Two-Flange Tunnel Liner Plate

Technical Data Sheet

NET ZERO BY 2050

Atlantic Industries Limited
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AIL's Two-Flange Tunnel Liner Plate provides optimum stability and protection when constructing new tunnels and relining structures under highways and railroads and relining vertical shafts. This Technical Data Sheet is intended as a supplement to our product brochure, which is downloadable from our website using the scan code below.

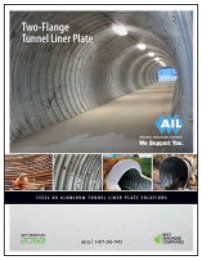

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TABLE 1 - Properties and Dimensions of Two-Flange Tunnel Liner Plate

Nominal Thickness (mm) t	Area (mm² per mm) A	Section Modulus (mm³ per mm) S	Moment of Inertia (mm⁴ per mm) I	Radius of Gyration (mm) r	X* (mm)	Approx. Plate Weights including Bolts (kgs)		
STEEL						12 Pi. Plate	14 Pi. Plate	16 Pi. Plate
2.0**	2.438	20.8387	557.160	15.113	19.228	11	13	14
2.8	3.429	29.4838	802.966	15.291	19.787	15	17	19
3.5	4.420	38.0644	1048.772	15.392	20.295	19	21	24
4.2	5.410	46.8386	1294.578	15.469	20.803	22	25	29
4.6	5.918	51.4838	1425.675	15.519	21.107	24	28	31
5.0	6.909	59.8708	1687.868	15.621	21.539	28	32	36
6.0	7.925	68.7095	1933.674	15.621	22.073	32	36	41
ALUMINUM						12 Pi. Plate	14 Pi. Plate	16 Pi. Plate
0.125	0.160	0.0540	0.0583	0.603	0.782	15	17	19
0.150	0.191	0.0649	0.0711	0.610	0.799	17	19	22
0.175	0.227	0.0756	0.0842	0.610	0.827	19	22	25
0.200	0.260	0.0864	0.0972	0.611	0.842	21	24	27
0.225	0.292	0.0972	0.1108	0.615	0.851	24	27	30
0.250	0.325	0.1080	0.1230	0.615	0.874	26	30	33

* X = Distance from outer face to neutral axis, in inches. See page 9, Section B-B.
** 2.0 mm is available upon special request.
Refer to AASHTO Standard Specifications for Highway Bridges Section 15, and AASHTO LRFD Bridge Design Specifications Section 12. Refer to Section 12.13 for t, A, I, and r; and Table 12.13.3.1-1 for nominal thicknesses (uncoated). Aluminum values are determined by the same design method.

TABLE 2 - Ultimate Longitudinal Seam Strength for Two-Flange Tunnel Liner Plate (lb/LF)

STEEL							
Specified	2.0	2.8	3.5	4.2	4.6	5.0	6.0
Strength kN/m	292	438	686	803	905	1,270	1,343
ALUMINUM							
Specified		0.125	0.150	0.175	0.200	0.225	0.250
Strength kN/m		511	657	730	876	1,022	1,080

Note: In 2.0 through 4.6 thickness structures, longitudinal bolts are ASTM A 307, Grade A, 5/8" diameter by 1 1/4" long. For a thickness greater than 4.6mm, the bolts are ASTM A449
Type 1, 5/8" diameter by 1 1/2" long.

TABLE 3 - Two-Flange Steel Tunnel Liner Plate - Weight by Diameter

Neutral Axis Diameter	1.9	2.7	3.4	4.2	4.6	5.3	6.1
Metres	KG/M	KG/M	KG/M	KG/M	KG/M	KG/M	KG/M
1.22	96	128	159	189	205	238	272
1.27	99	132	165	196	213	247	284
1.32	102	135	170	204	220	253	290
1.37	106	141	176	211	228	264	308
1.42	109	146	182	219	237	272	320
1.47	113	150	187	225	244	281	332
1.52	117	156	193	232	251	290	342
1.57	121	161	199	240	259	308	353
1.63	124	165	205	247	266	312	363
1.68	132	174	216	259	280	323	381
1.73	134	179	222	265	287	332	391
1.78	137	183	228	272	295	341	402
1.83	141	187	234	280	304	350	412
1.88	144	192	240	287	311	359	423
1.93	147	196	245	295	318	367	433
1.98	151	201	251	301	326	376	443
2.03	155	207	257	308	333	385	454
2.08	161	214	268	320	347	400	472
2.13	164	219	274	327	354	409	482
2.18	168	225	280	335	362	418	492
2.24	172	229	286	341	369	427	503
2.29	175	234	292	348	376	436	513
2.34	179	238	298	356	385	445	524
2.39	182	243	302	363	393	452	534
2.44	185	247	308	369	400	461	546
2.49	192	256	318	382	414	476	562
2.54	195	260	324	388	421	485	573.
2.59	199	265	330	396	428	494	583
2.64	202	269	336	403	436	503	594
2.69	206	275	342	411	443	512	604
2.74	210	280	348	417	451	521	616
2.79	213	284	354	424	458	530	626
2.84	216	289	360	431	467	539	637
2.90	223	298	370	443	481	553	653
2.95	227	302	376	451	488	562	664
3.00	230	306	382	458	495	571	674
3.05	233	311	388	464	503	580	684
3.10	237	315	394	472	510	589	696
3.15	240	320	400	479	518	598	707
3.20	244	326	406	487	525	607	717
3.25	248	330	411	492	534	616	728
3.30	253	338	421	504	546	631	744
3.35	258	344	427	512	553	640	754
3.40	261	348	433	519	562	649	765
3.45	264	353	439	529	570	658	777
3.51	268	358	445	533	577	667	787
3.56	271	362	451	540	585	675	797
3.61	275	366	457	548	592	684	808
3.66	278	370	463	555	600	693	818
3.71	285	379	473	567	613	708	835
3.76	288	384	479	574	620	717	847
3.81	291	388	485	580	628	726	857
3.86	296	394	491	588	637	735	867
3.91	299	399	497	595	644	742	878
3.96	302	403	503	603	652	751	888
4.01	306	408	509	609	659	760	899
4.06	309	412	515	616	667	769	909
4.11	316	421	525	628	680	784	927
4.17	319	426	530	635	687	793	937
4.22	322	430	534	643	695	802	948
4.27	326	434	542	649	702	811	958
4.32	329	439	548	656	711	820	969
4.37	334	445	553	664	719	829	979
4.42	337	449	559	671	726	838	989
4.47	340	454	565	678	733	847	1000
4.52	347	463	576	690	747	861	1018
4.57	350	467	582	696	754	870	1028

TABLE 4 - Table of Available Diameters and Dimensions, Including Number of Specific Types of Plates Required

Neutral Axis Diameter - mm	Approx. Inside Diameter - mm	Approx. Outside Diameter - mm	Approx. Outside Area-SM	Total Number Required	Plates Per Ring Plate Lengths and Offsets*									Neutral Axis Diameter - mm	Approx. Inside Diameter - mm	Approx. Outside Diameter - mm	Approx. Outside Area-SM	Total Number Required	Plates Per Ring Plate Lengths and Offsets*								
					12 Pi Plate			14 Pi Plate			6 Pi Plate								12 Pi Plate			14 Pi Plate			6 Pi Plate		
					N	S	D	N	S	D	N	S	D						N	S	D	N	S	D	N	S	D
1219	1149	1251	1.2	4	1	2	1							2946	2877	2978	7.0	8					6		1		1
1270	1200	1302	1.3	4		2	1	1						2997	2927	3029	7.2	8					5		1	1	1
1321	1251	1353	1.4	4		2		1		1				3048	2978	3080	7.4	8					4		1	2	1
1372	1302	1403	1.5	4			1	1	2					3099	3029	3131	7.7	8				1	1	1		5	
1422	1353	1454	1.7	4				1	2	1				3150	3080	3181	8.0	8				1		1		6	
1473	1403	1505	1.8	4					2	1	1			3200	3131	3232	8.2	8						1	1	6	
1524	1454	1556	1.9	4					2		1		1	3251	3181	3283	8.4	8							1	6	1
1575	1505	1607	2.0	4						1	1	2		3302	3232	3334	8.7	9					7		1		1
1626	1556	1657	2.2	4							1	2	1	3353	3283	3385	9.0	9					6		1	1	1
1676	1607	1708	2.3	5	1		1		3					3404	3334	3435	9.3	9					5		1	2	1
1727	1657	1759	2.4	5			1	1	3					3454	3385	3486	9.6	9					4		1	3	1
1778	1708	1810	2.6	5				1	3	1				3505	3435	3537	9.8	9				1	1	1		6	
1829	1759	1861	2.7	5					3	1	1			3556	3486	3588	10.1	9				1		1		7	
1880	1810	1911	2.9	5					3		1		1	3607	3537	3639	10.4	9						1	1	7	
1930	1861	1962	3.0	5				1		1		3		3658	3588	3689	10.7	9							1	7	1
1981	1911	2013	3.2	5						1	1	3		3708	3639	3740	11.0	10					7		1	1	1
2032	1962	2064	3.3	5							1	3	1	3759	3689	3791	11.3	10					6		1	2	1
2083	2013	2115	3.5	6			1	1	4					3810	3740	3842	11.6	10					5		1	3	1
2134	2064	2165	3.7	6				1	4	1				3861	3791	3893	11.9	10					4		1	4	1
2184	2115	2216	3.9	6					4	1	1			3912	3842	3943	12.2	10				1	1	1		7	
2235	2165	2267	4.0	6					4		1		1	3962	3893	3994	12.5	10				1		1		8	
2286	2216	2318	4.2	6					3		1	1	1	4013	3943	4045	12.9	10						1	1	8	
2337	2267	2369	4.4	6				1		1		4		4064	3994	4096	13.2	10							1	8	1
2388	2318	2419	4.6	6						1	1	4		4115	4045	4147	13.5	11					7		1	2	1
2438	2369	2470	4.8	6							1	4	1	4166	4096	4197	13.8	11					6		1	3	1
2489	2419	2521	5.0	7				1	5	1				4216	4147	4248	14.2	11					5		1	4	1
2540	2470	2572	5.2	7					5	1	1			4267	4197	4299	14.5	11					4		1	5	1
2591	2521	2623	5.4	7					5		1		1	4318	4248	4350	14.9	11				1	1	1		8	
2642	2572	2673	5.6	7					4		1	1	1	4369	4299	4401	15.2	11				1		1		9	
2692	2623	2724	5.8	7				1	1	1		4		4420	4350	4451	15.6	11							1	1	9
2743	2673	2775	6.0	7				1		1		5		4470	4401	4502	15.9	11								9	1
2794	2724	2826	6.3	7						1	1	5		4521	4451	4553	16.3	12					7		1	3	1
2845	2775	2877	6.5	7							1	5	1	4572	4502	4604	16.7	12					6		1	4	1
2896	2826	2927	6.7	8					6	1	1			Larger diameters, in 2" increments, are available on request.									6	1	1		

Note: Where the tunnel clearances are important, the designer should size the structure to provide for normal deflection.
*Type of offset at ends of plate. N = No Offset; S = Single Offset, D = Double Offset; Diameters are available above those shown in the same pattern. Structures designed for 4 Pi (12.5") stagger in longitudinal seams in alternate rings.

The information and suggested applications in this brochure are accurate and correct to the best of our knowledge, and are intended for general information purposes only. These general guidelines are not intended to be relied upon as final specifications, and we do not guarantee specific results for any particular purpose. We strongly recommend consultation with an Atlantic Industries Limited Technical Sales Representative before making any design and purchasing decisions.