### Basic Bearing Information for Common Material Handling Tire & Wheel Applications

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Single Row Radial Ball Bearing</th>
<th>Single Row Cup &amp; Cone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sealed bearing, Contact bearing, Greaseless, 2 Rubber Seals</td>
<td>One Shield, Greaseable</td>
<td>No Seal</td>
</tr>
<tr>
<td>NSK DDU Z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timken PP D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SKF 2RS Z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTN LLU Z</td>
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</tr>
</tbody>
</table>

#### Main Function, Benefit and Concern
- **NSK**
  - Non-Greaseable (NG)
  - Pre-packed grease contained within rubber seals
  - Maintenance Free
  - Rubber seals have full contact on both inner and outer race
  - Rubber seals heat up and can melt down if used in high speed – leaking grease
  - Rubber seals are sensitive to chemical attack – special rubber seals are required for some environments
  - Grease cannot be refilled to replace deteriorated old grease
- **Timken**
  - Greaseable (G)
  - Maintenance Required
  - Metal shield does not make sealed contact – no heat buildup in high speed run
  - Shield does not completely prevent grease leakage but allows grease to effectively fill the bearing during maintenance
  - Shield prevents debris from entering into the bearing
- **SKF**
  - Greaseable (G) – for specific design only
  - Requires extra hole in axle to release trapped air while greasing
  - Almost maintenance free when used in low speed application
  - Maintenance is required if used in high speed application due to leaking grease
  - Rubber seals are sensitive to chemical attack – special rubber seals are required for some environments
- **NTN**
  - Greaseable (G)
  - Maintenance Required
  - Perfect when used in a close area filled with grease (inside pair for load wheel assy with four bearings)
  - Designed to let grease flow through easiest during maintenance
  - No seal or shield = exposure to environment

#### Where Used
- **Fork, Outrigger and Stabilizing Caster Load Wheel**
  - Single direction of force (radial load) – limited thrust load capacity
  - Low-Medium Speed and Non-Continuous Run
  - Clean facility, frequent washdown or wet conditions
- **Fork, Outrigger and Stabilizing Caster Load Wheel**
  - Single direction of force (radial load) – limited thrust load capacity
  - Long and continuous run
- **Fork, Outrigger and Stabilizing Caster Load Wheel**
  - Single direction of force (radial load) – limited thrust load capacity
  - Can be used in long and continuous run
- **Recommended only for load wheel assemblies with four bearings as the inside pair**
  - Single direction of force (radial load) – limited thrust load capacity
  - Same usage as non-shouldered one shield ball bearing
- **Recommended only in Greaseable (one metal shield) configuration**
  - The inner lip/race acts as a spacer on the outside of the wheel eliminating extra components and offers a quicker and easier wheel change
  - Same function as non-shouldered one shield ball bearing

#### Design for multi-directional forces found mostly in 4th wheel casters (CL-II trucks) or drive tire
- **Maintenance Required**
- **Required bearing cap to contain grease**
- **Require locking element (lock nut or snap ring) to prevent the cup from separating from cone**
- **Offers higher load capacity in the same size as ball bearing due to tapered roller elements which provides larger contact area**
- **Designed for multi-directional force (radial load and thrust load)**
- **CL-II Caster wheels or Drive tire**
- **No typical coding pattern**
- **Recommended only**
  - No coding
  - For use in greasing areas
  - In a close area of the wheel
  - In high speed application
  - In maintenance
  - Most bearings
  - Single direction load
  - Single shield
  - Used in low speed application
  - Bearing cap to contain grease
  - Locking element
  - Requires special lubrication
  - For multi-directional use
  - In greasing areas
  - In high speed application
  - In maintenance
  - In special lubrication
  - In multi-directional use

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*Superior Tire & Rubber Corp.*

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## Appendix

<table>
<thead>
<tr>
<th>External Force</th>
<th>Radial Loading</th>
<th>Thrust (Axial) Loading</th>
<th>Angular Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Is a force perpendicular to the axis of rotation (axle), such as weight (most Load wheels)</td>
<td>A force parallel to the axis of rotation (axle), such as side impact or cornering</td>
<td>A combination of both radial and thrust loading resulting in an angular force acting on the bearing (most Drive tires and CL-II Caster wheels)</td>
</tr>
</tbody>
</table>

![Diagram showing Radial and Thrust forces on a bearing](image)