

Netherlands' comparison of two different calculations of "needed head restraint height".

	UMTRI data 1983		Caesar data USA 2000		Caesar data NL updated to 2004		Remarks
	50M	95M	50M	95M	50M	95M	
Anthropometry data	50M	95M	50M	95M	50M	95M	
Erect height	1751	1864	1777	1913	1818	1971	
Erect sitting height	911	971	928	994	949	1016	

Calculation of the needed head restraint height based on subjects in automotive (slumped!) posture.							
Vertical height of head CG from H point	646	678	655	690	667	702	Subject in automotive (slumped!) posture
Height of head CG from H point along torso line of 27 deg (cosine 27 deg = 0.891)	725	761	735	774	749	788	
Required head restraint height (per NHTSA procedure) after accounting for "15/0.891 mm" for only ramping up			752	791	765	805	Kroonenberg et al. described ramping up of the torso and spine straightening of subjects in an automotive posture. The reported z-displacement (vertical!) is 34 mm.
Required head restraint height after accounting for "34/0.891 mm" for both ramping up and spine straightening. This is considered necessary when the calculation is based on automotive posture!			773	813	787	826	

For comparison hereby the outcome of the Netherlands' calculation of the needed head restraint height (complete calculation is in doc. HR-3-6) that is based directly on the erect sitting height. Netherlands prefers the erect sitting height because its measurement gives much less scatter than the automotive (slumped) posture! Because of the erect position Netherlands has not taken on board the effect of spine straightening!							
Required head restraint height (per Netherlands procedure) after accounting for 15 mm for only ramping up.			778	830	797	849	