



Child Safety

in Cars

bast

Federal Highway Research Institute

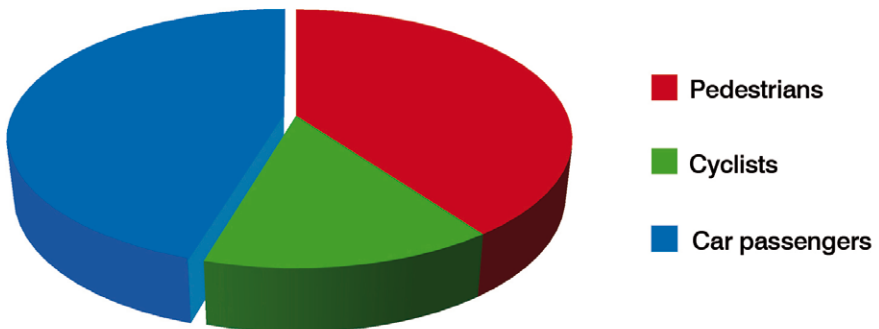
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Introduction

In 2013, 4,464 children under the age of 15 years were severely injured or killed in road traffic, 1,228 of these in cars. Of the 58 children killed in road traffic, 25 were killed in a car (43 percent) [Source: German Federal Statistical Office].

Killed children (under the age of 15 years) by type of road use



What is the legal situation in Germany?

In Germany, all children younger than 12 years, who are shorter than 150 cm, must be transported in an appropriate child restraint system (CRS), which is approved in accordance with the UNECE Regulation 44/03 or UNECE Regulation 129 or any amendments to these Regulations.

StVO (German Road Traffic Act) § Section 1a, as of 22 October 2014

“All children younger than 12 years, who are shorter than 150 cm, may only be transported in motor vehicles on seats for which safety belts are prescribed, if child restraint systems are used which comply with the requirements described in Article 2 Section 1 Letter c of the Council Directive 91/671/EEC of 16 December 1991 on the obligation of using child restraint systems in motor vehicles (Official Journal EC. No. L 373, P 26), last prepared in Article 1 Section 2 of the Implementing Directive 2014/37/EC on 27 February 2014 (official journal L 59 dated 28.02.2014, P. 32), and which are suitable for the child.”

Article 2 Section 1 Letter c of the Council Directive 91/671/EEC of 16 December 1991, last amended by Article 1 Section 2 of the Implementing Directive 2014/37/EU on 27 February 2014

„(...)

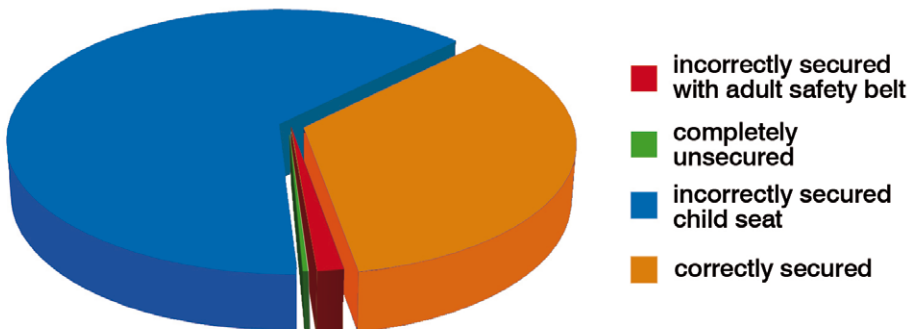
c) where a child restraint system is used, it shall be approved to the standards of: UNECE Regulation 44/03 or Directive 77/541/EEC or UNECE Regulation 129; or any subsequent adaptation thereto. ...”

Use and misuse of child restraint systems

The figures of the German Federal Highway Research Institute (BASt) from 2013 show a use of child seats in vehicles in built-up areas at 82 percent. When looking at children up to an age of five years, this figure is 90%. [Source: BASt; Forschung kompakt 11/14]

Studies on misuse, however, showed that only 35% of these children are secured correctly in the child restraint system. Incorrect use of the child restraint systems can drastically reduce the protective capability. [Source: BASt; Report M178; 2006]

Safety ratio of children from 349 random samples



A step towards the reduction of misuse is the introduction of the IsoFix anchorages. IsoFix is a rigid connection of the child restraint system and the car via two standardized attachment points. This system facilitates the installation of child seats into the car and reduces potential misuse. In addition, the IsoFix protective system has a further anchoring point in the vehicle to prevent the child seat from rotating. Here, a support leg or a top tether can be used.

To reduce the risk of severe injuries in the case of accidents, it is important that babies and toddlers are transported against the driving direction for as long as possible.

Compared to older children and adults, they have weaker neck muscles carrying a relatively large and heavy head. A (too) early change into a forward-facing child restraint system, increases the risk of severe injury to the cervical spine in case of accidents.

A rearward facing child restraint system is too small if the child's head is on the same height of the upper edge of the shell, is above the edge or if the child has exceeded the weight approved for the group.

The use of a rearward facing child restraint system on a vehicle seat with activated passenger airbag is prohibited by law due to the danger it holds.

Please check the vehicle manual to determine whether a child restraint system may be placed on the passenger seat and how the airbag can be turned off, if necessary.

Child restraint systems according to UNECE Regulation 44

Child restraint systems approved according to UNECE Regulation 44 are divided into five weight groups:

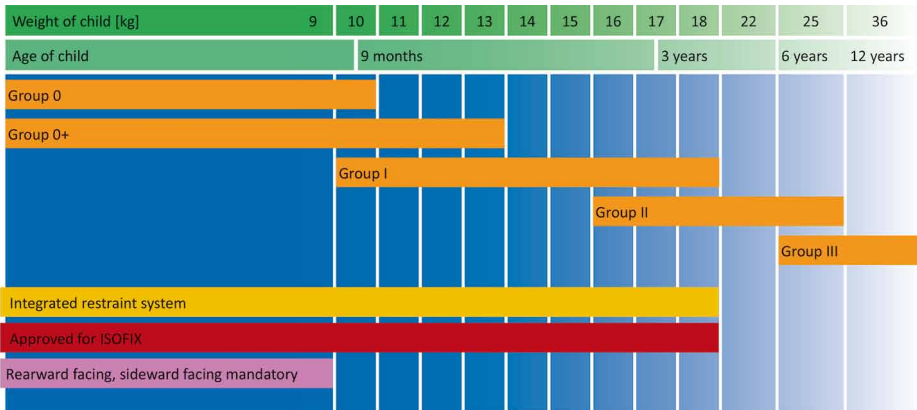
Group	Weight
Group 0	up to 10 kg
Group 0+	up to 13 kg
Group 1	9 to 18 kg
Group 2	15 to 25 kg
Group 3	22 to 36 kg

The child restraint systems of the groups 0 and 0+ must be rearward facing (or lateral as a carry-cot). Group 0+ systems may be used up to a weight of 13 kg.

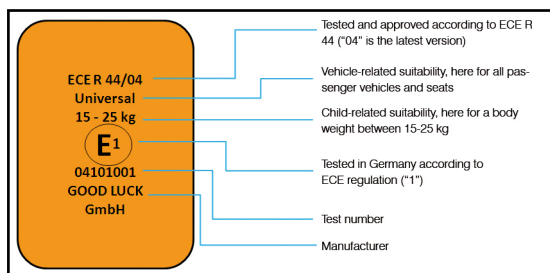
The groups 0, 0+ and 1 have an integrated harness system or (only for group 1) an impact shield, which holds back the child. In the groups 2 and 3, the child is mostly restrained by the safety belt of the vehicle.

IsoFix for the connection of child restraint systems to the vehicle is approved for groups 0 to 1.

A child restraint system approved according to UNECE Regulation 44 has a relevant marking. The marking shows the version of the Regulation under which the system was approved (also part of the test number, see the first two digits). Furthermore, it must be indicated for which body weight of the child the child restraint system is suitable for, the suitability with regard to the vehicle, the country in which the seat was approved as well as the seat manufacturer.



Child restraint systems can be approved universally, i.e. they are suitable for almost all vehicle seats which are approved in accordance with UNECE Regulations 14 and 16 (vehicle manual). Semi-universal approved child restraint systems use (safety) equipment which cannot be used on all vehicle seats. Vehicle-specific child restraint systems are approved specifically for each vehicle model. For semi-universal and vehicle-specific child restraint systems, the usability for each seat must be checked by means of the vehicle type list associated with the child seat.



Child restraint systems according to UNECE Regulation 129

Since 09.07.2013, child restraint systems can be approved in accordance with the new UNECE Regulation 129 for child restraint systems.

The UNECE Regulation 129 simplifies the use of child restraint systems in order to minimize the risk of misuse.

So-called “i-Size” systems are being introduced. An “i-Size” child seat is a universal IsoFix system and is attached in the vehicle using the IsoFix anchorage points. All “i-Size” child restraint systems can be used on any vehicle seats suitable for “i-Size”, which are approved according to UNECE Regulation 14 and 16. Either a top tether or a support leg can be used as the third anchoring point. Both systems can be used universally on “i-Size” seats. “i-Size” child seats and vehicle seats with “i-Size” approval, are marked with the new symbol.

The child restraint systems are categorized based on size. This means,



that the appropriate child restraint system is chosen according to the body size of the child. The manufacturer determines the sizes approved for the relevant systems and indicates this on the child seat.

The inner dimensions of the child restraint system are checked within the framework of the approval according to UNECE Regulation 129, ensuring usability across the entire designated size range.

In addition to the size range, a maximum weight is indicated, up to which the child seat can be used. This way, it is ensured that all safety-relevant

components, also vehicle components, are dimensioned for the total weight of the child and child seat.

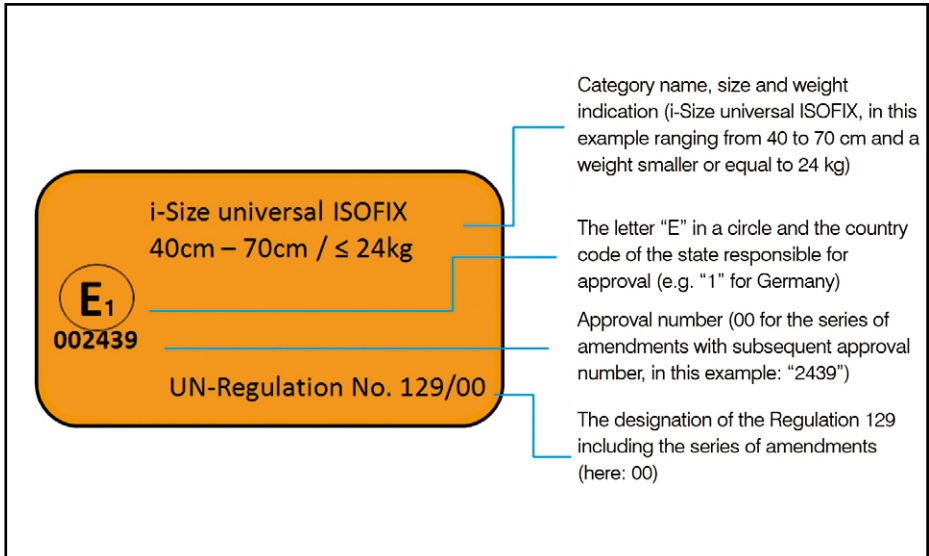
This classification simplifies the choice of a suitable child restraint system and reduces the danger of a too soon change to subsequent systems.



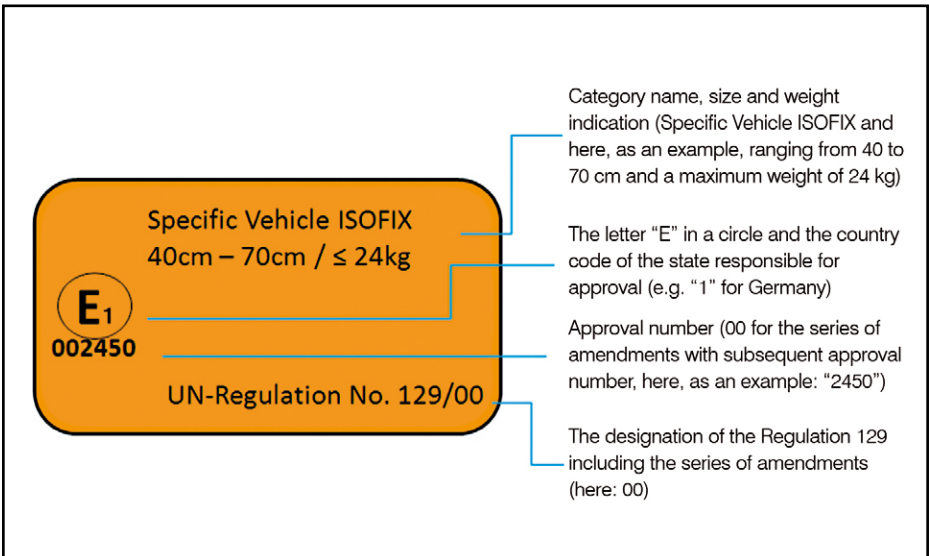
Children under the age of 15 months must be transported facing rearwards or sideways in seats that are approved according to UNECE Regulation 129. This takes into account the special required protection of the head and neck of babies and toddlers and a too soon change to forward-facing systems is restricted. In addition, the passive safety was improved in UNECE Regulation 129. A dynamic test for side impact is now required for the approval of child restraint systems.

In addition to an approval as an “i-Size” universal IsoFix child restraint system, the UNECE Regulation 129 also offers the option of a vehicle-specific approval. Here, the usability for each seat must be checked by means of the vehicle type list associated with the child seat. This approval is specifically required for child restraint systems that do not fit in the prescribed space for universal child restraint systems, for example, larger rearward facing systems.

A child restraint system approved according to UNECE Regulation 129 has a respective marking. In addition to the “i-Size” symbol, universal IsoFix child restraint systems have a marking attached on the child seat, which must contain at least the following information:



Appropriate marking must be affixed on child restraint systems with vehicle-specific approval in accordance with UNECE Regulation 129.



Usability of child restraint systems

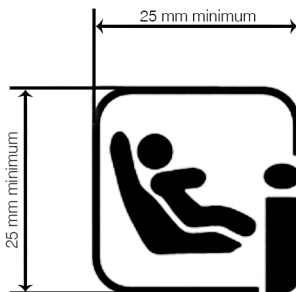
- Child restraint systems can be approved according to UNECE Regulation 44 or UNECE Regulation 129. Child seats that are approved according to UNECE Regulation 44/03 and subsequent amendments can still be used.
- Phase 1 of the UNECE Regulation 129 which has come into force by now, only applies to integrated IsoFix child restraint systems, meaning those, which are equipped with its own harness system or an impact shield for restraining the child. Child restraint systems which are installed with vehicle safety belts or where the child is restrained by means of the vehicle safety belts, are currently not included in UNECE Regulation 129.
- “i-Size” child restraint systems can always be used on “i-Size” vehicle seats.
- To use an “i-Size” child restraint system on an IsoFix vehicle seat, approval from the manufacturer is required. Please see the additional information of the child seat for this approval.
- If necessary, the current vehicle list of the child seat must be considered, as is the case for semi-universal child restraint systems according to UNECE Regulation 44. The vehicle list contains the vehicle makes in which the child seat can be used and specifies which IsoFix vehicle seats the child seat can be used on.
- IsoFix child restraint systems may be used, in accordance with the information in the vehicle manual, on seats that are marked with “i-Size”. For CRS with semi-universal or vehicle-specific approval, the current vehicle list of the child seat must be considered.

Questions and answers about the new UNECE Regulation on child restraint systems

1) What is i-Size?

Since 09.07.2013, child restraint systems can be approved in accordance with the new UNECE Regulation 129 for child restraint systems. The new regulation simplifies the application of child restraint systems, in order to minimise the risk of danger due to incorrect use. So-called universal IsoFix systems (named: “i-Size”) are being introduced. All “i-Size” child restraint systems can be used on any vehicle seats suitable for “i-Size”. “i-Size” child seats with support legs can also be used universally on all “i-Size” seats.

“i-Size” CRS and vehicle seats approved for “i-Size” are marked with the new symbol.



In addition to the simplified use of the child restraint systems, the passive safety has also been improved. Furthermore, a new size-based categorisation of the child seats was performed, which simplifies the choice of an appropriate child restraint system.

2) What is the difference between the UNECE Regulation 44 and the new UNECE Regulation 129?

CRS are no longer categorised by weight groups, as is the case under UNECE Regulation 44. The weight group categorisation partially overlapped and experience showed that this resulted in child seats being changed to the next group too early. The categorisation of child restraint systems in the UNECE Regulation 129 is no longer only based on the weight of the child, as in UNECE Regulation 44, but based on the size of the child in cm and the maximum weight, the child may have. The manufacturer displays this information on the seat.

When using child seats according to the new regulation, children under the age of 15 months must in future be transported in rearward facing systems. This is also to prevent a too early change to forward-facing systems and in particular, to increase the protection of the head and neck. In addition UNECE Regulation 129 requires a dynamic test for side impact. Under UNECE Regulation 44, the side impact is not tested dynamically.

3) Are child restraint systems that conform to the new regulation, safer?

The new regulation simplifies the application of child restraint systems.

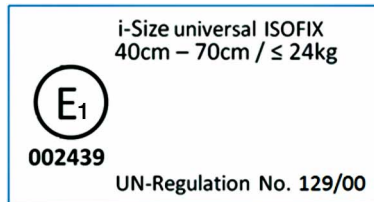
Child restraint systems in accordance with UNECE Regulation 129 offer a higher level of safety than systems in accordance with UNECE Regulation 44.

4) How do I recognize a child seat that is approved according to UNECE Regulation 129?

Child restraint systems in compliance with UNECE Regulation 129 can be recognized by the approval mark, which must be attached to the child restraint system.

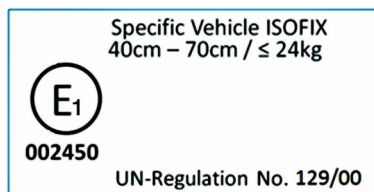
Examples for approval marks in accordance with UNECE Regulation 129:

Example 1



- The letter “E” in a circle and the country code of the state responsible for approval (e.g. “1” for Germany)
- An approval number (00 for the series of amendments with subsequent approval number, in this example: “2439”)
- The designation of the Regulation 129 including the series of amendments (here: 00)
- The category name, the size and weight indication. (i-Size universal ISOFIX and here, as an example, ranging from 40 to 70 cm and a maximum weight of 24 kg)

Example 2



- The letter “E” in a circle and the country code of the state responsible for approval (e.g. “1” for Germany)
- An approval number (00 for the series of amendments with subsequent approval number, here, as an example: “2450”)
- The designation of the Regulation 129 including the series of amendments (here: 00)

- The category name, the size and weight indication (Specific Vehicle ISOFIX and here, as an example, ranging from 40 to 70 cm and a maximum weight of 24 kg)

Children's seats which are approved as "i-Size universal ISOFIX" (example 1) are additionally marked with an "i-Size" symbol. "Specific Vehicle ISOFIX" seats (example 2) are approved for use in certain vehicles. Here, the vehicle list associated with the child seat must be observed.

5) Is a double marking of a seat according to UNECE Regulation 44 and 129 allowed?

A double marking is not allowed. A child restraint system must be approved either in accordance with Regulation 44 or Regulation 129 and be marked respectively.

6) In future, are child restraint systems manufacturers bound to the i-Size regulation of UNECE Regulation 129?

This depends on the manufacturer's strategy. It is assumed that vehicle-specific seats will come onto the market also in future, as not every vehicle seat is suitable for "i-Size" and therefore, no "i-Size" marking can be used.

7) Can i-Size child seats only be used on i-Size vehicle seats?

If, in the future, the vehicle is equipped with "i-Size" seats, then the child restraint system is suitable for use on the "i-Size" seats in the vehicle. Generally, child seats marked with the "i-Size" symbol may only be used on vehicle seats if these are also marked with the "i-Size" symbol. However, manufacturers of child restraint systems can approve a child seat marked with the "i-Size" symbol for use on other vehicle seats if they are equipped with IsoFix. Please see the additional car manufacturers' information to determine whether a special child restraint system is suitable for the provided IsoFix seat. Please check the current vehicle list of the child seat when using a child seat with support leg on an IsoFix seat. The vehicle list contains the vehicle makes in which the child seat can be used and specifies which IsoFix seat the child seat can be used on. The problem only applies to "old" vehicles, however, will also occur in new vehicles, as not all seat positions can be marked as "i-Size".

8) Can an IsoFIX child restraint system be used on an “i-Size” seat?

IsoFix child restraint systems may be used, in accordance with the information in the vehicle manual, on seats that are marked with “i-Size”. For semi-universal seats please adhere to the manufacturer’s vehicle type list.

9) What must I take into account when purchasing the correct “i-Size” child seat?

Manufacturers indicate the child size range, in centimetres, on the child restraint system for which the seat is suitable. In addition, the maximum weight for use of the seat is also indicated here. In a vehicle with “i-Size” seats, any type of “i-Size” child seat can be used. If the child seat manufacturer has approved the use of the “i-Size” seat for certain vehicle seats with IsoFix marking, then the child restraint system can be used like an approved system under UNECE Regulation 44, i.e. according to the specifications in the vehicle manual.

10) Why are child restraint systems categorized by size and weight?

Child restraint systems are categorized by size of the child to make it easier for parents to choose the correct child seat. Parents often rather know the size of the child than the weight. A review of the inner dimensions and the belt adjustment options in the new UNECE Regulation 129 ensures that the product can be used for the specified size range. The maximum weight of the child, up to which the child seat can be used, ensures that all safety-relevant components, including vehicle safety-relevant components are dimensioned according to the total weight of the child and child seat. The categorization also reduces the number of too early changes to a new system.

11) Why do children under the age of 15 months have to be transported rearward facing?

When using child seats according to the new regulation, children under the age of 15 months must in future be transported in rearward facing or side-facing systems.

The weak neck muscles of toddlers in combination with a large head in relation to the body size, requires special protection of the head and neck. For this reason, the new regulation includes an age limit up to which children must be transported at least rearward facing or side-facing.

12) When did the new Regulation come into force and when will the “i-Size” seats be available in vehicles?

The new UNECE Regulation 129 for child restraint systems came into force on 09 July 2013. Since mid 2013, vehicle manufacturers can also approve vehicle seats as “i-Size” seat positions. The first vehicles with seats marked as “i-Size” already came onto the market in 2014.

13) Is it possible to mark different seats with IsoFIX and “i-Size” in one vehicle?

Different markings are possible in a vehicle, if the space conditions are not met for all seats in the vehicle for approval as an “i-Size” seat.

14) Is a vehicle-specific approval for child restraint systems still possible?

Particularly in smaller vehicles it is not always possible to offer the “i-Size” marking for all seats, due to insufficient installation space. The German Federal Ministry of Transport and Digital Infrastructure (BMVI) will make certain, also in the future, that smaller vehicle models are not excluded from the possibility of using child seats.

15) Can I continue using child restraint systems that are approved according to UNECE Regulation 44/03 or 04?

The previous child restraint system regulation (UNECE Regulation 44) remains in force and all “old” child seats in accordance with UNECE Regulation 44 (series of amendments 03 and subsequent amendments) may still be used. Purchasing new child seats in accordance with UNECE Regulation 44 is permitted.

16) In future, are both regulations (UNECE - R 44 and UNECE-R 129) valid in parallel?

Yes, both regulations are currently valid in parallel. Currently, the UNECE Regulation 129 only includes integrated IsoFix child restraint systems, meaning those, which are equipped with own harness systems or an impact shield for restraining the child.

Following a transition phase, in which the UNECE Regulation 44 will be revised, IsoFix child seats will only be approved in accordance with the new UNECE Regulation 129. Child restraint systems that are fixed with vehicle safety belts or where the restraint of the child takes place with the vehicle safety belts are not yet included in the UNECE Regulation 129. Requirements for these non-integrated child restraint systems, where the child is restrained by the vehicle safety belt, are currently being developed by the UN Economic Commission for Europe (UNECE) for the new regulation. The procedure for child seats with integrated restraint systems, which are not fixed by IsoFix, but with the vehicle seatbelt, will be determined at a later point in time.

17) Is there a uniform communication strategy with regard to the approval of child seats in accordance with Regulation 44 and 129 ? How are insecurities among consumers being avoided with different instructions in the relevant manuals?

The German Federal Highway Research Institute (BAST) has published an information brochure about child seats for consumers.

In addition, the communication strategy is set by the individual manufacturers. The operating instructions also provide information for consumers. Clear information should be available in the relevant vehicle and child seat manuals. This of course requires communication between car manufacturers and child seat manufacturers.

18) Are “i-Size” child restraint systems available for all age groups?

Currently, only child restraint systems with integrated belt systems can be approved on the basis of UNECE Regulation 129. The use of “i-Size” child restraint systems is restricted by prescribed maximum dimensions and compliance with the total weight of the child and the child restraint system. The approval as a “Specific Vehicle ISOFIX” seat allows exceeding the maximum dimensions e.g. for large rearward facing child restraint systems,

whereby the requirements for passive safety of the UNECE Regulation 129 remain binding. The requirements for child restraint systems without own integral harness system for older children are currently being reworked within the framework of the UNECE Regulation 129.

19) Are the new child restraint systems permitted for use in Germany?

Yes, according to § 21 Section 1a of the German Road Traffic Act (StVO), child restraint systems according to the UNECE Regulation 44 and the new UNECE Regulation 129 are permitted. Due to the easier handling and improved protective effect, the BMVI recommends the use of child restraint systems in accordance with the new UNECE Regulation 129.

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