

TASARIM

2014/68/EU Basıncılı Kaplar direktifinin istediği EN 13445 Basıncılı Kaplar standardına göre Vessel Visual Design programı ile tasarım ve analiz yapmaktayız. Bu program sayesinde kullanılacak malzeme cinsi, malzemeye göre et kalınlığı, tank üzerine açılacak deliklerin çap ve adedi, kullanılacak boru, bombe, manşon, flanş, cıvata, ayak gibi parçaların hesaplamaları yapılmakta ve kullanılacak kaynak türleri analiz edilmektedir.

Bombe hesabı

VVD - Visual Vessel Design - [G:\GVN\HOME\ROOT\ARGEORTAK\GVN LIBRARY\DOŞYALAR\AR-GE DOŞYALAR\DIZAYN HESAPLAR\YENİ MÜŞTERİ HESAPLAR\HC AFRICA\OS.C.HC.1308]

File Action View 2D Drawing 3D Drawing Code Tools Setup Help Window

Vessel Tag No. Client :

Add Component/Calculation(35)

- S1 Cylindrical Shell
- S2 Conical Shell
- S3 Spherical Shell
- S4 Rectangular Shell
- P2 Pipe Bends/Elbows
- E1 Hemispherical End
- E2 Ellipsoidal End
- E3 Torispherical End
- E4 Welded Flat End
- E5 Bolted Flat End
- E6 Bolted Domed End
- N Nozzle/Opening
- F Flange
- T Tubesheet
- E9 Expansion Bellows
- TB Tube Bundle
- SR Stiff Ring
- SS Saddle/Ring Support
- SK Skirt Support
- SB Bracket Support
- SL Leg Support
- RS Ring Support
- U User Specified
- G0 Groups of Nozzles/Openings
- LC Nozzle/Loc. Loads on Cyl Sh
- LE Nozzle/Loc. Loads on Ends
- LI Line Loads
- LA Attachment Lug
- LL Lifting Lugs
- LT Lifting Trunnions
- HP Half Pipe Jacket
- BR Block/Sealing Ring
- OR Out of Roundness
- TT Tall Tower Analysis
- FA Fatigue Analysis

Edit Component/Calculation(11)

Copy Component/Calculation(10)

Insert a Shell Element(2)

Export/Copy to Component Library(10)

Move Component/Calculation(11)

Delete Component/Calculation(11)

View Calculation Results(11)

View Report(Updated:18 Apr. 2022 17:55)

Utilization Chart(12)

No.	ID	Err/Wrn	Umxl	Comp. Type	Comp. Description	Component Dimensions	Materials	ConnID	PC#	Date Rev.	Proj.Rev.	Code Ver.	Dry Wght	Volume	Code	BC
1	S1.1	0-0	90.7%	Cylindrical Shell	Shell	De= 168.3, em= 7.1, L= 712	ID 18, EN 10217-3:2002/A1.05, 1.0565 P355NH welded tube, HT-N	1	1	18 Apr. 2022 15:25	A	20.0.04	20.1	0.014	EN13445	0
2	E3.1	0-0	96.3%	Torispherical End	Bottom Head	De= 168.3, wt= 6, hw= 46.41, R= 134.64, r= 25.9182, KORBBGGEN DIN 28013-28014/SMS	ID 11, EN 10028-2:2017, 1.0473 P355GH plate and strip, HT-N	S1.1	1	18 Apr. 2022 15:24	A	20.0.04	2.0	0.001	EN13445	0
3	E5.1	0-0	88.7%	Bolted Flat End	Cover Flange	Do= 223, wt= 23	ID 12, EN 10028-2:2017, 1.0473 P355GH plate and strip, HT-N	F.2	1	14 Jan. 2021 10:25	A	20.0.03	7.0	0.0	EN13445	0
4	N.1	0-0	96.5%	Nozzle/Seamless Pipe	Inlet 1 3/8" ODS	do=47.5, wt=9.1, L=60.9, ho=50	ID 5, EN 10216-2:2013, 1.0425 P265GH seamless tube, HT-N	S1.1	1	18 Apr. 2022 17:32	A	20.0.01	0.5	0.0	EN13445	-8
5	N.2	0-0	96.5%	Nozzle/Seamless Pipe	Outlet 1 3/8" ODS	do=47.5, wt=9.1, L=60.9, ho=50	ID 5, EN 10216-2:2013, 1.0425 P265GH seamless tube, HT-N	S1.1	1	18 Apr. 2022 17:33	A	20.0.01	0.5	0.0	EN13445	-8
6	N.3	0-0	96.6%	Nozzle/Seamless Pipe	1/2" NPT	do=30, wt=7.1, L=58.6, ho=50	ID 2, EN 10216-2:2013, 1.0345 P235GH seamless tube, HT-N	S1.1	1	18 Apr. 2022 17:51	A	20.0.01	0.2	0.0	EN13445	81
7	N.4									2022 17:53	A	20.0.01	0.2	0.0	EN13445	0
8	N.5									2022 17:54	A	20.0.01	0.0	0.0	EN13445	0
9	F.2									2022 15:25	A	20.0.02	4.0	0.001	EN13445	0
10	SK.1									2021 14:04	A	20.0.05	1.4	0.0	EN13445	0
11	LL.1									2022 17:29	A	20.0.03	0.1	0.0	EN13445	0

EDIT: E3.1 TORISPHERICAL END/BOTTOM HEAD

EN13445:2014 Issue 5:2018+A5

7.5 DOMED ENDS

3 DIMENSIONS OF END

1-5 Type of Torispherical End

- 1 Dished End KORBBGGEN DIN 28013-28014/SMS 482
- 2 Dished End KLOPPERFORM DIN 28011-28012
- 3 Dished End KLOPPERFORM SMS 483
- 4 Dished End SMS 895
- 5 Dished End NOT listed above

Dimension of end: r=0.154D, R=0.8D

1-6 WELD JOINT COEFFICIENT

- 1 Testing Group 1 (z=1.0)
- 2 Testing Group 2 (z=1.0)
- 3 Testing Group 3 (z=0.85)
- 4 Testing Group 4 (z=0.7)
- 5 Unwelded Component(z=1.0)
- 6 User Specified

Outside diameter of cylindrical flange of end: De = 168.30 mm

Length of cylindrical flange of end: Lcyl = 25.00 mm

Negative tolerance/thinning allowance: th = 0.3000 mm

Nominal thickness of head/end (uncorroded): en = 6.00 mm

Include calculation of forming during fabrication to EN13445-4 Section 3.

NOTE: Negative tolerance/thinning allowance on thickness of end:
The negative tolerance for the end should include the thinning allowance for forming of the head.

If not otherwise specified in the drawing the length of the straight flange Lcyl shall be:
Lcyl = 3 * en or Lcyl = 3 * emin
The length of the straight flange need, however, not be more than:
50 < en <= 80 ; Lcyl = 120 mm
80 < en <= 100 ; Lcyl = 100 mm
100 < en <= 120 ; Lcyl = 75 mm
120 < en ; Lcyl = 50 mm

Assistant-2.3 Dished Ends

1 Component attachme. 2 General design dat. 3 Dimensions of end 4 Material data for 5 Nozzles in knuckle 6 Welding requiremen. 7 Calculation summar. 8 Calculation detail. 9 Utilization chart

Cancel Options Calculate Previous Next

1 COMPONENT ATTACHMENT/LOCATIO
2 GENERAL DESIGN DATA
3 DIMENSIONS OF END
4 MATERIAL DATA FOR END

ConnID:S1.1 Comment Units: SI

EN13445 2014 Issue 5:2018+A5 Mode: Visual No:11 Client: Vessel Tag No.:

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Gövde Borusu Hesabı



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View Calculation Results(11)

View Report(Updated 18 Apr. 2022 17:55)

Utilization Chart(12)

No.	ID	En+Win	Umax	Comp. Type	Comp. Description	Component Dimensions	Materials	ConnID	PC#	Date Rev.	Proj.Rev.	Code Ver.	Dry Wght	Volume	Code
1	S1.1	0+0	90.7%	Cylindrical Shell	Shell	De= 168.3, en= 7.1, L= 712	ID 18, EN 10217-3:2002/A1-05, 1.0565 P355NH welded tube, HT-N		1	18 Apr. 2022 15:25	A	20.0.04	20.1	0.014	EN13445
2	E3.1	0+0	86.3%	Torispherical End	Bottom Head	De= 168.3, wt= 6, h= 46.41, R= 134.64, r= 25.9182, KORBBÖGEN DIN 28013-28014/SMS	ID 11, EN 10028-2:2017, 1.0473 P355GH plate and strip, HT-N	S1.1	1	18 Apr. 2022 15:24	A	20.0.04	2.0	0.001	EN13445
3	E5.1	0+0	88.7%	Bolted Flat End	Cover Flange	D= 223, wt= 23	ID 12, EN 10028-2:2017, 1.0473 P355GH plate and strip, HT-N	F.2	1	14 Jan. 2021 10:25	A	20.0.03	7.0	0.0	EN13445
4	N.1	0+0	96.5%	Nozzle/Seamless Pipe	Inlet 1 3/8" ODS	do=47.5, wt=9L=60.9, ho=50	ID 5, EN 10216-2:2013, 1.0425 P265GH seamless tube, HT-N	S1.1	1	18 Apr. 2022 17:32	A	20.0.01	0.5	0.0	EN13445
5	N.2	0+0	9		EDIT: S1.1 CYLINDRICAL SHELL/SHELL										
6	N.3	0+0	9												
7	N.4	0+0	9		EN13445:2014 Issue 5:2018+A5										
8	N.5	0+0	9												
9	F.2	0+0	8												
10	SK.1	0+3	8		1-3 CYLINDER FABRICATION										
11	LL.1	0+0	1		1 Plate Material										

7.4.2 CYLINDRICAL SHELL

3 SHELL DATA

1-3 CYLINDER FABRICATION

1 Testing Group 1 (z=1.0)

2 Testing Group 2 (z=1.0)

3 Testing Group 3 (z=0.85)

4 Testing Group 4 (z=0.7)

5 Unwelded Component(z=1.0)

6 User Specified

1-2 NEGATIVE TOLERANCE

1 Negative tolerance specified in mm

2 Negative tolerance specified in % of nominal thickness

Shell Material Data

Material Library 18 EN 10217-3:2002/A1-05, 1.0565 P355NH welded tube, HT-N

MaxThk (m)	Temp (°C)	Rm (N/mm²)	Rp (N/mm²)	Rp (N/mm²)	f _d (N/mm²)	f ₂₀ (N/mm²)	no (l)
20	100	490	355	304	202.67	204.17	7.85

Outside diameter of shell De 168.30 mm

Length of cylindrical part of shell Lcyl 712.00 mm

Set en=0 to base the shell design on the minimum calculated thickness.

Nominal wall thickness (un corroded) en 7.10 mm

Negative tolerance/thinning allowance 10.00%

Calculate minimum shell thickness due to internal pressure at different elevations with steps of 1000 mm

Split shell into several shell courses and include welding information

1 Component attachme... 2 General design dat... 3 Shell data 4 Welding requiremen... 5 Calculation summar... 6 Calculation detail... 7 Utilization chart

1 COMPONENT ATTACHMENT/LOCATIO

2 GENERAL DESIGN DATA

3 SHELL DATA

4 WELDING REQUIREMENTS TO EN 170

Cancel Options Calculate Previous Next

Single Screen Multiple Screens Print Utilization Chart

S1.1 Shell Conn.ID: Comment Units: SI

EN13445 2014 Issue 5:2018+A5 Mode: Visual No.11 Client: Vessel Tag No:

Vessel Tag No.: Client :

Add Component/Calculation(35)

S1 Cylindrical Shell

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E5 Bolted Flat End

E6 Bolted Domed End

N Nozzle/Opening

F Flange

T Tubesheet

EB Expansion Bellows

TB Tube Bundle

SR Still Ring

GS Saddle/Ring Support

SK Skirt Support

SB Bracket Support

SL Leg Support

RS Ring Support

U User Specified

G0 Groups of Nozzles/Opening

LC Nozzle/Loc.Loads on Cyl.Sh

LE Nozzle/Loc.Loads on Ends

U Line Loads

LA Attachment Lug

LL Lifting Lugs

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HP Half Pipe Jacket

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Utilization Chart(12)

No.	ID	Err+V/m	Umax	Comp. Type	Comp. Description	Component Dimensions	Materials	ConnID	PC#	Date Rev.	Proj Rev.	Code Ver.	Dry Wght	Volume	Code
1	S1.1	0+0	90.7%	Cylindrical Shell	Shell	De= 168.3, en= 7.1, L= 712	ID 18, EN 10217-3:2002/A1-05, 1.0565 P355NH welded tube, HT-N	1	1	18 Apr. 2022 15:25	A	20.0.04	20.1	0.014	EN13445
2	E3.1	0+0	86.3%	Torispherical End	Bottom Head	De= 168.3, wt= 6, h= 46.41, R= 134.64, r= 25.9182, KDRBBOGEN DIN 28013:28014/SMS	ID 11, EN 10028-2:2017, 1.0473 P355GH plate and strip, HT-N	S1.1	1	18 Apr. 2022 15:24	A	20.0.04	2.0	0.001	EN13445
3	E5.1	0+0	88.7%	Bolted Flat End	Cover Flange	Do= 223, wt= 23	ID 12, EN 10028-2:2017, 1.0473 P355GH plate and strip, HT-N	F.2	1	14 Jan. 2021 10:25	A	20.0.03	7.0	0.0	EN13445
4	N.1	0+0	96.5%	Nozzle, Seamless Pipe	Inlet 1 3/8" ODS	do=47.5, wt=9.1, L=60.9, ho=50	ID 5, EN 10216-2:2013, 1.0425 P265GH seamless tube, HT-N	S1.1	1	18 Apr. 2022 17:32	A	20.0.01	0.5	0.0	EN13445
5	N.2	0+0													
6	N.3	0+0													
7	N.4	0+0													
8	N.5	0+0													
9	F.2	0+0													
10	SK.1	0+3													
11	LL.1	0+0													

1-3 Attachment

1 Set In Flush Nozzle

2 Protruding Nozzle

3 Set On Nozzle

1-2 Shape of Nozzle/Opening

1 Circular

2 Non-Circular

1-3 Application

1 9.4.6.3 NOT a critical fatigue area, and calc.temp.is outside creep range.

2 9.4.6.1 Fatigue Application - Opening is a critical area as defined in section 17.

3 9.4.6.2 Creep Application - Calculation temperature is in the creep range.

Outside nozzle diameter deb 47.50 mm

Nominal nozzle thickness (uncorroded) enb 9.00 mm

Size of Flange and Nozzle

Comment (Optional)

Negative tolerance/thinning allowance 12.50 %

Nozzle standout measured from vessel od ho 50.00 mm

No restrictions on nozzle to shell thickness ratio exist if the nozzle is not a critical area with regards to fatigue and is operating outside creep range.
Critical Area, an area where the fatigue damage index exceeds the maximum value Dmax as defined in section 17.2.16:
- Dmax = 0.8 for 500 < neq <= 1000.
- Dmax = 0.5 for 1000 < neq <= 10000.
- Dmax = 0.3 for neq > 10000.
Dmax will be calculated and checked when running the module for fatigue.

1 Component attachme... 2 General design dat... 3 Shell data (s1.1) 4 Nozzle material da... 5 Nozzle dimensional... 6 Welding data 7 Data for reinforce... 8 Limits of reinforce... 9 Welding requiremen... 10 Calculation summa... 11 Calculation detai... 12 Utilization c...

Cancel Options Calculate Previous Next

1 COMPONENT ATTACHMENT/LOCATIO
2 GENERAL DESIGN DATA
3 SHELL DATA (S1.1)
4 NOZZLE MATERIAL DATA

Single Screen

Multiple Screens

Print Utilization Chart

N.1 Inlet 1 3/8" ODS ConnID:S1.1 Comment Units: SI

EN13445 2014 Issue 5:2018+A5

Mode: Visual No:11 Client :

Vessel Tag No.:

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File Action View 2D Drawing 3D Drawing Code Tools Setup Help Window

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Edt Component/Calculation(11)

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Delete Component/Calculation(11)

View Calculation Results(11)

View Report(Updated 23 Mar. 2023 16:40)

Utilization Chart(2)

No. ID En+V/m Units Comp. Type Comp. Description Component Dimensions Materials ConnID PC# Date Rev. Proj Rev. Code Ver. Dry Weight Volume Code

1 S1.1 0+0 80.7% Cylindrical Shell Shell D=168.3, en=7.1, L=712 ID 19, EN 10217-3:2002/A1.05, 1.0555 P355GH welded tube, HT-N S1.1 1 18 Apr. 2022 15:25 A 20.004 20.1 0.014 EN13445

2 E3.1 0+0 86.7% Torispherical End Button Head D=168.3, w=6.7, h=45.41, R=134.64, r=25.5182, KORBBOGEN DIN 28013:20014/SMS ID 11, EN 10028-2:2017, 1.0473 P355GH plate and strip, HT-N S1.1 1 18 Apr. 2022 15:24 A 20.004 2.0 0.001 EN13445

3 E5.1 0+0 88.7% Bolted Flat End Cover Flange D=223, w=23 ID 12, EN 10028-2:2017, 1.0473 P355GH plate and strip, HT-N F.2 1 14 Jan. 2021 10:25 A 20.003 7.0 0.0 EN13445

4 N.1 0+0 96.5% Nozzle/Seamless Pipe Inlet 1.34" ODS d=47.5, w=51.4, L=60.9, h=50 ID 5, EN 10216-2:2013, 1.0425 P265GH seamless tube, HT-N S1.1 1 18 Apr. 2022 17:32 A 20.001 0.5 0.0 EN13445

5 N.2 0+0 EN13445:2014 Issue 5:2018+A5

6 N.3 0+0 EDIT :F.2 RT - FLANGE/SHELL FLANGE

7 N.4 0+0

8 N.5 0+0

9 F.2 0+0

10 SK.1 0+0

11 LL.1 0+0

11 FLANGE DESIGN

5 FLANGE DATA

1-1 FLANGE HUB

1-1 FLANGE WITHOUT HUB

1-1 FLANGE WITH HUB

1-2 DESIGN METHOD

1-2 A) INVOLVED FLANGE METHOD

1-2 B) LOOSE FLANGE METHOD (if requirements are met)

1-2 FLANGE BORE

1-2 Smooth

1-2 Stepped

Inside diameter of flange corroded B 161.00 mm

Outside diameter of flange A 223.00 mm

Thickness of flange (un corroded) e 25.00 mm

For face with groove the minimum thickness used in the calculations may have to be reduced to compensate for the material reduction in the groove.

Thickness of flange at reduced section e1 27.00 mm

Corrosion allowance for flange face c1 0.00 mm

Flange Material Data

Material Library 12 EN 10028-2:2017, 1.0473 P355GH plate and strip, HT-N

Max T/A (ts) Temp (C) P (N/mm2) Pp (N/mm2) Pp (N/mm2) Pp (N/mm2) Pp (N/mm2) Pp (N/mm2) Pp (N/mm2)

40 100 510 345 314 209.33 212.5 7.05

Assistant-4.1 Flanges

1 Component attach. 2 General design det. 3 Type of flange and 4 Shell/nozzle data 5 Flange data 6 Data for flange hu. 7 Bolting data 8 Gasket data 9 Welding requiremen. 10 Calculation summa. 11 Calculation deta. 12 Utilization chart

Cancel Options Calculate Previous Next

GENERAL DESIGN DATA

3 TYPE OF FLANGE AND GASKET FACIN

4 SHELL/NOZZLE DATA

5 FLANGE DATA

6 DATA FOR FLANGE HUB

7 BOLTING DATA

Single Screen Multiple Screens Print Utilization Chart

F.2 Shell Flange ConnID:S1.1 Comment Units:SI

Resim-10

Cıvata Hesabı

EDIT :F.2 RT - FLANGE/SHELL FLANGE

EN13445:2014 Issue 5:2018+A5

11 FLANGE DESIGN

7 BOLTING DATA

BOLTING TORQUE CALCULATION

NOMINAL BOLTING SIZE COMMENT M14x2

Effective bolt area per bolt Ae 115.00 mm2

Recommended minimum bolt center to edge clearance Bce 17.50 mm

Recommended minimum bolt center/radial clearance Bcr 21.50 mm

Set Bce and/or Bcr equal to zero if no check shall be performed for bolt edge/radial clearance.

Diameter of bolt holes in flange d 16.00 mm

Number of bolts n 16.00

Bolt circle diameter C 195.00 mm

Bolt Material Data

Material Library 19 EN 10263:2013, 2.4668 NiCr19Fe19Nb5Mo3 bar, bolt, HT-P

Max T/A (ts) Temp (C) P (N/mm2) Pp (N/mm2) Pp (N/mm2) Pp (N/mm2) Pp (N/mm2) Pp (N/mm2) Pp (N/mm2)

160 100 1200 1000 1000 307.5 307.5 7.50

1 Component attach. 2 General design det. 3 Type of flange and 4 Shell/nozzle data 5 Flange data 6 Data for flange hu. 7 Bolting data 8 Gasket data 9 Welding requiremen. 10 Calculation summa. 11 Calculation deta. 12 Utilization chart

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Single Screen Multiple Screens Print Utilization Chart

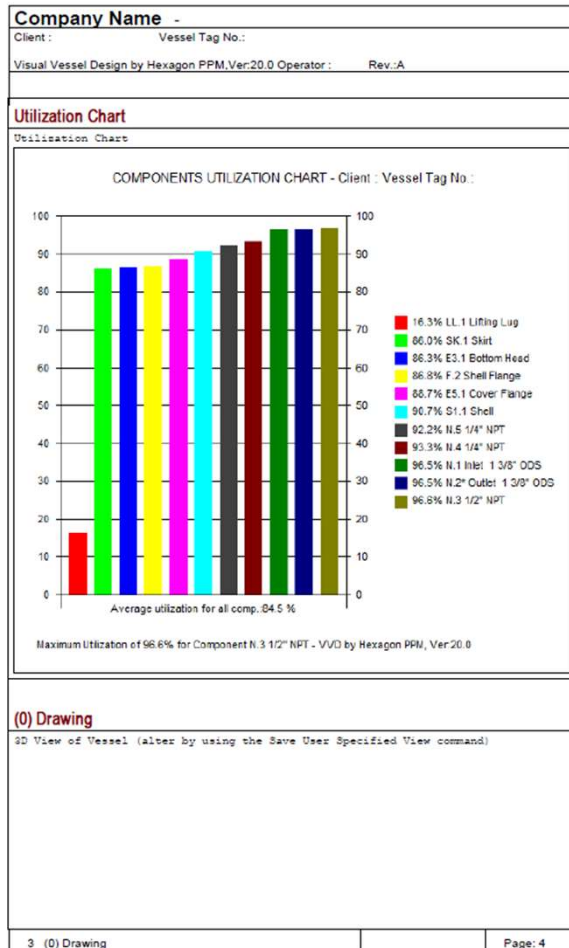
F.2 Shell Flange ConnID:S1.1 Comment Units:SI

Resim-11

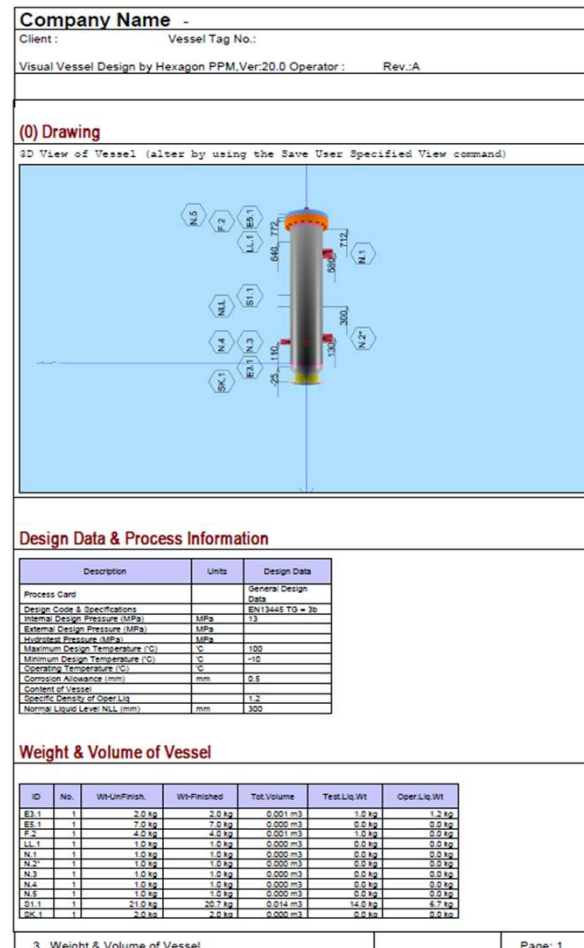
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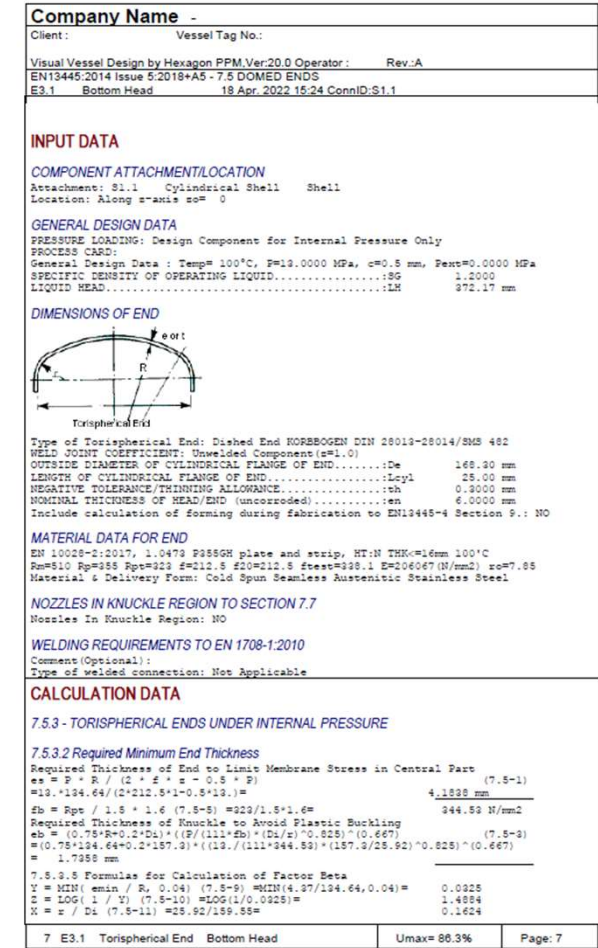
Program, yapılan hesaplamayı grafik, prototip resmi ve rapor şeklinde kayıt altına almaktadır.



Resim-12

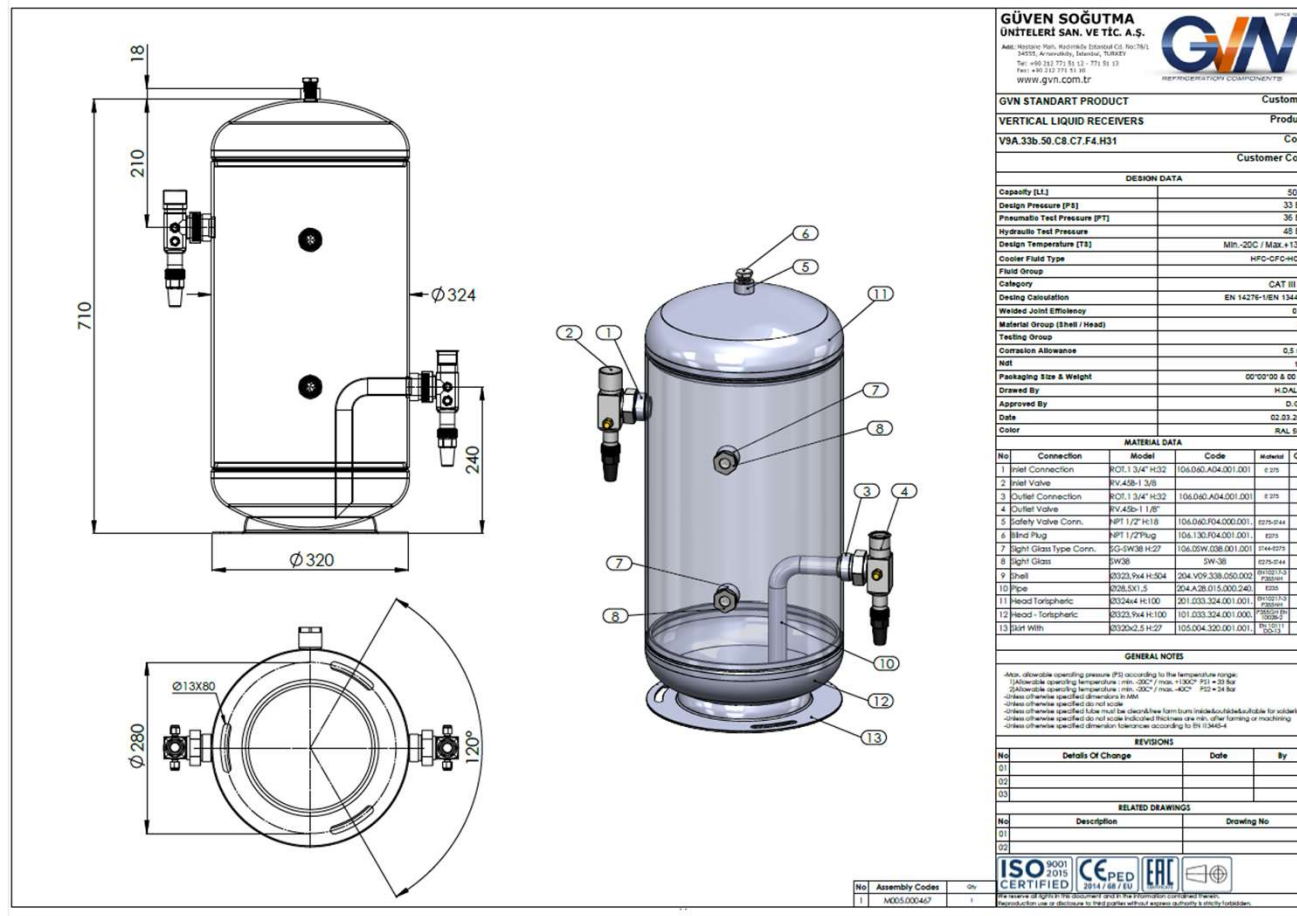


Resim-13

**Resim-14**

TASARIM

Hesaplamalar sonrasında Solidworks programı ile 3D çizim yapılarak teknik resimlendirme yapılmaktadır.



Resim-15