SLOVENSKI STANDARD
SIST-TP CEN/TR 14383-8:2010

01-januar-2010

Prepreļevanje kriminala - Urbanistiļno planiranje in projektiranje - 8. del: Zaģļita stavb v mestih pred kriminalnimi napadi z vozili

Prevention of crime - Urban planning and building design - Part 8: Protection of buildings and sites against criminal attacks with vehicles

Vorbeugende Kriminalitätsbekämpfung - Stadt- und Gebäudeplanung - Teil 8: Schutz von Gebäuden und Anlagen vor Angriffen unter Verwendung von Fahrzeugen

Prévention de la malveillance - Urbanisme et conception des bâtiments - Partie 8 : Protection de bâtiments et de sites contre l'utilisation malveillante de véhicules

Ta slovenski standard je istoveten z: **CEN/TR 14383-8:2009**

ICS:

13.310	Varstvo pred kriminalom	Protection against crime
91.020	Prostorsko planiranje. Urbanizem	Physical planning. Town planning

SIST-TP CEN/TR 14383-8:2010 **en,fr,de**

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/TR 14383-8

September 2009

ICS 13.310

English Version

Prevention of crime - Urban planning and building design - Part 8: Protection of buildings and sites against criminal attacks with vehicles

Prévention de la malveillance - Urbanisme et conception des bâtiments - Partie 8 : Protection de bâtiments et de sites contre l'utilisation malveillante de véhicules

Vorbeugende Kriminalitätsbekämpfung - Stadt- und Gebäudeplanung - Teil 8: Schutz von Gebäuden und Anlagen vor Angriffen unter Verwendung von Fahrzeugen

This Technical Report was approved by CEN on 19 April 2009. It has been drawn up by the Technical Committee CEN/TC 325.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. CEN/TR 14383-8:2009: E

Contents

Page

Foreword

This document (CEN/TR 14383-8:2009) has been prepared by Technical Committee CEN/TC 325 “Prevention of crime by urban planning and building design”, the secretariat of which is held by SNV.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document is one of a series for “Prevention of crime - Urban planning and building design” that consists of the following parts:

Part 1: Definitions of specific terms

Part 2: Urban planning

Part 3: Dwellings

Part 4: Shops and offices

Part 5: Petrol stations

Part 6: Schools (document in progress)

Part 7: Design and management of public transport facilities

Part 8: Protection of buildings and sites against criminal attacks with vehicles (this document)

Introduction

Vehicles are often used for criminal actions. Offenders use the vehicle as a means to perform their criminal deed. The vehicle does not only serve the getaway and transportation purposes, it is also used for the violent breakthrough of security facilities like fences, doors, windows or façades.

The physical protection of a building or a site against the use of vehicles for a criminal purpose is not limited to the sole application of access control through physical obstacles.

The design of such devices in urban environment must be subject to an approach that takes into account various parameters including:

— the goal to be reached (deterrence, prevention, delay or limitation of the consequences of such criminal act and, not least, allowing an alarm [1]),

— the cost-benefit ratio,

— the technical requirements,

— the policy carried out in the fields of urban planning, road planning and the protection of sensitive sites,

— the general visual aspect so that the town, the neighbourhood, the site or the building does not look like a military fortified camp.

Any preventive approach in the field of security/safety requires first of all an analysis aiming to highlight the real nature of the threat. The next step shall be a study of the consequences of the various elements that can be implemented to lead to the validation of technical recommendations set out.

Generally, and whatever the type of criminal act, the major concern of the person in charge of security/safety of a building or of a public or private site shall be the following:

— keep the potential vector of the risk as far as possible from its target.

To reduce the risk, the traffic flow in the direction of the target should, if possible, be influenced as follows:

— the speed parameter (winding road, use of zigzag, other speed reducer),

— preventing the frontal impact (vertical incidence direction) on the target by considering the design of access roads,

— prohibiting parking in the immediate neighbourhood and the basement of the considered building, except for buildings with trained staff in charge of strictly checking authorized vehicles (underneath, car boot, loading area, etc.),

— limiting the dimensions of vehicles with authorized access by means of size control devices.

The security strategy may take into account not only the direct consequences of an attack but also the consequential damage on persons and real values, which is the result of:

---

1 The alarm function is generally ensured by anti-intrusion devices or CCTV, see EN standards. It will not be reviewed in the present document devoted to the mechanical protection of a building or a site.

— the movement of the vehicle itself or the crashed element,

— the more or less fast projection of sometimes primary fragments coming from the bomb or the vehicle itself or secondary fragments from the crashed element or other objects in the danger area,

— the scattering of flammable materials or the projection of flames,

— the consequences of an explosion (blast, fire ball, primary and secondary fragments),

— etc.

NOTE Please remember that the set of protective elements mentioned in the present document should meet the relevant requirements of the documents of national implementation or European recommendations quoted in the references, see bibliography.

1 Scope

The purpose of this document is to describe the consequences and risks of the criminal use of motor vehicles against buildings or sites in order to better assess the threats and to establish a security analysis:

a) identification of possible attack methods,

b) recommendation of technical elements in the field of protection,

c) description of a set of physical protective measures to reinforce the security of public and private buildings,

d) recommendation of organizational measures.

This document contains information for the professional implementation and application of preventive measures against the unauthorised access of vehicles into buildings or areas. It is necessary to achieve one of the four following protection levels:

a) **Traffic control**
Regulating the use of the different spaces where vehicles occur: traffic lanes, car parks and parking areas, delivery places, pedestrian areas, access routes, etc. The delinquent uses his own vehicle and wants to avoid any damage on it.

b) **Protection against criminal attacks with vehicles**
Protection against burglary, robbery, vandalism, etc. The delinquent uses stolen vehicles to commit criminal acts. He accepts the destruction of the vehicle but wants to preserve his integrity.

c) **Protection against urban violence and heavy vandalism**
Protection against ramming and burning cars used against private and public buildings and police enforcement or intervention forces. The delinquent uses any available vehicles. He shows no consideration for the life of other persons. He fights against institutions, authorities and their representatives and wants to destroy the social network of an area.

d) **Mitigation of the effect of explosives in combination with vehicles**
Mitigation of the effect of gas trucks, car bombs, etc.

Security requirements on doors, windows, façades and their accessories are defined by CEN in normative documents. The characteristics of the components which are burglar resistant, bullet resistant and resistant to the effects of explosives are taken into account. Also electric and electronic security components are covered by normative CEN/CENELEC documents.

Up to the present, the special topic of protection against ramming has not been taken into account in European standardization. The protection against unauthorised access of vehicles already starts at municipal car-free zones. Large underground car parks in residential areas have equal requirements; only authorized vehicles should be granted access. The driveways to office buildings, storehouses, authority buildings, prisons and further vulnerable infrastructures also need to be protected.

The protection level offers a wide spectrum and has to meet different requirements. The spectrum ranges from simple access control devices to prevent unauthorised parking up to systems to stop ram raiding and bomb attacks. Permanent or automatic blocks with or without human or technical access control can be used. Provisory blocks or mobile jamming elements can also be applied.

To take the different dangerous situations into account, corresponding load values must be defined. This serves both the interpretation and the assembly of the security elements.

This document contains notes for protective measures against offences and criminal attacks with vehicles. This document is not suitable for protective measures against terrorist attacks.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 14383-1:2006, *Prevention of crime - Urban planning and building design - Part 1: Definition of specific terms*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN 14383-1:2006 and the following apply.

3.1
traffic lane
enables the flow of a line of vehicles; it may be reserved to certain users or to a particular use (taxi lane, bus lane) and equipped with traffic signs

3.2
bollard
manufactured product which, once positioned, is a vertical device aimed at delimiting an area and preventing the access for vehicles

3.2.1
fixed bollards
permanent mounted bollards which cannot be removed

3.2.2
removable bollards (mechanical)
manually removable bollards with a simple locking system

3.2.3
retractable bollards (mechanical)
device which can easily be lowered and secured in its position with a key

3.2.4
retractable bollards (automatic)
power operated device which can be lowered automatically and secured in its position

3.3
retractable roadblocks
device aimed at blocking the access to a determined area for an unauthorized motor vehicle (it must be possible to grant or refuse access according to the user's requirements). To give access, the obstacle is retracted on site, in its frame (ground or other), in a casing provided for this purpose

NOTE This obstacle may be operated manually, mechanically, with a motor, semi-automatically motorised or automatically.

3.4
casing
envelope case in which the obstacle is retracted in a low position and which contains the raising mechanism (this mechanism may be included in the obstacle itself); it is part of all devices called "retractable obstacle"

3.5
raising and lowering time
time between the beginning of the raising or lowering movement and the moment when the obstacle reaches its high or low position

3.6
cycle
period, including the time for the raising and lowering, during which the obstacle is in high or low position

3.7
speed reducer
road installation to encourage a driver to reduce speed (sleeping policeman, speed bumpers)

3.8
zigzag
special road design to oblige a driver to reduce speed

3.9
road blocks
device to stop vehicles, e.g. retractable ramps

3.10
multi-step border
border with two or more steps aimed at preventing from illegal car parking and driving into pedestrian areas

3.11
buried network
set of different devices: pipes, cables, sheath used to collect and evacuate water or to distribute fluid or energy (water, gas, electricity, lighting, heating or to distribute data like telecommunication, cable-TV, traffic control system, etc.)

3.12
planting
zone of plants to separate a road from a pedestrian area or to protect a site

3.13
planter
massive or well-anchored container (wood, concrete, steel, etc.) filled with soil and decorated with plants

3.14
street furniture used as protective device
different massive or well-anchored devices like candelabras, fountains, benches, sculptures, covered jersey barriers, etc. used to protect a building, a site or an area

3.15
retaining wall
specially designed and reinforced concrete wall, well-anchored and with a height which is adapted to the ground clearance of the considered type of vehicle

3.16
explosive charge
the European standards on explosion resistance refer in the details on the effects of explosions to the generally known explosive trinitrotoluene (TNT). The TNT equivalent is a furthermore common measurement – not in conformity with the SI – for the energy released in an explosion. Unlike the explosive charge used in test situations, improvised explosive devices (IED) are used in criminal attacks

3.17
fragments
the European standards on explosion resistance are using the term splinters instead of fragments. The tests in accordance with these documents only take into account the fragment free shock wave of an explosion. By protective measurements against a real explosion fragments need to be considered (see EN 13123-1, EN 13124-1, EN 13123-2, EN 13124-2 and EN 13541)

3.17.1
primary fragments
fragments deriving from the bomb itself including deliberate fragments e.g. ball bearing and parts of the vehicle containing the bomb

3.17.2
secondary fragments
fragments from external sources driven by the blast e.g. road signs, loose gravel and glass fragments from windows broken by the blast

4 Protection against vehicles as tools of crime

4.1 General

The application of improved mechanical protection measures during the last decades has changed the procedures of the offenders. With the increase of mechanical, electric and electronic protection, the delinquents cannot execute their criminal actions with conventional tools of crime fast and simply.

For these reasons, the delinquents also use vehicles as tools of crime. In a ram attack with a vehicle, tremendous forces arise (see load values in Annex A). These forces are fundamentally larger than the defined test loads in the test standards for burglar resistant building parts (see ENV 1627). These ramming methods enable the delinquents to perform the crime action quickly.

Generally, in the field of security and particularly in the field of personal security, the person in charge of the protection of a site must permanently keep the notion of anticipation in mind.

This is even more important if there is a strong probability that extremely violent acts will be committed. The potential of violence is reinforced by the use of motorised vehicles, which is why it is necessary to know their characteristics, their performances and their weak points.

The security analysis on this type of threat must be comprehensive in terms of site protection. It should not only focus on the entrance areas but should evaluate all features meticulously, such as the intrusion resistance level of the walls, of the fence, i.e. of the peripheral or perimeter belt of the site.

A coherent and thorough study should be carried out by a security expert in order to highlight the real threat in terms of site sensitiveness, the type of attack considered, the vulnerability of the site and protective measures that can be taken.

This study shall be conducted within the framework of the evaluation of the risk analysis based on the ratio seriousness/occurrence.

Before the completion of the study and the realisation of the project, a cost-benefit analysis of the proposed recommendations shall be carried out.

4.2 Type of crime

Criminal acts involving motor vehicles include:

a) the misuse of space like illegal parking in public or private areas (e.g. illegal settlings of travellers' camps),

b) vandalism (damage to property),

c) violent intrusion (for protest purposes – public or private buildings, theft from industrial sites, etc.),

d) violent robbery (with or without weapons),

e) urban riots and heavy vandalism.

4.3 Procedures (modus operandi)

There are different possibilities for offenders to overcome the security facilities with a vehicle:

a) ramming once at the highest possible speed; the offender accepts that the vehicle is no longer fit for use after the attack and takes a great injury risk;

b) ramming repeatedly at reduced speed;

c) pushing open with static load applied by a vehicle;

d) pulling out (e.g. with steel cable or bar);

e) setting on fire a vehicle;

f) setting on fire a vehicle to generate a domino effect (fire flashes over to buildings or other vehicles);

g) using a vehicle with explosive or incendiary load for an attack against people, a site and/or a building.

4.4 Auxiliary material for the procedures

For the different procedures, additional material is used to improve the efficiency of the methods:

a) steel or wood elements to hit the ramming point exactly;

b) steel cable or bar to pull out building elements or a safe;

c) simple provisional ramps to surmount obstacles, security facilities or security devices;

d) additional weights to raise maximal load of vehicle to obtain higher kinetic energy;

e) additional load of explosive or incendiary products to increase damage.

4.5 Additional factors of influence

The sites to be protected are generally located in an existing urban environment, which implicates obligations:

a) regulations on urban planning (e.g. road design);

b) aesthetical or architectural regulations (e.g. listed area or building);

c) technical regulations (e.g. underground pipe system and networks);

d) other regulations (e.g. handicapped accessible passageway, access for emergency and relief vehicles, parking reserved for cash transport, deliveries, handicapped persons' vehicles);

e) sociological or cultural obligations (e.g. users' associations, neighbourhood associations, environment protection, etc.).

This may also concern industrial and commercial sites which are located in easily accessible areas or the size of which is such that the length of the fence and the topography of the environment makes it particularly difficult to protect against this type of criminal acts.

4.6 Recommendations

The security/safety market offers a large range of technical devices (see hereafter).

If the risks and protection measures described above are assessed realistically, one comes to the conclusion that there is no clear, universal solution. The recommendations contain a package of measures consisting of visible and invisible, tightly mounted and mobile security elements, which must be coordinated with the protection requirement of the respective project.

5 Information and technical data

5.1 Forces released during ram attacks

5.1.1 General

We need information about forces for the interpretation of the security elements and safety devices. The evaluation of different ramming tests made the specification of these strengths possible. During different tests, the test specimen was equipped with many different measuring sensors (strain gauge). The evaluation of these measuring values yields a picture of the strength course during the ramming test.

At the moment, there are no European standards on protective devices against the criminal use of a vehicle.

NOTE The aim of existing national documents is to describe the resistibility for stopping the vehicle regardless of the operability after the loading procedure. Ramming tests with vehicles do not fulfil the requirements of European standards regarding the reproducibility. The test result depends on the used vehicle type, the point of the load initiation and the composition of the foundation's environment.

The kinetic energy which is released when ramming with vehicles is dependent on the speed and weight of the vehicle. The following factors reduce the kinetic energy which is effective in the ramming target:

a) any deviation from the ideal ramming direction of the vehicle to the destination point;

b) the destructive energy effective at the vehicle.

At protective elements like planters or New Jersey elements, whose protective effect is based on their weight; a part of the energy is absorbed by friction between the protective element and the road. The destructive energy at the vehicle has also a reducing effect.

5.1.2 Calculation of relevant test loads

The application of the static test loads from the calculated kinetic energy has two advantages:

a) reproducible test of the components;

b) for the assembly in existing buildings, the calculation of the foundation is dependent on the condition of the ground and the appropriate selection of the required fastening elements.

The kinetic energy is also described as a force (impact) and indicated with Nm. This equals Ws (watt seconds) or J (joule). The values are indicated in kNm in the tables in Annex A.

The following formula only applies to constant speed; therefore acceleration or deceleration = 0.

$$W = \frac{m}{2} \cdot v^2$$

where:

W is the kinetic energy or force (impact) [Nm];

m is the mass [kg];

v is the velocity [m/s].

Ramming tests have shown that a static test load which corresponds to half of the numeric value of the kinetic energy is sufficient to resist an appropriate ramming test.

The corresponding load tables are in the Annex A.

5.1.3 Additional loading criteria

Pulling and pushing tests with different vehicles allow for the following statement:

To cover the possible static pulling and pushing forces of vehicles, the protective elements must be interpreted for an impact speed of at least 20 km/h.

Broader influence factors were taken into account:

a) road surface;

b) weather conditions;

c) type of tyre (adhesion).

5.1.4 Application point of loading

For the test of the security elements and the interpretation of the foundations, the application point of loading must be defined 50 mm under the highest point of the security element, see dimension X.

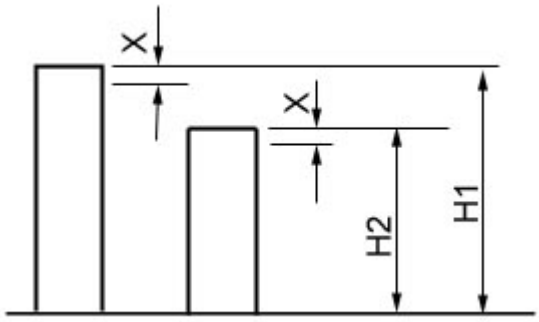
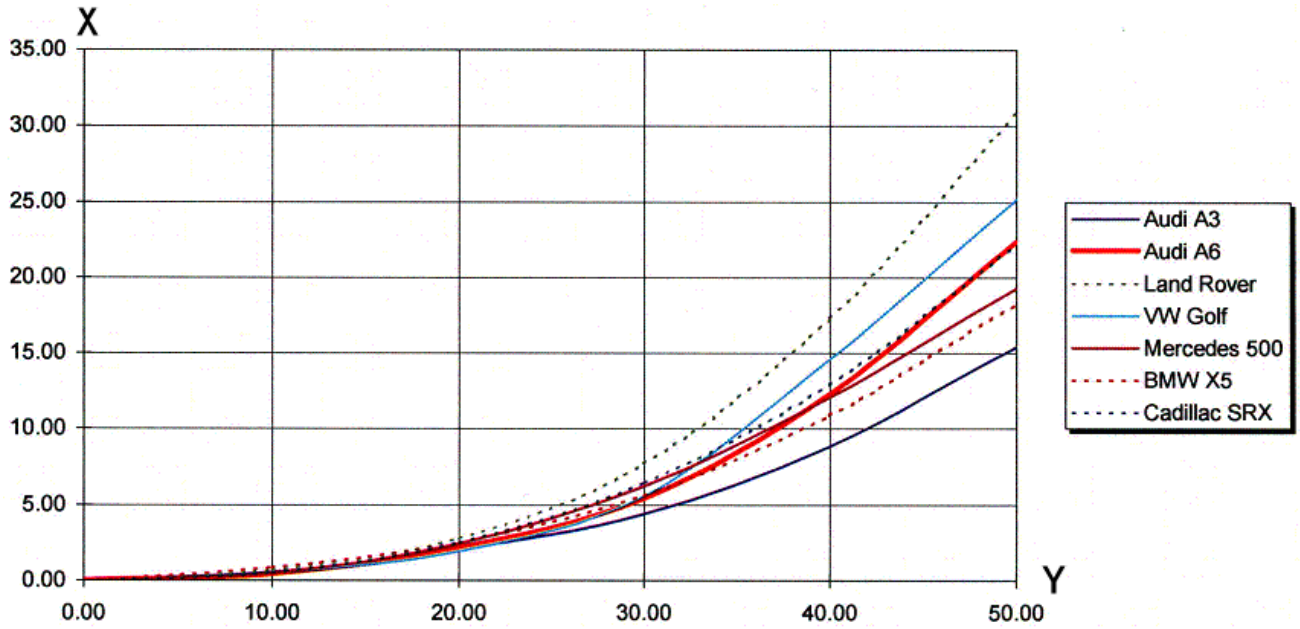


Figure 1 — Application point of loading

Unfortunately, the loading point has not been taken into account in existing tests with vehicles since equal test vehicles cause the equal strains at different heights of the element (see H1 and H2).

5.1.5 Space requirements for a ram attack

Figure 2 shows the distance required for a ramming vehicle to reach the target at a certain speed.



Key

X Acceleration distance in m
Y Speed in km/h

Figure 2 — Acceleration distance for vehicles

Speed over 30 km/h causes physical damage to the driver.

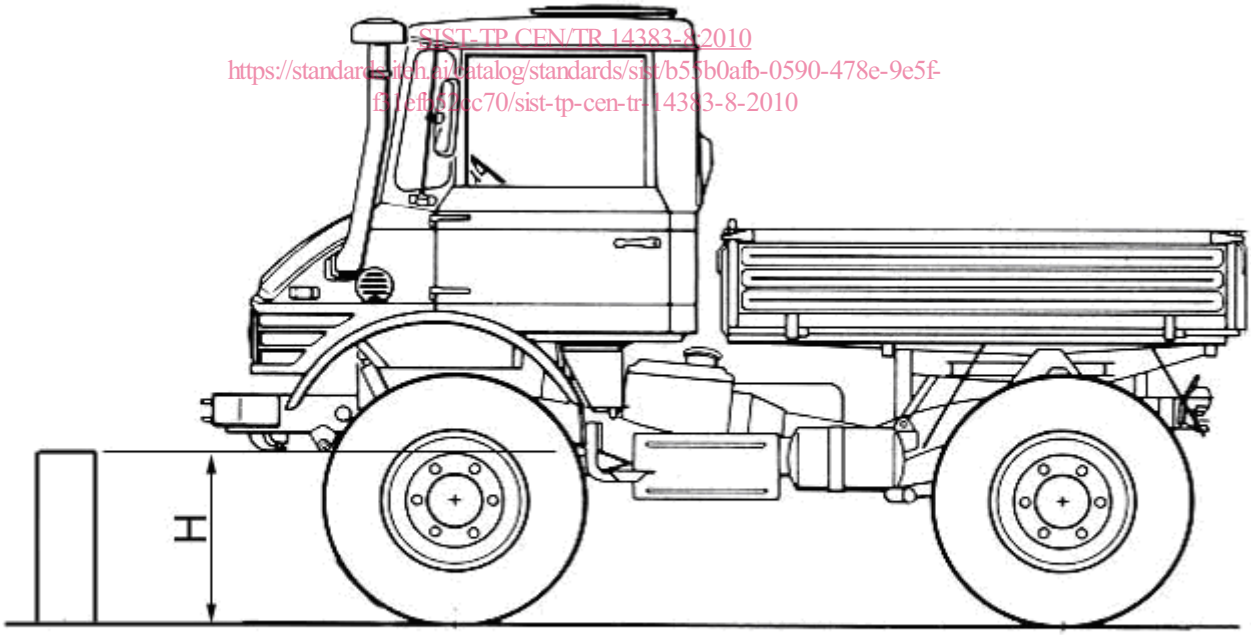


Figure 3 — Height of the protective element in accordance with the vehicle

The height H of fixed protective elements like walls, planting vessels, etc. shall be minimum 75 % of the wheel diameter of the expected off-road vehicle.