W-FORTEX

INTEGRATED PROTECTION AND SURVIVABILITY PROGRAMME

FACILITIES.
PEOPLE.
CRITICAL FUNCTIONS.

From an independent physical layer
to a protected environment
and operational continuity.



PHYSICAL PROTECTION + SYSTEMS + AUTONOMY

Conceptual visualisation from W-FORTEX NEXT; cropped.

NEXT / INTEGRATED ARCHITECTURE / SHELTERING AND CBRN / IBIPC

ONE PROGRAMME — PROTECTING CRITICAL FUNCTIONS

From facility requirements to protection, autonomy and a justified configuration

FACILITY → CRITICAL FUNCTION → THREAT PROFILE → REQUIREMENTS AND CONSTRAINTS

I / W-FORTEX NEXT

Physical protection and survivability

Independent circuit
Modular protective layers
Consequence localisation

II / INTEGRATED ARCHITECTURE

Selection and coordination of required functions

Detection and control
Active / physical layers
Response and recovery

III / SHELTERING AND CBRN

People and protected critical functions

Life support
Autonomous technical modules
Specialised modes

IV / IBIPC

Technologies and evidence base

Products and structures
Drawings and testing
Limits of application

FACILITY-ORIENTED CONFIGURATION → PILOT → INTEGRATION CHECK

A programme concept is not certification. IBIPC evidence applies only to the relevant products and test conditions.

FULL PROGRAMME MAP

From overall architecture to integration, protected functions and technical documents

I	**W-FORTEX NEXT** Physical architecture, modular layers, survivability	04–22
II	**INTEGRATED PROTECTION ARCHITECTURE** Function selection, coordination, interfaces, recovery	23–40
III	**SHELTER AND CBRN RESISTANCE** People protection, autonomy, specialised modes	41–55
IV	**IBIPC — TECHNICAL ANNEX** Products, drawings, testing, primary documents	56–151

01–03 INTRODUCTION / 152 OVERALL FINAL / CLICK A BLOCK TO NAVIGATE

Ranges include dividers. Internal source numbering is preserved; PDF bookmarks provide overall navigation.

W-FORTEX NEXT

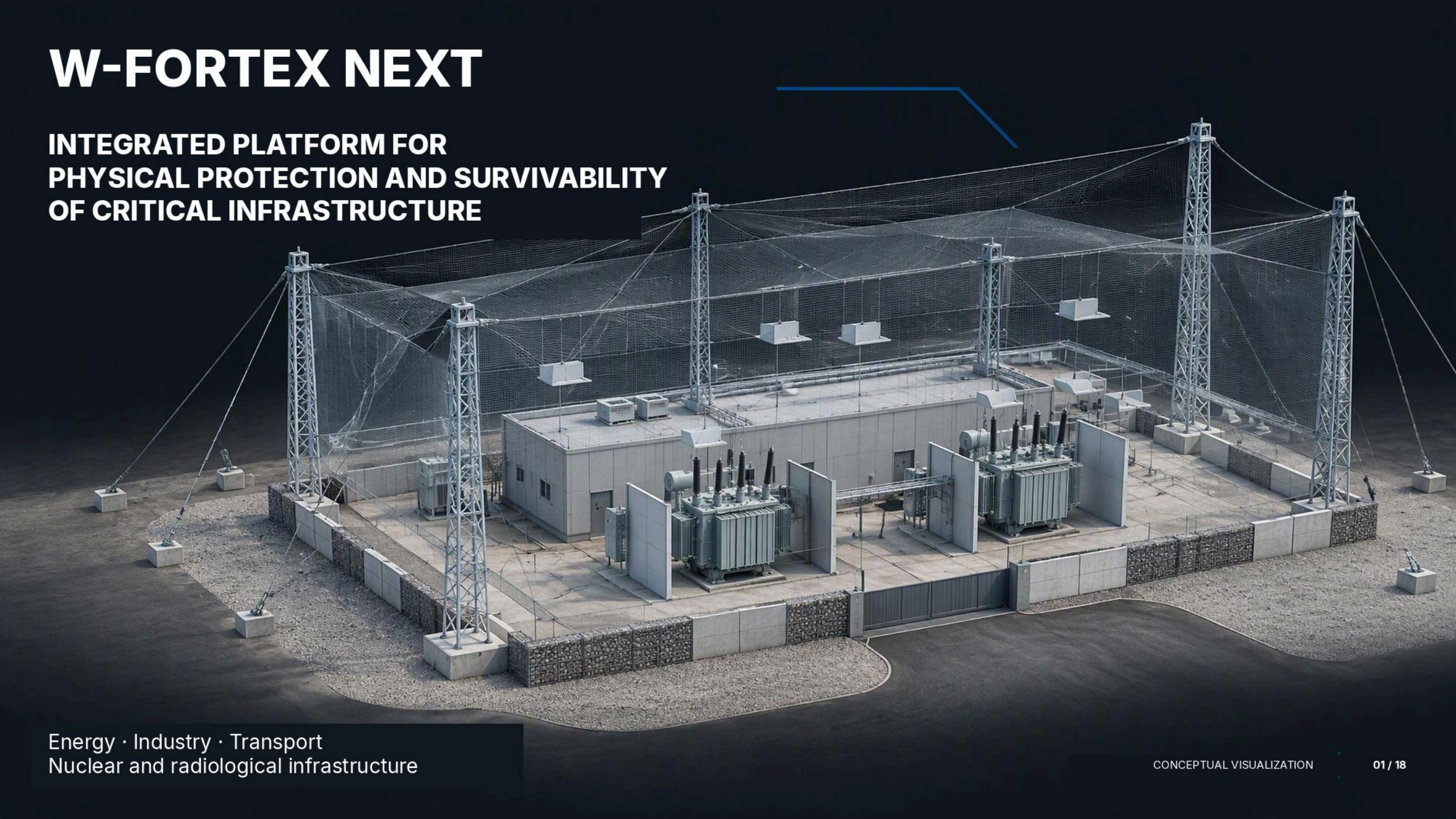
We start with the facility: protection is built around its geometry and critical function.

PERIMETER	LAYERS	FUNCTION
Independent supports Separation of impact	Modularity Local protection	Consequences Recovery

NEXT BLOCK: how to select and coordinate the required protection functions.

W-FORTEX NEXT

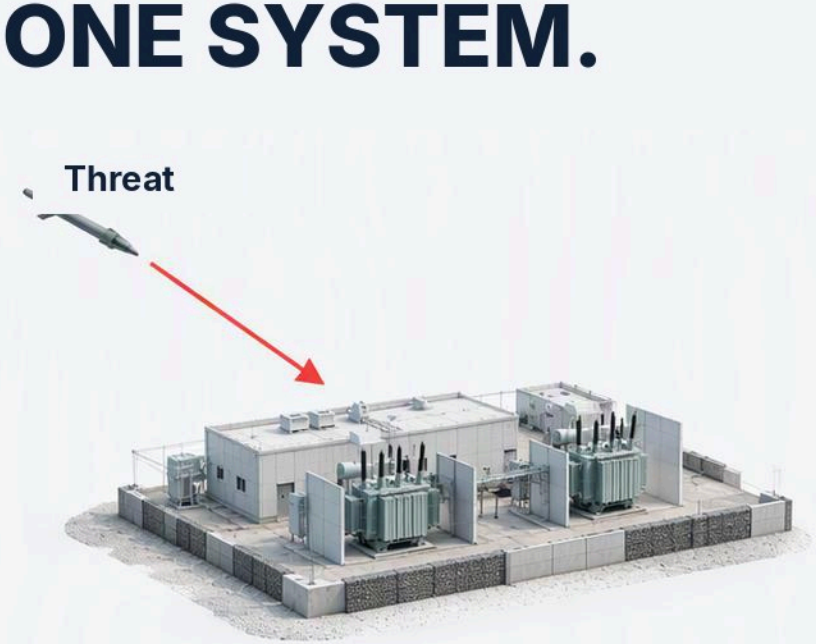
INTEGRATED PLATFORM FOR PHYSICAL PROTECTION AND SURVIVABILITY OF CRITICAL INFRASTRUCTURE



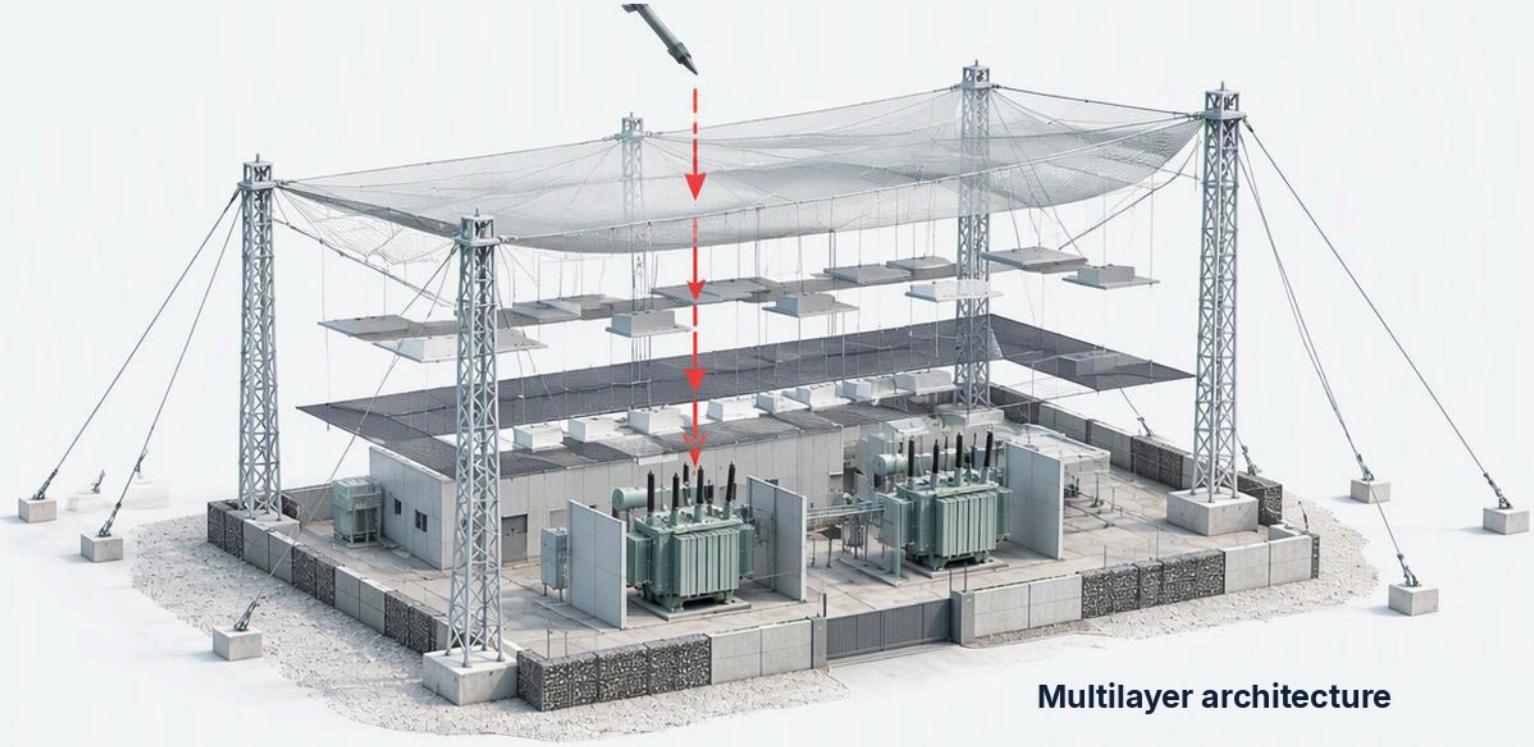
Energy · Industry · Transport
Nuclear and radiological infrastructure

CONCEPTUAL VISUALIZATION

NOT ONE WALL. NOT ONE NET. ONE SYSTEM.



Direct impact

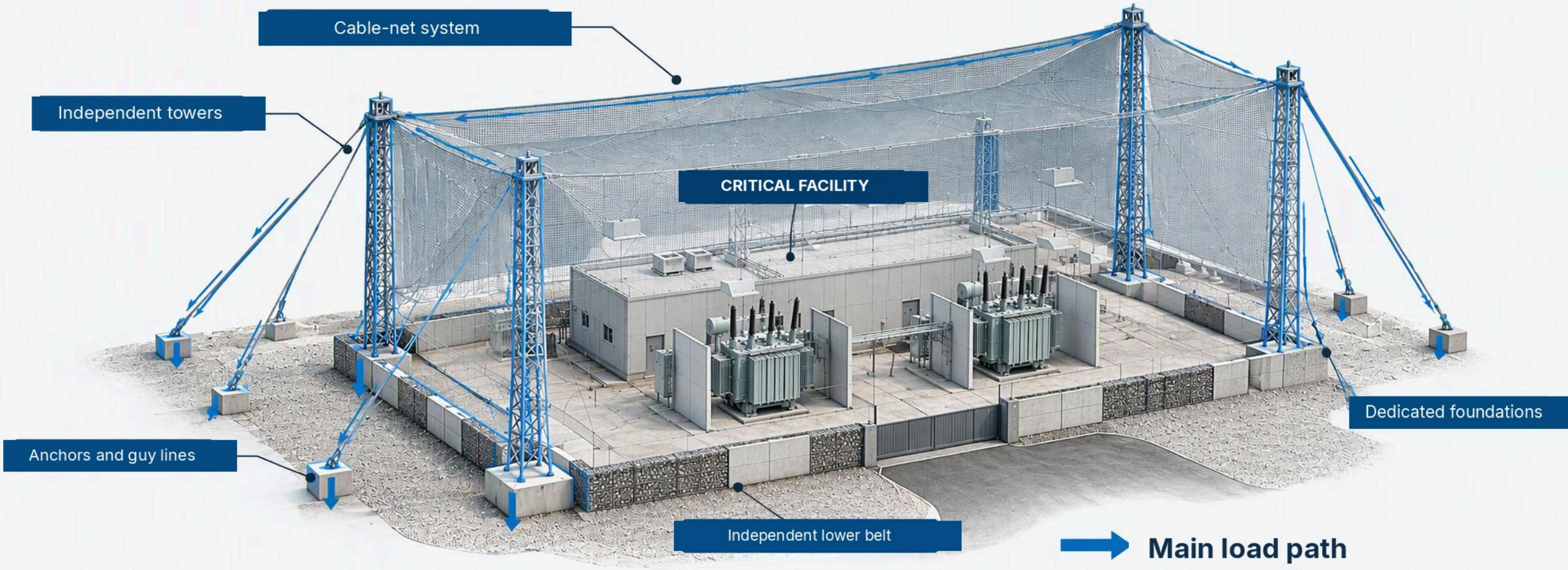


Multilayer architecture

01 DISTANCE → 02 INTERCEPT → 03 SEPARATE THE IMPACT → 04 ABSORB / CONTAIN → 05 PROTECT CRITICAL NODES → 06 CONTROL CONSEQUENCES → 07 RESTORE FUNCTION

Each threat — its own protective layer.

PROTECTION THAT DOESN'T RELY ON THE FACILITY

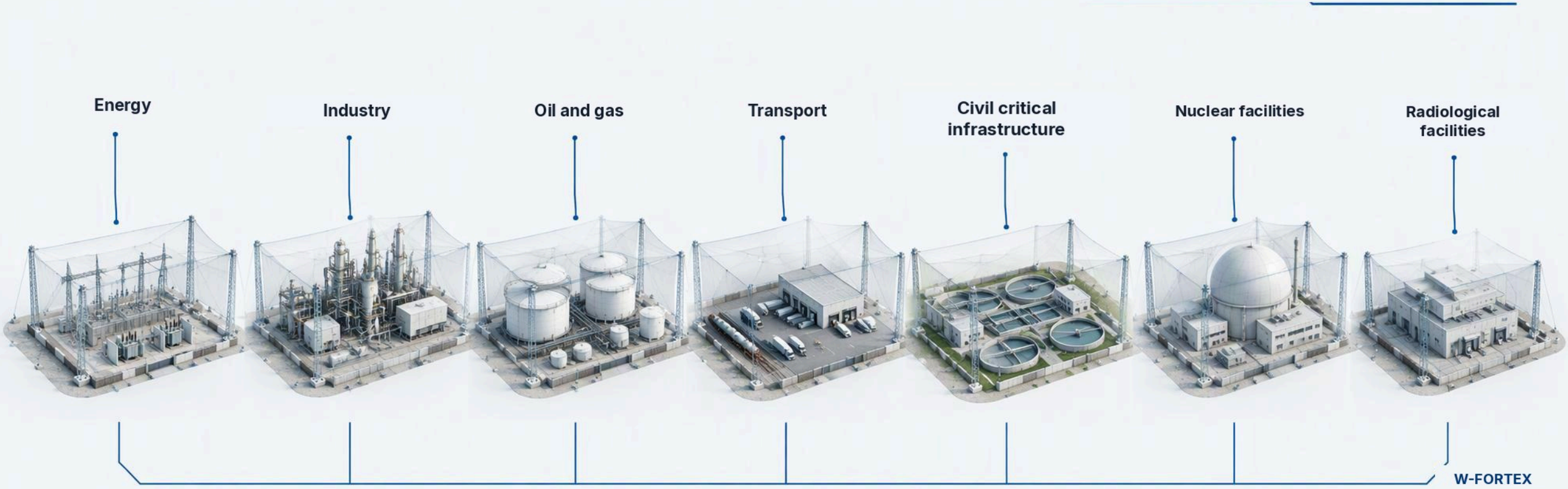


Main load path
To foundations and anchors
Not to the protected facility

Protection is formed around the facility, not by the facility itself.

Where technically feasible; final decisions subject to engineering review.

ONE PLATFORM — DIFFERENT INDUSTRIES



The architecture adapts to the function and geometry of the facility.

PROTECTING ENERGY AND INDUSTRIAL NODES



Substations • Generation • Refineries • Tank farms
Gas infrastructure • Chemical plants • Battery systems

Combine layers according to node criticality.

NUCLEAR AND RADIOLOGICAL INFRASTRUCTURE

Additional protection. Coordinated safety.



W4X-NRS

Integrating physical protection with nuclear and radiological safety

- Zoning and emergency access
- Protected radiation monitoring
- Radioactive material handling zones
- Contamination control
- Safety equipment and emergency power
- Monitoring, connectivity and communications

NPPs • Research facilities • Laboratories • Storage • Radwaste handling facilities

W-FORTEX does not replace nuclear safety justification, guarantees, a radiation protection program, or a licensed physical protection system.

An additional engineering layer of protection and survivability.

WE PROTECT NOT JUST THE BUILDING — WE PROTECT THE FUNCTION.



Power



Cooling



Control



Monitoring





Access



Emergency systems



Localization



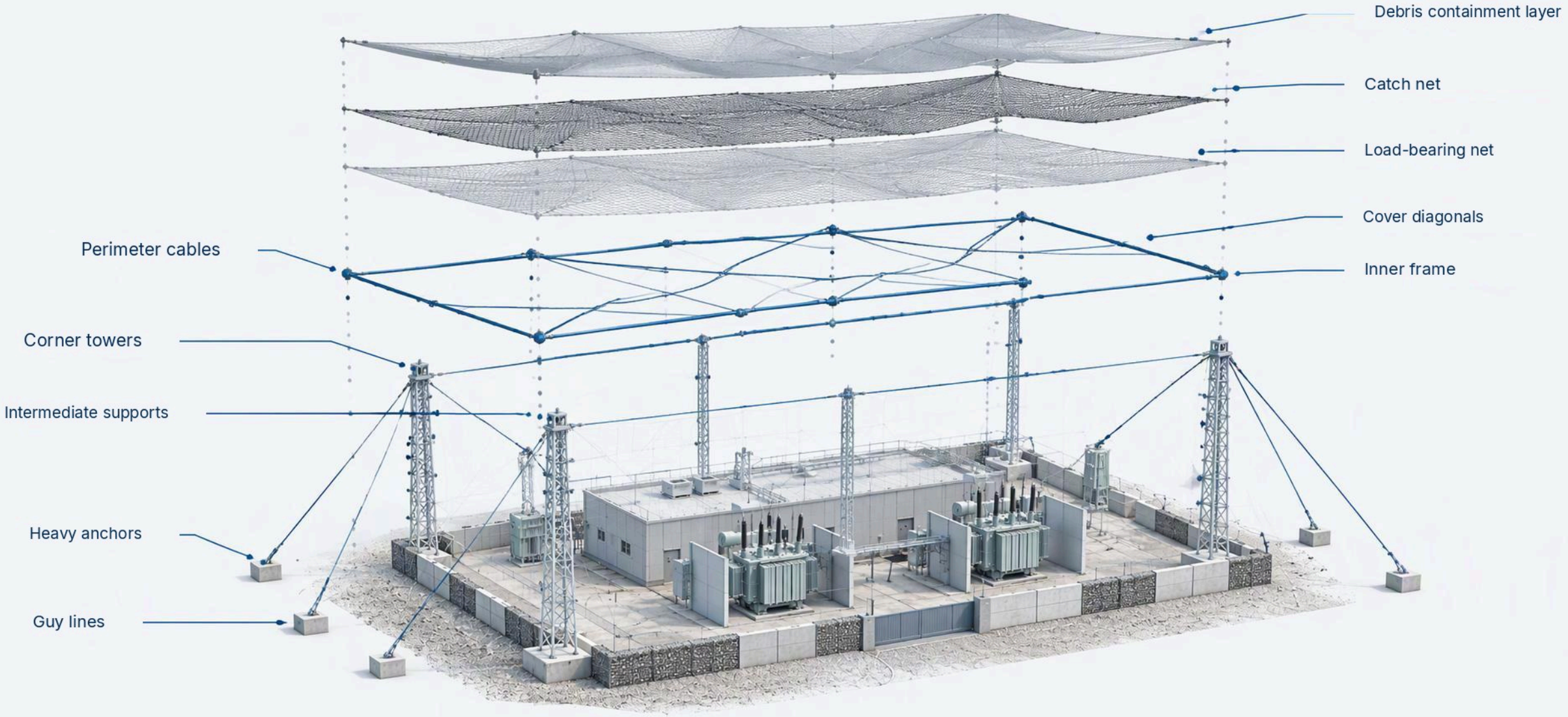
Fire response



Communications

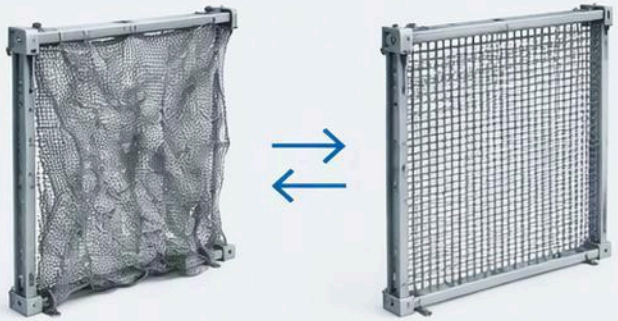
Critical infrastructure retains value as long as its function is preserved.

SPATIAL INTERCEPTION CONTOUR



Different layers — different functions. One independent structure.

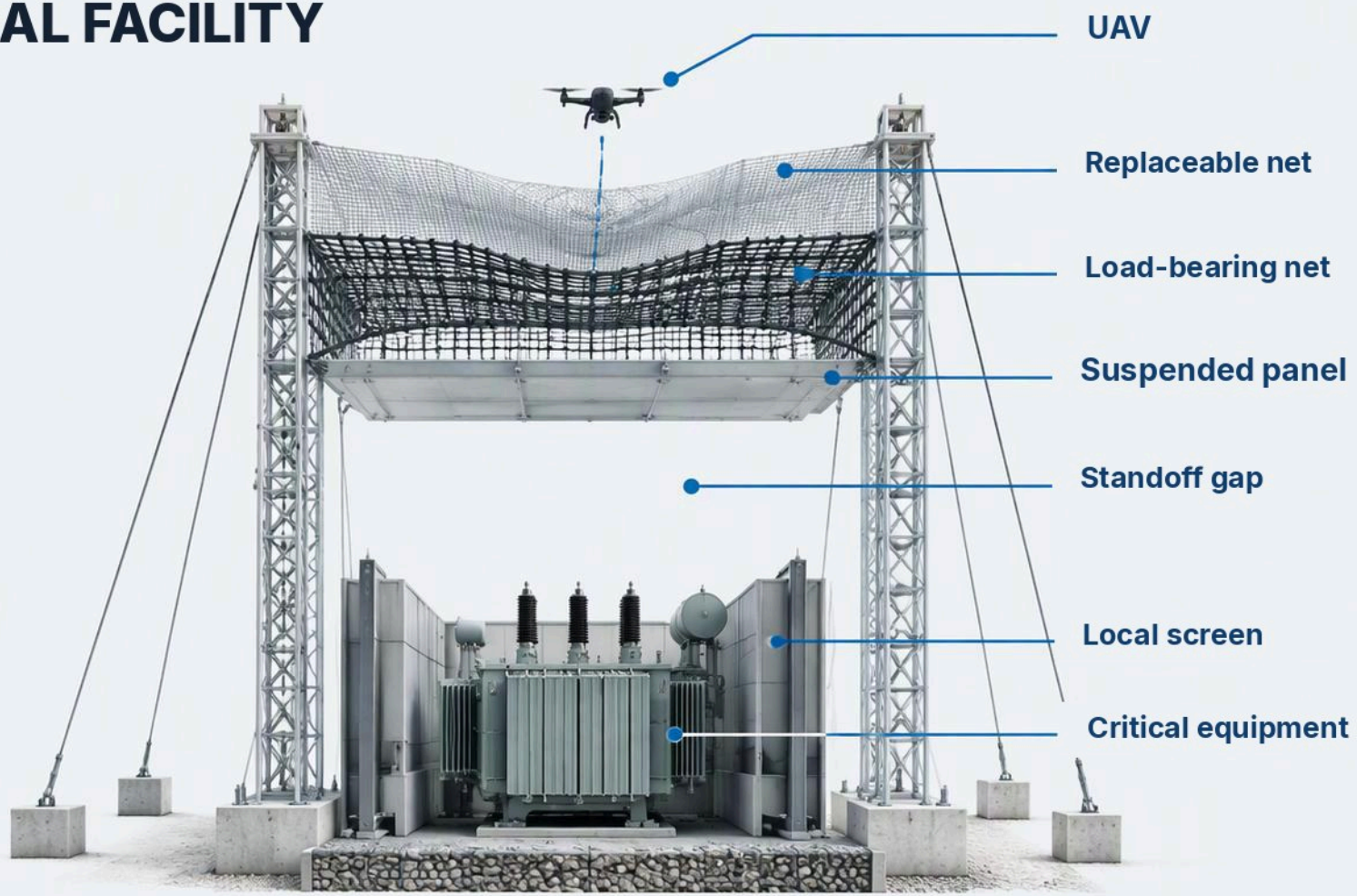
DAMAGE THE REPLACEABLE LAYER – PRESERVE THE CRITICAL FACILITY



Removed
net cartridge

New
replaceable net

Replaceability and repairability

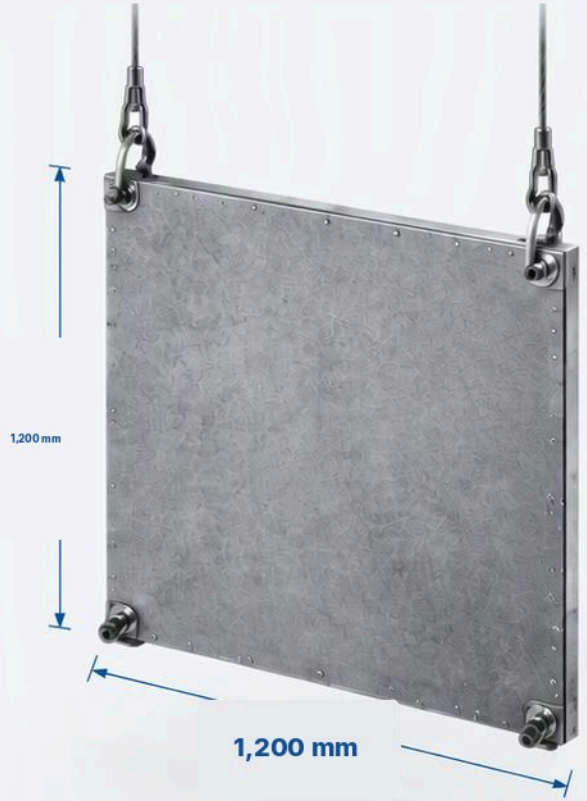


Inspect → **Isolate** → **Replace** → **Restore tension** → **Return to service**

Result depends on the scenario and verified configuration.

REINFORCE WHERE IT HAS THE GREATEST VALUE

Suspended protective layer



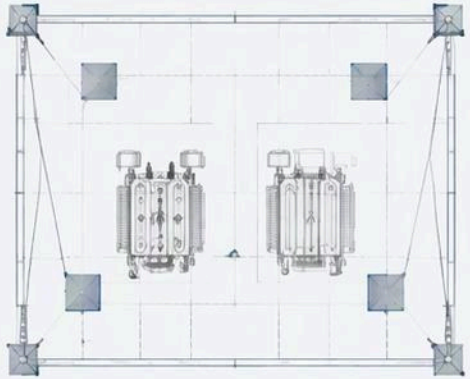
1,200 × 1,200 mm

Alternative options

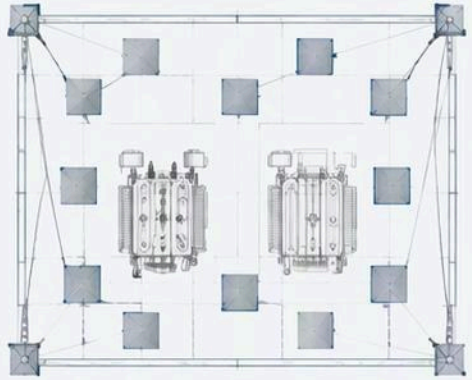


- Armored steel
- Composite
- UHMWPE
- Hybrid
- NOVERA coating

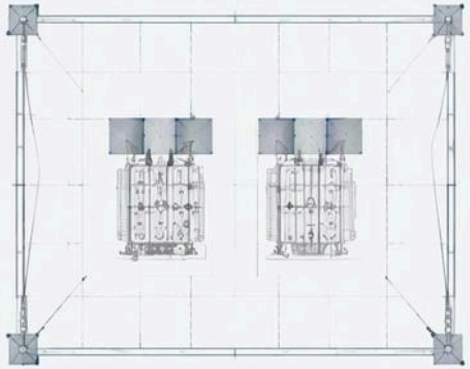
Sparse



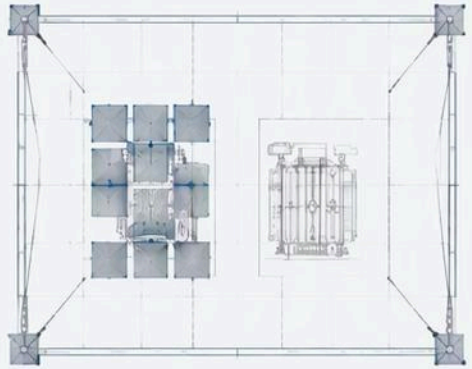
Staggered



Above critical zones



Local



Not uniform protection of the entire area. Priority on critical zones.

Material options and characteristics require confirmation.

NOT A SINGLE WALL. A MATRIX OF ENGINEERING SOLUTIONS.

Lower protective belt



LB-0 · No belt



LB-1 · Local screen



LB-2 · Gabion / local fill



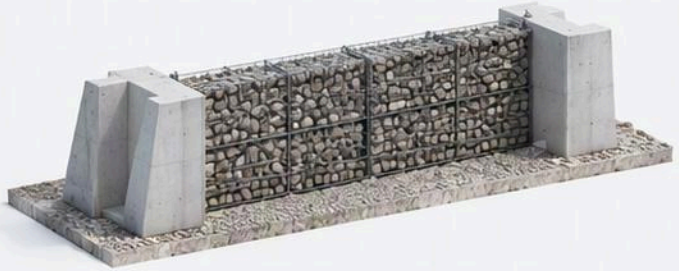
LB-3 · IBIPC / thin prefab elements



LB-4 · Local heavy reinforced concrete



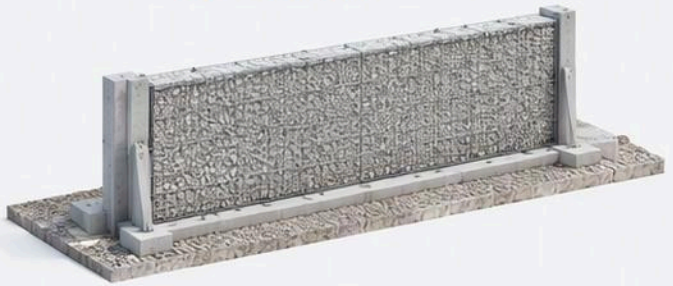
LB-5 · T/L hybrid



LB-6 · T/gabion hybrid



LB-7 · Cellular local fill



LB-8 · Thin wall with fill

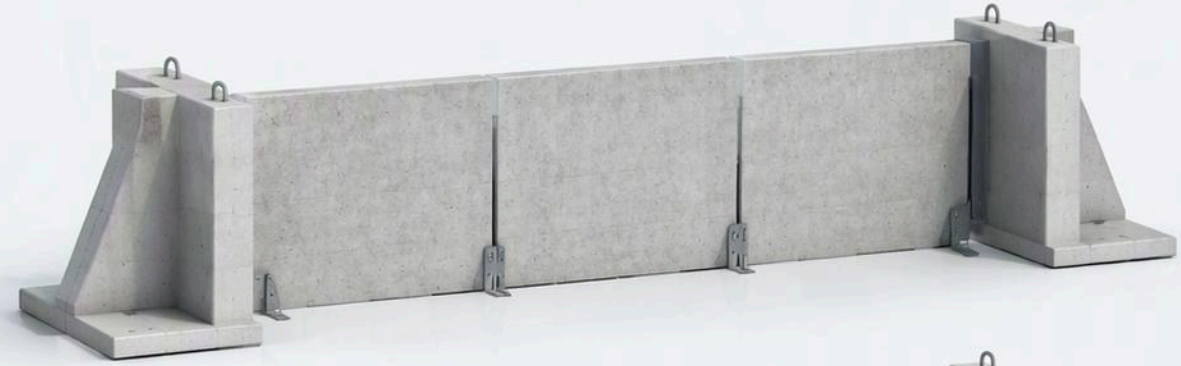
Protection ↔ Mass ↔ Logistics ↔ Cost ↔ Installation ↔ Repairability

IBIPC / UHPFRC and other material solutions — per verified specification.

HEAVY MASS ONLY WHERE NEEDED

T-L-L-L-T

2 stabilizing elements (T)
+ 3 prefab protective infills (L)



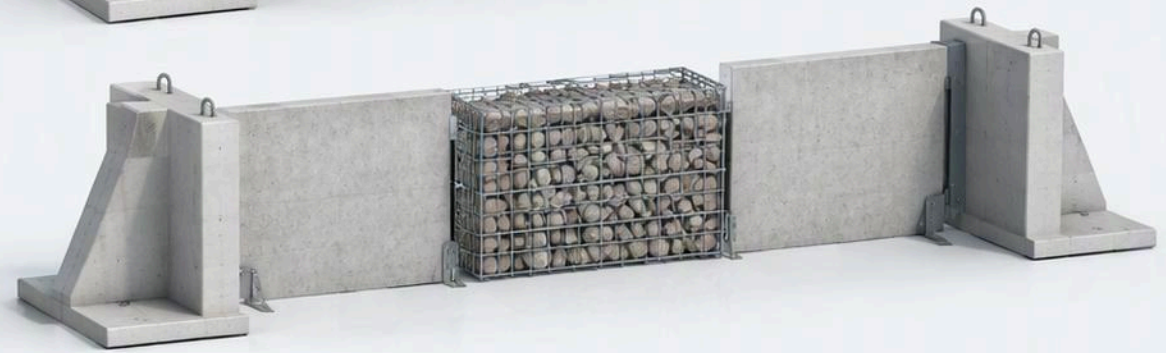
T-G-G-T

2 stabilizing elements (T)
+ 2 gabions (G)



T-L-G-L-T

2 stabilizing elements (T)
+ 2 prefab protective infills (L)
+ 1 gabion (G)



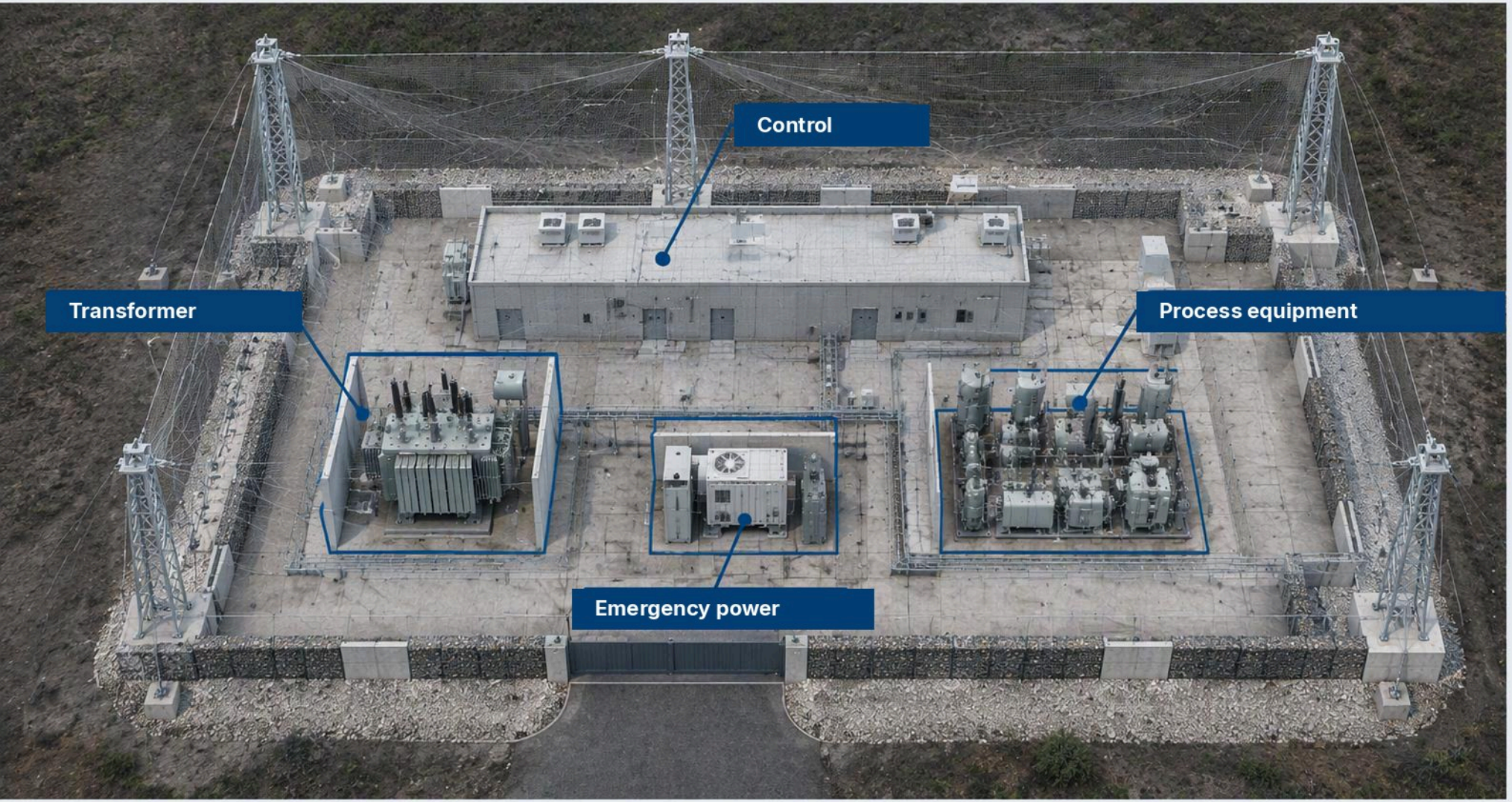
T — stabilizing element

L — prefab protective infill

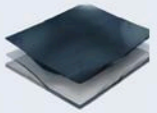
G — gabion / local fill

Stability of heavy elements + economy of local fill.

CRITICAL NODES. PRIORITY PROTECTION.



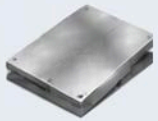
Local reinforcement



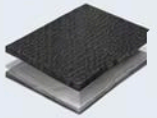
IBIPC



UHMWPE



Armored steel



Composite



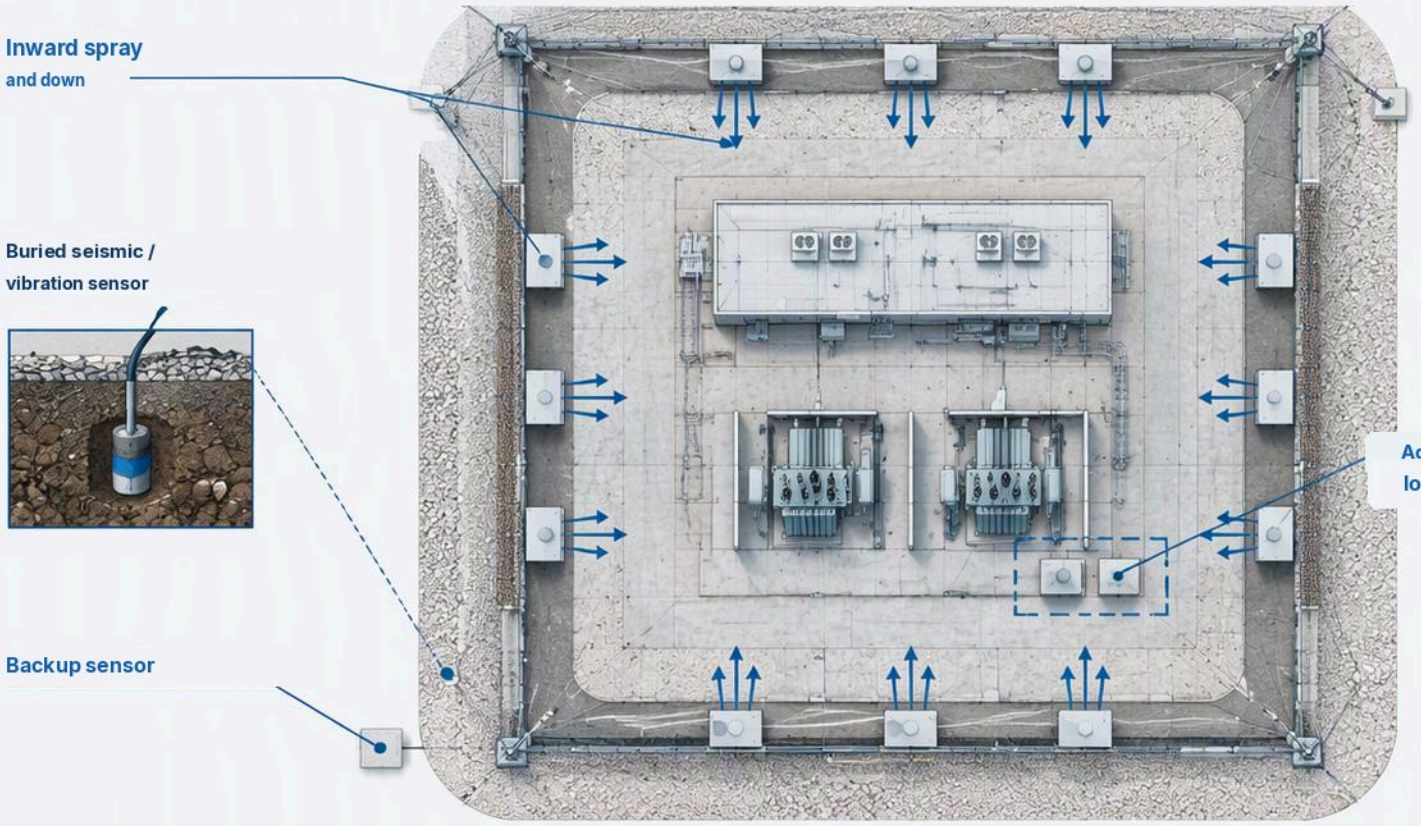
Local
reinforced concrete

IMPACT — NOT THE END OF THE SCENARIO

Impact

- Fire
- Debris
- Leak
- Electrical failure
- Contamination

12 autonomous modules · 3 per side



FULL RESPONSE COMPLEX

- **Fire suppression**
- **Spill containment**
- **Drainage**
- **Local isolation**
- **Quick repair**

Preserve ventilation and heat removal

> Layout and response algorithms require engineering verification.

SURFACE — A SEPARATE TECHNOLOGY LAYER

NOVERA and facility envelope



The facility envelope complements the independent protective contour.

NOVERA properties, compatibility and applications require confirmation.

FIRST — DIGITAL CONFIGURATION.
THEN — PHYSICAL IMPLEMENTATION.

DIGITAL W-FORTEX

Configuration

- Facility geometry
- Standoff
- W4X-WEB
- Suspended panels
- Lower belt
- Local screens



Mass
—

Logistics
—

Cost
—

HCU
—

Run scenario

Scenario

UAV approach | Net deformation | Load path | Blast impact | Fire | Consequences



Alternative net scenario

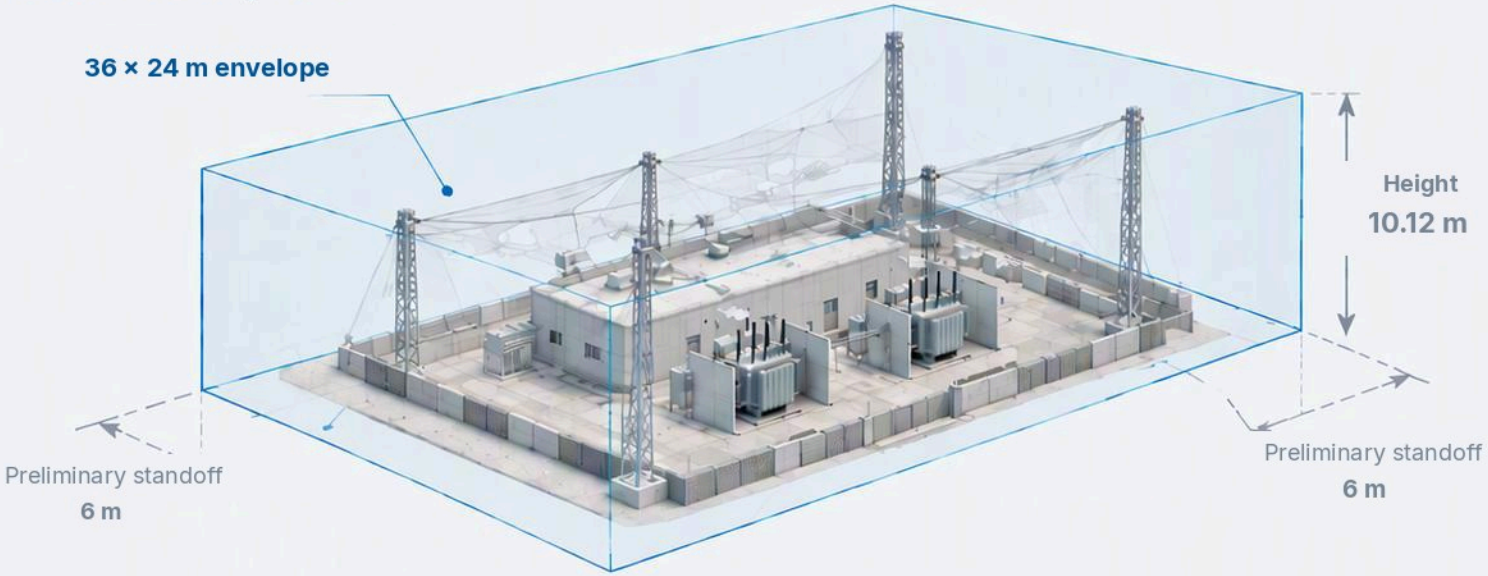
(example of deformed configuration, not for validation)

1 Configure → 2 Calculate → 3 Simulate → 4 Assess → 5 Change → 6 Recalculate → 7 Repeat

Interface concept. Physical models and calculations require validation.

FROM GEOMETRY TO PRELIMINARY ECONOMICS

HEXA-CUBE / HCU



Facility: 24 × 12 m
Envelope: 36 × 24 × 10.12 m

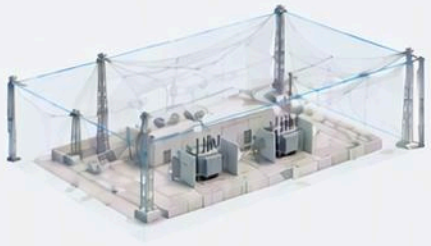
1 HCU = 1 m³

protected W-FORTEX envelope

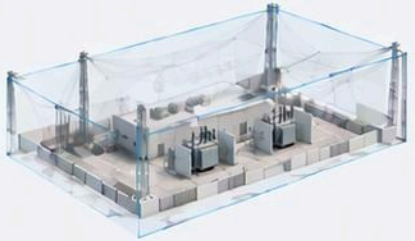
36 × 24 × 10.12 =

8,743.68 HCU

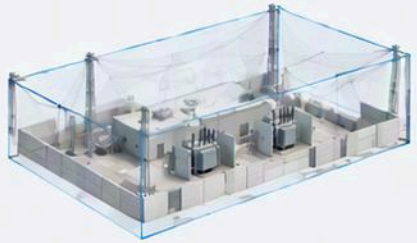
Preliminary commercial-configuration reference



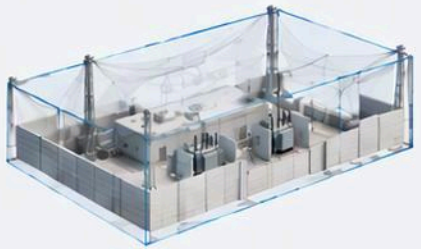
C0 · W4X-WEB only



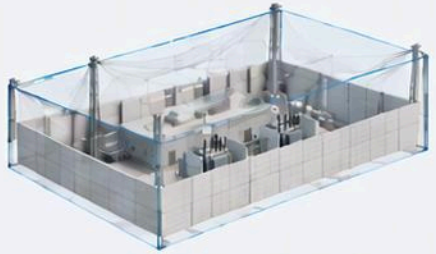
C1 · Light



C2 · Standard



C3 · Reinforced

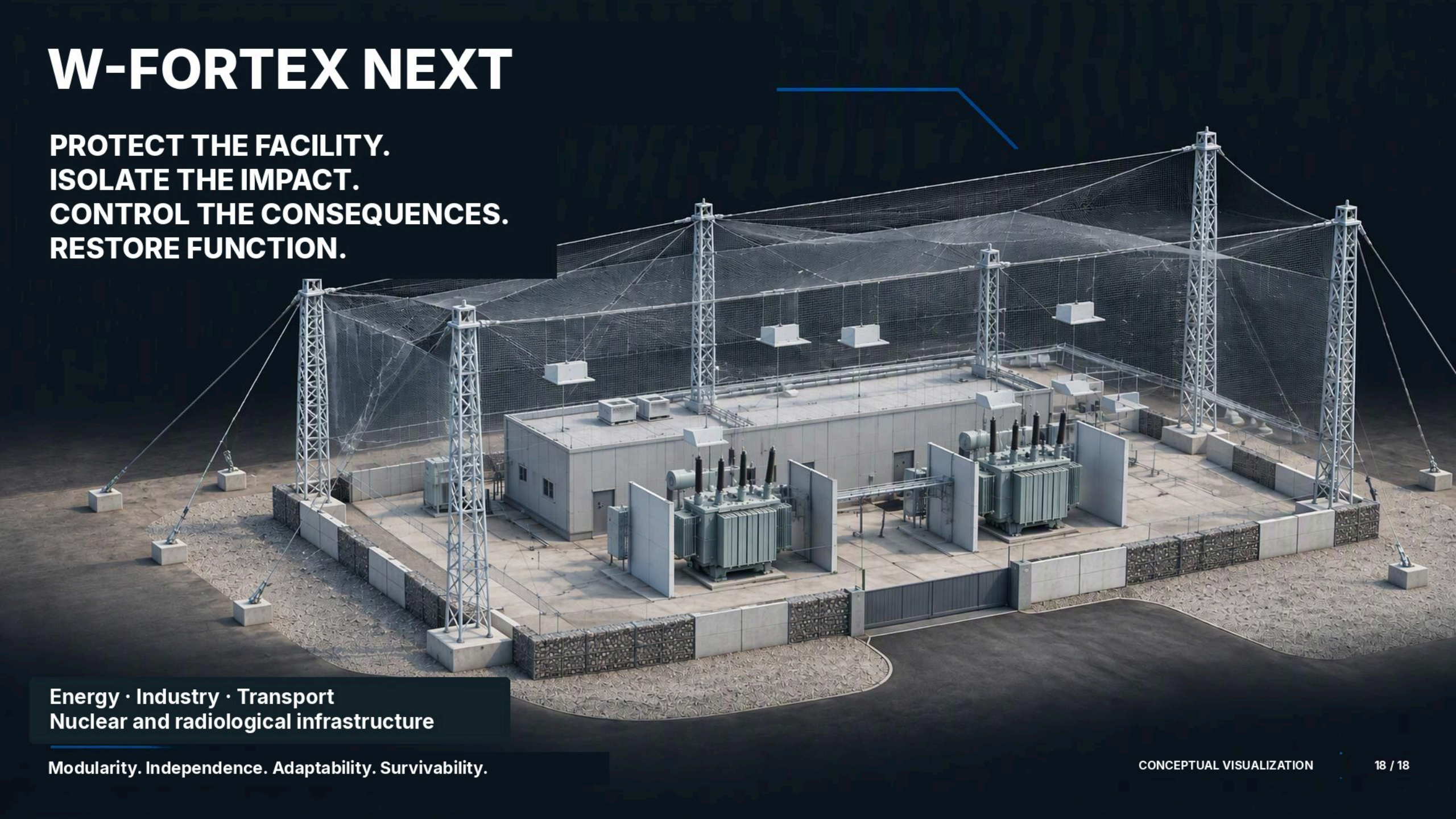


C4 · Critical

HCU is a geometric volume, not a ballistic or blast rating or certification.
Configuration classes are not verified protection levels.

W-FORTEX NEXT

PROTECT THE FACILITY.
ISOLATE THE IMPACT.
CONTROL THE CONSEQUENCES.
RESTORE FUNCTION.



Energy · Industry · Transport
Nuclear and radiological infrastructure

Modularity. Independence. Adaptability. Survivability.

CONCEPTUAL VISUALIZATION

II INTEGRATED ARCHITECTURE

The physical core is supplemented precisely with the functions the specific facility requires.

DETECT	COORDINATE	RECOVER
Data and confirmation Situational picture	Control Qualified interfaces	Inspection and response Function restoration

NEXT BLOCK: how to preserve people, life support and autonomy.

W-FORTEX

INTEGRATED PROTECTION ARCHITECTURE

ONE PLATFORM.
MANY TECHNOLOGIES.
ITS OWN CONFIGURATION.

Physical core + active levels +
robotic recovery.



Dietmar Rabich / Wikimedia Commons / CC BY-SA 4.0 · cropping, conceptual overlays

WITKOWINGS / TRIUMPH Systems Fusion

Ukrainian version · EN V1

FACILITY → REQUIREMENTS → FUNCTION SELECTION → INTEGRATED PROTECTION

Modular concept for critical infrastructure. From function selection to qualified integration.

ONE PLATFORM. MANY TECHNOLOGIES.

A–J: a library of functional layers, not a mandatory set

A — DETECTION

Radar / low-altitude / RF / EO / IR
Acoustic / perimeter / seismic / vibration

B — IDENTIFICATION

Correlation / optical / thermal / RF signatures
Classification and operator confirmation

C — C2 / SENSOR FUSION

Common picture / tracks / alerts / priorities
Response coordination and event log

D — ELECTRONIC RESPONSE

Permitted counter-UAS / RF means
Communications, navigation, directed effects

E — ACTIVE INTERCEPTION

Interceptor UAV / counter-FPV
Permitted physical and remote means

F — GROUND ROBOTICS

UGV / UGV / patrol / mobile sensing
Inspection / emergency response

G — PHYSICAL CORE

Stand-off / towers / cables / WEB / mesh
Panels / Lower Belt / IBIPC / hybrid / local

H — LOCAL REINFORCEMENT

NOVERA / glazing / windows / openings
Surface protection / local shielding

I — SECONDARY EFFECTS

Fire / containment / drainage / spills
Emergency monitoring

J — RECOVERY

Robotic inspection / damage assessment
Replaceable modules / rapid repair

THE FACILITY AND ITS CRITICAL FUNCTIONS DETERMINE WHICH LAYERS TO ADD

Conceptual architecture. Composition, interfaces and readiness are defined for each specific site.

NOT EVERYTHING AT ONCE. EXACTLY WHAT IS NEEDED.

Single technology library → facility requirements → bespoke configuration

01 / TECHNOLOGY LIBRARY

- **SENSORS**
- **C2 / COORDINATION**
- **COUNTER-UAS**
- ROBOTICS
- **WEB / PANELS**
- **LOWER PROTECTION**
- **LOCAL HARDENING**
- **FIRE SUPPRESSION**
- NOVERA / SURFACES

Selected for this example

02 / FACILITY REQUIREMENTS

THREAT

UAV / FPV

CRITICAL FUNCTIONS

Power supply

GEOMETRY

Zones and dimensions

REGULATION

Permits / EMC

BUDGET

Priorities

OPERATION

Access / service

03 / SELECTED CONFIGURATION

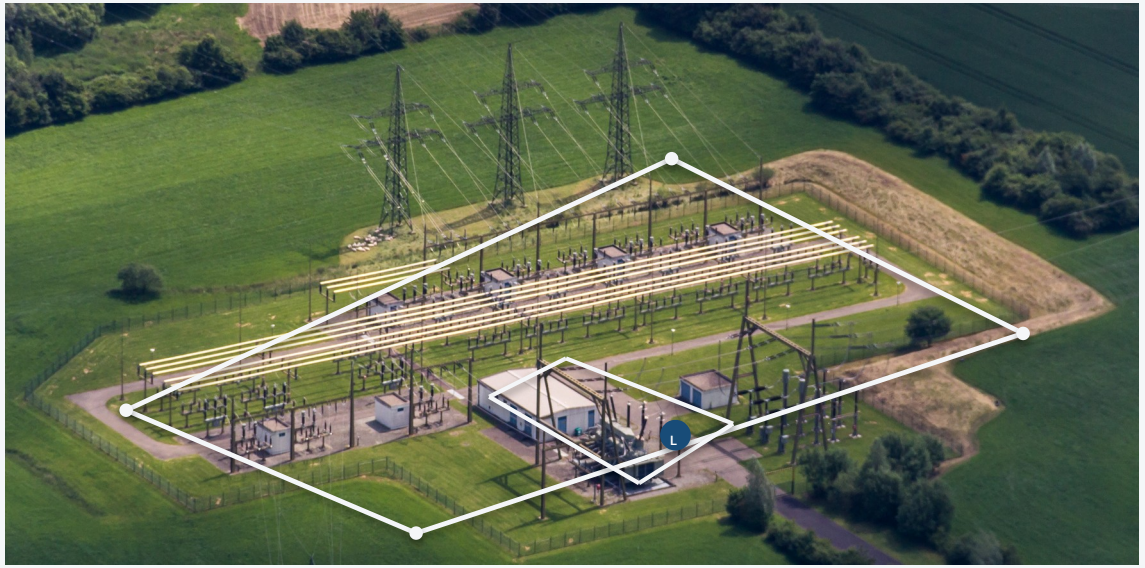


Photo: Dietmar Rabich / Wikimedia Commons / CC BY-SA 4.0 - crop + conceptual lines

POWER SUBSTATION

DETECTION	COORDINATION	PHYSICAL CORE
EO/IR + RF Radar — optional	C2 + Counter-UAS*	WEB / panels Lower / Local / Fire

Conceptual example, not an implemented installation. * Subject to permits and EMC requirements. Lines are notional zones, not a WEB project.

ACTIVE TIERS + PHYSICAL CORE

System resilience must not depend on a single technology

NORMAL MODE

- **ACTIVE LAYERS**

  Detection → identification → C2
  Electronic response → interception → robotics

- **PASSIVE PHYSICAL CORE**

  WEB / mesh / panels / Lower Belt
  IBIPC / Local Protection

CRITICAL ASSET

PASSIVE FALLBACK

RADAR / RF / NETWORK / C2 — OFF
ACTIVE INTERCEPTION — FAILED

WEB / MESH / PANELS
LOWER BELT / IBIPC / LOCAL

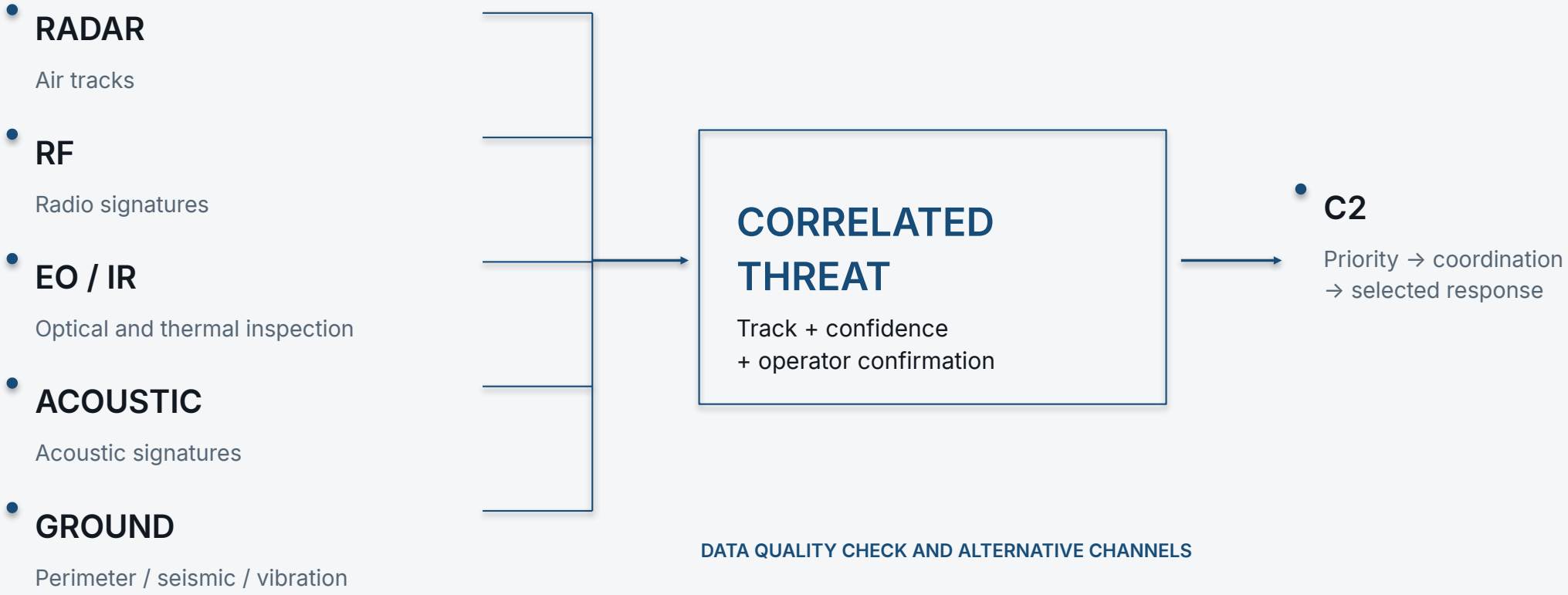
The physical barrier is retained without active detection.

Fire — separate readiness check.

Barriers do not guarantee universal threat stopping. Fire Suppression is available only where readiness and resources are ensured.

NOT ONE SENSOR. NOT ONE POINT OF FAILURE.

Detection → correlation → confirmation → selected response



Fusion does not eliminate common-cause failures: power, networks and synchronisation are verified separately.

Conceptual architecture. Composition, interfaces and readiness are defined for each specific site.

C2: COORDINATE, NOT LOCK DOWN

Common operating picture + open integration contract

SENSORS
Tracks / alarms

→

C2 / FUSION
Picture / priorities / logs

→

RESPONSE
Coordination / confirmation

Integration field	What we verify
FUNCTION	Required function and requirements of the specific facility
SOURCE	Supplier, product, version and support
INTERFACE	Protocol, data, timing, cybersecurity and degraded mode
EVIDENCE STATUS	Testing, qualification, limits of application
INTEGRATION STATUS	Planned → tested → accepted; status is never substituted

REPLACEMENT WITHOUT BREAKING THE ARCHITECTURE

RADAR A → RADAR B

Function retained.
Interface supported.
Supplier agreed.
Requirements confirmed.

Conceptual architecture. Composition, interfaces and readiness are defined for each specific site.

ELECTRONIC COUNTER-UAS

Early impact — only in the permitted configuration

01 / DETECTION

Multi-sensor signatures

02 / C2 / DECISION

Classification and approvals

03 / ELECTRONIC RESPONSE

Approved RF / directional means

IF THE THREAT CONTINUES TO MOVE

PHYSICAL W-FORTEX CORE

WEB → suspended protection
→ local hardening → secondary-effect control

The electronic layer does not replace a physical barrier and has no universal effectiveness.

Functional concept, not an application manual. Frequencies, permits, EMC and safety are determined by authorised specialists.

FPV / UAV: ONE CONTINUOUS CHAIN

Early response → physical fallback → secondary effects → recovery

01 DETECTION

UAV / FPV

02 CONFIRMATION

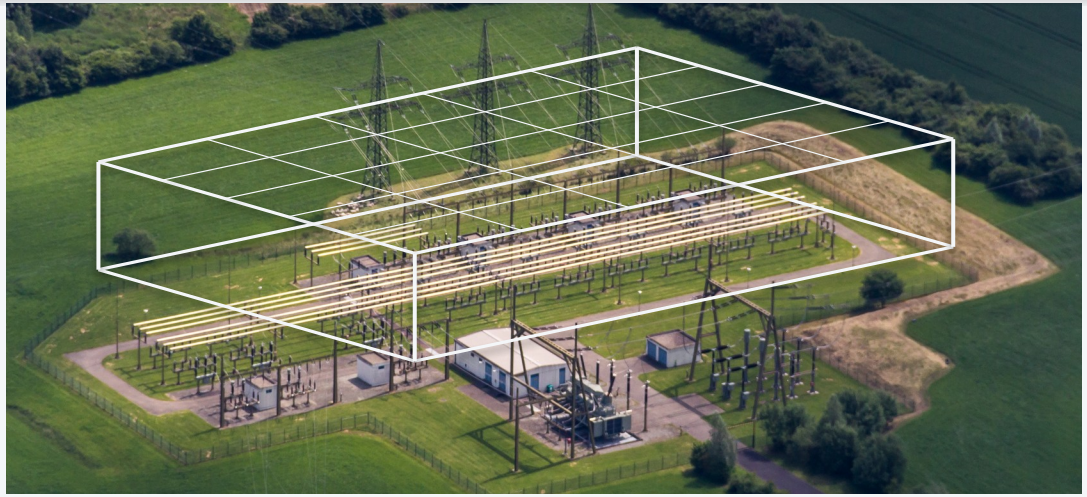
Multi-sensor

03 C2

Solution

04 RESPONSE

Electronic / interception



Dietmar Rabich / Wikimedia Commons / CC BY-SA 4.0 · cropping, conceptual overlays

05 WEB / PANELS

If the threat persists

06 LOCAL / FIRE

Barrier and secondary effects

07 ROBOTIC INSPECTION

Hazard and damage assessment

08 RECOVERY

Module replacement / repair

THE SAME FACILITY. THE SAME CONFIGURATION.

Conceptual architecture. Composition, interfaces and readiness are defined for each specific site.

ROBOTICS: INSPECTION BEFORE HUMAN ENTRY

Air and ground platforms support hazard assessment and recovery



Outisnn / Wikimedia Commons / CC BY-SA 3.0 · cropped, conceptual overlays

NO ONE ENTERS FIRST WITHOUT A HAZARD ASSESSMENT

Remote inspection → decision by the responsible specialist.

AIR ROBOTICS

Reconnaissance / interceptor / counter-FPV

GROUND ROBOTICS / UGV

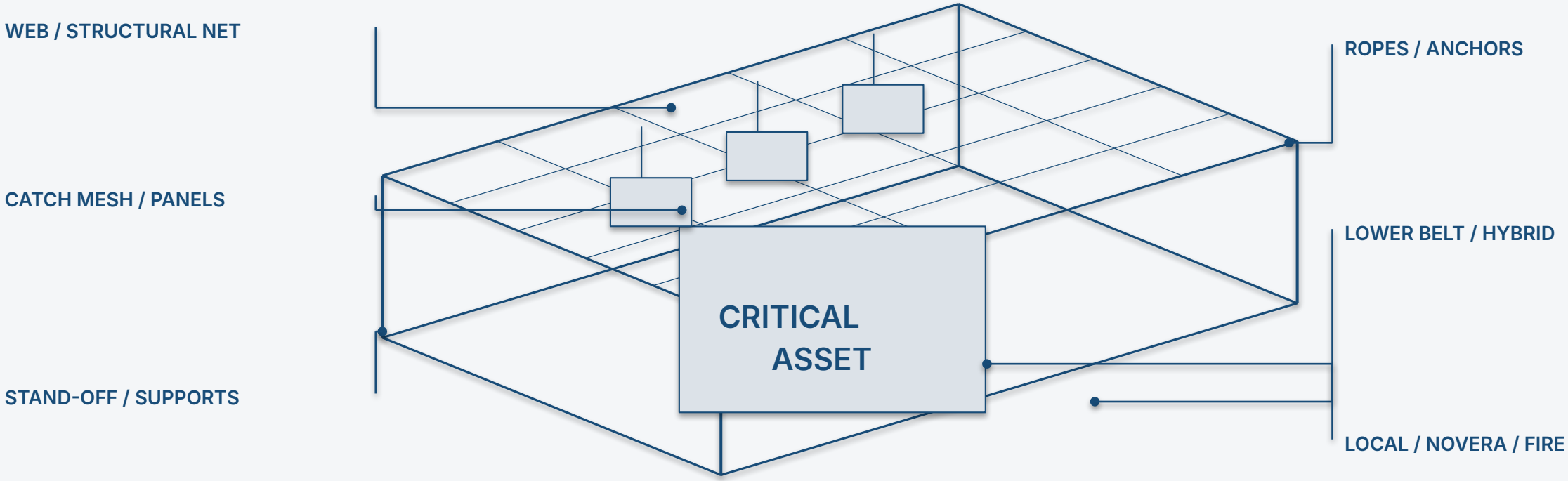
Patrol / inspection / mobile sensors / observation
Emergency response / radiation reconnaissance

- **AFTER THE ATTACK**
- **SURVEY AND ASSESSMENT**
- **MODULAR REPAIR**

Photo — example of the UGV class, not a supplier selection and not a confirmed PackBot integration into W-FORTEX.

MULTI-TIER PROTECTION AROUND THE FACILITY

Not a default geometry — an engineering choice for specific critical zones



Lower Belt: IBIPC / Gabion–Fill / Hybrid T/L / T–Gabion. Local: openings, glazing, shielding. Fire: separate functional circuit.

Conceptual spatial diagram, not a calculated structure. Geometry, supports, anchors, tension and clearances require design.

ENERGY: SUBSTATION CONFIGURATION

Power and transformer nodes determine local priorities



Dietmar Rabich / Wikimedia Commons / CC BY-SA 4.0 - cropping, conceptual overlays

REQUIREMENTS → SELECTION

Power + equipment access + fire risk
→ selected functions, not the whole set.

01 DETECTION / C2

EO/IR + RF; radar — optional.
C2 coordinates the confirmed response.

02 ACTIVE + PHYSICAL LAYER

Permitted Counter-UAS; WEB / panels;
Lower Belt for required zones.

03 CRITICAL NODES / FIRE

Local transformer protection;
Fire Suppression with verified readiness.

CONFIGURATION SELECTED FOR POWER ENGINEERING

Example of function selection. Photo is for reference; zones are conceptual. Not an installation design or confirmation of completed integration.

REFINERY: DIFFERENT FUNCTION — DIFFERENT CHOICE

Technological zones, fire and spills change the architecture



Andrew Nash / Wikimedia Commons / CC BY-SA 2.0 - cropped, conceptual overlays

01 LONG-RANGE DETECTION / ZONES

Radar + EO/IR + RF; C2;
several separate protected zones.

02 WEB / LOCAL HARDENING

WEB, local hardening;
local-fill / hybrid Lower Belt.

03 SECONDARY EFFECTS / OVERVIEW

Fire, spill containment, drainage;
robotic inspection and emergency monitoring.

REQUIREMENTS → SELECTION

Process zones + fire / spills + service
→ zonal protection and secondary-effect control.

**NOT A COPY OF A SUBSTATION.
A DIFFERENT REQUIREMENTS PROFILE.**

Example of function selection. Photo is for reference; zones are conceptual. Not an installation design or confirmation of completed integration.

TRANSPORT: NO EXTRA LEVELS

Terminal / rail hub / logistics hub / critical airport zone



H. Zell / Wikimedia Commons / CC BY-SA 3.0 - cropping, conceptual overlays

REQUIREMENTS → SELECTION

Flows + access control + perimeter
→ selective barriers without excess load.

01 PERIMETER / ACCESS

Perimeter detection + EO/IR;
access control and operator support.

02 AIR / ROBOTICS

Radar / authorized Counter-UAS;
robotic patrol — per threat profile.

03 SELECTIVE PHYSICAL PROTECTION

Protection of specific critical zones.
Heavy Lower Belt — not by default.

DO NOT IMPOSE UNNEEDED PROTECTION.

Example of function selection. Photo is for reference; zones are conceptual. Not an installation design or confirmation of completed integration.

NUCLEAR: AROUND SAFETY FUNCTIONS

Not just a building — preserving critical safety functions



Stefan Kühn / Wikimedia Commons / CC BY-SA 3.0 - cropping, conceptual overlays

CRITICAL FUNCTIONS — NOT COORDINATES ON THE PHOTO

POWER / COOLING / CONTROL / MONITORING
ACCESS / EMERGENCY SYSTEMS
RADIATION MONITORING / MATERIAL AREAS

SENSING + PROTECTED C2

Multi-sensor perimeter / radar / EO/IR / RF;
controlled access / protected coordination.

PHYSICAL W-FORTEX CORE

WEB / IBIPC / Local Protection;
Fire Suppression for selected safety functions.

ROBOTICS + SAFETY INTEGRATION

Inspection / radiation reconnaissance;
Nuclear & Radiological Safety Integration.

SAFETY FUNCTIONS → LEVEL SELECTION

Not nuclear qualification. Safety justification, qualification, regulatory procedures and operator approval are required.

WE INTEGRATE, NOT REINVENT EVERYTHING

Proven technologies — selection criterion for open architecture

BEST AVAILABLE TECHNIQUES

Radar / EO–IR / Counter-UAS
Robotics / Fire Systems
W-FORTEX Physical Core / IBIPC

Vendor independence.
Replaceable subsystems.
Qualified suppliers.

QUALIFICATION AIRLOCK

Stage	Connection condition
REQUIREMENT	Function meets facility requirements
PRODUCT EVIDENCE	Testing and application limits available
SUPPLIER APPROVAL	Supplier, service and version approved
INTERFACE TEST	Data, interaction and degradation verified
ACCEPTANCE	Integration accepted for this configuration

ONE ARCHITECTURE — INTERCHANGEABLE SUBSYSTEMS

The list of technology classes does not mean unnamed products are already verified or integrated. Status is confirmed by evidence.

CONFIGURATOR → SIMULATOR

Physical + active + digital systems use one configuration

01 / CONFIGURATOR — TARGET CAPABILITIES

OBJECT / ZONES / THREAT PROFILE

ENERGY SUBSTATION · OPTION B

- [x] Radar
- [x] RF
- [x] EO / IR
- [ ] Acoustic
- [x] Counter-UAS
- [ ] Interceptor
- [x] UGV / UGV
- [x] Inspection
- [x] C2

Required functions → recommendation → manual change → 3D / HCU → mass / logistics / price

02 / SIMULATOR — SAME OPTION B

- UAV APPROACH → RADAR DETECTION
- EO CONFIRMATION → C2 / COUNTER-UAS
- WEB INTERCEPTION → FIRE / SUPPRESSION
- UGV INSPECTION → DAMAGE ASSESSMENT
- RECOVERY → SYSTEM RESTORATION

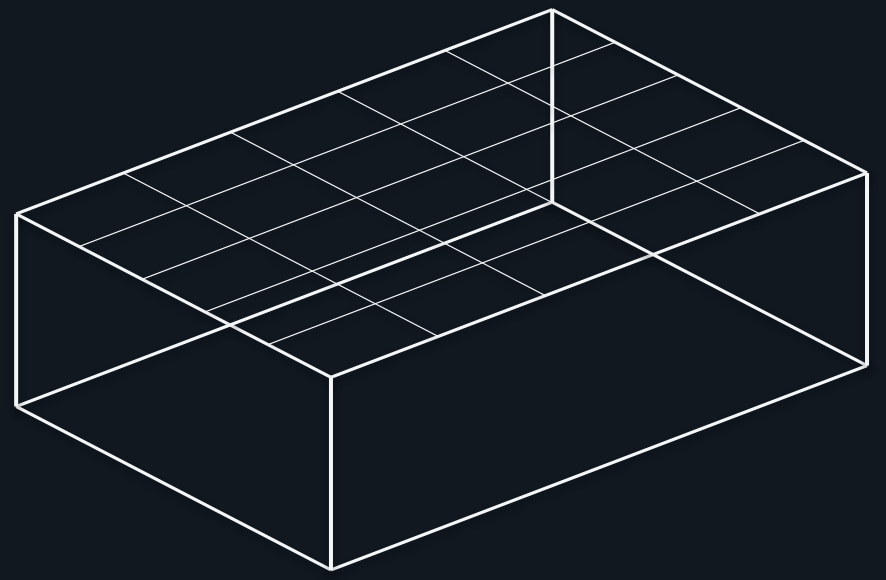
SCENARIO INPUT = SELECTED CONFIGURATION

Target workflow per the brief, not a demonstration of working software. HCU is a brief term; prices and efficiency are not calculated here.

W-FORTEX

WITKOWINGS / TRIUMPH Systems Fusion

ONE FACILITY.
ITS OWN CONFIGURATION.
ONE PROTECTION ARCHITECTURE.



OBJECT + THREATS + CRITICAL FUNCTIONS + TECHNOLOGIES

W-FORTEX CONFIGURATION

→ INTEGRATED PROTECTION

ONE PLATFORM
OBJECT-SPECIFIC CONFIGURATION

Next step: facility analysis → requirements → technology selection → interface verification → pilot configuration.

III SHELTERING AND CBRN RESISTANCE

Continuity requires a protected environment for people and technical functions.

PEOPLE	SYSTEMS	RISKS
Design capacity Suitability for occupancy	Air · water · power Communications · medical support	CBRN configuration Radiological integration

NEXT BLOCK: a specific material direction and documents with application limits.

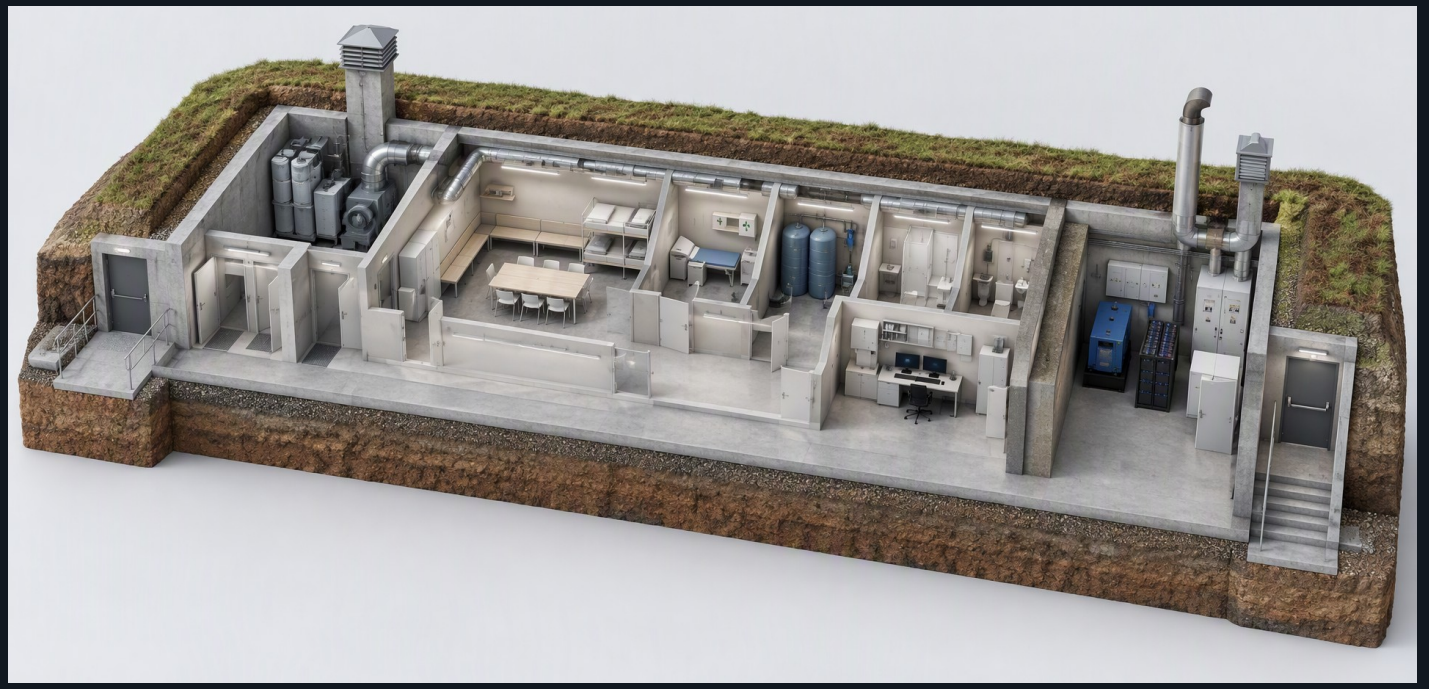
W-FORTEX

PROTECTIVE STRUCTURES AND CBRN RESISTANCE

Not a single bunker.
A platform for different missions.

People · critical functions
autonomy · continuity

DIRECTION CONCEPT / PILOT DISCUSSION



PROTECTED SHELTERS & CBRN RESILIENCE SYSTEMS

Conceptual CGI visualisation · not a working drawing

ONE PLATFORM — DIFFERENT USERS

The mission defines requirements for people, access, systems and critical functions

01 / CIVIL

Civil shelters

Population · municipal infrastructure

02 / SCHOOL

Educational institutions

Schools · universities · children's facilities

03 / MEDICAL

Medical and public sector

Hospitals · social and government facilities

04 / INDUSTRIAL

Industrial personnel

Production facilities · oil and gas sector

05 / ENERGY

Energy personnel

Power plants · substations · thermal power

06 / NUCLEAR

Nuclear / radiological facilities

Research institutions · materials · RAW

07 / COMMAND

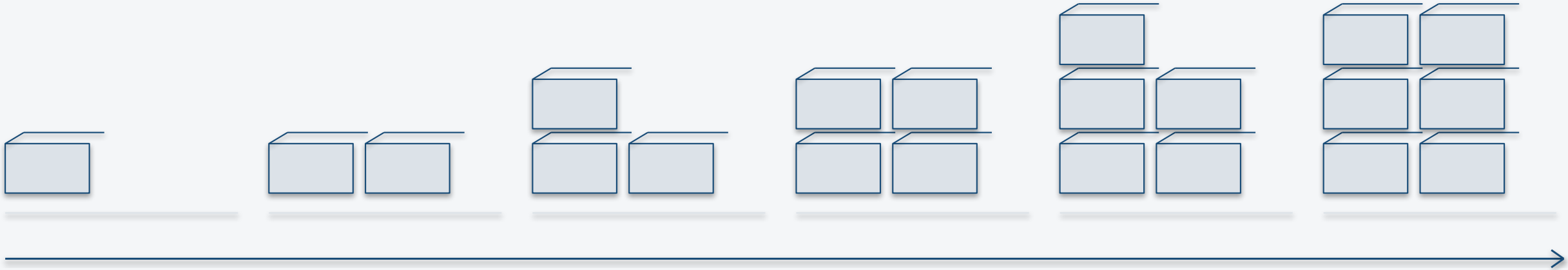
Emergency control

Operations teams · protected control rooms

SCALABLE SHELTER FAMILY

From a compact module to a large protected complex

MICRO	SMALL	MEDIUM	LARGE	XL	XXL
5–10	10–25	25–100	100–250	250–500	500–1000+
persons · guideline	persons · guideline	persons · guideline	persons · guideline	persons · guideline	persons · guideline



COMPACT SHELTER

MODULAR SHELTER

PROTECTED FACILITY

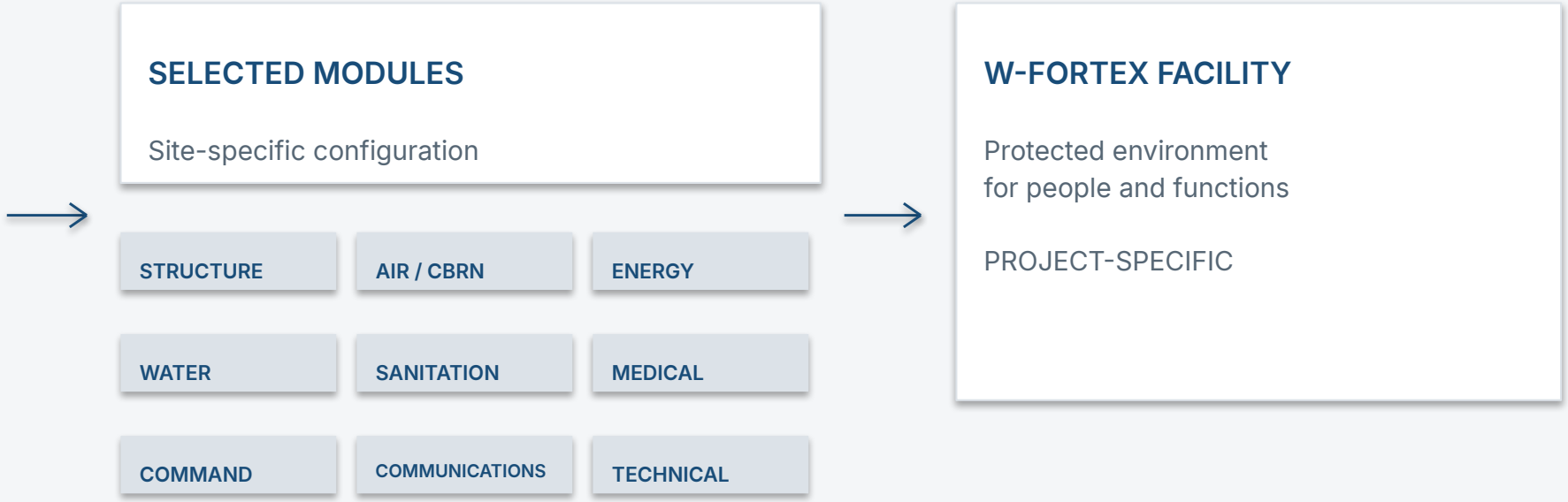
Presentation scale, not certified product classes. Actual capacity and endurance are determined by the project.

MODULAR PROTECTED STRUCTURE

Material and system composition are chosen for the mission — not the other way round

INPUT REQUIREMENTS

Mission and capacity
Autonomy
Threat profile
CBRN requirements
Site conditions
Power needs



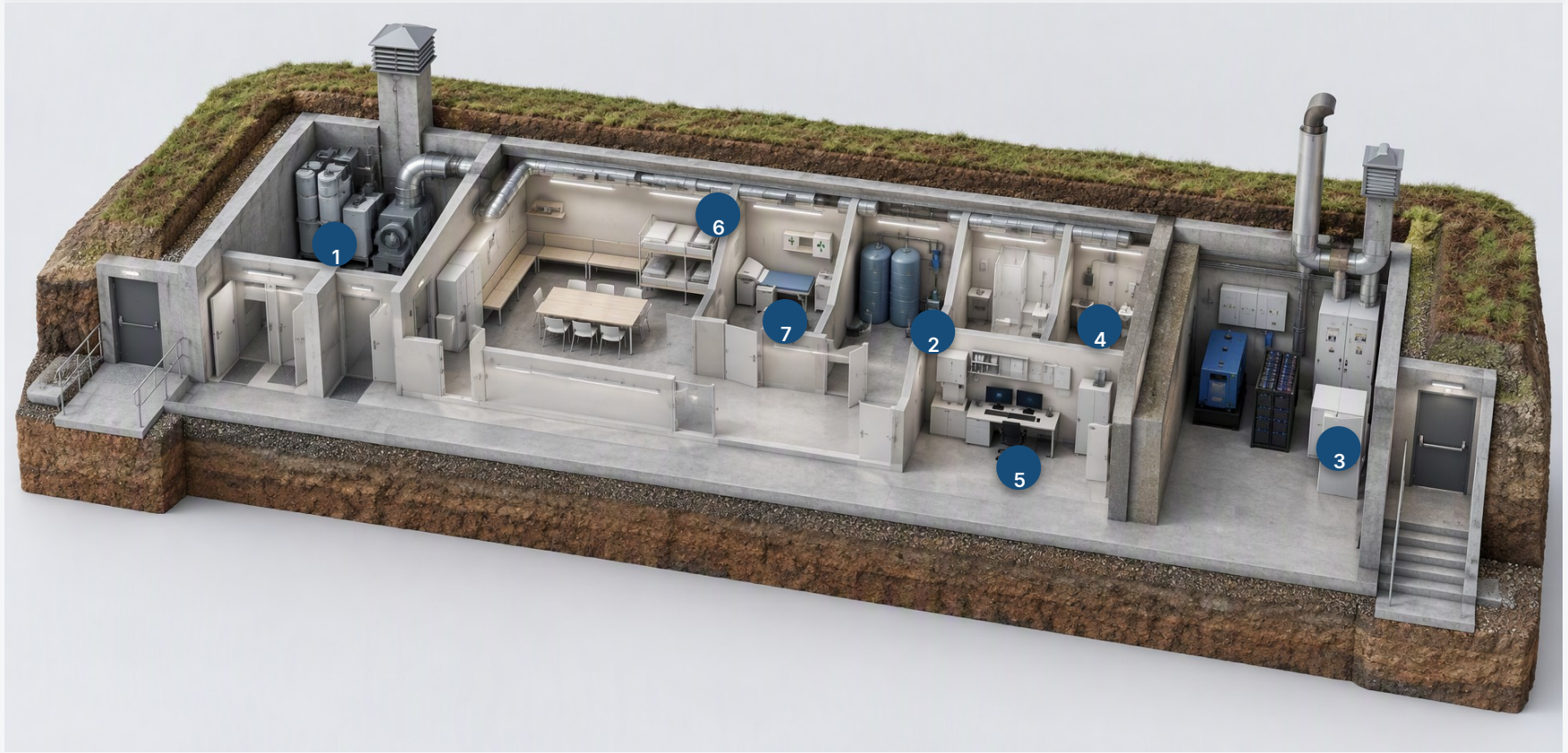
MATERIAL BY MISSION

Conventional / monolithic / precast reinforced concrete · high-performance concrete
IBIPC / UHPFRC — option · steel · composite · hybrid systems
Above-ground · bermed · partially or fully buried versions

LIFE SUPPORT AND AUTONOMY

Protected environment for people — systems integration, not just structure

AIR: OUTSIDE → PROTECTED INTAKE → FILTRATION → PEOPLE



ENERGY: GRID / UPS / РЕЗЕРВ → ЗАХИЩЕНА ШИНА → LIFE SUPPORT

Conceptual CGI visualisation, not a working drawing. Capacity, endurance and system parameters — PROJECT-SPECIFIC ENGINEERING.

INTEGRATED FUNCTIONS

01 AIRSPACE / AIR

Filtration · control of indoor environment

02 WATER

Potable / technical water

Reserve · distribution

03 ЕНЕРГІЯ / ENERGY

Grid · UPS · batteries

Backup generation

04 SANITATION

Hygiene · wastewater

Waste management

05 COMMUNICATIONS

Communications · monitoring

Emergency alarm

06 FIRE & SAFETY

Fire · gas · lighting

Environmental control

07 МЕДИЧНА ЗОНА

First aid

Isolation — as needed

CBRN — RISK-SPECIFIC CONFIGURATION

One standard system does not cover all scenarios

C	CHEMICAL	Chemical
B	BIOLOGICAL	Biological
R	RADIOLOGICAL	Radiological
N	NUCLEAR	Nuclear

01 / DETECTION

CBRN / hazardous monitoring
Radiation monitoring
Dosimetry · alarm

→

02 / CONTAMINATION CONTROL

Protected intake · filtration
Airlock · zoning
Decontamination interface

→

03 / PEOPLE SUPPORT

Water · power · communications
Controlled air environment
Emergency modes

Contamination control ≠ shielding from external ionizing radiation

Equipment set, operating modes and acceptance criteria — TBC / PROJECT-SPECIFIC ENGINEERING.

NUCLEAR AND RADIOLOGICAL INTEGRATION

Protected environment to sustain critical safety functions

EMERGENCY PERSONNEL

Specialised personnel
Protected technical rooms
Emergency control
Controlled access

POWER

Emergency power

COOLING

Cooling interfaces

CONTROL

Protected control

MONITORING

Radiation · dosimetry

COMMUNICATION

Emergency communications

ACCESS

Zone / access control

EMERGENCY RESPONSE

Response support

Integration into the facility safety case; not automatic nuclear qualification or W-FORTEX certification.

VENTILATION AND FILTRATION

Critical subsystem: integrated air control and isolation modes



MONITORING → MODE CONTROL → ALARM → PERSONNEL ACTIONS

MODES AND RESERVE

Emergency ventilation · redundancy
Pressure control — where required

ISOLATION AND EXHAUST

Controlled air removal
Contamination cross-flow control

SUPPLIERS / DATA

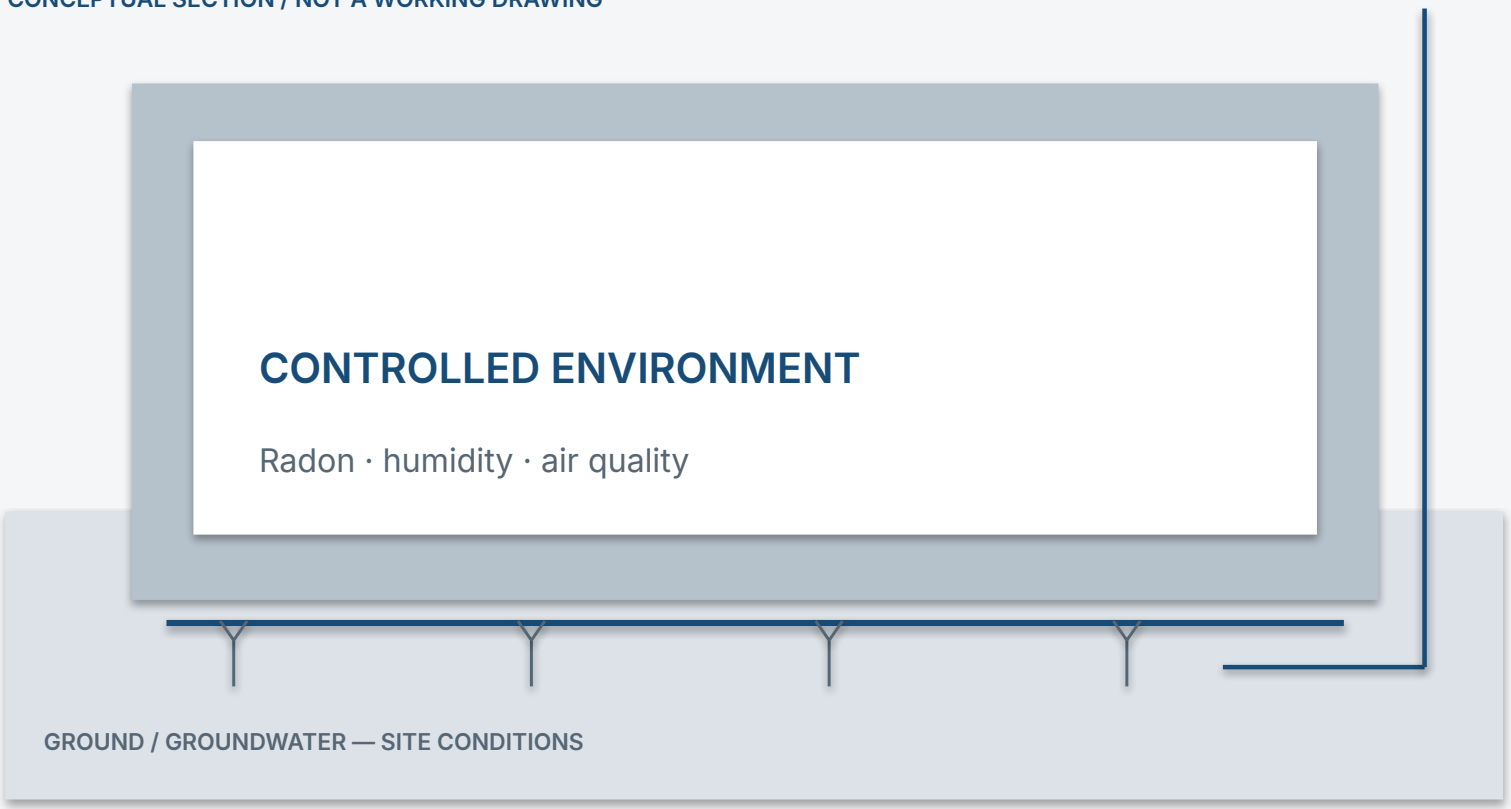
Specialist manufacturers and integrators
Characteristics by calculation

Generator: combustion and exhaust designed separately. Filter classes, flow and pressure — TBC / PROJECT-SPECIFIC.

RADON AND UNDERGROUND ENVIRONMENT

Burial requires not only structural protection but also environmental control

CONCEPTUAL SECTION / NOT A WORKING DRAWING



01 / SHELL

Barrier · sealing of joints and penetrations

02 / MONITORING

Radon and humidity measurement

03 / AIR EXCHANGE

Ventilation · modes per requirements

04 / BASE AND WATER

Sub-slab measures — as needed
Drainage · groundwater protection

Measurements confirm the effectiveness of the measures. Compatibility with CBRN isolation is determined by specialists.

SUITABILITY FOR LONG-TERM OCCUPANCY

Preserve not only life — sustain people's operational capability

01 / HUMAN

Rest and basic needs

Seating and sleeping areas
Drinking water · food storage
Sanitation · hygiene
Medical support

02 / ENVIRONMENT

Comfort and capability

Lighting · temperature
Humidity · noise
Psychological suitability
Internal conditions control

03 / SAFETY

Access and zoning

Accessibility for different people
Protected emergency exits
Separation of personnel
and technical zones

LENGTH OF STAY → RESOURCES → SPACE → OPERATING MODES

Capacity, occupancy conditions and autonomy time — calculated for each specific facility.

SCIENTIFIC AND TECHNICAL COOPERATION

For complex facilities, the protective structure is an integrated engineering system

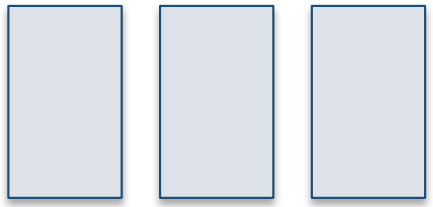


Model of required competence engagement; specific partners, contracts and roles are agreed per project.

PROTECTED POWER AND DECENTRALISATION

We protect not only people — we protect the facility's function

CENTRALISED NODE



Dependency concentration

MODULE A / GENERATION

Backup generation · cogeneration / micro-CHP

MODULE B / STORAGE

Batteries · UPS · protected distribution

MODULE C / CONTROL

Control · communications · technical reserves

CRITICAL FUNCTIONS

Life support
Pumps · water
Control · communications

Redundancy and autonomy — per scenarios and calculation. Combustion / exhaust paths separate from occupant ventilation.

DIFFERENT MISSIONS — DIFFERENT CONFIGURATIONS

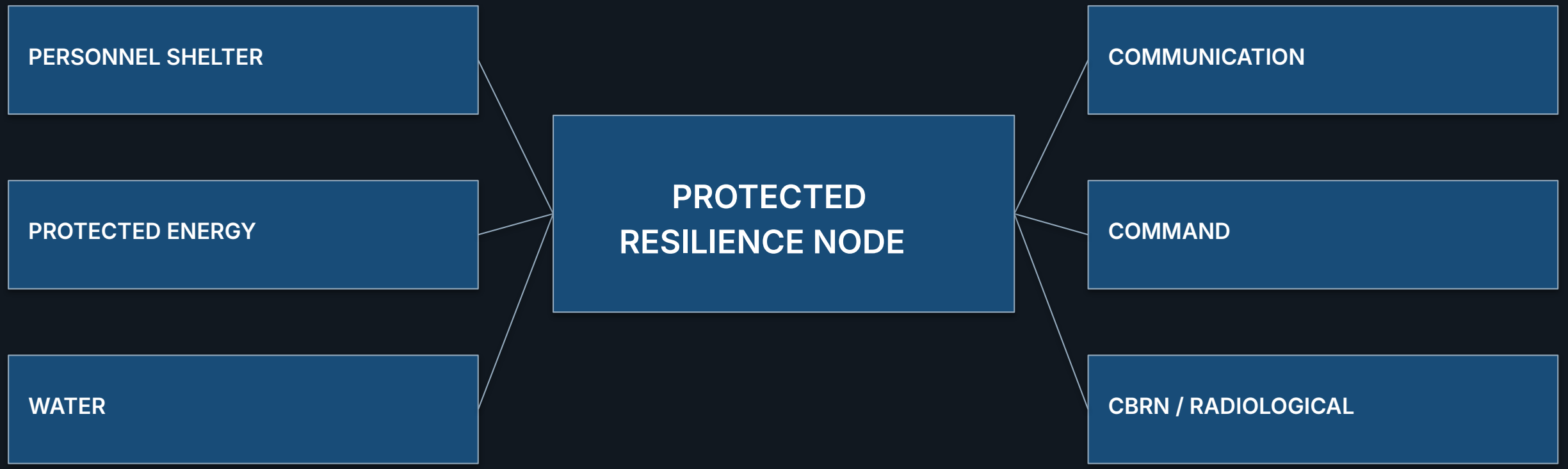
Shared platform; different priorities, interfaces and operating modes

FOCUS	CIVIL / SCHOOLS	INDUSTRY	ENERGY	NUCLEAR / RADIOLOGICAL
People and access	Capacity · safe access Clear evacuation	Shift crews Technical access	Personnel Operational teams	Specialised personnel Controlled access
Critical function	Sanitation · ventilation Medical support	Communications Emergency control	Control · backup generation Technical continuity	Emergency safety functions Radiation monitoring
Special modules	Life support Medical zone — if required	Emergency energy Command · communication	Cogeneration · batteries Protected technical modules	CBRN · dosimetry Protected ventilation
Design logic	User groups Accessibility · evacuation	Facility operating mode Limits of technical zones	Critical loads Redundancy	Safety case · zone control Specialized expertise

Priorities are shown, not a rigid configuration. Functions may be combined; all characteristics are set by the project.

W-FORTEX

PROTECTED RESILIENCE NODE



PROTECT PEOPLE. PRESERVE FUNCTIONS. ENSURE AUTONOMY.

SUSTAIN CONTINUITY OF OPERATIONS. Pilot: mission → requirements → experts → configuration

IV IBIPC — TECHNICAL ANNEX

From concept to specific products and verifiable input data.

CATALOGUE	DOCUMENTS	LIMITS
Full product family Geometry and configurations	Primary materials Test conditions	Evidence by configuration No general guarantees

IBIPC — one of the material directions of W-FORTEX, not a mandatory basis for all solutions.

W-FORTEX IBIPC

HIGH-PERFORMANCE BALLISTIC AND BLAST PROTECTION

Technical annex to W-FORTEX NEXT

UHPFRC technology, modular protective elements, drawings, tests and primary documents.

Ukrainian version · EN V1 · 96 slides



Source: Product File IBIPC, pp. 1, 2.

IBIPC IN W-FORTEX ARCHITECTURE

One of the high-performance technologies, not the system's only material

W-FORTEX	Modular protection architecture
LOWER PROTECTIVE BELT	Lower protective belt
LOCAL HARDENING	Local reinforcement
IBIPC / UHPFRC	High-performance concrete elements

Criticality · required protection level · available footprint · transport and installation · verified configuration

Conceptual W-FORTEX integration per client brief. Not a test result.

DATA. DOCUMENTS. LIMITS OF EVIDENCE

The annex separates four different types of information

Type	What it means	What it does not mean
Catalogue claim	Manufacturer's description, claimed class or property	Not a universal guarantee for every configuration
Test result	Data for the specific sample and test conditions	Not transferable to any sizes and designs
Certificate / letter	Identified product, configuration, details and status	Not blanket certification; conditions retained
W-FORTEX concept	The technology's place in the system architecture	Not nuclear qualification and not a new test result

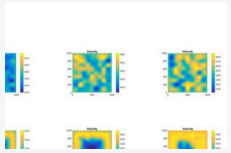
Old catalogue layout not carried over. Official documents, seals and handwritten annotations not retouched.

Source: Product File IBIPC, pp. 2, 36, 38, 39, 40, 41, 42, 43.

IBIPC: TECHNOLOGY PROFILE

Official name confirmed by the source

INSTITUTE OF BLAST & IMPACT PROOF CONCRETE



MATERIAL

UHPFRC — Ultra High Performance Fiber Reinforced Concrete: ultra-high-performance fiber-reinforced concrete.

The name IBIPC is retained as a technology designation in W-FORTEX.

DEVELOPMENT

The catalogue links the development to the Czech Technical University in Prague, the University of Defence and the Military Research Institute.

The Ministry of Defence letter cites research cooperation and contractual interaction.

Source: Product File IBIPC, pp. 1, 2, 4, 36.

PRODUCT FAMILY: FULL LIST

Catalogue numbering and names retained, including repetitions

I–IV · BARRIERS / WALLS / FACILITIES

01. Ballistic bench
02. Ballistic seat
03. Flower box

04. Ballistic wall
05. Ballistic mobile T-shaped wall

06. Mobile checkpoint — pyramid
07. Mobile checkpoint — STING
08. Blast-resistant mobile trash bins

09. Ballistic shields for reinforcing a building
10. Protective tunnels for high-priority cables

V.1 · TACTICAL LEVEL

10. Panic room
11. Checkpoint
12. Mobile bunker
13. Basic infantry bunker
14. Advanced infantry bunker
15. Advanced infantry bunker for issue
16. Inter-operational bunker for ammunition
17. Medical bunker
18. Operational bunker for ammunition

V.2–V.3 · OPERATIONAL / STRATEGIC

19. Underground bunker
20. Civil defence shelter
21. Military defence bunker
20. Command bunker
22. Modular container data centres
23. Evacuation bunker
24. Generator bunker
25. Bunker for cogeneration units
26. Custom-built bunkers

27. Hardened infantry bunker, Class A
28. Hardened infantry bunker, Class B
29. Hardened F-16 aircraft shelters
30. Hardened F-35 aircraft shelters

The catalogue claims 30 products but repeats numbers 10 and 20. For some items, individual specifications are not given.

Source: Product File IBIPC, p. 3.

RESEARCH AND INTELLECTUAL PROPERTY

Institutions, their role and legal protection in catalogue wording

DEVELOPMENT / CTU PRAGUE

The elements were developed by IBIPC together with CTU Prague, the University of Defence and the Military Research Institute; protected by international patent rights. The catalogue claims NATO compliance and supply for defence facilities, potential targets of attack and critical infrastructure.

In the modern laboratories of the Faculty of Civil Engineering at CTU, samples of the high-tech UHPFRC composite were developed and tested for several years. Research by leading scientists secured the declared unique physical and mechanical properties.

DEFENCE UNIVERSITY / VVÚ

Military engineering faculty: needs of the defence industry, armed forces and state bodies; protection, design and construction of critical / military infrastructure; structural diagnostics and military engineering technologies. Scientists, technicians, experts, specialists and military advisers with foreign-mission experience.

Military research institute: fundamental and applied research, experimental development for the strategic interests of the state, defence, security and capabilities of the Czech Army and allies; final testing, reports, certification.

INTELLECTUAL PROPERTY

Intellectual and industrial rights UHPFRC is protected by international patents. Copyright in the design solutions of protective components is also protected and duly registered with the relevant authorities, including the European Patent Office, within the meaning of the law.

Numbers given in the certificate, p. 40: Patent CVUT Prague No. 304 478 European Patent EP 3 351 518 A1.

Role and supply descriptions on this slide are Product File claims, not independent registry verification.

Source: Product File IBIPC, pp. 4, 40.

MATERIAL: INDICATORS ARE NOT MIXED

Catalogue parameters, concrete class and measured results are separate records

Parameter	Source value	Origin / status
Compressive strength	150 MPa	Catalogue, aircraft shelters, p. 27
Tensile strength	15 MPa	Catalogue, aircraft shelters, p. 27
Compressive strength of mixes	Over 165 MPa	Catalogue, concrete mixes, p. 35
High-strength concrete class	C105/115 · EN 206	Catalogue, underground shelters, p. 20
Mean specimen strength	163.3 ± 7.1 MPa	Report 133 003/2021, p. 39
Mean density (as printed)	2765 ± 64 kg/m³	Report, p. 39; see note on discrepancy

The supplied file gives no numerical data on flexural strength or mix composition. No assumed values have been added.

Source: Product File IBIPC, pp. 20, 27, 35, 39.

WHY HIGH-PERFORMANCE CONCRETE

Engineering logic, not unsubstantiated numerical advantages

POTENTIAL ADVANTAGE	WHAT NEEDS TO BE CHECKED
Smaller required thickness of the protective element.	The same design scenario of impact and configuration.
Lower mass and more compact footprint.	Total mass, joints, supports, foundation and stability.
Fewer trips; lighter crane equipment.	Logistics, local resources, installation and repairability.

The Product File contains no comparative percentages or universal reductions in cost, weight or thickness.

Conceptual W-FORTEX integration per client brief. Not a test result.

BALLISTIC PROTECTION

Gauges, standards and separate source conditions

Entry	Exact designations	Status
Catalogue class A5	14.5 × 114 API M32	STANAG 2280:2016 Edition 2
Ballistic glass / crew protection	STANAG 4569 Level IV	Catalogue statement for bunkers / shelters / checkpoints
Doors, ammunition list	7.62 × 54 R API; 7.62 × 51 AP8 (WC) 12.7 × 99 API M8; 14.5 × 114 API	Sandwich doors, p. 18
Test description	12,7 × 99 API M8 / 14,5 × 114 API M32 Impact velocity 900 m/s	Description p. 42; armour-piercing incendiary ammunition

The source gives no universal ballistic test distance or all setup details for each product.

Source: Product File IBIPC, pp. 2, 18, 42.

BLAST AND FRAGMENTS: DIFFERENT CONFIGURATIONS

Exact charge masses, calibres and distances are retained

Origin	Value	Limit of interpretation
Catalogue, class C4	107-mm rocket / 120-mm mortar	Claimed fragmentation effect class
Catalogue, class D6	50 kg TNT	Do not equate with the 20 kg test
Test description, p. 42	107 mm / 120 mm · distance 1,5 m	Not a full test report
Blast test description, p. 42	20 kg TNT · distance 5 m	Single stated scenario
Photos / captions of bunker tests	120-mm mortar: blast on bunker ceiling	pp. 15, 21, 26; original photos kept

The supplied Product File gives no numerical overpressure in kPa for these tests.

Source: Product File IBIPC, pp. 2, 15, 21, 26, 42.

STANAG / NATO: PRIMARY RECORDS MAP

Each claim is linked to a specific document

Document / record	Details	What the source confirms
Catalogue registration	BUNKR IBIPC · S-22802016 0145410000544 · A492H04BAYR6	Catalogue statement, p. 9
Letter from Ministry of Defence	490537/2024-1216 · 17 June 2024 NCAGE 8286G · NSN 5411160090335	Recommendation / reference letter
Laboratory report	133 003/2021 · 17 December 2021	Compression tests; sheets 1 and 3 available
VVÚ certificate	VVÚ 2280-011-2022 · 30 January 2023	A5 / C4 / D6; Conditionally Compliant
VVÚ certificate	VVÚ 2280-001-2025 · 6 November 2025	E3; Conditionally Compliant



	A Проєкти	Б Прямий вогонь Боєголовки	С Непрямий вогонь Боєприпаси	Д Високий Вибухівка (ТНТ-екв.)	Е Переїзд Транспортні засоби
6.	Automac canon 30 mm APDS	Розширений ASM Структура Боєприпаси	240-мм ракета	50 кг	Відстежуються
5.	Кулемет калібру 14,5 мм (0,57)	Тандемний ACM	155-мм міномет 122-мм ракета	10 кг	Велика вантажівка 32 000 кг
4.	Кулемет калібру 12,7 мм (0,50)	Персонал Термобаричний конвенальний звинувачення < 2,5 кг	120-мм міномет 107-мм ракета	2 кг	Вантажівка 7500 кг
3.	Штурм / Снайпер Гвинтівка 9,02 мм AP	Ан-танк Кумулятивний заряд	82-мм міномет	1 кг	Маленька вантажівка 2500 кг
2.	Штурмова гвинтівка Куля 5,56 - 7,62 мм	40-мм гвинтівкова граната кумулятивний заряд	60-мм міномет	0,5 кг	Легковий автомобіль 1500 кг
1.	Пістолет	(зарезервовано)	Ручна граната	0,1 кг	Мотоцикл

Тяжкість ефекту (вибух)

Original table · p. 43

STANAG 2280 Edition 2 / ATP-3.12.1.8 Edition 1 Version 1. NATO supplier status does not imply certification of every product.

Source: Product File IBIPC, pp. 9, 36, 38, 39, 40, 41, 43.

FINISHING AND CAMOUFLAGE

Catalogue variants without carrying over the old brand presentation

Element surfaces are treated with primer UNIVERSUM CAMOUFLAGE PATTREN; eight other camouflage colours on request.

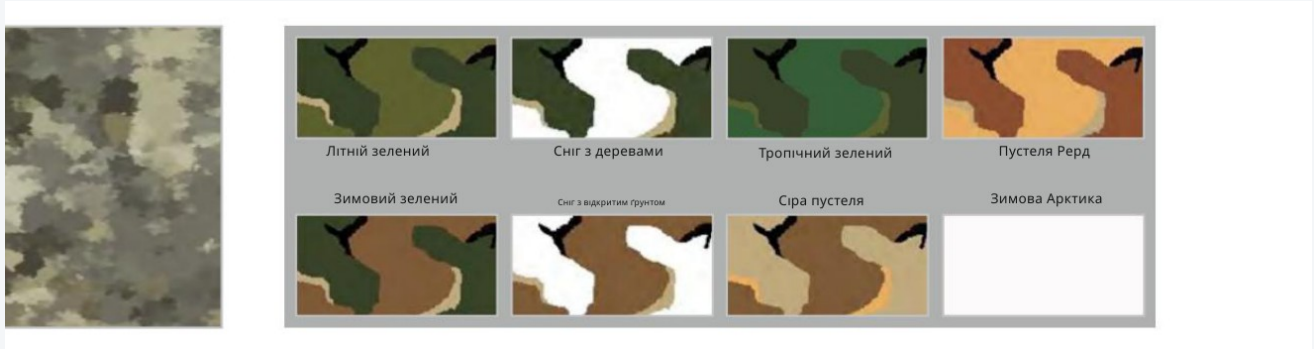
Catalogue reference: NATO MERDEC. PATTREN / MERDEC designations kept as printed.

Summer green · Winter green

Snow with trees · Snow with open ground

Tropical Green · Rerd Desert

Grey Desert · Winter Arctic



Source: Product File IBIPC, p. 2.

BALLISTIC CONCRETE BENCHES

Product description and declared catalogue characteristics

PURPOSE / DESIGN

To reinforce the defence of inner perimeters of military and civilian airports, to protect foreign embassies, state administration buildings, access routes to city centres, to protect critical infrastructure, both military and civilian. The security element is hard to notice under wooden cladding. Provides cover for reloading and returning fire.

Characterised by high resistance to blast wave and penetration by conventional projectiles, fragments and secondary fragments. Captures and diverts the pressure wave, prevents penetration of a passenger vehicle into the protected perimeter.

Light and heavy variants.

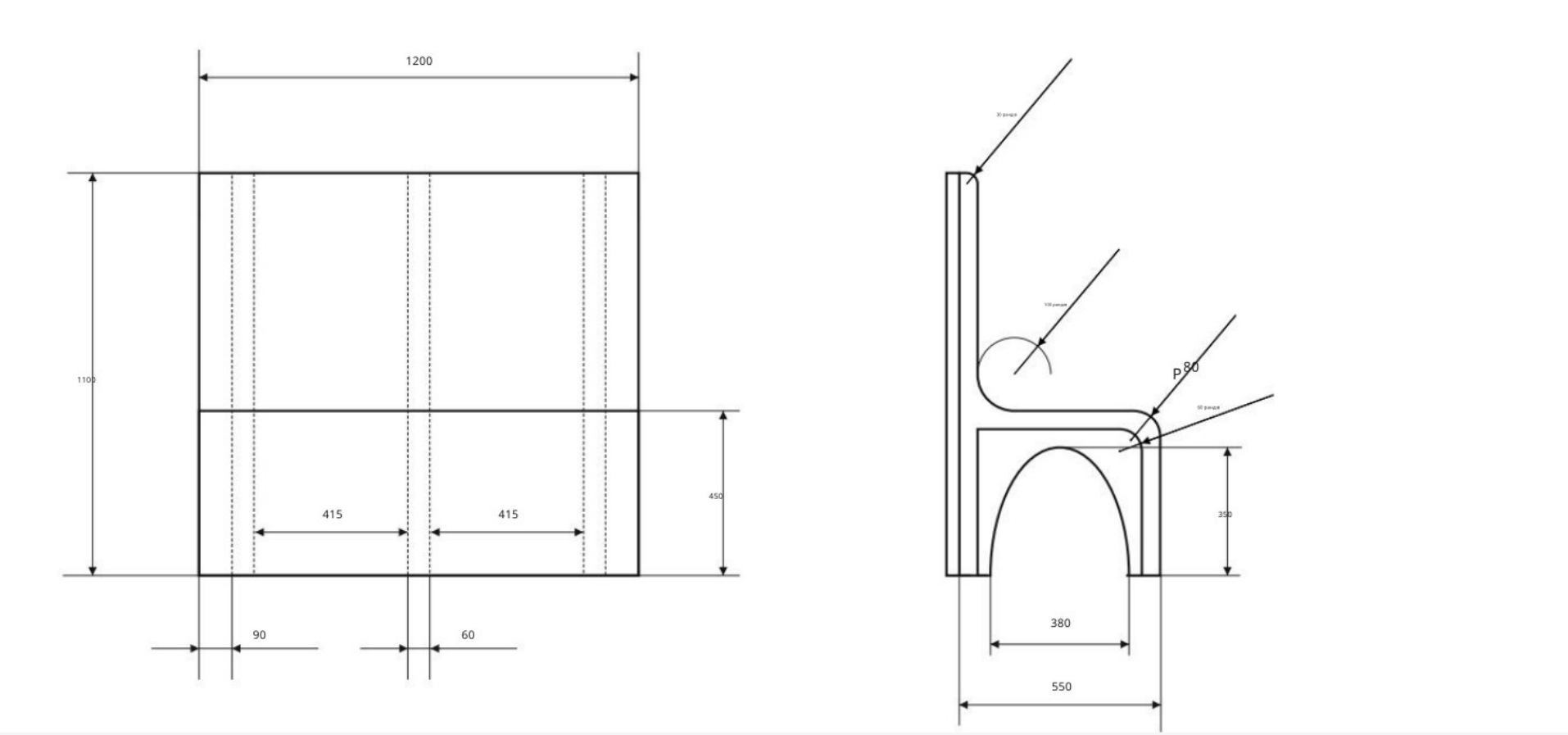




Source: Product File IBIPC, p. 5.

BENCHES: DRAWINGS AND TESTING

Original Product File materials — geometry and designations preserved



Original dimensions and captions: 30 / 100 / 60 “rands” preserved unchanged.

Source: Product File IBIPC, p. 5.

BALLISTIC CONCRETE PLANTERS

Product description and declared catalogue characteristics

PURPOSE / DESIGN

To reinforce the defence of inner perimeters of military and civilian airports, to protect foreign embassies, state administration buildings, access routes to city centres, to protect critical infrastructure, both military and civilian. The security element is hard to notice under wooden cladding. Provides cover for reloading and returning fire.

Either a freestanding upper part of the element only, or placed on a plate buried in the ground. A combination of the two parts, designed per explicit numerical modelling, can stop a 20-tonne truck travelling at 100 km/h.



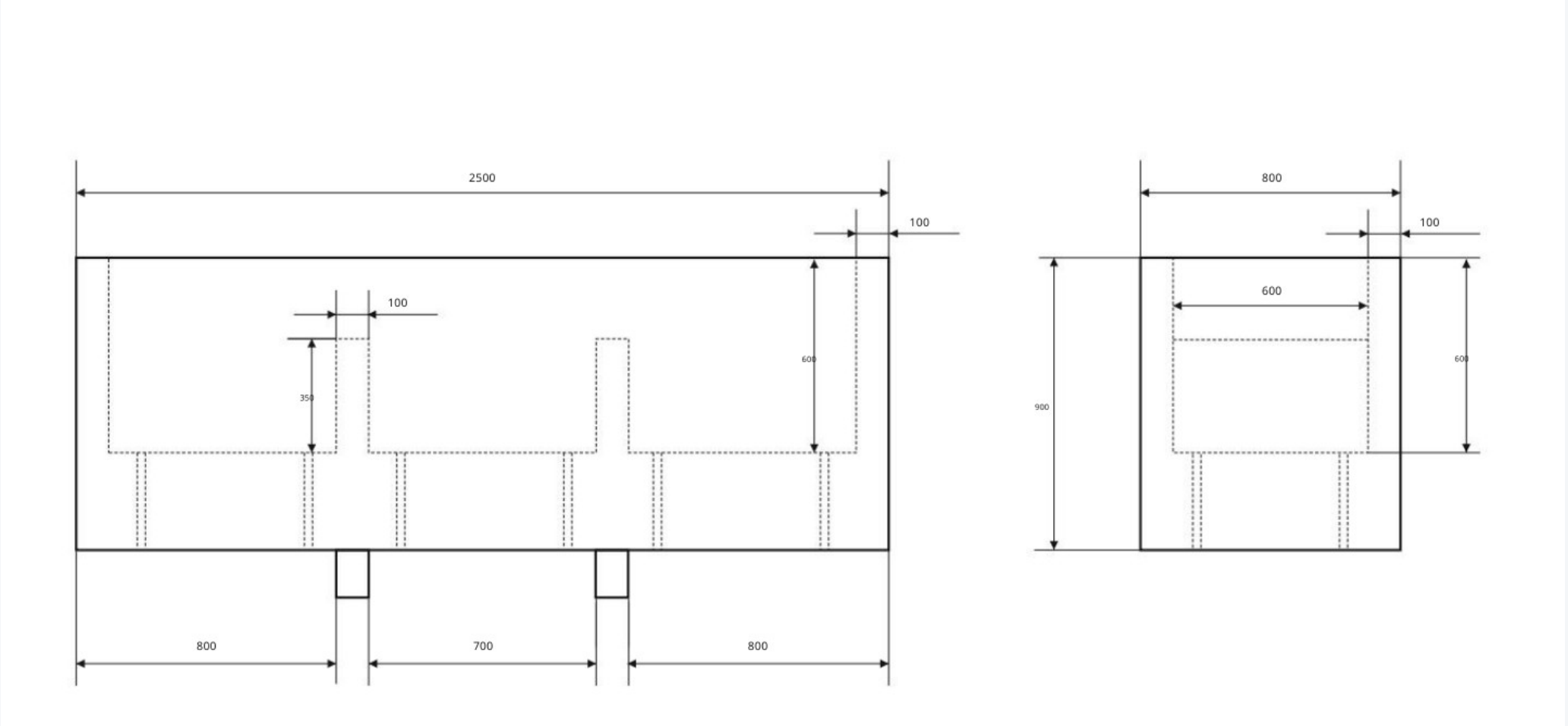


Light and heavy variants. 20 t / 100 km/h — claim of numerical modelling, not a separate shown crash test.

Source: Product File IBIPC, p. 6.

PLANTERS: ORIGINAL DIMENSIONAL VIEWS

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 6.

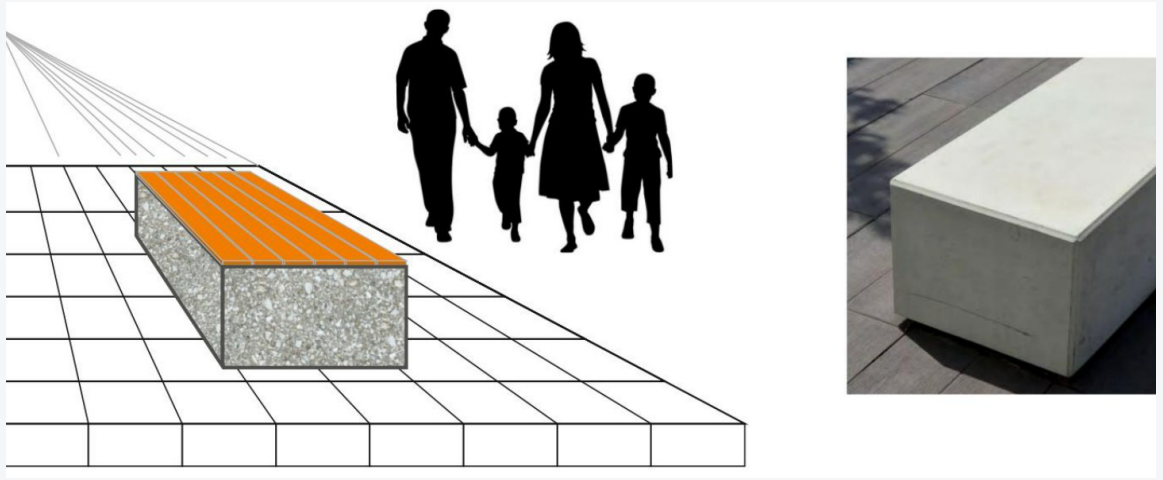
BALLISTIC SEATS

Product description and declared catalogue characteristics

PURPOSE / DESIGN

To reinforce the defence of inner perimeters of military and civilian airports, to protect foreign embassies, state administration buildings, access routes to city centres, to protect critical infrastructure, both military and civilian. The security element is hard to notice under wooden cladding. Provides cover for reloading and returning fire.

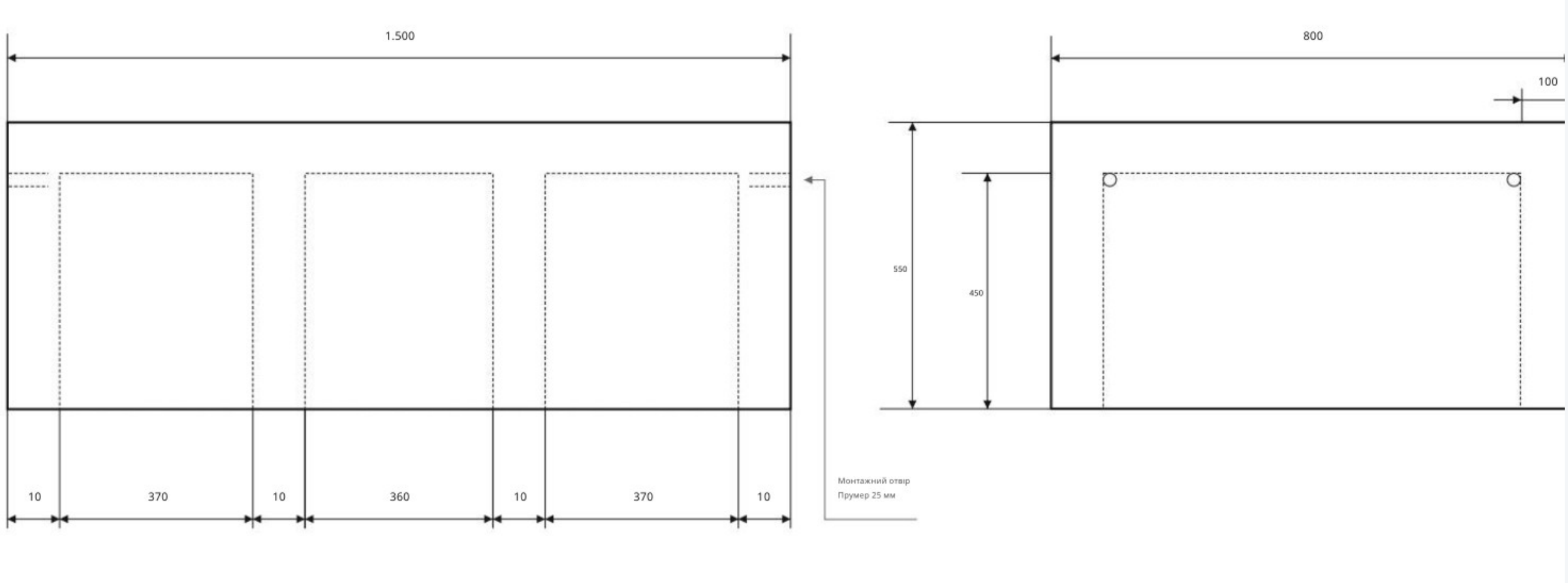
Characterised by high resistance to blast waves and penetration by conventional projectiles, fragments and secondary fragments. Captures and diverts the pressure wave. When anchored, it prevents penetration of passenger vehicles into the perimeter being guarded.



Source: Product File IBIPC, p. 7.

SEATS: GEOMETRY AND MOUNTING

Original Product File materials — geometry and designations preserved



Mounting hole: diameter 25 mm; all geometric designations are left in the original.

Source: Product File IBIPC, p. 7.

BALLISTIC WALLS

Product description and declared catalogue characteristics

PURPOSE / DESIGN

A. Protection of military infrastructure. Shelters for aircraft, flight control points, command posts, radar systems, aviation fuel depots, air defence stations and other selected airport infrastructure facilities.

Ammunition depots, fuel depots, combat vehicle parks, air defence facilities, command structures and other important ground infrastructure facilities.

B. Protection of civil infrastructure.
Power plants, transformer substations, key supply depots for the population, drinking water systems, hospitals and their backup generators, and other important civil infrastructure facilities.



Source: Product File IBIPC, p. 8.

WALLS: PHOTO AND ORIGINAL SECTION

Original Product File materials — geometry and designations preserved





Source: Product File IBIPC, p. 8.

UNIVERSAL MODULAR SYSTEM

Bunkers, shelters and checkpoints

STRUCTURE

Durability, simplicity, resistance and an exceptionally long service life. These are the key design attributes of the high-quality IBIPC prefabricated spatial frame with a lock that creates a watertight joint when sealing is secured. A simple and reliable system of reinforced concrete elements made of UHPFRC will create mobile infantry bunkers, extended squad infantry bunkers, CD shelters, checkpoints, command bunkers and other bunker types at the tactical and operational levels. In several dimensions and structural lengths.

All elements and components must be modularly deployable without the need for routine maintenance. Designed with the assembly flexibility needed to meet current requirements.

FILTRATION / VENTILATION

The Venlaon system operates even under martial law, when electricity is unavailable; Manual and electric unit. Filtration and ventilation equipment supplying air into the protected zone even under WMD effects. In a collective protection facility, overpressure is created that prevents the penetration of harmful substances into the protected crew compartment.

The name “Venlaon” is retained from the source description; no numerical overpressure value is given for this segment.

Source: Product File IBIPC, p. 9.

UNIVERSAL SEGMENTS I / II

Geometry, mass and sealed joint of modular elements

CATALOGUE PARAMETERS

Parameter	Segment I	Segment II
Length, m	2	2
Internal W × H, m	2 × 2.1	3 × 3
Overall W × H, m	2.4 × 2.5	3.4 × 3.4
Wall thickness, m	0.2	0.2
Mass, t	9,5	12,9

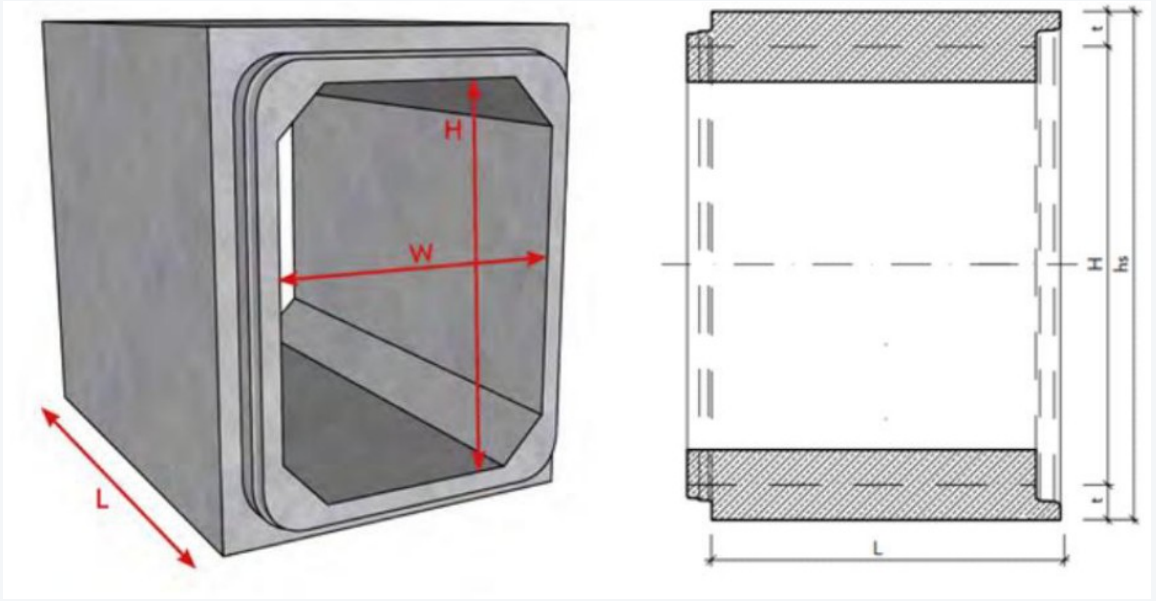
System material: UHPFRC. Values are per the catalogue; the drawing is not a scale template.

REGISTRATION STATED IN THE SOURCE

BUNKR IBIPC · S-22802016
Material classification: 0145410000544
Identifier: A492H04BAYR6

Source: Product File IBIPC, p. 9. Registration data are catalogue claims, not a separate certificate.

ORIGINAL DRAWINGS · NOT REDRAWN



Locking joint with rubber seal



CHECKPOINTS

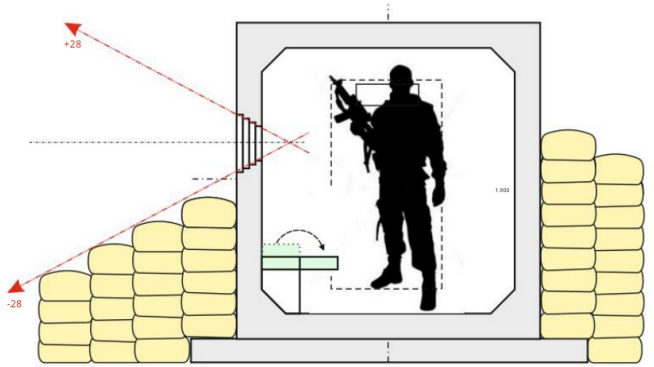
Product description and declared catalogue characteristics

PURPOSE / DESIGN

Strengthen the defence of the state border, reinforce the outer perimeters of military and civilian airports, strengthen the defence of bridges and key transit arteries, and enhance the protection of critical and civilian infrastructure.

Assembly and dimensional views are shown on the next slide; original ±28 designations left without reinterpretation.

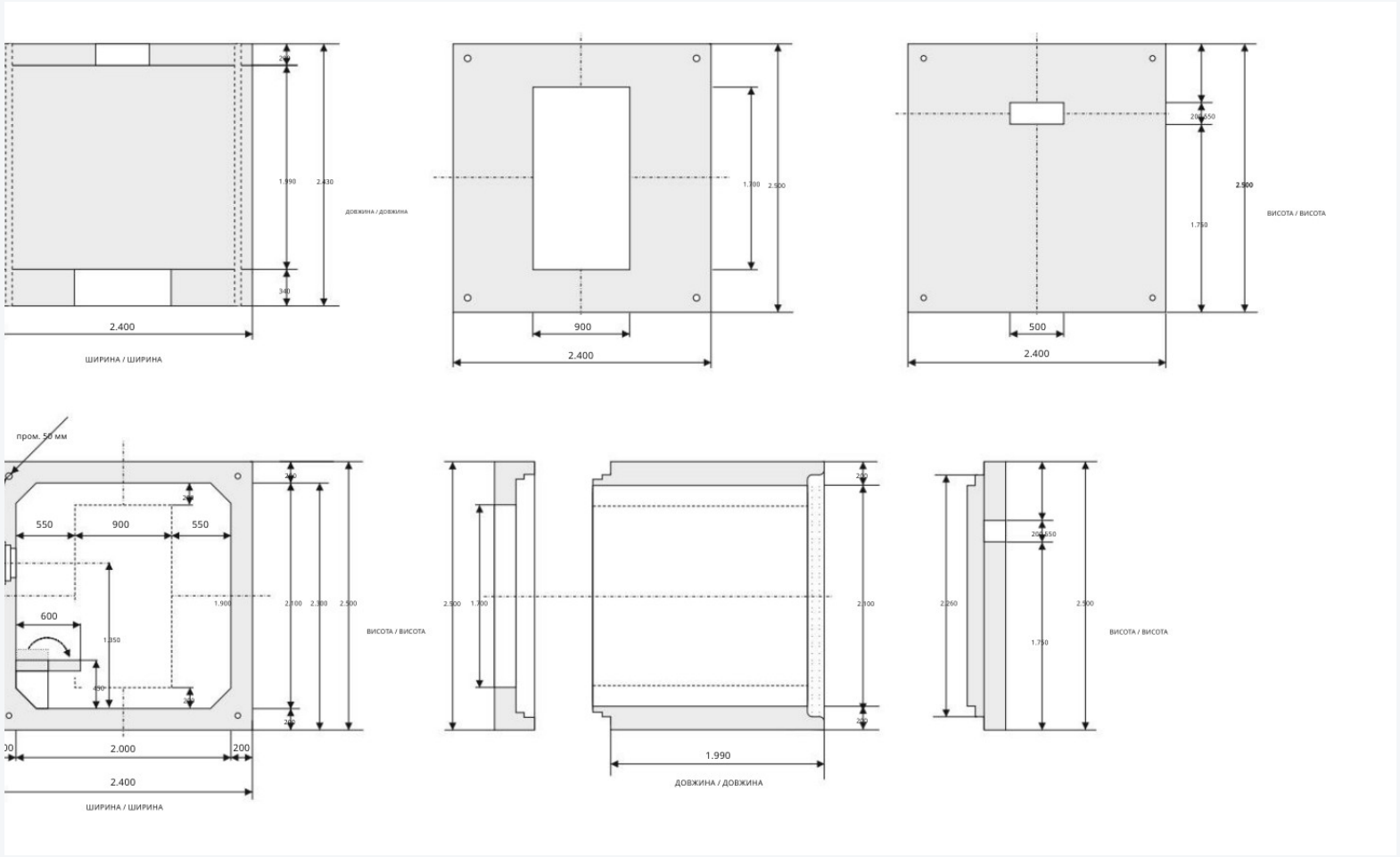




Source: Product File IBIPC, p. 10.

CHECKPOINTS: DRAWING

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 10.

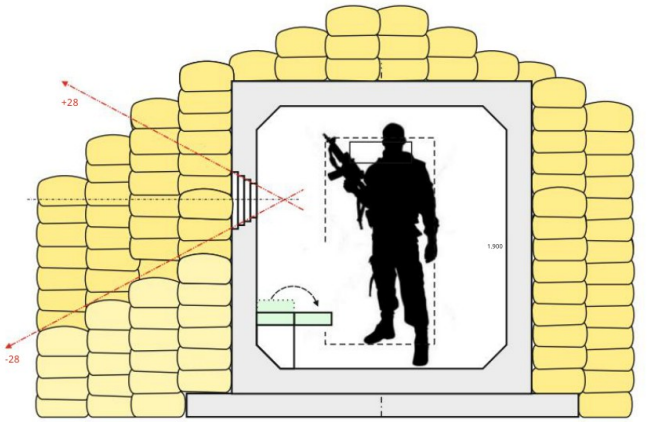
MOBILE BUNKERS

Product description and declared catalogue characteristics

PURPOSE / DESIGN

A front-line position to slow or stop an enemy attack. Interchangeable universal segments with stepped embrasures, slits, armoured doors, an emergency exit and a filtration and ventilation system. Mobile bunker deployed in the field according to the tactical situation, turnkey configuration to customer specifications.



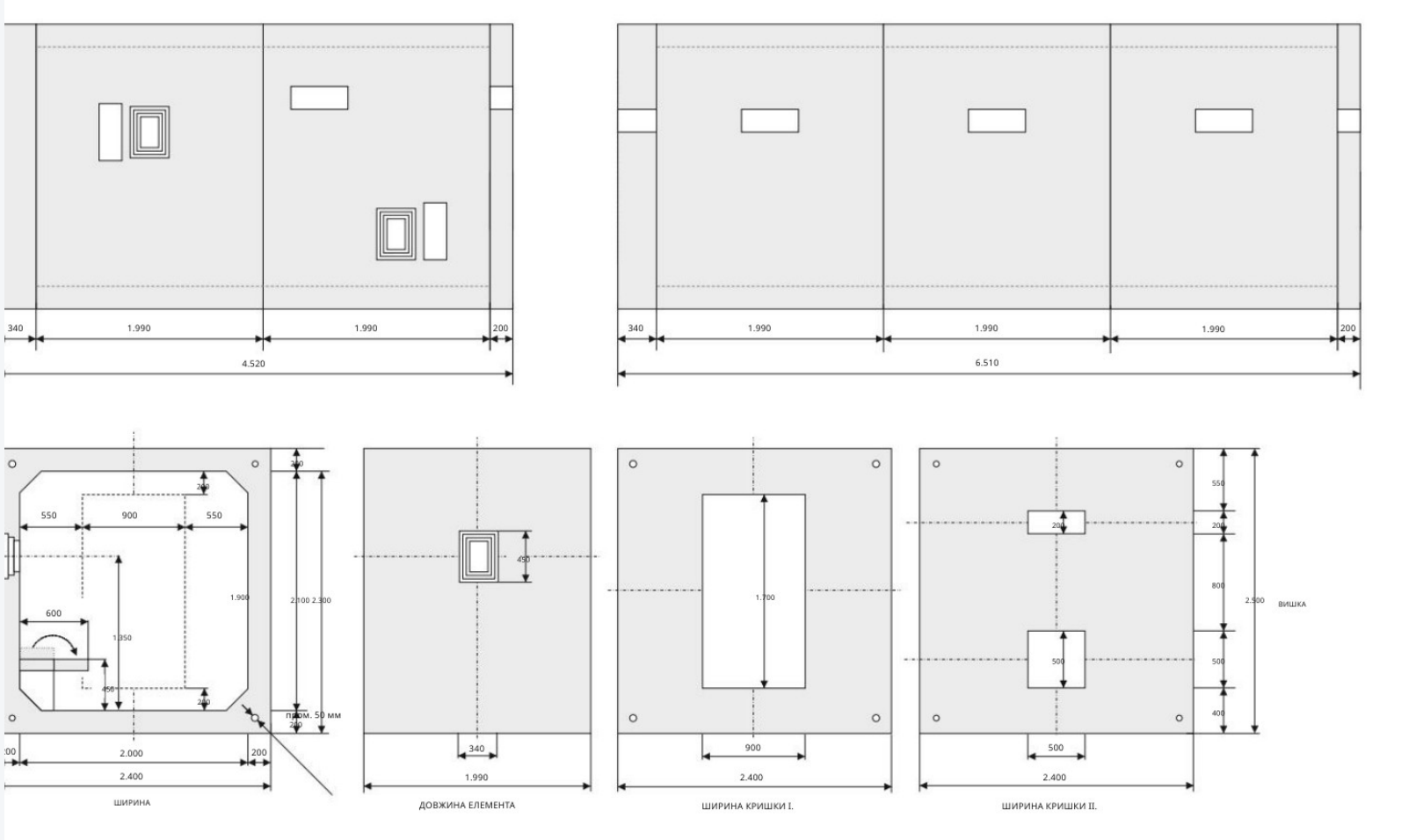


Example of possible layouts.
Individually fitted segments with doors and an evacuation hatch.

Source: Product File IBIPC, p. 11.

MOBILE BUNKERS: ASSEMBLY OPTIONS

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 11.

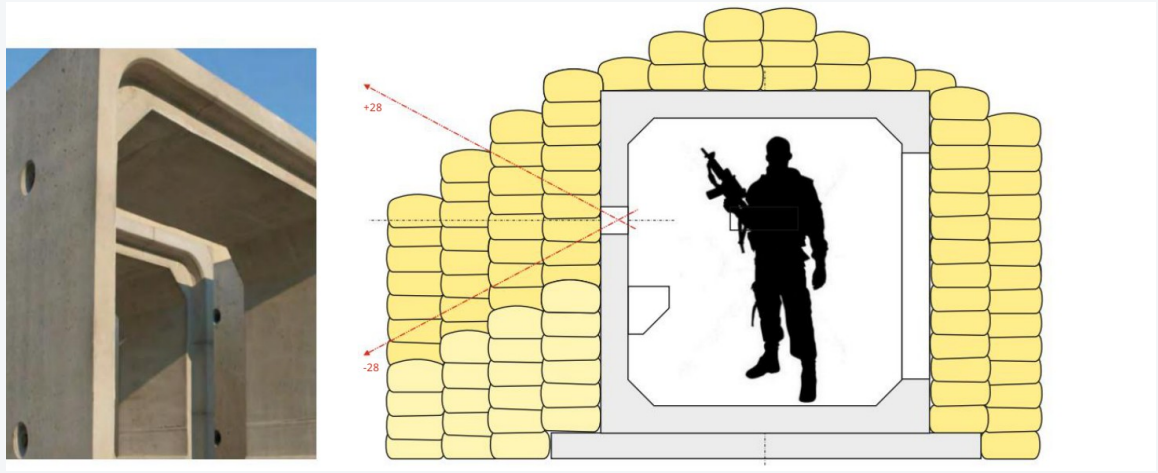
BASIC INFANTRY BUNKER

Three firing positions · protection for a six-person squad

PURPOSE / DESIGN

A front-line position to slow or stop an enemy attack. Mobile defensive military structure to protect personnel from drone attacks, artillery fire and grenades, and to conduct defensive combat on the defence line.

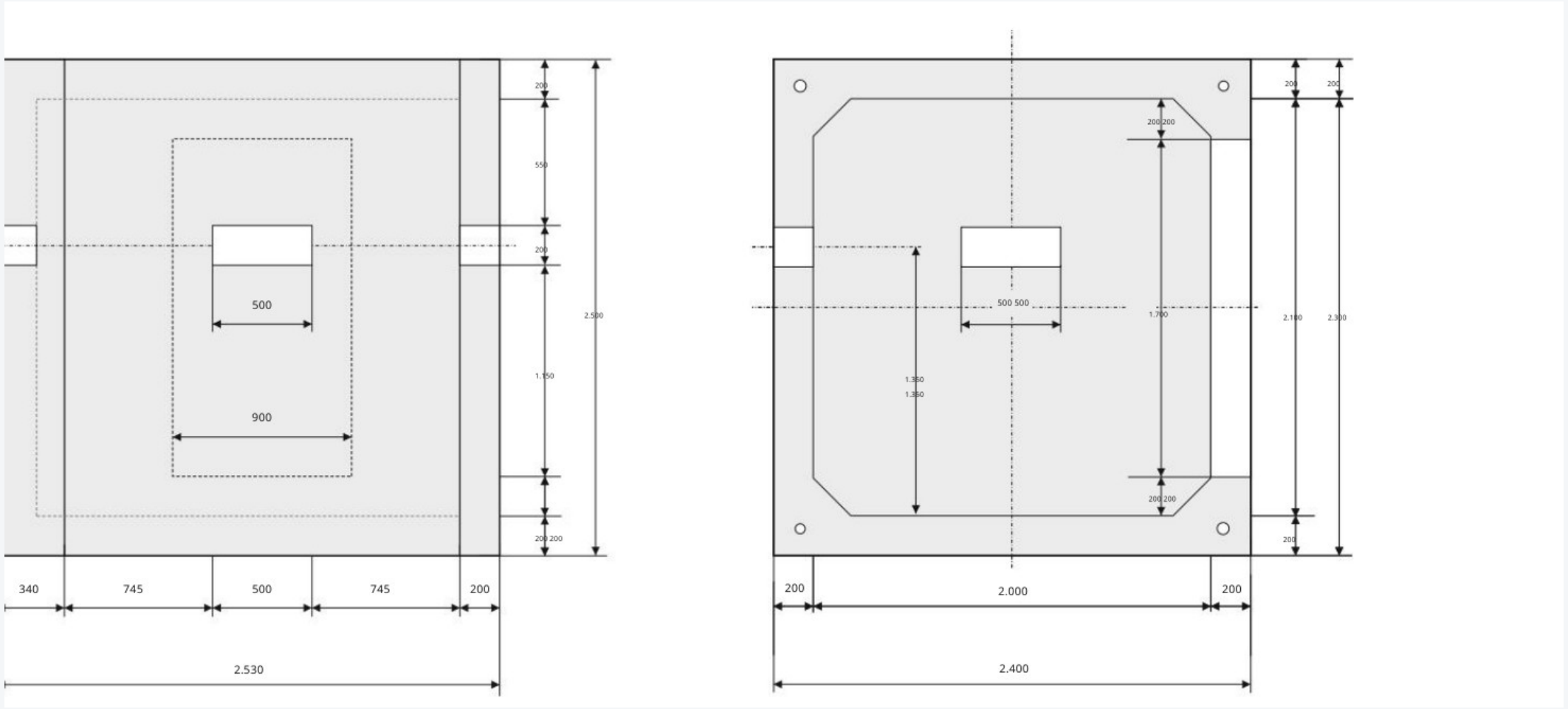
To increase protection effectiveness, it is advisable to partially bury it as part of a trench system and reinforce protection by covering it with natural material.
A universal building segment with variable arrangement of elements with embrasures, observation slits and an entrance opening. The advantage is quick assembly and modular design for creating a complex defence system.



Source: Product File IBIPC, p. 12.

BASIC BUNKER: DRAWING

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 12.

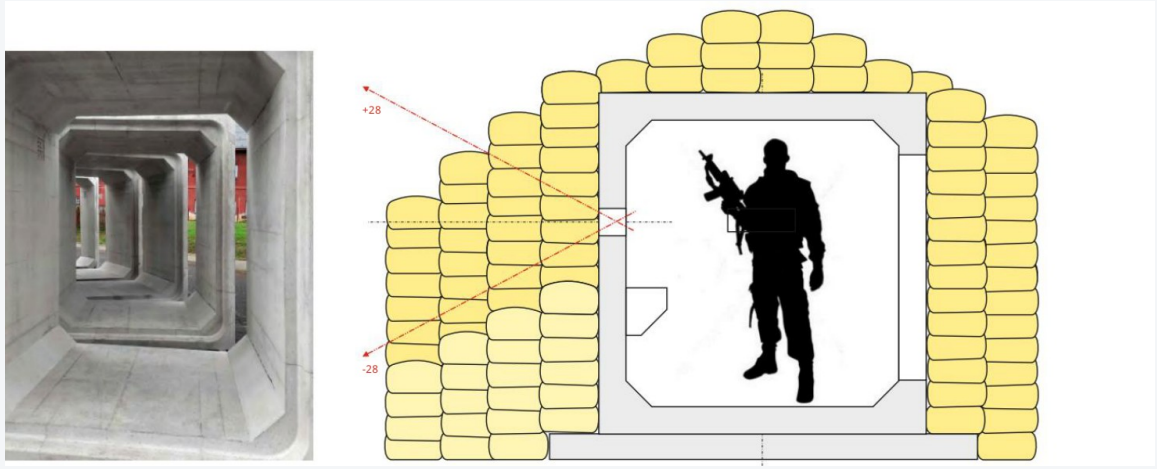
EXTENDED INFANTRY BUNKER

Four firing positions · protection for a 10-person squad

PURPOSE / DESIGN

A front-line position to slow or stop an enemy attack. Mobile defensive military structure to protect personnel from drone attacks, artillery fire and grenades, and to conduct defensive combat on the defence line.

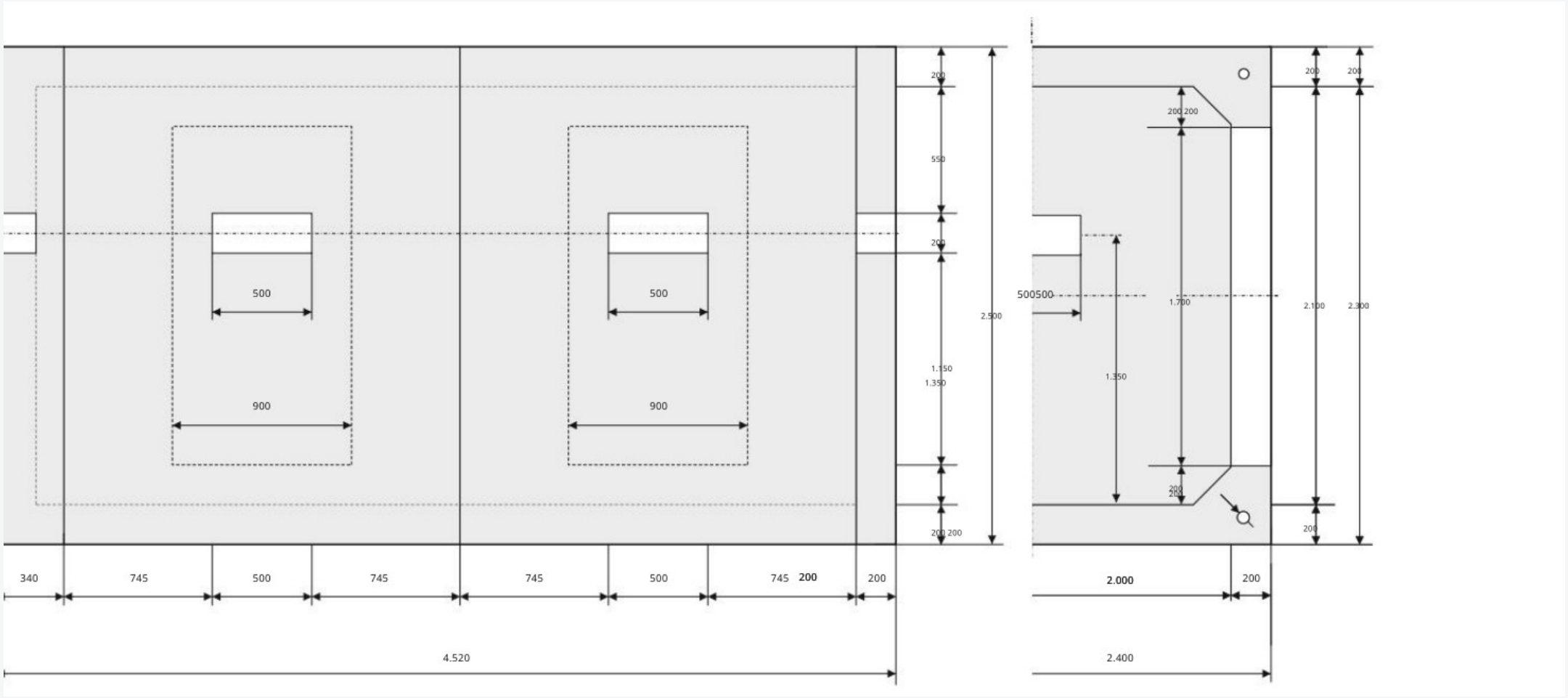
To increase protection effectiveness, it is advisable to partially bury it as part of a trench system and reinforce protection by covering it with natural material.
A universal building segment with variable arrangement of elements with embrasures, observation slits and an entrance opening. The advantage is quick assembly and modular design for creating a complex defence system.



Source: Product File IBIPC, p. 13.

FOUR POSITIONS: DRAWINGS

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 13.

EXTENDED INFANTRY BUNKER

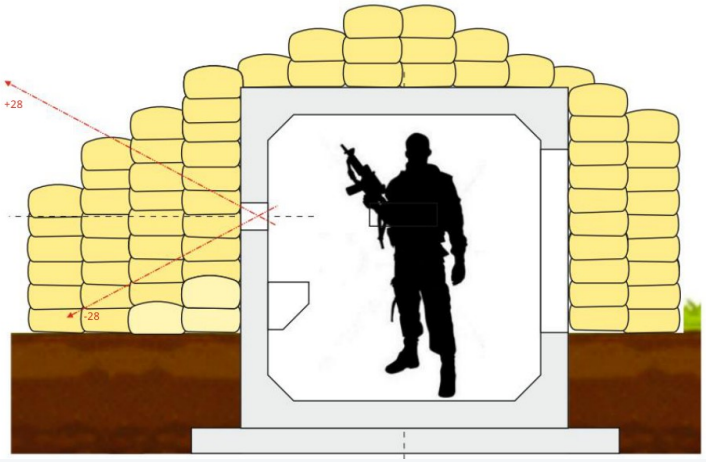
Eight firing positions · protection of a 10-person squad

PURPOSE / DESIGN

A front-line position to slow or stop an enemy attack. Mobile defensive military fortification to protect personnel from drone attacks, artillery fire and grenades, and to conduct defensive combat on the defence line. The bunker, built into the ground, reduces the frontal profile.

To increase protection effectiveness, it is designed for parallel embedding in the ground as part of a trench system, with additional protection recommended by soil backfilling. A universal building segment of variable design is fitted with embrasures, observation slits and an entrance opening. Its advantages are quick installation and modular assembly, which allow a comprehensive defence system to be created.

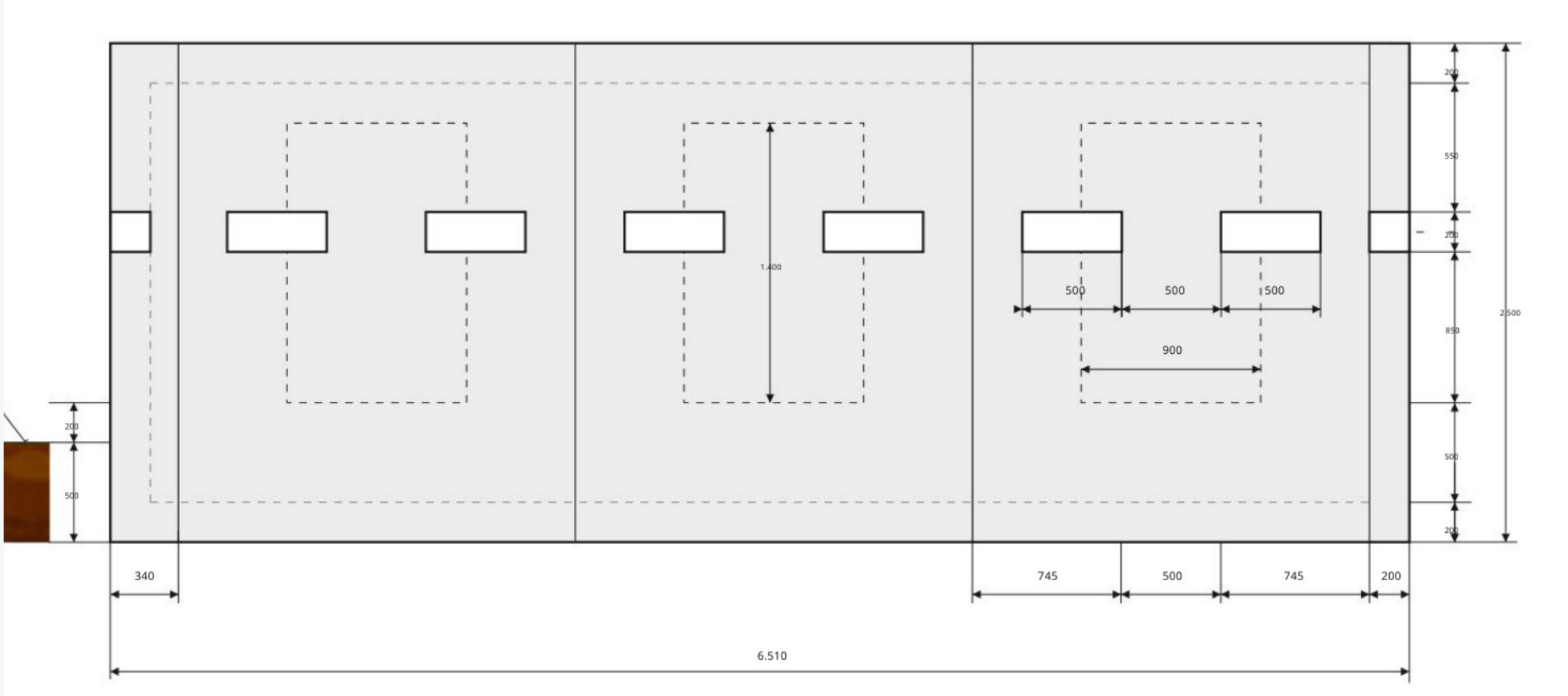




Source: Product File IBIPC, p. 14.

EIGHT POSITIONS: DRAWING

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 14.

AMMUNITION TRANSHIPMENT DEPOT

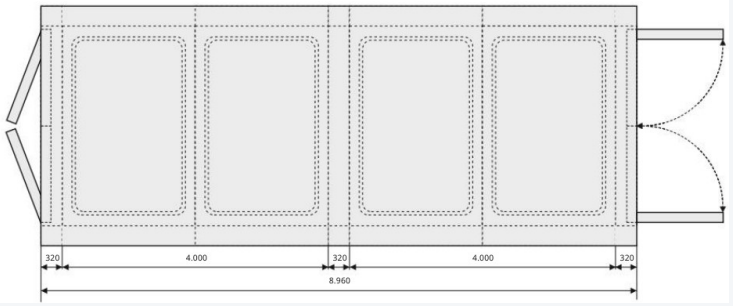
Product description and declared catalogue characteristics

PURPOSE / DESIGN

For safe storage of ammunition and equipment at railway transshipment points. Four universal building segments and a protective casing form a tube closed at both ends by covers; for fast forklift loading they are fitted with bulletproof double doors on both sides.

For safe storage of ammunition and equipment against drone attacks, gunfire, grenades and artillery fire; different building segments form a storage tube. In an explosion the material is retained, and directs the pressure wave upward, reducing the risk of concrete collapse and fragments flying across the whole area. For medium-term storage in SHORT-TERM and LONG-TERM period versions.

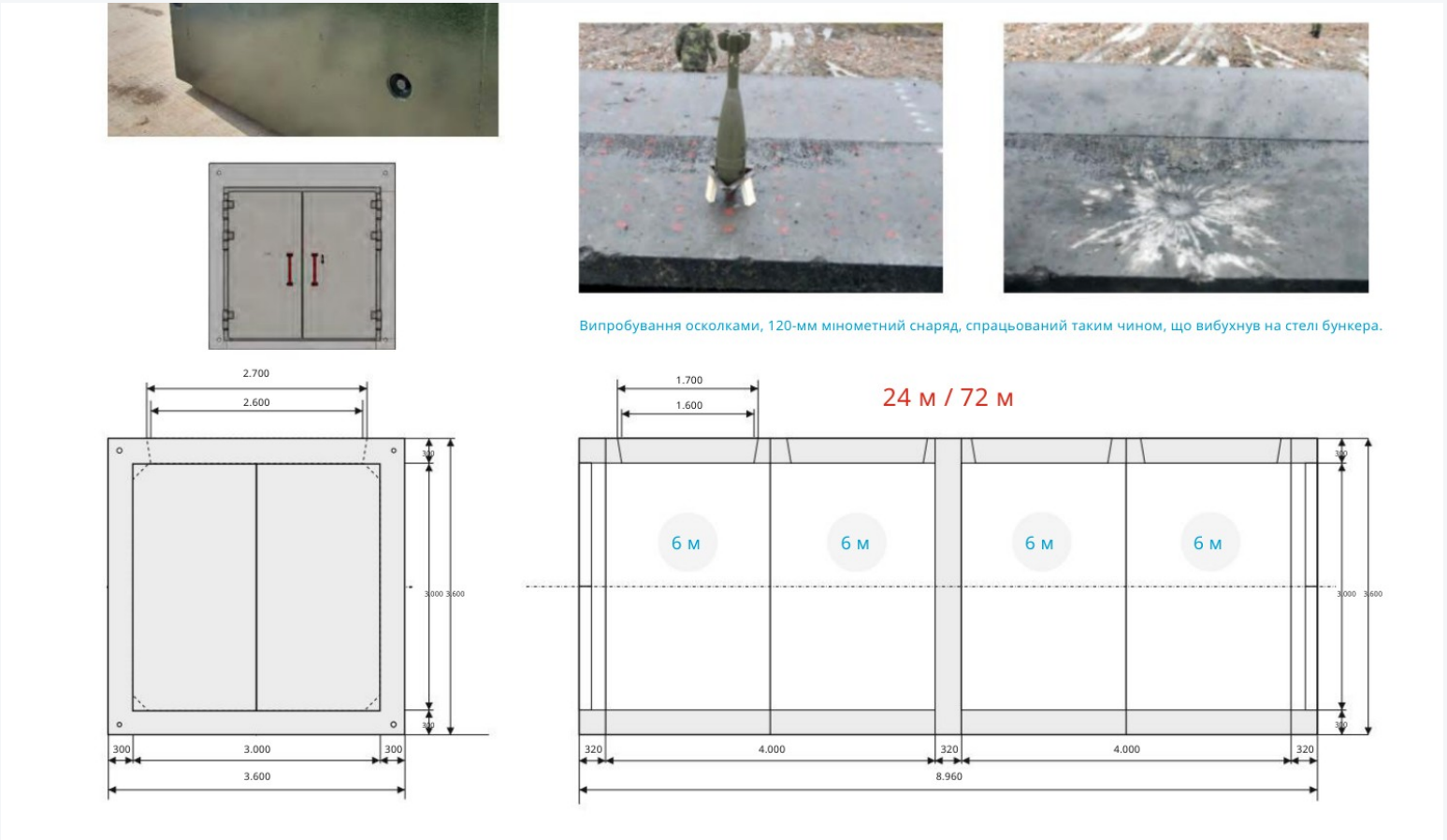




Source: Product File IBIPC, p. 15.

STORAGE: TESTS AND DRAWINGS

Original Product File materials — geometry and designations preserved



120-mm mortar: source caption indicates blast on bunker ceiling. 24 m / 72 m labels kept.

Source: Product File IBIPC, p. 15.

AMMUNITION BUNKER

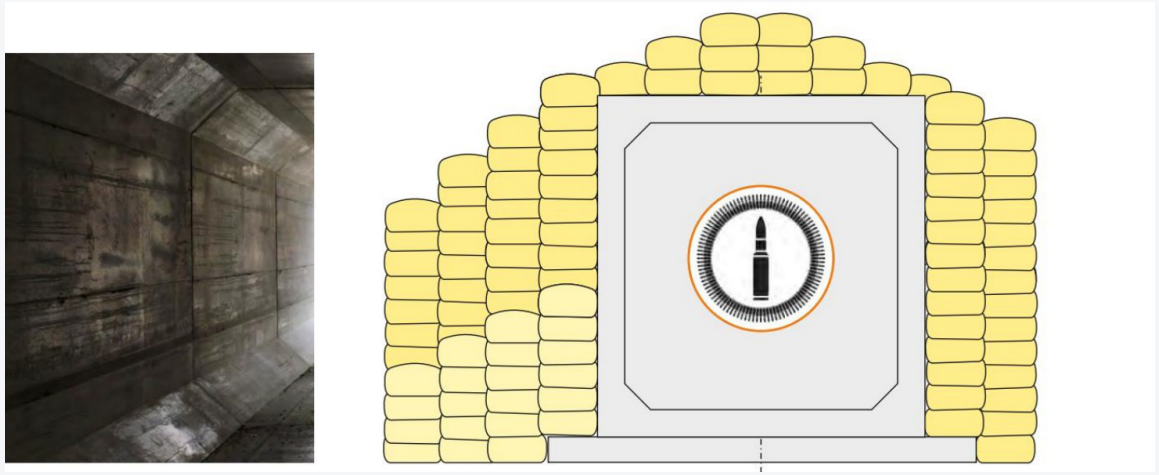
Product description and declared catalogue characteristics

PURPOSE / DESIGN

For safe storage of ammunition against drone attacks, gunfire, grenades and artillery fire. Three universal structural segments form a tube, closed at one end by a cover, open at the other end for quick access and use. No embrasures or observation slits.

In the event of an explosion of stored material, it directs the pressure wave out of the tubes and reduces the risk of concrete fragments scattering. The structure with a load capacity of 31.5 tonnes provides additional restraining mass. A built-in sandbag berm retainer limits the velocity of projectiles, secondary fragments and pressure waves. Advantage of the modular system for fast assembly.

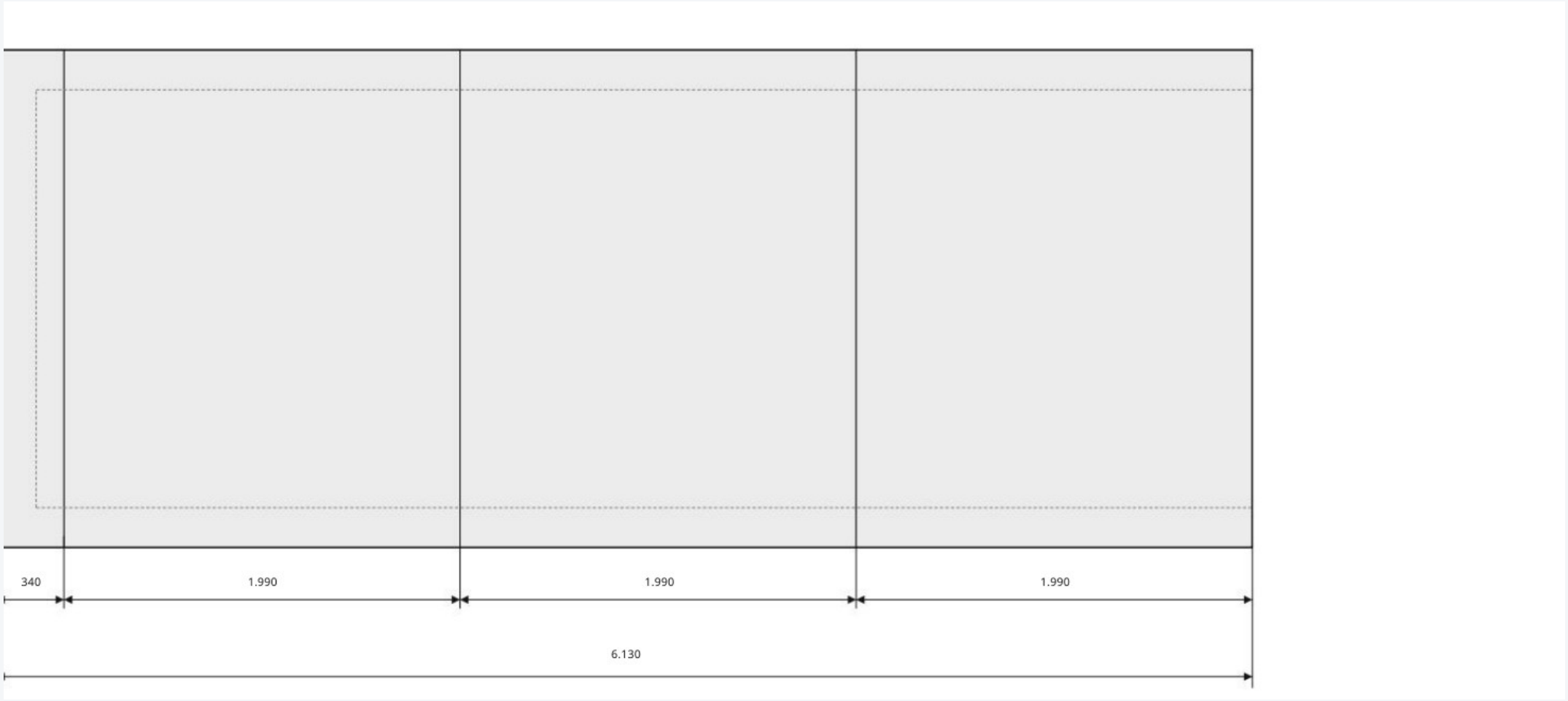
The term “31.5-tonne load capacity” is retained per the source; not replaced by the confirmed product mass.



Source: Product File IBIPC, p. 16.

AMMUNITION BUNKER: DRAWING

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 16.

MEDICAL BUNKER

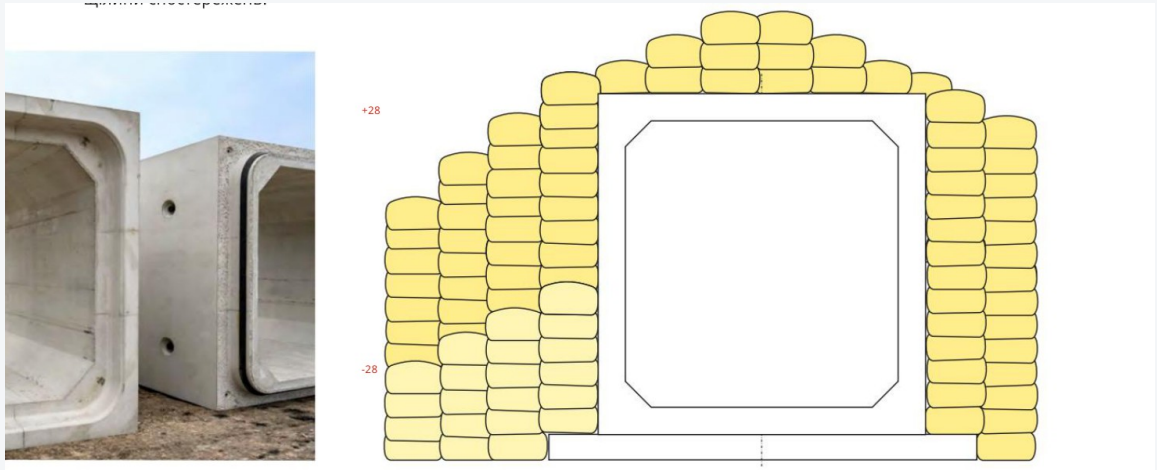
Product description and declared catalogue characteristics

PURPOSE / DESIGN

A place designated for assembly for transport to the first-aid point and further medical care. For safe accommodation of wounded infantry and squad members, with constant cover for all squad members from drone attack, fire, artillery fire. No embrasures or observation slits.

Three universal building segments form a walk-through tube for quick access and handling of the wounded. The 27.5-tonne load-capacity structure provides additional anchoring mass. A protective sandbag canopy around the bunker limits the velocity of rockets, secondary fragments and shock waves. The modular system has the advantage of fast assembly.

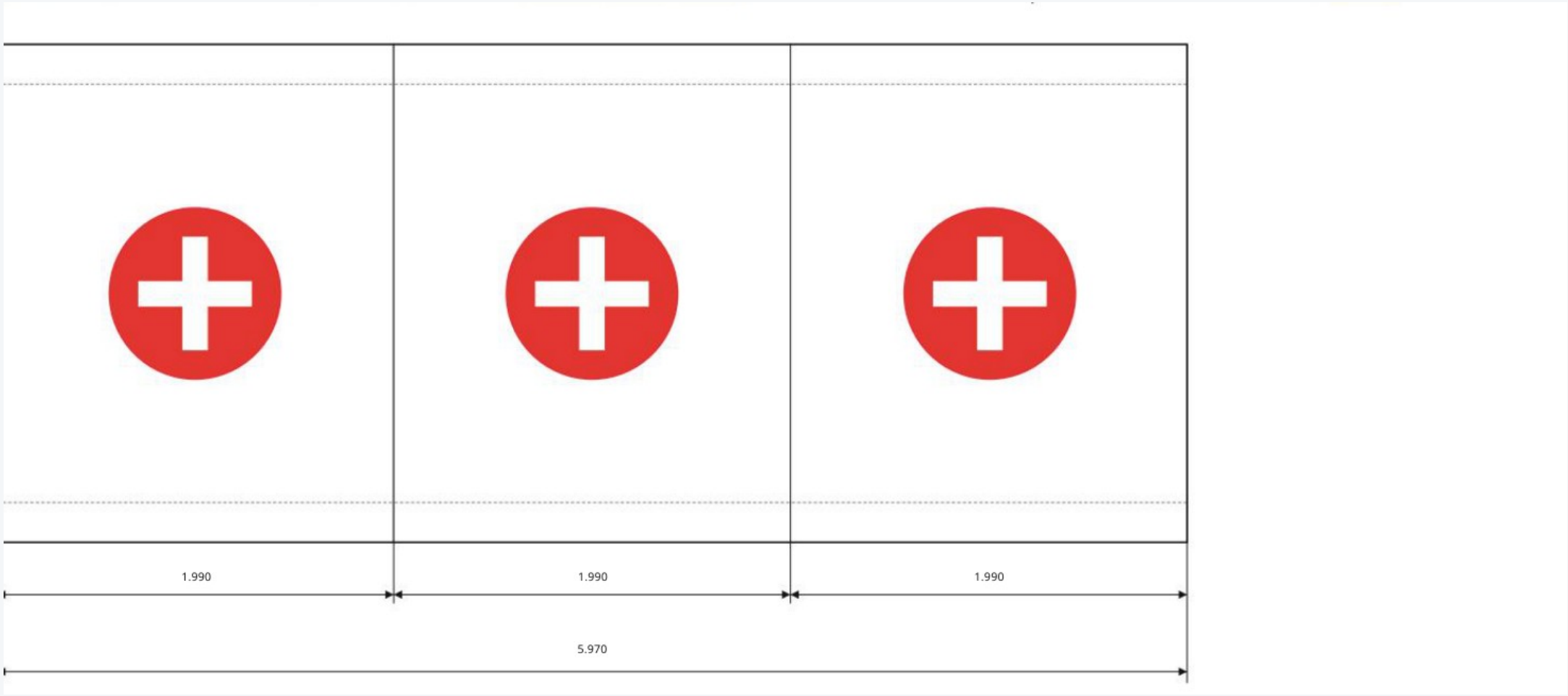
The term “27.5-tonne load capacity” is retained as in the source.



Source: Product File IBIPC, p. 17.

MEDICAL BUNKER: LAYOUT

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 17.

SANDWICH DOORS: BALLISTIC PROTECTION

Armoured steel and UHPFRC layer

Parameter	Source designation
Structure thickness	100 mm
Structure	ARMOX 500T 2 × 16 mm / UHPFRC / ARMOX 440T 8 mm
List of ammunition	7,62 × 54 R API; 7,62 × 51 AP8 (WC); 12,7 × 99 API M8; 14,5 × 114 API
Stated resistance	A5 · NATO STANAG 2280-2016

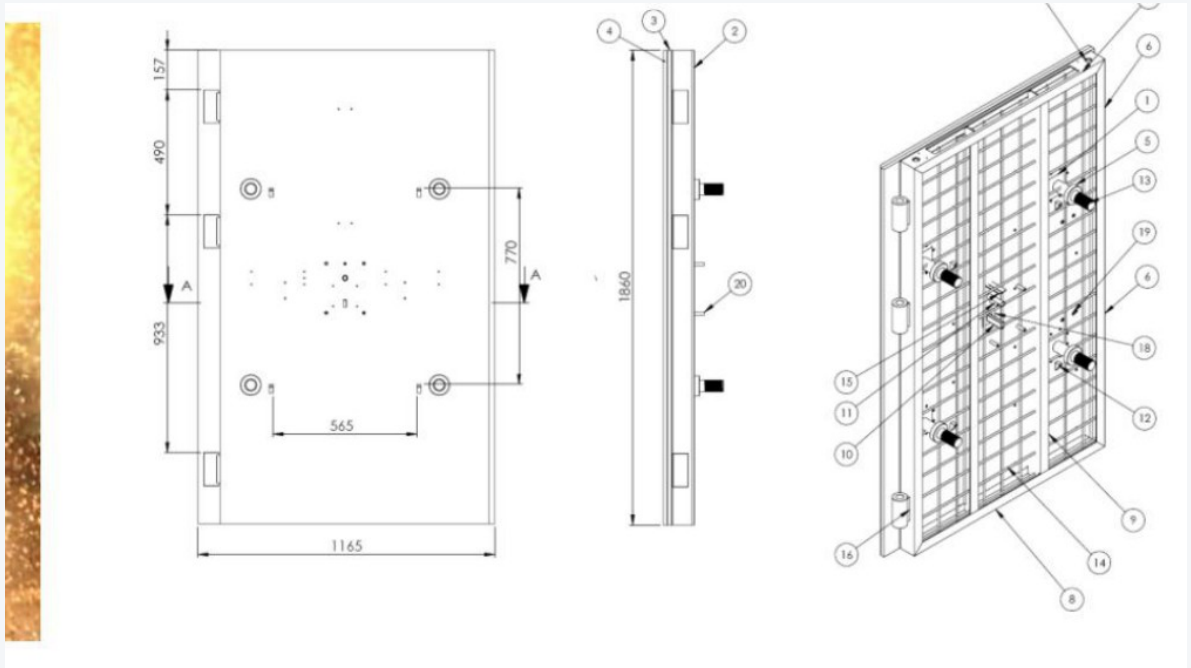


For civilian and military bunkers and shelters. The combination of ARMOX 500T / 440T and UHPFRC is described as high ballistic protection with compact thickness.

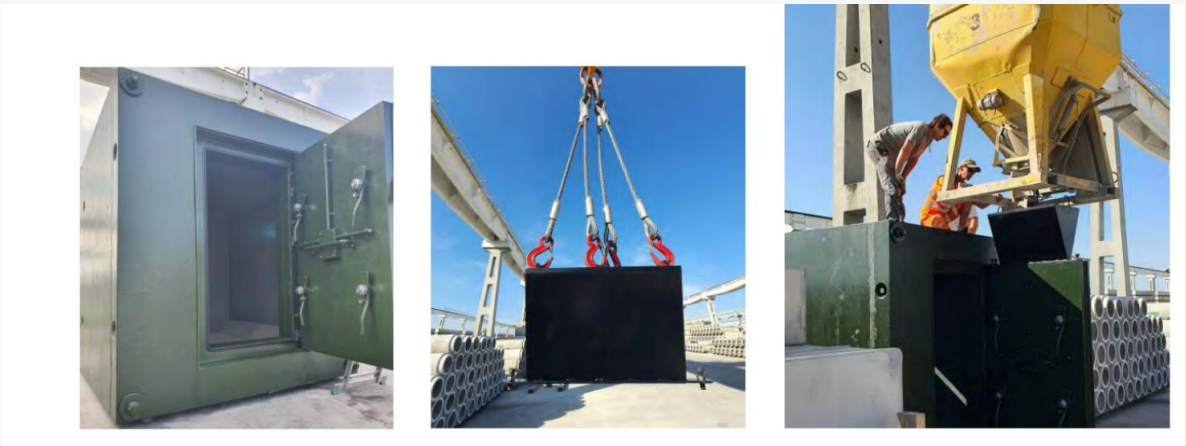
Source: Product File IBIPC, p. 18.

DOORS: DRAWINGS AND ORIGINAL PHOTOS

Original Product File materials — geometry and designations preserved



Drawing geometry and labels unchanged.



Original photos of fabrication, structure and testing.

Source: Product File IBIPC, p. 18.

CUSTOM BUNKERS: DESIGN

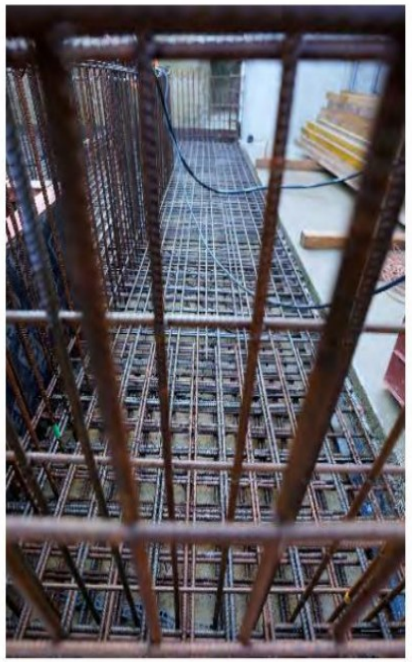
Custom structure and reinforcement per project

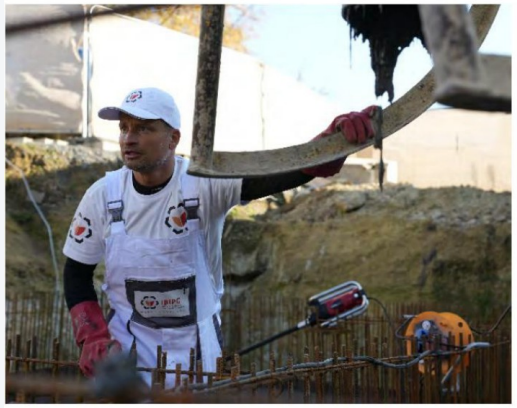
PURPOSE / DESIGN

IBIPC bunkers are the best security solution, made to NATO standards, offering exceptional resistance thanks to UHPFRC material developed for military use, and a long service life without the need for maintenance.

The structural engineering report is an integral part of every project.

A discreet, secure and flexible solution built to the highest safety standards, offering fast installation and seamless integration into any environment. The offer includes complete integrated systems covering filtration and ventilation, pressure valves, autonomous power and water supply, project consulting and final handover.





Source: Product File IBIPC, p. 19.

ENGINEERING REPORT AND ORIGINAL PLAN

Original Product File materials — geometry and designations preserved

Звіт з інженерних конструкцій є невід'ємною частиною кожного проекту.

$$w_k = S_{r,max}\,(\varepsilon_{sm} - \varepsilon_{cm}) = 351{,}2 \cdot 0{,}000833 = 0{,}292\ \text{mm} \le w_{max} = 0{,}3\ \text{mm} \quad \text{OK}$$

$$\varepsilon_{sm} - \varepsilon_{cm} = \frac{\sigma_s - k_t \frac{f_{ct.eff}}{\rho_{p.eff}}\,(1+\alpha_e\,\rho_{p,eff})}{E_s} = \frac{268{,}8 - 0{,}6\,\frac{2{,}06}{0{,}0128}\,(1+4{,}444 \cdot 0{,}0128)}{200\,000}$$

$$\varepsilon_{sm} - \varepsilon_{cm} = 0{,}000833 \quad \ge 0{,}6\,\sigma_s / E_s : 0{,}6 \cdot 268{,}8 / 200000 = 0{,}000806$$

$$\rightarrow \quad \varepsilon_{sm} - \varepsilon_{cm} = 0{,}000833$$

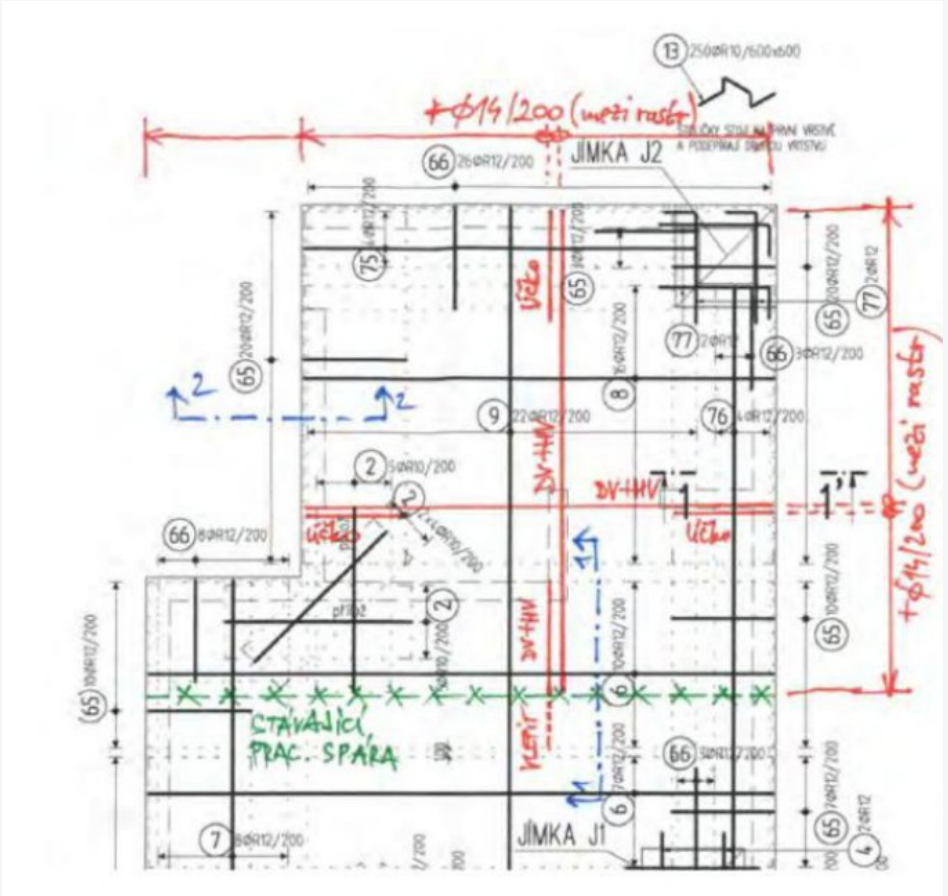
f_{ctm} = 9,0 MPa

$f_{ct.eff}$ = 2,06 MPa

E_{cm} = 45,0 GPa

Ing. Marek Vinkler, Ph.D.
AO 0013279
26.09.2025

Calculation excerpt with signature and stamp.



Working sketch with original handwritten annotations.

Source: Product File IBIPC, p. 19.

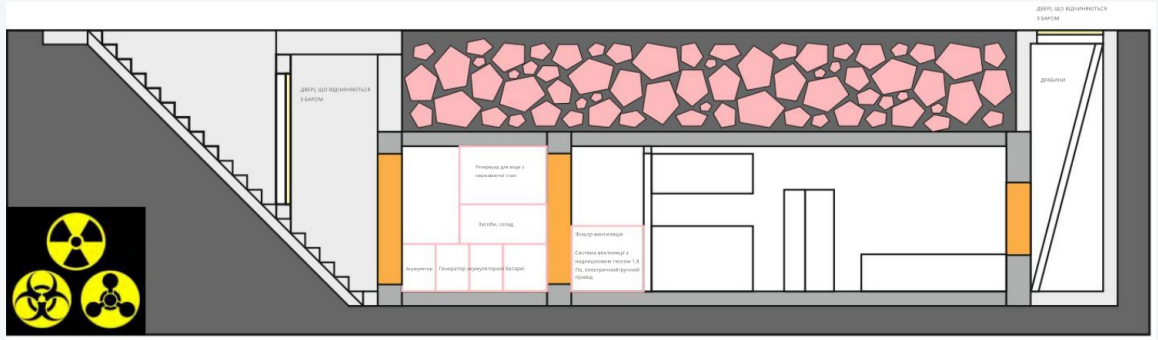
UNDERGROUND SHELTERS

Product description and declared catalogue characteristics

PURPOSE / DESIGN

For protection against weapons of mass destruction. Against the effects of pressure waves, penetrating radiation, radioactive contamination, combat chemical and biological agents, industrial and incendiary substances, thermal effects of fires, light and thermal radiation, ammunition fragments during explosions or collapse of building debris. By means of the FIRBACH 100 filtration and ventilation system, equipped with a CBRN filter, and with blast and overpressure valves.

Example of a possible configuration. Five separately selected segments with doors and an evacuation exit.



Patented UHPFRC composite: the catalogue states certified blast, ballistic and fragment resistance.

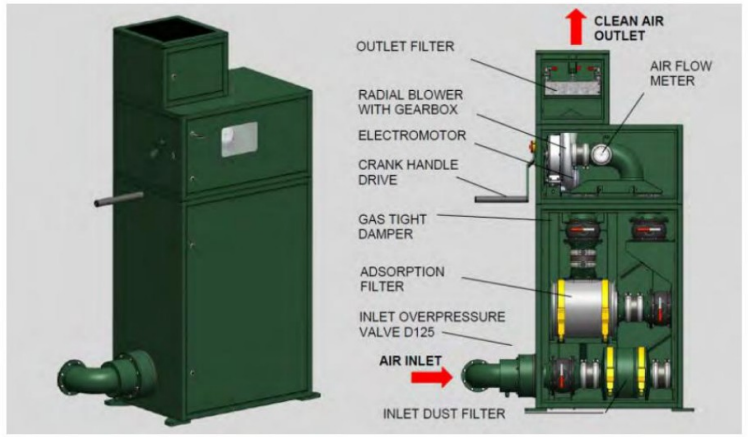
Catalogue claims on WMD / nuclear blast are not automatic nuclear qualification.

Source: Product File IBIPC, p. 20.

FIRBACH 100: SHELTER EQUIPMENT

Five segments, doors and an evacuation exit in the source example

Unit / entry	Source data
Manufacturer	VZDUCHOTECHNIK sro · Security Bunkers Alliance
Ventilation	FIRBACH 100 · CBRN filter
Overpressure	1.8 Pa (as printed in the source)
Drive	Electric / manual
Other units	Stainless steel tank; battery; generator; storage; door with bar; ladders





C105/115 · EN 206; high-strength armoured / lattice doors; stone layer with earth backfill — per source legend. 1,8 Pa requires clarification; value unchanged.

Source: Product File IBIPC, p. 20.

GENERATOR / COGENERATION BUNKER

Product description and declared catalogue characteristics

PURPOSE / DESIGN

Fortified tactical sites to minimise security risks when supplying electricity to military bases or part of critical infrastructure in affected areas during emergencies, hazardous states, states of emergency, national-level emergency states and martial law.

Reinforced power supply points protected against drone attacks, firearms, grenades and artillery fire; with an air intake through a check valve, ventilation exhaust and cable ducts. Provides shelter for army rear units and special-purpose units.

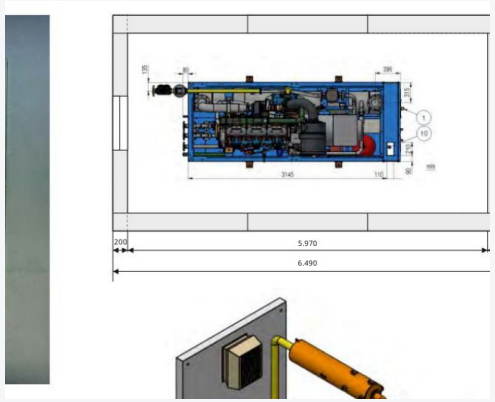


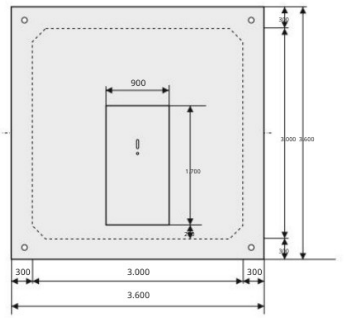
Source: Product File IBIPC, p. 21.

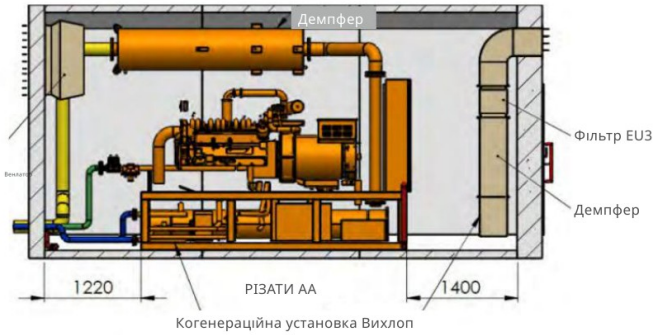
GENERATOR BUNKER: DIMENSIONS AND UNITS

Exact numerical values and original structural images

Parameter	Value
Total length	6490 mm = 200 + 5970 + 320
Ballistic door	900 × 1700 mm
Door opening panel	200 mm
Fan	6000 m³/h
Filters in the source	G3 / EU3
Shut-off valves	2 inlets / 1 outlet





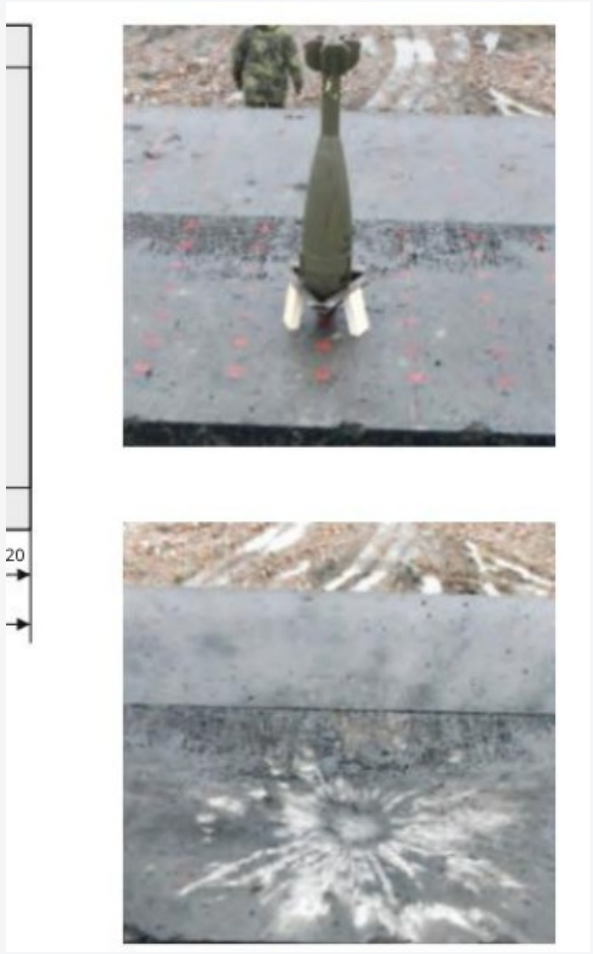


Intake / exhaust, two exhaust pipes, exhaust manifold silencer, dampers and cable ducts — per source.

Source: Product File IBIPC, p. 21.

GENERATOR BUNKER: TESTING

Original photos and preserved Product File caption



Fragment test, 120 mm ballistic protection, 2 inlet openings, 1 outlet opening. mortar round was brought to Inlet and outlet piping with G3 filter, 2 exhaust blasts on the bunker ceiling. pipes to housing, exhaust piping with fan

The described fragmentation test applies to a specific configuration. The image does not replace the test report.

In the equipment, the source lists ballistically protected shut-off valves, a G3 filter, a fan and a silencer.

Source: Product File IBIPC, p. 21.

REINFORCED INFANTRY BUNKER: CLASS A

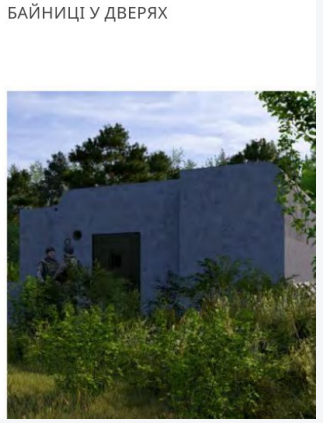
Product description and declared catalogue characteristics

PURPOSE / DESIGN

TYPE A INFANTRY BUNKER is equipped with loophole doors for combat operations from inside. The bunker is not fully buried, to cover a sufficient perimeter for conducting defensive fire from the loopholes. A bunker inside a bunker, covered by a sarcophagus made of ultra-high-strength reinforced concrete (UHPFRC).

The solution is modular and transportable, while providing a high level of protection and comfort for personnel, as well as sophisticated defence capabilities. Rapid deployment and modularity provide flexibility and effectiveness against modern threats, including drones, air strikes, attacks on critical infrastructure, and are designed to withstand numerous artillery hits.

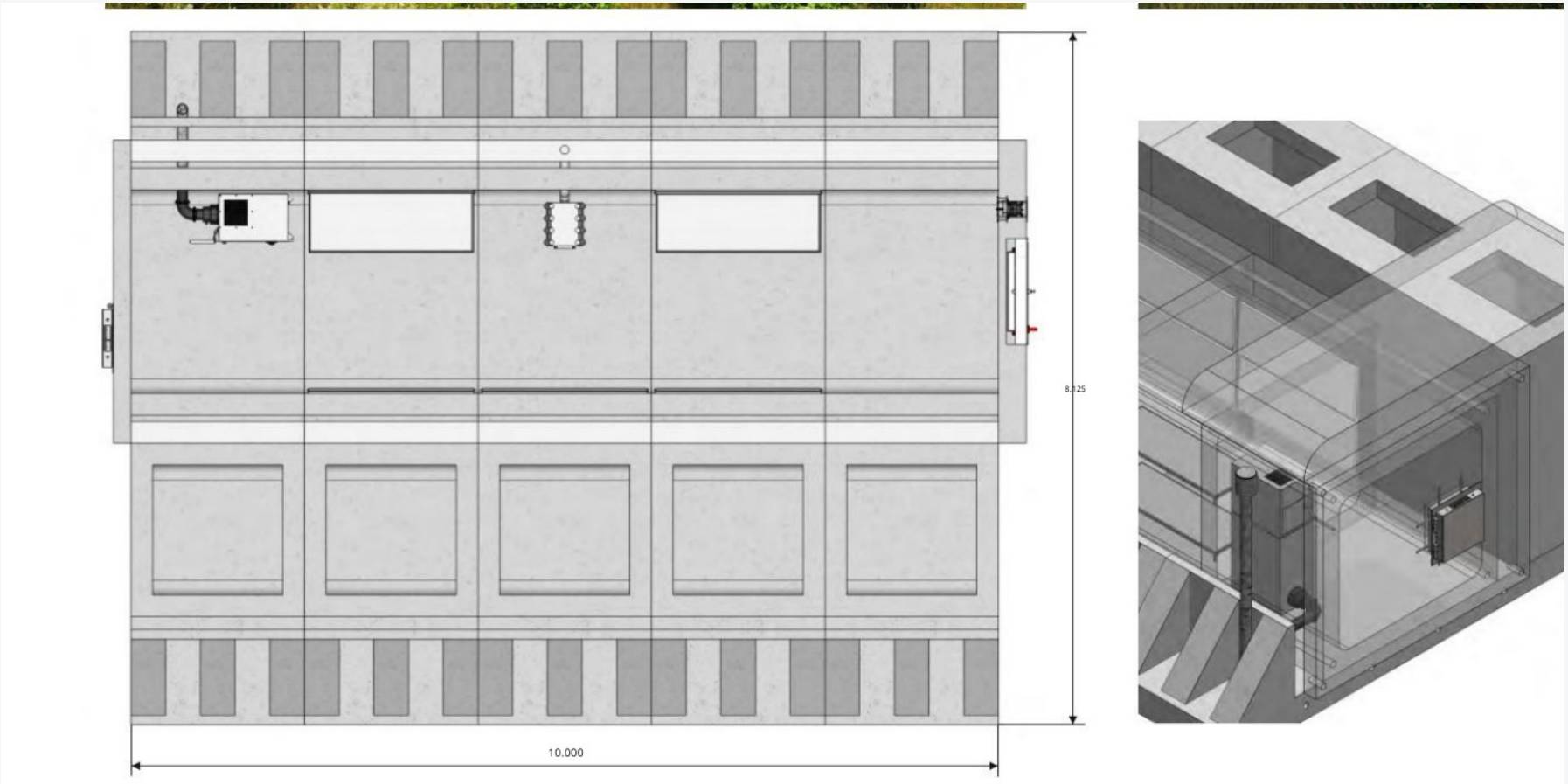




Source: Product File IBIPC, p. 22.

CLASS A: DRAWINGS AND VIEWS

Original Product File materials — geometry and designations preserved



Original designations 10.000 / 8.125 and “door loopholes” preserved.

Source: Product File IBIPC, p. 22.

REINFORCED INFANTRY BUNKER: CLASS B

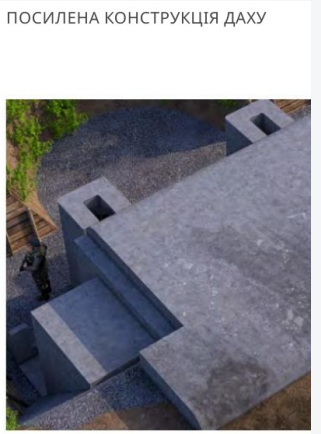
Product description and declared catalogue characteristics

PURPOSE / DESIGN

The structure is designed to withstand repeated direct hits by 152-mm artillery munitions. The type B infantry bunker is fully buried and intended to protect personnel from multiple artillery strikes. The inner protected space is configured as a “bunker within a bunker” with a protective sarcophagus made of ultra-high-strength composite material (UHPFRC).

“Bunker within a bunker”; full burial; UHPFRC protective sarcophagus. Declared resistance to repeated direct hits by 152-mm munitions.



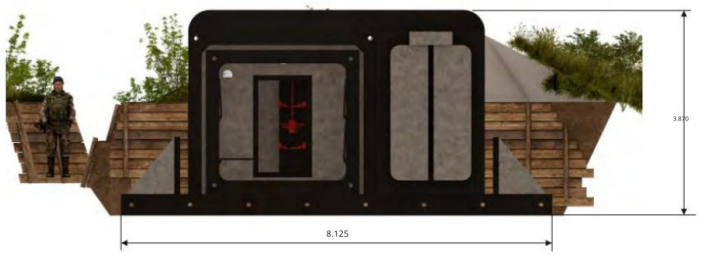


Source: Product File IBIPC, p. 23.

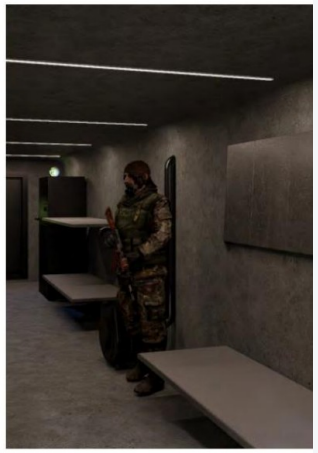
CLASSES A / B: CAPACITY AND EQUIPMENT

Advantages and standard equipment as worded in the catalogue

Characteristic	Value / description
Capacity	10 persons with required equipment
Room area	20–35 m²
Each structure	Under 10 t
Stated resistance	Direct hit by 152 mm munitions
Modularity	Standardisation; transport; installation
Application	Counter-attacks to eject and defend



ПЕРЕВАГИ ПІХОТНИХ БУНКЕРІВ КЛАСУ А ТА В. о Модульне та стандартизоване рішення.
о Стійкість до прямого влучання боєприпасів калібру 152 мм .
о Місткість загону з 10 осіб, включаючи необхідне спорядження.
Площа приміщення 20-35 кв.м.
о Легке маніпулювання, транспортування та встановлення.
о Вага кожної конструкції становить менше 10 тонн.
о Система призначена для загонних та захисних контратак.



The new class A and B infantry bunkers reflect trends in modern warfare. They are designed to protect personnel at tactical and operational command levels. As standard they are equipped with an effective pressurised filtration system with CBRN filters, stoves, folding beds, safety valves, armoured gas-tight doors, and provide a safe zone for the shelter crew to stay dry and warm.

Source: Product File IBIPC, p. 23.

CLASSES A / B: INSTALLATION AND SCENARIOS

Catalogue claims and simulation results do not replace separate certificates

DEPLOYMENT

Outstanding durability and protection against repeated impacts and hits from artillery and drones. Innovative multilayer triple fortifications, prepared for modern warfare. Suitable for building linear fortifications on the front line of defence or even in separate protected zones in the rear. Quick assembly with standard military equipment by a trained squad within one to two days.

EQUIPMENT / DECLARED EFFECTS

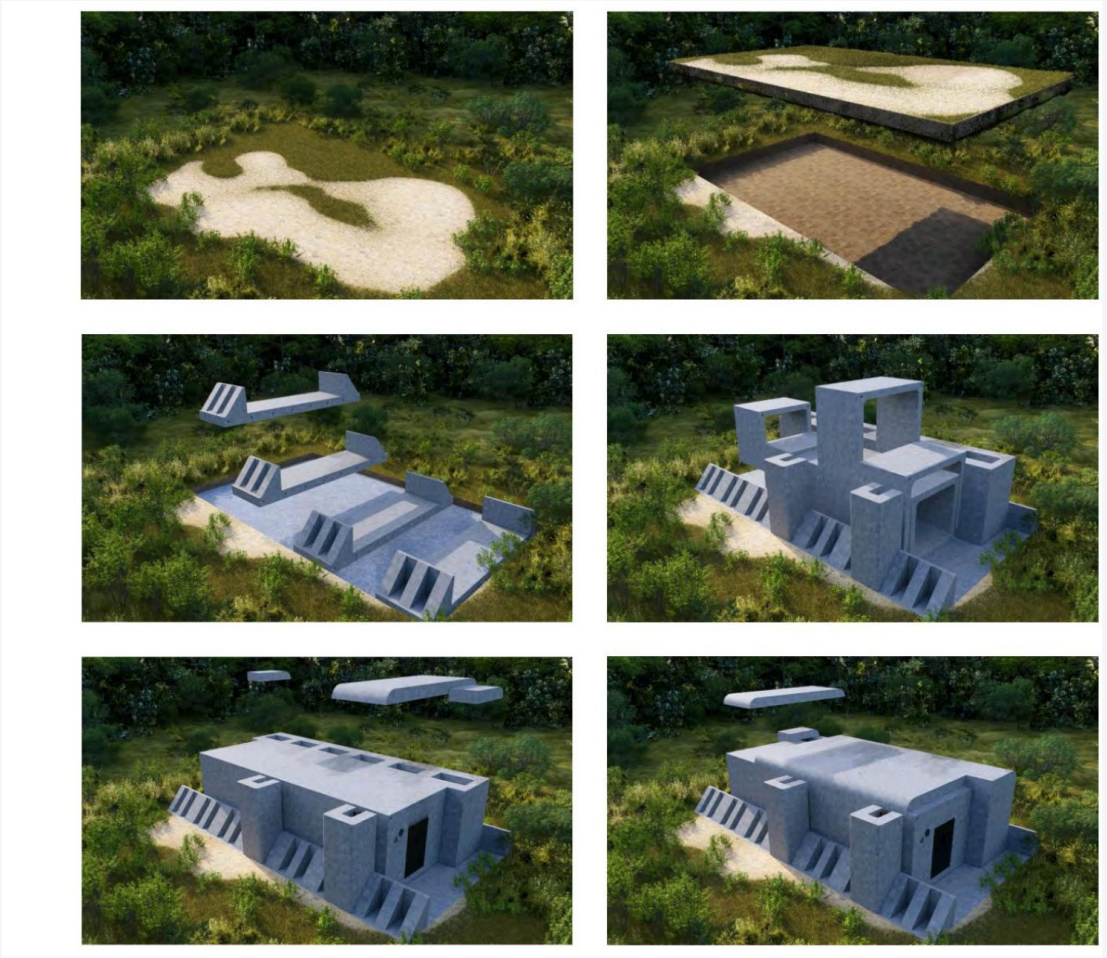
Infantry bunkers offer all IBIPC elements combined with an extremely high level of protection. Modelling based on NATO STANAG tests shows resistance to multiple artillery hits, including 155 mm howitzer rockets and 107 mm rockets from air strikes, including drones and other UAVs. All bunker ventilation system inlets and outlets are protected by ultra-high-strength spray resistance and pressure valves. Basic equipment includes ventilation, heating, reinforced doors, storage and communications. The concrete is waterproof; this removes the need for waterproofing when installed in the ground and has a positive effect on crew morale.

One to two days of installation; 155-mm and 107-mm effects are described as modelling based on NATO STANAG tests.

Source: Product File IBIPC, p. 24.

CLASSES A / B: SEQUENCE AND TYPES

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 24.

CIVIL PROTECTION SHELTER

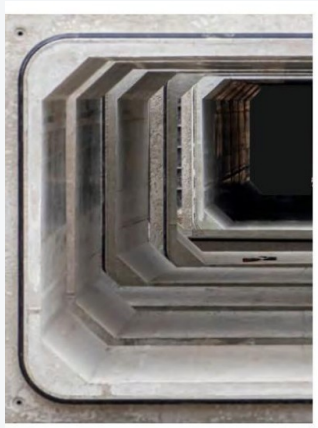
Product description and declared catalogue characteristics

PURPOSE / DESIGN

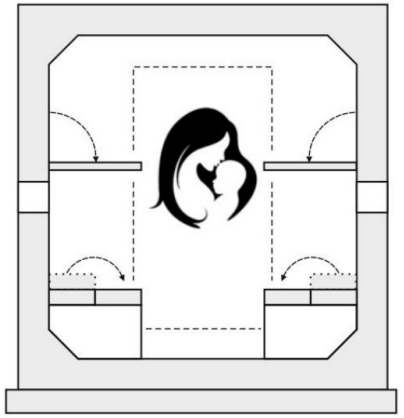
Use as a means of sheltering the civilian population in case of air strike or sniper fire by missile forces and artillery. Local institutions, kindergartens and schools, hospitals, critical infrastructure, etc. Protection can be increased by covering it with a sandbag or placing it in the ground.

Example of possible layouts. Five separately installed segments with doors and an evacuation hatch.

Five separately installed segments with doors and an evacuation hatch. Institutions, kindergartens, schools, hospitals and critical infrastructure.



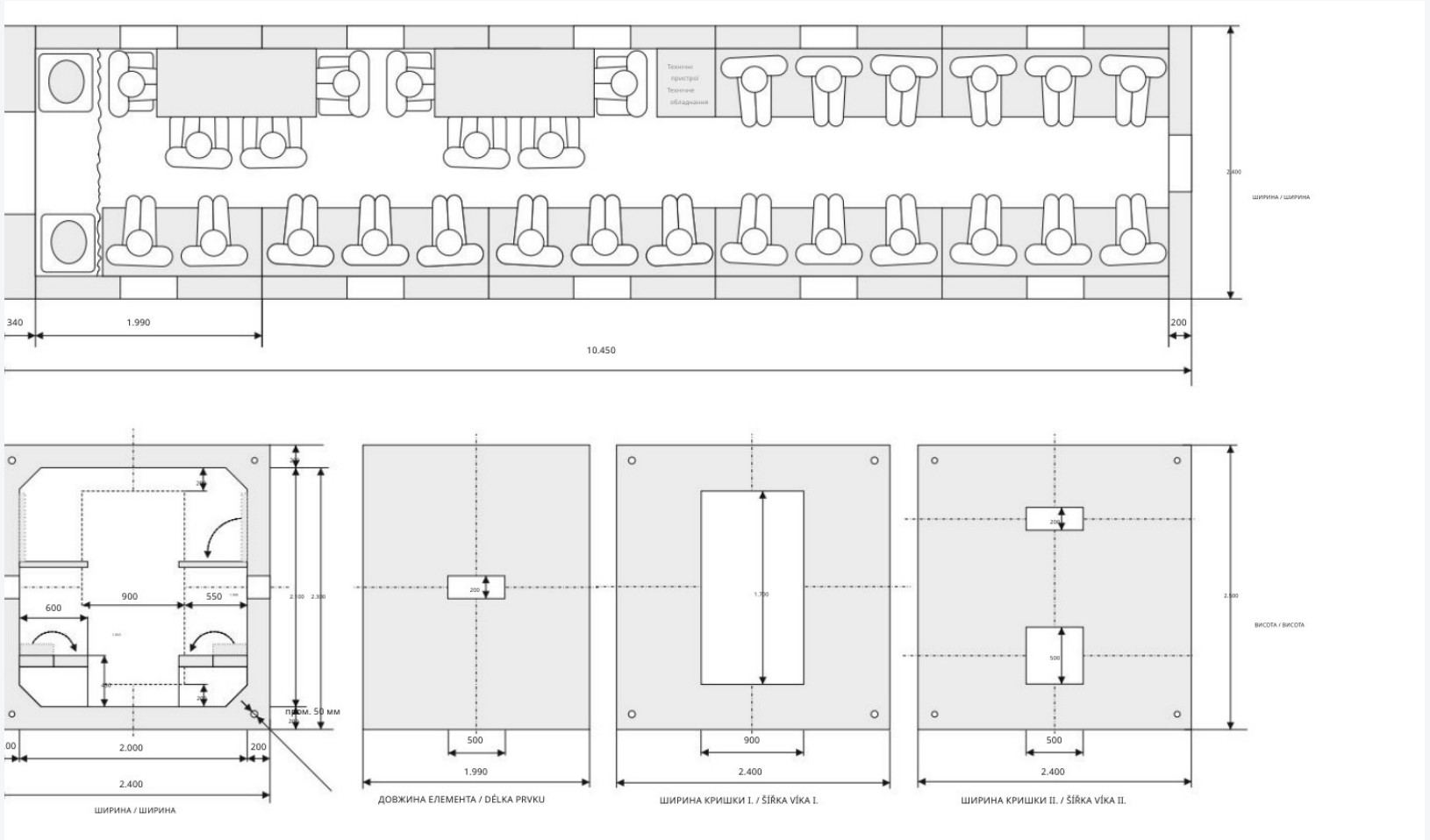




Source: Product File IBIPC, p. 25.

CIVIL SHELTER: DRAWINGS

Original Product File materials — geometry and designations preserved



Source: Product File IBIPC, p. 25.

COMMAND BUNKER

Product description and declared catalogue characteristics

PURPOSE / DESIGN

Fortified command-and-control post for rescue operations management during emergencies, hazardous conditions, state of emergency, alert and martial law. For military and security forces to conduct tactical-operational activities.

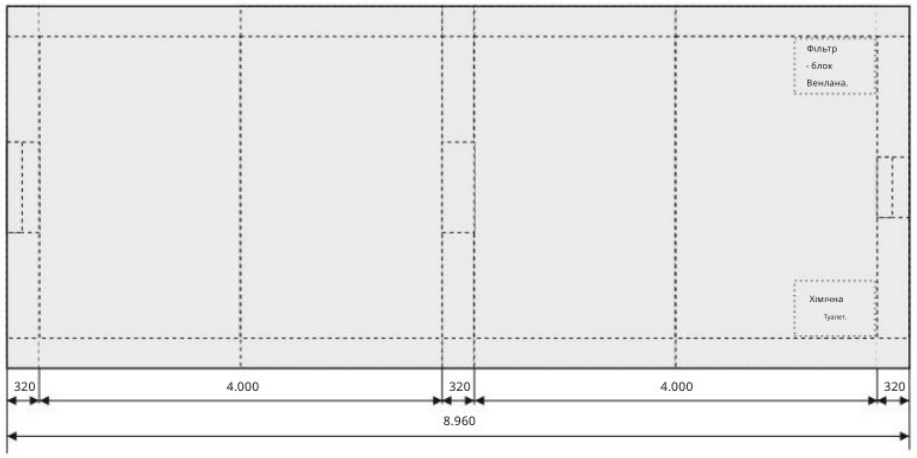
Reinforced command post protected against attacks by drones, missiles, grenades and artillery fire; with armoured gas-tight doors, a filtration system and a CBRN filter. Supplied to army rear-area units and special-purpose units.



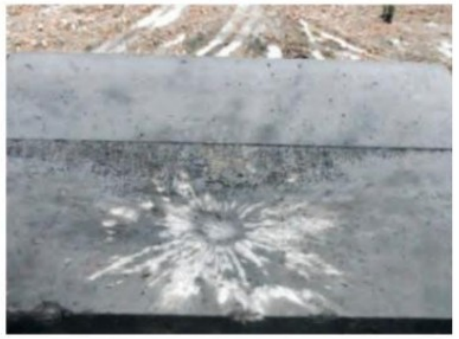
Source: Product File IBIPC, p. 26.

COMMAND BUNKER: TYPES AND TEST

Original Product File materials — geometry and designations preserved

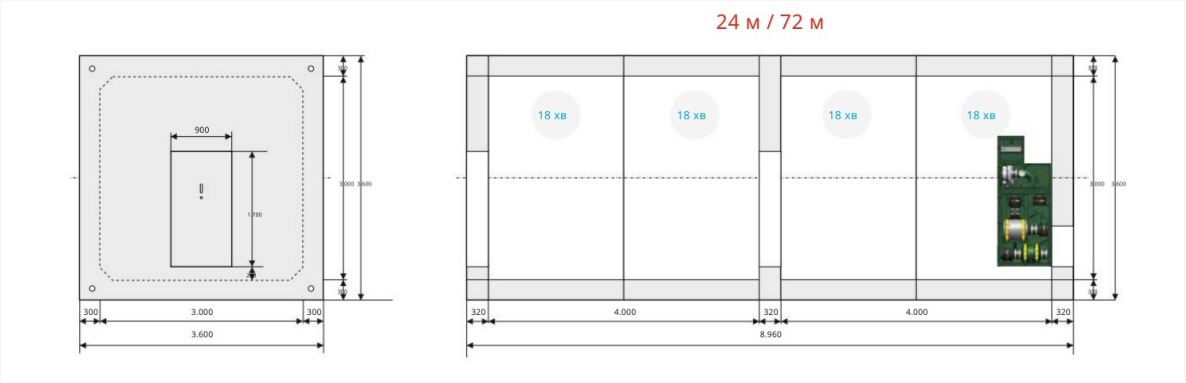






Випробування осколками, 120-мм мінометний снаряд, спрацьований таким чином, що вибухнув на стелі бункера.

120-mm mortar: source indicates blast on bunker ceiling.



Original dimensions, equipment, 24 m / 72 m designations and 18 min retained.

Source: Product File IBIPC, p. 26.

PROTECTED AIRCRAFT SHELTERS

Stated material parameters for aviation use

To house and protect military fighter aircraft from enemy attacks. Reduce aircraft vulnerability, provide protection against CBRN threats, prevent detection by satellites, aerial reconnaissance or drones to detect the presence of aircraft. Provides safe maintenance of aircraft in any weather conditions. Combined with active airfield defence assets, it increases aircraft survivability and reduces the cost of destroying them for the enemy.

Material: patented UHPFRC. The catalogue on p. 3 lists F-16 and F-35 variants.



150 MPa / 15 MPa

Compressive / tensile strength — catalogue values. Source reference: Department of Concrete and Masonry Structures, CTU Prague.

Source: Product File IBIPC, p. 27.

SHIELDING: CLAIMS AND THEIR LIMITS

Do not turn the catalogue description into a quantitative nuclear specification

STATED IN PRODUCT FILE

High compressive strength of 150 MPa and tensile strength of 15 MPa, unique high ductility, resistance to class A5 ballistic attacks, resistance to class C4 fragments, resistance to blasts of class D6, zero radio-wave transmission, very high level of infrared shielding and extremely high nuclear shielding properties against gamma radiation with neutron radiation are key factors and important parametric factors for optimal use of the patented UHPFRC as a material for hardened air-raid shelters.

WHAT THE FILE DOES NOT ESTABLISH

Attenuation coefficients, spectrum, thickness for a given dose, test regime or nuclear qualification are not provided.

A5 / C4 / D6 are not radiation protection classes.

RF / IR / gamma / neutron shielding requires separate justification for the specific configuration.

Source: Product File IBIPC, p. 27.

FILTRATION AND VENTILATION

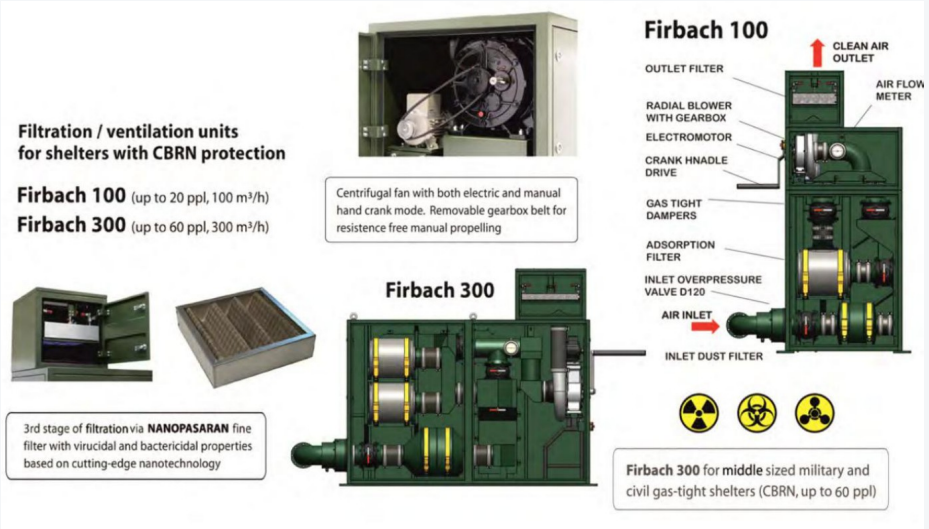
FIRBACH 100 / 300 and CBRN protection components

System / assembly	Full content of original captions
Firbach 100	Up to 20 persons · 100 m³/h
Firbach 300	Up to 60 persons · 300 m³/h; medium military / civilian gas-tight CBRN shelters
Centrifugal fan	Electric and manual crank drive; removable gearbox for manual drive
3rd filtration stage	NANOPASARAN: fine filter with virucidal and bactericidal properties, nanotechnology
Firbach 100 units	Outlet filter; radial blower with gearbox; electromotor; crank handle; gas-tight dampers; adsorption filter; inlet overpressure valve D120; air inlet; inlet dust filter; air flow meter; clean air outlet
Scalable solutions	Upgrade of existing shelters of any size; new CBRN shelters for up to 100 000 people; modular ventilation and filtration system for shelters of any size

Source: Product File IBIPC, p. 28.

NANOFILTERS AND VENTILATION UNITS

Original images, English captions and their Ukrainian content





Filtration and ventilation units are critical technological systems designed to provide a safe and clean environment in bunkers and shelters, enhancing protection, survivability and operational readiness of combat forces.

NANOFILTER – CBRN PROTECTION. High-efficiency nanofibre filter for capturing chemical - mycological, biological, radiological and nuclear (CBRN) threats. Bioactive fibres deactivate pathogens on contact. Low pressure drop ensures reliable air filtration in bunkers, shelters and critical facilities. The filter is suited to long-term operation and minimises the risk of secondary air contamination.

Source: Product File IBIPC, p. 28.

PROTECTED COMPONENTS: FULL LIST

Original English-language captions converted into editable entries

Component	Source data and captions
HPE coarse dust filter	Basic air filtration stage
Liquid column air manometer	Liquid column air manometer
Gas-tight valves / dampers	For sealing air ducts or regulating pressure; air mass flow meter — flowmeter
Centrifugal fan VA 300	2000 Pa · electric 600 m^3/h · manual drive 300 m^3/h
Firbach 50	Up to 10 persons · 50 m^3/h · W × H × D = 900 × 470 × 350 mm
Firbach 50 process	4 stages: coarse dust filter; HEPA H13 / H14; virucidal / bactericidal NANOPASARAN; CBRN activated carbon air filter
Mobile CBRN unit	Combat / rescue vehicles, mobile laboratories, quarantine chambers etc.
FV-400	Air filter-ventilation unit for air-raid shelters; up to 120 persons; no CBRN filter

Source: Product File IBIPC, p. 29.

COMPONENTS: ORIGINAL IMAGES

Equipment for gas-tight filtration systems and mobile applications





Designed for reliable operation in extreme conditions. Ideal for both the defence industry and civil defence. Robust, high-quality construction ensures long-term operational readiness.

Robust components for defence and civilian use. Designed to operate in extreme conditions, including high temperatures, humidity, shock and vibration. Tested for maximum reliability, safety and effectiveness in both military operations and critical civilian infrastructure facilities. Their rugged design ensures long-term operational readiness in the harshest conditions.

Source: Product File IBIPC, p. 29.

MOBILE T-WALL

Product description and declared catalogue characteristics

PURPOSE / DESIGN

For quick installation of a high level of security at military and civilian facilities. To reinforce protection of inner perimeters, access routes of city centres, to control drop points, before facility entrances or for vehicle access control.

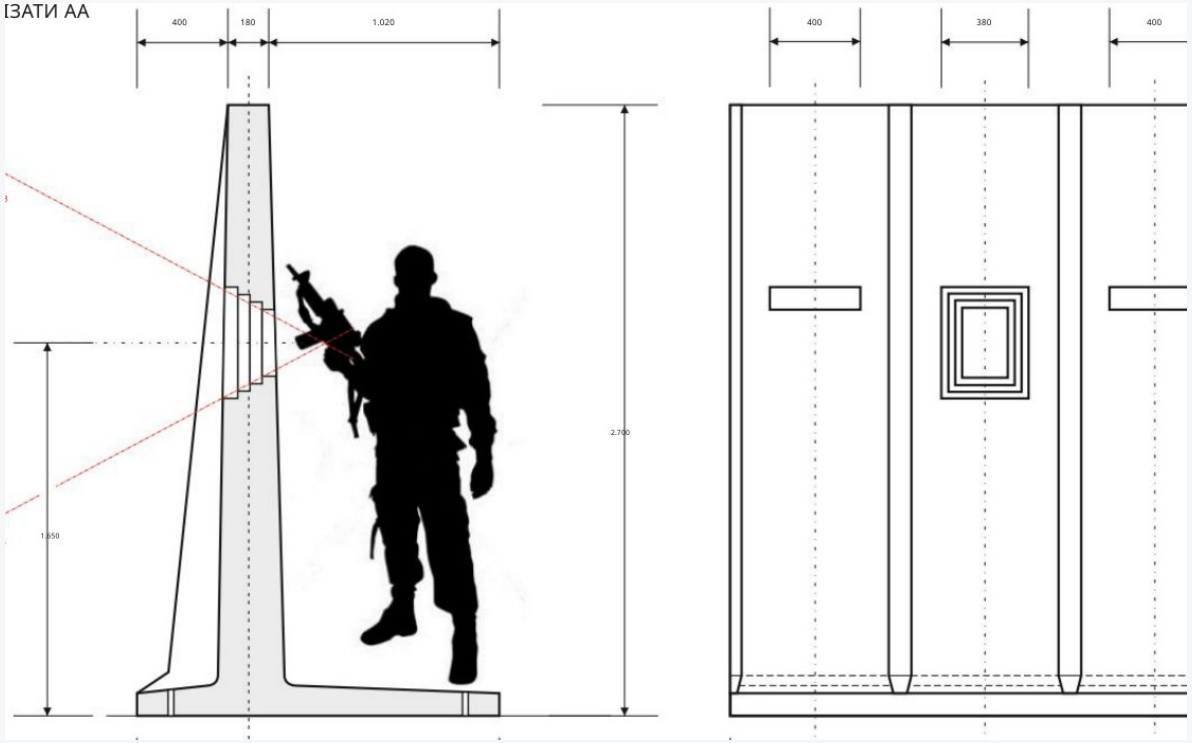
Quick installation for military and civilian facilities; internal perimeters, access roads and vehicle access control.



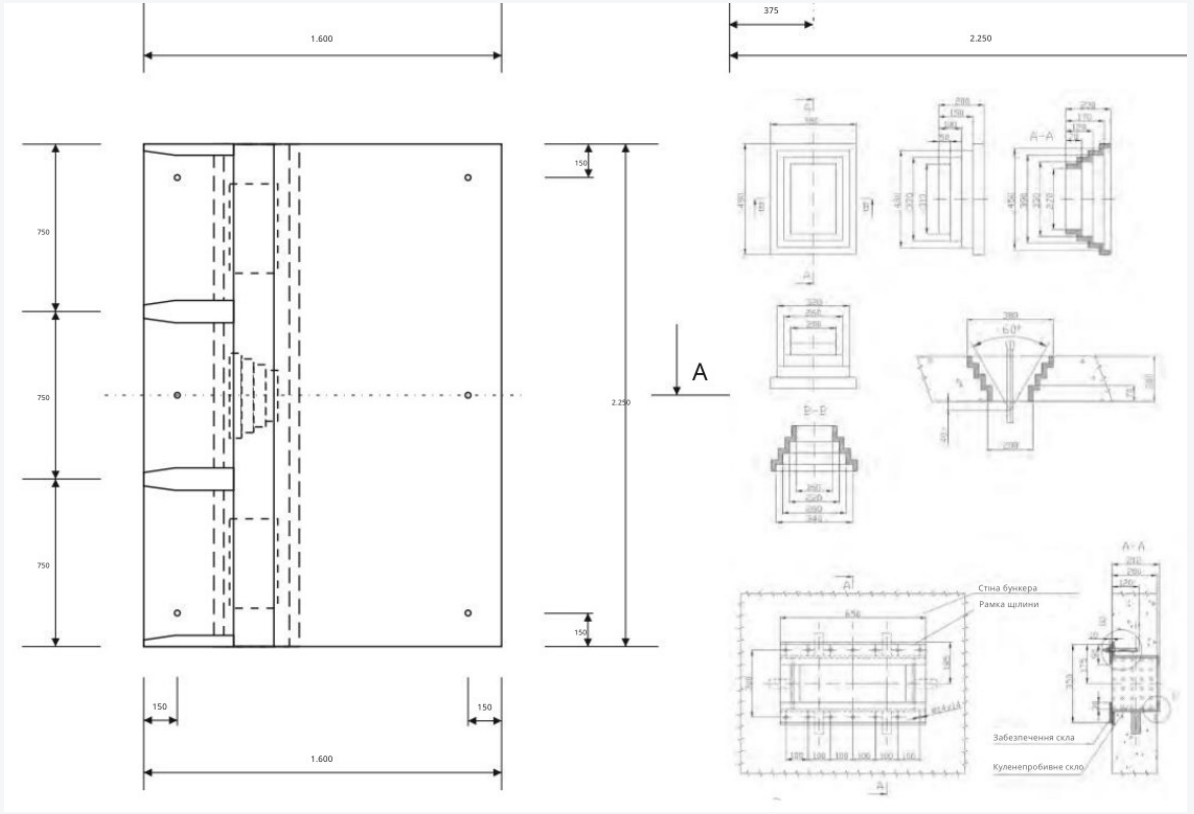
Source: Product File IBIPC, p. 30.

T-WALL: FULL DIMENSIONED DRAWING

Original Product File materials — geometry and designations preserved



Section A–A and front view.



Plan, slit frame assembly, fixings and bulletproof glass.

Source: Product File IBIPC, p. 30.

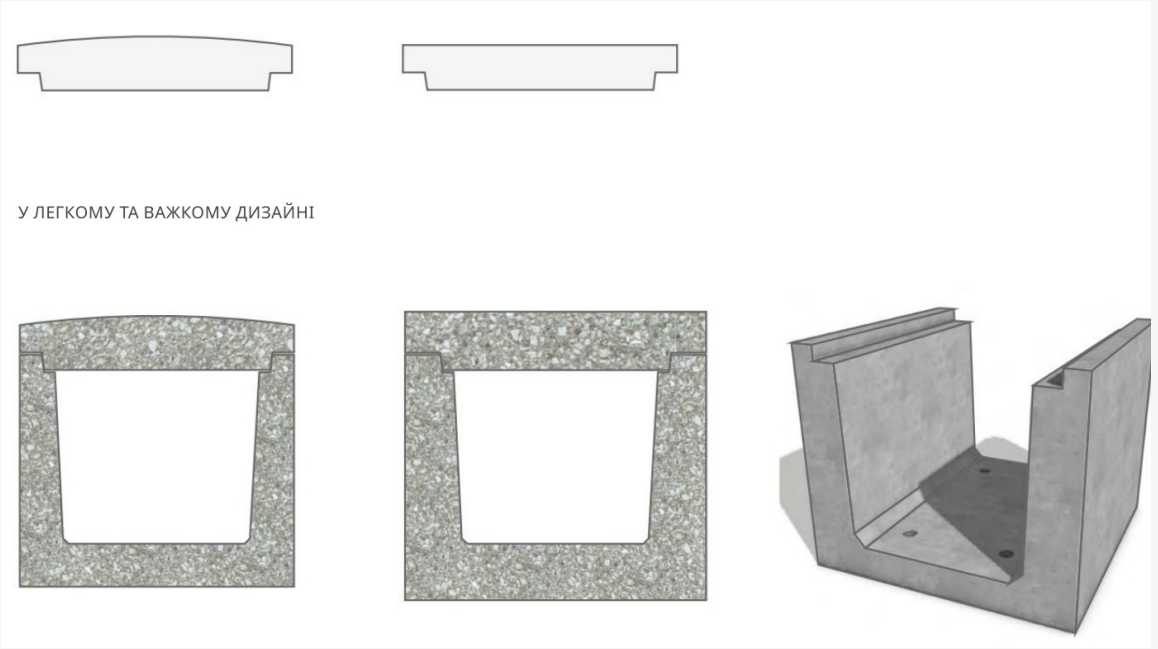
HIGH-PRIORITY CABLE TUNNELS

Product description and declared catalogue characteristics

PURPOSE / DESIGN

A system used to protect power transmission lines, fibre-optic cables, IT facilities and Internet of Things (IoT) technology systems of critical military and civil infrastructure.

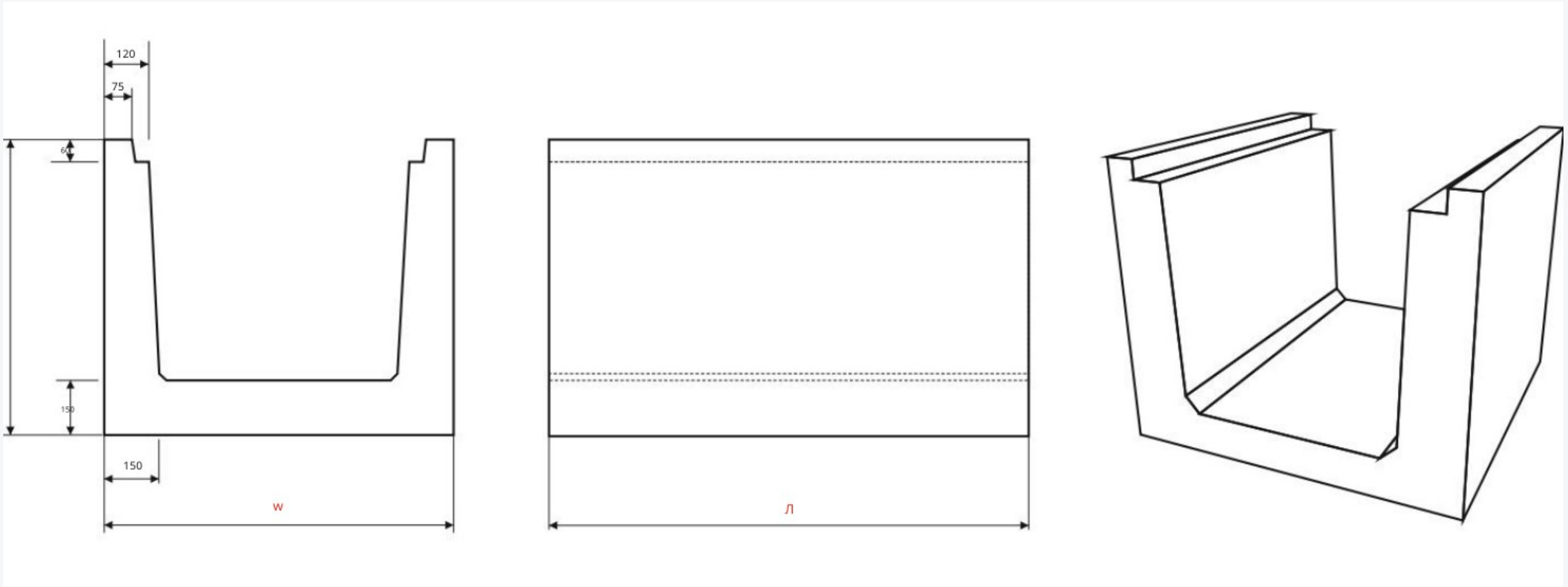
Variants: convex / flat lid; light / heavy version. Designations H, W, L and local dimensions are retained on the drawing.



Source: Product File IBIPC, p. 31.

CABLE TUNNELS: DIMENSIONAL VIEWS

Original Product File materials — geometry and designations preserved

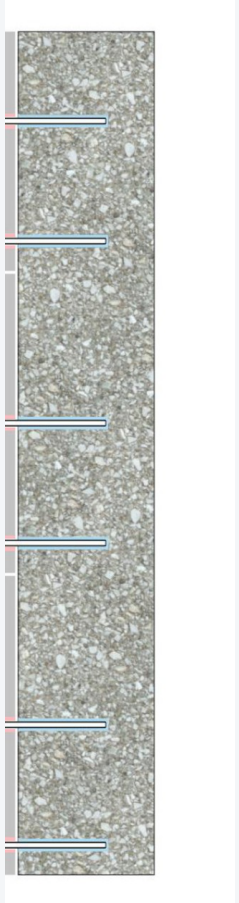


Source: Product File IBIPC, p. 31.

BALLISTIC PLATES: LIGHT / HEAVY

For reinforcing walls of important infrastructure, military and public buildings

Variant	Original drawing parameters
Light	Thickness 100 mm · split 50 + 50 mm
Heavy	Thickness 200 mm · split 100 + 100 mm
Type designations	A–A; 600; 500; 100 — retained in the source drawing



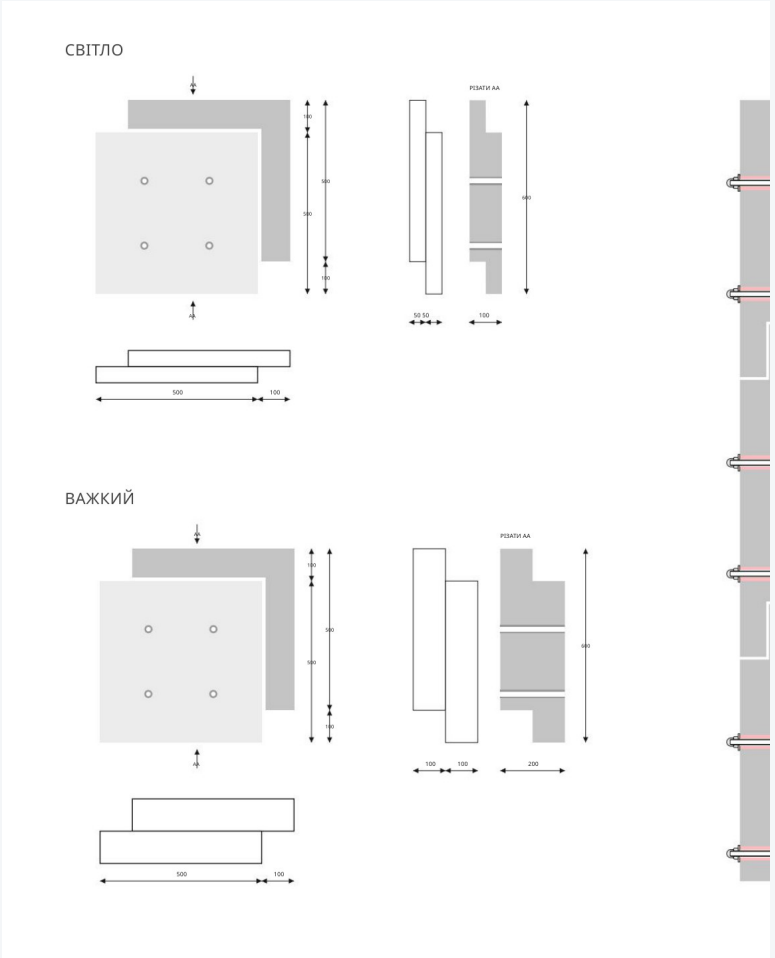
The names “СВІТЛО” / “ВАЖКИЙ” correspond to light / heavy in machine translation. Original designations and geometry unchanged.

Masses and protection levels of each variant are not given on this page.

Source: Product File IBIPC, p. 32.

BALLISTIC PLATES: ORIGINAL VIEWS

Original Product File materials — geometry and designations preserved

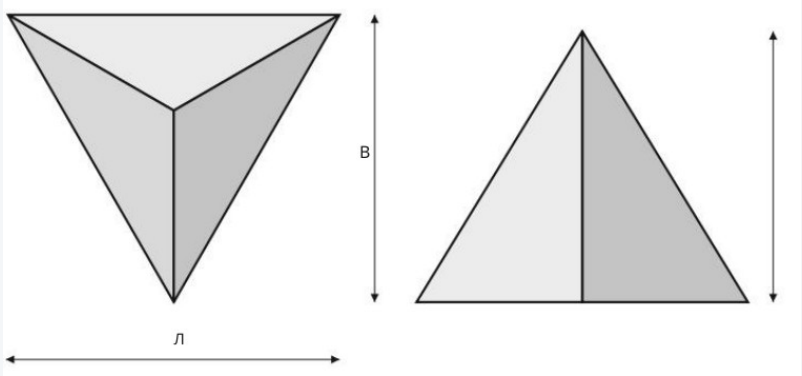


Source: Product File IBIPC, p. 32.

CONCRETE PYRAMID: THREE OPTIONS

Full source table, no silent correction of ambiguous figures

Parameter	Heavy	Medium	Light
Edge L, mm	1350	1000	600
Height H, mm	1102	816	490
Width W, mm	1170	866	518
Volume V, m³	0,47	0,27	0,58
Mass, t*	1,18	0,68	0,15

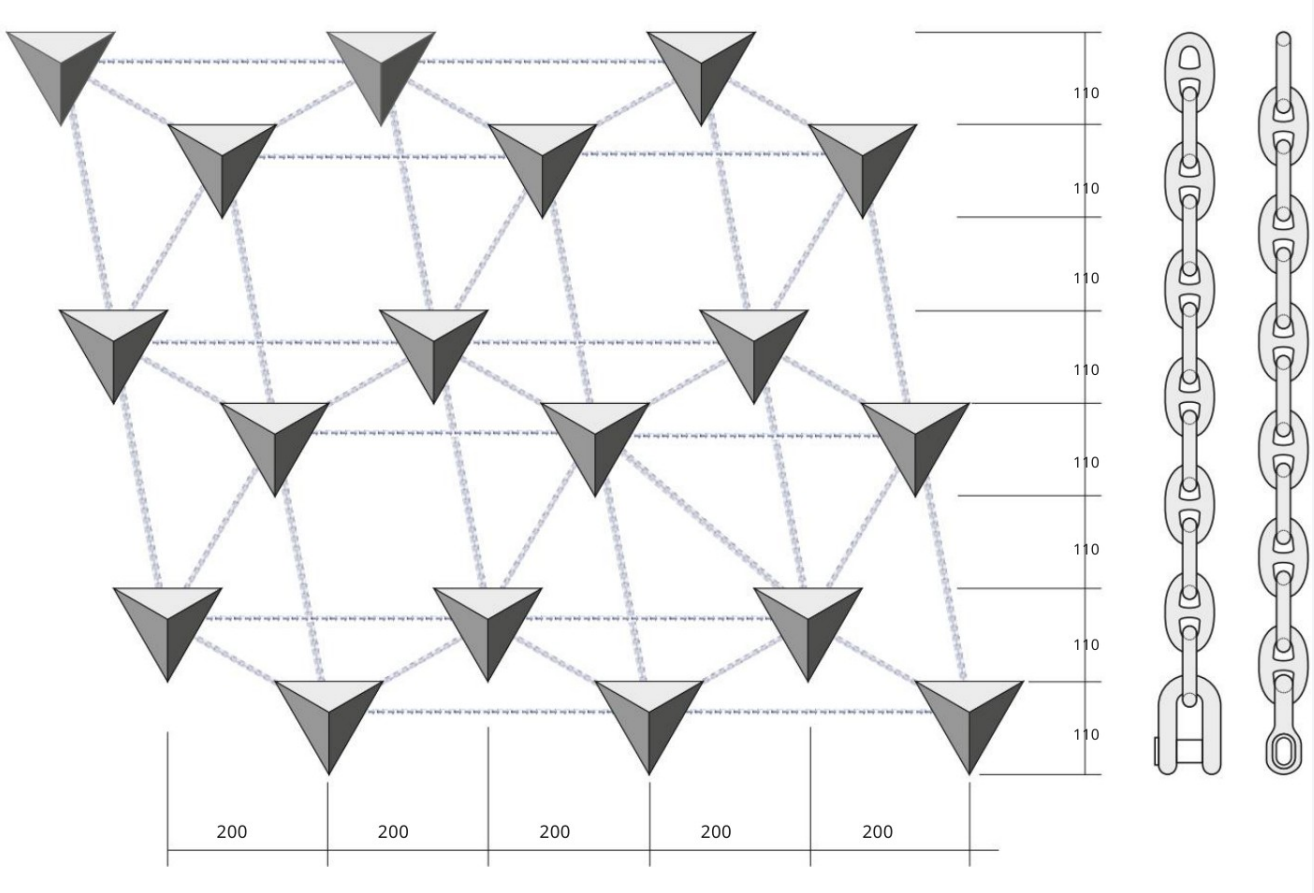


* The mass unit was printed as “million tonnes” in the machine translation; numerical values are given unchanged. The volume of the light variant, 0,58 m³, needs clarification; not corrected to an assumed value.

Source: Product File IBIPC, p. 33.

PYRAMIDS: LAYOUT AND CHAINS

Original Product File materials — geometry and designations preserved



Ship shackle and marine anchor chain; designations 110 and 200 retained as in the original.

Source: Product File IBIPC, p. 33.

STING: FOUR BARRIER VARIANTS

Mechanical protection of entrances, route blocking and vehicle control

Dimensions, mm	Mass, kg	Material in source	Catalogue category
1150 × 1150	400	UHPRC (as printed)	Heavy tanks
1100 × 1100	378	High-strength concrete	Medium tanks
1100 × 1100	150	High-strength steel	Combat vehicles / trucks
750 × 750	40	High-strength steel · Police Type	Vehicles

Material classification register numbers given in the catalogue: 0144110901003 / 0145450000003 / 0145450000027.

Vehicle categories are catalogue captions. The number of each modification has not been added by assumption.

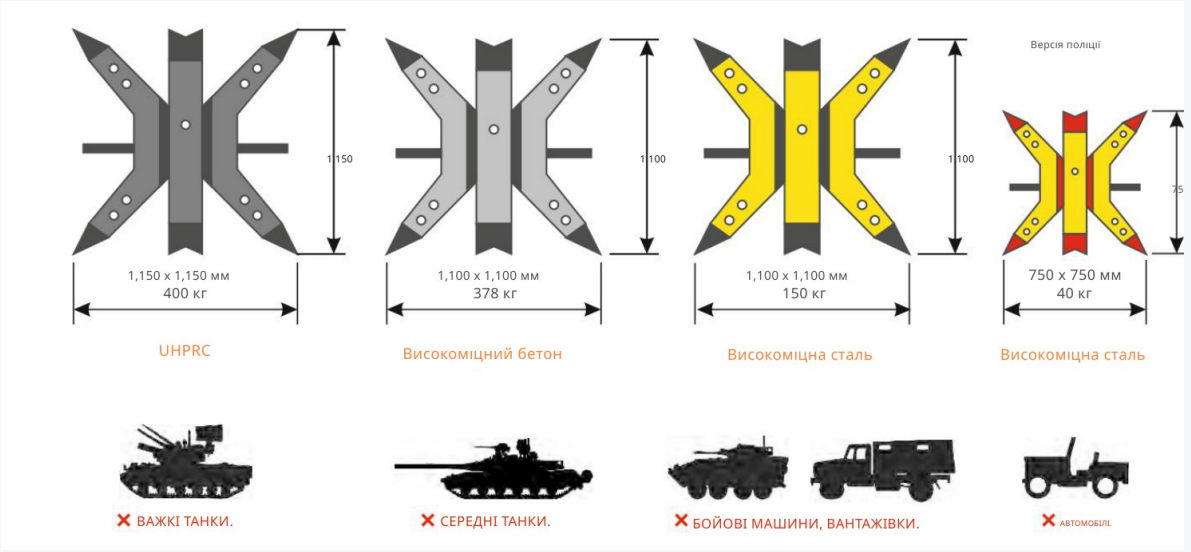
Source: Product File IBIPC, p. 34.

STING: ORIGINAL PHOTOS AND VARIANTS

Original Product File materials — geometry and designations preserved



Installed barriers, original photograph.



Four versions, the police version and original signatures.

Source: Product File IBIPC, p. 34.

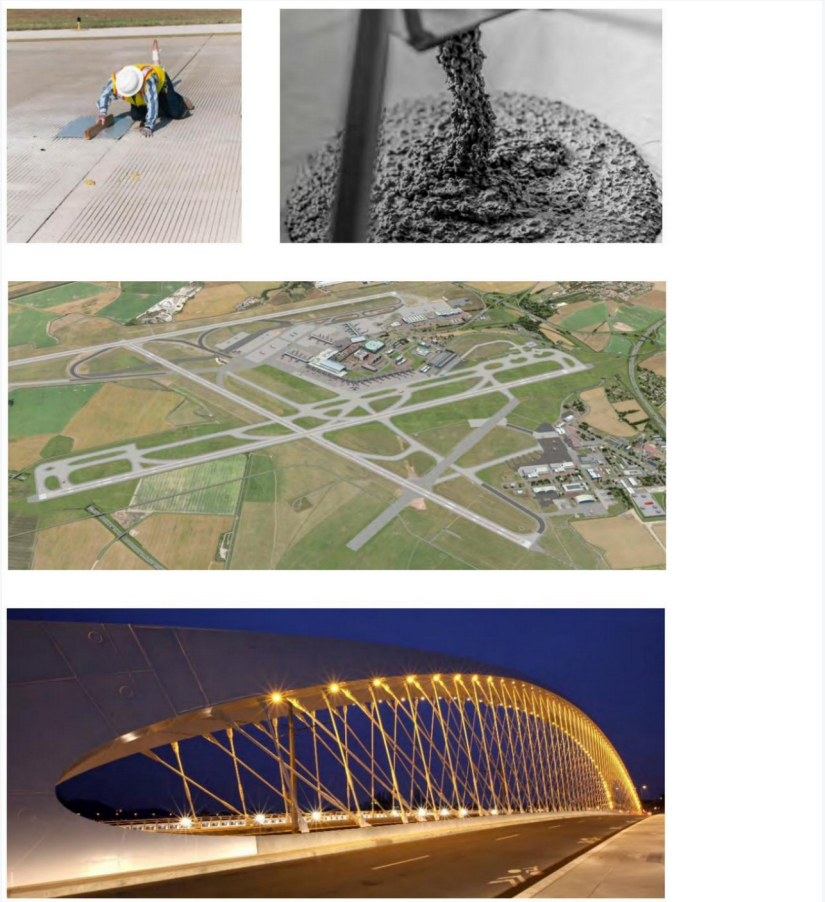
CONCRETE MIXES: REPAIR AND PRODUCTION

Product description and declared catalogue characteristics

PURPOSE / DESIGN

Rapidly repair damaged facilities vital to national defence and critical infrastructure sectors using patented UHPFRC. Provides high compressive strength above 165 MPa, durability and dimensional stability.

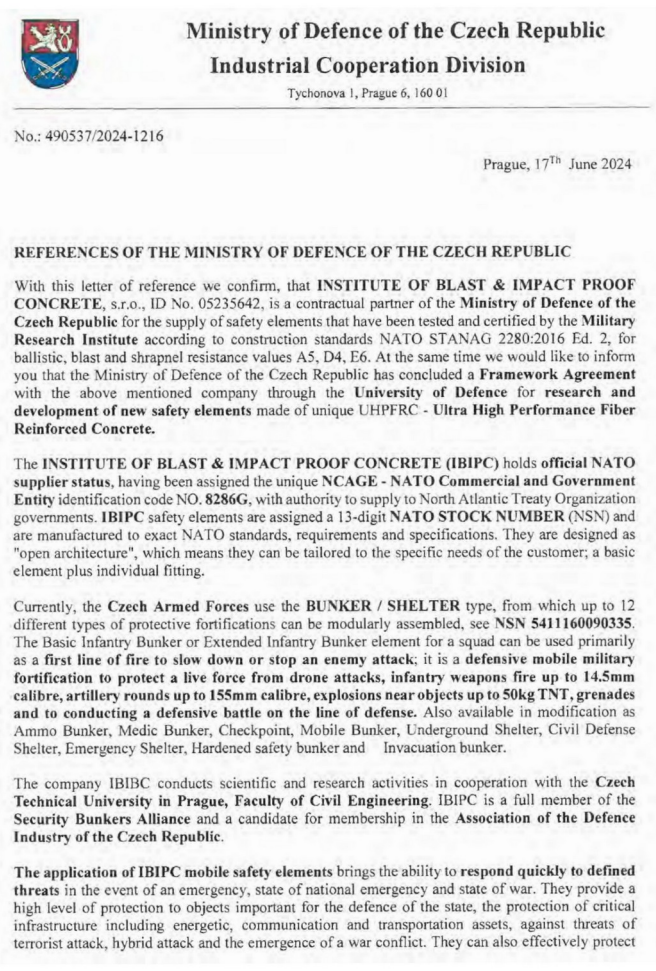
Over 165 MPa — catalogue compressive strength value. It does not replace the laboratory test table of another specimen.



Source: Product File IBIPC, p. 35.

MINISTRY OF DEFENCE: REFERENCE LETTER

Original English-language document, sheet 1



Ministry of Defence of the Czech Republic
Industrial Cooperation Division
Tychonova 1, Prague 6, 160 01

No.: 490537/2024-1216

Prague, 17Th June 2024

REFERENCES OF THE MINISTRY OF DEFENCE OF THE CZECH REPUBLIC

With this letter of reference we confirm, that **INSTITUTE OF BLAST & IMPACT PROOF CONCRETE**, s.r.o., ID No. 05235642, is a contractual partner of the **Ministry of Defence of the Czech Republic** for the supply of safety elements that have been tested and certified by the **Military Research Institute** according to construction standards NATO STANAG 2280:2016 Ed. 2, for ballistic, blast and shrapnel resistance values A5, D4, E6. At the same time we would like to inform you that the Ministry of Defence of the Czech Republic has concluded a **Framework Agreement** with the above mentioned company through the **University of Defence** for **research and development of new safety elements** made of unique UHPFRC - **Ultra High Performance Fiber Reinforced Concrete.**

The **INSTITUTE OF BLAST & IMPACT PROOF CONCRETE (IBIPC)** holds **official NATO supplier status**, having been assigned the unique **NCAGE - NATO Commercial and Government Entity** identification code NO. **8286G**, with authority to supply to North Atlantic Treaty Organization governments. **IBIPC** safety elements are assigned a 13-digit **NATO STOCK NUMBER** (NSN) and are manufactured to exact NATO standards, requirements and specifications. They are designed as "open architecture", which means they can be tailored to the specific needs of the customer; a basic element plus individual fitting.

Currently, the **Czech Armed Forces** use the **BUNKER / SHELTER** type, from which up to 12 different types of protective fortifications can be modularly assembled, see **NSN 5411160090335**. The Basic Infantry Bunker or Extended Infantry Bunker element for a squad can be used primarily as a **first line of fire to slow down or stop an enemy attack**; it is a **defensive mobile military fortification to protect a live force from drone attacks, infantry weapons fire up to 14.5mm calibre, artillery rounds up to 155mm calibre, explosions near objects up to 50kg TNT, grenades and to conducting a defensive battle on the line of defense.** Also available in modification as Ammo Bunker, Medic Bunker, Checkpoint, Mobile Bunker, Underground Shelter, Civil Defense Shelter, Emergency Shelter, Hardened safety bunker and Invacuation bunker.

The company IBIBC conducts scientific and research activities in cooperation with the **Czech Technical University in Prague, Faculty of Civil Engineering**. IBIPC is a full member of the **Security Bunkers Alliance** and a candidate for membership in the **Association of the Defence Industry of the Czech Republic**.

The application of IBIPC mobile safety elements brings the ability to **respond quickly to defined threats** in the event of an emergency, state of national emergency and state of war. They provide a high level of protection to objects important for the defence of the state, the protection of critical infrastructure including energetic, communication and transportation assets, against threats of terrorist attack, hybrid attack and the emergence of a war conflict. They can also effectively protect

Ministry of Defence of the Czech Republic
Industrial Cooperation Division
Tychonova 1, Prague 6, 160 01

No. 490537/2024-1216
Prague, 17th June 2024

The letter confirms that INSTITUTE OF BLAST & IMPACT PROOF CONCRETE, s.r.o., ID No. 05235642 is a contractual partner of the Ministry of Defence of the Czech Republic.

Testing and certification by the Military Research Institute to NATO STANAG 2280:2016 Ed. 2 are cited; the letter itself states classes A5, D4, D6.

Research framework agreement via University of Defence — for developing UHPFRC elements.

Source: Product File IBIPC, p. 36.

MINISTRY OF DEFENCE: LETTER CONTINUED

Original page with signature and photo



Міністерство оборони Чеської Республіки
Відділ промислової кооперації
Тихонова І, Прага 6, 160 0 І

об'єкти військової та цивільної інфраструктури високого ризику або інші подібні виробничі об'єкти та технологічні одиниці.

З огляду на вищезазначене, сертифіковані елементи IBIBC можуть бути рекомендовані для потенційного включення до складу озброєння збройних сил армій Організації Північноатлантичного договору.

Michal Rendla
Заступник генерального директора

The continuation describes protection of high-risk military and civil infrastructure facilities,
production sites and process units.

Certified elements in the letter are recommended for potential inclusion in the armament of the armed forces of NATO states.

Signature: Michal Rendla
Deputy General Director.

The photograph and caption are reproduced as part of the original document. “IBIBC” in the continuation translation is not corrected in the facsimile.

Recommendation and NATO supplier status are not blanket product certification.

Source: Product File IBIPC, p. 37.

LETTER: NCAGE / NSN AND FULL CONTENTS

Edited Ukrainian content of English-language sheet 1

IDENTIFIERS / SYSTEM

Official NATO supplier status; NCAGE — NATO Commercial and Government Entity identification code: 8286G. Right to supply NATO governments is stated in the letter.

The elements are assigned a 13-digit NATO STOCK NUMBER (NSN); manufacture to exact NATO requirements and an open architecture with base elements and custom layout are described.

Czech Armed Forces use BUNKER / SHELTER type: up to 12 types of protective structures with modular assembly. NSN 5411160090335.

Basic Infantry Bunker / Extended Infantry Bunker: mobile fortification for personnel protection and attack containment / stopping.

LETTER CLAIMS / COOPERATION

The letter names drone attacks; infantry weapons fire up to 14.5 mm; artillery rounds up to 155 mm; explosions near objects up to 50 kg TNT; grenades. This is a claim in the letter, not full protocols of each scenario.

Modifications: Ammo Bunker, Medic Bunker, Checkpoint, Mobile Bunker, Underground Shelter, Civil Defence Shelter, Emergency Shelter, Hardened safety bunker, Invacuation bunker.

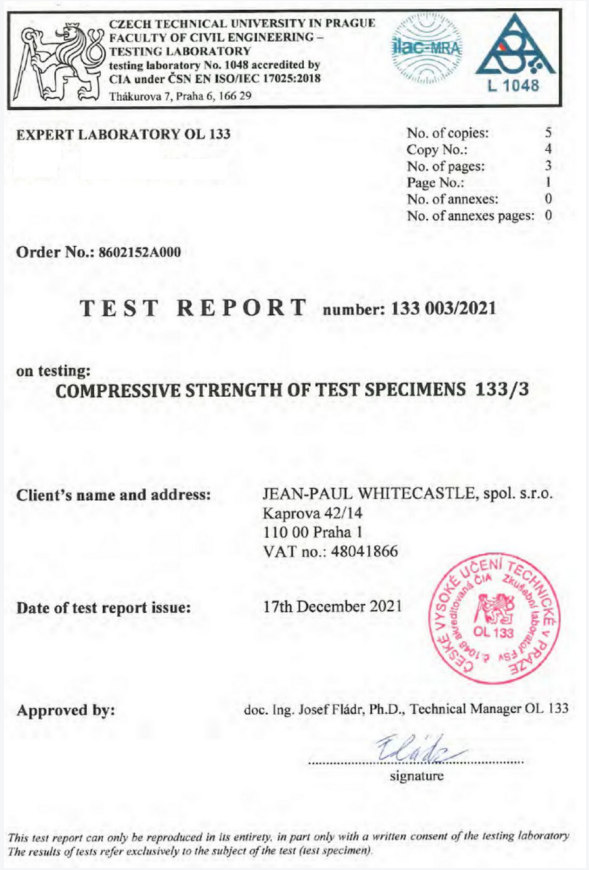
Scientific cooperation: Czech Technical University in Prague, Faculty of Civil Engineering. Full member of Security Bunkers Alliance; candidate member of Association of Defence Industry of the Czech Republic.

Rapid response is claimed in emergency / martial law and protection of key defence and critical energy, communications and transport facilities from terrorist, hybrid attacks and armed conflict.

Source: Product File IBIPC, pp. 36, 37.

REPORT 133 003/2021: DETAILS

Title sheet 1 of 3 available — not the full report



CZECH TECHNICAL UNIVERSITY IN PRAGUE
FACULTY OF CIVIL ENGINEERING –
TESTING LABORATORY
testing laboratory No. 1048 accredited by
CIA under ČSN EN ISO/IEC 17025:2018
Thákurova 7, Praha 6, 166 29

L 1048

EXPERT LABORATORY OL 133

No. of copies: 5
Copy No.: 4
No. of pages: 3
Page No.: 1
No. of annexes: 0
No. of annexes pages: 0

Order No.: 8602152A000

TEST REPORT number: 133 003/2021

on testing:
COMPRESSIVE STRENGTH OF TEST SPECIMENS 133/3

Client's name and address: JEAN-PAUL WHITECASTLE, spol. s.r.o.
Kaprova 42/14
110 00 Praha 1
VAT no.: 48041866

Date of test report issue: 17th December 2021

Approved by: doc. Ing. Josef Fládr, Ph.D., Technical Manager OL 133

signature

This test report can only be reproduced in its entirety, in part only with a written consent of the testing laboratory. The results of tests refer exclusively to the subject of the test (test specimen).

Detail	Value
Laboratory	Czech Technical University in Prague Faculty of Civil Engineering · Testing Laboratory 1048
Accreditation	CIA · ČSN EN ISO/IEC 17025:2018
Expert laboratory	OL 133 · Thákurova 7, Praha 6, 166 29
Report / order	133 003/2021 · Order 8602152A000
Subject / date	Compressive strength of test specimens 133/3 17th December 2021
Client	JEAN-PAUL WHITECASTLE, spol. s.r.o. Kaprova 42/14, 110 00 Praha 1 · VAT 48041866
Responsible	doc. Ing. Josef Fládr, Ph.D. · Technical Manager OL 133
Laboratory contact	Removed in the integrated copy

Sheet 2 missing. Copies 5; Copy No. 4; pages 3; annexes 0; annex pages 0. Reproduction of any part requires written consent of the laboratory.

Editorial note: phone and email removed only in the integrated copy; technical content preserved.

Source: Product File IBIPC, p. 38.

COMPRESSIVE STRENGTH: FULL TABLE

Report 133 003/2021 · samples 133/3 · all numerical results unrounded

№	Label	Length mm	Height mm	Width mm	Weight g	Density kg/m³	Force kN	Strength MPa
1	PB 1.1	147.5	149.7	149.8	9085.4	2747	3592.05	162.7
2	PB 1.2	149.2	150.0	149.6	9218.8	2754	3670.59	164.1
3	PB 1.3	148.6	150.0	149.7	9221.5	2763	3686.70	165.4
4	PB 1.4	149.2	149.8	149.6	9102.3	2722	3636.13	162.7
5	PB 1.5	147.8	150.2	149.8	9082.0	2732	3565.18	160.6
6	PB 1.6	147.8	149.8	149.6	9072.0	2740	3638.91	164.4

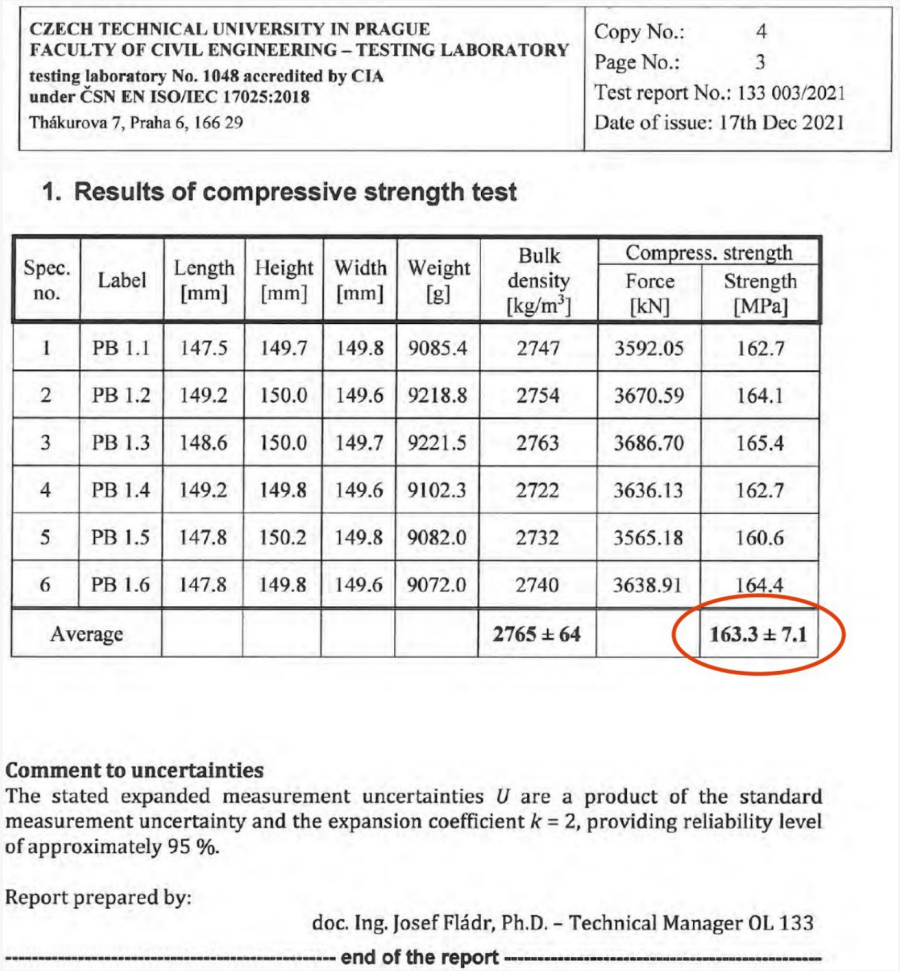
163.3 ± 7.1 MPa **2765 ± 64 kg/m³**

Mean values — as printed in the report. Density 2765 ± 64 is inconsistent with the simple mean of the rows; clarification needed.

Source: Product File IBIPC, p. 39.

REPORT: ORIGINAL RESULTS AND ERROR

Sheet 3 of 3 available; old catalogue logo outside the fragment



CZECH TECHNICAL UNIVERSITY IN PRAGUE
FACULTY OF CIVIL ENGINEERING – TESTING LABORATORY
testing laboratory No. 1048 accredited by CIA
under ČSN EN ISO/IEC 17025:2018
Thákurova 7, Praha 6, 166 29

Copy No.: 4
Page No.: 3
Test report No.: 133 003/2021
Date of issue: 17th Dec 2021

1. Results of compressive strength test

Spec. no.	Label	Length [mm]	Height [mm]	Width [mm]	Weight [g]	Bulk density [kg/m³]	Compress. strength	
							Force [kN]	Strength [MPa]
1	PB 1.1	147.5	149.7	149.8	9085.4	2747	3592.05	162.7
2	PB 1.2	149.2	150.0	149.6	9218.8	2754	3670.59	164.1
3	PB 1.3	148.6	150.0	149.7	9221.5	2763	3686.70	165.4
4	PB 1.4	149.2	149.8	149.6	9102.3	2722	3636.13	162.7
5	PB 1.5	147.8	150.2	149.8	9082.0	2732	3565.18	160.6
6	PB 1.6	147.8	149.8	149.6	9072.0	2740	3638.91	164.4
Average						**2765 ± 64**		**163.3 ± 7.1**

Comment to uncertainties
The stated expanded measurement uncertainties *U* are a product of the standard measurement uncertainty and the expansion coefficient $k = 2$, providing reliability level of approximately 95 %.

Report prepared by:
doc. Ing. Josef Fládr, Ph.D. – Technical Manager OL 133

---------- **end of the report** ----------

Expanded measurement uncertainty U: product of the standard uncertainty and the coverage factor k = 2; confidence level approx. 95 %.

Results apply only to the tested specimens.

Report prepared by: doc. Ing. Josef Fládr, Ph.D. — Technical Manager OL 133.

Copy No. 4; Page No. 3; issue 17th Dec 2021.

The file has no sheet 2. The report permits reproduction only in full or in part with the laboratory's written consent; this slide is marked as an available extract.

Source: Product File IBIPC, p. 39.

VVÚ 2280-011-2022: ORIGINAL

Certificate preserved with seal, signature and conditional status



Vojenský výzkumný ústav, s. p.
Veslařská 230, 63700 Brno, Česká republika

CERTIFICATE
Nr. VVÚ 2280-011-2022

Client: **JEAN PAUL WHITECASTLE, spol. s r.o.**
Kaprova 42/14
110 00 Praha 1 – Staré Město

Manufacturer: **INSTITUTE OF BLAST & IMPACT PROOF CONCRETE, s. r. o. (IBIPC)**
Jihlavská 2512/34,
591 01 Žďár nad Sázavou

Product: **UHPFRC**
The material composition of the samples is in accordance with Patent of CVTU Prague No. 304 478 and with European Patent of CVUT Prague No. EP 3 351 518 A1.

Testing Equipment: **1 pc sample (500 x 500 x 200 mm)**
1 pc basic part of the bunker (2400 x 2400 x 200 mm)

Classification Level: **A5, C4 and D6 according to STANAG 2280 Edition 2 / ATP-3.12.1.8, Edition 1, Version 1**

The validity of the Certificate is related to the Test Reports from the Physical Tests of UHPFRC samples No. VVU-SMI-22-101, VVU-SMI-22-102 and VVU-SMI-22-103 where tested UHPFRC samples are specified.

The testing Equipment is **Conditionally Compliant** with the protection level **A5, C4 and D6 according to STANAG 2280 Edition 2 / ATP-3.12.1.8, Edition 1, Version 1**.

Brno, January 30th 2023

Vojenský výzkumný ústav, s.p.

Ing. Pavel ČUDA, Ph.D.
director

Vojenský výzkumný ústav, s. p.
Veslařská 230, 63700 Brno, Česká republika

Nr. VVÚ 2280-011-2022
Brno, January 30th 2023

Classification: A5 / C4 / D6
STANAG 2280 Edition 2 / ATP-3.12.1.8 Edition 1 Version 1

Director: Ing. Pavel ČUDA, Ph.D.

Conditionally Compliant

Source: Product File IBIPC, p. 40.

VVÚ 2280-011-2022: SCOPE AND CONDITIONS

Edited details; names, parameters and conditional status kept as in the original

Entry	Full content
Client	JEAN PAUL WHITECASTLE, spol. s r.o. · Kaprova 42/14, 110 00 Praha 1 – Staré Město
Manufacturer	INSTITUTE OF BLAST & IMPACT PROOF CONCRETE, s. r. o. (IBIPC) Jihlavská 2512/34, 591 01 Žďár nad Sázavou
Product / patents	UHPFRC · CVUT Prague No. 304 478 · European Patent EP 3 351 518 A1
Test object	1 pc sample: 500 × 500 × 200 mm; 1 pc basic part of the bunker: 2400 × 2400 × 200 mm
Reports on which validity depends	VVU-SMI-22-101 / VVU-SMI-22-102 / VVU-SMI-22-103
Classes / standard	A5, C4, D6 · STANAG 2280 Edition 2 / ATP-3.12.1.8 Edition 1 Version 1
Status	Testing Equipment is Conditionally Compliant; specific tested specimens are defined in the reports

Source: Product File IBIPC, p. 40.

VVÚ 2280-001-2025: ORIGINAL

Police Type; E3; original terminology and conditional status



Vojenský výzkumný ústav, s. p.
Veslařská 230, 63700 Brno, Česká republika

CERTIFICATE
Nr. VVÚ 2280-001-2025

Client: **INSTITUT OF BLAST & IMPACT PROOF CONCRETE s.r.o,**
Jihlavská 2512/34
591 01 Žďár nad Sázavou

Manufacturer: **INSTITUT OF BLAST & IMPACT PROOF CONCRETE s.r.o,**
Jihlavská 2512/34
591 01 Žďár nad Sázavou

Product: ***Concrete panel*** *(main surface)*
(Police Type) – KČM 014 545 000 0027
Roadblock consists of 2 parts with 750 mm, height 750 mm, thickness 115 mm and weight 20 kg; Complete roadblock weight is 40 kg.

Testing Equipment: **14 pes of Small Metal Roadblock (Police Type)**

Classification Level: **E3 according to STANAG 2280 Edition 2 / ATP-3.12.1.8, Edition 1, Version 1**

The validity of the certificate is related to the Test report from the Physical test of Roadblock System No. SMI/66/2019-VVÚ, where the tested and certified Small Metal Roadblock System is specified..

The tested Roadblock System of 14 pes of Small Metal Roadblocks (Police Type) **is Conditionally Compliant with the protection level E3 according to STANAG 2280 ed.2 / ATP-3.12.1.8, edition 1, version 1.**

Brno, November 6th 2025

Vojenský výzkumný ústav, s.p.

Ing. Pavel ČUDA, Ph.D.
director

Vojenský výzkumný ústav, s. p.
Veslařská 230, 63700 Brno, Česká republika

Nr. VVÚ 2280-001-2025
Brno, November 6th 2025

Classification: E3
STANAG 2280 Edition 2 / ATP-3.12.1.8 Edition 1
Version 1

Report: SMI/66/2019-VVU
Director: Ing. Pavel ČUDA, Ph.D.

Conditionally Compliant

Source: Product File IBIPC, p. 41.

VVÚ 2280-001-2025: E3 PARAMETERS

Edited records without hidden reconciliation of ambiguous terminology

Entry	Source value
Client and manufacturer	INSTITUTE OF BLAST & IMPACT PROOF CONCRETE s.r.o. Jihlavská 2512/34, 591 01 Žďár nad Sázavou
Product	Concrete panel (main surface) (Police Type) – KČM 014 545 000 0027
Roadblock: two parts	750 mm × 750 mm · thickness 115 mm · weight 20 kg
Total weight	Complete roadblock weight is 40 kg
Testing Equipment	14 pcs Small Metal Roadblock (Police Type)
Class / report	E3 · SMI/66/2019-VVU
Status	14 pcs Small Metal Roadblocks (Police Type): Conditionally Compliant

The certificate contains both Concrete panel and Small Metal Roadblock. The ambiguity is preserved; not replaced with a new name.

Source: Product File IBIPC, p. 41.

TESTING: CONDITIONS AND ORIGINAL PHOTOS

Product File description, not full test reports



12,7 × 99 API M8 / 14,5 × 114 API M32

Armour-piercing incendiary rounds; impact velocity 900 m/s. For heavy machine gun and anti-materiel rifle; against armoured targets.



107 mm / 120 mm · 1,5 m

Rocket / mortar round. In the source: 120-mm mortar for unprotected stationary targets, troop concentrations, columns and machine-gun nests.



20 kg TNT · 5 m

Description of sudden energy release, sharp local temperature and pressure rise, and formation of an atmospheric pressure wave. Not equal to D6 / 50 kg.

Source: Product File IBIPC, p. 42.

STANAG 2280: EFFECTS TABLE A–C

Levels 1–6 — full catalogue classification, not an IBIPC certification range

Level	A · projectiles	B · direct fire / warheads	C · indirect fire
6	Automac canon 30 mm APDS	Extended ASM · Structure Ammunition	240-mm rocket
5	Machine gun 14,5 mm (0,57)	Tandem ASM	155-mm mortar / 122-mm rocket
4	Machine gun 12,7 mm (0,50)	Personnel / Thermobaric / conventional charge < 2,5 kg	120-mm mortar / 107-mm rocket
3	Assault / sniper rifle 7,62 mm AP	Anti-tank · shaped charge	82-mm mortar
2	Assault rifle · 5,56–7,62 mm ball	40-mm rifle grenade · shaped-charge warhead	60-mm mortar
1	Pistol	Reserved	Hand grenade

STANAG 2280 Ed. 2 / ATP-3.12.1.8. ASM / Automac canon names and ambiguous translations kept as in source.

Source: Product File IBIPC, p. 43.

STANAG 2280: EFFECTS D–E AND ATP SCOPE

Blast and transport loads; full content of source notes

Level	D · high explosive (TNT-eq.)	E · vehicles
6	50 kg	Tracked vehicle
5	10 kg	Heavy truck · 32 000 kg
4	2 kg	Truck · 7500 kg
3	1 kg	Small truck · 2500 kg
2	0,5 kg	Passenger car · 1500 kg
1	0,1 kg	Motorcycle

ATP covers common military projectiles, fragmentation, transport and blast weapons, and a generalised spectrum of explosive threats, including the characteristics of most attacks using IEDs.

Impact of weapon systems on infrastructure:
1. Blast.
2. Penetration: bullets and penetrating projectiles; shaped charges; vehicles.
3. Fragmentation.
4. Secondary effects, including spalling and fire.

Source: Product File IBIPC, p. 43.

DISCREPANCIES: PRESERVE, DO NOT CORRECT

Open map of questions to primary documents

Source entries	To be clarified
A5 / C4 / D6 ↔ A5 / D4 / D6	Catalogue / certificate 2022 ↔ Ministry of Defence letter
20 kg TNT at 5 m ↔ D6 / 50 kg TNT	Separate test description ↔ declared class
150 MPa; over 165 MPa; 163.3 ± 7.1 MPa	Different sources / samples; not a single guaranteed value
2765 ± 64 kg/m³	Printed average density ↔ row arithmetic
0,58 m³; “million tonnes”	Light pyramid variant and machine translation of the unit
1,8 Pa	Ventilation entry requires primary specification
Concrete panel ↔ Small Metal Roadblock	Ambiguous names in the Police Type certificate
E3 ↔ marked on the table as E2 / 1500 kg	Do not align certificate and catalogue entry by assumption
Report: sheets 1 and 3; sheet 2 missing	Excerpt available, not the full protocol

Source: Product File IBIPC, pp. 2, 20, 27, 33, 35, 36, 39, 40, 41, 42, 43.

IBIPC IN THE LOWER PROTECTIVE BELT

Potential W-FORTEX configuration, not a new certified system

WHERE JUSTIFIED

Zones with limited footprint.

High criticality and high required protection.

Local areas where thickness and transport mass determine the layout.

WHAT IT CAN BE COMBINED WITH

Local RC; Gabion / Fill.

Hybrid T/L; Hybrid T/Gabion.

Steel; UHMWPE; Composite.

Suspended Panels and other material W-FORTEX directions.

Material selection depends on the exposure scenario, confirmed configuration and full engineering verification.

Conceptual W-FORTEX integration per client brief. Not a test result.

LOCAL REINFORCEMENT OF CRITICAL NODES

Protecting the critical function, not uniformly reinforcing all surfaces

PRIORITY ZONES

Emergency and backup power.

Control, communications and monitoring.

High-priority cable routes.

Local zones of critical equipment.

INTEGRATION CONDITIONS

Do not block ventilation,
heat dissipation or emergency access.

Check joints, openings, supports and foundation.

Maintain access for maintenance
and replacement.

Do not transfer sample classes to a component without confirmation.

Conceptual W-FORTEX integration per client brief. Not a test result.

HYBRID WALL / T-WALL / LOCAL SHIELDING

IBIPC — one of the material options of the modular architecture

Configuration	IBIPC role	What is verified separately
Hybrid Wall	High-performance local fill / screen	Compatible with steel, RC, gabions and supports
T-Wall	Protective module or local belt section	Stability; foundation; joints; transport; installation
Local shielding	Priority screen around the critical node	Impact scenario; standoff; openings; secondary effects
Other W-FORTEX materials	Alternatives or supplements, not exclusions	Material-dependent properties and verified configuration

Conceptual applications do not change the geometry of the source drawings and do not create new certified levels.

Conceptual W-FORTEX integration per client brief. Not a test result.

ENERGY AND INDUSTRY

Potential applications of IBIPC in W-FORTEX

ASSETS

Generators and cogeneration units.

Transformer and power nodes.

Power cables, fibre optic and IT / IoT.

Control points and backup systems.

ENGINEERING LOOP

Lower protective belt and local screens.

Protected air inlets / outlets and cable penetrations.

Technological compatibility with equipment operation.

A separate justification for the specific asset and threat.

Source: Product File IBIPC, pp. 8, 21, 26, 30, 31.

NUCLEAR AND RADIOLOGICAL INFRASTRUCTURE

POTENTIAL APPLICATION IN W-FORTEX ARCHITECTURE

POTENTIAL AREAS

Nuclear infrastructure and research facilities.

Radioactive material handling zones.

Radioactive waste handling facilities.

External safety-related equipment.

CRITICAL FUNCTIONS

Emergency power.

Monitoring and communications.

Local protective structures.

Protected access and preserved system operation.

No automatic nuclear qualification is claimed. Separate safety justification, qualification and operator approval are required.

Conceptual W-FORTEX integration per client brief. Not a test result.

SYSTEM LOGISTICS AND ECONOMICS

Material cost is assessed together with the full configuration

POTENTIAL COMPENSATION

The higher price of a high-performance material can be offset by lower thickness and mass.

Fewer trips and more compact crane equipment.

Smaller foundation / footprint and faster installation — if confirmed by calculation.

TOTAL SOLUTION COST

Material + fabrication + delivery + crane + foundation + joints + installation.

Operation, repair, replacement and access to critical equipment.

Compare the same impact scenario and the required protective function.

The appendix contains no invented percentages, costs, trip reductions or universal savings.

Conceptual W-FORTEX integration per client brief. Not a test result.

W-FORTEX IBIPC

HIGH-PERFORMANCE CRITICAL INFRASTRUCTURE PROTECTION

Technology. Modularity. Confirmed configuration.

IBIPC — high-performance variant within W-FORTEX.

Real drawings and results. Preserved documents. Open limits of evidence.

TRIUMPH Alliance / WITKOWITZ Group

Conceptual W-FORTEX integration per client brief. Not a test result.

W-FORTEX

FROM THE FULL PROGRAMME — TO A PILOT CONFIGURATION

PROTECT THE FACILITY

Independent physical circuit
Selected levels and local reinforcement

PRESERVE PEOPLE

Shelter and life support
Specialised protected modes

SUSTAIN FUNCTION

Power · control · communications
Autonomy and recovery

ONE FACILITY. ITS OWN CONFIGURATION. A SHARED GOAL — CONTINUITY.

FACILITY ANALYSIS → REQUIREMENTS → TECHNOLOGY SELECTION → INTERFACE VERIFICATION → PILOT

Project integration, qualification and safety justification — for a specific facility and scenario.