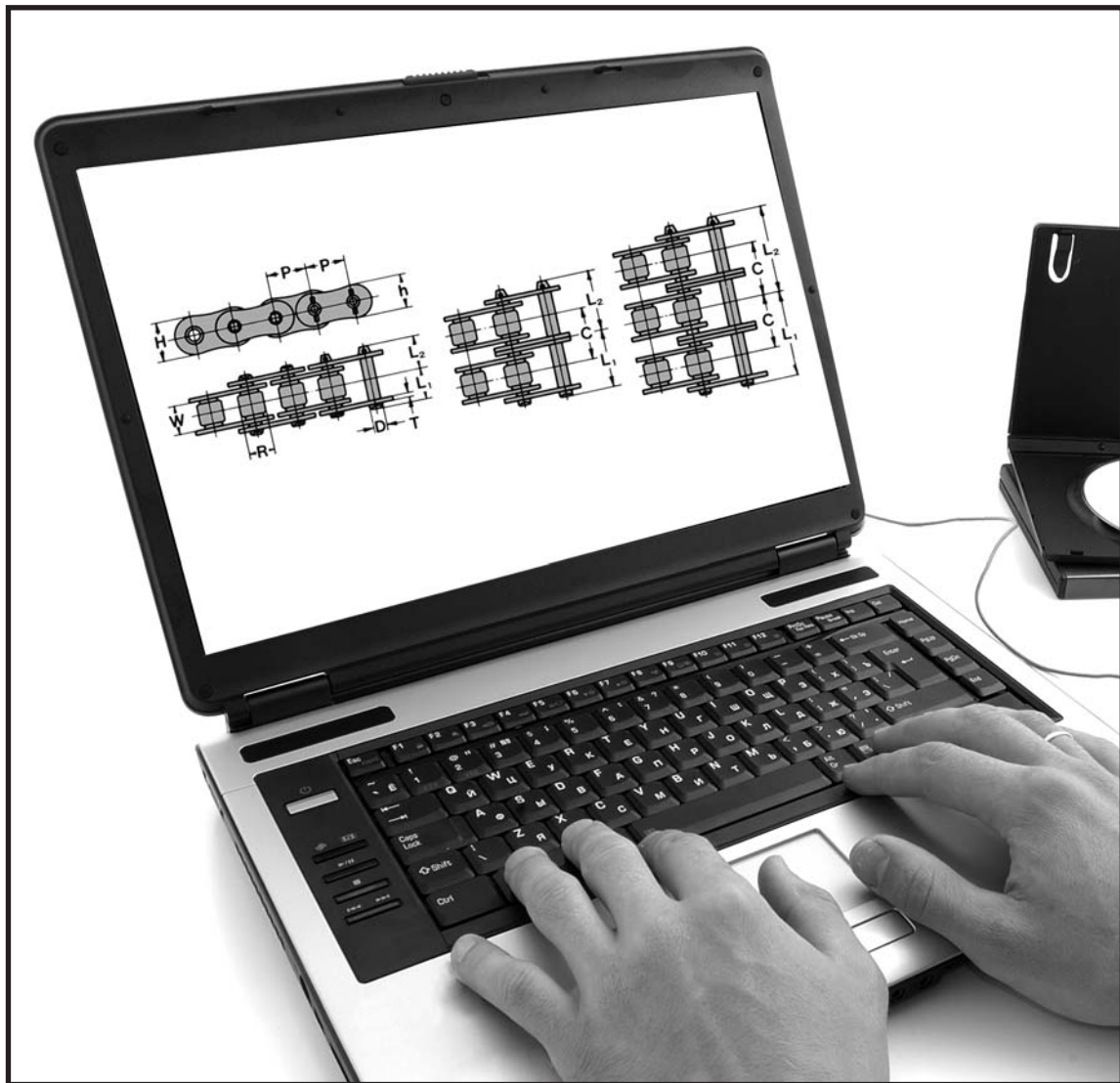


Engineering Information



Speed Ratio and Chain Wrap

The speed ratio of the roller chain can range up to 7:1 under normal operating conditions. However, a speed ratio of 10:1 is possible if the speed is very slow. Chain wrap on the small sprocket must be at least 120 degrees.

Distance Between Shafts

Sprockets can be separated by any distance as long as their teeth do not touch. Optimum distance is 30 to 50 times the pitch of the chain used except when there is a pulsating load. In such cases, the distance should be up to 20 times the pitch of the chain used.

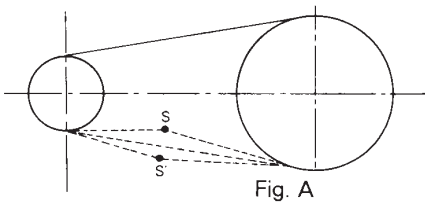
Position

Roller chains are ideally installed horizontally. When chains are installed at angles approaching the vertical, they stretch quickly and may slip off the sprockets. In such cases the sprockets should be adjusted properly.

Slack

Generally, the slack of a roller chain should be on the lower side (see Fig. A). Adequate slack (SS') is 4% of the span for normal drives. In the following cases, the slack should be about 2% of the span.

- a. Vertical drive or close to vertical drive.
- b. Center distance between two shafts is greater than 3 ft.
- c. Chain is operated under heavy load and high frequency of on and off drive.
- d. Direction of the drive is often changed.



Position of Sprocket

The two shafts should be parallel and preferably in a horizontal position. Sprockets should be firmly installed. (See Figs. B and C) Use a straight edge to check that the two sprockets are installed along the same horizontal plane.

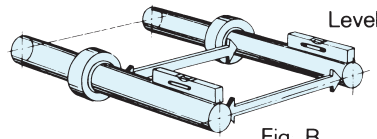


Fig. B

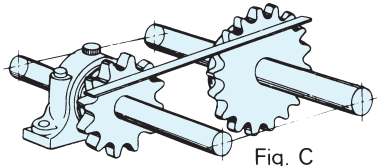


Fig. C

Arrangement

When designing roller chain drives, the centerline of both sprockets should be close to horizontal (see Figs. D and E). The angle of inclination can be up to 60 degrees as shown in Figs. F and G.

If installation is close to vertical, it is desirable to install an idler or a guide stopper to maintain smooth engagement of the chain and sprocket.

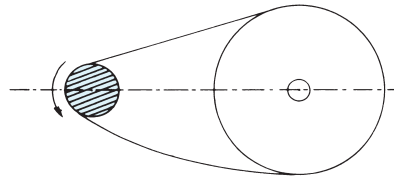


Fig. D

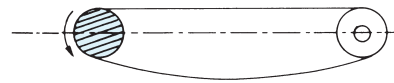


Fig. E

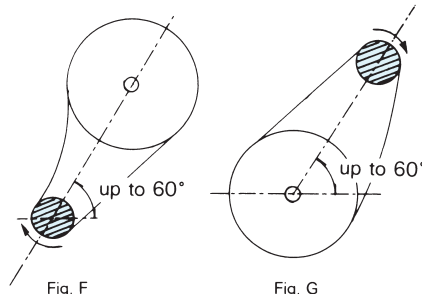


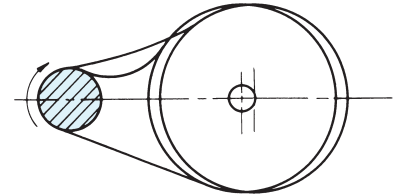
Fig. F

Fig. G

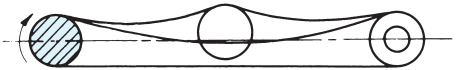
Attention should be paid to the following arrangements.

If the slack side is on the top, it is necessary to eliminate excessive chain slack.

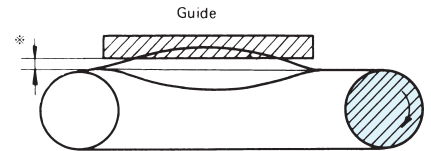
A-1. When the center distance is short, chain slack should be adjusted by increasing the center distance.



A-2. When the center distance is long, chain slack should be adjusted by installing an idler.

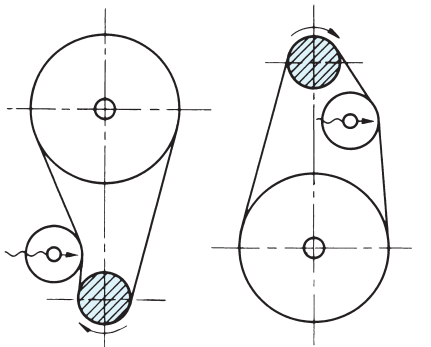


B. If vibration occurs due to high chain speed, install a guide.



* Clearance between chain and guide should be 5/64" to 5/32"

C. If the centerline is vertical, install an idler which functions automatically to eliminate extra chain slack. If the driving shaft is on the lower side, an idler must be installed.



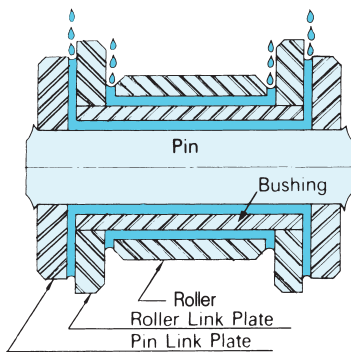
LUBRICATION

Lubrication Increases the Service Life

One of the most important factors in getting the best possible performance out of your roller chain is proper lubrication. No matter how well a transmission system is designed, if it is not properly lubricated, its service life will be shortened.

Lubrication

Wear between the pin and bushing causes the roller chain to stretch. These parts should, therefore, be well lubricated. The gap between the pin link plate and the roller link plate on the slack side of the chain should be filled with oil. This oil forms a film which minimizes wear on the pin and bushing, thus increasing the chain's service life. It also reduces noise and acts as a coolant when the chain runs at high speeds.



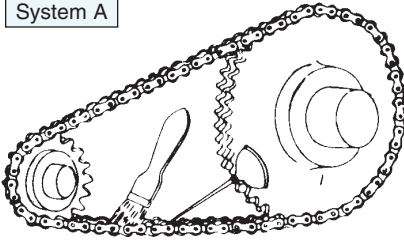
Suggested Lubricants

Only high quality oil should be used to lubricate the roller chain. Neither heavy oil nor grease is suitable. The viscosity of the oil used will depend on the chain size, chain speed and ambient temperature. The lubricants suggested for specific temperature ranges are given in the following table.

Lubricating System	A, B				C			
	14°F 32°F	32°F 104°F	104°F 122°F	122°F 140°F	14°F 32°F	32°F 104°F	104°F 122°F	122°F 140°F
Chain No.								
RS50 or less	SAE 10	SAE 20	SAE 30	SAE 40	SAE 10	SAE 20	SAE 30	SAE 40
RS60 and RS80	SAE 20	SAE 30	SAE 40	SAE 50				
RS100								
RS120 or more	SAE 30	SAE 40	SAE 50					

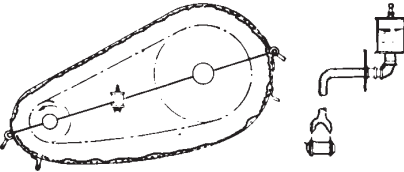
The following three lubricating systems are suggested:

System A



Manual Lubrication

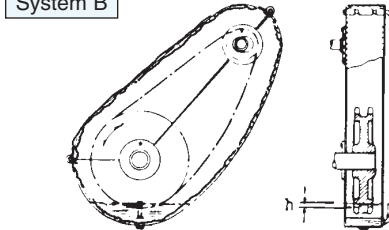
Oil is applied with an oil filler or brush in the gap between the pin link and roller link on the slack side of the chain. It should be applied about every eight hours or as often as necessary to prevent the bearing area of the chain from becoming dry. Always turn off & lockout the power switch before lubricating or servicing a chain system.



Drip Lubrication

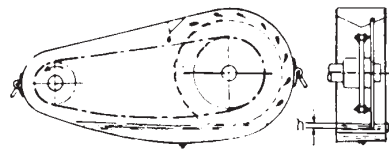
A simple casing can be used. The oil is supplied by drip feed. Each strand of chain should ordinarily receive 5 to 20 drops of oil per minute, according to increases in the chain speed.

System B



Oil Bath Lubrication

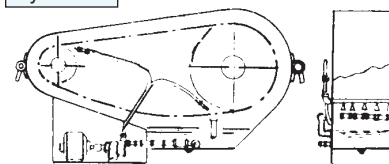
The chain is installed in a leak-free casing. The oil depth "h" should be 1/4 to 1/2 inch deep. If the oil is too deep, the oil will be adversely affected by the heat generated.



Lubrication by Slinger Disc

Install the slinger disc in a leak-free oil casing. Oil is splashed on the chain. The circumferential speed should be at least 700 ft./min. If the width of the chain is greater than 5 inches, attach slinger discs to both sides. The oil depth of "h" should be from 1/2 to 1 inch deep. The chain should not pass through the oil.

System C



Lubrication Using a Pump

Use a leak-free casing. A pump is used to circulate the oil which is then cooled. The number of supply holes should equal Z+1 where Z is the number of strands of chain. The amount of oil supplied to each hole is constant.

Chain Speed (ft./min.)	Chain Number			
	RS60 and under	RS80 RS100	RS120 RS140	RS160 and over
1,600 ~ 2,600	0.26 gal./min.	0.40 gal./min.	0.53 gal./min.	0.66 gal./min.
2,600 ~ 3,600	0.53 gal./min.	0.66 gal./min.	0.79 gal./min.	0.92 gal./min.
3,600 ~ 4,600	0.79 gal./min.	0.92 gal./min.	1.06 gal./min.	1.19 gal./min.

Regardless of the lubricating system used, the roller chain must be washed periodically with petroleum or gasoline. Examine the pin and bushing after removing the chain. Any damage or reddish-brown color on their surfaces indicate that the system is not being adequately lubricated.

TROUBLESHOOTING GUIDE

Problem	Possible Causes	What to Do
Excessive Noise	<ul style="list-style-type: none"> • Misalignment of sprockets • Loose casings or bearings • Too little or too much slack • Chain and/or sprocket wear • Inadequate lubrication or no lubrication • Chain pitch size too large 	<ul style="list-style-type: none"> • Realign sprockets and shafts • Tighten set-bolts • Adjust centers or idler take-up • Replace chain and/or sprocket • Lubricate properly • Check chain drive selection
Chain Vibration	<ul style="list-style-type: none"> • Resonance to the vibration cycle of machine to be installed • High load fluctuation 	<ul style="list-style-type: none"> • Change vibration cycle of chain or machine • Use torque converter or fluid coupling
Wear on inside of link plate and one side of sprocket teeth	<ul style="list-style-type: none"> • Misalignment 	<ul style="list-style-type: none"> • Realign sprockets and shafts
Chain climbs sprockets	<ul style="list-style-type: none"> • Excessive chain wear • Excessive chain slack • Heavy overload 	<ul style="list-style-type: none"> • Replace chain • Adjust centers or idler take-up • Reduce load or install stronger chain
Broken pins, bushings or rollers	<ul style="list-style-type: none"> • Chain speed too high for pitch and sprocket size • Heavy shock or suddenly applied loads • Material build-up in sprocket tooth pockets • Inadequate lubrication • Chain or sprocket corrosion 	<ul style="list-style-type: none"> • Use shorter pitch chain or install larger diameter sprockets • Reduce shock load or install stronger chain • Remove material build-up or install side gashed sprockets • Lubricate properly • Install anti-corrosive chain or sprockets
Chain clings to sprocket	<ul style="list-style-type: none"> • Center distance too big or high load fluctuation • Excessive chain slack • Excessive chain wear 	<ul style="list-style-type: none"> • Adjust the center distance or install idler take-up • Same as above • Replace chain
Chain gets stiff	<ul style="list-style-type: none"> • Misalignment • Inadequate lubrication • Corrosion • Excessive load • Material build-up in chain joint • Peening of link plate edges 	<ul style="list-style-type: none"> • Realign sprockets and shafts • Lubricate properly • Replace with anti-corrosive chain • Reduce load or replace with chain of suitable strength • Shield drive from foreign matter • Check for chain interference
Breakage of link plate	<ul style="list-style-type: none"> • Subjected to shock load • Vibration • Moment of load inertia is too big 	<ul style="list-style-type: none"> • Reduce shock (e.g., install a shock absorber) • Install a device to absorb vibration (e.g., tensioner idler wheel) • Chain section should be checked (increase number of strands or select next larger size chain)

U.S. TSUBAKI ENGINEERING INFORMATION

ASME/ANSI SPROCKET DIMENSIONS

A - DRIVE CHAINS

No. of Teeth	RS25 ¼" Pitch		RS35 ⅜" Pitch		RS40, RS41 ½" Pitch		RS50 ¾" Pitch		RS60 1" Pitch		RS80 1" Pitch	
	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.
9	.731	.837	1.096	1.256	1.462	1.674	1.827	2.092	2.193	2.511	2.924	3.347
10	.809	.919	1.214	1.380	1.618	1.839	2.023	2.299	2.427	2.758	3.236	3.678
11	.887	1.002	1.331	1.502	1.775	2.003	2.219	2.504	2.662	3.004	3.549	4.006
12	.966	1.083	1.449	1.625	1.932	2.166	2.415	2.708	2.898	3.249	3.864	4.332
13	1.045	1.167	1.567	1.747	2.089	2.329	2.612	2.911	3.134	3.493	4.179	4.657
14	1.123	1.246	1.685	1.868	2.247	2.491	2.809	3.113	3.371	3.736	4.494	4.982
15	1.202	1.326	1.804	1.990	2.405	2.652	3.006	3.315	3.607	3.979	4.810	5.305
16	1.281	1.407	1.922	2.111	2.563	2.814	3.204	3.517	3.844	4.221	5.126	5.627
17	1.361	1.487	2.041	2.231	2.721	2.975	3.401	3.719	4.082	4.462	5.442	5.950
18	1.440	1.568	2.159	2.352	2.879	3.135	3.599	3.920	4.319	4.704	5.759	6.271
19	1.519	1.648	2.278	2.473	3.038	3.296	3.797	4.120	4.557	4.945	6.076	6.593
20	1.598	1.729	2.397	2.593	3.196	3.457	3.995	4.321	4.794	5.185	6.392	6.914
21	1.677	1.809	2.516	2.713	3.355	3.617	4.193	4.522	5.032	5.426	6.710	7.235
22	1.757	1.889	2.635	2.833	3.513	3.778	4.392	4.722	5.270	5.666	7.027	7.555
23	1.836	1.969	2.754	2.954	3.672	3.938	4.590	4.922	5.508	5.907	7.344	7.875
24	1.915	2.049	2.873	3.074	3.831	4.098	4.788	5.122	5.746	6.147	7.661	8.196
25	1.995	2.129	2.992	3.194	3.989	4.258	4.987	5.322	5.984	6.387	7.979	8.516
26	2.074	2.209	3.111	3.314	4.148	4.418	5.185	5.522	6.222	6.627	8.296	8.836
27	2.153	2.289	3.230	3.434	4.307	4.578	5.384	5.722	6.460	6.867	8.614	9.156
28	2.233	2.369	3.349	3.554	4.466	4.738	5.582	5.922	6.699	7.107	8.931	9.475
29	2.312	2.449	3.468	3.673	4.625	4.897	5.781	6.122	6.937	7.346	9.249	9.795
30	2.392	2.529	3.588	3.793	4.783	5.057	5.979	6.321	7.175	7.586	9.567	10.114
31	2.471	2.609	3.707	3.913	4.942	5.217	6.178	6.521	7.413	7.825	9.885	10.434
32	2.551	2.688	3.826	4.033	5.101	5.377	6.376	6.721	7.652	8.065	10.202	10.753
33	2.630	2.768	3.945	4.152	5.260	5.536	6.575	6.920	7.890	8.304	10.520	11.072
34	2.710	2.848	4.064	4.272	5.419	5.696	6.774	7.120	8.128	8.544	10.838	11.392
35	2.789	2.928	4.183	4.392	5.578	5.855	6.972	7.319	8.367	8.783	11.156	11.711
36	2.869	3.008	4.303	4.511	5.737	6.015	7.171	7.519	8.605	9.022	11.474	12.030
37	2.948	3.087	4.422	4.631	5.896	6.175	7.370	7.718	8.844	9.262	11.792	12.349
38	3.028	3.167	4.541	4.751	6.055	6.334	7.568	7.918	9.082	9.501	12.110	12.668
39	3.107	3.247	4.660	4.871	6.214	6.494	7.767	8.117	9.321	9.740	12.428	12.987
40	3.187	3.327	4.780	4.990	6.373	6.653	7.966	8.316	9.559	9.980	12.745	13.306
41	3.266	3.406	4.899	5.110	6.532	6.813	8.165	8.516	9.798	10.219	13.063	13.625
42	3.346	3.486	5.018	5.229	6.691	6.972	8.363	8.715	10.036	10.458	13.381	13.944
43	3.425	3.566	5.137	5.349	6.850	7.131	8.562	8.914	10.275	10.697	13.700	14.263
44	3.505	3.646	5.257	5.468	7.009	7.291	8.761	9.114	10.513	10.936	14.018	14.582
45	3.584	3.725	5.376	5.588	7.168	7.451	8.960	9.313	10.752	11.176	14.336	14.901
46	3.664	3.805	5.495	5.708	7.327	7.609	9.159	9.512	10.990	11.415	14.654	15.219
47	3.743	3.885	5.614	5.827	7.486	7.769	9.357	9.711	11.229	11.654	14.972	15.538
48	3.823	3.964	5.734	5.947	7.645	7.928	9.556	9.911	11.467	11.893	15.290	15.857
49	3.902	4.044	5.853	6.066	7.804	8.088	9.755	10.111	11.706	12.132	15.608	16.176
50	3.982	4.124	5.972	6.186	7.963	8.247	9.954	10.309	11.944	12.371	15.928	16.495
51	4.061	4.203	6.091	6.305	8.122	8.407	10.153	10.508	12.183	12.610	16.244	16.813
52	4.141	4.283	6.211	6.425	8.281	8.566	10.351	10.707	12.422	12.849	16.562	17.132
53	4.220	4.363	6.330	6.544	8.440	8.725	10.550	10.907	12.660	13.088	16.880	17.451
54	4.300	4.442	6.449	6.664	8.599	8.885	10.749	11.106	12.899	13.327	17.198	17.769
55	4.379	4.522	6.569	6.783	8.758	9.044	10.948	11.305	13.137	13.566	17.517	18.088
56	4.459	4.602	6.688	6.903	8.917	9.203	11.147	11.504	13.376	13.805	17.835	18.406
57	4.538	4.681	6.807	7.022	9.076	9.363	11.346	11.703	13.615	14.044	18.153	18.725
58	4.618	4.761	6.927	7.142	9.236	9.522	11.544	11.902	13.853	14.283	18.471	19.044
59	4.697	4.841	7.046	7.261	9.395	9.681	11.743	12.102	14.092	14.522	18.739	19.363
60	4.777	4.920	7.165	7.381	9.554	9.841	11.942	12.301	14.330	14.761	19.107	19.681
61	4.857	5.000	7.284	7.500	9.713	10.000	12.141	12.500	14.569	15.000	19.426	20.000
62	4.936	5.080	7.404	7.619	9.872	10.159	12.340	12.699	14.808	15.238	19.744	20.318
63	5.016	5.159	7.523	7.739	10.031	10.318	12.539	12.898	15.046	15.477	20.062	20.637

* Outside diameter dimensions are nominal.

Note: Bottom diameter = pitch diameter – chain roller diameter

No. of Teeth	RS25 ¼" Pitch		RS35 ⅜" Pitch		RS40, RS41 ½" Pitch		RS50 ¾" Pitch		RS60 ⅞" Pitch		RS80 1" Pitch	
	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.
64	5.095	5.239	7.642	7.858	10.190	10.478	12.738	13.097	15.285	15.716	20.380	20.955
65	5.175	5.319	7.762	7.978	10.349	10.637	12.936	13.296	15.524	15.955	20.698	21.274
66	5.254	5.398	7.881	8.097	10.508	10.796	13.135	13.495	15.762	16.194	21.016	21.593
67	5.334	5.478	8.000	8.217	10.667	10.956	13.334	13.694	16.001	16.433	21.335	21.911
68	5.413	5.558	8.120	8.336	10.826	11.115	13.533	13.893	16.240	16.672	21.653	22.230
69	5.493	5.637	8.239	8.456	10.986	11.274	13.732	14.092	16.478	16.911	21.971	22.548
70	5.572	5.717	8.358	8.575	11.145	11.434	13.931	14.292	16.717	17.150	22.289	22.867
71	5.652	5.796	8.478	8.694	11.304	11.593	14.130	14.491	16.956	17.388	22.607	23.185
72	5.732	5.876	8.597	8.814	11.463	11.752	14.328	14.690	17.194	17.628	22.926	23.504
73	5.811	5.956	8.716	8.933	11.622	11.911	14.527	14.889	17.433	17.866	23.244	23.822
74	5.891	6.035	8.836	9.053	11.781	12.071	14.726	15.088	17.672	18.105	23.562	24.141
75	5.970	6.115	8.955	9.172	11.940	12.229	14.925	15.287	17.910	18.344	23.880	24.459
76	6.050	6.195	9.074	9.292	12.099	12.389	15.124	15.486	18.149	18.583	24.198	24.778
77	6.129	6.274	9.194	9.411	12.258	12.548	15.323	15.685	18.387	18.822	24.517	25.096
78	6.209	6.354	9.313	9.531	12.417	12.708	15.522	15.884	18.626	19.061	24.835	25.415
79	6.288	6.433	9.432	9.650	12.577	12.867	15.721	16.083	18.865	19.299	25.153	25.733
80	6.368	6.513	9.552	9.770	12.736	13.026	15.920	16.282	19.104	19.539	25.471	26.052
81	6.448	6.593	9.671	9.889	12.895	13.185	16.118	16.481	19.342	19.777	25.790	26.370
82	6.527	6.672	9.790	10.008	13.054	13.345	16.317	16.681	19.581	20.016	26.108	26.689
83	6.607	6.752	9.910	10.128	13.213	13.504	16.516	16.879	19.820	20.255	26.426	27.007
84	6.686	6.832	10.029	10.247	13.372	13.663	16.715	17.079	20.058	20.494	26.744	27.326
85	6.766	6.911	10.148	10.367	13.531	13.822	16.914	17.277	20.297	20.733	27.063	27.644
86	6.845	6.991	10.268	10.486	13.690	13.981	17.113	17.476	20.536	20.971	27.381	27.962
87	6.925	7.070	10.387	10.605	13.849	14.141	17.312	17.676	20.774	21.210	27.699	28.281
88	7.004	7.150	10.506	10.725	14.009	14.299	17.511	17.874	21.013	21.449	28.017	28.599
89	7.084	7.230	10.626	10.844	14.168	14.459	17.710	18.074	21.252	21.688	28.335	28.918
90	7.164	7.309	10.745	10.964	14.327	14.618	17.909	18.272	21.490	21.927	28.654	29.236
91	7.243	7.389	10.864	11.083	14.486	14.777	18.107	18.471	21.729	22.165	28.972	29.554
92	7.323	7.468	10.984	11.202	14.645	14.937	18.306	18.671	21.968	22.404	29.290	29.873
93	7.402	7.548	11.103	11.322	14.804	15.096	18.505	18.869	22.206	22.643	29.608	30.191
94	7.482	7.628	11.223	11.441	14.963	15.255	18.704	19.069	22.445	22.882	29.927	30.510
95	7.561	7.707	11.342	11.561	15.122	15.414	18.903	19.267	22.684	23.121	30.245	30.828
96	7.641	7.787	11.461	11.680	15.282	15.573	19.102	19.466	22.922	23.359	30.563	31.146
97	7.720	7.866	11.581	11.799	15.441	15.733	19.301	19.666	23.161	23.598	30.881	31.465
98	7.800	7.946	11.700	11.919	15.600	15.892	19.500	19.864	23.400	23.837	31.200	31.783
99	7.880	8.026	11.819	12.038	15.759	16.051	19.699	20.064	23.638	24.076	31.518	32.102
100	7.959	8.105	11.939	12.158	15.918	16.210	19.898	20.262	23.877	24.315	31.836	32.420
101	8.039	8.185	12.058	12.277	16.077	16.370	20.097	20.462	24.116	24.554	32.154	32.739
102	8.118	8.264	12.177	12.396	16.236	16.529	20.295	20.661	24.355	24.793	32.473	33.058
103	8.198	8.344	12.297	12.516	16.395	16.688	20.494	20.860	24.593	25.032	32.791	33.376
104	8.277	8.424	12.416	12.635	16.555	16.847	20.693	21.059	24.832	25.271	33.109	33.695
105	8.357	8.503	12.535	12.755	16.714	17.006	20.892	21.258	25.071	25.510	33.428	34.013
106	8.437	8.583	12.655	12.874	16.873	17.166	21.091	21.457	25.309	25.749	33.746	34.332
107	8.516	8.662	12.774	12.994	17.032	17.325	21.290	21.656	25.548	25.987	34.064	34.650
108	8.596	8.742	12.893	13.113	17.191	17.484	21.489	21.854	25.787	26.226	34.382	34.968
109	8.675	8.822	13.013	13.232	17.350	17.643	21.688	22.054	26.025	26.465	34.701	35.287
110	8.755	8.901	13.132	13.352	17.509	17.803	21.887	22.253	26.264	26.704	35.019	35.605
111	8.834	8.981	13.251	13.471	17.669	17.962	22.086	22.452	26.503	26.943	35.337	35.924
112	8.914	9.060	13.371	13.591	17.828	18.122	22.285	22.651	26.742	27.182	35.655	36.243
113	8.994	9.140	13.490	13.710	17.987	18.280	22.484	22.850	26.980	27.421	35.974	36.561
114	9.073	9.220	13.609	13.830	18.146	18.440	22.682	23.049	27.219	27.660	36.292	36.879
115	9.153	9.299	13.729	13.948	18.305	18.597	22.881	23.246	27.458	27.896	36.610	37.194
116	9.232	9.379	13.848	14.068	18.464	18.757	23.080	23.447	27.696	28.136	36.929	37.515
117	9.312	9.458	13.968	14.187	18.623	18.917	23.279	23.647	27.935	28.376	37.247	37.835
118	9.391	9.538	14.087	14.307	18.783	19.077	23.478	23.846	28.174	28.615	37.565	38.135
119	9.471	9.662	14.206	14.427	18.942	19.235	23.677	24.045	28.413	28.853	37.883	38.471
120	9.550	9.679	14.326	14.545	19.101	19.394	23.876	24.243	28.651	29.091	38.202	38.789

* Outside diameter dimensions are nominal.

Note: Bottom diameter = pitch diameter – chain roller diameter

U.S. TSUBAKI ENGINEERING INFORMATION

ASME/ANSI SPROCKET DIMENSIONS

A - DRIVE CHAINS

No. of Teeth	RS100 1 1/4" Pitch		RS120 1 1/2" Pitch		RS140 1 3/4" Pitch		RS160 2" Pitch		RS200 2 1/2" Pitch		RS240 3" Pitch	
	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.
9	3.655	4.184	4.386	5.021	5.117	5.858	5.848	6.695	7.310	8.367	8.771	10.044
10	4.045	4.597	4.854	5.516	5.663	6.436	6.472	7.355	8.090	9.195	9.708	11.034
11	4.437	5.007	5.324	6.008	6.212	7.010	7.099	8.011	8.872	10.015	10.649	12.018
12	4.830	5.415	5.796	6.498	6.762	7.581	7.727	8.664	9.660	10.830	11.591	12.996
13	5.223	5.821	6.268	6.986	7.313	8.150	8.357	9.314	10.447	11.642	12.536	13.971
14	5.617	6.227	6.741	7.472	7.864	8.718	8.988	9.963	11.235	12.455	13.482	14.943
15	6.012	6.631	7.215	7.957	8.417	9.283	9.620	10.609	12.025	13.262	14.429	15.912
16	6.407	7.034	7.689	8.441	8.970	9.848	10.252	11.255	12.815	14.067	15.377	16.881
17	6.803	7.437	8.163	8.924	9.524	10.411	10.885	11.899	13.605	14.872	16.327	17.847
18	7.198	7.839	8.638	9.407	10.078	10.975	11.518	12.543	14.397	15.677	17.276	18.813
19	7.594	8.241	9.113	9.889	10.632	11.537	12.151	13.185	15.190	16.482	18.227	19.779
20	7.991	8.642	9.589	10.370	11.187	12.099	12.785	13.828	15.982	17.285	19.177	20.742
21	8.387	9.043	10.064	10.851	11.742	12.660	13.419	14.470	16.775	18.087	20.129	21.705
22	8.783	9.444	10.540	11.332	12.297	13.221	14.053	15.110	17.567	18.887	21.080	22.665
23	9.180	9.844	11.016	11.813	12.852	13.782	14.688	15.751	18.360	19.687	22.032	23.628
24	9.577	10.245	11.492	12.294	13.407	14.343	15.323	16.392	19.152	20.490	22.984	24.588
25	9.973	10.645	11.968	12.774	13.963	14.903	15.958	17.032	19.947	21.290	23.936	25.548
26	10.370	11.045	12.444	13.254	14.518	15.463	16.593	17.671	20.740	22.090	24.889	26.508
27	10.767	11.444	12.921	13.733	15.074	16.022	17.228	18.311	21.535	22.890	25.841	27.468
28	11.164	11.844	13.397	14.213	15.630	16.582	17.863	18.951	22.330	23.687	26.794	28.425
29	11.561	12.244	13.874	14.692	16.186	17.141	18.498	19.590	23.122	24.487	27.747	29.385
30	11.958	12.643	14.350	15.172	16.742	17.700	19.134	20.229	23.917	25.285	28.700	30.342
31	12.356	13.043	14.827	15.651	17.298	18.259	19.769	20.868	24.712	26.085	29.654	31.302
32	12.753	13.442	15.303	16.130	17.854	18.818	20.405	21.506	25.505	26.882	30.607	32.259
33	13.150	13.841	15.780	16.609	18.410	19.377	21.040	22.145	26.300	27.680	31.560	33.219
34	13.547	14.240	16.257	17.088	18.966	19.936	21.676	22.784	27.095	28.480	32.514	34.176
35	13.945	14.639	16.734	17.566	19.523	20.494	22.312	23.422	27.890	29.277	33.467	35.133
36	14.342	15.038	17.211	18.045	20.079	21.052	22.947	24.060	28.685	30.075	34.421	36.090
37	14.740	15.437	17.687	18.524	20.635	21.611	23.583	24.698	29.480	30.872	35.375	37.047
38	15.137	15.835	18.164	19.002	21.192	22.169	24.219	25.336	30.275	31.670	36.329	38.004
39	15.534	16.234	18.641	19.481	21.748	22.728	24.855	25.975	31.070	32.467	37.283	38.961
40	15.932	16.633	19.118	19.959	22.305	23.286	25.491	26.613	31.865	33.265	38.237	39.918
41	16.329	17.032	19.595	20.438	22.861	23.844	26.127	27.251	32.660	34.062	39.191	40.875
42	16.727	17.430	20.072	20.916	23.418	24.402	26.763	27.888	33.455	34.860	40.145	41.832
43	17.124	17.829	20.549	21.394	23.974	24.960	27.399	28.526	34.250	35.657	41.099	42.789
44	17.522	18.227	21.026	21.873	24.531	25.518	28.035	29.164	35.045	36.455	42.053	43.746
45	17.919	18.626	21.503	22.351	25.087	26.076	28.671	29.802	35.840	37.252	43.007	44.703
46	18.317	19.024	21.980	22.829	25.644	26.634	29.307	30.439	36.635	38.047	43.961	45.657
47	18.715	19.423	22.458	23.308	26.201	27.192	29.943	31.077	37.430	38.845	44.915	46.614
48	19.112	19.821	22.935	23.786	26.757	27.750	30.580	31.714	38.225	39.642	45.869	47.571
49	19.510	20.219	23.412	24.264	27.314	28.308	31.216	32.352	39.020	40.440	46.824	48.528
50	19.908	20.618	23.889	24.742	27.871	28.865	31.852	32.989	39.815	41.237	47.778	49.485
51	20.305	21.017	24.366	25.220	28.427	29.423	32.488	33.626	40.610	42.032	48.732	50.439
52	20.703	21.415	24.843	25.698	28.984	29.980	33.124	34.263	41.405	42.830	49.687	51.396
53	21.100	21.813	25.320	26.176	29.541	30.538	33.761	34.901	42.200	43.627	50.641	52.353
54	21.498	22.212	25.798	26.654	30.097	31.096	34.397	35.539	42.996	44.422	51.595	53.307
55	21.896	22.610	26.275	27.132	30.654	31.654	35.033	36.176	43.792	45.220	52.550	54.264
56	22.293	23.008	26.752	27.610	31.211	32.211	35.669	36.813	44.587	46.015	53.504	55.221
57	22.691	23.407	27.229	28.088	31.768	32.769	36.306	37.451	45.382	46.812	54.458	56.175
58	23.089	23.805	27.707	28.566	32.324	33.327	36.942	38.088	46.177	47.610	55.413	57.132
59	23.486	24.203	28.184	29.044	32.881	33.885	37.578	38.725	46.972	48.407	56.368	58.089
60	23.884	24.601	28.661	29.522	33.438	34.442	38.215	39.362	47.767	49.202	57.322	59.043
61	24.282	25.000	29.138	30.000	33.995	35.000	38.851	39.999	48.565	50.000	58.277	60.000
62	24.680	25.397	29.616	30.477	34.551	35.557	39.487	40.636	49.360	50.795	59.231	60.954
63	25.077	25.796	30.093	30.955	35.108	36.114	40.124	41.274	50.155	51.592	60.185	61.911

* Outside diameter dimensions are nominal.

Note: Bottom diameter = pitch diameter – chain roller diameter

No. of Teeth	RS100 1¼" Pitch		RS120 1½" Pitch		RS140 1¾" Pitch		RS160 2" Pitch		RS200 2½" Pitch		RS240 3" Pitch	
	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.	Pitch Dia.	* Outside Dia.
64	25.475	26.194	30.570	31.433	35.665	36.672	40.760	41.911	50.950	52.387	61.140	62.868
65	25.873	26.593	31.047	31.911	36.222	37.229	41.396	42.548	51.745	53.185	62.095	63.822
66	26.271	26.991	31.525	32.389	36.779	37.787	42.033	43.185	52.540	53.982	63.049	64.779
67	26.668	27.389	32.002	32.867	37.336	38.345	42.669	43.822	53.337	54.777	64.004	65.733
68	27.066	27.787	32.479	33.345	37.892	38.902	43.306	44.459	54.132	55.575	64.958	66.690
69	27.464	28.185	32.957	33.822	38.449	39.459	43.942	45.096	54.927	56.370	65.913	67.644
70	27.862	28.584	33.434	34.301	39.006	40.017	44.578	45.734	55.722	57.167	66.868	68.601
71	28.259	28.981	33.911	34.778	39.563	40.574	45.215	46.370	56.517	57.962	67.822	69.555
72	28.657	29.380	34.388	35.256	40.120	41.132	45.851	47.008	57.315	58.760	68.777	70.512
73	29.055	29.778	34.866	35.733	40.677	41.689	46.488	47.644	58.110	59.555	69.731	71.466
74	29.453	30.176	35.343	36.212	41.234	42.247	47.124	48.282	58.905	60.352	70.686	72.423
75	29.850	30.574	35.820	36.689	41.790	42.803	47.760	48.918	59.700	61.147	71.641	73.377
76	30.248	30.973	36.298	37.167	42.347	43.362	48.397	49.556	60.495	61.945	72.595	74.334
77	30.646	31.370	36.775	37.644	42.904	43.918	49.033	50.192	61.292	62.741	73.550	75.288
78	31.044	31.769	37.252	38.123	43.461	44.476	49.670	50.830	62.087	63.537	74.505	76.245
79	31.441	32.166	37.730	38.600	44.018	45.033	50.306	51.466	62.882	64.332	75.459	77.199
80	31.839	32.565	38.207	39.078	44.575	45.591	50.943	52.104	63.677	65.130	76.414	78.156
81	32.237	32.963	38.684	39.555	45.132	46.148	51.579	52.740	64.475	65.925	77.369	79.110
82	32.635	33.361	39.162	40.034	45.689	46.706	52.216	53.378	65.270	66.722	78.323	80.067
83	33.033	33.759	39.639	40.511	46.246	47.262	52.852	54.014	66.065	67.517	79.278	81.021
84	33.430	34.158	40.116	40.989	46.803	47.821	53.489	54.652	66.860	68.315	80.233	81.978
85	33.828	34.555	40.594	41.466	47.359	48.377	54.125	55.288	67.657	69.110	81.188	82.932
86	34.226	34.953	41.071	41.943	47.916	48.934	54.761	55.924	68.452	69.905	82.142	83.886
87	34.624	35.351	41.548	42.422	48.473	49.492	55.398	56.562	69.247	70.702	83.097	84.843
88	35.022	35.749	42.026	42.899	49.030	50.048	56.034	57.198	70.042	71.497	84.052	85.797
89	35.419	36.148	42.503	43.377	49.587	50.607	56.671	57.836	70.837	72.295	85.006	86.754
90	35.817	36.545	42.981	43.854	50.144	51.163	57.307	58.472	71.635	73.090	85.961	87.708
91	36.215	36.943	43.458	44.331	50.701	51.720	57.944	59.108	72.430	73.885	86.916	88.665
92	36.613	37.341	43.935	44.810	51.258	52.278	58.580	59.746	73.225	74.682	87.871	89.619
93	37.011	37.739	44.413	45.287	51.814	52.834	59.216	60.382	74.020	75.477	88.825	90.576
94	37.408	38.138	44.890	45.765	52.371	53.393	59.853	61.020	74.815	76.275	89.780	91.530
95	37.806	38.535	45.367	46.242	52.928	53.949	60.489	61.656	75.612	77.070	90.735	92.484
96	38.204	38.933	45.845	46.719	53.485	54.506	61.126	62.292	76.407	77.865	91.690	93.441
97	38.602	39.331	46.322	47.198	54.042	55.064	61.762	62.930	77.202	78.662	92.645	94.395
98	39.000	39.729	46.800	47.675	54.499	55.620	62.399	63.566	77.997	79.457	93.599	95.352
99	39.397	40.128	47.277	48.153	55.156	56.179	63.035	64.204	78.795	80.255	94.554	96.306
100	39.795	40.525	47.754	48.630	55.713	56.735	63.672	64.840	79.590	81.050	95.509	97.263
101	40.193	40.924	48.232	49.109	56.270	57.294	64.309	65.478	80.385	81.847	96.464	98.217
102	40.591	41.322	48.709	49.586	56.827	57.851	64.945	66.115	81.182	82.642	97.418	99.171
103	40.989	41.720	49.187	50.064	57.384	58.408	65.582	66.752	81.977	83.440	98.373	100.128
104	41.387	42.118	49.664	50.542	57.941	58.966	66.218	67.389	82.772	84.235	99.328	101.082
105	41.784	42.517	50.141	51.020	58.498	59.523	66.855	68.027	83.567	85.030	100.283	102.039
106	42.182	42.915	50.619	51.498	59.055	60.081	67.492	68.664	84.365	85.827	101.238	102.993
107	42.580	43.312	51.096	51.975	59.612	60.637	68.128	69.299	85.160	86.622	102.192	103.947
108	42.978	43.710	51.574	52.452	60.169	61.194	68.765	69.936	85.955	87.420	103.147	104.904
109	43.376	44.108	52.051	52.930	60.726	61.751	69.401	70.573	86.752	88.215	104.102	105.858
110	43.774	44.506	52.528	53.408	61.283	62.309	70.038	71.210	87.547	89.012	105.056	106.815
111	44.171	44.905	53.006	53.886	61.840	62.867	70.674	71.848	88.342	89.807	106.011	107.769
112	44.569	45.304	53.483	54.364	62.397	63.425	71.311	72.486	89.137	90.602	106.967	108.723
113	44.967	45.701	53.960	54.841	62.954	63.982	71.948	73.122	89.935	91.400	107.921	109.680
114	45.365	46.099	54.438	55.319	63.511	64.539	72.584	73.759	90.730	92.195	108.876	110.634
115	45.763	46.493	54.915	55.792	64.068	65.090	73.220	74.388	91.525	92.992	109.831	111.591
116	46.161	46.893	55.393	56.272	64.625	65.651	73.857	75.030	92.322	93.787	110.786	112.545
117	46.558	47.293	55.870	56.752	65.182	66.210	74.494	75.669	93.117	94.582	111.740	113.499
118	46.956	47.691	56.348	57.230	65.739	66.768	75.130	76.306	93.912	95.380	112.695	114.456
119	47.354	48.089	56.825	57.707	66.296	67.325	75.767	76.943	94.707	96.175	113.650	115.410
120	47.752	48.486	57.302	58.183	66.853	67.880	76.403	77.577	95.502	96.970	114.605	116.364

* Outside diameter dimensions are nominal.

Note: Bottom diameter = pitch diameter – chain roller diameter

U.S. TSUBAKI ENGINEERING INFORMATION

PITCH CONVERSION TABLE — NO. OF PITCHES CONVERTED INTO FEET

No. of Pitches	Chain No.												Length of Pitches
	RS25 ¼"	RS35 ⅜"	RS40, RS41 ½"	RS50 ⅝"	RS60 ¾"	RS80 1"	RS100 1¼"	RS120 1½"	RS140 1¾"	RS160 2"	RS200 2½"	RS240 3"	
	Chain Length (ft.)												
1	0.0208	0.0313	0.0417	0.0521	0.0625	0.0833	0.1042	0.1250	0.1458	0.1667	0.2083	0.2500	1
2	0.0416	0.0625	0.0833	0.1042	0.1250	0.1667	0.2083	0.2500	0.2917	0.3333	0.4147	0.5000	2
3	0.0625	0.0938	0.1250	0.1563	0.1875	0.2500	0.3125	0.3750	0.4375	0.5000	0.6250	0.7500	3
4	0.0833	0.1250	0.1667	0.2083	0.2500	0.3333	0.4167	0.5000	0.5833	0.6667	0.8333	1.0000	4
5	0.1041	0.1563	0.2083	0.2604	0.3125	0.4167	0.5208	0.6250	0.7222	0.8333	1.0417	1.2500	5
6	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	0.8750	1.0000	1.2500	1.5000	6
7	0.1458	0.2188	0.2917	0.3646	0.4375	0.5833	0.7992	0.8750	1.0208	1.1667	1.4583	1.7500	7
8	0.1666	0.2500	0.3333	0.4167	0.5000	0.6667	0.8333	1.0000	1.1667	1.3333	1.6667	2.0000	8
9	0.1875	0.2813	0.3750	0.4688	0.5625	0.7500	0.9375	1.1250	1.3125	1.5000	1.8750	2.2500	9
10	0.2083	0.3125	0.4167	0.5208	0.6250	0.8333	1.0417	1.2500	1.4583	1.6667	2.0833	2.5000	10
11	0.2292	0.3438	0.4584	0.5729	0.6875	0.9167	1.1458	1.3750	1.6041	1.8333	2.2917	2.7500	11
12	0.2500	0.3750	0.5000	0.6250	0.7500	1.0000	1.2500	1.5000	1.7500	2.0000	2.5000	3.0000	12
13	0.2708	0.4063	0.5417	0.6771	0.8125	1.0833	1.3542	1.6250	1.8958	2.1667	2.7083	3.2500	13
14	0.2916	0.4375	0.5833	0.7292	0.8750	1.1667	1.4583	1.7500	2.0417	2.3333	2.9167	3.5000	14
15	0.3125	0.4688	0.6250	0.7813	0.9375	1.2500	1.5625	1.8750	2.1875	2.5000	3.1250	3.7500	15
16	0.3333	0.5000	0.6667	0.8333	1.0000	1.3333	1.6667	2.0000	2.3333	2.6667	3.3333	4.0000	16
17	0.3542	0.5313	0.7084	0.8854	1.0625	1.4167	1.7708	2.1250	2.4791	2.8333	3.5417	4.2500	17
18	0.3750	0.5625	0.7500	0.9375	1.1250	1.5000	1.8750	2.2500	2.7250	3.0000	3.7500	4.5000	18
19	0.3958	0.5938	0.7917	0.9896	1.1875	1.5833	1.9792	2.3750	2.7708	3.1667	3.9583	4.7500	19
20	0.4166	0.6250	0.8333	1.0417	1.2500	1.6667	2.0833	2.5000	2.9167	3.3333	4.1667	5.0000	20
21	0.4375	0.6563	0.8750	1.0938	1.3125	1.7500	2.1875	2.6250	3.0625	3.5000	4.3750	5.2500	21
22	0.4583	0.6875	0.9167	1.1458	1.3750	1.8333	2.2917	2.7500	3.2083	3.6667	4.5833	5.5000	22
23	0.4792	0.7188	0.9584	1.1979	1.4375	1.9166	2.3958	2.8750	3.3541	3.8333	4.7917	5.7500	23
24	0.5000	0.7500	1.0000	1.2500	1.5000	2.0000	2.5000	3.0000	3.5000	4.0000	5.0000	6.0000	24
25	0.5208	0.7813	1.0417	1.3021	1.5625	2.0833	2.6042	3.1250	3.6458	4.1667	5.2083	6.2500	25
26	0.5416	0.8125	1.0833	1.3541	1.6250	2.1667	2.7083	3.2500	3.7917	4.3333	5.4167	6.5000	26
27	0.5625	0.8438	1.1250	1.4062	1.6875	2.2500	2.8125	3.3750	3.9375	4.5000	5.6250	6.7500	27
28	0.5833	0.8750	1.1667	1.4583	1.7600	2.3333	2.9167	3.5000	4.0833	4.6667	5.8333	7.0000	28
29	0.6024	0.9063	1.2084	1.5104	1.8125	2.4167	3.0208	3.6250	4.2291	4.8333	6.0417	7.2500	29
30	0.6250	0.9375	1.2500	1.5625	1.8750	2.5000	3.1250	3.7500	4.3750	5.0000	6.2500	7.5000	30
31	0.6458	0.9688	1.2917	1.6164	1.9375	2.5833	3.2292	3.8750	4.5208	5.1667	6.4583	7.7500	31
32	0.6667	1.0000	1.3333	1.6667	2.0000	2.6667	3.3333	4.0000	4.6667	5.3333	6.6667	8.0000	32
33	0.6875	1.0313	1.3750	1.7188	2.0625	2.7500	3.4375	4.1250	4.8125	5.5000	6.8750	8.2500	33
34	0.7083	1.0625	1.4167	1.7708	2.1250	2.8333	3.5417	4.2500	4.9583	5.6667	7.0833	8.5000	34
35	0.7292	1.0938	1.4584	1.8229	2.1875	2.9167	3.6458	4.3750	5.1041	5.8333	7.2917	8.7500	35
36	0.7500	1.1250	1.5000	1.8750	2.2500	3.0000	3.7500	4.5000	5.2500	6.0000	7.5000	9.0000	36
37	0.7708	1.1563	1.5417	1.9271	2.3125	3.0833	3.8542	4.6250	5.3958	6.1667	7.7083	9.2500	37
38	0.7916	1.1875	1.5833	1.9791	2.3750	3.1667	3.9583	4.7500	5.5417	6.3333	7.9167	9.5000	38
39	0.8125	1.2188	1.6250	2.0312	2.4375	3.2500	4.0625	4.8750	5.6875	6.5000	8.1250	9.7500	39
40	0.8333	1.2500	1.6667	2.0833	2.5000	3.3333	4.1667	5.0000	5.8333	6.6667	8.3333	10.0000	40
41	0.8542	1.2813	1.7084	2.1354	2.5625	3.4167	4.2709	5.1250	5.9791	6.8333	8.5417	10.2500	41
42	0.8750	1.3125	1.7500	2.1875	2.6250	3.5000	4.3750	5.2500	6.1250	7.0000	8.7500	10.5000	42
43	0.8958	1.3438	1.7917	2.2396	2.6875	3.5833	4.4792	5.3750	6.2708	7.1667	8.9583	10.7500	43
44	0.9166	1.3750	1.8333	2.2916	2.7500	3.6667	4.5833	5.5000	6.4167	7.3333	9.1667	11.0000	44
45	0.9375	1.4063	1.8750	2.3437	2.8125	3.7500	4.6875	5.6250	6.5625	7.5000	9.3750	11.2500	45
46	0.9583	1.4375	1.9167	2.3958	2.8750	3.8333	4.7917	5.7500	6.7083	7.6667	9.5833	11.5000	46
47	0.9792	1.4688	1.9584	2.4479	2.9375	3.9167	4.8959	5.8750	6.8541	7.8333	9.7917	11.7500	47
48	1.0000	1.5000	2.0000	2.5000	3.0000	4.0000	5.0000	6.0000	7.0000	8.0000	10.0000	12.0000	48
49	1.0208	1.5313	2.0417	2.5521	3.0625	4.0833	5.1042	6.1250	7.1458	8.1667	10.2083	12.2500	49
50	1.0416	1.5625	2.0833	2.6042	3.1250	4.1667	5.2083	6.2500	7.2917	8.3333	10.4167	12.5000	50

A - DRIVE CHAINS

PITCH CONVERSION TABLE — NO. OF PITCHES CONVERTED INTO FEET

No. of Pitches	Chain No.												No. of Pitches
	RS25 ¼"	RS35 ⅜"	RS40, RS41 ½"	RS50 ⅝"	RS60 ¾"	RS80 1"	RS100 1¼"	RS120 1½"	RS140 1¾"	RS160 2"	RS200 2½"	RS240 3"	
	Chain Length (ft.)												
51	1.0625	1.5938	2.1250	2.6563	3.1875	4.2500	5.3125	6.3750	7.4375	8.5000	10.6250	12.7500	51
52	1.0833	1.6250	2.1667	2.7083	3.2500	4.3333	5.4167	6.5000	7.5833	8.6667	10.8333	13.0000	52
53	1.1042	1.6563	2.2084	2.7604	3.3125	4.4167	5.5209	6.6250	7.7291	8.8333	11.0417	13.2500	53
54	1.1250	1.6875	2.2500	2.8125	3.3750	4.5000	5.6250	6.7500	7.8750	9.0000	11.2500	13.5000	54
55	1.1458	1.7188	2.2917	2.8647	3.4375	4.5833	5.7292	6.8750	8.0208	9.1667	11.4583	13.7500	55
56	1.1666	1.7500	2.3333	2.9167	3.5000	4.6667	5.8333	7.0000	8.1667	9.3333	11.6667	14.0000	56
57	1.1375	1.7813	2.3750	2.9688	3.5625	4.7500	5.9375	7.1250	8.3125	9.5000	11.8750	14.2500	57
58	1.2083	1.8125	2.4167	3.0208	3.6250	4.8333	6.0417	7.2500	8.4583	9.6667	12.0833	14.5000	58
59	1.2292	1.8438	2.4584	3.0729	3.6875	4.9166	6.1459	7.3750	8.6041	9.8333	12.1917	14.7500	59
60	1.2500	1.8750	2.5000	3.1250	3.7500	5.0000	6.2500	7.5000	8.7500	10.0000	12.5000	15.0000	60
61	1.2708	1.9063	2.5417	3.1771	3.8125	5.0833	6.3542	7.6250	8.8958	10.1667	12.7083	15.2500	61
62	1.2916	1.9375	2.5833	3.2292	3.8750	5.1667	6.5583	7.7500	9.0417	10.3333	12.9167	15.5000	62
63	1.3125	1.9688	2.6250	3.2813	3.9375	5.2500	6.6625	7.8750	9.1875	10.5000	13.1350	15.7500	63
64	1.3333	2.0000	2.6667	3.3333	4.0000	5.3333	6.7667	8.0000	9.3333	10.6667	13.3333	16.0000	64
65	1.3542	2.0313	2.7084	3.3854	4.0625	5.4167	6.8709	8.1250	9.4791	10.8333	13.5417	16.2500	65
66	1.3750	2.0625	2.7500	3.4375	4.1250	5.5000	6.9750	8.2500	9.6250	11.0000	13.7500	16.5000	66
67	1.3958	2.0938	2.7917	3.4897	4.1875	5.5833	7.0792	8.3750	9.7708	11.1667	13.9583	16.7500	67
68	1.4166	2.1250	2.8333	3.5417	4.2500	5.6667	7.1833	8.5000	9.9167	11.3333	14.1667	17.0000	68
69	1.4375	2.1563	2.8750	3.5938	4.3125	5.7500	7.2875	8.6250	10.0625	11.5000	14.3750	17.2500	69
70	1.4583	2.1875	2.9167	3.6458	4.3750	5.8333	7.3917	8.7500	10.2083	11.6667	14.5833	17.5000	70
71	1.4792	2.2188	2.9584	3.6979	4.4375	5.9167	7.3950	8.8750	10.3541	11.8333	14.7917	17.7500	71
72	1.5000	2.2500	3.0000	3.7500	4.5000	6.0000	7.5000	9.0000	10.5000	12.0000	15.0000	18.0000	72
73	1.5208	2.2813	3.0417	3.8021	4.5625	6.0833	7.6042	9.1250	10.6458	12.1667	15.2083	18.2500	73
74	1.5416	2.3125	3.0833	3.8541	4.6250	6.1667	7.7083	9.2500	10.7917	12.3333	15.4167	18.5000	74
75	1.5525	2.3438	3.1250	3.9062	4.6875	6.2500	7.8125	9.3750	10.9375	12.5000	15.6250	18.7500	75
76	1.5831	2.3750	3.1667	3.9583	4.7500	6.3333	7.9167	9.5000	11.0833	12.6667	15.8333	19.0000	76
77	1.6039	2.4063	3.2084	4.0104	4.8125	6.4167	8.0209	9.6250	11.2291	12.8333	16.0417	19.2500	77
78	1.6247	2.4375	3.2500	4.0625	4.8750	6.5000	8.1250	9.7500	11.3750	13.0000	16.2500	19.5000	78
79	1.6456	2.4688	3.2917	4.1146	4.9375	6.5833	8.2282	9.8750	11.5208	13.1667	16.4583	19.7500	79
80	1.6664	2.5000	3.3333	4.1667	5.0000	6.6667	8.3333	10.0000	11.6667	13.3333	16.6667	20.0000	80
81	1.6872	2.5313	3.3750	4.2188	5.0625	6.7500	8.4375	10.1250	11.8125	13.5000	16.8750	20.2500	81
82	1.7081	2.5625	3.4167	4.2700	5.1250	6.8333	8.5417	10.2500	11.9583	13.6667	17.0833	20.5000	82
83	1.7289	2.5938	3.4584	4.3230	5.1875	6.9167	8.6459	10.3750	12.1041	13.8333	17.2917	20.7500	83
84	1.7497	2.6250	3.5000	4.3750	5.2500	7.0000	8.7500	10.5000	12.2500	14.0000	17.5000	21.0000	84
85	1.7706	2.6563	3.5417	4.4271	5.3125	7.0833	8.8542	10.6250	12.3958	14.1667	17.7083	21.2500	85
86	1.7914	2.6875	3.5833	4.4792	5.3750	7.1667	8.9583	10.7500	12.5417	14.3333	17.9167	21.5000	86
87	1.8122	2.7188	3.6250	4.5313	5.4375	7.2500	9.0625	10.8750	12.6875	14.5000	18.1250	21.7500	87
88	1.8330	2.7500	3.6667	4.5834	5.5000	7.3333	9.1667	11.0000	12.8333	14.6667	18.3333	22.0000	88
89	1.8539	2.7813	3.7084	4.6355	5.5625	7.4167	9.2709	11.1250	12.9791	14.8333	18.5417	22.2500	89
90	1.8747	2.8125	3.7500	4.6875	5.6250	7.5000	9.3750	11.2500	13.1250	15.0000	18.7500	22.5000	90
91	1.8955	2.8438	3.7917	4.7396	5.6875	7.5833	9.4792	11.3750	13.2708	15.1667	18.9583	22.7500	91
92	1.9164	2.8750	3.8333	4.7917	5.7500	7.6667	9.5833	11.5000	13.4167	15.3333	19.1667	23.0000	92
93	1.9372	2.9063	3.8750	4.8438	5.8125	7.7500	9.6875	11.6250	13.5625	15.5000	19.3750	23.2500	93
94	1.9580	2.9375	3.9167	4.8958	5.8750	7.8333	9.7917	11.7500	13.7083	15.6667	19.5833	23.5000	94
95	1.9789	2.9688	3.9584	4.9479	5.9375	7.9167	9.8959	11.8750	13.8541	15.8333	19.7917	23.7500	95
96	1.9997	3.0000	4.0000	5.0000	6.0000	8.0000	10.0000	12.0000	14.0000	16.0000	20.0000	24.0000	96
97	2.0205	3.0313	4.0417	5.0521	6.0625	8.0833	10.1042	12.1250	14.1458	16.1667	20.2083	24.2500	97
98	2.0413	3.0625	4.0833	5.1042	6.1250	8.1667	10.2083	12.2500	14.2917	16.3333	20.4167	24.5000	98
99	2.0622	3.0938	4.1250	5.1563	6.1875	8.2500	10.3125	12.3750	14.4375	16.5000	20.6250	24.7500	99
100	2.0830	3.1250	4.1667	5.2083	6.2500	8.3333	10.4167	12.5000	14.5833	16.6667	20.8333	25.0000	100