GILLNET ACTIVITIES IN SOUTHERN BRASIL

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ABSTRACT

Information about gillnet fisheries directed to elasmobranchs were collected from fleets based in Itajaí and Navegantes harbours, Santa Catarina State, Brasil. 126 fishing-boats were identified as "drifters" and/or "bottom gillnetters". "Drifters" total length ranged between 12 and 27 m, engine power between 66 and 360 Hp, and register net tonnage between 3 and 53. For the "bottom gillnetters", total length ranged between 10 and 27 m, engine power between 22 and 360 Hp, and register net tonnage between 5 and 76. Net draws are presented. "Driftnets" have mesh size (stretched) in the tans ranging between 14 and 40 cm; tan height ranged between 4 and 27 m; tan length between 25 and 118 m; total tan number carried on board between 35 and 120; and total driftnet length used between 1250 and 7560 m. On the other hand, "bottom gillnets" used tan mesh size ranging between 12 and 40 cm; net height ranging between 1.5 and 12 m; tan length between 45 and 100 m; total tan number on board between 40 and 500; and total bottom gillnet length used ranged between 2000 and 25000 m. During the period 1993-1994, the average species landings were the following: *Squatina spp* (1048 t, 38 %), *Sphyrna lewini* and *Sphyrna zygaena* (480.5 t, 17%), *Carcharias taurus* (68.2 t, 2 %), *Rhinobatos horkelli* (50.2 t, 2 %), *Carcharhinus leucas* (43.6 t, 2 %), *Isurus oxyrinchus* (21.2 t, 1 %), *Galeorhinus galeus* (18.9 t, 1 %), *Rhizoprionodon spp* (11 t, <1 %), *Mustelus spp* (4.5 t, < 1 %), *Carcharhinus spp* (2.5 t, < 1 %), *Prionace glauca* (1.9 t, < 1 %), *Notorynchus pectorosus* (1 t, < 1 %) e *Carcharhinus plumbeus* (0.5 t, < 1 %), *Mustelus canis* (0.3 t, <1 %) e *Galeocerdo cuvier* (0.27 t, < 1 %).

I - INTRODUCTION

The present paper has the aim to **describe** the driftnet and bottom gillnet fisheries from fishing-vessels based in Itajaí and Navegantes harbours, Santa Catarina State, Brasil, during 1995, first semester. This project is the first step of a work to manage gillnet fishing activities in southern Brasil , and to study the biology of the most important species in these fisheries, mainly the hammerhead shark *Sphyrna lewini*.

II - FLEET

In the first semester of 1995, 47 fishing-boats were found operating with driftnets. The fleet probably is bigger than that, because many bottom gillnetters, operating near the coast in shallower waters, change to driftnets in warmer seasons and deeper waters (spring and summer). There are at least 34 fishing-boats using bottom gillnets, plus 49 **gillnetters unknown about its modality. The total** fleet size is about 126 different fishing **vessels**, which means a considerable fishing effort directed to coastal and **oceanic** elasmobranchs (tables).

III - GILLNETS AND FISHING-BOATS

For the description of nets and fishing-boats, weekly visits to Itajaí and Navegantes harbours, and two cruises on the fleet have been done during the first semester of 1995 (tables).

III.a - DRIFTNET FISHERY

Most of the fleet is using mesh size (stretched, between knots) at about 40 cm, with a range of values between 14 and 40 cm. The average size was 35.6 cm. The distribution was leptokurtic and skewed to right. The net's height mainly used was from the surface to a depth of 13.7 m, ranging between 4.4 and 27 m. The average height was 13.5 m. The distribution was also leptokurtic, and skewed to right. The length of each tan (tans are independent net panels which are the working unit of driftnets) set with buoys, plumbs, etc., was in most of the cases at about 50 m. There is a range of values between 25 and 119 m length. Leptokurtosis, skewed to right, with average length at about 56.6 m. The number of tans that a driftnetter carries on board during one fishing journey varies as well. In most of the cruises, fishing-boats carry at about 60 tans (approximately 3000 m net length), but it can vary with the size of the boat. The biggest boats can carry until 120 tans (7560 m net length) and the smallest only 35 tans (1250 m net length). The average net length was 3411m . The distribution was leptokurtic and skewed to right.

Driftnetters have peculiarities. Most of them are wooden boats (e.g., previous purse-seiners or trawlers adapted to driftnets) and built in 1989. The vessel's age ranged between 1949 until 1995. The distribution was leptokurtic and skewed to right. Most of the driftnetters are medium size (total length = 20 m), but another sizes can be found like the "whalers" (size ranging between 13 and 17 m), used by the community of fishermen called "Araçá", in Porto Belo's county, Santa Catarina State, until bigger boats (27 m) from the industrial fleet. The average size found was 17.2 m and the size distribution was leptokurtic and skewed to right. Fishing boats use mainly power engines of 170 Hp. Depending on the boat size, the power range between a minimum of 66 Hp to a maximum of 360 Hp. The average power engine was 196 Hp. The distribution was quite normal (Kurtosis and skeweness near zero). The gross tonnage mainly found was 35 * 2.83 m^3, but the values ranged between 10.3 * 2.83 m^3 to 128.5 * 2.83 m^3 . Average value was 37.5 * 2.83 m^3. The distribution was leptokurtic, skewed to right.

III.b - BOTTOM GILLNET FISHERY

The most frequent mesh size found in the bottom gillnets tans was 40 cm (stretched, poliamide/PA). This type of mesh size is mainly directed to big angelsharks (*Squatina argentina*, *Squatina guggenheim*, and *Squatina occulta*). The values ranged to a minimum of 12 cm (nylon, monofilament, used to catch croakers, *Micropogonias furnieri*, and smaller angelsharks). The average mesh size used was 22 cm. The type of distribution was leptokurtic, skewed to right. The nets height has an average value of 4.81 m, lower than driftnets, which use an average value of 13.5 m. Most of the fleet use nets with 4m height. The values ranged between 1.5 to 12 m . The distribution is leptokurtic and skewed to rigth. The most common length tan used was 50 m (standard measure used by fishermen), similar than used on driftnets. The average length value was 59.6 m, ranging between 45 and 100 m. The distribuition was also leptokurtic and skewed to right. Most of the fishing-boats carry 100 tans per journey. The carrying capacity varies between a minimum of 40 tans per cruise for smaller boats, 12 m length, to a maximum of 500 tans per cruise for bigger ones, like 22 m length. The average value was 184 tans per cruise, and the distribution was sligthly leptokurtic and skewed to rigth. The total net length carried by one boat use to be 8640 m, but it can fluctuate between 2000 m for small boats (12 m length) to 25000 m for bigger ones (22 m length). Average value was 10365 m and the distribution was slightly leptokurtic and skewed to right.

The fleet is composed of wooden fishing-boats mainly built in 1970. The boat's age ranged between 1948 to 1993. The average value was 1977. In the same way as driftnetters, most of the

vessels were adaptations of previous purse-seiners and trawlers. The total length of these boats ranges between 10.5 m for small "whalers" to bigger ones from the industrial fleet with 27 m length. Most of them have 20.5 m length and the average value was 18.4 m. The distribution was leptokurtic, skewed to right. The engine power ranged between 22 Hp for small boats to a maximum of 360 Hp for industrial boats. Most of the fleet is composed of 115 Hp engine power. The distribution is leptokurtic skewed to right. The average engine power is 206.4 Hp. Gross tonnage was mainly 68.34*2.83 m^3, ranging between 10.8*2.83 to a maximum of 128.5*2.83 m^3. The average value was 54.6*2.83 m^3, and the distribution was leptokurtic skewed to right.

IV - DRIFTNET SPECIES COMPOSITION

Although driftnet fishery is mainly directed to hammerhead sharks (*Sphyrna lewini*), there are bycatches of another species of elasmobranchs, teleosts and also cetaceans (table) .

In the elasmobranch's group, 3 families are the most important: **Carcharhinidae**, **Lamnidae** and **Sphyrnidae**. Carcharhinids (requiem sharks) are represented mainly by 2 genus (*Carcharhinus* and *Prionace*), with catches of *Carcharhinus leucas* , *Carcharhinus brevipinna*, *Carcharhinus limbatus* and *Carcharhinus obscurus* in the neritic (until approximately 200 m depth), and catches of *Carcharhinus longimanus* and *Prionace glauca* in the neritic and oceanic environment (100 to 4000 m depth). Lamniforms are mainly represented by *Isurus oxyrinchus*, an oceanic species and rarely by *Lamna nasus* (which is more associated with temperate waters, i.e., below 18 º C). The Sphyrnids are mainly represented by *Sphyrna lewini* (captures using driftnets are mainly adults, called by fishermen as "cow") and sometimes catches of *Sphyrna zygaena* (also mainly adults) associated with temperate waters (Compagno, L.J.V., 1984, Gilbert, C. R., 1967). The highest catches of *Sphyrna lewini* happen during summer season, when the sea surface temperature waters are higher than 21 º C. Fishermen don't use thermometers to search areas of higher hammerhead shark abundance. Carcharhinids and Sphyrnids are the most endangered species by the "finning" activities (ICCAT, Newsletter, vol.1, nº. 2, 1994).

In the neritic and oceanic environment, sometimes there are important catches of Manta rays (Mobylidae), which don't have market value, and are discarded. The species is *Manta birostris* and fishermen claim about that because it is an elasmobranch difficult to disentangle from the net. When operating in shallower waters (less than 100 m depth), driftnets catch sometimes *Carcharias taurus* .

Teleosts are only bycatches in this fishery, but most of them have economic value. Billfishes are the most important, specially *Istiophorus albicans* and *Xiphias gladius* followed by Scombrids, particularly *Auxis thazard*, *Thunnus albacares*, *Sarda sarda* and *Katsuwonus pelamis*. Another oceanic families take place in this fisheries like Coryphaenidae and Bramidae.

Cetacean bycatches (suborder odontoceti) use to happen in this fishery. There were already identified the long-finned pilot whale (*Globicephala melas*) , two dolphin species, i.e., *Delphinus delphis* and *Stenella frontalis* , both surface migratory species without economic value. The populational status of these mammals are not well defined by the IUCN (Jefferson, T.A., S. Leatherwood, and M.A. Webber, 1993).

V - DRIFTNETS LANDINGS

In Santa Catarina State, Brasil, the landings composition (Branco, E.J. , 1995, fishery statistics sector, CEPSUL/IBAMA) are not discriminated into driftnets or bottom gillnets. They are only classified as "gillnet landings". There are species common to both modalities and others exclusive to only one. Landings composition from this fishery exist since 1989, but reliable information seems to be only for the years 1993 and 1994, because during these periods the sampling coverage around the state was more representative than previous years. Based on field experience, i.e., harbour and cruise samplings and identification of species, a separated analisis by gear was tried.

Table shows elasmobranchs landings from driftnetters for the period 1993-1994 in Santa Catarina State. The most important species in dicreasing order are the following: Hammerhead sharks (76 % of total catches), represented mainly by *Sphyrna lewini* ; different species of Carcharhinids (i.e., *Carcharhinus obscurus*, *Carcharhinus longimanus*, *Carcharhinus leucas*, which represent 7.32 % of

total catches), Shortfin mako, *Isurus oxyrinchus* (3.4 % of total catches), and the blue shark *Prionace glauca* (0.3 % of total catches). Sandtiger shark, *Carcharias taurus* also appears in the table , but the species is mainly fished by the bottom gillnetts. The elasmobranchs represented 98 % of the total catches of fish, which means that this fishery is directed to sharks.

Bony fishes are only bycatch, and the quantities landed of each species are in the following decreasing order: Atlantic sailfish, *Istiophorus albicans* (1.2 % of total catches), Bullet tuna, *Auxis thazard* (0.35 % of total catches), Dolphin fish, *Coryphaena hippurus* (0.16 % of total catches), Broadbill swordfish, *Xiphias gladius* (0.14 % of total catches), Yellowfin tuna, *Thunnus albacares* (0.1 % of total catches), Atlantic bonito, *Sarda sarda* (0.04 % ot total catches) and the Skipjack, *Katsuwonus pelamis* (0.03 % ot total catches). Teleosts represented only 1.95 % of the total driftnet catches.

The Hammerhead shark, *Sphyrna lewini* is the target species for driftnet fishery due to the high prices that their fins reach in the Asian market (i.e., Taiwan, Hong Kong, South Korea, Japan). During the first semester of 1995, 1 Kg of hammerhead shark fin was near U$ 50.00 in Itajaí and Navegantes harbours (fresh fins, without processing). Undoubtedly the prices are higher in the international market. The fins are bought by a first purchaser in Itajaí and Navegantes harbours who resale the product to a Japanese company based in São Paulo (CODEN), and finally they are exported to Asia from São Paulo International Airport. On the other hand, hammerhead shark fresh meat reaches only U$ 0.10 - 0.12 per Kg in Itajaí and Navegantes harbours, a very low value compared with fin's price, fact that estimulates carcass discards. A plan for better carcass utilization should be implemented by the national government, mainly because Brasil is a third world country where most of the population has protein deficiency. It is also recommended a law forbidding discards of shark's carcasses.

VI - BOTTOM GILLNETS SPECIES COMPOSITION

The species diversity in bottom gillnet is higher than driftnet fishery because it happens mainly on the continental shelf, opposite to driftnet fishery which is mainly oceanic. More than 50 % of the catches from bottom gillnets are elasmobranchs, but the proportion is lower than driftnets where 98 % of the catches are sharks. There are considerable teleostean catches in bottom gillnets (tables).

The target species in bottom gillnet fisheries are the angel sharks, mainly *Squatina occulta* (70 to 320 m depth), *Squatina guggenheim* (10 to 80 m), with occasional catches of *Squatina argentina* (120 to 320 m) (Vooren, 1991). Other species are caught, like carcharhinids and sphyrnids (*S. lewini* and *S. zygaena*), but they are less important than *Squatina*. Bony fishes are better represented in decreasing order by croaker (*Micropogonias furnieri*), which is also a target species in bottom gillnet fishery, followed by bluefish (*Pomatomus saltatrix*) and the smooth weakfish (*Cynoscion leiarchus*).

Seven shark families were identified in this fishing modality, i.e., Alopiidae, Carcharhinidae, Odontaspididae, Triakidae, Sphyrnidae, Squalidae and Hexanchidae. Carcharhinids presented the highest number of species (9), with bull shark (*Carcharhinus leucas*) the most important species in this family (43.6 t/year in Santa Catarina State), although shared with driftnet fishery. Another important Carcharhinid was tope shark (*Galeorhinus galeus*) mainly fished during winter (18.9 t/year, Santa Catarina State). Spinner (*Carcharhinus brevipinna*) and blacktip sharks (*Carcharhinus limbatus*) are also present in this fishery, but showed some difficulties for identification (observed only carcasses of these fishes). Another species as well caught in bottom gillnet fishery were sandbar (*Carcharhinus plumbeus*), dusky (*Carcharhinus obscurus*), tiger (*Galeocerdo cuvier*), and sharpnose sharks (genus *Rhizoprionodon*). The Sandtiger shark (*Carcharias taurus*) was only surpassed by the landings of hammerhead sharks (*Sphyrna lewini* and *S. zygaena*), species also shared with driftnets. Triakidae is a frequent family in bottom gill net fishery (most of them less than 1m length) and the most important species in decreasing order were the narrownose smooth-hound (*Mustelus schmitti*), dusky smooth-hound (*Mustelus canis*) and striped smooth-hound (*Mustelus fasciatus*). *Squalus* genus was also present and included in the "small sharks" statistic category.

Rays are well represented by Rajidae, Dasyatidae and Myliobatidae families. The most abundant species was *Raja castelnaui* , which requires a special attention by fisheries biologists.

Bony fishes represented considerable catches in bottom gillnet fisheries. 27 different families were detected, and the most important was Sciaenidae, mainly represented by the white-mouth croaker

(*Micropogonias furnieri*) which shows the highest landings. There were identified at least 44 different neritic species in this fishery, also caught by trawlers.

Turtle by-catches also occur in bottom gillnet fisheries. During only one fishing cruise in april 1995, there were caught four Atlantic loggerhead turtles (*Caretta caretta*). High fishing mortality on turtles is caused by gill nets (FAO, 1994). Global catch statistics for these reptiles showed gradual decline since 1975-1980 from 7400 t, to only 1255 t in 1991. In the central-Atlantic, catches of *Caretta caretta* declined from 480 t in 1970-1974 to 185 t in 1988. An assessment of the impact caused on turtles by bottom gillnets in southern Brasil is recommended. Most of the loggerhead turtles are drowned in the nets.

An interesting point about elasmobranchs are the catches of sphyrnids and carcharhinids. Both families are caught by driftnets and bottom gillnets. Driftnets use to get mainly adults of *Sphyrna lewini* (above 2 m length), both in the neritic (mainly border of the continental shelf) and oceanic environmet. On the other hand, carcharhinids, are mainly caught by driftnets in the neritic environment (continental shelf and the border). Bottom gillnets operate exclusively in the neritic environment, fishing *Sphyrna* juveniles (i.e., *S. lewini* and *S. zygaena*) and carcharhinids throughout the year. During summertime (which seems to be the reproductive period for *Sphyrna lewini*), bottom gillnets use to catch also adult hammerhead sharks on the continental shelf. To stablish an adequate management strategy for *Sphyrna lewini* it is necessary to know the horizontal movements of the species throughout the neritic-oceanic environment, and the distribution of juveniles and adults.

Bottom gillnet landings for the period 1993 - 1994 in Santa Catarina State, Brasil, are presented (table). This fishery is also directed to elasmobranchs, because approximately 52 % ot the total landings were sharks and rays (an average of 2738 t/year). The most important species in decreasing order are particularly the angel sharks, *Squatinas* (20 % of the total landings, 1048 t/year), different shark species (carcharhiniforms, representing 15 % of the total landings, 774 t/year), hammerhead sharks of the genus *Sphyrna* (9.2 % of total landings, 480 t/year, although shared with driftnets), different ray species (2.7 % of total landings, 141 t/year, mainly *Raja castelnaui*), small sharks mainly from Triakidae family (1.8 % of total landings, 91.5 t/year) and the sandtiger shark (*Carcharias taurus*) representing 1.3 % of total landings, i.e., 68.2 t/year. There are another species of elasmobranchs, i.e., guitarfish (*Rhinobatos horkelli*), bull shark (*Carcharhinus leucas*) , tope shark (*Galeorhinus galeus*), sharpnose sharks (*Rhizoprionodon spp*), which represented altogether 2.4 % of total landings (124 t/year). Another shark bycatches on bottom gillnets are the sandbar shark (*Carcharhinus plumbeus*), broadnose sevengill shark (*Notorynchus pectorosus*) and the tiger shark (*Galeocerdo cuvier*) representing only 0.04 % of total landings.

Teleostean catches by bottom gillnets are highly diversified, directed to demersal fishes on the continental shelf (table). The most important species in decreasing order are respectively: whitemouth croaker (*Micropogonias furnieri*, 17 % of total landings, an average of 869 t/year for the period 1993 - 1994), smooth weakfish (*Cynoscion leiarchus*, 7 % of total landings, 368 t/year), bluefish (*Pomatomus saltatrix*, 5.3 % of total landings, 277 t/year), brazilian codling (*Urophycis brasiliensis* , 3.4 % of total landings, 176 t/year), mullets (Mugil spp, 3 % of total landings, 157 t/year), drum (*Umbrina canosai*, 2.7 % of total landings, 142 t/year) and the hakes of the genus *Cynoscion* (1.6 % of total landings, 82.8 t/year). The remain is composed by different species, not so frequent than the previous, but perform a considerable amount of 427 t/year of fish (8 % of total landings).

Summing up, bottom gill net effort is mainly affecting the angel sharks (*Squatina occulta*, *Squatina guggenheim*) and whitemouth croaker stocks (*Micropogonias furnieri*), which means that these species need a management program in a near future. These species are already overexploited (Demersal Fish Assessment Group, October 1993) by trawlers in southern Brasil, and the problem seems to be worst for angel sharks, because they are ovoviviparous, with low fecundity (4 to 10 newborns for *S. occulta*, 3 to 8 for *S. guggenheim* and 7 to 11 for *S. argentina*), not supporting high fishing intensity.

VII - DRIFTNETS DESIGNS

Studying gillnet fishery, observations and measurements have been done about the gear, with the aim do draw detailed net plans. Attached to this paper are the net designs used by the fleet, showing information about dimensions, netting yarn type, hanging (of netting), hanging ratio (E), and mesh size used.

For driftnets, panels are made of polyamide (PA) braided multifilament, with hanging ratio (E) between 39 an 67 %. This ratio is important because it "wrinkles" the panels, raising the fishing power of the net, and the hammerhead sharks are entangled by head, first dorsal and pectoral fins, helped by its "cork-screw" movements .

Headline is made of braided or twisted multifilament polyethylene (PE), but there are a few cases of twisted multifilament polypropylene (PP). The headline diameter ranges between 7 and 20 mm, but the usual value found was 16 mm. These ropes are strong enough to support heavy fishes like 50 - 100 Kg.

Panel dimensions vary. In most of the cases the height was 14 m and the length 50 m.

Panel mesh size use to be 40 cm (stretched) polyamide (PA) braided multifilament, and string diameter of 2 mm, but there are cases of smaller mesh sizes like 15 to 18 cm (stretched) made of polyamide (PA) or Nylon monofilament, with string diameters ranging between 0.7 and 1.47 mm. Fishermen claim about these smaller ones because they use to catch high quantities of *Sphyrna lewini* juveniles.

The string that links headline and leadline with the netting is called "arcala" and have different sizes. Arcala's length range betwen 14 and 40 cm and use to be of polyamide (PA) braided multifilament between 1.17 and 2.5 mm diameter. Some fishermen commonly use mesh size to the arcala's length. This device is used as a tension-absorber, avoiding that big sharks, billfishes and swordfish tear the netting easily. The netting is linked to the arcalas (i.e., in the headline and leadline) in different ways:

- 2 meshes/1mesh/2 meshes (for mesh size between 38 - 40 cm).
- 2 meshes/2 meshes/2 meshes (for mesh size between 38 - 40 cm).
- 3 meshes/3 meshes/3 meshes (for mesh size between 15 - 17 cm).
- 5 meshes/5 meshes/5 meshes (for mesh size between 15 - 17 cm).
- 3 meshes/1 mesh/3 meshes (for mesh size between 15 - 17 cm).

There was only one case where the meshes linked to the arcalas were doubled, offering higher resistance.

Buoys are attached to the headline, with distances between each other ranging from 0.82 to 4.80 m. The buoys commonly used were made of polyurethane, with buoyancy of 0.588 Kgf (mainly used on mesh size of 38 - 40 cm), but the range can be of 0.1 to 1.318 Kgf.

The leadline is similar than the headline comparing the type and diameter of ropes, existing only few cases with small differences (i.e., headline diameter = 1.6 cm, leadline diameter = 1.2 cm), but what really varies are the lead quantity in the ropes. The values ranged between 40 grams/m to 350 grams/m. The leads maintain the panels in a vertical position.

VIII - BOTTOM GILLNET DESIGNS

For this fishing gear, the netting can be prepared from two different types of material:

. **Braided polyamide (PA)**, netting comonly used to catch big angel sharks, with twine diameter ranging between 1.5 and 2.0 mm and mesh size from 370 to 400 mm (stretched). There is only one case of netting made by braided polyamide (PA) with mesh size of 140 mm. The hanging ratio (E) ranged between 47 and 71 %, but it is usual 50 %. Like driftnets, the hanging ratio is used to rise the fishing power of the nets, because angel sharks are entangled by head and pectoral fins.

. **Nylon monofilament**, netting manily used to fish the whitemouth croaker and small angel sharks. The string diameter in this case ranged from 0.6 to 1.0 mm and the usual mesh size (stretched) between 110 to 150 mm. It was found only one case of netting using nylon monofilament with mesh size

equal to 400 mm, and string diameter of 2.0 mm. For these nets the hanging ratio (E) range between 30 to 64 %.

The headline is basically prepared by two types of material:

. **Braided Polypropylene (PP)**, floating stuff, which do not use buoys in the headline, with rope diameter from 10 to 30 mm.

. **Braided Polyethylene (PE)**, this type of headline use buoys and the rope diameter range between 15 to 20 mm. There was only one case of net using two polyethylen ropes in the headline (the first rope of twisted polyethylene ∅ = 25 mm and the second rope of braided polyethylene of ∅ = 15 mm).

Arcalas in bottom gillnets have 140 mm to a maximum of 380 mm total length. Most of them are made of braided polyamide (PA) threads with arcala's diameter from 1 to 2.5 mm. There was only one case of arcala with 175 mm total length, nylon monofilament with ∅ = 2.5 mm and another with 260 mm total length, braided polyethylene (PE) with ∅ = 3.0 mm.

The netting is linked to the arcalas (i.e., in the headline and leadline) in different ways:

. 2 meshes/1mesh/2 meshes (for mesh size of 37 and 40 cm).

. 2 meshes/2 meshes/2 meshes (for mesh size of 11, 14 and 38 cm).

. 3 meshes/3 meshes/3 meshes (for mesh size of 14, 15 cm).

Usually nettings with smaller mesh sizes, i.e., 140 - 150 mm (stretched) use double mesh linked to the arcalas. There was only one case of 370 mm mesh size using this matching .

The leadline use to be made of braided polyethylene (PE) with diameters ranging from 16 to 25 mm. Polyethylene (PE) is less floating than Polypropylene (PP) and because of this it is mainly used in the leadline. A few nets use braided or twisted Polypropylene (PP) for the leadline, with rope diameter between 15 and 20 mm. The amount of lead used to maintain the panels in a vertical position ranged between 130 grams/m to 380 grams/m.

In the polyethylene (PE) headline, can be used three different types of buoys:

. Nylon floats with buoyancy between 0.1 and 0.2 Kgf, fixed by distances of 1.7 to 2.4 m (mesh size used between 14 to 40 cm).

. Styrofoam floats with buoyancy between 0.05 and 0.25 Kgf, fixed by distances of 4.3 m (mesh size used mainly between 11 and 14 cm).

. Polyurethane floats with buoyancy of 0.25 Kgf, fixed by distance of 3.2 m (mesh size used of 37 cm).

IX - FISHING EFFORT BY DRIFTNET FISHERY

Skipper interviews during landings and a fishing cruise in a driftnetter supplied important information about the fishery, its catches and effort levels.

During the first semester of 1995, the fishing area was mainly located from Santos (São Paulo State, latitude 24°00'S) to Chuí (Rio Grande do Sul State, latitude 33°45'S) between 47 and 3600 m depth. There are some fishing boats that also operated northerly, i.e. until Vitória (Espirito Santo State, latitude 20°00S). The average depth was 1500 m.

The fishing cruises duration ranged between a minimum of 8 days to a maximum of 27 days, depending mainly on the availability of catches. There are also cases of more than 30 days, but the main restriction is the amount of diesel and freshwater on board. The average endurance was 17 days. The effective fishing days, ranged between 5 and 18 days. The difference between cruise and fishing days is due to the navigation time and bad weather conditions. The average fishing days were 12.

Driftnet launching begin between 3:00 and 6:00 pm. Its duration was on average 3 hours, depending on wind conditions and the length of the net. Strong winds help launching operation, with the fishing boat perpendicular to wind direction and the net, which is a slow operation, while during becalmed sea driftnet is launched by side with the fishing boat navigating at 2-3 knots speed, a dangerous operation due to the risk of holding the net to the propeller.

The driftnet soaking time was about 12 hours, by night, with better yields during dark moon, making the nets less visible for the sharks. For the hammerhead shark, *Sphyrna lewini*, better yields are associated with temperatures higher than 21° Centigrade, but it is necessary to get more data to confirm this hypothesis.

The driftnet recovery use to be the next day between 4:30 and 6:30 am. The average recovery time was 4 hours, which depends on the length of the net and the sea conditions.

X - FISHING EFFORT BY BOTTOM GILLNET FISHERY

Fishing areas for bottom gillnets are located between Macaé (Rio de Janeiro State, Latitude) and Chuí (Rio Grande do Sul State, Latitude) from 30 to 400 m depth. The genus *Squatina* is mainly found within this depth range. The average depth was 96 m.

The cruise duration ranged from a minimum of 5 to a maximum of 23 days, depending mainly on the fishing yields. The average was 14 days. The effective fishing days ranged between a minimum of 3 to a maximum of 21, with an average of 12. Stormy days use to harm fishing operations, and sometimes there are net losses, mainly because they work separately from the fishing boat (i.e. there is no cable connecting the net with the boat).

Bottom gillnet launching time is variable, and it can happen during the morning (i.e., 5:00 am), the afternoon (01:00 pm), and even in the dawn (between 0:00 and 4:00 am). The launching operation is quick, and use to happen with the fishing boat navigating at 6 to 7 knots speed, which avoids the net get entangled in the propeller. The net is launched from the boat sides, or from the stern poop (where there is a fence to enclose the gear to be launched). Launching operation is also variable, and depends on the quantity of tans released (i.e., to launch 150 tans , each with 30 fathoms length and 40 cm mesh size were spent 1 hour and 10 minutes; on the other hand, launching 28 tans, each with 33 fathoms length and 14 cm mesh size endured only 15 minutes). On average, launching operation time was 1 hour.

The soaking time varied from 12 hours (monofilament, mesh size 14 - 15 cm, and polyamide, mesh size 40 cm) to 48 hours (polyamide, mesh size 40 cm). There were a few cases of soaking time of minimum of 5 to a maximum of 64 hours. The factor that controls the soaking time was the spoilage of the fish and the attacks caused by parasites isopods. Better catches are done by night, when the net is less visible for the fish.

The net recovery use to began between 5:00 and 6:00 o'clock am, but there were cases of recovery during the afternoon, between 12:00 and 17:00 and even during the dawn (3:00 to 4:30 am). This operation was slower than launching and done by a hydraulic winch, ranging from 30 minutes to a maximum of 12 hours. The average time was 5 hours, depending on the number of tans in the water.

XI - CATCH PER UNIT EFFORT (CPUE) FROM DRIFTNET FISHERY

With the information about effective fishing days, drifnet length carried on board and number of fishes caught per cruise (table), two CPUE indexes were generated for this fishery: **number of fishes/Km of net** and **number of fishes/effective fishing days**.

XI . a - *Sphyrna lewini* (Hammerhead shark)

Target species on driftnet fishery presented high variability in the CPUE values, during the considered period (i.e., march to august), from a maximum of 14 sharks/Km of net (i.e. 45 sharks/fishing day) in may to a minimum of 0.07 sharks/Km of net (0.22 sharks/fishing day) in july. Although there is a lack of information, and the hammerhead shark in this area have an unknown distributional pattern, there are signs that better yields are found during summertime, season when the surface seawater temperature is higher (above 21° Celsius), probably aggregating the hammerhead sharks near the surface and also due to the reproductive behaviour. This hypothesis should be studied because the

driftnet seasonality depends on it. For example, there is a community of fishermen based in Araçá (Porto Belo, Santa Catarina State), whose fleet is composed of smaller fishing boats (less than 17 cm total length), fishing big hammerhead sharks with driftnets during spring-summer season mainly in the oceanic environment, and during the end of autumn - winter become concentrated on the continental shelf, catching whitemouth croakers and angelsharks with bottom gillnets, because during this time the oceanic envirnoment is stormy and the hammerhead yields are low. The average CPUE values for the summer were 3.82 sharks/Km (11.21 sharks/fishing day) and for the winter 1.7 sharks/Km (6.21 sharks/fishing day).

XI . b - ANOTHER SPECIES IN DRIFTNET FISHERIES

There are another shark species fished by driftnets, which presents less important CPUE values. *Isurus oxyrinchus* a species with good acceptance in the market (U$ 0.5/Kg in Itajaí and Navegantes harbours), have the CPUE ranging between 0.21 sharks/Km (0.63 sharks/fishing day) to 0.02 sharks/Km (0.11 sharksfishing day). *Prionace glauca* has the CPUE between 0.23 sharks/Km (0.75 sharks/fishing day) and 0.03 sharks/Km (0.10 sharks/fishing day).

Driftnets also catch teleosts, like billfishes, swordfishes, tunas, and dolphin fish. They are only bycatches, due to its low levels of CPUE (i.e., between 0.03 and 0.06 fishes/Km, or 0.08 to 0.15 fishes/fishing day).

Cetaceans also occur in this fishery, but it is necessary to create an observer program to quantify the catches.

XII - RECOMMENDATIONS

. To implement studies related to the population dynamic of the hammerhead shark, *Sphyrna lewini*, i.e., reproduction, migration, juveniles and adults distribution, feeding, age and growth, morphometric relations, to assess and manage this natural resource.

. To develop an observer's program on driftnetters, quantifying the seasonal CPUE's levels of sharks, teleosts and cetaceans. Countings can be done from research vessels, using binoculars. Logbooks are also recommended for the skippers.

. To assess the catches of *Sphyrna lewini* from other types of fisheries, i.e., trawlers, bottom gillnets, artisanal fisheries.

. Quantify and qualify the fins commercialized by the exporters, creating a law forbidding discards of shark's carcasses without fins.

. Many countries banned driftnets from international waters, and its ZEE's. This type of net doesn't discriminate the species and size composition, catching a high variety of bycathes, including mammals, turtles, and other fishes. Due to these problems, United Nations through the resolution A/Res/44/225 of 1989, banned driftnets from high-seas since June 30, 1992. (Woodley, T.H., Earle, M., 1991, Bonfil, R., 1994).

. *Sphyrna lewini*, target species on drift-net fishery, doesn't support high fishing pressure, due to its low fecundity (15 to 31 newborns, Compagno, L.J.V. 1984, 1988).

. It is recommended a closure season during the months of november, december, january and february for all fishing gears, in Santa Catarina and Rio Grande do Sul State, because most of the elasmobranchs give birth to their pups in shallower waters during this period. Also a minimum distance from the coast for industrial fleet of 3 nautical miles in Rio Grande do Sul State and 1 nautical mile in Santa Catarina State It is recommended (Regulations from SUDEPE Nº. 026 of 07.28.1983, and Nº 059 of 12.20.1984 respectively).

. As an initial measure of effort control it is internationally recommended a maximum length of 2.5 Km per gillnet.

. Release of alive sharks, and without economical importance.

. To restrict the number of fishing licenses for driftnets and gillnets.

XIII - REFERENCES

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TABLE 1 - CHARACTERISTICS OF THE FISHING BOATS AND ITS DRIFTNETS FROM THE FLEET BASED IN ITAJAÍ AND NAVEGANTES HARBOURS DURING 1995.

DRIFT-NETS					FISHING BOATS					
MESH SIZE (CM)	TAN HIGH (M)	TAN LENGTH (M)	TOTAL NUMBER OF TANS ON BOARD	TOTAL DRIFTNET LENGTH (M)	CONSTRUCTION YEAR	TOTAL LENGTH (M)	ENGINE POWER (Hp)	GROSS TONNAGE	NET TONNAGE	HARBOUR
40,00	13,00	59,40	66,00	3.920,40	1.995	16,80	153,00	28,03	10,77	ITAJAI
40,00	12,00	50,00	40,00	2.000,00	1.988	13,00	66,00	14,00	4,00	ITAJAI
40,00	12,00	50,00	40,00	2.000,00	1.990	14,30	190,00	19,06	5,71	ITAJAI
38,00	13,68	50,00	60,00	3.000,00		15,40	115,00	19,94	5,89	ITAJAI
38,00	13,68	50,00	60,00	3.000,00	1.989	15,21	115,00	29,00		ITAJAI
38,00	13,68	50,00	60,00	3.000,00						
38,00	9,00	61,20	50,00	3.060,00	1.993	15,18	163,00	35,00	11,00	ITAJAI
39,00	16,20	72,00	60,00	4.320,00		18,50	267,00	51,00	33,00	SANTOS
40,00	15,60	63,00	65,00	4.095,00	1.974	20,00	220,00	75,90	53,48	ITAJAI
40,00	14,40	50,00	70,00	3.500,00						
					1.989	15,05	170,00	19,50	9,20	ITAJAI
34,00	10,20	50,40			1.964	18,40	165,00	31,99	13,11	SANTOS
40,00	16,20	54,00	50,00	2.700,00	1.987	14,72	170,00	18,00	5,14	ITAJAI
40,00	14,40	50,00	55,00	2.750,00	1.980	14,10	150,00	15,20	4,86	ITAJAI
38,00	13,68	50,00	65,00	3.250,00		20,50	250,00	49,00		SANTOS
38,00	12,00	45,00	60,00	2.700,00	1.990	13,65	115,00	28,18	9,40	ITAJAI
38,00	16,20	60,00	60,00	3.600,00	1.986	14,70	155,00	23,45		ITAJAI
35,00	12,95	54,00	60,00	3.240,00	1.970	21,36	250,00	59,83	38,00	ITAJAI
17,00	4,50	45,00	100,00	4.500,00		27,00	360,00	128,47	49,61	
					1.984	14,00	250,00	19,40	4,82	ITAJAI
40,00	12,80	57,60	50,00	2.880,00		20,00	267,00			ANGRA DOS REIS
38,00	12,00	50,00	40,00	2.000,00	1.987	17,50	291,00	35,00	13,00	ITAJAI
18,00	10,00	50,00	50,00	2.500,00	1.987	17,50	260,00	40,00	12,00	ITAJAI
					1.986	15,26	195,00	38,30	12,00	ITAJAI
38,00	13,30	50,00			1.985	14,00	170,00	17,08	5,12	ITAJAI
40,00	14,40	100,00	58,00	5.800,00						
35,00	27,00	57,60	60,00	3.456,00		21,00	250,00	45,00	24,00	ITAJAI
34,00	15,00	30,00	60,00	1.800,00	1.973	17,00	153,00	36,08	16,87	ITAJAI
40,00			50,00		1.974	17,91	230,00	44,92	29,72	ITAJAI
37,00	14,06	50,00	50,00	2.500,00	1.965	20,45	240,00	48,04	36,80	ITAJAI
18,00	11,80	118,80	60,00	7.128,00						
40,00	23,40	45,00	60,00	2.700,00	1.989	15,20		30,00		ITAJAI
40,00	12,81	25,00	50,00	1.250,00	1.985	14,40	155,00	23,00	8,70	ITAJAI
14,00	12,00	63,00	120,00	7.560,00	1.980	18,70	267,00	61,76	35,61	ITAJAI
37,00					1.970	23,15	135,00	61,66	40,58	ITAJAI
37,00	4,44	50,00								
17,00	11,90	50,00								
34,00	12,24	70,00								
38,00	9,00	50,00	60,00	3.000,00						ITAJAI
38,00	6,20	63,00	80,00	5.040,00						ITAJAI
32,00	15,36	50,00	35,00	1.750,00	1.969	19,50	225,00	49,00	27,90	SANTOS
38,00	13,68	50,00	60,00	3.000,00						
					1.989	15,31	90,00	27,00		ITAJAI
40,00	14,00	59,40	70,00	4.158,00	1.949	20,20	230,00	48,58	27,36	SANTOS
40,00	12,60	100,00	50,00	5.000,00	1.988	12,90	90,00	10,30	3,09	ITAJAI
					1.988	16,00	170,00			ITAJAI
40,00	27,00	54,00	53,00	2.862,00		18,30	320,00	32,83		ITAJAI
38,00	13,68	63,00	60,00	3.780,00						

TABLE 2 - CHARACTERISTICS OF THE FISHING BOATS AND ITS BOTTOM GILLNETS FROM THE FLEET BASED IN ITAJAÍ AND NAVEGANTES HARBOURS DURING 1995.

BOTTOM GILL NETS					FISHING BOATS					
MESH SIZE (CM)	TAN HIGH (M)	TAN LENGTH (M)	TOTAL NUMBER OF TANS ON BOARD	TOTAL BOTTOM GILLNET LENGTH (M)	CONSTRUCTION YEAR	TOTAL LENGTH (M)	ENGINE POWER (Hp)	GROSS TONNAGE	NET TONNAGE	HARBOUR
40,00	12,00	50,00	40,00	2.000,00	1.982,00	12,70	45,00	16,00	5,50	ITAJAI
13,00			100,00							ITAJAI
12,00	4,00	100,00	80,00	8.000,00	1.993,00	10,50	33,00	10,78	8,20	ITAJAI
14,00			150,00		1.973,00	16,92	155,00	29,51	16,36	ITAJAI
35,00	5,40	54,00	200,00	10.800,00						CABO FRIO
15,00	5,40	54,00	160,00	8.640,00						CABO FRIO
40,00	3,40	54,00	110,00	5.940,00	1.970,00	20,50	290,00	68,34	40,24	ITAJAI
15,50	4,20	70,00	110,00	7.700,00	1.970,00	20,50	290,00	68,34	40,24	ITAJAI
15,00	6,15	50,00	400,00	20.000,00						
40,00		50,00	400,00	20.000,00						
12,50	3,60	57,60	80,00	4.608,00		14,00	90,00			ITAJAI
14,00	4,60	57,60	150,00	8.640,00						
12,00	4,00	45,00	150,00	6.750,00						
12,00	4,00	45,00	150,00	6.750,00						
12,00	4,00	100,00	50,00	5.000,00						
14,00	7,00	100,00	180,00	18.000,00	1.948,00	17,25	250,00	25,74	19,09	ITAJAI
18,00	3,60	54,00	50,00	2.700,00		27,00	360,00	128,47	49,61	
40,00	5,20	45,00	350,00	15.750,00		27,00	360,00	128,47	49,61	
40,00	5,40	75,00	200,00	15.000,00	1.977,00	23,90	325,00	123,22	75,69	ITAJAI
13,50	4,39	57,60	94,00	5.414,40						
13,00	3,20	50,00	70,00	3.500,00		12,50	115,00	17,37	5,02	ITAJAI
38,00	3,60	54,00	340,00	18.360,00	1.980,00	22,80	325,00	79,00	50,00	ITAJAI
12,00	3,96	50,00	120,00	6.000,00	1.975,00	17,00	154,00	32,37	15,80	ITAJAI
13,00	4,29	50,00	90,00	4.500,00	1.988,00	12,85	22,00	16,90	8,20	ITAJAI
40,00	10,00	100,00	58,00	5.800,00		15,30	115,00	19,98	10,43	ITAJAI
15,00		50,00	98,00							
37,50		50,00	400,00							
40,00	5,40	45,00	350,00	15.750,00	1.983,00	20,93	325,00	78,00	24,00	FLORIANOPOLIS
12,00	4,50	63,00	80,00	5.040,00			115,00			ITAJAI
14,00	4,50	54,00	160,00							
12,50	4,12	63,00	100,00	6.300,00	1.978,00	14,00	115,00	17,72	5,32	ITAJAI
40,00	4,80	54,00	450,00	24.300,00		21,94	291,00	74,06	22,22	SANTOS
14,00	1,50	54,00	100,00	5.400,00	1.989,00	15,20		30,00		ITAJAI
					1.979,00	23,00	267,00	77,22	57,52	ITAJAI
13,00	4,20	57,60	100,00	5.760,00						ITAJAI
12,00					1.987,00	13,70	90,00	18,00	5,68	ITAJAI
14,00	4,50	54,00	430,00	23.220,00	1.974,00	23,00	300,00	79,64	43,14	SANTOS
14,00	4,20	70,00	158,00	11.060,00						
37,50										
40,00	4,80	50,00	500,00	25.000,00	1.971,00	21,60	314,00	61,63	43,97	ITAJAI

TABLE 3 - STATISTICS FROM THE FISHING BOATS AND ITS DRIFTNETS CHARACTERISTICS . FLEET BASED IN ITAJAÍ AND NAVEGANTES HARBOURS DURING 1995.

	CHARACTERISTICS OF THE FISHING BOATS AND ITS DRIFTNETS									
STATISTICS	1	2	3	4	5	6	7	8	9	10
MEAN	35,63	13,46	56,60	59,38	3.411,09	1.981,43	17,19	196,17	37,53	18,99
STANDARD ERROR	1,10	0,70	2,61	2,54	229,93	1,92	0,52	11,43	3,78	2,77
MEDIAN	38,00	13,30	50,00	60,00	3.000,00	1.986,00	16,80	180,00	32,83	12,00
MODE	40,00	13,68	50,00	60,00	3.000,00	1.989,00	20,00	170,00	35,00	12,00
STANDARD DEVIATION	7,21	4,47	16,72	15,43	1.379,57	10,53	3,15	68,57	22,36	14,93
SAMPLE VARIANCE	51,95	19,96	279,40	238,19	1.903.203,94	110,94	9,95	4.702,49	499,89	222,93
KURTOSIS	3,48	3,62	5,60	6,73	2,22	1,58	1,01	(0,40)	7,05	(0,45)
SKEWNESS	(2,17)	1,15	1,98	2,06	1,35	(1,31)	0,96	0,22	2,13	0,86
RANGE	26,00	22,56	93,80	85,00	6.310,00	46,00	14,10	294,00	118,17	50,39
MINIMUM	14,00	4,44	25,00	35,00	1.250,00	1.949,00	12,90	66,00	10,30	3,09
MAXIMUM	40,00	27,00	118,80	120,00	7.560,00	1.995,00	27,00	360,00	128,47	53,48
n	43,00	41,00	41,00	37,00	36,00	30,00	37,00	36,00	35,00	29,00

1 - MESH SIZE (STRETCHED, CM)
2 - TAN HIGH (M)
3 - TAN LENGTH (M)
4 - TOTAL NUMBER OF TANS ON BOARD
5 - TOTAL DRIFTNET LENGTH (M)
6 - CONSTRUCTION YEAR
7 - FISHING BOAT TOTAL LENGTH (M)
8 - ENGINE POWER (Hp)
9 - GROSS TONNAGE
10 - NET TONNAGE

TABLE 4 - STATISTICS FROM THE FISHING BOATS AND ITS BOTTOM GILLNETS CHARACTERISTICS. FLEET BASED IN ITAJAÍ AND NAVEGANTES HARBOURS

	CHARACTERISTICS OF THE FISHING BOATS AND ITS BOTTOM GILLNETS									
STATISTICS	1	2	3	4	5	6	7	8	9	10
MEAN	22,03	4,81	59,64	184,00	10.365,08	1.977,47	18,44	206,35	54,58	28,37
STANDARD ERROR	1,97	0,34	2,75	21,97	1.210,39	2,50	1,02	24,04	8,24	4,60
MEDIAN	14,00	4,34	54,00	150,00	7.225,00	1.978,00	17,25	250,00	47,00	22,22
MODE	40,00	4,00	50,00	100,00	8.640,00	1.970,00	20,50	115,00	68,34	8,20
STANDARD DEVIATION	12,30	1,90	16,26	133,66	6.847,01	10,30	4,88	115,30	38,66	21,09
SAMPLE VARIANCE	151,35	3,63	264,28	17.863,78	46.881.614,17	106,01	23,84	13.293,33	1.494,59	444,87
KURTOSIS	(1,50)	7,30	2,22	(0,22)	(0,54)	3,32	(1,15)	(1,60)	(0,64)	(0,74)
SKEWNESS	0,72	2,36	1,79	1,08	0,88	(1,25)	0,16	(0,19)	0,68	0,56
RANGE	28,00	10,50	55,00	460,00	23.000,00	45,00	16,50	338,00	117,69	70,67
MINIMUM	12,00	1,50	45,00	40,00	2.000,00	1.948,00	10,50	22,00	10,78	5,02
MAXIMUM	40,00	12,00	100,00	500,00	25.000,00	1.993,00	27,00	360,00	128,47	75,69
n	39,00	32,00	35,00	37,00	32,00	17,00	23,00	23,00	22,00	21,00

1 - MESH SIZE (STRETCHED, CM)
2 - TAN HIGH (M)
3 - TAN LENGTH (M)
4 - TOTAL NUMBER OF TANS ON BOARD
5 - TOTAL BOTTOM GILLNET LENGTH (M)
6 - CONSTRUCTION YEAR
7 - FISHING BOAT TOTAL LENGTH (M)
8 - ENGINE POWER (Hp)
9 - GROSS TONNAGE
10 - NET TONNAGE

TABLE 5 - SPECIES CAUGHT BY DRIFTNETS DURING THE FIRST SEMESTER OF 1995.

FAMILY	SPECIES	MONTH
	ELASMOBRANCHS	
Carcharhinidae	*Carcharhinus leucas*	3, 6
Carcharhinidae	*Carcharhinus limbatus*	
Carcharhinidae	*Carcharhinus brevipinna*	
Carcharhinidae	*Carcharhinus longimanus*	1, 3, 4, 5
Carcharhinidae	*Carcharhinus obscurus*	
Carcharhinidae	*Carcharhinus spp*	3, 4
Lamnidae	*Isurus oxyrinchus*	3, 4, 5, 6, 7, 8
Lamnidae	*Lamna nasus*	8
Mobulidae	*Manta birostris (?)*	8
Odontaspididae	*Carcharias taurus*	7
Carcharhinidae	*Prionace glauca*	3, 4, 5, 7, 8
Sphyrnidae	*Sphyrna lewini*	3, 4, 5, 6, 7, 8
Sphyrnidae	*Sphyrna zygaena*	7
	BONY FISHES	
Scombridae	*Auxis thazard*	8
Bramidae	*Brama brama*	7, 8
Coryphaenidae	*Coryphaena hippurus*	7, 8
Istiophoridae	*Istiophorus albicans*	8
Scombridae	*Katsuwonus pelamis*	7, 8
Istiophoridae	*Makaira nigricans*	4
Scombridae	*Sarda sarda*	8
Istiophoridae	*Tetrapturus albidus*	3, 4, 7
Scombridae	*Thunnus albacares*	7
Xiphiidae	*Xiphias gladius*	7
	CETACEANS	
Delphinidae	*Delphinus delphis*	winter
Delphinidae	*Globicephala melas*	summer
Delphinidae	*Stenella coeruleoalba*	winter
Delphinidae	*Stenella frontalis*	verão

TABLE 6 - SPECIES CAUGHT BY BOTTOM GILLNETS DURING THE FIRST SEMESTER OF 1995.

FAMILY	SPECIES	MONTH
	ELASMOBRANCHS	
Alopiidae	*Alopias spp*	3
Carcharhinidae	*Carcharhinus brevipinna*	5
Carcharhinidae	*Carcharhinus limbatus*	
Carcharhinidae	*Carcharhinus leucas*	3
Carcharhinidae	*Carcharhinus obscurus*	5
Carcharhinidae	*Carcharhinus plumbeus*	4, 5
Carcharhinidae	*Carcharhinus spp*	3, 4, 5
Carcharhinidae	*Galeocerdo cuvier*	3, 5
Carcharhinidae	*Galeorhinus galeus*	3
Carcharhinidae	*Rhizoprionodon lalandii*	5
Carcharhinidae	*Rhizoprionodon porosus*	4
Dasyatidae	*Dasyatis spp*	4, 5
Hexanchidae	*Notorynchus pectorosus*	
Myliobatidae	*Myliobatis goodei*	3, 4, 5
Odontaspididae	*Carcharias taurus*	5
Rajidae	*Raja agassizi*	3, 4
Rajidae	*Raja castelnaui*	3, 4, 5,
Rajidae	*Raja cyclophora*	4, 5
Rajidae	*Sympterigia spp*	4
Rajidae	*Sympterygia acuta*	5
Rhinobatidae	*Rhinobatos horkelli*	3, 4
Sphyrnidae	*Sphyrna lewini*	3, 4, 5
Sphyrnidae	*Sphyrna zygaena*	4, 5
Squalidae	*Squalus megalops*	3, 4
Squatinidae	*Squatina guggenheim*	3, 4, 5
Squatinidae	*Squatina occulta*	3, 4, 5
Squatinidae	*Squatina spp*	3, 4, 5
Triakidae	*Mustelus canis*	3,4
Triakidae	*Mustelus schmitti*	3,4,5
Triakidae	*Mustelus spp*	5
	TELEOSTS	
Ariidae	*Netuma barba*	3
Atherinidae	*Xenomelaniris spp*	
Balistidae	*Balistes capriscus*	3, 5
Bothidae	*Paralichthys patagonicus*	4, 5
Bothidae	*Paralichthys spp*	5
Bothidae	*Paralichthys triocellatus*	3
Branchiostegidae	*Lopholatilus villari*	
Carangidae	*Caranx crysos*	
Carangidae	*Chloroscombrus chrysurus*	
Carangidae	*Oligoplites spp*	5
Carangidae	*Seriola lalandi*	
Carangidae	*Trachinotus spp*	
Centropomidae	*Centropomus spp*	
Congridae	*Conger orbignyanus*	
Cynoglossidae	*Symphurus jenynsi*	
Ephippididae	*Chaetodipterus faber*	3, 5
Gadidae	*Urophycis brasiliensis*	3, 5
Gadidae	*Urophycis cirrata*	4
Lophiidae	*Lophius gastrophysus*	4
Merlucciidae	*Macruronus magellanicus*	
Merlucciidae	*Merlucius hubbsi*	
Mugilidae	*Mugil spp*	
Mugiloididae	*Pseudopercis numida*	
Ophidiidae	*Genypterus brasiliensis*	
Percophidae	*Percophis brasiliensis*	
Pomadasyidae	*Conodon nobilis*	5
Pomatomidae	*Pomatomus saltatrix*	4
Sciaenidae	*Cynoscion leiarchus*	
Sciaenidae	*Cynoscion striatus*	3, 5
Sciaenidae	*Cynoscions jamaicensis*	3
Sciaenidae	*Macrodon ancylodon*	
Sciaenidae	*Menticirrhus americanus*	3, 5
Sciaenidae	*Micropogonias furnieri*	3, 4, 5
Sciaenidae	*Umbrina canosai*	
Serranidae	*Epinephelus flavolimbatus*	3, 5
Serranidae	*Epinephelus niveatus*	5
Sparidae	*Archosargus rhomboidalis*	5
Sparidae	*Pagru pagrus*	3
Stromateidae	*Peprilus paru*	3, 5
Trichiuridae	*Trichiurus lepturus*	
Triglidae	*Prionotus nudigula*	4
Triglidae	*Prionotus punctatus*	3, 4, 5
Uranoscopidae	*Astroscopus sexpinosus*	
Zeidae	*Zenopsis conchifer*	3
	REPTILES	
Chelonidae	*Caretta caretta*	4

TABLE 7 - LANDING COMPOSITION FROM DRIFTNET FISHERY, IN SANTA CATARINA STATE, DURING THE YEARS 1993 AND 1994. LANDINGS IN METRIC TONNES.

SPECIES	1993	1994	Mean	% Total landed	% Total Elasmobranch
Sphyrna lewini e zygaena	422,4	538,43	480,42	76,25	77,76
Carcharias taurus	49,38	87	68,19	10,82	11,04
Carcharhinus leucas	47,94	39,18	43,56	6,91	7,05
Isurus oxyrinchus	13,76	28,61	21,19	3,36	3,43
Carcharhinus spp	1,98	3,16	2,57	0,41	0,42
Prionace glauca	0,33	3,41	1,87	0,30	0,30
Total Elasmobranchs	535,79	699,79	617,79	98,05	
SPECIES	1993	1994	Mean	% Total landed	% Total Teleosts
Istiophorus albicans	2,53	12,49	7,51	1,19	61,23
Auxis thazard	2	2,41	2,21	0,35	17,98
Coryphaena hippurus	1,31	0,66	0,99	0,16	8,03
Xiphias gladius	0,56	1,15	0,86	0,14	6,97
Thunnus albacares	0,13	1,02	0,58	0,09	4,69
Sarda sarda		0,27	0,27	0,04	2,20
Katsuwonus pelamis	0,22	0,21	0,22	0,03	1,75
Total Teleosts	6,53	18	12,27	1,95	
Total Elasm. + Teleosts	542,32	717,79	630,06		

TABLE 8 - LANDING COMPOSITION FROM BOTTOM GILLNET FISHERY, IN SANTA CATARINA STATE, DURING THE YEARS 1993 AND 1994. LANDINGS IN METRIC TONNES.

SPECIES	LANDINGS (TONNES)			% TOTAL	% TOTAL
	1993	1994	MEAN	LANDINGS	ELASMO.
Squatina spp (1)	1.128,83	966,69	1.047,76	20,01	38,27
Sharks (2)	607,11	940,68	773,89	14,78	28,27
Sphyrna lewini e S. zygaena	422,40	538,43	480,42	9,17	17,55
Rays (3)	147,79	134,01	140,90	2,69	5,15
Small sharks (4)	92,49	90,45	91,47	1,75	3,34
Carcharias taurus	49,38	87,00	68,19	1,30	2,49
Rhinobatos horkelli	9,80	90,56	50,18	0,96	1,83
Carcharhinus leucas	47,94	39,18	43,56	0,83	1,59
Galeorhinus galeus	11,82	25,96	18,89	0,36	0,69
Rhizoprionodon spp	2,68	19,47	11,08	0,21	0,40
Mustelus spp	4,22	4,59	4,41	0,08	0,16
Carcharhinus spp	1,98	3,16	2,57	0,05	0,09
Raja spp	2,56	2,50	2,53	0,05	0,09
Notorynchus pectorosus		1,05	1,05	0,02	0,04
Carcharhinus plumbeus	0,89	0,12	0,51	0,01	0,02
Mustelus canis		0,30	0,30	0,01	0,01
Galeocerdo cuvier	0,14	0,39	0,26	0,01	0,01
	2.530,02	2.944,51	2.737,94	52,28	

SPECIES	LANDINGS (TONNES)			% TOTAL	% TOTAL
	1993	1994	MEAN	LANDINGS	TELEOSTS
Micropogonias furnieri	276,43	1.461,56	869,00	16,59	34,77
Cynoscion leiarchus	367,93		367,93	7,03	14,72
Pomatomus saltatrix	55,40	498,89	277,15	5,29	11,09
Mixture (1)	313,56	203,86	258,71	4,94	10,35
Urophycis brasiliensis	170,83	181,29	176,06	3,36	7,04
Mugil spp	123,21	191,04	157,12	3,00	6,29
Umbrina canosai	252,47	31,95	142,21	2,72	5,69
Cynoscion spp	19,31	146,20	82,76	1,58	3,31
Trachinotus spp	0,92	78,60	39,76	0,76	1,59
Paralichthys spp	6,54	54,08	30,31	0,58	1,21
Menticirrhus americanus	3,26	31,40	17,33	0,33	0,69
Prionotus spp	10,62	17,48	14,05	0,27	0,56
Catfish (2)	4,71	19,90	12,30	0,23	0,49
fishmeal (3)	3,66	11,98	7,82	0,15	0,31
Cynoscion striatus	4,46	11,09	7,77	0,15	0,31
Epinephelus niveatus	7,24	8,15	7,69	0,15	0,31
Cynoscion jamaicensis		3,94	3,94	0,08	0,16
Lopholatilus villari	0,15	6,87	3,51	0,07	0,14
Epinephelus spp	0,02	6,66	3,34	0,06	0,13
Peprilus paru	2,41	2,16	2,28	0,04	0,09
Balistes capriscus	1,88	2,27	2,07	0,04	0,08
Lophius gastrophysus	0,82	3,32	2,07	0,04	0,08
Macrodon ancylodon	2,33	1,35	1,84	0,04	0,07
Pagrus pagrus	0,02	3,65	1,83	0,03	0,07
Macruronus magellanicus	0,74	2,61	1,67	0,03	0,07
Caranx crysos		1,40	1,40	0,03	0,06
Xenomelaniris spp		1,21	1,21	0,02	0,05
Percophis brasiliensis	1,45	0,67	1,06	0,02	0,04
Seriola lalandi	1,25	0,85	1,05	0,02	0,04
Conger orbignyanus	0,58	1,50	1,04	0,02	0,04
Oligoplites spp	0,68		0,68	0,01	0,03
Genypterus brasiliensis	0,14	1,21	0,68	0,01	0,03
Merluccius hubbsi	0,02	1,00	0,51	0,01	0,02
Pseudopercis numida	0,18	0,38	0,28	0,01	0,01
Astroscopus sexspinosus	0,26		0,26	0,01	0,01
Symphurus jenynsi	0,18		0,18	0,00	0,01
Centropomus spp		0,16	0,16	0,00	0,01
Chloroscombrus chrysurus		0,10	0,10	0,00	0,00
Caranx spp		0,10	0,10	0,00	0,00
Trichiurus lepturus		0,03	0,03	0,00	0,00
	1.633,64	2.988,86	2.499,24	47,72	
	4.163,66	5.933,36	5.237,18		

Source :Branco, E.J., 1995. Fishery Statistics Section, CEPSUL/IBAMA.

(1) *Squatina* genus, i.e., *Squatina guggenheim*, *S. occulta* e *S. argentina*.
(2) Sharks, mainly from the following families: Triakidae, Sphyrnidae, Odontaspididae, Squatinidae, Carcharhinidae, Alopidae, Lamnidae, Squalidae.
(3) Rays , from the genus *Raja*.
(4) Small sharks (less than 1m length), mainly from the families Triakidae, Carcharhinidae e Squalidae.

1- Mixture - Different teleosts species .
2- Catfish - Different catfish species, mainly *Netuma barba*.
3- Fishmeal - Fish used for fishmeal.

TABLE 9 - INFORMATION ABOUT CATCH AND EFFORT FROM DRIFTNET FISHERY . DATA FROM SKIPPER'S INTERVIEWS AND FISHING CRUISES.

collection date	FISHING AREA										
	LATITUDE/S	LONGITUDE/W	DEPTH (M)	sea days	fishing days	launching time	launching operation	recovery time	recovery operation	soaking time (1)	species caught
03/jul/95	285000	471200	1170	19	10	17:00	2,5	5:30	3	12	7,23
03/mai/95	272100	431500	2700	10	6	17:00		6:00		12	7
10/jul/95	335500	500200	2930	17	8	17:00	4	5:00	4	12	7
12/jul/95	Sta. Marta Cape to Rio Grande (207 miles)		3600	27	16	16:00	2	5:00	7	12	7,23,21
07/mar/95	284300	463900	2000	13	10	16:00		5:00	4	12	7,23
28/jun/95	East of Solidão		400	20	18	15:00	3	4:30	3,5	12	7,21,30
27/mar/95	280000	472700	117	18	14	16:30	1	6:30	3	12	
10/mar/95	272200	444100	2885	15	12	16:00		5:00	5	12	7
06/mar/95	282400	470600	500	20	15	15:00		6:00		12	7,30,21
29/mar/95	273900	474800	100	17	12	17:30		5:30			7, 42
22/mar/95	292400	455100	2550	8	5	16:00	2	6:00		12	7, 21,18, 22, 23
	Solidão to Itajaí		60	12							
05/jul/95	245133	443244	150	11	9	16:00	2,5	4:30	4	12	23,21,7
12/jul/95	294500	474400	1300	19	8	16:30	5	5:00	4	12	21,7,8,23,15
03/abr/95	282400	470600	250	13	13	16:00	4	5:00	3	12	7,23,22,21,53
06/mar/95	291300	460900	2500	19	15	16:00		5:30	4,5	12	7,21
10/mai/95	303000	444200	3400								22,7,23,21
02/jul/95	300998	472265	1600	20	9	17:00	1	6:00	3,5	12	7, 41,23,42, 43
05/jul/95	310600	474200	3090	25	18	15:00	4	6:00	5	12	7, 21
	São Sebastião to Solidão		600	20		18:00		5:00	5	12	
jul/ago/95	Sta. Catarina Island to Mostardas		1910	19	13	16:15	1,8	6:27	2,2	12,2	7,43,23,21,47,48,49,50,51,52,45,46,44,45
01/mar/95	Sta. Catarina Island to Solidão		47		16						7
jun/jul/95	Sta. Marta to Mostardas		1758		16						7
		mean	1549	17	12	16:18	3	5:26	4	12	

SPECIES CAUGHT

(7) Sphyrna lewini
(8) Sphyrna zygaena
(15) Carcharias taurus
(18) Carcharhinus spp
(21) Isurus oxyrinchus
(22) Carcharhinus longimanus
(23) Prionace glauca
(30) Carcharhinus leucas
(41) Xiphias gladius
(42) Tetrapturus albidus
(43) Thunnus albacares
(44) Raia-manta
(45) Auxis thazard
(46) Sarda sarda
(47) Coryphaena hippurus
(48) Brama brama
(49) Lamna nasus
(50) Delphinus delphis
(51) Katsuwonus pelamis
(52) Istiophorus albicans
(53) Makaira nigricans

TABLE 10 - INFORMATION ABOUT CATCH AND EFFORT FROM BOTTOM GILLNET FISHERY. DATA FROM SKIPPER'S INTERVIEWS AND FISHING CRUISES.

collection date	FISHING AREA		min. depth (m)	max. depth (m)	num. sea days	num. fishing days	launch time (min.)	launch time (max)	launch operation mín.	launch operation máx.	recovery time min.	recovery time max.	recovery operation min.	recovery operation max.	soaking time min.	soaking time max.	species present in the catches
	latitude/S	longitude/W															
06/mar/95	Santos to São Francisco do sul		250	400													
06/mar/95	331200		50	80	20	17									48		25,7,8
08/mar/95	Grande Island to Paranaguá		68	260	19	16	18:00				6:00		6,5		12	48	1,7,8,9,27,18,28
13/mar/95	Santos to Guaratuba		29	250											12	48	29,3,7,8,9,26,12,11,2,1,18,30
15/mar/95	Capão da Canoa to Solidão		70	90			15:00	17:00			6:00				12		23,11,14,10,9,3,2,25,7
28/mar/95	Macaé to Chuí		30	150		15	17:00				6:00				12		2,7,6,8,15,25,24,26
05/abr/95	302800	494800	70	115	19	15											2,1,25,24,9,14,31,32,33,4,18,7
20/abr/95	Sta.Marta to Araranguá		31	88	6	5	11:35	22:45	0,13	1,00	6:00	13:08	0,50	5,53	12	64,63	1,2,3,4,5,6,7,8,9,10,11,12,13,14
08/mai/95	311500	503300	60	160	16	8											25
08/mai/95	281500	474800	125		15	6											25,7,15,9,4
08/mai/95	274800	481800	50	60	10	4											7,8,36
08/mai/95	272100	480600	48		7	5											7,8
10/mai/95	280000	473300	115		5	3	7:00				6:00				48		25,9,32,34,35,27,1,2,3
10/mai/95	243000	461200	50		12	10	18:00				6:00				12		7,36,19,29,18,15,8,2,6,11,24,29
15/mai/95	Sta. Marta to Araranguá		100	130	22	20											2,1,7,37
15/mai/95	273100	480600	66		10	10											8,19,7,36
31/mai/95	321200	502200	80	100	20	15	6:00								12	48	15,18,2,1,16,11,3
12/jun/95	304200		80	120			14:00	19:00	0,67		5:00	15:00	8	12	12		1,2,7,8,15,16,18,5, 9,4
14/jun/95	320800	502500	90	100	23	19	16:00		1		6:00		8		48		1,2,7,8,15,16
27/jun/95	Paranaguá to Itajaí		55	75	15	13	5:00		0,67		12:00		4	5	6		6,7,8
27/jun/95	Paranaguá to Itajaí		55	75	15	13	5:00		0,67		12:00		4	5	6		6,7,8
03/jul/95	263800	475700	58	64	13	7	7:00		0,67		13:00		5	6	5	6	7,8,36,25
03/jul/95	SE of Paz island		58	64	13	7	7:00		0,67		13:00		5	6	5	6	7,8,36,25
05/jul/95	251200 to 252400		40	60	15	15	13:00		5		6:00		4	5	12		7,8
05/jul/95	290000 to 292400		60	70	16	16	4:00		0,5		13:00		4		12		24,7,8,19,11,2,3
05/jul/95	330600 to 331500		80	120	20	16	14:00	22:00	1		7:00		3	5	24	40	25,15,30,38
05/07/95	Bom Abrigo, Figueira		4	6	15	15	13:00		5		6:00		4	5	12		7,8
05/07/95	Araranguá, Torres		60	70	16	16	4:00		0,5		13:00		4		8,5		24,7,8,18,11,2,3
05/07/95	Rio Grande		80	120	20	16	14:00	22:00	1		3:00	5:00	3	5	24	40	25,15,30,38
05/07/95	Iguape, Queimada Grande island		150	170	11	9	15:00	16:00	1	2,5	4:30	5:00	2,5	4	12		23,21,7
17/jul/95	Itajaí and São Francisco		46	63	13	13	4:00	6:00	0,7		16:00	17:00	4	6	8	12	39,13,7,8
17/jul/95	Armação de Itapocorói		57		6	6	0:00	3:00	0,5		12:00	13:00	5		12		7,8,2,40,6,39
17/jul/95	São Francisco		60		13	11	20:00		0,5		12:00		4	5	12		7,8,15,40
17/jul/95	Itajaí		60		12	9	0:00	3:00	0,01		11:00	12:00	3		6	8	7,8,40,39
17/jul/95	Itajaí to Arvoredo island		90	110	23	21	17:00	18:00			6:30				48		25,15,30,29,1,2,3,7,8
	271200	473600	115	177	5	3											6,18,1,25,7
	321000	500400															
		mean	93		14	12	12:29		1,2		9:15		4,9		21		

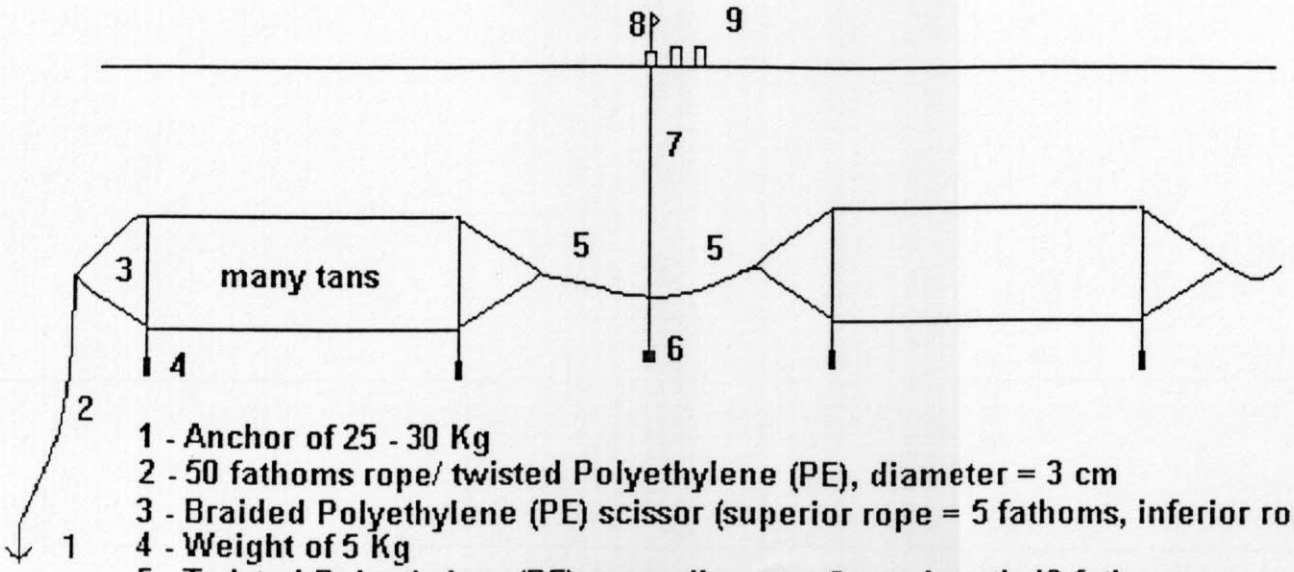
1 Squatina occulta	23 Prionace glauca
2 Squatina guggenhei	24 Mustelus spp
3 Rhinobatos horkelli	25 Squatina spp
4 Myliobatis goodei	26 Galeorhinus galeus
5 Gymnura altavella	27 Myliobatis spp
6 Carcharhinus plumb	28 Alopias spp
7 Sphyrna lewini	29 Galeocerdo cuvier
8 Sphyrna zygaena	30 Carcharhinus leucas
9 Raja castelnaui	31 Sympterygia spp
10 Mustelus canis	32 Raja cyclophora
11 Mustelus Schmitti	33 Dasyatis centroura
12 Squalus megalops	34 Sympterygia acuta
13 Rhizoprionodon poro	35 Dasyatis spp
14 Raja agassizi	36 Rhyzoprionodon lalandei
15 Carcharias taurus	37 Charcharhinus obscurus
16 Squatina argentina	38 Raja spp
18 Carcharhinus spp	39 Carcharhinus limbatus
19 Carcharhinus brevipi	40 Rhyzopriondon spp
21 Isurus oxyrinchus	

TABLE 11 - CATCH PER UNIT EFFORT (CPUE) FROM DRIFTNET FISHERY (INDIVIDUALS/KM OF NET; INDIVIDUALS/EFFECTIVE FISHING DAY). YEAR 1995.

MONTH	FISHING DAYS	DRIFTNET TOTAL LENGTH (M)	TOTAL EFFORT (M)	SPECIES	NUMBER OF INDIVIDUALS	CPUE (INDIV./Km)	CPUE (INDIV./FISHING DAYS)
JULY/AUGUST	13	7027	32792	*Brama brama*	3	0,09	0,23
APRIL	13			*Carcharhinus longimanus*	1		0,08
MARCH	5	1250	6250	*Carcharhinus longimanus*	1	0,16	0,20
JULY	8	3000	24000	*Carcharias taurus*	1	0,04	0,13
JULY/AUGUST	13	7027	32792	*Coryphaena hippurus*	1	0,03	0,08
JULY/AUGUST	13	7027	32792	*Delphinus delphis*	1	0,03	0,08
JULY/AUGUST	13	7027	32792	*Istiophorus albicans*	1	0,03	0,08
JULY	8	3000	24000	*Isurus oxyrinchus*	5	0,21	0,63
MARCH	5	1250	6250	*Isurus oxyrinchus*	1	0,16	0,20
JULY/AUGUST	13	7027	32792	*Isurus oxyrinchus*	5	0,15	0,38
JULY	16	3294	52704	*Isurus oxyrinchus*	6	0,11	0,38
JULY	9	3000	27000	*Isurus oxyrinchus*	1	0,04	0,11
JULY	18	7027	126486	*Isurus oxyrinchus*	2	0,02	0,11
APRIL	13			*Isurus oxyrinchus*	1		0,08
JULY/AUGUST	13	7027	32792	*Katsuwonus pelamis*	2	0,06	0,15
JULY/AUGUST	13	7027	32792	*Lamna nasus*	1	0,03	0,08
APRIL	13			*Makaira nigricans*	1		0,08
JULY/AUGUST	13	7027	32792	*Manta birostris?*	4	0,12	0,31
JULY	16	3294	52704	*Prionace glauca*	12	0,23	0,75
MARCH	5	1250	6250	*Prionace glauca*	1	0,16	0,20
JULY	8	3000	24000	*Prionace glauca*	3	0,13	0,38
JULY/AUGUST	13	7027	32792	*Prionace glauca*	3	0,09	0,23
JULY	9	3000	27000	*Prionace glauca*	1	0,04	0,11
MARCH	10	3920	39200	*Prionace glauca*	1	0,03	0,10
APRIL	13			*Prionace glauca*	4		0,31
JULY/AUGUST	13	7027	32792	*Sarda sarda*	1	0,03	0,08
MAY	6	3250	19500	*Sphyrna lewini*	270	13,85	45,00
MARCH	10	3920	39200	*Sphyrna lewini*	257	6,56	25,70
MARCH	5	1250	6250	*Sphyrna lewini*	36	5,76	7,20
MARCH	15	1800	27000	*Sphyrna lewini*	152	5,63	10,13
MARCH	16	3294	52704	*Sphyrna lewini*	206	3,91	12,88
JULY	8	3000	24000	*Sphyrna lewini*	69	2,88	8,63
JULY	9	2862	25758	*Sphyrna lewini*	70	2,72	7,78
MARCH	12	5800	69600	*Sphyrna lewini*	140	2,01	11,67
JULY	8	3250	26000	*Sphyrna lewini*	52	2,00	6,50
JULY	18	7027	126486	*Sphyrna lewini*	251	1,98	13,94
JULY	18	2000	36000	*Sphyrna lewini*	71	1,97	3,94
JULY	16	3294	52704	*Sphyrna lewini*	93	1,76	5,81
JUNE/JULY	16	3294	52704	*Sphyrna lewini*	93	1,76	5,81
MARCH	12	2700	32400	*Sphyrna lewini*	51	1,57	4,25
MARCH	15	5000	75000	*Sphyrna lewini*	100	1,33	6,67
JULY/AUGUST	13	7027	32792	*Sphyrna lewini*	13	0,40	1,00
JULY	9	3000	27000	*Sphyrna lewini*	2	0,07	0,22
APRIL	13			*Sphyrna lewini*	68		5,23
JULY	8	3000	24000	*Sphyrna zygaena*	30	1,25	3,75
MARCH	12	2700	32400	*Tetrapterus albidus*	1	0,03	0,08
JULY/AUGUST	13	7027	32792	*Thunus albacares*	1	0,03	0,08

AVERAGE (cpue)		
Sphyrna lewini	WINTER	SUMMER
indiv/Km	1,7	3,82
indiv/fish.day	6,21	11,21

BOTTOM GILL NET GEAR



1 - Anchor of 25 - 30 Kg
2 - 50 fathoms rope/ twisted Polyethylene (PE), diameter = 3 cm
3 - Braided Polyethylene (PE) scissor (superior rope = 5 fathoms, inferior rope = 4 fathoms
4 - Weight of 5 Kg
5 - Twisted Polyethylene(PE) rope, diameter 3 cm, length 40 fathoms
6 - Concrete cube (height = 18 cm, length = 32 cm, breadth = 34 cm)
7 - Twisted Polyethylene (PE) rope, diameter 2 cm. With 100 m depth use 200 m rope.
8 - Mark float with galloon of 20 liters
9 - 2 galoons of 50 liters

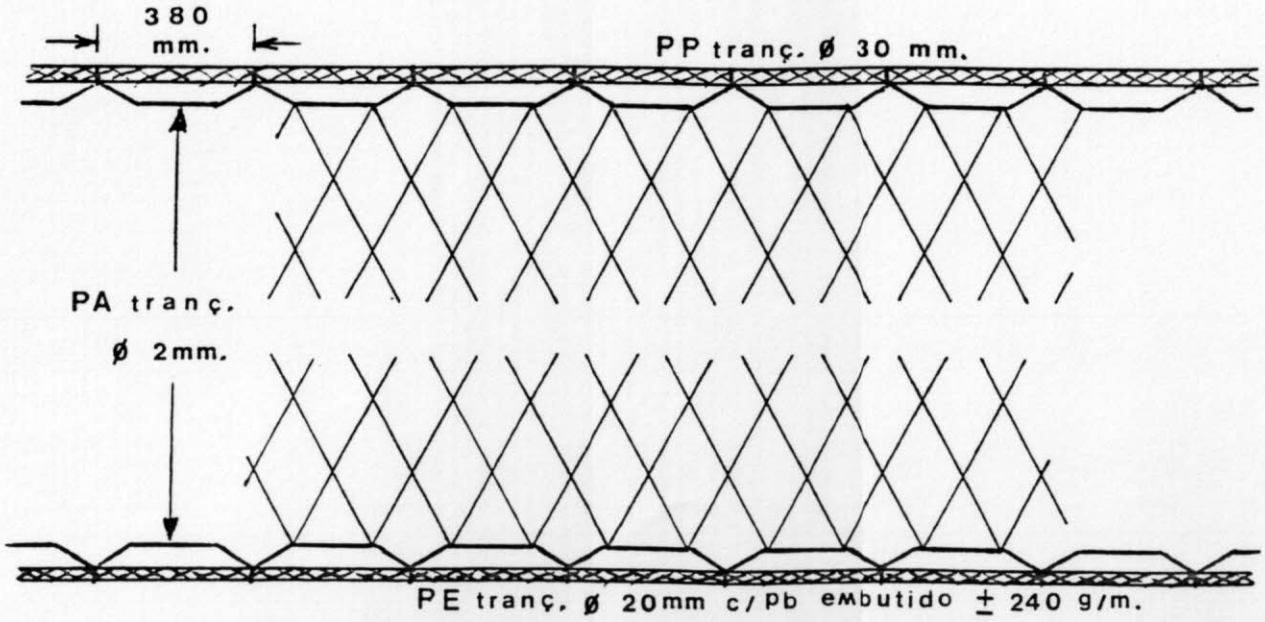
BOTTOM GILLNET

50 m. PP tranç. ø 30mm s/ boias

264

12 — 380 mm. PA tranç. ø 1,5 mm. — E = 0,50

50 m. PE tranç. ø 20 mm.

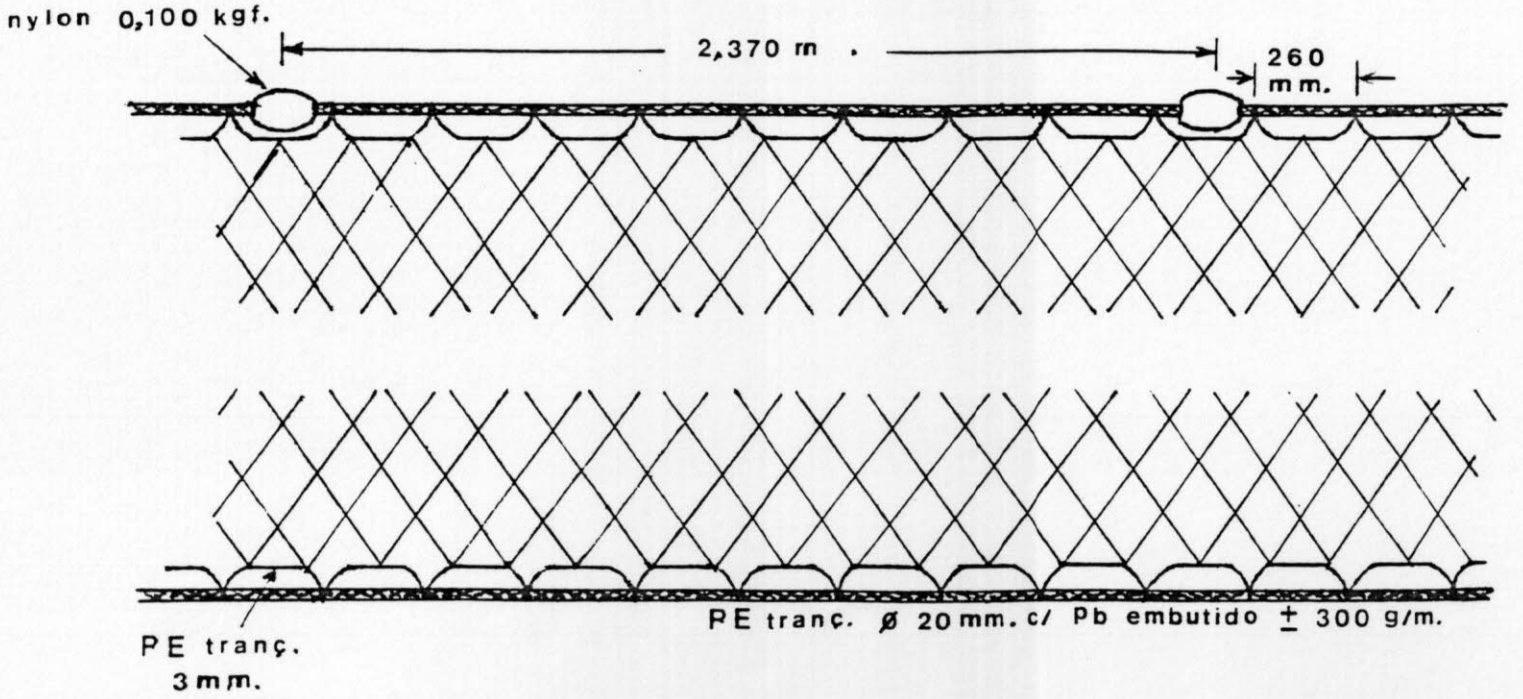


BOTTOM GILLNET

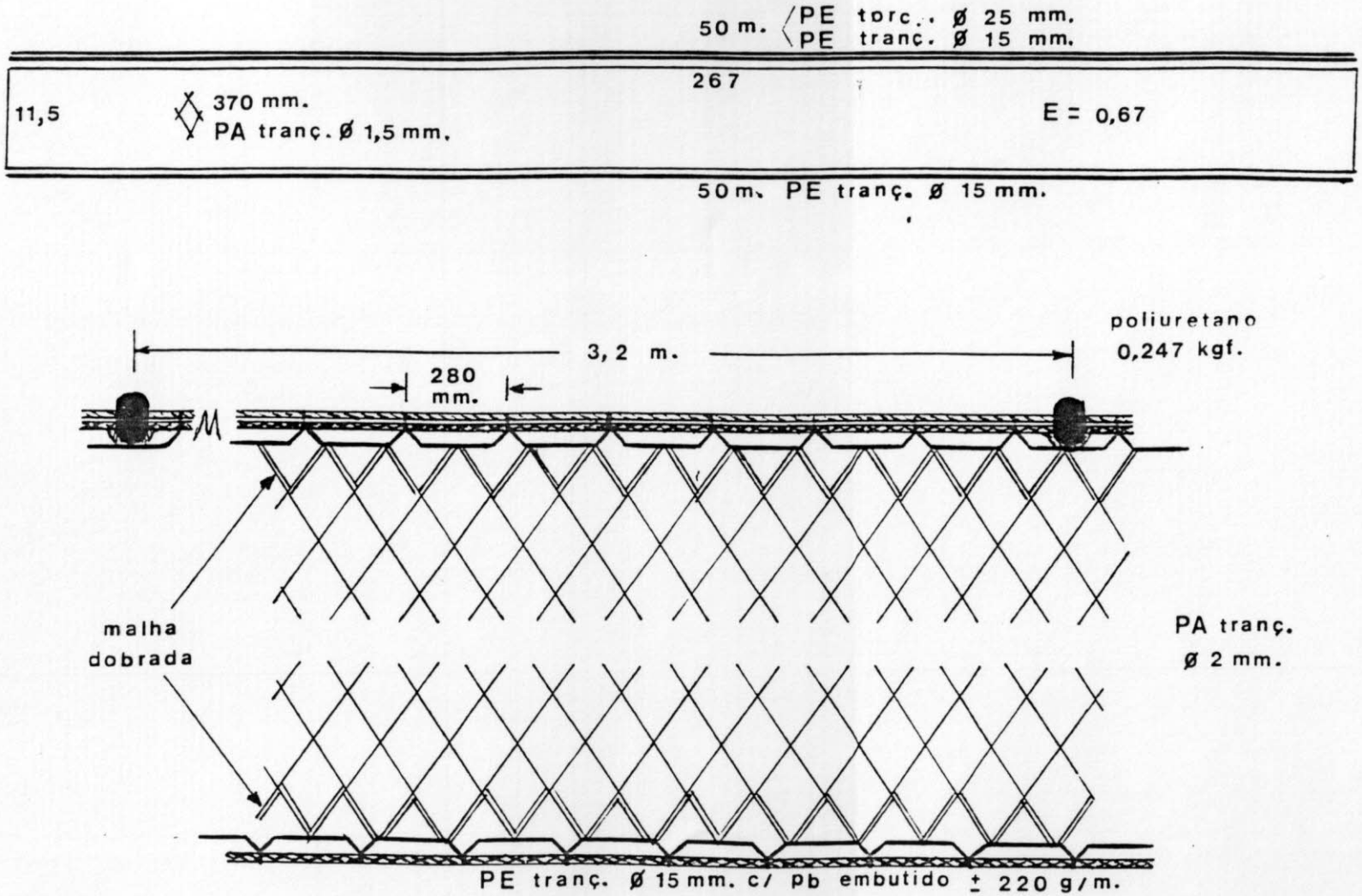
50 m. PE tranç. ø 20 mm.

12	400 mm. PA tranç. ø 2 mm.	288	E = 0,50

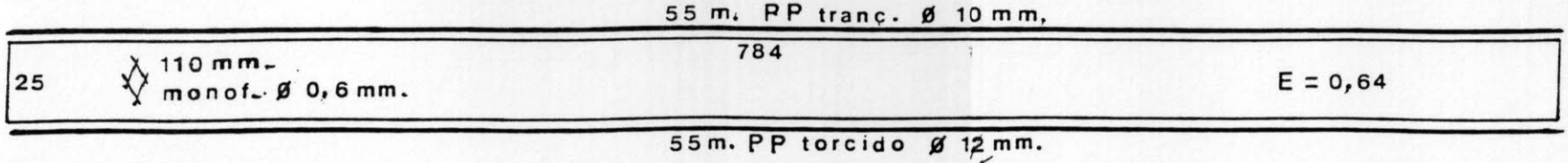
50 m. PE tranç. ø 20 mm.



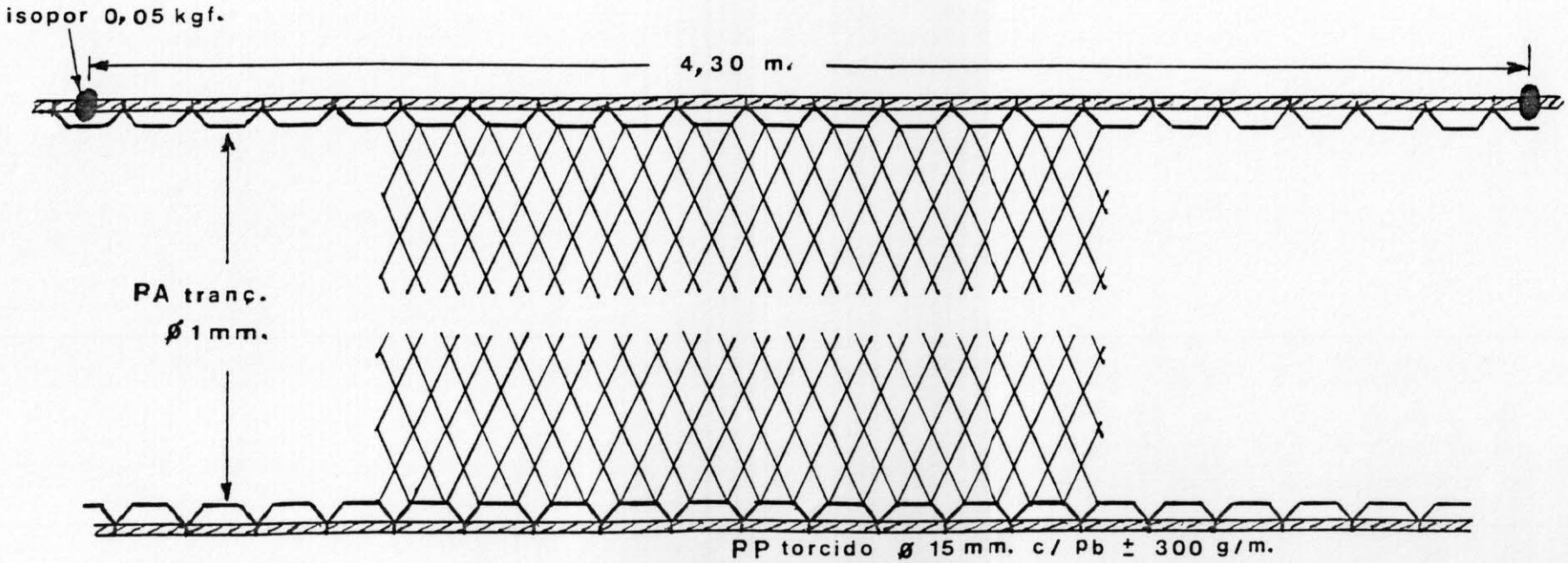
BOTTOM GILLNET



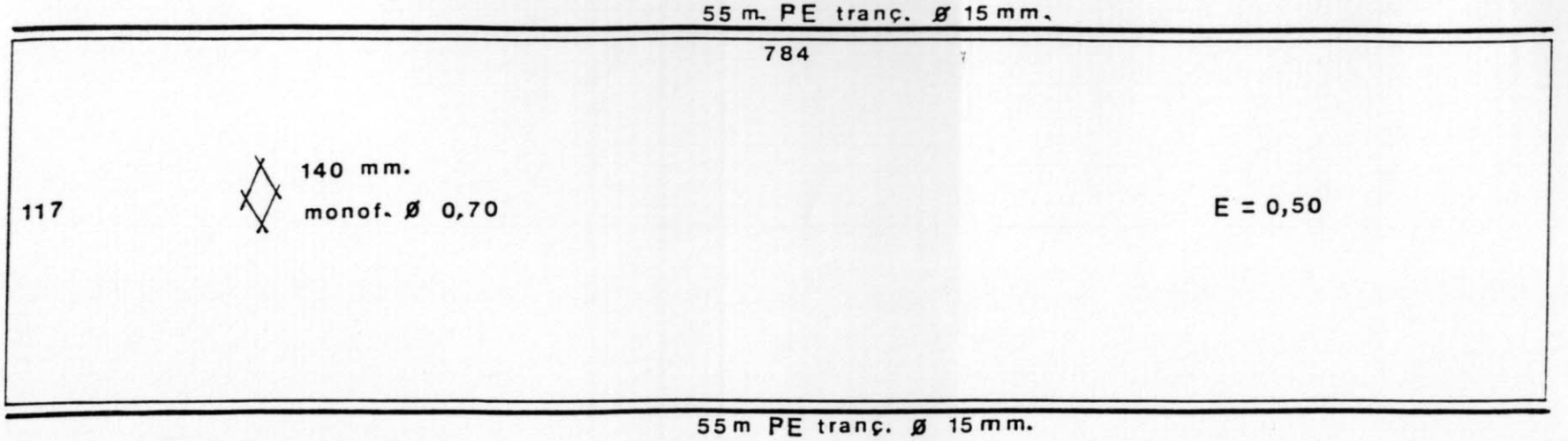
BOTTOM GILLNET

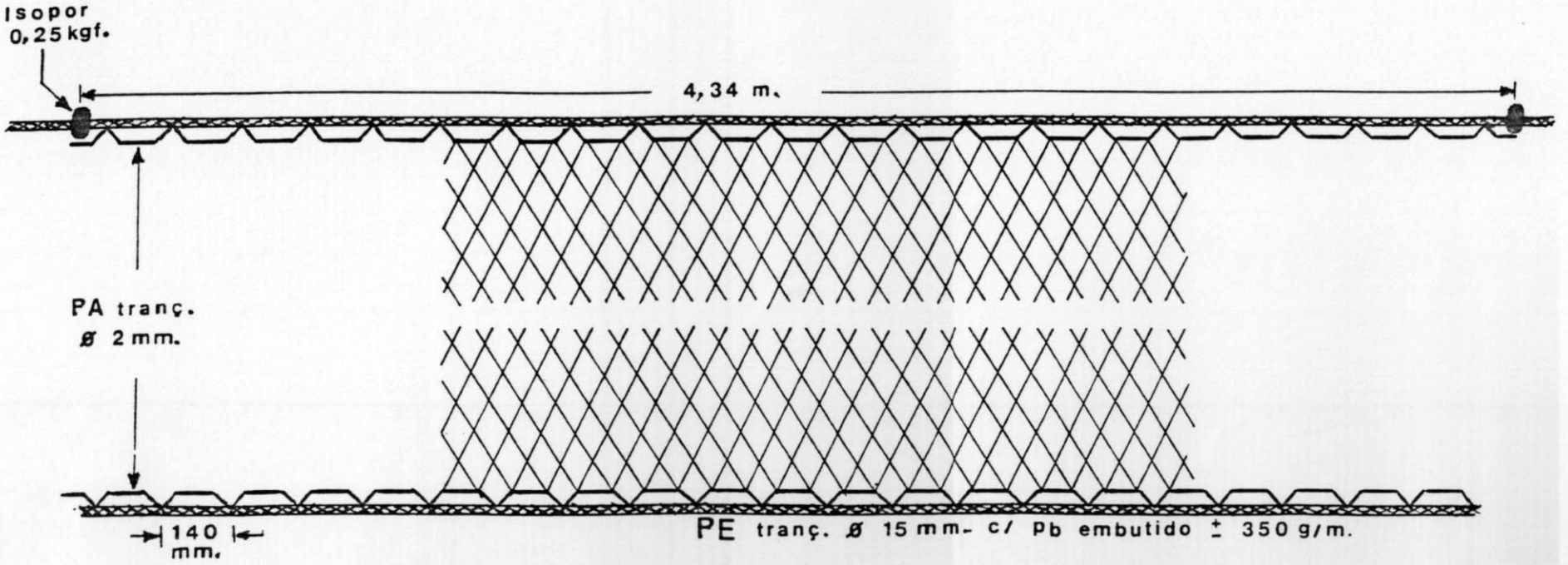


5

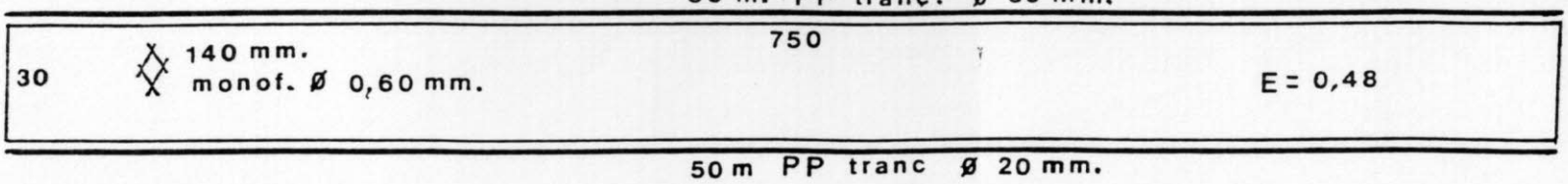


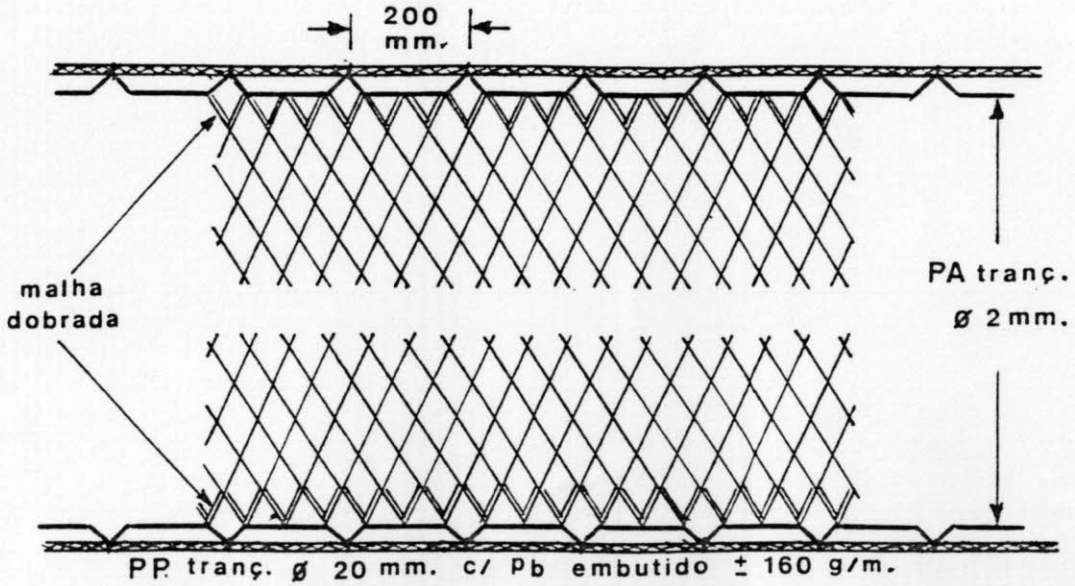
BOTTOM GILLNET



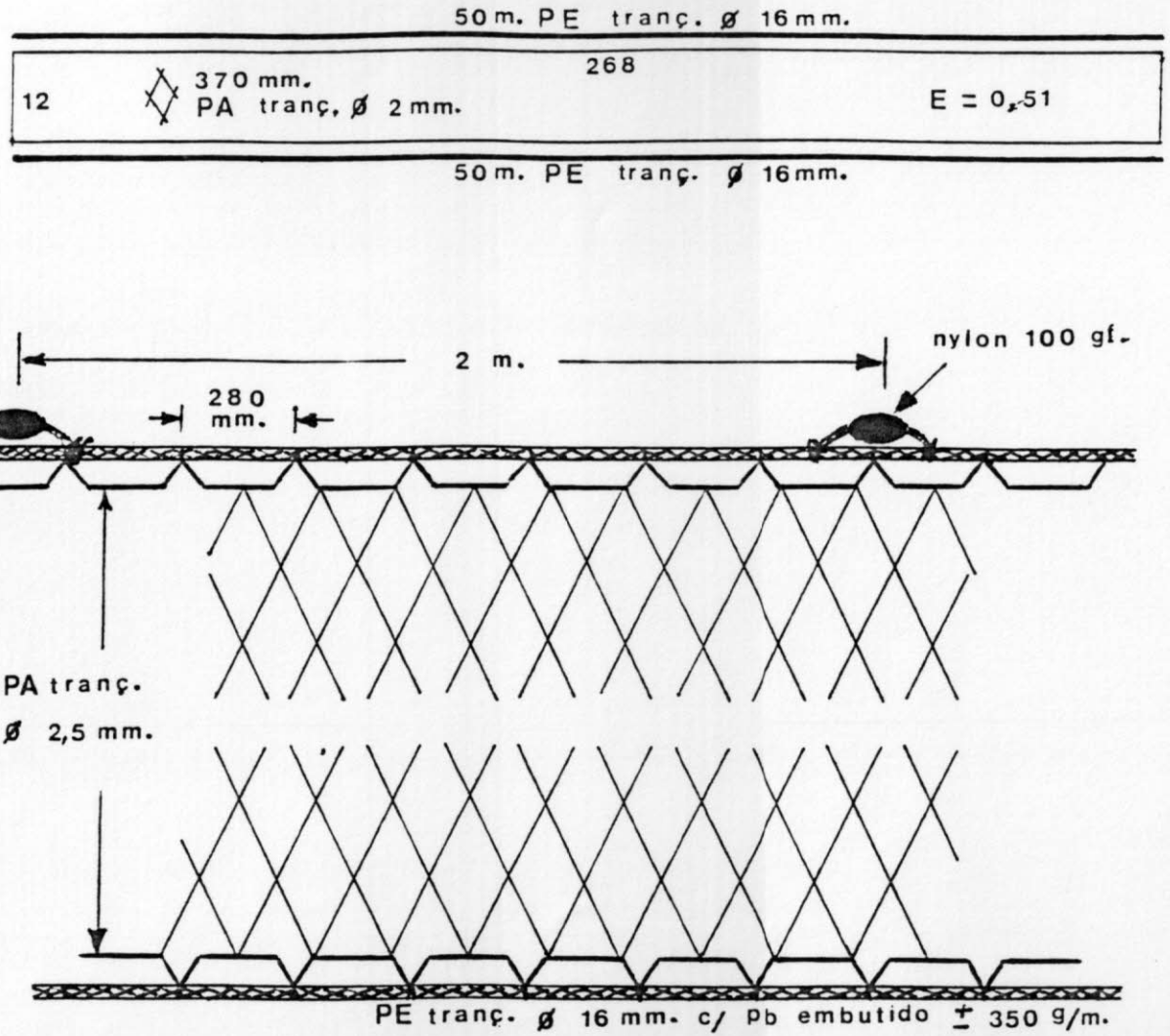


BOTTOM GILLNET





BOTTOM GILLNET



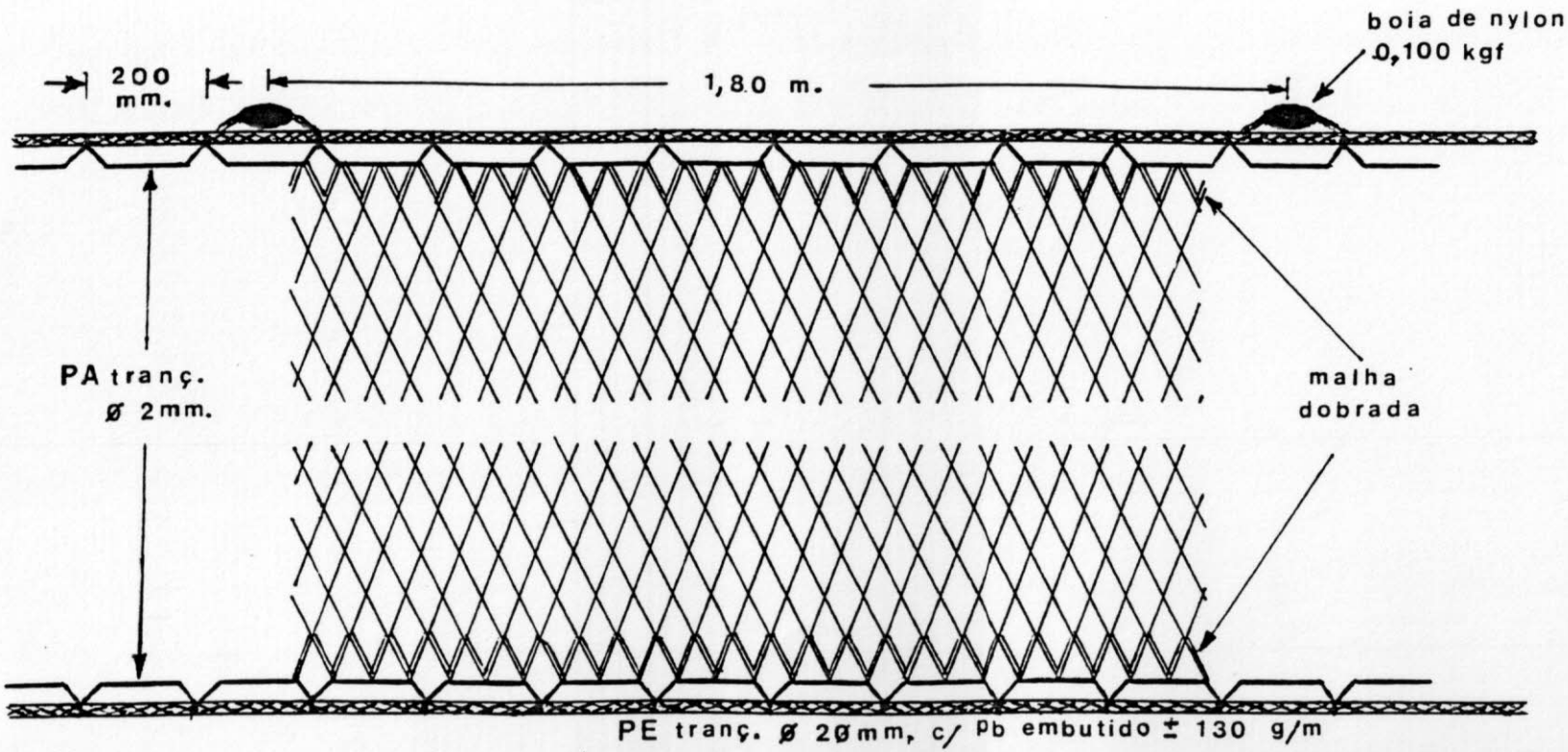
BOTTOM GILLNET

100 m. PE tranç. ø 20 mm.

1500

50 — 140 mm. monof. ø 0,7 mm. — E = 0,48

100 m. PE tranç. ø 20 mm.

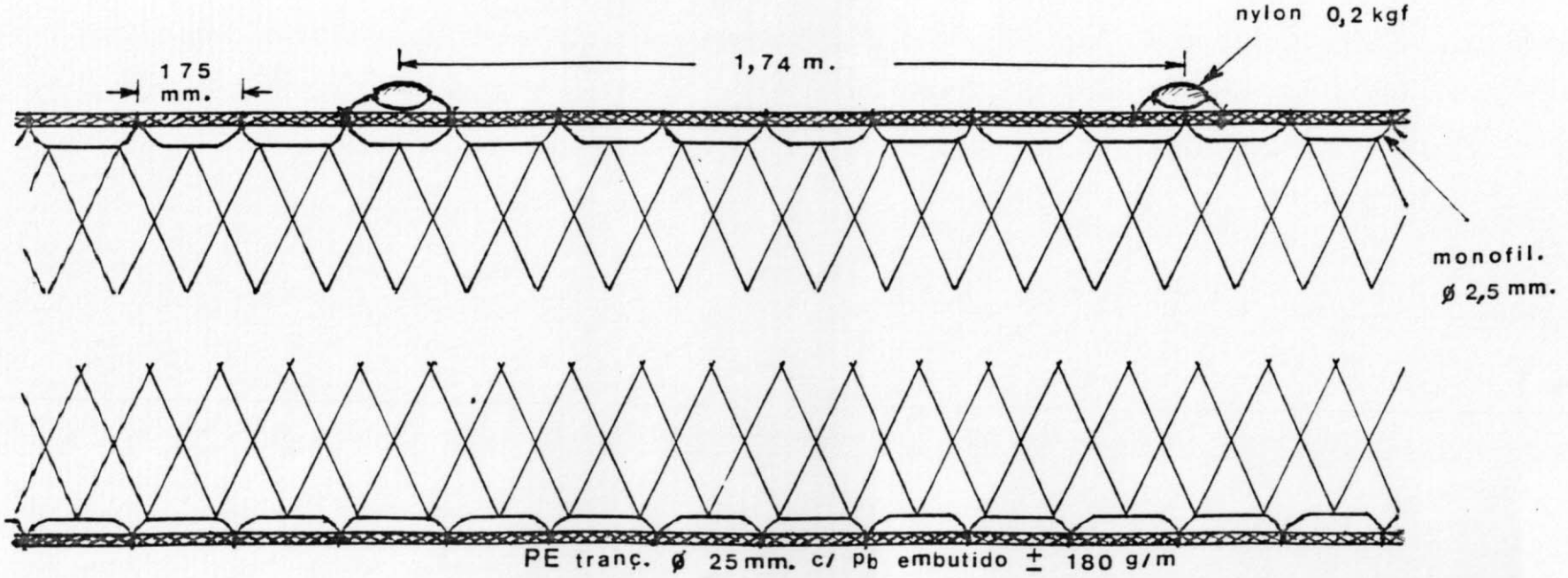


BOTTOM GILLNET

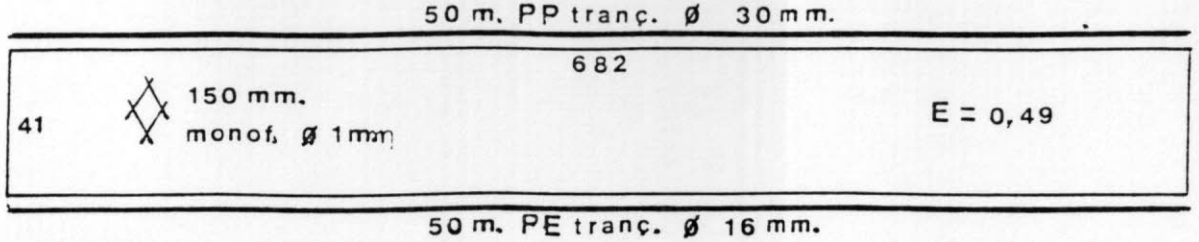
100 m. PE tranç. ø 18 mm.

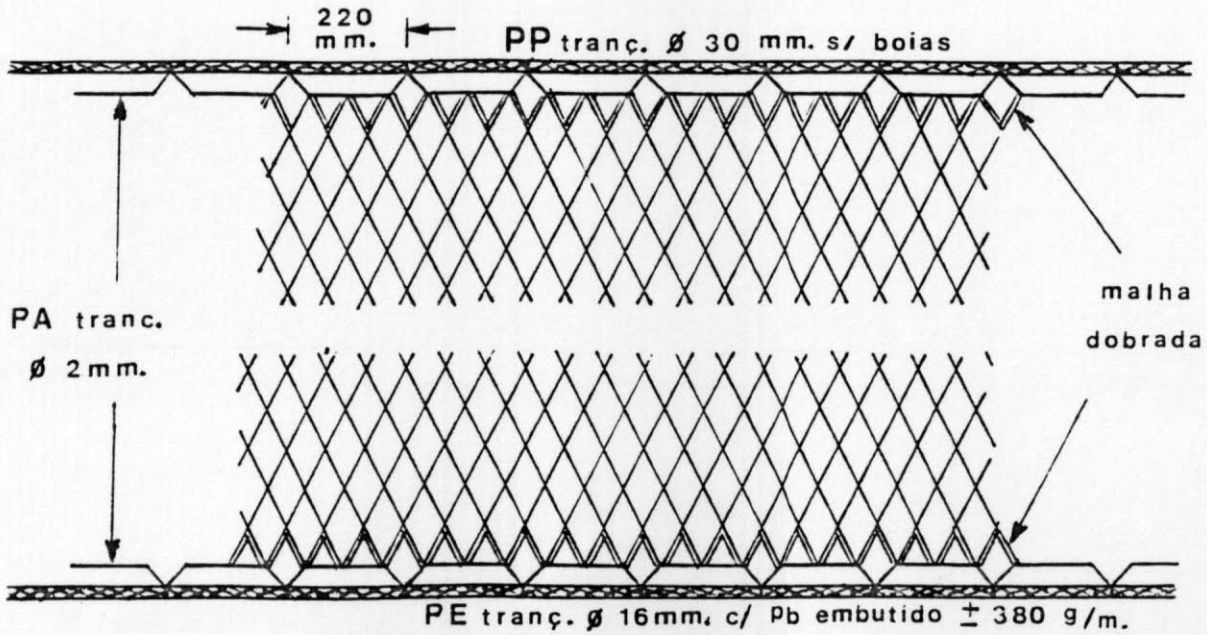
12	400 mm. monof. ø 2 mm.	858	E = 0,30

100 m. PE tranç. ø 25 mm.

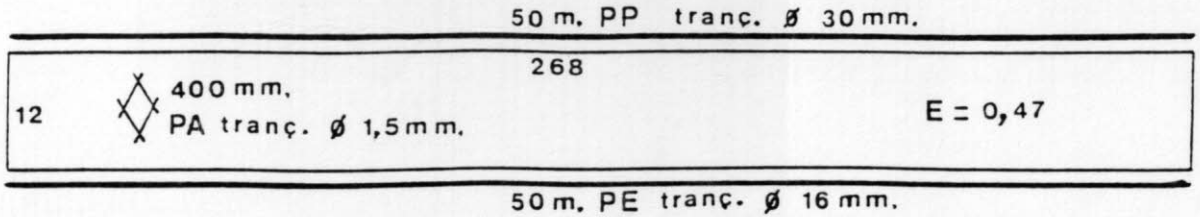


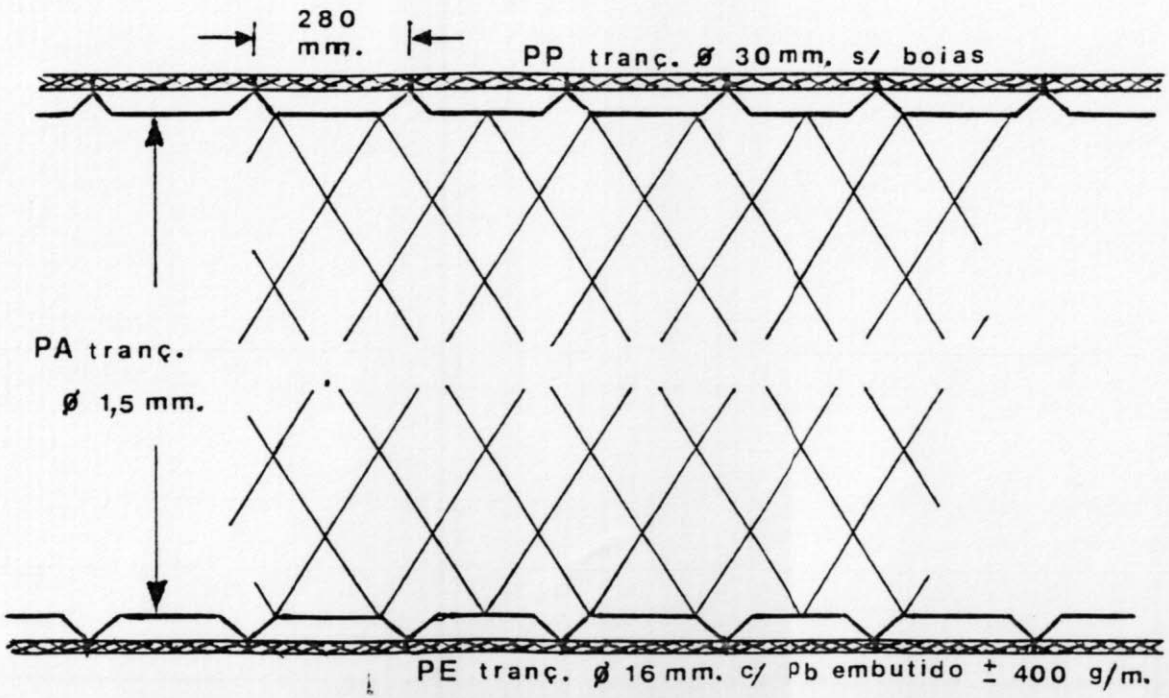
BOTTOM GILLNET





BOTTOM GILLNET



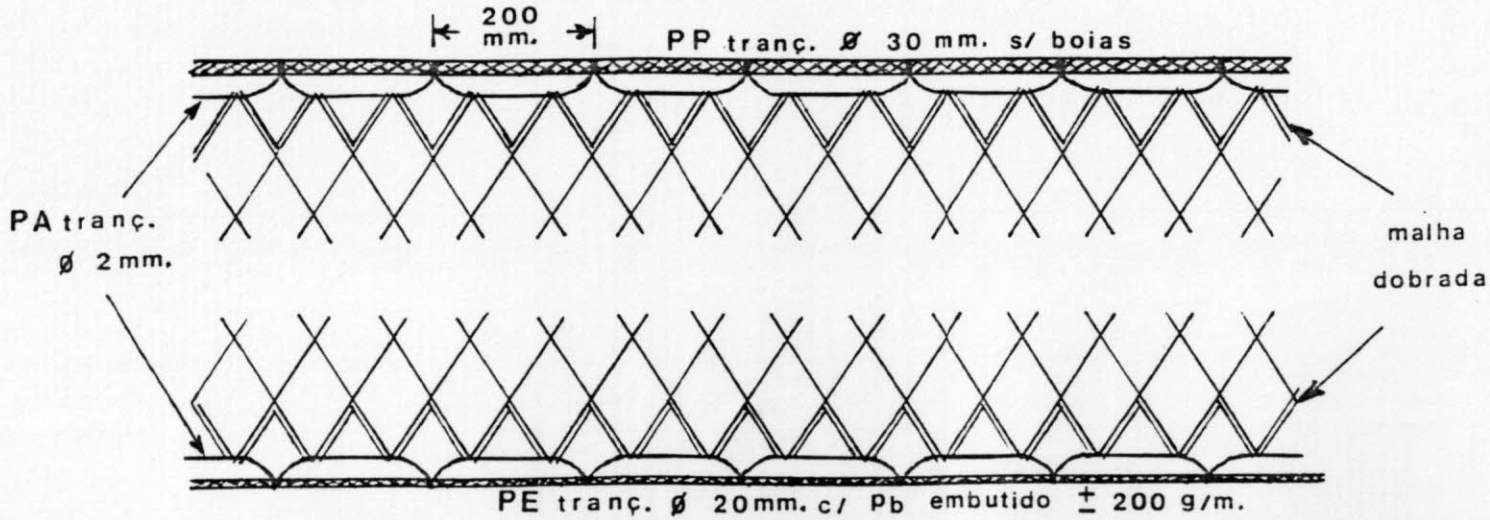


BOTTOM GILLNET

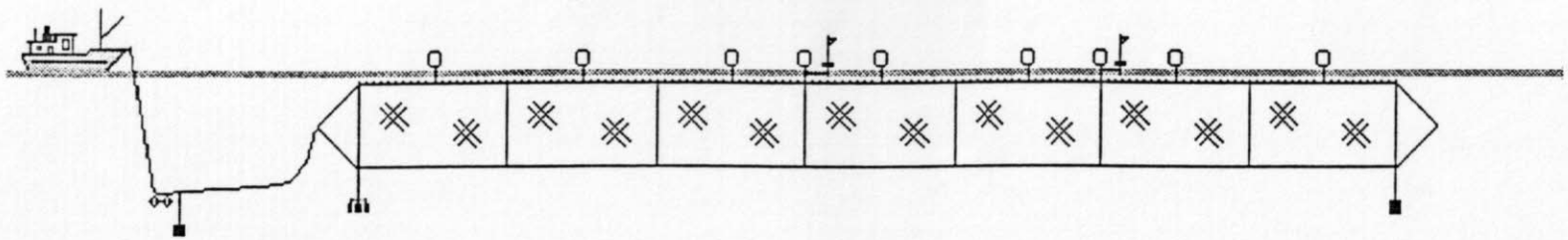
70 m. PP tranç. ø 30mm.

30	140 mm. PA 210/60 = ø = 1,65 mm	700	E = 0,71

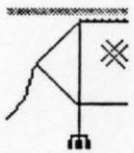
70 m PE tranç. ø 20mm.



DRIFTNET GEAR

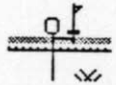


Twisted cotton rope
length = 200 m
diameter = 4 cm



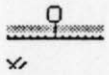
Scissor
superior rope
length = 8 fathoms
inferior rope
length = 10 fathoms

3-4 weights of 3 Kg



mark floats
1 in the middle of the driftnet and the other at the end.
rope that links the floats = 2 m.

2 tyres
1 weight of 30 Kg

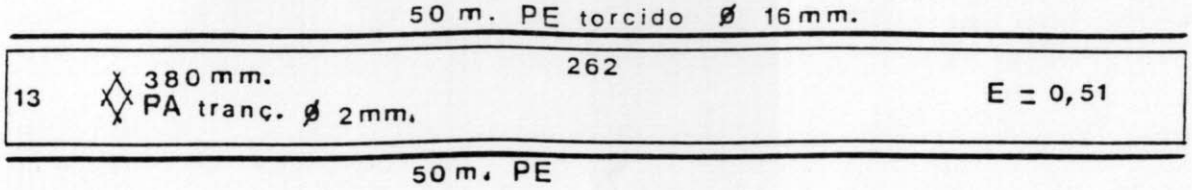


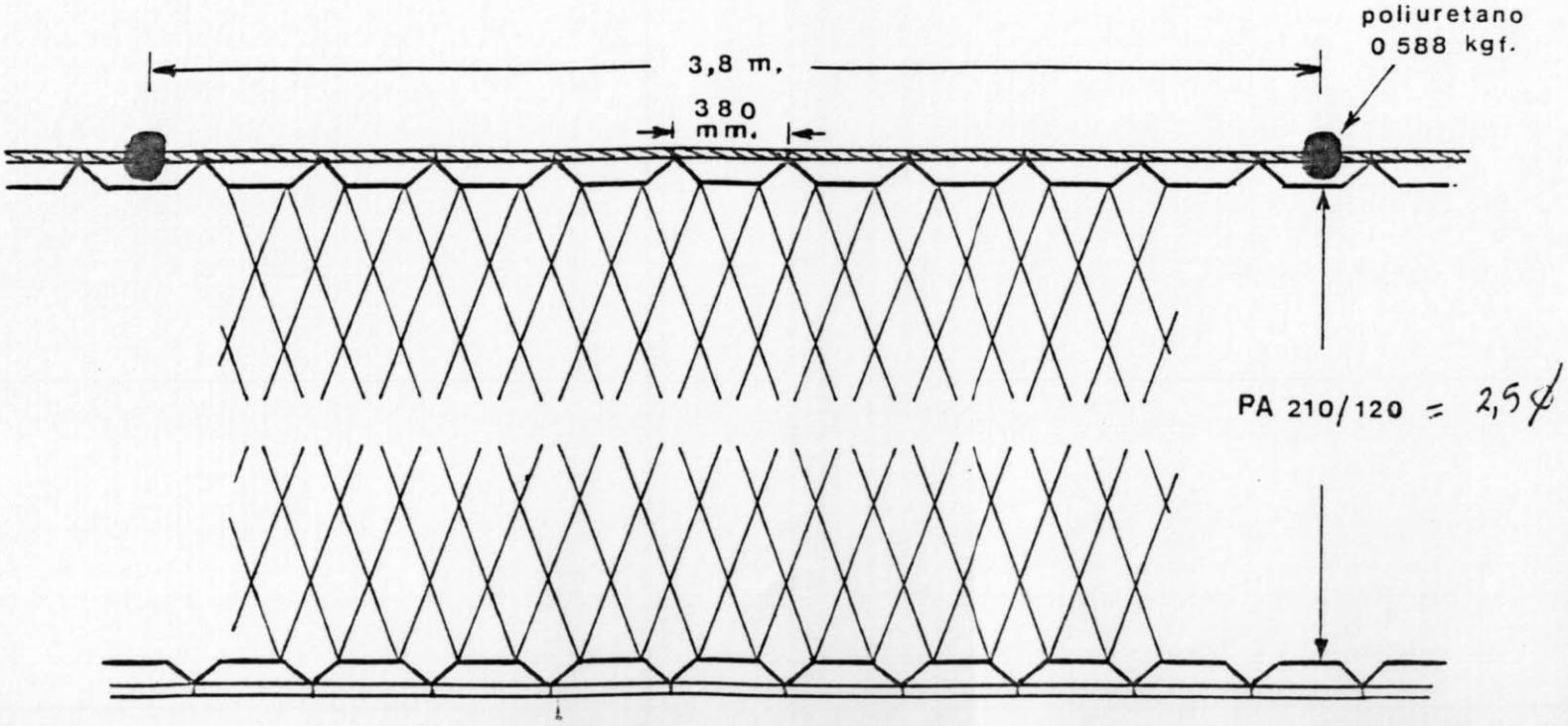
50 liters galloon
1 galloon per tan
fixed in the middle of the headline

rope that links the galloon to the headline = 2 m

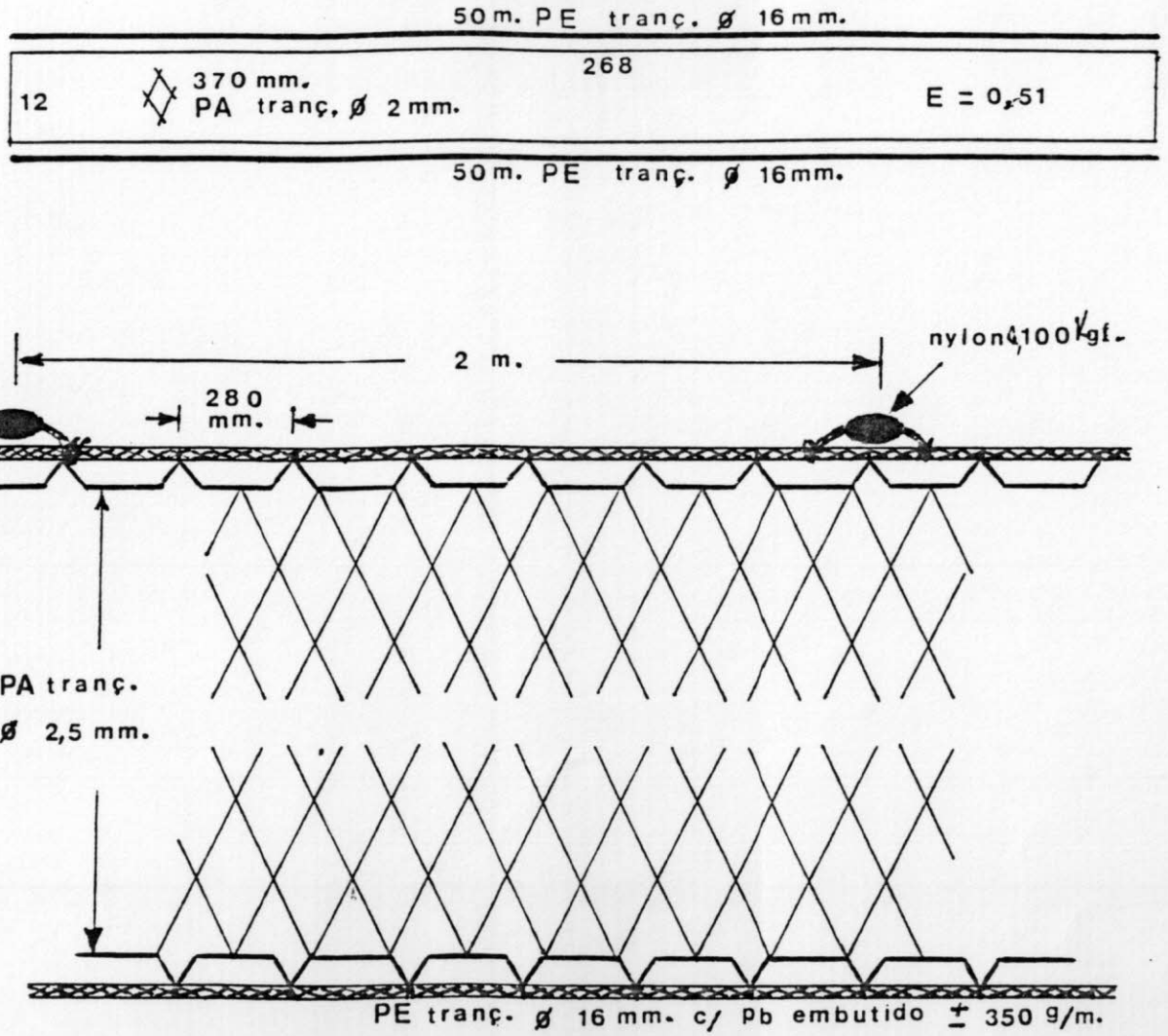
3 - 4 Kg weight at the end of the net.

DRIFTNET

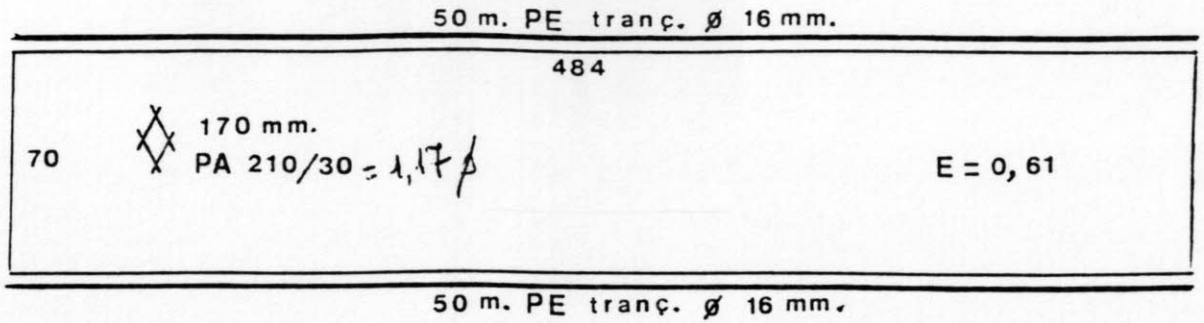

50 m. PE torcido ø 16 mm.
262
13
380 mm.
PA tranç. ø 2mm.
E = 0,51
50 m. PE

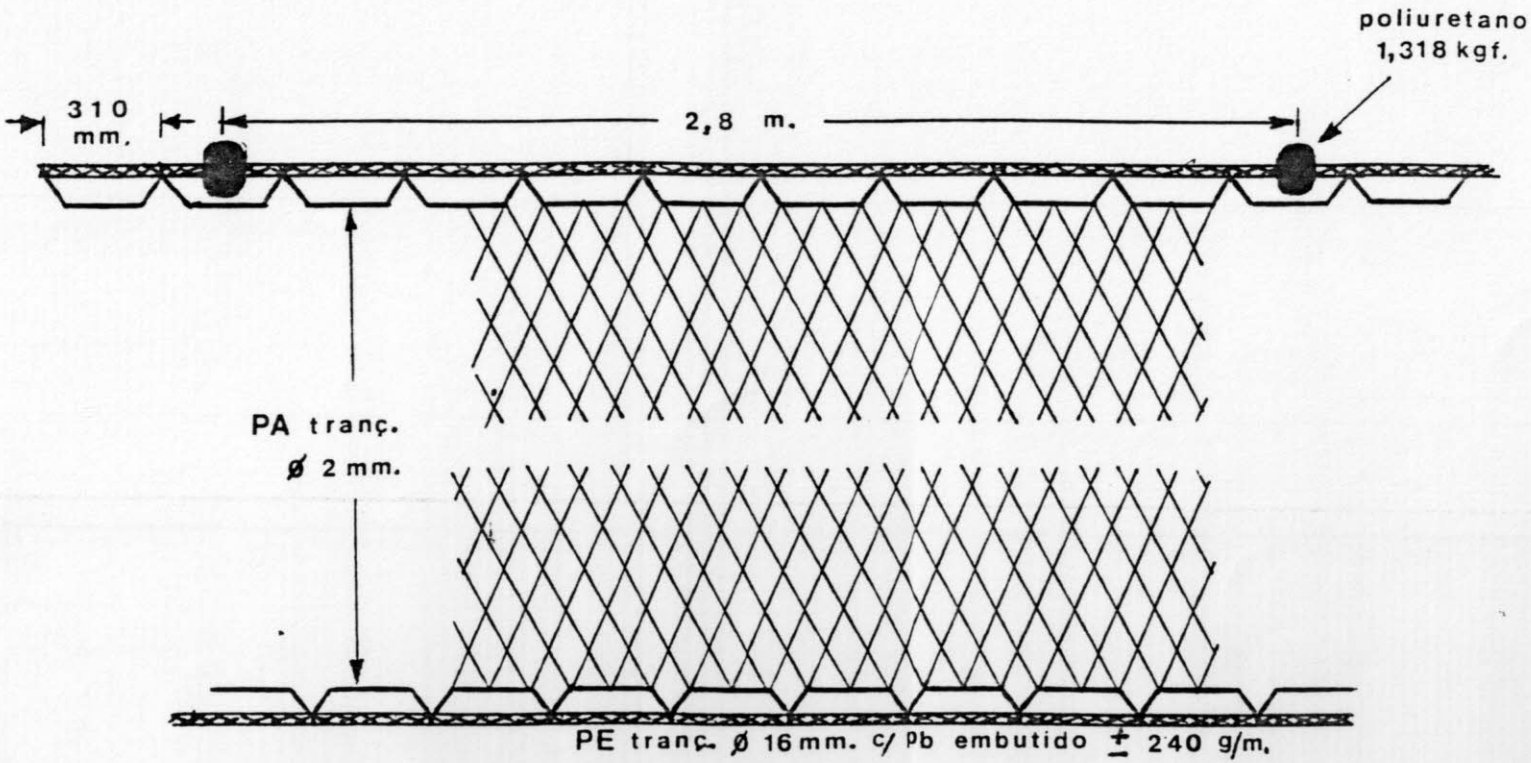

poliuretano
0 588 kgf.
3,8 m.
380
mm.
PA 210/120 = 2,5ø

DRIFTNET

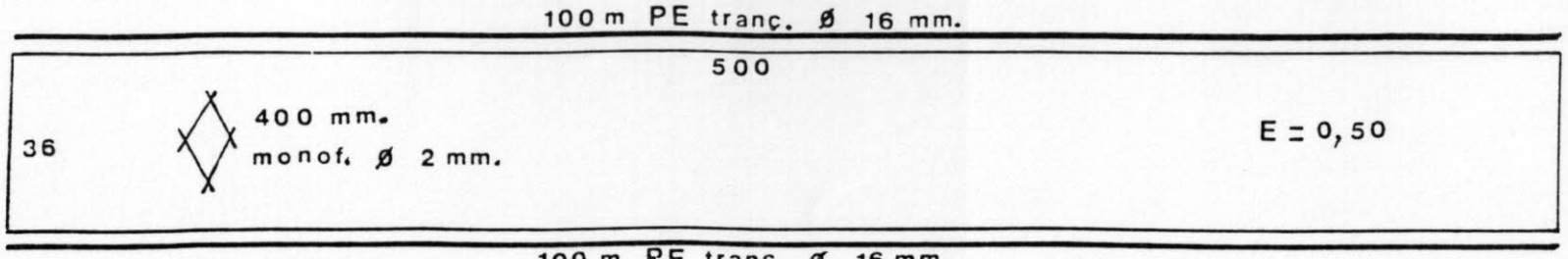

50 m. PE tranç. ø 16 mm.
268
12
370 mm.
PA tranç. ø 2 mm.
E = 0,51
50 m. PE tranç. ø 16 mm.
2 m.
nylon 100 kgf.
280 mm.
PA tranç.
ø 2,5 mm.
PE tranç. ø 16 mm. c/ Pb embutido ± 350 g/m.

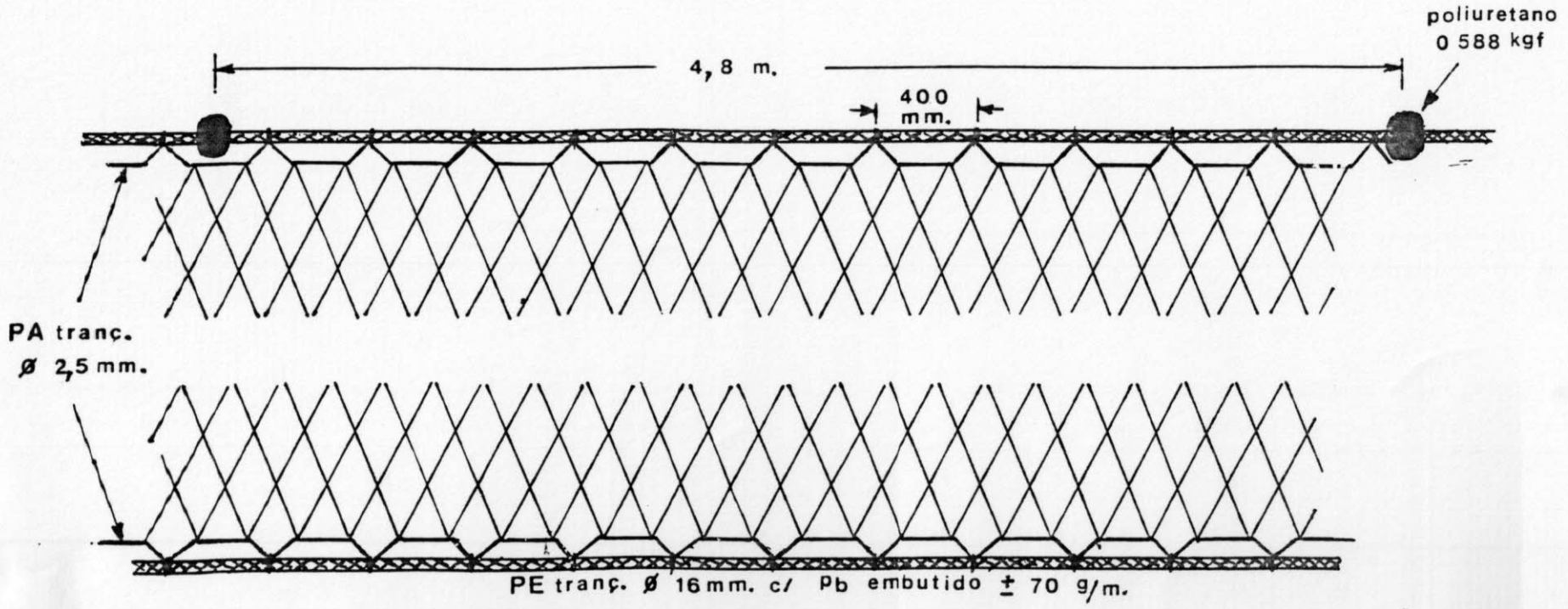
DRIFTNET


50 m. PE tranç. ø 16 mm.
484
170 mm.
PA 210/30 = 1,17 ø
70
E = 0, 61
50 m. PE tranç. ø 16 mm.

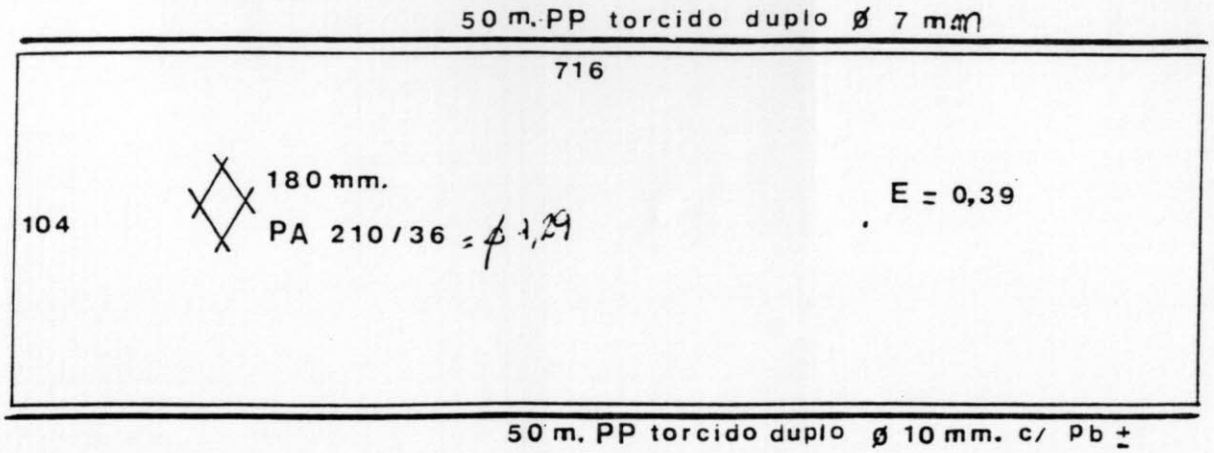

poliuretano
1,318 kgf.
310 mm.
2,8 m.
PA tranç.
ø 2 mm.
PE tranç. ø 16 mm. c/ Pb embutido ± 240 g/m.

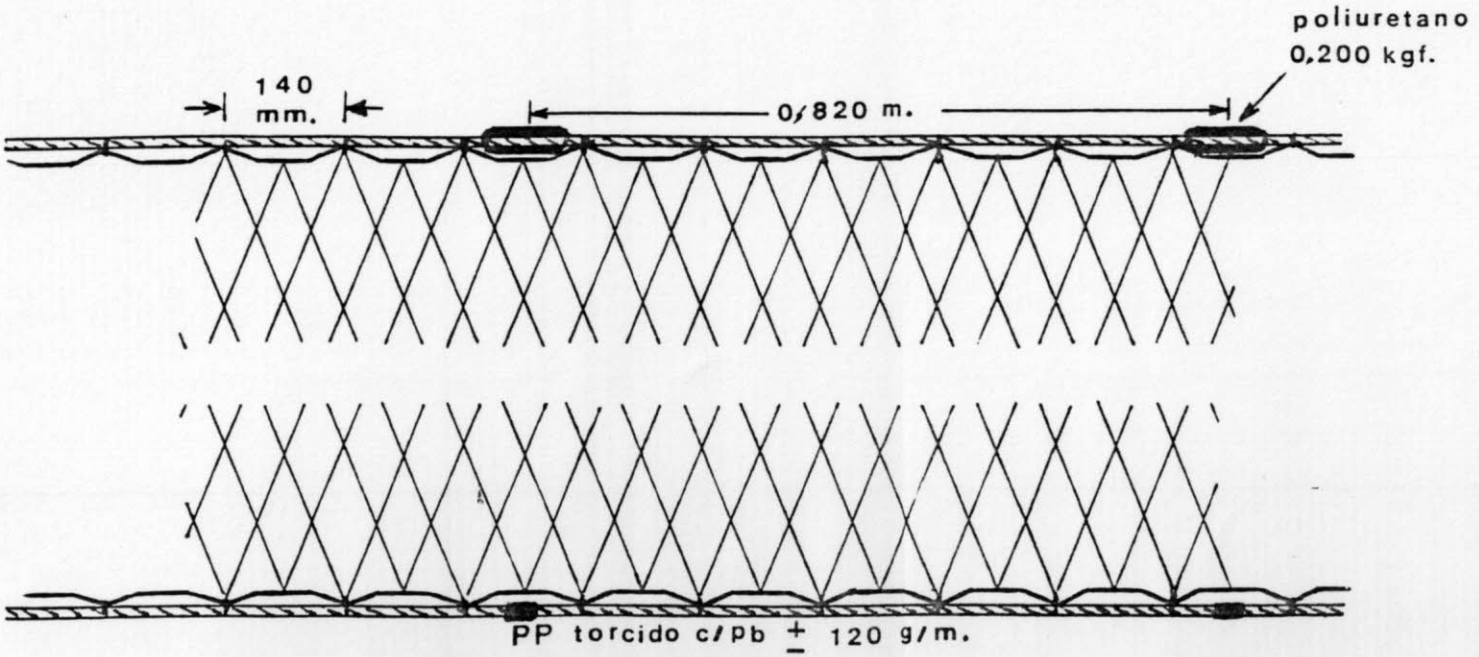
DRIFTNET


100 m PE tranç. ø 16 mm.
500
36
400 mm.
monof. ø 2 mm.
E = 0,50
100 m PE tranç. ø 16 mm.

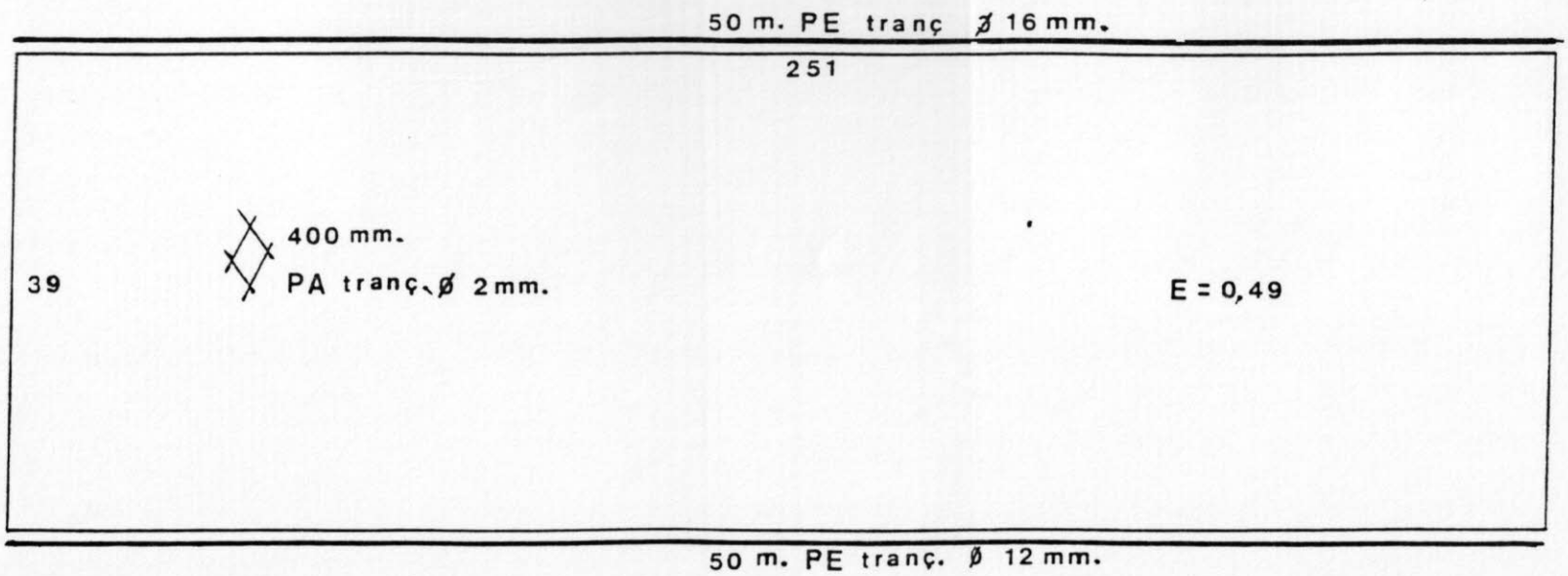

poliuretano
0 588 kgf
4,8 m.
400
mm.
PA tranç.
ø 2,5 mm.
PE tranç. ø 16 mm. c/ Pb embutido ± 70 g/m.

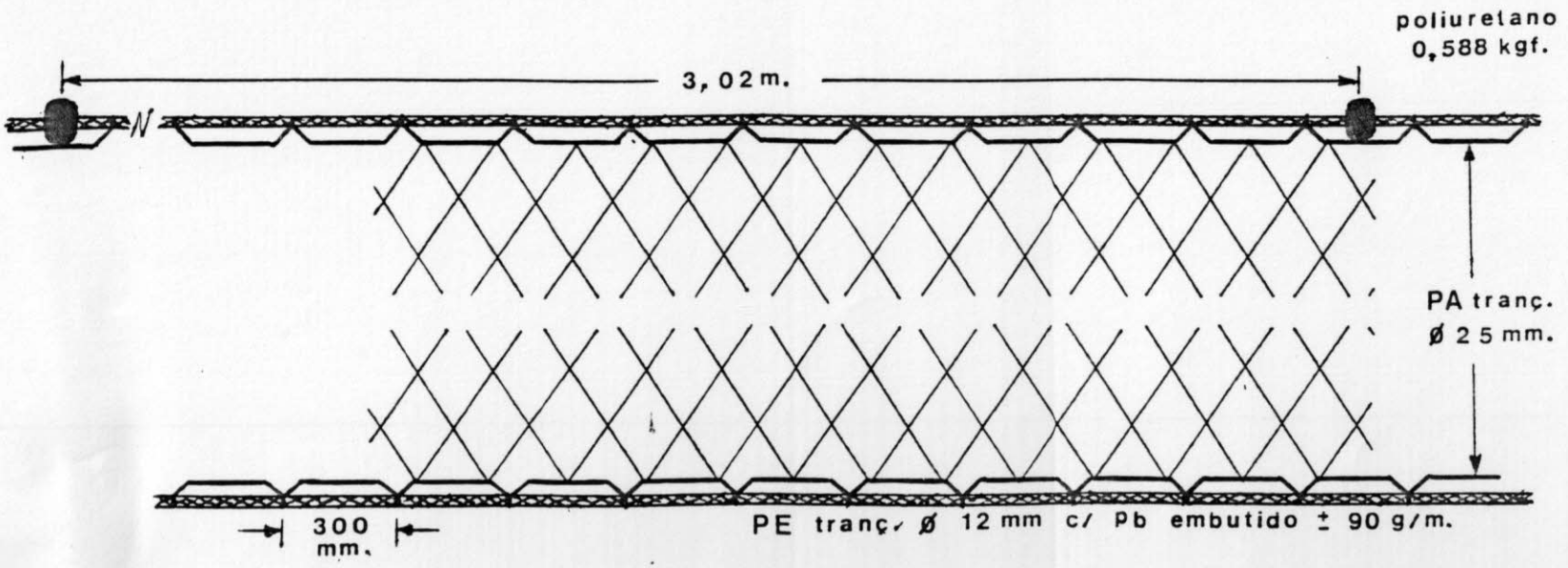
DRIFTNET


50 m. PP torcido duplo ø 7 mm
716
180 mm.
PA 210/36 = ø 1,29
104
E = 0,39
50 m. PP torcido duplo ø 10 mm. c/ Pb ±

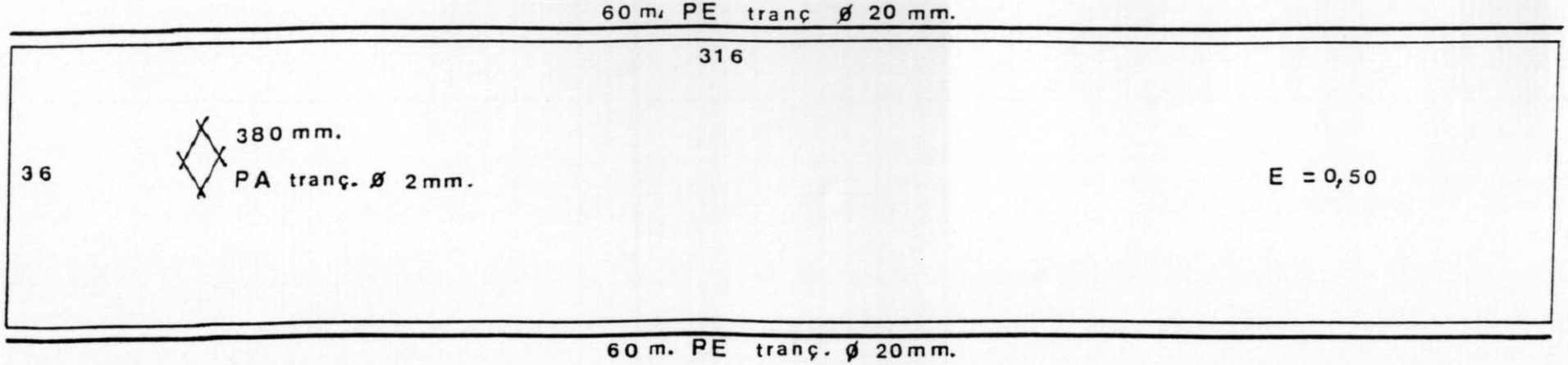

poliuretano
0,200 kgf.
140
mm.
0,820 m.
PP torcido c/Pb ± 120 g/m.

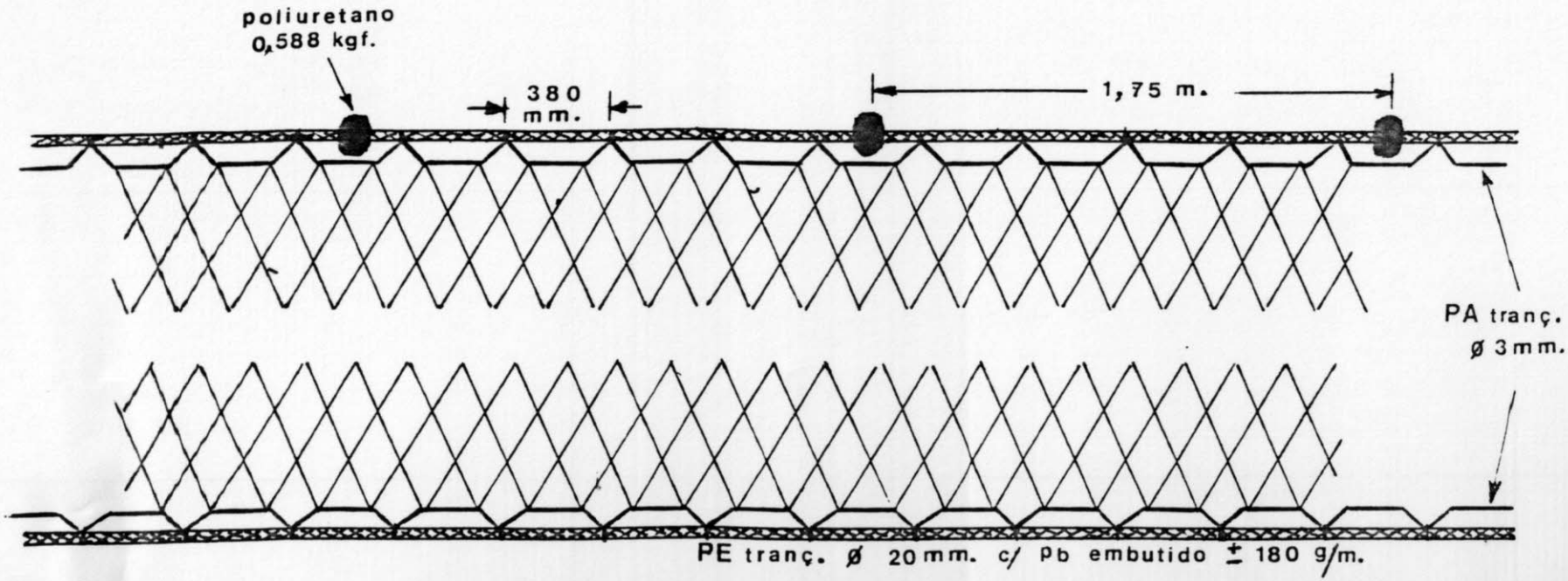
DRIFTNET


50 m. PE tranç Ø 16 mm.
251
400 mm.
39
PA tranç. Ø 2mm.
E = 0,49
50 m. PE tranç. Ø 12 mm.

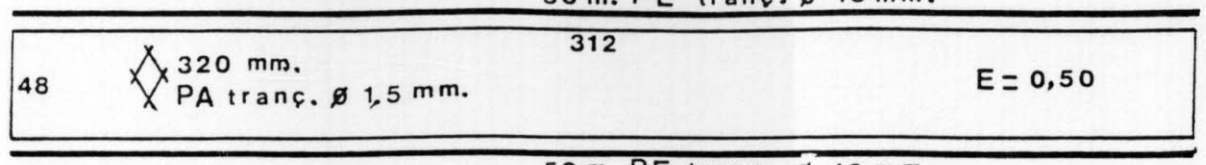

poliuretano
0,588 kgf.
3,02 m.
PA tranç.
Ø 25 mm.
300
mm.
PE tranç. Ø 12 mm c/ Pb embutido ± 90 g/m.

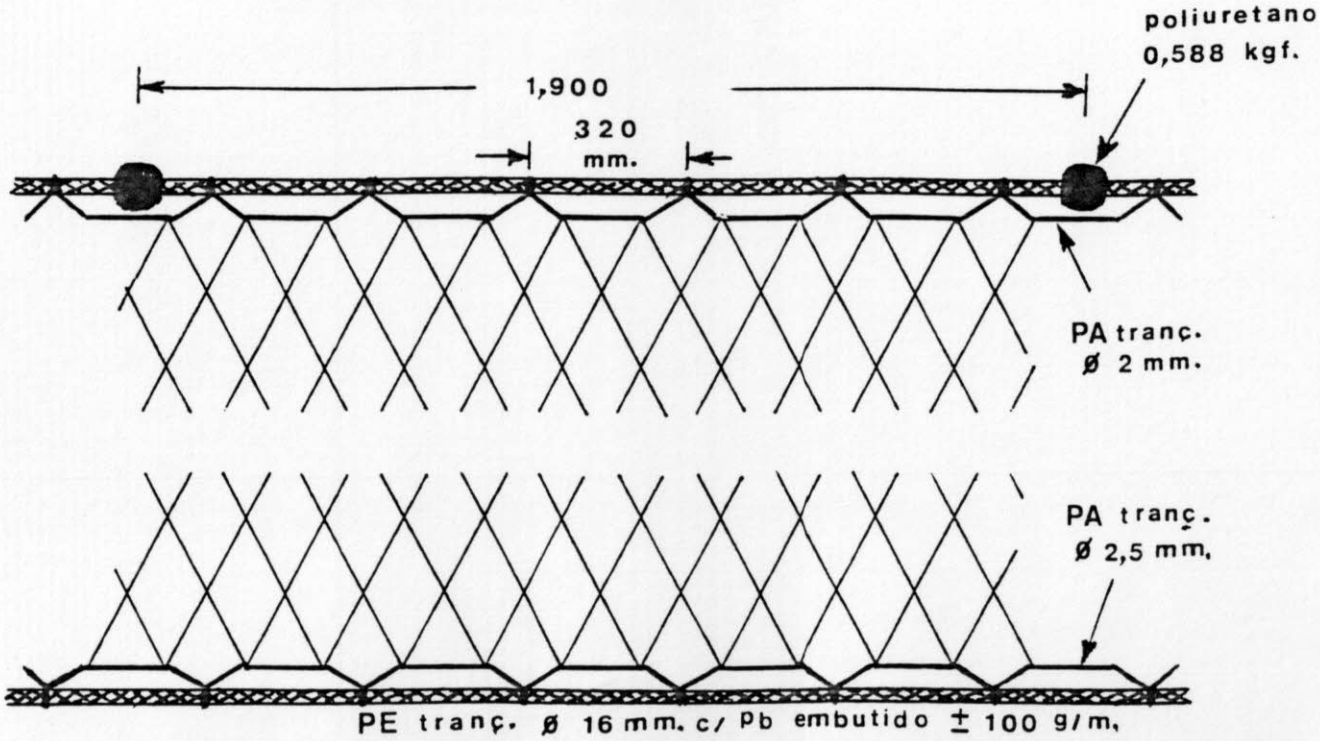
DRIFTNET


60 m. PE tranç ø 20 mm.
316
380 mm.
36
PA tranç. ø 2mm.
E = 0,50
60 m. PE tranç. ø 20mm.


poliuretano
0,588 kgf.
380
mm.
1,75 m.
PA tranç.
ø 3mm.
PE tranç. ø 20mm. c/ Pb embutido ± 180 g/m.

DRIFTNET


50 m. PE tranç. ø 18 mm.
312
48
320 mm.
PA tranç. ø 1,5 mm.
E = 0,50
50 m. PE tranç. ø 16 mm.


poliuretano
0,588 kgf.
1,900
320
mm.
PA tranç.
ø 2 mm.
PA tranç.
ø 2,5 mm.
PE tranç. ø 16 mm. c/ Pb embutido ± 100 g/m.

DRIFTNET

118,8 m. PE duplo ø 6 mm.

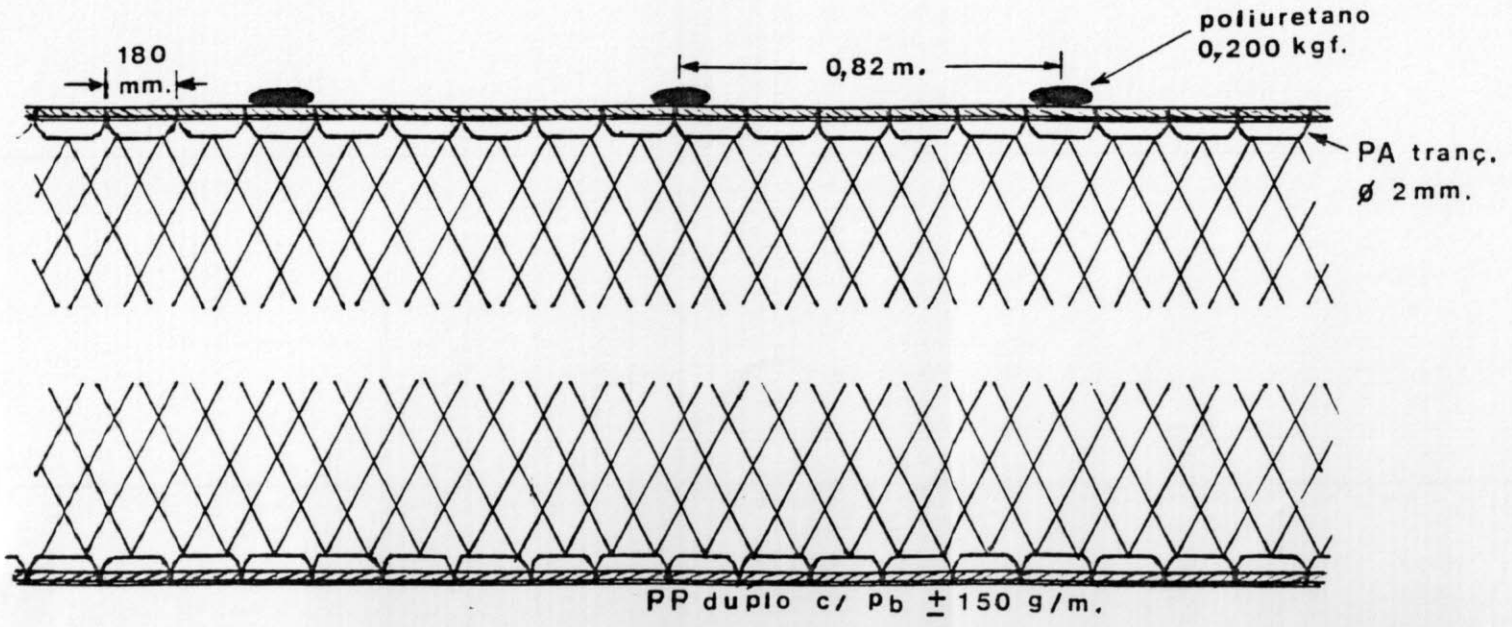
990

66

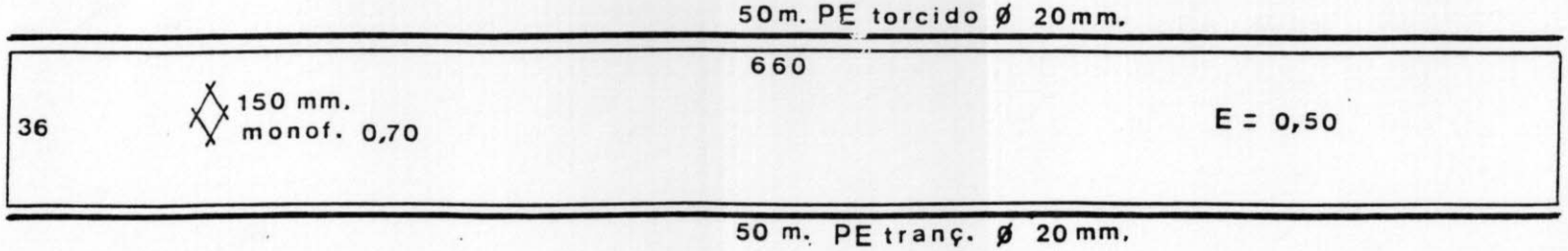
180 mm.
PA210/48 = 1,47

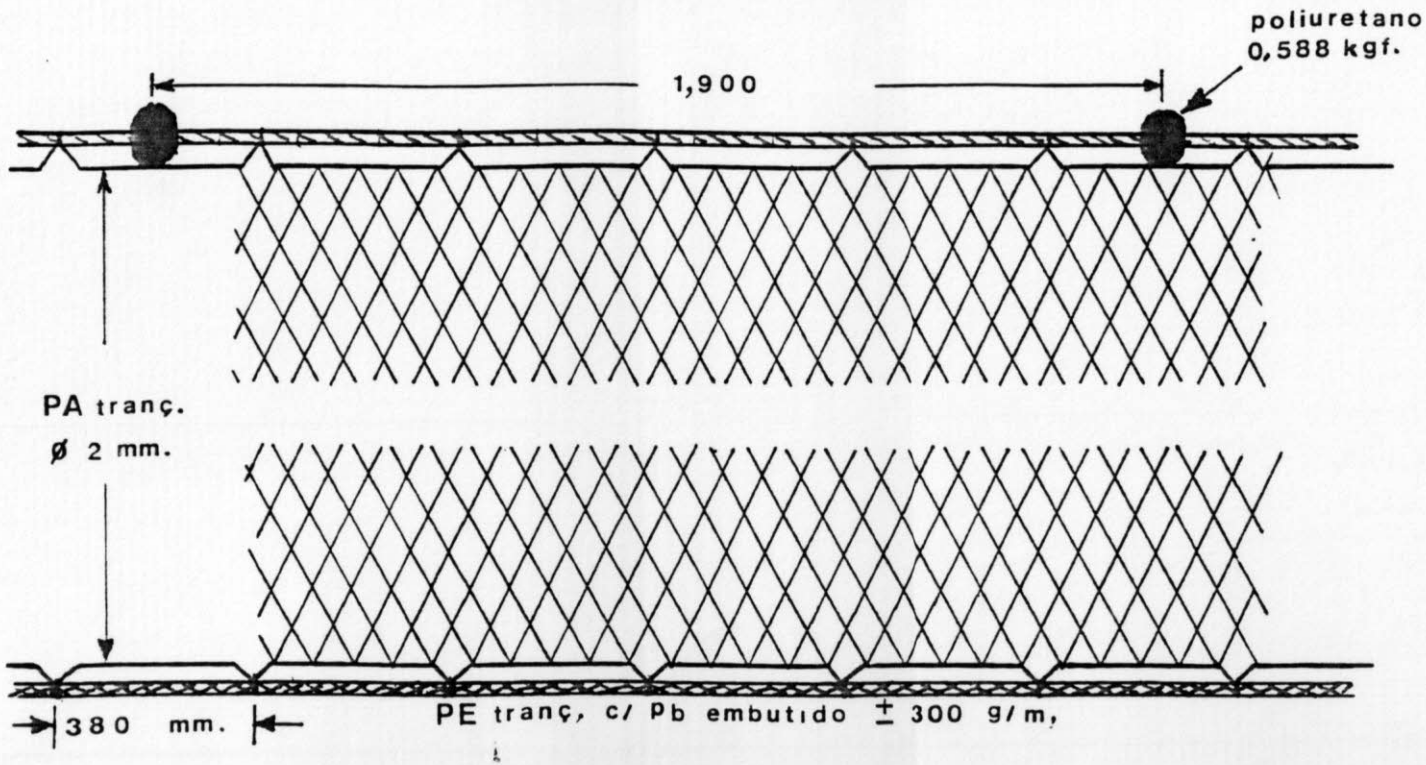
E=0,70

118,8 m. PP duplo ø 10 mm.



DRIFTNET


50m. PE torcido Ø 20mm.
660
36
150 mm.
monof. 0,70
E = 0,50
50 m. PE tranç. Ø 20 mm.


poliuretano
0,588 kgf.
1,900
PA tranç.
Ø 2 mm.
380 mm.
PE tranç, c/ Pb embutido ± 300 g/m,

DRIFTNET

50 m. PE tranç. ø 16 mm.

441

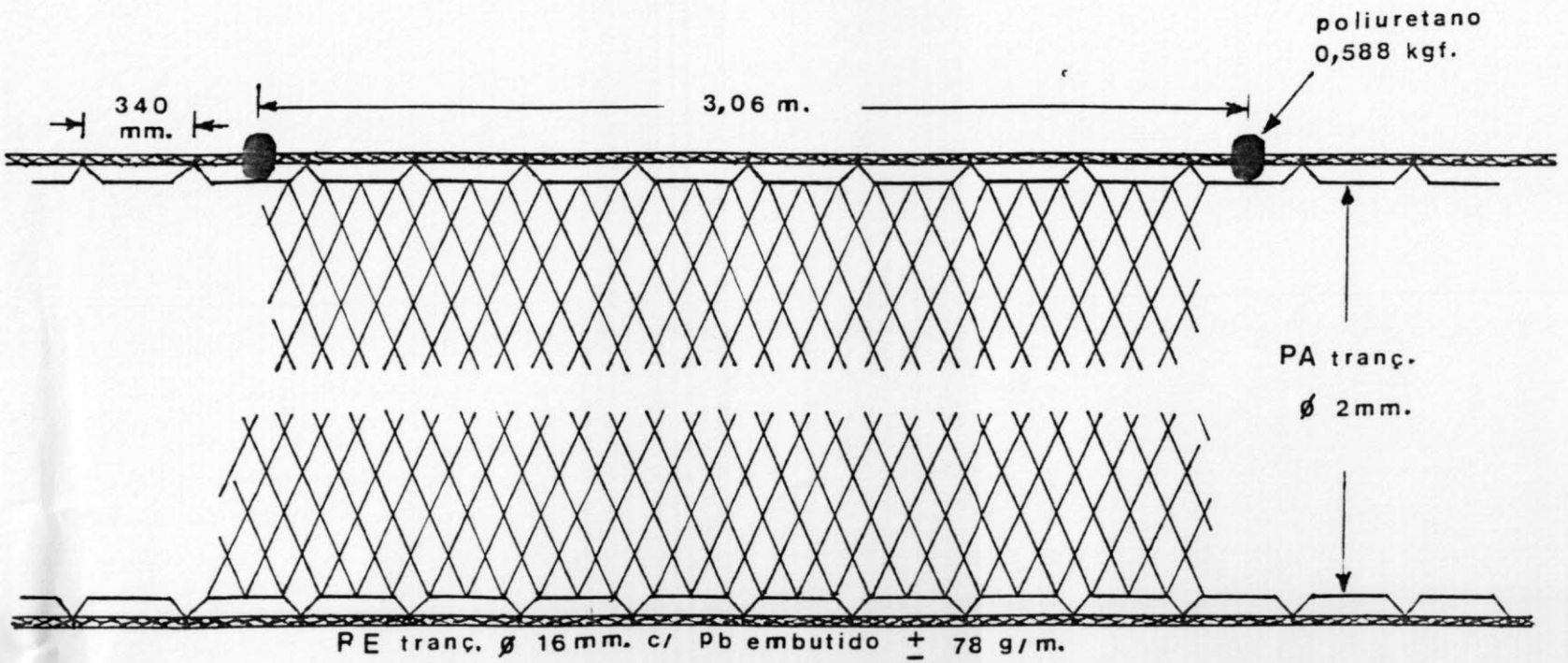
55

180 mm.

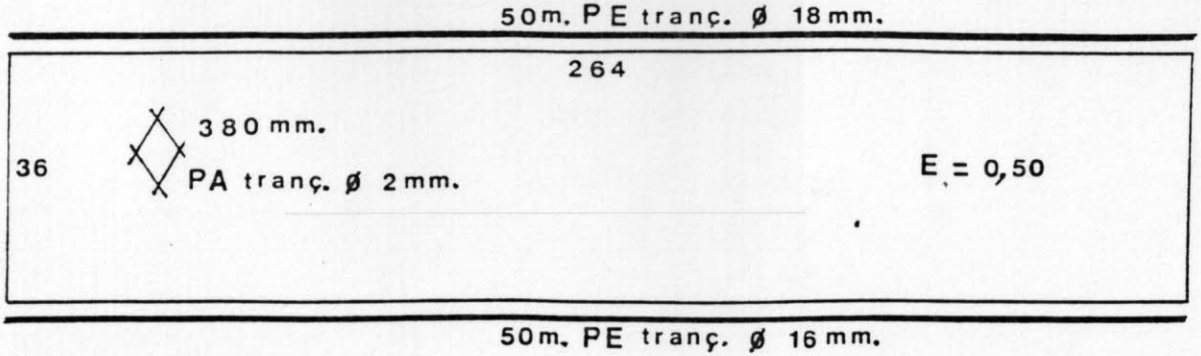
PA 210/30 = 1,17 ø

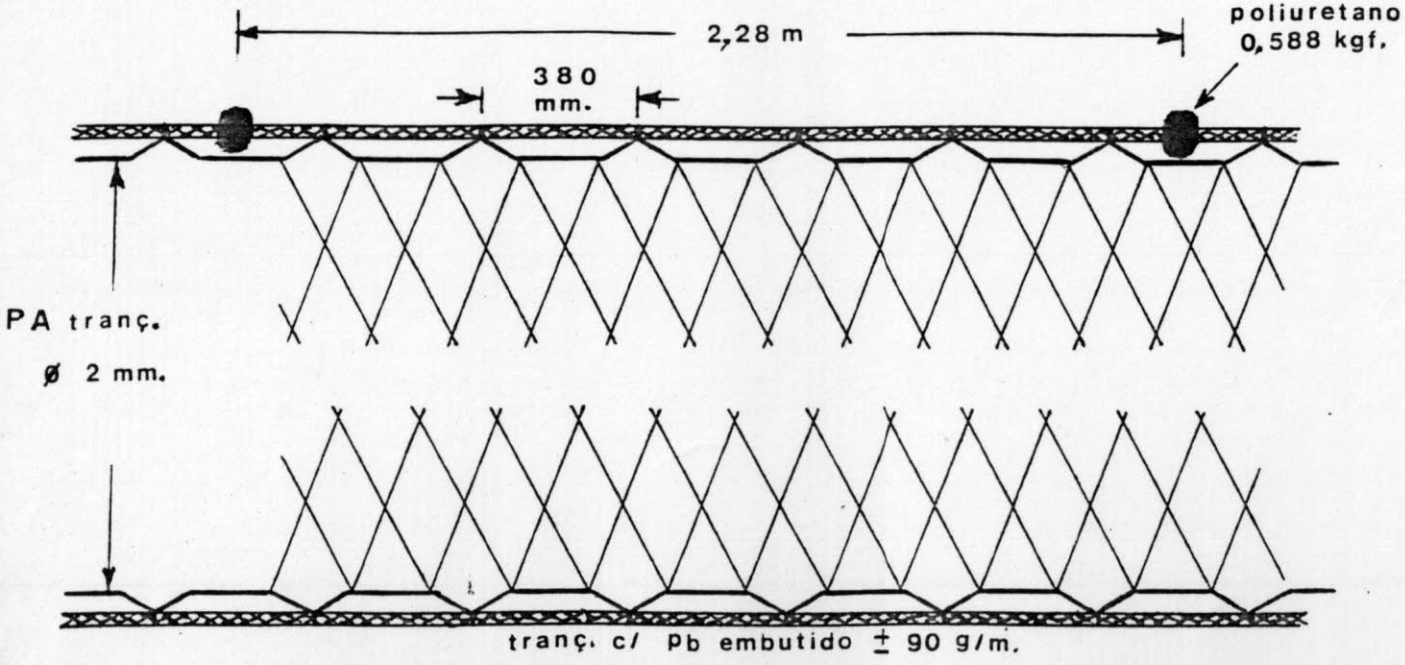
E = 0,63

50 m. PE tranç. ø 16 mm.



DRIFTNET


50m. PE tranç. ø 18mm.
264
380 mm.
36
PA tranç. ø 2mm.
E = 0,50
50m. PE tranç. ø 16mm.


2,28 m
poliuretano
0,588 kgf.
380
mm.
PA tranç.
ø 2 mm.
tranç. c/ Pb embutido ± 90 g/m.