Belt Conveyor Pulleys

DODGE offers two standard designs that are stocked for quick delivery, CEMA duty (Conveyor Equipment Manufacturers Association), HE (High Endurance) welded hub and Mine Duty Extra HE integral hub construction. These are available with a plain surface and rubber lagged. HE bushings with 14 degree taper and 1/2 inch 60 diameter SBR rubber with herring bone groove lagging, are standard, stocked features.

DODGE recommends pulley designs within the four classes of service detailed below. All of our designs strive for balance between cost and reliability. When possible, welds are avoided or eliminated to maintain the full strength of the base metal. Our welded designs rely upon the chemistry of the base metal, the type of weld and the geometry of the structure to achieve optimum post–weld performance as explained below. *(Detailed descriptions of the four service classes are available in the Rockwell Automation publication, DODGE Global Conveyor Pulley Specifications & Technical Aspects, Selection and Applications.)*

WARRANTY

- Class IV and III pulleys are conditionally warranted against defects in material and workmanship for one year of operation. A two–year warranty is available when loading information is provided.
  Note: Special Construction features listed at the top of page PT13–7 can be added to both Class IV and III pulleys to extend service life. Because these pulleys are made–to–order, they will require longer lead–time for shipment. The Special Construction modifications must be quoted at the time of inquiry and before order entry.
- Class II and I pulleys are conditionally warranted against defects in material and workmanship for two years of operation because loading information must be provided.

CLASS IV

DODGE Heavy Duty CEMA Standard drum pulleys use 14 degree taper welded hubs and bushings, and certified steel with special consideration for post weld strength with submerged arc welds. These pulleys meet or exceed all requirements for steel drum pulleys established by CEMA and as detailed in ANSI standard number B105.1. The standard establishes load ratings and dimensions for use with fabric belts rated to 750 PIW (Pounds per Inch of belt Width).

CLASS III

DODGE Mine Duty Extra pulleys use a proprietary 14 degree one piece integral hub to accept HE bushings. This eliminates the two welds of the hub into the end disc and delivers 100% of the capacity of the end disc steel. There is not a universal standard published for this class of service. The DODGE MDX design gives much higher safety factors than pulleys designed to meet the CEMA load ratings while fitting into the CEMA dimensions.

CLASS II

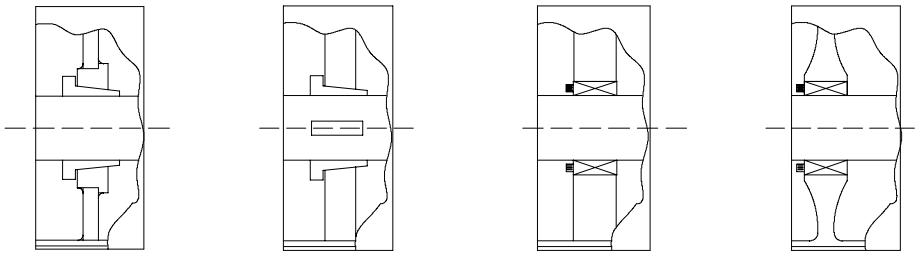
DODGE Engineered pulleys utilize one–piece integral hub–and–end–discs and either HE 14 degree taper compression bushings or keyless locking devices. They are designed specifically to meet customer supplied load and tension ratings. This class is for fabric or steel cable conveyor belts rating to 2,499 PIW. These pulleys incorporate machined rims and laggings, static balance, stress relieving, magnetic particle and/or ultrasonic weld testing.

CLASS I

DODGE Engineered pulleys with one piece “T” section machined end discs are continuously butt welded to the pulley rim for fabric or steel cable belts rated over 2,500 PIW up to the maximum available from belt manufactures, currently in excess of 10,000 PIW. These pulleys use keyless locking devices for shafts up to 30” in diameter. These pulleys incorporate machined rims and lagging, static balance, stress relieving, magnetic particle and/or ultrasonic weld testing. All class I pulleys are manufactured within a 60 step documented Quality Assurance Process.

Important Note: To Ensure You Get The Right Class Of Pulley For Your Application, Please Fill Out And Send In Form DMR 1477, Shown On Page PT13–10.

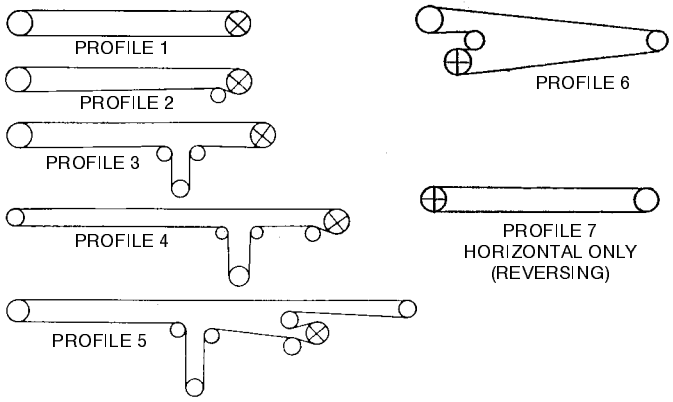
Bushing and End Disc Constructions



Pulley Profiles

Rockwell Automation has a conveyor design program for selecting pulleys for conveyor profiles shown. For more information and License Agreement, call 864–297–4800 or FAX 864–281–2318.

Only the seven types of profiles shown are available for design program analysis.



Standard, Stocked CEMA and Mine Duty Extra Pulleys

The DODGE Global Pulley Specifications on page PT13–4 direct customers to one of the four service or application classes. If customers know their pulley description and the dodge catalog, they can order pulleys for Class IV (CEMA Standard) and Class III (Mine Duty Extra) by part number, bare or lagged, flat faced or taper crowned.

However, the DODGE part number is often not known and the customer will inquire based upon pulley diameter, face width and hub size. CEMA standards for pulley face width are belt width + 2 inches up to 42 inch belts and belt width + 3 inch from 48 inch to 60 inch belts. Drum and wing pulley diameters are dependent upon belting and the shaft diameter required for the application. Availability from stock is best for standard CEMA dimensions.

METRIC PULLEY DIMENSIONS

Common metric pulley diameters and face widths are not exact equivalents to CEMA dimensions. Recommendations for dimensional interchanges from metric to inches are shown below.

Common Metric Pulley Diameters (mm)	Comparable or Recommended Inch Diameter (in.)
150	6
200	8
250	10
300	12
315	12
350	14
400	16
450	18
500	20
600	24
630	24
750	30
800	30
1000	40
1250	50
1400	56

Common Metric Pulley Face Widths (mm)	Comparable or Recommended Inch Face Widths (in.)
500	20
600	24
750	30
950	38
1150	46
1400	56
1600	64
1800	72
2000	80
2200	88

Note: It is important to remember that DODGE is a component supplier, not a conveyor builder. The end user or the OEM, building or over hauling the conveyor, takes the responsibility for sizing pulleys, shafts and bearings for the application, and operating at or below those specifications to receive the conditional warranty. In the role of a components supplier, DODGE will make selections based upon inputs from the customer.

PULLEY ASSEMBLIES

One of the most popular services we offer is to package and assemble pulleys, shaft, bearings and coupling halves for shipment, ready to install on the customer's conveyor truss. However, to do this we must have accurate shaft dimensions and tolerances at the time of order entry. These determine the hub size of the pulley and the bearing size. Bearings are ordered from another DODGE plant. The pulley assembly process can be shortened by providing the shaft details outlined in from **DMR 1446** (page PT13–8). Please note – all pulley assemblies are considered non–standard because of the variability of size and weight.

Special Construction Pulleys

There are Special Construction specifications that can be stipulated by the customer to extend the service life of Class IV CEMA and Class III Mine Duty Extra pulleys, for demanding applications, or to meet special job requirements. If these modifications are required, the products will become Special Construction made–to–order and identified by order number. These nonstandard modifications must be documented and quoted at the time of inquiry and before order entry.

Special Construction Features Include But Are Not Limited To:

1. Rim and rubber lagging thickness
2. Lagging rubber material and durometer
3. Turning steel rims and/or rubber lagging to a specified total indicated run–out (TIR)
4. End disc steel thickness
5. Shaft material surface finish (RMS) and turndown radii
6. Keyless locking devices with dust covers vs standard HE 14–degree compression bushings
7. Post weld thermal stress relieving before machining
8. Magnetic particle and/or ultra sonic weld inspections
9. Static or dynamic balancing
10. Identification tags
11. Export or other special packaging

ENGINEERED, MADE–TO–ORDER PULLEYS

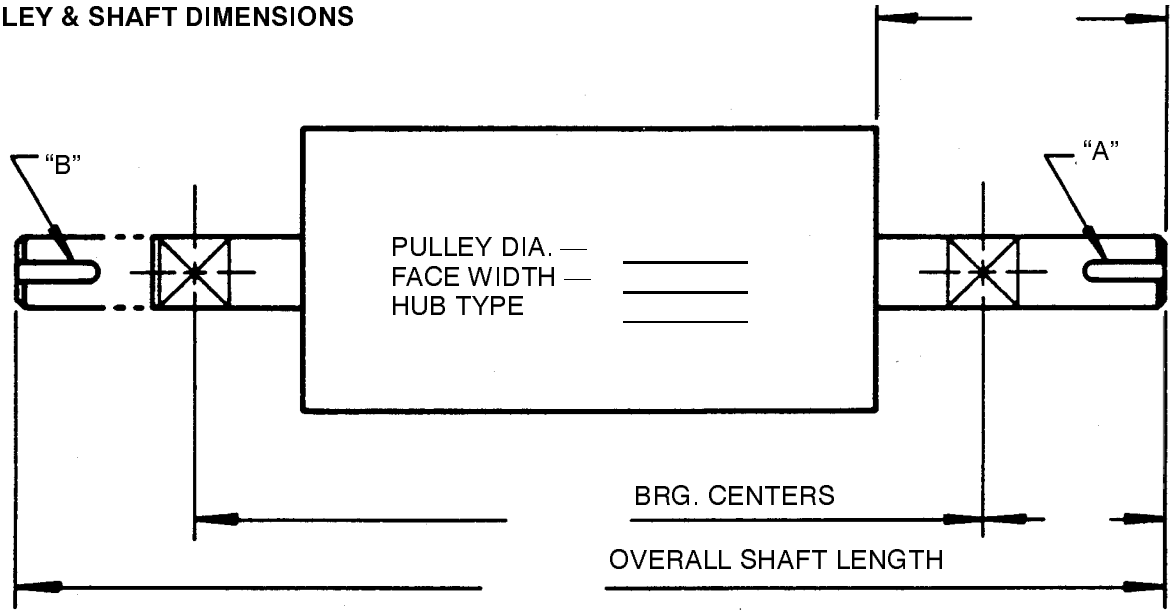
All DODGE heavy duty CEMA or Mine Duty Extra pulleys are designed to meet or exceed the CEMA steel pulley ANSI standard B105.1. However, for pulleys engineered to the customer's application loads and tensions, we require completion of the Engineered Pulley Data Sheet, **DMR 1447** (page PT13–10).

The selection process recommended by Rockwell Automation for DODGE conveyor pulley is covered on page PT13–11.

Pulley Assemblies

To order shafting, please copy and complete the sketches shown below (DMR1446).

DRIVE PULLEY & SHAFT DIMENSIONS

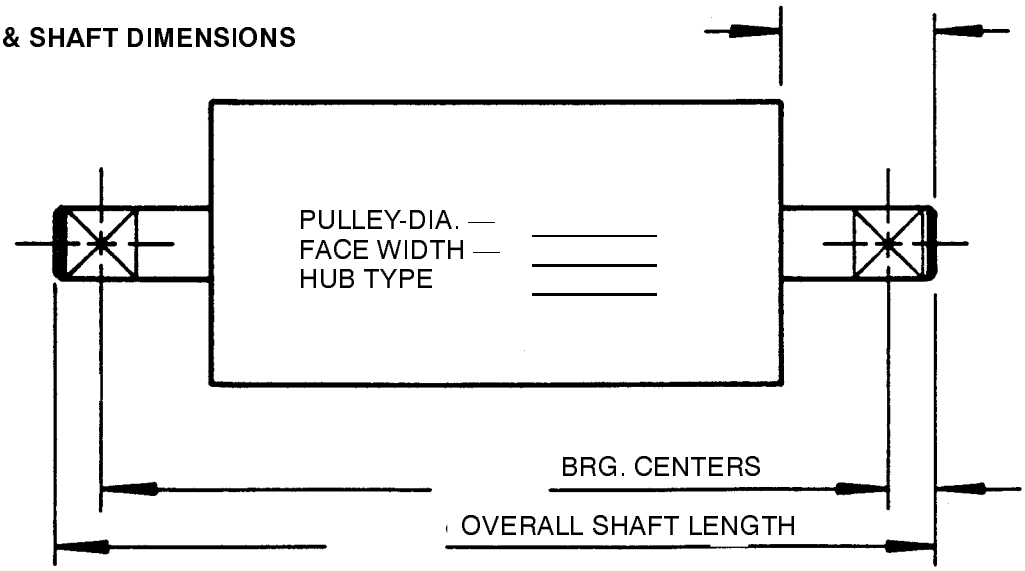


SHAFT DIA AT HUB. — _____
SHAFT DIA. AT BRG. — _____
SHAFT DIA. AT "A" — _____
SHAFT DIA. AT "B" — _____
NUMBER OF KEYSEATS — _____

KEYSEAT "A" — _____X_____X_____LONG
KEYSEAT "B" — _____X_____X_____LONG
DIRECTION OF ROTATION _____
(LOOKING AT DRIVEN END)
LAGGING — THICKNESS — _____
TYPE — _____

NON-DRIVE PULLEY & SHAFT DIMENSIONS

DRUM — ☐
WING — ☐



SHAFT DIA AT HUB. — _____
SHAFT DIA. AT BRG. — _____

KEYSEAT — 0_____, 1_____, 2_____

FEATURES/BENEFITS PAGE PT13-2	SELECTION/DIMENSIONS PAGE PT13-11	MODIFICATIONS/ACCESSORIES PAGE PT13-42	RELATED PRODUCTS PAGE PT13-47

NOMENCLATURE

Pulleys

(QTY) Diameter X Face Width • Face Type • Hub Type & Size • Class
(QTY) Lagging Thickness & Type
(QTY) Bushing Size & Bore

- **Diameter:** 6″-60″ (Other diameters available upon request)
- **Face Width:** 12″-78″ (Other face widths available upon request)
- **Face Type:** CR —Crown Face
  ST — Straight Face
- **Pulley Type:** Drum
  Wing
- **Hub Type & Size:** HE — (High Endurance) and Size (HE25)
  T-L — (TAPER-LOCK)
  QD — (Quick Disconnect)
  Keyless Locking
- **Class:** CEMA (Heavy Duty)
  MDX (Mine Duty Extra)
  MD (Mind Duty)
  ENG (engineered)
- **Lagging Thickness:** 1/4″, 3/8″, 1/2″, 3/4”, 1” (Standard) Other Thickness Available on Request
- **Lagging Material & (Durometer):** SBR (60/45/70), D–LAG (60), Neoprene (60/45/70), Ceramic, Hotz
- **Lagging Pattern:** Plain, Herringbone, Chevron, Diamond, Tuff–Top, Concentric, Parallel, Lorig Aligner
- **Bushing Size:** HE25 (Max. Bore 2-1/2″)
  F30 (Max. Bore 3″)
  E (Max. Bore 2-15/16″)
- **Examples:** 1–12 x 26 CR. DR. HE25 MDX
  3/8″ Herringbone Lagging
  2-HE25 x 2-7/16″ Bushings

  1-14 x 42CR. WI. T-L F25
  2-2517 x 2-7/16″ TAPER-LOCK Bushings

  1-16 x 44 ST. DR. QD F
  2-F x 3-7/16″ QD Bushings

Shafting

Diameter X Length • # of Keyseats • # of Turndowns x Turndown Diameters

- **Examples:** 2-7/16″ x 63″
  3-7/16″ x 84″, 3KS
  3-15/16″ x 76″, 3KS, 2TD X 3-7/16″

NOTE: All shafts require a drawing which indicates the location of keyseats, length of turndowns, turndown radii and location of pulley on the shaft.

Engineered Pulley Data Sheet

LIMITED WARRANTY: Rockwell Automation offers a 2–year limited warranty and a serialized name plate for all engineered pulleys designed to customer supplied loading information.

Selection of DODGE Conveyor Pulleys can be simplified by supplying the information in the Application Data Sheet provided below(DMR1447). DODGE can then engineer the correct pulleys or pulley assemblies for your application.

Company Name _____ Date _____ By _____

Address _____ Est. No. _____

Project _____

Conveyor Information —

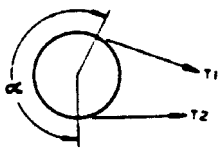
Belt: ☐ Fabric ☐ Steel ☐ Other _____ Belt Width _____ in.

Take-Up: ☐ Screw ☐ Gravity ☐ Hyd. ☐ Other _____

Drive Motor: HP _____ Belt Speed _____ FPM Capacity _____ TPH

Center to Center Distance _____ Lift in Feet _____

Pulley Data:

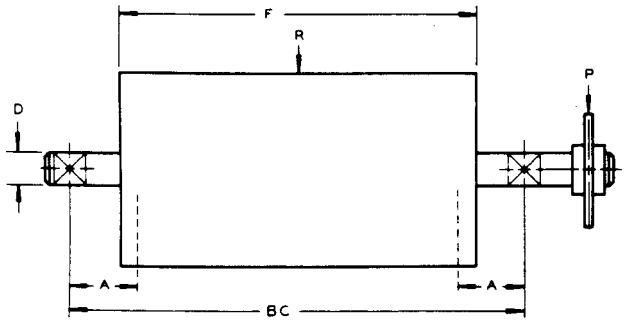
Conveyor Identification						
Pulley Location (Drive, Tail, etc.)						
Pulley Quantity						
Pulley Type (Drum or Wing)						
Diameter x Face						
Crown or Straight						
Lagging Thickness - Type of Grooves						
Shaft Diameter through Pulley						
Shaft Diameter through Bearing						
Shaft Diameter at Drive						
Shaft Length						
Number of Keyseats						
Drive Type (Sprocket, Coupling, Shaft Mount Reducer, etc.)						
Bearing Centers						
Arc of Contact _____ ° T_1 _____ Lbs. T_2 _____ Lbs. 	○	○	○	○	○	○

Special Requirements:

Drum and Wing Pulleys – CEMA, MDX, Mine Duty

Proper selection of pulley diameter, face width and shaft diameter can easily be determined if the following information is known:

- Belt Width (BW)
- Bearing Centers (BC)
- Arc of Belt Contact (∝)
- Tight Side Belt Tension (T_1) (for drive pulleys only)*
- Slack Side Belt Tension (T_2)*



A = Moment arm for pulley (inches)
BC = Bearing centers (inches)
D = Shaft diameter (inches)
F = Face width
P = Overhung load
R = Resultant pulley load (pounds)

STEP 1

Determine Required Pulley Face Width

From: F = BW + 2″ (for BW 42″ and under)
F = BW + 3″ (for BW over 42″)

Where: F = Pulley face width
BW = Belt width

Note: For replacement pulleys use face width of existing pulleys.

STEP 2

Determine Bearing Center Minus Face Dimension

From: BCMF=BC-F

Where: BCMF = Bearing center minus face dimension
F = Face width
BC = Bearing centerline to centerline dimension

Note: This selection guide is for conveyors with fabric belting. For other conveyor systems, consult factory for pulley selection.

***Note:** If belt tensions T_1 and T_2 are not known, see page PT13–52 for determination.

STEP 3

Determine Pulley Pounds Per Inch of Belt Width

From: PIW = T_1 ÷ BW (for drive pulleys)
PIW = T_2 ÷ BW (for non-drive pulleys)

Where: PIW = Pounds per inch of width value
T1 = Tight side tension
T2 = Slack side tension
BW = Belt Width

STEP 4

Determine Minimum Pulley Diameter

(Drum pulleys only) Determine minimum pulley diameter using PIW, arc of belt contact (∝) and Table 1. Reading across table from proper arc of contact select pulley diameter with PIW rating greater than actual PIW. Final pulley diameter may be greater than the diameter selected from Table 1 and must be greater than the belt manufacturer's recommended minimum diameter.

(Wing pulleys only) Determine minimum pulley diameter using PIW and Table 2. Select pulley diameter with PIW rating greater than actual PIW. Final pulley diameter may be greater than the diameter selected from Table 2 and must be greater than the belt manufacturer's recommended minimum diameter.

Drum and Wing Pulleys

TABLE 1
Use in STEP 4 to determine minimum pulley diameter for *Drum Pulleys Only*
MAXIMUM BELT TENSION (Pounds Per Inch of Belt Width)

Arc of Contact (Deg.)	PULLEY DIAMETER (Inches)													
	8	10	12	14	16	18	20	24	30	36	42	48	54	60
10	65	80	95	120	145	175	205	260	345	430	520	605	690	775
20	50	60	75	95	115	135	160	200	265	335	400	465	535	600
30	45	55	65	80	100	115	140	175	230	290	345	405	460	520
40	35	45	55	70	85	100	120	150	200	245	295	345	395	445
50	30	40	45	60	70	85	100	130	170	215	255	300	340	385
60	30	40	45	60	70	85	100	125	165	205	250	290	330	375
70	30	40	50	60	75	85	105	130	175	220	260	305	350	395
80	35	45	50	65	80	95	115	140	190	235	285	330	375	425
90	35	45	55	70	85	100	120	150	200	255	305	355	405	455
100	40	50	60	75	90	110	130	160	215	270	325	380	430	485
110	45	55	65	80	100	115	140	175	230	290	345	405	460	520
120	45	55	65	85	105	120	145	185	245	305	365	425	490	550
130	50	60	75	95	115	135	160	200	265	335	400	465	535	600
140	55	70	80	105	125	150	180	225	300	375	450	525	600	675
150	60	75	90	115	140	170	200	250	335	420	505	590	670	755
160	70	85	100	130	160	185	225	280	375	465	560	650	745	840
170	75	95	115	145	175	205	250	310	415	520	620	725	830	930
180	85	105	125	160	195	230	275	345	460	575	690	805	920	1035
190	75	95	115	145	175	205	250	310	415	520	620	725	830	930
200	70	85	100	130	160	185	225	280	375	465	560	650	745	840
210	60	75	90	115	140	170	200	250	335	420	505	590	670	755
220	55	70	80	105	125	150	180	225	300	375	450	525	600	675
230	50	60	75	95	115	135	160	200	265	335	400	465	535	600
240	45	55	65	85	105	120	145	185	245	305	365	425	490	550

STEP 5

Determine Pulley Resultant Load

Determine pulley resultant load from belt tensions and arc of contact.

Resultant load is calculated by:

$R = 2 \times T_2 \times \sin(\propto/2)$ (non-drive)*

$R = (T_1 + T_2) \times \sin(\propto/2)$ (drive)*

Where: R = Pulley resultant load

T_1 = Tight side tension

T_2 = Slack side tension

$\propto$ = Arc of contact

***Note:** If non-drive pulley is on tight side of belt, substitute T_1 for T_2. Wing pulleys should not be used as drive pulleys.

STEP 6

Determine Shaft Diameter

Determine shaft diameter from Table 3. Go down the proper pulley face width column and across from the bearing center minus face value (if the correct value is not listed, interpolate or use the next higher value) until a load rating greater than the resultant load calculated in Step 5 is found. The proper shaft diameter is then read from the vertical shaft diameter column.

TABLE 2
Use in STEP 4 to determine minimum pulley diameter for *Wing Pulleys* only
MAXIMUM BELT TENSION
(Pounds Per Inch of Belt Width)

Dia.	Pounds Per Inch	Dia.	Pounds Per Inch
8″	80#	18″	180#
10″	100#	20″	200#
12″	120#	24″	240#
14″	140#	30″	280#
16″	160#	36″	350#

Drum and Wing Pulleys

TABLE 3 — Use in Step 6 to determine shaft diameter
LOAD RATINGS (POUNDS) FOR PULLEY AND SHAFT COMBINATIONS

SHAFT DIAMETER (Inches)	(L) BEARING CENTERS MINUS FACE	PULLEY FACE WIDTH (inches)													
		12	14	16	18	20	22	26	32	38	44	51	57	63	66
1-3/16	2	1000	920	780	670	590	530	440	350	290	240	210	180	170	160
	6	570	520	440	380	340	300	250	700	160	140	170	100	94	90
	10	400	370	310	270	230	210	170	140	110	96	82	73	66	63
	14	300	280	240	200	180	160	130	110	87	74	63	56	51	48
1-7/16	3	1500	1500	1400	1200	1100	950	790	620	510	440	370	330	300	290
	6	1000	1000	950	820	720	640	530	420	350	300	250	220	200	190
	10	700	700	660	570	500	450	370	290	240	210	180	160	140	130
	14	540	540	510	440	390	350	290	230	190	160	140	120	110	100
1-11/16	3	2400	2400	2400	2300	2000	1800	1500	1200	980	830	710	630	570	540
	6	1600	1600	1600	1600	1400	1200	1000	800	660	560	480	430	380	370
	10	1100	1100	1100	1100	960	850	700	560	460	390	340	300	270	260
	16	780	780	780	750	660	590	490	380	320	270	230	210	180	180
1-15/16	3	3700	3700	3700	3700	3500	3100	2600	2100	1700	1400	1200	1100	990	940
	6	2500	2500	2500	2500	2400	2100	1800	1400	1100	980	840	740	670	640
	10	1700	1700	1700	1700	1700	1500	1200	970	800	680	580	520	470	420
	16	1200	1200	1200	1200	1100	1000	840	670	550	470	400	360	320	310
2-3/16	3	5300	5300	5300	5300	5300	5100	4200	3300	2800	2400	2000	1800	1600	1500
	8	2900	2900	2900	2900	2900	2800	2300	1900	1500	1300	1100	990	890	850
	12	2200	7200	2200	2200	2200	2100	1700	1400	1100	970	820	730	660	630
	18	1500	1500	1500	1500	1500	1500	1200	980	810	690	590	530	470	450
2-7/16	4	6300	6300	6300	6300	6300	6300	5600	4400	3700	3100	2700	2400	2100	2000
	8	4000	4000	4000	4000	4000	4000	3600	2900	2400	2000	1700	1500	1400	1300
	12	3000	3000	3000	3000	3000	3000	2700	2100	1700	1500	1300	1100	1000	910
	18	2100	2100	2100	2100	2100	2100	1900	1500	1300	1100	910	810	130	690
2-11/16	4	8100	8100	8100	8100	8100	8100	8100	6400	5300	4500	3800	3400	3100	2900
	8	5300	5300	5300	5300	5300	5300	5300	4200	3400	2900	2500	2200	2000	1900
	12	3900	3900	3900	3900	3900	3900	3900	3100	2600	2200	1900	1600	1500	1400
	18	2800	2800	2800	2800	2800	2800	2800	2200	1800	1600	1300	1200	1100	1000
2-15/16	4	10600	10600	10600	10600	10600	10600	10600	9100	7500	6400	5500	4900	4400	4200
	8	6900	6900	6900	6900	6900	6900	6900	6000	4900	4200	3600	3200	2900	4700
	14	4600	4600	4600	4600	4600	4600	4600	3900	3200	2800	2300	2100	1900	1800
	20	3400	3400	3400	3400	3400	3400	3400	2900	2400	2000	1700	1600	1400	1300
3-7/16	6	11600	11600	11600	11600	11600	11600	11600	11600	10100	8500	7200	6400	5700	5500
	10	8500	8500	8500	8500	8500	8500	8500	8500	7400	6300	5300	4700	4200	4000
	14	6700	6700	6700	6700	6700	6700	6700	6700	5800	4900	4200	3700	3300	3200
	20	5100	5100	5100	5100	5100	5100	5100	5100	4400	3800	3200	2800	2500	2400
3-15/16	6	16700	16700	16700	16700	16700	16700	16700	16700	16700	14200	12000	10600	9500	9000
	10	12400	12400	12400	12400	12400	12400	12400	12400	12400	10600	8900	7900	7100	6700
	14	9800	9800	9800	9800	9800	9800	9800	9800	9800	8400	7100	6300	5600	5300
	20	7500	7500	7500	7500	7500	7500	7500	7500	7500	6400	5400	4800	4300	4100
4-7/16	8	19600	19600	19600	19600	19600	19600	19600	19600	19600	19100	16100	14200	12700	12100
	12	15300	15300	15300	15300	15300	15300	15300	15300	15300	14800	12500	11100	9900	9400
	16	12500	12500	12500	12500	12500	12500	12500	12500	12500	12100	10300	9100	8100	7700
	22	9800	9800	9800	9800	9800	9800	9800	9800	9800	9500	8100	7100	6400	6000
4-15/16	8		25200	25200	25200	25200	25200	25200	25200	25200	25200	25200	23600	20800	18500	17600
	12		19900	19900	19900	19900	19900	19900	19900	19900	19900	19900	18600	16400	14600	13900
	16		16400	16400	16400	16400	16400	16400	16400	16400	16400	16400	15400	13500	12100	11500
	22		13000	13000	13000	13000	13000	13000	13000	13000	13000	13000	12200	10700	9600	9100
5-7/16	10			26600	26600	26600	26600	26600	26600	26600	26600	26600	26600	25100	22300	21100
	14			22000	22000	22000	20000	22000	22000	22000	22000	22000	20700	18400	17500
	18			18700	18700	18700	18700	18700	18700	18700	18700	18700	17700	15700	14900
	24			15300	15300	15300	15300	15300	15300	15300	15300	15300	14500	12800	12200

Drum and Wing Pulleys

TABLE 3 (cont'd) — Use in Step 6 to determine shaft diameter
LOAD RATINGS (POUNDS) FOR PULLEY AND SHAFT COMBINATIONS

SHAFT DIAMETER (Inches)	(L) BEARING CENTERS MINUS FACE	PULLEY FACE WIDTH (inches)													
		12	14	16	18	20	22	26	32	38	44	51	57	63	66
6	10			35700	35700	35700	35700	35700	35700	35700	35700	35700	35700	33100	31300
	14			29500	29500	29500	29500	29500	29500	29500	29500	29500	29500	27300	25900
	18			25100	25100	25100	25100	25100	25100	25100	25100	25100	25100	23300	22100
	24			20600	20600	20600	20600	20600	20600	20600	20600	20600	20600	19000	19000
6-1/2	12				39200	39200	39200	39200	39200	39200	39200	39200	39200	39200	38000
	16				33200	33200	33200	33200	33200	33200	33200	33200	33200	33200	32100
	20				28800	28800	28800	28800	28800	28800	28800	28800	28800	28800	27800
	26				24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	23200
7	12				49000	49000	49000	49000	49000	49000	49000	49000	49000	49000	49000
	16				41400	41400	41400	41400	41400	41400	41400	41400	41400	41400	41400
	20				35900	35900	35900	35900	35900	35900	35900	35900	35900	35900	35900
	26				29900	29900	20000	29900	29900	29900	29900	29900	29900	29900	29900
7-1/2	14				54100	54100	54100	54100	54100	54100	54100	54100	54100	54100	54100
	18				46500	46500	46500	48500	48500	46500	46500	46500	46500	46500	46500
	22				40800	40800	40800	40800	40800	40800	40800	40800	40800	40800	40800
	28				34400	34400	34400	34400	34400	34400	34400	34400	34400	34400	34400
8	14				65700	65700	65700	65700	65700	65700	65700	65700	65700	65700	65700
	18				56400	56400	56400	56400	56400	56400	56400	56400	56400	56400	56400
	22				49500	49500	49500	49500	49500	49500	49500	49500	49500	49500	49500
	28				41800	41800	41800	41800	41800	41800	41800	41800	41800	41800	41800
8-1/2	16						67700	67700	67700	67700	67700	67700	67700	67700	67700
	20						59400	59400	59400	59400	59400	59400	59400	59400	59400
	24						52900	52900	52900	52900	52900	52900	52900	52900	52900
	30						45400	45400	45400	45400	45400	45400	45400	45400	45400
9	16						80400	80400	80400	80400	80400	80400	80400	80400	80400
	20						70500	70500	70500	70500	70500	70500	70500	70500	70500
	26						59500	59500	59500	59500	59500	59500	59500	59500	59500
	32						51500	51500	51500	51500	51500	51500	51500	51500	51500
9-1/2	16						94500	94500	94500	94500	94500	94500	94500	94500	94500
	22						78100	78100	78100	78100	78100	78100	78100	78100	78100
	28						66500	66500	66500	66500	66500	66500	66500	66500	66500
	34						57900	57900	57900	57900	57900	57900	57900	57900	57900
10	16						110000	110000	110000	110000	110000	110000	110000	110000	110000
	22						91100	91100	91100	91100	91100	91100	91100	91100	91100
	28						77600	77600	77600	77600	77600	77600	77600	77600	77600
	34						64800	64800	64800	64800	64800	64800	64800	64800	64800

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STEP 7

Determine Drive Pulley Shaft Diameter

(For drive pulleys only) The shaft diameter determined in Step 6 must be checked for torque capacity. The shaft diameter required for torque is determined from:

$$D_T = 3\sqrt{\frac{16}{\pi \times S} \times \sqrt{(K_B \times A \times R \div 2)^2 + [(T_1 - T_2) \times D \div 2]^2}}$$

Where: D_T = Required shaft diameter from torque
π= 3.1416
S = 8000 psi for 1042 -1045 shafting
(10,000 for 4140)
K_B = 1.5*
A = Moment arm (from Table 4)
R = Resultant load from Step 5
T_1 = Tight side tension
T_2 = Slack side tension
D = Pulley Diameter

***Note:** Use K_B = 2.5 for overhung load drive (chain, torque arm, etc.)

If D_T is greater than the shaft diameter from Step 6, round D_T up to the next standard shaft diameter and use that value. If D_T is less than the shaft diameter from Step 6, use the diameter selected from Step 6.

Table 4 — A-Values

Shaft Dia. (inches)	A	Shaft Dia. (inches)	A
1 to 2-7/16	N+1-5/8	4-15/16	N+3-1/4
2-11/16 to 2-15/16	N+1-3/4	5-7/16 to 6	N+4-1/2
3-7/16	N+2-1/2	6-1/2 to 7	N+5
3-15/16	N+2-3/4	7-1/2 to 8	N+5-1/4
4-7/16	N+3	8-1/2 to 10	N+6-1/4

N = BCMF÷2

STEP 8

Compare Pulley Diameter

Compare the pulley diameter, face width combination selected with the standard drum pulley listing on pages PT13--16 -- PT13--23 or the standard wing pulley listing on pages PT13--24 - PT13--31 to insure the selected combination is available. If the selected combination is not available increase shaft diameter or pulley diameter until a standard pulley is listed.

Example 1 (Drive Pulley)

Given: 36″ belt width — 3600 lb. T_1
52″ bearing centers — 1600 lb. T_2
210° arc of contact

Step 1
Determine required face width from:
F=BW+2″ F=36+2=38

Step 2
Determine bearing center minus face dimension from:
BCMF= BC-F BCMF=52-38= 14″

Step 3
Determine pounds per inch of face width from:
PIW=T_1 ÷ BW PIW=3600÷36=100 PIW

Step 4
Determine minimum pulley diameter using Table 1. Since PIW = 100 and arc of contact is 210°, the minimum pulley diameter is 14″.

Step 5
Determine resultant load from:
R=(T_1 + T_2) x sin (α/2)
R=(3600 + 1600) x sin (210/2)=5023 lb.

Step 6
Determine shaft diameter using Table 3. Using a face width of 38″ bearing center minus face dimension of 14″ and a pulley resultant load of 5023 lbs., read down the 38″ face width column until the load rating at BCMF = 14″ exceeds 5023 lb. The first value to exceed 5023 lbs. is 5800 lbs. at a shaft diameter of 3-7/16.

Step 7
Check torque capacity of selected shaft using:

$$D_T = 3\sqrt{\frac{16}{\pi \times S} \times \sqrt{(K_B \times A \times R \div 2)^2 + [(T_1 - T_2) \times D \div 2]^2}}$$

$$D_T = 3\sqrt{\frac{16}{3.1416 \times 8000} \times \sqrt{(1.5 \times 9.5 \times 5023 \div 2)^2 + [(3600-1600) \times 14 \div 2]^2}}$$

D_T = 2.86″

The 3-7/16 shaft diameter selected in Step 6 is greater than 2.86: therefore 3-7/16 is the final shaft diameter selection.

Step 8
Checking the standard pulley listing on page PT13–20, a 14 x 38 pulley with 3-7/16 shaft (HE35 Hub) is a standard pulley.

Example 2 (Non-drive wing pulley).

Given: 54″ belt width — 180° arc of contact
71 bearing centers — 8600 lb. T_2

Step 1
Determine required face width from:
F = BW + 3″ F = 54 + 3 = 57″

Step 2
Determine bearing center minus face dimension from:
BCMF=BC-F BCMF=71 -57=14″

Step 3
Determine pounds per inch of face width from:
PIW=T_2 ÷ BW PIW=8600÷54=159 PIW

Step 4
Determine minimum pulley diameter using Table 2. Since PIW = 159 the minimum pulley diameter is 16″.

Step 5
Determine resultant load from:
R=2 x T_2 x sin (α/2)
R = 2 x 8600 x sin (180/2) = 17,200 lbs.

Step 6
Determine shaft diameter using Table 3. Using a face width of 57″, bearing center minus face dimension of 14″ and a pulley resultant load of 17,200 lbs., read down the 57″ face width column until the load rating at BCMF = 14″ exceeds 17,200 lbs. The first value to exceed 17,200 lbs. is 20,700 lbs. at a shaft diameter of 5-7/16.

Step 7
Checking the standard wing pulley listing on page PT13--28, a 16 x 57 wing pulley with 5-7/16 shaft (HE60 hub) is a standard pulley.