

**WC20 & ISO 16840-4 Performance Test for
Rating of Seating System Accommodation of Vehicle-Anchored Belt Restraints**

AS1301
Aspen Seating LLC / Ride Designs

The Java Decaf Complete Back Support
with FlexLoc Attachment Hardware,
Installed on the ISO/RESNA Surrogate Wheelchair Frame (14-inch Width)
With a Surrogate Metal Seat Assembly with a 2-inch Cushion
And Loaded with a Hybrid III Small Female ATD Weighted to 130 lb

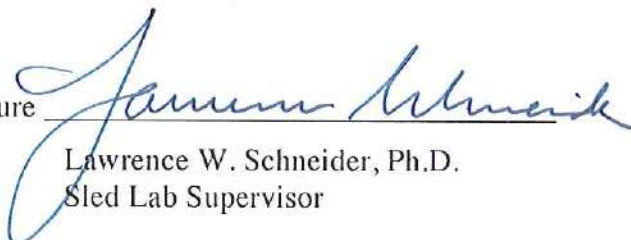
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ACKNOWLEDGMENT AND DATA USE RESTRICTION

This test was sponsored by the Ride Designs of Sheridan, Colorado. Ratings provided are advisory in nature based on the test methods of Annex C in RESNA WC-4:2012 Section 20, *Wheelchair Seating Systems for Use in Motor Vehicles*, hereafter referred to as WC20, and of Annex D of ISO 16840-4, *Seating Systems for Use in Motor Vehicles*. These standards provide a method for evaluating a complete seating system consisting of back support, seat, and attachment hardware, but the purpose of this test was to evaluate only a wheelchair back support and its attachment hardware. Therefore, a surrogate seat consisting of a steel plate with a 2-inch thick seat cushion was used to comprise a complete wheelchair seating system for testing.

The ratings provided do not constitute endorsement, certification, or approval of the products. Advertisements and marketing literature should refer to the requirements and provisions of WC20 and ISO 16840-4, but should not refer to the University of Michigan or the University of Michigan Transportation Research Institute (UMTRI).

WC20 TEST FOR ACCOMMODATION OF VEHICLE-ANCHORED BELT RESTRAINTS

Purpose

This test evaluates a wheelchair seating system with regard to the effective use of a vehicle-anchored three-point belt restraint, including ease of proper belt positioning, allowance for proper fit and contact on the wheelchair user, and the allowance of belt clear paths to vehicle anchor points.

According to 5.2 of WC20, ratings in table C.1 and the overall rating from tables C.2 through C.8 below must be at least “acceptable”.

Methods

The Java Decaf complete back support was evaluated using the scoring criteria in Annex C of WC20 using the procedures described in C.5.

Results

Vehicle-Anchored Belt-Restraint Accommodation Ratings

WC20 table	Description of Criteria	Description of Criteria	Rating
C.1	Ease of Achieving Proper Belt Restraint Placement	Belt does not need to be inserted or threaded through openings in seating components.	Excellent

WC20 clause	Description of Criteria	Description of Criteria	Score	Maximum Possible
C.2	Pelvic-Belt Contact Area	Belt makes contact over front of ATD pelvis and hips.	2	2
C.3	Shoulder-Belt Contact Area	Belt makes full contact with ATD’s sternum and front of shoulder.	2	2
C.4	Pelvic-Belt Location on ATD	Belt contacts ATD low on pelvis or at the thigh/abdominal junction.	4	4
C.5	Shoulder-Belt Location on ATD	Belt travels over middle of ATD’s shoulder.	2	2
C.6	Pelvic-Belt Angle	Average projected side-view angle is 52°.	2	2
C.7	Pelvic-Belt Clear Paths	Belt path does not deviate more than 5° from a straight line.	2	2
C.8	Belt Proximity to Sharp Edges	No sharp edges on the seating system come within 25 mm of the sharp edge clearance zone of Figure C.2.	2	2
Overall		Rating = Excellent	16	16

ISO 16840-4 TEST FOR ACCOMMODATION OF VEHICLE-ANCHORED BELT RESTRAINTS

Purpose

This test evaluates a wheelchair seating system with regard to the effective use of a vehicle-anchored three-point belt restraint, including ease of proper belt positioning, allowance for proper fit and contact on the wheelchair user, and the allowance of belt clear paths to vehicle anchor points.

According to 5.2 of ISO 16840-4, the resulting overall rating shall be reported in the product presale literature.

Methods

The Java Decaf complete back support was evaluated using the scoring criteria in Annex D of ISO 16840-4 using the procedures described in D.5.

Results

Vehicle-Anchored Belt Accommodation Ratings

ISO 16840-4 clause	Description of Criteria	Description of Criteria	Score	Maximum Possible
D.1	Ease of Belt Restraint Positioning	Good – Gaps for inserting restraint between seating components are greater than 25 mm. No threading of belt into openings is required.	2	2
D.2	Pelvic-Belt Contact Area	Good – Belt makes greater than 50% contact across full breadth of front of ATD and does contact the ATD H-points.	2	2
D.3	Shoulder-Belt Contact Area	Good - Belt makes contact across thoracic section of ATD and contacts the sternum and anterior curve of shoulder.	2	2
D.4	Pelvic-Belt Contact Location	Good – Belt contacts ATD low on pelvis near or at the thigh-abdominal junction.	2	2
D.5	Shoulder-Belt Contact Location	Good – Belt crosses near the middle of the ATD’s shoulder.	2	2
D.6	Pelvic-Belt Angle	Good – Projected side view angle is 52°.	2	2
D.7	Pelvic-Belt Clear Paths	Good – Belt makes no contact with seating components.	2	2
D.8	Belt Proximity to Sharp Edges	Good – Belt does not come within 25 mm of any sharp edge on seating system.	2	2
Overall		Rating = Good	16	16



