NATO STANDARD

AEP-88

REPRESENTATIVE TARGET -UNFORTIFIED AND FORTIFIED STRUCTURES

Edition A Version 1
OCTOBER 2013
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NORTH ATLANTIC TREATY ORGANIZATION

ALLIED ENGINEERING PUBLICATION

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LETTER OF PROMULGATION

17 October 2013

1. The enclosed Allied Engineering Publication AEP-88, REPRESENTATIVE TARGET – UNFORTIFIED AND FORTIFIED STRUCTURES, which has been approved by the nations in the NAAG, is promulgated herewith. The agreement of nations to use this publication is recorded in STANREC 4536.

2. AEP-88 is effective upon receipt.

3.

4. This publication shall be handled in accordance with C-M(2002)60.

Dr. Cihangir AKSIT, TUR Civ
Director NATO Standardization Agency

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RESERVED FOR NATIONAL LETTER OF PROMULGATION

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Database for the complete list of existing reservations.	

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Database for the complete list of existing reservations.	

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TABLE OF CONTENTS

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CHAPTER 1 INTRODUCTION

1. The aim of this standard is to establish a range of representative building targets for various categories of structures, unfortified and fortified targets, for use in operational analyses and weapon system assessments.

2. The following terms and definitions are used for the purpose of this agreement.

Test Target – Representative section of the building and, where specified, associated fortifications.

3. This standard deals with:

a. The definition of reperesentative building types, construction methods and materials for operational analysis modelling.

b. The definition of representative test targets for weapon system assessment.

c. The definition of the principal method of fortifying buildings for inclusion in the weapon system assessments.

d. The definition of possible positions of defending personnel in buildings for both operational analysis modelling and weapon system assessments.

4. The options for the type and construction of buildings covered in this standard are as follows:

Table 1: Type and construction of buildings

Building type	Wall Construction						Roof type	Floor type	Target volume [sq. ft.]	Cellar
	Adobe brick	Block	Brick & Block	Brick & Brick	Reinf. Conc.	Light frame				
Adobe	√	√					F	W	400 - 800	
Small Domestic		√	√	√	√	√	P/F	C/W	> 800 - 1200	√
Standard Domestic			√	√	√	√	P/F	C/W	> 1200 - 1400	√
Substantial Domestic			√	√	√	√	P/F	C/W	> 2400	√
Municipal				√	√	√	P/F	C	> 5000	√
Ligh Industrial			√	√		√	P/F	C	> 10 000	

Key:

P	-	Pitched roof
F	-	Flat Roof
C	-	Concrete Intermediate Floor
W	-	Wooden Intermediate Floor
Reinf. conc.	-	Reinforced Concrete

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ANNEX A BUILDING TYPE

GENERAL

1. The aim of this annex is to define a typical range of building types and the associates relevant dimensions.

APPENDIX
1 - An Adobe
2 - A Small Domestic
3 - A Standard Domestic
4 - A Substantial Domestic
5 - A Municipal
6 - A Light Industrial

ANNEX A - APPENDIX 1 ADOBE BUILDING

1. General

This Appendix defines the typical physical size of an Adobe Building and provide a pictorial representation.

2. Building description

A small lightly constructed single storey dwelling house. The house will have a flat roof.

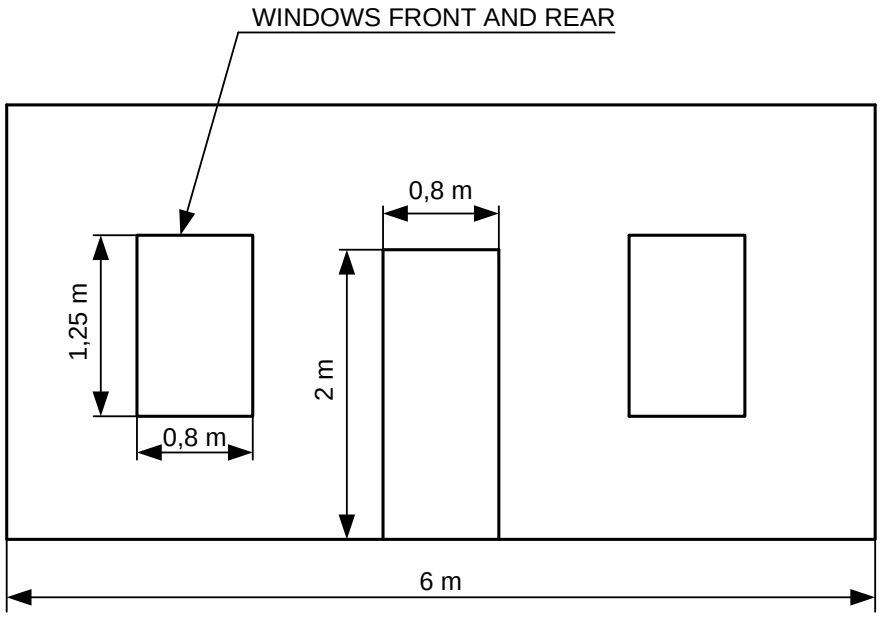
3. Dimensions

Outer Walls	-	Normal Thickness		0.40 - 0.50m
Outer doors (front and back)		-	Nominal sizes	
			height	2.0m
			width	0.8m
			thickness	0.04m
Windows	-	Nominal sizes	height	1.25m
			width	0.8m
Room sizes	-	Nominally	height	2.5m
			width	4.0m
			length	5.0m
Flat Roof	-	Nominal thickness		0.35m

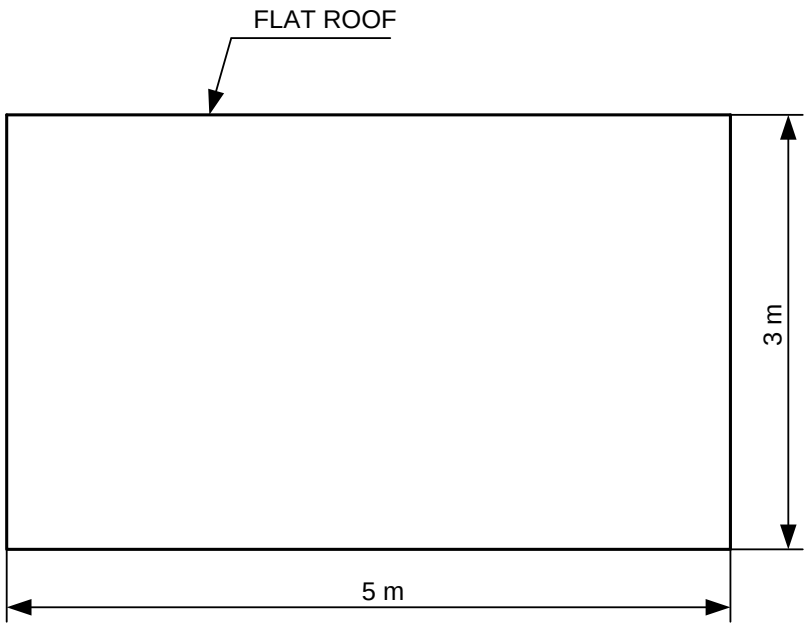
4. Pictorial Representation

A Pictorial Representation of the Building is shown at A1-3.
A Pictorial Representation of a Room in theBuilding is shown at A1-4.

AN ADOBE BUILDING PICTORIAL REPRESENTATION
(A1-3)

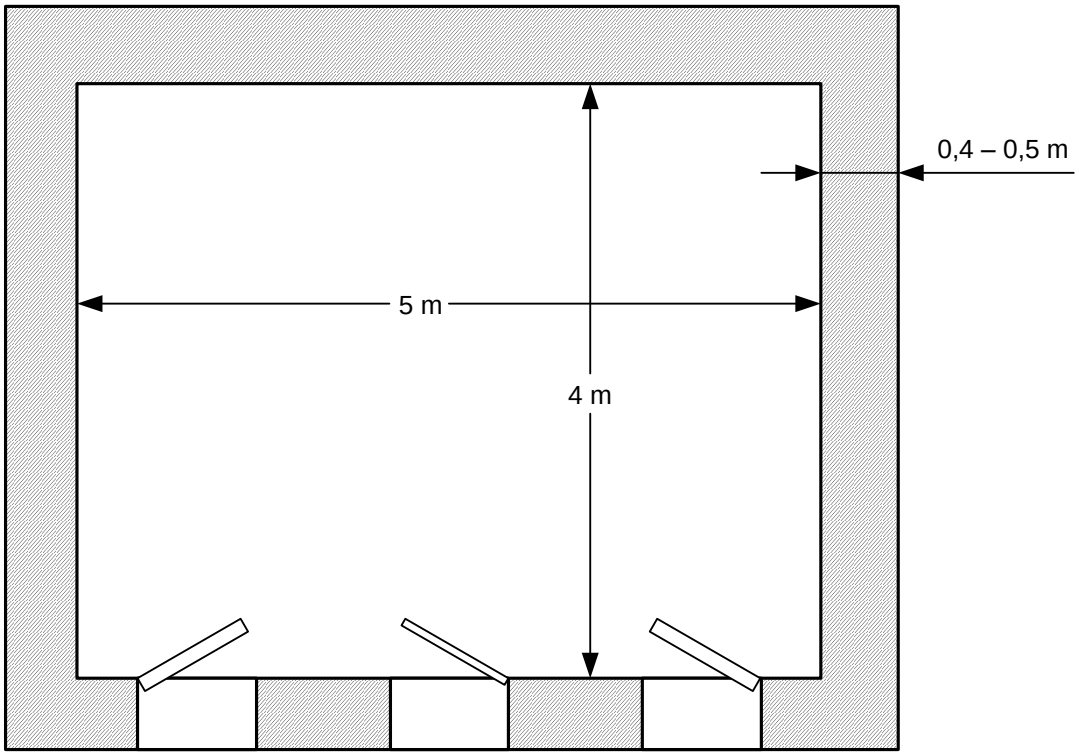


FRONT VIEW



SIDE VIEW

AN ADOBE BUILDING:- ROOM PICTORIAL REPRESENTATION (A1-4)



ANNEX A -APPENDIX 2 SMALL DOMESTIC BUILDING

1. General

This Appendix defines the typical physical size of a Small Domestic Building and provides a pictorial representation.

2. Building Description

A small lightly constructed single storey dwelling house.
The house could have a flat roof or pitched roof.

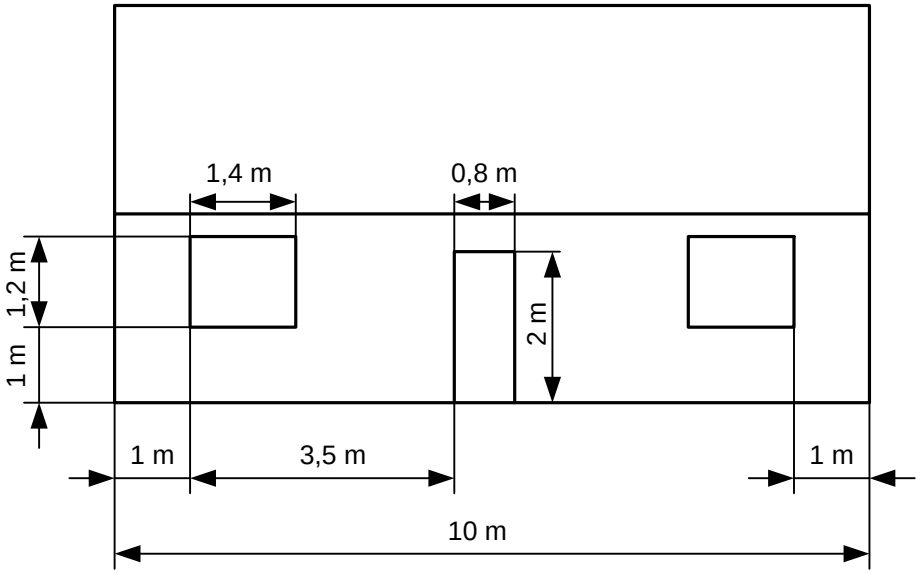
3. Dimensions

Outer Walls	-	Nominal thickness		0.20 - 0.25 m
Inner Walls	-	Nominal thickness		0.10 - 0.15m
Outer Doors (front and back)	-	Nominal sizes		
			height	2.0m
			width	0.8m
			thickness	0.04m
Windows	-	Nominal sizes	height	1.2m
			width	1.4m
Room sizes	-	Nominally	height	2.5m
			width	4.0m
			length	5.0m
Flat reinforced concrete roof	-	Nominal thickness		0.25m

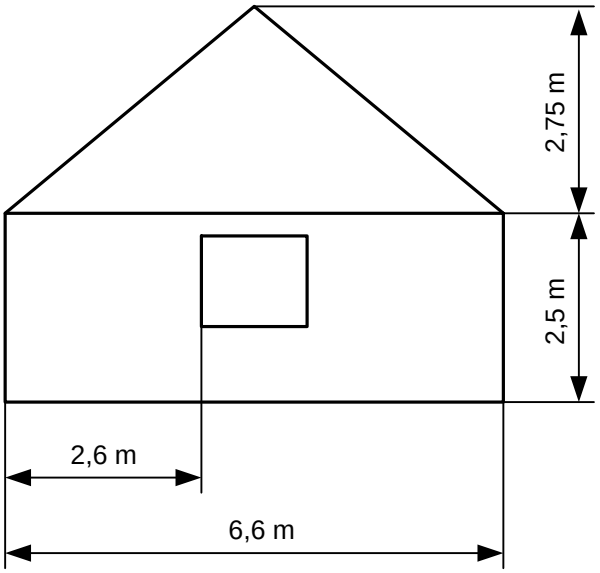
4. Pictorial Representation

A Pictorial Representation of the Building is shown at A2-3.
A Pictorial Representation of a Room in the Building is shown at A2-4.

SMALL DOMESTIC BUILDING PICTORIAL REPRESENTATION (A2-3)

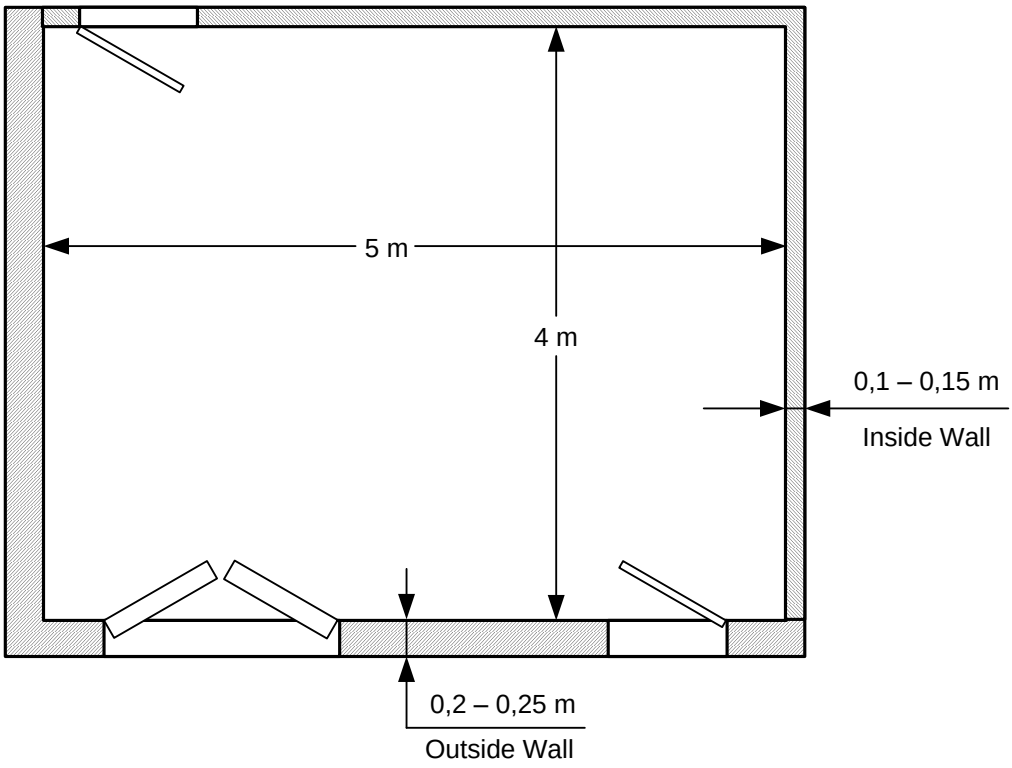


FRONT AND REAR VIEW



SIDE VIEW

SMALL DOMESTIC BUILDING:- ROOM PICTORIAL REPRESENTATION (A2-4)



ROOM VIEW

ANNEX A - APPENDIX 3 STANDARD DOMESTIC BUILDING

1. General

This Appendix defines the typical physical size of a Standard Domestic Building and provides a pictorial representation.

2. Building Description

A lightly constructed double storey dwelling house. The house could have a flat roof or pitched roof.

3. Dimensions

Outer Walls	-	Nominal thickness		0.30 - 0.35 m
Inner Walls	-	Nominal thickness		0.10 - 0.15m
Outer Doors (front and back)	-	Nominal sizes		
			height	2.0m
			width	0.8m
			thickness	0.04m
Windows	-	Nominal sizes	height	1.2m
			width	1.4m
Room sizes	-	Nominally	height	2.5m
			width	4.0m
			length	5.0m
Flat reinforced concrete roof	-	Nominal thickness		0.25m

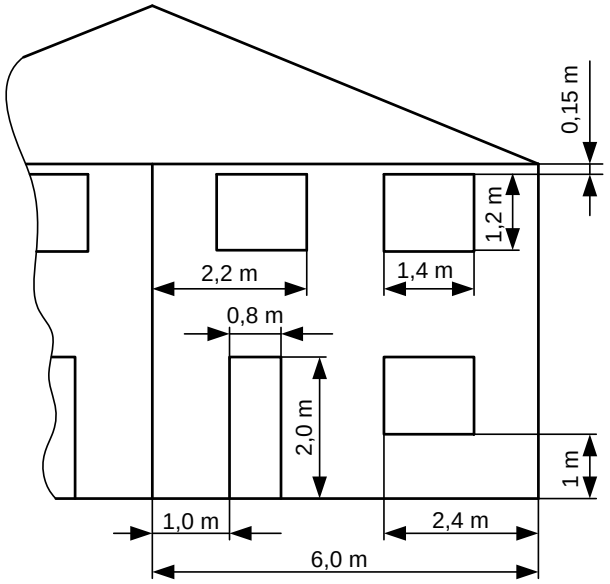
4. Cellar

The building could have a small cellar.

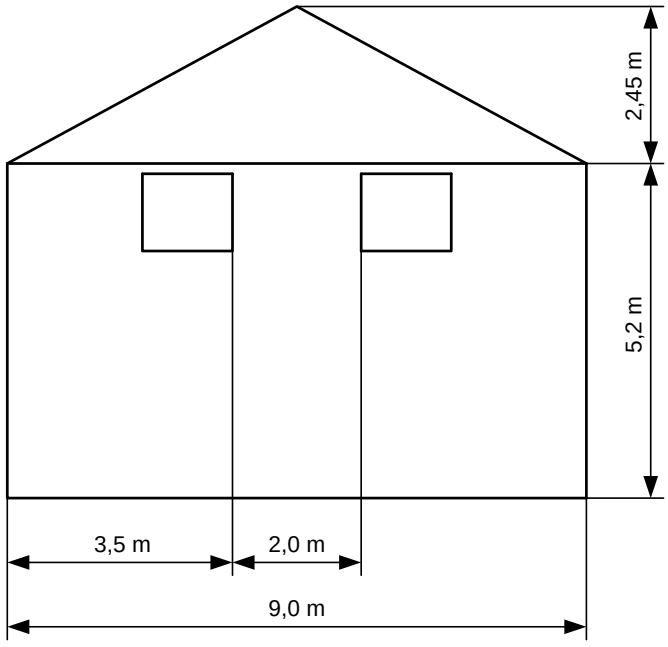
5. Pictorial Representation

A Pictorial Representation of the Building is shown at A3-3.
A Pictorial Representation of a Room in the Building is shown at A3-4.

STANDARD DOMESTIC BUILDING PICTORIAL REPRESENTATION
(A3-3)

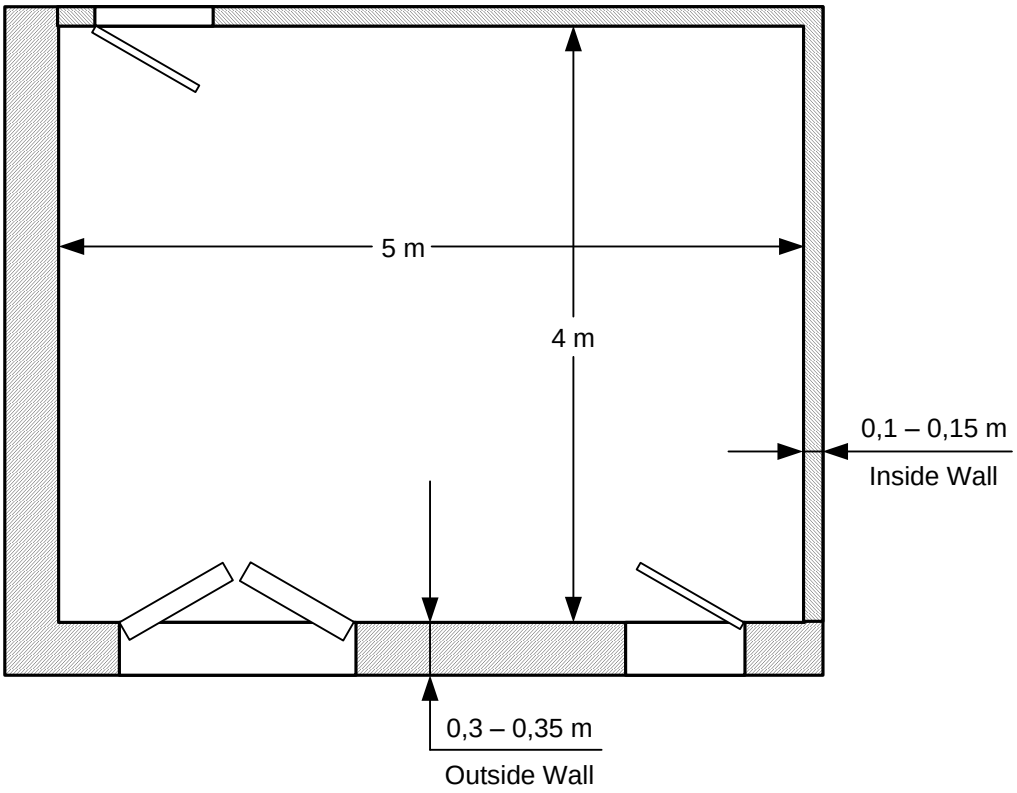


FRONT AND REAR VIEW



SIDE VIEW

STANDARD DOMESTIC BUILDING:- ROOM PICTORIAL REPRESENTATION
(A3-4)



ROOM VIEW

ANNEX A - APPENDIX 4 SUBSTANTIAL DOMESTIC BUILDING

1. General

This Appendix defines the typical physical size of a Substantial Domestic Building and provides a pictorial representation.

2. Building Description

A substantial constructed double storey dwelling house. The house could have a flat roof or pitched roof.

3. Dimensions

Outer Walls	-	Nominal thickness		0.30 - 0.35 m
Inner Walls	-	Nominal thickness		0.10 - 0.15m
Outer Doors (front and back)	-	Nominal sizes		
		height		2.0m
		width		1.0m
		thickness		0.04m
Windows	-	Nominal sizes	height	1.2m
			width	1.4m
Room sizes	-	Nominally	height	3.0m
			width	4.0m
			length	5.0m
Flat reinforced concrete roof	-	Nominal thickness		0.25m

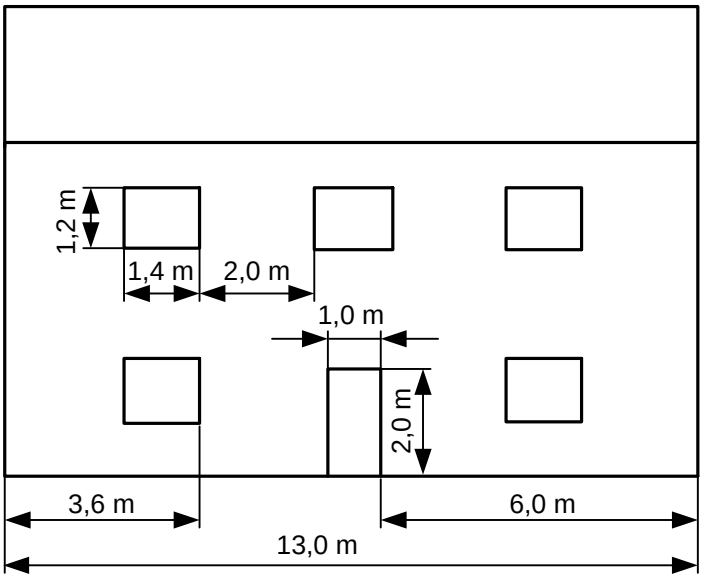
4. Cellar

The building could have a large cellar under the whole ground floor.

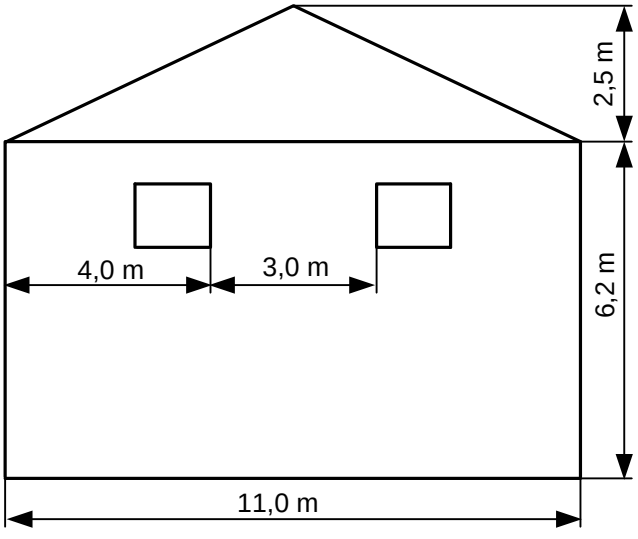
5. Pictorial Representation

A Pictorial Representation of the Building is shown at A4-3.
A Pictorial Representation of a Room in the Building is shown at A4-4.

SUBSTANTIAL DOMESTIC BUILDING PICTORIAL REPRESENTATION (A4-3)

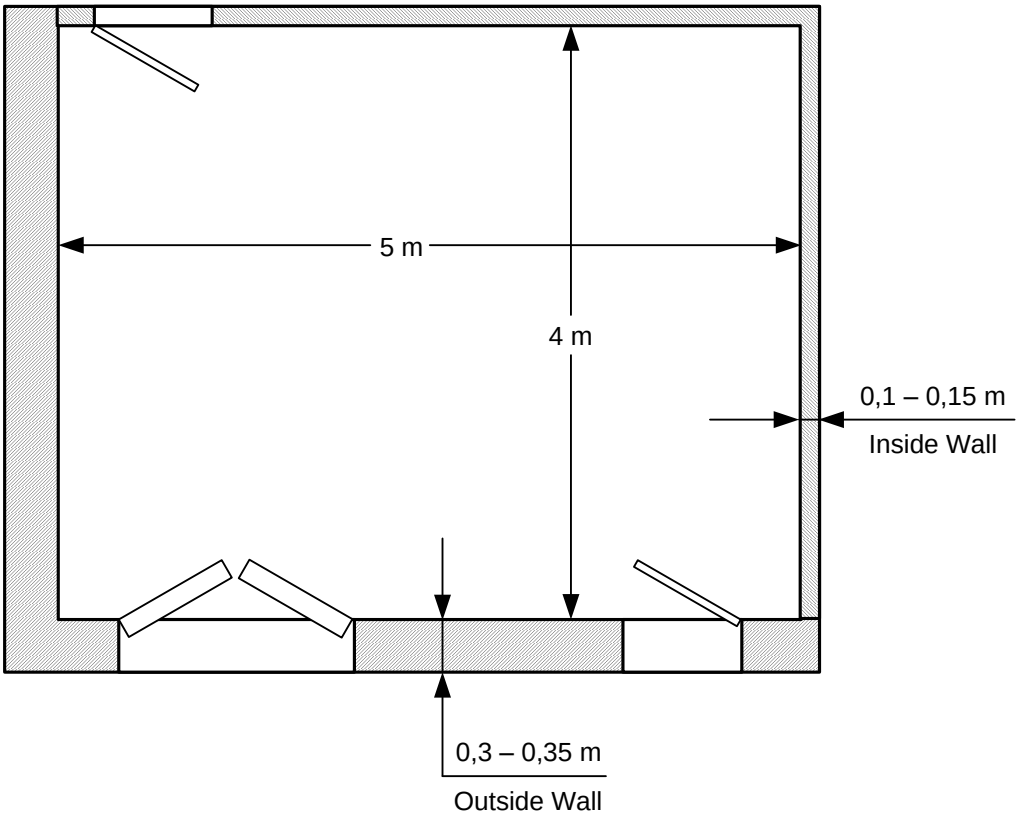


FRONT AND REAR VIEW



SIDE VIEW

SUBSTANTIAL DOMESTIC BUILDING:- ROOM PICTORIAL REPRESENTATION
(A4-4)



ROOM VIEW

ANNEX A - APPENDIX 5 A MUNICIPAL BUILDING

1. General

This Appendix defines the typical physical size of a Municipal Building and provides a pictorial representation.

2. Building Description

A multi-storey Municipal building typical of a City Centre.

3. Dimensions

Outer Walls	-	Nominal thickness		0.2 - 0.8 m
Inner Walls	-	Nominal thickness		0.10 - 0.15m
Outer Doors (front and back)	-	Nominal sizes		
			height	2.25m
			width	2.0m
			thickness	0.04m
Windows	-	Nominal sizes	height	2.0m
			width	1.5m
Room sizes	-	Nominally	height	3.5m
			width	5.0m
			length	8.0m
Flat reinforced concrete roof	-	Nominal thickness		0.25m

4. Cellar

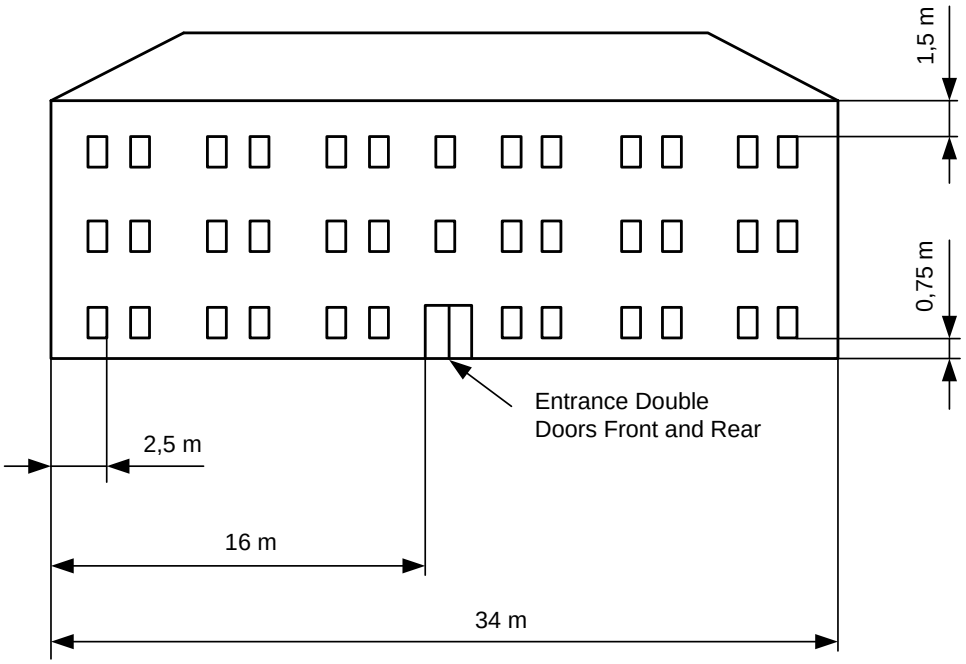
There could be a multi-level cellar/basement the size of the ground floor.

5. Pictorial Representation

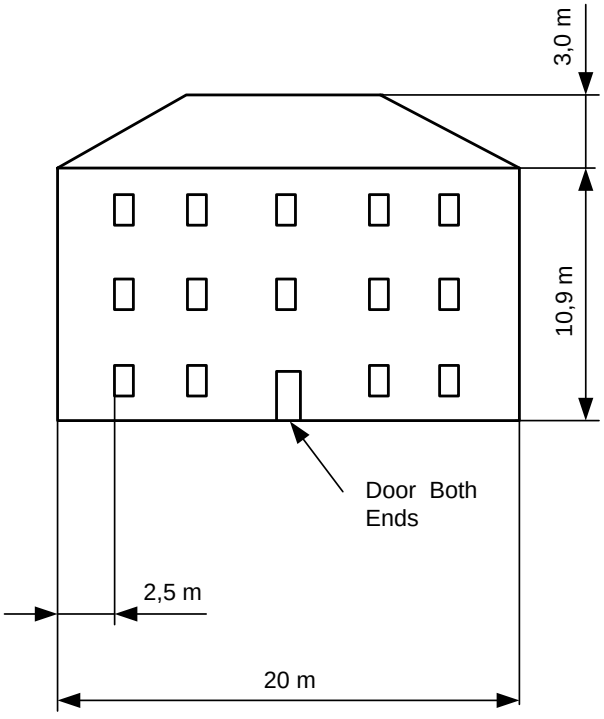
A Pictorial Representation of the Building is shown at A5-3.
A Pictorial Representation of a Room in the Building is shown at A5-4.

**APPENDIX 5 TO
ANNEX A TO
AEP-88**

MUNICIPAL BUILDING PICTORIAL REPRESENTATION
(A5-3)

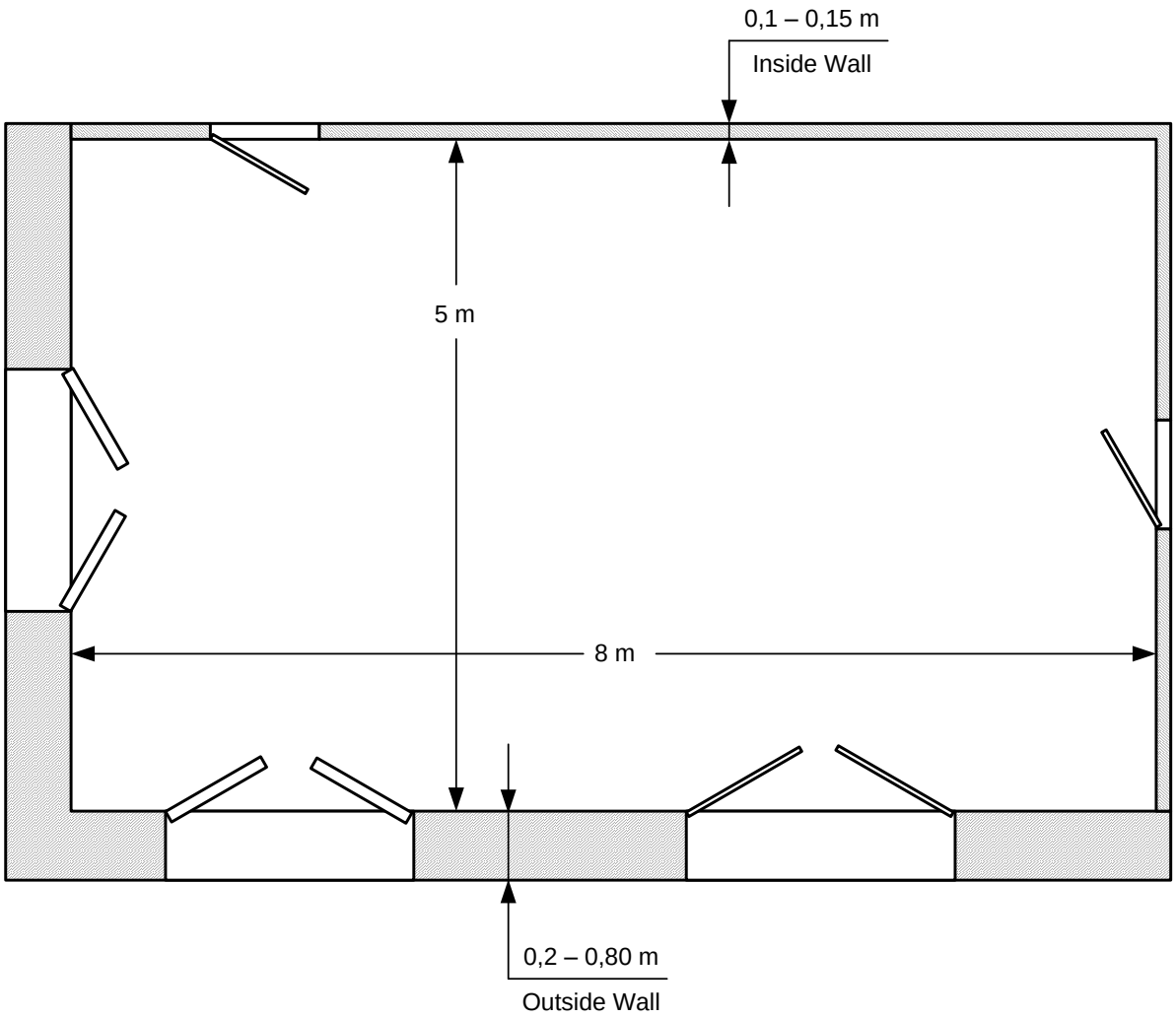


FRONT AND REAR VIEW



SIDE VIEW

MUNICIPAL BUILDING:- ROOM PICTORIAL REPRESENTATION (A5-4)



ROOM VIEW

ANNEX A - APPENDIX 6 A LIGHT INDUSTRIAL BUILDING

1. General

This Appendix defines the typical physical size of a Light Industrial Building and provides a pictorial representation.

2. Building Description

A Light Industrial/Warehouse type building.

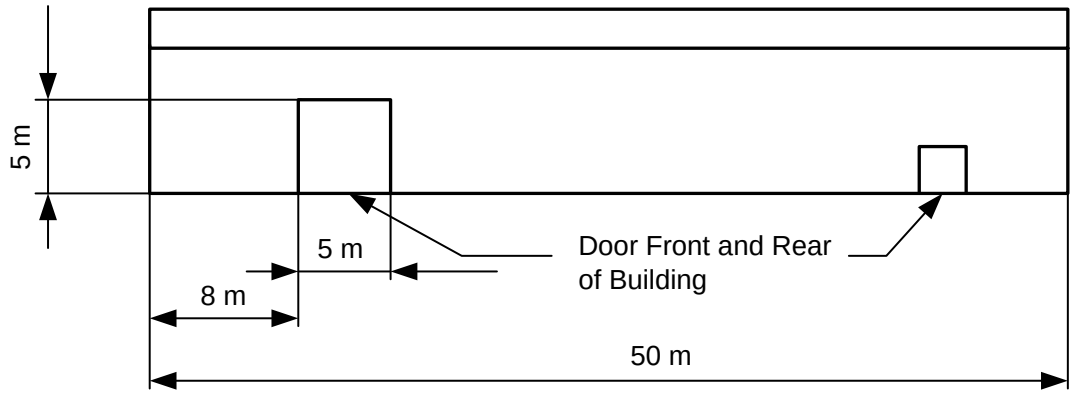
3. Dimensions

Outer Walls	-	Nominal thickness		0.15 – 0.30m
Outer Doors (front and back)	-	Nominal sizes		
		height		5.0m
		width		5.0m

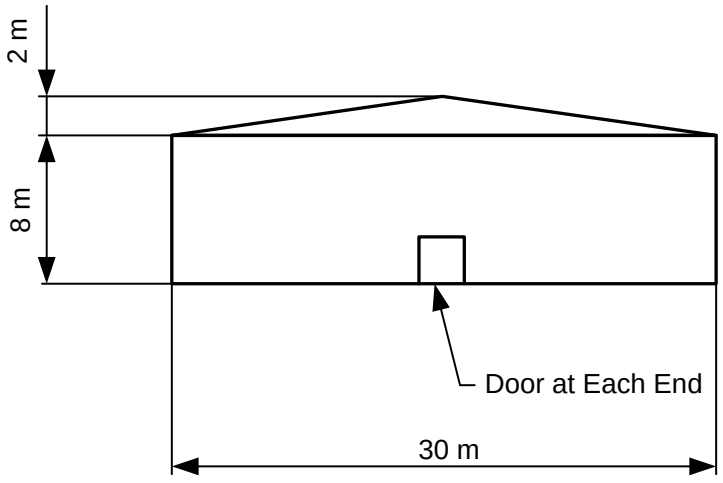
4. Pictorial Representation

A Pictorial Representation of the Building is shown at A6-2.
A Pictorial Representation of a Room in the Building is shown at A6-3

LIGHT INDUSTRIAL BUILDING PICTORIAL REPRESENTATION
(A6-2)

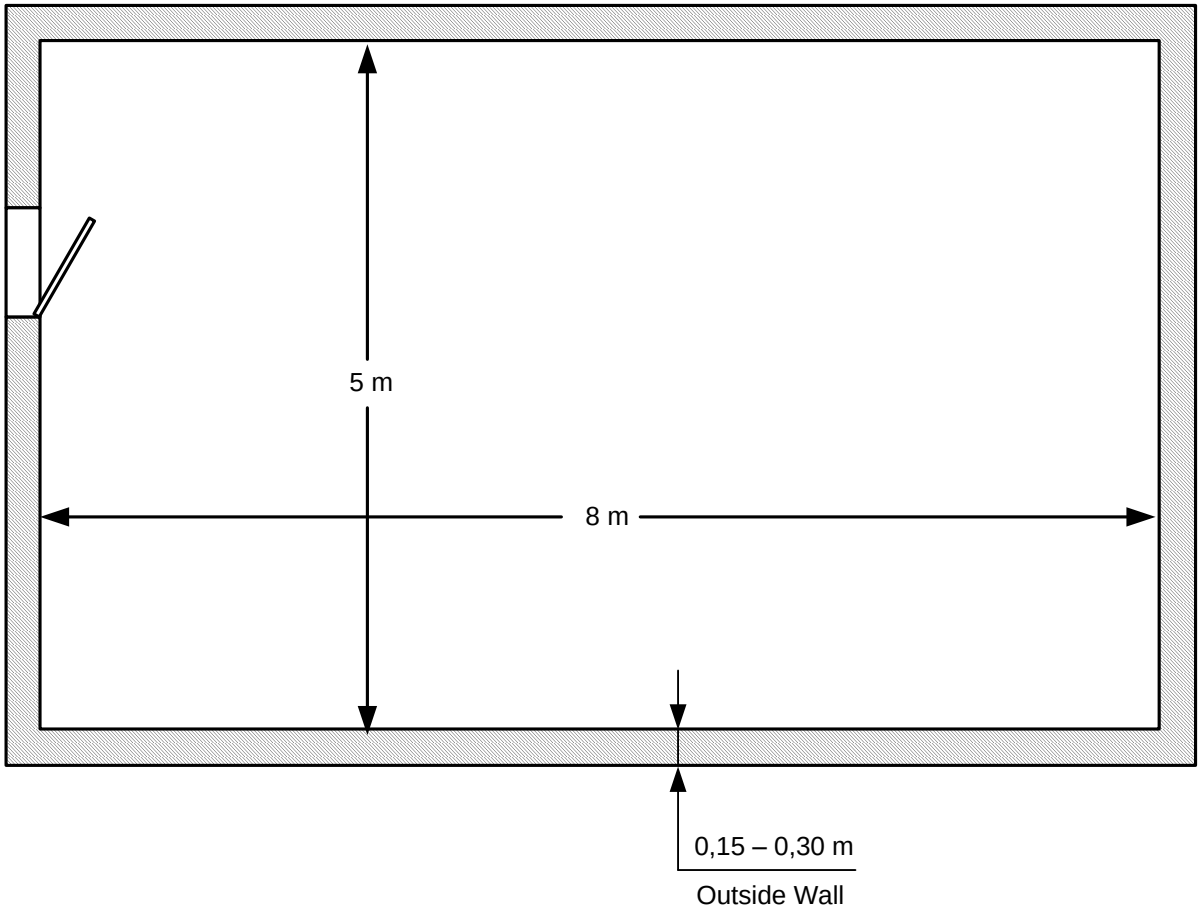


FRONT AND REAR VIEW



SIDE VIEW

LIGHT INDUSTRIAL BUILDING:- ROOM PICTORIAL REPRESENTATION (A6-3)



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ANNEX B CONSTRUCTION TYPES AND MATERIALS

General

1. The aim of this Annex is to define the typical construction types and associated building materials.

APPENDIX	1	-	An Adobe
	2	-	A Small Domestic
	3	-	A Standard Domestic
	4	-	A Substantial Domestic
	5	-	A Municipal
	6	-	A Light Industrial

ANNEX B - APPENDIX 1 ADOBE BUILDING

1. General

This Appendix defines the typical construction and building materials used for an Adobe Building.

2. Constructions and Building Materials

2.1 Outer Walls

Single skin of Adobe bricks made from a mixture of sand and clay in the ratio 7 to 5.

2.2 Roof

Timber planks on top of timber ceiling joints. The planks are covered in layers of twigs, earth and Adobe mix mud.

2.3 Floors

Floors are made from compacted Adobe mix mud.

2.4 Doors

Outer doors - Hardwood

2.5 Windows

Glass with Softwood frames.

ANNEX B - APPENDIX 2 SMALL DOMESTIC BUILDING

1. General

This Appendix defines the typical construction and building materials used for a Small Domestic Building.

2. Constructions and Building Materials

2.1 Outer Walls

Timber frame with infill of brick or light concrete blocks.
Timber frame with wood cladding and insulant filler.
Single skin of lightweight concrete blocks.
Outer skin of brick and an inner skin of lightweight concrete blocks.
Outer and Inner skin of brick.

2.2 Inner Walls

Timber frame with infill of cellular lightweight concrete blocks.
Timber frame with facings of lathe and plaster.
Single skin of cellular lightweight concrete blocks.
Single skin of brick.

2.3 Roof

Pitched timber frame with concrete or slate tiles.
Flat reinforced concrete.

2.4 Floors and Ceilings

Timber joists and floor boards with plastered ceiling.
Reinforced concrete with plastered ceiling.

2.5 Doors

Outer doors	- Hardwood
	- Softwood partially glazed
Inner doors	- Softwood

2.6 Windows

Glass with Hardwood frames.
Glass with Softwood frames.
Glass with Metal frames.

ANNEX B - APPENDIX 3 STANDARD DOMESTIC BUILDING

1. General

This Appendix defines the typical construction and building materials used for a Standard Domestic Building.

2. Constructions and Building Materials

2.1 Outer Walls

Timber frame with infill of brick or light concrete blocks.
Outer skin of brick and an inner skin of lightweight concrete blocks.
Outer and Inner skin of brick.

2.2 Inner Walls

Timber frame with infill of cellular lightweight concrete blocks.
Timber frame with facings of lathe and plaster.
Single skin of cellular lightweight concrete blocks.
Single skin of brick.

2.3 Roof

Pitched timber frame with concrete or slate tiles.
Flat reinforced concrete.

2.4 Floors and Ceilings

Timber joists and floor boards with plastered ceiling.
Reinforced concrete with plastered ceiling.

2.5 Doors

Outer doors	- Hardwood
	- Softwood partially glazed
Inner doors	- Softwood

2.6 Windows

Glass with Hardwood frames.
Glass with Softwood frames.
Glass with Metal frames.

ANNEX B - APPENDIX 4 SUBSTANTIAL DOMESTIC BUILDING

1. General

This Appendix defines the typical construction and building materials used for a Substantial Domestic Building.

2. Constructions and Building Materials

2.1 Outer Walls

Timber frame with infill of brick or light concrete blocks.
Outer skin of brick and an inner skin of lightweight concrete blocks.
Outer and Inner skin of brick.
Outer skin of reinforced concrete.

2.2 Inner Walls

Timber frame with infill of cellular lightweight concrete blocks.
Timber frame with facings of lathe and plaster.
Single skin of cellular lightweight concrete blocks.
Single skin of brick.
Single skin of reinforced concrete.

2.3 Roof

Pitched timber frame with concrete or slate tiles.
Flat reinforced concrete.

2.4 Floors and Ceilings

Timber joists and floor boards with plastered ceiling.
Reinforced concrete with plastered ceiling.

2.5 Doors

Outer doors	- Hardwood
	- Softwood partially glazed
Inner doors	- Softwood

2.6 Windows

Glass with Hardwood frames.
Glass with Softwood frames.
Glass with Metal frames.

ANNEX B - APPENDIX 5 MUNICIPAL BUILDING

1. General

This Appendix defines the typical construction and building materials used for a Municipal Building.

2. Construction and Building Materials

2.1 Outer Walls

Reinforced concrete.
Stone.)
Reducing in thickness on higher stories
Brick)

Steel girder framework for higher buildings

2.2 Inner Walls

Single skin of cellular lightweight concrete blocks.
Single skin of brick.
Double skin of brick.
Reinforced concrete

2.3 Roof

Pitched timber frame with concrete or slate tiles.
Flat reinforced concrete.

2.4 Floors and Ceilings

Reinforced concrete, with plastered ceiling.

2.5 Doors

Outer doors - Hardwood
- Softwood partially glazed
- Steel
Inner doors - Softwood

2.6 Windows

Glass with Hardwood frames.
Glass with Softwood frames.
Glass with Metal frames.

ANNEX B - APPENDIX 6 LIGHT INDUSTRIAL BUILDING

1. General

This Appendix defines the typical construction and building materials used for a Light Industrial Building.

2. Construction and Building Materials.

2.1 Outer Walls

Steel girder or reinforced concrete framework with corrugated or flat steel or aluminium cladding.
Steel girder or reinforced concrete framework with lightweight concrete block infill.

2.2 Roof

Steel girder framework with corrugated steel cladding.

2.3 Floors

Reinforced concrete.

2.4 Doors

Outer doors
- Steel
- Hardwood
- Steel partially glazed

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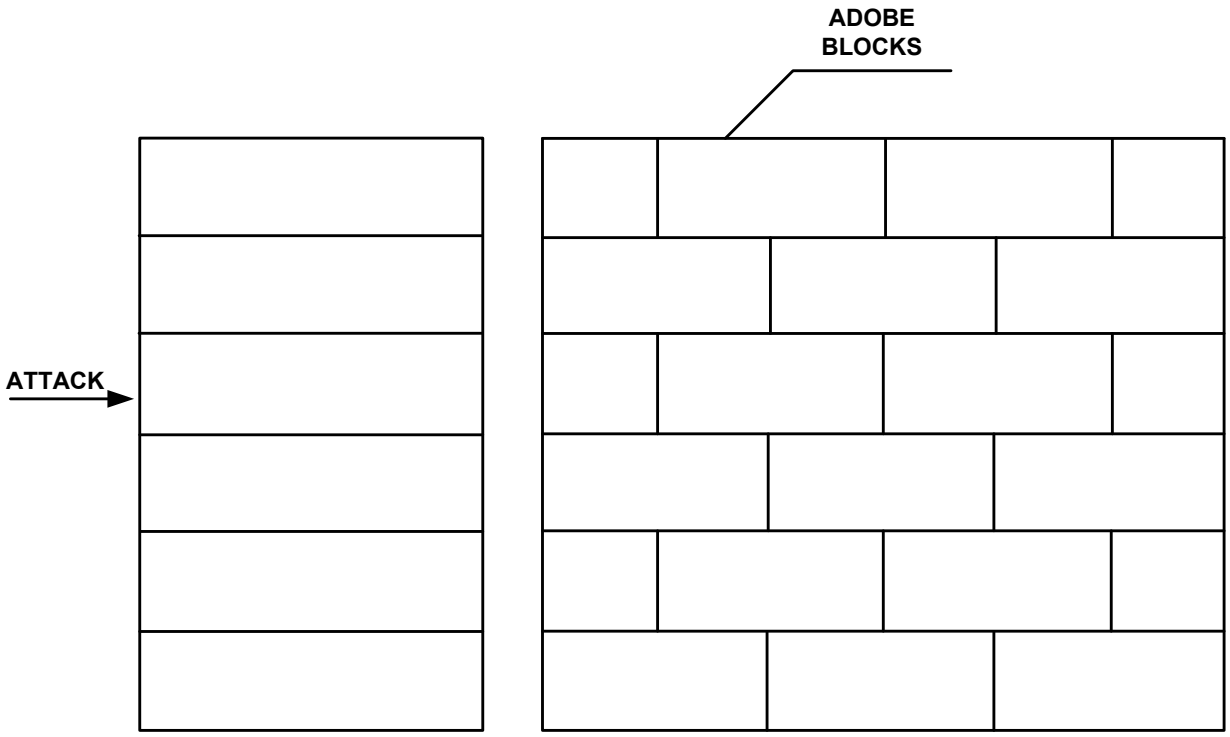
ANNEX C REPRESENTATIVE TEST TARGETS – OUTER WALLS

General

1. The aim of this Annex is to define a representative test outer wall target for each of the building types.

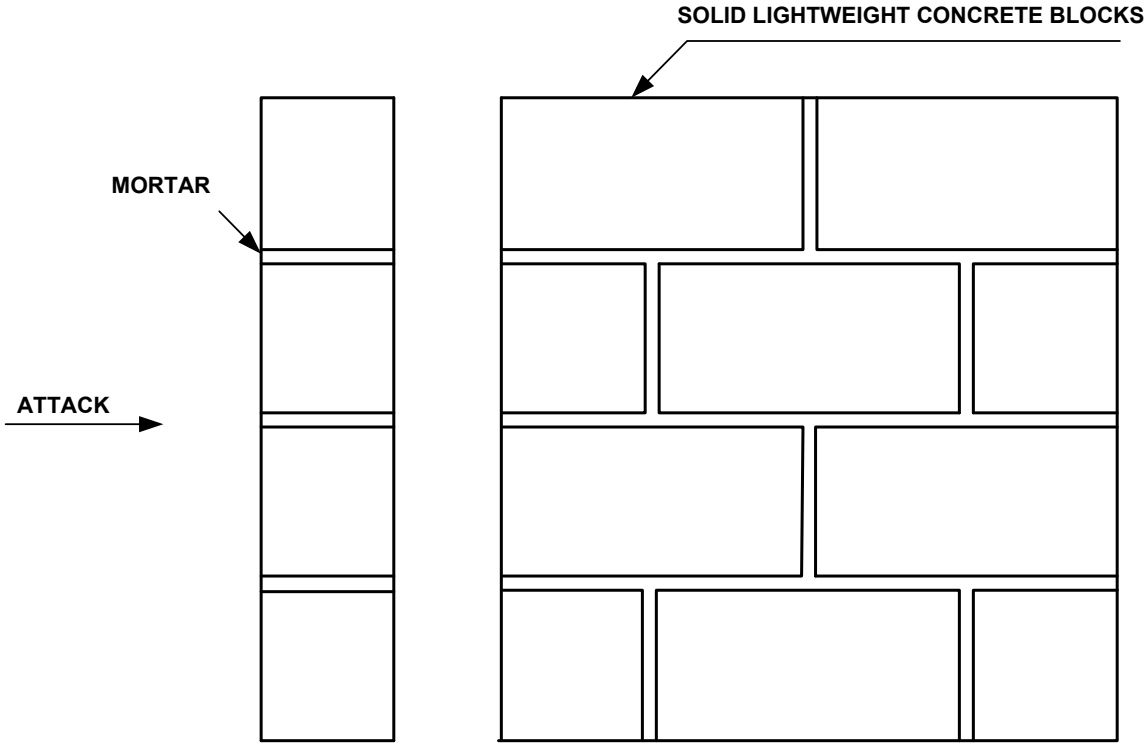
APPENDIX
1 - An Adobe
2 - A Small Domestic
3 - A Standard Domestic
4 - A Substantial Domestic
5 - A Municipal
6 - A Light Industrial

ADOBE BUILDING TEST TARGET OUTER WALL
(C1)



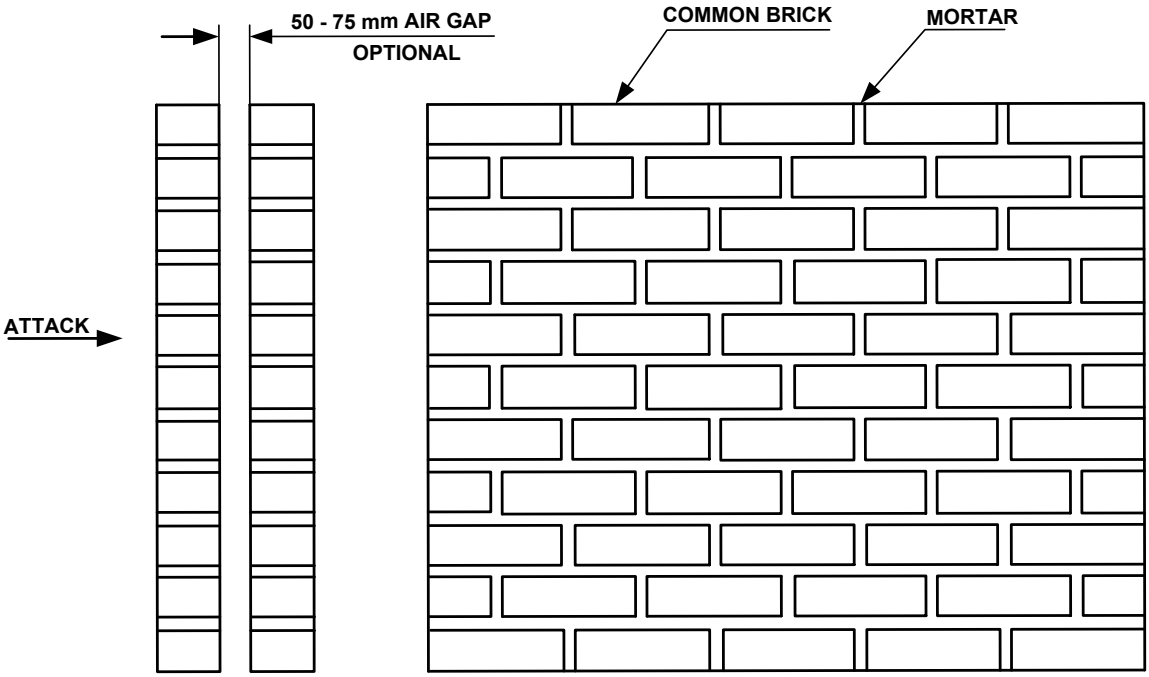
MATERIAL SPECIFICATIONS: -
ADOBE BLOCK: 7 PARTS SAND TO 5 PARTS CLAY (KAOLINITE)
SIZE NOMINALLY 450mm x 300mm x 130mm
COMPRESSIVE STRENGHT 4 N/mm^2

SMALL DOMESTIC BUILDING TEST TARGET OUTER WALL
(C2)



MATERIAL SPECIFICATIONS: -
MORTAR: 15 - 20 mm THICK (1 PART CEMENT, 1 PART LIME AND 6 PARTS SAND)
SOLID LIGHTWEIGHT CONCRETE BLOCKS : COMPRESSIVE STRENGHT 3.2 – 4.8 N/mm^2
(NOMINALLY 440mm x 215mm x 190mm)

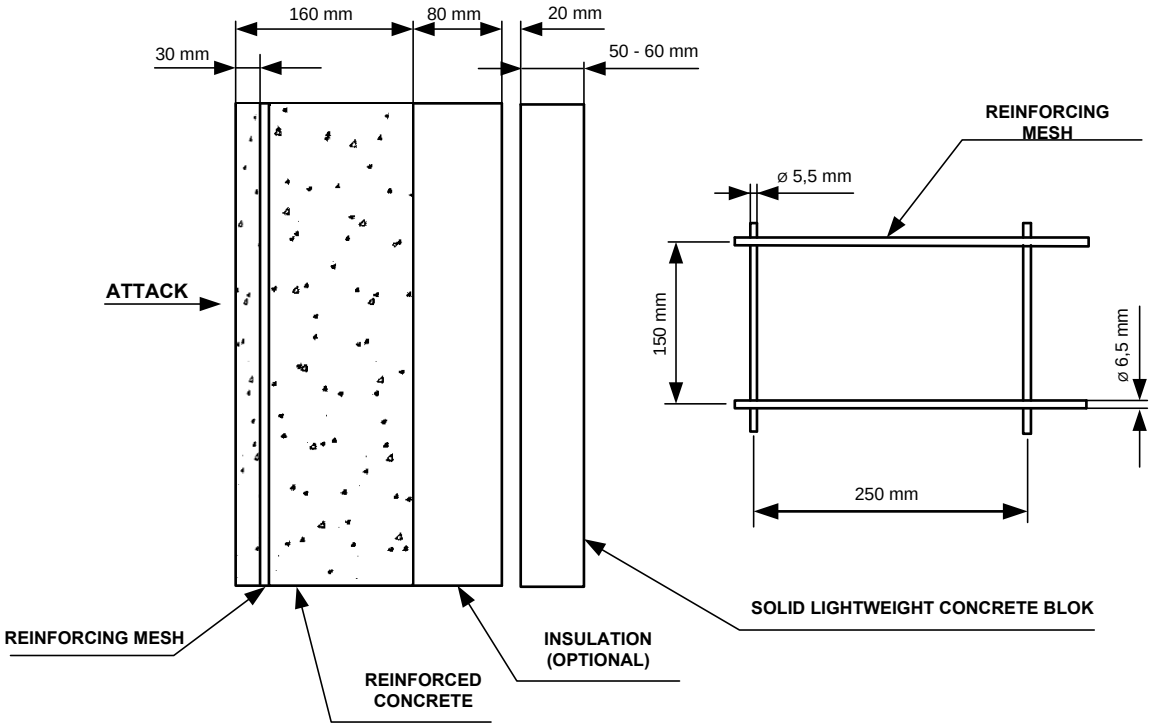
STANDARD DOMESTIC BUILDING TEST TARGET OUTER WALL
(C3)



MATERIAL SPECIFICATIONS : -
COMMON BRICK : COMPRESSIVE STRENGHT 10 - 50 N/mm^2
(NOMINALLY 215mm x 102,5mm x 65mm)
MORTAR: 15 - 20 mm THICK (1 PART CEMENT, 1 PART LIME AND 6 PARTS SAND)

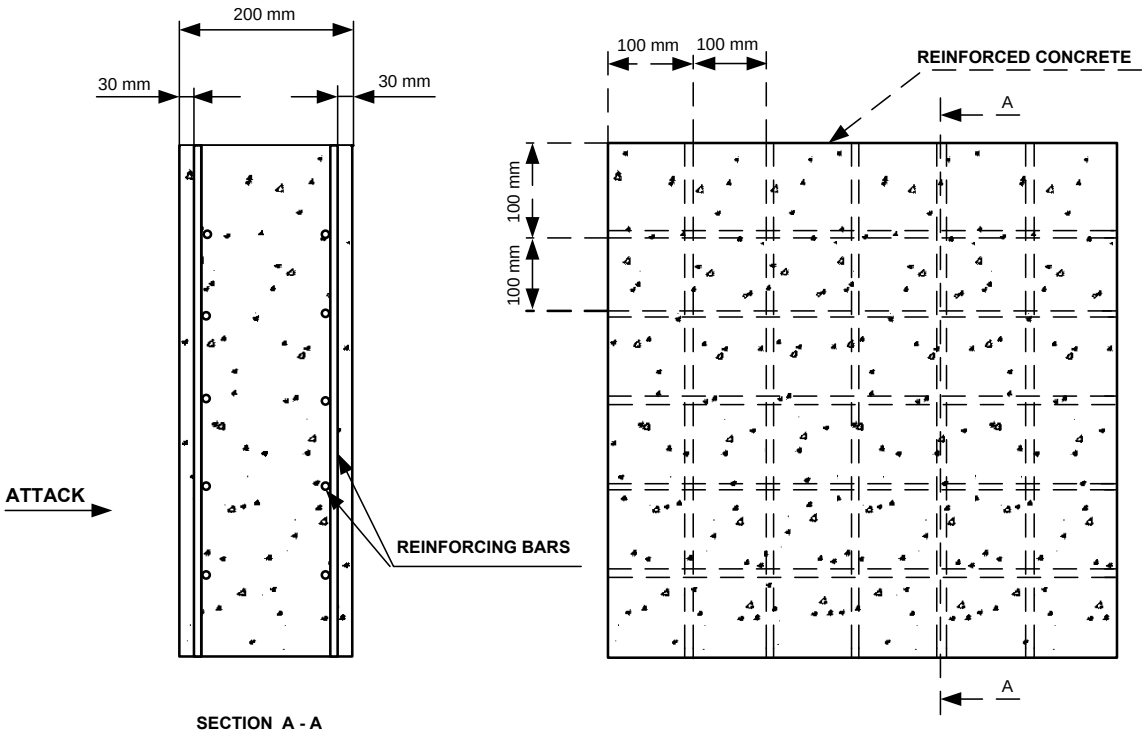
**APPENDIX 4 TO
ANNEX C TO
AEP-88**

SUBSTANTIAL DOMESTIC BUILDING TEST TARGET OUTER WALL
(C4)



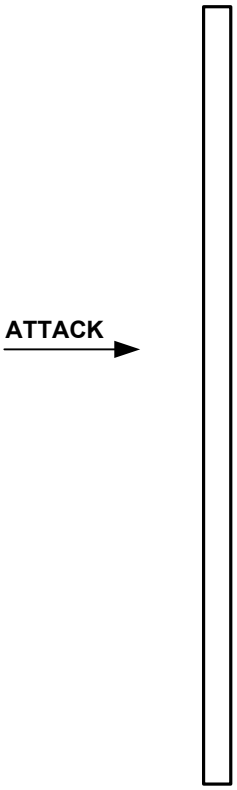
MATERIAL SPECIFICATIONS : -
REINFORCED CONCRETE : CONCRETE MIX RC40
SOLID LIGHTWEIGHT CONCRETE BLOCKS : COMPRESSIVE STRENGHT 7.0 N/mm^2
(NOMINALLY 440mm x 215mm x 50mm)
STEEL REINFORCING BAR GRADE 420

MUNICIPAL BUILDING TEST TARGET OUTER WALL
(C5)



MATERIAL SPECIFICATIONS : -
REINFORCED CONCRETE : CONCRETE MIX RC40
STEEL REINFORCING BARS GRADE 420 9 mm DIA

LIGHT INDUSTRIAL BUILDING TEST TARGET OUTER WALL
(C6)



MATERIAL SPECIFICATIONS : - 2mm THICK MILD STEEL

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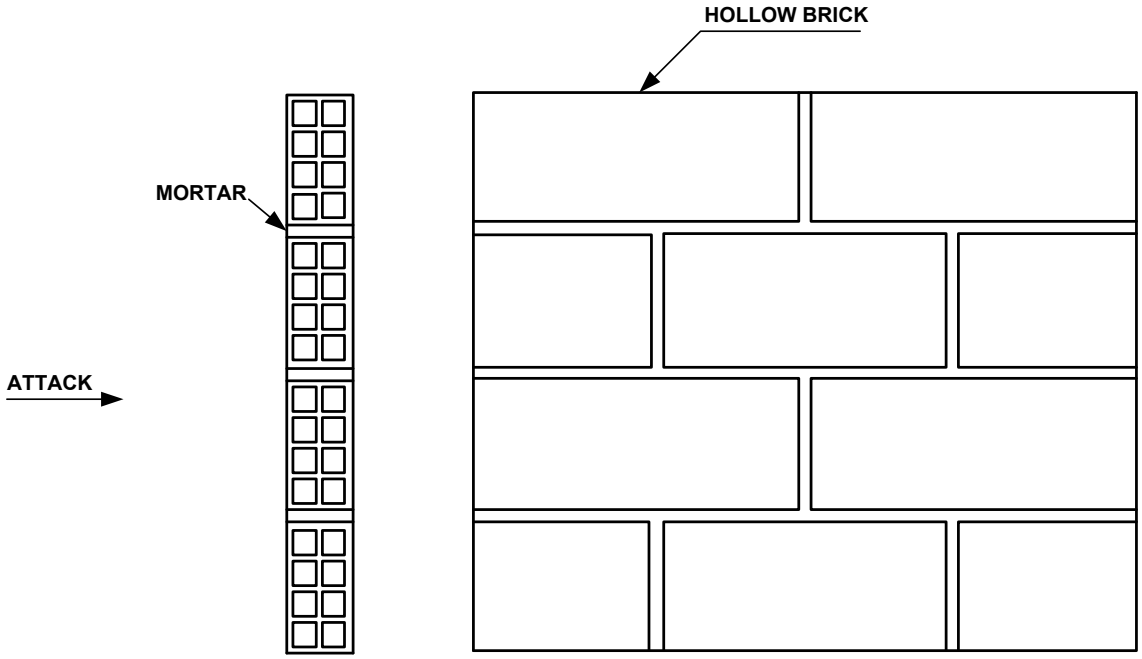
ANNEX D REPRESENTATIVE TEST TARGETS – INTERNAL WALLS

General

1. The aim of this Annex is to define a representative test internal wall target for each of the building types.

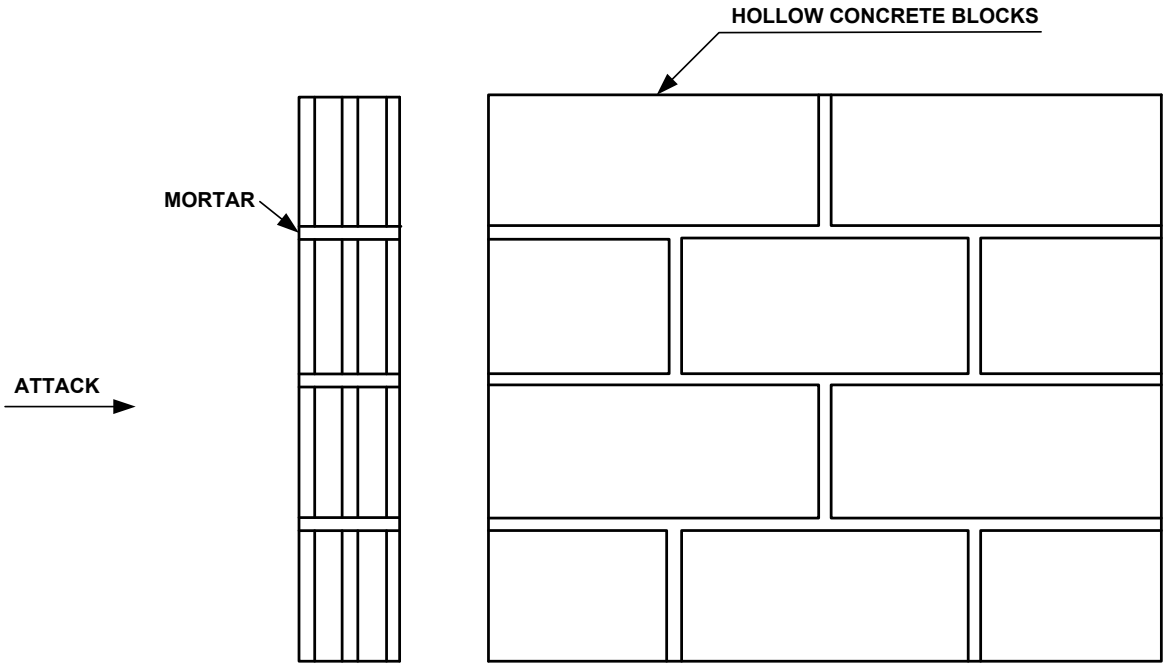
APPENDIX 1 - A Small Domestic
2 - A Standard Domestic
3 - A Substantial Domestic

SMALL DOMESTIC BUILDING TEST TARGET INTERNAL WALL
(D1)



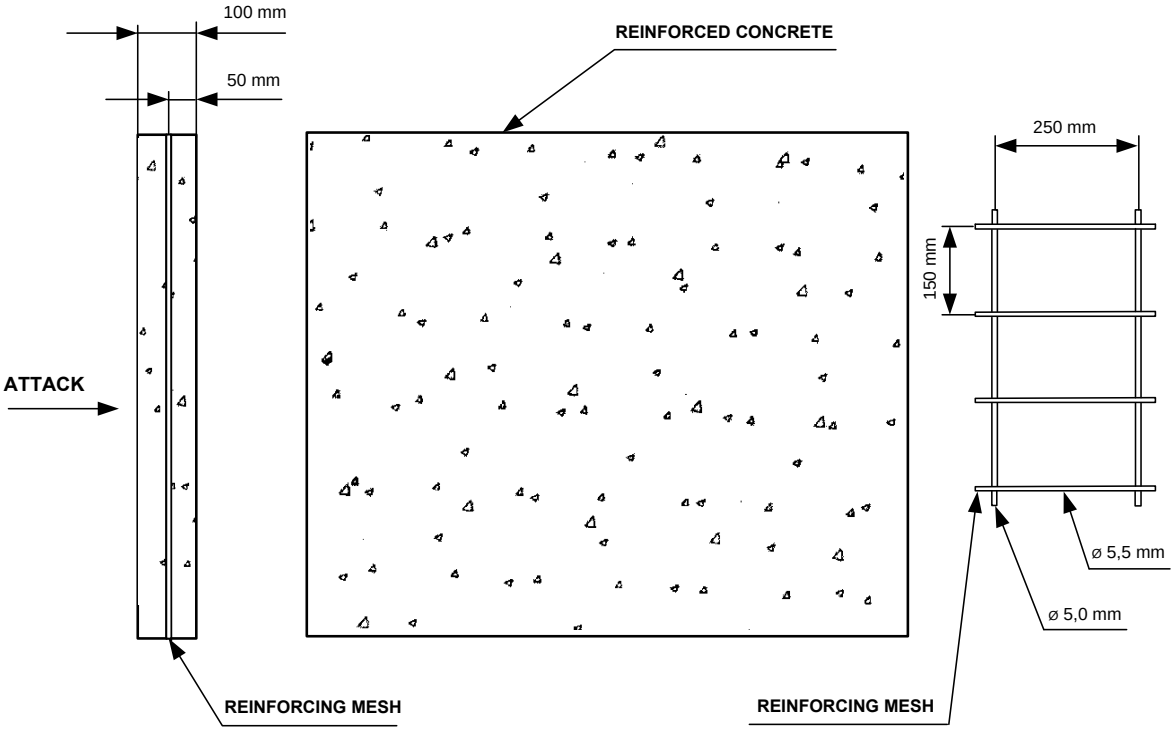
MATERIAL SPECIFICATIONS : -
MORTAR : 15 - 20 mm THICK (1 PART CEMENT, 1 PART LIME AND 6 PARTS SAND)
HOLLOW BRICKS : COMPRESSIVE STRENGHT 3.2 – 4.8 N/mm^2
(NOMINALLY 500mm x 200mm x 100 mm)

STANDARD DOMESTIC BUILDING TEST TARGET INTERNAL WALL
(D2)



MATERIAL SPECIFICATIONS : -
MORTAR : 15 - 20 mm THICK (1 PART CEMENT, 1 PART LIME AND 6 PARTS SAND)
HOLLOW BRICKS : COMPRESSIVE STRENGHT 3.2 – 4.8 N/mm^2
(NOMINALLY 500mm x 200mm x 150 mm)

SUBSTANTIAL DOMESTIC BUILDING TEST TARGET INTERNAL WALL
(D3)



MATERIAL SPECIFICATIONS :
REINFORCED CONCRETE : CONCRETE MIX RC40
STEEL REINFORCING BARS : GRADE 420

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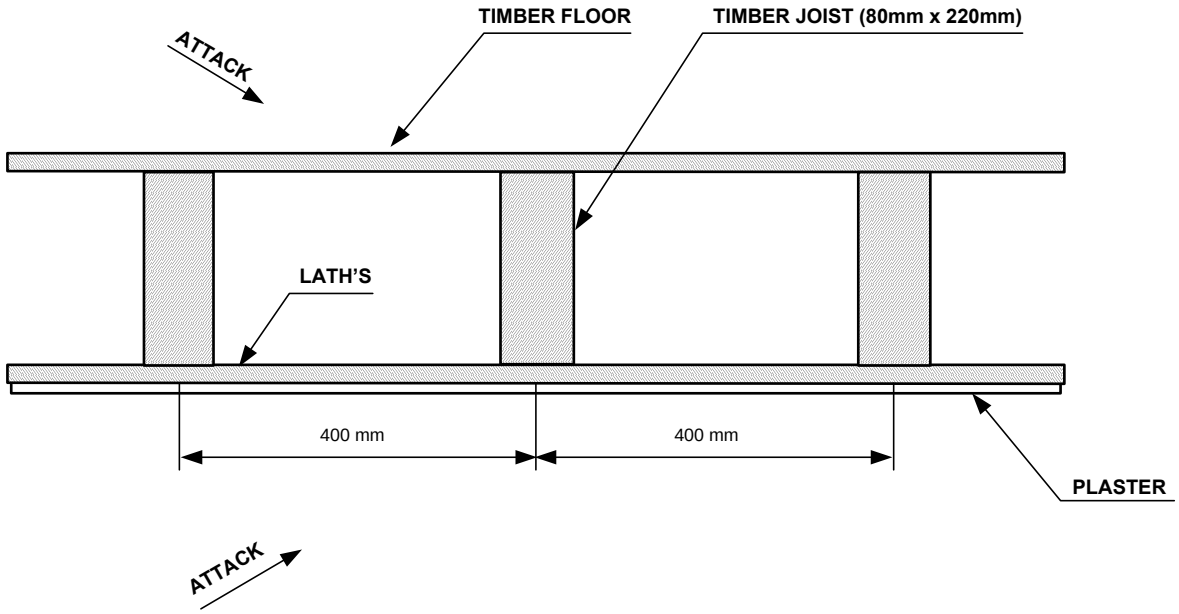
ANNEX E REPRESENTATIVE TEST TARGETS – CEILINGS AND FLOORS

General

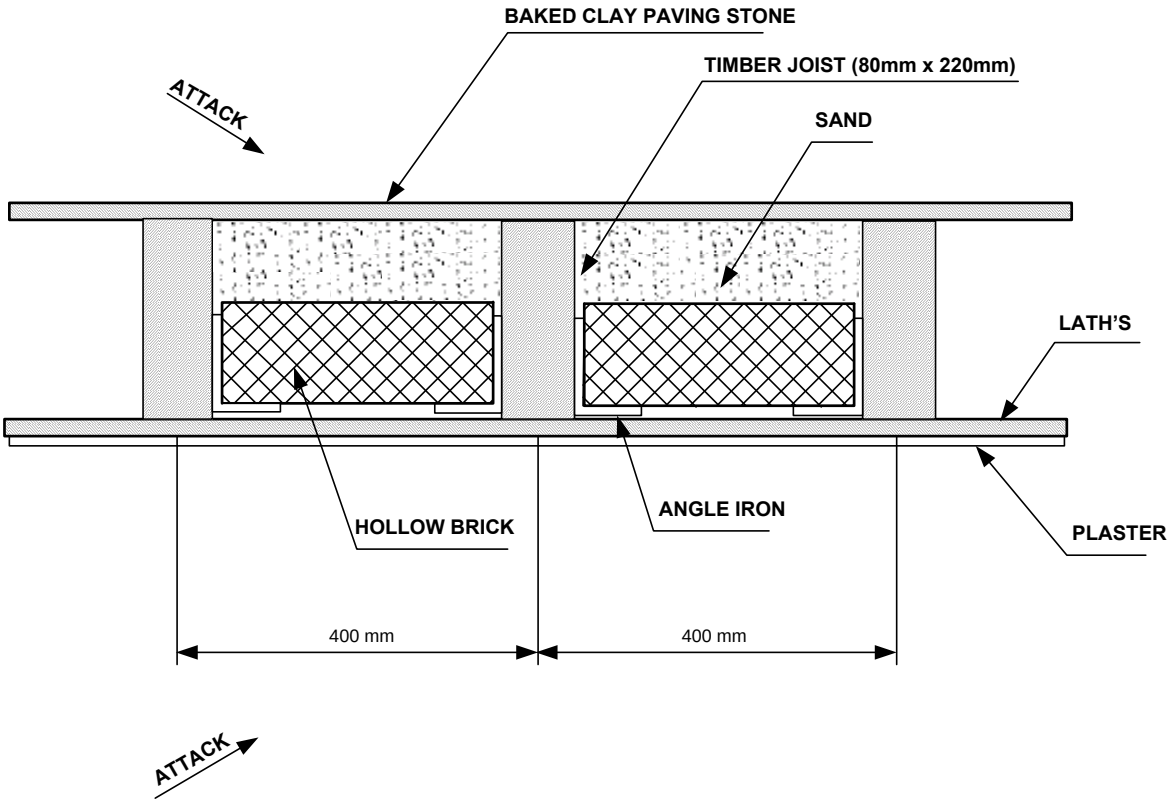
1. The aim of this Annex is to define a representative test ceiling/floor target for each of the building types.

APPENDIX 1 - A Small Domestic
2 - A Standard Domestic
3 - A Substantial Domestic
4 - A Municipal

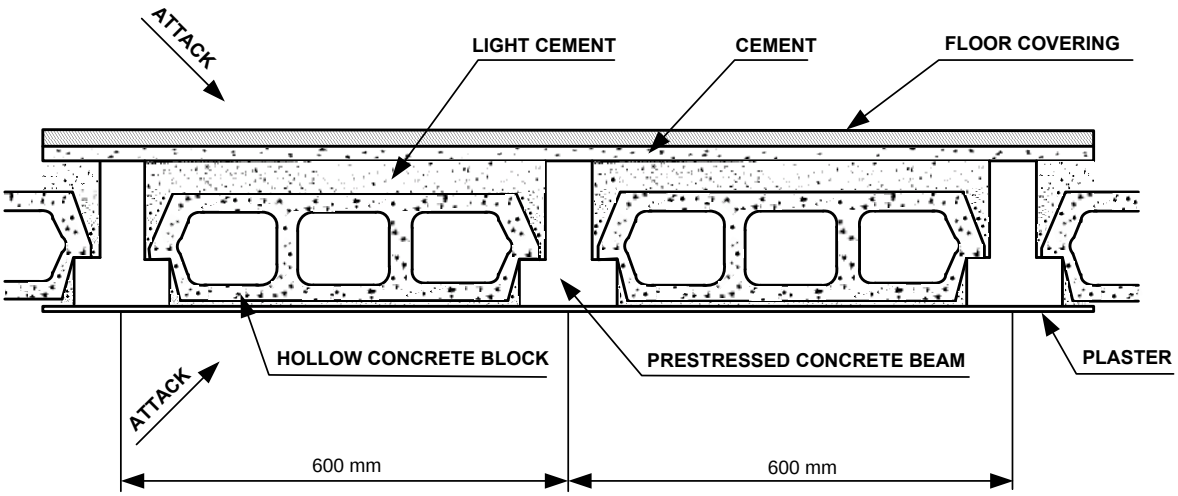
SMALL DOMESTIC BUILDING TEST TARGET CEILING AND FLOOR
(E1)



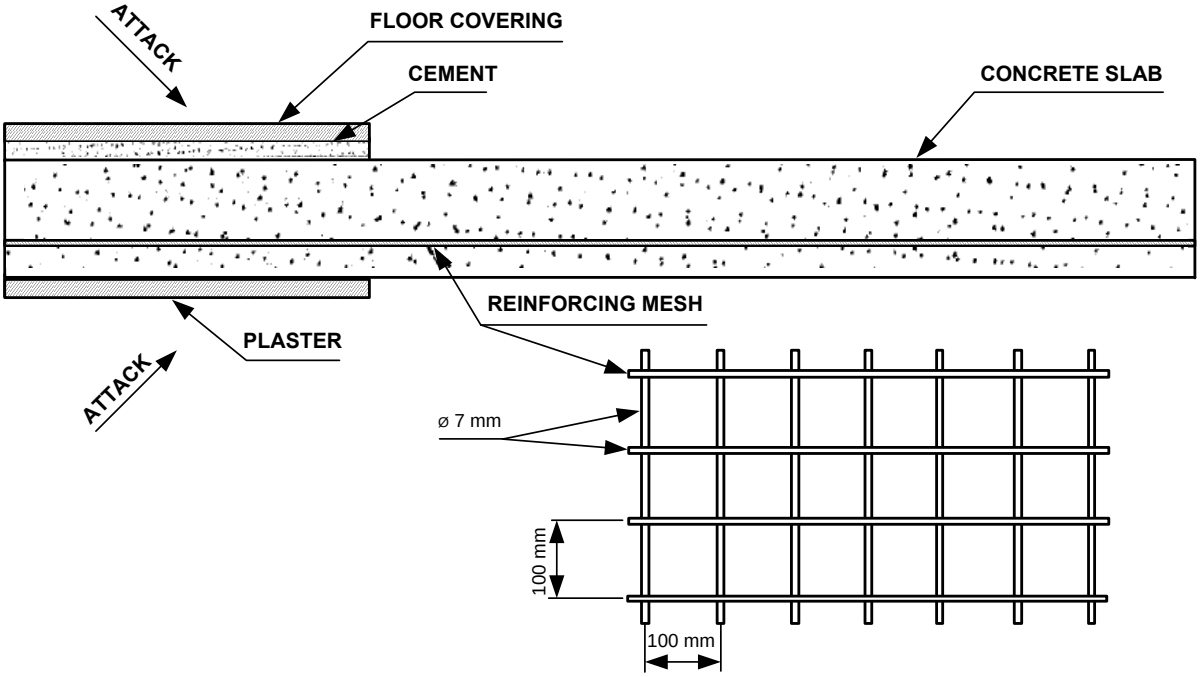
STANDARD DOMESTIC BUILDING TEST TARGET CEILING AND FLOOR
(E2)



SUBSTANTIAL DOMESTIC BUILDING TEST TARGET CEILING AND FLOOR
(E3)



MUNICIPAL BUILDING TEST TARGET CEILING AND FLOOR
(E4)



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ANNEX F FORTIFICATION OF BUILDINGS

General

1. The aim of this Annex is to:

   a) Identify the principal means used to fortify buildings.

   b) Define the additional component to be added to test target, specified at Annex C, to represent such fortification.

Description

2. Light domestic, standard domestic and substantial domestic buildings are all likely to be fortified to withstand attack. Substantial municipal buildings may well not be fortified.

3. Where time and defence stores are available, fortification is likely to consist of:

   a) Up to four layers and sandbags (1.00m) in front of fire positions and/or behind the window or firing aperture.

   b) Where small loopholes are cut into the outer wall structure, the firer will be adjacent to a single layer of sandbags against the wall.

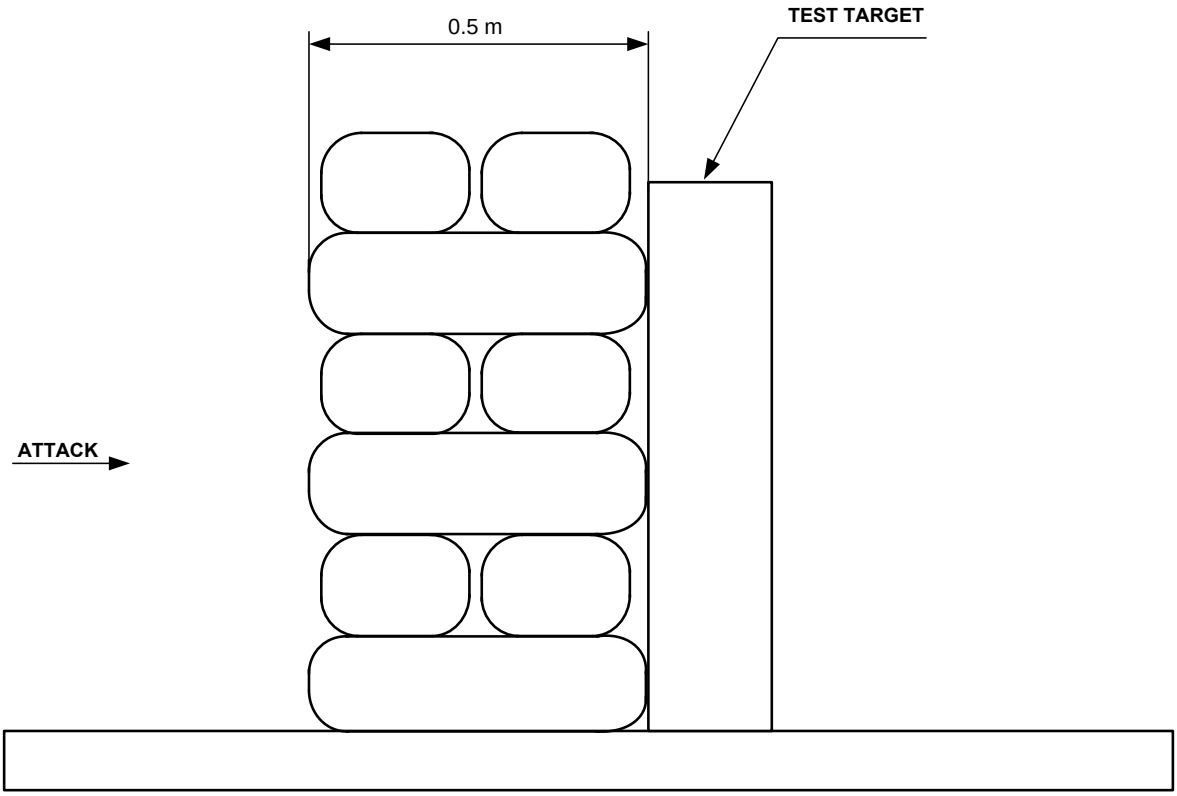
   c) Two layers of sandbags on top of intermediate floors.

Test Target

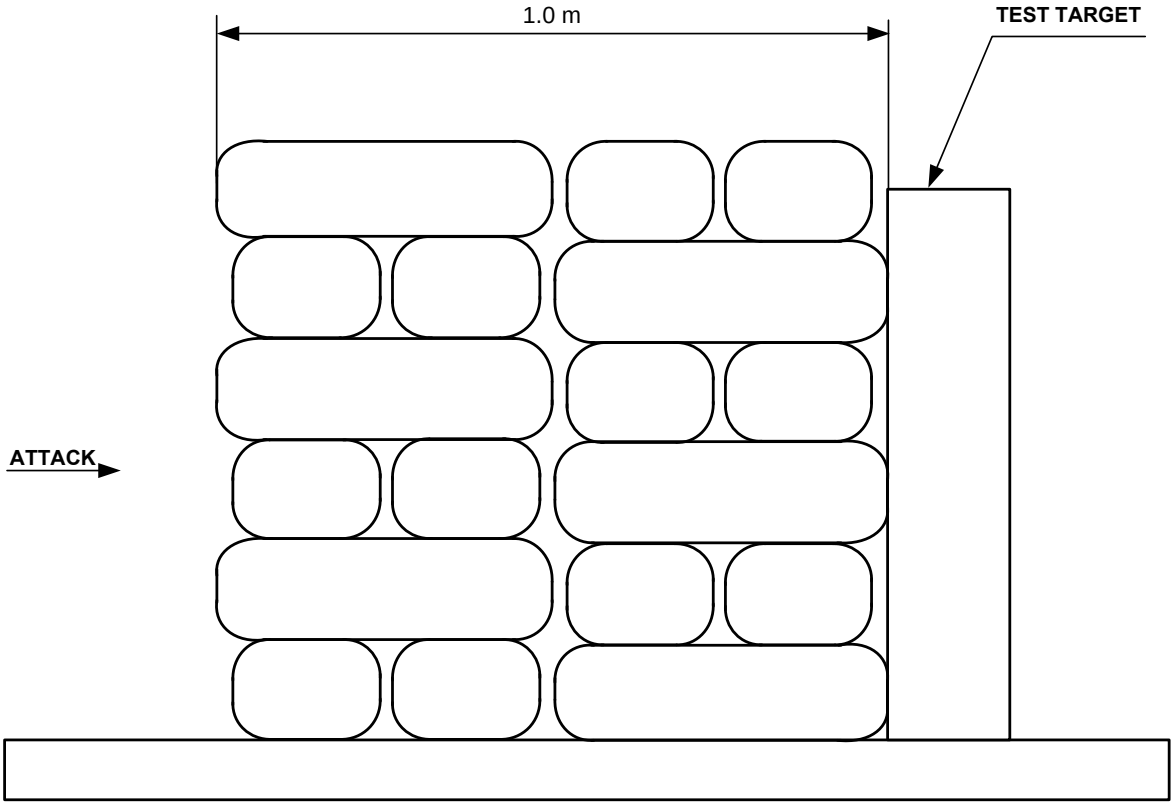
4. Fortification of each of the test targets described at Annex C,D and E is to be represented by placing a sand barrier as shown in attaches Appendix 1 to 7.

APPENDIX
1 - 0.5 m Sand in Front of Test Target
2 - 1 m Sand in Front of Test Target
3 - 0.5 m Sand behind Test Target
4 - 1 m Sand behind Test Target
5 - 0.5 m Sand Rampart in Front of Test Target
6 - 1 m Sand Rampart in Front of Test Target
7 - 0.5 m Bastion Wall in Front of Test Target

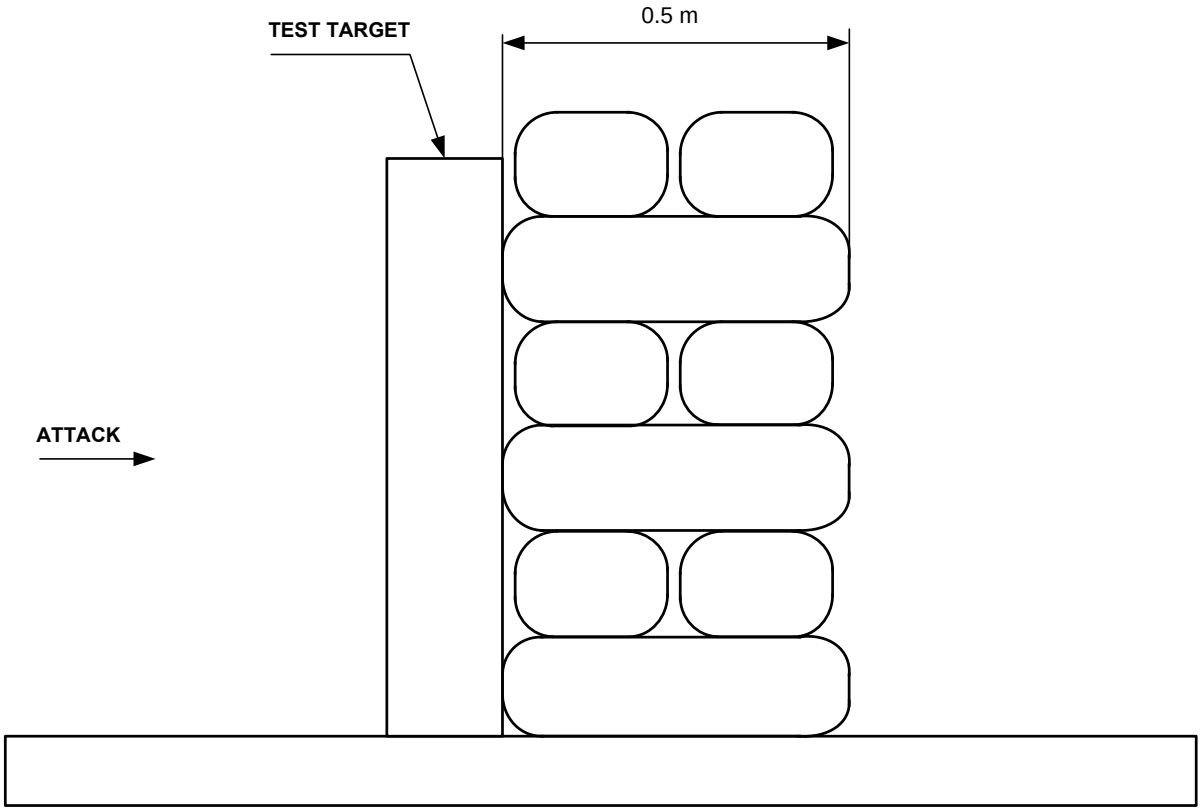
0.5 m SAND IN FRONT OF TEST TARGET
(F1)



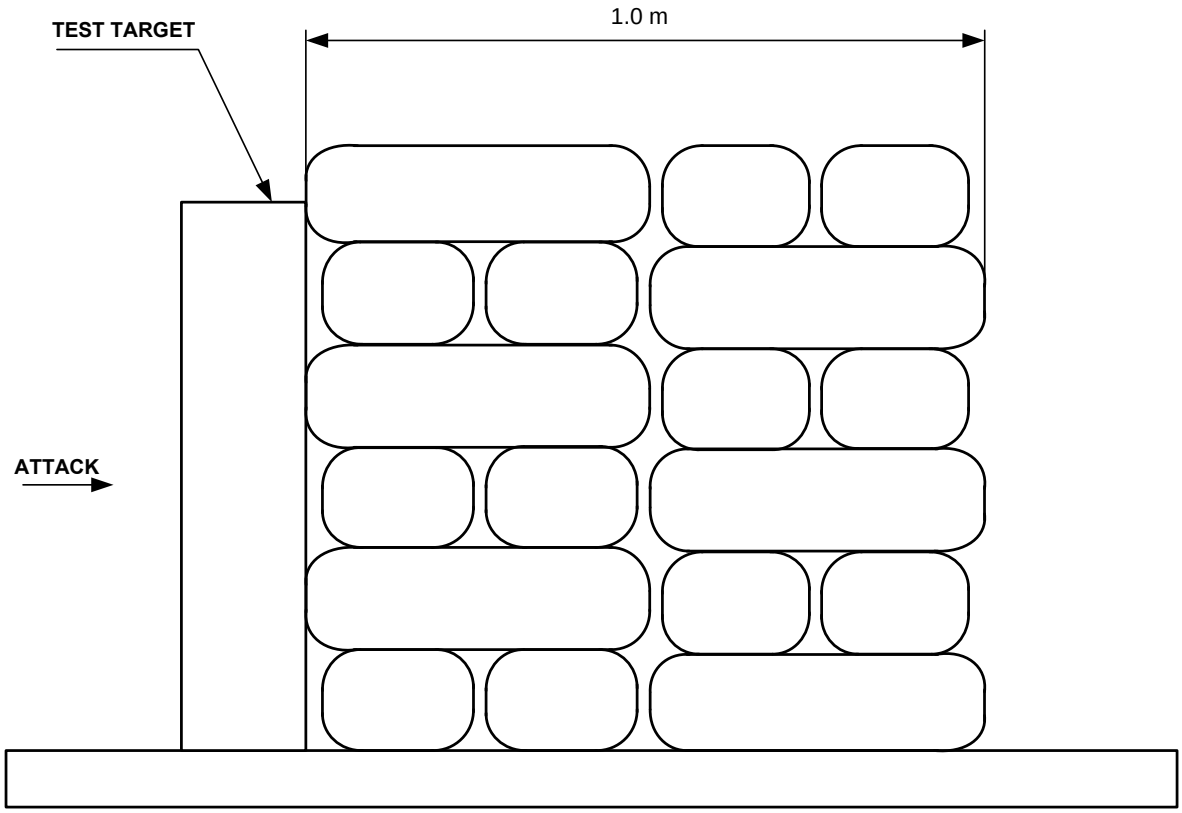
1.0 m SAND IN FRONT OF TEST TARGET
(F2)



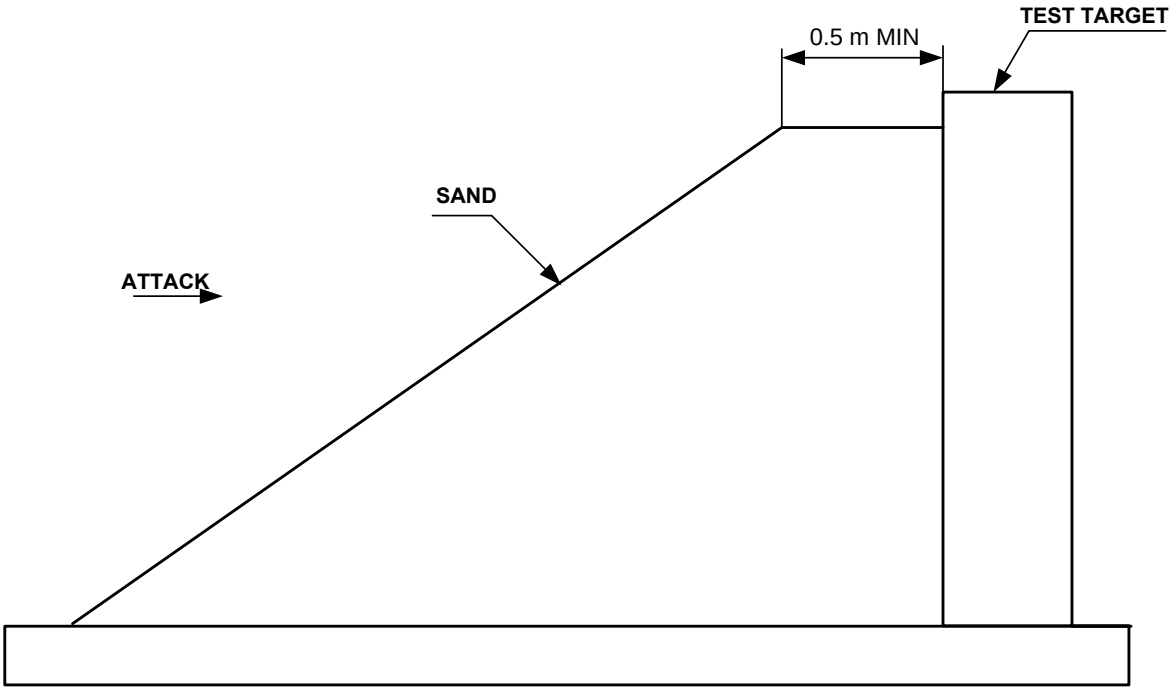
0.5 m SAND BEHIND OF TEST TARGET
(F3)



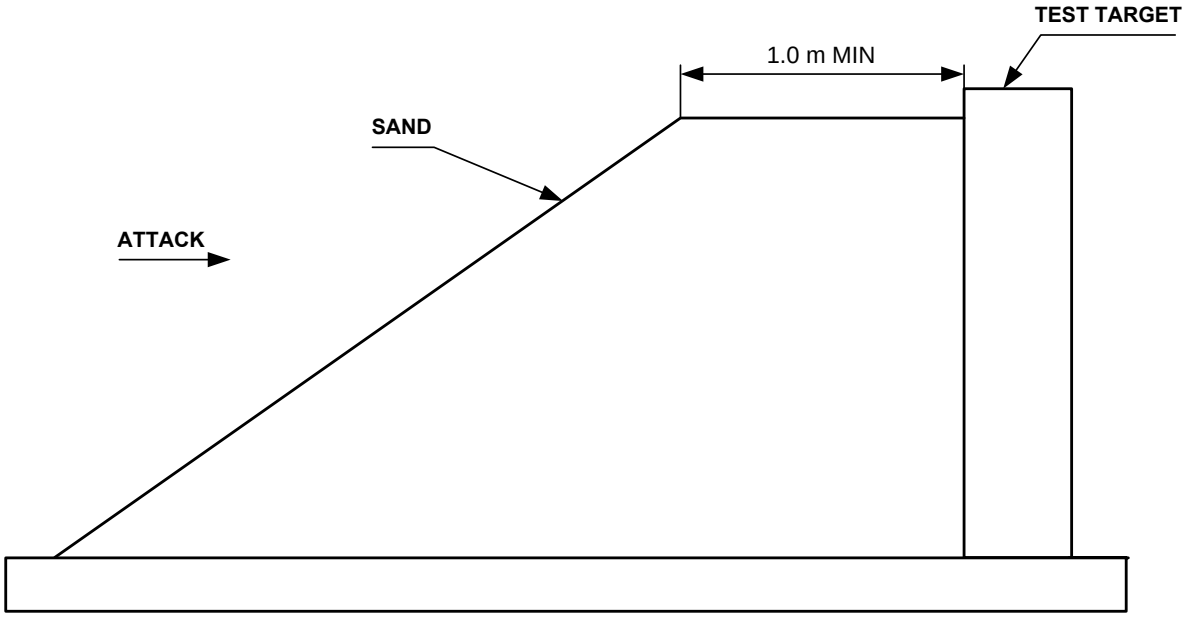
1.0 m SAND BEHIND OF TEST TARGET
(F4)



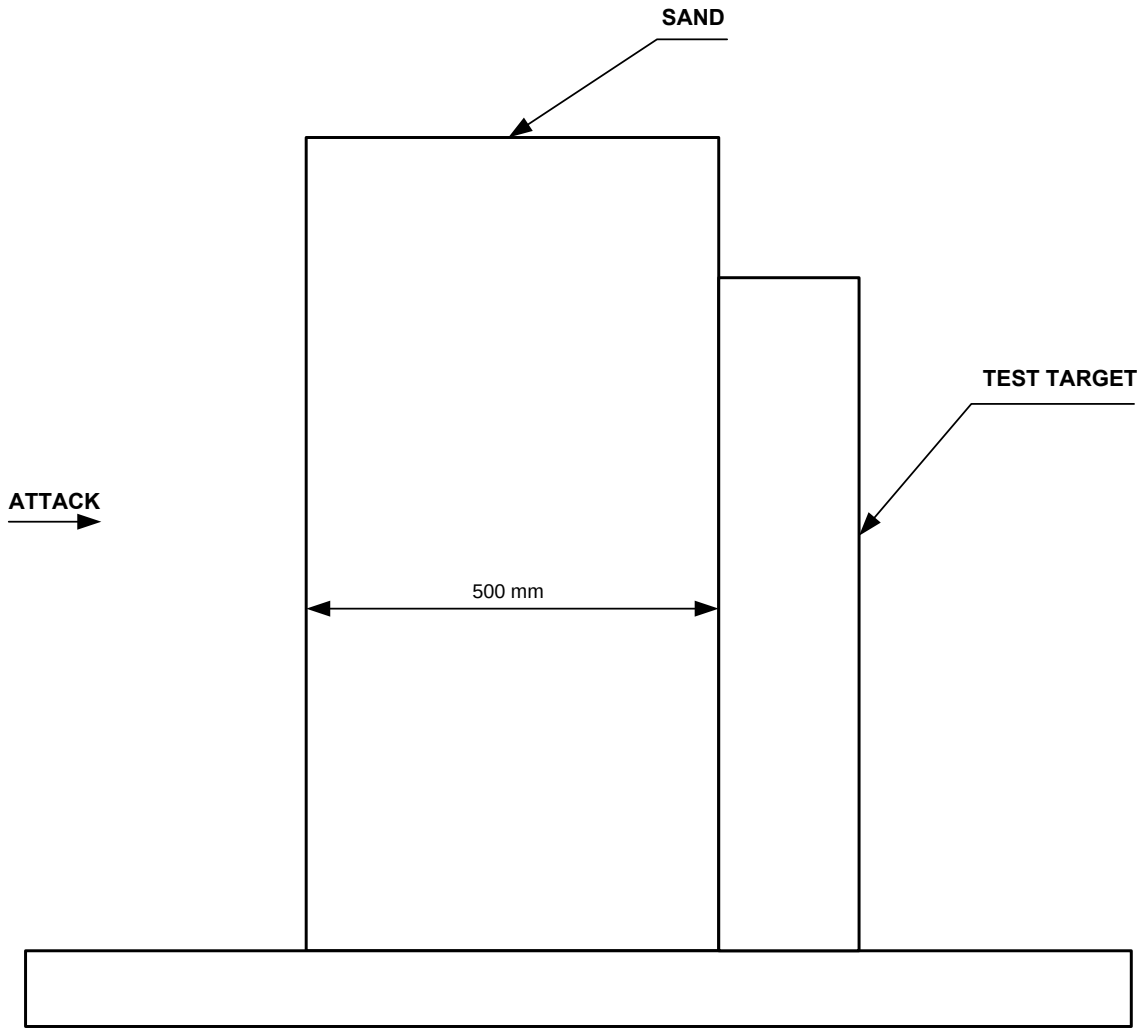
0.5 m SAND RAMPART IN FRONT OF TEST TARGET
(F5)



1.0 m SAND RAMPART IN FRONT OF TEST TARGET
(F6)



0.5 m BASTION WALL IN FRONT OF TEST TARGET
(F7)



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ANNEX G FIELD FORTIFICATION

General

1. The aim of this Annex is to:

   a) Define a typical Field Fortification and location of personnel.

   b) It is not intended to have a test target for the Field Fortification.

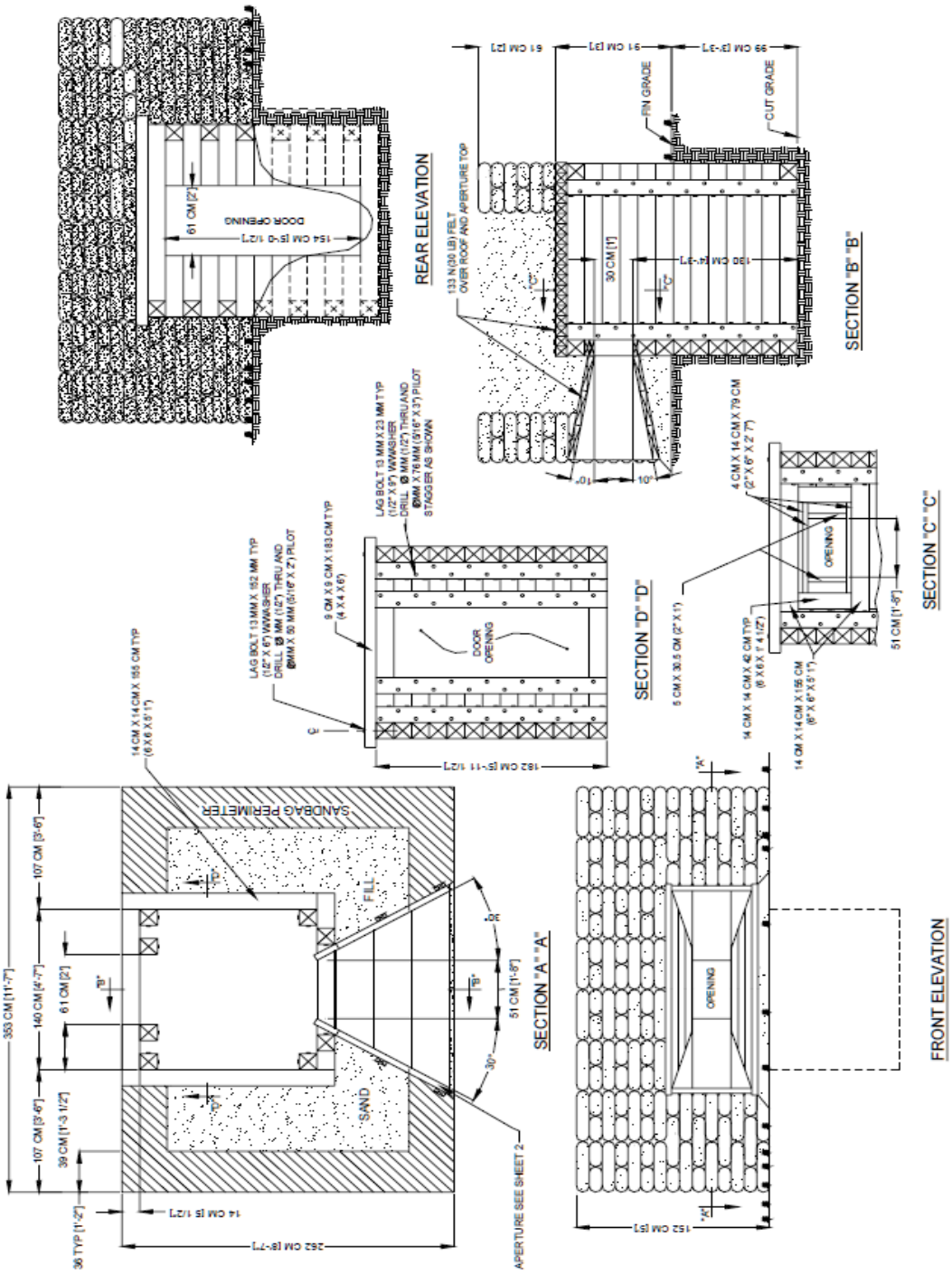
Description

2. General Data:

   a) Number of soldiers: 2.

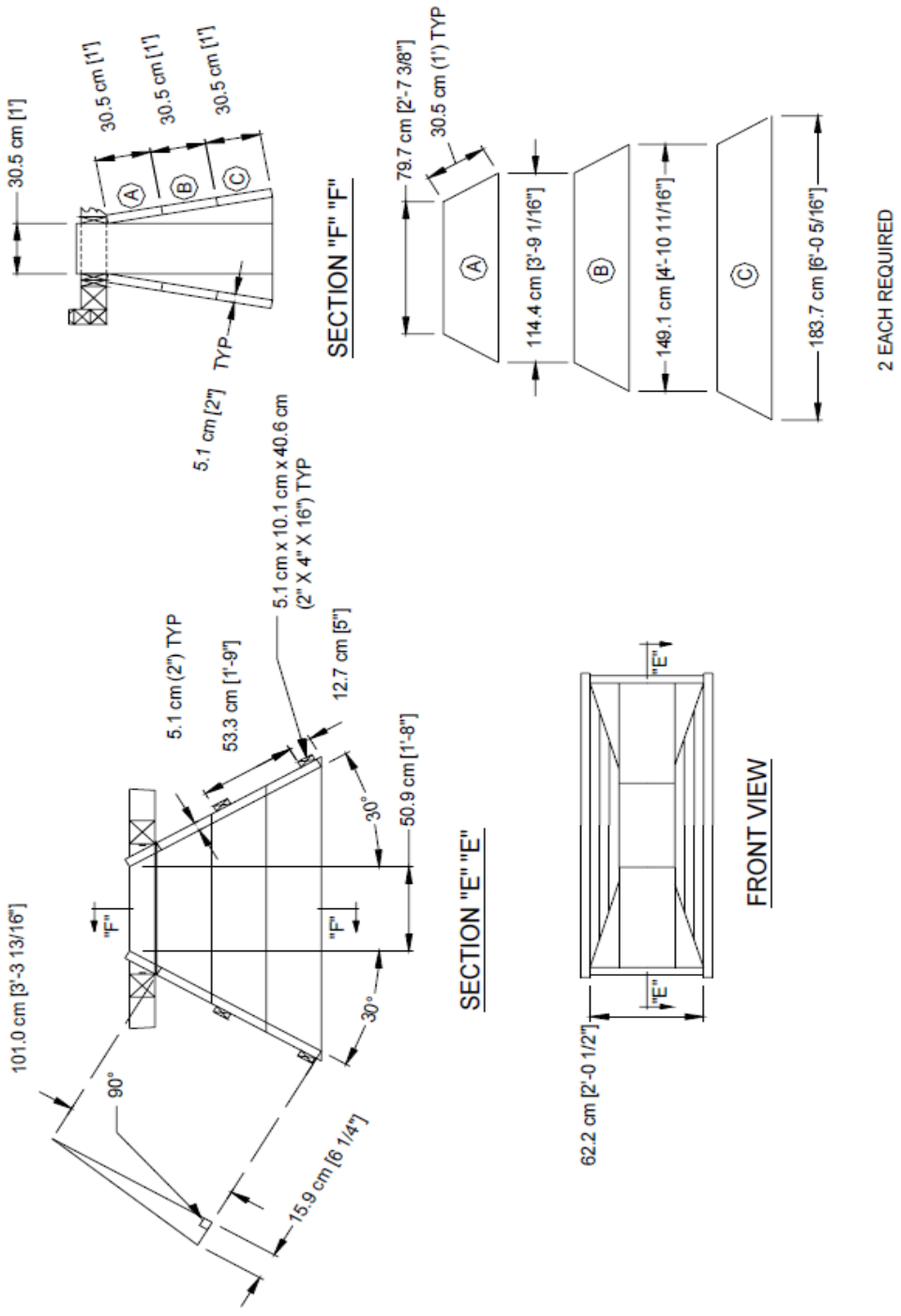
APPENDIX 1 - Pictorial Target Description

PICTORIAL TARGET DESCRIPTION
(G1-1)



Source: ITOP 5-2-503 / MOUT Earth and Timber Target Bunker (1 of 2)

PICTORIAL TARGET DESCRIPTION
(G1-2)



Source: ITOP 5-2-503 / MOUT Earth and Timber Target Bunker (2 of 2)

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ANNEX H POSITION OF DEFENDING PERSONNEL

General

1. The aim of this Annex is to identify the likely position of personnel defending a building.

Deployment

2. Personnel defending buildings are deployed with a minimum of 2 in any one room.

3. Fire positions are sited as far back from windows as possible while retaining acceptable fields of fire.

4. Where loopholes are cut into the wall structure, the firer will be adjacent to the sandbag layer against the outer wall.

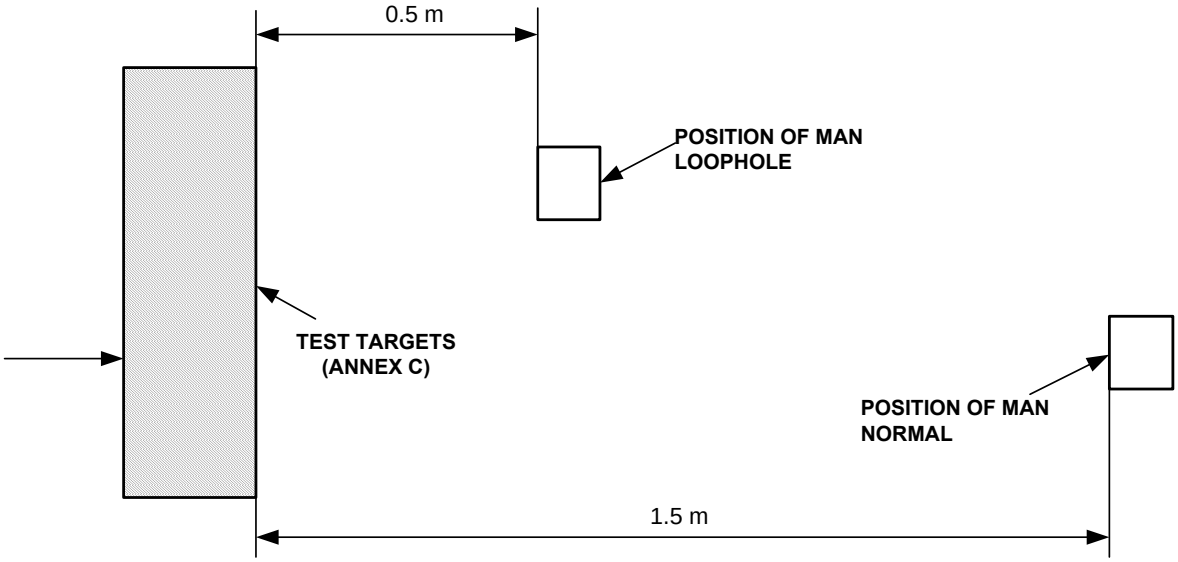
Test Target

5. The positioning of the representative personnel targets is specified at Appendix 1.

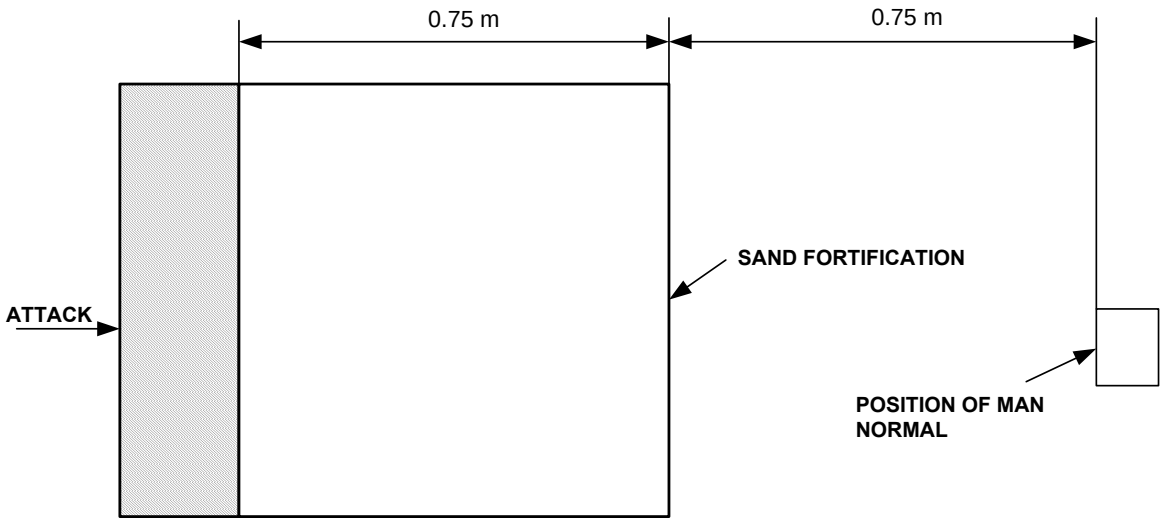
Appendix 1. Defence of Urban Buildings, Position of Targets representing Personnel.

DEFENCE OF BUILDINGS
POSITION OF TARGETS REPRESENTING PERSONNEL
(H1)

1. UNFORTIFIED BUILDING



2. FORTIFIED BUILDING



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ANNEX I TEST TARGET MATERIAL SPECIFICATIONS

TEST TARGET MATERIAL SPECIFICATIONS

APPENDIX
1 - UK Specifications
2 - US Specifications
3 - French Specifications
4 - German Specifications
5 - Spanish Specifications

UK MATERIAL SPECIFICATIONS

Title	**Specification**
Common Brick	BS 3921
Mortar	BS 5628
Solid Lightweight Concrete Blocks	BS 6073
Reinforced Concrete	BS 5328
Steel Reinforcing Bar	BS4449
Mild Steel	BS EN 10130
Hollow Lightweight Concrete Blocks	BS 6073
Timber Joists	BS 5268
Sand	BS 1200

US MATERIAL SPECIFICATIONS

Title	Specification
Refractory Bricks	ISO 5019
Hallow Masonary (Clay or Shale)	ANSI C652-10
Building Brick (Solid – Clay or Shale)	ASTM 62-08
Glazed Brick	ASTM C1405-08
Facing Brick	ASTM C216-07a
Concrete	ISO 22965-2:2007
Plaster	ASTM C59/C59M-00 (2006)
Gypsum Board	ASTM C840-08
Wood	ISO 21887:2007

FRENCH MATERIAL SPECIFICATIONS

Title	Specification
Hollow Baked Clay Bricks	NF P 13-301
Hollow Baked Clay Floor Blocks for mounting between Pre-Fabricated Girders	NF P 13-302
Baked Clay Bricks (External)	NF P 13-304
Solid or Holllow Blocks in Baked Clay for Ceilings/Flooring	NF P 13-305
Preformed Blocks in Brickearth (External)	NF P 13-306
Concrete Blocks for Walls and Partitions- Definitions.	NF P 14-101
Concrete Blocks (External)	NF P 14-102
Concrete Blocks made from Granules for Walls and Partitions.	NF P 14-301
Concrete Blocks made from Light Granules for Walls and Partitions	NF P 14-304
Concrete Hollow Blocks made from Light Granules for Floors(Mounting between Pre-Fabricated Girders.)	NF P 14-305
Blocks made from Cellular Autoclave Concrete for Walls and Partitions.	NF P 14-306
Concrete Blocks for Walls and Partitions- Dimensions.	NF P 14-402
Classification and Description of Hydraulic Concrete.	NF P 18-010

GERMAN MATERIAL SPECIFICATIONS

Title	Specification
Mauerziegel (clay bricks)	DIN 105
Kalksandsteine (lime-concrete blocks)	DIN 106
Hüttensteine (foamed slag bricks)	DIN 398
Gasbetonblocksteine (gas aerated concrete blocks)	DIN 4165
Hohlblöcke aus Leichtbeton (lightweight hollow concrete blocks)	DIN 18511
Vollsteine aus Beton (lightweight concrete blocks)	DIN 18512
Mausersteine aus Beton (concrete blocks)	DIN 18513
Wandbauplatten aud Leichtbeton, unbewehrt (precast lightweight concrete wall Blocks, plain)	DIN 18162

SPANISH MATERIAL SPECIFICATIONS

Title	Specification
Mortar	UNE – EN 998-2 : 2002
Bricks	UNE – EN 771-1 : 2003
Concrete	EHE - 08
Roof Tiles	UNE-EN 1304 : 1999
Hollow Concrete Blocks	UNE – EN 771-1 : 2000
Floor Covering Tiles	UNE 67087 / 1M :1992 UNE 67087 : 1985
Plaster	UNE-EN 13279-2 : 2006
Plain Steel Bars	UNE – EN 10080 : 2006
Corrugated Steel Bars	UNE – EN 10080 : 2006
Steel Wires	UNE 36094 : 1997
Reinforcing Bars	UNE 36092 : 1996
Laminated Steel	UNE – EN 36137 : 1996 UNE – EN 10205 UNE – EN 10210 : 1994 UNE – EN 10219 : 1998
Wood	UNE 56544 UNE – EN 336 : 1995 UNE – EN 338 : 1995 UNE – EN 384 : 2004 UNE – EN 1193 : 1998 UNE – EN 26891 : 1992 UNE – EN 1194
Concrete Blocks	UNE – EN 771-1 : 2000

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Edition A Version 1