

# **Future Truck Position Paper: 2017-3**

## *Performance Expectations for Zero-Pressure Commercial Truck Tires*

Developed by the Technology & Maintenance Council's (TMC)  
Future Tire Durability and Reliability Task Force

### **ABSTRACT**

The Future Tire Durability and Reliability Task Force — working under the auspices of TMC's Future Truck Committee — was tasked with exploring and identifying key factors related to the adoption of zero-pressure tires in commercial transportation service. Accordingly, the Task Force developed this position paper to define future features and expectations for zero pressure commercial tires in terms of product performance, maintainability, reliability, durability, serviceability, environmental and educational issues. This document provides the industry with an overview of what will be necessary for trucking companies to integrate this new technology into their fleets.

### **INTRODUCTION**

The Future Tire Durability and Reliability Task Force working under the auspices of TMC's Future Truck Committee was tasked with exploring and identifying key factors related to the adoption of zero-pressure tires in commercial transportation service. This included tire performance, integration into the vehicle system, tire service and market education for the technology.

Accordingly, the Task Force developed this position paper to define future features and

expectations for zero-pressure commercial tires in terms of product performance, maintainability, reliability, durability, serviceability, environmental and educational issues. This document provides the industry with an overview of what will be necessary for trucking companies to integrate this new technology into their fleets.

Although the emphasis of this position paper is integrating zero-pressure tires into the trucks, tractors and trailers of today, developments within the industry are likely to drive changes

in vehicles and operations in the near future. All tires — including future zero-pressure tires — could look and perform differently to meet these needs.

## **A. SAFETY**

Tires are a critical component in the safe operation of commercial vehicles. Tires provide the only direct physical interaction between the vehicle and the road surface and play a major role in the transmission of driving and braking forces. Additionally, responsive handling and control of the vehicle through the tires allows drivers to safely maneuver in normal and emergency situations. Zero-pressure tires must perform so that the vehicle can be operated safely and no compromise is made in these performances to gain the advantages they offer. Additionally, maintaining and servicing tires must also be done safely and zero-pressure tires should be developed with this as the highest priority.

## **B. TIRE PERFORMANCE**

The focus of tire performance is to provide value to the customer with improved cost-per-mile performance that compares favorably with today's total cost of ownership, including retreading. A zero-pressure tire will have significant advantages in costs but must be able to perform in a manner similar to pneumatic tires. Specifically, the following criteria are of high importance:

1. Tire size should be compatible so that integrating new zero-pressure tires into a fleet is simplified. It is not necessary for a zero-pressure tire to be immediately compatible with a pneumatic tire in a dual tire fitment, but is strongly preferred that a cross-axle limitation not be necessary.
2. Tread mileage should be similar or better than equivalent pneumatic tires in the same wheel position, vehicle type and service conditions.
3. Tire load capacity should match that of the equivalent size pneumatic tire. Zero-pressure tires must meet the current

North American government regulations which specify a maximum ground contact pressure in some jurisdictions.

4. Zero-pressure tires should maintain all of their performance capabilities across the range of tire loads present today and be able to meet these levels regardless of the load on the tire.
5. When it comes to traction, zero-pressure tires should deliver dry, wet and snow traction similar to or better than that of an equivalent pneumatic tire. The use of application specific tread patterns common with today's tire is a desirable feature.
6. Today's commercial truck typically uses air cushioning in the vehicle suspension system and, in many cases, the truck cab and driver seats for driver comfort and fatigue reduction as well as cargo protection. Today's pneumatic tire provides a certain level of cushioning and dampening of road vibrations and is well integrated into the truck/trailer system. A zero-pressure tire should deliver this same level of vibration dampening and reduction of vibration to the vehicle, driver and cargo. Any zero-pressure tire should include provisions which allow maintenance technicians to easily balance the tire/wheel assembly if necessary.
7. The weight of the zero-pressure tire and wheel or vehicle attachment system should be the same or lighter than current pneumatic tires with steel or aluminum wheels.
8. Zero-pressure tires should be designed with the capability for multiple tread lives and have total casing endurance similar or better than an equivalent pneumatic tire.

## **C. VEHICLE INTEGRATION**

The technology of a zero-pressure tire may lead to products that look different from tires of today. Integration of the vehicle attachment method — today a common disc wheel —

may be unnecessary with no need to apply and maintain inflation pressure inside the tire. Some considerations on how a zero-pressure tire should integrate into the vehicle include:

1. Utilization of current disc wheel technology is preferred if the zero-pressure tire will be mounted on a separate wheel. For tires with an integrated attachment method, or “built-in wheel,” these should be compatible with current axle hub and wheel stud attachment systems.
2. Truck and trailer suspension systems are designed to operate with today’s pneumatic tire technology. Installation of a zero-pressure tire should not require any re-design or re-tuning of these systems with the tire providing some level of cushioning as does today’s tire.
3. Tires in commercial service typically have a relatively long life yet are replaced on a routine basis unlike other mechanical system components on a vehicle. The result will be a phase-in over time of new technology zero-pressure tires into a truck fleet so compatibility with current tires will be important. Mixing of pneumatic and zero-pressure tires will be a consideration and interoperability between the tires an important factor. Zero-pressure tires should be able to be fitted on the same axle. Compatibility should also be present for combination vehicles such that zero-pressure tires on a tractor are compatible with a trailer fitted with pneumatic tires.

#### **D. SERVICE**

Installation, maintenance and removal of zero-pressure tires should be no more difficult or time consuming than pneumatic tires. A key benefit of zero-pressure tires is the elimination of inflation pressure considerations including matching tire pressures for the load and matching tire pressures on dual tire fitments. Considerations include:

1. Tire markings critical to service including size and load capacity should be readily visible to the tire technician.
2. Zero-pressure tires should be easy to inspect on and off the vehicle.
3. If a zero-pressure tire must be fitted to a current disc wheel, this fitment process should be easy for one technician to manage and the tire should have a visible tire-centering ring or marking in the lower sidewall so the technician can verify concentric mounting.
4. Zero-pressure tires developed with an integrated wheel must be easy to mount with tools currently available to the tire technician. Roadside emergency service should be possible with no special equipment necessary.
5. Provisions should be made for individually marking the zero-pressure tires with a physical brand number or electronic identification sensor.

#### **E. EDUCATION AND TRAINING**

New technologies must be incorporated into truck fleet and service provider training programs to ensure successful adoption. Key steps include:

1. Clear and concise training material that specifies necessary installation and maintenance practices to support zero-pressure tires.
2. Incorporation of these training materials with industry organizations such as the Tire Industry Association’s commercial tire service training program and TMC’s Recommended Practices.

#### **F. ENVIRONMENTAL ISSUES**

Zero-pressure tires should be designed to minimize their environmental footprint. This should include optimizing use of the natural resources used to manufacture them by constructing them for long service life and recyclability. □