Brakes, Tires & Wheel-Ends: Keys to Safe Trailer Equipment

November 2015
Trailer Disc Brake Market

Growing 1 to 2% annually

- Virtually no brake fade
- Perception of lower maintenance
- Lower CSA violations

Air Disc  Drum
## Reduced Stopping Distance

Then: 355 Feet  Now: 250 Feet

<table>
<thead>
<tr>
<th>Phase</th>
<th>Axle Configuration</th>
<th>GVWR</th>
<th>New Requirement</th>
<th>Old Requirement</th>
<th>Compliance Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standard 6x4 Tractors</td>
<td>≤ 59,600 lbs.</td>
<td>250 feet</td>
<td>355 feet</td>
<td>8/1/11</td>
</tr>
<tr>
<td></td>
<td>2-axle</td>
<td>All</td>
<td>250 feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6x4 Severe Service Tractors</td>
<td>&gt; 59,600 lbs. and ≥ 70,000 lbs.</td>
<td>250 feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6x4 Severe Service Tractors</td>
<td>&gt; 70,000 lbs.</td>
<td>310 feet</td>
<td>355 feet</td>
<td>8/1/13</td>
</tr>
<tr>
<td></td>
<td>Tractors with 4+ axles</td>
<td>≤ 85,000 lbs.</td>
<td>250 feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tractors with 4+ axles</td>
<td>&gt; 85,000 lbs.</td>
<td>310 feet</td>
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</table>

Source: National Highway Traffic Safety Administration
Why Reduced Stopping Distance?

- 3,757 fatalities
- 88,000 injured
- Over $100M property damages

Source: FMCSA - 2011
RSD: Collision Reduction

Total Collisions per Brake Type

- **S-Cam**: 51 collisions (36.4%)
- **Enhanced**: 31 collisions (22.5%)
- **Disc**: 29 collisions (20.7%)

Source: NHTSA
Why Air Disc Brakes?

Torque output @60mph

- 20K Drum Brake at 160F
- 20K Drum Brake at 400F
- MAXX22T at 160F
- MAXX22T at 400F

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Tires: Evolution of Solutions

- **Checking**
  Manually check for under-inflated, over-inflated and unequal tire pressure

- **Monitoring**
  Review data for under-inflated, over-inflated and unequal tire pressure

- **Inflating**
  Periodically complete a manual adjustment for over-inflated and unequal tire pressure

- **Controlling**
  The system automatically controls over-inflation and unequal tire pressure
Equalization

DID YOU KNOW...

1. Mismatched tire pressures on dual tires and its relationship to tread wear, tire life and fuel economy can be problematic.

2. Within a matter of weeks, mismatched pressures can cause permanent irregular wear patterns, which can lead to early tire removal.

3. Almost 25 percent of trailer dual assemblies have mismatched air pressures greater than 5 PSI, and testing has shown that a five PSI difference between duals creates a 5/16-inch difference in tire circumference.

4. Since dual tires are bolted together and must rotate at the same speed, any differences in tire diameter can cause the smaller tire to be scuffed and dragged against the road.

5. The tire with the larger diameter carries a disproportionate amount of the trailer’s load which can result in abnormal tread wear.

6. Ultimately, failure to properly equalize dual tire pressures can lead to unequal tread wear for both tires.
Equalization

Exhibit 4.14 Distribution of Trailer Tire Duals

28% on target
72% off target

25% REALLY off target
Equalization

A 5 PSI pressure difference equals a 5/16” difference in tire circumference and 1/10” difference in diameter.

Dual tire assemblies will drag/brake each other during operation.
DID YOU KNOW...

1. Overinflated tires are harder than properly inflated tires making them more susceptible to tread surface cutting, impact breaks, punctures and shock damage.

2. Overinflated tires change a tire’s footprint which can affect tire traction and lead to irregular wear patterns.

3. A 2003 FMCSA study found that 16 percent of all trailer tires are overinflated by more than 5 psi and 5 percent of tires by more than 10 psi.

4. Overinflated tires can experience accelerated tread wear costing from 7 to 15 percent of life.
Over-inflation

Tire Pressure by Month

- Avg High Temp (degrees F)
- Tire Pressure (inflated only)
- Tire Pressure (none)
- Tire Pressure (TIREMAAX PRO)

Any tire in this pressure range needs to be monitored for over-inflation and equalization.

Average monthly high temps for Dallas, TX
Assumes 100 PSI cold target pressure
Assumes loss of 2 PSI/month
Assumes one exposure to -30° F in January
Maximize Tire Life, Maximize Safety!

Have a plan for **all** tire pressure conditions!

- Under-inflation
- Over-inflation
- Equalization
For More Information

www.hendrickson-intl.com

Reference Lit # L1199
Wheel-End Integrity

The Foundation for a Safe & Reliable Wheel-End System

- Robust Wheel Seals
- Precise Bearing Settings
- Proper Lubrication
Precise Bearing Setting

Hendrickson Precision Nut Systems
Installed in this area

Conventional Spindle Nut Systems
Installed in this area

Buffer Zone

Pre-load

Bearing Life

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Robust Wheel Seals

- Withstands temperature changes
- Resists leakage
- Prevents contaminant ingress
Proper Lubrication

Primary Purpose: Reduce wheel-end operating temperatures

<table>
<thead>
<tr>
<th>Lubricant</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chevron SAE 80/90</td>
<td>Amber</td>
</tr>
<tr>
<td>Chevron SAE 75W-90</td>
<td>Amber</td>
</tr>
<tr>
<td>Chevron Delo SF</td>
<td>Yellow/Orange</td>
</tr>
<tr>
<td>Mobilith SHC 007</td>
<td>Red</td>
</tr>
<tr>
<td>Chevron NLGI #2</td>
<td>Red</td>
</tr>
</tbody>
</table>
Why Semi-Fluid Grease?

- Exceptional performance at both high and low temps
- Remains in place better than oil
- Provides better protection against water & dirt
Importance of Correct Lubricant Volume

Under-fill
- Overheating
- Wheel lock-up
- Break away of hub from axle
- Fire

Over-fill
- Excessive pressure (seal blowout)
- Loss of oil through leakage