

Company Name -

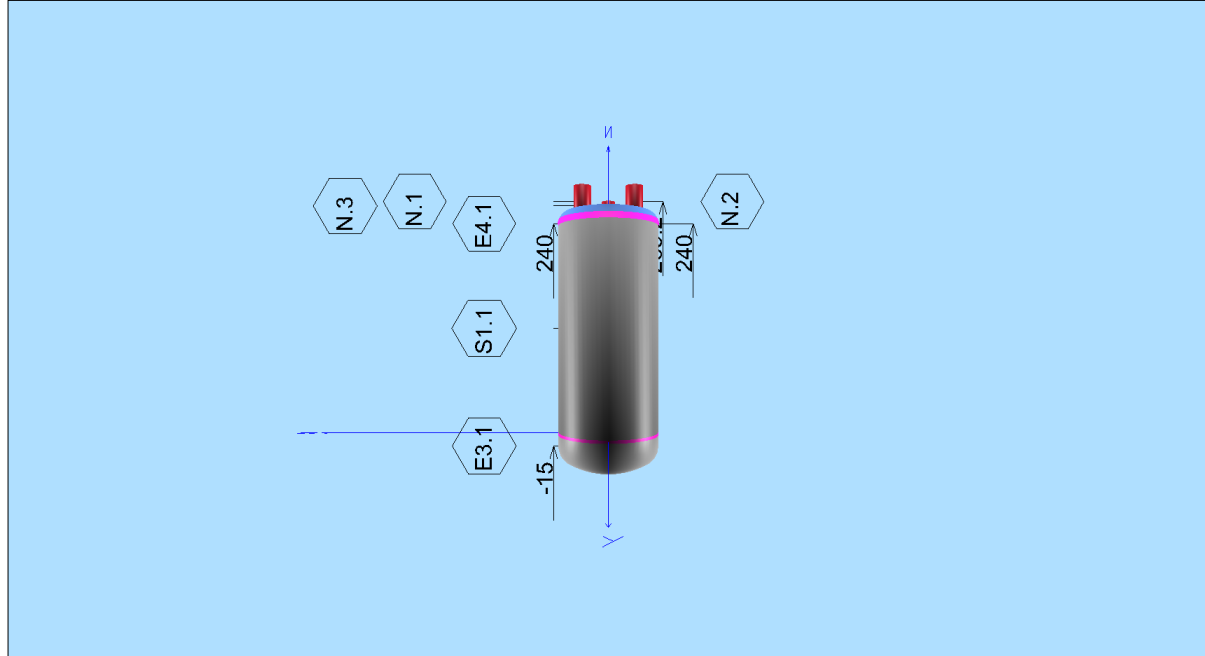
Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

(0) Drawing

3D View of Vessel (alter by using the Save User Specified View command)



Design Data & Process Information

Description	Units	Design Data
Process Card		General Design Data
Design Code & Specifications		EN13445 TG = 3b
Internal Design Pressure (MPa)	MPa	3
External Design Pressure (MPa)	MPa	
Hydrotest Pressure (MPa)	MPa	
Maximum Design Temperature (°C)	°C	130
Minimum Design Temperature (°C)	°C	-20
Operating Temperature (°C)	°C	
Corrosion Allowance (mm)	mm	0.5
Content of Vessel		
Specific Density of Oper.Liq		
Normal Liquid Level NLL (mm)	mm	

Test Pressure

TEST PRESSURE OF VESSEL - NEW & COLD - VERTICAL

Design Pressure..... : 3.000 MPa

Design Temperature..... : 130.0 C

ID	Description	Pdesign	PtMax	PtMin	Wat.Head	PtTop	PtTopMax
E3.1	Torispherical End-Bottom head	3.000	16.345	3.873	0.003	3.873	16.342
E4.1	KAYNAKLI DUZ BOMBE/B-Flat	3.000	7.297	3.873	0.000	3.873	7.296
N.1	NOZUL,DiKiSSIZ BORU-1/2" ODS	3.000	5.187	NA	0.000	NA	5.187
N.2	NOZUL,DiKiSSIZ BORU-1/2"ODS	3.000	5.187	NA	0.000	NA	5.187
N.3	NOZUL,DiKiSSIZ BORU-3/8" SAE	3.000	5.295	NA	0.000	NA	5.295
S1.1	Cylindrical Shell-Main Shell	3.000	16.330	3.933	0.003	3.933	16.328

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PtReq = MAX(MIN(PtTop), 1.43*p)= 4.2900 MPa (EN13445-5, 10.2.3.3.1-1 & 2)

HYDRO-TEST

REQUIRED TEST PRESSURE AT TOP OF VESSEL PtReq(Hydro Test): 4.2900 MPa
MAXIMUM TEST PRESSURE AT TOP OF VESSEL PtLim(Hydro Test): 5.1868 MPa

PNEUMATIC TEST

REQUIRED TEST PRESSURE AT TOP OF VESSEL PtReq(Pneumatic Test) ...: 4.2900 MPa
MAXIMUM TEST PRESSURE AT TOP OF VESSEL PtLim(Pneumatic Test) ...: 5.1871 MPa

Note : Other components may limit Ptlim than the ones checked above.

TEST PRESSURE OF VESSEL - NEW & COLD - HORIZONTAL

Design Pressure.....: 3.000 MPa

Design Temperature.....: 130.0 C

ID	Description	Pdesign	PtMax	PtMin	Wat.Head	PtTop	PtTopMax
E3.1	Torispherical End-Bottom head	3.000	16.345	3.873	0.001	3.873	16.344
E4.1	KAYNAKLI DUZ BOMBE/B-Flat	3.000	7.297	3.873	0.001	3.873	7.296
N.1	NOZUL,DiKiSSIZ BORU-1/2" ODS	3.000	5.187	NA	0.000	NA	5.187
N.2	NOZUL,DiKiSSIZ BORU-1/2"ODS	3.000	5.187	NA	0.001	NA	5.186
N.3	NOZUL,DiKiSSIZ BORU-3/8" SAE	3.000	5.295	NA	0.001	NA	5.294
S1.1	Cylindrical Shell-Main Shell	3.000	16.330	3.933	0.001	3.933	16.329

PtReq = MAX(MIN(PtTop), 1.43*p)= 4.2900 MPa (EN13445-5, 10.2.3.3.1-1 & 2)

HYDRO-TEST

REQUIRED TEST PRESSURE AT TOP OF VESSEL PtReq(Hydro Test): 4.2900 MPa
MAXIMUM TEST PRESSURE AT TOP OF VESSEL PtLim(Hydro Test): 5.1863 MPa

PNEUMATIC TEST

REQUIRED TEST PRESSURE AT TOP OF VESSEL PtReq(Pneumatic Test) ...: 4.2900 MPa
MAXIMUM TEST PRESSURE AT TOP OF VESSEL PtLim(Pneumatic Test) ...: 5.1871 MPa

Note : Other components may limit Ptlim than the ones checked above.

NOMENCLATURE:

Pdesign- is the design pressure including liquid head at the part under consideration.

PtMax - is the maximum allowed test pressure determined at the part under consideration.

PtMin - is the required test pressure determined at the part under consideration.

Wat.Head - is the water head during hydrotesting at the part under consideration.

PtBot - is the required test pressure at bottom of the vessel, for the part under consideration.

PtTop - is the required test pressure at top of the vessel, for the part under consideration.

PtTopMax - is the maximum test pressure allowed at top of the vessel, for the part under consideration.

PtReq - is the required minimum test pressure (minimum value of PtTop) at top of vessel for the listed components.

PtLim - is the maximum allowed test pressure (minimum value for PtTopMax) at top of vessel for the listed components.

EN13445-5 10.2.3.3.8 Pressure of vessels under test shall be gradually increased to a value of approximately 50 % of the specified test pressure, thereafter the pressure shall be increased in stages of approximately 10 % of the specified test pressure until this is reached. The required test pressure shall be maintained for not less than 30 min. At no stage shall the vessel be approached for close examination until the pressure has been positively reduced by at least 10 % to a level lower than that previously attained. The pressure shall be maintained at the specified close examination level for a sufficient length of time to permit a visual inspection to be made of all surfaces and joints.

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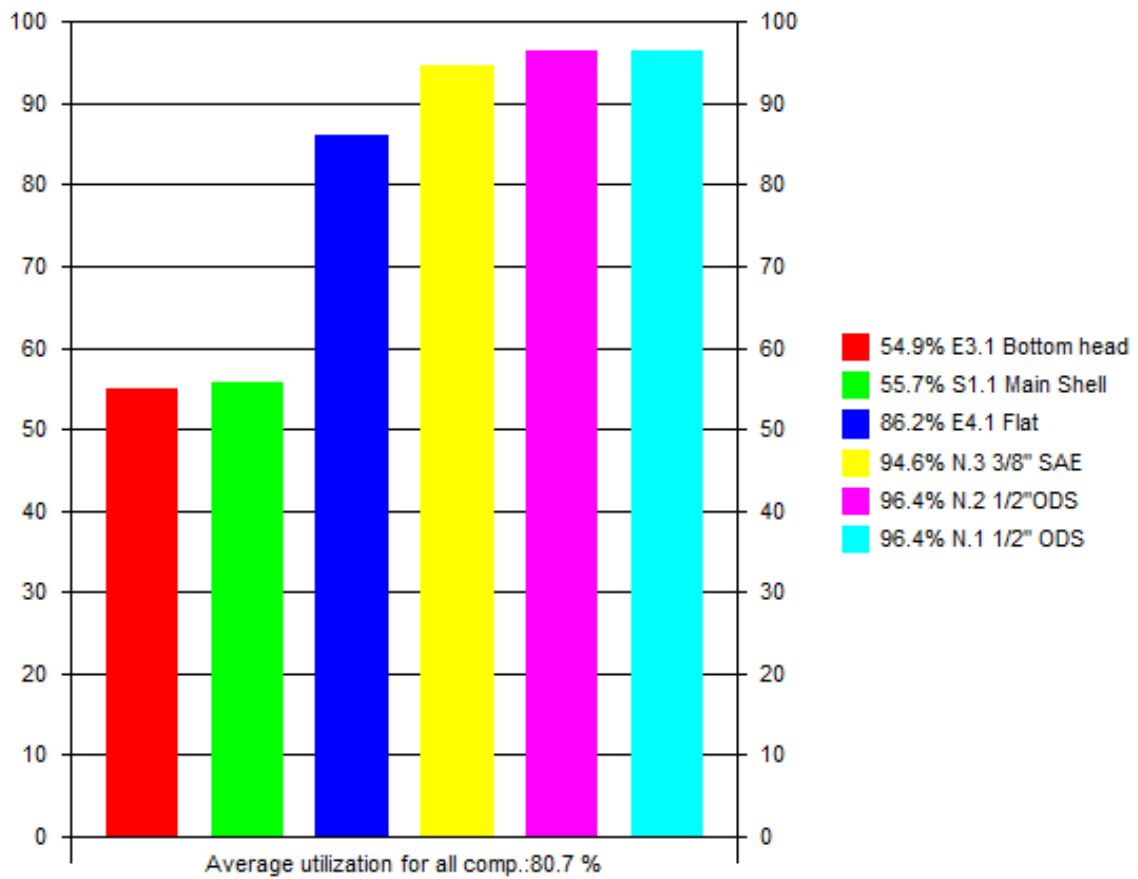
Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator :

Rev.:A

Utilization Chart

Utilization Chart

COMPONENTS UTILIZATION CHART - Client :GÜVEN SOGUTMA Vessel Tag No.:OS.30B.12.



Maximum Utilization of 96.4% for Component N.2 1/2" ODS - VVD by Hexagon PPM, Ver:20.0

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Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 7.4.2 SiLiNDiRiK BASINCLIKAP GOVDESİ

S1.1 Main Shell 04 Feb. 2022 11:49

GİRİS BİLGİLERİ

BAGLANTI KOMPONENTİ/ YERİ

SiLiNDiR KENARINDAN REFERANS CizGiSiNE MESAFE.....:mm 0.00 mm

GENEL PROJE BİLGİLERİ

BASINC DEGERİ: SADECE IC BASINC ICIN PROJE KOMPONENTİ
ISLEM KARTI:

GENEL PROJE BİLGİLERİ : Temp= 130°C, P=3.0000 MPa, c=0.5 mm, Pext=0.0000 MPa

ISLETME SIVISI OZGUL AGIRLIGI:SG 0.00

SIVI KOLONU.....:LH 0.00 mm

GOVDE DETAY BİLGİLERİ

SİLİNDİR İMALATI: KAYNAKLI BORU

WELD JOINT COEFFICIENT: TEST GURUBU 2 (z=1.0)

NEGATIVE TOLERANCE: Negative tolerance specified in mm

EN 10217-3:2019, 1.0565 P355NH welded tube, HT:N THK<=20mm 130°C

Rm=490 Rp=355 Rpt=292 f=194.67 f20=204.17 ftest=338.1 E=203868(N/mm2) ro=7.85

GOVDE DIS CAPI.....:De 114.00 mm

GOVDE SiLiNDiR BOYU:Lcyl 240.00 mm

İMALAT SONRASI DUVAR KALINLIĞI (PAS YOK):en 3.0000 mm

İNCELME PAYLI/ NEGATİF TOLERANS.....:th 0.3000 mm

Split shell into several shell courses and include welding information: YOK / HAYIR

WELDING REQUIREMENTS TO EN 1708-1:2010

Comment(Optional):

Type of welded connection: Not Applicable

HESAPLAMA BİLGİSİ

7.4.2 IC BASINCA MARUZ SiLiNDiRiK GOVDE

GEREKLi ASGARI GOVDE KALINLIĞI-PAY HARİC, "emin"

emin = De * P / (2 * f * z + P) (7.4-2) =114*3/(2*194.67*1+3)= 0.8717 mm

GEREKLi ASGARI GOVDE KALINLIĞI-PAY DAHiL

emina = emin + c + NegDev =0.8717+0.5+0.3= 1.6717 mm

KALINLIK ANALİZİ

ea = en - c - NegDev =3-0.5-0.3= 2.2000 mm

»7.4.1. UYGULAMA SARTLARI emin/De=0.0076 <= 0.16« » OK«

IC BASINC emina=1.67 <= en=3[mm]

55.7%

OK

AZAMİ UYGULANABİLİR CALISMA BASINCI MAWP

GOVDE İC CAPI

Di = De - 2 * ea =114-2*2.2= 109.60 mm

ORTALAMA CAP- GOVDE

Dm = (De + Di) / 2 =(114+109.6)/2= 111.80 mm

MAWP SICAK VE PASLI (PROJE DEGERLERİNDE PASLI)

MAWPHC = 2 * f * z * ea / Dm =2*194.67*1*2.2/111.8= 7.6614 MPa

MAWP YENİ VE SOGUK (PAS YOK VE ORTAM SICAKLIĞI)

MAWPNC = 2 * f20 * z * (ea + c) / Dm
=2*204.17*1*(2.2+0.5)/111.8= 9.8615 MPa

AZAMİ TEST BASINCI (ORTAM SICAKLIĞI VE PAS YOK)

Ptmax = 2 * ftest * ztest * (ea + c) / Dm

=2*338.1*1*(2.2+0.5)/111.8= 16.33 MPa

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EN13445-5;10.2.3.3 ASGARi TEST BASINCI: P_{tmin}

TEST GRUP 1-2-3 ICIN ORTAN SICAKLIGINDA- YENi

$$P_{tmin} = 1.25 * P_d * f_{20} / f = 1.25 * 3 * 204.17 / 194.67 =$$

3.9330 MPa

$$P_{tmin} = 1.43 * P_d = 1.43 * 3 =$$

4.2900 MPa

TEST BASINCI P_{tmin}=4.29 <= P_{tmax}=16.33[MPa]**26.2%****OK**

GOVDENiN TAKViYESiZ ACIKLIK AZAMi CAPI

GOVDENiN IC YARI CAPI

$$r_{is} = D_i / 2 (9.5-3) = 109.6 / 2 =$$

54.80 mm

TAKViYEYE DESTEK OLAN GOVDE BOYU

$$I_s = \sqrt{(2 * r_{is} + e_a) * e_a} (9.5-2) = \sqrt{(2 * 54.8 + 2.2) * 2.2} =$$

15.68 mm

Maximum Diameter of Unreinforced Opening in Shell Checked to Rules in Section 9

$$d_{max1} = \text{MIN}(0.5 * D_i, (e_a * I_s * (f - 0.5 * P) / (P - r_{is} * I_s)) / (0.5 * r_{is} + 0.5 * e_a)) (9.5-7, 22, 23)$$

$$= \text{MIN}(0.5 * 109.6, (2.2 * 15.68 * (194.67 - 0.5 * 3) / (3 - 54.8 * 15.68)) / (0.5 * 54.8 + 0.5 * 2.2))$$

$$= 47.80 \text{ mm}$$

Maximum diameter of Opening Not Requiring Reinforcement Check

$$d_{max2} = 0.15 * \sqrt{(2 * r_{is} + e_a) * e_a} (9.5-18)$$

(9.5-18)

$$= 0.15 * \sqrt{(2 * 54.8 + 2.2) * 2.2} =$$

2.3525 mm

Maximum Diameter of Unreinforced Opening

$$d_{max} = \text{MAX}(d_{max1}, d_{max2}) = \text{MAX}(47.8, 2.35) =$$

47.80 mm

HESAPLAMA ÖZETİ

7.4.2 IC BASINCA MARUZ SiLiNDiRiK GOVDE

GEREKLi ASGARi GOVDE KALINLIGI-PAY HARIc, "emin"

$$e_{min} = D_e * P / (2 * f * z + P) (7.4-2) = 114 * 3 / (2 * 194.67 * 1 + 3) =$$

0.8717 mm

GEREKLi ASGARi GOVDE KALINLIGI-PAY DAHiL

$$e_{min_a} = e_{min} + c + \text{NegDev} = 0.8717 + 0.5 + 0.3 =$$

1.6717 mm

IC BASINC e_{min_a}=1.67 <= e_n=3[mm]**55.7%****OK**

AZAMi TEST BASINCI (ORTAM SICAKLIGI VE PAS YOK)

$$P_{tmax} = 2 * f_{test} * z_{test} * (e_a + c) / D_m$$

$$= 2 * 338.1 * 1 * (2.2 + 0.5) / 111.8 =$$

16.33 MPa

EN13445-5;10.2.3.3 ASGARi TEST BASINCI: P_{tmin}

TEST GRUP 1-2-3 ICIN ORTAN SICAKLIGINDA- YENi

$$P_{tmin} = 1.25 * P_d * f_{20} / f = 1.25 * 3 * 204.17 / 194.67 =$$

3.9330 MPa

$$P_{tmin} = 1.43 * P_d = 1.43 * 3 =$$

4.2900 MPa

TEST BASINCI P_{tmin}=4.29 <= P_{tmax}=16.33[MPa]**26.2%****OK**

GOVDENiN TAKViYESiZ ACIKLIK AZAMi CAPI

Maximum Diameter of Unreinforced Opening

$$d_{max} = \text{MAX}(d_{max1}, d_{max2}) = \text{MAX}(47.8, 2.35) =$$

47.80 mm

HACIM0.0023 m³ Weight:2 kg (SG= 7.85)

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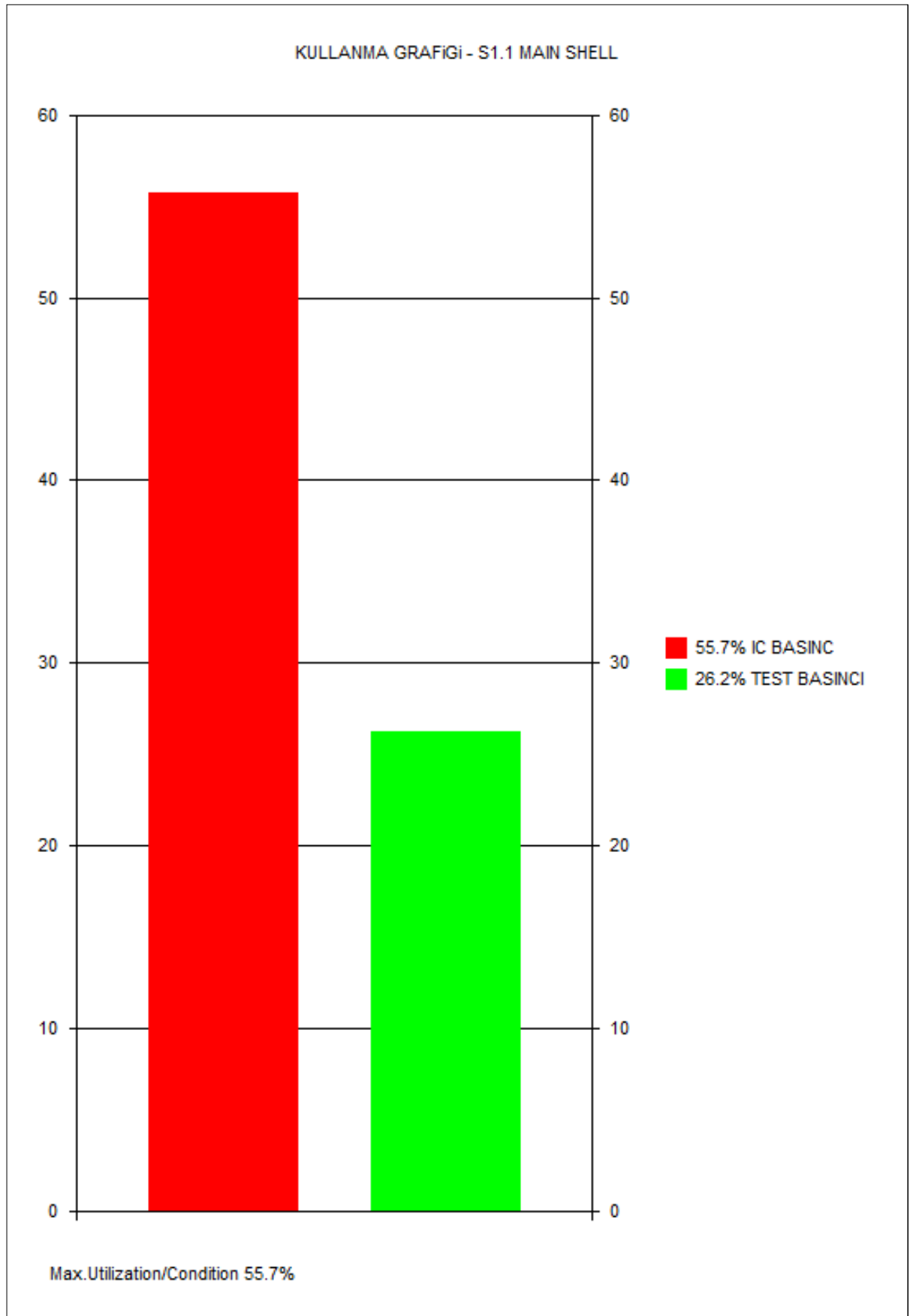
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S1.1 Main Shell

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EN13445:2014 Issue 5+A8:2019 - 7.5 DOMED ENDS

E3.1 Bottom head 10 July 2023 15:42 ConnID:S1.1

INPUT DATA

COMPONENT ATTACHMENT/LOCATION

Attachment: S1.1 Cylindrical Shell Main Shell
Location: Along z-axis zo= 0

GENERAL DESIGN DATA

PRESSURE LOADING: Design Component for Internal Pressure Only

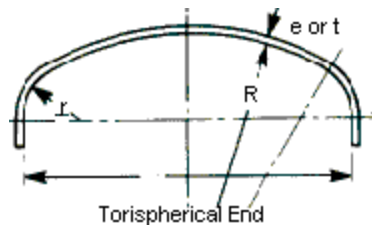
PROCESS CARD:

General Design Data : Temp= 130°C, P=3.0000 MPa, c=0.5 mm, Pext=0.0000 MPa

SPECIFIC DENSITY OF OPERATING LIQUID.....:SG 0.00

LIQUID HEAD.....:LH 0.00 mm

DIMENSIONS OF END



Type of Torispherical End: Dished End KORBOGEN DIN 28013-28014/SMS 482

WELD JOINT COEFFICIENT: Unwelded Component(z=1.0)

OUTSIDE DIAMETER OF CYLINDRICAL FLANGE OF END.....:De 114.00 mm

LENGTH OF CYLINDRICAL FLANGE OF END.....:Lcyl 15.00 mm

NEGATIVE TOLERANCE/THINNING ALLOWANCE.....:th 0.3000 mm

NOMINAL THICKNESS OF HEAD/END (uncorroded).....:en 3.0000 mm

Include calculation of forming during fabrication to EN13445-4 Section 9.: NO

MATERIAL DATA FOR END

EN 10028-2:2017, 1.0473 P355GH plate and strip, HT:N THK<=16mm 130'C

Rm=510 Rp=355 Rpt=308.6 f=205.73 f20=212.5 ftest=338.1 E=203868(N/mm2) ro=7.85

Material & Delivery Form: NOT Cold Spun Seamless Austenitic Stainless Steel

NOZZLES IN KNUCKLE REGION TO SECTION 7.7

Nozzles In Knuckle Region: NO

WELDING REQUIREMENTS TO EN 1708-1:2010

Comment(Optional):

Type of welded connection: Not Applicable

CALCULATION DATA

7.5.3 - TORISPHERICAL ENDS UNDER INTERNAL PRESSURE

7.5.3.2 Required Minimum End Thickness

Required Thickness of End to Limit Membrane Stress in Central Part

$$e_s = P * R / (2 * f * z - 0.5 * P) \quad (7.5-1)$$

$$= 3 * 91.2 / (2 * 205.73 * 1 - 0.5 * 3) = 0.6674 \text{ mm}$$

$$f_b = R_{pt} / 1.5 \quad (7.5-4) = 308.6 / 1.5 = 205.73 \text{ N/mm}^2$$

Required Thickness of Knuckle to Avoid Plastic Buckling

$$e_b = (0.75 * R + 0.2 * D_i) * ((P / (111 * f_b)) * (D_i / r)^{0.825})^{(0.667)} \quad (7.5-3)$$

$$= (0.75 * 91.2 + 0.2 * 109) * ((3 / (111 * 205.73)) * (109 / 17.556)^{0.825})^{(0.667)} = 0.6348 \text{ mm}$$

7.5.3.5 Formulas for Calculation of Factor Beta

$$Y = \text{MIN}(e_{min} / R, 0.04) \quad (7.5-9) = \text{MIN}(0.8472 / 91.2, 0.04) = 0.0093$$

$$Z = \text{LOG}(1 / Y) \quad (7.5-10) = \text{LOG}(1 / 0.0093) = 2.0320$$

$$X = r / D_i \quad (7.5-11) = 17.556 / 112.31 = 0.1563$$

$$N = 1.006 - 1 / (6.2 + (90 * Y)^4) \quad (7.5-12)$$

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E3.1 Bottom head 10 July 2023 15:42 ConnID:S1.1

$$=1.006-1/(6.2+(90*0.0093)^4)= 0.8565$$

$$\text{Beta01} = N*(-0.1833*Z^3+1.0383*Z^2-1.2943*Z+0.837) \quad (7.5-15)$$

$$=0.8565*(-0.1833*2.03^3+1.0383*2.03^2-1.2943*2.03+0.837)= 0.8190$$

$$\text{Beta02} = \text{MAX}(0.5, 0.95 * (0.56 - 1.94 * Y - 82.5 * Y^2)) \quad (7.5-17)$$

$$=\text{MAX}(0.5, 0.95*(0.56-1.94*0.0093-82.5*0.0093^2))= 0.5081$$

$$\text{beta} = 10 * ((0.2 - X) * \text{Beta01} + (X - 0.1) * \text{Beta02}) \quad (7.5-16)$$

$$=10*((0.2-0.1563)*0.819+(0.1563-0.1)*0.5081)= 0.6439$$

Required Thickness of Knuckle to Avoid Axisymmetric Yielding

$$e_y = \text{beta} * P * (0.75 * R + 0.2 * D_i) / f \quad (7.5-2)$$

$$=0.6439*3*(0.75*91.2+0.2*112.31)/205.73= 0.8531 \text{ mm}$$

NOTE 3, since $e_y(0.9) > 0.005*D_i(0.6)$ it is NOT necessary to calculate/consider eb.

Required Minimum End Thickness Excl.Allow. e_{min} :

$$e_{min} = e_{min} = 0.8531 = \underline{\underline{0.8531 \text{ mm}}}$$

Required Minimum End Thickness Incl.Allow. :

$$e_{min} = e_{min} + c + t_h = 0.8531 + 0.5 + 0.3 = \underline{\underline{1.6500 \text{ mm}}}$$

Internal Pressure $e_{min}=1.65 \leq e_n=3[\text{mm}]$

54.9%

OK

Analysis Thickness

$$e_a = e_n - c - t_h = 3 - 0.5 - 0.3 = 2.2000 \text{ mm}$$

Inside Diameter of Shell

$$D_i = D_e - 2 * (e_n - c) = 114 - 2*(3-0.5) = 109.00 \text{ mm}$$

Mean Diameter of Shell

$$D_m = (D_e + D_i) / 2 = (114+109)/2 = 111.50 \text{ mm}$$

7.5.3.4 - Required Minimum Thickness of Straight Cylindrical Flange

$$L_{lim} = 0.2 * \text{SQRT}(D_i * e_{min}) = 0.2 * \text{SQRT}(109 * 0.8531) = 1.9286 \text{ mm}$$

Since $L_{cyl} > L_{lim}$, Required Thickness of Straight Cylindrical Flange to 7.4.2

Minimum Thickness of Straight Flange Excl. Allow.

$$e_{cyl} = P * D_i / (2 * f * z - P) \quad (7.4-1) = 3*109/(2*205.73*1-3) = \underline{\underline{0.8006 \text{ mm}}}$$

Minimum Thickness of Straight Flange Incl.Corr. :

$$e_{cyl} = e_{cyl} + c = 0.8006 + 0.5 = \underline{\underline{1.3000 \text{ mm}}}$$

7.5.3.1 Conditions of Applicability - Torispherical Ends

»Geometry Check $r=17.556 \leq 0.2 * D_i=21.8[\text{mm}]$ « » OK«

»Geometry Check $r=17.556 \geq 0.06 * D_i=6.54[\text{mm}]$ « » OK«

»Geometry Check $r=17.556 \geq 2*e[\text{mm}]$ « » OK«

»Geometry Check $e=0.8531 \leq 0.08*D_e=9.12[\text{mm}]$ « » OK«

»Geometry Check $e_a=2.2 \geq 0.001*D_e=0.114[\text{mm}]$ « » OK«

»Geometry Check $R=91.2 \leq D_e=114[\text{mm}]$ « » OK«

MAXIMUM ALLOWABLE WORKING PRESSURE MAWP :NEW & COLD

$$P_s = 2 * f * z * e_a / (R + 0.5 * e_a) \quad (7.5-6)$$

$$=2*212.5*1*2.7/(90.7+0.5*2.7)= 12.47 \text{ MPa}$$

$$P_y = f * e_a / (\text{beta} * (0.75 * R + 0.2 * D_i)) \quad (7.5-7)$$

$$=212.5*2.7/(0.5477*(0.75*90.7+0.2*109))= 11.66 \text{ MPa}$$

$$P_B = 111*fb*(e_a/(0.75*R+0.2*D_i))^{1.5}*(r/D_i)^{0.825} \quad (7.5-8)$$

$$=111*236.67*(2.7/(0.75*90.7+0.2*109))^{1.5}*(17.556/109)^{0.825}= 30.35 \text{ MPa}$$

$$P_{cyl} = 2 * e_a * f * z / (D_i + e_a)$$

$$=2*2.7*212.5*1/(109+2.7)= 10.27 \text{ MPa}$$

P_{max} (is the least of P_s , P_y , P_b and P_{cyl}) = P_{max}

$$=10.27 = \underline{\underline{10.27 \text{ MPa}}}$$

MAXIMUM ALLOWABLE WORKING PRESSURE MAWP :HOT & CORR

$$P_s = 2 * f * z * e_a / (R + 0.5 * e_a) \quad (7.5-6)$$

$$=2*205.73*1*2.2/(91.2+0.5*2.2)= 9.8073 \text{ MPa}$$

$$P_y = f * e_a / (\text{beta} * (0.75 * R + 0.2 * D_i)) \quad (7.5-7)$$

$$=205.73*2.2/(0.564*(0.75*91.2+0.2*109))= 8.8970 \text{ MPa}$$

$$P_B = 111*fb*(e_a/(0.75*R+0.2*D_i))^{1.5}*(r/D_i)^{0.825} \quad (7.5-8)$$

$$=111*205.73*(2.2/(0.75*91.2+0.2*109))^{1.5}*(17.556/109)^{0.825}= 19.29 \text{ MPa}$$

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$$P_{cyl} = 2 * e_a * f * z / (D_i + e_a)$$

$$= 2 * 2.2 * 205.73 * 1 / (109 + 2.2) =$$

8.1404 MPa

$$P_{max} \text{ (is the least of } P_s, P_y, P_b \text{ and } P_{cyl}) = P_{max}$$

$$= 8.14 =$$

8.1404 MPa

MAX TEST PRESSURE (Uncorroded cond.at ambient temp.)

$$P_s = 2 * f * z * e_a / (R + 0.5 * e_a) \quad (7.5-6)$$

$$= 2 * 338.1 * 2.7 / (90.7 + 0.5 * 2.7) =$$

19.83 MPa

$$P_y = f * e_a / (\beta * (0.75 * R + 0.2 * D_i)) \quad (7.5-7)$$

$$= 338.1 * 2.7 / (0.5477 * (0.75 * 90.7 + 0.2 * 109)) =$$

18.55 MPa

$$P_b = 111 * \beta_b * (e_a / (0.75 * R + 0.2 * D_i))^{1.5} * (r / D_i)^{0.825} \quad (7.5-8)$$

$$= 111 * 338.1 * (2.7 / (0.75 * 90.7 + 0.2 * 109))^{1.5} * (17.556 / 109)^{0.825} =$$

43.36 MPa

$$P_{cyl} = 2 * e_a * f * z / (D_i + e_a)$$

$$= 2 * 2.7 * 338.1 * 1 / (109 + 2.7) =$$

16.35 MPa

$$P_{max} \text{ (is the least of } P_s, P_y, P_b \text{ and } P_{cyl}) = P_{max}$$

$$= 16.35 =$$

16.35 MPa

EN13445-5;10.2.3.3 REQUIRED MIN.HYDROSTATIC TEST PRESSURE:Ptmin

NEW AT AMBIENT TEMP. FOR TEST GROUPS 1, 2 and 3

$$P_{tmin} = 1.25 * P_d * f_{20} / f = 1.25 * 3 * 212.5 / 205.73 =$$

3.8734 MPa

$$P_{tmin} = 1.43 * P_d = 1.43 * 3 =$$

4.2900 MPa

Test Pressure Ptmin=4.29 <= Pmax=16.35[MPa]**26.2%****OK**

Maximum diameter of Opening Not Requiring Reinforcement Check , dmax

$$r_{is} = R \quad (9.5-4) = 91.2 =$$

91.20 mm

Length of Shell Contributing to Reinforcement

$$I_s = \text{Sqr}((2 * r_{is} + e_a) * e_a) \quad (9.5-2) = \text{Sqr}((2 * 91.2 + 2.2) * 2.2) =$$

20.15 mm

Maximum Diameter of Unreinforced Opening in Shell Checked to Rules in Section 9

$$d_{max1} = \text{MIN}(0.5 * D_i, (e_a * I_s * (f - 0.5 * P) / (P - r_{is} * I_s)) / (0.5 * r_{is} + 0.5 * e_a)) \quad (9.5-7, 22, 23)$$

$$= \text{MIN}(0.5 * 109, (2.2 * 20.15 * (205.73 - 0.5 * 3) / (3 - 91.2 * 20.15)) / (0.5 * 91.2 + 0.5 * 2.2))$$

$$= 25.27 \text{ mm}$$

Maximum diameter of Opening Not Requiring Reinforcement Check

$$d_{max2} = 0.15 * \text{Sqr}((2 * r_{is} + e_a) * e_a) \quad (9.5-18)$$

$$= 0.15 * \text{Sqr}((2 * 91.2 + 2.2) * 2.2) =$$

3.0229 mm

Maximum Diameter of Unreinforced Opening

$$d_{max} = \text{MAX}(d_{max1}, d_{max2}) = \text{MAX}(25.27, 3.02) =$$

25.27 mm

CALCULATION SUMMARY

7.5.3 - TORISPHERICAL ENDS UNDER INTERNAL PRESSURE

7.5.3.2 Required Minimum End Thickness

Required Minimum End Thickness Excl.Allow. e_{min} :

$$e_{min} = e_{min} = 0.8531 =$$

0.8531 mm

Required Minimum End Thickness Incl.Allow. :

$$e_{min_a} = e_{min} + c + t_h = 0.8531 + 0.5 + 0.3 =$$

1.6500 mm

Internal Pressure $e_{min_a} = 1.65 <= e_n = 3[\text{mm}]$ **54.9%****OK**

Minimum Thickness of Straight Flange Incl.Corr. :

$$e_{cyl_a} = e_{cyl} + c = 0.8006 + 0.5 =$$

1.3000 mm

MAXIMUM ALLOWABLE WORKING PRESSURE MAWP :NEW & COLD

$$P_{max} \text{ (is the least of } P_s, P_y, P_b \text{ and } P_{cyl}) = P_{max}$$

$$= 10.27 =$$

10.27 MPa

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 7.5 DOMED ENDS

E3.1 Bottom head 10 July 2023 15:42 ConnID:S1.1

MAXIMUM ALLOWABLE WORKING PRESSURE MAWP :HOT & CORRPmax (is the least of Ps, Py, Pb and Pcyl) = Pmax
=8.14=8.1404 MPa**MAX TEST PRESSURE (Uncorroded cond.at ambient temp.)**Pmax (is the least of Ps, Py, Pb and Pcyl) = Pmax
=16.35=16.35 MPa**EN13445-5;10.2.3.3 REQUIRED MIN.HYDROSTATIC TEST PRESSURE:Ptmin**

NEW AT AMBIENT TEMP. FOR TEST GROUPS 1, 2 and 3

Ptmin = 1.25 * Pd * f20 / f =1.25*3*212.5/205.73=

3.8734 MPa

Ptmin = 1.43 * Pd =1.43*3=

4.2900 MPa**Test Pressure Ptmin=4.29 <= Pmax=16.35[MPa]****26.2%****OK****Maximum diameter of Opening Not Requiring Reinforcement Check , dmax**

Maximum Diameter of Unreinforced Opening

dmax = MAX(dmax1, dmax2) =MAX(25.27,3.02)=

25.27 mm

Volume:0.0003100 m3 Weight:0.4 kg (SG= 7.85)

Company Name -

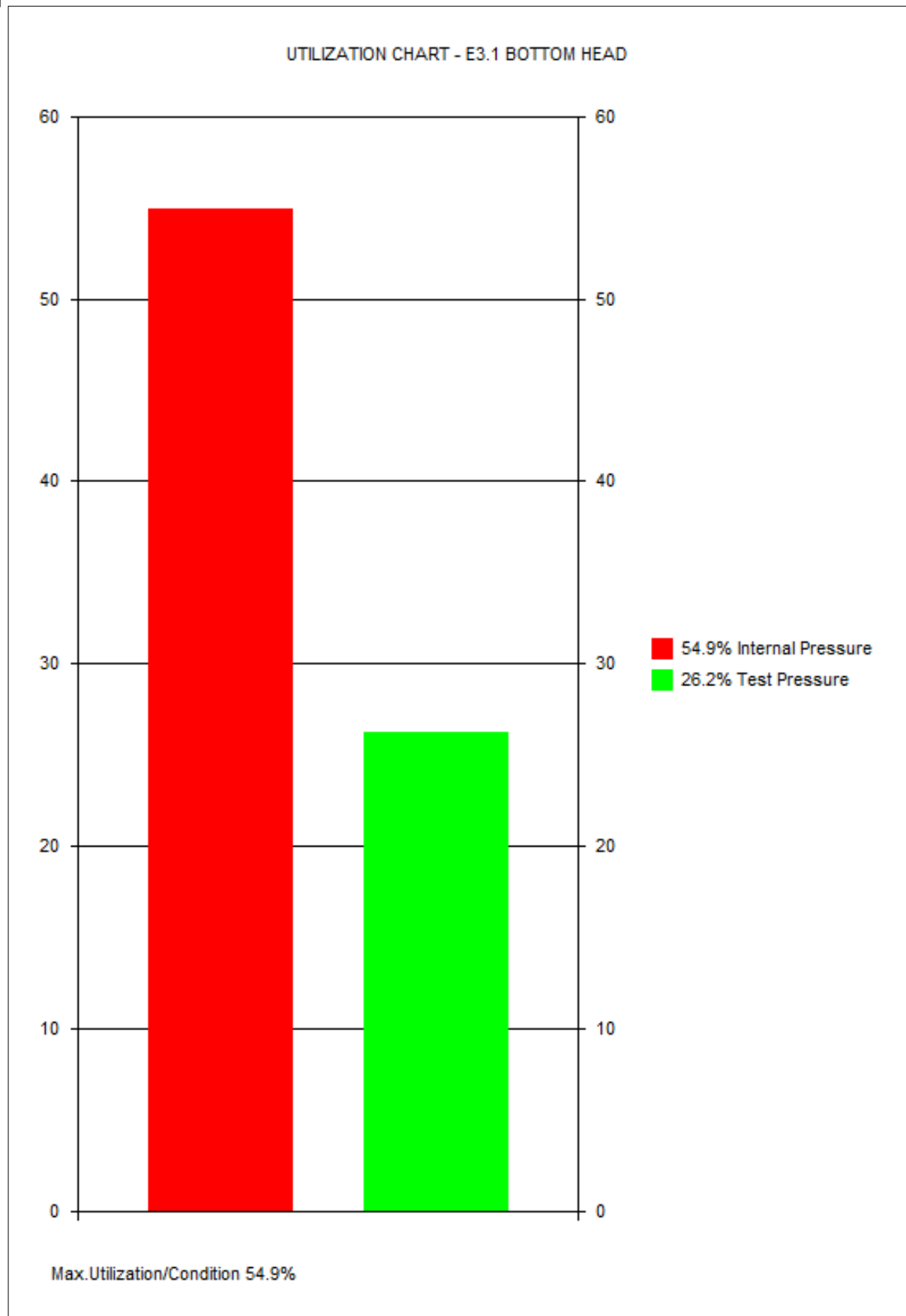
Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 7.5 DOMED ENDS

E3.1 Bottom head 10 July 2023 15:42 ConnID:S1.1



Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 10.4 KAYNAKLI DAIRESEL DUZ BASLIK

E4.1 Flat 04 Feb. 2022 14:54 ConnID:S1.1

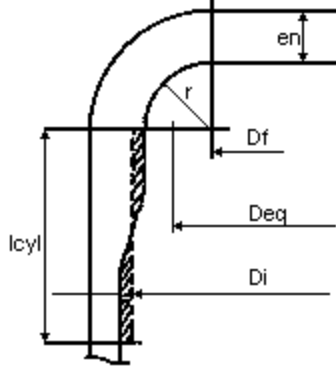
GIRIS BİLGİLERİ

BAGLANTI KOMPONENTİ/ YERİ

BAGLANTILAR: S1.1 Cylindrical Shell Main Shell
YERLEŞİM: z-EKSENİ BOYUNCA z1= 240

GENEL PROJE BİLGİLERİ

ISLEM KARTI: GENEL PROJE BİLGİLERİ : Temp= 130°C, P=3.0000 MPa, c=0.5 mm
ISLETME SIVISI ÖZGÜL AĞIRLIĞI:SG 0.00
SIVI KOLONU.....:LH 0.00 mm
Check Deflection of Cover to TEMA RCB-9-21(multipass units): YOK / HAYIR
Shape of Cover: DAİRESEL
Stayed Flat Plate to section 20.2: YOK / HAYIR
Circular flat ends with radial reinforcement ribs to section 21: YOK / HAYIR



DUZ KAYNAKLI BASLIK TİPİ: GOBEKLİ DUZ UC/ KOSE YARICAPI

SİLİNDİRİK GOVDE BÖLGESİ İÇİN BİLGİ

SİLİNDİR CAPI: SİLİNDİR DİS CAPI TEMEL PROJESİ
GOVDE DİS CAPI.....:De 114.00 mm
İMALAT SONRASI DUVAR KALINLIĞI (PAS YOK):esn 3.0000 mm
İNCELME PAYLI/ NEGATİF TOLERANS.....:th 0.3000 mm
SİLİNDİR KENAR BOYU:Lc 240.00 mm
EN 10217-3:2019, 1.0565 P355NH welded tube, HT:N THK<=20mm 130'C
Rm=490 Rp=355 Rpt=292 fs=194.67 fs20=204.17 fstest=338.1 E=203868(N/mm2) ro=7.85

BASLIK / KOR FLANS İÇİN BİLGİ

İC GOBEK/ KENAR YARICAPI:r 7.2000 mm
BASLIK İMALAT SONRASI KALINLIĞI (PAS YOK).....:en 6.0000 mm
EN 10028-2:2017, 1.0473 P355GH plate and strip, HT:N THK<=16mm 130'C
Rm=510 Rp=355 Rpt=308.6 f=205.73 f20=212.5 fstest=338.1 E=203868(N/mm2) ro=7.85

WELDING REQUIREMENTS TO EN 1708-1:2010

Comment(Optional):
Type of welded connection: Not Applicable

HESAPLAMA BİLGİSİ

$Di = De - 2 * (esn - c) = 114 - 2 * (3 - 0.5) = 109.00 \text{ mm}$
ASGARİ KALINLIK- SİLİNDİR BÖLGESİ- BASINÇ "esmin"
 $esmin = P * Di / (2 * fs - P) = 3 * 109 / (2 * 194.67 - 3) = 0.8464 \text{ mm}$
BAGLANTIYA DESTEK OLAN SİLİNDİR GOVDESİ BOYU "l cyl"
 $Icyl = 0.5 * \text{Sqr}((Di + es) * es) = 7.8200 \text{ mm}$ (10.4-1)
 $= 0.5 * \text{Sqr}((109 + 2.2) * 2.2) = 7.8200 \text{ mm}$
SİLİNDİRİK GOVDEDE KALINLIK ANALİZİ "es"
 $es = (esn - c - th) * \text{MIN}(Lc, Icyl) / Icyl = 2.2000 \text{ mm}$
 $= (3 - 0.5 - 0.3) * \text{MIN}(240, 7.82) / 7.82 = 2.2000 \text{ mm}$

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 10.4 KAYNAKLI DAIRESEL DUZ BASLIK

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ASGARi MUSAADe EDiLiR PROJE GERiLiMi "fmin"

$f_{min} = \min(f, f_s) = \min(205.73, 194.67) =$

194.67 N/mm²

ASGARi GOBEK/ KOSE YARICAPI rmin

$r_{min} = \max(e_s, 1.3 * e_{af}) = \max(2.2, 1.3 * 5.5) =$

7.1500 mm

10.4.3 ASGARi KALINLIK- GOBEKLi e, DUZ BASLIK iCiN

Factor C1 from fig.10.4.4($e_s/D_i=0.0202$) ($p/f=0.0146$)

C1 =0.3803

GOBEKLi BASLIK ESDEGER CAPI

$Deq = D_i - r (10.4-7) = 109 - 7.2 =$

101.80 mm

ASGARi KALINLIK-PAS PAYI "er" HARiC

$e_{min} = C1 * Deq * \sqrt{P / f}$

(10.4-3)

$= 0.3803 * 101.8 * \sqrt{3 / 205.73} =$

4.6746 mm

ASGARi KALINLIK- PAsPAYI "e" DAHiL

$e = e_{min} + c = 4.67 + 0.5 =$

5.1746 mm

KALINLIK KONTROLU en=6 >= e=5.17[mm]

86.2%

OK

PRESSURE CALCULATIONS

AZAMi UYGULANAN CALISMA BASINCI MAWP:YENi &SOGUK

$P_{max} = f * (ea / (C1 * Deq)) ^ 2$

$= 212.5 * (6 / (0.3931 * 101.8)) ^ 2 =$

4.7771 MPa

AZAMi UYGULANAN CALISMA BASINCI MAWP:SICAK &PASLI

$P_{max} = f * (ea / (C1 * Deq)) ^ 2$

$= 205.73 * (5.5 / (0.3887 * 101.8)) ^ 2 =$

3.9741 MPa

AZAMi TEST BASINCI (ORTAM SICAKLIGI VE PAS YOK)

$P_{max} = f * (ea / (C1 * Deq)) ^ 2$

$= 338.1 * (6 / (0.4011 * 101.8)) ^ 2 =$

7.2999 MPa

EN13445-5;10.2.3.3 ASGARi TEST BASINCI: Ptmin

TEST GRUP 1-2-3 ICIN ORTAN SICAKLIGINDA- YENi

$P_{tmin} = 1.25 * P_d * f_{20} / f = 1.25 * 3 * 212.5 / 205.73 =$

3.8734 MPa

$P_{tmin} = 1.43 * P_d = 1.43 * 3 =$

4.2900 MPa

TEST BASINCI Ptmin=4.29 <= Pmax=7.3[MPa]

58.7%

OK

HESAPLAMA OZETi

10.4.3 ASGARi KALINLIK- GOBEKLi e, DUZ BASLIK iCiN

ASGARi KALINLIK- PAsPAYI "e" DAHiL

$e = e_{min} + c = 4.67 + 0.5 =$

5.1746 mm

KALINLIK KONTROLU en=6 >= e=5.17[mm]

86.2%

OK

PRESSURE CALCULATIONS

AZAMi UYGULANAN CALISMA BASINCI MAWP:YENi &SOGUK

$P_{max} = f * (ea / (C1 * Deq)) ^ 2$

$= 212.5 * (6 / (0.3931 * 101.8)) ^ 2 =$

4.7771 MPa

AZAMi UYGULANAN CALISMA BASINCI MAWP:SICAK &PASLI

$P_{max} = f * (ea / (C1 * Deq)) ^ 2$

$= 205.73 * (5.5 / (0.3887 * 101.8)) ^ 2 =$

3.9741 MPa

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 10.4 KAYNAKLI DAIRESEL DUZ BASLIK

E4.1 Flat 04 Feb. 2022 14:54 ConnID:S1.1

AZAMi TEST BASINCI (ORTAM SICAKLIGI VE PAS YOK)

$$P_{max} = f * (e_a / (C_1 * D_{eq}))^2$$
$$= 338.1 * (6 / (0.4011 * 101.8))^2 =$$

7.2999 MPa

EN13445-5;10.2.3.3 ASGARi TEST BASINCI: P_{tmin}

TEST GRUP 1-2-3 ICIN ORTAN SICAKLIGINDA- YENi

$$P_{tmin} = 1.25 * P_d * f_{20} / f = 1.25 * 3 * 212.5 / 205.73 =$$

3.8734 MPa

$$P_{tmin} = 1.43 * P_d = 1.43 * 3 =$$

4.2900 MPa

TEST BASINCI P_{tmin}=4.29 <= P_{tmax}=7.3[MPa]

58.7%

OK

HACIM0.00 m³ Weight:0 kg (SG= 7.85)

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

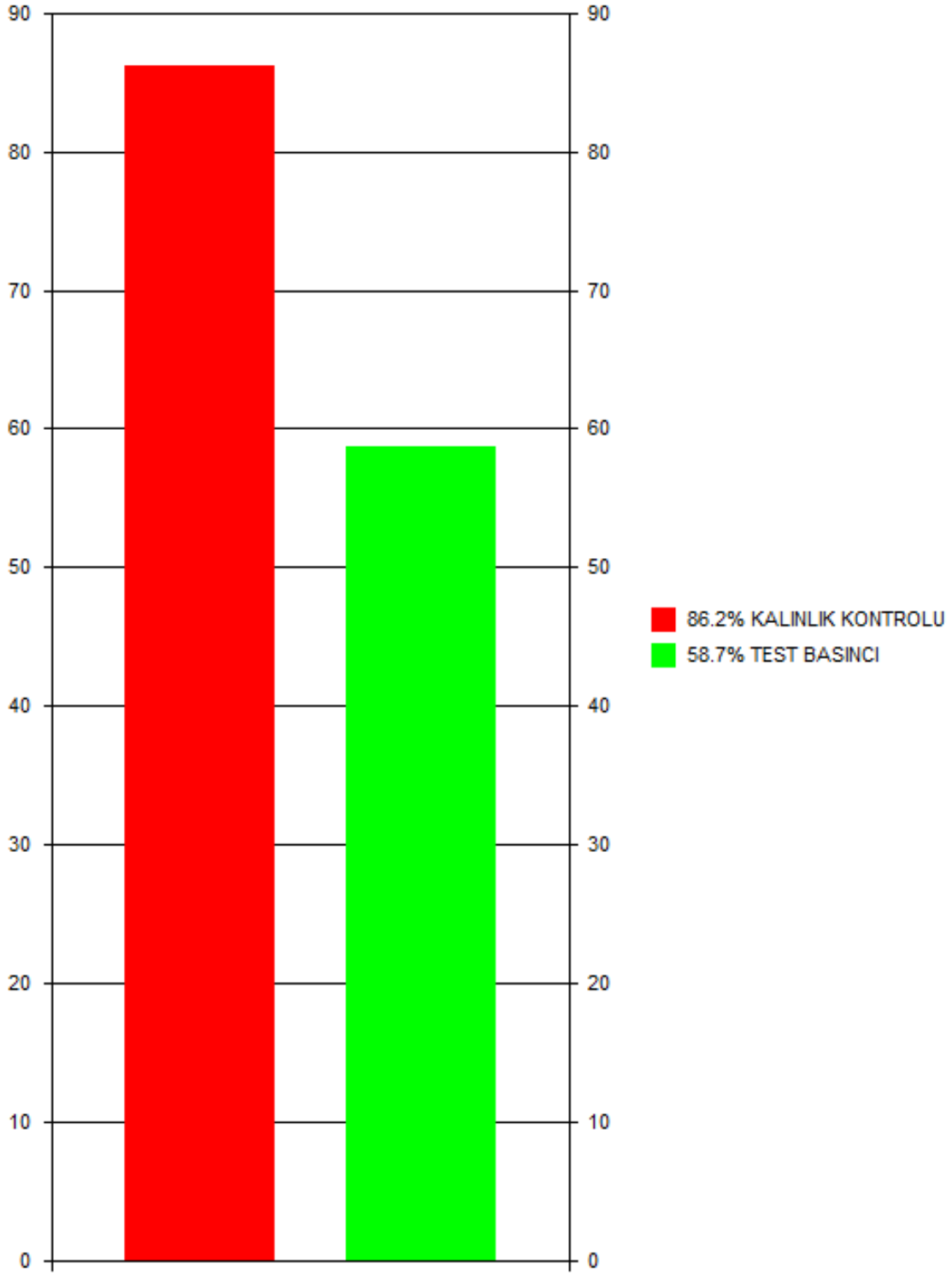
Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 10.4 KAYNAKLI DAIRESEL DUZ BASLIK

E4.1 Flat

04 Feb. 2022 14:54 ConnID:S1.1

KULLANMA GRAFIGI - E4.1 FLAT



Max.Utilization/Condition 86.2%

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.1 1/2" ODS

04 Feb. 2022 14:29 ConnID:E4.1

GİRİŞ BİLGİLERİ

BAGLANTI KOMPONENTİ/ YERİ

BAGLANTILAR: E4.1 KAYNAKLI DÜZ BOMBE/B Flat

S1.1

Connect this nozzle to the nozzle neck of another nozzle: YOK / HAYIR



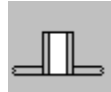
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NOZUL YERLESTIRMESİ VE YONLENDİRME: BASLIĞA RADYAL ETKİ (MERKEZDEN KACIK)

x-y DÜZLEMİNDE NOZUL ROTASYON ACISI.....:Phi 0.00 Degr.

BASLIK VE NOZUL EKSENLERİ ARASI MESAFE.....:R 30.00 mm

GENEL PROJE BİLGİLERİ



PENCERE- BOSLUK TİPİ: STANDART ASME VEYA DIN FLANSI OLMAYAN NOZUL

BASINÇ DEĞERİ: SADECE İÇ BASINÇ İÇİN PROJE KOMPONENTİ

İŞLEM KARTI:

GENEL PROJE BİLGİLERİ : Temp= 130°C, P=3.0000 MPa, c=0.5 mm, Pext=0.0000 MPa

İŞLETME SIVISI ÖZGÜL AĞIRLIĞI:SG 0.00

SİVİ KOLONU.....:LH 0.00 mm

Apply a different corrosion allowance to nozzle neck than the shell thickness.:

YOK / HAYIR

GOVDE DETAY BİLGİLERİ (E4.1)

GOVDE TİPİ: KAYNAKLI DÜZ BASLIK

GOVDE/CONTA REAKSİYON İÇ ÇAPI:Di 109.00 mm

İMALAT SONRASI DUVAR KALINLIĞI (PAS YOK):en 6.0000 mm

TEKPARÇA BASLIK GEREKLİ KALINLIĞI (PAS VAR).....:eo 4.6746 mm

DAİRESEL DÜZ BASLIK HESABINDA ŞEKİL FAKTORU:C1 0.3803

EN 10028-2:2017, 1.0473 P355GH plate and strip, HT:N THK<=16mm 130'C

Rm=510 Rp=355 Rpt=308.6 fs=205.73 f20=212.5 ftest=338.1 E=203868(N/mm2) ro=7.85

NZUL MALZEME BİLGİLERİ



Delivery Form: DiKiSSiZ BORU

EN 10216-2:2013, 1.0345 P235GH seamless tube, HT:N THK<=16mm 130'C

Rm=360 Rp=235 Rpt=191.4 fb=127.6 f20=150 ftest=223.81 E=203868(N/mm2) ro=7.85

NOZUL BOYUT BİLGİLERİ

Company Name -

Client :GÜVEN SOGUTMA

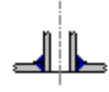
Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.1 1/2" ODS

04 Feb. 2022 14:29 ConnID:E4.1



BAGLANTILAR: ACIK NOZULDA AYARLAR

Application:

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

NOZUL DIS CAPI:deb 20.00 mm

IMAL EDILMIS NOZUL KALINLIGI (PAS YOK).....:enb 4.5000 mm

FLANS VE NOZUL BUYUKLUGU:

YORUM (ISTEGE BAGLI):

NEGATIF TOLERANS/ INCELME PAYI: 12.50 %

KAP DISCAPINDAN NOZUL YERLESiMi MESAFESi.....:ho 30.00 mm

WELDING REQUIREMENTS TO EN 1708-1:2010

Comment(Optional):

Type of welded connection: Not Applicable

HESAPLAMA BiLGiSi

ON PROJE HESAPLARI

GOVDE ANALiZ KALINLIGI eas

eas = en - c =6-0.5= 5.5000 mm

NOZUL ANALiZ KALINLIGI eab

eab = enb - cn - NegDev =4.5-0.5-0.5625= 3.4375 mm

dib = deb - 2 * eab =20-2*3.4375= 13.13 mm

ASGARi NOZUL KALINLIGI- IC BASINC ESAS "ebp"

ebp = P * deb / (2 * fb * z + P) =3*20/(2*127.6*1+3)= 0.2300 mm

ASGARi NOZUL KALINLIGI ebp=0.23 <= eab=3.4375[mm] 6.6% OK

NOZUL BOYUNCA TAKViYE SINIRI

Ibo = MIN(0.8 * Sqr((dib + eab) * eab), ho) (10.6-8)

=MIN(0.8*Sqr((13.125+3.4375)*3.4375,)30)= 6.0363 mm

NOZUL A'DA MEVCUT TAKViYE TOPLAM ALANI

A = Ibo * (eab - ebp) + eas * eab

=6.04*(3.4375-0.23)+5.5*3.4375= 38.27 mm2

A = MIN(A , A * fb / fs) (10.6-7)

=MIN(38.27,38.27*127.6/205.73)= 23.73 mm2

deq = deb - 2 * A / eas (10.6-6) =20-2*23.73/5.5= 11.37 mm

10.6 DELiKLi DAiRESEL DUZ BASLIK

HESAPLANAN, Y1 VE Y2 DELiK TAKViYESi KATSAYISI

Y1 = MIN(2, (2 * h / (2 * h - deq)) ^ (1 / 3)) (10.6-3)

=MIN(2, (2*24.5/(2*24.5-11.37))^(1/3))= 1.0920

Y2 = SQR(Di / (Di - deq)) (10.6-4) =SQR(109/(109-11.37))= 1.0566

GEREKLi ASGARi BASLIK KALINLIGI-PENCERE "emin"

emin = MAX(Y1 * eo, C1 * Y2 * Di * SQR(P / fs)) + c (10.6-1)

=MAX(1.09*4.67,0.3803*1.06*109*SQR(3/205.73))+0.5= 5.7886 mm

GEREKLi TEKPARCA BASLIK KALINLIGI emin=5.79 <= en=6[mm] 96.4% OK

Weight of Nozzle: .0516kg Pad: 0kg

HESAPLAMA OZETi

ASGARi NOZUL KALINLIGI ebp=0.23 <= eab=3.4375[mm] 6.6% OK

NOZUL BOYUNCA TAKViYE SINIRI

Ibo = MIN(0.8 * Sqr((dib + eab) * eab), ho) (10.6-8)

=MIN(0.8*Sqr((13.125+3.4375)*3.4375,)30)= 6.0363 mm

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.1 1/2" ODS

04 Feb. 2022 14:29 ConnID:E4.1

GEREKLi ASGARİ BASLIK KALINLIGI-PENCERE "emin"
$$\text{emin} = \text{MAX}(Y1 * eo, C1 * Y2 * Di * \text{SQR}(P / fs)) + c \quad (10.6-1)$$
$$= \text{MAX}(1.09 * 4.67, 0.3803 * 1.06 * 109 * \text{SQR}(3 / 205.73)) + 0.5 = 5.7886 \text{ mm}$$
GEREKLi TEKPARCA BASLIK KALINLIGI emin=5.79 <=
en=6[mm]**96.4%****OK**

HACIM0.00 m3 Weight:0.1 kg (SG= 7.85)

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

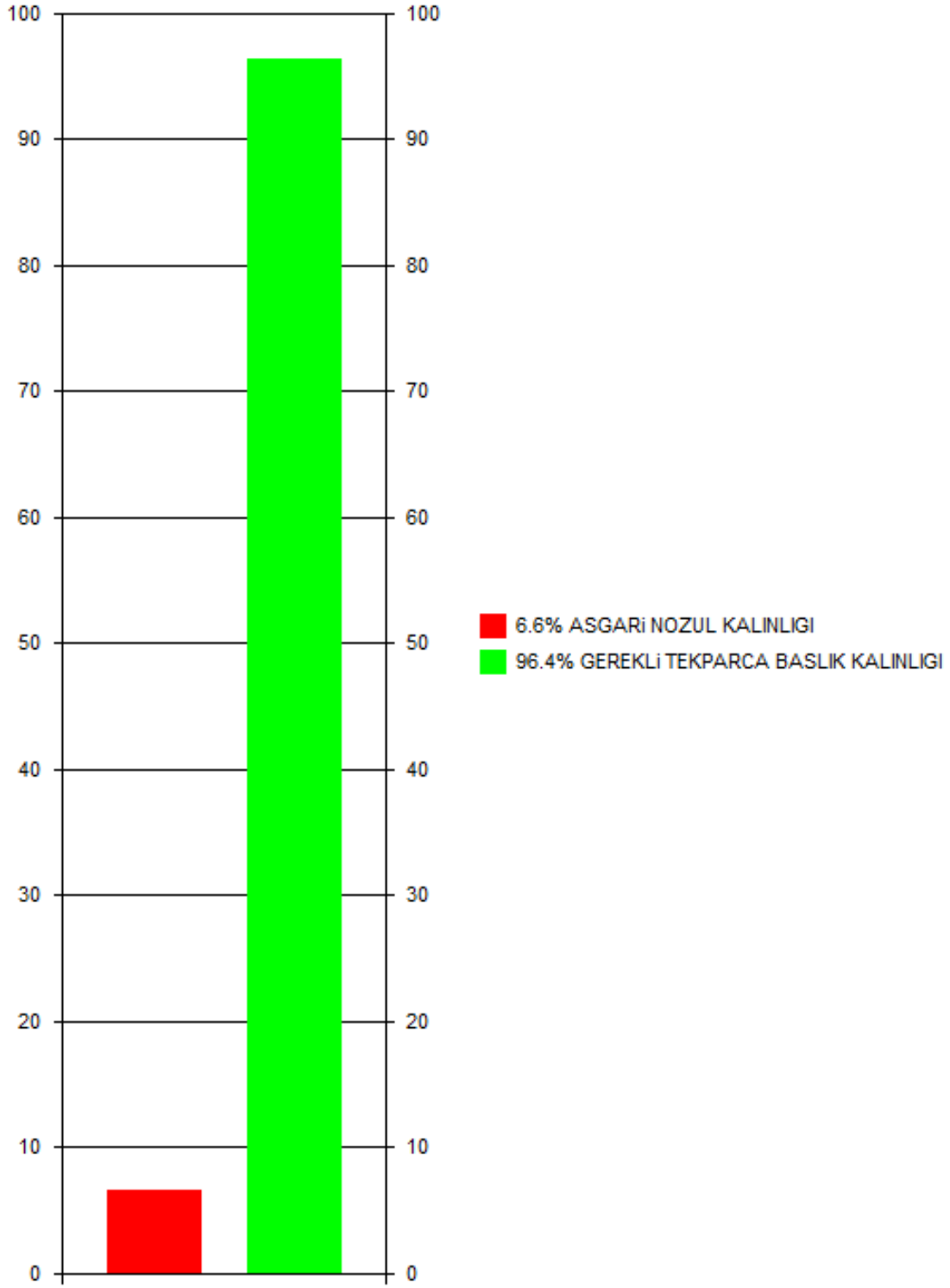
Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.1 1/2" ODS

04 Feb. 2022 14:29 ConnID:E4.1

KULLANMA GRAFiGi - N.1 1/2" ODS



Max.Utilization/Condition 96.4%

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.2 1/2"ODS

04 Feb. 2022 14:34 ConnID:E4.1

GİRİŞ BİLGİLERİ

BAGLANTI KOMPONENTİ/ YERİ

BAGLANTILAR: E4.1 KAYNAKLI DÜZ BOMBE/B Flat

S1.1

Connect this nozzle to the nozzle neck of another nozzle: YOK / HAYIR



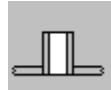
Off Center

NOZUL YERLESTIRMESİ VE YONLENDİRME: BASLIĞA RADYAL ETKİ (MERKEZDEN KACIK)

x-y DÜZLEMİNDE NOZUL ROTASYON ACISI.....:Phi 180.00 Degr.

BASLIK VE NOZUL EKSENLERİ ARASI MESAFE.....:R 30.00 mm

GENEL PROJE BİLGİLERİ



PENCERE- BOSLUK TİPİ: STANDART ASME VEYA DIN FLANSI OLMAYAN NOZUL

BASINÇ DEĞERİ: SADECE İÇ BASINÇ İÇİN PROJE KOMPONENTİ

İŞLEM KARTI:

GENEL PROJE BİLGİLERİ : Temp= 130°C, P=3.0000 MPa, c=0.5 mm, Pext=0.0000 MPa

İŞLETME SIVISI ÖZGÜL AĞIRLIĞI:SG 0.00

SİVİ KOLONU.....:LH 0.00 mm

Apply a different corrosion allowance to nozzle neck than the shell thickness.:

YOK / HAYIR

GOVDE DETAY BİLGİLERİ (E4.1)

GOVDE TİPİ: KAYNAKLI DÜZ BASLIK

GOVDE/CONTA REAKSİYON İÇ ÇAPI:Di 109.00 mm

İMALAT SONRASI DUVAR KALINLIĞI (PAS YOK):en 6.0000 mm

TEKPARÇA BASLIK GEREKLİ KALINLIĞI (PAS VAR).....:eo 4.6746 mm

DAİRESEL DÜZ BASLIK HESABINDA ŞEKİL FAKTORU:C1 0.3803

EN 10028-2:2017, 1.0473 P355GH plate and strip, HT:N THK<=16mm 130'C

Rm=510 Rp=355 Rpt=308.6 fs=205.73 f20=212.5 ftest=338.1 E=203868(N/mm2) ro=7.85

NZUL MALZEME BİLGİLERİ



Delivery Form: DiKiSSiZ BORU

EN 10216-2:2013, 1.0345 P235GH seamless tube, HT:N THK<=16mm 130'C

Rm=360 Rp=235 Rpt=191.4 fb=127.6 f20=150 ftest=223.81 E=203868(N/mm2) ro=7.85

NOZUL BOYUT BİLGİLERİ

Company Name -

Client :GÜVEN SOGUTMA

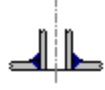
Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.2 1/2"ODS

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BAGLANTILAR: ACIK NOZULDA AYARLAR

Application:

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

NOZUL DIS CAPI:deb 20.00 mm

IMAL EDILMIS NOZUL KALINLIGI (PAS YOK).....:enb 4.5000 mm

FLANS VE NOZUL BUYUKLUGU:

YORUM (ISTEGE BAGLI):

NEGATIF TOLERANS/ INCELME PAYI: 12.50 %

KAP DISCAPINDAN NOZUL YERLESiMi MESAFESi.....:ho 30.00 mm

WELDING REQUIREMENTS TO EN 1708-1:2010

Comment(Optional):

Type of welded connection: Not Applicable

HESAPLAMA BiLGiSi

ON PROJE HESAPLARI

GOVDE ANALiZ KALINLIGI eas

eas = en - c =6-0.5= 5.5000 mm

NOZUL ANALiZ KALINLIGI eab

eab = enb - cn - NegDev =4.5-0.5-0.5625= 3.4375 mm

dib = deb - 2 * eab =20-2*3.4375= 13.13 mm

ASGARi NOZUL KALINLIGI- IC BASINC ESAS "ebp"

ebp = P * deb / (2 * fb * z + P) =3*20/(2*127.6*1+3)= 0.2300 mm

ASGARi NOZUL KALINLIGI ebp=0.23 <= eab=3.4375[mm] 6.6% OK

NOZUL BOYUNCA TAKViYE SINIRI

Ibo = MIN(0.8 * Sqr((dib + eab) * eab), ho) (10.6-8)

=MIN(0.8*Sqr((13.125+3.4375)*3.4375,)30)= 6.0363 mm

NOZUL A'DA MEVCUT TAKViYE TOPLAM ALANI

A = Ibo * (eab - ebp) + eas * eab

=6.04*(3.4375-0.23)+5.5*3.4375= 38.27 mm²

A = MIN(A , A * fb / fs) (10.6-7)

=MIN(38.27,38.27*127.6/205.73)= 23.73 mm²

deq = deb - 2 * A / eas (10.6-6) =20-2*23.73/5.5= 11.37 mm

10.6 DELiKLi DAiRESEL DUZ BASLIK

HESAPLANAN, Y1 VE Y2 DELiK TAKViYESi KATSAYISI

Y1 = MIN(2, (2 * h / (2 * h - deq)) ^ (1 / 3)) (10.6-3)

=MIN(2, (2*24.5/(2*24.5-11.37))^(1/3))= 1.0920

Y2 = SQR(Di / (Di - deq)) (10.6-4) =SQR(109/(109-11.37))= 1.0566

GEREKLi ASGARi BASLIK KALINLIGI-PENCERE "emin"

emin = MAX(Y1 * eo, C1 * Y2 * Di * SQR(P / fs)) + c (10.6-1)

=MAX(1.09*4.67,0.3803*1.06*109*SQR(3/205.73))+0.5= 5.7886 mm

GEREKLi TEKPARCA BASLIK KALINLIGI emin=5.79 <= en=6[mm] 96.4% OK

Weight of Nozzle: .0516kg Pad: 0kg

HESAPLAMA OZETi

ASGARi NOZUL KALINLIGI ebp=0.23 <= eab=3.4375[mm] 6.6% OK

NOZUL BOYUNCA TAKViYE SINIRI

Ibo = MIN(0.8 * Sqr((dib + eab) * eab), ho) (10.6-8)

=MIN(0.8*Sqr((13.125+3.4375)*3.4375,)30)= 6.0363 mm

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.2 1/2"ODS

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GEREKLi ASGARİ BASLIK KALINLIGI-PENCERE "emin"

$$\text{emin} = \text{MAX}(Y1 * eo, C1 * Y2 * Di * \text{SQR}(P / fs)) + c \quad (10.6-1)$$
$$= \text{MAX}(1.09 * 4.67, 0.3803 * 1.06 * 109 * \text{SQR}(3 / 205.73)) + 0.5 = 5.7886 \text{ mm}$$

GEREKLi TEKPARCA BASLIK KALINLIGI emin=5.79 <=
en=6[mm]

96.4%

OK

HACIM0.00 m3 Weight:0.1 kg (SG= 7.85)

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

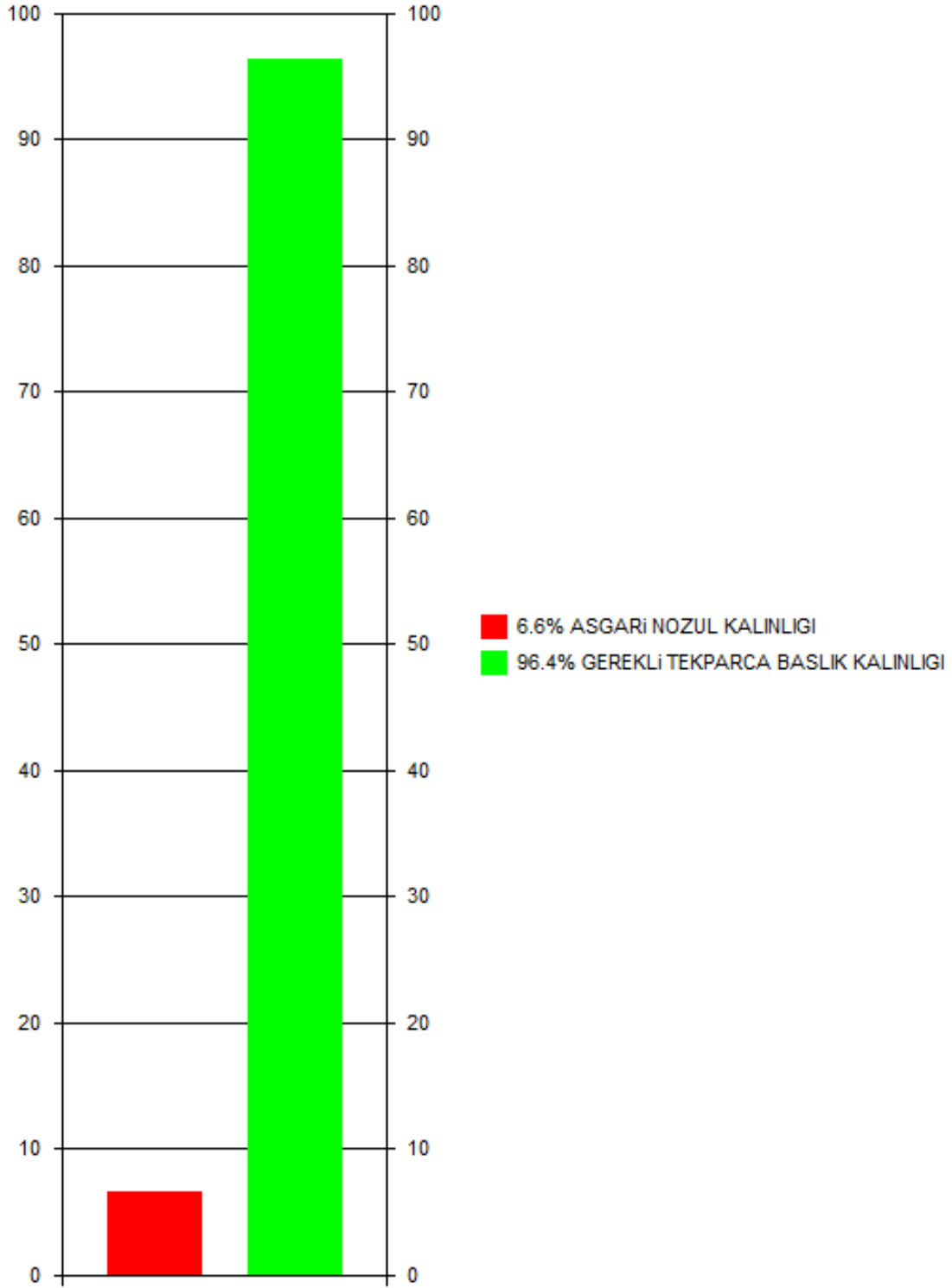
Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.2 1/2"ODS

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KULLANMA GRAFIGI - N.2 1/2"ODS



Max.Utilization/Condition 96.4%

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.3 3/8" SAE

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GİRİŞ BİLGİLERİ

BAGLANTI KOMPONENTİ/ YERİ

BAGLANTILAR: E4.1 KAYNAKLI DÜZ BOMBE/B Flat

S1.1

Connect this nozzle to the nozzle neck of another nozzle: YOK / HAYIR



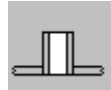
Off Center

NOZUL YERLESTIRMESİ VE YONLENDİRME: BASLIĞA RADYAL ETKİ (MERKEZDEN KACIK)

x-y DÜZLEMİNDE NOZUL ROTASYON ACISI.....:Phi 270.00 Degr.

BASLIK VE NOZUL EKSENLERİ ARASI MESAFE.....:R 40.00 mm

GENEL PROJE BİLGİLERİ



PENCERE- BOSLUK TİPİ: STANDART ASME VEYA DIN FLANSI OLMAYAN NOZUL

BASINÇ DEĞERİ: SADECE İÇ BASINÇ İÇİN PROJE KOMPONENTİ

İŞLEM KARTI:

GENEL PROJE BİLGİLERİ : Temp= 130°C, P=3.0000 MPa, c=0.5 mm, Pext=0.0000 MPa

İŞLETME SIVISI ÖZGÜL AĞIRLIĞI:SG 0.00

SİVİ KOLONU.....:LH 0.00 mm

Apply a different corrosion allowance to nozzle neck than the shell thickness.:

YOK / HAYIR

GOVDE DETAY BİLGİLERİ (E4.1)

GOVDE TİPİ: KAYNAKLI DÜZ BASLIK

GOVDE/CONTA REAKSİYON İÇ ÇAPI:Di 109.00 mm

İMALAT SONRASI DUVAR KALINLIĞI (PAS YOK):en 6.0000 mm

TEKPARÇA BASLIK GEREKLİ KALINLIĞI (PAS VAR).....:eo 4.6746 mm

DAİRESEL DÜZ BASLIK HESABINDA ŞEKİL FAKTORU:C1 0.3803

EN 10028-2:2017, 1.0473 P355GH plate and strip, HT:N THK<=16mm 130'C

Rm=510 Rp=355 Rpt=308.6 fs=205.73 f20=212.5 ftest=338.1 E=203868(N/mm2) ro=7.85

NZUL MALZEME BİLGİLERİ



Delivery Form: DİKİSSİZ BORU

EN 10216-2:2013, 1.0345 P235GH seamless tube, HT:N THK<=16mm 130'C

Rm=360 Rp=235 Rpt=191.4 fb=127.6 f20=150 ftest=223.81 E=203868(N/mm2) ro=7.85

NOZUL BOYUT BİLGİLERİ

Company Name -

Client :GÜVEN SOGUTMA

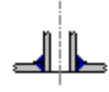
Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.3 3/8" SAE

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BAGLANTILAR: ACIK NOZULDA AYARLAR

Application:

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

NOZUL DIS CAPI:deb 16.00 mm

IMAL EDILMIS NOZUL KALINLIGI (PAS YOK).....:enb 4.7500 mm

FLANS VE NOZUL BUYUKLUGU:

YORUM (ISTEGE BAGLI):

NEGATIF TOLERANS/ INCELME PAYI: 12.50 %

KAP DISCAPINDAN NOZUL YERLESiMi MESAFESi.....:ho 20.00 mm

WELDING REQUIREMENTS TO EN 1708-1:2010

Comment(Optional):

Type of welded connection: Not Applicable

HESAPLAMA BiLGiSi

ON PROJE HESAPLARI

GOVDE ANALiZ KALINLIGI eas

eas = en - c =6-0.5= 5.5000 mm

NOZUL ANALiZ KALINLIGI eab

eab = enb - cn - NegDev =4.75-0.5-0.5938= 3.6563 mm

dib = deb - 2 * eab =16-2*3.66= 8.6875 mm

ASGARi NOZUL KALINLIGI- IC BASINC ESAS "ebp"

ebp = P * deb / (2 * fb * z + P) =3*16/(2*127.6*1+3)= 0.1900 mm

ASGARi NOZUL KALINLIGI ebp=0.19 <= eab=3.66[mm]

5.1%

OK

NOZUL BOYUNCA TAKViYE SINIRI

Ibo = MIN(0.8 * Sqr((dib + eab) * eab), ho) (10.6-8)

=MIN(0.8*Sqr((8.6875+3.66)*3.66,)20)= 5.3744 mm

NOZUL A'DA MEVCUT TAKViYE TOPLAM ALANI

A = Ibo * (eab - ebp) + eas * eab

=5.37*(3.66-0.19)+5.5*3.66= 38.74 mm2

A = MIN(A , A * fb / fs) (10.6-7)

=MIN(38.74,38.74*127.6/205.73)= 24.03 mm2

deq = deb - 2 * A / eas (10.6-6) =16-2*24.03/5.5= 7.2630 mm

10.6 DELiKLi DAiRESEL DUZ BASLIK

HESAPLANAN, Y1 VE Y2 DELiK TAKViYESi KATSAYISI

Y1 = MIN(2, (2 * h / (2 * h - deq)) ^ (1 / 3)) (10.6-3)

=MIN(2,(2*14.5/(2*14.5-7.26))^(1/3))= 1.1009

Y2 = SQR(Di / (Di - deq)) (10.6-4) =SQR(109/(109-7.26))= 1.0351

GEREKLi ASGARi BASLIK KALINLIGI-PENCERE "emin"

emin = MAX(Y1 * eo, C1 * Y2 * Di * SQR(P / fs)) + c (10.6-1)

=MAX(1.1*4.67,0.3803*1.04*109*SQR(3/205.73))+0.5= 5.6808 mm

GEREKLi TEKPARCA BASLIK KALINLIGI emin=5.68 <= en=6[mm]

94.6%

OK

Weight of Nozzle: .0264kg Pad: 0kg

HESAPLAMA OZETi

ASGARi NOZUL KALINLIGI ebp=0.19 <= eab=3.66[mm]

5.1%

OK

NOZUL BOYUNCA TAKViYE SINIRI

Ibo = MIN(0.8 * Sqr((dib + eab) * eab), ho) (10.6-8)

=MIN(0.8*Sqr((8.6875+3.66)*3.66,)20)= 5.3744 mm

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

Visual Vessel Design by Hexagon PPM,Ver:20.0 Operator : Rev.:A

EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.3 3/8" SAE

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GEREKLi ASGARİ BASLIK KALINLIGI-PENCERE "emin"
$$\text{emin} = \text{MAX}(Y1 * e_0, C1 * Y2 * D_i * \text{SQR}(P / f_s)) + c \quad (10.6-1)$$
$$= \text{MAX}(1.1 * 4.67, 0.3803 * 1.04 * 109 * \text{SQR}(3 / 205.73)) + 0.5 = 5.6808 \text{ mm}$$
GEREKLi TEKPARCA BASLIK KALINLIGI emin=5.68 <=
en=6[mm]**94.6%****OK**

HACIM0.00 m3 Weight:0 kg (SG= 7.85)

Company Name -

Client :GÜVEN SOGUTMA

Vessel Tag No.:OS.30B.12.1

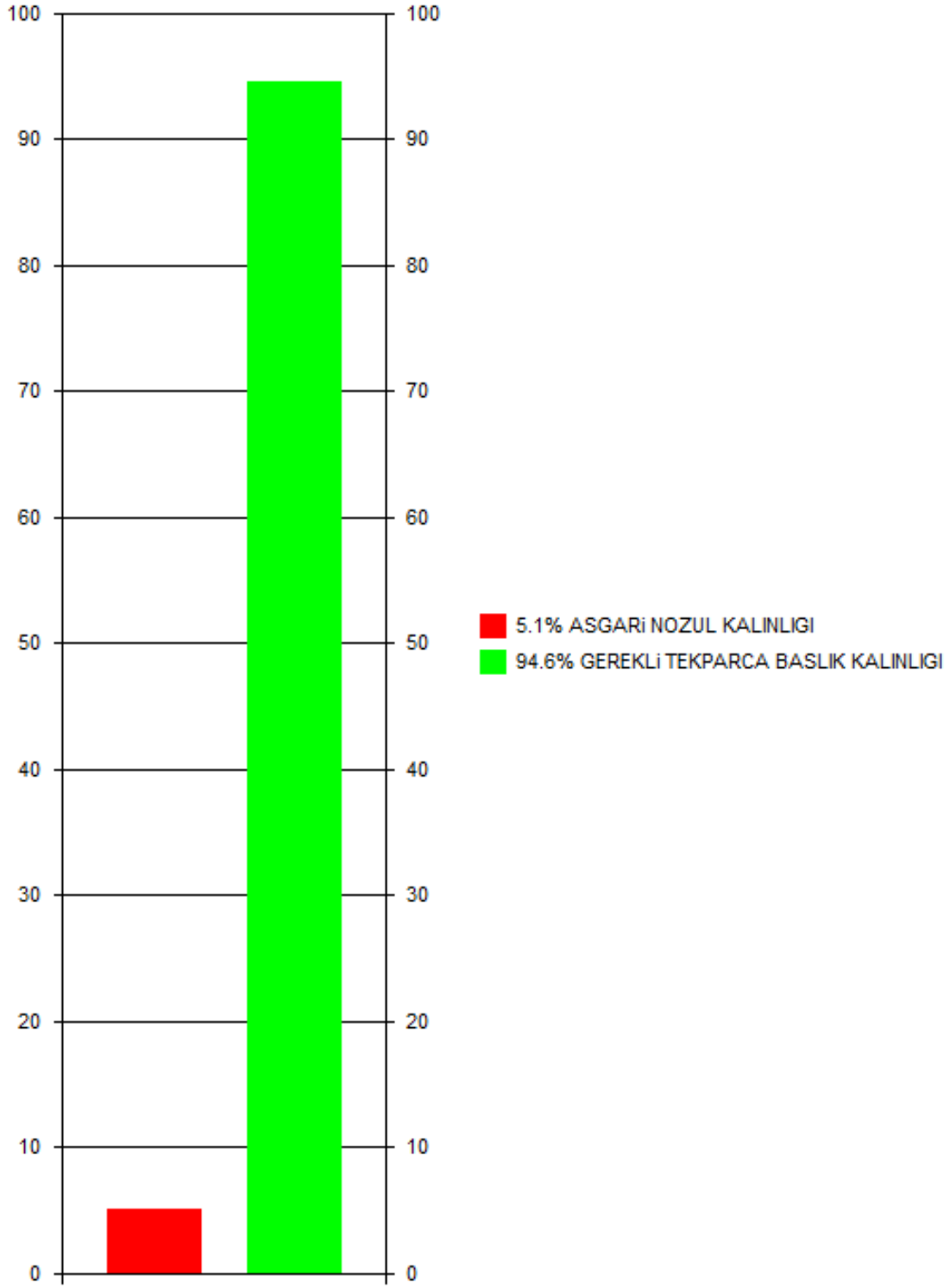
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EN13445:2014 Issue 5+A8:2019 - 9.5 GOVDELERDE IZOLE ACIKLIKLAR

N.3 3/8" SAE

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KULLANMA GRAFiGi - N.3 3/8" SAE



Max.Utilization/Condition 94.6%