INTERNATIONAL STANDARD

ISO 13216-3

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Road vehicles — Anchorages in vehicles and attachments to anchorages for child restraint systems —

Part 3: Classification of child restraint dimensions and space in vehicle

Véhicules routiers — Ancrages dans les véhicules et attaches aux ancrages pour systèmes de retenue pour enfants —

Partie 3: Classification des dimensions des retenues pour enfants et espace dans le véhicule

Reference number
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13216-3 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 12, *Passive safety crash protection systems*.

ISO 13216 consists of the following parts, under the general title *Road vehicles — Anchorages in vehicles and attachments to anchorages for child restraint systems*:

— *Part 1: Seat bight anchorages and attachments*

— *Part 2: Top tether anchorages and attachments*

— *Part 3: Classification of child restraint dimensions and space in vehicle*

Introduction

The basic ISOFIX standard ISO 13216-1 provides requirements needed for positioning of the seat bight anchorages, the geometry around anchorage points and, to some extent, dimensional requirements for forward-facing child restraint systems.

In order to ensure that a child restraint system fully fits in a vehicle, it is also essential that the vehicle interior and the child restraint system match each other spatially. This part of ISO 13216 provides requirements for the space needed in vehicles to accommodate child restraints, in particular for rearward-facing child restraint systems.

Not all vehicles on the market are capable of accommodating the largest child restraint systems. This part of ISO 13216 thus provides a rough classification system to help in judging which types and sizes of child restraint systems will fit in the vehicle. Three size classes of forward-facing systems and three size classes of rearward-facing systems are provided. In addition, two classes of lateral-facing systems are included.

A suggested marking of the space available for the respective child restraint positions in the vehicle, and for the child restraint system dimensions, is included in this part of ISO 13216 to help consumers choose a child restraint system that is dimensionally suitable for their vehicle. This information is shown in informative Annex A.

Road vehicles — Anchorages in vehicles and attachments to anchorages for child restraint systems —

Part 3: Classification of child restraint dimensions and space in vehicle

1 Scope

This part of ISO 13216 classifies the spatial requirements in a vehicle to enable a child restraint system (CRS) to be conveniently mounted. It also specifies the dimensions of child restraint systems, in order to ensure that they will fit in vehicles.

A classification scheme is provided to determine dimensional compatibility between child restraint systems and the available space at specified seating positions in vehicles. The dimensional requirements refer to forward-facing child restraint systems of three size categories, rearward-facing child restraint systems of three size categories, and lateral-facing child restraint systems of two categories.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6549, *Road vehicles — Procedure for H- and R-point determination*

ISO 13216-1:1999, *Road vehicles — Anchorages in vehicles and attachments to anchorages for child restraint systems — Part 1: Seat bight anchorages and attachments*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13216-1, ISO 6549 and the following apply.

3.1
child restraint envelope
envelope simulating the dimensions of a child restraint system of a specified class, used in this part of ISO 13216 to evaluate the space available for child restraint systems in a vehicle at a specified seating position

NOTE The child restraint envelope is also used to identify the dimensional class for a given child restraint system.

4 Vehicle space requirements

4.1 Space required in a vehicle to accommodate forward-facing, rearward-facing and lateral-facing child restraint systems

It shall be possible to accommodate the child restraint envelopes as specified below at a specified seating position in a vehicle, without interference with the vehicle interior elements, such as head restraints, dashboard, windshield, or the vehicle seat in front of the seating position.

When checking the child restraint envelope on a seat, the vehicle seat shall be adjusted longitudinally to its rearmost position and its lowest position.

In addition, when checking the child restraint envelope in a rear seating position, the related vehicle front seat shall be adjusted as follows:

— longitudinally, to the mid-position between the rearmost position and the foremost position;

— vertically, to the mid position of its height adjustment;

— the seat backrest may be adjusted, but not to a more upright angle than corresponding to a torso angle of 15°, measured according to ISO 6549.

The requirements of this subclause only apply for the child restraint envelope when positioned in the anchorages. It is not required that the child restraint envelope shall move in and out of the seat under these conditions.

NOTE When installed on a vehicle seat, the child restraint envelopes in 4.2 to 4.8 will have a pitch angle of 15° ± 10°, which corresponds to a clockwise rotation of the side view (upper-right drawing) in Figures 1 to 7.

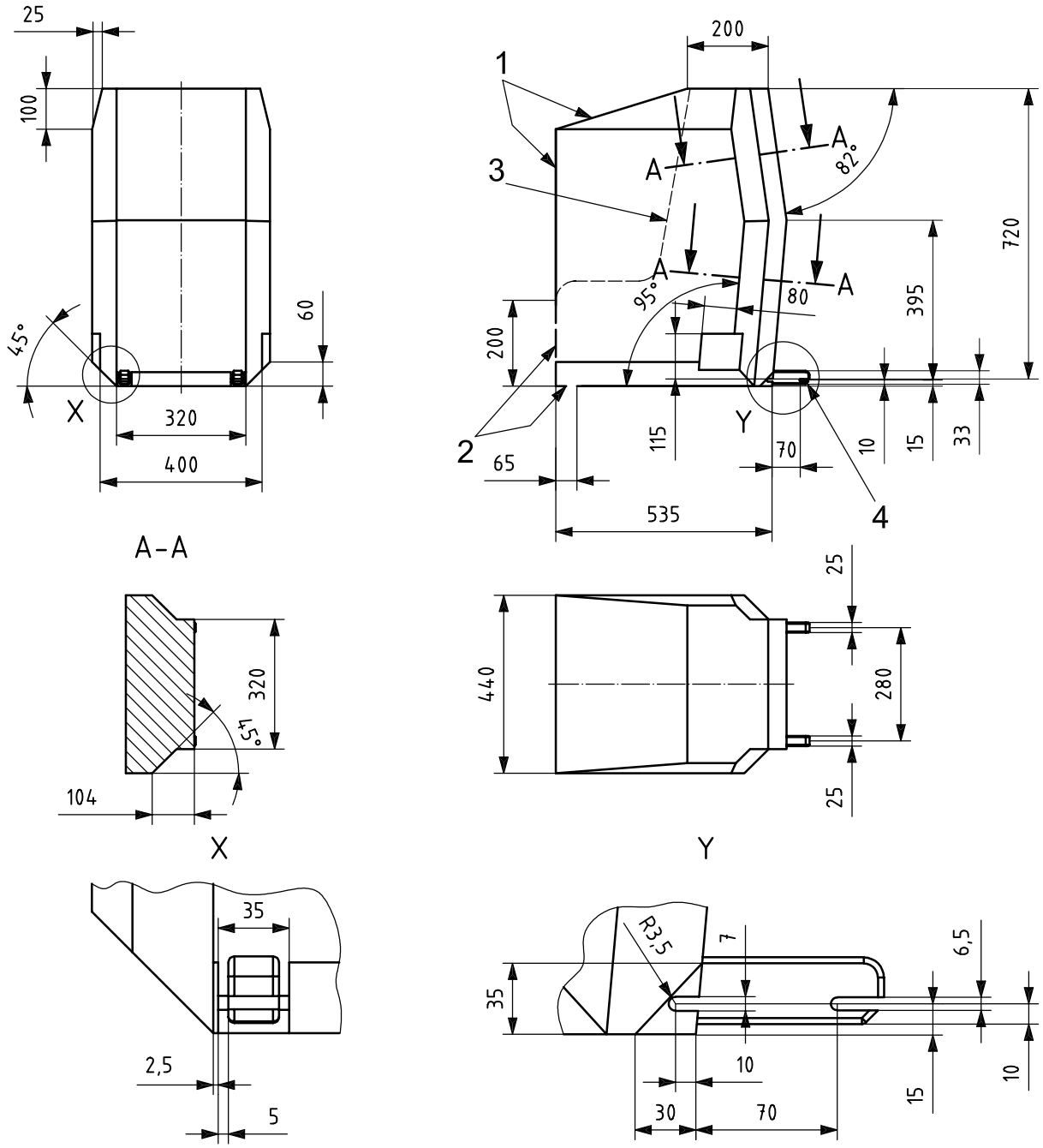
4.2 Space required for full-height forward-facing toddler child restraint systems

The vehicle seating position accommodates a full-height forward-facing toddler CRS. The child restraint envelope according to Figure 1 can be positioned without interference with the vehicle interior when installed as in 4.1. Adjustable attachments according to detail Y may be used to facilitate the interference checking.

4.3 Space required for reduced-height forward-facing toddler child restraint systems

The vehicle seating position accommodates a reduced-height forward-facing toddler CRS. The child restraint envelope according to Figure 2 can be positioned without interference with the vehicle interior when installed as in 4.1. Adjustable attachments according to detail Y may be used to facilitate the interference checking.

Dimensions in millimetres

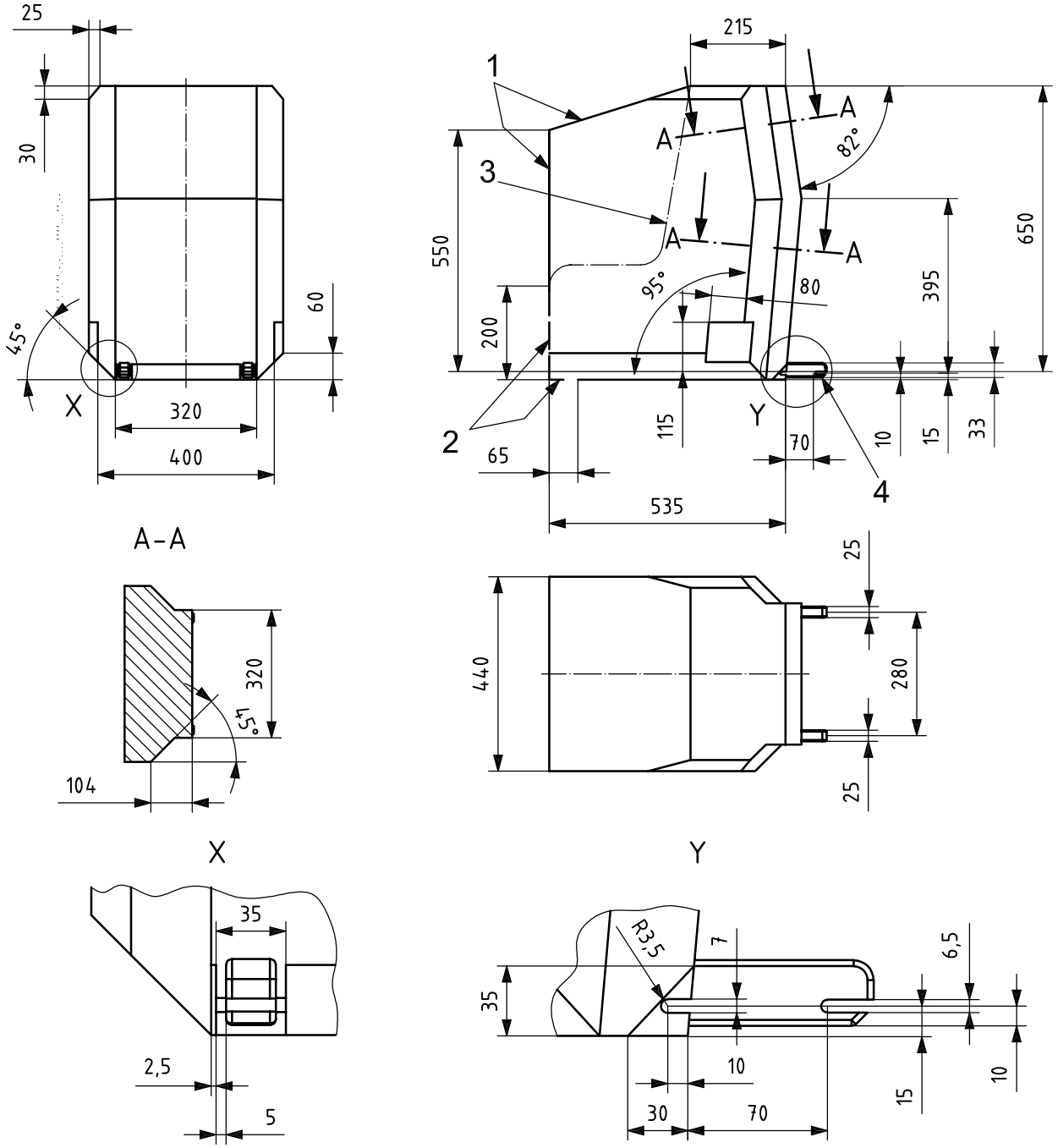


Key

1 limits in the forward and upward directions
2 dashed line marks the area where a support leg, or similar, is allowed to protrude
3 shape of CRF for positioning purpose in ISO 13216-1 (for reference)
4 further specifications of the connector area, see detail Y and ISO 13216-1:1999, Figures 2 and 3

Figure 1 — Envelope dimensions for a full-height forward-facing CRS — ISO/F3

Dimensions in millimetres



Key

1 limits in the forward and upward directions
2 dashed line marks the area where a support leg, or similar, is allowed to protrude
3 shape of CRF for positioning purpose in ISO 13216-1 (for reference)
4 further specifications of the connector area, see detail Y and ISO 13216-1:1999, Figures 2 and 3

Figure 2 — Envelope dimensions for a reduced-height forward-facing CRS, height 650 mm — ISO/F2

4.4 Space required for reduced-height forward-facing toddler child restraint systems having a reduced contour in the upper part, and an extended seatback upper part

The vehicle seating position accommodates a reduced-height forward-facing toddler CRS having a reduced contour in the upper part (to allow fitting in low-roof cars), and an extended upper part of the seatback. The child restraint envelope according to Figure 3 can be positioned without interference with the vehicle interior when installed as in 4.1. Adjustable attachments according to detail Y may be used to facilitate the interference checking.

NOTE This envelope may come into conflict with the head restraint in some car models, as it slightly differs from the ISOFIX positioning device (ISOFIX CRF, see ISO 13216-1) in the upper back area.

4.5 Space required for full-size rearward-facing toddler child restraint systems

The vehicle seating position accommodates a full-size rearward-facing toddler CRS. The child restraint envelope according to Figure 4 can be positioned without interference with the vehicle interior when installed as in 4.1. Adjustable attachments according to detail Y may be used to facilitate the interference checking.

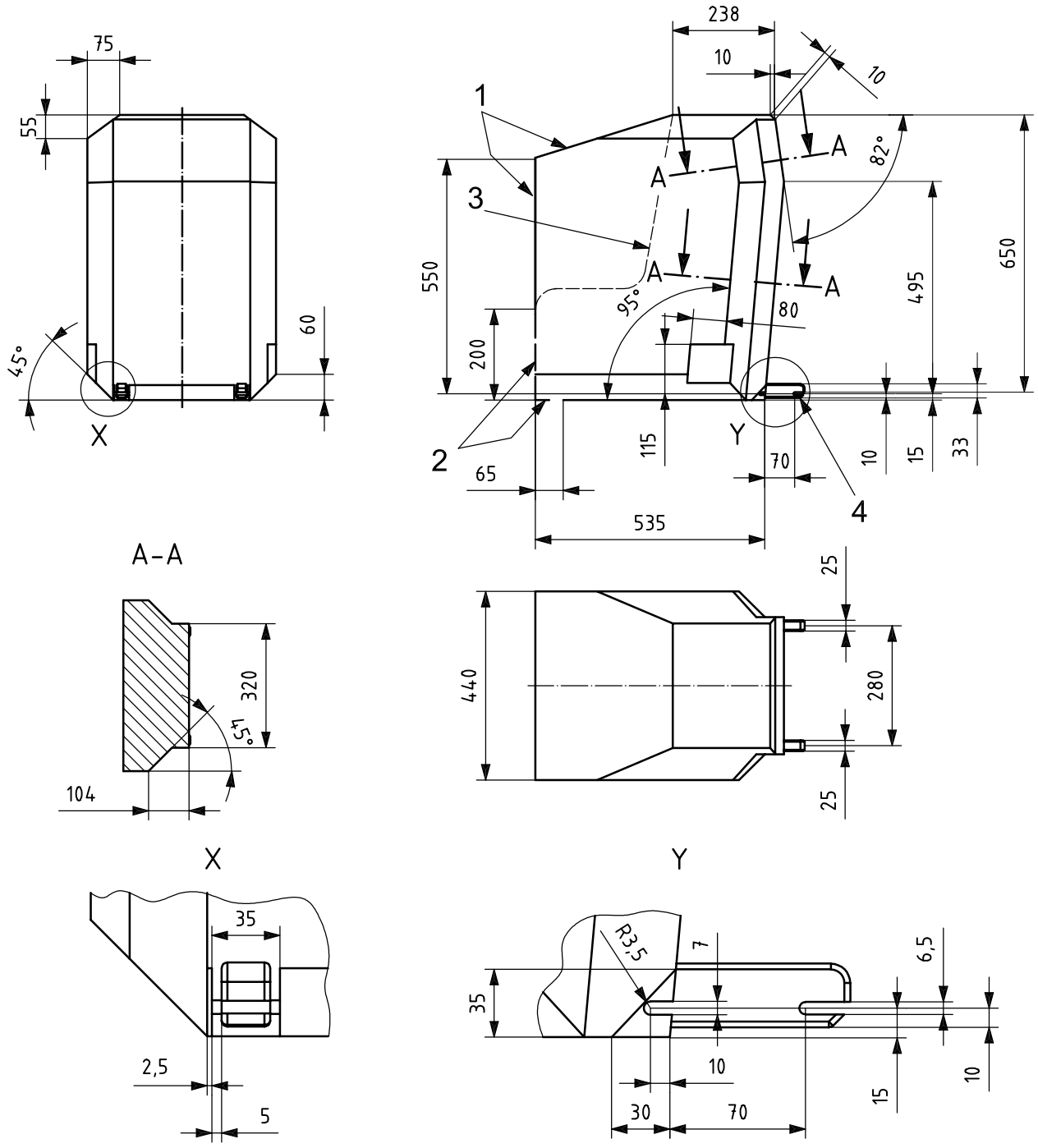
NOTE Measurements taken with the attachments in the fully extended position ensure full compatibility with all rearward-facing child restraint systems, classified according to the corresponding envelope. The envelope attachments may be adjusted to a less extended position when taking the measurements in the vehicle. However, some incompatibility with rearward-facing CRS with non-adjustable attachments may then occur. This may require further adjustment of the vehicle seat in conflict, and result in a more uncomfortable seating posture for the vehicle driver or passenger in that seat position.

4.6 Space required for reduced-size rearward-facing toddler child restraint systems

The vehicle seating position accommodates a reduced-size rearward-facing toddler CRS. The child restraint envelope according to Figure 5 can be positioned without interference with the vehicle interior when installed as in 4.1. Adjustable attachments according to detail Y may be used to facilitate the interference checking.

NOTE Measurements taken with the attachments in the fully extended position ensure full compatibility with all rearward-facing child restraint systems, classified according to the corresponding envelope. The envelope attachments may be adjusted to a less extended position when taking the measurements in the vehicle. However, some incompatibility with rearward-facing CRS with non-adjustable attachments may then occur. This may require further adjustment of the vehicle seat in conflict, and result in a more uncomfortable seating posture for the vehicle driver or passenger in that seat position.

Dimensions in millimetres

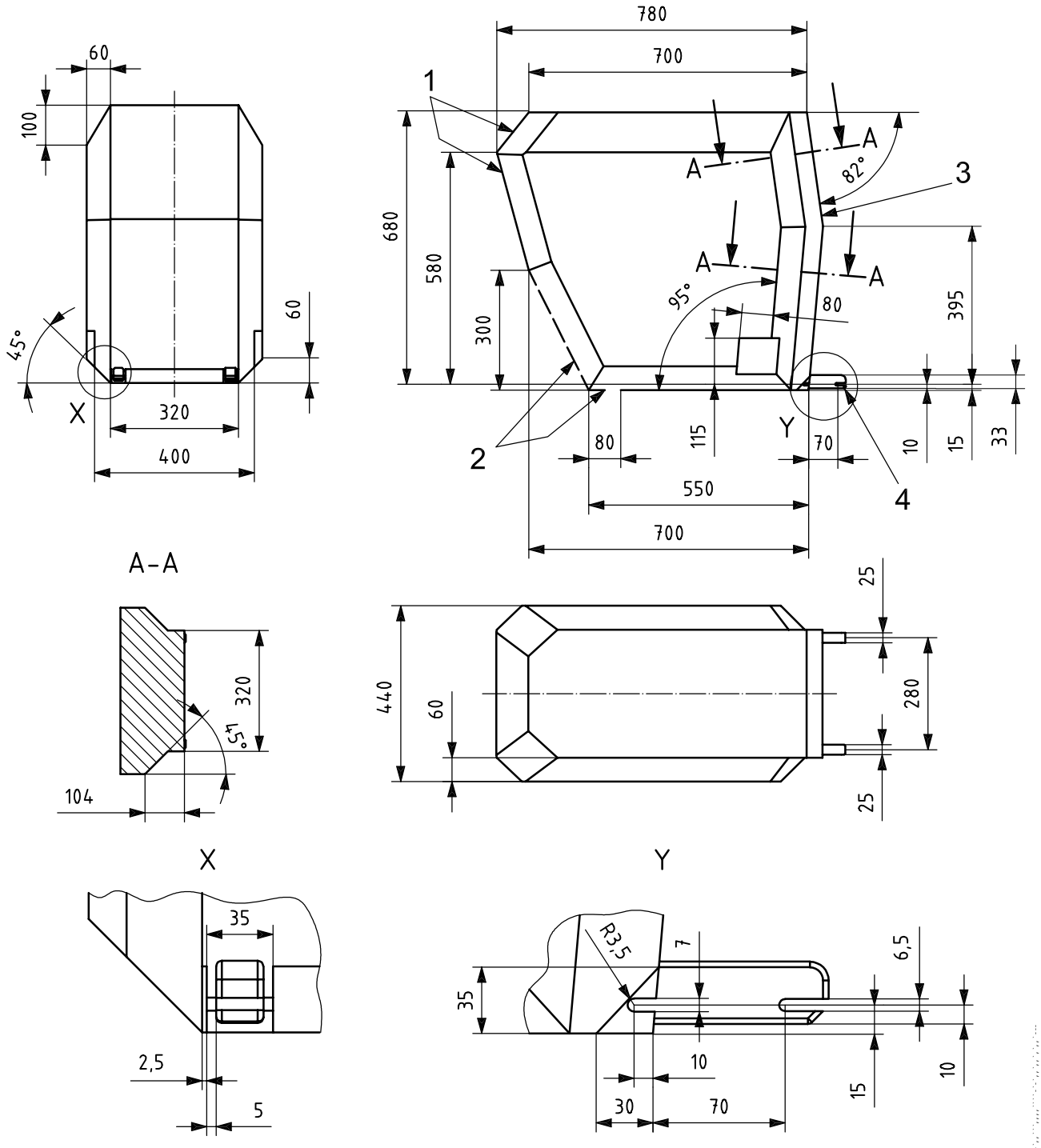


Key

1 limits in the forward and upward directions
2 dashed line marks the area where a support leg, or similar, is allowed to protrude
3 shape of CRF for positioning purpose in ISO 13216-1 (for reference)
4 further specifications of the connector area, see detail Y and ISO 13216-1:1999, Figures 2 and 3

Figure 3 — Envelope dimensions for a reduced-height forward-facing CRS having a reduced contour in the upper part, and an extended seatback upper part — ISO/F2X

Dimensions in millimetres

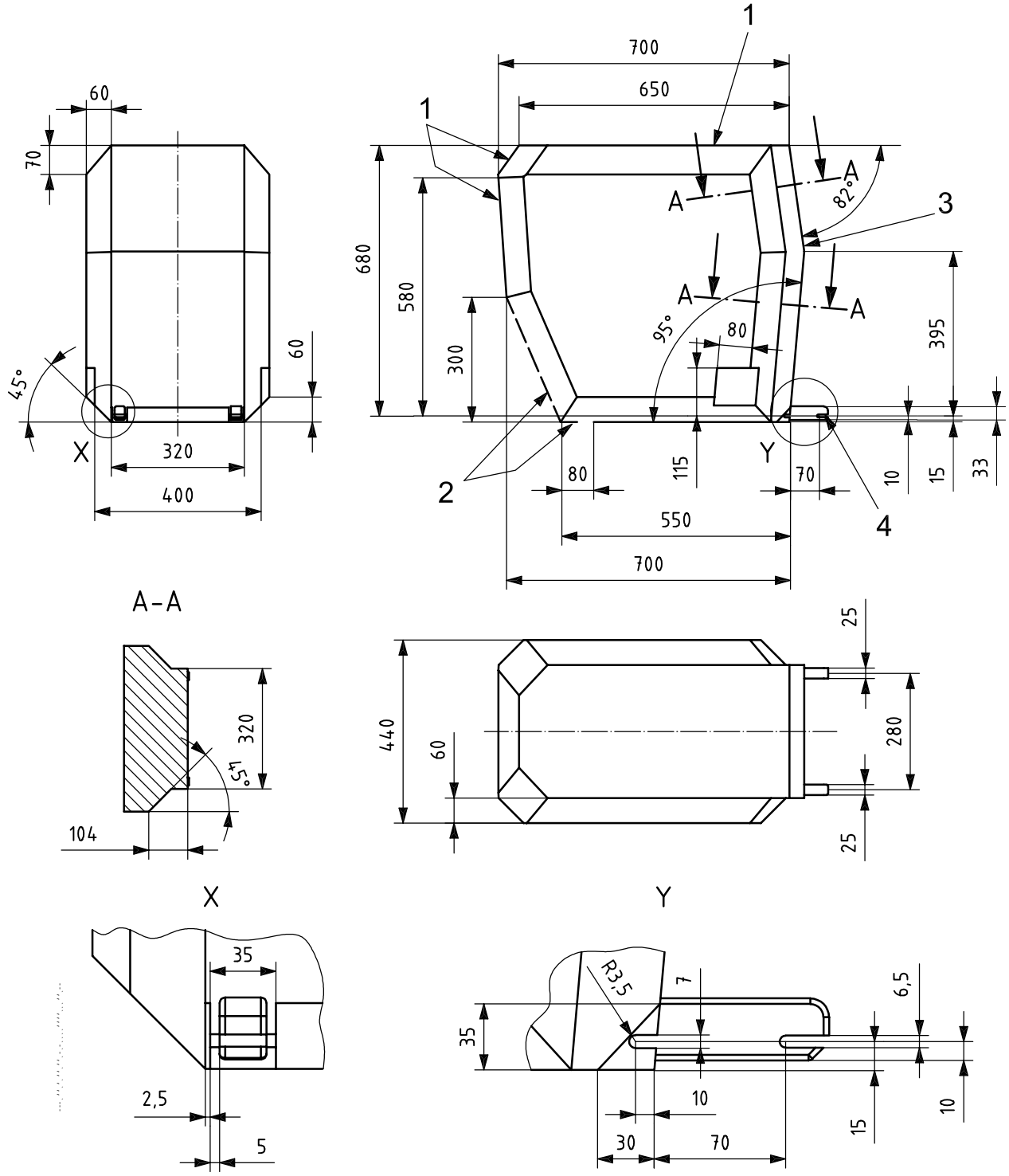


Key

1 limits in the rearward and upward directions
2 dashed line marks the area where a support leg, or similar, is allowed to protrude
3 the backward limitation (to the right in the figure) is given by the forward-facing envelope in Figure 2
4 further specifications of the connector area, see detail Y and ISO 13216-1:1999, Figures 2 and 3

Figure 4 — Envelope dimensions for a full-size rearward-facing CRS — ISO/R3

Dimensions in millimetres



Key

1 limits in the rearward and upward directions
2 dashed line marks the area where a support leg, or similar, is allowed to protrude
3 the backward limitation (to the right in the figure) is given by the forward-facing envelope in Figure 2
4 further specifications of the connector area, see detail Y and ISO 13216-1:1999, Figures 2 and 3

Figure 5 — Envelope dimensions for a reduced-size rearward-facing CRS — ISO/R2

4.7 Space required for rearward-facing infant child restraint systems

The vehicle seating position accommodates a rearward-facing infant CRS, typically in accordance with ECE R.44 [4] Group 0 and 0+, or similar. The child restraint envelope according to Figure 6 can be positioned without interference with the vehicle interior when installed as in 4.1. Adjustable attachments according to detail Y may be used to facilitate the interference checking.

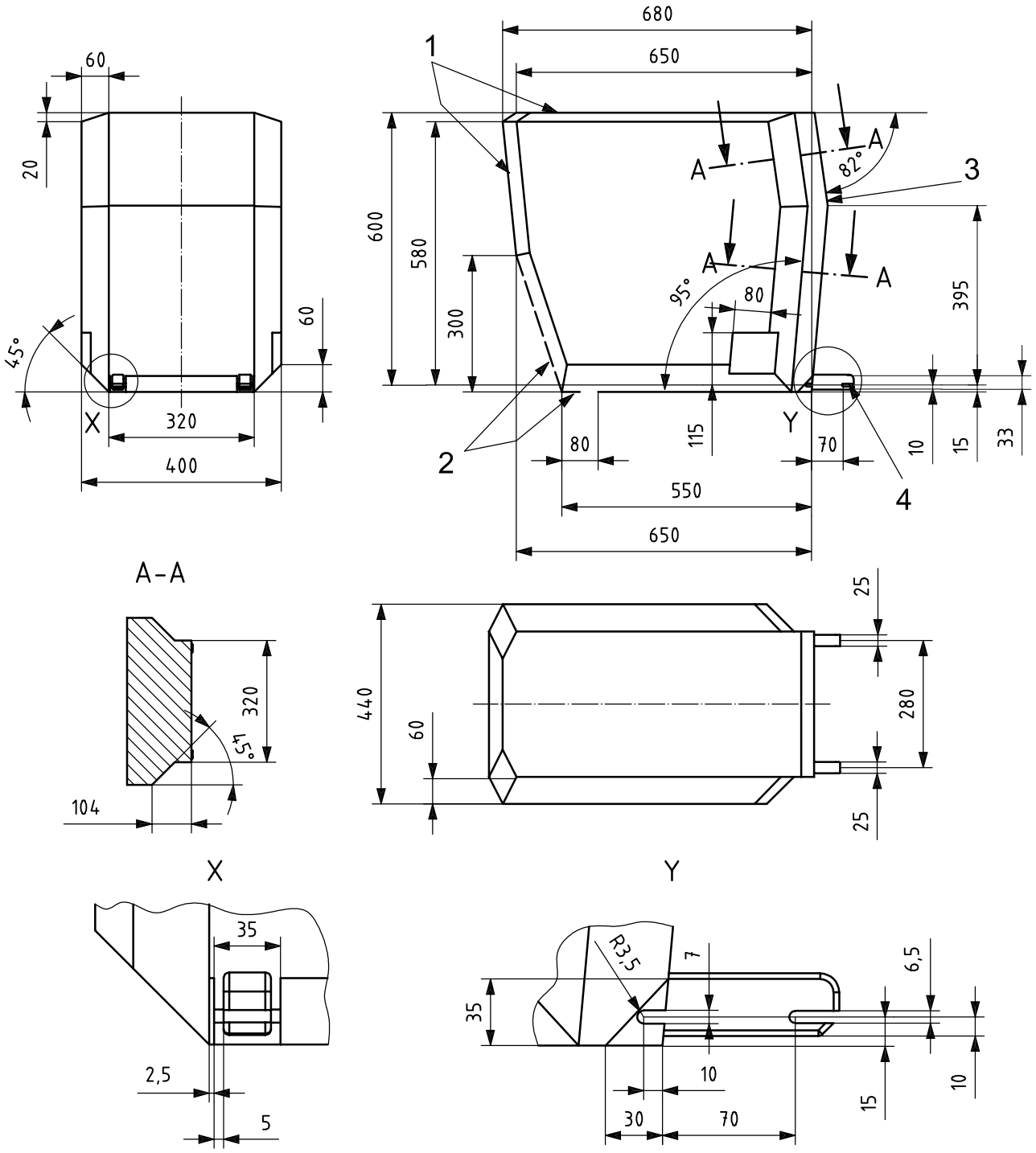
NOTE Measurements taken with the attachments in the fully extended position ensure full compatibility with all rearward-facing child restraint systems, classified according to the corresponding envelope. The envelope attachments may be adjusted to a less extended position when taking the measurements in the vehicle. However, some incompatibility with rearward-facing CRS with non-adjustable attachments may then occur. This may require further adjustment of the vehicle seat in conflict, and result in a more uncomfortable seating posture for the vehicle driver or passenger in that seat position.

4.8 Space required for lateral-facing infant child restraint systems (carry-cots)

The vehicle seating position accommodates a lateral-facing (left or right) infant CRS. The child restraint envelope according to Figure 7 can be positioned without interference with the vehicle interior when installed as in 4.1. Adjustable attachments according to detail Y may be used to facilitate the interference checking.

NOTE The envelope for a right lateral-facing infant CRS (ISO/L2) has dimensions symmetric to (ISO/L1), with regard to its intermediate longitudinal plan.

Dimensions in millimetres

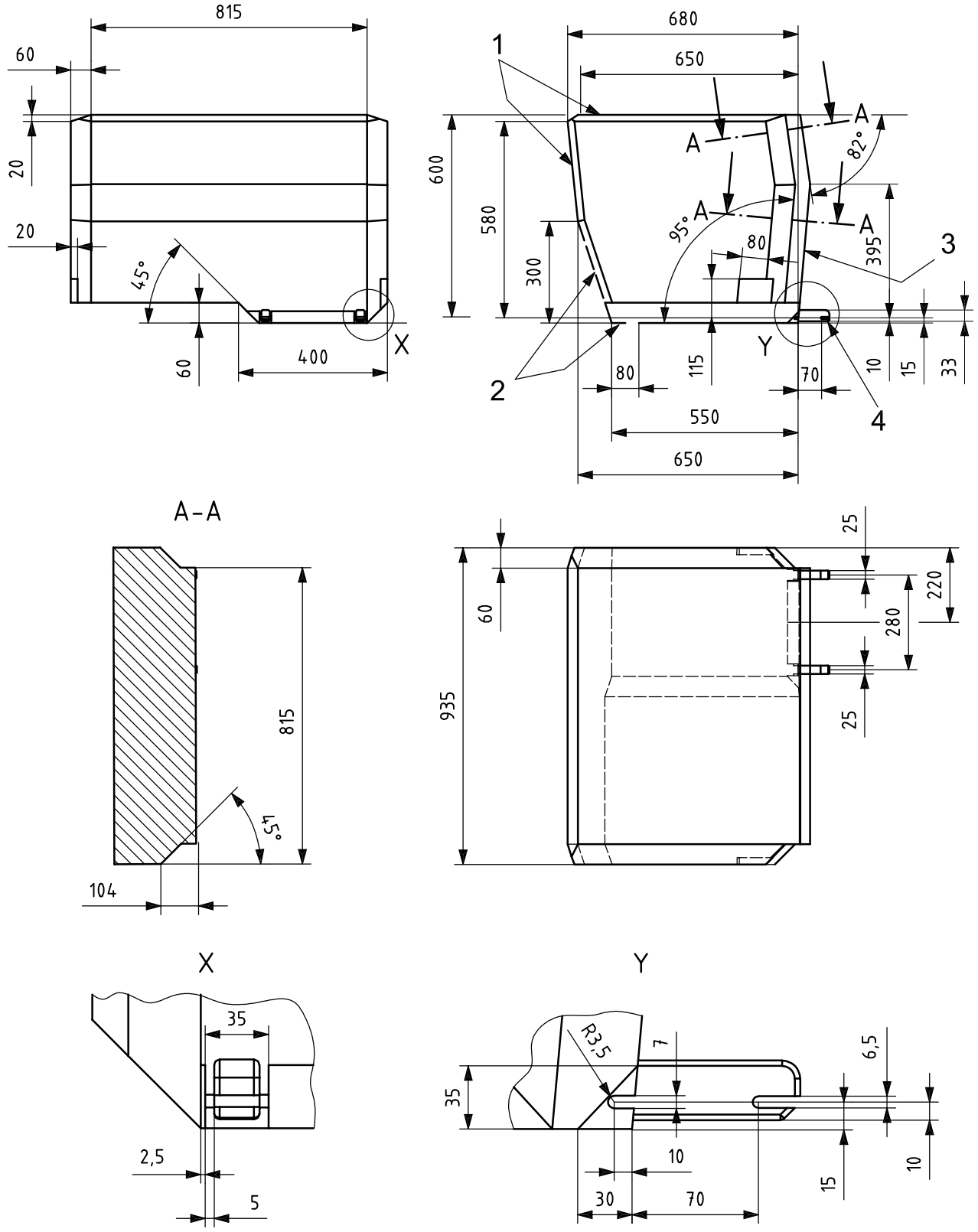


Key

1 limits in the rearward and upward directions
2 dashed line marks the area where a support leg, or similar, is allowed to protrude
3 the backward limitation (to the right in the figure) is given by the forward-facing envelope in Figure 2
4 further specifications of the connector area, see detail Y and ISO 13216-1:1999, Figures 2 and 3

Figure 6 — Envelope dimensions for a rearward-facing infant CRS — ISO/R1

Dimensions in millimetres



Key

1 limits in the rearward and upward directions
2 dashed line marks the area where a support leg, or similar, is allowed to protrude
3 the backward limitation (to the right in the figure) is given by the forward-facing envelope in Figure 2
4 further specifications of the connector area, see detail Y and ISO 13216-1:1999, Figures 2 and 3

Figure 7 — Envelope dimensions for a left lateral-facing infant CRS — ISO/L1

5 Dimensions of child restraint system

5.1 Maximum dimensions of child restraint systems and recommended mass of envelopes

The child restraint system shall not exceed the dimensions given by the respective child restraint envelopes specified in 5.2 to 5.8.

Child restraint envelopes for practical testing should have a mass between 5 kg and 15 kg, in order to obtain a realistic compression of the vehicle seat.

5.2 Full-height forward-facing toddler child restraint system

A forward-facing CRS with a height range of 650 mm to 720 mm. The CRS fits within the full-height envelope shown in Figure 1, but does not fit within the reduced-height envelope shown in Figure 2. A support leg, or similar, is allowed to protrude the area marked with a dashed line.

5.3 Reduced-height forward-facing toddler child restraint system

A forward-facing CRS with a maximum height of 650 mm. The CRS fits within the reduced-height envelope shown in Figure 2. A support leg, or similar, is allowed to protrude the area marked with a dashed line.

5.4 Reduced-height forward-facing toddler child restraint systems with a reduced contour in the upper part, and an extended seatback upper part

A forward-facing CRS with a maximum height of 650 mm, having a reduced contour in the upper part (to allow fitting in low-roof cars), and an extended upper part of the seatback. The CRS fits within the reduced-height envelope shown in Figure 3. A support leg, or similar, is allowed to protrude the area marked with a dashed line.

5.5 Full-size rearward-facing toddler child restraint system

The CRS fits within the full-size rearward-facing toddler envelope shown in Figure 4, but does not fit within the reduced-size rearward-facing toddler envelope shown in Figure 5. A support leg, or similar, is allowed to protrude the area marked with a dashed line.

5.6 Reduced-size rearward-facing toddler child restraint system

The CRS fits within the reduced-size rearward-facing toddler envelope shown in Figure 5, but does not fit within the rearward-facing infant CRS envelope shown in Figure 6. A support leg, or similar, is allowed to protrude the area marked with a dashed line.

5.7 Rearward-facing infant child restraint systems

The CRS fits within the rearward-facing infant CRS envelope shown in Figure 6. A support leg, or similar, is allowed to protrude the area marked with a dashed line.

5.8 Lateral-facing infant child restraint systems

The carry-cot (car-bed) fits within the lateral-facing infant CRS envelope shown in Figure 7. A support leg, or similar, is allowed to protrude the area marked with a dashed line.

6 Classification system

The classification system, from the largest to the smallest CRS, is given in Tables 1 and 2.

Table 1 — Classification of child restraint systems

CHILD RESTRAINT SYSTEM SIZE CLASS	
Class designation	**CRS classification, forward-facing CRS**
ISO/F3 Size 3 forward-facing CRS	Full-height forward-facing toddler CRS, height range 650 mm to 720 mm
ISO/F2 Size 2 forward-facing CRS	Reduced-height forward-facing toddler CRS (height max. 650 mm)
ISO/F2X Size 2 extended forward-facing CRS	Reduced-height forward-facing toddler CRS (height max. 650 mm) having a reduced contour in the upper part (to allow fitting in low-roof cars), and an extended seatback upper part
	CRS classification, rearward-facing CRS
ISO/R3 Size 3 rearward-facing CRS	Full-size rearward-facing toddler CRS
ISO/R2 Size 2 rearward-facing CRS	Reduced-size rearward-facing toddler CRS
ISO/R1 Size 1 rearward-facing infant CRS	Rearward-facing infant CRS
	CRS classification, lateral-facing CRS
ISO/L1 left lateral-facing infant CRS	Left lateral-facing infant CRS
ISO/L2 right lateral-facing infant CRS	Right lateral-facing infant CRS

Table 2 — Classification of available space of vehicle seating positions

VEHICLE SEATING POSITION SPACE CLASS	
Class designation	**Vehicle seat classification, forward-facing CRS**
ISO/F3 Size 3 forward-facing CRS	The vehicle seating position accommodates a full-height forward-facing toddler CRS
ISO/F2 Size 2 forward-facing CRS	The vehicle seating position accommodates a reduced-height forward-facing toddler CRS
ISO/F2X Size 2 extended forward-facing CRS	The vehicle seating position accommodates a reduced-height forward-facing toddler CRS having a reduced contour in the upper part (to allow fitting in low-roof cars), and an extended seatback upper part
	Vehicle seat classification, rearward-facing CRS
ISO/R3 Size 3 rearward-facing CRS	The vehicle seating position accommodates a full-size rearward-facing toddler CRS
ISO/R2 Size 2 rearward-facing CRS	The vehicle seating position accommodates a reduced-size rearward-facing toddler CRS
ISO/R1 Size 1 rearward-facing infant CRS	The vehicle seating position accommodates a rearward-facing infant CRS
	Vehicle seat classification, lateral-facing CRS
ISO/L1 Left lateral-facing infant CRS	The vehicle seating position accommodates a left lateral-facing infant CRS
ISO/L2 Right lateral-facing infant CRS	The vehicle seating position accommodates a right lateral-facing infant CRS

Annex A
(informative)

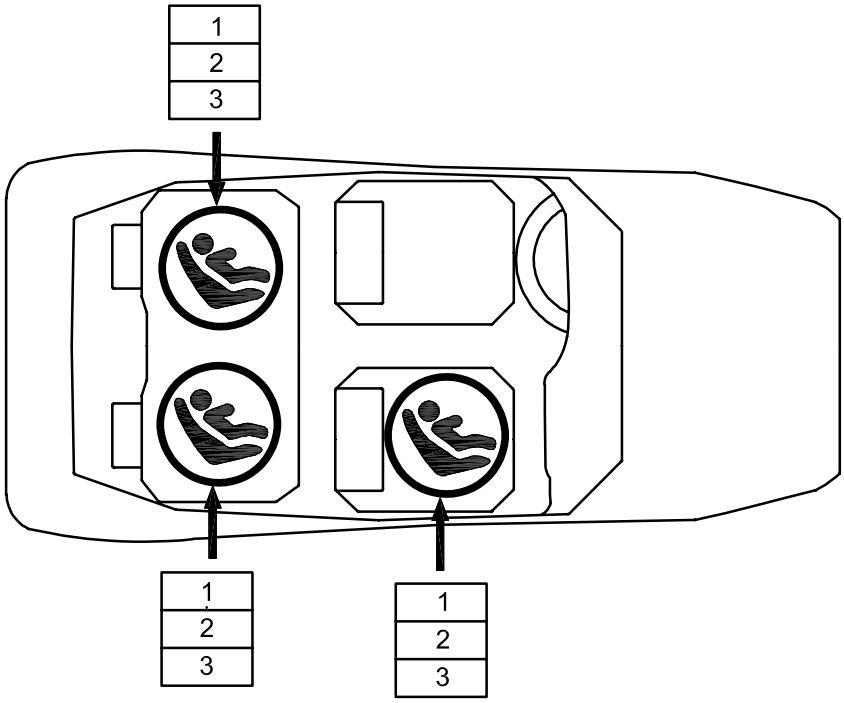
Marking of vehicle seating positions and child restraint systems

A.1 General

A marking of the space available for the respective child restraint positions in the vehicle, and for the child restraint systems, is given below to help consumers choose a child restraint system that is dimensionally suitable for their vehicle.

A.2 Marking of space for child seating positions in a vehicle

Figure A.1 shows a possible marking of vehicle seating positions. The squares are intended to be filled out with a classification designation for forward-facing, rearward-facing, and lateral-facing child restraint systems, for example according to the marking in A.3.



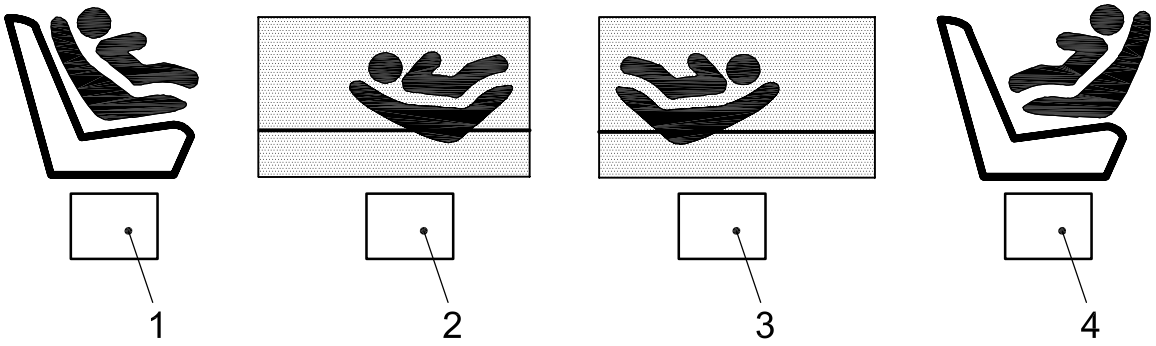
Key

1 forward-facing CRS classification designation/symbol
2 rearward-facing CRS classification designation/symbol
3 lateral-facing CRS classification designation/symbol

Figure A.1 — Example of marking of vehicle seating position

A.3 Marking of the type and size of a child restraint system

Figure A.2 shows a possible marking of the dimension class of a child restraint system.



Key

1 dimensional classification of a forward-facing CRS (e.g. ISO/F2 or B)
2 dimensional classification of a right lateral-facing CRS (e.g. ISO/L2 or G)
3 dimensional classification of a left lateral-facing CRS (e.g. ISO/L1 or F)
4 dimensional classification of a rearward-facing CRS (e.g. ISO/R2 or D)

Figure A.2 — Example of marking of types and sizes for child restraint systems

Annex B
(informative)

3-D drawing of child restraint envelope

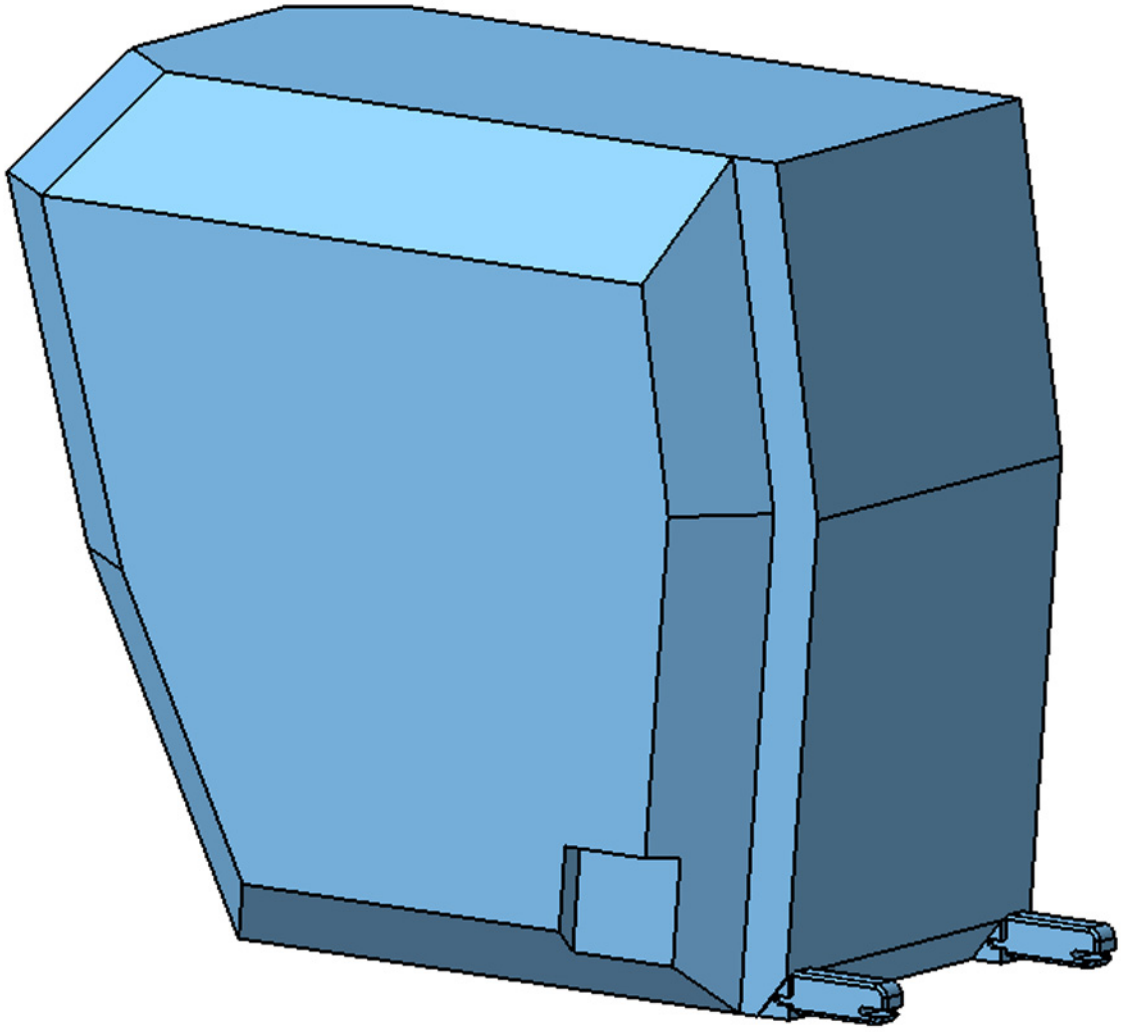


Figure B.1 — Full-size rearward-facing toddler envelope — ISO/R3

Annex C
(informative)

Relationship with ECE classification

Table C.1 — Relationship between the ECE letter designation and the ISO dimensional fixtures

ECE letter	ISO fixture	CRS type
A	ISO/F3	Full-Height Forward-Facing toddler CRS
B1	ISO/F2X	Extended Reduced-Height Forward-Facing toddler CRS
B	ISO/F2	Reduced-Height Forward-Facing toddler CRS
C	ISO/R3	Full-Size Rearward-Facing toddler CRS
D	ISO/R2	Reduced-Size Rearward-Facing toddler CRS
E	ISO/R1	Rearward-Facing infant CRS
F	ISO/L1	Left Lateral-Facing position CRS (carry-cot)
G	ISO/L2	Right Lateral-Facing position CRS (carry-cot)

Table C.2 — Relationship between the ECE R.44 mass groups and the ISO dimensional classification

ECE mass group	ISO dimensional classification
Group 0: up to 10 kg	ISO/R1, ISO/L1, ISO/L2
Group 0+: up to 13 kg	ISO/R1, ISO/R2, ISO/R3
Group 1: 9 kg to 18 kg	ISO/R2, ISO/R3, ISO/F2, ISO/F2X, ISO/F3

Table C.3 — Interpretation of infant and toddler CRS designations for different regions

CRS designation	ECE			USA		Canada		Australia	
	Age	Mass	Group	Age	Mass	Age	Mass	Age	Mass
Infant	0-18 months	0-13 kg	0, 0+		0-10 kg		0-9 kg		3-9 kg
Toddler	1-4 years	9-18 kg	1		10-18 kg		9-18 kg		8-18 kg

Table C.4 — Table of vehicle handbook information on ISOFIX child-restraint-systems' installation suitability for various ISOFIX positions

Mass group	Size class	Fixture	Vehicle ISOFIX positions					
			Front Passenger	Rear Outboard	Rear Centre	Intermediate Outboard	Intermediate Centre	Other sites
Carry-cot	F	ISO/L1						
	G	ISO/L2						
0: up to 10 kg	E	ISO/R1						
0+: up to 13 kg	E	ISO/R1						
	D	ISO/R2						
	C	ISO/R3						
I: 9 kg to 18 kg	D	ISO/R2						
	C	ISO/R3						
	B	ISO/F2						
	B1	ISO/F2X						
	A	ISO/F3						
II: 15 kg to 25 kg								
III: 22 kg to 36 kg								

Bibliography

[1] ISO 13215-2, *Road vehicles — Reduction of misuse risk of child restraint systems — Part 2: Requirements and test procedure for correct installation (panel method)*

[2] ISO 13215-3, *Road vehicles — Reduction of misuse risk of child restraint systems — Part 3: Prediction and assessment of misuse by Misuse Mode and Effect Analysis (MMEA)*

[3] ISO 13216-2, *Road vehicles — Anchorages in vehicles and attachments to anchorages for child restraint systems — Part 2: Top tether anchorages and attachments*

[4] Regulation ECE/UN No. 44, *Approval of restraining devices for child occupants of power-driven vehicle ("child restraints")*

[5] Regulation ECE/UN No. 16, *Approval of:*

I. *Safety-belts, restraint systems, child restraint systems and ISOFIX child restraint systems for occupants of power-driven vehicles*

II. *Vehicles equipped with safety-belts, restraint systems, child restraint systems and ISOFIX child restraint systems*

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