REPORT

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Test of Variocage III SL, dog crate according to the SPCT-method, Revision 2

(5 appendices)

Summary

The Variocage III SL, dog crate from MIM Construction has been tested according to the SPCT-method[1], Revision 2.

Three different tests were performed on the dog crate, a frontal impact test, a rear impact test and a drop test. For all tests the crate was loaded with a dummy weight of 45 kg.
For the frontal impact test the dog crate was placed in the left side of the luggage compartment mounted on the impact sled. The sled was crash tested in forward direction in 50 km/h with a retardation of 20-28 g.
For the rear impact test the dog crate was impacted from behind in 30 km/h with an acceleration of 14-21 g. A crash test dummy was positioned in the left rear seat and equipped with head and neck accelerometers to measure the impact from the crate into the backrest.
In the drop test the crate dropped from a height of 70 cm onto a drop plate. The crate was positioned in an angle of 45° around the longitudinal axis and 15° around the transverse axis before the test.

During and after the tests of the Variocage III SL, no sharp edges occurred, the gates remained closed and were possible to open and evacuate after the test. The crash test dummy responses fulfilled the demands for green rating. No permanent deformations of the seatback was found after the rear impact test.

The tests resulted in an overall green rating of the test object according to the SPCT-method, Revision 2.

[1] SPCT stands for Safe Pet Crate Test

1 Introduction

On assignment of MIM Construction two crash tests and one drop test were performed according to the SPCT-method, Revision 2. The purpose of the tests were to evaluate if the dog crate fulfilled the demands for green rating according to the SPCT-method.

2 Test object

Tested product:	Variocage III
Model:	Single, size Large
Dog crate attachments:	Straps attached to the luggage compartment in the two left corners.
Test load in the crate:	45 kg
Test object arrival at SP:	2012-02-02 and 2012-02-14
Selection of test object:	The test objects have been selected by the client without SP's assistance.

3 Test method and performance

Test facility:	SP Structural and Solid Mechanics laboratory in Borås
Pulse measurement:	Two accelerometers mounted on the sled, inv no 403201 and 403215. The graphs can be found in appendix 1.
Velocity measurement:	Optical time sensors measuring the time for the sled to travel a distance of 1 meter just before impact.
Film cameras:	HG 2000 High-speed cameras, 1000 frames per second for the crash tests and a Casio EX-F1 digital camera, 600 frames per second for the drop test.
Photographs:	Photos were taken before and after the tests and can be found in appendix 3-5.

3.1 Frontal impact crash test

Test method:	SPCT-method, Revision 2, 2012-02-01, section 3.1 Frontal impact test
Test date:	2012-02-14
Crash pulse:	48-50 km/h, retardation 20-28 g according to ECE Regulation No. 17, Rev.2, Amend. 2, Annex 9 – Appendix, *Test procedure for devices intended to protect the occupants against displacement of luggage*, 6 November 2009.

The dog crate was positioned in the left part of the luggage compartment of a Volvo V70N chassis with a backseat divided in 40/60 and made of aluminium, see figure 1.
The sled was accelerated to a speed of 49.8 km/h before impact.

Figure 1 Test setup Frontal impact crash test

3.2 Rear impact crash test

Test method:	SPCT-method, Revision 2, section 3.2 Rear impact test
Test date:	2012-02-02
Crash pulse:	30-32 km/h, retardation 14-21 g according to ECE Regulation No. 44, Rev.2, Corr. 4, Annex 7 – Appendix 2, *Rear impact Child restraints*, 14 February 2011.
Crash test dummy:	Hybrid III, 50%-ile equipped with a 3-axial accelerometer in Head COG and a 1-axial accelerometer in the T1-vertabra position. The graph can be found in appendix 2.

The crash test dummy was positioned in the left side of the rear seat in a Volvo V70N chassis with a backseat divided in 40/60 and made of aluminium. The test object was placed in the left part of the luggage compartment, see figure 2.
The sled was accelerated to a speed of 30 km/h before impact.

Figure 2 Test setup Rear impact test

3.3 Drop test

Test method:	SPCT-method Revision 2, section 3.3 Drop test
Test object position:	Longitudinal axle 45°
	Transverse axle 15°
	70 cm above drop plate
Test date:	2012-02-14

The test object was mounted in a drop test rig. The impact position was adjusted with straps and rotated around the vehicle's prospective longitudinal axis 45° and then turned around the vehicle transverse axis of drafting 15°. The lowest point of the test object was adjusted to 70 cm above the drop plate, see figure 3.

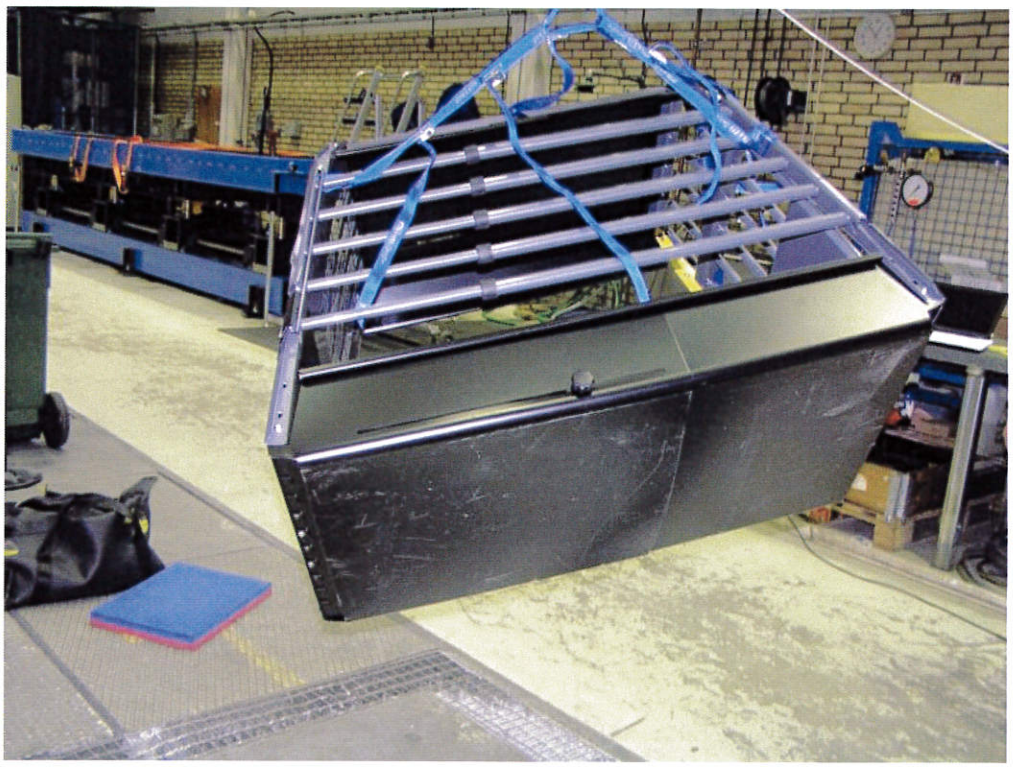

Figure 3 Test setup Drop test

4 Test results

The test result showed in this report refer only to the tested object.

Table 1 Test results

Test type	Criteria	Green	Yellow	Red	Result
All tests	Risk for the dog to fallout of the test object during and after the test	No	-	Yes	No
	Sharp edges after test	No	-	Yes	No
	Possible to open or evacuate the test object after test without any tools or violence	Yes	-	No	Yes
	Evacuation hatch	Yes	-	No	Yes
Rear impact test	Head 3 ms-acc	< 70 g	70-80 g	> 80 g	57.0 g
	HIC 36	< 400	400-500	> 500	338
	T1-acceleration	< 70 g	70-80 g	> 80 g	44.7 g
	Horizontal deformation of the seat back	< 50 mm	-	> 50 mm	0 mm
	Penetration depth in the seat back	< 15 mm	-	> 15 mm	0 mm

During the frontal impact the rear left strap attachment in the dog crate broke. The dog crate was still attached by the front left attachment.

The tests resulted in an overall green rating according to the SPCT-method.

5 Measurement uncertainty

The measurement uncertainty for the deceleration pulse is less than 1.5%.
Reported uncertainty corresponds to an approximate 95 % confidence interval around the measured value. The interval has been calculated in accordance with GUM (The ISO guide to the expression of uncertainty in measurements), which is normally accomplished by quadratic addition of the actual standard uncertainties and multiplication of the resulting combined standard uncertainty by the coverage factor k=2.

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Examined by

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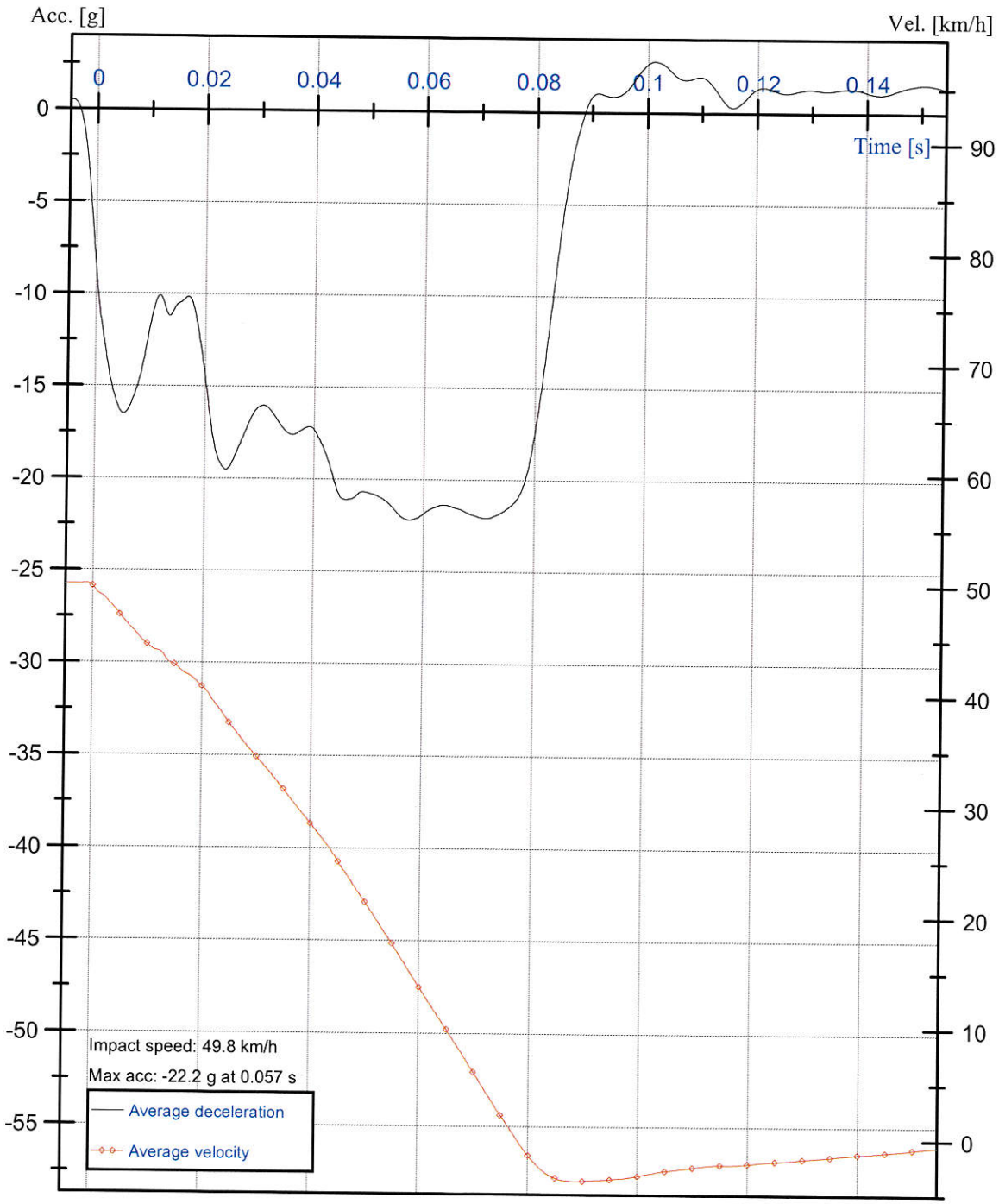
Appendices

Appendix 1	Sled deceleration graphs (2 pages)
Appendix 2	Dummy acceleration graph (1 page)
Appendix 3	Photos Frontal impact test (4 pages)
Appendix 4	Photos Rear impact test (4 pages)
Appendix 5	Photos Drop test (3 pages)

Appendix 1

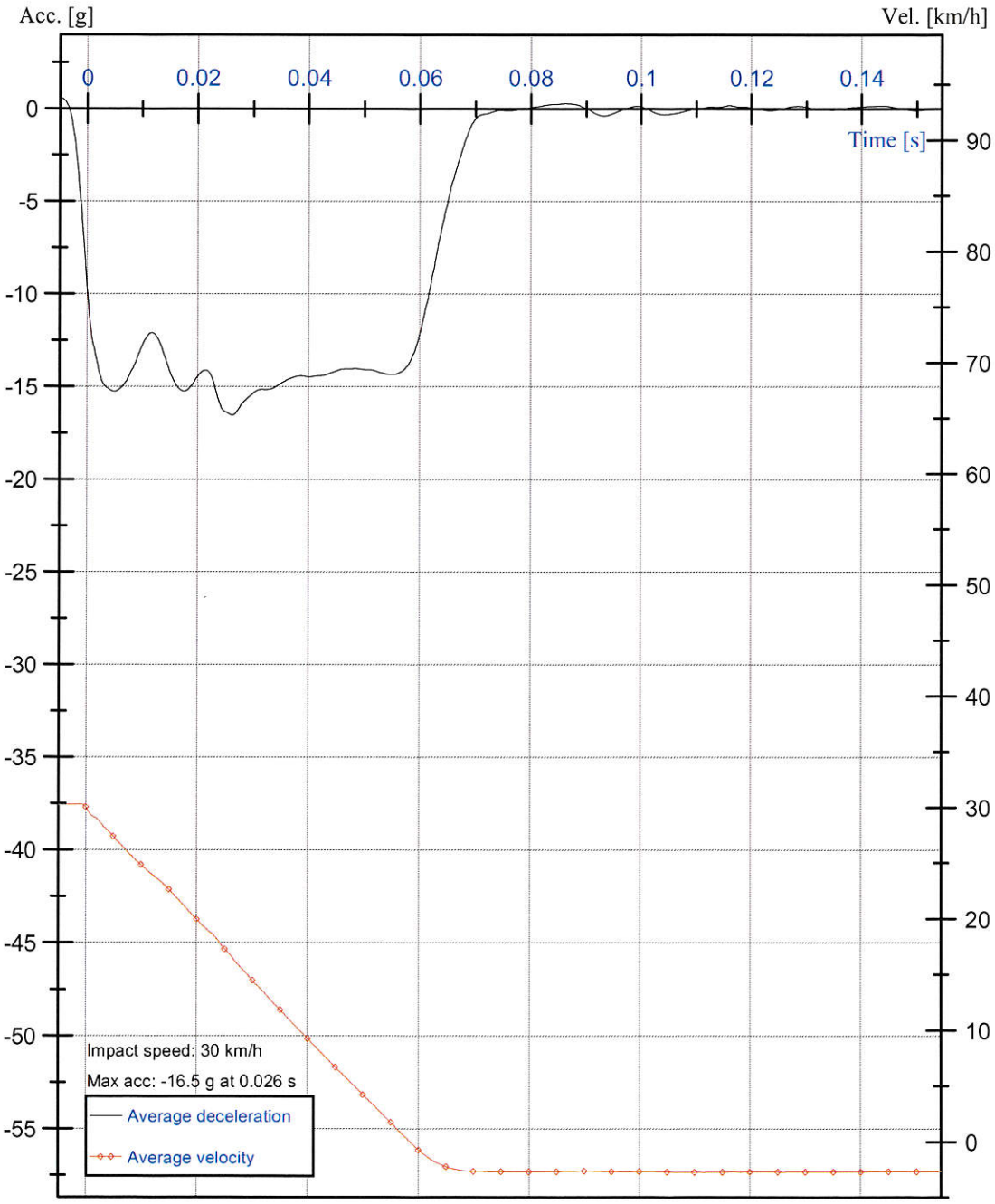
Sled deceleration, Average pulse, CFC 60



Customer:	MIM Construction
Test object:	Variocage 3, enkelbur, 45 kg
Standard:	SPCT-metoden, frontalkrock
Test date:	2012-02-14 **Test:** 6

Appendix 1

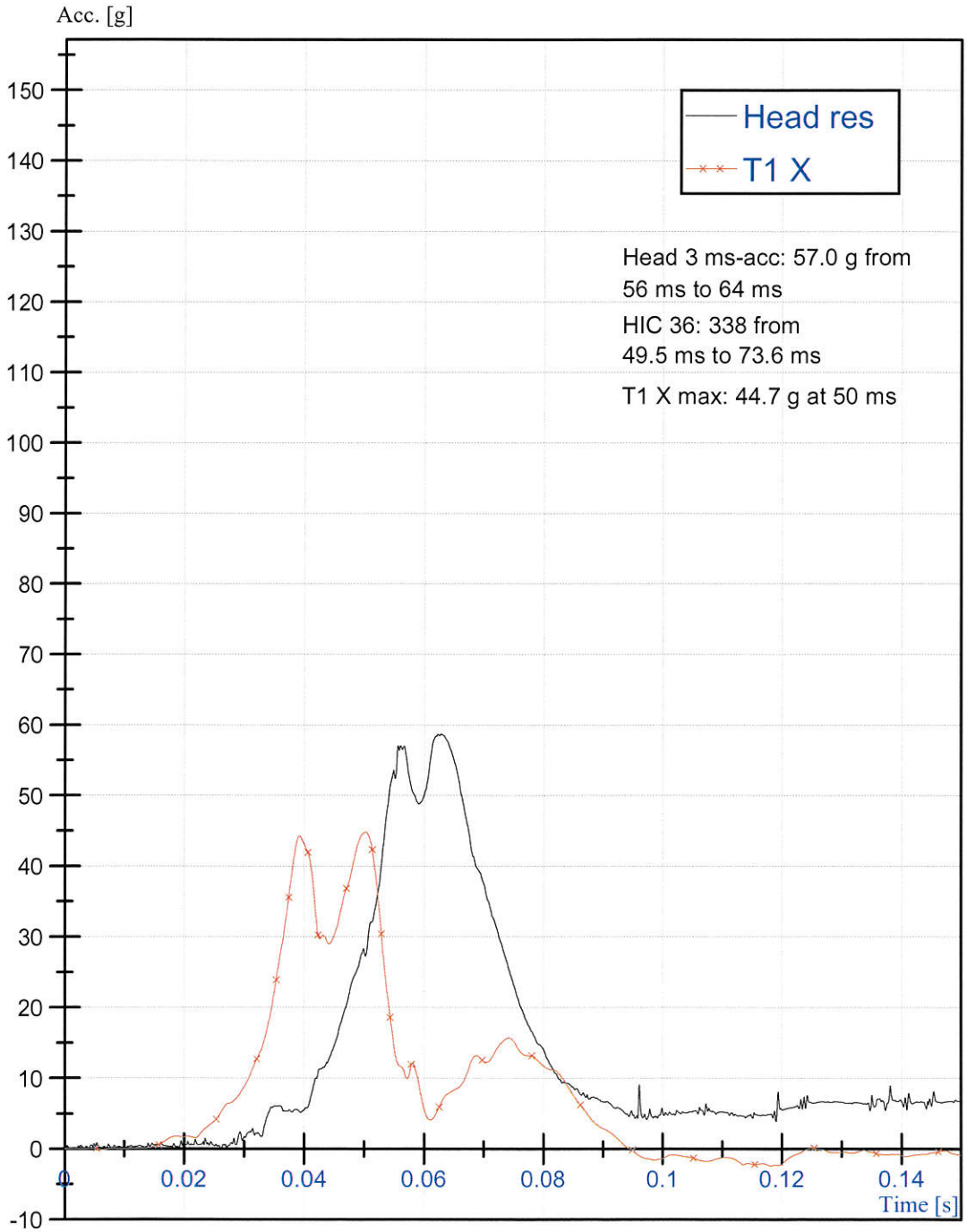
Sled deceleration, Average pulse, CFC 60



Customer:	MIM Construction
Test object:	Variocage 3, enkelbur, 45 kg
Standard:	SPCT-metoden
Test date:	2012-02-02 **Test:** 2

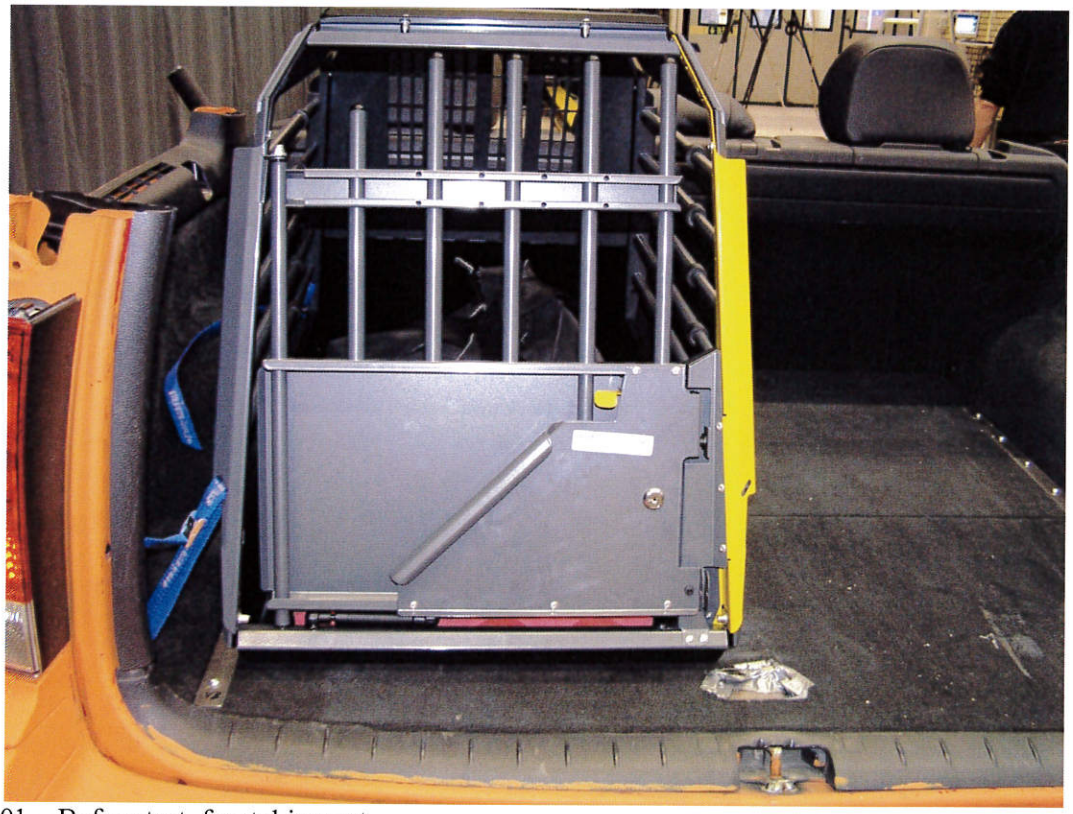
Appendix 2

Head resultant and T1X acceleration



Customer:	MIM Construction
Test object:	Variocage 3, enkelbur, 45 kg
Standard:	SPCT-metoden
Test date:	2012-02-02 **Test:** 2

Appendix 3



01 – Before test, frontal impact

02 – Before test, frontal impact

Appendix 3

03 – Before test, frontal impact

04 – After test, frontal impact

Appendix 3

05 – After test, frontal impact

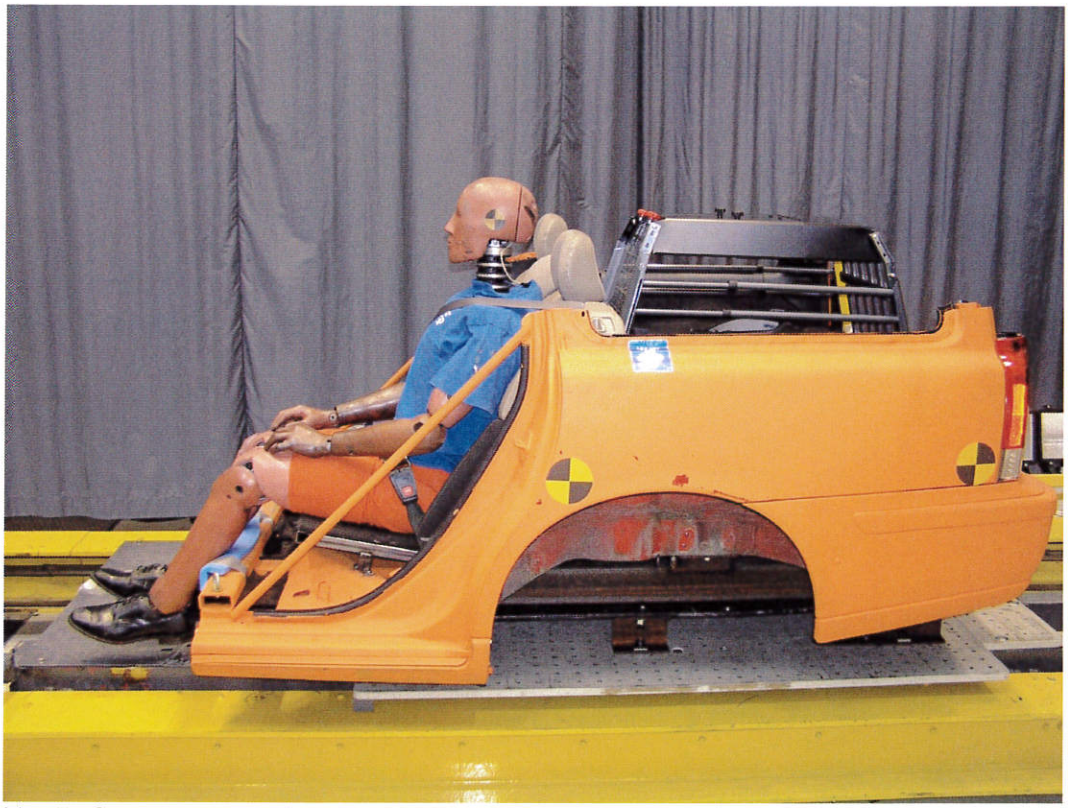
06 – After test, frontal impact

Appendix 3

07 – After test, frontal impact

08 – After test, frontal impact

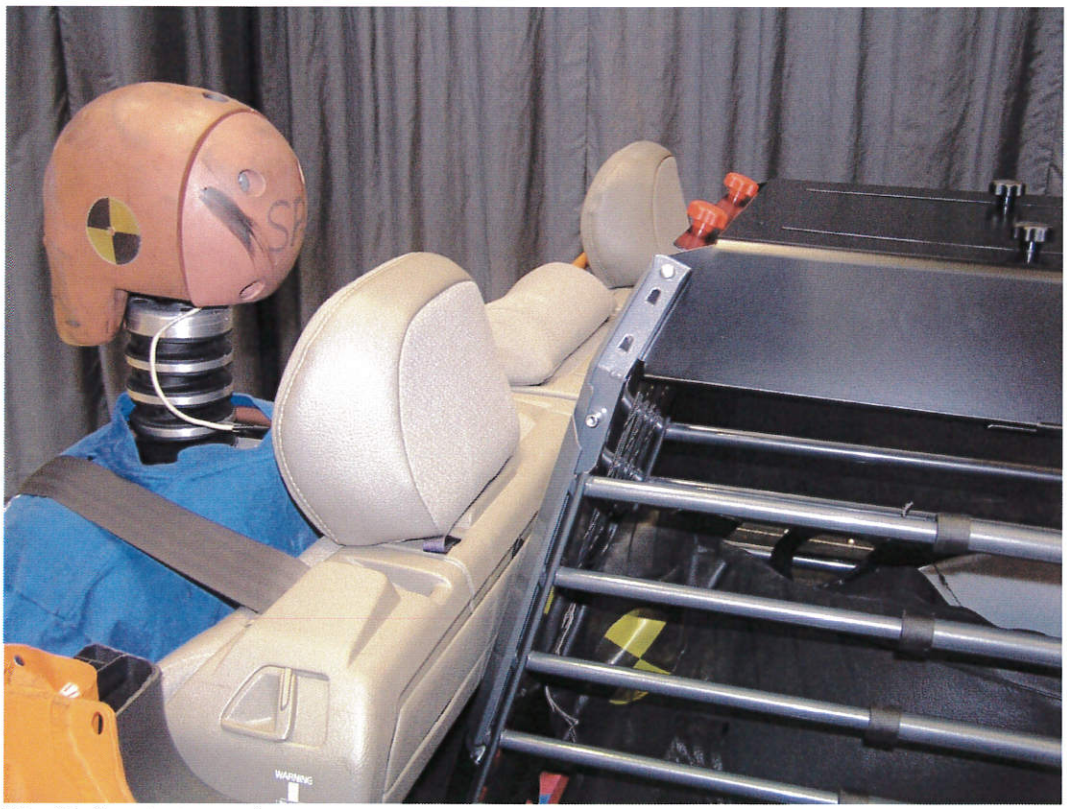
Appendix 4



01 – Before test, rear impact

02 – Before test, rear impact

Appendix 4



03 – Before test, rear impact

04 – After test, rear impact

Appendix 4

05 – After test, rear impact

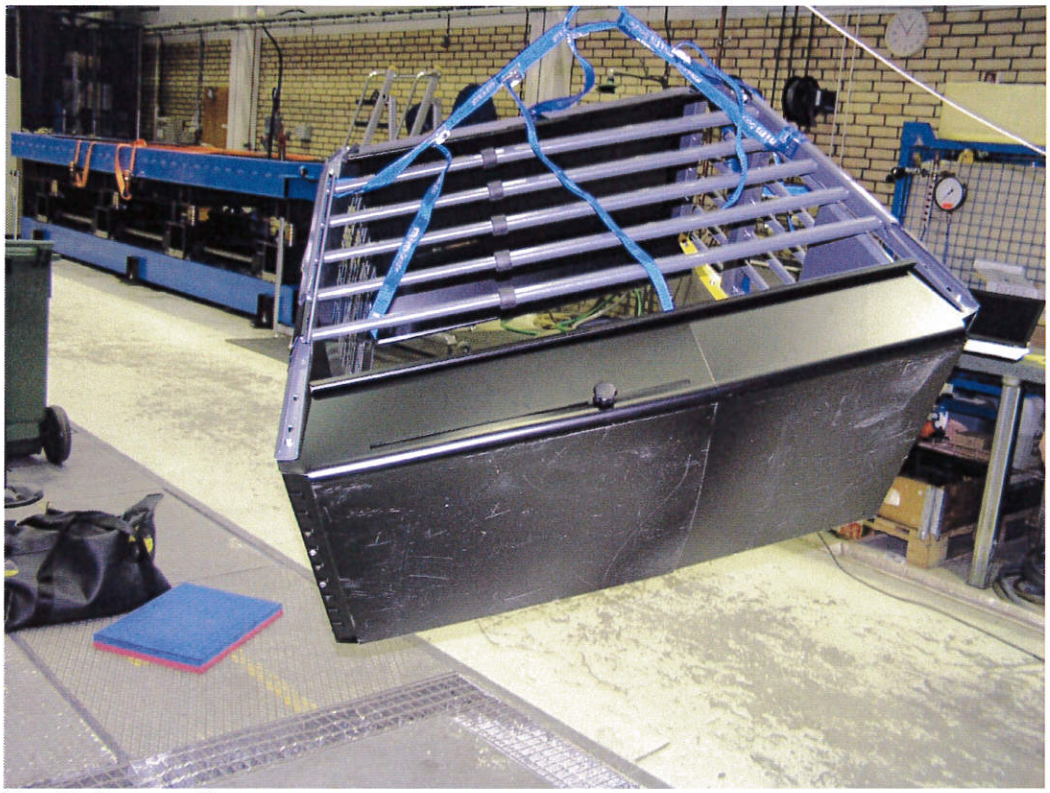
06 – After test, rear impact

Appendix 4

07 – After test, rear impact

08 – After test, rear impact

Appendix 5

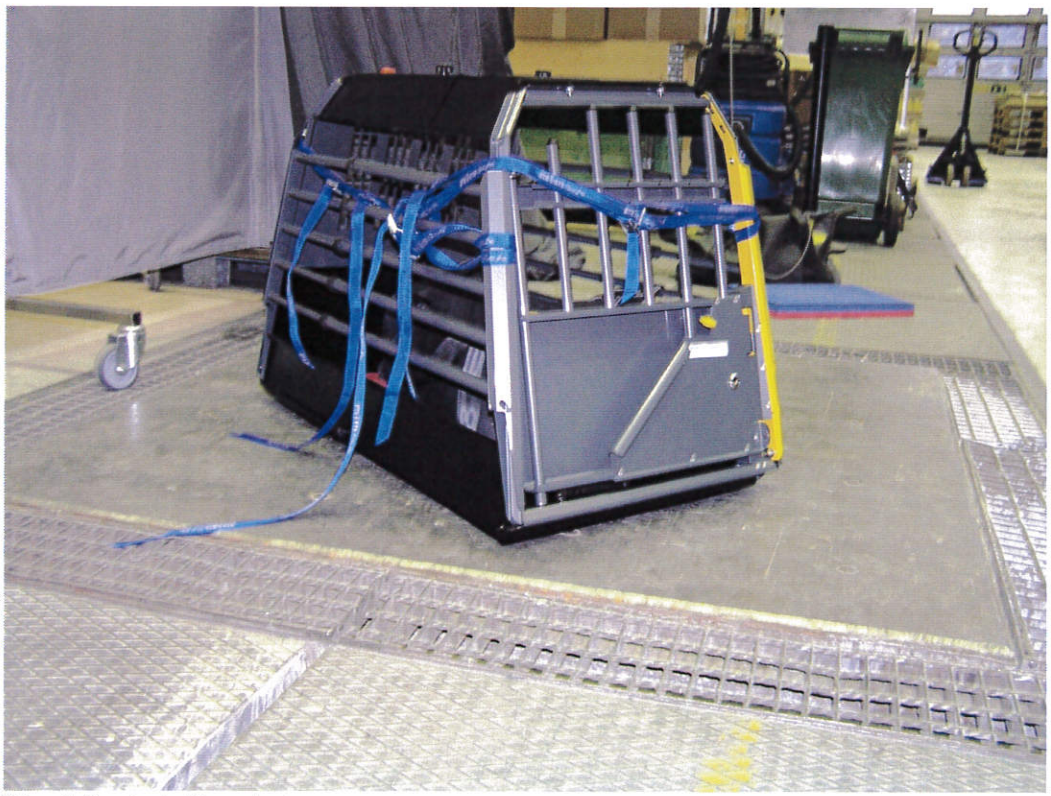


01 – Before test, Drop test

02 – Before test, Drop test

Appendix 5

03 – After test, Drop test



04 – After test, Drop test

Appendix 5

05 – After test, Drop test

06 – After test, Drop test