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DIFFERENT TYPES OF NETTING MATERIALS & THEIR PROPERTIES

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With the invention of Poly Amide fibres (Nylon) in 1935 by W.H.Carothers(USA) there happened tremendous improvement in the quality of fishing gear materials. There after a series of petrochemical based synthetic fibres were developed which is widely in use in the fishing net industry. The following are the major classes of synthetic fibres.

- (i) Poly Amide (Nylon) : PA. (W.H.Carothers, USA, 1935)
- (ii) Polyester : PES (J.R.Whinfield & J.T.Dickson, UK,1940-41)
- (iii) Polyethylene : PE (Ziegler,Germany-1950)
- (iv) Polypropylene : PP (Natta,Italy-1954)
- (v) Polyvinyl chloride : PVC (F. Klatte & H.Hubert, Germany-1934)
- (vi) Polyvinyl alcohol : PVA (W.O.Hermann & W.Haehnel,Germany-1931)

The most important and widely used synthetic fibres are Nylon (PA) and Polyethylene.

Nylon :Very high breaking strength, high melting point(215 c) and high extensibility are the important qualities of Nylon which makes suitable for the fabrication of fishing gear.

There are nylon monofilament and nylon multifilament twines.

Table 1. Different types of Nylon monofilament & multifilament twines

| Nylon multi filament twines | | | Nylon monofilament twines | |
|-----------------------------|--------|----------|---------------------------|--------|
| 1 | 2 PLY | 210/1X2 | 1 | 0.10mm |
| 2 | 3 PLY | 210/1X3 | 2 | 0.12mm |
| 3 | 4 PLY | 210/2X2 | 3 | 0.16mm |
| 4 | 6 PLY | 210/2X3 | 4 | 0.20mm |
| 5 | 9 PLY | 210/3X3 | 5 | 0.23mm |
| 6 | 12 PLY | 210/4X3 | 6 | 0.28mm |
| 7 | 15 PLY | 210/5X3 | 7 | 0.32mm |
| 8 | 18 PLY | 210/6X3 | 8 | 0.40mm |
| 9 | 24 PLY | 210/8X3 | 9 | 0.50mm |
| 10 | 27 PLY | 210/9X3 | | |
| 11 | 30 PLY | 210/10X3 | | |
| 12 | 36 PLY | 210/12X3 | | |
| 13 | 45 PLY | 210/15X3 | | |
| 14 | 54 PLY | 210/18X3 | | |
| 15 | 72 PLY | 210/24X3 | | |

Nylon fishnets

- (I) Nylon Multifilament Fishnets – Knotless & Knotted
- (II) Nylon Monofilament Fishnets

Nylon Multifilament fishnets are commonly used for the fabrication of various types of gill nets, ring seine, Purse seine, Cast net, Chinese nets, Drift nets etc.



Common specifications of nylon multifilament twine for fishing ranges from 210/1x2 to 210/12x3.

The mesh size commonly required is from 8mm onwards to 450mm for different fishing gear. It is more effective for fishing than polyester because of the better sinking speed and extensibility.

Nylon monofilament is better for long lining and various types of gill netting. The twine range for fishing purpose is from 0.10 to 0.50 and for long line fishing 1.5mm to 3mm. The mesh size is normally starts from 16mm to 450mm.

Thinner monofilament nets are more effective for fishing but less durable and not repairable.

High Density Poly Ethylene (HDPE):HDPE is a linear polymer which is prepared from ethylene by a catalytic process. More closely packed structure without branches and higher density, higher chemical resistance make HDPE more suitable for fishnets.

Other properties of HDPE:

- i. It can withstand high temp. up to 110c.
- ii. HDPE is highly resistant to dilute and concentrated acids, alcohol and bases.
- iii. Very good chemical resistance and high rigidity make it a good choice for cage nets.
- iv. Very low moisture absorption and high tensile strength are other characteristics of HDPE.

HDPE twine is of two types; Braided and twisted. HDPE fishnet is usually used for the fabrication of trawl nets.

Important qualities of fishing net:

- (i) Raw material quality as per BIS.
- (ii) Perfect knot formation and knot tightness.
- (iii) Accurate mesh size, mesh depth.

Synthetic twines manufactured from HDPE are totally resistant to sea water, acids, alkalis and chemicals. They do not absorb water and cannot rot very easily. These are the main reasons why HDPE fishnets are preferred for the fabrication of net cages.

Table 2. Different size of HDPE twines

| Sl. No | Code | Apprx.Dia. | Apprx. Runnage (Mtrs/Kg) | Apprx. Br.strength (in Kgs) |
|--------|----------|------------|--------------------------|-----------------------------|
| 1 | 280D/1/3 | 0.25mm | 11100 | 3 |
| 2 | 280/2x3 | 0.50mm | 5490 | 6 |
| 3 | 280/3x3 | 0.75mm | 3080 | 9 |
| 4 | 280/5x3 | 1.00mm | 1890 | 15 |
| 5 | 280/6x3 | 1.25mm | 1612 | 18 |
| 6 | 300D/8x3 | 1.50mm | 1200 | 24 |
| 7 | 300/12x3 | 2.00mm | 802 | 36 |
| 8 | 300/21x3 | 2.50mm | 432 | 63 |
| 9 | 300/28x3 | 3.00mm | 342 | 84 |

HDPE is more suitable for the fabrication of net cages

The following qualities of HDPE make it more suitable for the fabrication of cages.

- (i) Breaking strength of HDPE in water will be 110% as that of dry condition but that of nylon is 85-90% only.
- (ii) Shrinkage in water is 5-8% only where as for nylon it is 10-12%.
- (iii) HDPE will not absorb moisture but nylon absorbs.
- (iv) Weight in water will be same but weight of nylon in water will be 12% more.
- (v) HDPE is easy for handling and cleaning.
- (vi) Because of rigid nature the mesh opening will be perfect which enables free exchange of water.



Nets suitable for open sea cage culture

Mesh size of any fish net used for fabricating the cages must be selected according to the species and also to ensure good water exchange. Proper aeration can also enhance water quality, reduce stress, improve feed conversion and allow to hold more fishes.

Because of the turbulent nature of the sea and presence of cannibalistic animals a suitable predator prevention net is essential for open sea cage culture. Considering the strength, durability and cost factor usually braided UV treated HDPE of 3mm thickness and 80mm mesh size is recommended and found very effective. The diameter of the cage can be decided as per requirement from 6 m to 8 m and a depth 5-7m for easy handling. The cages are mounted to floating circular frames with ropes and rings.

For the fabrication of inner cage twisted HDPE of 0.75mm to 1.5 mm depending on the size of cultivable species can be selected with a mesh size ranging 16mm to 28mm. Usually for sea bass 1.25 mm/26 mm to 1.5 mm/30 mm mesh size is recommended. The inner cage has to be periodically cleaned for better durability.

In order to prevent predator birds proper protective nets are also must be provided. HDPE twisted & UV treated 1.25mm 60 mm to 80 mm mesh size will be ideal for preventing the birds of prey.

Net cages for Inland water bodies

In the inland water bodies there are predators like crabs, certain type of eels which can destroy the nets and penetrate into the cage. In such water bodies Braided HDPE net having 2 mm to 2.5 mm thickness can be used as outer net to prevent the predators. Otherwise 1.5 mm twisted HDPE net can also be used.

The specification of inner cage can be decided depending on the species, from HDPE 0.5 mm/10 mm mesh size to 1.0 mm/22 mm which will be cost effective and durable. Predator birds are also common hence proper prevention net also must be used.

