

The background image shows a close-up, high-angle view of a train's undercarriage and wheels on a gravel track. Several yellow and black clasp retarders are visible, mounted on the track bed. The train cars are silver and cylindrical, with 'VTG' and 'LIM' markings. The Siemens logo is in the top left corner.

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# Trackguard Retarder TW-F/TW-E

Variable clasp retarder system for speed control in  
train formation yards



# Trackguard Retarder TW-F/TW-E retarders

## Important speed control elements

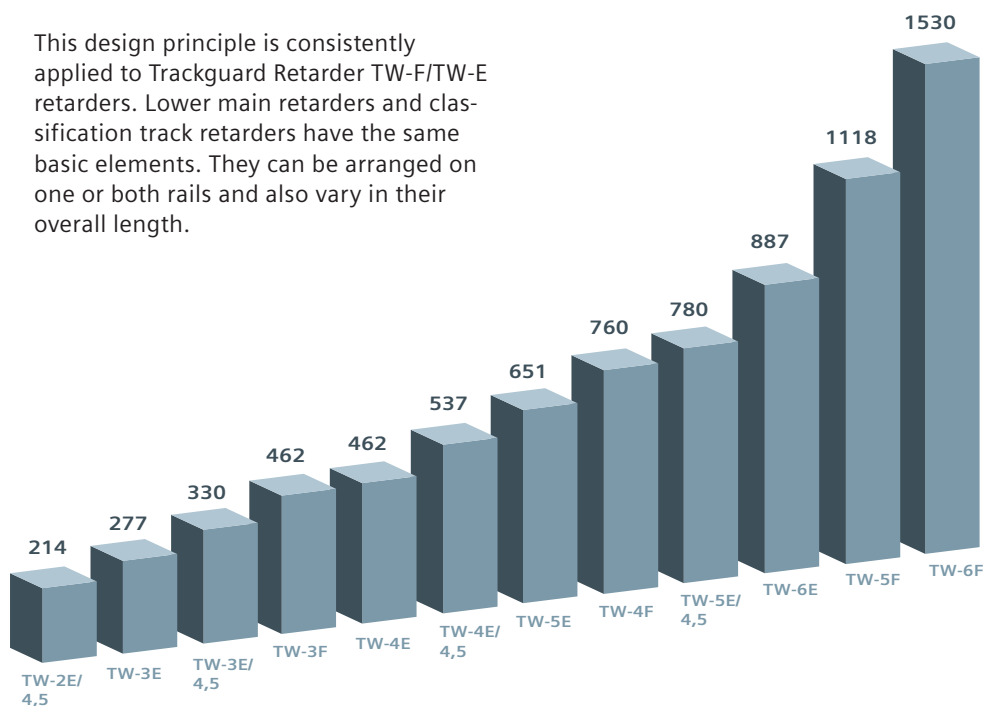
At humps in marshaling yards, retarders function as very important elements for controlling the speed of humping operations. Retarders in the classification zone of humps can be used to keep a safe distance between differently running cars, thus boosting hump efficiency.

The applications of and requirements for retarders are very diverse. Conditions at humps vary considerably.

Hence, in terms of performance, the retarders in use should be capable of being installed as a modular system (see the diagram below). The basic elements are best kept the same whereas their number and the length-dependent parts vary.

This design principle is consistently applied to Trackguard Retarder TW-F/TW-E retarders. Lower main retarders and classification track retarders have the same basic elements. They can be arranged on one or both rails and also vary in their overall length.

These numerous possibilities combine to make up the wide range of available retarders. Planning is simplified by using the modular system, enabling optimally dimensioned humps to be built. The modular system with its identical parts considerably cuts down on costs for spare parts stockage and corrective maintenance.



Retarding energy in kJ for an axle with an axle load of 22.5 t for single-rail or two-rail Trackguard Retarder clasp retarders of the types TW-F and TW-E



Clasp retarder with five power units

## Low operating costs guaranteed

Single-rail clasp retarders are noted for their very low operating costs and minimum level of necessary maintenance.

### Operating principle

With the Trackguard Retarder TW-F/TW-E clasp retarder, rolled retarding beams are mounted on individual power units. Facing the rail head, the retarding segments are bolted on as wear parts. The power units subject the retarding beams to the controllable pressing force which is created by rubber-spring assemblies. These parts only need to be replaced or reconditioned after they have been traversed by approx. 5 to 7 million axles.

In order to keep operating costs low, a retarding principle is applied which needs little external energy and which features active retarding by means of rubber-spring assemblies laterally arranged below the yellow hoods. These rubber-spring assemblies apply pressure to the outer retarding beams by way of a roller. This applied pressure and thus the retarding force vary depending on the position of the link which can be hydraulically adjusted via retarding rods. The link is driven by a hydraulic cylinder located on the exit side of the retarder.

### Optimum controllability

Low power costs and good controllability must not be mutually exclusive. Exact exit speeds from the retarders assume good controllability. This is particularly true for the classification zone where correctly kept safe distances between cars are intended to enhance humping performance.

The process of joining cars in the exact position for coupling with due regard to their load is also a major requirement on classification tracks with respect to target-shooting. In order to meet this requirement and use these benefits for customers, retarders and the Trackguard Cargo MSR 32 control system have been combined to form a highly efficient system for many years now.

Short response times of the overall system are crucial for good controllability. Small masses which have to be moved are an advantage. Application of the relevant force can be set exactly by means of a two-stage valve system on the control plate and precisely queried and adjusted by means of a position sensor on the cylinder.

Trackguard Retarder TW-F/TW-E retarders provide short response times of 100 ms between stages. In combination with usage of the Trackguard Cargo MSR 32 control system, these optimum conditions for good controllability within the entire adjustment range guarantee exact control of the retarder's exit speed. The electronic controller electromagnetically operates the valves of the control plate which are integrated into a closed control loop.



Retarding principle with rubber-spring assemblies



### Hydraulic controller

A central oil supply unit which is housed in a prefabricated building is used to operate the hydraulic controller. An external pipe ensures that the retarders are centrally supplied with oil.

The central hydraulic system comprises a unit with two fitted pumps and electric motors with a driving power of 22 kW each (see Figure 2). In general, only one pump is used for operation. A second pump serves as a stand-by for peak loads. These pumps also continuously replenish the wall-mounted storage tanks which, if necessary, continuously discharge the pressure oil into the external pipe and also serve as buffers for the pumps.

Special pressure switches control the oil pressure within a narrow range of 160 to 180 bar. The temperature, oil level and filter condition are permanently monitored. Important switching elements are designed to be redundant. Deviations from the specified limit values are recorded by the Trackguard Cargo MSR 32 control system and indicated to the operator and the maintenance staff.

At the Trackguard Retarder plant in Duisburg, the central oil hydraulic system is installed in a prefabricated building. After a trial run, it is then delivered to the

intended site ready for connection. A special benefit is the fact that the pump building can be easily removed and, if necessary, erected at another hump.

### Emissions: a good environmental balance

State-of-the-art retarders may create only low emission levels, i.e. primarily escaping oil and noise emission during retarding.

The piping between the retarders and the central hydraulic system are housed in oil-tight ducts. Furthermore, maintenance-free retarders mean that bearing points and sliding surfaces need not be greased, thus preventing any soil contamination. During retarding, very unpleasant squealing is sometimes caused by the wheels. After years of research and optimization, we have succeeded in reducing noise levels considerably. Although the phenomenon of squealing wheels has not been entirely eliminated, such noise is encountered much less frequently and noise levels are lower.

The illustration below shows our technical solution. PUCK retarding segments made of special cast iron are used on the rolled retarding beam.



- 1 Central oil supply
- 2 Hydraulic controller
- 3 Active water protection with piping installed in oil-tight ducts
- 4 Monitoring elements of the hydraulic controller
- 5 PUCK retarding segments



#### Benefits

- Large functional scope
- Low operating costs
- Good controllability
- Low emission levels
- Good operational, on-site adjustability
- Retarders scalable to the respective application
- Low noise levels due to the use of special retarder pads
- Little need for maintenance
- Discontinuation of hazardous workplaces

Single-rail clasp retarder, type TW-E, in a curve

#### Ideal adaptability

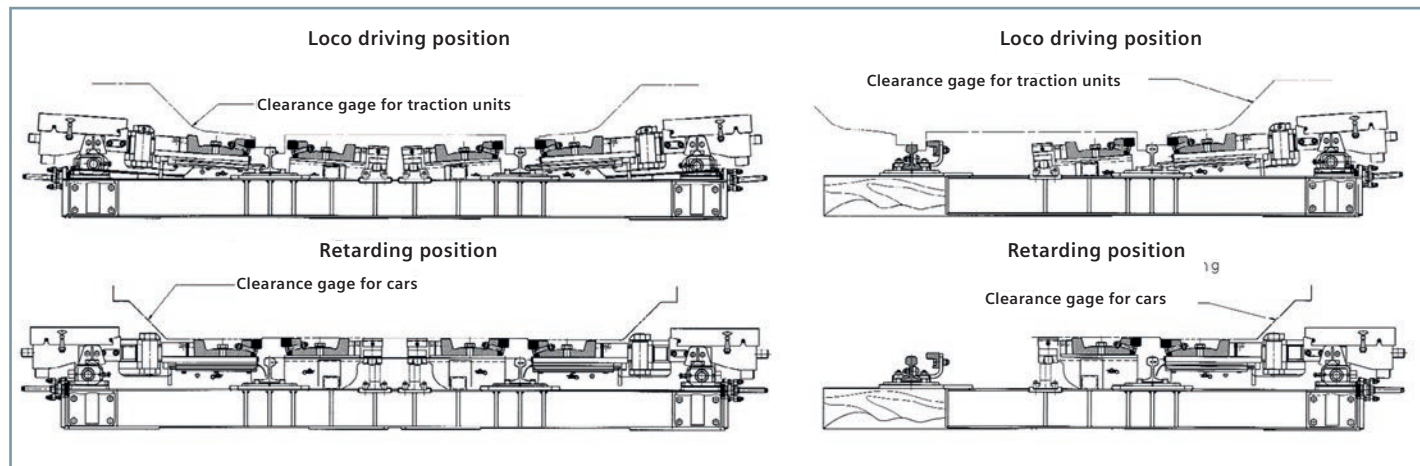
Operational, on-site adjustability is the hallmark of state-of-the-art retarders.

During retarding, the retarding beams engage with the wheel as far above the top of the rail as possible in order to create maximum retarding potential. This engagement height is often an obstruction when traction units have to run over the retarder. In such operational conditions, lowerable retarders (see the illustration below) can be used. When set to the locomotive driving position, such lowerable retarders allow traction units to pass unobstructed.

The engineering effort involved in designing lowerable retarders is relatively low. A hydraulic cylinder acts on a wedge-type lift linkage in the middle of the track. The lifting cylinders are located in the actuator chamber of the retarder. Here, they are controlled via the hydraulic control plate and monitored by position sensors. This principle enables significant operational freedom.

Good on-site adjustability is demonstrated by the Trackguard Retarder TW-F/TW-E retarders when equipping marshaling yards since classification track retarders can be installed in curves (see the

illustration above). This is particularly so if the retarder beams can precisely follow the track curve. In this case, installation lengths are reduced, especially on short curves, since the retarders can be installed immediately behind the fouling point markers. The minimum radius is 190 m and can be increased freely. A wedge-type lift linkage located in the middle of the track permits the installation of curved lowerable classification track retarders.



Operating positions of a two-rail clasp retarder, type TW-F

Operating positions of a single-rail clasp retarder, type TW-E

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