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U.S. Department of Transportation
(Federal Railroad Administration) regulations



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Technological Principles



Technological Principles



Changing the Way America Moves.

www.talgoamerica.com
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Short length and lightweight cars

Talgo cars are approximately 43 feet long. The lightweight design and construction offers key advantages to acceleration and the amount of stress placed on the track. The short length design provides emergency egress opportunities that exceed FRA requirements because roughly two Talgo cars take the place of one conventional car. The low platform height keeps the center of gravity low and allows Talgo to be the most ADA friendly passenger cars around.



Articulated connection between adjacent cars

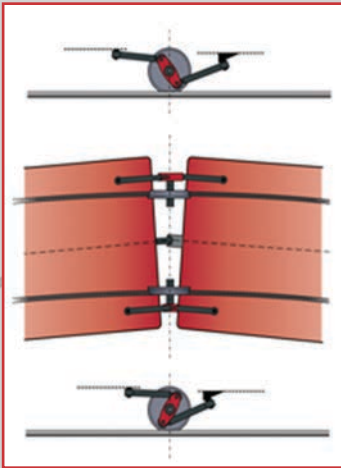
Talgo’s multiple connection points mean increased safety, reliability and passenger comfort. Talgo cars are strongly connected to one another with several connection devices. In addition to a stronger connection, anti-overriding mechanisms are located between each car. Thus the risk of overriding individual cars and “piling-up” is significantly reduced, as there are no trucks located underneath passenger areas. The location of the shock absorbers (four lateral and one longitudinal) and springs (near the top of the car body structures) also help to reduce noise and vibrations.

Automatic Steering System

Talgo’s steering system produces increased safety because the wheels are kept parallel to the track at all times. The automatic steering works naturally by connecting each wheel axle to the adjacent cars via two solid steering links. There are no electronic devices involved in the operation. Wheel-track interactions are reduced to a minimum.

Independent Wheels

Acquisition and maintenance costs for wheels are greatly reduced on Talgo cars. Talgo wheel sets are located between adjoining cars instead of under the cars, as in conventional equipment. Conventional cars have two trucks with a total of eight wheels. Each Talgo car is equipped with a single wheel-



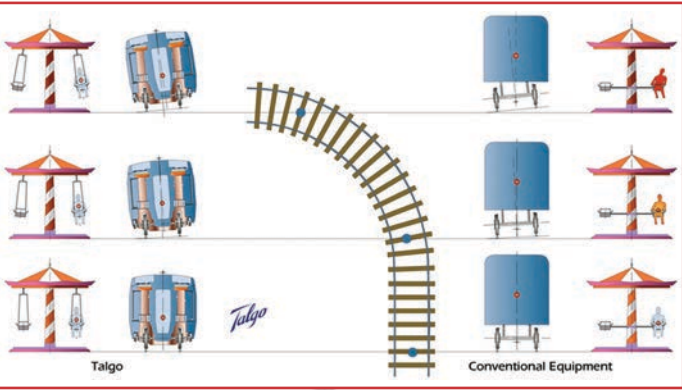
Talgo Natural Tilting System

In a Talgo tilting car, suspension springs are located above the center of gravity of each car. As the train enters a curve, centrifugal force makes the car-body tilt toward the interior of the curve (like a pendulum), allowing for faster speeds and higher passenger comfort. Talgo’s natural tilting system does not consume energy and is fail-safe because it does not use computers, servo mechanisms or electronic devices.

This system is a unique and simple system based on the elevation of the support plane of the suspension springs above the center of gravity of the carbodies. The system reduces the lateral forces that affect passengers in curves. The carbodies tilt due to natural (centrifugal) force **without:**

- Any additional assistance
- Any energy consumption
- Any possibility of failure
- Any failure-prone mechanisms or special equipment
- Any abrupt artificial movements
- Any loss of safety and comfort levels

All due to the unique Talgo suspension and independent wheel systems.



...carbodies tilt toward the inside of the curves in direct proportion to train speed...
...reducing the perceived lateral force that acts on the passengers.

Additionally, the original characteristics of the wheelsets of the Talgo trainsets (independent axles, steered wheels) reduce the level of the wheel-rail interactions, & increase speed in curves without reducing safety.



set (2 wheels per set) located at one end of the car and is suspended from the adjacent car on the other end.

The independent wheels (no solid axle) are designed to rotate independently of each other on tangent track. This System keeps the wheels parallel to the rail at all times, thereby reducing the angle of attack. Consequently, the cars are “guided” over the track, thus eliminating the contact between the wheel flange and the track when negotiating a curve. This arrangement prevents hunting of the truck by providing excellent stability over a wider speed range than is possible with the conventional method. Dangerous hunting movements and excessive wheel-rail interaction are greatly reduced.

How do Talgo Trains provide increased safety?

A number of factors make Talgo trains provide greater running stability and safety:

- Talgo trainsets are fully articulated and therefore constitute an integral assembly.
- Talgo trainsets always follow the track centerline because of their steering system.
- Talgo trainsets are low-height and have a low center of gravity, made possible by the location of Talgo trucks between cars, instead of under them.



Talgo Technological Principles & Benefits

Lightweight Aluminum Construction

- Less energy consumption
- Lower traction requirements
- Higher acceleration capability

Short-length cars

- Greater rigidity

Articulated connection between all cars

- Increased passenger comfort
- Independent wheels
- Increased safety in collision or derailment
- Reduced wheel and rail wear
- Lower maintenance costs

Guided axles

- Increased safety - no hunting movement
- Reduced wheel and rail wear
- Lower maintenance costs

Independent wheels

- Higher speeds in and out of curves
- Reduced hunting and wheel-track interaction

Talgo’s Natural Tilting System

- Reduced lateral forces that act upon passengers, increasing comfort
- No energy consumption
- Fail-safe system
- No additional maintenance costs

Low center of gravity and reduced lateral profile

- Higher dynamic stability
- Less energy consumption

Compliant

- Fully compliant with FRA regulations and APTA standards
- Crash Energy Management (CEM) system exceeds regulations and standards in the Cab and Auxiliary Car

