

TENDER SPECIFICATION

FOR SUPPLY OF METAL GABION AND MATTRESSES

(EARTH RETAINING AND EROSION CONTROL)

1.0 GENERAL

This work comprises supply of Metal Gabion and Mattresses (Zinc + PVC Coated) conforming to the material specifications stated herein, as per the bill of quantity and schedule of supplies enclosed.

2.0 MATERIALS

2.1 General Requirements

Metal Wire Mesh product comprised doubled twisted hexagonally woven hot dipped galvanized mild steel wire of diameter not less than 2.7 mm having minimum Tensile Strength 350 N/mm² confirming to IS:280 and or EN 10223-3. The Zinc Galvanization shall be heavy coating for soft condition confirming to IS: 4826 and or EN 10244-2. For corrosive environment, an additional PVC coating of 0.5 mm thickness shall be provided over the Zinc Galvanization. The mesh of the Box shall be of type 8 x 10 and 6 x 8 cm for Metal Gabion and Mattresses respectively as per EN-10223. Mesh shall be doubled twisted at each intersection and shall be mechanically selvedge along the edge of the boxes. The boxes standard sizes shall be as per ASTM A 975. The box shall be divided into compartments by diaphragms placed at 1 m centre to centre.

Indigenously manufactured Metal Gabion and Mattresses should be preferred, considering advantages of shorter delivery periods, no inventory pile-up and rates being not affected by fluctuation of exchange rate of foreign currency.

A plant visit by the Engineer's representative to verify the manufacturer's quality control procedures and witness testing of products is also required prior to the dispatch of material.

2.2 Transportation, Storage and Handling

Metal Gabion and Mattresses shall deliver at site in the form of bundles. All bundles shall have a label or tag specifying name of the product, name of the manufacturer, quantity of boxes, date of manufacture and box dimension.

Material shall be protected from mud, dirt, debris, any other harmful substances or mechanical damage during transportation.

Boxes shall be stored in a secured area sufficiently elevated above the ground and adequately covered to protect them from the following: site construction damage, precipitation, prolonged exposure like chemicals that are strong acids or strong bases, flames including welding sparks, high temperatures, and any other environmental conditions that may damage the physical property values of the Metal Gabion and Mattresses.

Any material, which is damaged during transportation, handling or storage and do not meet the minimum requirements of the specifications is liable for rejection by the Engineer.

2.3 Quality Control & testing

The quality management system of the manufacturer shall conform to the requirements of ISO 9001:2008 and In-house Laboratory should have certificate of GAI-LAP & NABL Accreditation ISO/IEC 17025:2005.

Manufacturer shall issue a test report stating minimum average values of material properties, at the time of shipment is made.

Manufacturer shall have in-house PVC manufacturing, coating and testing facilities as per IS:4826/EN 10245-2 of specific gravity, hardness, tensile strength and elongation.

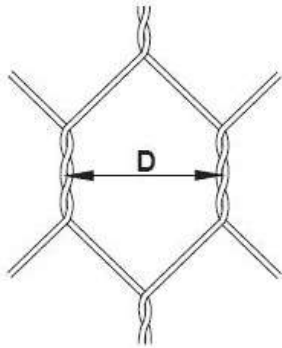
The contractor shall have to give a certificate / (MOU) from the manufacturer regarding Design support, Vetting of Design, Supply sufficient quantity of Double Twisted Wire mesh Gabion and Mattresses and Technical Assistance during Execution to the contractor for this project.

Supplied material shall witness at manufacturer's NABL Accreditation laboratory by collecting sample from site to conduct joint tests with the department, client and contractor's officials.

Contractor shall furnish proof of all above and it is mandatory.

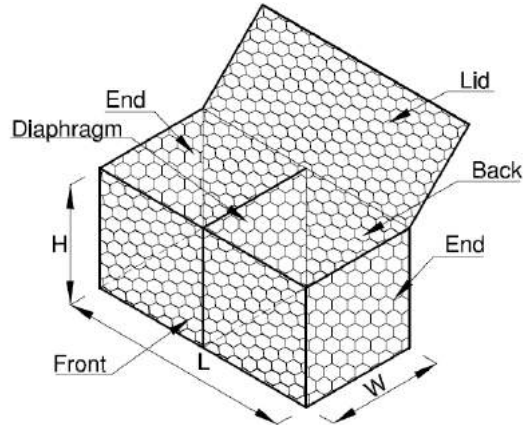
2.4 Physical and Mechanical Properties

The Physical and Mechanical properties of Metal Gabion and Mattresses shall conform as per below:



'D' (mm)=60/80 mm (EN 10223-3 / ASTM A 975)

Fig-1



METAL GABION BOX

Fig-2

Mesh and Box Characteristics of Metal Gabion and Mattresses:

Mesh Types and Shapes shall confirm to Table:1

Table: 1

MESH TYPE (cm)	'D' NOMINAL SIZE (mm)	TOLERANCES
8 X 10	80	+16% to -4%
6 X 8	60	

Mesh and Box Characteristics of Gabion and Mattresses:

MESH TYPE (cm)	8 X 10	6 X 8
'D' mm	80	60
WIRE TYPE	ZINC + PVC COATED	ZINC + PVC COATED
Mesh Wire Dia., mm	2.70/3.70*	2.20/3.20*
Edge/Selvedge Wire Dia., mm	3.40/4.40*	2.70/3.70*
Lacing Wire Dia., mm	2.20/3.20*	2.20/3.20*
PVC Coating thickness, mm	Nominal-0.50 Minimum-0.38	Nominal-0.50 Minimum-0.38
Typical Sizes, meter Length x Width x Height/ Number of Diaphragms	4x1x1/3 Nos., 3x1x1/2 Nos., 2x1x1/1 No., 1.5x1x1/0 No., 4x1x0.5/3 Nos., 3x1x0.5/2 Nos., 2x1x0.5/1 No., 4x1x0.3/3 Nos., 3x1x0.3/2 Nos., 2x1x0.3/1 No.,	
Tolerances in Size of Gabion Boxes	Length & Width= ±5%, Height >0.3m= ±5%, Height <0.3m= ±10%	

*Internal Diameter/External Diameter of PVC coating wire (ID/OD)

Only standard sizes of Gabion Boxes are indicated in the table above. Special sizes can also be ordered as agreed between the purchaser and manufacturer.

Permitted Tolerances on Galvanized Steel Wire Diameters:

NOMINAL DIAMETER OF GALVANIZED WIRE, mm	PERMITTED TOLERANCES (\pm) ON WIRE DIAMETERS, mm
2.70	0.07
3.40	0.09
2.20	0.06

Mass of Zinc Coating: The coating weight shall conform to the requirements of IS:4826 heavily coated and soft type.

NOMINAL DIAMETER OF GALVANIZED WIRE, mm	MASS OF ZINC COATING g/m ²
2.70	245
3.40	265
2.20	230

The Zinc Coating shall remain adherent to the steel wire and conform to IS:4826 such that Zinc Coating does not flake off, nor crack to such an extent that there is possibility of removing any Zinc by rubbing with bare fingers, the use of finger nails being not allowed.

3 TERMINOLOGY OF METAL GABION AND MATTRESSES

3.1 Double Twisted Wire Mesh: A non-raveling mesh made by twisting continuous pairs of wires through three-one-half turns (commonly called double-twisted) to form hexagonal shaped openings which are then interconnected to adjacent wires to form hexagonal openings. Fig-1

3.2 Gabion: A double-twisted wire mesh container of variable sizes, uniformly partitioned into internal cells having mesh opening (8 x 10) cm, inter-connected with other similar units, and filled with trap stone rubble at the project site to form flexible, permeable, monolithic structures for earth retaining and erosion control projects. Fig-2

3.3 Gabion Mattresses: A double-twisted wire mesh container of variable sizes, uniformly partitioned into internal cells with relatively smaller height in relation to other dimensions, having smaller mesh openings (6 x 8) cm than the mesh used for gabions inter-connected with other similar units, and filled with trap stone rubble at the project site to form flexible, permeable, monolithic structures for scour apron, river bank protection and slope protection projects. Fig-3

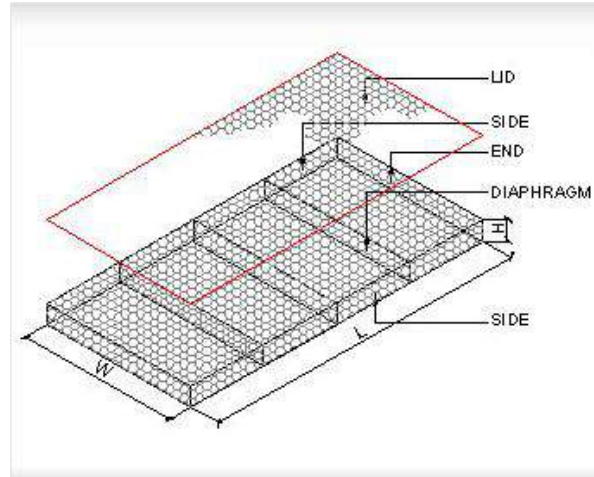


Fig-3

3.4 Selvedge Wire: A terminal wire used to edge the wire mesh perpendicular to the double-twist by mechanically wrapping the mesh wire around it at least 2.5 times. Fig-4

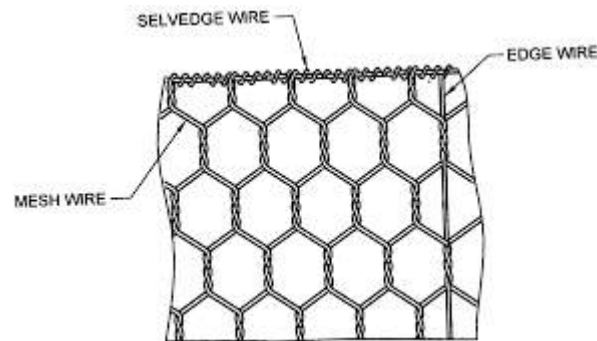


Fig-4

3.5 Edge Wire: A terminal wire of the same diameter as the selvedge wire used to edge the wire mesh parallel to the double-twist by continuously weaving it mechanically into the wire mesh. Fig-4

3.6 Lacing Wire: A terminal wire used to assemble and interconnect empty units, to close and secure stone-filled units and for internal stiffeners.

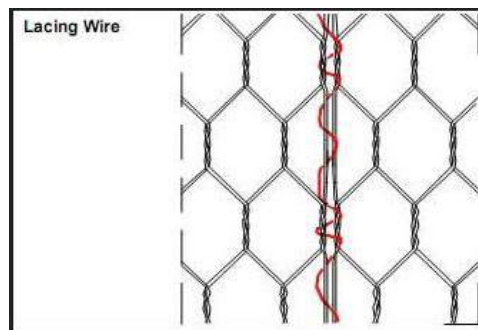


Fig-5

3.7 Diaphragm: An internal partition made of same double-twisted wire mesh panel in a gabion and mattresses that is attached to the bottom, the sides, and after the gabion box is packed with stones, to the lid of the box. Fig-1

3.8 Bracing Wire: A length of wire used for support of facing by connecting the front panel to the back panel of gabion box and having the same diameter as the lacing wire. Fig-6

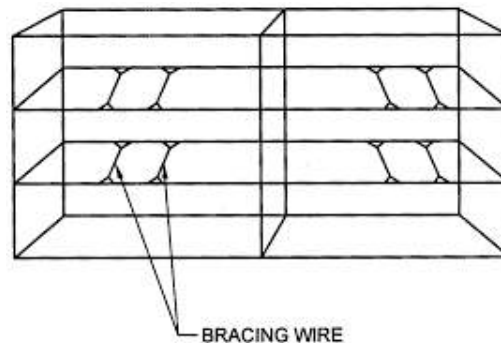


Fig-6

4 INSTALLATION

4.1 Site Preparation

The foundation shall be prepared by clearing, grubbing, and excavation or filling the area to the design grade and well compacted to achieve batter as per designed cross section.

4.2 Specification for Assembly and Erection:

4.1 Scope

This specification details the requirements from the assembly stage through to the final wiring of the completed Metal Gabion and Mattresses product.

The contractor shall provide to the Engineer, for his approval, full details and specifications of the gabion he proposes to use in this contract. Only those products so approved by the Engineer shall be allowed to be incorporated in the works.

4.2 Assembly

Prior to assembly, the gabion material shall be opened out flat on the ground and stretched to remove all kinks and bends.

The gabion boxes shall be assembled individually, by raising the sides, ends and diaphragms, ensuring that all creases are in the correct position and that the tops of all four sides and the diaphragms are even.

The four corner edges of the Gabion boxes shall be laced first, followed by the edges of internal diaphragms to the sides.

In all cases, lacing shall commence by twisting the end of the lacing wire tightly around the selvedge/s. It shall then pass round the two edges being joined using alternate single and double loops at 100mm intervals and be securely tied off at the bottom. The ends of all lacing wires shall be turned to the inside of the box on completion of each lacing operation. Each loop shall be pulled tight to prevent the joint opening during filling. Tightness of the lacing is essential.

4.3 Placing of Metal Gabion and Mattresses

Gabion boxes and Mattresses shall be placed in position on the prepared foundation as per designed cross-section with process of unfolding the gabion by bundles, folding them as per size to prepare a box with fastening edges by lacing wire. Adjacent boxes shall be tie with lacing wire on each side.

To ensure proper alignment of Metal Gabion and Mattresses, bracing shall be used on the front face of Gabions.

4.4 Geotextile

CE Marked needle punched and mechanically bonded Nonwoven Geotxtile indigenously manufactured from high quality polypropylene staple fibres (continuous filament will not be accepted) as per MORTH-700 shall be placed at the bottom and behind the Gabions and Mattresses to allow passage of water and retention of backfill i.e separation, filtration and drainage application.

4.5 Filling

The Metal Gabion & Mattresses shall be filled by carefully hand packing the trap stones size 15-20 cm and or 20-50 Kg in weight as tightly as possible and not by merely throwing of trap stones. Voids shall be filled by proper hand packing with rubble chips.

All gabions shall be overfilled by 25mm using flat stone to allow for minor settlement and to provide a level surface for subsequent layers.

After filling the Gabion Box upto top; the lid shall stretched and closed tying by lacing wire to the front and side panels of the Gabion Box.

Prior to placing backfill, reinforced fill material as per project requirements the installed Metal Gabion and Mattresses shall be inspected and approved by the Engineer. Any damages during construction shall be repaired and or removed as directed by the Engineer.

4.6 Placing and compacting backfill, reinforced fill material

The backfill, reinforced fill material shall be placed in layers as per specification by end dumping after placement of Nonwoven Geotextile.

Backfill shall be compacted by baby roller and or mechanical compacter of weight < 0.6 MT in layers to achieve good compaction. Heavy weight Static of Vibratory Roller not allowed in 2 meter width stretch from the wall line.

Movement of construction equipment directly over the backfill, reinforced fill material beyond 2 m line from the Gabion wall shall not be permitted to prevent disturbance in alignment of Gabions.

Sudden breaking and sharp turning of construction equipment shall be avoided over 2 m line from the Gabion Wall and Mattresses.

5 APPROVED MANUFACTURERS

5.1 Approved Manufacturers

Techfab (India) Industries Ltd.
712 Embassy Centre,
Nariman Point, Mumbai – 400021
Phone: 022 – 2287 6224/6225
Fax: 022 – 2287 6218
Cell: +91 9822097561

6 DELIVERY

Delivery of Metal Gabion and Mattresses shall be done according to the delivery schedule.

7 PAYMENT

7.1 Method of Measurement

Metal Gabion and Mattresses will be measured by the Number, Cubic Meter or Square Meter of material received at the owner's / contractor's store.

7.2 Basis of Payment

Payment for the Metal Gabion and Mattresses shall be made at the contract unit price per Number, Cubic Meter or Square Meter, which shall be full compensation for the cost of materials, transportation, duties and taxes.

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