

ATTACK TEST REPORT

1. Overview

The only way to measure a structure's effectiveness in resisting attack is through a fully-accredited independent testing programme.

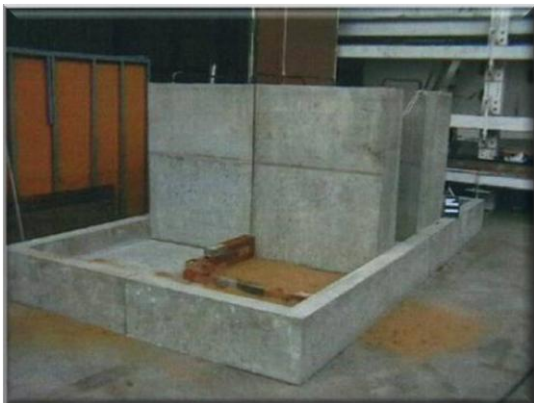
In 2009 and again in early 2011, the armouring solutions offered by ASP were subjected to rigorous testing by BRE Global - the UK's primary independent testing company - in accordance with the benchmark European Standard EN1143-1 (2010).

When subjected to intense attack by thermal lance, diamond core drill and high explosive, the two-wall test structure incorporating ASP's armouring elements exceeded the Resistance Values required to achieve the highest possible Resistance Grade – EX CD XIII.

As a result, any contractor specifying ASP armouring elements within their project can be confident that they are incorporating fully-tested solutions offering the greatest possible protection against attack – now and in the future.

2. Vault Design

On every project, ASP and Gunnebo work closely with the security consultant to ensure the vault is designed and detailed in line with the complex standards and guidelines issued by the European Certification Board for Security Systems.



One of the ECB's key recommendations is that the design of large vaults should be based on a double wall system incorporating a control corridor.

Given this advice, the independent attack tests undertaken to prove the effectiveness of ASP armouring elements are conducted in line with a double wall / control corridor vault design.

3. Certification

The benchmark for rating a security structure's ability to resist attack is set by European Standard EN 1143-1:2010.

Under this Standard, security structures are classified to a Resistance Grade according to their Resistance Value. The Resistance Grades, expressed in roman numerals, range from 0 (least resistant) to XIII (most resistant).

The Resistance Values - expressed in RU's (Resistance Units) - reflect the time that it would take to gain complete access to the structure under test.

The additional 'EX' designation is applied where the structure under test meets additional criteria relating to post-detonation resistance following explosive attack.

The additional 'CD' designation is applied where the structure under test meets additional criteria relating to attack by diamond core drills.

Having undertaken a series of attack tests in 2009 and 2011, independent specialists BRE Global and TPS confirmed that the resistance provided by concrete incorporating ASP's armouring elements exceeded that required to achieve the highest European Standard Resistance Grade EX CD XIII.

EN 1143-1: 2010 Classifications

Resistance Grade	Resistance Value	Value for EX Designation	Value for CD Designation
0	30	-	-
I	50	-	-
II	80	4	-
III	120	6	-
IV	180	9	-
V	270	14	-
VI	400	20	-
VII	600	30	-
VIII	825	41	10000
IX	1050	53	10000
X	1350	68	10000
XI	2000	100	10000
XII	3000	150	10000
XIII	4500	225	10000

4. Thermal Lance Attack Test

The objective of the Thermal Lance attack was to create a 350mm aperture in the external wall of the test structure in under two hours.

The test was halted after two hours after the test team determined that it was not possible to meet the test objective.

During the test, only one of the 28 Thermal Lances used had managed to pierce a single hole through the external wall.



When calculated in accordance with EN 1143-1, the Resistance Value of the reinforced concrete wall in this test equated to 6107RU, 35% above the 4500RU threshold required to achieve Resistance Grade XIII.

5. Diamond Core Drill Attack Test

The objective of the Diamond Core Drill attack was to achieve complete vault access by creating a 350mm aperture through both the external and internal walls of the double wall / control corridor test structure.

All tests were conducted using a 2300W / 1000mm long diamond core drill with a 150mm diameter bit.



Test 1: External Wall

A 350mm aperture was created in a time equating to a Resistance Value of 9991RU in accordance with EN 1143-1, exceeding the 4500RU threshold for Resistance Grade XIII by almost 100%.

Test 2: Internal Wall

A 350mm aperture was created in a time equating to a Resistance Value of 17,575RU, 75% above the 10,000RU threshold required to achieve the highest possible Resistance Grade CD XIII.

Conclusion

Each wall in this test significantly exceeded the Resistance Values required to achieve Resistance Grade XIII, with the Internal Wall easily achieving the additional CD rating.

When combined in a double wall / control corridor vault design, it's clear that vault walls incorporating ASP armouring elements not only provide formidable protection against attack by existing drills but also 'future-proof' vaults against attack by more aggressive mechanical attack tools that may be developed in the years ahead.

6. High Explosive Attack Test

This test was designed to assess the damage inflicted on the test structure by the detonation of SEMTEX to determine if attack by explosive blast could create the 350mm aperture required to allow complete access to the theoretical strongroom within.

To fulfil these objectives, the explosive test was conducted twice - first on the external wall and then on the internal wall. In each case the methodology was identical.



Using electric drilling equipment, four 37mm holes were drilled in the front face of the wall to a depth sufficient to hold the explosive charge, with a further series of 22mm holes drilled in a circular pattern to form a 400mm diameter stitch drilled weakness in the concrete panel.

Each of the four main holes was filled with a quarter of the explosive charge and set for simultaneous detonation.

Results - External Wall



Following detonation, both faces of the concrete experienced severe damage with breaching evident local to the position of the attack charges.

Results - Internal Wall



Following the detonation, partial de-lamination of the front face of the concrete was observed. The core concrete remained largely undamaged with the spiral armouring completely undamaged.

Damage to the rear face of the concrete was less apparent with only some cracking observed. Further physical attack with sledge hammers and chisels extended the cracking but could not remove the rear face.

Conclusion

Overall, these tests failed to create the 350mm diameter aperture in the internal wall structure which would be required to allow complete access to the strongroom within and, as such, the reinforced concrete under test was deemed to have achieved the Resistance Value necessary to be classified as Resistance Grade EX XIII.