Auftrag 9050300 Datum 22.06.05 10:00:02
ASU Kosice N0. 9
System: KO 07b

CCC **********CCC
CCC Spannungsanalyse CCC
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Spannungsnachweise nach PRESSURE PIPING ASME B31.3 Stand 2002

Automatische Ermittlung der zul. Spannung nach folgenden Regeln:

Die zulaessigen Spannungen Sh und Sa werden entweder vom Programm in Anlehnung an ASME B31.3 Art. 302.3
mit den Festigkeitswerten der Werkstoffdatei ermittelt oder direkt der Werkstoffdatei entnommen, falls ein ASME/ASTM-Werkstoff vorliegt. Die im ET-Satz (RR-Aufgabe) vorgegebenen zulaessigen Spannungen haben jedoch Vorrang.

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Sc = min (Rm\RT\min/3.0 , Rp0.2\RT\min/1.5)
Fuer ferritische Werkstoffe:
Sh = min (Sc , Rm\T\min/3.0 , Rp0.2\T\min/1.5 ,
          Rm\100000\mitt/1.5 , 0.8*Rm\100000\min)
Fuer austenitische Werkstoffe:
Sh = min (Sc , Rp1.0\T\min/1.5 ,
          Rm\100000\mitt/1.5 , 0.8*Rm\100000\min)
Sa = f * (1.25*Sc + 0.25*Sh)
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Rm\RT\min	=Zugfestigkeit 20 Grad C Mindestw.	in N/mm^2
Rm\T\min	=Zugfestigkeit Berechn.-T. Mindestwert	in N/mm^2
Rp02\RT\min	=0.2% Streckgrenze 20 Grad C Mindestw.	in N/mm^2
Rp02\T\min	=0.2% Streckgrenze Berechn.-T. Mindestw.	in N/mm^2
Rp1.0\T\min	=1.0% Streckgrenze Berechn.-T. Mindestw.	in N/mm^2
Rm\100000\mitt	=Zeitstandsfestw. 100000h Mittelwert	in N/mm^2
Rm\100000\min	=Zeitstandsfestw. 100000h Mindestwert	in N/mm^2

Erlaeuterungen:

Bei austenit. Staehlen mit einem Verhaeltnis von Streckgrenze/Zugfestigkeit bei 20 Grad C <= 0.5 wird mit Werten der 1% Streckgrenze gerechnet. Dieser, in deutschen Regelwerken ueblicherweise verwendete Wert zur Ermittlung der zul.Spannung fuer Austenite (/1.5), ersetzt den Wert "90% der Steckgrenze bei Temperatur" aus ASME B31.3 (303.3.2 d(3))

Falls Rm\T\min nicht vorliegt, werden Naeherungsformeln eingesetzt.
Fuer ferritische Werkstoffe:
Rm\T\min = Rm\RT\min * (Rp02\RT\min + Rp02\T\min) / (2 * Rp02\RT\min) .

Der Faktor f (von Lastwechselzahl abhaengiger Spannungs-Reduktionsfaktor) kann ueber den SPI-Datenatz eingegeben werden. (SPI .... F=f)

ANSI B31.3		Werkstoff: X6CRNITI1810			
Materialkennwert	ZUGF	RP02 RP1P	RM1H RM2H	EMOD AFAT	
Quelle	DIN17458	DIN17458	DIN17458	SEW 310 I	
Ausgabe	07/1985	07/1985	07/1985	08/1997	
1.4541 nach DIN 17458 fuer warmgeformte / nahtlose Rohre					
1.4541 enthaelt d. Kennwerte fuer nahtlose warmgeformte Rohr und fuer weiterverarbeitete Bauteile nach DIN 17458, Fuer (K)altverformte / (G)eschweisste Rohre sind die in 1.4541KG enthaltenen erhoehten Werte nach DIN 17457 zulaessi Der Zeitstandswert fuer 100000h wurde extrapoliert.					
AuslegungstempGR C	-200.000				
Betriebstemp. GR C	-200.000				
E-Mod kalt kN/mm^2	197.00				
E-Mod warm kN/mm^2	206.00				
Wanddicken mm	0- 50				
in N/mm^2					
Rm\RT\min	460.00				
Rp0.2\RT\min	180.00				
Rp1.0\T\min	215.00				
Rm\100000\mitt	-.-				
Rm\100000\min	-.-				
Rm\RT\min/3.0	153.33				
Rp0.2\RT\min/1.5	120.00				
Sc	120.00				
Rp1.0\T\min /1.5	143.33				
Rm\100000\mitt/1.5	-.-				
0.8*Rm\100000\min	-.-				
Sh	120.00				
Sa	180.00				

Den Spannungsnachweisen liegen folgende Lastfaelle zugrunde :

Lf-Datei	Lf-Feld	Lf-Bezeichnung	erstellt am:
Gew1.erg	G1	Gewicht	22.06.05 09:59:54
Temp1.erg	T1	Betrieb1	22.06.05 09:59:57
Wind1.erg	W1	Wind1-X	22.06.05 09:59:58
Wind1.erg	W2	Wind1-Y	22.06.05 09:59:58

Gedruckte Querschnittsdaten sind Nettowerte.

Es werden Toleranzeingaben beruecksichtigt fuer :
Druck-Spannungsanteile S(P)
Momenten-Spannungsanteile in SL, SOL

U E B E R L A G E R U N G S V O R S C H R I F T

Lf-Feld TMP1	Lastf. Betrie.-Gewich.1 = ARITHMET aus:			
	Lf-Feld T1	Lastf. Betrieb1	*	1.00
	+ Lf-Feld G1	Lastf. Gewicht	*	-1.00
Lf-Feld TRANGE	Lastf. Range	= RANGE aus:		
	Lf-Feld TMP1	Lastf. Betrie.-Gewich.1	*	1.00
Lf-Feld W-G_21	Lastf. Wind1-X-Gew	= ARITHMET aus:		
	Lf-Feld W1	Lastf. Wind1-X	*	1.00
	+ Lf-Feld G1	Lastf. Gewicht	*	-1.00
Lf-Feld W-G_22	Lastf. Wind1-Y-Gew	= ARITHMET aus:		
	Lf-Feld W2	Lastf. Wind1-Y	*	1.00
	+ Lf-Feld G1	Lastf. Gewicht	*	-1.00
Lf-Feld W_RMS2	Lastf. Wind1-XY	= RMS aus:		
	Lf-Feld W-G_21	Lastf. Wind1-X-Gew	*	1.00
	+ Lf-Feld W-G_22	Lastf. Wind1-Y-Gew	*	1.00

Angeforderte GLEICHUNGEN:

ANSI B31.3 Nachweis 01 SL = SLP+QXL/A+SQRT(ii*MiL^2+io*MoL^2)/Z < Sh
P aus ET-Satz (Ausleg.Druck)
Ma aus Lastfall Gewicht
Sh aus MATDAT errechnet oder aus ET-Satz Faktor = 1.00

ANSI B31.3 Nachweis 02 SE =SQRT(ii*MiE^2+io*MoE^2+MT^2)/Z < SA+f*(Sh-SL)
P aus ET-Satz (Ausleg.Druck)
Ma aus Lastfall Gewicht
Mc aus Lastfall Range
Sh aus MATDAT errechnet oder aus ET-Satz Faktor = 1.00
Sa aus MATDAT errechnet oder aus ET-Satz Faktor = 1.00
Ermuedungsfaktor f = 1.00
P,Ma fuer die Ermittlung von SL in Gleichung SE
Mc = Mc * E-MODkalt / E-MODwarm

ANSI B31.3 Nachweis 03 SOL = SL+QXO/A+SQRT(ii*MiO^2+io*MoO^2)/Z < k*Sh
P aus ET-Satz (Ausleg.Druck)
Ma aus Lastfall Gewicht
Mb aus Lastfall Wind1-XY
Sh aus MATDAT errechnet oder aus ET-Satz Faktor = 1.33

Pkt 10 Strg 1 n Da= 48.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL n	40.0	45.3	0.001	0.000	0.000	0.0	45.3	120.0	38
02 SE n	SL=	45.3	0.000	0.000	0.000	0.0	0.0	254.7	0
03 SOLn	SL=	45.3	0.000	0.000	0.000	0.0	45.3	159.6	28

Pkt 15 Strg 1 v Da= 48.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 48.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	45.3	0.001	0.000	0.001	0.8	46.1	120.0	38
01 SL n	40.0	45.3	0.001	0.000	0.001	0.8	46.1	120.0	38
02 SE v	SL=	46.1	0.000	0.000	0.000	0.0	0.0	253.9	0
02 SE n	SL=	46.1	0.000	0.000	0.000	0.0	0.0	253.9	0
03 SOLv	SL=	46.1	0.000	0.001	0.000	0.3	46.4	159.6	29
03 SOLn	SL=	46.1	0.000	0.001	0.000	0.3	46.4	159.6	29

Pkt 20 Strg 1 v Da= 48.3 mm s= 1.0 mm (RKR) Reduz. Kl.Radien
Strg 1 n Da= 60.3 mm s= 1.0 mm A= 13.0 Grd
ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	45.3	0.001	0.000	0.003	1.6	46.9	120.0	39
01 SL n	40.0	57.3	0.001	0.000	0.003	1.0	58.3	120.0	49
02 SE v	SL=	46.9	0.000	0.000	0.000	0.0	0.0	253.1	0
02 SE n	SL=	58.3	0.000	0.000	0.000	0.0	0.0	241.7	0
03 SOLv	SL=	46.9	0.000	0.002	0.000	1.1	48.0	159.6	30
03 SOLn	SL=	58.3	0.000	0.002	0.000	0.7	59.0	159.6	37

Pkt 25 Strg 1 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.002	0.000	0.005	1.7	59.0	120.0	49
01 SL n	40.0	57.3	0.002	0.000	0.005	1.7	59.0	120.0	49
02 SE v	SL=	59.0	0.000	0.000	0.000	0.0	0.0	241.0	0
02 SE n	SL=	59.0	0.000	0.000	0.000	0.0	0.0	241.0	0
03 SOLv	SL=	59.0	0.000	0.004	0.000	1.5	60.5	159.6	38
03 SOLn	SL=	59.0	0.000	0.004	0.000	1.5	60.5	159.6	38

Pkt 30 Strg 1 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.003	0.000	0.018	6.7	64.0	120.0	53
01 SL n	40.0	57.3	0.018	0.000	0.018	6.7	64.1	120.0	53
02 SE v	SL=	64.0	0.000	0.000	0.000	0.0	0.0	236.0	0
02 SE n	SL=	64.1	0.000	0.000	0.000	0.0	0.0	235.9	0
03 SOLv	SL=	64.0	0.000	0.024	0.001	8.7	72.7	159.6	46
03 SOLn	SL=	64.1	0.001	0.024	0.001	8.7	72.8	159.6	46

Pkt 40 Strg 1 v Da= 60.3 mm s= 1.0 mm (TWA) T-Stck Weld.,Aufsw
Strg 1 n Da= 60.3 mm s= 1.0 mm ii= 2.4 io= 2.4
Strg 2 n Da= 21.3 mm s= 0.6 mm

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	57.3	0.023	0.017	0.013	19.3	76.6	120.0	64
01	SL n	40.0	57.3	0.023	0.017	0.013	19.1	76.4	120.0	64
01	SL n	40.0	32.5	0.011	0.000	0.003	20.6	53.1	120.0	44
02	SE v	SL=	76.6	0.000	0.004	0.003	2.3	2.3	223.4	1
02	SE n	SL=	76.4	0.000	0.004	0.003	2.3	2.3	223.6	1
02	SE n	SL=	53.1	0.000	0.000	0.000	0.0	0.0	246.9	0
03	SOLv	SL=	76.6	0.001	0.024	0.033	36.8	113.4	159.6	71
03	SOLn	SL=	76.4	0.003	0.024	0.033	36.8	113.3	159.6	71
03	SOLn	SL=	53.1	0.000	0.002	0.001	15.9	69.0	159.6	43

Pkt 50 Strg 1 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	57.3	0.031	0.000	0.046	17.1	74.5	120.0	62
01	SL n	40.0	57.3	0.072	0.005	0.051	19.1	76.5	120.0	64
02	SE v	SL=	74.5	0.000	0.000	0.009	1.6	1.6	225.5	1
02	SE n	SL=	76.5	0.070	0.107	0.021	24.0	24.0	223.5	11
03	SOLv	SL=	74.5	0.003	0.093	0.004	34.3	108.7	159.6	68
03	SOLn	SL=	76.5	0.422	0.084	0.006	33.4	109.8	159.6	69

Pkt 58 Strg 1 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 60.3 mm s= 1.9 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	57.3	0.068	0.004	0.014	5.7	63.0	120.0	53
01	SL n	40.0	28.8	0.068	0.004	0.014	3.1	31.9	120.0	27
02	SE v	SL=	63.0	0.070	0.083	0.019	20.5	20.5	237.0	9
02	SE n	SL=	31.9	0.070	0.084	0.019	14.8	14.8	268.1	6
03	SOLv	SL=	63.0	0.422	0.033	0.014	15.3	78.3	159.6	49
03	SOLn	SL=	31.9	0.422	0.033	0.014	8.4	40.3	159.6	25

Pkt 60 Strg 1 v Da= 60.3 mm s= 1.9 mm (TFS) T-Stck FormStueck
Strg 1 n Da= 60.3 mm s= 1.9 mm ii= 1.7 io= 2.0
Strg 11 n Da= 60.3 mm s= 1.9 mm

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	28.8	0.067	0.028	0.006	10.1	38.9	120.0	32
01	SL n	40.0	28.8	0.029	0.030	0.000	10.6	39.4	120.0	33
01	SL n	40.0	28.8	0.158	0.003	0.001	1.4	30.2	120.0	25
02	SE v	SL=	38.9	0.070	0.029	0.132	36.4	36.4	261.1	14
02	SE n	SL=	39.4	0.011	0.000	0.009	2.7	2.7	260.6	1
02	SE n	SL=	30.2	0.141	0.029	0.081	27.8	27.8	269.8	10
03	SOLv	SL=	38.9	0.422	0.017	0.054	23.2	62.1	159.6	39
03	SOLn	SL=	39.4	0.036	0.033	0.073	31.0	70.4	159.6	44
03	SOLn	SL=	30.2	0.040	0.049	0.035	21.4	51.6	159.6	32

Pkt 62 Strg 1 v Da= 60.3 mm s= 1.9 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	28.8	0.025	0.000	0.033	6.7	35.5	120.0	30
01	SL n	40.0	57.3	0.025	0.000	0.033	12.3	69.6	120.0	58
02	SE v	SL=	35.5	0.010	0.008	0.006	1.8	1.8	264.5	1
02	SE n	SL=	69.6	0.010	0.008	0.006	2.6	2.6	230.4	1
03	SOLv	SL=	35.5	0.042	0.065	0.029	14.5	50.1	159.6	31
03	SOLn	SL=	69.6	0.042	0.065	0.029	26.4	96.0	159.6	60

Pkt 65 Strg 1 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 68.3 mm s= 5.0 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	57.3	0.026	0.000	0.034	12.7	70.0	120.0	58
01	SL n	40.0	10.7	0.027	0.000	0.034	2.3	13.1	120.0	11
02	SE v	SL=	70.0	0.010	0.006	0.010	2.8	2.8	230.0	1
02	SE n	SL=	13.1	0.010	0.006	0.010	0.9	0.9	286.9	0
03	SOLv	SL=	70.0	0.042	0.058	0.026	23.7	93.7	159.6	59
03	SOLn	SL=	13.1	0.042	0.058	0.026	4.4	17.5	159.6	11

Pkt 70 Strg 1 v Da= 68.3 mm s= 5.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 68.3 mm s= 5.0 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	10.7	0.036	0.000	0.008	0.6	11.3	120.0	9
01	SL n	40.0	10.7	0.036	0.000	0.008	0.6	11.3	120.0	9
02	SE v	SL=	11.3	0.010	0.002	0.029	1.8	1.8	288.7	1
02	SE n	SL=	11.3	0.010	0.002	0.029	1.8	1.8	288.7	1
03	SOLv	SL=	11.3	0.042	0.014	0.014	1.4	12.7	159.6	8
03	SOLn	SL=	11.3	0.042	0.014	0.014	1.4	12.7	159.6	8

Pkt 80 Strg 1 v Da= 68.3 mm s= 5.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	10.7	0.037	0.000	0.001	0.1	10.9	120.0	9
01	SL n	40.0	57.3	0.039	0.000	0.001	0.7	58.0	120.0	48
02	SE v	SL=	10.9	0.010	0.004	0.032	1.9	1.9	289.1	1
02	SE n	SL=	58.0	0.010	0.004	0.032	6.3	6.3	242.0	3
03	SOLv	SL=	10.9	0.042	0.012	0.012	1.2	12.0	159.6	8
03	SOLn	SL=	58.0	0.042	0.012	0.012	6.4	64.4	159.6	40

Pkt 85 Strg 1 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 1 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	57.3	0.041	0.000	0.044	16.5	73.9	120.0	62
01	SL n	40.0	57.3	0.005	0.000	0.044	16.4	73.7	120.0	61
02	SE v	SL=	73.9	0.010	0.009	0.045	8.7	8.7	226.1	4
02	SE n	SL=	73.7	0.010	0.009	0.045	8.7	8.7	226.3	4
03	SOLv	SL=	73.9	0.042	0.055	0.005	20.4	94.3	159.6	59
03	SOLn	SL=	73.7	0.007	0.055	0.005	20.2	93.9	159.6	59

Pkt 90 Strg 1 v Da= 60.3 mm s= 1.0 mm (TWA) T-Stck Weld.,Aufsw
Strg 1 n Da= 60.3 mm s= 1.0 mm ii= 2.4 io= 2.4
Strg 8 n Da= 21.3 mm s= 0.6 mm

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	57.3	0.003	0.019	0.000	17.3	74.6	120.0	62
01	SL n	40.0	57.3	0.005	0.021	0.000	18.5	75.8	120.0	63
01	SL n	40.0	32.5	0.036	0.001	0.000	10.7	43.2	120.0	36
02	SE v	SL=	74.6	0.010	0.043	0.002	19.4	19.4	225.4	9
02	SE n	SL=	75.8	0.000	0.000	0.000	0.0	0.0	224.2	0
02	SE n	SL=	43.2	0.002	0.043	0.010	167.8	167.8	256.8	65
03	SOLv	SL=	74.6	0.007	0.002	0.025	22.8	97.4	159.6	61
03	SOLn	SL=	75.8	0.000	0.001	0.025	22.4	98.3	159.6	62
03	SOLn	SL=	43.2	0.010	0.000	0.004	29.4	72.6	159.6	45

Pkt 100 Strg 1 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	57.3	0.001	0.000	0.000	0.0	57.3	120.0	48
02	SE v	SL=	57.3	0.000	0.000	0.000	0.0	0.0	242.7	0
03	SOLv	SL=	57.3	0.000	0.000	0.000	0.0	57.3	159.6	36

Pkt 300 Strg 2 v Da= 21.3 mm s= 0.6 mm (VUU) V-Naht Umf.,Ubear.
Strg 2 n Da= 27.7 mm s= 3.8 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	32.5	0.008	0.000	0.000	2.2	34.8	120.0	29
01	SL n	40.0	4.4	0.008	0.000	0.000	0.3	4.7	120.0	4
02	SE v	SL=	34.8	0.000	0.000	0.000	0.0	0.0	265.2	0
02	SE n	SL=	4.7	0.000	0.000	0.000	0.0	0.0	295.3	0
03	SOLv	SL=	34.8	0.000	0.000	0.000	1.8	36.6	159.6	23
03	SOLn	SL=	4.7	0.000	0.000	0.000	0.2	5.0	159.6	3

Pkt 310 Strg 2 v Da= 27.7 mm s= 3.8 mm (VUU) V-Naht Umf.,Ubear.
ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	4.4	0.000	0.000	0.000	0.0	4.4	120.0	4
02	SE v	SL=	4.4	0.000	0.000	0.000	0.0	0.0	295.6	0
03	SOLv	SL=	4.4	0.000	0.000	0.000	0.0	4.4	159.6	3

Pkt 400 Strg 8 v Da= 21.3 mm s= 0.6 mm (VUU) V-Naht Umf.,Ubear.
Strg 8 n Da= 21.3 mm s= 0.6 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	32.5	0.031	0.000	0.000	1.3	33.8	120.0	28
01	SL n	40.0	32.5	0.032	0.000	0.000	1.3	33.8	120.0	28
02	SE v	SL=	33.8	0.002	0.008	0.014	33.5	33.5	266.2	13
02	SE n	SL=	33.8	0.002	0.008	0.014	33.5	33.5	266.2	13
03	SOLv	SL=	33.8	0.010	0.002	0.002	16.2	50.0	159.6	31
03	SOLn	SL=	33.8	0.006	0.002	0.002	16.1	49.9	159.6	31

Pkt 410 Strg 8 v Da= 21.3 mm s= 0.6 mm (BGL) Bogen GLatt
Strg 8 m Da= 21.3 mm s= 0.6 mm R= 28.0 mm
Strg 8 n Da= 21.3 mm s= 0.6 mm ii= 1.5 io= 1.2

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	32.5	0.031	0.000	0.000	1.9	34.5	120.0	29
01 SL m	40.0	32.5	0.023	0.000	0.000	1.4	33.9	120.0	28
01 SL n	40.0	32.5	0.001	0.001	0.000	5.3	37.8	120.0	32
02 SE v	SL=	34.5	0.002	0.012	0.008	44.5	44.5	265.5	17
02 SE m	SL=	33.9	0.008	0.011	0.005	40.7	40.7	266.1	15
02 SE n	SL=	37.8	0.009	0.010	0.002	36.1	36.1	262.2	14
03 SOLv	SL=	34.5	0.006	0.001	0.001	7.3	41.8	159.6	26
03 SOLm	SL=	33.9	0.007	0.000	0.003	17.5	51.4	159.6	32
03 SOLn	SL=	37.8	0.016	0.000	0.003	20.2	58.0	159.6	36

Pkt 420 Strg 8 v Da= 21.3 mm s= 0.6 mm (VUU) V-Naht Umf.,Ubear.
Strg 8 n Da= 21.3 mm s= 0.6 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	32.5	0.001	0.000	0.001	3.6	36.1	120.0	30
01 SL n	40.0	32.5	0.001	0.000	0.001	3.6	36.1	120.0	30
02 SE v	SL=	36.1	0.009	0.002	0.010	27.9	27.9	263.9	11
02 SE n	SL=	36.1	0.009	0.002	0.010	27.9	27.9	263.9	11
03 SOLv	SL=	36.1	0.016	0.003	0.000	16.4	52.5	159.6	33
03 SOLn	SL=	36.1	0.016	0.003	0.000	16.4	52.5	159.6	33

Pkt 430 Strg 8 v Da= 21.3 mm s= 0.6 mm (VUU) V-Naht Umf.,Ubear.
Strg 8 n Da= 27.7 mm s= 3.8 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	32.5	0.001	0.000	0.002	9.4	41.9	120.0	35
01 SL n	40.0	4.4	0.001	0.000	0.002	1.2	5.7	120.0	5
02 SE v	SL=	41.9	0.009	0.001	0.007	24.1	24.1	258.1	9
02 SE n	SL=	5.7	0.009	0.001	0.007	6.4	6.4	294.3	2
03 SOLv	SL=	41.9	0.016	0.002	0.000	12.5	54.4	159.6	34
03 SOLn	SL=	5.7	0.016	0.002	0.000	1.6	7.3	159.6	5

Pkt 440 Strg 8 v Da= 27.7 mm s= 3.8 mm (VUU) V-Naht Umf.,Ubear.
Strg 8 n Da= 21.3 mm s= 0.6 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	4.4	0.001	0.000	0.003	1.7	6.1	120.0	5
01 SL n	40.0	32.5	0.001	0.000	0.003	12.9	45.5	120.0	38
02 SE v	SL=	6.1	0.009	0.000	0.002	5.0	5.0	293.9	2
02 SE n	SL=	45.5	0.009	0.000	0.002	18.7	18.7	254.5	7
03 SOLv	SL=	6.1	0.016	0.000	0.001	0.6	6.8	159.6	4
03 SOLn	SL=	45.5	0.016	0.000	0.001	4.8	50.3	159.6	32

Pkt 450 Strg 8 v Da= 21.3 mm s= 0.6 mm (BGL) Bogen GLatt
Strg 8 m Da= 21.3 mm s= 0.6 mm R= 28.0 mm
Strg 8 n Da= 21.3 mm s= 0.6 mm ii= 1.5 io= 1.2

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	32.5	0.001	0.000	0.000	1.9	34.4	120.0	29
01	SL m	40.0	32.5	0.016	0.001	0.000	5.4	37.9	120.0	32
01	SL n	40.0	32.5	0.021	0.001	0.000	6.7	39.2	120.0	33
02	SE v	SL=	34.4	0.009	0.011	0.001	38.8	38.8	265.6	15
02	SE m	SL=	37.9	0.007	0.012	0.005	42.8	42.8	262.1	16
02	SE n	SL=	39.2	0.001	0.012	0.008	44.3	44.3	260.8	17
03	SOLv	SL=	34.4	0.016	0.002	0.002	17.1	51.5	159.6	32
03	SOLm	SL=	37.9	0.015	0.002	0.002	16.1	54.0	159.6	34
03	SOLn	SL=	39.2	0.006	0.001	0.000	11.1	50.3	159.6	31

Pkt 460 Strg 8 v Da= 21.3 mm s= 0.6 mm (VUU) V-Naht Umf.,Ubear.
Strg 8 n Da= 21.3 mm s= 0.6 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	32.5	0.033	0.000	0.000	3.0	35.5	120.0	30
01	SL n	40.0	32.5	0.002	0.000	0.000	0.1	32.6	120.0	27
02	SE v	SL=	35.5	0.001	0.001	0.009	18.5	18.5	264.5	7
02	SE n	SL=	32.6	0.000	0.000	0.000	0.0	0.0	267.4	0
03	SOLv	SL=	35.5	0.006	0.008	0.004	44.4	79.9	159.6	50
03	SOLn	SL=	32.6	0.000	0.001	0.001	4.8	37.3	159.6	23

Pkt 470 Strg 8 v Da= 21.3 mm s= 0.6 mm (VUU) V-Naht Umf.,Ubear.
ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	32.5	0.000	0.000	0.000	0.0	32.5	120.0	27
02	SE v	SL=	32.5	0.000	0.000	0.000	0.0	0.0	267.5	0
03	SOLv	SL=	32.5	0.000	0.000	0.000	0.0	32.5	159.6	20

Pkt 140 Strg 12 v Da= 60.3 mm s= 1.9 mm (TFS) T-Stck FormStueck
Strg 11 v Da= 60.3 mm s= 1.9 mm ii= 1.7 io= 2.0
Strg 9 n Da= 33.7 mm s= 1.6 mm

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	28.8	0.002	0.013	0.002	4.6	33.4	120.0	28
01	SL v	40.0	28.8	0.002	0.013	0.002	4.6	33.4	120.0	28
01	SL n	40.0	18.1	0.204	0.000	0.000	1.3	19.4	120.0	16
02	SE v	SL=	33.4	0.072	0.019	0.010	10.9	10.9	266.6	4
02	SE v	SL=	33.4	0.072	0.019	0.010	10.9	10.9	266.6	4
02	SE n	SL=	19.4	0.000	0.000	0.000	0.0	0.0	280.6	0
03	SOLv	SL=	33.4	0.095	0.042	0.059	27.9	61.3	159.6	38
03	SOLv	SL=	33.4	0.173	0.016	0.059	24.7	58.1	159.6	36
03	SOLn	SL=	19.4	0.000	0.049	0.049	82.9	102.2	159.6	64

Pkt 500 Strg 9 v Da= 33.7 mm s= 1.6 mm (VUU) V-Naht Umf.,Ubear.
Strg 9 n Da= 33.7 mm s= 1.0 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	18.1	0.192	0.000	0.000	1.2	19.3	120.0	16

01	SL	n	40.0	30.7	0.192	0.000	0.000	1.9	32.6	120.0	27

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
02	SE v	SL=	19.3	0.000	0.000	0.000	0.0	0.0	280.7	0
02	SE n	SL=	32.6	0.000	0.000	0.000	0.0	0.0	267.4	0
03	SOLv	SL=	19.3	0.000	0.045	0.045	51.1	70.4	159.6	44
03	SOLn	SL=	32.6	0.000	0.045	0.045	77.5	110.1	159.6	69

Pkt 505 Strg 9 v Da= 33.7 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 9 n Da= 41.7 mm s= 5.0 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	30.7	0.092	0.000	0.000	0.9	31.6	120.0	26
01	SL n	40.0	5.5	0.079	0.000	0.000	0.1	5.6	120.0	5
02	SE v	SL=	31.6	0.000	0.000	0.000	0.0	0.0	268.4	0
02	SE n	SL=	5.6	0.000	0.000	0.000	0.0	0.0	294.4	0
03	SOLv	SL=	31.6	0.000	0.007	0.007	11.9	43.5	159.6	27
03	SOLn	SL=	5.6	0.000	0.007	0.007	2.0	7.7	159.6	5

Pkt 510 Strg 9 v Da= 41.7 mm s= 5.0 mm (VUU) V-Naht Umf.,Ubear.
ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	5.5	0.000	0.000	0.000	0.0	5.5	120.0	5
02	SE v	SL=	5.5	0.000	0.000	0.000	0.0	0.0	294.5	0
03	SOLv	SL=	5.5	0.000	0.000	0.000	0.0	5.5	159.6	3

Pkt 190 Strg 12 v Da= 60.3 mm s= 1.0 mm (TWA) T-Stck Weld.,Aufsw
Strg 12 n Da= 60.3 mm s= 1.0 mm ii= 2.4 io= 2.4
Strg 10 n Da= 21.3 mm s= 0.6 mm

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	57.3	0.007	0.034	0.000	30.6	87.9	120.0	73
01	SL n	40.0	57.3	0.007	0.034	0.000	30.7	88.0	120.0	73
01	SL n	40.0	32.5	0.021	0.000	0.000	1.4	34.0	120.0	28
02	SE v	SL=	87.9	0.027	0.063	0.044	34.7	34.7	212.1	16
02	SE n	SL=	88.0	0.012	0.080	0.044	40.9	40.9	212.0	19
02	SE n	SL=	34.0	0.000	0.017	0.015	86.6	86.6	266.0	33
03	SOLv	SL=	87.9	0.150	0.019	0.025	28.6	116.4	159.6	73
03	SOLn	SL=	88.0	0.148	0.019	0.025	28.8	116.7	159.6	73
03	SOLn	SL=	34.0	0.000	0.001	0.002	17.4	51.3	159.6	32

Pkt 605 Strg 10 v Da= 21.3 mm s= 0.6 mm (VUU) V-Naht Umf.,Ubear.
Strg 10 n Da= 21.3 mm s= 0.6 mm ii= 1.0 io= 1.0

Na	Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01	SL v	40.0	32.5	0.015	0.000	0.000	0.9	33.5	120.0	28
01	SL n	40.0	32.5	0.015	0.000	0.000	0.9	33.5	120.0	28
02	SE v	SL=	33.5	0.000	0.002	0.000	4.0	4.0	266.5	1
02	SE n	SL=	33.5	0.000	0.000	0.002	4.0	4.0	266.5	1
03	SOLv	SL=	33.5	0.000	0.000	0.000	1.0	34.4	159.6	22
03	SOLn	SL=	33.5	0.000	0.000	0.000	1.0	34.4	159.6	22

Pkt 610 Strg 10 v Da= 21.3 mm s= 0.6 mm (VUU) V-Naht Umf.,Ubear.
Strg 10 n Da= 27.7 mm s= 3.8 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	32.5	0.015	0.000	0.000	0.9	33.5	120.0	28
01 SL n	40.0	4.4	0.015	0.000	0.000	0.1	4.6	120.0	4
02 SE v	SL=	33.5	0.000	0.000	0.001	1.9	1.9	266.5	1
02 SE n	SL=	4.6	0.000	0.000	0.001	0.5	0.5	295.4	0
03 SOLv	SL=	33.5	0.000	0.000	0.000	0.3	33.8	159.6	21
03 SOLn	SL=	4.6	0.000	0.000	0.000	0.0	4.6	159.6	3

Pkt 630 Strg 10 v Da= 33.3 mm s= 3.8 mm (VUU) V-Naht Umf.,Ubear.
ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	5.9	0.000	0.000	0.000	0.0	5.9	120.0	5
02 SE v	SL=	5.9	0.000	0.000	0.000	0.0	0.0	294.1	0
03 SOLv	SL=	5.9	0.000	0.000	0.000	0.0	5.9	159.6	4

Pkt 105 Strg 11 v Da= 60.3 mm s= 1.9 mm (VUU) V-Naht Umf.,Ubear.
Strg 11 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	28.8	0.141	0.005	0.003	1.5	30.3	120.0	25
01 SL n	40.0	57.3	0.141	0.005	0.003	2.8	60.1	120.0	50
02 SE v	SL=	30.3	0.145	0.029	0.028	20.1	20.1	269.7	7
02 SE n	SL=	60.1	0.145	0.029	0.028	27.9	27.9	239.9	12
03 SOLv	SL=	30.3	0.040	0.023	0.014	5.6	35.9	159.6	22
03 SOLn	SL=	60.1	0.040	0.023	0.014	10.1	70.3	159.6	44

Pkt 110 Strg 11 v Da= 60.3 mm s= 1.0 mm (BGL) Bogen GLatt
Strg 11 m Da= 60.3 mm s= 1.0 mm R= 76.0 mm
Strg 11 n Da= 60.3 mm s= 1.0 mm ii= 2.6 io= 2.2

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.141	0.003	0.005	5.5	62.8	120.0	52
01 SL m	40.0	57.3	0.112	0.002	0.001	2.6	59.9	120.0	50
01 SL n	40.0	57.3	0.034	0.003	0.004	4.5	61.9	120.0	52
02 SE v	SL=	62.8	0.145	0.028	0.029	32.2	32.2	237.2	14
02 SE m	SL=	59.9	0.144	0.007	0.033	29.8	29.8	240.1	12
02 SE n	SL=	61.9	0.099	0.016	0.076	36.0	36.0	238.1	15
03 SOLv	SL=	62.8	0.040	0.014	0.023	22.8	85.6	159.6	54
03 SOLm	SL=	59.9	0.264	0.008	0.047	39.2	99.2	159.6	62
03 SOLn	SL=	61.9	0.317	0.011	0.045	38.8	100.7	159.6	63

Pkt 120 Strg 11 v Da= 60.3 mm s= 1.0 mm (BGL) Bogen GLatt
Strg 11 m Da= 60.3 mm s= 1.0 mm R= 76.0 mm
Strg 11 n Da= 60.3 mm s= 1.0 mm ii= 2.6 io= 2.2

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.034	0.001	0.017	13.7	71.0	120.0	59
01 SL m	40.0	57.3	0.043	0.002	0.015	12.0	69.4	120.0	58
01 SL n	40.0	57.3	0.046	0.002	0.010	8.4	65.7	120.0	55

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
02 SE v	SL=	71.0	0.099	0.069	0.008	37.7	37.7	229.0	16
02 SE m	SL=	69.4	0.095	0.091	0.026	48.1	48.1	230.6	21
02 SE n	SL=	65.7	0.079	0.101	0.056	55.4	55.4	234.3	24
03 SOLv	SL=	71.0	0.317	0.022	0.005	23.4	94.4	159.6	59
03 SOLm	SL=	69.4	0.325	0.025	0.009	26.6	96.0	159.6	60
03 SOLn	SL=	65.7	0.311	0.026	0.012	28.2	93.9	159.6	59

Pkt 130 Strg 11 v Da= 60.3 mm s= 1.0 mm (BGL) Bogen GLatt
Strg 11 m Da= 60.3 mm s= 1.0 mm R= 76.0 mm
Strg 11 n Da= 60.3 mm s= 1.0 mm ii= 2.6 io= 2.2

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.046	0.001	0.002	2.5	59.8	120.0	50
01 SL m	40.0	57.3	0.042	0.001	0.012	9.8	67.1	120.0	56
01 SL n	40.0	57.3	0.031	0.000	0.020	16.1	73.4	120.0	61
02 SE v	SL=	59.8	0.079	0.168	0.019	81.8	81.8	240.2	34
02 SE m	SL=	67.1	0.081	0.165	0.009	80.2	80.2	232.9	34
02 SE n	SL=	73.4	0.072	0.149	0.034	73.7	73.7	226.6	33
03 SOLv	SL=	59.8	0.311	0.055	0.025	57.6	117.4	159.6	74
03 SOLm	SL=	67.1	0.287	0.053	0.021	54.8	121.9	159.6	76
03 SOLn	SL=	73.4	0.226	0.051	0.014	51.1	124.5	159.6	78

Pkt 135 Strg 11 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 11 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.031	0.003	0.031	11.7	69.0	120.0	58
01 SL n	40.0	57.3	0.002	0.003	0.031	11.5	68.9	120.0	57
02 SE v	SL=	69.0	0.072	0.084	0.021	20.8	20.8	231.0	9
02 SE n	SL=	68.9	0.072	0.084	0.021	20.8	20.8	231.1	9
03 SOLv	SL=	69.0	0.226	0.047	0.018	19.9	88.9	159.6	56
03 SOLn	SL=	68.9	0.173	0.047	0.018	19.6	88.5	159.6	55

Pkt 138 Strg 11 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 11 n Da= 60.3 mm s= 1.9 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.002	0.002	0.010	3.7	61.1	120.0	51
01 SL n	40.0	28.8	0.002	0.002	0.010	2.1	30.8	120.0	26
02 SE v	SL=	61.1	0.072	0.049	0.020	16.6	16.6	238.9	7
02 SE n	SL=	30.8	0.072	0.049	0.020	12.0	12.0	269.2	4
03 SOLv	SL=	61.1	0.173	0.053	0.015	21.3	82.4	159.6	52
03 SOLn	SL=	30.8	0.173	0.053	0.015	11.7	42.6	159.6	27

Pkt 220 Strg 12 n Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL n	40.0	57.3	0.005	0.001	0.006	2.1	59.4	120.0	50
02 SE n	SL=	59.4	0.092	0.118	0.133	37.0	37.0	240.6	15
03 SOLn	SL=	59.4	0.277	0.004	0.037	15.2	74.6	159.6	47

Pkt 210 Strg 12 v Da= 60.3 mm s= 1.0 mm (BGL) Bogen GLatt
Strg 12 m Da= 60.3 mm s= 1.0 mm R= 76.0 mm
Strg 12 n Da= 60.3 mm s= 1.0 mm ii= 2.7 io= 2.3

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.005	0.006	0.001	5.7	63.0	120.0	53
01 SL m	40.0	57.3	0.074	0.000	0.001	1.0	58.3	120.0	49
01 SL n	40.0	57.3	0.126	0.003	0.000	3.5	60.8	120.0	51
02 SE v	SL=	63.0	0.092	0.133	0.118	85.2	85.2	237.0	36
02 SE m	SL=	58.3	0.004	0.070	0.113	59.2	59.2	241.7	25
02 SE n	SL=	60.8	0.067	0.037	0.041	28.5	28.5	239.2	12
03 SOLv	SL=	63.0	0.277	0.037	0.004	38.7	101.8	159.6	64
03 SOLm	SL=	58.3	0.392	0.042	0.038	54.4	112.6	159.6	71
03 SOLn	SL=	60.8	0.334	0.034	0.053	57.6	118.4	159.6	74

Pkt 200 Strg 12 v Da= 60.3 mm s= 1.0 mm (BGL) Bogen GLatt
Strg 12 m Da= 60.3 mm s= 1.0 mm R= 76.0 mm
Strg 12 n Da= 60.3 mm s= 1.0 mm ii= 2.7 io= 2.3

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.217	0.003	0.004	5.7	63.0	120.0	53
01 SL m	40.0	57.3	0.170	0.002	0.003	4.0	61.3	120.0	51
01 SL n	40.0	57.3	0.007	0.015	0.000	15.0	72.3	120.0	60
02 SE v	SL=	63.0	0.067	0.177	0.015	90.2	90.2	237.0	38
02 SE m	SL=	61.3	0.061	0.188	0.029	96.4	96.4	238.7	40
02 SE n	SL=	72.3	0.027	0.144	0.055	76.6	76.6	227.7	34
03 SOLv	SL=	63.0	0.334	0.035	0.017	39.6	102.7	159.6	64
03 SOLm	SL=	61.3	0.349	0.037	0.020	43.0	104.3	159.6	65
03 SOLn	SL=	72.3	0.150	0.025	0.026	34.2	106.5	159.6	67

Pkt 180 Strg 12 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 12 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.007	0.001	0.081	30.0	87.3	120.0	73
01 SL n	40.0	57.3	0.004	0.001	0.081	30.0	87.3	120.0	73
02 SE v	SL=	87.3	0.012	0.015	0.079	15.0	15.0	212.7	7
02 SE n	SL=	87.3	0.012	0.015	0.079	15.0	15.0	212.7	7
03 SOLv	SL=	87.3	0.148	0.030	0.062	26.1	113.4	159.6	71
03 SOLn	SL=	87.3	0.236	0.030	0.062	26.6	113.9	159.6	71

Pkt 170 Strg 12 v Da= 60.3 mm s= 1.0 mm (BGL) Bogen GLatt
Strg 12 m Da= 60.3 mm s= 1.0 mm R= 76.0 mm
Strg 12 n Da= 60.3 mm s= 1.0 mm ii= 2.7 io= 2.3

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.004	0.000	0.004	3.6	60.9	120.0	51
01 SL m	40.0	57.3	0.002	0.000	0.010	8.3	65.6	120.0	55
01 SL n	40.0	57.3	0.002	0.000	0.017	14.6	71.9	120.0	60
02 SE v	SL=	60.9	0.012	0.216	0.073	113.5	113.5	239.1	47
02 SE m	SL=	65.6	0.060	0.240	0.043	123.2	123.2	234.4	53
02 SE n	SL=	71.9	0.072	0.223	0.013	113.7	113.7	228.1	50
03 SOLv	SL=	60.9	0.236	0.010	0.026	24.9	85.8	159.6	54
03 SOLm	SL=	65.6	0.150	0.017	0.021	25.6	91.2	159.6	57
03 SOLn	SL=	71.9	0.095	0.028	0.011	29.7	101.6	159.6	64

Pkt 155 Strg 12 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 12 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.002	0.000	0.017	6.4	63.7	120.0	53
01 SL n	40.0	57.3	0.002	0.000	0.017	6.4	63.7	120.0	53
02 SE v	SL=	63.7	0.072	0.223	0.013	43.5	43.5	236.3	18
02 SE n	SL=	63.7	0.072	0.223	0.013	43.5	43.5	236.3	18
03 SOLv	SL=	63.7	0.095	0.028	0.011	11.4	75.2	159.6	47
03 SOLn	SL=	63.7	0.095	0.028	0.011	11.4	75.2	159.6	47

Pkt 160 Strg 12 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 12 n Da= 68.3 mm s= 5.0 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.002	0.001	0.024	8.9	66.2	120.0	55
01 SL n	40.0	10.7	0.002	0.001	0.024	1.6	12.4	120.0	10
02 SE v	SL=	66.2	0.072	0.196	0.014	38.7	38.7	233.8	17
02 SE n	SL=	12.4	0.072	0.196	0.014	11.9	11.9	287.6	4
03 SOLv	SL=	66.2	0.095	0.035	0.006	13.4	79.6	159.6	50
03 SOLn	SL=	12.4	0.095	0.035	0.006	2.5	14.9	159.6	9

Pkt 150 Strg 12 v Da= 68.3 mm s= 5.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 12 n Da= 60.3 mm s= 1.0 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	10.7	0.002	0.002	0.027	1.9	12.6	120.0	11
01 SL n	40.0	57.3	0.002	0.002	0.027	10.1	67.4	120.0	56
02 SE v	SL=	12.6	0.072	0.056	0.017	5.3	5.3	287.4	2
02 SE n	SL=	67.4	0.072	0.056	0.017	17.2	17.2	232.6	7
03 SOLv	SL=	12.6	0.095	0.057	0.027	4.4	17.0	159.6	11
03 SOLn	SL=	67.4	0.095	0.057	0.027	23.9	91.3	159.6	57

Pkt 145 Strg 12 v Da= 60.3 mm s= 1.0 mm (VUU) V-Naht Umf.,Ubear.
Strg 12 n Da= 60.3 mm s= 1.9 mm ii= 1.0 io= 1.0

Na Gl	P (bar)	SLP (N/mm2)	Qx,Mt (kN,kNm)	Mi (kNm)	Mo (kNm)	S(Q,M) (N/mm2)	S-ges (N/mm2)	S-zul (N/mm2)	Ausn (%)
01 SL v	40.0	57.3	0.002	0.002	0.022	8.1	65.4	120.0	54
01 SL n	40.0	28.8	0.002	0.002	0.022	4.4	33.2	120.0	28
02 SE v	SL=	65.4	0.072	0.029	0.018	14.7	14.7	234.6	6
02 SE n	SL=	33.2	0.072	0.029	0.018	10.6	10.6	266.8	4
03 SOLv	SL=	65.4	0.095	0.059	0.033	25.4	90.8	159.6	57
03 SOLn	SL=	33.2	0.095	0.059	0.033	14.0	47.2	159.6	30

EXTRAKT DER SPANNUNGSANALYSE NACH ASME B31.3:

Nachweis 01 Spannungen infolge staendiger Lasten (SL)

Bauteile mit maximaler Spannungsausnutzung

Pkt		ii	io	Errechn. Spannung (N/mm2)	Zulaess. Spannung (N/mm2)	Aus-nutzung (%)
190	(TWA)	2.42	2.42	88.0	120.0	73.3
180	(VUU)	1.00	1.00	87.3	120.0	72.8
40	(TWA)	2.42	2.42	76.6	120.0	63.8
50	(VUU)	1.00	1.00	76.5	120.0	63.7
90	(TWA)	2.42	2.42	75.8	120.0	63.2
85	(VUU)	1.00	1.00	73.9	120.0	61.6
130	(BGL)	2.58	2.15	73.4	120.0	61.2
200	(BGL)	2.73	2.27	72.3	120.0	60.3
170	(BGL)	2.73	2.27	71.9	120.0	59.9
120	(BGL)	2.58	2.15	71.0	120.0	59.2
65	(VUU)	1.00	1.00	70.0	120.0	58.3
62	(VUU)	1.00	1.00	69.6	120.0	58.0
135	(VUU)	1.00	1.00	69.0	120.0	57.5
150	(VUU)	1.00	1.00	67.4	120.0	56.1
160	(VUU)	1.00	1.00	66.2	120.0	55.1
145	(VUU)	1.00	1.00	65.4	120.0	54.5
30	(VUU)	1.00	1.00	64.1	120.0	53.4
155	(VUU)	1.00	1.00	63.7	120.0	53.1
210	(BGL)	2.73	2.27	63.0	120.0	52.5
58	(VUU)	1.00	1.00	63.0	120.0	52.5
110	(BGL)	2.58	2.15	62.8	120.0	52.4
138	(VUU)	1.00	1.00	61.1	120.0	50.9
105	(VUU)	1.00	1.00	60.1	120.0	50.1
220	(VUU)	1.00	1.00	59.4	120.0	49.5
25	(VUU)	1.00	1.00	59.0	120.0	49.2
20	(RKR)	1.00	1.00	58.3	120.0	48.6
80	(VUU)	1.00	1.00	58.0	120.0	48.3
100	(VUU)	1.00	1.00	57.3	120.0	47.8
15	(VUU)	1.00	1.00	46.1	120.0	38.4
440	(VUU)	1.00	1.00	45.5	120.0	37.9

0 Schnitte mit Spannungsueberschreitungen (*)

EXTRAKT DER SPANNUNGSANALYSE NACH ASME B31.3:

Nachweis 02 Spannungen infolge Staend. u. Temperaturlast

Bauteile mit maximaler Spannungsausnutzung

Pkt		ii	io	Errechn. Spannung (N/mm2)	Zulaess. Spannung (N/mm2)	Aus-nutzung (%)
90	(TWA)	2.42	2.42	167.8	256.8	65.3
170	(BGL)	2.73	2.27	123.2	234.4	52.6
200	(BGL)	2.73	2.27	96.4	238.7	40.4
210	(BGL)	2.73	2.27	85.2	237.0	35.9
130	(BGL)	2.58	2.15	80.2	232.9	34.4
190	(TWA)	2.42	2.42	86.6	266.0	32.6
120	(BGL)	2.58	2.15	55.4	234.3	23.6
155	(VUU)	1.00	1.00	43.5	236.3	18.4
450	(BGL)	1.49	1.24	44.3	260.8	17.0
410	(BGL)	1.49	1.24	44.5	265.5	16.8
160	(VUU)	1.00	1.00	38.7	233.8	16.6
220	(VUU)	1.00	1.00	37.0	240.6	15.4
110	(BGL)	2.58	2.15	36.0	238.1	15.1
60	(TFS)	1.71	1.95	36.4	261.1	13.9
400	(VUU)	1.00	1.00	33.5	266.2	12.6
105	(VUU)	1.00	1.00	27.9	239.9	11.6
50	(VUU)	1.00	1.00	24.0	223.5	10.7
420	(VUU)	1.00	1.00	27.9	263.9	10.6
430	(VUU)	1.00	1.00	24.1	258.1	9.3
135	(VUU)	1.00	1.00	20.8	231.0	9.0
58	(VUU)	1.00	1.00	20.5	237.0	8.6
150	(VUU)	1.00	1.00	17.2	232.6	7.4
440	(VUU)	1.00	1.00	18.7	254.5	7.3
180	(VUU)	1.00	1.00	15.0	212.7	7.0
460	(VUU)	1.00	1.00	18.5	264.5	7.0
138	(VUU)	1.00	1.00	16.6	238.9	6.9
145	(VUU)	1.00	1.00	14.7	234.6	6.3
140	(TFS)	1.71	1.95	10.9	266.6	4.1
85	(VUU)	1.00	1.00	8.7	226.1	3.8
80	(VUU)	1.00	1.00	6.3	242.0	2.6

0 Schnitte mit Spannungsueberschreitungen (*)

EXTRAKT DER SPANNUNGSANALYSE NACH ASME B31.3:

Nachweis 03 Spannungen infolge staend. + gelegentl. Lasten (SOL)

Bauteile mit maximaler Spannungsausnutzung

Pkt		ii	io	Errechn. Spannung (N/mm2)	Zulaess. Spannung (N/mm2)	Aus-nutzung (%)
130	(BGL)	2.58	2.15	124.5	159.6	78.0
210	(BGL)	2.73	2.27	118.4	159.6	74.2
190	(TWA)	2.42	2.42	116.7	159.6	73.1
180	(VUU)	1.00	1.00	113.9	159.6	71.4
40	(TWA)	2.42	2.42	113.4	159.6	71.1
500	(VUU)	1.00	1.00	110.1	159.6	69.0
50	(VUU)	1.00	1.00	109.8	159.6	68.8
200	(BGL)	2.73	2.27	106.5	159.6	66.7
140	(TFS)	1.71	1.95	102.2	159.6	64.1
170	(BGL)	2.73	2.27	101.6	159.6	63.6
110	(BGL)	2.58	2.15	100.7	159.6	63.1
90	(TWA)	2.42	2.42	98.3	159.6	61.6
120	(BGL)	2.58	2.15	96.0	159.6	60.2
62	(VUU)	1.00	1.00	96.0	159.6	60.1
85	(VUU)	1.00	1.00	94.3	159.6	59.1
65	(VUU)	1.00	1.00	93.7	159.6	58.7
150	(VUU)	1.00	1.00	91.3	159.6	57.2
145	(VUU)	1.00	1.00	90.8	159.6	56.9
135	(VUU)	1.00	1.00	88.9	159.6	55.7
138	(VUU)	1.00	1.00	82.4	159.6	51.6
460	(VUU)	1.00	1.00	79.9	159.6	50.1
160	(VUU)	1.00	1.00	79.6	159.6	49.9
58	(VUU)	1.00	1.00	78.3	159.6	49.1
155	(VUU)	1.00	1.00	75.2	159.6	47.1
220	(VUU)	1.00	1.00	74.6	159.6	46.7
30	(VUU)	1.00	1.00	72.8	159.6	45.6
60	(TFS)	1.71	1.95	70.4	159.6	44.1
105	(VUU)	1.00	1.00	70.3	159.6	44.0
80	(VUU)	1.00	1.00	64.4	159.6	40.3
25	(VUU)	1.00	1.00	60.5	159.6	37.9

0 Schnitte mit Spannungsueberschreitungen (*)