



**UNION CHAIN DIVISION - DRIVE CHAINS**

U.S. TSUBAKI

A - ENGINEERING CLASS CHAINS

**SELECTION GUIDELINES**

There are two methods to determine the right drive chain for your application: Standard and Working Load. To determine the suggested chain, follow Steps 1-10 of the **Standard Selection Procedure** on pages A-5 through A-7. An example procedure is shown on page A-15.

Each selection procedure is intended to be used for Engineering Class Drive Chain (ASME/ANSI Standard B29.10).

**STANDARD SELECTION PROCEDURE**

**Step 1: Determine Class of Driven Load**

From the Application Classifications Table 1 determine the class of the driven load: uniform load, moderate shock, heavy shock.

**Table 1 – Application Classifications**

Application	Load Class <sup>1</sup>	Application	Load Class <sup>1</sup>	Application	Load Class <sup>1</sup>	Application	Load Class <sup>1</sup>
<b>Agitators</b>		<b>Conveyors – Uniformly Loaded or Fed (Continued)</b>		<b>Dry Dock Cranes (Continued)</b>		<b>Laundry Washers</b>	
Pure Liquids . . . . .	U	Oven . . . . .	U	Rotating (Swing or Slew) . . . . .	M	Reversing . . . . .	M
Liquids and Solids . . . . .	M	Screw . . . . .	U	Tracking (Drive Wheels) . . . . .	H	<b>Laundry Tumblers</b> . . . . .	M
Liquids – Variable Density . . . . .	M			<b>Elevators</b>		<b>Line Shafts</b>	
<b>Blowers</b>		<b>Conveyors – Heavy Duty Not Uniformly Fed</b>		Bucket – Uniform Load . . . . .	U	Driving Processing Equipment . . . . .	M
Centrifugal . . . . .	U	Apron . . . . .	M	Bucket – Heavy Load . . . . .	M	Light . . . . .	U
Lobe . . . . .	M	Assembly . . . . .	M	Bucket – Cont. Centrifugal Discharge . . . . .	U	Other Line Shafts . . . . .	U
Vane . . . . .	U	Belt . . . . .	M	Escalators . . . . .	U	<b>Lumber Industry</b>	
<b>Brewing and Distilling</b>		Bucket . . . . .	M	Freight . . . . .	M	Barkers – Hydraulic . . . . .	M
Bottling Machinery . . . . .	U	Chain . . . . .	M	Gravity Discharge . . . . .	U	Mechanical . . . . .	M
Brew Kettles – Cont. Duty . . . . .	U	Flight . . . . .	M	Man Lifts . . . . .	H	Burner Conveyor . . . . .	M
Cookers – Cont. Duty . . . . .	U	Live Roll . . . . .	M	Passenger . . . . .	H	Chain Saw and Drag Saw . . . . .	H
Mash Tubs – Cont. Duty . . . . .	U	Oven . . . . .	M	<b>Fans</b>		Chain Transfer . . . . .	H
Scale Hopper, Freq. Starts . . . . .	M	Reciprocating . . . . .	H	Centrifugal . . . . .	U	Craneway Transfer . . . . .	H
<b>Can Filling Machines</b> . . . . .	U	Screw . . . . .	M	Cooling Towers – Induced Draft . . . . .	U	De-barking Drum . . . . .	H
<b>Cane Knives</b> . . . . .	M	Shaker . . . . .	H	Cooling Towers – Forced Draft . . . . .	U	Edger Feed . . . . .	M
<b>Car Dumpers</b> . . . . .	H	<b>Cranes</b>		Induced Draft . . . . .	M	Gang Feed . . . . .	M
<b>Car Pullers</b> . . . . .	M	Main Hoists . . . . .	U	Large (Mine, etc.) . . . . .	M	Green Chain . . . . .	M
<b>Clarifiers</b> . . . . .	U	Bridge Travel . . . . .	M	Large (Industrial) . . . . .	M	Live Rolls . . . . .	H
<b>Classifiers</b> . . . . .	M	Trolley Travel . . . . .	M	Light (Small Diameter) . . . . .	U	Log Deck . . . . .	H
<b>Clay Working Machinery</b>		<b>Crusher</b>		<b>Feeders</b>		Log Haul – Incline . . . . .	H
Brick Press . . . . .	H	Ore . . . . .	H	Apron . . . . .	M	Log Haul – Well Type . . . . .	H
Briquette Machine . . . . .	H	Stone . . . . .	H	Belt . . . . .	M	Log Turning Device . . . . .	H
Clay Working Machinery . . . . .	M	Sugar . . . . .	M	Disc . . . . .	U	Main Log Conveyor . . . . .	H
Pub Mill . . . . .	M	<b>Dredges</b>		Reciprocating . . . . .	H	Off Bearing Rolls . . . . .	M
<b>Compressors</b>		Cable Reels . . . . .	M	Screw . . . . .	M	Planer Feed Chains . . . . .	M
Centrifugal . . . . .	U	<b>Conveyors</b> . . . . .	M	<b>Food Industry</b>		Planer Floor Chains . . . . .	M
Lobe . . . . .	M	Cutter Head Drives . . . . .	H	Beet Slicer . . . . .	M	Planer Tilting Hoist . . . . .	M
Reciprocating, Multi-Cylinder . . . . .	M	Jig Drives . . . . .	H	Cereal Cooker . . . . .	U	Re-saw Merry-go-round Conveyor . . . . .	M
Reciprocating, Single-Cylinder . . . . .	H	Maneuvering Winches . . . . .	M	Dough Mixer . . . . .	M	Roll Cases . . . . .	H
<b>Conveyors – Uniformly Loaded or Fed</b>		Pumps . . . . .	M	Meat Grinders . . . . .	M	Slab Conveyor . . . . .	H
Apron . . . . .	U	Screen Drive . . . . .	H	<b>Generators (Not Welding)</b> . . . . .	U	Small Waste Conveyor – Belt . . . . .	U
Assembly . . . . .	U	Stackers . . . . .	M	<b>Hammer Mills</b>	H	Small Waste Conveyor – Chain . . . . .	M
Belt . . . . .	U	Utility Winches . . . . .	M	<b>Hoists</b>		Sorting Table . . . . .	M
Bucket . . . . .	U	<b>Dry Dock Cranes</b>		Heavy Duty . . . . .	H	Tipple Hoist Conveyor . . . . .	M
Chain . . . . .	U	Main Hoist, Auxiliary Hoist, Boom (Luffing) . . . . .	U	Medium Duty . . . . .	M	Tipple Hoist Drive . . . . .	M
Flight . . . . .	U			Skip Hoist . . . . .	M	Transfer Conveyors . . . . .	M

<sup>1</sup>U = Uniform load; M = Moderate shock; H = Heavy shock.



**Required Information for Drive Selection**

- Type of input horsepower (electric motor, internal combustion engine, etc.).
- Type of equipment to be driven.
- Horsepower to be transmitted.
- Full load speed of the fastest running shaft (RPM).
- Desired speed of the slow speed shaft (RPM).  
**Note:** If speeds are variable, determine maximum and minimum speed and HP to be transmitted at each speed.
- Diameters of the driving and driven shafts.
- Center to center distance of shafts.  
**Note:** If this dimension is adjustable, determine amount of adjustment.
- Position of drive and space limitations, if any.
- Proposed method of lubrication.
- Conditions of drive. Drives with more than two sprockets, idlers, or unusual conditions such as severely abrasive or corrosive atmosphere, extremely high or low temperatures, severely fluctuating loads, frequent stops and starts, etc., require special consideration. It is advisable to consult Union engineers for selections of this nature.

**Table 1 – Application Classifications (Continued)**

Application	Load Class <sup>1</sup>	Application	Load Class <sup>1</sup>	Application	Load Class <sup>1</sup>	Application	Load Class <sup>1</sup>
<b>Lumber Industry (Continued)</b>		<b>Mixers</b>		<b>Printing Presses</b> . . . . .	U	<b>Sewage Disposal Equipment (Continued)</b>	
Transfer Rolls . . . . .	M	Concrete Mixers – Cont. . . . .	M	<b>Pullers</b>		Slow or Rapid Mixers . . . . .	M
Tray Drive . . . . .	M	Concrete Mixers – Intermittent . . . . .	M	Barge Haul . . . . .	H	Thickeners . . . . .	M
Trimmer Feed . . . . .	M	Constant Density . . . . .	U	<b>Pumps</b>		Vacuum Filters . . . . .	M
Waste Conveyor . . . . .	M	Variable Density . . . . .	M	Centrifugal . . . . .	U	<b>Screens</b>	
<b>Machine Tools</b>		<b>Oil Industry</b>		Proportioning . . . . .	M	Air Washing . . . . .	U
Bending Roll . . . . .	M	Chillers . . . . .	M	Reciprocating – Single Acting, . . . . .	M	Rotary – Stone or Gravel . . . . .	M
Punch Press – Gear Driven . . . . .	H	Oil Well Pumping . . . . .	H	Three or more Cylinders . . . . .	M	Traveling Water Intake . . . . .	U
Notching Press – Belt Driven . . . . .	H	Paraffin Filter Press . . . . .	M	Reciprocating – Double Acting, . . . . .	M	<b>Slab Pushers</b>	M
Plate Planers . . . . .	H	Rotary Kilns . . . . .	M	Two or more Cylinders . . . . .	M	<b>Steering Gear</b>	H
Tapping Machine . . . . .	H	<b>Paper Mills</b>		Reciprocating – Single Acting, . . . . .	M	<b>Stokers</b> . . . . .	U
Other Machine Tools –		Agitators (Mixers) . . . . .	M	One or Two Cylinders . . . . .	M	<b>Sugar Industry</b>	
Main Drives . . . . .	M	Barker – Auxiliaries – Hydraulic . . . . .	M	Reciprocating – Double Acting, . . . . .	M	Cane Knives . . . . .	M
Other Machine Tools –		Barker – Mechanical . . . . .	M	Single Cylinder . . . . .	M	Crushers . . . . .	M
Auxiliary Drives . . . . .	U	Barking Drum . . . . .	H	Reciprocating –		Mills . . . . .	H
<b>Metal Mills</b>		Beater and Pulper . . . . .	M	Rotary – Gear Type . . . . .	U	<b>Textile Industry</b>	
Draw Bench Carriage		Bleacher . . . . .	U	Rotary – Lobe, Vane . . . . .	U	Batchers . . . . .	M
and Main Drive . . . . .	M	Calendars . . . . .	M	<b>Rubber and Plastics Industries</b>		Calendars . . . . .	M
Pinch, Dryer and Scrubber		Calendars – Super . . . . .	H	Crackers . . . . .	H	Cards . . . . .	M
Rolls, Reversing . . . . .	H	Converting Machine,		Laboratory Equipment . . . . .	M	Dry Cans . . . . .	M
Slitters . . . . .	M	Except Cutters, Platers . . . . .	M	Mixing Mills . . . . .	H	Dryers . . . . .	M
Table Conveyors – Non-		Conveyors . . . . .	U	Refiners . . . . .	M	Dyeing Machinery . . . . .	M
Reversing Group Drives . . . . .	M	Couch . . . . .	M	Rubber Calendars . . . . .	M	Knitting Machines . . . . .	M
Table Conveyors – Non-		Cutters – Platers . . . . .	H	Rubber Mill (Two on Line) . . . . .	M	Looms . . . . .	M
Reversing Individual Drives . . . . .	H	Cylinders . . . . .	M	Rubber Mill (Three on Line) . . . . .	M	Mangles . . . . .	M
Table Conveyors – Reversing . . . . .	H	Dryers . . . . .	M	Sheeter . . . . .	M	Nappers . . . . .	M
Wire Drawing and		Felt Stretcher . . . . .	M	Tire Building Machines . . . . .	M	Pads . . . . .	M
Flattening Machine . . . . .	M	Felt Whipper . . . . .	H	Tire and Tube Press Openers . . . . .	M	Range Drives . . . . .	M
Wire Winding Machine . . . . .	M	Jordans . . . . .	H	Tubers and Strainers . . . . .	M	Slashers . . . . .	M
<b>Mills, Rotary Type</b>		Log Haul . . . . .	H	Warming Mills . . . . .	M	Soapers . . . . .	M
Ball . . . . .	M	Presses . . . . .	U	<b>Sand Muller</b> . . . . .	M	Spinners . . . . .	M
Cement Kilns . . . . .	M	Pulp Machine Reel . . . . .	M	<b>Sewage Disposal Equipment</b>		Tenter Frames . . . . .	M
Dryers and Coolers . . . . .	M	Stock Chests . . . . .	M	Bar Screens . . . . .	U	Washers . . . . .	M
Kilns . . . . .	M	Suction Roll . . . . .	U	Chemical Feeders . . . . .	U	Winders . . . . .	M
Pebble . . . . .	M	Washers and Thickeners . . . . .	M	Collectors . . . . .	U	<b>Windless</b> . . . . .	M
Rod, Plane and Wedge Bar . . . . .	M	Winders . . . . .	U	Dewatering Screws . . . . .	M		
Tumbling Barrels . . . . .	H			Scum Breakers . . . . .	M		

<sup>1</sup>U = Uniform load; M = Moderate shock; H = Heavy shock.



# UNION CHAIN DIVISION - DRIVE CHAINS

U.S. TSUBAKI

A - ENGINEERING CLASS CHAINS

### Step 2: Select Service Factor

From the Service Factors Table 2 below, select the number under the type of input power and opposite the class of driven load that most closely relates to the application.

**Table 2 – Service Factors**

Type of Driven Load	Type of Input Power		
	Internal Combustion Engine with Hydraulic Drive	Electric Motor or Turbine	Internal Combustion Engine with Mechanical Drive
Uniform	1.0	1.0	1.2
Moderate Shock	1.2	1.3	1.4
Heavy Shock	1.4	1.5	1.7

### Step 3: Calculate Design Horsepower

Design Horsepower = HP x Service Factor.

The Design Horsepower equals the Horsepower to be transmitted multiplied by the Service Factor selected in Step 2.

### Step 4: Select Chain Pitch

Use the Quick Selection Chart (page A-10), to find chain pitch, as follows:

- Locate the design horsepower from Step 4 on the vertical axis.
- Locate the RPM of the small sprocket on the horizontal axis.
- The intersection of the two lines (design horsepower and RPM) will be in an area designated with the suggested chain pitch. If the intersection is near the borderline of the pitch area, the pitches on both sides of the line should be evaluated to obtain the most suitable selection.
- If the chain is not listed in the Quick Selection Chart, go to the Working Load Selection Guidelines.

### Step 5: Select Number of Teeth in Small Sprocket

Horsepower Table Ratings for single strand chains are given on pages A-11 ~ A-14 for each chain pitch. Turn to the page giving the chain pitch obtained in Step 4 and select the number of teeth in the small sprocket:

- Read down the column in the Horsepower Ratings Table under the RPM of the small sprocket until the requested HP Table Rating is located. Read across the table to the first column (Number of Teeth Small Sprocket). This is the smallest number of teeth to specify for this application.
- Note the lubrication type specification in the table for this chain. This type of lubrication must be used to obtain reasonable service life.

### Step 6: Determine Number of Teeth in Large Sprocket

$$N = \frac{rn}{R}$$

The number of teeth in the large sprocket equals the RPM of the small sprocket times the number of teeth in the small sprocket divided by the RPM of the large sprocket. Note: Hardened teeth are suggested for sprockets with less than 15 teeth, speeds greater than 600 RPM, ratios over 4:1, or in heavy loading or abrasive environments.

### Step 7: Determine Suggested Minimum Center Distance; C = Chain Pitches

$$C = \frac{2N + n}{6}$$

This formula is to be used as a guide to MINIMUM center distances only. The final selection may vary slightly to suit clearance dimensions.

### Step 8: Check Final Drive Design

Be sure that the sprockets and chain will fit into the available space.

### Step 9: Specify Sprockets

Specify the sprockets selected. See Sprocket section in this catalog. Also, refer to Section C for standard keyway and set screw dimensions.

### Step 10: Calculate Chain Length

To order the proper length of chain, use the following calculation:

$$\text{Chain Length in Pitches} = \frac{S}{2} + 2C + \frac{K}{C}$$

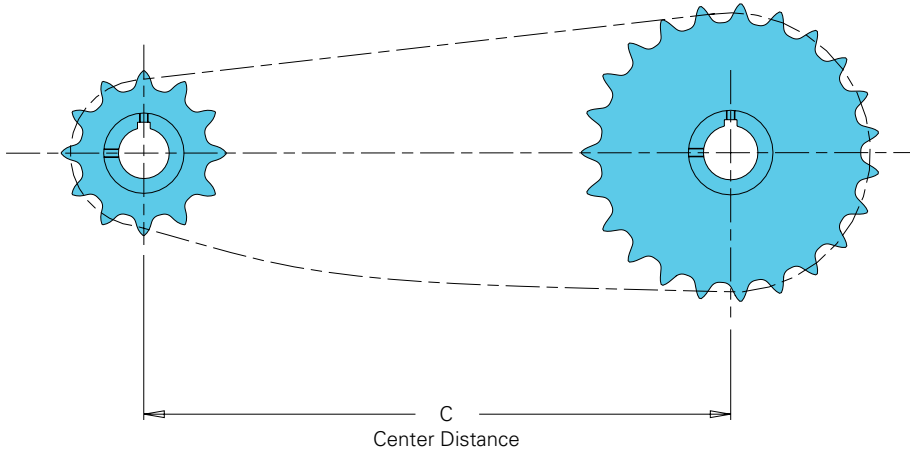
- Add number of teeth in small sprocket and number of teeth in large sprocket to obtain S.
- Subtract number of teeth in small sprocket from number of teeth in large sprocket to obtain value D. Find D in Table 3, and note corresponding value K.
- Divide center distance in inches by pitch of chain, obtaining C.
- Using these values, solve the formula above.

$$\text{Chain Length in Feet} = \frac{\text{Length in Pitches} \times \text{Pitch in Inches}}{12}$$

A chain cannot contain a fractional part of a pitch. If the chain length obtained contains a fractional part of a pitch, use the next higher whole number.

### Glossary

- N = Number of teeth in large sprocket
- n = Number of teeth in small sprocket
- R = RPM large sprocket
- r = RPM small sprocket
- C = Shaft center distance in pitches
- S = N + n
- D = N - n



**Table 3 – K Values<sup>1</sup>**

D	K	D	K	D	K	D	K	D	K	D	K
1	.03	32	25.94	63	100.54	94	223.82	125	395.79	156	616.44
2	.10	33	27.58	64	103.75	95	228.61	126	402.14	157	624.37
3	.23	34	29.28	65	107.02	96	233.44	127	408.55	158	632.35
4	.41	35	31.03	66	110.34	97	238.33	128	415.01	159	640.38
5	.63	36	32.83	67	113.71	98	243.27	129	421.52	160	648.46
6	.91	37	34.68	68	117.13	99	248.26	130	428.08	161	656.59
7	1.24	38	36.58	69	120.60	100	253.30	131	434.69	162	664.77
8	1.62	39	38.53	70	124.12	101	258.39	132	441.36	163	673.00
9	2.05	40	40.53	71	127.69	102	263.54	133	448.07	164	681.28
10	2.53	41	42.58	72	131.31	103	268.73	134	454.83	165	689.62
11	3.06	42	44.68	73	134.99	104	273.97	135	461.64	166	698.00
12	3.65	43	46.84	74	138.71	105	279.27	136	468.51	167	706.44
13	4.28	44	49.04	75	142.48	106	284.67	137	475.42	168	714.92
14	4.96	45	51.29	76	146.31	107	290.01	138	482.39	169	723.46
15	5.70	46	53.60	77	150.18	108	295.45	139	489.41	170	732.05
16	6.48	47	55.95	78	154.11	109	300.95	140	496.47	171	740.68
17	7.32	48	58.36	79	158.09	110	306.50	141	503.59	172	749.37
18	8.21	49	60.82	80	162.11	111	312.09	142	510.76	173	758.11
19	9.14	50	63.33	81	166.19	112	317.74	143	517.98	174	766.90
20	10.13	51	65.88	82	170.32	113	323.44	144	525.25	175	775.74
21	11.17	52	68.49	83	174.50	114	329.19	145	532.57	176	784.63
22	12.26	53	71.15	84	178.73	115	334.99	146	539.94	177	793.57
23	13.40	54	73.86	85	183.01	116	340.84	147	547.36	178	802.57
24	14.59	55	76.62	86	187.34	117	346.75	148	554.83	179	811.61
25	15.83	56	79.44	87	191.73	118	352.70	149	562.36	180	820.70
26	17.12	57	82.30	88	196.16	119	358.70	150	569.93	181	829.85
27	18.47	58	85.21	89	200.64	120	364.76	151	577.56	182	839.04
28	19.86	59	88.17	90	205.18	121	370.86	152	585.23	183	848.29
29	21.30	60	91.19	91	209.76	122	377.02	153	592.96	184	857.58
30	22.80	61	94.25	92	214.40	123	383.22	154	600.73	185	866.93
31	24.34	62	97.37	93	219.08	124	389.48	155	608.56		

<sup>1</sup>Used to calculate chain length. See Step 10 on page A-7.



# UNION CHAIN DIVISION - DRIVE CHAINS

## Alternate Working Load Selection Guidelines

Selection of drive chains not listed in the Quick Selection Chart by the Working Load method:

To use a chain that is not listed in the Quick Selection Chart, the proper chain can be selected from the working load values given in the chain listings. The working load required can be determined from the following:

### Working Load

$$\frac{(HP) \times (396,000) \times (E) \times (V)}{(CP) \times (T) \times (RPM)}$$

Where:

HP = Actual horsepower required. (Use motor HP if actual is not known.)

CP = Chain pitch (inches)

T = Number of teeth in smaller sprocket. (12T are suggested.)

RPM = Speed of smaller sprocket.

E = Speed factor (from Speed Correction Factors Table 11 on page A-50. A 12T sprocket is suggested.)

V = Service factor (obtain from Service Factors Table 10 on page A-50.)

This Working Load formula is not to be compared with the selection tables since the tables involve other considerations in addition to working load. This formula is intended only to supplement the selection tables for those cases where a chain other than the ones listed in the selection procedure is required.

When the Working Load has been determined, select a chain which has a rated working load equal to or greater than the working load value.

## Calculation of Shaft Centers

Use the following formula to determine the approximate centers in pitches for chain lengths in pitches already determined. Consult Union Chain Division for fixed center drives.

$$C = \frac{L - \frac{N+n}{2} + \sqrt{\left(L - \frac{N+n}{2}\right)^2 - 8 \frac{(N-n)^2}{4-2}}}{4}$$

Where:

C = Shaft center distance in pitches.

L = Length of chain in pitches.

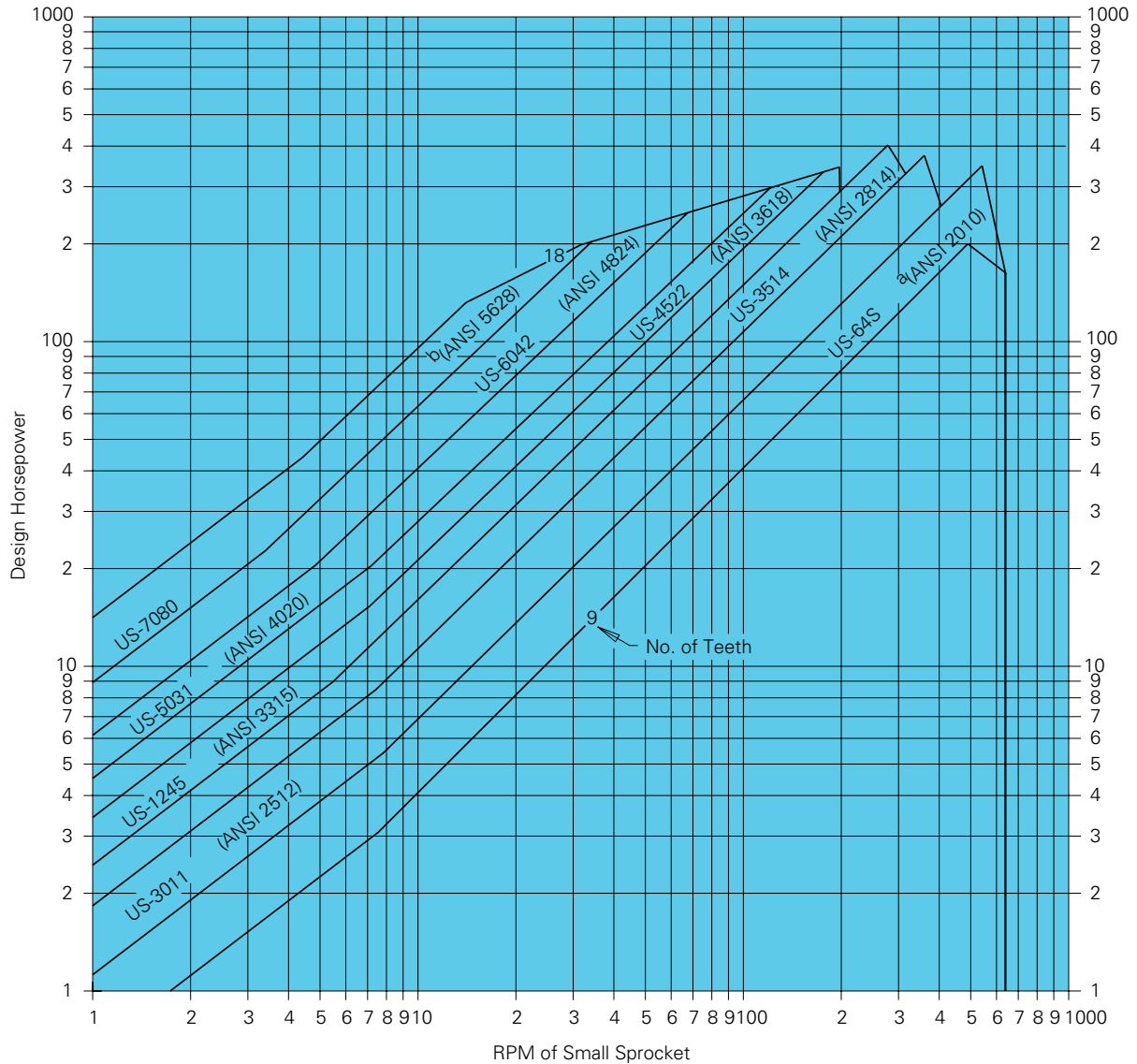
N = Number of teeth in larger sprocket.

n = Number of teeth in smaller sprocket.

$\pi = 3.1416$ .



**Quick Selection Chart**



a. This chain has straight sidebars. No. 2010 ANSI standard chain has been assigned. (US-64S does not run on 2010 (US-2570) sprockets.)  
 b. This chain has straight sidebars. No. 5628 ANSI standard chain has been assigned. (US-7080 does not run on 5628 (US-7060) sprockets.)  
 Lower line is for 9 tooth US-64S. Top line is for 18 tooth US-7080. Intermediate lines are approximate mid-points for sprocket tooth range shown in HP charts, pages A-11 ~ A-14. Where the horsepower-RPM intersection lands near a line, both chains on each side should be checked on the charts.  
 The horsepower ratings in the following pages apply to lubricated single strand Engineering Drive Chains operating on cut tooth sprockets.



**UNION CHAIN DIVISION - DRIVE CHAINS**  
U S TSUBAKI

A - ENGINEERING CLASS CHAINS

**Horsepower Ratings US-64S**

**Heavy Duty Straight Sidebar Power Transmission Chain**

**2.500" Pitch**

Teeth	Horsepower Capacity RPM													
	2	3	7	10	20	30	40	100	200	250	350	450	600	700
9	1.1	1.4	2.7	3.9	7.7	11.6	15.4	38.6	77.2	96.5	135.1	100.1	65.0	—
10	1.1	1.5	3.0	4.3	8.6	12.9	17.2	42.9	85.8	107.3	150.2	117.2	76.1	—
11	1.2	1.7	3.3	4.7	9.4	14.2	18.9	47.2	94.4	118.0	165.2	135.2	87.8	—
12	1.3	1.8	3.6	5.1	10.3	15.4	20.6	51.5	103.0	128.7	180.2	154.1	100.1	—
13	1.4	1.9	3.9	5.6	11.2	16.7	22.3	55.8	111.5	139.4	195.2	173.7	112.8	—
14	1.5	2.0	4.2	6.0	12.0	18.0	24.0	60.1	120.1	150.2	210.2	194.2	126.1	—
15	1.5	2.1	4.5	6.4	12.9	19.3	25.7	64.4	128.7	160.9	225.2	215.3	139.9	—
16	1.6	2.2	4.8	6.9	13.7	20.6	27.5	68.6	137.3	171.6	240.3	237.2	154.1	—
17	1.7	2.3	5.1	7.3	14.6	21.9	29.2	72.9	145.9	182.3	255.3	259.8	168.8	—
18	1.8	2.4	5.4	7.7	15.4	23.2	30.9	77.2	154.5	193.1	270.3	283.1	183.9	—
19	1.9	2.5	5.7	8.2	16.3	24.5	32.6	81.5	163.0	203.8	285.3	307.0	—	—
20	1.9	2.6	6.0	8.6	17.2	25.7	34.3	85.8	171.6	214.5	300.3	331.5	—	—
21	2.0	2.7	6.3	9.0	18.0	27.0	36.0	90.1	180.2	225.2	315.3	356.7	—	—
22	2.1	2.8	6.6	9.4	18.9	28.3	37.8	94.4	188.8	236.0	330.4	382.5	—	—
23	2.1	3.0	6.9	9.9	19.7	29.6	39.5	98.7	197.4	246.7	345.4	405.3	—	—
24	2.2	3.1	7.2	10.3	20.6	30.9	41.2	103.0	205.9	257.4	360.4	414.4	—	—
	<b>Manual Lubrication</b>					<b>Oil Bath</b>				<b>Oil Stream Lubrication</b>				

**Horsepower Ratings US-3011**

**Heavy Duty Offset Sidebar Power Transmission Chain**

**3.067" Pitch**

Teeth	Horsepower Capacity RPM													
	1	3	6	10	20	40	100	150	200	250	300	350	400	450
9	1.0	2.4	4.0	6.4	12.7	25.5	63.7	95.6	127.4	159.3	191.1	171.8	140.6	—
10	1.1	2.6	4.3	7.1	14.2	28.3	70.8	106.2	141.6	177.0	212.4	198.9	164.7	—
11	1.2	2.7	4.7	7.8	15.6	31.1	77.9	116.8	155.7	194.7	231.3	215.5	190.0	—
12	1.3	2.9	5.1	8.5	17.0	34.0	85.0	127.4	169.9	212.4	248.6	231.5	216.5	—
13	1.4	3.1	5.5	9.2	18.4	36.8	92.0	138.0	184.1	230.1	265.3	247.0	232.3	—
14	1.4	3.3	5.9	9.9	19.8	39.6	99.1	148.7	198.2	247.8	281.4	262.1	246.4	—
15	1.5	3.5	6.4	10.6	21.2	42.5	106.2	159.3	212.4	265.5	296.9	276.6	260.0	—
16	1.6	3.7	6.8	11.3	22.7	45.3	113.3	169.9	226.5	283.2	312.0	290.6	273.2	—
17	1.7	3.8	7.2	12.0	24.1	48.1	120.3	180.5	240.7	300.9	326.5	304.1	285.9	—
18	1.7	4.0	7.6	12.7	25.5	51.0	127.4	191.1	245.9	318.6	340.5	317.1	—	—
19	1.8	4.2	8.1	13.5	26.9	53.8	134.5	201.8	269.0	336.3	354.0	329.7	—	—
20	1.9	4.3	8.5	14.2	28.3	56.6	141.6	212.4	283.2	354.0	367.1	341.9	—	—
21	1.9	4.5	8.9	14.9	29.7	59.5	148.7	233.0	297.3	371.7	379.6	353.6	—	—
22	2.0	4.7	9.3	15.6	31.1	62.3	155.7	233.6	311.5	389.4	391.7	364.8	—	—
23	2.1	4.9	9.8	16.3	32.6	65.1	162.8	244.2	325.6	407.1	403.4	375.7	—	—
24	2.2	5.1	10.2	17.0	34.0	68.0	169.9	254.9	339.8	424.8	414.6	386.1	—	—
	<b>Manual Lubrication</b>					<b>Oil Bath</b>				<b>Oil Stream Lubrication</b>				

For continuous operation in the highlighted area, some galling of the live bearing surfaces of the chain joints may be expected even though lubrication is as suggested.

The ratings shown on these charts are based on chain which operates over machine cut tooth sprockets.





**Horsepower Ratings US-3514**

**Heavy Duty Offset Sidebar Power Transmission Chain**

**3.500" Pitch**

Teeth	Horsepower Capacity RPM													
	1	3	6	10	20	35	80	100	125	150	200	250	300	325
9	1.4	3.3	5.5	8.8	17.6	30.8	52.8	88.1	110.1	132.1	176.1	178.7	170.8	—
10	1.5	3.5	6.0	9.8	19.6	34.2	58.7	97.8	122.3	146.8	195.7	196.1	187.4	—
11	1.6	3.8	6.5	10.8	21.5	37.7	64.6	107.6	134.5	161.4	215.2	213.0	203.6	—
12	1.8	4.1	7.0	11.7	23.5	41.1	70.4	117.4	146.8	176.1	234.8	229.5	219.4	—
13	1.9	4.3	7.6	12.7	25.4	44.5	76.3	127.2	159.0	190.8	254.4	245.6	234.7	—
14	2.0	4.6	8.2	13.7	27.4	47.9	82.2	137.0	171.2	205.5	273.9	261.2	249.6	—
15	2.1	4.8	8.8	14.7	29.4	51.4	88.1	146.8	183.4	220.1	292.1	276.3	264.1	—
16	2.2	5.1	9.4	15.7	31.3	54.8	93.9	156.5	195.7	234.8	307.7	291.1	278.2	—
17	2.3	5.3	10.0	16.6	33.3	58.2	99.8	166.3	207.9	249.5	322.8	305.5	—	—
18	2.4	5.5	10.6	17.6	35.2	61.6	105.7	176.1	220.1	264.2	337.6	319.4	—	—
19	2.5	5.8	11.2	18.6	37.2	65.1	111.5	185.9	232.4	278.8	351.9	333.0	—	—
20	2.6	6.0	11.7	19.6	39.1	68.5	117.4	195.7	244.6	293.5	365.8	346.1	—	—
21	2.7	6.2	12.3	20.5	41.1	71.9	123.3	205.5	256.8	308.2	379.3	358.9	—	—
	<b>Manual Lubrication</b>					<b>Oil Bath</b>			<b>Oil Stream Lubrication</b>					

**Horsepower Ratings US-1245**

**Heavy Duty Offset Sidebar Power Transmission Chain**

**4.073" Pitch**

Teeth	Horsepower Capacity RPM													
	1	3	6	10	20	30	40	65	80	100	125	150	200	225
9	2.0	4.7	8.0	12.8	25.5	38.3	51.1	83.0	102.1	127.7	159.6	168.2	166.3	—
10	2.2	5.1	8.7	14.2	28.4	42.6	56.7	92.2	113.5	141.8	177.3	185.0	182.9	—
11	2.4	5.5	9.4	15.6	31.2	46.8	62.4	101.4	124.8	156.0	195.0	201.5	199.2	—
12	2.5	5.9	10.2	17.0	34.0	51.1	68.1	110.6	136.2	170.2	212.8	217.6	215.1	—
13	2.7	6.3	11.1	18.4	36.9	55.3	73.8	119.9	147.5	184.4	230.5	233.4	230.7	—
14	2.9	6.6	11.9	19.9	39.7	59.6	79.4	129.1	158.9	198.6	248.2	248.8	246.0	—
15	3.0	7.0	12.8	21.3	42.6	63.8	85.1	138.3	170.2	212.8	265.9	263.9	261.0	—
16	3.2	7.3	13.6	22.7	45.4	68.1	90.8	147.5	181.6	227.0	280.7	278.7	275.6	—
17	3.3	7.7	14.5	24.1	48.2	72.3	96.5	156.7	192.9	241.1	295.3	293.2	289.9	—
18	3.5	8.0	15.3	25.5	51.1	76.6	102.1	166.0	204.3	255.3	309.6	307.3	303.9	—
19	3.6	8.4	16.2	27.0	53.9	80.9	107.8	175.2	215.6	269.5	323.5	321.2	317.6	—
20	3.8	8.7	17.0	28.4	56.7	85.1	113.5	184.4	227.0	283.7	337.1	334.7	—	—
21	3.9	9.0	17.9	29.8	59.6	89.4	119.2	193.6	238.3	297.9	350.5	347.9	—	—
	<b>Manual Lubrication</b>					<b>Oil Bath</b>			<b>Oil Stream Lubrication</b>					

For continuous operation in the highlighted area, some galling of the live bearing surfaces of the chain joints may be expected even though lubrication is as suggested.

The ratings shown on these charts are based on chain which operates over machine cut tooth sprockets.





**UNION CHAIN DIVISION - DRIVE CHAINS**  
U S TSUBAKI

A - ENGINEERING CLASS CHAINS

**Horsepower Ratings US-4522**

**Heavy Duty Offset Sidebar Power Transmission Chain**

**4.500" Pitch**

Teeth	Horsepower Capacity RPM													
	1	3	6	10	20	30	35	50	65	80	100	125	150	175
9	2.6	6.0	10.2	16.3	32.6	48.9	57.0	81.5	105.9	130.4	153.8	156.6	158.8	—
10	2.8	6.5	11.1	18.1	36.2	54.3	63.4	90.5	117.7	144.9	169.5	172.5	175.0	—
11	3.0	7.0	12.0	19.9	39.8	59.8	69.7	99.6	129.5	159.4	184.8	188.1	190.8	—
12	3.3	7.5	13.0	21.7	43.5	65.2	76.1	108.7	141.3	173.9	199.8	203.4	206.3	—
13	3.5	8.0	14.1	23.5	47.1	70.6	82.4	117.7	153.0	188.3	214.6	218.4	221.6	—
14	3.7	8.5	15.2	25.4	50.7	76.1	88.7	126.8	164.8	202.8	229.1	233.2	236.6	—
15	3.9	8.9	16.3	27.2	54.3	81.5	95.1	135.8	176.6	217.3	243.4	247.7	251.3	—
16	4.1	9.4	17.4	29.0	58.0	86.9	101.4	144.9	188.3	231.8	257.4	261.9	265.7	—
17	4.2	9.8	18.5	30.8	61.6	92.4	107.8	153.9	200.1	246.3	271.1	275.9	279.9	—
18	4.4	10.2	19.6	32.6	65.2	97.8	114.1	163.0	211.9	260.8	284.6	289.6	293.8	—
19	4.6	10.7	20.6	34.4	68.8	103.2	120.4	172.0	223.7	275.3	297.8	303.1	307.5	—
20	4.8	11.1	21.7	36.2	72.4	108.7	126.8	181.1	235.4	289.8	310.7	316.3	320.9	—
21	5.0	11.5	22.8	38.0	76.1	114.1	133.1	190.1	247.2	304.2	323.5	329.2	334.0	—
	<b>Manual Lubrication</b>					<b>Oil Bath</b>				<b>Oil Stream Lubrication</b>				

**Horsepower Ratings US-5031**

**Heavy Duty Offset Sidebar Power Transmission Chain**

**5.000" Pitch**

Teeth	Horsepower Capacity RPM													
	.5	1	3	6	10	20	30	35	50	65	80	100	125	130
9	2.0	3.4	7.8	13.3	21.1	42.2	63.3	73.8	105.5	133.9	139.3	145.3	151.6	—
10	2.2	3.7	8.5	14.4	23.4	46.9	70.3	82.0	117.2	147.6	153.6	160.2	—	—
11	2.3	3.9	9.1	15.5	25.8	51.6	77.4	90.3	128.9	161.2	167.7	174.9	—	—
12	2.5	4.2	9.7	16.9	28.1	56.3	84.4	98.5	140.7	174.5	181.6	189.4	—	—
13	2.6	4.5	10.3	18.3	30.5	61.0	91.4	106.7	152.4	187.7	195.2	203.7	—	—
14	2.8	4.7	10.9	19.7	32.8	65.6	98.5	114.9	164.1	200.6	208.7	217.7	—	—
15	2.9	5.0	11.5	21.1	35.2	70.3	105.5	123.1	175.8	213.4	222.0	231.6	—	—
16	3.1	5.2	12.1	22.5	37.5	75.0	112.5	131.3	187.5	225.9	235.0	245.2	—	—
17	3.2	5.5	12.7	23.9	39.9	79.7	119.6	139.5	199.3	238.2	247.8	258.6	—	—
18	3.4	5.7	13.3	25.3	42.2	84.4	126.6	147.7	211.0	250.4	260.5	271.7	—	—
	<b>Manual Lubrication</b>					<b>Oil Bath</b>				<b>Oil Stream Lubrication</b>				

For continuous operation in the highlighted area, some galling of the live bearing surfaces of the chain joints may be expected even though lubrication is as suggested.

The ratings shown on these charts are based on chain which operates over machine cut tooth sprockets.



**Horsepower Ratings US-6042**

**Heavy Duty Offset Sidebar Power Transmission Chain**

**6.000" Pitch**

Teeth	Horsepower Capacity RPM													
	.5	1	3	6	10	20	30	35	40	45	50	60	70	75
9	3.1	5.3	12.2	20.7	33.0	66.0	96.1	101.5	106.3	110.8	115.0	122.6	129.0	—
10	3.4	5.7	13.2	22.4	36.6	73.3	106.2	112.1	117.5	122.5	127.1	135.5	—	—
11	3.6	6.2	14.2	24.2	40.3	80.6	116.1	122.6	128.5	133.9	139.0	148.2	—	—
12	3.9	6.6	15.2	26.4	44.0	87.9	126.0	133.0	139.4	145.3	150.8	160.8	—	—
13	4.1	7.0	16.2	28.6	47.6	95.3	135.7	143.2	150.1	156.5	162.4	173.2	—	—
14	4.4	7.4	17.1	30.8	51.3	102.6	145.3	153.4	160.8	167.6	173.9	185.4	—	—
15	4.6	7.8	18.0	33.0	55.0	109.9	154.8	163.4	171.3	178.5	185.3	197.5	—	—
16	4.8	8.2	18.9	35.2	58.6	117.3	164.2	173.3	181.6	189.3	196.5	209.5	—	—
17	5.1	8.6	19.8	37.4	62.3	124.6	173.4	183.1	191.9	200.0	207.6	221.3	—	—
18	5.3	9.0	20.7	39.6	66.0	131.9	182.6	192.7	202.0	210.6	218.5	233.0	—	—
<b>Manual Lubrication</b>										<b>Oil Bath</b>			<b>Oil Stream Lubrication</b>	

**Horsepower Ratings US-7080**

**Heavy Duty Offset Sidebar Power Transmission Chain**

**7.000" Pitch**

Teeth	Horsepower Capacity RPM													
	.1	.5	1	2	4	6	10	15	20	25	30	35	40	45
9	1.3	4.6	7.7	13.1	22.2	30.2	48.1	67.1	76.7	85.0	92.5	99.4	105.7	—
10	1.4	4.9	8.4	14.2	24.0	32.7	53.5	74.2	84.8	94.0	102.3	109.9	—	—
11	1.6	5.3	9.0	15.2	25.9	35.3	58.8	81.2	92.8	103.0	112.0	120.3	—	—
12	1.7	5.7	9.6	16.3	27.6	38.5	64.2	88.2	100.8	111.8	121.7	130.7	—	—
13	1.8	6.0	10.2	17.3	29.4	41.7	69.5	95.1	108.7	120.6	131.2	140.9	—	—
14	1.9	6.4	10.8	18.3	31.1	44.9	74.8	102.0	116.5	129.2	140.6	151.1	—	—
15	2.0	6.7	11.4	19.3	32.7	48.1	80.2	108.8	124.3	137.8	150.0	161.1	—	—
16	2.1	7.1	12.0	20.3	34.4	51.3	85.5	115.5	132.0	146.4	159.3	171.1	—	—
17	2.2	7.4	12.5	21.2	36.4	54.5	90.9	122.2	139.6	154.8	168.5	180.9	—	—
18	2.3	7.7	13.1	22.2	38.5	57.7	96.2	128.8	147.1	163.2	177.5	190.7	—	—
<b>Manual Lubrication</b>														

For continuous operation in the highlighted area, some galling of the live bearing surfaces of the chain joints may be expected even though lubrication is as suggested.

The ratings shown on these charts are based on chain which operates over machine cut tooth sprockets.



# UNION CHAIN DIVISION - DRIVE CHAINS

## Standard Selection Procedure Example

### Engineering Class Drive Chain From Reducer to Apron Feeder Head Shaft

Select the proper Engineering Drive Chain to transmit power from a reducer to an apron feeder head shaft. The input power will be a 25 HP electric motor. The reducer output RPM will be 15 RPM and the head shaft RPM will be 5 RPM. Reducer shaft is 2 15/16" diameter. Head shaft is 3 15/16" diameter. The shaft centers should be minimum suggested.

#### Step 1: Determine Class of Driven Load

From Table 1 (Application Classifications), the load class for an apron feeder is M, representing moderate shock. (See Feeders, Apron.)

#### Step 2: Select Service Factor

From Table 2 (Service Factors), for electric motor and moderate shock is 1.3.

#### Step 3: Calculate Design Horsepower

Design horsepower equals the horsepower transmitted x service factor of 25 x 1.3 = 32.5.

#### Step 4: Select Chain Pitch

- From the Engineering Drive Chain Quick Selection Chart locate the vertical axis 32.5 design horsepower.
- Locate on the horizontal axis 15 RPM of the small sprocket.
- The intersection of the 32.5 design horsepower and 15 RPM of the small sprocket lines intersect in the area designating 4.5" pitch US-4522 Engineering Drive Chain as the appropriate selection.

#### Step 5: Select Number of Teeth in Small Sprocket

Interpolating the US-4522 rating table for 15 RPM, a 12-tooth sprocket will transmit 32.6 HP. Hardened teeth suggested. Required lubrication is Type I, manual.

#### Step 6: Determine Number of Teeth in Large Sprocket

$$\text{Number of teeth in large sprocket} = \frac{15 \times 12}{5} = 36$$

#### Step 7: Determine Suggested Minimum Center Distance

Approximate minimum center distance =

$$\frac{2(36) + 12}{6} = \frac{84}{6} = 14 \text{ Pitches}$$

#### Step 8: Check Final Drive Design

Check the final drive design.

#### Step 9: Specify Sprockets

12-Tooth Sprocket for US-4522 Chain. Hardened Steel, Type C Hub, 2 15/16" Diameter Bore, 3/4" x 3/8" KW, and 5/8" SS.

36 Tooth Sprocket for US-4522 Chain. Steel Type C Hub, 3 15/16" Diameter Bore, 1" x 1/2" KW, and 5/8" SS.

#### Step 10: Calculate Chain Length

$$\begin{aligned} \text{Chain length} &= \frac{S}{2} + 2C + \frac{K}{C} \\ &= \frac{36 + 12}{2} + 2(14) + \frac{14.6}{14} \\ &= 24 + 28 + 1 = 53 \text{ Pitches} \end{aligned}$$

Where:

$$S = N + n$$

C = Shaft center distance in pitches

K = Constant from Table 3, (page A-8)