
 Innovation and Equipment	MODIFIED STARCH FLASH DRYER PROJECT						 A.G.F.D. Tândărei
	STRESS ANALYSIS REPORT						
	Project No.	Discipline	Document Type	Plant / Equipment No	Sequence No.	Rev.	
	5204	ME	CL	000	03	00	

Stress Analysis Report

00	12.18.2025	Comments	M.E	P.S	A.Z
REV.	ISSUE	PURPOSE OF ISSUE	PREPARED	CHECKED	APPROVED



	MODIFIED STARCH FLASH DRYER PROJECT						
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1 SUMMARY

The analysis was performed in accordance with ASME B31.3 (2022) and included a review of nozzle loads on all connected equipment (Dryer and Cyclone). The analysis model was developed based on Microtec's design, which included isometric drawings and equipment data, as well as process information provided by Microtec.

The analysis results confirm that all piping stresses and equipment nozzle loads are within the allowable limits set by the governing code and relevant industry standards. This report summarizes the methodology and results, with supporting documentation included in the appendices.

2 ANALYSIS AND EVALUATION

The following documents, provided by Microtec, were used for this analysis:

- General Arrangement Drawing of Dryer and Cyclone

2.1 SCOPE OF ANALYSIS

A piping stress analysis was performed for the Dryer Air piping system designed and installed by Microtec at the Plant.

The scope of the analysis included the following expandable-fluid lines and inputs:

- Piping from Dryer to Cyclone as shown in Figure 1.
- Design Temperature = 170 C, Design Internal Pressure = 0.5 bar
- Pipe/Duct Thickness = 3mm
- Pipe/Duct Material= AISI SS 316
- Wind, seismic, and equipment vibration effects are not considered in stress analysis.

The analysis ensures that the piping system complies with the flexibility and stress requirements of ASME B31.3 (2022) and that mechanical loads imparted to the equipment remain within acceptable limits.

Nozzle loads for the connected equipment (Dryer and Cyclone) were evaluated and compared against the allowable limits outlined in Table 1.

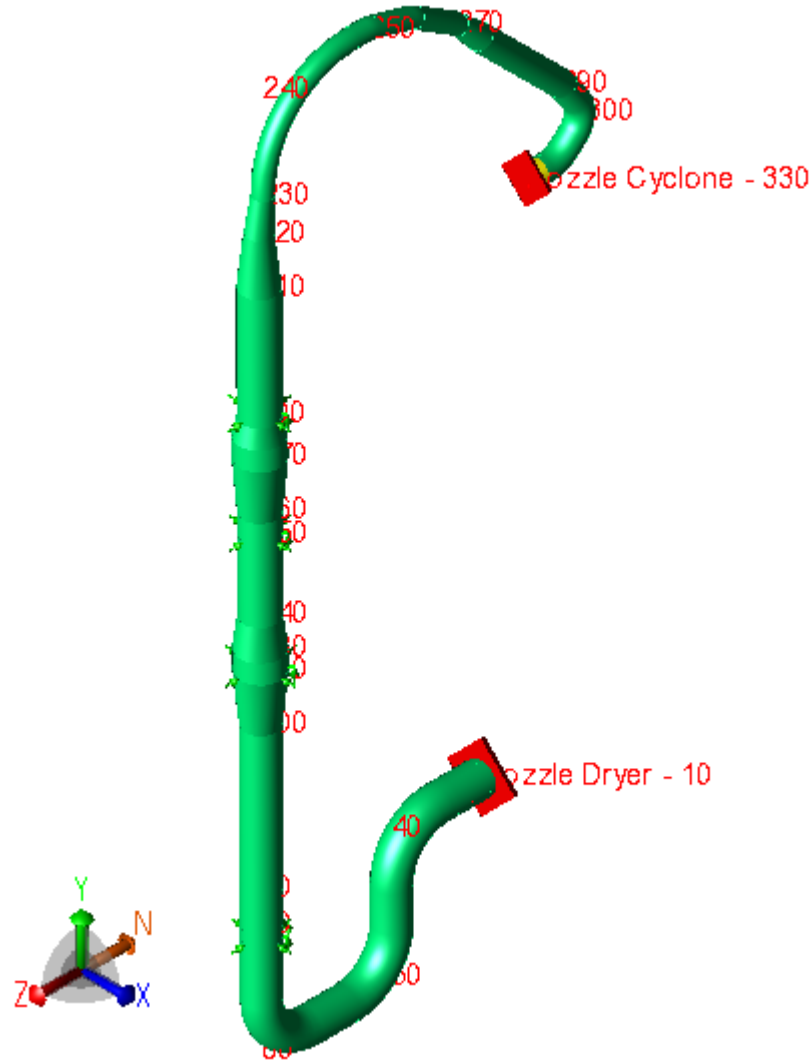


Figure 1 – Dryer to Cyclone

Equipment	Node	Nozzle size	Nozzle Load (max) (ABS)										FR (lb)	MR (ft-lbs)	Basis
			Fx (lbf)	Fy (lbf)	Fz (lbf)	FR (lbf)	Mx (ft-lbs)	My (ft-lbs)	Mz (ft-lbs)	MR (ft-lbs)	F % of Allowable	M % of Allowable			
Nozzle Dryer	10	1300 mm	0	8296	577	8316	9400	0	0	9400	88%	99%	9500	9500	Similar Equipment Nozzle Allowables
Nozzle Cyclone	330	604 mm	0	9315	577	9326	8725	0	0	8725	98%	92%	9500	9500	

Table 1 – Nozzle loads

2.2 RESULTS

The piping design for the Air Dryer by Microtec at the Plant complies with the required code stress criteria by ASME B31.3 2022 process piping Code for Pressure Piping.

All equipment nozzle loads were evaluated and found to be within acceptable limits.

APPENDIX 1 – CAESAR II INPUT

CAESAR II Ver.14.00.00.0910, (Build 231113) Date: DEC 24, 2025 Time: 13:48
Job:: DRYER CYCLONE-01A
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LISTING OF STATIC LOAD CASES FOR THIS ANALYSIS

- 1 (OPE) W+T1+P1
- 2 (Alt-SUS) W+P1
- 3 (SUS) W+P1
- 4 (EXP) L4=L1-L3

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INPUT LISTING

Job Description:

PROJECT: 2720A Vertical Pipeworks Header

CLIENT :

ANALYST:

NOTES :

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PIPE DATA

From 10 Nozzle Dryer To 20 DZ= .152 m.

PIPE

Dia= 1,320.800 mm Wall= 2.997 mm

GENERAL

T1= 170 C P1= .5171 bar Mat= (163)A312 TP316 E= 195,129 N/mm2

EH1= 184,593 N/mm2 EH2= 195,129 N/mm2 EH3= 195,129 N/mm2

EH4= 195,129 N/mm2 EH5= 195,129 N/mm2 EH6= 195,129 N/mm2

EH7= 195,129 N/mm2 EH8= 195,129 N/mm2 EH9= 195,129 N/mm2 v = .292

Pipe Den=8027.1997070 kg/m3 Fluid Den= 11.0719995 kg/m3

Insul Thk= .000 mm

RESTRAINTS

Node 10 X

Node 10 Y

Node 10 Z

Node 10 RX Kr= 90,384 N.m./deg

Node 10 RY

Node 10 RZ

ALLOWABLE STRESSES

B31.3 (2022) Cycle Max Switch = --- Sc= 138 N/mm2 Sh1= 99 N/mm2

Sh2= 138 N/mm2 Sh3= 138 N/mm2 Sh4= 138 N/mm2 Sh5= 138 N/mm2

Sh6= 138 N/mm2 Sh7= 138 N/mm2 Sh8= 138 N/mm2 Sh9= 138 N/mm2

Sy= 207 N/mm2

From 20 To 30 DZ= .127 m.

From 30 To 40 DZ= 2.286 m.

GENERAL

T1= 170 C

BEND at "TO" end

Radius= 1,981.200 mm (LONG) Bend Angle= 90.000 Angle/Node @1= 45.00 39

Angle/Node @2= .00 38

From 40 To 50 DY= -5.436 m.

BEND at "TO" end

Radius= 1,981.200 mm (LONG) Bend Angle= 90.000 Angle/Node @1= 45.00 49

Angle/Node @2= .00 48

From 50 To 60 DZ= 5.499 m.

BEND at "TO" end

Radius= 1,981.200 mm (LONG) Bend Angle= 90.000 Angle/Node @1= 45.00 59

Angle/Node @2= .00 58

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INPUT LISTING

 From 60 To 70 DY= 4.252 m.

RESTRAINTS

Node 70 +Y
 Node 70 Z Gap= 25.400 mm
 Node 70 X Gap= 25.400 mm

From 70 To 80 DY= .457 m.

From 80 To 90 DY= 1.270 m.

From 90 To 100 DY= 6.076 m.

GENERAL

T1= 170 C

From 100 To 110 DY= 1.999 m.

REDUCER

Diam2= 1,727.200 mm Wall2= 2.997 mm Angle= 45.00

From 110 To 120 DY= .102 m.

PIPE

Dia= 1,727.200 mm Wall= 2.997 mm
 Insul Thk= .000 mm

RESTRAINTS

Node 120 +Y
 Node 120 Z Gap= 25.400 mm
 Node 120 X Gap= 25.400 mm

From 120 To 130 DY= .698 m.

From 130 To 140 DY= 1.199 m.

REDUCER

Diam2= 1,397.000 mm Wall2= 2.997 mm Angle= 45.00

From 140 To 150 DY= 3.000 m.

PIPE

Dia= 1,397.000 mm Wall= 2.997 mm
 Insul Thk= .000 mm

RESTRAINTS

Node 150 +Y
 Node 150 X Gap= 25.400 mm
 Node 150 Z Gap= 25.400 mm

From 150 To 160 DY= .826 m.

From 160 To 170 DY= 1.999 m.

REDUCER

Diam2= 1,727.200 mm Wall2= 2.997 mm Angle= 45.00

From 170 To 180 DY= .800 m.

PIPE

Dia= 1,727.200 mm Wall= 2.997 mm
 Insul Thk= .000 mm

From 180 To 190 DY= .692 m.

REDUCER

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Job:: DRYER CYCLONE-01A

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INPUT LISTING

Diam2= 1,397.000 mm Wall2= 2.997 mm Angle= 45.00

From 190 To 200 DY= .076 m.

PIPE

Dia= 1,397.000 mm Wall= 2.997 mm

Insul Thk= .000 mm

RESTRAINTS

Node 200 +Y

Node 200 X Gap= 25.400 mm

Node 200 Z Gap= 25.400 mm

From 200 To 210 DY= 4.651 m.

From 210 To 220 DY= 1.948 m.

REDUCER

Diam2= 949.960 mm Wall2= 2.997 mm Angle= 45.00

From 220 To 230 DY= 1.356 m. DZ= -.170 m.

PIPE

Dia= 949.960 mm Wall= 2.997 mm

Insul Thk= .000 mm

REDUCER

Diam2= 749.300 mm Wall2= 2.997 mm Angle= 45.00

From 230 To 240 DY= 3.884 m.

PIPE

Dia= 749.300 mm Wall= 2.997 mm

Insul Thk= .000 mm

BEND at "TO" end

Radius= 3,746.500 mm (5D) a Bend Angle= 90.000 Angle/Node @1= 45.00 239

Angle/Node @2= .00 238

From 240 To 250 DZ= -4.470 m.

BEND at "TO" end

Radius= 1,123.950 mm (LONG) Bend Angle= 15.524 Angle/Node @1= 7.76 249

From 250 To 260 DY= -.508 m. DZ= -1.829 m.

BEND at "TO" end

Radius= 1,123.950 mm (LONG) Bend Angle= 16.342 Angle/Node @1= 8.17 259

From 260 To 270 DY= -1.168 m. DZ= -1.880 m.

BEND at "TO" end

Radius= 1,123.950 mm (LONG) Bend Angle= 13.207 Angle/Node @1= 6.60 269

Angle/Node @2= .00 268

From 270 To 280 DY= -.996 m. DZ= -.993 m.

REDUCER

Diam2= 949.960 mm Wall2= 2.997 mm Angle= 45.00

From 280 To 290 DY= -3.429 m. DZ= -3.429 m.

PIPE

Dia= 949.960 mm Wall= 2.997 mm

Insul Thk= .000 mm

BEND at "TO" end

Radius= 949.960 mm (SHORT) Bend Angle= 10.008 Angle/Node @1= 5.00 289

Angle/Node @2= .00 288

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INPUT LISTING

```
-----
From 290 To 300 DY= -1.524 m. DZ= -1.067 m.
BEND at "TO" end
      Radius= 949.960 mm (SHORT Bend Angle= 81.161 Angle/Node @1= 40.58 299
-----
From 300 To 310 DY= -1.219 m. DZ= 1.270 m.
BEND at "TO" end
      Radius= 1,424.940 mm (LONG) Bend Angle= 43.831 Angle/Node @1= 21.92 309
-----
From 310 To 320 DZ= .762 m.
-----
From 320 To 330 Nozzle Cyclone DZ= .508 m.
RESTRAINTS
      Node 330 X
      Node 330 Y
      Node 330 Z
      Node 330 RX Kr= 11,298 N.m./deg
      Node 330 RY
      Node 330 RZ
REDUCER
      Diam2= 609.600 mm Wall2= 2.997 mm Angle= 45.00
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```

```
NODENAMES
      10      20 From= Nozzle Dryer To=
      320     330 From= To= Nozzle Cyclone
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```

MATERIAL Changes:

10 Nozzle Dryer 20

Mat= (163)A312 TP316 E= 195,129 N/mm2 v = .292

Density= 8,027.1997 kg/m3

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JOBNAME: H:\MICROTEC\2025-12-24\DRYER CYCLONE-01A

ALLOWABLE STRESS Changes

10 Nozzle Dryer 20

B31.3 (2022) Cycle Max Switch = --- Sc= 138 N/mm2 Sh1= 99 N/mm2

Sh2= 138 N/mm2 Sh3= 138 N/mm2 Sh4= 138 N/mm2 Sh5= 138 N/mm2

Sh6= 138 N/mm2 Sh7= 138 N/mm2 Sh8= 138 N/mm2 Sh9= 138 N/mm2

Sy= 207 N/mm2

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BEND ELEMENTS

30 40

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INPUT LISTING

Radius= 1,981.200 mm (LONG)	Bend Angle= 90.000	Angle/Node @1= 45.00 39
Angle/Node @2= .00 38		
40	50	

Radius= 1,981.200 mm (LONG)	Bend Angle= 90.000	Angle/Node @1= 45.00 49
Angle/Node @2= .00 48		
50	60	

Radius= 1,981.200 mm (LONG)	Bend Angle= 90.000	Angle/Node @1= 45.00 59
Angle/Node @2= .00 58		
230	240	

Radius= 3,746.500 mm (5D) a	Bend Angle= 90.000	Angle/Node @1= 45.00 239
Angle/Node @2= .00 238		
240	250	

Radius= 1,123.950 mm (LONG)	Bend Angle= 15.524	Angle/Node @1= 7.76 249
250	260	

Radius= 1,123.950 mm (LONG)	Bend Angle= 16.342	Angle/Node @1= 8.17 259
260	270	

Radius= 1,123.950 mm (LONG)	Bend Angle= 13.207	Angle/Node @1= 6.60 269
Angle/Node @2= .00 268		
280	290	

Radius= 949.960 mm (SHORT	Bend Angle= 10.008	Angle/Node @1= 5.00 289
Angle/Node @2= .00 288		
290	300	

Radius= 949.960 mm (SHORT	Bend Angle= 81.161	Angle/Node @1= 40.58 299
300	310	

Radius= 1,424.940 mm (LONG)	Bend Angle= 43.831	Angle/Node @1= 21.92 309
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REDUCERS

100	110
-----	-----

Diam2= 1,727.200 mm	Wall2= 2.997 mm	Angle= 45.00
130		140

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INPUT LISTING

Diam2= 1,397.000 mm Wall2= 2.997 mm Angle= 45.00
160 170

Diam2= 1,727.200 mm Wall2= 2.997 mm Angle= 45.00
180 190

Diam2= 1,397.000 mm Wall2= 2.997 mm Angle= 45.00
210 220

Diam2= 949.960 mm Wall2= 2.997 mm Angle= 45.00
220 230

Diam2= 749.300 mm Wall2= 2.997 mm Angle= 45.00
270 280

Diam2= 949.960 mm Wall2= 2.997 mm Angle= 45.00
320 330 Nozzle Cyclone

Diam2= 609.600 mm Wall2= 2.997 mm Angle= 45.00
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RESTRAINTS

10 Nozzle Dryer 20

RESTRAINTS

Node	10	Type	X	Dir Vec=	1.000	.000	.000
Node	10	Type	Y	Dir Vec=	.000	1.000	.000
Node	10	Type	Z	Dir Vec=	.000	.000	1.000
Node	10	Type	RX	STIF1=	90,384 N/mm		Dir Vec= 1.000
.000	.000						
Node	10	Type	RY	Dir Vec=	.000	1.000	.000
Node	10	Type	RZ	Dir Vec=	.000	.000	1.000
	60						70

RESTRAINTS

Node	70	Type	+Y	Dir Vec=	.000	1.000	.000
Node	70	Type	Z	Len/GAP/STIF2 =		25.40 mm	
Dir Vec=	.000	.000	1.000				
Node	70	Type	X	Len/GAP/STIF2 =		25.40 mm	
Dir Vec=	1.000	.000	.000				
	110						120

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INPUT LISTING

RESTRAINTS

Node	120	Type	+Y	Dir Vec=	.000	1.000	.000
Node	120	Type	Z	Len/GAP/STIF2 =		25.40	mm
Dir Vec=	.000		.000	1.000			
Node	120	Type	X	Len/GAP/STIF2 =		25.40	mm
Dir Vec=	1.000		.000	.000			

140

150

RESTRAINTS

Node	150	Type	+Y	Dir Vec=	.000	1.000	.000
Node	150	Type	X	Len/GAP/STIF2 =		25.40	mm
Dir Vec=	1.000		.000	.000			
Node	150	Type	Z	Len/GAP/STIF2 =		25.40	mm
Dir Vec=	.000		.000	1.000			

190

200

RESTRAINTS

Node	200	Type	+Y	Dir Vec=	.000	1.000	.000
Node	200	Type	X	Len/GAP/STIF2 =		25.40	mm
Dir Vec=	1.000		.000	.000			
Node	200	Type	Z	Len/GAP/STIF2 =		25.40	mm
Dir Vec=	.000		.000	1.000			

320

330 Nozzle Cyclone

RESTRAINTS

Node	330	Type	X	Dir Vec=	1.000	.000	.000
Node	330	Type	Y	Dir Vec=	.000	1.000	.000
Node	330	Type	Z	Dir Vec=	.000	.000	1.000
Node	330	Type	RX	STIF1=	11,298	N/mm	Dir Vec= 1.000
.000	.000						
Node	330	Type	RY	Dir Vec=	.000	1.000	.000
Node	330	Type	RZ	Dir Vec=	.000	.000	1.000

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INPUT UNITS USED...

UNITS= SI-Bar NOM/SCH INPUT= ON

LENGTH	inches	x	25.400	=	mm
FORCE	pounds	x	4.448	=	N
MASS (dynamics)	pounds	x	0.454	=	kg
MOMENTS (INPUT)	inch-pounds	x	0.113	=	N.m
MOMENTS (OUTPUT)	inch-pounds	x	0.113	=	N.m
STRESS	lbs./sq.in.	x	0.007	=	N/mm2
TEMP. SCALE	degrees F.	x	0.556	=	C
PRESSURE	psig	x	0.069	=	bar

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INPUT LISTING

ELASTIC MODULUS	lbs./sq.in.	x	0.007	=	N/mm2
PIPE DENSITY	lbs./cu.in.	x	27680.000	=	kg/m3
INSULATION DENS.	lbs./cu.in.	x	27680.000	=	kg/m3
FLUID DENSITY	lbs./cu.in.	x	27680.000	=	kg/m3
TRANSL. STIF	lbs./in.	x	0.175	=	N/mm
ROTATIONAL STIF	in.lb./deg.	x	0.113	=	N.m./deg
UNIFORM LOAD	lb./in.	x	0.175	=	N/mm
G LOAD	g's	x	1.000	=	g's
WIND LOAD	lbs./sq.in.	x	6894.757	=	N/m2
ELEVATION	inches	x	0.025	=	m.
COMPOUND LENGTH	inches	x	0.025	=	m.
DIAMETER	inches	x	25.400	=	mm
WALL THICKNESS	inches	x	25.400	=	mm

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SETUP FILE PARAMETERS

```

-----
CONNECT GEOMETRY THRU CNODES =      YES
MIN ALLOWED BEND ANGLE =              5.00000
MAX ALLOWED BEND ANGLE =              95.0000
BEND LENGTH ATTACHMENT PERCENT =      1.00000
MIN ANGLE TO ADJACENT BEND PT =       5.00000
LOOP CLOSURE TOLERANCE =              25.4000      mm
THERMAL BOWING HORZ TOLERANCE =       0.100000E-03
AUTO NODE NUMBER INCREMENT=          10.0000
Z AXIS UP=                            NO
USE PRESSURE STIFFENING =              DEFAULT
ALPHA TOLERANCE =                     0.500000E-01
RESLD-FORCE =                          NO
HGR DEF RESWGT STIF =                  0.175120E+12 N/mm
DECOMP SNG TOL =                       0.100000E+11
BEND AXIAL SHAPE =                     YES
FRICT STIF =                           175120.      N/mm
FRICT NORM FORCE VAR =                  0.150000
FRICT ANGLE VAR =                       15.0000
FRICT SLIDE MULT =                      1.00000
ROD TOLERANCE =                         1.00000
ROD INC =                               2.00000
INCORE NUMERICAL CHECK =                NO
OUTCORE NUMERICAL CHECK =               NO
DEFAULT TRANS RESTRAINT STIFF=          0.175120E+12 N/mm
DEFAULT ROT RESTRAINT STIFF=            0.112980E+12 N.m./deg
IGNORE SPRING HANGER STIFFNESS =        NO
MISSING MASS ZPA =                      EXTRACTED
MIN WALL MILL TOLERANCE =                12.5000
WRC-107 VERSION =                       MAR 79 1B1/2B1
WRC-107 INTERPOLATION =                  LAST VALUE
DEFAULT AMBIENT TEMPERATURE=            21.1142      C
BOURDON PRESSURE=                       NONE
COEFFICIENT OF FRICTION (MU) =           0.000000
INCLUDE SPRG STIF IN HGR OPE =          NO
INCLUDE INSULATION IN HYDROTEST =        NO
REDUCED INTERSECTION =                  B31.1 (POST1980)
USE WRC329                              NO
NO REDUCED SIF FOR RFT AND WLT          NO
B31.1 REDUCED Z FIX =                   YES

```

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INPUT LISTING

CLASS 1 BRANCH FLEX	NO	
ALL STRESS CASES CORRODED =	NO	
ADD TORSION IN SL STRESS =	DEFAULT	
ADD F/A IN STRESS =	DEFAULT	
OCCASIONAL LOAD FACTOR =	0.000000	
DEFAULT CODE =	B31.3 2022	
B31.3 SUS CASE SIF FACTOR =	0.000000	
ALLOW USERS BEND SIF =	NO	
USE SCHNEIDER	NO	
YIELD CRITERION STRESS =	MAX 3D SHEAR	
USE PD/4T	NO	
BASE HOOP STRESS ON ? =	ID	
EN13480 USE IN OUTPLANE SIFS=	NO	
LIBERAL EXPANSION ALLOWABLE=	YES	
B31.3 SEC 319.2.3C SAXIAL=	Default	
B31.3 WELDING/CONTOUR TEE ISB16.9	FALSE	
PRESSURE VARIATION IN EXP CASE=	DEFAULT	
Use Alt Rules Stress Range	NO	
IMPLEMENT B313 CODE CASE 178	YES	
IGNORE B31.1/B31.3 Wc FACTOR=	YES	
APPLY B31J SIFS & FLEX=	DEFAULT	
ENFORCE B31J SIFS ONLY=	FALSE	
USE FRP SIF =	YES	
USE FRP FLEX =	YES	
BS 7159 Pressure Stiffening=	Design Strain	
FRP Property Data File=	CAESAR.FRP	
FRP Emod (axial) =	22064.0	N/mm2
FRP Ratio Gmod/Emod (axial) =	0.250000	
FRP Ea/Eh*Vh/a =	0.152730	
FRP Laminate Type =	THREE	
FRP Alpha =	21.5983	C
FRP Density =	1660.80	kg/m3
EXCLUDE f2 FROM UKOOA BENDING =	NO	
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EXECUTION CONTROL PARAMETERS

Rigid/ExpJt Print Flag	1.000
Bourdon Option000
Loop Closure Flag	2.000
Thermal Bowing Delta Temp ..	.000 C
Liberal Allowable Flag	1.000
Uniform Load Option000
Ambient Temperature	21.114 C
Plastic (FRP) Alpha	21.598
Plastic (FRP) GMOD/EMODa250
Plastic (FRP) Laminate Type.	3.000
Eqn Optimizer000
Node Selection000
Eqn Ordering000
Collins000
Degree Determination000
User Eqn Control000

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INPUT LISTING

North Direction -Z
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COORDINATE REPORT

```

/----- (mm ) -----/
NODE      X      Y      Z
  10      .000      .000      .000
  20      .000      .000     152.400
  30      .000      .000     279.400
  40      .000      .000    2565.400
  50      .000    -5435.600    2565.400
  60      .000    -5435.600    8064.500
  70      .000   -1183.640    8064.500
  80      .000    -726.440    8064.500
  90      .000     543.560    8064.500
 100      .000     6619.239    8064.500
 110      .000     8618.219    8064.500
 120      .000     8719.818    8064.500
 130      .000     9418.318    8064.500
 140      .000    10617.198    8064.500
 150      .000    13616.938    8064.500
 160      .000    14442.438    8064.500
 170      .000    16441.418    8064.500
 180      .000    17241.518    8064.500
 190      .000    17933.414    8064.500
 200      .000    18009.613    8064.500
 210      .000    22660.354    8064.500
 220      .000    24608.533    8064.500
 230      .000    25964.893    7894.320
 240      .000    29848.555    7894.320
 250      .000    29848.555    3423.918
 260      .000    29340.555    1595.117
 270      .000    28172.154    -284.484
 280      .000    27176.475   -1277.624
 290      .000    23747.475   -4706.624
 300      .000    22223.475   -5773.424
 310      .000    21004.275   -4503.423
 320      .000    21004.275   -3741.423
 330      .000    21004.275   -3233.423

```

APPENDIX 2 – CAESAR II OUTPUT

CAESAR II Ver.14.00.00.0910, (Build 231113) Date: DEC 24, 2025 Time: 13:48
Job:: DRYER CYCLONE-01A
Licensed To:: Edit name in <system>\company.txt

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LISTING OF STATIC LOAD CASES FOR THIS ANALYSIS

- 1 (OPE) W+T1+P1
- 2 (Alt-SUS) W+P1
- 3 (SUS) W+P1
- 4 (EXP) L4=L1-L3

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STRESS SUMMARY (LEGACY) REPORT: Highest Stresses Mini Statement Various Load Cases

LOAD CASE DEFINITION KEY

CASE 3 (SUS) W+P1
 CASE 4 (EXP) L4=L1-L3

Note: This report indicates generic stresses summary. Currently, CAESAR II does not have summary for code-defined stresses.
 Piping Code: B31.3-2022 = B31.3 -2022, January 31, 2023

CODE STRESS CHECK PASSED : LOADCASE 3 (SUS) W+P1

Highest Stresses: (N/mm2)	LOADCASE 3 (SUS) W+P1	
Ratio (%):	72.6	@Node 299	
Code Stress:	71.5	Allowable Stress:	98.6
Axial Stress:	7.8	@Node 120	
Bending Stress:	68.3	@Node 299	
Torsion Stress:	0.0	@Node 330	
Hoop Stress:	14.8	@Node 110	
Max Stress Intensity:	73.1	@Node 299	

CODE STRESS CHECK PASSED : LOADCASE 4 (EXP) L4=L1-L3

Highest Stresses: (N/mm2)	LOADCASE 4 (EXP) L4=L1-L3	
Ratio (%):	6.4	@Node 299	
Code Stress:	14.4	Allowable Stress:	224.0
Axial Stress:	2.6	@Node 80	
Bending Stress:	17.1	@Node 249	
Torsion Stress:	0.0	@Node 270	
Hoop Stress:	0.0	@Node 20	
Max Stress Intensity:	17.1	@Node 249	

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B31.3-2022 STRESSES REPORT: Stresses on Elements
CASE 3 (SUS) W+P1

Piping Code (1 of 1): B31.3 -2022, January 31, 2023

The SLP column shows the longitudinal pressure stress.

Stresses Evaluation CHECK PASSED : LOADCASE 3 (SUS) W+P1

Highest Stresses: (N/mm2)			
Ratio (%):	72.6	@Node	299
Code:	71.5	Allowable:	98.6
SLP	7.4	@Node	110
F/A	1.1	@Node	200
Bending	68.3	@Node	299
Torsion	0.0	@Node	330
SIF/Index In-Plane	11.6	@Node	288
SIF/Index Out-Plane	9.6	@Node	288
SIF/Index Torsion	1.5	@Node	130
SIF/Index Axial	1.0	@Node	10

[illegible]

CAESAR II Ver.14.00.00.0910, (Build 231113) Date: DEC 24, 2025 Time: 13:48

Job:: DRYER CYCLONE-01A

Licensed To:: Edit name in <system>\company.txt

B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 3 (SUS) W+P1

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
38	5.66	0.04	8.19	0.00	6.885	5.737	1.000	1.000	13.88	98.60	14.08	
39	5.66	0.35	7.04	-0.00	6.885	5.737	1.000	1.000	13.05	98.60	13.23	
39	5.66	0.35	7.04	0.00	6.885	5.737	1.000	1.000	13.05	98.60	13.23	
40	5.66	0.32	10.94	0.00	6.885	5.737	1.000	1.000	16.92	98.60	17.16	
40	5.66	0.32	1.59	-0.00	1.000	1.000	1.000	1.000	7.57	98.60	7.67	
48	5.66	0.19	1.42	0.00	1.000	1.000	1.000	1.000	7.26	98.60	7.37	
48	5.66	0.19	9.77	-0.00	6.885	5.737	1.000	1.000	15.62	98.60	15.84	
49	5.66	0.06	9.79	0.00	6.885	5.737	1.000	1.000	15.51	98.60	15.73	
49	5.66	0.06	9.79	-0.00	6.885	5.737	1.000	1.000	15.51	98.60	15.73	
50	5.66	0.04	8.46	0.00	6.885	5.737	1.000	1.000	14.16	98.60	14.36	
50	5.66	0.04	1.23	-0.00	1.000	1.000	1.000	1.000	6.93	98.60	7.02	
58	5.66	0.04	0.45	0.00	1.000	1.000	1.000	1.000	6.15	98.60	6.24	
58	5.66	0.04	3.13	-0.00	6.885	5.737	1.000	1.000	8.82	98.60	8.95	
59	5.66	0.29	5.28	0.00	6.885	5.737	1.000	1.000	11.23	98.60	11.39	
59	5.66	0.29	5.28	-0.00	6.885	5.737	1.000	1.000	11.23	98.60	11.39	
60	5.66	0.52	9.33	-0.00	6.885	5.737	1.000	1.000	15.50	98.60	15.72	
60	5.66	0.52	1.36	0.00	1.000	1.000	1.000	1.000	7.53	98.60	7.64	
70	5.66	0.72	1.09	-0.00	1.000	1.000	1.000	1.000	7.48	98.60	7.58	
70	5.66	-0.44	1.09	0.00	1.000	1.000	1.000	1.000	6.31	98.60	6.40	
80	5.66	-0.40	1.04	-0.00	1.000	1.000	1.000	1.000	6.30	98.60	6.39	
80	5.66	-0.40	1.04	0.00	1.000	1.000	1.000	1.000	6.30	98.60	6.39	

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B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 3 (SUS) W+P1

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
90	5.66	-0.28	0.90	-0.00	1.000	1.000	1.000	1.000	6.27	98.60	6.36	
90	5.66	-0.28	0.90	0.00	1.000	1.000	1.000	1.000	6.27	98.60	6.36	
100	5.66	0.27	0.20	-0.00	1.000	1.000	1.000	1.000	6.12	98.60	6.21	
100	5.66	0.27	0.39	0.00	2.000	2.000	1.405	1.000	6.32	98.60	6.41	
110	7.41	0.37	0.04	-0.00	2.000	2.000	1.405	1.000	7.82	98.60	7.93	
110	7.41	0.37	0.02	0.00	1.000	1.000	1.000	1.000	7.80	98.60	7.91	
120	7.41	0.38	0.03	-0.00	1.000	1.000	1.000	1.000	7.81	98.60	7.93	
120	7.41	-0.21	0.03	0.00	1.000	1.000	1.000	1.000	7.23	98.60	7.33	
130	7.41	-0.15	0.07	-0.00	1.000	1.000	1.000	1.000	7.34	98.60	7.44	
130	7.41	-0.15	0.15	0.00	2.000	2.000	1.485	1.000	7.41	98.60	7.52	
140	5.99	-0.06	0.47	-0.00	2.000	2.000	1.485	1.000	6.40	98.60	6.49	
140	5.99	-0.06	0.23	0.00	1.000	1.000	1.000	1.000	6.17	98.60	6.25	
150	5.99	0.22	0.54	-0.00	1.000	1.000	1.000	1.000	6.75	98.60	6.84	
150	5.99	-0.21	0.54	0.00	1.000	1.000	1.000	1.000	6.32	98.60	6.41	
160	5.99	-0.14	0.63	-0.00	1.000	1.000	1.000	1.000	6.48	98.60	6.57	
160	5.99	-0.14	1.25	0.00	2.000	2.000	1.485	1.000	7.10	98.60	7.20	
170	7.41	0.06	1.09	-0.00	2.000	2.000	1.485	1.000	8.56	98.60	8.68	
170	7.41	0.06	0.54	0.00	1.000	1.000	1.000	1.000	8.01	98.60	8.13	
180	7.41	0.13	0.60	-0.00	1.000	1.000	1.000	1.000	8.14	98.60	8.26	
180	7.41	0.13	1.19	0.00	2.000	2.000	1.485	1.000	8.74	98.60	8.86	
190	5.99	0.24	1.97	-0.00	2.000	2.000	1.485	1.000	8.19	98.60	8.31	

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Job:: DRYER CYCLONE-01A

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B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 3 (SUS) W+P1

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
190	5.99	0.24	0.99	0.00	1.000	1.000	1.000	1.000	7.21	98.60	7.31	
200	5.99	0.24	0.99	-0.00	1.000	1.000	1.000	1.000	7.22	98.60	7.33	
200	5.99	-1.05	0.99	0.00	1.000	1.000	1.000	1.000	5.93	98.60	6.01	
210	5.99	-0.63	1.47	-0.00	1.000	1.000	1.000	1.000	6.83	98.60	6.93	
210	5.99	-0.63	2.94	0.00	2.000	2.000	1.205	1.000	8.30	98.60	8.42	
220	4.06	-0.71	7.25	-0.00	2.000	2.000	1.205	1.000	10.60	98.60	10.75	
220	4.06	-0.71	7.25	0.00	2.000	2.000	1.289	1.000	10.60	98.60	10.75	
230	3.19	-0.77	11.13	-0.00	2.000	2.000	1.289	1.000	13.56	98.60	13.75	
230	3.19	-0.77	5.57	0.00	1.000	1.000	1.000	1.000	7.99	98.60	8.11	
238	3.19	-0.76	5.62	-0.00	1.000	1.000	1.000	1.000	8.05	98.60	8.17	
238	3.19	-0.76	15.99	0.00	2.848	2.373	1.000	1.000	18.43	98.60	18.69	
239	3.19	-0.40	8.78	0.00	2.848	2.373	1.000	1.000	11.57	98.60	11.73	
239	3.19	-0.40	8.78	-0.00	2.848	2.373	1.000	1.000	11.57	98.60	11.73	
240	3.19	-0.07	5.19	0.00	2.848	2.373	1.000	1.000	8.32	98.60	8.44	
240	3.19	-0.07	1.82	-0.00	1.000	1.000	1.000	1.000	4.95	98.60	5.02	
249	3.19	-0.04	22.09	0.00	8.209	6.841	1.000	1.000	25.25	98.60	25.61	
249	3.19	-0.04	22.09	-0.00	8.209	6.841	1.000	1.000	25.25	98.60	25.61	
250	3.19	-0.02	23.40	0.00	8.209	6.841	1.000	1.000	26.58	98.60	26.96	
250	3.19	-0.02	2.85	-0.00	1.000	1.000	1.000	1.000	6.03	98.60	6.11	
259	3.19	-0.05	32.50	0.00	8.209	6.841	1.000	1.000	35.65	98.60	36.16	

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B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 3 (SUS) W+P1

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
259	3.19	-0.05	32.50	-0.00	8.209	6.841	1.000	1.000	35.65	98.60	36.16	
260	3.19	-0.05	32.87	0.00	8.209	6.841	1.000	1.000	36.01	98.60	36.52	
260	3.19	-0.05	4.00	-0.00	1.000	1.000	1.000	1.000	7.15	98.60	7.25	
268	3.19	-0.14	3.78	0.00	1.000	1.000	1.000	1.000	6.84	98.60	6.94	
268	3.19	-0.14	31.06	-0.00	8.209	6.841	1.000	1.000	34.12	98.60	34.60	
269	3.19	-0.15	30.56	0.00	8.209	6.841	1.000	1.000	33.60	98.60	34.08	
269	3.19	-0.15	30.56	-0.00	8.209	6.841	1.000	1.000	33.60	98.60	34.08	
270	3.19	-0.17	30.11	0.00	8.209	6.841	1.000	1.000	33.14	98.60	33.61	
270	3.19	-0.17	7.34	-0.00	2.000	2.000	1.289	1.000	10.36	98.60	10.51	
280	4.06	-0.20	3.57	0.00	2.000	2.000	1.289	1.000	7.43	98.60	7.53	
280	4.06	-0.20	1.78	-0.00	1.000	1.000	1.000	1.000	5.64	98.60	5.72	
288	4.06	-0.50	3.76	0.00	1.000	1.000	1.000	1.000	7.33	98.60	7.43	
288	4.06	-0.50	43.51	-0.00	11.564	9.637	1.000	1.000	47.07	98.60	47.74	
289	4.06	-0.54	45.14	0.00	11.564	9.637	1.000	1.000	48.67	98.60	49.36	
289	4.06	-0.54	45.14	-0.00	11.564	9.637	1.000	1.000	48.67	98.60	49.36	
290	4.06	-0.57	46.61	0.00	11.564	9.637	1.000	1.000	50.09	98.60	50.80	
290	4.06	-0.57	4.03	-0.00	1.000	1.000	1.000	1.000	7.52	98.60	7.62	
299	4.06	-0.80	68.29	0.00	11.564	9.637	1.000	1.000	71.55	98.60	72.56	
299	4.06	-0.80	68.29	-0.00	11.564	9.637	1.000	1.000	71.55	98.60	72.56	
300	4.06	-0.56	54.88	0.00	11.564	9.637	1.000	1.000	58.38	98.60	59.21	
300	4.06	-0.56	4.75	-0.00	1.000	1.000	1.000	1.000	8.24	98.60	8.36	

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Job:: DRYER CYCLONE-01A

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B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 3 (SUS) W+P1

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
309	4.06	-0.30	14.84	0.00	8.072	6.727	1.000	1.000	18.60	98.60	18.86	
309	4.06	-0.30	14.84	-0.00	8.072	6.727	1.000	1.000	18.60	98.60	18.86	
310	4.06	0.05	2.97	0.00	8.072	6.727	1.000	1.000	7.08	98.60	7.18	
310	4.06	0.05	0.37	-0.00	1.000	1.000	1.000	1.000	4.48	98.60	4.54	
320	4.06	0.05	1.17	0.00	1.000	1.000	1.000	1.000	5.28	98.60	5.35	
320	4.06	0.05	2.34	-0.00	2.000	2.000	1.064	1.000	6.45	98.60	6.54	
330 (Nozzle Cyclone)	2.59	0.08	16.51	0.00	2.000	2.000	1.064	1.000	19.19	98.60	19.46	

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B31.3-2022 STRESSES REPORT: Stresses on Elements
CASE 4 (EXP) L4=L1-L3

Piping Code (1 of 1): B31.3 -2022, January 31, 2023

The SLP column shows the longitudinal pressure stress.

Stresses Evaluation CHECK PASSED : LOADCASE 4 (EXP) L4=L1-L3

Highest Stresses: (N/mm2)
 Ratio (%): 6.4 @Node 299
 Code: 14.4 Allowable: 224.0
 F/A 5.3 @Node 100
 Bending 17.1 @Node 249
 Torsion 0.0 @Node 270
 SIF/Index In-Plane 11.6 @Node 288
 SIF/Index Out-Plane 9.6 @Node 288
 SIF/Index Torsion 1.5 @Node 130
 SIF/Index Axial 2.0 @Node 100

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out- Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
10 (Nozzle Dryer)		0.01	0.09	0.00	1.000	1.000	1.000	1.000	0.10	287.62	0.04	
20		0.01	0.10	-0.00	1.000	1.000	1.000	1.000	0.11	287.92	0.04	
20		0.01	0.10	0.00	1.000	1.000	1.000	1.000	0.11	287.92	0.04	
30		0.01	0.11	-0.00	1.000	1.000	1.000	1.000	0.12	288.17	0.04	
30		0.01	0.11	0.00	1.000	1.000	1.000	1.000	0.12	288.17	0.04	
38		0.01	0.12	-0.00	1.000	1.000	1.000	1.000	0.13	288.74	0.04	
38		0.01	0.83	0.00	6.885	5.737	1.000	1.000	0.84	281.74	0.30	

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Job:: DRYER CYCLONE-01A

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B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 4 (EXP) L4=L1-L3

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
39		0.02	1.15	-0.00	6.885	5.737	1.000	1.000	1.17	282.58	0.41	
39		0.02	1.15	0.00	6.885	5.737	1.000	1.000	1.17	282.58	0.41	
40		0.01	1.07	-0.00	6.885	5.737	1.000	1.000	1.09	278.71	0.39	
40		0.01	0.16	0.00	1.000	1.000	1.000	1.000	0.17	288.06	0.06	
48		0.01	0.12	-0.00	1.000	1.000	1.000	1.000	0.13	288.36	0.05	
48		0.01	0.80	0.00	6.885	5.737	1.000	1.000	0.82	280.01	0.29	
49		0.02	0.72	-0.00	6.885	5.737	1.000	1.000	0.74	280.11	0.26	
49		0.02	0.72	0.00	6.885	5.737	1.000	1.000	0.74	280.11	0.26	
50		0.01	1.04	-0.00	6.885	5.737	1.000	1.000	1.05	281.46	0.37	
50		0.01	0.15	0.00	1.000	1.000	1.000	1.000	0.16	288.70	0.06	
58		0.01	0.22	-0.00	1.000	1.000	1.000	1.000	0.23	289.47	0.08	
58		0.01	1.51	0.00	6.885	5.737	1.000	1.000	1.52	286.80	0.53	
59		-0.00	2.05	-0.00	6.885	5.737	1.000	1.000	2.05	284.38	0.72	
59		-0.00	2.05	0.00	6.885	5.737	1.000	1.000	2.05	284.38	0.72	
60		-0.01	2.48	0.00	6.885	5.737	1.000	1.000	2.49	280.10	0.89	
60		-0.01	0.36	-0.00	1.000	1.000	1.000	1.000	0.37	288.09	0.13	
70		-0.01	0.42	0.00	1.000	1.000	1.000	1.000	0.44	288.14	0.15	
70		-2.64	0.42	-0.00	1.000	1.000	1.000	1.000	3.06	289.31	1.06	
80		-2.64	0.43	0.00	1.000	1.000	1.000	1.000	3.07	289.32	1.06	
80		-2.64	0.43	-0.00	1.000	1.000	1.000	1.000	3.07	289.32	1.06	
90		-2.64	0.47	0.00	1.000	1.000	1.000	1.000	3.10	289.35	1.07	

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Job:: DRYER CYCLONE-01A

Licensed To:: Edit name in <system>\company.txt

B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 4 (EXP) L4=L1-L3

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
90		-2.64	0.47	-0.00	1.000	1.000	1.000	1.000	3.10	289.35	1.07	
100		-2.64	0.63	0.00	1.000	1.000	1.000	1.000	3.27	289.50	1.13	
100		-5.28	1.26	-0.00	2.000	2.000	1.405	2.000	6.53	289.30	2.26	
110		-4.03	0.80	0.00	2.000	2.000	1.405	2.000	4.83	287.81	1.68	
110		-2.02	0.40	-0.00	1.000	1.000	1.000	1.000	2.41	287.83	0.84	
120		-2.02	0.40	0.00	1.000	1.000	1.000	1.000	2.42	287.81	0.84	
120		-1.43	0.40	-0.00	1.000	1.000	1.000	1.000	1.83	288.40	0.63	
130		-1.43	0.41	0.00	1.000	1.000	1.000	1.000	1.84	288.28	0.64	
130		-2.86	0.82	-0.00	2.000	2.000	1.485	2.000	3.68	288.21	1.28	
140		-3.53	1.31	0.00	2.000	2.000	1.485	2.000	4.84	289.22	1.67	
140		-1.77	0.66	-0.00	1.000	1.000	1.000	1.000	2.42	289.46	0.84	
150		-1.77	0.73	0.00	1.000	1.000	1.000	1.000	2.49	288.88	0.86	
150		-1.33	0.73	-0.00	1.000	1.000	1.000	1.000	2.06	289.31	0.71	
160		-1.33	0.75	0.00	1.000	1.000	1.000	1.000	2.08	289.15	0.72	
160		-2.67	1.49	-0.00	2.000	2.000	1.485	2.000	4.16	288.52	1.44	
170		-2.16	1.04	0.00	2.000	2.000	1.485	2.000	3.20	287.07	1.11	
170		-1.08	0.52	-0.00	1.000	1.000	1.000	1.000	1.60	287.61	0.56	
180		-1.08	0.53	0.00	1.000	1.000	1.000	1.000	1.61	287.48	0.56	
180		-2.16	1.06	-0.00	2.000	2.000	1.485	2.000	3.22	286.88	1.12	
190		-2.67	1.66	0.00	2.000	2.000	1.485	2.000	4.33	287.43	1.51	

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Job:: DRYER CYCLONE-01A

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B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 4 (EXP) L4=L1-L3

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
190		-1.33	0.83	-0.00	1.000	1.000	1.000	1.000	2.16	288.42	0.75	
200		-1.33	0.83	0.00	1.000	1.000	1.000	1.000	2.17	288.40	0.75	
200		-0.04	0.83	-0.00	1.000	1.000	1.000	1.000	0.87	289.70	0.30	
210		-0.04	0.94	0.00	1.000	1.000	1.000	1.000	0.98	288.79	0.34	
210		-0.08	1.88	-0.00	2.000	2.000	1.205	2.000	1.96	287.32	0.68	
220		-0.11	4.29	0.00	2.000	2.000	1.205	2.000	4.40	285.03	1.54	
220		-0.12	4.29	-0.00	2.000	2.000	1.289	2.000	4.40	285.03	1.54	
230		-0.15	7.00	0.00	2.000	2.000	1.289	2.000	7.15	282.07	2.53	
230		-0.07	3.50	-0.00	1.000	1.000	1.000	1.000	3.57	287.63	1.24	
238		-0.07	3.51	0.00	1.000	1.000	1.000	1.000	3.58	287.57	1.25	
238		-0.07	10.00	-0.00	2.848	2.373	1.000	1.000	10.07	277.20	3.63	
239		-0.06	9.41	-0.00	2.848	2.373	1.000	1.000	9.48	284.06	3.34	
239		-0.06	9.41	0.00	2.848	2.373	1.000	1.000	9.48	284.06	3.34	
240		-0.02	6.74	-0.00	2.848	2.373	1.000	1.000	6.76	287.28	2.35	
240		-0.02	2.37	0.00	1.000	1.000	1.000	1.000	2.38	290.66	0.82	
249		-0.01	17.13	-0.00	8.209	6.841	1.000	1.000	17.14	270.32	6.34	
249		-0.01	17.13	0.00	8.209	6.841	1.000	1.000	17.14	270.32	6.34	
250		0.00	16.63	-0.00	8.209	6.841	1.000	1.000	16.64	268.99	6.19	
250		0.00	2.03	0.00	1.000	1.000	1.000	1.000	2.03	289.59	0.70	
259		0.01	10.96	-0.00	8.209	6.841	1.000	1.000	10.98	259.94	4.22	
259		0.01	10.96	0.00	8.209	6.841	1.000	1.000	10.98	259.94	4.22	

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Job:: DRYER CYCLONE-01A

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B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 4 (EXP) L4=L1-L3

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
260		0.02	10.46	-0.00	8.209	6.841	1.000	1.000	10.49	259.58	4.04	
260		0.02	1.27	0.00	1.000	1.000	1.000	1.000	1.30	288.47	0.45	
268		0.02	0.56	-0.00	1.000	1.000	1.000	1.000	0.58	288.78	0.20	
268		0.02	4.57	0.00	8.209	6.841	1.000	1.000	4.59	261.49	1.76	
269		0.03	4.18	-0.00	8.209	6.841	1.000	1.000	4.21	262.01	1.61	
269		0.03	4.18	0.00	8.209	6.841	1.000	1.000	4.21	262.01	1.61	
270		0.04	3.81	-0.00	8.209	6.841	1.000	1.000	3.85	262.48	1.47	
270		0.08	0.93	0.00	2.000	2.000	1.289	2.000	1.01	285.26	0.35	
280		0.06	0.05	-0.00	2.000	2.000	1.289	2.000	0.11	288.20	0.04	
280		0.03	0.02	0.00	1.000	1.000	1.000	1.000	0.06	289.98	0.02	
288		0.03	0.96	-0.00	1.000	1.000	1.000	1.000	0.99	288.29	0.34	
288		0.03	11.11	0.00	11.564	9.637	1.000	1.000	11.14	248.51	4.48	
289		0.04	11.31	-0.00	11.564	9.637	1.000	1.000	11.34	246.91	4.59	
289		0.04	11.31	0.00	11.564	9.637	1.000	1.000	11.34	246.91	4.59	
290		0.04	11.49	-0.00	11.564	9.637	1.000	1.000	11.52	245.49	4.69	
290		0.04	0.99	0.00	1.000	1.000	1.000	1.000	1.03	288.10	0.36	
299		0.06	14.34	-0.00	11.564	9.637	1.000	1.000	14.40	224.03	6.43	
299		0.06	14.34	0.00	11.564	9.637	1.000	1.000	14.40	224.03	6.43	
300		0.05	13.89	-0.00	11.564	9.637	1.000	1.000	13.94	237.19	5.88	
300		0.05	1.20	0.00	1.000	1.000	1.000	1.000	1.25	287.38	0.43	
309		0.03	8.52	-0.00	8.072	6.727	1.000	1.000	8.55	277.00	3.09	

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Job:: DRYER CYCLONE-01A

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B31.3-2022 STRESSES REPORT: Stresses on Elements

CASE 4 (EXP) L4=L1-L3

Node	SLP N/mm2	F/A N/mm2	Bending N/mm2	Torsion N/mm2	SIF/Index In-Plane	SIF/Index Out-Plane	SIF/Index Torsion	SIF/Index Axial	Code N/mm2	Allowable N/mm2	Ratio %	
309		0.03	8.52	0.00	8.072	6.727	1.000	1.000	8.55	277.00	3.09	
310		0.01	7.53	-0.00	8.072	6.727	1.000	1.000	7.54	288.54	2.61	
310		0.01	0.93	0.00	1.000	1.000	1.000	1.000	0.94	291.14	0.32	
320		0.01	0.89	-0.00	1.000	1.000	1.000	1.000	0.90	290.34	0.31	
320		0.02	1.77	0.00	2.000	2.000	1.064	2.000	1.80	289.18	0.62	
330 (Nozzle Cyclone)		0.04	3.73	-0.00	2.000	2.000	1.064	2.000	3.77	276.44	1.36	

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 Job:: DRYER CYCLONE-01A
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RESTRAINT SUMMARY REPORT: Loads On Restraints
Various Load Cases

LOAD CASE DEFINITION KEY

CASE 1 (OPE) W+T1+P1

CASE 3 (SUS) W+P1

Node	Load Case	FX N	FY N	FZ N	MX N.m	MY N.m	MZ N.m
10 (Nozzle Dryer)		TYPE=Rigid X; Rigid Y; Rigid Z; Flex RX; Rigid RY; Rigid RZ;					
	1(OPE)	-0	-8296	577	9014	-0	-0
	3(SUS)	-0	-8116	469	9400	-0	-0
	MAX	-0/L3	-8296/L1	577/L1	9400/L3	-0/L3	-0/L1
70		TYPE=Rigid +Y; Rigid Z w/gap; Rigid X w/gap;					
	1(OPE)	0	-46972	0	0	0	0
	3(SUS)	0	-14426	0	0	0	0
	MAX		-46972/L1				
120		TYPE=Rigid +Y; Rigid Z w/gap; Rigid X w/gap;					
	1(OPE)	0	0	0	0	0	0
	3(SUS)	0	-9550	0	0	0	0
	MAX		-9550/L3				
150		TYPE=Rigid +Y; Rigid X w/gap; Rigid Z w/gap;					
	1(OPE)	0	0	0	0	0	0
	3(SUS)	0	-5660	0	0	0	0
	MAX		-5660/L3				
200		TYPE=Rigid +Y; Rigid X w/gap; Rigid Z w/gap;					
	1(OPE)	0	0	0	0	0	0

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Job:: DRYER CYCLONE-01A

Licensed To:: Edit name in <system>\company.txt

RESTRAINT SUMMARY REPORT: Loads On Restraints
Various Load Cases

Node	Load Case	FX N	FY N	FZ N	MX N.m	MY N.m	MZ N.m
	3(SUS)	0	-17010	0	0	0	0
	MAX		-17010/L3				
330 (Nozzle Cyclone)		TYPE=Rigid X; Rigid Y; Rigid Z; Flex RX; Rigid RY; Rigid RZ;					
	1(OPE)	0	-8808	-577	-8725	0	-0
	3(SUS)	0	-9315	-469	-7116	0	-0
	MAX	0/L3	-9315/L3	-577/L1	-8725/L1	0/L3	-0/L3

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Job:: DRYER CYCLONE-01A

Licensed To:: Edit name in <system>\company.txt

DISPLACEMENTS REPORT: Nodal Movements

CASE 4 (EXP) L4=L1-L3

Node	DX mm	DY mm	DZ mm	RX deg.	RY deg.	RZ deg.
10 (Nozzle Dryer)	0.000	-0.000	0.000	-0.0043	0.0000	-0.0000
20	0.000	0.011	0.380	-0.0043	0.0000	-0.0000
30	0.000	0.021	0.697	-0.0043	0.0000	-0.0000
38	0.000	0.043	1.458	-0.0043	0.0000	-0.0000
39	0.000	-1.237	5.036	-0.0101	0.0000	0.0000
40	0.000	-4.608	6.818	-0.0167	0.0000	-0.0000
48	0.000	-8.286	7.249	-0.0168	0.0000	-0.0000
49	0.000	-11.584	9.157	-0.0210	0.0000	-0.0000
50	-0.000	-12.462	12.882	-0.0258	0.0000	-0.0000
58	-0.000	-11.767	16.718	-0.0260	0.0000	-0.0000
59	-0.000	-9.573	19.887	-0.0361	0.0000	-0.0000
60	-0.000	-5.668	20.289	-0.0492	0.0000	-0.0000
70	-0.000	-0.000	18.331	-0.0496	0.0000	-0.0000
80	-0.000	1.135	17.935	-0.0497	0.0000	-0.0000
90	-0.000	4.288	16.832	-0.0499	0.0000	-0.0000
100	0.000	19.372	11.463	-0.0514	0.0000	-0.0000
110	0.000	24.338	9.662	-0.0518	0.0000	-0.0000
120	0.000	24.590	9.570	-0.0518	0.0000	-0.0000
130	0.000	26.329	8.937	-0.0519	0.0000	-0.0000
140	0.000	29.312	7.849	-0.0522	0.0000	-0.0000
150	0.000	36.772	5.096	-0.0530	0.0000	-0.0000
160	0.000	38.827	4.331	-0.0533	0.0000	-0.0000
170	0.000	43.805	2.463	-0.0538	0.0000	-0.0000
180	0.000	45.798	1.711	-0.0539	0.0000	-0.0000
190	0.000	47.520	1.060	-0.0541	0.0000	-0.0000
200	0.000	47.710	0.988	-0.0541	0.0000	-0.0000
210	0.000	59.318	-3.472	-0.0558	0.0000	-0.0000
220	0.000	64.181	-5.390	-0.0573	0.0000	-0.0000
230	0.000	67.392	-7.198	-0.0600	0.0000	-0.0000
238	0.000	67.735	-7.342	-0.0603	0.0000	-0.0000
239	0.000	71.886	-15.130	-0.1626	0.0000	-0.0000
240	0.000	64.929	-25.455	-0.2472	0.0000	-0.0000
249	0.000	61.757	-27.212	-0.2629	0.0000	-0.0000
250	0.000	60.978	-27.438	-0.2771	0.0000	-0.0000
259	0.000	51.626	-29.297	-0.2892	0.0000	-0.0000
260	0.000	50.712	-29.268	-0.2987	0.0000	-0.0000
268	0.000	39.648	-28.038	-0.3000	0.0000	-0.0000
269	0.000	38.904	-27.909	-0.3032	0.0000	-0.0000
270	0.000	38.175	-27.692	-0.3060	0.0000	-0.0000
280	0.000	31.103	-25.112	-0.3062	0.0000	-0.0000
288	0.000	4.699	-15.534	-0.3048	0.0000	-0.0000
289	0.000	4.250	-15.352	-0.2998	0.0000	-0.0000
290	0.000	3.824	-15.136	-0.2946	0.0000	-0.0000
299	0.000	-3.393	-9.901	-0.2424	0.0000	-0.0000
300	0.000	-3.821	-6.932	-0.1901	-0.0000	-0.0000

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Job:: DRYER CYCLONE-01A

Licensed To:: Edit name in <system>\company.txt

DISPLACEMENTS REPORT: Nodal Movements

CASE 4 (EXP) L4=L1-L3

Node	DX mm	DY mm	DZ mm	RX deg.	RY deg.	RZ deg.
309	0.000	-2.904	-3.350	-0.1652	-0.0000	-0.0000
310	0.000	-1.735	-1.739	-0.1430	-0.0000	0.0000
320	0.000	-1.264	-1.268	-0.1429	-0.0000	0.0000
330 (Nozzle Cyclone)	-0.000	0.000	-0.000	-0.1424	-0.0000	0.0000

APPENDIX 3 – DRAWINGS AND SKETCHES

(Nodes & Numbers)

