

## Engineering Fundamentals for the Radian Car Seat

### **Radian Convertible Car Seat:**

Sunshine Kids' Radian child restraint was conceptualized and designed around a set of strict safety and performance parameters. Below is a brief summary explaining how those features are embodied and the resultant crash test performance.

### **FMVSS 213 Compliance:**

Extensive crash testing was conducted for a matrix of both rear-facing and forward-facing child occupants. In each test, fully instrumented test dummies were used to accurately measure and record all biomechanical data throughout the entire crash test sequence. In every test configuration and within every weight category, Radian achieved a level of performance significantly superior to that required by US safety standard FMVSS 213.

### **Forward-Facing Excursion:**

Radian65: In crash tests with 65 lb test dummy (lap belt only and no top tether) resultant excursion values were more than 4" under the limit established in FMVSS 213 (and more than 6" under such limit when top tether was utilized). Crash tests with lower weight dummies resulted in significantly further decreased excursion values.

Radian80: In crash tests with a 10 yr old, 80 lb test dummy (lap belt only and no top tether) resultant excursion values were approximately 3" under the limit established in FMVSS213.

### **Rear Facing Seat Back Angle:**

Crash tests with rear-facing, 22 lb and 33 lb test dummies resulted in installation angle deflections that only peaked in the low and low ranges, respectively. Radian achieves such incredible rear-facing stability due to the strength of its alloy steel frame, its very low center of gravity and close positioning of the occupant to the bite of the automotive seat.

### **Performance Enhancing Features:**

SafeStop is a unique, energy-absorbing harness component that significantly reduces the forces affecting a child's head, neck and chest in an accident. This is especially important for younger, forward-facing children with less-developed neck strength. Radian is the only car seat that includes such an important energy-management component.

Radian positions the child occupant's center of gravity as low and as far back as possible on the vehicle seat for optimal restraint performance, especially in oblique-angled crashes – which is how most car accidents occur. In addition, this lower center of gravity significantly decreases the opportunity for occupant contact with the car's fixed interior structure.

An energy-absorbing system of closed-cell foam in the sidewalls and the seat back provide total side impact protection. The same foam is positioned underneath the child to help absorb the compressive forces on the spine that occur in the forward-facing crashes.

5-point harness system with 3 buckle locations and 5 shoulder harness locations, all reinforced for forward-facing use for maximum versatility and fit.

Radian's chest clip is perhaps the strongest of any car seat: crash tested with an 80 lb test dummy. The chest clip features a slight curve to properly fit an infant's chest and it holds the harness straps very close together for maximum performance under deceleration loading. Anti-slip ribs have been designed into its belt path so a younger occupant cannot easily slide the clip downward and slip the harness straps off the shoulders.



Director of Engineering