

PILOMAT
MASTERSHIP IN RETRACTILE TECHNOLOGY

PILOMAT 275/M50-1200
CRASH TESTED
M50 (K12) RATING
AMERICAN CERTIFICATION
ASTM F2656-07 STANDARD

PILOMAT

F2656-07
PILOMAT
275 / M50-1200
RETRACTABLE
BOLLARD
BY 2025-07 M50
04 / 18 / 18
KARG'S
Engineering

CERTIFICATION

Crash Test - M50 (K12) Rating
American Certification - ASTM F2656-07 Standard
Performed at Karco Engineering, LLC
Automotive Research Center, Adelanto CA, U.S.A.



M50/K12 Automatic hydraulic anti-terrorism bollards with built-in pump



275/M50 1200A

- Ø 275 mm / h 1200 mm
- 2.000.000 joules
- 700.000 joules



KARCO Engineering, LLC.
AUTOMOTIVE RESEARCH CENTER
9270 Holly Road
Adelanto, CA 92301
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PILOMAT S.r.l.
Via Zanica, 17/P
24050 Grassobbio (Bg) Italy

Attention: Mr. Sergio Toffetti

Date: May 6, 2011

Mr. Toffetti,

Based upon the testing performed on Tuesday, April 11, 2011 at KARCO Engineering LLC., the as-tested configuration of the PILOMAT S.r.l. PASS PM 275/M50-1200A single retractable bollard has received an impact rating of P3 at the M50 test level, based on the ASTM F 2656-07 standard test method. The M50 test level is evaluated using a 6,800 kg test vehicle traveling at a nominal velocity of 80 km/h. The P3 penetration rating is given when penetration beyond the protected side of the barrier is between 7.01 m and 30 m at the lower leading edge of the test vehicle's cargo bed.

The PASS PM 275/M50-1200A completely disabled the test vehicle causing severe damage to the engine compartment and drivetrain. Maximum penetration recorded was 21.38 m on the passenger's side of the vehicle. Dynamic and static measurements were taken to be the same for this test.

Complete information relating to the test can be found in report number TR-P31047-01-NC and CD serial number 2011-1926 from KARCO Engineering LLC., including test conditions, test vehicle information, and manufacturer drawings. Also included are any discrepancies/differences from the manufacturer supplied drawings and the as-tested test article.

Sincerely yours,

Frank D. Richardson
President
KARCO Engineering, LLC.

TEST REPORT FOR:

PILOMAT S.r.l.

PASS PM 275/M50-1200A



TESTED TO:

ASTM F 2656-07

Standard Test Method for Vehicle Crash Testing of Perimeter Barriers

Test M50

PREPARED FOR:

PILOMAT S.r.l.

Via Zanica, 17/P

24050 Grassobbio (Bg) Italy

TEST REPORT NUMBER:

TR-P31047-01-NC

REPORT DATE:

June 20, 2011

TEST DATE:

April 11, 2011



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Automotive Research Center
9270 Holly Road
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SECTION 3 TEST RESULTS

3.1 TEST RESULTS

As recommended in ASTM F 2656-07 '*Standard Test Method for Vehicle Crash Testing of Perimeter Barriers*' the following full-scale impact test was conducted to evaluate the impact performance of the PILOMAT S.r.l. PASS PM 275/M50-1200A to the M50 test level.

Test M50 was conducted on the PILOMAT S.r.l. PASS PM 275/M50-1200A on April 11, 2011. The test article was positioned at an angle of ninety degrees (90°) to the direction of travel of the test vehicle, with the vehicle's centerline intersecting the center of the bollard. The test was conducted using a commercially available 1989 Ford F700 medium duty truck with a test inertial mass of 6,703.0 kg. Test vehicle information is presented in Data Sheets No. 1 and No. 2. The test vehicle impacted the barrier at a velocity of 82.2 km/h (51.1 mph). Evaluation of the bollard performance is presented in Data Sheet No. 5.

This crash was documented by a minimum of two (2) real-time video cameras and four (4) high-speed digital color video cameras. Photographs of the test vehicle and PILOMAT S.r.l. PASS PM 275/M50-1200A are shown in Appendix A. Data plots of the instrumentation are available in Appendix B.

The test vehicle's forward motion was arrested by the PILOMAT S.r.l. PASS PM 275/M50-1200A within the 7.01 m to 30.0 m penetration limit for a P3 rating. The maximum penetration recorded was 21.38 m on the passenger's side. The maximum penetration on the driver's side was 20.51 m. Both penetration measurements were measured statically using the vehicle's final resting position. Dynamic and static measurements were taken to be the same for this test.

The test vehicle sustained severe damage and was disabled by the impact. The bumper wrapped around the bollard. The bolts holding the bollard insert support to the metal sub frame sheared off and the bollard insert support in the foundation bent toward the protected edge. The bollard separated from the foundation and stayed with the test vehicle: the bollard did not appear to bend or break. The test vehicle was not operable after the impact.

The foundation sustained major cracks perpendicular to the vehicle travel, along the front of the metal box. The opening was not blocked after the impact.

DATA SHEET 4

IMPACT CONDITIONS

Test Article: PILOMAT S.r.l. PASS PM 275/M50-1200A
Test Program: ASTM F 2656-07 M50 Project No.: P31047-01
Test Vehicle: 1989 Ford F-700 Test Date: 4/11/11

IMPACT CONDITIONS

Item	Value
Test Time	1:18 PM
Temperature (°F)	72 ¹
Wind Velocity (km/h)	5 ¹
Wind Direction	N ¹
Impact Speed (km/h)	82.2
Impact Angle (°)	1.2
Impact Location (mm)	0

Impact Angle and impact location measured using high speed video analysis

¹ - Information for reference only.

DATA SHEET 5

EVALUATION OF TEST RESULTS

Test Article: PILOMAT S.r.l. PASS PM 275/M50-1200A
Test Program: ASTM F 2656-07 M50 Project No.: P31047-01
Test Vehicle: 1989 Ford F-700 Test Date: 4/11/11

PENETRATION RATINGS

Measured Penetration	Rating
Less than 1 m	P1
1.01 m - 7.0 m	P2
7.01 - 30.0 m	P3
Greater than 30 m	P4

MEASURED PENETRATION

Description	Units	Value
Driver's Side Penetration (Dynamic)	m	20.51
Passenger's Side Penetration (Dynamic)	m	21.38
Maximum Dynamic Penetration	m	21.38
Driver's Side Penetration (Static)	m	20.51
Passenger's Side Penetration (Static)	m	21.38
Maximum Static Penetration	m	21.38
Maximum Penetration	m	21.38

PENETRATION RATING

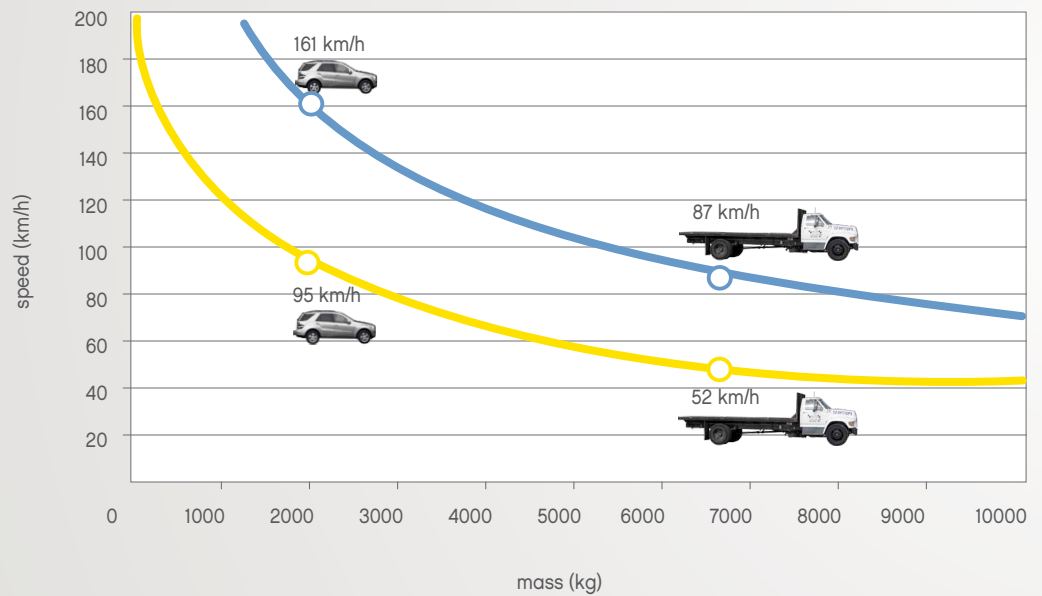
ASTM F 2656-07 penetration rating for test P30121-01	P3
Comments:	
The Pass PM 275/M50-1200A completely arrested the test vehicle within the 7.01 m to 30.0 m penetration limit for a P3 rating.	
The test vehicle was disabled by the impact. The bumper wrapped around the bollard and pulled the bollard from the foundation. The foundation cracked and the opening was not blocked after the impact. The Static and Dynamic penetrations were taken to be the same for this test.	

275/M50 1200A

MOVING CYLINDER	FE 510 STEEL
MOVING CYLINDER NOMINAL DIAMETER	275 mm
MOVING CYLINDER HEIGHT	1200 mm
MOVING CYLINDER FE 510 STEEL THICKNESS	25 mm
MOVING CYLINDER FE 510 STEEL FINISH	POLYESTER POWDER PAINT – STANDARD GREY ANTHRACITE
OTHER MOVING CYLINDER FINISH	RIBS ON CYLINDER SURFACE - 316 AISI STAINLESS STEEL BRUSHED COVERING 1,5 mm
REFLECTING ADHESIVE STRIP	YES - HEIGHT 55 mm
RISING SPEED	22 cm/sec
LOWERING SPEED	22 cm/sec
MANUAL EMERGENCY LOWERING	YES (VERSION WITH RELEASE NO 220 = AUTOMATIC LOWERING)
CONNECTION LINE TO CONTROL UNIT	STANDARD 10 m (MAXIMUM LENGTH: 80 m)
HYDRAULIC PUMP	BUILT-IN INTO THE PILOMAT
PROTECTION CLASS	IP 67
TYPE OF USE	INTENSIVE - LIFE AVERAGE 2.000.000 MOVEMENTS - 2.000 MOVEMENTS/DAY
IMPACT RESISTANCE (WITHOUT DEFORMATION)	700.000 J
BREAKOUT RESISTANCE	2.000.000 J
OPERATING TEMPERATURE	- 40°C + 70°C (FOR LOW TEMPERATURES SEE HEATING RESISTANCE)
NOMINAL PILOMAT WEIGHT (WITHOUT PIT)	605 kg
NOMINAL WEIGHT OF STANDARD PIT	425 kg

PILOMAT 275/M50 1200A

- 2.000.000 JOULES
- 700.000 JOULES



BREAKOUT RESISTANCE

The resistance to breakage at a given threshold applies to the impact of a vehicle causing the Pilomat permanent damage in its active and structural mechanisms. The Pilomat, although damaged, provides the vehicle stop within a metre from the point of collision.

IMPACT RESISTANCE

Resistance to impact at a given threshold indicates that the impact of a vehicle does not cause the PILOMAT blocking or damage to the structural and action mechanisms. The Pilomat's continued functionality and safety are guaranteed.

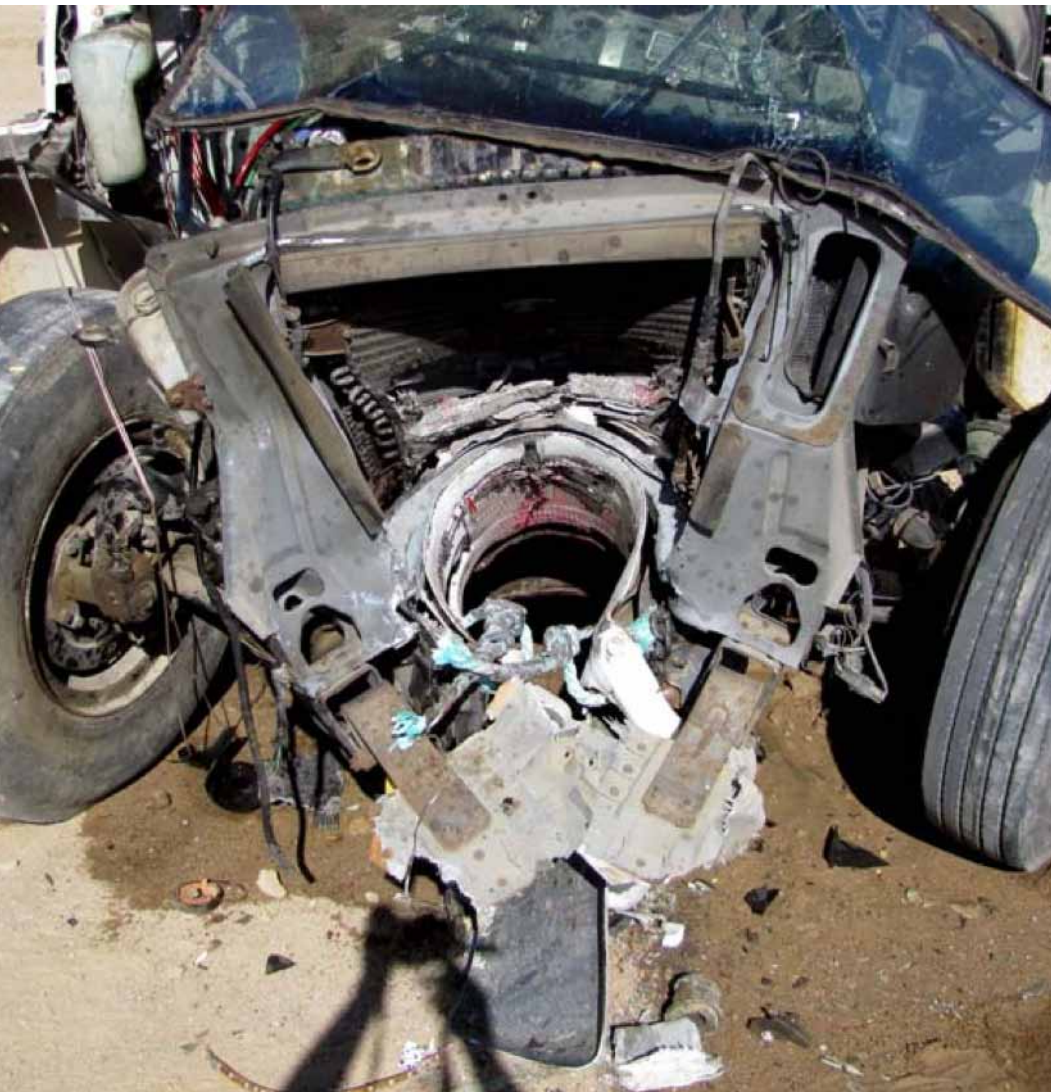
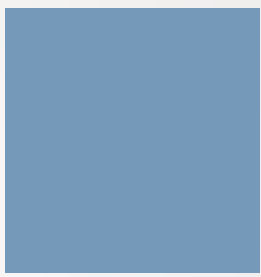
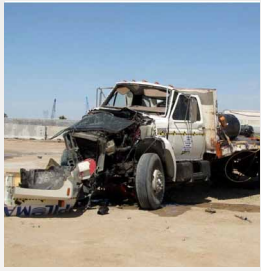
800 kg 

1.200 kg 

2.000 kg 

6.800 kg 

CRASH TEST



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100% MADE IN ITALY



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