CRS-10-02

CRS - SIDE IMPACT TEST

Initial evaluation of repeatability on CRS side impact test using a deceleration test device with rigid fixed door

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Semi Universal Isofix Group 0+ CRS

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CRS set up

- **CRS SemiUniversal group 0+**
- **CRS anchored to Isofix anchorages according to R44**

  (but, moved completely towards the door)
- **Door positioned in contact with the CRS**

  (“first contact point”)
- **Door height 500 mm**

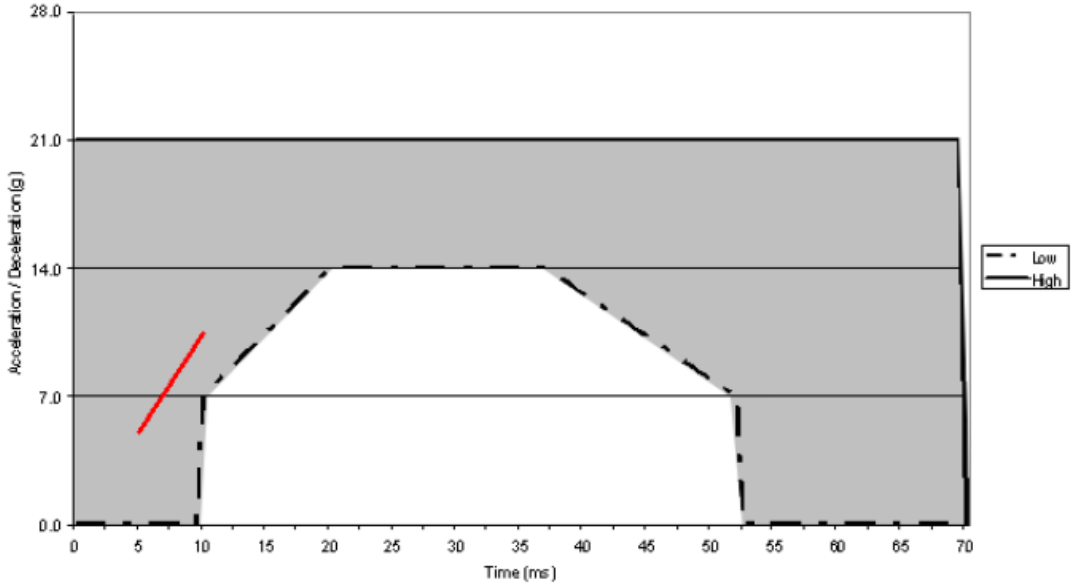
  (measured from C_r)
- **Leg support floor pan -310 mm**

  (measured from Cr)
- **Styrodur thickness 20 mm**

Sled pulse

Pulse according to Reg.44 Rear Impact

- Impact speed: 30 -0/+2 Km/h
- Stopping distance: 275 ±25 mm
- Deceleration Corridor: see picture
- Direction of impact: “side”
- Impact angle: 90°



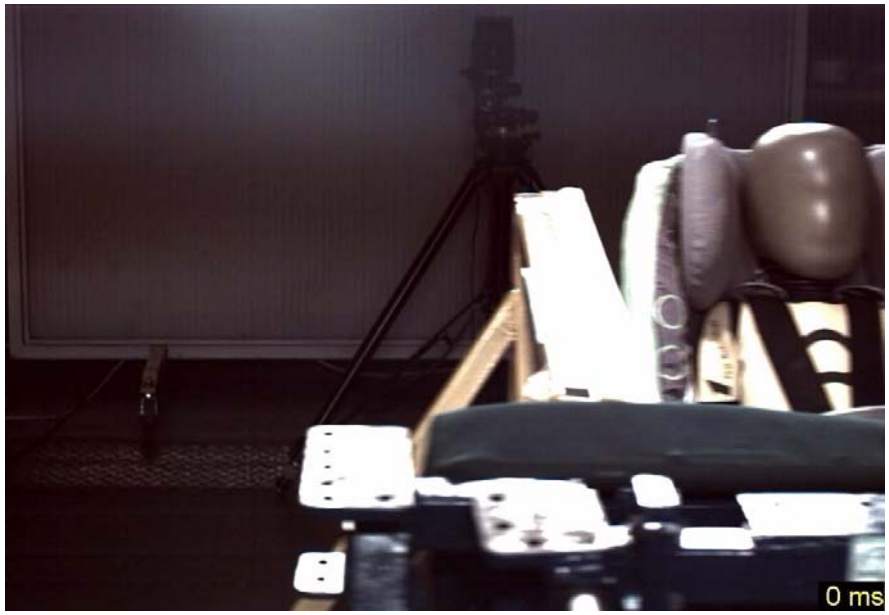
Dummy set up

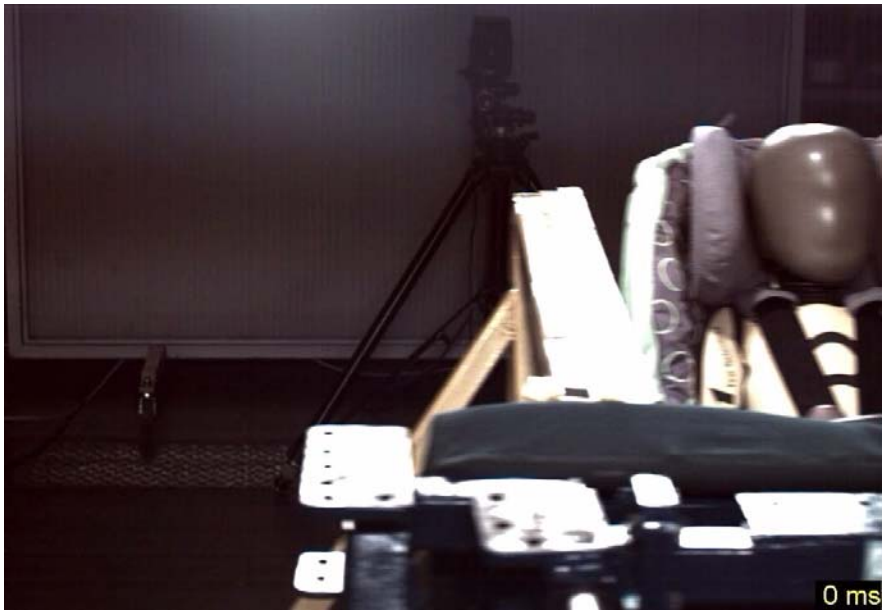
- Dummy used: Q1.5
- Dummy installation: according to R44
- Dummy positioning:
  - Definition of head position
  - Definition of shoulder position
  - Definition of pelvis position
  - Definition of arm positioning
  - Definition of leg positioning
- Dummy + CRS weight: 22.54 Kg

Dummy installation

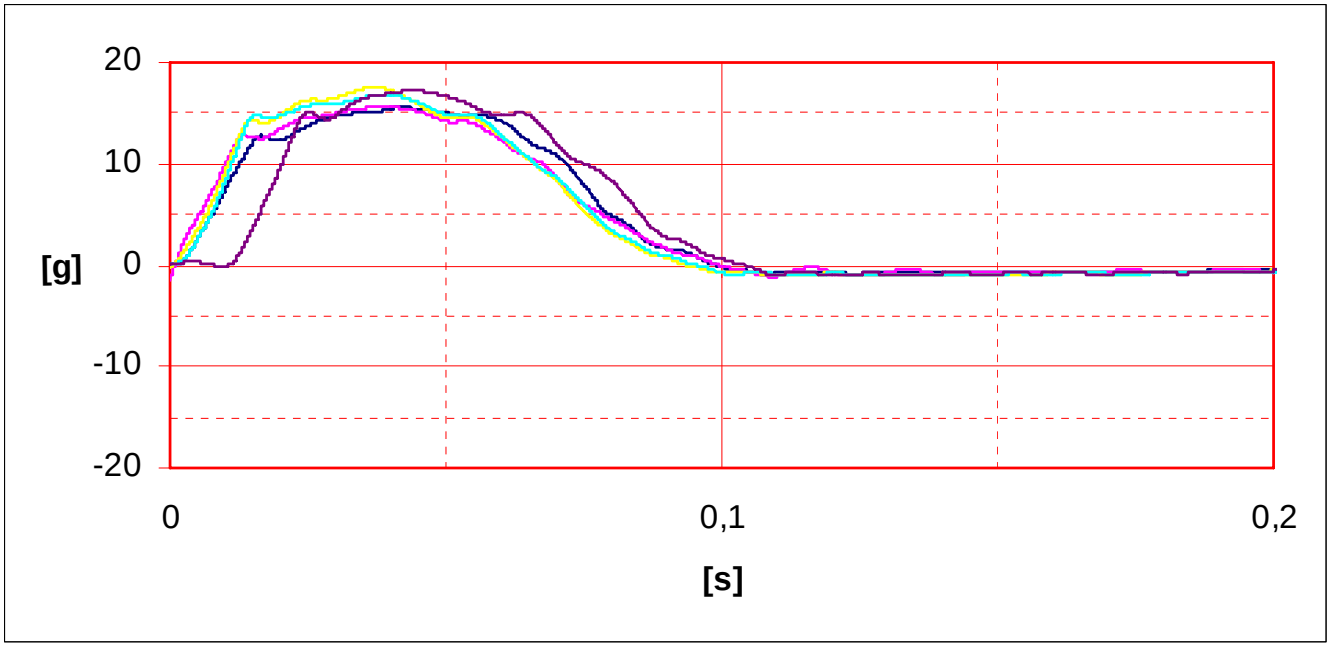
Test	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	Average	Standard Dev.
Date:	06/04/2009	06/04/2009	07/04/2009	07/04/2009	07/04/2009		
1) Distance between Isofix base central axis to door	210	210	215	210	210	211	2,2
2) Distance between CRS central axis to door	210	210	215	210	210	211	2,2
3)Distance between Dummy Head central axis to door	210	210	215	210	210	211	2,2
6) Distance between Dummy knees	140	140	140	140	140	140	0,0
7) Distance between Dummy heels	160	160	160	160	160	160	0,0
8) Dummy head height to Cr	603	596	595	595	595	596,8	3,5
9) Dummy shoulder height to Cr	437	426	420	420	420	424,6	7,4
10) Dummy pelvis height to Cr	203	196	195	195	200	197,8	3,6
11) Dummy head distance to seat back top	520	525	520	530	520	523	4,5
12) Dummy shoulder distance to seat back top	510	540	530	540	540	532	13,0
13) Dummy pelvis distance to seat back top	450	460	460	460	455	457	4,5
4) Arm in contact with torso	YES	YES	YES	YES	YES		
5) Legs straight ahead	YES	YES	YES	YES	YES		

Test videos





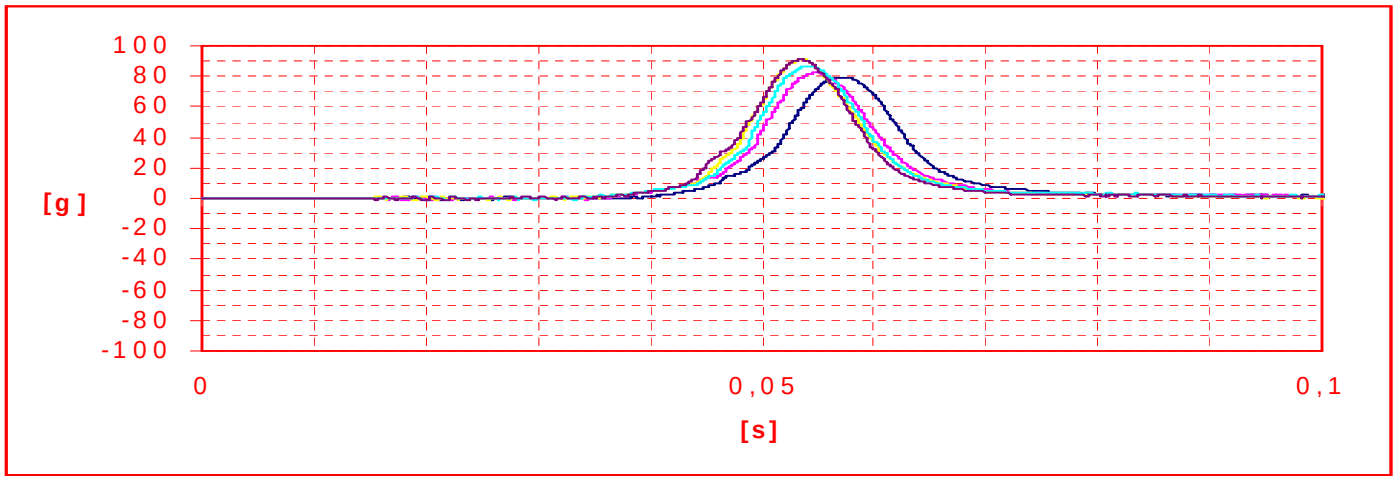
Sled pulses



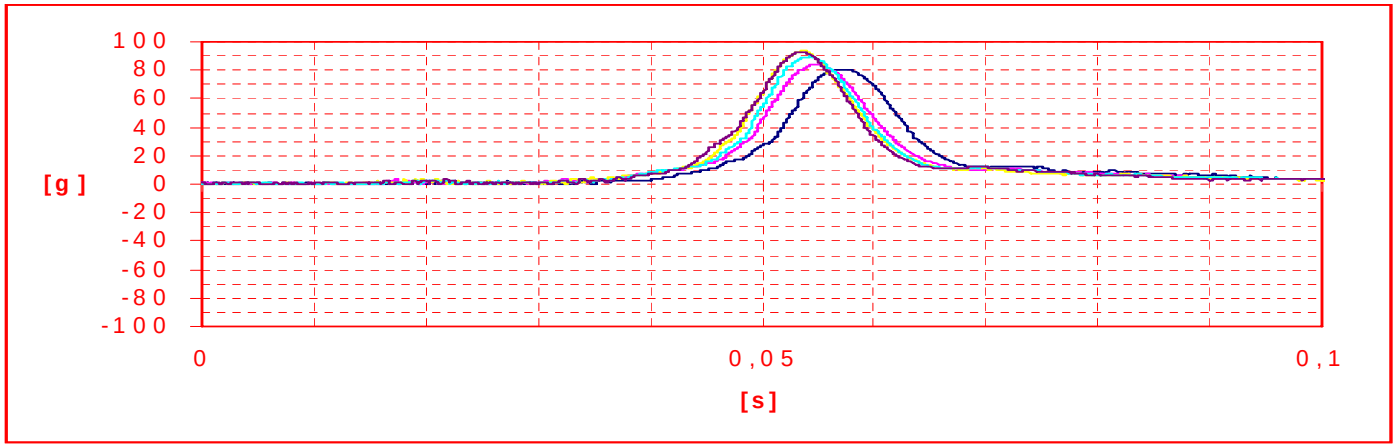
Test Parameter	Test number				
	T1	T2	T3	T4	T5
Impact speed [m/s]	8,65	8,63	8,65	8,62	8,61
Max sled deceleration [g]	15,6	15,7	17,5	16,8	17,2
Stopping distance [mm]	305	304	295	292	289

Head Deceleration

Y Axis



Resultant

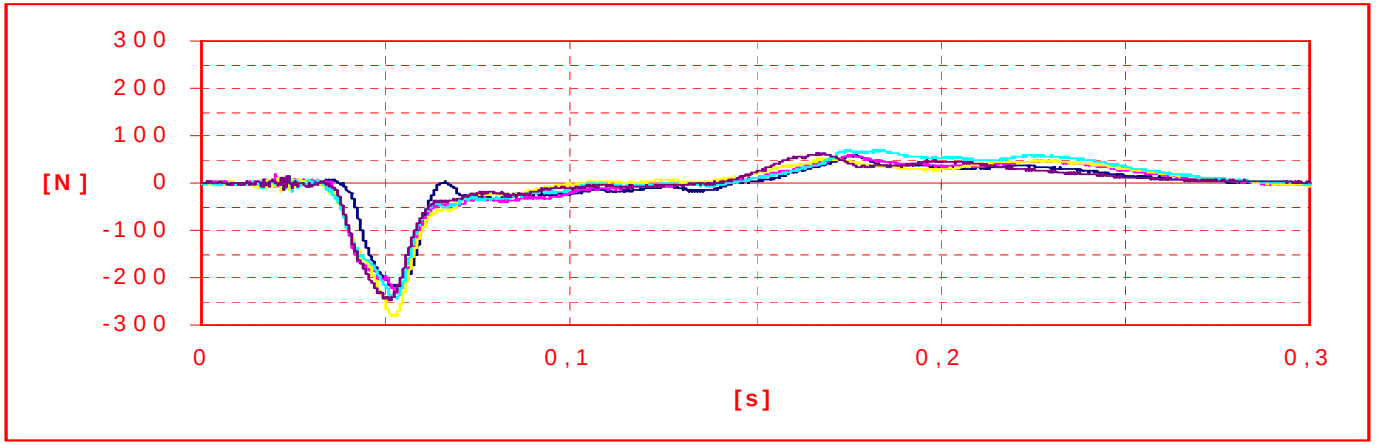


Head Deceleration Summary

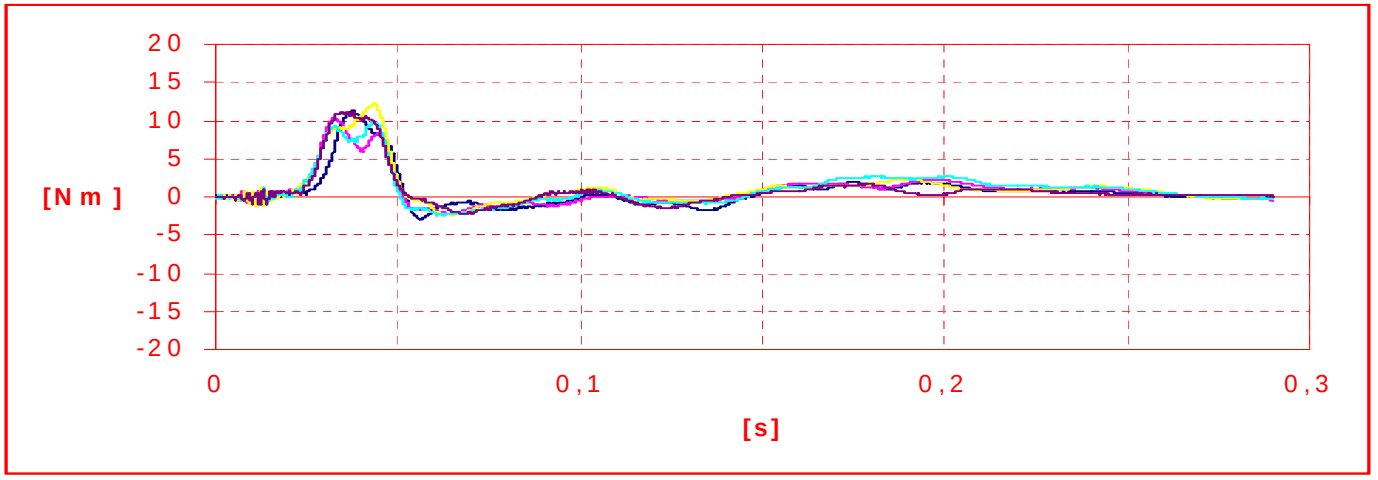
Test N°	T1	T2	T3	T4	T5	Average	Standard Deviation
Head (cfc1000)							
Peak Resultant Deceleration	80,6	84,4	94,0	89,5	92,4	88,19	5,01
Resultant Deceleration 3ms clip	77,5	79,9	87,1	84,0	86,6	83,02	3,78
HIC (36ms)	392	408	498	455	487	448	42
Peak Y Axis Deceleration	79,4	82,5	91,7	87,0	90,8	86,28	4,73
Head contact	NO	NO	NO	NO	NO		

Neck F_y Forces and M_x Bending Moments

F_y Forces



M_x Moments

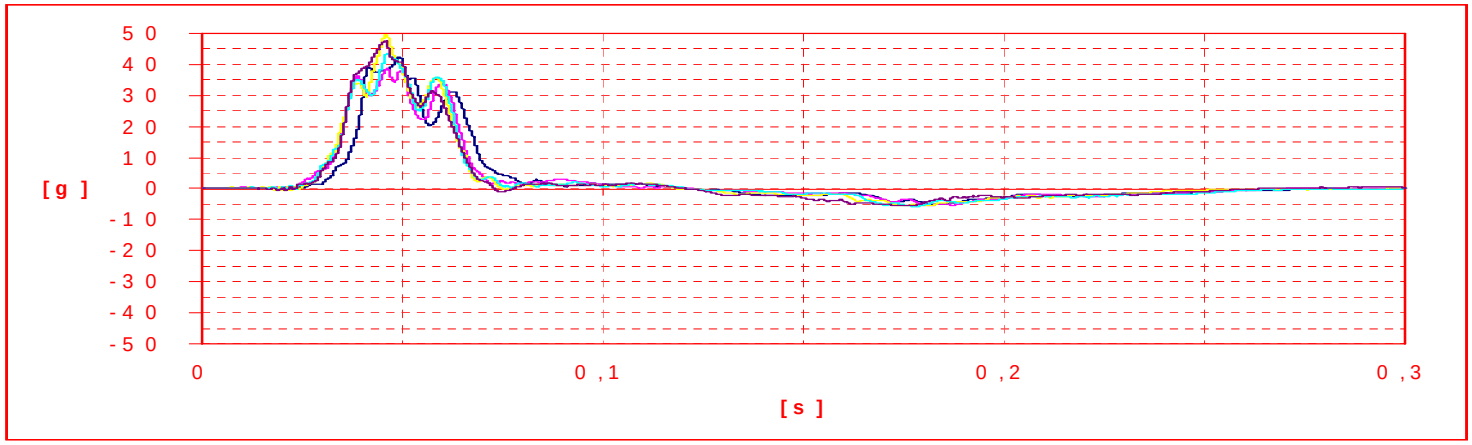


Neck Summary

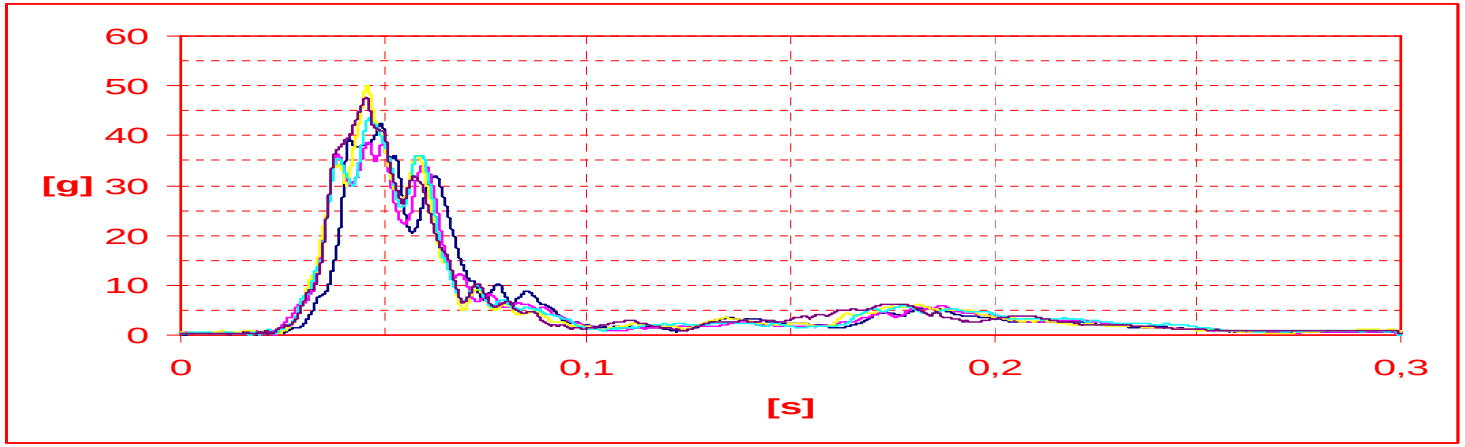
Test N°	T1	T2	T3	T4	T5	Average	Standard Deviation
Neck (cfc 1000F; cfc 600M)							
Peak Positive Y Axis Forces [N]	59,1	59,4	51,9	69,0	61,6	60,19	5,47
Peak Negative Y Axis Forces [N]	-218,8	-233,7	-283,1	-243,1	-248,8	-245,49	21,39
Peak Positive X Axis Bending Moment [Nm]	11,4	10,4	12,3	10,0	11,2	11,07	0,81
Peak Negative X Axis Bending Moment [Nm]	-2,9	-2,3	-2,4	-2,4	-2,2	-2,46	0,24

Chest decelerations

Y Axis



Resultant

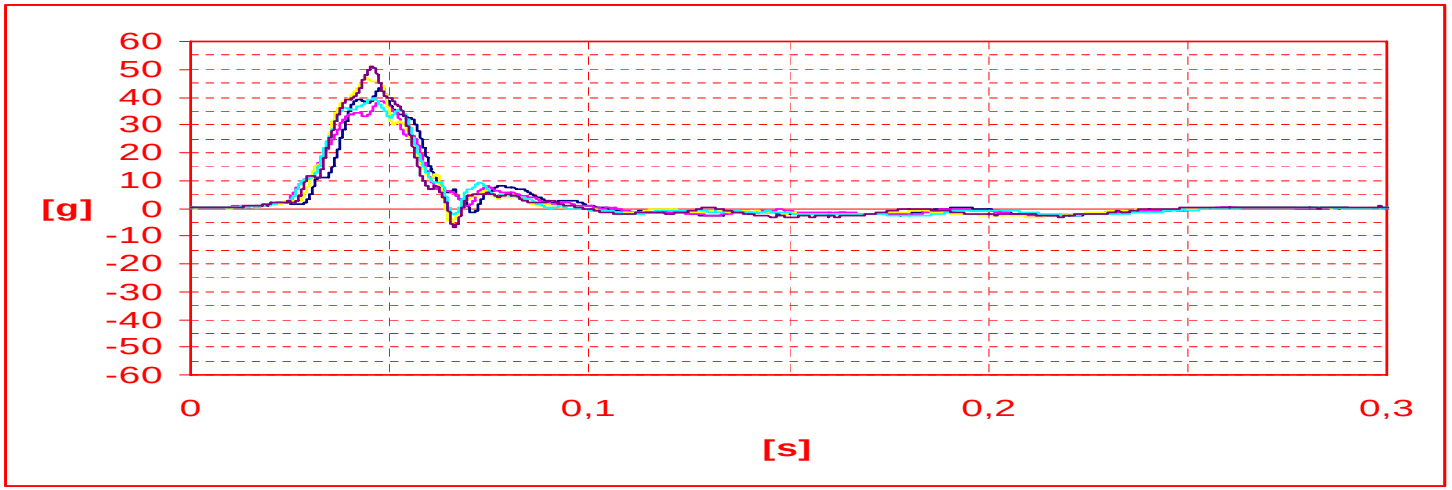


Chest Summary

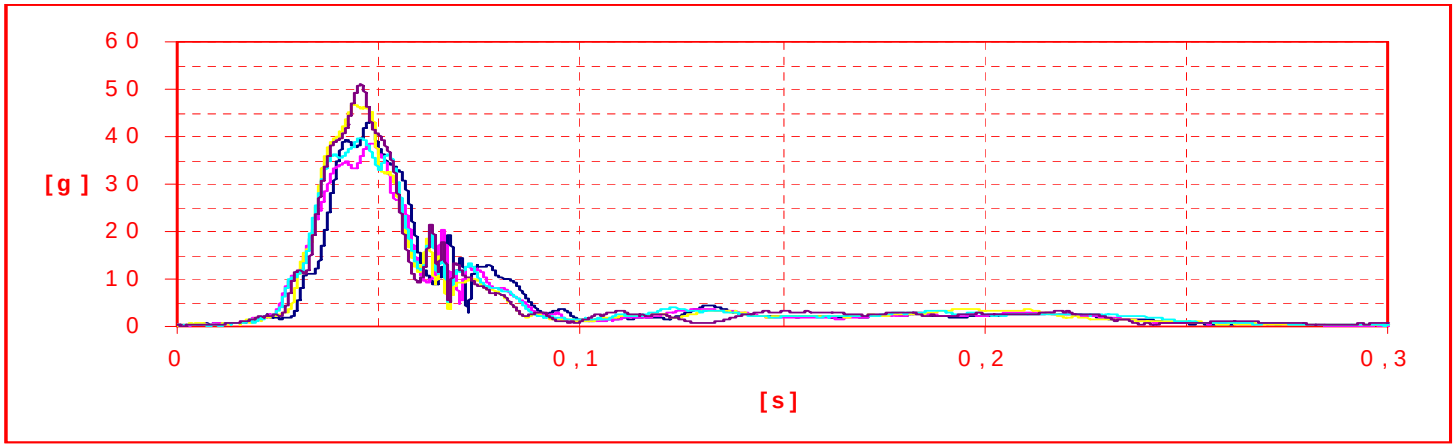
Test N°	T1	T2	T3	T4	T5	Average	Standard Deviation
Chest (cfc 180)							
Peak Y Axis Deceleration [g]	42,5	38,6	49,8	43,5	47,7	44,42	3,92
Peak resultant Deceleration [g]	42,5	38,7	49,9	43,6	47,7	44,47	3,94
Resultant Deceleration 3ms clip [g]	39,3	35,3	44,7	41,6	44,3	41,06	3,49
Z Axis Deceleration 3ms clip [g]	6,5	5,9	6,3	6,4	6,3	6,29	0,21

Pelvis decelerations

Y Axis



Resultant



Pelvis Summary

Test N°	T1	T2	T3	T4	T5	Average	Standard Deviation
Pelvis (cfc 180)							
Peak Y Axis Deceleration [g]	43,3	38,4	46,6	39,5	50,9	43,74	4,60
Peak resultant Deceleration [g]	43,4	38,7	46,9	39,7	51,0	43,92	4,58
Resultant Deceleration 3ms clip [g]	40,5	37,6	46,0	38,5	48,1	42,13	4,20
Z Axis Deceleration 3ms clip [g]	7,5	5,7	0,2	7,0	6,9	5,47	2,69

Biomechanical limits

Basic Existing biomechanical limits	Chest resultant	Chest vertical	HIC_{15}	Head resultant
REGULATION 44	55	30		
FMVSS208 CRABI 12	50		390	
FMVSS208 3YO	55		570	
Australia				150
Results Average (*)	**44,5**	**6,3**	**448**	**88,2**

(*) HIC_{36} - Chest vert= 3ms clip

Repeatability

Repeatability	r95%
Head (cfc1000)	
Peak Resultant Deceleration	13,9
Resultant Deceleration 3ms clip	10,5
HIC (36ms)	117
Peak Y Axis Deceleration	13,2
Head contact	NA
Chest (cfc 180)	
Peak Y Axis Deceleration [g]	10,9
Peak resultant Deceleration [g]	11,0
Resultant Deceleration 3ms clip [g]	9,7
Z Axis Deceleration 3ms clip [g]	0,6
Pelvis (cfc 180)	
Peak Y Axis Deceleration [g]	12,8
Peak resultant Deceleration [g]	12,7
Resultant Deceleration 3ms clip [g]	11,7
Z Axis Deceleration 3ms clip [g]	7,5
Neck (cfc 1000F; cfc 600M)	
Peak Positive Y Axis Forces [N]	15,2
Peak Negative Y Axis Forces [N]	59,5
Peak Positive X Axis Bending Moment [Nm]	2,3
Peak Negative X Axis Bending Moment [Nm]	0,7

Repeatability= Standard dev. multiplied by Student's var (95%), with 4 degrees of freedom

For any additional request, contact

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