The wagon remains the most simple railway vehicle. Its brake equipment is the same, as it shall be robust, enduring and low cost (purchase and maintenance).

The wagon remains the best scale 1 test bench for brake equipment, as it is a vehicle on which maintenance remains reduced at its minimum; and that presents the most difficult operating conditions: high levels of shocks and vibrations (no secondary suspension), pollution of the railway environment to which is added the pollution of the load (powder, chemical products, grains, etc.).

**Equipment in car body**

Wagons are generally equipped only with the Brake Pipe (BP). The latter is connected to the BP of the adjacent wagons (or of the locomotive) by means of half flexible couplings linked, at each end, to a stop cock that enables, during uncoupling operations, to isolate the train portion downstream as well as to vent the flexible couplings to avoid their disconnection under pressure (which could be dangerous for the operating agent).

On the BP is connected a single distributor valve, generally mounted on a holder which ensures functions of supporting under frame and of connection to BP rigid piping.

Are also connected to the holder:
- The control reservoir, often directly flanged on the holder.
- The rigid piping to the auxiliary reservoir, supplied by the distributor valve, and mounted under frame.
- Rigid piping to the brake cylinder.

A cock installed between the BP and the distributor valve makes it possible to isolate the brake equipment of the wagon in case of problem. This cock can be operated from both sides of the wagon, by means of handles linked by a transversal rod actuating the isolating cock.

Handles installed on both sides of the car are linked by means of cables to the venting rod of the distributor valve, so as to enable brake release after isolation.

*Typical equipment of a wagon (Document FAIVELEY Transport)*
Load compensation can be performed in different ways:

- Either by means of simple "empty/loaded" device acting on the rigging (see page on the bogie brake equipment), action being:
  - Either mechanical, by means of a handle actuated by an operator after loading.

> ![Image showing empty/loaded control and G/P braking mode switching control](image)

- Or pneumatic, by means of a load weighing valve mounted in the primary suspension of the wagon, and delivering pneumatic information that actuates the load switching device over a defined level of load.

> ![Image showing load weighing valve](image)

- Or by means of simple "empty/loaded" device acting on the pressure in the brake cylinder:
  - By means of a cock actuated by a handle from one of the side of the wagon, and that enables the output pressure of the distributor valve to supply one or the two input chambers of a relay valve, which in turn modifies the maximum pressure delivered to the brake cylinder.
  - Or by means of a load weighing valve installed in the primary suspension of the wagon, which delivers pneumatic information that provokes the switching of a valve leading to supply one or the two input chambers of a relay valve, which in turn modifies the maximum pressure delivered to the brake cylinder.
Or by means of a load variable device: a load valve installed in the primary suspension of the wagon delivers a load information that is used:

- To modify the amplification ratio of the rigging, but in this case in a continuous way and not only in form of two values.
- Or to modify the pressure delivered to the brake cylinder, by means of a relay valve which ratio is variable (see page dedicated to the relay valve).

The pressure, when delivered by the distributor valve as well as by a relay valve, is supplied to a brake cylinder that presents a big diameter. This brake cylinder provides a brake force that is a function of this pressure, this brake force being amplified then transferred to the axles by means of a rigging including a slack adjuster.

A wheel installed on the side of the wagon makes it possible to apply manually the brakes (parking brake) by acting directly on the rigging.

**Equipment on axles or bogies**

Brake force is delivered by the rigging mounted under frame of the car body:

- Either directly to brake shoes for a wagon with single axles.
- Or to the rigging in the bogie for a wagon equipped with bogies: the rigging on bogies will then apply the brake shoes on the wheels.

**Particular cases**

Some wagons are equipped with particular devices due to their specific use. This is the case in particular for:

- Automobiles carrier wagons.
- High and very high speed wagons.

**Automobiles carrier wagons**

Many automobiles carrier wagons can be incorporated in passenger trains, which requires that brake application and release times are compatible with those of passenger cars (see page on the distributor valve). However, they are most of the time incorporated in freight trains, this requiring setting the brake application and release times at values that are compatible with the G mode.

This is the reason why these vehicles are often equipped with a G/P mode switching device, operated by means of handles on each side of the wagon, and acting by means of a transversal rod on the brake mode switching handle of the distributor valve. They are also, for some wagons, equipped with the Main Reservoir Pipe (MRP), the latter being however not functional but used only to ensure continuity if these vehicles are included on the front end, between the locomotive and the passenger cars.

Note that some automobiles carrier wagons dedicated only to passenger trains that are equipped with the MRP and the E.P. assist, thus guaranteeing braking performances similar to passenger cars whatever is their position in the train.

**High and very high speed wagons**

The wagons operated at high (up to 160 kph) and very high (up to 200 kph) speed also build up specific categories, and are only operated in complete trains.

Their brake equipment is relatively standard and based on a distributor valve. This makes it possible to integrate them, if need be, into any type of freight train.
However, due to the operating speeds in complete trains, these wagons are often equipped:

- With the G/P switching function, which makes it possible to operate them in complete trains with the same braking mode as passenger trains.
- With the load variable function.
- With the Main Reservoir Pipe and the E.P. assist, which provide better braking performances in terms of stopping distances.

Some wagons are sometimes also equipped with wheel mounted or axle mounted brake discs, which enable higher braking capacities: in this case, each brake disc is associated to a disc brake unit installed on the bogie (see page on the brake equipment on bogie), the compressed air delivered by the load variable relay valve being transferred on the bogie by means of a flexible hose linked to the rigid piping of the car body.

Finally, some of these wagons are equipped with a wheel slide protection device (see corresponding page). The latter is composed of an electronic unit mounted under frame in a sealed cabinet, and permanently measuring the axles speeds of the wagon by means of speed sensors. It controls two dump valves (one per bogie) mounted on the car body, just upstream the car body to bogie flexible hoses. The electric power supply is generally ensured by means of a battery that is reloaded by a generator driven by one of the axles. In order to save this power supply, the equipment automatically switches to a standby mode when the operating speed is nil since a defined time.