



britax

DOREL JUVENILE
Care for Precious Life

R129 Q10 HEAD VERTICAL EXCURSION

20/01/15

britax

britax
BOB

britax
römer

Q10 Vertical Head Excursion

- Is the 840mm head vertical limit relevant for Q10?
 - Q10 sitting height is 23mm > P10
 - Dynamic kinematics of Q10 is different to P10
 - Q10 has greater rebound vertical excursion
 - Can lead to head vertical excursion over 840mm
- FP7 EPOCH project demonstrated that head vertical plane may need to be increased for Q10



Q10 vs P10

- EPOCH evaluated 9 CRSs with both P10 & Q10
- All tests conducted on R44 bench

CRS	P10 Head Vertical Av. (mm)	Q10 Head Vertical Av. (mm)	Increase (mm)
Booster Seat 1	799	813	14
Booster Seat 2	787	811	24
Booster Seat 3 (ISOFIT)	801	881	80
Booster Seat 4	796	865	69
Booster Seat 5	795	833	38
Booster Cushion 1	774	858	84
Booster Cushion 2	790	825	35
Booster Cushion 3	781	800	19
Booster Cushion 4	797	844	47

- EPOCH proposed increase of head vertical limit to 885mm*

*based on Q10 tests results using R44 test bench

R129 Front impact tests with Q10

- Britax conducted tests evaluating different CRS using Q10:



No CRS



CRS A
(Rigid ISO-FIT)



CRS B
(Flexible ISO-FIT)



CRS C
(Rigid ISO-FIT)



CRS A
(Rigid ISO-FIT, no backrest)

R129 Front impact tests with Q10

- Q10 tests were conducted on the R129 test bench
- Results were compared to P10 R44 tests

CRS	P10 Head Vertical R44 Bench (mm)	Q10 Head Vertical R129 Bench (mm)	Factor (Increase)
No CRS	-	770	
No CRS	-	790	
CRS A (Rigid ISOFIX)	840	895	7%
CRS B (Flexible ISOFIX)	825	905	10%
CRS C (Rigid ISOFIX)	835	885	6%
CRS A (Rigid ISOFIX, no backrest)	-	880	-

- All Q10 tests with CRS exceeded current 840mm head vertical requirement

R129 Q10 initial head position

- Q10 initial head position in the range of CRS (relative to Cr):

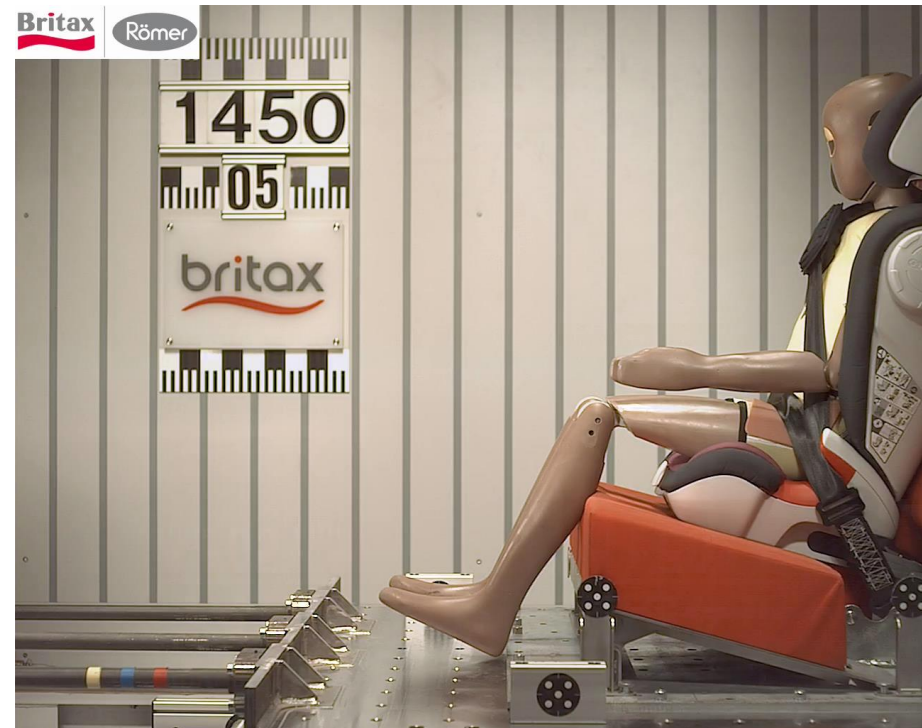
CRS	Q10 Head Position (mm)	Space Below 840mm (mm)	Exceeded 840mm during Dynamic?
No CRS	702	138	N
CRS A (Rigid ISOFIX)	839	1	Y
CRS B (Flexible ISOFIX)	821	19	Y
CRS C (Rigid ISOFIX)	816	24	Y
CRS A (Rigid ISOFIX, no backrest)	785	55	Y

- Booster seats have limited available space below 840mm limit
- All exceed 840mm in dynamic

COMPARING Q10 AND P10 KINEMATICS

P10 ECE44

Q10 UNECE 129



R129 Front impact tests with Q10 & P10

- DOREL conducted tests evaluating different CRS using Q10 & P10:



CRS D



CRS E



CRS F

R129 & Q10 initial head position

- Q10 & P10 head position in the range of CRS (relative to Cr):

Dummy	CRS	Initial vertical head position (mm)	Maximum vertical head excursion (mm)	Head over DE limit
Q10	CRS D	802	856	Yes
	CRS E	817	850	Yes
	CRS F	814	836	Yes
P10	CRS D	796	786	No
	CRS E	810	807	No
	CRS F	802	757	No

Vertical head excursion occurs during rebound phase (important variations possible)

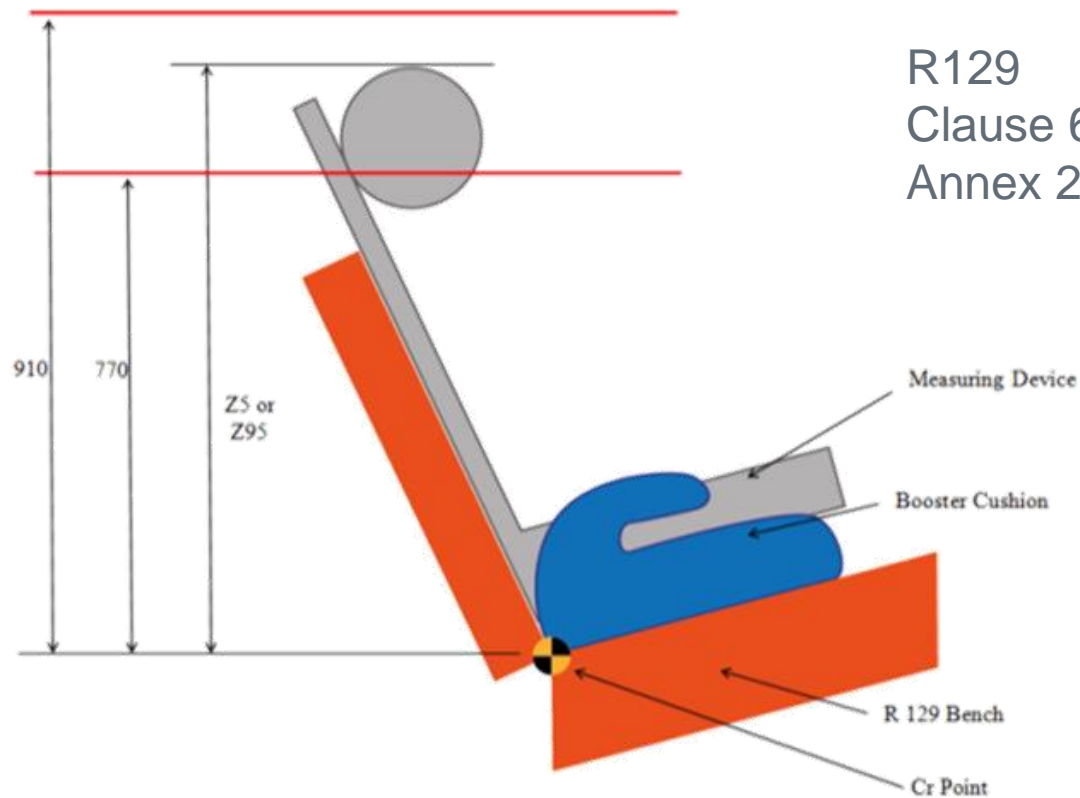
R129 & Q10 initial head position

- Q10 & P10 kinematics on seat D :



R129 Static Booster Cushion Requirements

- R129 requires head position for booster cushion to be in range 770mm-910mm (equivalent to HIII 5th & HIII 95th respectively)



Summary

- EPOCH demonstrated that head vertical plane may need to be increased for Q10
- Q10 with no CRS has 770mm-790mm vertical head excursion
- R129 requires head position for booster cushion to be in range 770mm-910mm (equivalent to HIII 5th & HIII 95th respectively)
- CRS that place head above 840mm will fail dynamic requirements
- Propose making dynamic head vertical limit requirement consistent with head position requirement

Proposal

- 1/ Increase the AD limit to 910 mm from Cr and cancel the DE limit,
Or
- 2/ Take into account the head excursion only during the loading phase , up to a time of x ms (max head forward displacement)