | | |
| | req | act | req | act | req | act | req | act | | | | | | | |

Frame #99 (64510 mm from A.P.)

Outer shell at #99

| | | | | | | | | | | | | | | | |
|----|-----------|--|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-----|-----|
| 69 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 54 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 65 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.4 | 112.3 | 112.3 | 112.3 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.4 | 112.3 | 112.3 | 112.3 | 0.0 | Yes |
| 66 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.3 | 112.2 | 112.2 | 112.2 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.3 | 112.2 | 112.2 | 112.2 | 0.0 | Yes |
| 67 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.2 | 112.1 | 112.1 | 112.1 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.2 | 112.1 | 112.1 | 112.1 | 0.0 | Yes |
| 68 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.1 | 112.0 | 112.0 | 112.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.1 | 112.0 | 112.0 | 112.0 | 0.0 | Yes |
| 69 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.0 | 111.9 | 111.9 | 111.9 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.0 | 111.9 | 111.9 | 111.9 | 0.0 | Yes |
| 81 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 81 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 81 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{wc} [mm] | | | OK? | |
| | | req | act | req | act | req | act | | | | | | | | req |
| 82 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 93 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 105 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 106 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 55 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 107 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 108 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 115 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| 116 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{we} [mm] | OK? | | | |
| | | req | act | req | act | req | act | | | | | req | act | | |
| 117 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | WELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | Yes |
| 118 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | WELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | Yes |
| 142 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | WELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | Yes |
| 136 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | WELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | Yes |
| 137 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | WELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | Yes |
| 138 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | WELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | Yes |
| 56 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | WELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | Yes |
| 139 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | WELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | Yes |
| 7 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | WELD aft fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | Yes |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{we} [mm] | OK? | | | |
| | | req | act | req | act | req | act | | | | | | req | act | |
| 9 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 57 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 59 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 125.1 | 112.9 | 112.9 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 125.1 | 112.9 | 112.9 | 0.0 | 0.0 | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | Yes | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | | |
| 60 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 125.0 | 112.8 | 112.8 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 125.0 | 112.8 | 112.8 | 0.0 | 0.0 | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | Yes | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | | |
| 61 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.9 | 112.7 | 112.7 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.9 | 112.7 | 112.7 | 0.0 | 0.0 | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | Yes | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | | |
| 62 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.8 | 112.6 | 112.6 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.8 | 112.6 | 112.6 | 0.0 | 0.0 | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | Yes | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | | |
| 63 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.6 | 112.5 | 112.5 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 124.6 | 112.5 | 112.5 | 0.0 | 0.0 | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | Yes | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | | |

Strength Deck at #99

| | | | | | | | | | | | | | | | |
|----------|-----------|--|-----|-----|-----|-----|-----|-----|-------|------|-----|-----|-------|-----|-----|
| 1 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | 0.0 | Yes |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | 0.0 | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{we} [mm] | | | OK? | |
| | | req | act | req | act | req | act | | | | | | | | req |
| 2 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 13 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.7 | 2.0 | 2.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.7 | 2.0 | 2.0 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 14 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 16 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 17 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 18 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 19 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 20 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 21 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{wc} [mm] | | | OK? | |
| | | req | act | req | act | req | act | | | | | | | | req |
| 22 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 24 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 3 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 25 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 26 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 4 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 6 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 7 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 8 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{we} [mm] | OK? | | | |
| | | req | act | req | act | req | act | | | | | | req | act | |
| 10 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 11 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.1 | 2.7 | 2.7 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 12 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 4.2 | 2.2 | 2.2 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 4.2 | 2.2 | 2.2 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |

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| | | | | | | | | | | | | | | | |
|----|-----------|--|-----|-----|-----|-----|-----|-----|-------|------|-----|-----|-------|-----|--|
| 38 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.8 | 4.3 | 4.3 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.8 | 4.3 | 4.3 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 39 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 50 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 51 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 52 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{wc} [mm] | | | OK? | |
| | | req | act | req | act | req | act | | | | | | | | req |
| 53 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| 40 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| 43 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.9 | 5.0 | 5.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.9 | 5.0 | 5.0 | 0.0 | Yes | |
| 44 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.0 | 4.5 | 4.5 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.0 | 4.5 | 4.5 | 0.0 | Yes | |
| 45 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| 46 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| 47 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| 48 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| 49 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 9.5 | 6.1 | 6.1 | 0.0 | Yes | |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{wc} [mm] | | | OK? | |
| | | req | act | req | act | req | act | | | | | | | | req |

Deck_8100_8100 at #99

| | | | | | | | | | | | | | | | |
|----------|-----------|--|-----|-----|-----|-----|-----|-----|-------|------|-----|-----|-------|-----|--|
| 27 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 19 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 32 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 2.2 | 1.4 | 1.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 2.2 | 1.4 | 1.4 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 33 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 35 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 36 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 37 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 38 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{wc} [mm] | | | OK? | |
| | | req | act | req | act | req | act | | | | | | | | req |
| 39 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 40 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 41 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 43 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 20 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 44 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 45 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 22 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 24 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 3.0 | 1.9 | 1.9 | 0.0 | | |
| WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | | |
| fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|----------------------------|---------------------------------|--|------------|-------------------------------------|------------|---|------------|-------------------------|-------------------------------|------------------------------------|----------------------|----------------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{wc} [mm] | OK? | | | |
| | | req | act | req | act | req | act | | | | | | req | act | |
| 26 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 145.5 145.5 | 3.0 3.0 | 1.9 1.9 | 1.9 1.9 | 0.0 0.0 | Yes | |
| | WELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 4.0 4.0 | 6.0 6.0 | 0.0 0.0 | 0.0 0.0 | 0.3 1.0 | 1.0 1.0 | 0.0 0.0 | 0.0 0.0 | | Yes | |
| 27 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 145.5 145.5 | 3.0 3.0 | 1.9 1.9 | 1.9 1.9 | 0.0 0.0 | Yes | |
| | WELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 4.0 4.0 | 6.0 6.0 | 0.0 0.0 | 0.0 0.0 | 0.3 1.0 | 1.0 1.0 | 0.0 0.0 | 0.0 0.0 | | Yes | |
| 29 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 145.5 145.5 | 3.0 3.0 | 1.9 1.9 | 1.9 1.9 | 0.0 0.0 | Yes | |
| | WELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 4.0 4.0 | 6.0 6.0 | 0.0 0.0 | 0.0 0.0 | 0.3 1.0 | 1.0 1.0 | 0.0 0.0 | 0.0 0.0 | | Yes | |
| 30 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 145.5 145.5 | 3.0 3.0 | 1.9 1.9 | 1.9 1.9 | 0.0 0.0 | Yes | |
| | WELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 4.0 4.0 | 6.0 6.0 | 0.0 0.0 | 0.0 0.0 | 0.3 1.0 | 1.0 1.0 | 0.0 0.0 | 0.0 0.0 | | Yes | |
| 31 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 145.5 145.5 | 2.5 2.5 | 1.6 1.6 | 1.6 1.6 | 0.0 0.0 | Yes | |
| | WELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 4.0 4.0 | 6.0 6.0 | 0.0 0.0 | 0.0 0.0 | 0.3 1.0 | 1.0 1.0 | 0.0 0.0 | 0.0 0.0 | | Yes | |
| Inner bottom at #99 | | | | | | | | | | | | | | | |
| 54 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 145.5 145.5 | 7.5 7.5 | 6.1 6.1 | 6.1 6.1 | 0.0 0.0 | Yes | |
| | WELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 4.0 4.0 | 6.0 6.0 | 0.0 0.0 | 0.0 0.0 | 0.3 1.0 | 1.0 1.0 | 0.0 0.0 | 0.0 0.0 | | Yes | |
| 46 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 145.5 145.5 | 7.5 7.5 | 6.1 6.1 | 6.1 6.1 | 0.0 0.0 | Yes | |
| | WELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 4.0 4.0 | 6.0 6.0 | 0.0 0.0 | 0.0 0.0 | 0.3 1.0 | 1.0 1.0 | 0.0 0.0 | 0.0 0.0 | | Yes | |
| 58 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 184.5 184.5 | 113.5 113.5 | 102.4 102.4 | 102.4 102.4 | 0.0 0.0 | Yes | |
| | WELD aft fwd | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 5.5 5.5 | 6.0 6.0 | 0.0 0.0 | 0.0 0.0 | 0.3 1.0 | 1.0 1.0 | 95.0 95.0 | 0.0 0.0 | | Yes | |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{we} [mm] | | | OK? | |
| | | req | act | req | act | req | act | | | | | | | | req |
| 59 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | | |
| 60 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | | |
| 61 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | | |
| 62 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | | |
| 64 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.2 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.2 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 65 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.2 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.2 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 66 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.2 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.2 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 67 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.2 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 6.2 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |
| 68 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.6 | 5.5 | 5.5 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 5.6 | 5.5 | 5.5 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | | |

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _c PSM [mm] | t _c web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | OK? |
|--------------|---------------------------------|--|-----|-------------------------------------|-----|---|-----|-------------------------|-------------------------------|------------------------------------|----------------------|--------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{wc} [mm] | OK? | | | |
| | | req | act | req | act | req | act | | | | | | req | act | |
| 48 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.5 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | |
| 49 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.5 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | |
| 50 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 1.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.5 | 6.1 | 6.1 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 7.5 | 6.1 | 6.1 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | |
| 52 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | |
| 53 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | |
| 54 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | |
| 55 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | |
| 56 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 184.5 | 113.5 | 102.4 | 102.4 | 0.0 | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | Yes | |
| | fwd | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 95.0 | 0.0 | | |

Girder6000 at #99

| ID | ACT aft fwd | End conn Shear conn | | | | | | t _e PSM [mm] | t _e web stiff [mm] | PSM web angle φ _w [deg] | S1 [m] | S2 [m] | R _{eH} PSM [N/mm ²] | R _{eH} web stiff [N/mm ²] | |
|--------------|---------------------------------|--|----------------------------|-------------------------------------|------------------------------|---|---------------------------|-------------------------|-------------------------------|------------------------------------|---------------------|----------------------|--|--|-----|
| | | σ _w perm [N/mm ²] | | σ _w [N/mm ²] | | σ _{wc} perm [N/mm ²] | | | | | | | | | |
| WELD aft fwd | l _{leg} web stiff [mm] | | l _{leg} brkt [mm] | | l _{leg} direct [mm] | | l _{leg} lug [mm] | | f _{weld} | f _c | l _s [mm] | d _{we} [mm] | | | OK? |
| | req | act | req | act | req | act | req | act | | | | | | | |
| 0 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (3) EC3 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 235.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 17.4 | 9.1 | 9.1 | 0.0 | Yes | |
| | fwd | 195.1 | 0.0 | 0.0 | 136.3 | 0.0 | 0.0 | 0.0 | 145.5 | NaN | 9.1 | NaN | NaN | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | |
| | fwd | 3.5 | 6.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | |
| 1 | ACT aft | (31) EC31 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 0.0 | |
| | fwd | (3) EC3 (Da) Direct without lug asym, t=10 | | | | | | 0.5 | 0.0 | 90.0 | 1.8 | 1.8 | 355.0 | 235.0 | |
| | YIELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.5 | 16.7 | 8.7 | 8.7 | 0.0 | Yes | |
| | fwd | 195.1 | 0.0 | 0.0 | 136.3 | 0.0 | 0.0 | 0.0 | 145.5 | NaN | 8.7 | NaN | NaN | | |
| | WELD aft | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | Yes | |
| | fwd | 3.5 | 6.0 | 0.0 | 0.0 | 4.0 | 6.0 | 0.0 | 0.0 | 0.3 | 1.0 | 0.0 | 0.0 | | |

4. ZAKLJUČAK

U ovome radu dan je pregled relevantnih pravila za dimenzioniranje brodske konstrukcije izložene opterećenju od leda. Osnovna ideja ovog rada jest zadovoljavanje uvjeta lokalne i globalne čvrstoće uz maksimalnu moguću uštedu na materijalu, a cilj rada jest izrada nacrtu glavnog rebra broda. Proveden je postupak dimenzioniranja glavnog rebra istraživačkog broda koristeći softver Nauticus Hull primjenom pravila klasifikacijske kuće Det Norske Veritas (DNV). Kroz detaljnu analizu i primjenu pravila, dobivene su optimalne dimenzije glavnog rebra koje zadovoljavaju sve propisane sigurnosne i tehničke zahtjeve. Proračunom odabranog modela na kriterij uzdužne čvrstoće je ispunjen prema pravilima DNV-a i klasnoj notaciji ICE-1C. Rezultati ovog rada pokazuju da je računalni softver Nauticus Hull prikladan alat za precizno i efikasno dimenzioniranje brodskih konstrukcija koji omogućuje zadovoljavanje visokih standarda sigurnosti. Korištenjem DNV pravila osigurana je visoka pouzdanost rezultata što je ključno za projektiranje istraživačkih brodova koji često djeluju u zahtjevnim uvjetima. Projektiranje provedeno u ovom radu može poslužiti kao osnova za daljnji razvoj i unaprjeđenje metoda dimenzioniranja brodskih struktura, posebno u kontekstu integracije novih materijala i tehnologija.

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POPIS SIMBOLA

| <i>Oznaka</i> | <i>Mjerna jedinica</i> | <i>Opis</i> |
|----------------|------------------------|---|
| B | [m] | Projektna širina |
| C_B | | Blok koeficijent |
| C_W | | Koeficijent vala |
| D | [m] | Projektna dubina |
| D_{LL} | [m] | Projektna dubina nadvođa |
| f_m | | Faktor materijala |
| f_{nl-vh} | | Koeficijent nelinearnih efekata u progibu |
| f_{nl-vs} | | Koeficijent nelinearnih efekata u pregibu |
| f_p | | Faktor opterećenja |
| f_R | | Faktor povezan s operativnim profilom |
| f_r | | Faktor odbitka vezan uz ograničenja službe |
| f_{q-neg} | | Distribucijski faktor po duljini broda za pozitivne smične sile |
| f_{q-pos} | | Distribucijski faktor po duljini broda za negativne smične sile |
| f_{qs} | | Distribucijski faktor po duljini broda =0,8 |
| f_{sw} | | Distribucijski faktor po duljini broda= 1,0 |
| h | [m] | Projektna debljina leda |
| h_0 | [m] | Maksimalna debljina leda |
| I_y | [m ⁴] | Vertikalni moment inercije |
| I_{y-gr} | [m ⁴] | Ukupni moment inercije oko neutralne linije |
| I_{yR-gr} | [m ⁴] | Moment inercije trupa brodo oko horizontalne osi |
| I_z | [m ⁴] | Horizontalni moment inercije |
| k | | Koeficijent materijala |
| L | [m] | Duljina prema pravilima |
| L_{LL} | [m] | Duljina nadvođa |
| L_{pp} | [m] | Duljina između perpendikulara |
| M_{sv} | [kNm] | Dopušteni vertikalni moment savijanja na mirnoj vodi |
| $M_{sw-h-min}$ | [kNm] | Minimalni moment savijanja na mirnoj vodi u progibu |
| $M_{sw-s-min}$ | [kNm] | Minimalni moment savijanja na mirnoj vodi u pregibu |
| M_{wh} | [kNm] | Moment savijanja horizontalnog vala |
| M_{wv} | [kNm] | Vertikalni moment savijanja na valu |
| M_{wv-h} | [kNm] | Vertikalni moment savijanja na valu u progibu |

| | | |
|------------------|----------------------|---|
| M_{wv-s} | [kNm] | Vertikalni moment savijanja na valu u pregibu |
| $M_{wv-h-mid}$ | [kNm] | Moment savijanja uslijed horizontalnog vala za procjenu čvrstoće na paralelnom srednjaku u uvjetima progiba |
| $M_{wv-s-mid}$ | [kNm] | Moment savijanja uslijed horizontalnog vala za procjenu čvrstoće na paralelnom srednjaku u uvjetima progiba |
| $Q_{sw-neg-min}$ | [kN] | Minimalna negativna smična sila na mirnoj vodi |
| $Q_{sw-pos-min}$ | [kN] | Minimalna pozitivna smična sila na mirnoj vodi |
| Q_{wv-neg} | [kN] | Negativne sile smicanja vertikalnog vala |
| Q_{wv-pos} | [kN] | Pozitivne sile smicanja vertikalnog vala |
| T | [m] | Projektni gaz broda |
| V | [čv] | Maksimalna radna brzina broda |
| V_D | [m] | Udaljenost do palube po z-osi |
| x | [m] | Pozicija krmenog kraja vodne linije za duljinu nadgrađa |
| Z_{B-gr} | [m ³] | Moment otpora broda na dnu |
| Z_D | [m] | Z koordinata visine palube čvrstoće |
| Z_{D-gr} | [m ³] | Moment otpora broda na palubi |
| Z_n | [m] | Visina neutralne linije |
| Z_{n-gr} | [m] | Z koordinata na neutralnoj liniji poprečnog presjeka |
| Z_{R-gr} | [m ³] | Ukupni minimalni moment otpora presjeka paralelnog srednjaka |
| σ_{perm} | [N/mm ²] | Dopušteno naprezanje |

SAŽETAK

U ovome radu projektirano je glavno rebro istraživačkog broda za plovidbu na područjima mora koja su prekrivena (ili sadrže led) ledom do debljine 0.4 m. Promatratne su značajke istraživačkog broda te je analiziran referentni model elemenata strukture glavnog rebra istraživačkog broda proračunatog prema pravilima DNV-a („Det Norske Veritas“). Za potrebe proračuna uzeti su osnovni podatci o brodu koji su dani na kraju završnog rada kao Prilog A. Nakon modeliranja proveden je proračun elemenata strukture trupa istraživačkog broda te je analiziran primjenom programskog alata Nauticus Hull s implementiranim pravilima DNV Rules for Classification of Ships. Na temelju rezultata proračuna dimenzionirano je glavno rebro te je izrađen nacrt poprečnog presjeka paralelnog srednjaka broda uz dodatak nepropusne pregrade. U sklopu rada objašnjen je postupak dimenzioniranja i izrade računalnog modela broda za analizu prema odrađenim proračunima i izrađenome nacrtu.

Ključne riječi: istraživački brod, Det Norske Veritas, projektiranje brodske konstrukcije, analiza strukture, granična čvrstoća, ice class, ICE-1C/E1

SUMMARY

In this paper, the main frame of a research vessel designed for navigation in the Baltic region is designed. With the observation of the characteristics of a research vessel a reference model of the of the main frame structure elements, calculated according to DNV („Det Norske Veritas“) rules, is analyzed. For calculation purposes basic data about the vessel was provided at the end of the final paper as Attachment A. After modeling, a calculation of the structural elements of the research vessel's hull was conducted and it was analyzed using the Nauticus Hull software tool in accordance with the implementation of DNV Rules for Classification of Ships. Based on the calculation results, the main frame was dimensioned, and a drawing of the main section, including a detail of a watertight bulkhead, was created. The paper explains the process of dimensioning and creating the ship's computational model for analysis based on the performed calculations and the created drawing.

Keywords: research vessel, Det Norske Veritas, ship structure design, structural analysis, ultimate strength, ice class, ICE-1C/E1

PRILOG A

OPĆI PODATCI O BRODU:

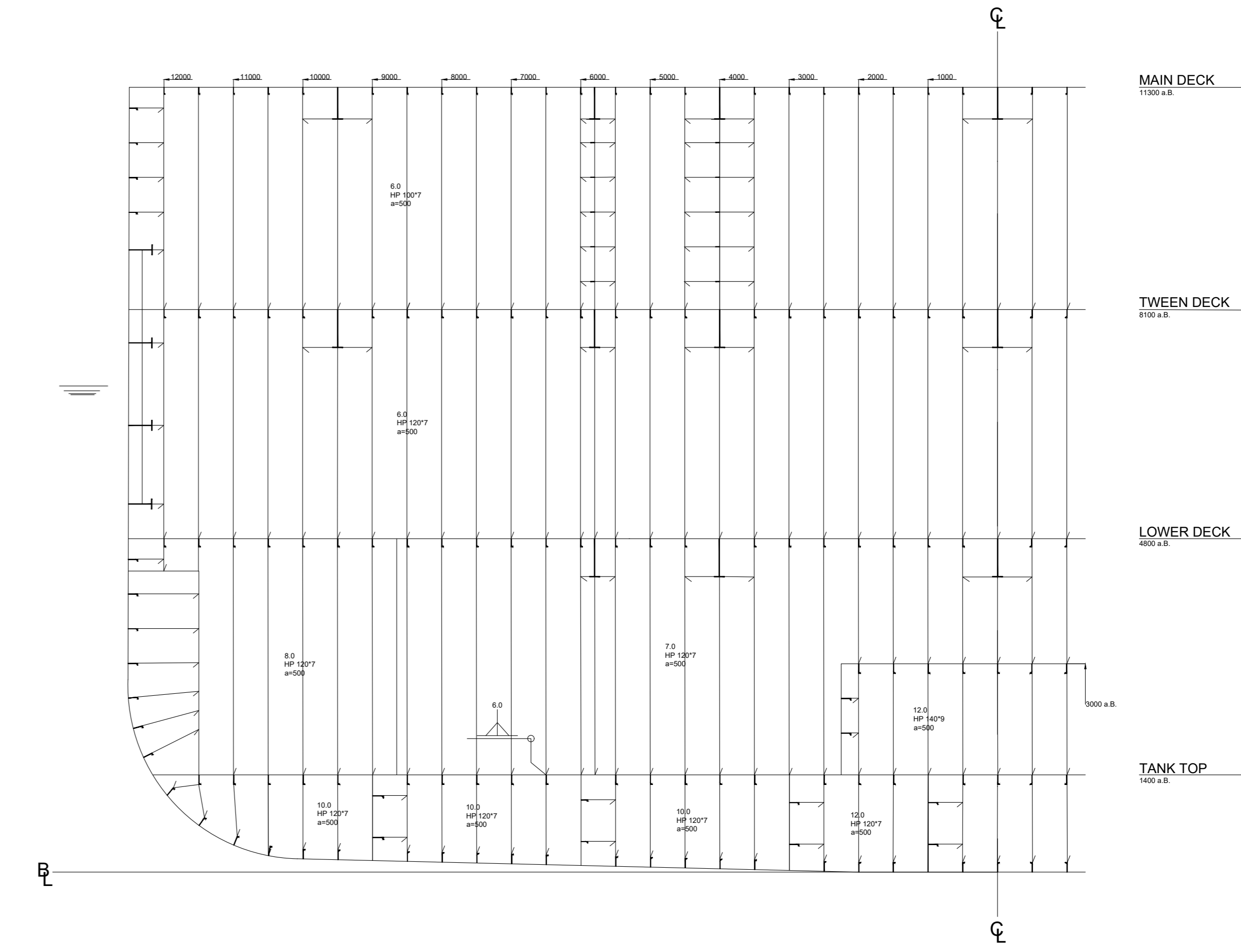
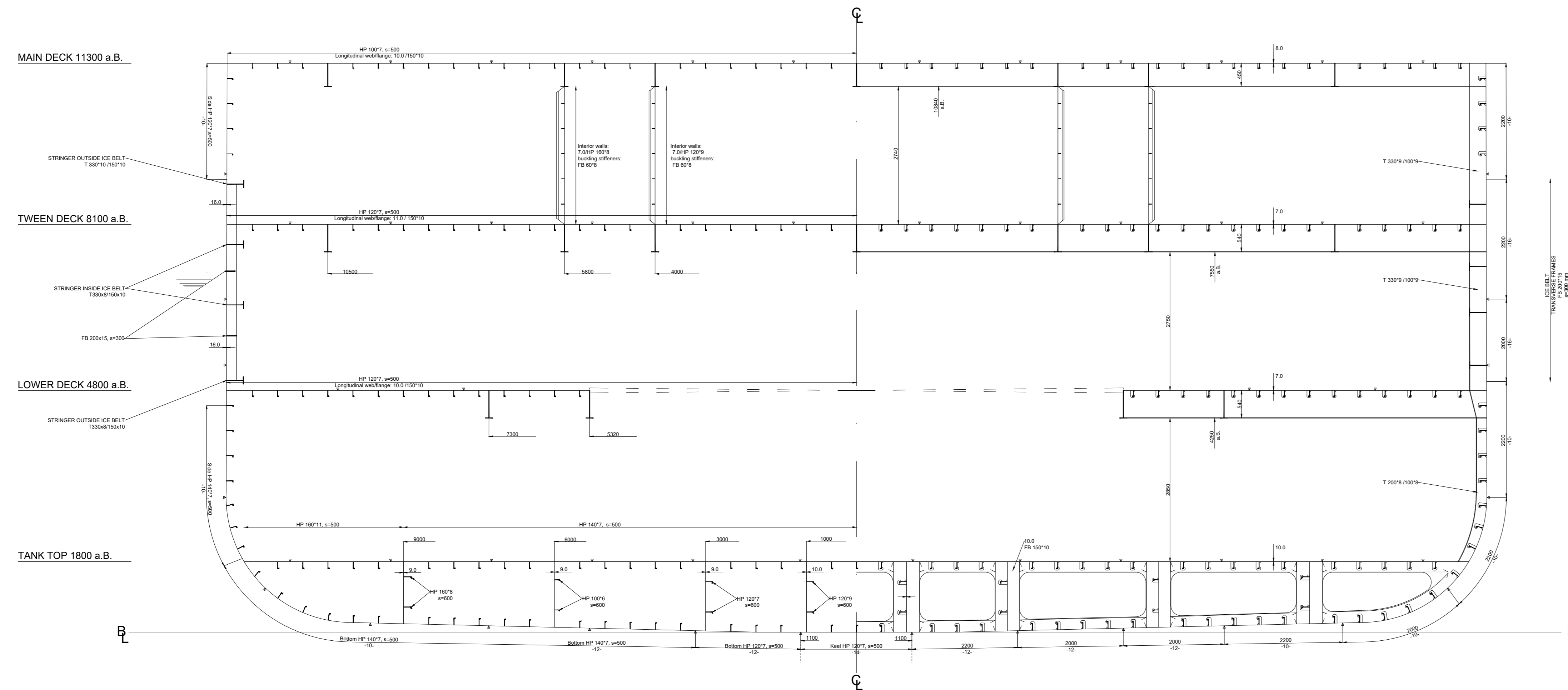
| | | |
|--|----------|---------|
| Duljina između perpendikulara, L_{PP} | [m]: | 123.695 |
| Duljina prema pravilima, L | [m]: | 119.984 |
| Duljina nadvođa, L_{LL} | [m]: | 123.754 |
| X-pozicija za krmeni kraj vodene linije za duljinu nadgrađa . | [m]: | 115.000 |
| Projektna širina, B | [m]: | 25.000 |
| Projektna dubina, D | [m]: | 11.300 |
| Projektna dubina nadvođa, D_{LL} | [m]: | 11.300 |
| Konstruktivski gaz, T_{SC} | [m]: | 7.200 |
| Projektni gaz, T_{Design} | [m]: | 7.200 |
| Minimalni balastni gaz T_{BAL} | [m]: | 6.750 |
| Projektni gaz pri udarima vala na pramcu (pri praznim balastnim tankovima), T_{F-e} | [m]: | 7.000 |
| Projektni gaz pri udarima vala na pramcu (pri punim balastnim tankovima), T_{F-f} | [m]: | 7.000 |
| Blok koeficijent, C_B | : | 0.650 |
| Maksimalna radna brzina, V | [knots]: | 15.000 |
| Broj kontinuiranih paluba iznad 0.7D od osnovice | : | 2 |
| Plovilo ima više od ti kontinuirane palube?..... | : | Da |
| Tip nadvođa | : | A |
| Ugrađena bočna kobilica?..... | : | Ne |
| Ship with high speed and/or large flare? | : | Ne |
| Klasifikacijske oznake prema zahtjevu brodoglasnika: | | |
| DNV Diving support vessel Ice(1C) | | |

MAIN SECTION
FRAME SPACING a=600

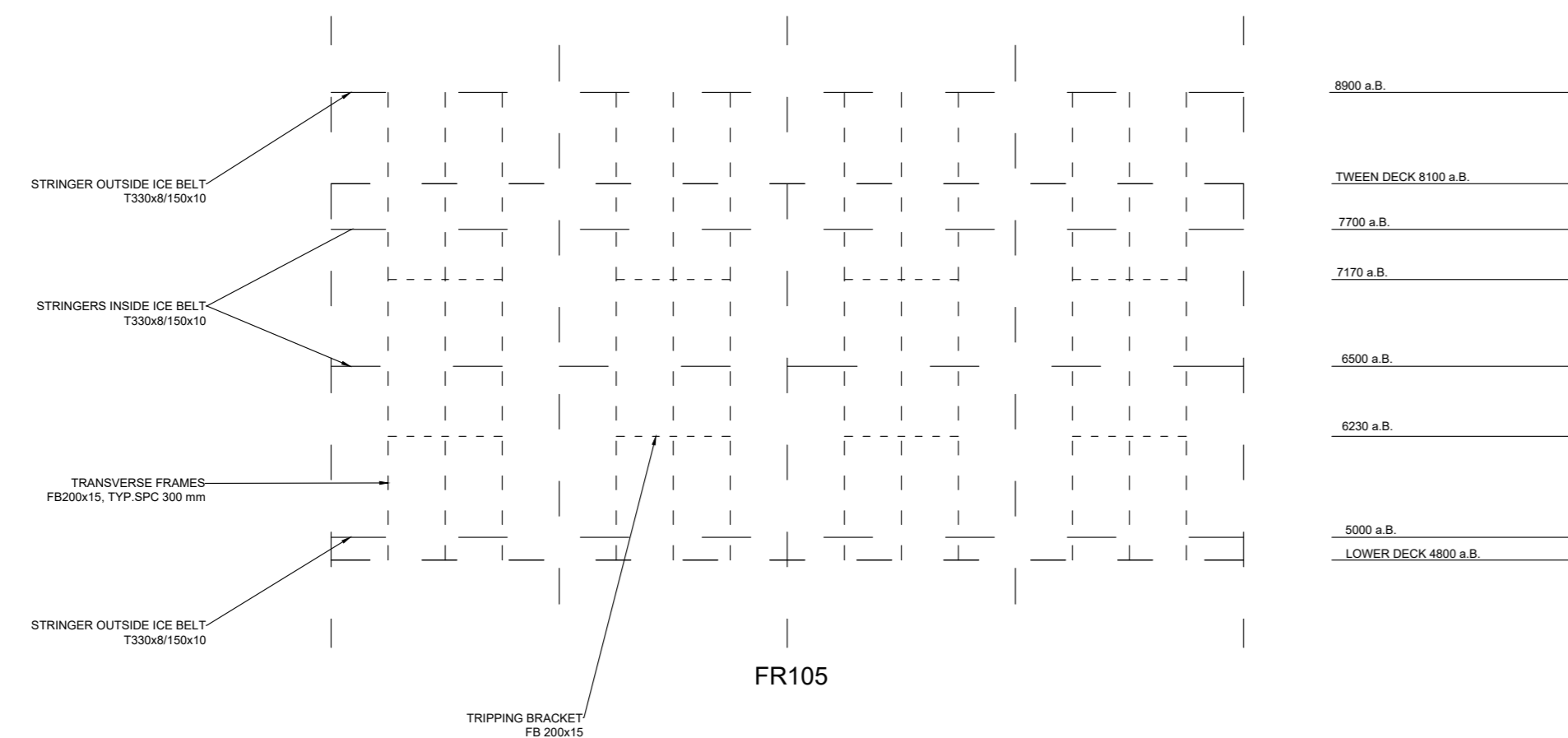
TYPICAL - FRAME #100

WEB FRAME #99
each 1800 mm (3rd frame)

Typ. WT-Bulkhead (Frame 112 shown)

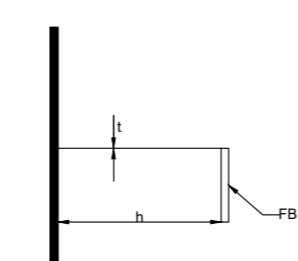


DETAIL OF ICE BELT



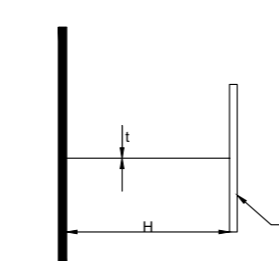
Definition of Stringer-dimensions

Stringer h^t, FB x^y
means:



Definition of Webframe-dimensions

T H^u X^Y
means:



MAIN DIMENSIONS

| | |
|-------------------|-----------|
| LOA | 127.000 m |
| LPP | 117.00 m |
| LWL | 120.00 m |
| RULE LENGTH | 115.00 m |
| BREADTH MOULDED | 25.00 m |
| DEPTH TO MAINDECK | 11.30 m |
| DESIGN DRAUGHT | 7.00 m |
| SCANTLING DRAUGHT | 7.20 m |

| | |
|-------------------------------------|---------|
| DISPLACEMENT (AT DESIGN DRAUGHT) | 1488 t |
| DISPLACEMENT (AT SCANTLING DRAUGHT) | 15425 t |

| | |
|-----------------|----------|
| SCANTLING SPEED | 15 knots |
| CB | 0.65 |

CLASS NOTATION

ICE-1C/E1

| | | | | | | | | |
|--------------------------|-------------|----------------|-------------|-------------|-----------------|-------------|----------|------|
| Datum | 30.07.2024. | Ime i prezime | Maria Šuper | Potpis | Format | A0 | Mjerilo: | 1:50 |
| Nacrtao: | 30.07.2024. | Provjerio: | 30.07.2024. | Maria Šuper | List / listova: | 1 / 1 | | |
| Odobrio: | 10.09.2024. | Albert Zamarin | | | Šk. god.: | 2023./2024. | | |
| Materijal: | | VL-36 | | | Broj crteža: | 1 | | |
| Tehnički fakultet Rijeka | Naziv: | Main Section | | | | | | |