

OUTSTANDING SAFETY STANDARD FOR TRAILER HYDRAULIC BRAKING SYSTEM: **3 NEW EFFECTIVE SOLUTIONS**

The new **RVBR (EU 2015/68)** regulation, concerning the braking systems of agricultural machineries, establishes that new machineries are compelled to be equipped with **double line braking systems**.



In such type of hydraulic systems, the first line, the so called Control Line (CL), supplies the pressure and the quantity of oil necessary to actuate the trailer braking system. The second line, the so called Supplementary Line (SL), permanently supplies a set pressure between 15 and 35 bar, which keeps the automatic emergency brake inoperative. Whenever the pressure in the SL pipes drops below a minimum value (which means a failure of the tractor or, in the worst cases, a disconnection of the pipes eventually caused

by a crash), the braking system automatically applies the emergency brake of the trailer stopping it. **Safim, since ever active in the development of hydraulic systems for tractors and trailers, has designed different solutions complying with the requirements of the new rule**, even granting safety, easiness and convenience at the same time. Thanks to the product range of Safim, which includes efficient tractor trailer brake valves for double line trailers, today many tractors already

working on the field (almost 100.000 units) have already been provided of such hydraulic braking system, effectively anticipating the introduction date noticed in the new RVBR rule. For trailers, on the contrary, it does not exist a common European deadline for the compulsory introduction of the RVBR rule, but Safim yet in this case is ready to supply pilot and series applications as long as it disposes of systems already available and developed, which are safe and easy to use.

The three hydraulic systems for trailers developed by Safim

AS ACCUMULATOR SYSTEM	ECS EQUAL CHAMBER SYSTEM	CTS CYLINDER & TANK SYSTEM
<p>Pressurized oil stored in an accumulator is used for automatic braking in emergency condition. The benefit of this system is the compactness of the brake actuators which can be located on trailers with limited room. This system can also be used with hydraulic brakes integrated on the hub</p>	<p>Brake actuators are combined cylinders, made up of two sections, one for service brake function, the other one for automatic and parking brake function. The second section contains compressed springs which provide the necessary output force to fulfil the requirements of the new regulation concerning emergency and parking brake. ECS is a simple and effective system but, as for pneumatic spring brakes, the dimension of the actuators might limit the application on certain trailers. The oil used for releasing the spring brakes is discharged inside the spring cylinder itself</p>	<p>Similarly to the ECS system, we find combined cylinders in the CTS solution too, and spring brakes are released by SL Line pressure. The main difference from the ECS system is that once the emergency braking has to be applied (in case of disconnection of the trailer from the tractor), the oil used to release the spring brakes is discharged into a separated tank. This system is very easy to be fitted and it is also a cost effective solution</p>

The ECS and CTS systems are intrinsically safe, as because they use a merely mechanic energy source (i.e. the compressed springs in one of the two cylinder sections of a combined cylinder), that actuates the automatic emergency brake. Moreover, such systems are connected to the tractor only by pipes with no need of electrical connection, which on the contrary is necessary on AS systems.

All three systems for trailers described above are hydraulically connected to the tractor by means of a coupling device named DLC (dual line coupling).

This name identifies a mechanic assembly including CL and SL connections, properly designed to enable the coupling with the tractor in an easy and safe way.

The DLC ensures the hydraulic lines disconnection whenever the mechanical coupling of the trailer disconnects while moving. A safety cable shorter than the hydraulic hoses allows the disconnection of the coupling system of the trailer without insisting on the pipes and leaking oil on the street, applying automatically the emergency brake.

In an AS type system, the accumulator pressure can decrease only due to an emergency braking application.

The AVA block (Automatic Valve Accumulator) designed by Safim is leak-free. The pressure stored in the accumulators lasts for a very long time with no need to be frequently recharged.

The automatic braking application takes place if the tractor turns off, at the application of the parking brake, or in case of trailer disconnection in conformity with the new requirements given by the regulation. If during the automatic braking, the pressure should decrease under the safety level, an electric signal turns on the yellow light alarm on the dashboard, in order to inform the driver about the necessity to charge the accumulator through a high pressure service brake.

The AS system needs an electric cable connecting the trailer to the tractor through the ISO 7638 socket (connection ABS/EBS) which is

available as an optional device for all tractors provided with hydraulic braking system. In order to ensure this safety systems, as well as of the tractor ABS and of the correct connection of the cabling itself, the RVBR rules requires also the trailer to be electrically powered throughout the above mentioned cabling, when the engine is on, in order the automatic braking can be removed.

necessity to provide to recharge the accumulator at the first possible chance by actuating the brakes. Whenever the driver should not care about the warning, the driver itself would be forced to recharge the accumulator during the first release of the parking brake, or during the moment the engines turns off and then on.

During the SIMA exhibition in Paris on February 2019, Safim showed the evolution of such a solution with accumulator with the best improvements possible respect what required by the RVBR rule.

All systems are then provided by a manual pump and an automatic/manual selector, which temporarily releases the automatic brake in case a suitable tractor is not available. With this operation the certified braking system of the trailer is not tampered. The manual/automatic selector is restored on

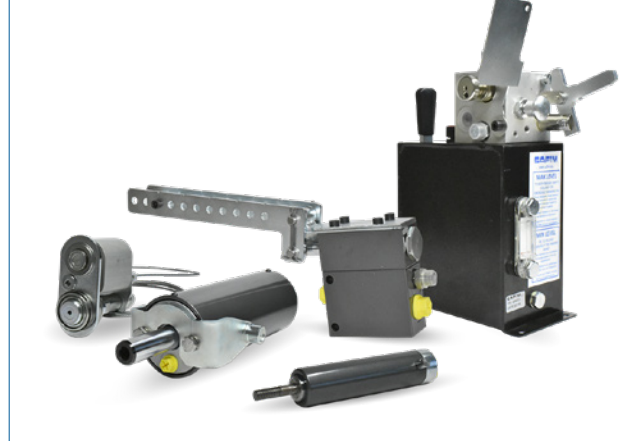
“automatic” mode just when the trailer is once again reconnected to the tractor complying with RVBR Rules, when the SL line gets in pressure.

If on the contrary the trailer should be towed by a tractor provided with a single line braking system, Safim offers an adapting joint standing between and making the hydraulic connection possible. In this case it is necessary to position the selector in “manual” mode to free the automatic braking.

In such configuration, the tractor actuates the service brake of the trailer, while automatic braking activates only in case of mechanical disconnection of the DLC coupling.

Not to forget that, in this case, locally in each European country it is necessary to ask for an authorization to the relevant authorities in order to travel on the public road.

double line braking system components



Every braking system manufactured by Safim complies with RVBR regulation requirement, moreover Safim introduced on its braking systems further improvements on safety, avoiding the release of the automatic braking function if the accumulator does not reach the prescribed pressure. A red indicator light and an acoustic alarm have been added on the trailer just in case it is difficult to see the indicator on the dashboard due to the daylight.

If the indicator notifying a low pressure of the accumulator turns on during the movement (this may happen in event the vehicle starts moving having the safety pressure level of the accumulator next to the minimum) the braking system will not apply the automatic emergency brake as long as the rule does not allows it. In this case, in fact, no dangerous situation are detected because the accumulator is still provided with a sufficient pressure to ensure the automatic braking application. The driver, at the same time, would be correctly noticed of the



	EMERGENCY BRAKE	SPRING BASED SOLUTION	ACCUMULATOR BASED SOLUTION	AUTOMATIC PARKING BRAKE
AS →	✓		✓	
ECS →	✓	✓		✓
CTS →	✓	✓		✓

	SYSTEM DIMENSIONS	ELECTRIC CONNECTION NEEDED	REGULATION COMPLIANCE UE 2015/68
AS →	*	✓	✓
ECS →	**	✗	✓
CTS →	***	✗	✓