(This is an unofficial translation of the text)

Guideline PP-4

Detailed requirement levels for the systems, structures and components of the delay physical protection function

Version number:

2.

September 2015

Issued by:

Gyula Fichtinger

Director General of the HAEA

Budapest, 2015

The publication can be acquired from:

Hungarian Atomic Energy Authority

Budapest

FOREWORD FROM THE DIRECTOR GENERAL

The Hungarian Atomic Energy Authority (hereinafter referred to as HAEA) is a central state administration organ (a so-called government office) having nation-wide competence in the field of peaceful use of atomic energy; it operates under the direction of the Government, it has independent tasks and scope of authority. The HAEA was established in 1990 by the Government of the Republic of Hungary with Govt. decree 104/1990. (XII. 15.) Korm. on the scope of tasks and competence of the Hungarian Atomic Energy Commission and the OAH.

The public service of the HAEA as defined in law is to perform and coordinate, independently of organizations having interest in the application of atomic energy, the regulatory tasks in relation to the peaceful and safe use of atomic energy, including the safety of nuclear facilities and materials, nuclear emergency response and nuclear security, and the corresponding public information activity, and to make proposal to develop and amend, and to offer an opinion on proposed legislations corresponding to the use of atomic energy.

The fundamental nuclear safety objective is to ensure the protection of individuals and groups of the population and of the environment against the hazards of ionising radiation. This is ensured with effective safety measures implemented and adequately maintained in the nuclear facility.

The radiation protection objective is to keep the radiation exposure of the operating personnel and the public all times below the prescribed limits and as low as reasonable achievable. This shall be ensured in the case of radiation exposures occurring during design basis accidents, and as far as reasonably possible during beyond design basis accidents and severe accidents.

The technical safety objective is to prevent or avoid the occurrence of accidents with high confidence, and the potential consequences occurring in the case of every postulated initiating event taken into account in the design of the nuclear facility shall remain within acceptable extent, and the probability of severe accidents shall be adequately low.

The HAEA determines the way how the regulations should be implemented in guidelines containing clear, unambiguous recommendations in agreement with the users of atomic energy. These guidelines are published and accessible to every members of the public. The guidelines regarding the implementation of nuclear safety, security and non-proliferation requirements for the use of atomic energy are published by the director general of the HAEA.

FOREWORD

The internationally accepted bases of physical protection are represented by the Law Order 8 of 1987 on the promulgation of the International Convention on the Physical Protection of Nuclear Materials, the Act LXII of 2008 on the promulgation of the Amendment to the Convention on Physical Protection of Nuclear Materials approved in the frame of the International Atomic Energy Agency and promulgated by Law-decree 8 of 1987 amended by a Diplomatic Conference organized by the IAEA signed on July 8, 2005, and the Act XX of 2007 on the promulgation of the International Convention for the Suppression of Acts of Nuclear Terrorism.

The realization of the stipulations undertaken by Hungary, at the highest level, is represented by the Act CXVI of 1996 (hereinafter referred to as Atomic Act), which includes the fundamental security principles and establishes the frame of the detailed physical protection regulations.

The Govt. decree 190/2011. (IX. 19.) Korm. published based on the authorization of the Act (hereinafter referred to as Government Decree) establishes the legal requirements for the physical protection of the use of atomic energy and for the connecting licensing, reporting and inspection system.

The HAEA is authorized to develop recommendations regarding the implementation of requirements established in laws, which are published in the form of guidelines and made accessible on the website of the HAEA.

For the fast and smooth conduct of licensing and inspection procedures connecting to the regulatory oversight activity, the Authority encourages the licensees to take into account the recommendations of the guidelines to the extent possible.

If methods different from those laid down in the regulatory guidelines are applied, then the Authority shall conduct an in-depth examination to determine if the applied method is correct, adequate and full scope, which may entail a longer regulatory procedure, involvement of external experts and extra costs.

The guidelines are revised regularly as specified by the HAEA or out of turn if initiated by a licensee.

The regulations listed are supplemented by the internal regulations of the licensees and other organizations contributing to the use of atomic energy (designers, manufacturers etc.), which shall be developed and maintained according to their quality management systems.

Before applying a given guideline, always make sure whether the newest, effective version is considered. The valid guidelines can be downloaded from the HAEA's website: http://www.oah.hu.

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Scope and objective of the guideline

This guideline contains recommendations on how to meet the provisions of the Decree.

It provides detailed guidance and practical examples regarding the delay function of the physical protection system; thus it supports the licensees to comply with the prescribed criteria.

1.2. Corresponding laws and regulations

Legal background of nuclear security requirements are provided by the Atomic Act and the Decree and the following provisions:

a) Nuclear security recommendations on the physical protection of nuclear materials and nuclear facilities, (INFCIRC/225/Rev5), IAEA Nuclear Security Series No. 13, IAEA, 2011.

b) Recommendation of the MABISZ (Association of Hungarian Insurance Companies) (Version effective from 01.10.2007. – hereinafter referred to as the Recommendation) „Mechanical protection– building structures, doors, windows”

c) MSZ ENV 1627, 1628, 1629, 1630

d) MSZ EN 356:2000

e) MSZ EN 1063

2. TERMINOLOGY

In addition to the definitions in Section 2 of the Atomic Act and Section 2 of the Decree, this guideline uses the following definitions:

Level „A" tool kit: 1 piece of screwdriver (full length 260 mm, edge width 10 mm), 1 piece of screwdriver (full length 375 mm, edge width 16 mm), 3-4 pieces of wooden or plastic wedge (length 200 mm, width 80 mm, height 40 mm), 1 piece of water pump pliers (full length 240 mm), 1 pieces of alligator wrench (full length 240 mm) 1 pieces of pry (full length 710 mm), 1 pieces of screwdriver (full length 375 mm, edge width 16 mm).

Level „B" tool kit: level "A" tool kit plus 1 piece of crowbar (full length 710 mm), 1 piece of screw driver (full length 375 mm, edge width 16 mm).

Level „C" tool kit: in addition to level „A", „B" tool kit: 1 piece of hammer (full length 300 mm, weight 1,25 kg 10 mm), 1 piece of axe (full length 350 mm), 1 piece of bolt clipper (full length 460 mm), 1 piece of cold-chisel (full length 250 mm, edge width 30 mm), 1 piece of carpenter's chisel (full length 350 mm, edge width 30 mm), 1 piece of hand-saw with HSS sheet, 1 piece of miniature saw with HSS sheet, 1 piece of electric boring machine 320/160W, borers HSS, max. Ø 10 mm, plate shears cutting to right or left (full length 260 mm).

Level „D" tool kit: in addition to level „A", „B", „C" tool kit 1 piece of electric cutting saw 550/335 W with saw blades, 1 piece of electric fox-saw 900/520 W with saw blades, 1 piece of extension pipe with a max length of 500 mm, 1 piece of electric boring machine 600/310 W, 4 pieces of HSS/HM borer of max Ø 13 mm, HSS/HM crown drill of max. Ø 50 mm, 1 piece of angle grinder 100/575 W, max disc Ø 125 mm.

„Fire fighter" tool kit: 1 piece of gate saw of 900, 1 piece of FORCE axe, 1 piece of dismantling axe, 1 piece of bolt clipper, 1 piece of chisel-cutter, 1 piece of motor cutter + accessories, 1 piece of motor chain saw + accessories, 1 piece of chisel of 1300, 1 piece of cutting tool, 2 db safety belt cutter + glass breaker hammer, 1 piece of two-piece extension ladder, 1 piece of 4-piece single ladder.

Intrusion proof: a property of a window, door or exterior closing structure, that makes the given object resistant against aggressive intrusion to a protected area. Application of living force or specific tools leads to damage or failure of the window, door or external closing structure.

Unacceptable radiological consequence: a consequence of sabotage directed against a nuclear facility, nuclear material, a radioactive source or radioactive waste is unacceptable if it cause or might cause nuclear emergency.

Furthermore, if the sabotage causes substantial exceedance of the dose limits for individuals or group of individuals in a short period or it is suitable to cause such extra radiation exposure.

Authority: Hungarian Atomic Energy Authority and National Police Headquarters.

Fence*:* as structure spatially separating and providing boundary the site from public areas and from neighboring real assets (Govt. decree 253/1997. (XII. 20.) Korm. on the national requirements for the development of settlements and for construction). With other words; fence is a line made of plants or a structure indicating the boundaries of the real asset.

Artificial barrier: such a structure located on the road towards a gate, which is able to prevent the forced break-through of a gate by a vehicle, or prevent or delay the intrusion by providing physical barrier between fences.

Protection fence*:* a reinforced, fully closed structure providing perimeter for the area and inner zones of the protected facility, which limits unauthorized access/regress to and from the protected area and zone; it includes check points (gate) of the access and regress control of personals and vehicles.

3. RECOMMENDATIONS OF THE GUIDELINE

3.1. General considerations

From physical protection perspective the protection elements applied for delay are such structures with a capacity for physical resistance that impede or avoid the unauthorized person in carrying out the intrusion to a given area or room.

Section 11 of the Decree specifies that:

(1) Delay shall be implemented to impede the adversary in carrying out the act, and thus to provide the time required for the response forces to react.

(2) Delay shall be realized through due combination of the following items as specified in Annex 3 and 4:

a) passive mechanical barriers, structures,

b) active movable mechanical barriers and the respective locks,

c) security stores, sheet metal cabinet, vehicle cabinets, and

d) activated equipment.

Since the response itself only alarmed after detection, so the delay preceding detection does not play a role in the effectiveness of the physical protection system.

The delay can be passive or active or activating type. In addition, the solutions deployed for delay can be temporary mechanical obstacles (concrete block, wire mesh, etc) or fix installed systems. These latter ones are fences, gates, access systems, buildings at the perimeter of the protected area, security stores surrounding the object to be protected.

The external border of the area under physical protection can be the boundary wall, floor or roof and the windows and doors of the building. These elements mean a delay against a potential intrusion depending on their design. In a physical protection system only the protection elements of appropriate quality and mechanical properties commensurate with the given protection level can be applied.

The resistance of the wall, floor and roof against adverse intrusion depends on the material, thickness and structure. The windows and doors of the building should have the same mechanical resistance as the wall. Opening of doors and windows should be delayed by lock, padlock or grating, which is also part of the building protection.

The target to be protected may also be comprised in a safe deposit within the building, the opening of which can be delayed by a lock.

The design of the elements meant to realize the delay is divided to 4 classes according to mechanical properties and physical resistance.

Table 1: Classification of mechanical elements meant to realize delay

Class	Condition
4.	High level mechanical resistance
3.	Significant mechanical resistance
2.	Mechanical resistance if traditional manual tools are used
1.	Limited mechanical resistance

3.2. Fences, Gates

3.2.1. Requirements

It has to be laid down as a principle that in the case of nuclear facilities and radioactive waste storage facilities (as separate sites) the site and controlled area of the facility should be surrounded by external and internal security fences. The path of the fences should be designated by taking into consideration the local features and protection solutions of the facility.

Chapter III of Annex 2 of the Decree outlines the requirements for the fences at each physical protection level (A-D).

28. On physical protection level A the fence shall be established as follows:

28.1 the fence shall exhibit strong protection against intruders equipped with special equipment;

28.2 the fence shall exhibit minimum 2 minutes delay time, it shall have minimum 2.5 meter element height, barb wire or NATO wire to the height of 3 meters, and reinforced continuous foundation at a minimum depth of 50 cm;

28.3 the fence elements shall be made of welded steel, the grid density shall be maximum 10 cm, it shall be made by welding or non-decomposable bolting; and

28.4 the fence columns shall be made with strong concrete foundation, the distance between two columns shall be maximum 2.5 meters, the columns shall be capable to hold barb wire or NATO wire top.

29. On physical protection level A the gates located in various points of the fence shall be established as follows:

29.1. additional gates shall provide reserve access routes and shall support the performance of maintenance actions, and

29.2. their material shall have at least equivalent strength as the material of the fence.

30. On physical protection level A the gates shall be kept closed; they may be opened at the presence of a guard.

(...)

32. On physical protection level B the buildings shall comply with the following requirements:

32.1. the doors and windows shall exhibit resistance equivalent to the walls; and

32.2. the fence shall exhibit minimum 1.5 minutes delay time, it shall have minimum 2.5 meter element height, climb over barrier or barb wire to the height of 3 meters, and reinforced continuous foundation at a minimum depth of 50 cm;

32.3. the fence elements shall be made of welded steel, the grid density shall be maximum 12 cm, it shall be made by welding or non-decomposable bolting;

32.4. the fence columns shall be made with strong concrete foundation, the distance between two columns shall be maximum 2.5 meters.

33. On physical protection level B the gates located in various points of the fence shall be established as follows:

33.1. additional gates may provide reserve access routes and support the performance of maintenance actions, and

33.2. their material shall have at least equivalent strength as the material of the fence.

34. On physical protection level B the gates shall be kept closed; they may be opened at the presence of a guard.

(...)

36. On physical protection level C the fence shall be established as follows:

36.1. the fence shall exhibit strong protection against intruders equipped with tools that can be found on the spot;

36.2. the fence shall exhibit minimum 1 minutes delay time, it shall have minimum 2.5 meter element height with barb wire;

36.3. the fence elements shall be made of welded steel, the grid density shall be maximum 15 cm, it shall be made by welding or non-decomposable bolting;

36.4. the fence columns shall be made with strong single foundation, pre-fabricated concretre elements having at least 45 cm depths shall be installed between two columns, the distance between two columns shall be minimum 2.5 meters,

36.5. the columns shall be capable to hold barb wire.

37. On physical protection level C the gates located in various points of the fence shall be established as follows:

37.1. additional gates may provide reserve access routes and support the performance of maintenance actions, and

37.2. their material shall have at least equivalent strength as the material of the fence.

38. On physical protection level C the gates shall be kept closed; they may be opened at the presence of a guard.

(...)

40. On physical protection level D, if the site under protection consists of more than one physical protection zone, then the fence shall be constructed so that:

40.1. the fence shall be erected on the border of the building site or around a separated area;

40.2. the fence shall be made of steel or plastic wire, with single foundation, and it shall be minimum 2 meters high;

40.3. the fence columns shall be made of steel or concrete; and

40.4. it shall exhibit at least 5 seconds delay time.

41. On physical protection level D, if the site under protection consists of more than one physical protection zone, then the gates located on the fence shall be installed so that:

41.1. the gate shall be used as a checkpoint for personal and vehicle access and regress;

41.2. the gate shall reach its closed position within the time interval defined in the physical protection plan;

41.3. the gate shall be made of steel being stronger than the material of the fence; the gate shall exhibit protection as a vehicle barrier and it shall be at least as high as the fence;

41.4. the gate shall be equipped with remotely controlled, motor operated opening equipment, the grid on the gate shall be made of any material stronger than the fence,

41.5. additional gates may provide reserve access routes and support the performance of maintenance actions, and

41.6. their shall have at least equivalent strength as the material of the fence.

42. On physical protection level D the gates shall be kept closed, and if the physical protection system consists of more than one physical protection zone may be opened at the presence of a guard.

3.2.2. Determination of delay time of fences

Delay times of fences depend on the design and capabilities and equipment of the adversary. Below, delay times accepted by the authority are described for typical fences and cases.

Table 2: Determination of delay times

	Equipment		Delay [sec]			
Fence type	type	weight [kg]	min	average	max	deviation
2.5 m high with metal mesh (mesh: 4 mm x 50 mm) + barb wire (outriggers)	ladder	5	6	12	18	2.4
	gloves	2	6	12	18	2.4
	wire clipper	1	60	120	180	24.6
	bolt clipper	3	30	60	90	12
	disc saw	11	45	90	135	18.6
2.5 m high with plastic coating + metal mesh (mesh: 3 mm x 50 mm) + barb wire (outriggers)	ladder	5	6	12	18	2.4
	wire clipper	3	60	120	180	25
	bolt clipper	3	30	60	90	12
	disc saw	11	45	90	135	19
2.5 m high with plastic coating with metal mesh (mesh: 3 mm x 50 mm) without barb wire	ladder	5	6	12	18	2.4
	wire clipper	1	60	120	180	24.6
	bolt clipper	3	30	60	90	12
	none	0	3	6	9	1.2
2.5 m welded steel wire of 3 mm	ladder	3	6	12	18	2.4
	bolt clipper	3	30	60	90	12
	disc saw	11	45	90	135	18.6

2.5 m concrete panel fence	ladder	3	6	12	18	2.4
	hammer	5	60	90	120	27
	none	0	6	9	12	2.7

3.3. Building

3.3.1. Requirements

The Decree requires that

On physical protection level A the buildings shall comply with the following requirements based on Annex 2 of the Decree:

31.1. the walls, ceiling and floor shall exhibit strong mechanical resistance, which shall provide protection equivalent to a dense brick wall having the width of 38 cm and exhibit minimum 15 minutes breakage time against an intruder equipped with special tools;

31.2. the doors and windows shall exhibit resistance equivalent to the walls; and

31.3. air holes having maximum 20x20 cm size shall be applied without grid, while the larger ones shall be secured by girds.

(...)

35. On physical protection level B the buildings shall comply with the following requirements:

35.1. the walls, ceiling and floor shall exhibit strong mechanical resistance, which shall provide protection equivalent to a dense brick wall having the width of 15 cm and exhibit minimum 10 minutes breakage time against an intruder equipped with special tools;

35.2. the doors and windows shall exhibit resistance equivalent to the walls;

35.3. air holes having maximum 20x20 cm size shall be applied without grid, while the larger ones shall be secured by girds.

(...)

39. On physical protection level C the buildings shall comply with the following requirements:

39.1. the walls can be made of bricks or lightweight construction, but they shall exhibit mechanical resistance equivalent that exhibited by a dense brick wall having width of 6 cm against common tools;39.2. the doors and windows shall exhibit resistance equivalent to the walls; and the walls shall exhibit minimum 5 minutes breakage time against an intruder equipped with common tools.

(...)

43. On physical protection level D the buildings shall comply with the following requirements:

43.1. the walls can be made of lightweight construction, but they shall exhibit limited mechanical resistance,

43.2. shall exhibit minimum 3 minutes breakage time against an intruder equipped with common tools.

The Decree specifies four requirement levels for mechanical protection depending on the threat, for which it determines walls of different strength and different roof systems. In each case it takes the resistance of the dense brick wall as basis, but it allows different designs. Table 3 contains one more such typical solution for the civil structure, which is equivalent with the specified resistance capability.

Table 3

Class	Minimum design	Recommended alternative
A	Dense brick wall of 38 cm thickness	Concrete reinforced by a 12 cm thick, Ø8-10 mm reinforcing steel in a mesh of 15 x 15 cm, with a quality of C 12/15
B	Dense brick wall of 15 cm thickness	Concrete reinforced by a 6 cm thick, Ø5 mm reinforcing steel in a mesh of 15 x 15 cm, with a quality of C 12/15
C	Dense brick wall of 6 cm thickness	Light structure of minimum 10 cm thickness with a special dual layer design, with thermal insulating, fire-proof or other material ensuring mechanical resistance between the layers.

3.4. Windows and doors

3.4.1. Requirements

It is a principle also for windows and doors that they should have the same strength indexes as the wall commensurate with the four classes described in Table 1.

The Annex 2 of the Decree requires that

44. On physical protection level A the doors, windows and locks shall exhibit strong mechanical resistance:

44.1. the doors shall exhibit minimum 15 minutes breakage time against an intruder equipped with special equipment;

44.2. the windows shall comply with the same requirements as the doors, what shall be ensured by security glass or by such fix grid that cannot be assembled from outside or a grid inside that can be opened, which is fully welded, has 70x70 mm arrangement and made of 10 mm concrete steel;

44.3. the window casing and frame shall exhibit at least the same resistance against attacks as the door and the glass.

(...)

45. On physical protection level B the doors, windows and locks shall exhibit significant mechanical resistance:

45.1. the doors shall exhibit minimum 10 minutes breakage time against an intruder equipped with special equipment;

45.2. the windows shall comply with the same requirements as the doors, what shall be ensured by security glass or by such fix grid that cannot be assembled from outside or a grid inside that can be opened, which is fully welded, has 90x90 mm arrangement and made of 10 mm concrete steel;

45.3. the window casing and frame shall exhibit at least the same resistance against attack as the door and the glass.

(...)

46. On physical protection level C the doors, windows and locks shall exhibit significant mechanical resistance:

46.1. the doors shall exhibit minimum 5 minutes breakage time against an intruder equipped with common tools;

46.2. the windows shall comply with the same requirements as the doors, what shall be ensured by glass having 6 mm width or by such fix grid that cannot be assembled from outside or a grid inside that can be opened, which is fully welded, has 140x140 mm arrangement and made of 6 mm concrete steel;

46.3. the window casing and frame shall exhibit at least the same resistance against attack as the door and the glass.

(...)

47. On physical protection level D such doors, windows and locks shall be installed:

47.1. the doors shall exhibit at least limited mechanical resistance, and exhibit minimum 3 minutes breakage time against an adversary equipped with common tools;

47.2. the windows shall have glass having minimum 6 mm width, the window protecting grids shall be installed on the inner side of the windows.

The requirements have been based on the MABISZ (Association of Hungarian Assurance Companies) Recommendations, which are primarily concluded from the effective minimum requirements of the European and Hungarian standards (MSZ ENV 1627, 1628, 1629, 1630, and MSZ EN 356:2000, MSZ EN 1063). Classification of doors and windows should take place from the aspect of intrusion resistance.

The standard specifies the following resistance classes from intrusion resistance point of view:

Table 4

Resistance class	Method of the adversary
1	An occasional adversary attempts to break the window, door or external lock structure by body force, like kick, pushing by shoulder, pushing up or displacement.
2	An occasional adversary attempts to break the window, door or external lock structure using simple tools like screwdriver, pliers and wedge.
3	An adversary attempts to intrude using further screwdrivers and crowbar.
4	An experienced adversary attempts to intrude using further tools like saw, hammer, axe, chisel, battery driven boring machine.
5	An experienced adversary attempts to intrude using further tools like boring machine, keyhole saw and angle grinder with a maximum disc diameter of 124 mm.
6	An experienced adversary attempts to intrude using high power electric tools, like boring machine, keyhole saw and angle grinder with a maximum disc diameter of 230 mm.

3.4.2. Doors

The resistance of the doors depends on the used material, structure and fixing of the door unit. The doors should be so stable to exhibit appropriate resistance against body force, like kicking, knocking against, jumping and pushing by shoulder and against such simple tools that can be used to hit, bore, cut or saw.

Elements of the door:

a) Door leaf
b) Door case
c) Door hinge
d) Door lock
e) Fitting
f) Striking plate
g) Supplementary protection

In the case of each door in the exterior wall that delimits protected rooms, it is important that the door leaf, door case and the door hinge, door lock, fittings and striking plate and in a certain case the supplementary protections also, fit together with respect to their intrusion resistance. For this reason difference is made between the anti-intrusion doors and such doors that are equipped with supplementary protection capabilities.

The door units accepted and recommended by the MABISZ are classified in the table below according to their intrusion resistance capability (doors that do not have any delay capabilities are not mentioned: class 1 according to MSZ ENV 1627:2000):

Table 5

Class per MSZ ENV 1627:2000	**Breaking resistance time [min]**	**Reference tool kit**
2.	3	**A**
3. Category III safety door	5	**B**
4. Category II safety door	10	**C**
5. Category I safety door	15	**D**

The Decree requires the following door qualifications for the four classes of Table 1.

Table 6

Class	Breaking, intrusion resistance [min]	Class per MSZ ENV 1627:2000
A	15	5. Category I safety door
B	10	4. Category II safety door
C	5	3. Category III safety door
D	3	Traditional, lockable door

The table provides that which category according to MSZ ENV 1627:2000 can meet the breaking times required by the Decree.

3.4.3. Windows

Similarly to doors, due to the need of balanced protection against breaking, the basic principle is also that the windows should meet the same physical-mechanical requirements like the doors. Consequently, classification of windows from mechanical resistance aspect is the same as described in Table 5.

In the case of windows, the resistance of the glass is very important. With respect to that the MSZ ENV 1627:2000 standard assigns also the resistance of the glass to a particular class. Classification of glasses takes place according to MSZ EN 356:2000 standard as described in Table 7.

Table 7

Window class per MSZ ENV 1627:2000	Resistance of glass according to MSZ E N 356:2000	Drop height [mm]
2	P4A	9000 ± 50
3	P5A	9000 ± 50
		Number of all hits
4	P6B	30–50
5	P7B	51–70
6	P8B	Above 70

The basis for classification in the case of P4A and P5A is such a drop test, during which a drop piece (hard piece), which is a steel sphere with a diameter of 100 ±

0.2 mm and with a weight of 4.11 ± 0.06 kg is dropped onto the glass from a specified height. The class depends on the drop height.

In the case of P6B, P7B and P8B, the classification is performed with a test using manual axe hit, where the material of the axe head and helve is exactly specified. During the test the impact angle between the surface of the test piece and the helve art the impact point is (25 ± 2)°. The test is also performed with hammer hits and curing hits. Regarding hammer hits the impact speed should be 12.5 ± 0.3 m/s and impact energy should be 350 ± 15 NM, while regarding cutting impacts these should be 11.0 ± 0.3 m/s and 300 ± 15 NM respectively. The class is determined according to the number of hits resisted.

3.4.4. Grids

The resistance of grids depends on their particular mechanical properties:

Table 8

Class	Mechanical properties of grids
A	Grid made of Ø10 mm round steel, with a mesh of 70 x 70 mm
B	Grid made of Ø10 mm round steel, with a mesh of 90 x 90 mm
C	Grid made of Ø10 mm round steel, with a mesh of 140 x 140 mm
D	No grid

3.5. Locks

3.5.1. Requirements

The Annex 2 of the Decree specifies that

44.4. On physical protection level A the locks shall be security locks providing 15 minutes breakage resistance or equivalent.

45.4. On physical protection level B the locks shall be security locks providing 10 minutes breakage resistance or equivalent.

46.4. On physical protection level C the doors the locks shall be security locks providing 5 minutes breakage resistance or equivalent.

47.3. On physical protection level D the locks shall be any traditional quality locks.

Difference of locks can be identified according to their design (e.g. mortise lock or boxed lock), lock structure (cylinder or lamellar lock), type of interlocking (e.g. bolt lock or hooked bolt lock) and application (e.g. full glass door lock). In the case of each lock it should be provided that the lock box is protected against access and that the bolt penetrates the striking plate at least to 15 mm. The Decree assigns the locks to the particular protection levels according to the break resistance of the doors in which they are applied.

Chapter C.1. of the MABISZ recommendation specifies as follows for lock structures and cylindrical locks depending on the risk, assigned to the 3 levels of mechanical protection requirements.

Table 9

Risk level	Cylindrical lock
High and extraordinary	The highest requirements according to Hungarian standard MSZ EN1303: min. 5 bolt cylindrical lock, or rotor or magnetic lock number of variation exceeds 10 000, it resists for at least 3 minutes to an attack by HSS borer, has protection against scanning opening, cannot be opened for at least 3 minutes by core pulling
Medium	Requirement according to Hungarian standard MSZ EN1303: min. 5 bolt cylindrical lock or 6 rotor magnetic lock can be accepted, the number of variation of which exceeds 10 000, has protection against scanning opening, cannot be opened for at least 3 minutes by core pulling
Low	min. 5 bolt cylindrical lock or 6 rotor magnetic lock or any such lock, qualified padlock the number of variation of which exceeds 3000.

The technical specifications determined for the lock structure are as follows for the particular possible solutions:

For high and extraordinary risk:

(A) In the case of mortise locks the lock box should be protected against an attack using borer. If anti-borer sheet is applied, it should be made of a material that is annealed to min. 60 HRC hardness or that provides at least equivalent resistance. The lock structure can be lamellar with a key cogged on one or both sides. Its safety value can be accepted if at least six lamellas ensure the movement of the lock bolt rod and the number of variation is min. 10 000.

(B) In the case of cylindrical locks the protection of the lock box against an attack using borer should also be provided. The locking rod of the lock structure should be provided with push back protection. For the effect of a force of 350 kN exerted perpendicular to the lock structure the bolt lock rod should not slide back.

(C) The crossbar door locks provide two-point horizontal and/or vertical supplementary locking. The crossbar door locks should satisfy the following conditions:

a) the locking rods should be stronger or at least equally strong to those accepted for safety locks,

b) the locking rods should penetrate the terminal part into a depth of at least 25 mm,

c) the locking rod terminal elements should be fixed to the wall with minimum 2 pieces of M 6x80 bolts penetrating into a metal plug, or with any equivalently strong fixing methods, like incision,

d) the locking rod terminal should be closed, or reinforced to the side to withstand an attack on the door leaf using a dynamic force of 700 kN,

e) the lock bolt should be resistant against boring for 3 minutes. This can be carried out by using anti-borer lock bolt or boring protection armor,

f) the cylindrical lock should be equipped with a break down protection which cannot be accessed from outside,

g) the lock structure should have protection against push back hits for the bolt,

h) the lock bolt rods should have push back protection against a force of 350 kN exerted perpendicularly,

i) the crossbar door locks should have a reinforcement to withstand a force of 700 kN exerted on the door leaf, perpendicularly to the shaft, without such a deformation that could fail the locking function.

For medium risk:

(A) Lamellar system, in which at least six lamellas provide the movement of the lock bolt, and the number of variations of which is min. 10 000. For the effect of a force of 350 kN exerted perpendicularly to the locking direction the locking bolt should not slide back.

(B) Crossbar door lock, in which the locking rods are stronger or at least equally strong to those accepted for safety locks. The locking rods should penetrate into the terminal part into a depth of at least 20 mm. The locking rod terminal elements should be fixed to the wall with minimum 2 pieces of M 6x80 bolts penetrating into a metal plug, or with any equivalently strong fixing methods, like incision. The locking rod terminal should be closed, or reinforced to the side to withstand an attack on the door leaf using a dynamic force of 350 kN.

The lock structure should have protection against push back hits for the bolt, the cylindrical lock should be equipped with a break down protection which cannot be accessed from outside. The lock bolt rods should have push back protection against a force of 350 kN exerted perpendicularly. The crossbar door locks should have a reinforcement to withstand a 350 kN force exerted on the door leaf, perpendicularly to shaft, without such a deformation that could fail the locking function

For low risk:

Lamellar lock.

MSZ EN1303 standard categorizes the locks, cylindrical lock bolts from the aspect of protection against an attack to the 3 categories below.

Table 10

Method of attack	Parameter	Category		
		0	1	2
Boring	Time [min]	-	3-5	5-10
Chasing	Number of hits	-	30	40
Twisting break	Number of attempts with 250 Nm force	-	20	30
Core pushing with 15 kN force	Time [min]	-	3	3
Internal twisting of lock structure	Necessary Momentum [Nm]	-	20	30

Locks, cylindrical lock bolts should be provided with such a protection in harmony with the categories I-III of the safety doors, that individually (for their structural design) or with supplementary protection can satisfy the time limits prescribed for attacks.

Based on table 9 it can be observed that the MSZ EN1303 standard specifies maximum 5 to 10 minutes delay for boring and only 3 minutes delay against core pushing. In conclusion these conditions are not enough from the aspect of the delay times specified in the Decree for delay times. The highest category locks therefore should be anti-boring and anti lock clamping sheet. The anti-boring sheet should be annealed to at least 60 HRC hardness, or made of a material providing equivalent resistance.

3.6. Security stores, steel plate cabinets

3.6.1. Requirements

The Annex 2 of the Decree requires that

48. On physical protection level A the security store shall be made of such single-wall or double-wall steel plate, the destructive testing of which resulted in 30 RU (Resistant Unit) resistance value for partial penetration and 50 RU resistance value for total penetration;

49. On physical protection level A such lock shall be applied, which

49.1. shall guarantee secure locking by locking of the knobs in one, three or four directions;

49.2. when the lock is not closed, the key shall not be removed from the lock;

49.3. protection against boring of the lock shall be guaranteed by a minimum 60 HRC hardness anti-bore plate;

49.4. the lock shall be Category "A" EU certified and approved lock; and

49.5. fastening of the consignment shall resist 10,000 N tensile force, including the weight of the store including the weight of the store.

50. On physical protection level B the security store shall be made of such single-wall or double-wall steel plate, where the total wall thickness of the cover plates shall be 6-8 mm, the door shall be made of steel plate having the wall thickness of 6-8 mm, the distance between two walls shall be at least 30 mm, and the destructive testing shall result in 15 RU (Resistant Unit) resistance value for partial penetration and 24 RU resistance value for total penetration. Structural concrete fill, sandwich structure made of steel plates having 60 HRC hardness, or protection made in other way shall be built between the two walls.

51. On physical protection level B such lock shall be applied, which

51.1. shall guarantee secure locking by locking of the knobs in one or three directions;

51.2. when the lock is not closed, the key shall not be removed from the lock;

51.3. protection against drilling of the lock shall be guaranteed by a minimum 60 HRC hardness anti-drill plate; and

51.4. fastening of the consignment shall resist 5,000 N tensile force, including the weight of the store.

52. On physical protection level C the security store shall be made of single wall steel plate, where the wall thickness of the cover plates shall be at least 2–4.5 mm, or a solution providing an equivalent delay shall be applied.

53.On physical protection level C such lock shall be applied, which

53.1. shall guarantee secure locking by locking of the knobs in one or three directions;

53.2. when the lock is not closed, the key shall not be removed from the lock;

53.3. protection against drilling of the lock shall be guaranteed by a minimum 60 HRC hardness anti-drill plate; and

53.4. fastening of the consignment shall resist 5,000 N tensile force, including the weight of the store.

54. On physical protection level D the security store shall exhibit resistance equivalent to a piece of lockable office furniture.

MABISZ grades equivalent with the classes required by the Decree are as follows:

Class	MABISZ grade
A	E
B	C
C	A
D	-

3.7. Artificial barriers

3.7.1. Requirements

The Annex 2 of the Decree requires that

4. On physical protection level A, such artificial barrier shall be established on the road leading to the main entrance, which is able to prevent the aggressive penetration through the gate and entering by a vehicle.

5. On physical protection level B, such artificial barrier shall be established on the road leading to the main entrance, which is able to prevent unauthorized penetration, and shall assure the controlled entering to the protected facility.

6. On physical protection level C, the protection against unauthorized penetration and the controlled entering to the protected facility shall be assured by mobile barriers and road dividers.

7. On physical protection level D, the controlled entering to the protected facility shall be assured by road signs, if it consists of more than one physical protection zone; otherwise artificial barriers shall not be applied.

3.7.2. Obstructions

Obstructions are mainly used to direct or arrest motion of the vehicles. Their appropriate design ensures that wheeled vehicles cannot get across them since their height exceeds the clearance height of the vehicles and/or stair climbing ability; as a consequence of the robustness or fixed design the vehicles are not able to push them away and the obstructions have such a load capacity that the vehicles running up onto them get stuck and become crippled.

In order to arrest a vehicle by an obstruction, it is not necessary for all the three conditions to be met, it is enough if the uppermost item exceeds the clearance level of the vehicle and it is able to bear 50% of the weight of the run up vehicle.

Obstructions can be made of improvised materials processed at the scene or pre-fabricated and stored closing elements. According to practical experience 200 l metal barrels filled with stones, tires put onto each other or bastions constructed from sandbags can effectively be used as obstructions.

The pre-fabricated obstructions can be steel sections adjusted to seats, metal hedgehogs, reinforced concrete hooks and concrete pyramids. Their common property is that they are hard to move because of their weight, but the installation with appropriate machines can be implemented quickly.

3.7.3. Wire locks

Wire locks that can be local or mobile are the most commonly used group of technical blocks against persons.

The mobile wire locks are for example the barbed wire (or NATO wire) fence or wire mesh, which can be easily moved or mobilized as necessary. They can be made in advance or at the location of use.

Wire structures can be outstandingly applied for protection and quick and reliable blocking of areas and roads. The various wire structures are usually used in combination to supplement and reinforce each other (such as wire fence with a barbed wire cylinder on the top).

The barbed wire cylinders can be used effectively against both persons and vehicles depending on the thickness and quality of the wire used. The barbed

wire cylinder is the most commonly used wire block type; its scope of application is very wide. They can be applied in a wide variety of sizes: in different diameter and length. Their wire can be single or doubled; in a single or multi stage structure; and used alone or to reinforce other blocking methods.

3.7.4. Activation barriers

The purpose of activation barriers is to arrest an intruder by a temporary arrangement of area protection. The most typical set of tools are as follows:

a) Decision mechanism of activation

b) Hardware launching and controlling activation

c) Material of the barrier

d) Mechanism to place the material

Decision should usually be made by the members of the guarding personnel, when the delay time is justified to be increased due to real alert event, because the arrival of the response forces is delayed.

The activation launching and controlling systems should be robust against electro-magnetic disturbances, lightning, short circuit and other foreseen environmental impact.

The material of the barrier is usually stored in a compacted form, which can expand for a physical or chemical effect. The most typical forms:

a) Rigid polyurethane foam

b) Stabilized water-based foam

c) Chemically generated smoke

d) Sticky foam folio

3.8. Speed of intruder

Along with the intrusion path time is required to overcome the distances between the barriers, which should be taken into account in the total delay time of the physical protection system (see Guideline PP-9).

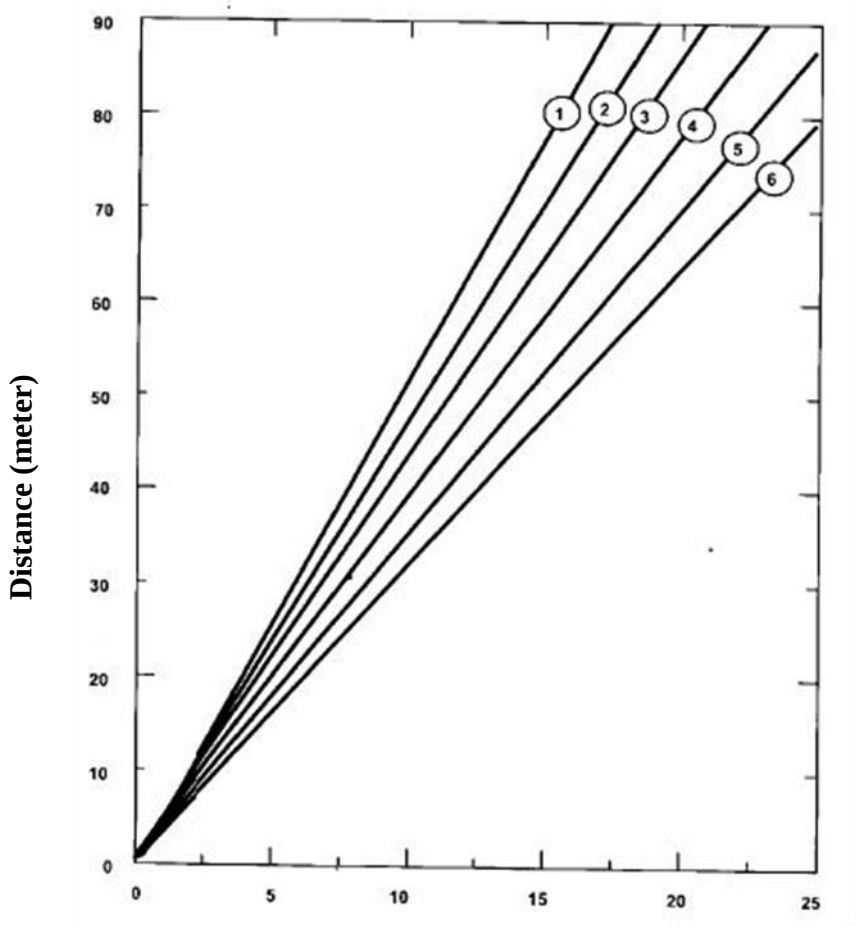
The coping time for the distances, if the intruder is a footman, depends on the running speed which, besides the physical condition of the intruder, is determined by:

a) the size and weight of the tools carried by the intruder

b) the quality of the surface of the path (slower in sand than on hard surface)

The following diagram describing the running time of the intruder for particular cases can be used for the calculation of the resulting delay times:

1 On even ground
2 On even ground with tools
3 On sand
4 with 16 kg weight
5 with 2.4 m long ladder
6 with 10 m long ladder (2 persons)



The following speeds should be used for intrusion by vehicle:

Motorcycle:	77 km/h
Cross-country vehicle (four-wheel drive):	55 km/h
Truck:	60 km/h