

<b>Document Title</b>	Span Tables
<b>DRG Document No.</b>	DRG-101872-2829-CA01-R00
<b>Client</b>	Airpack Nederland BV
<b>Project</b>	API 618 Design Approach 2 for 17811-00-0701

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# Appendix C

## Span Tables

0	Issued for comments	For Comments	TK	MPB	FMB	18/02/2022
<b>Rev.</b>	<b>Description</b>	<b>Status</b>	<b>Prep'd</b>	<b>Chk'd</b>	<b>App'd</b>	<b>Date</b>

Pipe size	Sch.	maximum pipe span <i>mm</i>	Compressor speed <i>Hz</i>	Number of cylinders <i>-</i>	highest excitation frequency with 20% margin <i>Hz</i>	cartoon	Freq. factor (1st harm.)	E-mod <i>MPa</i>	OD <i>mm</i>	ID <i>mm</i>	THK <i>mm</i>	I <i>mm4</i>	mass liquid <i>kg/m</i>	mass steel pipe <i>kg/m</i>	total mass <i>kg/m</i>	Fluid Density <i>[kg/m3]</i>
<i>Simply supported</i>																
1"	80	<b>1595</b>	6.67	2	32.0	B	9.87	203,000	33.4	24.3	4.55	4.40E+04	0.02	3.3	3.3	46
2"	80	<b>2187</b>	6.67	2	32.0	B	9.87	203,000	60.3	49.22	5.54	3.61E+05	0.09	7.6	7.7	46
<i>bends out-plane</i>																
1"	80	<b>2063</b>	6.67	2	32.0	E	16.5	203,000	33.4	24.3	4.55	4.40E+04	0.02	3.3	3.3	46
2"	80	<b>2828</b>	6.67	2	32.0	E	16.5	203,000	60.3	49.22	5.54	3.61E+05	0.09	7.6	7.7	46
<i>bends in-plane</i>																
1"	80	<b>3914</b>	6.67	2	32.0	E	59.4	203,000	33.4	24.3	4.55	4.40E+04	0.02	3.3	3.3	46
2"	80	<b>5366</b>	6.67	2	32.0	E	59.4	203,000	60.3	49.22	5.54	3.61E+05	0.09	7.6	7.7	46
<i>Fixed supported</i>																
1"	80	<b>1993</b>	6.67	2	32.0	C	15.4	203,000	33.4	24.3	4.55	4.40E+04	0.02	3.3	3.3	46
2"	80	<b>2732</b>	6.67	2	32.0	C	15.4	203,000	60.3	49.22	5.54	3.61E+05	0.09	7.6	7.7	46
<i>Z-bend (in-plane)</i>																
1"	80	<b>2403</b>	6.67	2	32.0	G	22.4	203,000	33.4	24.3	4.55	4.40E+04	0.02	3.3	3.3	46
2"	80	<b>3295</b>	6.67	2	32.0	G	22.4	203,000	60.3	49.22	5.54	3.61E+05	0.09	7.6	7.7	46

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**Client** Airpack Nederland B.V.  
**Project title** API618 DA2 study for 17811-OO-0701  
**Project number** DRG-101872-2829





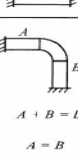
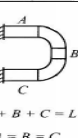
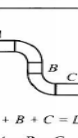
Piping Configuration		Frequency Factor	
		1 <sup>st</sup>	2 <sup>nd</sup>
<b>A</b> 	Fixed-Free	3.52	22.4
<b>B</b> 	Simply Supported	9.87	39.5
<b>C</b> 	Fixed-Supported	15.4	50.0
<b>D</b> 	Fixed-Fixed	22.4	61.7
<b>E</b>  $A + B = L$ $A = B$	L-Bend (Out of Plane)	16.5	67.6
	L-Bend (In Plane)	59.4	75.5
<b>F</b>  $A + B + C = L$ $A = B = C$	U-Bend (Out of Plane)	18.7	35.6
	U-Bend (In Plane)	23.7	95.8
<b>G</b>  $A + B + C = L$ $A = B = C$	Z-Bend (Out of Plane)	23.4	34.2
	Z-Bend (In Plane)	22.4	96.8

Figure 41—Frequency Factors for Idealized Pipe Spans and Bends (1<sup>st</sup> and 2<sup>nd</sup> Natural Frequencies)