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March 27, 2019

## SECURING OF PETS WITH THE HELP OF BELT AUTOMATS AND ISOFIX OR TOP TETHER

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### Recommended Citation

Schwaiger, Verena, "SECURING OF PETS WITH THE HELP OF BELT AUTOMATS AND ISOFIX OR TOP TETHER",  
Technical Disclosure Commons, (March 27, 2019)  
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## SECURING OF PETS WITH THE HELP OF BELT AUTOMATS AND ISOFIX OR TOP TETHER

### Technical task:

Pets are often transported in transport boxes in the boot of the vehicle. In vehicles with a small trunk or if the load does not allow it differently, other ways have to be found. This also applies to limousines or two-seaters. In Germany, for example, securing the animal is legally obligatory. The following solution variants are used:

1. transport box on one of the seats, secured by the seat belt
2. a pet is secured to the closed belt with a harness and an intermediate line (e.g. by knotting or threading)
3. a pet is secured with a harness via an intermediate line by means of a latch tongue on the belt buckle
4. pet travels in passenger footwell (allowed in some countries)

### Initial situation:

Assigned to the alternative 1-4

Regarding alternative 1:

- Slipping of the belt cannot always be ensured, in case of an accident the box can slip.
- Not practical for large pets, as boxes are only available on the market up to a certain size.
- Movement of the pet in the box not ensured in the event of an accident, e.g. maximum movement path specified by the size of the box (conflict of interest between maximum comfort and maximum safety)

Regarding alternative 2:

- Damage/deformation of the webbing may occur => may lead to problems when retracting the webbing in the automatic conveyor.
- The position of the berthing point cannot be individually determined (belt buckle on the rear seat and passenger seat always in the middle of the vehicle), thus possibly impairing other occupants and the driver
- Length of belt always the same (conflict of interest between maximum comfort and maximum safety)

Regarding alternative 3:

- Position of the mooring point always in the middle of the vehicle at the belt buckle, thereby impairing other occupants and the driver if necessary.
- Length of belt always the same (conflict of interest between maximum comfort and maximum safety)

Regarding alternative 4:

- Loss of passenger safety
- Loss of comfort for the passenger
- Pet is not fixed in the vehicle and can move more or less freely

### Solution:

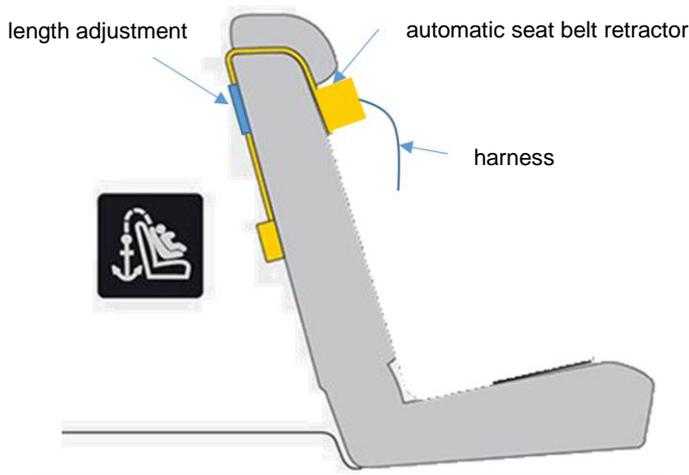
Instead of the belt or belt buckle, the Iso-Fix or Top-Tether bracket is used as the anchorage point. An automatic belt conveyor replaces the fixed-length piece of line.

It is possible to use a commercially available automatic harness which may have to be adjusted in its harness length. At its end a karabiner must be attached which fulfils the necessary breaking loads.

The automatic seat belt retractor must be encased in a housing (e.g. made of injection moulded parts) to protect the seats of the vehicle from damage.

In the example of the Iso-Fix bracket, the automatic seat belt retractor must be attached to the ISOFIX locking arm via a flexible connection.

In the case of the Top Tether mount, the automatic belt tensioner must again be connected to the Top Tether via a length-adjustable connection with a rake. The length adjustment is necessary because the installation position of the Top Tether can vary greatly in its distance from the target position of the automatic belt conveyor.



**Figure 1: Top-Tether-Holder**

**Advantages:**

By using Iso-Fix or Top-Tether, no components of the car are misused (knotting an intermediate line to the vehicle belt). The use of the top mooring point and the slight pre-tensioning in the belt eliminates the risk of the animal getting entangled. In addition, the external position can be used instead of the vehicle central position of the belt buckle. The animal is fixed in such a way that, with sufficient freedom of movement, it cannot yet enter the area of other occupants.

The use of an automatic belt dispenser does not restrict the animal's freedom of movement within the available space, but the restraint system is always in use with as few belt lots as possible. This also reduces the strain on the animal in an emergency.

The fact that the animal can be strapped on more easily can be seen as a gain in comfort, since the strap from the automatic belt dispenser is always in the same rest position and can be pulled out beyond the actually necessary length for putting on. In addition, the automatic harness sits so accessible that the animal does not cover it.