

TECHNICAL SPECIFICATION

Earth-filled Protective Barrier System

1. Scope

1.1. General

This document defines the type of protective barrier system of interest and the key technical information requested from manufacturers and suppliers. It is not a final procurement specification and is deliberately performance-based so that technically suitable products can be identified.

The system of interest is a prefabricated, modular, collapsible or foldable, cellular protective barrier that can be transported unfilled, rapidly deployed on site, and filled with locally available soil, sand, gravel, crushed aggregate or other suitable granular material.

Potential applications include:

- Blast-pressure and fragment mitigation;
- Protective perimeter walls; Temporary and semi-permanent security barriers;
- Protection against certain direct and indirect-fire, fragments and debris;
- Vehicle and pedestrian-channel separation;
- Flood diversion and temporary flood protection;
- Protection of critical infrastructure, buildings, accommodation and operational facilities.

1.2. Product description

The concept is a multi-cellular structural cage formed from welded steel wire mesh or a technically equivalent rigid cage system, internally lined with geotextile or an equivalent fill-retaining material. The suppliers should identify all standard components, connectors, accessories, repair materials and installation equipment required.

The product should be described generically as a modular, collapsible/foldable, earth-filled protective barrier system. Proprietary products may be proposed, but the response should describe their technical characteristics and performance rather than rely on brand recognition.

1.3. Performance-based requirement

Suppliers may propose any standard product or system that meets the intended function. Suppliers could provide details of their proposed products, including cell dimensions, mesh configuration, connection systems, liner materials, coatings, deployment methods, and any other relevant technical characteristics, supported where available by technical data sheets, drawings, or test information.

2. Applicable Standards and Guidance

Suppliers are requested to identify the national or international standards used for design, manufacture, materials, testing and quality control.

2.1. Barrier cage and steel wire

Suppliers should identify the applicable standards for welded-wire/gabion products, steel wire, weld quality and corrosion protection. Examples include EN 10223-8, ASTM A974, ASTM A1064/A1064M, EN 10244-2 or technically equivalent standards.

2.2. Geotextile

Suppliers should identify the standards used to characterize the liner, including relevant mass, tensile, puncture, tear, opening-size, permeability, UV-weathering and durability properties. ISO or ASTM geotextile test methods, or recognized equivalents.

2.3. Testing, inspection and quality

The suppliers should state their quality-management certification and the accreditation status of laboratories or facilities used for independent testing, such as ISO 9001 and ISO/IEC 17025 or recognized equivalents.

2.4. Blast engineering and protective design

Where blast performance is claimed, the suppliers should identify the engineering methodology and test standard used. Recognized blast-engineering methods such as UFC 3-340-02, or other accepted international approaches.

3. Definitions

- Barrier unit: A prefabricated group of connected cells supplied as one deployable package.
- Cell: One fill-retaining compartment within the barrier.
- Liner: Geotextile or equivalent material used to retain the fill.
- Fill: Soil, sand, aggregate or other granular material placed inside the cells.
- Threat-side face: Side exposed to the identified threat.
- Protected-side face: Side facing the asset, personnel or area requiring protection.

4. Configuration

4.1. Cellular arrangement

The system sought should be modular and capable of:

- Compact transport in folded or collapsed form and rapid deployment on site;
- Connection of adjacent units to create continuous barriers, corners, curves and returns;
- Maintaining cell geometry during filling and normal service;
- Vertical stacking or multi-tier construction where such configurations are approved by the manufacturer;
- Deployment using conventional construction equipment and without unnecessary proprietary plant.

4.2. Module sizes

The suppliers should provide its standard available range. For each representative product family, the following information is requested:

Parameter	Information requested from suppliers
Cell / module dimensions	Height, width and nominal cell length
Unit configuration	Number of cells and total deployed length
Transport configuration	Collapsed dimensions and unfilled mass
Fill requirement	Internal fill volume and typical filled mass/density basis
Logistics	Units per pallet / shipping container and typical packing arrangement

4.3. Unit length

Suppliers should state available unit lengths, number of cells per unit, connection method between units, minimum turning radius if relevant, and whether units can be recovered, emptied and redeployed.

5. **Welded-wire mesh panels**

5.1. Material

Suppliers should provide steel grade, nominal mechanical properties and manufacturing standard for the structural wire or equivalent cage material, together with available material certificates.

5.2. Wire diameter

Suppliers should state the nominal structural wire diameter(s) used for each product range and explain any changes required for taller, wider or stacked configurations.

5.3. Mesh opening

Suppliers should state the standard mesh aperture(s), tolerances and any available alternatives, and confirm compatibility with the liner, connectors, filling method and approved stacking arrangements.

5.4. Welding

Suppliers should describe the welding/manufacturing process and quality controls used to ensure that panels withstand transportation, deployment, filling, compaction and approved stacking without progressive weld failure.

6. Corrosion Protection

6.1. General

All exposed steel components should have corrosion protection suitable for outdoor service. The suppliers should state the coating system, applicable standard, coating mass or thickness, expected service environment and any optional enhanced-corrosion systems.

6.2. Coating quality

Suppliers should provide available coating test data, inspection criteria and guidance for repair of coating damaged during transport, deployment or reuse.

7. Panel Connections and Accessories

7.1. Hinges

Suppliers should describe the standard hinge or panel-connection system, material/coating, retention method and suitability for repeated folding and deployment.

7.2. Connecting pins

Suppliers should describe the method for connecting adjacent units, including whether connections are reusable and the ordinary tools or accessories required.

7.3. Stacking connections

Where stacking is offered, suppliers should provide the approved connector arrangement, maximum number of tiers, required offsets/batter, base width, bracing and any environmental or construction limitations.

7.4. Sharp edges

The supplied system should be finished to avoid unreasonable handling hazards from exposed wire ends, clips, pins or fasteners.

8. Geotextile Liner

8.1. Material

Suppliers should state the liner material, mass per unit area, thickness and available tensile, puncture, tear, UV-weathering and durability properties. Nonwoven polypropylene is typical, but technically equivalent durable materials may be proposed.

8.2. Liner arrangement

Suppliers should describe how the liner retains fill at corners, panel joints, diaphragms, unit-to-unit connections and stacked interfaces, including standard overlaps or skirts where applicable.

8.3. Liner attachment

Suppliers should identify the standard attachment method and spacing, and provide information on field repair or replacement of damaged liner sections.

8.4. Color

Suppliers should state standard and optional liner colors suitable for operational use, including neutral earth-tone options where available.

9. Structural and Functional Performance

9.1. General

Suppliers should provide evidence that the assembled barrier withstands normal transport, deployment, filling, limited compaction, self-weight of fill, approved stacking and environmental exposure without loss of function.

9.2. Cell stability

Suppliers should state expected limits or acceptance criteria for panel bulging, connector movement, weld failure, liner damage, settlement and alignment after filling, based on its standard product qualification or field experience.

9.3. Filled-cell vertical load test

Where the product is intended for stacking or high vertical loads, suppliers should provide available filled-cell compression or vertical-load test results, including specimen geometry, fill, loading arrangement and observed failure/acceptance criteria.

10. Blast-Protection

10.1. No automatic blast rating

UNHCR is interested in documented protective performance, not generic descriptions such as “military grade” or “blast resistant.” Blast capability should be related to the complete installed configuration, including barrier geometry, fill, foundation, threat and stand-off.

10.2. Engineering assessment

Suppliers should provide existing blast-test reports, engineering assessments or published performance data for standard configurations. Information should identify, as available, the threat/charge, TNT-equivalent basis, stand-off, barrier geometry, fill type/density, foundation conditions, observed deformation/failure mode and limitations.

10.3. Suggested blast-test acceptance criteria

Suppliers should describe the acceptance criteria used in its testing or assessment, including resistance to breach, overturning, progressive collapse, connection failure, hazardous component/soil throw and loss of protected-side barrier integrity.

10.4. Test-report applicability

The response should clearly distinguish between tested configurations and untested extrapolations. Where a proposed configuration differs from the tested arrangement, the suppliers should explain the technical basis for applying the available evidence.

11. Other Protective Measures of Interest

11.1. Ballistic and fragment protection

If ballistic or fragment resistance is claimed, suppliers should provide the relevant test standard and key test conditions, including projectile/fragment type, mass/velocity, barrier thickness, fill and penetration or residual-velocity result.

11.2. Flood applications

If flood-control use is offered, suppliers should state whether additional membranes or accessories are required and provide available information on seepage, stability, scour/erosion and deployment limitations.

11.3. Retaining-wall applications

If retaining-wall use is offered, suppliers should identify the approved applications and any requirements relating to foundation bearing, sliding, overturning, drainage, settlement, slope stability or anchorage.

12. Fill Material

12.1. Recommended fill

Suppliers should identify acceptable and preferred locally available fills, such as sand, sandy gravel, well-graded soil, selected excavated material or crushed aggregate, together with unacceptable materials and maximum particle-size restrictions.

12.2. Density and moisture

Suppliers should state the fill density and moisture assumptions used for structural or protective-performance claims and any sensitivity to wet, saturated or poorly compacted fill.

12.3. Filling procedure

Suppliers should provide its recommended filling sequence, layer thickness, compaction limitations, equipment requirements and precautions to avoid excessive bulging or liner damage.

13. Design and Installation Guidance

Suppliers' response should summarize the manufacturer's standard installation requirements and identify conditions that require project-specific structural, geotechnical or blast engineering.

13.1. Foundation and ground preparation

Suppliers should state minimum ground/foundation requirements, including levelness, bearing capacity, drainage and treatment of soft, sloping or irregular ground.

13.2. Alignment and installation tolerances

Suppliers should provide recommended alignment, verticality/batter and cell-geometry tolerances, together with corrective actions for settlement, rotation, excessive bulging or open joints.

13.3. Corners, curves, returns and free ends

Suppliers should provide standard details for corners, curves, returns, junctions and terminations, and identify when buttresses, additional rows, returns, anchorage or other stabilization is required.

13.4. Stacking and multi-tier configurations

For stacked systems, suppliers should provide drawings of approved configurations and identify maximum tiers, permitted module combinations, base width, setback/batter, connection method, temporary stability requirements, filling sequence and applicable wind/seismic limitations.

13.5. Installation manual and technical guidance

Suppliers should confirm availability of an illustrated installation manual covering handling, deployment, connection, filling, stacking, inspection, repair, recovery/redeployment and safe dismantling. The response should also state typical installation team size, plant/equipment requirements and indicative deployment rate.

14. Manufacturing Quality

14.1. Quality-management system

Suppliers should state the manufacturer's quality-management certification, such as ISO 9001 or an equivalent recognized system, and describe routine production inspection/testing.

14.2. Traceability

Suppliers should describe the level of traceability maintained for structural wire/cage material, corrosion coating, geotextile, connectors, production date, inspection records and test results.

15. Documentation to be submitted with the submission

15.1. Technical submission

Suppliers are requested to provide, where available:

- Product data sheets and general arrangement drawings;
- Available module/cell dimensions, unit mass, fill volume and transport/packing information;
- Wire/cage, coating, geotextile and connector technical data;
- Approved stacking arrangements and installation guidance;
- Quality certificates and available independent material, structural, blast, ballistic or other performance test reports;
- Standard warranty, expected service life and repair/redeployment information;
- Country and factory of manufacture, indicative production capacity/lead time and relevant deviations or limitations.

15.2. Test-report of Interest

Test evidence should identify the tested product/configuration, test method, date, laboratory, key conditions, measured results and acceptance criteria. A simple “pass” certificate without enough information to understand the tested configuration is less useful for this market survey.

15.3. Previous experience

Suppliers should summarize relevant previous supply or operational experience for defence, security, civil-protection, critical-infrastructure, humanitarian or similar users, including approximate quantities, locations and dates where disclosure is permitted.

16. Training and Technical Support

Suppliers should describe available technical support, installation supervision and training covering deployment, connection, filling, stacking, inspection, repair, recovery/redeployment and maintenance, including whether support can be provided internationally.

17. Warranty

Suppliers should state its standard warranty period and coverage, expected product/service life under typical outdoor exposure, limitations, spare-parts/accessory availability and recommended inspection/maintenance arrangements.