



Q3s Child Side Impact ATD NHTSA Proposed Rule (020-0100)

The Q3s Dummy is a side impact dummy that evolved from the Q3 version of a European frontal impact dummy. The Q3s is representative of a 50th percentile 3-year-old child and has been designated for inclusion into the U.S. code of federal regulation CFR 49 Part 572, Subpart W.

The NHTSA NPRM

On November 21, 2013, the National Highway Traffic Safety Administration (NHTSA) issued a Notice of Proposed Rule Making (NPRM) for the Q3s Child Side Impact crash test dummy. The new rule proposes to amend CFR Part 572 and add subpart W to reference specifications and qualifications for an anthropomorphic test device (ATD) representing a 3-year-old child for the evaluation of side impact performance in Child Restraint Systems.

On January 28, 2014 the agency also issued an NPRM to amend Federal Motor Vehicle Safety Standard (FMVSS) No. 213, "Child Restraint Systems" (49 CFR 571.213) to incorporate side impact requirements for child restraints. The Q3s will be adopted for use in this side impact compliance test procedure.

Build Levels D and E

Humanetics' Standard Build Level (SBL) D version of the Q3s was released in December of 2010. After the SBL D release, a number of significant updates were made to the dummy between December 2010 and mid-2013. Key updates to the dummy included new polyurethane materials, revisions to the neck, and improvements to the knees and shoulder elements. All of the updates were subsequently provided to the NHTSA for evaluation and in their ensuing evaluations

(including CRS sled testing and certification impacts), the updates have been reported to have met the agency's performance criteria. Since these new updates have been accepted by the NHTSA, the current Q3s Build Level will be officially established at SBL E.

How Humanetics is Responding to the NPRM

After thorough review of the proposed rule, Humanetics submitted a written response to highlight important concerns with respect to the contents of the NPRM.

Since Humanetics was not directly involved with the agency's evaluation program, and had no prior knowledge of NHTSA's certification test results, we must now determine if the proposed testing criteria from this NPRM are appropriate for current production Q3s dummies. Humanetics has been in contact with the NHTSA and a program is now under way to have two of the NHTSA Q3s dummies recertified at the Vehicle Research and Test Center as well as at Humanetics Innovative Solutions to ensure that data and test correlation between the two entities can be accomplished.

In addition, Humanetics has informed the NHTSA that we will be submitting additional certification data for early production Q3s dummies to aid in establishing more appropriate and permanent
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certification corridors to reflect a larger population of dummies. Furthermore, Humanetics informed the NHTSA that we will be shipping production Q3s dummies with certification test results that may not meet the proposed corridors established in the NPRM since the final corridors are yet to be established.

Until further evaluations can be completed and analyzed, Humanetics will not be able to supply Q3s ATDs that fully meet the proposed NPRM test corridors. However, we encourage you to certify your dummy as well, and provide your data to Humanetics for inclusion in the overall database so that the final certification corridors reflect input from all users of Q3s dummies.

For detailed NPRM specifications, please see the following technical page.



Technical Specifications

Q3s Proposed Specifications

Required Instrumentation To Qualify the Q3s Dummy Under Part 572

Location	Measurement	Instrument
Q3s head C.G.	Acceleration	Accelerometer (3 req.).
Q3s upper neck	Forces and moments	Load cell.
Q3s thorax	Deflection	IR-TRACC.
Q3s shoulder	Deflection	String potentiometer.
Q3s lumbar spine	Forces and moments	Load cell.
Q3s pubic symphysis	Force	Load cell.
Qualification test equipment	Neck, lumbar rotation	Angular rate sensor (2 req.).

Q3s Anthropometry and Mass

ANTHROPOMETRY (mm)	Q3s
Standing height	986
Sitting height	556
Shoulder height, sitting	340
Shoulder breadth (max)	247
Hip breadth (seated)	202
Head depth	180
Head breadth	138
Head circumference	502
Chest breadth	174
Chest depth	151
Chest circumference, axilla	523
Waist circumference	521
Thigh height, sitting	86
Buttock-knee length	240
Shoulder-elbow distance	186
Elbow to tip of finger	240

MASS (kg)	Q3s
Total mass	14.26
Head	2.81
Neck	0.31
Torso assembly	5.78
Upper extremities	1.41
Lower extremities	3.55

Proposed Q3s Qualification Requirements

Test	Measurement	Units	Corridor
Head—Frontal	Resultant acceleration	G	250-297
Head—Lateral	Resultant acceleration	G	113-140
Neck—Flexion	Maximum rotation	deg	70-82
	Time of max rotation	msec	55-63
	Peak moment (My)	N-m	41-51
	Time of peak My	msec	49-62
Neck—Lateral	Decay time to 0 from peak angle	msec	50-54
	Maximum rotation	deg	77-88
	Time of max rotation	msec	65-72
	Peak moment (Mx)	N-m	25-32
Neck—Torsion	Time of peak Mx	msec	TBD
	Decay time to 0 from peak angle	msec	63-69
	Maximum rotation	deg	75-93
	Time of max rotation	msec	91-113
Shoulder	Peak moment (Mz)	N-m	8-10
	Time of peak Mz	msec	85-105
	Decay time to 0 from peak angle	msec	84-103
	Lateral displacement	mm	16-21
Thorax with Arm	Peak probe force	kN	1.24-1.35
	Lateral displacement	mm	23-28
Thorax without Arm	Peak probe force	kN	1.38-1.69
	Lateral displacement	mm	24-31
Lumbar—Flexion	Peak probe force	N	620-770
	Maximum rotation	deg	48-57
	Time of max rotation	msec	52-59
	Peak moment (My)	N-m	78-94
Lumbar—Lateral	Time of peak My	msec	46-57
	Decay time to 0 from peak angle	msec	50-56
	Maximum rotation	deg	47-59
	Time of max rotation	msec	50-59
Pelvis	Peak moment (Mx)	N-m	78-97
	Time of peak Mx	msec	46-57
	Decay time to 0 from peak angle	msec	47-59
	Peak pubic load	N	700-870
	Peak probe force	kN	1.57-1.81

For further inquiries please contact Humanetics Customer Service or your account manager.

Read the NHTSA NPRM: <http://www.regulations.gov/#!documentDetail;D=NHTSA-2013-0118-0001>



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