Precision Pulley & Idler An Employee Owned Company

PCP Hydraulic Conversion Guide

PCP frames are designed to handle push or pull applications. PCP frames can be used in passive systems where the cylinder is used to apply the tension and the screw is used to lock the bearing into position. They can also be used for active systems where there is no screw and the cylinder is used to provide tension. However, the setups are different and will be explained in this guide along with instructions to convert the frame. Page 1 will cover general cylinder requirements, page 2 is the setup of a passive system, page 3 will cover the setup of an active system, and pages 4-7 will identify the cylinders that will fit our frames.

While PPI can help you with conversion, the customer is better served by contacting their local hydraulics dealer/distributor for hydraulics and controls.

PCP frames are designed for Rod End (or Head End) Rectangular Flange Mount, Series 2HD, Heavy Duty Hydraulic Cylinders NFPA Style # MF1. Please note, KK2 threads are standard.

Cylinders for PCP Take-Up Frames are to have lip seals. The reason for this is that standard piston seals will leak. While any seal will leak, lip seals will hold pressure longer.

Cylinders for PCP Take-Up Frames are to have SAE ports. NPT ports are not rated for pressures used in PCP frames.

The cylinder should be plumbed for double action. This decreases the size of the reservoir necessary and allows the user to retract the rod under power.

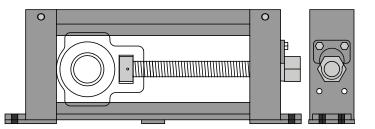
While active systems can be set up for push or pull, passive systems can only be set up for the cylinder to push while the screw pulls.

The two charts to the right show the rating and size of the cylinder for each frame. The top chart is for pull, while the bottom chart is for push. Please note, for pull applications, a smaller rod size is desirable as it yields the most effective area. For a push application, a larger rod size is necessary for column strength.

The first step is to determine whether your application will be push or pull and use the appropriate chart to determine the cylinder size and rating.

For example, a frame size of 200 will accommodate a 1-15/16" bore wide slot bearing, 203 will handle a 2-3/16" bore bearing, etc.

The standard PPI PCP frame is symmetrical on both ends. This allows the user to bolt the cylinder and/or screw to either end. It also allows the user to remove the entire top of the frame.



| Frame | Cylinder | Rating | P | Pull - Hydraulic PCP | | | | | | |
|-------|----------|----------|-------|----------------------|------------|-------|--|--|--|--|
| Size | Bore | (pounds) | Rod | Area | Cylinder # | (PSI) | | | | |
| 200 | 1 1/2 | 3,000 | 5/8 | 1.46 | 1506 | 2,055 | | | | |
| 203 | 1 1/2 | 4,000 | 5/8 | 1.46 | 1506 | 2,740 | | | | |
| 208 | 2 | 5,000 | 1 | 2.356 | 2010 | 2,122 | | | | |
| 300 | 2 | 6,000 | 1 | 2.356 | 2010 | 2,547 | | | | |
| 308 | 2 1/2 | 9,000 | 1 | 4.123 | 2510 | 2,183 | | | | |
| 400 | 3 1/4 | 12,000 | 1 3/8 | 6.811 | 3213 | 1,762 | | | | |
| 408 | 3 1/4 | 15,000 | 1 3/8 | 6.811 | 3213 | 2,202 | | | | |
| 500 | 3 1/4 | 18,000 | 1 3/8 | 6.811 | 3213 | 2,643 | | | | |

| Frame | Cylinder | Rating | Ρι | Push - Hydraulic PCP | | | | | | |
|-------|----------|----------|-------|----------------------|------------|-------|--|--|--|--|
| Size | Bore | (pounds) | Rod | Area | Cylinder # | (PSI) | | | | |
| 200 | 1 1/2 | 3,000 | 1 | 1.767 | 1510 | 1,698 | | | | |
| 203 | 1 1/2 | 4,000 | 1 | 1.767 | 1510 | 2,264 | | | | |
| 208 | 2 | 5,000 | 1 3/8 | 3.142 | 2013 | 1,591 | | | | |
| 300 | 2 | 6,000 | 1 3/8 | 3.142 | 2013 | 1,910 | | | | |
| 308 | 2 1/2 | 9,000 | 1 3/8 | 4.909 | 2517 | 1,833 | | | | |
| 400 | 3 1/4 | 12,000 | 1 3/4 | 8.296 | 3217 | 1,446 | | | | |
| 408 | 3 1/4 | 15,000 | 1 3/4 | 8.296 | 3220 | 1,808 | | | | |
| 500 | 3 1/4 | 18,000 | 1 3/4 | 8.296 | 3220 | 2,170 | | | | |

PCP Active Setup

To set-up an active PCP, the first step is to remove the keeper plate from the end. Then slide the screw up the keyhole slot and out of the frame. The hydraulic cylinder will replace it.

The hydraulic cylinder is mounted to the frame by four bolts. These bolts are:

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- 3/8" x 2" UNF thread for 1-1/2" bore cylinders
- 1/2" x 2-1/2" UNF thread for 2" or 2-1/2" bore cylinders
- 5/8" x 3" UNF thread for 3-1/4" bore cylinders

Each bolt is to have three nuts. The first nut locks the bolt to the frame. The second and third nut lock the flange of the cylinder between them. This allows the user to fine tune the alignment of the cylinder to the frame.

At one end of the frame, insert a bolt into each of the four bolt holes in the end stand and thread on a nut. The nut should be snug, but not locked. Next, snug up a second nut to the first for each of the four bolts. Mount the cylinder over the four bolts and snug up the final nut onto the bolts.

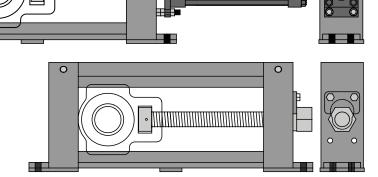
The additional item that is necessary is the nut to fit into the bearing housing. The dimensions and materials are given in the chart to the right. It is a piece of round shafting which is drilled and tapped for the cylinder rod. Two flats are machined to facilitate turning the nut onto the threads.

Remove the cap of the frame. Set the wide slot bearing onto the lower rail and insert the nut into the housing. With the cylinder retracted, thread the nut onto the rod.

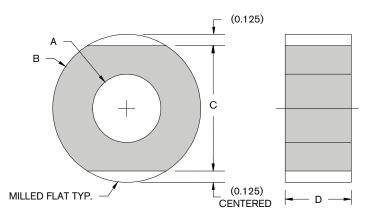
Check the cylinder to make sure that it is centered in the frame, and that the housing is free to travel.

Using the pump, slowly extend the cylinder to its maximum extension. If the housing starts to bind or lifts off of the rails, adjust the nuts holding the cylinder to keep the cylinder in line with the travel of the housing. Once this is done, tighten the four bolts and double check the alignment.

The bearing and nut can be removed to facilitate installation of the assembly onsite. But the cylinder should be left locked into position once it has been aligned.



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| РСР | Cylinder # | Part # | А | В | с | D | Raw Material | Wt. |
|-----|---------------|--------|---------------|-------|--------|--------|-----------------|-----|
| 200 | 1506 | 57780 | 7/16"-20 UNF | 1 5/8 | 1 3/8 | 0.725 | 1 5/8" | 0.4 |
| 200 | 1510 | 57781 | 3/4"-16 UNF | 1 3/6 | 13/0 | 0.725 | 1045 | 0.4 |
| 203 | 1506 | 57782 | 7/16"-20 UNF | 1 | 1 7/16 | 15/16 | 1 11/16" | 0.6 |
| 203 | 1510 | 57783 | 3/4"-16 UNF | 11/16 | 1 //10 | 15/16 | 1045 | 0.5 |
| 208 | 2010 | 57784 | 3/4"-16 UNF | 1 7/8 | 1 5/8 | 1 1/8 | 1 7/8" | 0.8 |
| 200 | 2013 | 57785 | 1"-14 UNF | 1 //0 | 1 3/6 | 1 1/0 | 1045 | 0.7 |
| 300 | 2010 | 57786 | 3/4"-16 UNF | 2 3/8 | 2 1/8 | 1.0/10 | 2 3/8" | 1.3 |
| 300 | 2013 | 57787 | 1"-14 UNF | 2 3/8 | 2 1/8 | 1 3/16 | 1045 | 1.2 |
| 000 | 2510 | 57788 | 3/4"-16 UNF | 2 3/4 | 2 1/2 | 1 9/16 | 2 3/4" | 2.5 |
| 308 | 2513 | 57789 | 1"-14 UNF | 2 3/4 | 21/2 | 19/10 | 1045 | 2.4 |
| 400 | 3213 | 57790 | 1"-14 UNF | 0.1/0 | 0.7/0 | 2 | 3 1/8" | 4 |
| 408 | 3217 | 57791 | 1 1/4"-12 UNF | 3 1/8 | 2 7/8 | 2 | 1045 | 3.8 |
| 500 | 3213 | 57792 | 1"-14 UNF | 3 1/2 | 3 1/4 | 2 1/4 | 3 1/2" | 5.8 |
| 500 | 3217 | 57793 | 1 1/4"-12 UNF | | 3 1/4 | 2 1/4 | 1045 | 5.5 |

PCP Passive Setup

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In a passive setup, the screw is used to lock the housing into position. Therefore the PCP nut that holds the housing will need to have the back shoulder machined off, as shown in the diagram and chart on the bottom right.

This modification will allow the screw to only pull while the hydraulic cylinder mounted on the opposite end will push. Therefore, a push nut is needed to mount on the end of the hydraulic cylinder. The push nut is drilled and tapped to fit onto the cylinder. A relief is also machined to fit over the grease fitting in the bearing. It is recommended that rubber is affixed to the end of the push nut to keep damage from occurring to the housing during the pushing operation.

The hydraulic cylinder is mounted to the frame by four bolts. These bolts are:

- 3/8" x 2" UNF thread for 1-1/2" bore cylinders
- 1/2" x 2-1/2" UNF thread for 2 or 2-1/2" bore cylinders
- 5/8" x 3" UNF thread for 3-1/4" bore cylinders

Each bolt is to have three nuts. The first nut locks the bolt to the frame. The second and third nut lock the flange of the cylinder between them. This allows the user to fine tune the alignment of the cylinder to the frame.

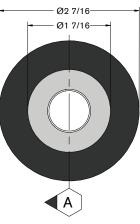
One one end of the frame, insert a bolt into each of the four bolt holes in the end stand and thread on a nut. The nut should be snug, but not locked. Next, snug up a second nut to the first for each of the four bolts. Mount the cylinder over the four bolts and snug up the final nut onto the bolts.

Check the cylinder to see that it is centrally mounted onto the frame. Extend the cylinder while measuring the distance between the rod and the bottom rail. If it is not the same for the full extension of the rod, adjust the four bolts until it is close to being the same.

Retract the cylinder and mount the frame, wide-slot bearing and nut as in standard PCP.

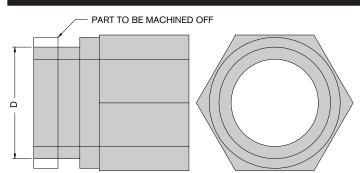


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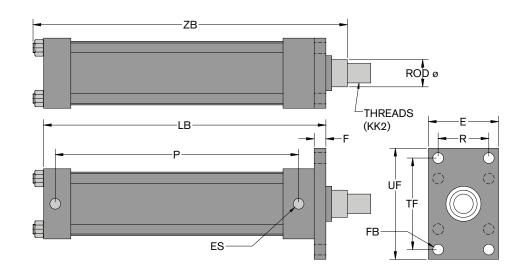
SHAFT 2 7/16" 1045 CD

| Cylinder | Part # | А | В | Weight |
|-----------|--------|---------------|-------|--------|
| 1510 | 57801 | 3/4"-16 UNF | 2 1/8 | 2.2 |
| 2013/2513 | 57802 | 1"-14 UNF | 2 5/8 | 2.7 |
| 3217 | 57803 | 1 1/4"-12 UNF | 3 | 2.9 |



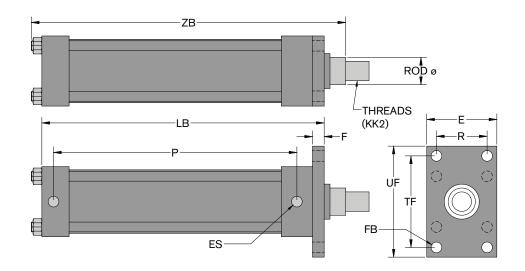
| Series | Part # | Original Part # | D |
|---------|--------|-----------------|---------|
| 200 | 57341 | 573201 | 1 1/4 |
| 203 | 57342 | 573202 | 1 7/16 |
| 208 | 57343 | 573203 | 1 11/16 |
| 300 | 57344 | 573204 | 1 15/16 |
| 308 | 57345 | 573205 | 2 3/16 |
| 400/408 | 57346 | 573206 | 2 5/8 |
| 500 | 57348 | 573208 | 2 7/8 |

PCP Pull Cylinders



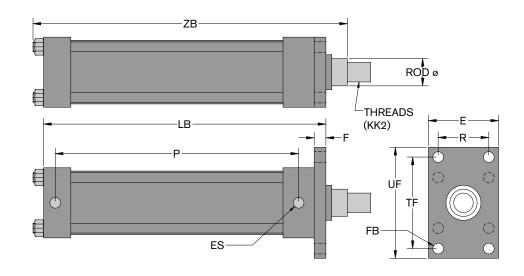
| PCP Frame | Bore Dia | Rod Dia | Stroke | Р | LB | ZB | F | ES | Threads (KK2) | Е | UF | R | TF | FB | Approx. Weight |
|--------------|-------------|------------|--------|--------|--------|--------|-----|--------------|------------------|-------|-------|------|--------|------|-------------------|
| | | | 12 | 14 7/8 | 17 | 18 1/8 | | | | | | | | | 15 |
| | | | 18 | 20 7/8 | 23 | 24 1/8 | | | | | | 1.63 | | | 19 |
| 200 | 1 1/2 | 5/8 | 24 | 26 7/8 | 29 | 30 1/8 | 3/8 | #8 or #10 | 7/16-20 | 2 1/2 | 4 1/4 | | 3 7/16 | 7/16 | 23 |
| | | | 30 | 32 7/8 | 35 | 36 1/8 | 1 | | | | | | | | 26 |
| | | | 36 | 38 7/8 | 41 | 42 1/8 | | | | | | | | 30 | |
| | | | 12 | 14 7/8 | 17 | 18 1/8 | | | | | | | | | 15 |
| | | | 18 | 20 7/8 | 23 | 24 1/8 | 1 | | | | 4 1/4 | 1.63 | 3 7/16 | 7/16 | 19 |
| 203 | 203 1 1/2 | 5/8 | 24 | 26 7/8 | 29 | 30 1/8 | 3/8 | #8 or #10 | 7/16-20 | 2 1/2 | | | | | 23 |
| | | | 30 | 32 7/8 | 35 | 36 1/8 | | | | | | | | | 26 |
| | | | 36 | 38 7/8 | 41 | 42 1/8 | | | | | | | | | 30 |
| | | | 12 | 14 7/8 | 17 1/4 | 18 5/8 | | | | 3 | | 2.05 | 4 1/8 | 9/16 | 20 |
| | | | 18 | 20 7/8 | 23 1/4 | 24 5/8 | | | | | 5 1/8 | | | | 25 |
| 208 | 2 | 1 | 24 | 26 7/8 | 29 1/4 | 30 5/8 | 5/8 | #8 or #10 | 3/4-16 | | | | | | 30 |
| | | | 30 | 32 7/8 | 35 1/4 | 36 5/8 | | | | | | | | | 35 |
| | | | 36 | 38 7/8 | 41 1/4 | 42 5/8 | | | | | | | | | 40 |
| | | | 12 | 14 7/8 | 17 1/4 | 18 5/8 | | | | | | | | | 20 |
| | | | 18 | 20 7/8 | 23 1/4 | 24 5/8 | | | | | | | | | 25 |
| 300 | 300 2 | 1 | 24 | 26 7/8 | 29 1/4 | 30 5/8 | 5/8 | #8 or #10 | 3/4-16 | 3 | 5 1/8 | 2.05 | 4 1/8 | 9/16 | 30 |
| | | | 30 | 32 7/8 | 35 1/4 | 36 5/8 | 1 | | | | | | | | 35 |
| | | | 36 | 38 7/8 | 41 1/4 | 42 5/8 | | | | | | | | | 40 |

PCP Pull Cylinders



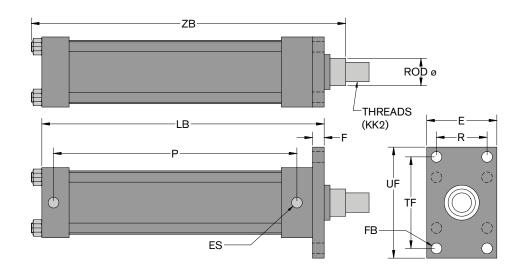
| PCP Frame | Bore Dia | Rod Dia | Stroke | Р | LB | ZB | F | ES | Threads (KK2) | Е | UF | R | TF | FB | Approx. Weight |
|--------------|-------------|------------|--------|----------|--------|--------|-----|--------------|------------------|-------|-------|------|-------|-------|-------------------|
| | | | 12 | 15 | 17 3/8 | 18 3/4 | | | | | | | | | 35 |
| | | | 18 | 21 | 23 3/8 | 24 3/4 | | | | | 5 5/8 | 2.55 | | | 43 |
| 308 | 2 1/2 | 1 | 24 | 27 | 29 3/8 | 30 3/4 | 5/8 | #8 or #10 | 3/4-16 | 3 1/2 | | | 4 5/8 | 9/16 | 50 |
| | | | 30 | 33 | 35 3/8 | 36 3/4 | | | | | | | | | 60 |
| | | | 36 | 39 | 41 3/8 | 42 3/4 | | | | | | | | | 68 |
| | | 1 3/8 | 12 | 15 19/32 | 18 1/4 | 19 7/8 | | | | | | | | 11/16 | 60 |
| | | | 18 | 21 19/32 | 24 1/4 | 25 7/8 | | | 1-14 | 4 1/2 | 7 1/8 | 3.25 | 5 7/8 | | 70 |
| 400 | 3 1/4 | | 24 | 27 19/32 | 30 1/4 | 31 7/8 | 3/4 | #12 | | | | | | | 80 |
| | | | 30 | 33 19/32 | 36 1/4 | 37 7/8 | | | | | | | | | 90 |
| | | | 36 | 39 19/32 | 42 1/4 | 43 7/8 | | | | | | | | | 110 |
| | | | 12 | 15 19/32 | 18 1/4 | 19 7/8 | | #12 | 1-14 | 4 1/2 | | 3.25 | 5 7/8 | 11/16 | 60 |
| | | | 18 | 21 19/32 | 24 1/4 | 25 7/8 | | | | | 7 1/8 | | | | 70 |
| 408 | 3 1/4 | 1 3/8 | 24 | 27 19/32 | 30 1/4 | 31 7/8 | 3/4 | | | | | | | | 80 |
| | | | 30 | 33 19/32 | 36 1/4 | 37 7/8 | | | | | | | | | 90 |
| | | | 36 | 39 19/32 | 42 1/4 | 43 7/8 | | | | | | | | | 110 |
| | | | 12 | 15 19/32 | 18 1/4 | 19 7/8 | | | | | | | | | 60 |
| | | | 18 | 21 19/32 | 24 1/4 | 25 7/8 | | | | | | | | | 70 |
| 500 | 500 3 1/4 | 1 3/8 | 24 | 27 19/32 | 30 1/4 | 31 7/8 | 3/4 | #12 | 1-14 | 4 1/2 | 7 1/8 | 3.25 | 5 7/8 | 11/16 | 80 |
| | | | 30 | 33 19/32 | 36 1/4 | 37 7/8 | | | | | | | | | 90 |
| | | | 36 | 39 19/32 | 42 1/4 | 43 7/8 | | | | | | | | | 110 |

PCP Push Cylinders



| PCP Frame | Bore Dia | Rod Dia | Stroke | Р | LB | ZB | F | ES | Threads (KK2) | E | UF | R | TF | FB | Approx. Weight |
|--------------|-------------|------------|--------|--------|--------|--------|-----|--------------|------------------|-------|-------|------|--------|------|-------------------|
| | | | 12 | 14 7/8 | 17 | 18 1/2 | | | | | 4 1/4 | | | | 15 |
| | | | 18 | 20 7/8 | 23 | 24 1/2 | | | | | | | | | 19 |
| 200 | 1 1/2 | 1 | 24 | 26 7/8 | 29 | 30 1/2 | 3/8 | #8 or #10 | 3/4-16 | 2 1/2 | | 1.63 | 3 7/16 | 7/16 | 23 |
| | | | 30 | 32 7/8 | 35 | 36 1/2 | | 01 #10 | | | | | | | 26 |
| | | | 36 | 38 7/8 | 41 | 42 1/2 | | | | | | | | | 30 |
| | | | 12 | 14 7/8 | 17 | 18 1/2 | | | | | | | | | 15 |
| | | | 18 | 20 7/8 | 23 | 24 1/2 | | | | | | 1.63 | 3 7/16 | 7/16 | 19 |
| 203 | 203 1 1/2 | 1 | 24 | 26 7/8 | 29 | 30 1/2 | 3/8 | #8 or #10 | 3/4-16 | 2 1/2 | 4 1/4 | | | | 23 |
| | | | 30 | 32 7/8 | 35 | 36 1/2 | | | | | | | | | 26 |
| | | | 36 | 38 7/8 | 41 | 42 1/2 | | | | | | | | | 30 |
| | | | 12 | 14 7/8 | 17 1/4 | 18 7/8 | | | | | | | 4 1/8 | 9/16 | 20 |
| | | | 18 | 20 7/8 | 23 1/4 | 24 7/8 | 1 | | | 3 | 5 1/8 | 2.05 | | | 25 |
| 208 | 2 | 1 3/8 | 24 | 26 7/8 | 29 1/4 | 30 7/8 | 5/8 | #8 or #10 | 1-14 | | | | | | 30 |
| | | | 30 | 32 7/8 | 35 1/4 | 36 7/8 | | | | | | | | | 35 |
| | | | 36 | 38 7/8 | 41 1/4 | 42 7/8 | | | | | | | | | 40 |
| | | | 12 | 14 7/8 | 17 1/4 | 18 7/8 | | | | | | | | | 20 |
| | | | 18 | 20 7/8 | 23 1/4 | 24 7/8 | | | | | | | | | 25 |
| 300 | 300 2 | 1 3/8 | 24 | 26 7/8 | 29 1/4 | 30 7/8 | 5/8 | #8 or #10 | 1-14 | 3 | 5 1/8 | 2.05 | 4 1/8 | 9/16 | 30 |
| | | | 30 | 32 7/8 | 35 1/4 | 36 7/8 | | | | | | | | | 35 |
| | | | 36 | 38 7/8 | 41 1/4 | 42 7/8 | | | | | | | | | 40 |

PCP Push Cylinders



| PCP Frame | Bore Dia | Rod Dia | Stroke | Р | LB | ZB | F | ES | Threads (KK2) | E | UF | R | TF | FB | Approx. Weight |
|--------------|-------------|------------|--------|----------|--------|--------|-----|--------------|------------------|-------|-------|------|-------|-------|-------------------|
| | | | 12 | 15 | 17 3/8 | 19 | | | | | | | | | 35 |
| | | | 18 | 21 | 23 3/8 | 25 | 1 | | | | 5 5/8 | 2.55 | 4 5/8 | | 43 |
| 308 | 2 1/2 | 1 3/8 | 24 | 27 | 29 3/8 | 31 | 5/8 | #8 or #10 | 1-14 | 3 1/2 | | | | 9/16 | 50 |
| | | | 30 | 33 | 35 3/8 | 37 | | | | | | | | | 60 |
| | | | 36 | 39 | 41 3/8 | 43 | | | | | | | | | 68 |
| | | | 12 | 15 19/32 | 18 1/4 | 20 1/8 | | | | | | | | 11/16 | 60 |
| | | 1 3/4 | 18 | 21 19/32 | 24 1/4 | 26 1/8 | | | 1 1/4-12 | | 7 1/8 | 3.25 | 5 7/8 | | 70 |
| 400 | 3 1/4 | | 24 | 27 19/32 | 30 1/4 | 32 1/8 | 3/4 | #12 | | 4 1/2 | | | | | 80 |
| | | | 30 | 33 19/32 | 36 1/4 | 38 1/8 | | | | | | | | | 90 |
| | | | 36 | 39 19/32 | 42 1/4 | 44 1/8 | | | | | | | | | 110 |
| | | | 12 | 15 19/32 | 18 1/4 | 20 1/8 | | #12 | 1 1/4-12 | 4 1/2 | | 3.25 | 5 7/8 | 11/16 | 60 |
| | | | 18 | 21 19/32 | 24 1/4 | 26 1/8 | 3/4 | | | | 7 1/8 | | | | 70 |
| 408 | 3 1/4 | 1 3/4 | 24 | 27 19/32 | 30 1/4 | 32 1/8 | | | | | | | | | 80 |
| | | | 30 | 33 19/32 | 36 1/4 | 38 1/8 | | | | | | | | | 90 |
| | | | 36 | 39 19/32 | 42 1/4 | 44 1/8 | | | | | | | | | 110 |
| | | | 12 | 15 19/32 | 18 1/4 | 20 1/8 | | | | | | | | | 60 |
| | | | 18 | 21 19/32 | 24 1/4 | 26 1/8 | | | | | | | | | 70 |
| 500 | 3 1/4 | 1 3/4 | 24 | 27 19/32 | 30 1/4 | 32 1/8 | 3/4 | #12 | 1 1/4-12 | 4 1/2 | 7 1/8 | 3.25 | 5 7/8 | 11/16 | 80 |
| | | | 30 | 33 19/32 | 36 1/4 | 38 1/8 | | | | | | | | | 90 |
| | | | 36 | 39 19/32 | 42 1/4 | 44 1/8 | | | | | | | | | 110 |