

Dear Colleagues,

Colin Ross gave some interesting inputs ([EVSC06-23](#)) to the letter of Winfried Gaupp ([EVSC06-21](#)). Please see my comments below in *italic letters*.

During the meeting on 30./31. of March the EVSC group made the decision to stay on the words we find in EVSC 05-38 Rev 3, because most meeting attendances believe minimum design restrictions will be accepted more likely by GRRF. For this reason we agree to the proposal. From our point of view an additional meeting is not necessary.

Kind regards,

Christoph Adam
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Gents,

I would like to comment on the content of the mail from Mr.Gaupp as follows:

The topic of whether a roll-over control system should have the capability of braking all axles was first discussed at the meeting held in Brussels and it was accepted that the requirements should reflect the state of the art at that time which for trailers means that there are two different philosophies used, one having the capability of automatically braking the front axle and the other not having that capability. After discussion it was agreed that braking only one axle would be acceptable.

With respect to my document EVSC 05-49 this was introduced to clarify the requirements concerning the braking of axles within an axle group as it was currently required that the left and right wheels of all axles must be individually controlled which would have meant that 6 or 8 channel systems would be required for some commercial vehicles. When this subject was discussed at the Munich meeting the paragraph relating to direction control was amended at the time and the roll-over control paragraph and that of the trailers was amended later. Unfortunately the text in EVSC 05-38 Rev 2 did not reflect the content of EVSC 05-49 as there was now the reference to controlling "each" axle or axle group. This oversight then re-opened the discussion at the Paris meeting when the error was pointed out.

From a technical and legislative point of view I would make the following comments:

Having a requirement that a system must have the capability of controlling each axle group is no guarantee of performance. The argument put forward by Mr.Gaupp supposes that if the capability exists then all wheels will be braked to their maximum and the highest level of performance produced. In theory this may be correct but in practice this is not the case. In a roll-over condition the loading of the inside wheels is reduced and may be zero. In this case applying full braking to all outside wheels is not desirable particularly on steering axles as this will cause a significant yaw moment that may make the vehicle even more unstable.

[Adam, Christoph]

I agree: design restrictions do not guarantee a good system performance. And of course the braking of the wheels of the steered axles has to be done in a way that the stability of the vehicle is improved and not reduced. The value of the brake forces must not exceed a level where the driver cannot keep the vehicle under control. But this coherence of physics is valid for front and rear axles, too: braking of the front axle generates yaw moments, braking of the rear axle generates the risk of losing the cornering forces that will lead to oversteering and/or skidding. As all stability control systems work in the range of the stability limit, all control actions have to follow sophisticated algorithms and a compromise has to be found to reduce vehicle speed as fast as possible (to avoid the roll over) and to

keep the vehicle stable. For all trailers yaw moments are not as critical as for driven vehicles, because both front axle of the full trailer and king pin of the semi trailer are lead by the truck/tractor.

Equally on trailers the minimum number of directly controlled wheels is prescribed which in the case of full trailers is two directly controlled wheels on one front axle and two directly controlled wheels on one rear axle equally directly controlled wheels are not allowed to lock.

[Adam, Christoph]

These requirements are part of Annex 13, that describe ABS systems. Here we talk about stability control systems which have their own requirements. Even when both functions - ABS and ESC - use some identical components, the use of a select high algorithm for the roll over protection function the vehicle is permitted.

As full trailer braking systems are generally a 4S/3M configuration with the single modulator being installed on the front axle and utilises select low control then the maximum braking force that can be transmitted to that axle is limited to the load on the inside wheel which if it is approaching zero means the braking force produced by that axle will also approaching zero and therefore have little or no impact on the vehicle deceleration produced.

[Adam, Christoph]

I agree that 4S/3M configuration is a standard on full trailers, but the installation of a single modulator on the rear axle and using an individual control of the wheels with two modulators on the front axle is widespread. Advantage: significant higher vehicle deceleration because the load transfer to the front axle while braking is used. The generated yawing moments are retained by the draw bar connected to the truck.

In the case of a roll over protection control this configuration with an individual control on the front and a select high control on the rear axle (not for ABS, for roll over protection, only !) generates deceleration values that are more than 2 times higher compared to a system with 2 modulators on the trailer rear axle and not braking the trailer front axle.

Therefore in conclusion it may appear that having a requirement which demands that all axles must have the capability of being braked does not guarantee a higher performance level than what is current required in EVSC 05-38 Rev 3 therefore it is proposed that the existing text should remain unchanged.

Best Regards

Colin Ross