

ASTM F2656 - Standard Test Method for Crash Testing of Vehicle Security Barriers

US Federal Agencies have developed systematic test standards using real crash test data to certify barrier performance. Test methods were initially published by the U.S. Department of Defense (DoD) in 1985; however, these methods have been gradually replaced with American Society for Testing and Materials International (ASTM) standards. Therefore, all crash tests will be tested under ASTM standards. The following table will explain the certification standards and what they mean when considering installation of a crash barrier.

Standard	Rating	Vehicle Weight	Vehicle Speed	Penetration Rating
DoD ***K-Ratings	K4 (see M30)	15,000 lbs.	30 mph	*L1, L2, L3
	K8	15,000 lbs.	40 mph	*L1, L2, L3
	K12	15,000 lbs.	50 mph	*L1, L2, L3
Standard	Rating	Vehicle Weight	Vehicle Speed	Penetration Rating
ASTM ***M-Ratings	M30	15,000 lbs.	30 mph	**P1, P2, P3
	M40	15,000 lbs.	40 mph	**P1, P2, P3
	M50	15,000 lbs.	50 mph	**P1, P2, P3

* Penetration is measured by three categories (L1= 20 - 50 ft.; L2 = 3-20 ft.; L3 = 3 ft. or less.)

** Penetration is measured by three categories:
P1= ≤ 1m (3.3 ft.); P2 = 1.01 – 7 m (3.31 to 23.0 ft.);
P3 = 7.01 – 30m (23.1ft. to 98.4 ft.)

(Source: ASTM Standard F2656-18)

*** The K ratings and M ratings above identify the threat vehicle tested to be a 15,000 lbs, standard cab flat bed truck (shown below).



The DoD and ASTM ratings are determined by the weight of the vehicle and its maximum speed when it hits a barrier. The L-rating is a DoD Standard and the P-Rating is the ASTM Standard. For example, a M50/P1 crash barrier is designed to stop a Medium (M) Duty 15,000 pound truck traveling 50 mph with a penetration distance of < 3.3 feet. The penetration rating indicates a barrier's performance to stop the forward movement of the vehicle load after impact. The shorter the testing vehicle's penetrating distance, the higher the barrier's performance level.

Crash Terminology

Tested: Be very cautious of security products that only state “crash tested”. A product can be tested but not pass the test. Manufacturers who have tested their product successfully at an ISO Accredited Testing Laboratory can easily produce the certificate of the test and have an extensive test report.

Rated: A barrier tested in accordance with this test standard by an accredited facility in accordance with ASTM F2656.

Engineered: Engineered products have been engineered (calculations, design, computer model tested) to meet a particular designation within a referenced standard. However, they have not been physically tested

Equivalent: Because M-ratings and K-rating are so similar, a facility owner looking for an M50 certified product can also use a K12 certified product and achieve the same results.

ASTM Vehicle Types

In addition, ASTM has expanded the crash ratings to include the following vehicle weight and speed:

Vehicle Type	Vehicle Weight	Penetration Rating
<i>Small Passenger Car (SC)</i>	2,430 lbs.	SC30 (30 mph) SC40 (40 mph) SC50 (50 mph) SC60 (60 mph)
<i>Full Size Sedan (FS)</i>	4630 lbs	FS30 (30 mph) FS40 (40 mph) FS50 (50 mph) FS60 (60 mph)
<i>Pickup Truck (PU)</i>	5,070 lbs.	PU30 (30 mph) PU40 (40 mph) PU50 (50 mph) PU60 (60 mph)
<i>Heavy Goods Vehicle (H)</i>	65,000 lbs.	H30 (30 mph) H40 (40 mph) H50 (50 mph)

These expanded standards provide crash ratings for products to be used in urban areas and restricted access locations that may be located in industrial and commercial areas as well as the more obvious military or governmental facilities. These are areas where larger trucks would be unable to gain access to the barrier but a level of protection is still required.