LOAD BEARING ROLLER ASSEMBLIES

SOLUTIONS GUIDE

989.358.6148
www.pcimfg.com
LOAD BEARING
ROLLER ASSEMBLIES

Cam Followers

CAM FOLLOWERS:
BEARING TYPE: Needle Bearings
Available from 2” to 20” roller body diameter, these units provide maximum radial capacity in lower speed applications. An extra thick roller body provides high load carrying capability by minimizing distortion.

DCB Rollers

DCB ROLLERS
BEARING TYPE: Cylindrical Roller Bearings
Available from 2” to 10” roller body diameter, these units provide maximum dynamic radial load capacity and allow for incidental thrust loads. DCB Rollers also offer rubber seals and are a drop-in replacement for Cam Followers.

XR Rollers

XR ROLLERS
BEARING TYPE: Ball or Tapered Roller Bearings
Available from 1.5” to 10” roller body diameter, PCI XR Rollers provide the rugged seals and thrust load capacity of a PCI Track Roller in the sizing of a Cam Follower, for an easy, maintenance-free upgrade.
Track Rollers

**TRACK ROLLERS**

**BEARING TYPE:** Ball or Tapered Roller Bearings

Available from 1” to 20” roller body diameter, PCI Track Rollers provide balanced radial and thrust load capacity, maximized sealing provisions and profile options which include Flanged, Double Flanged, V-Grooved, U-Grooved and Channel & I-Beam profiles. On stud type versions, a steel dust cover provides added protection against contamination.

316 STAINLESS STEEL

316 Stainless Steel for ultimate corrosion resistance

Fluorocarbon seals for chemical resistance

**NON-METALLIC**

Economical corrosion resistant alternative to Stainless

Eliminates noise by eliminating metal-to-metal contact

Improved design for added contamination exclusion

**HIGH TEMPERATURE**

Rated for operation up to 350°F

Available as regreasable or sealed for life

Extreme Duty Solutions

**TOP DRIVE ROLLERS**

PCI “TDR” Top Drive Rollers are a drop-in replacement for units found on top drive equipment commonly used in the oilfield. TDR Rollers are available in several configurations with stock availability.

**CUSTOM SOLUTIONS**

Available in all roller body diameters, PCI manufactures special/custom assemblies in all shapes and sizes using a variety of internal bearing configurations. And, to make this a viable option, PCI delivers these rollers in industry leading turn-around times and requires no piece minimums.

Special & Custom Solutions
Understanding Application Needs
Load Bearing Roller Assemblies

The answers to the following questions help to describe the demands of an application. Gaining an understanding of an application’s demands is the first step in obtaining choices for a solution.

**What are the Application Loads?**
Load bearing roller assemblies are designed to support moving (dynamic) loads or stationary (static) loads. The load that the rollers will be supporting can be communicated using the following terminology:

- **RADIAL LOAD**
  Load applied 90 degrees to the bearing bore or axis of rotation

- **THRUST LOAD**
  Load applied parallel with the bearing bore or axis of rotation

Rollers in many applications experience a load comprised of radial and thrust load which can be referred to as **Combination Load**. This load may not be intentionally designed into the application, but a combination load can be created as a result of misalignment or other functions within the application.

**What are the Applied Speeds?**
The rate at which the moving object will be travelling can be communicated in two different ways: in distance per time (FPM, M/sec) for linear movement or in revolutions per minute (RPM) for rotational movement. Depending on the type of application, one of these will best communicate the applied speed.

**What are the Needs for Location?**
Load bearing roller assemblies facilitate the location of moving loads or the contact surface by allowing for specific movements and by limiting unwanted ones. Applications must be reviewed to determine the required freedom of motion and the desired constraint of movement.

**What is the Application Environment?**
Environmental conditions can impact the life and performance of load bearing roller assemblies. Applications with exposure to the following substances may require special consideration: chemicals, vapors, water, temperature and solid particulate.
It is important to account for the physical constraints within an application. The following diagrams outline common dimensional requirements and the terms by which they are referred.

In addition to complying with physical constraints, rollers can be manufactured to accommodate multiple mounting arrangements. The two most common mounting arrangements are Stud Type and Yoke Type, both indicated in the diagrams below:

For applications requiring precision alignment between a roller and the mating contact surface, an eccentric style roller may be used to achieve uniform contact.

PCI Load Bearing Roller Assembly solutions can be manufactured with a variety of body profiles to help address concerns with debris, location and rail profile. Some examples include:
Symptoms Include:
Fatigue, Anxiety, Frustration etc.

Avoid Catalogitis.

Call PCI Today!
989.358.6148

For additional information and to explore all of the choices for your solution, contact PCI-ProCal Inc. at 989.358.6148 or visit us on the web at www.pcimfg.com.

PCI is empowering industry with choices for a solution by breaking the limits of the catalog through:

**PRODUCT KNOWLEDGE**
Having a thorough understanding of what it takes to manufacture a successful roller enables PCI to provide you with multiple viable choices for your solution. Choices include pre-engineered products, modified units or products engineered specifically for your needs. PCI provides you the maximum number of viable choices so you can make the best decision for your economic and delivery requirements.

**APPLICATION ASSISTANCE**
Performing market research enables PCI to offer unique market solutions that fulfill the specific requirements of individual markets including the petrochemical, wood, marine, mining and food processing industries.

**“CATALOG-LIKE” AVAILABILITY**
Along with an innovative design, a solution needs desirable delivery to be viable. PCI “Catalog-Like” availability secures your application solution when you need it.

Pre-Engineered units IN STOCK
Modified units ship in 1 Week
Industry Leading Delivery for Custom Units, including EXPEDITES
THICK SECTION ROLLER BODY
Proven toughness under heavy radial loads

CASE HARDENED ROLLER BODY
Maintains the integrity of the assembly by preventing pre-mature fracture under shock loads

MOLY-FILLED NYLON LIP SEALS
Dual function seal provides low level thrust capacity and contamination exclusion

FULL COMPLEMENT NEEDLE BEARINGS
Reliable performance under moderate to heavy radial dynamic loads.

EASY INSTALLATION BORE
Efficient yoke roller installation by eliminating the need for tedious installation methods.

PREMIUM SYNTHETIC LUBRICANT
High performance grease resistant to break down to minimize downtime

BLACK OXIDE FINISH
PCI Cam Followers have a black oxide finish on all external surfaces.
LOAD BEARING ROLLER ASSEMBLIES
Cam Follower Assemblies
Part Number Nomenclature

SERIES
S – Standard Stud Type
H – Heavy Stud Type
Y – Yoke Type

ROLLER BODY PROFILE
None – Plain / Cylindrical
C – Crowned / Spherical

CAM FOLLOWER

BORE TYPE (for Stud type rollers only)
None – Concentric Stud Type
E – Eccentric Stud Type

ROLLER SIZE
Imperial – Inches (Decimals)

SEALING
S – Sealed

SLOT TYPE
None – Screwdriver Slot
H – Hex Socket

ALTERNATE FITTING
THT – Threaded Lubrication Fitting (Units 4” Diameter and Smaller)
**IMPROVED SEALING**
Rubber lip seals with expanded grease barrier maximize protection of rolling elements

**CASE HARDENED ROLLER BODY**
Maintains the integrity of the assembly by preventing pre-mature fracture under shock loads

**GUIDED ROLLING ELEMENTS**
Provides efficient handling of intermittent combination loads by reducing skewing of the rolling elements and minimizing internal contact points.

**QUANTITY & SIZE OF ROLLING ELEMENTS**
Efficient yoke roller installation by eliminating the need for tedious installation methods.

**ROLLING ELEMENT PROFILE**
Lengthens component life by minimizing fatigue of the load bearing surfaces

**GREASE STORAGE**
Maximizes roller life by offering up to 20% more grease storage than competitive designs

**BLACK OXIDE FINISH**
PCI DCB Rollers have a black oxide finish on all external surfaces.
LOAD BEARING ROLLER ASSEMBLIES
DCB Roller Assemblies
Part Numbering Nomenclature

SERIES
None – Standard Stud
H – Heavy Stud

ROLLER BODY PROFILE
P – Plain / Cylindrical
C – Crowned / Spherical

DOUBLE ROW CYLINDRICAL BEARING ROLLER

BORE TYPE
None – Concentric Stud Type
E – Eccentric Stud Type
Y – Yoke Type

ROLLER SIZE
Imperial – (Inches: Decimals)

H     C     DC     _     _  _  2 . 50  _  HT  _  R  _  __

Heavy Stud, Crowned, DCB Roller, 2.50” Roller Diameter, High Temperature, Regreasable

TEMPERATURE
None – Standard Temperature
HT – High Temperature

RELUBRICATION
None – Lube for Life
R – Regreasable

HEX PROVISIONS
None – Hex in Roller End
H – Hex in Both Ends
PCI has been developing Load Bearing Roller Assembly solutions for more than 20 years. An integral part of our success has been our commitment to understanding the ever-changing needs of our valued customers and developing solutions that turn application hurdles into success stories. It is this critical interaction that has fueled the development of our Double-Row Cylindrical Bearing Roller Assemblies, the PCI DCB Roller. PCI’s unique DCB design addresses performance problems associated with traditional Cam Follower and Track Roller products while offering several unique advantages over competitive alternatives.

**LOAD ACCOMMODATION**

**APPLICATION MISALIGNMENT**
Standard Cam Followers are very effective at accommodating radial load; however, internal design significantly limits their capacity to handle other types of load commonly found in real world applications. One of the most common is combination load produced from application misalignment. Combination load is comprised of both radial and thrust loads and is a large contributor to premature failure of Cam Followers. PCI DCB Rollers are designed to effectively accommodate combination load, providing a solution to performance problems associated with misalignment. Pictured below are common misalignment examples:

**DYNAMIC LOAD CAPACITY**
Traditional Load Bearing Roller Assembly products offer either significant radial capacity at low speeds or increased speed accommodation at reduced radial capacities. The PCI DCB Roller is designed to provide significant radial load capacity while operating at elevated speeds, a mixture of loads in a size package that no other Cam Follower or Track Roller product can offer.

**MAINTENANCE FREE OPERATION**
Most Cam Follower products are engineered to be re-lubricated at regular intervals in order to operate effectively. In applications where moderate to high levels of contaminant are present, the frequency of re-lubrication can be significant. DCB Rollers reduce maintenance costs by addressing two primary design characteristics:

**SEALING PROVISIONS**
Needle Bearing Cam Follower products utilize nylon lip seals designed to provide low-level thrust capacity to the roller while providing some protection against contamination failure. Because of their dual-function purpose, nylon seals sacrifice sealing characteristics, struggling to compete against rubber seals in protection against external contamination. By engineering thrust accommodation into the internal design of the bearing, PCI DCB Rollers eliminate the need for the use of a dual purpose seal. This design improvement allows DCB Roller products the use of rubber lip seal technology as its protection against contamination, providing an industry proven solution to the problems commonly associated with Cam Follower designs.

**GREASE CAPACITY**
Internal design constraints limit traditional Cam Follower products in providing only a minimal amount of grease capacity to the bearing assembly. The minimal amount of lubrication limits the life of the Cam Follower once grease oxidation and break-down occur. PCI DCB Rollers are engineered with optimized grease capacity to ensure long-term operation, reducing the frequency of maintenance procedures. DCB Rollers provide up to 5 times the amount of grease capacity of standard Cam Follower products to ensure adequate lubrication for the assembly long after grease begins to oxidize.
MATCHED SET OF TAPERED ROLLER BEARINGS*
Maximum thrust load paired with significant radial load in a precision bearing package

*Features dependent on size of unit. See specifications for details.
LOAD BEARING ROLLER ASSEMBLIES
“XR” Roller Assemblies
Part Number Nomenclature

BODY MATERIAL
None – Steel
N – Non-Metallic

ROLLER BODY PROFILE
P – Plain / Cylindrical
C – Crowned / Spherical

“XR” Roller

BORE TYPE
None – Concentric Stud Type
E – Eccentric Stud Type

ROLLER SIZE
Imperial: Inches (Decimals)

Plain, "XR” Roller, Eccentric, 2.50” Roller Diameter, High Temperature

CAPACITY
None – Standard
E – Extra Capacity
A – Alternate

STEEL TYPE
None – Carbon Steel
SS – Stainless Steel

TEMPERATURE
None – Standard Temperature
HT – High Temperature

RELUBRICATION
None – Lube for Life
R – Regreaseable

HEX PROVISIONS
None – Hex in Roller End
H – Hex in Both Ends
Built To Last In Demanding Environments

**TIGHT FITTING DUST COVER**
Added protection against direct spray and contamination

**CASE HARDENED ROLLER BODY**
Maintains the integrity of the assembly by preventing pre-mature fracture under shock loads.

**PRECISION DEEP GROOVE BALL BEARINGS**
Performance under high speeds and combination loads.

**MATCHED SET OF TAPERED ROLLER BEARINGS**
Maximum thrust load paired with significant radial load capacity in a precision bearing package.

**RUBBER LIP SEALS**
Maximizes protection of the bearing elements from external contamination.

**PREMIUM SYNTHETIC LUBRICANT**
High performance grease resistant to break down to minimize downtime.

**STRESSPROOF® STUD / INNER RACE**
High strength material provides dependable performance under load.
BODY MATERIAL
- None – Steel
- N – Non-Metallic

SIZING
- None – Imperial: Inches (Decimals)
- M – Metric (Millimeters)

ROLLER BODY PROFILE
- P – Plain / Cylindrical
- C – Crowned / Spherical
- F – Flanged
- FF – Double Flanged
- V – V-Grooved
- U – U-Grooved
- CIR – Channel & I-Beam
- WGR – Wire Guide

TRACK ROLLER
- “TR” is omitted for CIR & WGR units

BORE TYPE
- None – Concentric Stud Type
- E – Eccentric Stud Type

ROLLER SIZE
- Imperial: Inches (Decimals)
- Metric: Millimeters

CAPACITY
- None – Standard
- E – Extra Capacity
- A – Alternate

STEEL TYPE
- None – Carbon Steel
- SS – Stainless Steel

TEMPERATURE
- None – Standard Temperature
- HT – High Temperature

RELUBRICATION
- None – Lube for Life
- R – Regreasable
316 STAINLESS STEEL ROLLER BODY, STUD & DUST COVER*
Maximum corrosion resistance and added protection against direct spray and contamination

440 STAINLESS STEEL PRECISION DEEP GROOVE BALL BEARINGS*
Optimum balance of corrosion resistance and dynamic load capacity

FLUOROCARBON LIP SEALS
Maximizes protection of the bearing elements from high heat, chemicals and external contamination.

SYNTHETIC FOOD GRADE LUBRICANT
Food grade grease with resistance to chemicals and wash-out.

WHY USE PCI 316 STAINLESS STEEL ROLLERS?
PCI® chooses to utilize 316 Stainless Steel materials for the exposed surfaces of our Stainless Steel Rollers. Most stainless cam follower products utilize 400 series stainless steel for these same surfaces. 316 Stainless has nearly 40% greater resistance to pitting corrosion than 400 series grades. If corrosion resistance is your goal, PCI 316 Stainless Steel Track Rollers & XR Rollers are your engineered stainless solution.

*Features dependent on size and style of unit. See specifications for details.
One Piece Solid End Cap Design
Solid protection of the bearing elements from external contaminants.

Non-Metallic Roller Body
Minimizes Rolling Noise
Reduces Track Wear
Eliminates Need for Track Lubrication
Reduces Rolling Resistance
FDA Compliant Material
Reduces Likelihood of Metal-on-Metal Sparking

Rubber Lip Seals
Maximizes protection of the bearing elements from external contamination.

Precision Deep Groove Ball Bearings
Dependable performance under high speeds and combination loads.

Synthetic Lubricant
High performance grease resistant to break down to minimize downtime.

How Quiet Are PCI Non-Metallic Track Rollers?
PCI’s Non-Metallic roller body design absorbs vibration and reduces the likelihood of metal on metal sparking to provide reliable Non-Sparking Quiet Performance. PCI® Non-Metallic Rollers are more than 10 dBA quieter than their metallic counterparts – that’s a 50% reduction in sound over traditional carbon steel Track Roller and Cam Follower products.

Operational Noise Index
(as measured in dBA)

*Features dependent on size and style of unit. See specifications for details.
Defeat Extreme Heat – The 350 °F Solution

TIGHT FITTING DUST COVER*
Maximum protection against direct spray and contamination

CASE HARDENED ROLLER BODY
Maintains the integrity of the assembly by preventing pre-mature fracture under shock loads.

FLUOROCARBON LIP SEALS
Lasting protection of the bearing elements in high temperatures.

PRECISION HIGH TEMPERATURE DEEP GROOVE BALL BEARINGS
Performance under high speeds and combination loads in a high temperature environment.

PREMIUM HIGH TEMPLUBRICANT
Performance in applications up to 350°F (Continuous)

EXTEND PERFORMANCE WITH RELUBE
PCI High Temperature Rollers are available IN STOCK with regreasing provisions to maximize life in your demanding application. PCI High Temperature Rollers are supplied with wrench flats for easy installation and a readily accessible grease fitting located in the end of the stud for ease of maintenance. Add a “-R” suffix to the part number to Replenish & ReUse...Relube

*Features dependent on size and style of unit. See specifications for details.
Comparable Replacements for
#30158767 - 04 / F76105 – 4” Diameter Top Drive Roller
#30155438 / F76139 – 6” Diameter Top Drive Roller
## TDR Series Roller Assembly

### Top Drive Rollers

Double Row Cylindrical Roller Bearings / Needle Bearings

![Diagram of TDR-4.00 and TDR-6.00 roller assemblies](image)

### Specifications

<table>
<thead>
<tr>
<th>Stud Type</th>
<th>TDR Roller Part Number</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>FL</th>
<th>F</th>
<th>H</th>
<th>R</th>
<th>SD</th>
<th>SL</th>
<th>T</th>
<th>Z</th>
<th>Approx. Roller Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDR-4.00-1</td>
<td>4.000</td>
<td>2.50</td>
<td>1.500</td>
<td>3.50</td>
<td>1.50</td>
<td>1 1/2 - 12</td>
<td>3/4</td>
<td>30</td>
<td>2.3</td>
<td>0.03</td>
<td>2.53</td>
<td>1/8-27 NPT</td>
<td>47,200</td>
<td></td>
</tr>
<tr>
<td>TDR-4.00-2</td>
<td>4.000</td>
<td>2.50</td>
<td>1.500</td>
<td>3.50</td>
<td>1.50</td>
<td>1 1/2 - 12</td>
<td>3/4</td>
<td>30</td>
<td>2.3</td>
<td>0.03</td>
<td>2.53</td>
<td>1/8-27 NPT</td>
<td>47,200</td>
<td></td>
</tr>
<tr>
<td>TDR-4.00-3</td>
<td>4.000</td>
<td>2.50</td>
<td>1.500</td>
<td>3.50</td>
<td>1.50</td>
<td>1 1/2 - 12</td>
<td>3/4</td>
<td>30</td>
<td>2.9</td>
<td>0.03</td>
<td>2.53</td>
<td>1/8-27 NPT</td>
<td>47,200</td>
<td></td>
</tr>
<tr>
<td>TDR-6.00-1</td>
<td>6.000</td>
<td>2.25</td>
<td>2.000</td>
<td>3.50</td>
<td>1.50</td>
<td>2 - 12</td>
<td>3/4</td>
<td>48</td>
<td>2.3</td>
<td>0.03</td>
<td>2.28</td>
<td>1/8-27 NPT</td>
<td>47,200</td>
<td></td>
</tr>
<tr>
<td>TDR-6.00-2</td>
<td>6.000</td>
<td>2.25</td>
<td>2.000</td>
<td>3.50</td>
<td>1.50</td>
<td>2 - 12</td>
<td>3/4</td>
<td>48</td>
<td>2.3</td>
<td>0.03</td>
<td>2.28</td>
<td>1/8-27 NPT</td>
<td>47,200</td>
<td></td>
</tr>
<tr>
<td>TDR-6.00-3</td>
<td>6.000</td>
<td>2.25</td>
<td>2.000</td>
<td>3.30</td>
<td>1.50</td>
<td>2 - 12</td>
<td>3/4</td>
<td>48</td>
<td>2.9</td>
<td>0.03</td>
<td>2.28</td>
<td>1/8-27 NPT</td>
<td>47,200</td>
<td></td>
</tr>
<tr>
<td>TDR-6.00-4</td>
<td>6.000</td>
<td>2.25</td>
<td>2.000</td>
<td>3.30</td>
<td>1.50</td>
<td>2 - 12</td>
<td>3/4</td>
<td>48</td>
<td>2.9</td>
<td>0.03</td>
<td>2.28</td>
<td>1/8-27 NPT</td>
<td>47,200</td>
<td></td>
</tr>
<tr>
<td>TDR-6.00-5</td>
<td>6.000</td>
<td>2.25</td>
<td>2.000</td>
<td>3.30</td>
<td>1.50</td>
<td>2 - 12</td>
<td>3/4</td>
<td>48</td>
<td>2.3</td>
<td>0.03</td>
<td>2.28</td>
<td>1/8-27 NPT</td>
<td>47,200</td>
<td></td>
</tr>
</tbody>
</table>

### Additional Notes

*For lubricated threads, use half the maximum clamping torque value shown.

**FC DCRB:** Full Compliment Double Row Cylindrical Roller Bearings – Alloy Steel

**FC DCRB-SS:** Full Compliment Double Row Cylindrical Roller Bearings – 440C Stainless Steel

**FC Needle:** Full Compliment Needle Roller Bearings – Alloy Steel

Lubrication Fitting included with roller assembly. Jam Nut & Lock Washer sets are available at an additional cost.

Specifications subject to change without notice.
<table>
<thead>
<tr>
<th>Industry Cross Reference</th>
<th>Industry Cross Reference</th>
<th>Industry Cross Reference</th>
<th>Industry Cross Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCF 2 5</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 2 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 2 1/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 2 1/2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 2 1/2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 2 3/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 3 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 3 1/2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 3 3/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 5 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 6 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 7 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 8 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 9 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCF 10 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFD 2</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFD 2 1/4</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFD 2 1/2</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFD 2 3/4</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFD 3</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFD 3 1/4</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFD 3 1/2</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFD 4</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFD 6</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 2 5</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 2 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 2 1/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 2 1/2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 2 1/2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 2 3/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 3 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 3 1/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 3 1/2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 3 3/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 5 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 6 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 7 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 8 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 9 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCFE 10 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 2 SB</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 2 1/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 2 1/2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 2 1/2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 2 3/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 3 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 3 1/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 3 1/2 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 3 3/4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
<tr>
<td>CCHF 4 S</td>
<td>McG</td>
<td>HCF 4.00 SH</td>
<td>CBBCE 2.00</td>
</tr>
</tbody>
</table>
### Cross Reference Charts

In Alphabetical Order by Reference Number

<table>
<thead>
<tr>
<th>Industry Cross Reference</th>
<th>FCT.</th>
<th>Industry Cross Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>596LW RBC</td>
<td>SCF-3.00-SH</td>
<td>VLRE-2-1/2 Osb VTRE-2.50</td>
</tr>
<tr>
<td>596LWX RBC</td>
<td>SCF-3.00-SH</td>
<td>VLRE-3-1/2 Osb VTRE-3.50</td>
</tr>
<tr>
<td>510ML RBC</td>
<td>SCF-3.25-S</td>
<td>VLRE-3-1/2-4 Osb VTRE-3.50E</td>
</tr>
<tr>
<td>5104LV RBC</td>
<td>SCF-3.25-SH</td>
<td>VLRE-4-1/2 Osb VTRE-4.50</td>
</tr>
<tr>
<td>5104LWX RBC</td>
<td>SCF-3.25-SH</td>
<td>VLRE-5-1/2 Osb VTRE-5.50</td>
</tr>
<tr>
<td>511L4 RBC</td>
<td>SCF-3.50-S</td>
<td>VLRE-6-1/2 Osb VTRE-6.50</td>
</tr>
<tr>
<td>511LWX RBC</td>
<td>SCF-3.50-SH</td>
<td>VLRE-7-1/2 Osb VTRE-7.50</td>
</tr>
<tr>
<td>512BL RBC</td>
<td>SCF-4.00-S</td>
<td>VLREH-1-1/2 Osb VTR-1.50-HT</td>
</tr>
<tr>
<td>512BLWX RBC</td>
<td>SCF-4.00-SH</td>
<td>VLREH-2 Osb VTR-2.00-HT</td>
</tr>
<tr>
<td>5160LV RBC</td>
<td>SCF-5.00-SH</td>
<td>VLREH-2-1/2 Osb VTR-2.50-HT</td>
</tr>
<tr>
<td>5192LV RBC</td>
<td>SCF-6.00-SH</td>
<td>VLY-2-1/2 Osb VTRY-2.50-9</td>
</tr>
<tr>
<td>5224LV RBC</td>
<td>SCF-7.00-SH</td>
<td>VLY-3 Osb VTRY-3.00</td>
</tr>
<tr>
<td>SHA-437 Osb</td>
<td>YSH-437</td>
<td>VLY-3-1/2-7 Osb VTRY-3.50-9</td>
</tr>
<tr>
<td>SHA-500 Osb</td>
<td>YSH-500</td>
<td>VLY-3-3/4 Osb VTRY-3.75</td>
</tr>
<tr>
<td>SHA-625 Osb</td>
<td>YSH-625</td>
<td>VLY-4-1/2 Osb VTRY-4.50</td>
</tr>
<tr>
<td>SHA-750 Osb</td>
<td>YSH-750</td>
<td>VLY-5 Osb VTRY-5.00</td>
</tr>
<tr>
<td>SHA-1000 Osb</td>
<td>YSH-1.000</td>
<td>VLY-5-1/2 Osb VTRY-5.50</td>
</tr>
<tr>
<td>SHA-125 Osb</td>
<td>YSH-1.250</td>
<td>VLY-6-1/2 Osb VTRY-6.50</td>
</tr>
<tr>
<td>SHA-125 Osb</td>
<td>YSH-1.250</td>
<td>VLY-7-1/2 Osb VTRY-7.50</td>
</tr>
<tr>
<td>SHA-1750 Osb</td>
<td>YSH-1.750</td>
<td>VLY-8-1/2 Osb VTRY-8.50</td>
</tr>
<tr>
<td>SHA-2250 Osb</td>
<td>YSH-2.250</td>
<td>VLY-9-1/2 Osb VTRY-9.50</td>
</tr>
<tr>
<td>SHA-2750 Osb</td>
<td>YSH-2.750</td>
<td>VLY-10-1/2 Osb VTRY-10.50</td>
</tr>
<tr>
<td>SHB-3250 Osb</td>
<td>YSH-3.250</td>
<td>VLY-11-1/2 Osb VTRY-11.50</td>
</tr>
<tr>
<td>SHB-3750 Osb</td>
<td>YSH-3.750</td>
<td>Y64L RBC YCF-2.00-S</td>
</tr>
<tr>
<td>SHB-4250 Osb</td>
<td>YSH-4.250</td>
<td>Y72L RBC YCF-2.25-S</td>
</tr>
<tr>
<td>SHE-437 Osb</td>
<td>YSH-625</td>
<td>Y84L RBC YCF-2.50-S</td>
</tr>
<tr>
<td>SHE-437 Osb</td>
<td>YSH-625</td>
<td>Y88L RBC YCF-2.75-S</td>
</tr>
<tr>
<td>SHE-500 Osb</td>
<td>YSH-750</td>
<td>Y96L RBC YCF-3.00-S</td>
</tr>
<tr>
<td>SHE-625 Osb</td>
<td>YSH-750</td>
<td>Y104L RBC YCF-3.25-S</td>
</tr>
<tr>
<td>SHE-750 Osb</td>
<td>YSH-750</td>
<td>Y12BL RBC YCF-3.50-S</td>
</tr>
<tr>
<td>SHE-1000 Osb</td>
<td>YSH-750</td>
<td>Y12BL RBC YCF-4.00-S</td>
</tr>
<tr>
<td>SHE-1125 Osb</td>
<td>YSH-1.000</td>
<td>Y160L RBC YCF-5.00-S</td>
</tr>
<tr>
<td>SHE-125 Osb</td>
<td>YSH-1.125</td>
<td>Y192L RBC YCF-6.00-S</td>
</tr>
<tr>
<td>SHE-125 Osb</td>
<td>YSH-1.250</td>
<td>Y224L RBC YCF-7.00-S</td>
</tr>
<tr>
<td>SHE-1750 Osb</td>
<td>YSH-1.750</td>
<td>YCR-32 Kyo YCF-2.00-S</td>
</tr>
<tr>
<td>SHE-2250 Osb</td>
<td>YSH-2.250</td>
<td>YCR-36 Kyo YCF-2.25-S</td>
</tr>
<tr>
<td>SHE-2750 Osb</td>
<td>YSH-2.750</td>
<td>YCR-40 Kyo YCF-2.50-S</td>
</tr>
<tr>
<td>VCR-1-1/2 McG</td>
<td>VTR-2.50</td>
<td>YCR-44 Kyo YCF-2.75-S</td>
</tr>
<tr>
<td>VCR-1-1/2 McG</td>
<td>VTR-3.50</td>
<td>YCR-48 Kyo YCF-3.00-S</td>
</tr>
<tr>
<td>VCR-4-1/2 McG</td>
<td>VTR-4.50</td>
<td>YCR-52 Kyo YCF-3.25-S</td>
</tr>
<tr>
<td>VCR-5-1/2 McG</td>
<td>VTR-5.50</td>
<td>YCR-56 Kyo YCF-3.50-S</td>
</tr>
<tr>
<td>VCR-6-1/2 McG</td>
<td>VTR-6.50</td>
<td>YCR-64 Kyo YCF-4.00-S</td>
</tr>
<tr>
<td>VCR-7-1/2 McG</td>
<td>VTR-7.50</td>
<td>YCR-80 Kyo YCF-5.00-S</td>
</tr>
<tr>
<td>VCR-8-1/2 McG</td>
<td>VTR-8.50</td>
<td>YCR-96 Kyo YCF-6.00-S</td>
</tr>
<tr>
<td>VCF-2-1/2 McG</td>
<td>VTR-2.50</td>
<td>YCRSC-32 Kyo YCFC-2.00-S</td>
</tr>
<tr>
<td>VCF-3-1/2 McG</td>
<td>VTR-3.50</td>
<td>YCRSC-36 Kyo YCFC-2.25-S</td>
</tr>
<tr>
<td>VCF-4-1/2 McG</td>
<td>VTR-4.50</td>
<td>YCRSC-40 Kyo YCFC-2.50-S</td>
</tr>
<tr>
<td>VCF-5-1/2 McG</td>
<td>VTR-5.50</td>
<td>YCRSC-44 Kyo YCFC-2.75-S</td>
</tr>
<tr>
<td>VCF-6-1/2 McG</td>
<td>VTR-6.50</td>
<td>YCRSC-48 Kyo YCFC-3.00-S</td>
</tr>
<tr>
<td>VCF-7-1/2 Osb</td>
<td>VTR-7.50</td>
<td>YCRSC-52 Kyo YCFC-3.25-S</td>
</tr>
<tr>
<td>VCF-8-1/2Os</td>
<td>VTR-8.50</td>
<td>YCRSC-56 Kyo YCFC-3.50-S</td>
</tr>
<tr>
<td>VUR-1-1/2 Osb</td>
<td>VTR-1.50</td>
<td>YCRSC-64 Kyo YCFC-4.00-S</td>
</tr>
<tr>
<td>VUR-2 Osb</td>
<td>VTR-2.00</td>
<td>YCRSC-80 Kyo YCFC-5.00-S</td>
</tr>
<tr>
<td>VUR-2-1/2 Osb</td>
<td>VTR-2.50</td>
<td>YCRSC-96 Kyo YCFC-6.00-S</td>
</tr>
<tr>
<td>VUR-3-1/2 Osb</td>
<td>VTR-3.50</td>
<td>YCR-32 Kyo YCF-2.00-S</td>
</tr>
<tr>
<td>VUR-3-1/2-16 Osb</td>
<td>VTR-3.50E</td>
<td>YCR-36 Kyo YCF-2.25-S</td>
</tr>
<tr>
<td>VUR-4-1/2 Osb</td>
<td>VTR-4.50</td>
<td>YCR-40 Kyo YCF-2.50-S</td>
</tr>
<tr>
<td>VUR-5-1/2 Osb</td>
<td>VTR-5.50</td>
<td>YCR-44 Kyo YCF-2.75-S</td>
</tr>
<tr>
<td>VUR-6-1/2 Osb</td>
<td>VTR-6.50</td>
<td>YCR-48 Kyo YCF-3.00-S</td>
</tr>
<tr>
<td>VUR-7-1/2 Osb</td>
<td>VTR-7.50</td>
<td>YCR-52 Kyo YCF-3.25-S</td>
</tr>
<tr>
<td>VUR-8-1/2 Osb</td>
<td>VTR-8.50</td>
<td>YCR-56 Kyo YCF-3.50-S</td>
</tr>
<tr>
<td>VURE-1-1/2 Osb</td>
<td>VTR-1.50</td>
<td>YCR-64 Kyo YCF-4.00-S</td>
</tr>
<tr>
<td>VURE-2 Osb</td>
<td>VTR-2.00</td>
<td>YCRSC-80 Kyo YCFC-5.00-S</td>
</tr>
<tr>
<td>VURE-3-1/2 Osb</td>
<td>VTR-3.50</td>
<td>YCRSC-96 Kyo YCFC-6.00-S</td>
</tr>
</tbody>
</table>