

# DIAMOND STANDARD

PICKUP, VAN AND MULTI-PURPOSE VEHICLE  
FULL ASSEMBLY STEPBUMPER SYSTEMS

**CERTIFIED: VESC V-5 TOWABILITY STANDARD COMPLIANT**

Documentation of certified test results and assembly system performance to State and Federal Standards by an accredited and respected independent testing firm

MGA Research Corporation

**mga**

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STANDARD<sup>™</sup>  
Class AAA Safety Parts

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# THE PURPOSE, POLICY & SCOPE OF DIAMOND STANDARD FULL ASSEMBLY STEPBUMPER TEST PERFORMANCE CERTIFICATION

## Purpose & Policy

The patent belief is that individual part criteria established by OEM in its original parts created the standard range to which all structural parts in collision must be held. A Diamond Standard multi-purpose vehicle stepbumper, therefore, must achieve the same standard of functional performance to ensure the performance of the system has been properly and effectively restored. Each manufacturer offering a stepbumper assembly incorporating a towing capability feature must be responsible for and must pass the federal standard for towability. Diamond Standard Brand full assembly stepbumpers meet or exceed the Vehicle Equipment Safety Commission's (VESC) performance standard established in VESC Regulation V-5 testing. Meeting the standard determines each hitch capable of withstanding the tow forces applied without causing permanent deformation of the ball platform which in final position the ball must not depart more than the allowable 5 degrees from its original nominal vertical position.

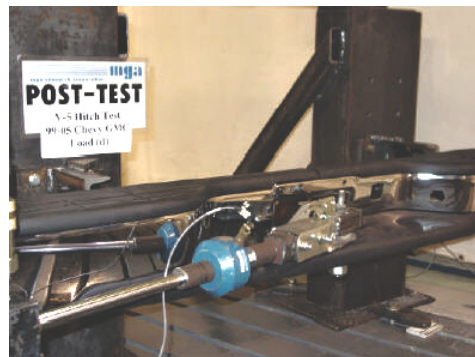
Certification of Diamond Standard full assembly stepbumper systems' performance in meeting the VESC Regulation V-5 towability standard is conducted at MGA Research, Burlington, Wisconsin ([www.mgaresearch.com](http://www.mgaresearch.com)) a requirement of NSF's Automotive Parts Certification Program.

## Scope of Certification

Beginning 2002, a robust comparative testing program was undertaken utilizing MGA Research. Tests covering all Diamond Standard full assembly step bumper systems' performance have been conducted and the performance certified as meeting or exceeding the VESC V-5 towability standard by MGA Research.

The certified performance test results are further validated by former Crashworthiness Experts from NHTSA and The Volpe National Transportation Center requiring confirmation that the Diamond Standard stepbumper's performance was equal to the performance of the OEM service part it replaces. James R. Hackney, former Director of Crashworthiness at NHTSA co-authored the paper "New Car Assessment-Five Star Crash rating-Vehicle Safety Performance Characteristics" and was critical in designing Diamond Standard testing protocols and evaluating the test results just as he was instrumental in a vast number of the safety devices now standard on vehicles throughout the world.

To date, tests covering more than 3,000 parts have been conducted across all Diamond Standard Structural part categories at a cost in excess of \$2,000,000 to provide an assurance of part functional performance certification for parts used in the autobody repair.



In July 2005, Diamond Standard conducted a VESC Regulation V-5 test of a 1999 – 2005 Chevy/GMC Fleetside stepbumper. The hitch rating of this class 3 vehicle is a load factor over 3,500 lbs. but not to exceed 5,000 lbs GTWR with a tongue rating of 500 lbs. The test loads applicable were applied above the minimum test loads for the class rating to the center of the tow ball at a rate of 150 lbs. per second. Once achieved, the loads were held for a minimum of 5 seconds. The post test photos above document the angle of the ball from vertical relative to its original axis. After all load tests showed a net movement of 2.7 degrees, exceeding the standard performance without ball platform deformation.

# CERTIFIED VESC V-5 REGULATION COMPLIANT TOWING REQUIREMENT & PERFORMANCE

Diamond Standard is a manufacturer of structural parts meaningfully associated with the highest quality standards in place and over 40 years of automotive structural part manufacturing expertise. Diamond Standard Brand stepbumpers are designed to exacting engineering standards to produce the criteria of safety, crashworthiness and towability.

Just as Diamond Standard part protocols and standards are based on the original part on your vehicle, certified functional performance comparability to the system which came on the original vehicle must be established and is a requirement of a full assembly stepbumper system before it becomes approved as Diamond Standard.

**TEST DATA FOR 00-06 TOYOTA TUNDRA REAR BUMPER**

Test	MGA Test #	MAXIMUM LOAD		BALL AXIS MOVEMENT*	
		Horizontal Load [lbs]	Vertical Load [lbs]	Pre-Test [deg]	Post-Test [deg]
A	Q07670	2845.29	2855.2	0.0°	0.4°
B	Q07671	2691.87	779.3	0.4°	0.1°
C	Q07672	2696.77	779.6	0.1°	0.5°
<b>NET MOVEMENT</b>					<b>0.4°</b>

VESC Regulation V-5 testing is utilized across all Diamond Standard alternative full assembly stepbumper systems to determine each hitch shall be capable of withstanding the forces applied. The test protocol is followed by rigidly mounting the bumpers to a test fixture. All test loads are applied above the minimum test loads for the class rating and the angle of the ball from vertical relative to its original axis is measured before and after each of

the quasi static load tests. Test "A" applies equal load forces horizontally and vertically simultaneously equaling 5,700 lbs. Tests "B & C" measure the impact of attempting to pull off the ball with increased horizontal load factors while maintaining downward pressure with loads of at least 3,471 lbs.

In the November 2007 VESC V-5 test of a 2000 – 2006 Toyota Tundra stepbumper (above) Class 3 test loads were applied above the minimum load requirements to the test article. As can be seen in the test result performance chart documentation, per the V-5 regulation, the hitch was capable of withstanding the forces applied registering a net ball axis movement of 4 degrees which exceeds the standard's performance.



The post damage photo documentation for this October 2005 VESC V-5 test of a 1994 – 2001 Dodge Ram stepbumper to the left results in a net tow ball axis movement of 1.7 degrees as compared to the allowable Regulation movement of 5 degrees from its original, nominally vertical position.

The performance chart documentation for this November 2007 VESC V-5 Regulation test of a 2004 – 2007 Ford Flareside stepbumper registers a net tow ball axis movement of 1.2 degrees confirming the hitch was capable of withstanding the towability forces significantly better than the federal standard requirement performance.

**TEST DATA FOR 04-07 FORD F150 FLARE-SIDE REAR BUMPER**

Test	MGA Test #	MAXIMUM LOAD		BALL AXIS MOVEMENT*	
		Horizontal Load [lbs]	Vertical Load [lbs]	Pre-Test [deg]	Post-Test [deg]
A	Q07655	2845.78	2858.3	0.0°	0.8°
B	Q07656	2684.53	779.6	0.8°	1.2°
C	Q07657	2698.93	779.2	1.2°	1.3°
<b>NET MOVEMENT</b>					<b>1.2°</b>

# **CERTIFIED DIAMOND STANDARD VESC V-5 RATED STEPBUMPERS PRECISION ENGINEERED TO FIT/MEET ALL STATE REGULATIONS**

Diamond Standard full assembly stepbumper systems come ready to mount and meet all State and Federal Safety Requirements regarding manufacturer permanent identification on the part, like kind and quality of fit, form, finish in terms of quality and most importantly functionality, performance and safety.

Four (4) States today require or mention certification in their regulations, emphasize performance and in the instance of New Jersey and Oregon speak to certification by an independent test facility. Fifteen (15) states include the specific word "performance" in regulations citing a replacement aftermarket or crash part must meet the performance of the comparable original equipment manufacturer part.

## **281 SKUS & MULTI-PURPOSE VEHICLE APPLICATIONS**



Diamond Standard stepbumper bars and assembly systems are available for new vehicle install or replacement of rear bumpers that have been damaged. Depending on the application required Diamond Standard Brand stepbumper full assembly models include: the face bar, hitch pull bar, top and face pads, mounting brackets, support braces and connecting parts, license lamps and a full bolt assembly pack necessary for a full replacement. Delivered as a full assembly ready to mount to the vehicle. Diamond Standard stepbumpers deliver a significant savings in R&R time.

## **ABOUT MGA TESTING AND CERTIFICATION OF TEST RESULTS**



MGA Research Corporation

[www.mgaresearch.com](http://www.mgaresearch.com)

MGA Research Corporation Testing is an accredited, recognized worldwide leading independent provider of engineering consulting, automotive testing technologies and state-of-the-art facilities and staff of test experts. MGA's global footprint offers the automotive industry a comprehensive array of products and services related to consulting, testing and government compliance issues supported by five (5) facilities in the United States with additional facilities in So. Korea, Japan, China, India and Brazil.

The MGA client base includes all original equipment car manufacturers, the aerospace industry, IIHS and the U.S. military providing services for virtually every global vehicle regulation from full-vehicle level to component-level certification of interior and exterior components. The MGA expertise includes conducting safety and reliability tests for North American (FMVSS and CMVSS), European (EEC and ECE), Australian (ADR), and Asian (TRIAS, GB) markets and supports other activities related to testing, validation and the documentation and certification of test results.

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