

PILOMAT
MASTERSHIP IN RETRACTILE TECHNOLOGY

**PILOMAT 275/M30-1200
CRASH TESTED
M30 (K4) RATING
AMERICAN CERTIFICATION
ASTM F2656-07 STANDARD**



P32052-01
PILOMAT
275 / M30 - 12000
RETRACTABLE
BOLLARD
ASTM F 2656-07 M30
03 / 20 / 12
AKARCO
Engineering

CERTIFICATION

Crash Test - M30 (K4) Rating
American Certification - ASTM F2656-07 Standard
Performed at Karco Engineering, LLC
Automotive Research Center, Adelanto CA, U.S.A.



M30/K4 Automatic hydraulic anti-terrorism bollards with built-in pump



275/M30 1200A

- Ø 275 mm / h 900 mm
- 1.200.000 joules
- 700.000 joules



KARCO Engineering, LLC.
AUTOMOTIVE RESEARCH CENTER
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PILOMAT S.r.l.
Via Zanica, 17/P
24050 Grassobbio (Bg) Italy

Attention: Mr. Sergio Tofetti

Date: April 12, 2012

Mr. Tofetti,

Based upon the test performed on Tuesday, March 20, 2012 at KARCO Engineering, LLC., the as-tested configuration of the PILOMAT 275/M30-1200A single retractable bollard has received an impact rating of P1 at the M30 test level, based on the ASTM F 2656-07 standard test method. This test evaluated the 275/M30-1200A for an impact to the center of the bollard.

The M30 test level of the ASTM F 2656-07 is evaluated using a 6,800 kg test vehicle traveling at a nominal velocity of 50 km/h. The P1 penetration rating is given when penetration beyond the protected side of the barrier is less than 1 meter at lower leading edge of the test vehicle's cargo bed.

The 275/M30-1200A completely disabled the test vehicle causing severe damage to the chassis, and drivetrain. The maximum penetration was recorded dynamically on the driver's side of the vehicle and was -1.6 m.

The 275/M30-1200A sustained minor damage as a result of the impact. The bollard and foundation shifted, causing the bollard to lean 2.8° in the direction of vehicle travel. The vehicle path remained blocked during and after the impact. The 275/M30-1200A was operational after the test.

Complete information relating to the test can be found in report number TR-P32052-01-NC and CD serial number 2012-2315 from KARCO Engineering, LLC., including test conditions, test vehicle information, test article specifications, manufacturer drawings and any deviations from the drawings in the as-tested configuration. This letter should not be considered complete documentation of this test without consideration of the test report and deliverable CD.

Sincerely yours,

Frank D. Richardson
President
KARCO Engineering, LLC.

TEST REPORT FOR:

PILOMAT S.r.l.

PILOMAT 275/M30-1200A



TESTED TO:

ASTM F 2656-07

Standard Test Method for Vehicle Crash Testing of Perimeter Barriers

Test M30

PREPARED FOR:

PILOMAT S.r.l.

Via Zanica, 17/P

24050 Grassobbio (Bg) Italy

TEST REPORT NUMBER:

TR-P32052-01-NC

REPORT DATE:

April 12, 2012

TEST DATE:

March 20, 2012



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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 275/M30-1200A to the M30 test level.

Test M30 was conducted on the PILOMAT 275/M30-1200A on March 20, 2012. 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 1992 GMC TopKick medium duty truck with a test inertial mass of 6795.0 kg. Test vehicle information is presented in Data Sheets No. 1 and No. 2. The test vehicle impacted the test article at a velocity of 49.6 km/h (30.8 mph). Evaluation of the test article performance is presented in Data Sheet No. 5.

This impact test 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 the PILOMAT 275/M30-1200A are shown in Appendix A. Data plots of the instrumentation are available in Appendix B.

The test vehicle's forward motion was completely arrested by the PILOMAT 275/M30-1200A before the 1.0 m penetration limit for a P1 rating. The maximum penetration recorded was -1.56 m on the driver's side measured dynamically using high speed video.

The test vehicle sustained severe damage to the front end and drivetrain. The driveshaft snapped into pieces, rendering the vehicle inoperable. The engine was pushed rearward toward the occupant compartment and the bumper and frame rails wrapped around the bollard. The impact resulted in occupant compartment intrusion at the footwell.

The bollard sustained minimal damage and the vehicle path remained blocked after impact. The bollard remained set in the foundation and there were no visible cracks in the concrete. The bollard and foundation shifted, causing the bollard to lean 2.8° in the vehicle's direction of travel. There was no significant bending of the bollard. After the impact test, the bollard was able to cycle between its retracted and deployed states and was deemed operational.

DATA SHEET 4

IMPACT CONDITIONS

Test Article: PILOMAT 275/M30-1200A
Test Program: ASTM F 2656-07 M30 Project No.: P32052-01
Test Vehicle: 1992 GMC TopKick Test Date: 03/20/12

IMPACT CONDITIONS

Item	Value
Test Time	11:50 AM
Temperature (°F)	55
Wind Velocity (km/h)	0
Wind Direction	
Impact Speed (km/h)	49.6
Impact Angle (°)	89.9
Impact Location (mm)	44 (left)

¹ - Information for reference only.

² - Impact Angle and impact location measured using high speed video analysis.

DATA SHEET 5
EVALUATION OF TEST RESULTS

Test Article: PILOMAT 275/M30-1200A
 Test Program: ASTM F 2656-07 M30 Project No.: P32052-01
 Test Vehicle: 1992 GMC TopKick Test Date: 03/20/12

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	-1.56
Passenger's Side Penetration (Dynamic)	m	-1.71
Maximum Dynamic Penetration	m	-1.56
Driver's Side Penetration (Static)	m	-1.98
Passenger's Side Penetration (Static)	m	-2.07
Maximum Static Penetration	m	-1.98
Maximum Penetration	m	-1.56

PENETRATION RATING

ASTM F 2656-07 penetration rating for test P32052-01	P1
Comments:	
<p>The PILOMAT 275/M30-1200A arrested the test vehicle before the 1.0 m penetration limit for a P1 rating.</p> <p>The test vehicle was disabled by the impact. The front end and drivetrain were damaged by the impact. The bollard sustained minimal damage and was operational after the impact.</p>	

275/M30 1200A	
MOVING CYLINDER	FE 510 STEEL (IRON)
MOVING CYLINDER NOMINAL DIAMETER	275 mm
MOVING CYLINDER HEIGHT	1200 mm
MOVING CYLINDER FE 510 STEEL THICKNESS	15 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	20 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	1.200.000 J
OPERATING TEMPERATURE	- 40°C + 70°C (FOR LOW TEMPERATURES SEE HEATING RESISTANCE)
NOMINAL PILOMAT WEIGHT (WITHOUT PIT)	385 kg
NOMINAL WEIGHT OF STANDARD PIT, WITH COUNTER-FRAME AND BRACKETS	275 kg

PILOMAT 275/M30 1200A

- 1.200.000 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.



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