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REBIS
AutoPIPE 6.20 MODEL PAGE 1

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Pipe Stress Analysis and Design Program

Version: 6.20.09

Edition: Win

Developed and Maintained by

REBIS Industrial Workgroup Software
1600 Riviera Ave., Suite 300
Walnut Creek, CA 94596

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AutoPIPE 6.20 MODEL PAGE 2

**
** AUTOPIPE SYSTEM INFORMATION **
**

SYSTEM NAME : 79319847_komplett

PROJECT ID : ASU KOSICE

DESCRIPTION :

PREPARED BY : _____
WEGSTEIN

CHECKED BY : _____
FRICKHOEFER

PIPING CODE : B31.3

VERTICAL AXIS : Z

AMBIENT TEMPERATURE : 20.0 deg C

COMPONENT LIBRARY : HANAU_AL

MATERIAL LIBRARY : AUTOB313

MODEL REVISION NUMBER : 0

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AutoPIPE 6.20 MODEL PAGE 3

C O M P O N E N T D A T A L I S T I N G

*** SEGMENT B , LINE # 79319847

From B00 to B01, DX= -207.89 mm, DY= -207.89 mm, DZ= -5.13 mm,
L= 294.05 mm

Run

PIPE DATA:

Pipe Id= 150MX7.1, Material= AL, Poisson= 0.300, Nom Size= 150 mm,
OD= 168.30 mm, Sch= 7.1, Wall Thk= 7.100 mm, Mill= 0.887 mm, Cor= 0 mm,
Pipe Density= 2707.12 kg/m3, Pipe Unit Wgt= 95.46 N/m, Insul Thk= 0 mm,
Lining Thk= 0 mm, Long Weld factor= 1.00, Circ Weld factor= 1.00,
Long Modulus= 0.06899 x10⁶ N/m, Hoop Modulus= 0.06899 x10⁶ N/m,
Shear Modulus= 0.02653 x10⁶ N/m, Sc= 103.4 N/mm2, Syc= 0 N/mm2

OPERATING DATA:

P1= 0 N/mm2, T1= -196.00 deg C, Exp1= -3.84587 mm/m,
E1= 0.07646 x10⁶ N/m, Sh1= 71.00 N/mm2

POINT DATA:

B00, Coordinates, X= 207.89 mm, Y= 207.89 mm, Z= 16.58 mm

SUPPORT DATA:

B00, Anchor, KTX= Rigid, KTY= Rigid, KTZ= Rigid, KRX= Rigid, KRY= Rigid,
KRZ= Rigid

From B01 to B02, DZ= -1160.66 mm

Bend

COMPONENT DATA (Bend, TIP= B01, Near= B01 N, Far= B01 F):

Elbow, Radius= 228.99 mm, Bend angle= 89.00 deg, End flanges= 0,
Flex= 6.593, SIFI= 2.27, SIFO= 1.89

POINT DATA:

B01, Coordinates, X= 0.00 mm, Y= 0.00 mm, Z= 11.45 mm
B01 N, Coordinates, X= 159.10 mm, Y= 159.10 mm, Z= 15.38 mm
B01 F, Coordinates, X= 0.00 mm, Y= 0.00 mm, Z= -213.58 mm

From B02 to B03, DX= 161.93 mm, DY= 161.93 mm, L= 229.00 mm

Bend

COMPONENT DATA (Bend, TIP= B02, Near= B02 N, Far= B02 F):

Elbow, Radius= 228.99 mm, Bend angle= 90.00 deg, End flanges= 0,
Flex= 6.593, SIFI= 2.27, SIFO= 1.89

POINT DATA:

B02, Coordinates, X= 0.00 mm, Y= 0.00 mm, Z= -1149.21 mm
B02 N, Coordinates, X= 0.00 mm, Y= 0.00 mm, Z= -920.22 mm
B02 F, Coordinates, X= 161.92 mm, Y= 161.92 mm, Z= -1149.21 mm
B03, Coordinates, X= 161.93 mm, Y= 161.93 mm, Z= -1149.21 mm

SUPPORT DATA:

B02 F, Anchor, KTX= Rigid, KTY= Rigid, KTZ= Rigid, KRX= Rigid,
KRY= Rigid, KRZ= Rigid

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C O M P O N E N T D A T A L I S T I N G

Number of points in the system: 8

Weight of Empty Pipes + Weight of Contents = Total Weight of System
14.5 kg + 0.0 kg = 14.5 kg

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AutoPIPE 6.20 MODEL PAGE 5

C O O R D I N A T E S D A T A L I S T I N G

POINT	-----COORDINATE (mm)-----		
NAME	X	Y	Z

*** SEGMENT B , LINE # 79319847			
B00	207.89	207.89	16.58
B01 N	159.10	159.10	15.38
B01	0.00	0.00	11.45
B01 F	0.00	0.00	-213.58
B02 N	0.00	0.00	-920.22
B02	0.00	0.00	-1149.21
B02 F	161.92	161.92	-1149.21
B03	161.93	161.93	-1149.21

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PIPE DATA LISTING

Pipe ID/ Material	Nom/ Sch	O.D. mm	-----Thickness(mm)----- W.Th. Corr Mill Insu Ling	Spec Grav	Weight(N/m) Pipe Other Total	ZL/ ZC
150MX7.1 AL	150 7.1	168.30	7.100 0 0.89 0 0	0	95.46 0 95.46	1.00 1.00

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M A T E R I A L D A T A L I S T I N G

Material Name	Pipe ID	Density kg/m3	Pois. Ratio	Temper. deg C	Modulus x10 ⁶ N/ Axial Hoop Shear			Expans. mm/m
AL	150MX7.1	2707.1	0.30	20.0	0.06899	0.06899	0.02653	
				-196.0	0.07646			-3.8459

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M A T E R I A L A L L O W A B L E D A T A L I S T I N G

Material Name	Pipe ID	Temper. deg C	Allow. N/mm2	Yield N/mm2
AL	150MX7.1	20.0	103.42	0.00
		-196.0	71.00	

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TEMPERATURE AND PRESSURE DATA

	-----C A S E 1-----			-----C A S E 2-----			-----C A S E 3-----		
POINT	PRESS.	TEMPER	EXPAN.	PRESS.	TEMPER	EXPAN.	PRESS.	TEMPER	EXPAN.
NAME	N/mm2	deg C	mm/m	N/mm2	deg C	mm/m	N/mm2	deg C	mm/m
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

*** SEGMENT B , LINE # 79319847

B00	0	-196	-3.846
B03	0	-196	-3.846

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AutoPIPE 6.20 MODEL PAGE 10

H O T M O D U L U S (x10⁶ N/)

POINT

NAME	CASE 1	CASE 2	CASE 3
------	--------	--------	--------

*** SEGMENT B , LINE # 79319847

B00 0.07646

B03 0.07646

* Non-standard material

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H O T A L L O W A B L E S (N/mm2)										
-----C A S E 1-----										
POINT	NOT		NOT		NOT		NOT		NOT	
NAME	ALLOW	USED	USED	ALLOW	USED	USED	ALLOW	USED	USED	

*** SEGMENT B , LINE # 79319847

B00 71.00*

B03 71.00*

< User-defined code allowable

* Non-code material

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THERMAL ANCHOR MOVEMENTS AND DISPLACEMENTS

POINT NAME	LOAD CASE	DX (mm)	DY (mm)	DZ (mm)	RX (deg)	RY (deg)	RZ (deg)
-----	-----	-----	-----	-----	-----	-----	-----
B00	Thermal 1	3.10	3.10	-123.50	0.000	0.000	0.000
B02 F	Thermal 1	3.30	3.30	-118.20	0.000	0.000	0.000

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Point name	Load combination	TRANSLATIONS (mm)			ROTATIONS (deg)		
		X	Y	Z	X	Y	Z
		-----	-----	-----	-----	-----	-----

B00	T1	3.100	3.100-123.500	0.000	0.000	0.000
B01 N	T1	3.287	3.287-123.462	-0.010	0.010	0.000
B01 F	T1	3.662	3.662-122.206	-0.020	0.020	0.000
B02 N	T1	3.685	3.685-119.442	0.023	-0.023	0.000
B02 F	T1	3.300	3.300-118.200	0.000	0.000	0.000
B03	T1	3.300	3.300-118.200	0.000	0.000	0.000

*** Segment B end *** Line # 79319847

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R E S T R A I N T R E A C T I O N S

Point name	Load combination	FORCES (N)				MOMENTS (Nm)			
		X	Y	Z	Result	X	Y	Z	Result
B00	Anchor								
	T1	62	62	16382	16383	-2512	2512	0	3553
B02 F	Anchor								
	T1	-62	-62	-16382	16383	1831	-1831	0	2590

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AutoPIPE 6.20 RESULT PAGE 3

Point name	Load combination	X	FORCES (N)				MOMENTS (Nm)			
			Y	Z	Result	X	Y	Z	Result	
*** Segment B begin *** Line # 79319847										
B00	T1	-62	-62	-16382	16383	2512	-2512	0	3553	
B01 N	T1	-62	-62	-16382	16383	1713	-1713	0	2423	
B01 F	T1	-62	-62	-16382	16383	-879	879	0	1243	
B02 N	T1	-62	-62	-16382	16383	-836	836	0	1182	
B02 F-	T1	-62	-62	-16382	16383	1831	-1831	0	2590	
B02 F+	T1	0	0	0	0	0	0	0	0	
B03	T1	0	0	0	0	0	0	0	0	
*** Segment B end *** Line # 79319847										

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ASME B31.3b (2001) CODE COMPLIANCE

Point name	Load combination	(Moments in Nm)			S.I.F		Eq. Load no. type	(Stress in N/mm2)	
		In-Pl. Moment	Out-Pl. Moment	Torsion Moment	In	Out		Code Stress	Code Allow.
*** Segment B begin *** Line # 79319847									
B00	Max P						(3a) HOOP	0	71
	Max P	0	0		1.00	1.00	(18) SUST	0	71
	Cold to T1	3553	0	0	1.00	1.00	(17) DISP	26	147
B01 N-	Max P						(3a) HOOP	0	71
	Max P	0	0		1.00	1.00	(18) SUST	0	71
	Cold to T1	2423	0	0	1.00	1.00	(17) DISP	17	147
B01 N+	Max P						(3a) HOOP	0	71
	Max P	0	0		2.27	1.89	(18) SUST	0	71
	Cold to T1	2423	0	0	2.27	1.89	(17) DISP	39	147
B01 F-	Max P						(3a) HOOP	0	71
	Max P	0	0		2.27	1.89	(18) SUST	0	71
	Cold to T1	1243	0	0	2.27	1.89	(17) DISP	20	147
B01 F+	Max P						(3a) HOOP	0	71
	Max P	0	0		1.00	1.00	(18) SUST	0	71
	Cold to T1	879	879	0	1.00	1.00	(17) DISP	9	147
B02 N-	Max P						(3a) HOOP	0	71
	Max P	0	0		1.00	1.00	(18) SUST	0	71
	Cold to T1	836	836	0	1.00	1.00	(17) DISP	8	147
B02 N+	Max P						(3a) HOOP	0	71
	Max P	0	0		2.27	1.89	(18) SUST	0	71
	Cold to T1	1182	0	0	2.27	1.89	(17) DISP	19	147
B02 F-	Max P						(3a) HOOP	0	71
	Max P	0	0		2.27	1.89	(18) SUST	0	71
	Cold to T1	2590	0	0	2.27	1.89	(17) DISP	42	147
B02 F+	Max P						(3a) HOOP	0	71
	Max P	0	0		1.00	1.00	(18) SUST	0	71
	Cold to T1	0	0	0	1.00	1.00	(17) DISP	0	147
B03	Max P						(3a) HOOP	0	71
	Max P	0	0		1.00	1.00	(18) SUST	0	71
	Cold to T1	0	0	0	1.00	1.00	(17) DISP	0	147

*** Segment B end *** Line # 79319847

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S Y S T E M S U M M A R Y

Maximum displacements (mm)

Maximum X :	3.685	Point : B02 N	Load Comb.: T1
Maximum Y :	3.685	Point : B02 N	Load Comb.: T1
Maximum Z :	-123.500	Point : B00	Load Comb.: T1
Max. total:	123.578	Point : B00	Load Comb.: T1

Maximum rotations (deg)

Maximum X :	0.023	Point : B02 N	Load Comb.: T1
Maximum Y :	-0.023	Point : B02 N	Load Comb.: T1
Max. total:	0.033	Point : B02 N	Load Comb.: T1

Maximum restraint forces (N)

Maximum X :	-62	Point : B02 F	Load Comb.: T1
Maximum Y :	62	Point : B00	Load Comb.: T1
Maximum Z :	16382	Point : B00	Load Comb.: T1
Max. total:	16383	Point : B00	Load Comb.: T1

Maximum restraint moments (Nm)

Maximum X :	-2512	Point : B00	Load Comb.: T1
Maximum Y :	2512	Point : B00	Load Comb.: T1
Max. total:	3553	Point : B00	Load Comb.: T1

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S Y S T E M S U M M A R Y

Maximum pipe forces (N)

Maximum X :	-62	Point : B02 F	Load Comb.: T1
Maximum Y :	-62	Point : B02 F	Load Comb.: T1
Maximum Z :	-16382	Point : B00	Load Comb.: T1
Max. total:	16383	Point : B00	Load Comb.: T1

Maximum pipe moments (Nm)

Maximum X :	2512	Point : B00	Load Comb.: T1
Maximum Y :	-2512	Point : B00	Load Comb.: T1
Maximum Z :	0	Point : B02 N	Load Comb.: T1
Max. total:	3553	Point : B00	Load Comb.: T1

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S Y S T E M S U M M A R Y

Maximum displacement stress

Point	:	B02 F
Stress	N/mm2	: 42
Allowable	N/mm2	: 147
Ratio	:	0.29
Load combination	:	Cold to T1

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S Y S T E M S U M M A R Y

Maximum displacement stress ratio

Point : B02 F
Stress N/mm2 : 42
Allowable N/mm2 : 147
Ratio : 0.29
Load combination : Cold to T1

* * * The system satisfies ASME B31.3 code requirements * * *
* * * for the selected options * * *