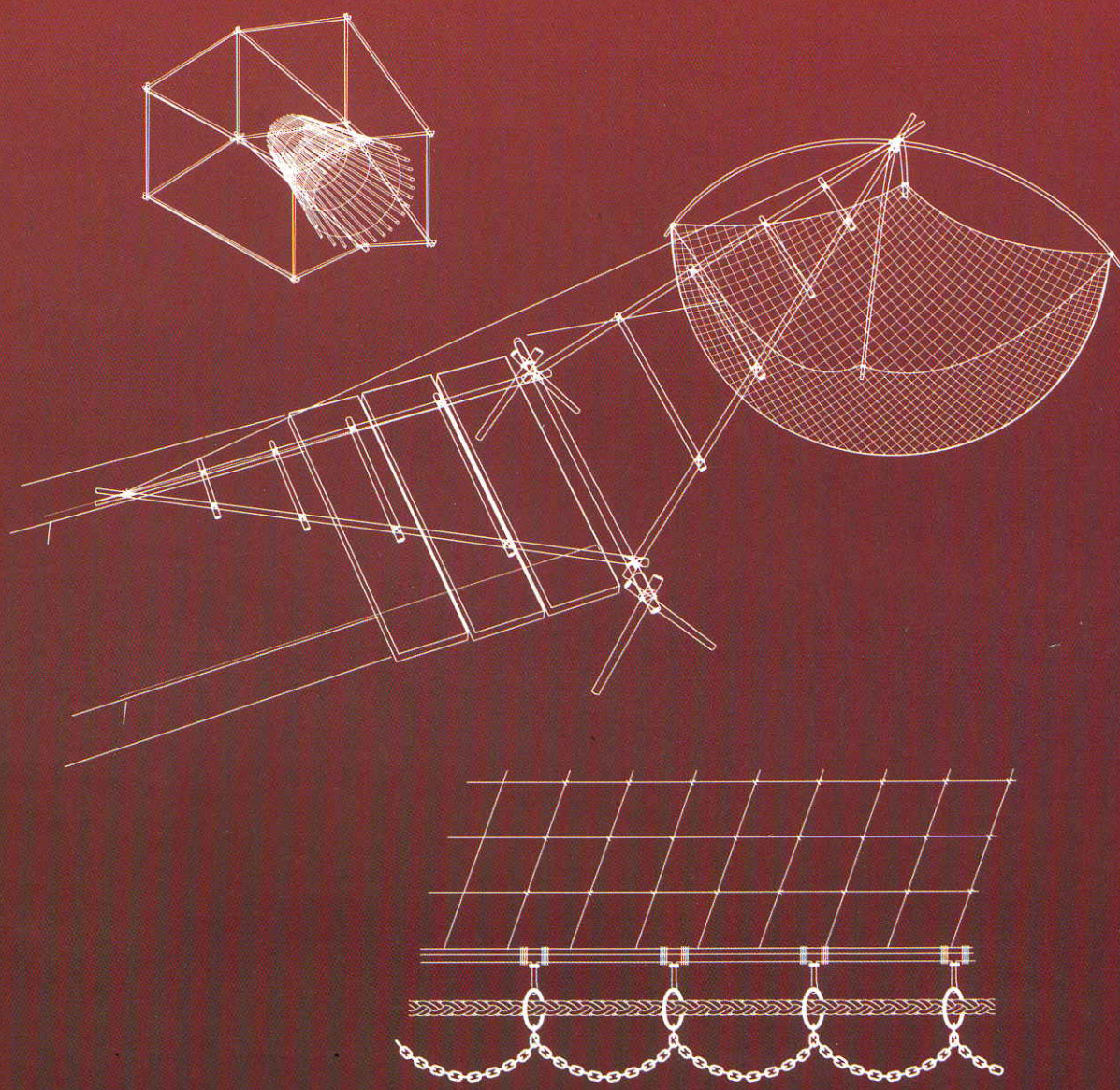
FISHING GEAR AND METHODS IN SOUTHEAST ASIA : IV . VIETNAM



SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER

What is SEAFDEC?

The Southeast Asian Fisheries Development Center (SEAFDEC) is an autonomous intergovernmental body established as a regional treaty organization in 1967 to promote fisheries development in Southeast Asia.

Objectives

SEAFDEC aims specifically to develop the fishery potential in the region through training, research and information services in order to improve the food supply by rational utilization of the fisheries resources in the region.

Functions

To achieve its objectives, the Center has the following functions:

1. To offer training courses, and organize workshops and seminars in fishing technology, marine engineering, extension methodology, post-harvest technology, and aquaculture.

2. To conduct research on fishing gear technology, fishing ground survey, post-harvest technology and aquaculture, to examine problems related to the handling of fish at sea and quality control, and to undertake studies on the fishery resources in the region.

3. To facilitate the transfer of technology to the countries in the region and to provide information materials to the print and non-print media, including the publication of statistical bulletins and reports for the dissemination of survey, research and other data on fisheries and aquaculture.

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SEAFDEC membership is open to all Southeast Asian Countries. The Member Countries of SEAFDEC at present are Brunei Darussalam, Cambodia, Japan, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand and the Socialist Republic of Vietnam.

FISHING GEAR AND METHODS IN SOUTHEAST ASIA : IV. VIETNAM

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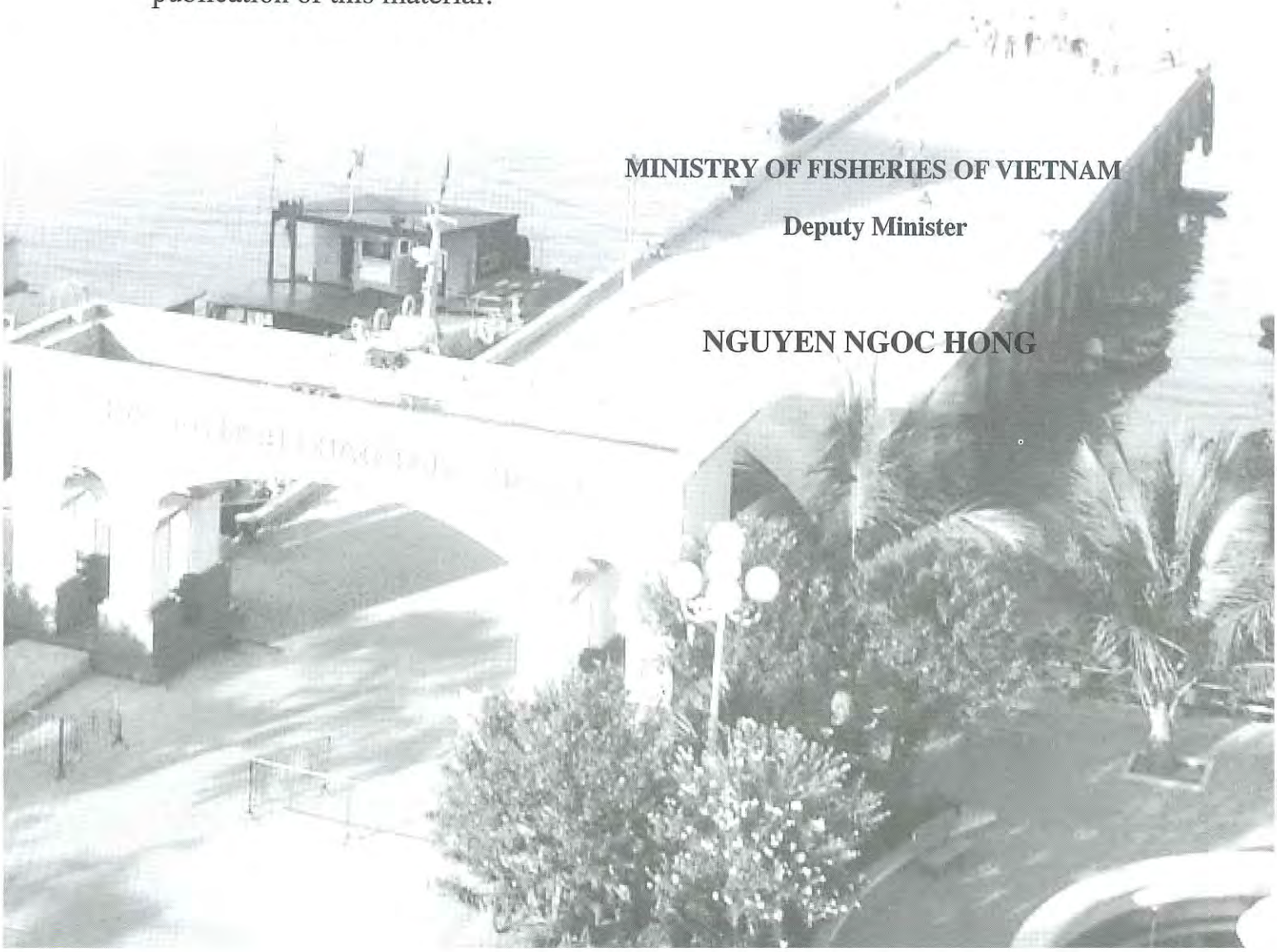
PREFACE

The collection of " Monograph of Fishing Gear and Methods in Southeast Asia: IV. Vietnam" has been compiled by the staff of The Research Institute of Marine Fisheries with a view to introduce the structure and fishing techniques of main fishing gears commonly used in Vietnam.

This work will contribute to the management of marine fishing; application of high efficient fishing gears in fishing practices and limitation of using destructive fishing gears to carry out responsible fishing and the development of responsible fisheries in Vietnam.

On this occasion, I would like to give my sincere thanks to SEAFDEC for the enthusiastic assistance, to Mr. Panu Tavarutmaneegul - SEAFDEC Secretary General and Dr. Yasuhisa Kato, Special Adviser who have supported us in the publication of this material.



MINISTRY OF FISHERIES OF VIETNAM

Deputy Minister

NGUYEN NGOC HONG

LỜI TỰA

Tuyển tập "Monograph of Fishing gear and methods in Vietnam" do cán bộ Viện Nghiên cứu Hải sản thực hiện nhằm giới thiệu cấu tạo và kỹ thuật khai thác của các ngư cụ chủ yếu đã được sử dụng phổ biến ở Việt Nam.

Công trình này sẽ đóng góp cho công tác quản lý ngành khai thác hải sản; áp dụng các ngư cụ có năng suất cao vào thực tế đánh bắt và hạn chế việc sử dụng những ngư cụ có hại nhằm thực hiện đánh cá có trách nhiệm và phát triển nghề cá bền vững ở Việt Nam.

Nhân dịp này, tôi xin cảm ơn sự hỗ trợ nhiệt tình của Trung tâm phát triển nghề cá Đông Nam Á (SEAFDEC); Ông Panu Tavarutmaneegul - Tổng thư ký SEAFDEC và Tiến sĩ Yasuhisa Kato - Cố vấn đặc biệt, đã giúp đỡ chúng tôi trong việc in tuyển tập này.

THỨ TRƯỞNG BỘ THUỶ SẢN VIỆT NAM

NGUYỄN NGỌC HỒNG

MESSAGE

from the Secretary-General of SEAFDEC

We are indebted to our friends and colleagues at RIMF for their excellent and prompt compilation of this monograph on Fishing Gear and Methods in Southeast Asia: IV. Vietnam. I also wish to offer our thanks for the support that they are giving to the efforts to encourage responsible fishing practices in this Southeast Asian Region. This monograph serves to augment the information necessary for the complete understanding of the mechanisms of the fisheries in the region.

The efficient management of the regional fisheries is a necessary adjunct to the drive to achieve food security in the region and to promote the rehabilitation of the fishing grounds around our coasts and on the high seas. Although Vietnam is a comparatively recent member nation of SEAFDEC their contribution in many fields is greatly welcomed and their work is warmly applauded.

I should like to take this opportunity to offer our sincere thanks to the Nha Trang University of Fisheries and to the scientific staff of the Research Institute of Marine Fisheries for their dedication in the compilation of this informative monograph.

(Panu Tavarutmaneegul)

Secretary-General

Southeast Asian Fisheries Development Center

FOREWORD

Vietnamese Fisheries has many favorable conditions for development due to the coastline of 3260 km and abundant marine resources. The number of fishing boats increases ceaselessly and the types of fishing gears are diversified. The sizes and designs of fishing gears depend on fishing methods, boat sizes, conditions' fishing ground and the habits of fishermen in each region, so there are lots of different types. Therefore, it is necessary to design the Monograph of Fishing Gears and Methods to make known widely the structure of fishing gears with high fishing efficiency for common application. Also the design of the Monograph produces management measures and limits the practices of destructive fishing gears and methods.

The Ministry of Fisheries of Vietnam entrusted Nha Trang University of Fisheries and the Research Institute of Marine Products to carry out the subject "Designing Monograph of Fishing Gears in Vietnam" in 1997. However, this work has not fully reflected the types of fishing gears as well as fishing techniques.

In order to contribute to the design of the overall picture of fishing gears and fishing techniques of the Southeast Asia, some experienced research staff from the Research Institute of Marine Fisheries implemented the surveys of fishing gears in coastal provinces, then processed data, designed monographs and finished the work on fishing gears and methods of Vietnam. The publication have used some designs of fishing gear in monograph of 1997 and it consists of 10 parts, each part shows fishing operation, characteristics and drawing of typical fishing gear samples of each group, such as trawl net, surrounding net, gill net, hook and line and others.

In this volume, we are only able to present the samples of fishing gears which are most commonly used and have high fishing catch and economic efficiency of some key fisheries areas in Vietnam. With a view to reading easily, symbols written in the drawing are in accordance with the regional common regulations.

Hopefully, the information in the publication will be scientific base and useful reference material for designers and users of fishing gears in Vietnam and other countries in the region.

During the preparation, because of the restriction in some aspects, there are some shortcomings in this book. We are very pleased to receive your suggestions.

RESEARCH INSTITUTE OF MARINE FISHERIES

Vice Director

DR. NGUYEN LONG

ACKNOWLEDGMENTS

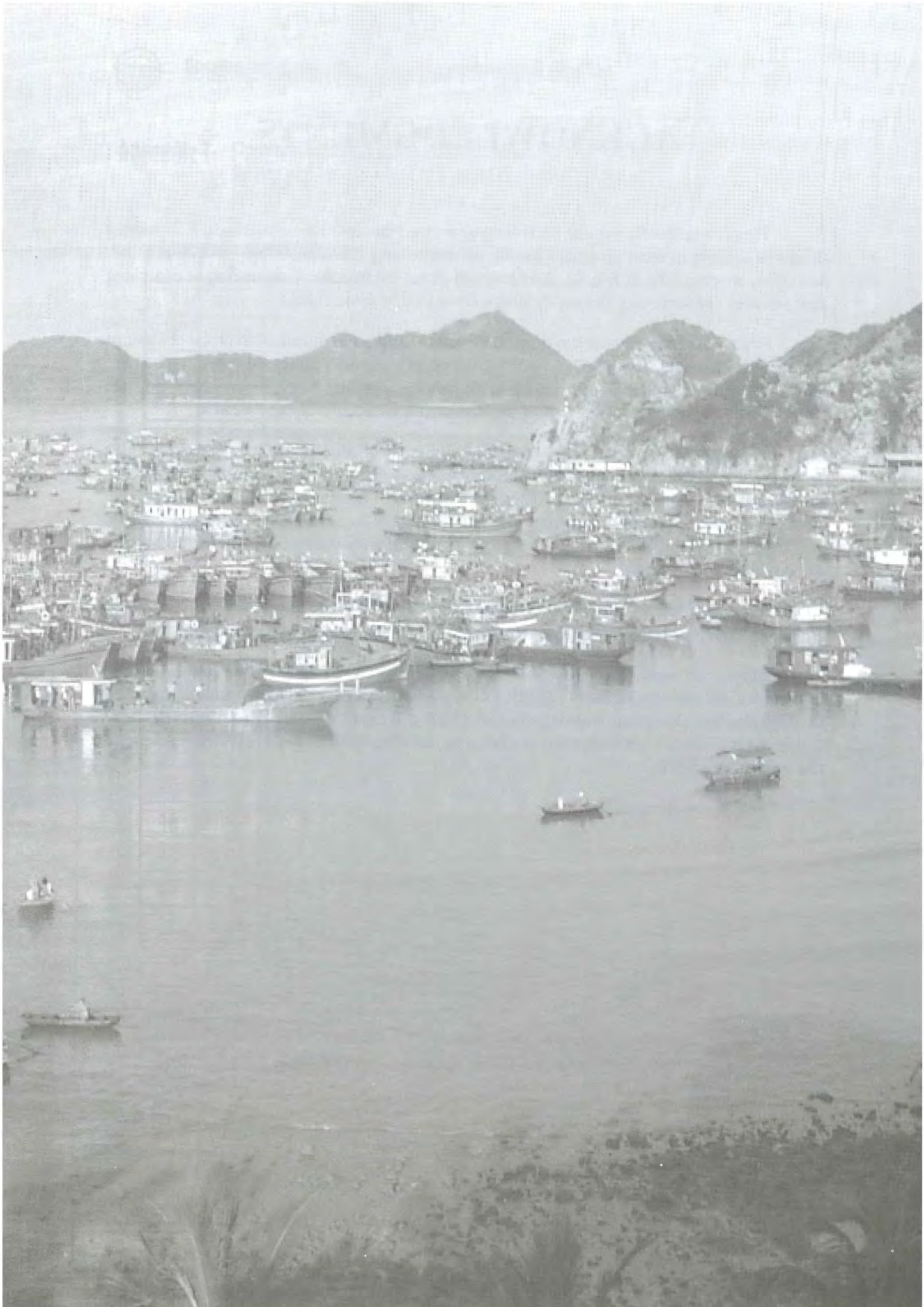
This is a scientific volume on fishing gear structure and fishing methods. It is written thanks to surveys in most provinces having marine fishing. The content of surveys includes: Designing monographs of fishing gears through direct measurement, enumeration of fishing gear samples and surveying fishing technique by scientific researchers.

Because fisheries statistic system of Vietnam is still poor, information of the number of fishing boats, annual catch of each type of fishing gears is not fully presented in the publication. However, contents of the scientific material on fishing gears and methods have been finished owing to the attempt of research staff of the Research Institute of Marine Products.

We would like to thank the Vietnamese Ministry of Fisheries for helping us to prepare necessary administrative procedures. Thanks very much Mr. Nguyen Ngoc Hong, Deputy Minister of Fisheries for valuable guidance opinions during the implementation process, Mr. Panu Tavarutmaneegul, SEAFDEC Secretary General,Mr Shogo Sugiura, Deputy Secretary General and Trust Fund Project Manager, Dr. Yasuhisa Kato, Special Advisor of SEAFDEC for helping us to publish this volume.

We would like to offer our heartfelt thanks to fishers for the close cooperation, to net-making sectors for providing us highly valuable information on fishing gears and methods.

Finally, we would like to give our deep gratitude to research staff of the Fishing Technology Department and other expert staff of RIMF, technical staff of provincial Departments of Fisheries, Dr. Nguyen Van Dong and teaching staff of Fishing Technology Department of Nha Trang University of Fisheries to assist us in collecting data, drawing monographs and correcting material to complete this work.



CONTENTS

< Chapter 1 >

Introduction of Marine Fishing in Vietnam

1..Characteristics of Vietnamese Waters

Vietnam has a coastline of 3,260 Km and the area of the Exclusive Economic Zone includes more than 1 million square kilometers. Based upon the natural characteristics of the sea areas, the Vietnamese sea can be divided into the following regions:

1.1. The Northern Region

This sea region has a smooth bottom and so is very suitable for bottom trawl fishery. The average depth is 50 m, only at the mouth of Tonkin Gulf does it increase to 100 m in depth.

Fishing activities have developed in both pelagic and demersal fisheries. The total number of motorized boats in the year of 1997 was 20,515 units with a total engine capacity of 391,567 Hp. The average engine capacity per boat is 19.08 Hp and the number of motorized boats of less than 90 Hp constituted 97.85% of the total number of fishing boats in the region. Therefore, the fisheries in the North Region are mainly small-scale fisheries operating on short fishing trips in the coastal areas.

1.2. The Central Region

In this region, the continental shelf is very severely sloped and the trawlable area is very narrow and close to the shore. Thus, pelagic fisheries are the main activities in this region using purse seine, long line and gill net fisheries.

Total number of motorized boats in the year 1997 was 25,742 units with a total engine horsepower of 653,879. The average engine horsepower per boat being 25.40. The number of fishing boats having an engine horsepower of less than 75 is 96.92% of the total number of fishing boats in the region.

The size and capacity of the boats in this region are bigger than those in the North Region, but in general, the fisheries in Central region are still small-scale.

1.3. The Southeast and Southwest Regions

Similar to the conditions of the North Region, the bottom of this region is very smooth and suitable for bottom trawl fishery. The living marine resources of pelagic and demersal fish are very abundant. The trawl, purse seine, and long line fisheries are well developed.

The total number of motorized fishing boats in the year 1997 was 25,647 units with a total engine horsepower of 1,456,574. The average engine horsepower per boat being 56.79. The number of fishing boats with an engine of less than 75 Hp constituted some 83.23% of the total number of fishing boats in the region. The fishing boats in this region are the largest compared to those of the whole country and they are able to operate in the offshore fishing grounds.

According to the fisheries statistics of 1998, the number of boats of more than 75 Hp in the whole country are 5,491 units. Of which 439 units (2.14 %) are in the Northern region, 751 units (3.08%) in the Central region, 4,301 units (16.77%) in the Southeast and Southwest Regions.

This shows that the fisheries in the Southern Provinces are more developed than in the Central and Northern provinces.

1.4. The Offshore Area of the Vietnamese Eastern Sea Waters

Generally, this is a very deep area where the fisheries targeted are the pelagic fish and ocean squid species. The main fisheries for these target species are purse seine, long line and squid jigging.

2. Living Marine Resources in Vietnamese Sea Waters

According to the previous surveys 1, 145 fish species have been identified (Pham Thuoc, 2000) in the Vietnamese waters in which 50 species considered to be the commercially important species. The total biomass was estimated about of 3.0 - 3.5 million tons and total allowable catch was 1.2 - 1.3 million tons per year. However, the number of boats less than 75 Hp (91.8% of total fishing boats) operating only in the coastal area has caused decline of the resource in the coastal areas due to over exploitation.

3. Number of Fishing Boats

In recent years, the number of fishing boats have been increasing rapidly and the average engine capacity of a boat also increased. The number of boats and total engine capacity by years are presented in **Table 1**.

The number of fishing boats for each region in the year of 1998 is presented in **Table 2**. It shows that some provinces in the North region and Central region have small size of fishing boats. The average engine capacity per boat is from 18.71 Hp/boat (Quang Tri province) to 30.20 Hp/boat (Quang Ngai province). The size fishing boats of provinces in Southeast and Southwest Region is bigger than that in the North and Central regions. The average engine capacity per boat is from 34.59 Hp/boat (Binh Thuan province) to 93.77 Hp/boat (Tien Giang province).

Table 2 also shows the number of boats classified by horsepower group, a number of boats that were capable of operating in the offshore areas were generated from south region. It was indicated that the fisheries more developed in the south.

4. Fishing Boat

4.1. Structure of Fishing Boat Hull

The hull of almost boats are made of wood. Only some of them with engine capacity of

Table 1. Number of fishing boats and total engine capacity in Vietnam

Year	Number of boats (unit)	Total horse power (Hp)
1981	29,684	453,871
1982	29,429	469,976
1983	29,117	475,832
1984	29,549	484,114
1985	29,323	494,507
1986	31,680	537,503
1987	35,406	597,022
1988	35,744	609,317
1989	37,035	660,021
1990	41,266	727,585
1991	43,940	824,438
1992	54,612	986,420
1993	61,805	1,291,550
1994	67,254	1,443,950
1995	68,000	1,500,000
1996	69,953	1,543,163
1997	71,500	1,850,000
1998	71,904	2,502,020

Table 2. Number of fishing boats by engine capacity groups.

Number of boats (unit)	Total horse power (Hp)	<20Hp	20-45Hp	46-75Hp	76-140Hp	>140Hp
71,904	2,502,020	36,250	21,563	8,172	3,052	2,867

more than 200 Hp are made of steel. Besides, there arc a lot of bamboo boats without engine. Nowadays, wood used for building boat become rare boat and its price increases rapidly, so the Government encouraged people to use other material to build the fishing boats.

4.2. Size of Fishing Boat Hull

There are many fishing boat models being used in Vietnamese fisheries. However, fishermen still like the traditional models. These traditional models are different from region to region. The size of fishing boats is shown in **Table 3**.

5. Catch Productions

As mentioned above, the number of fishing boats in recent years has increased rapidly and catch productions grew up, too (**Table 4**).

Table 1& 4 show that during the period 1986 - 1998 the total engine capacity was increased by 4.65 times from 537,503 Hp in 1986 to 2,502,020 Hp in 1998 while total catch was increased by only 2.02 times from 570,481 tons in 1986 to 1,151,400 tons in 1998. It means that although the total horse power increases rapidly but the total catch increases slowly. Furthermore, the total cost also increases, but the total income increases very slowly, therefore the profits getting from fishing operations would be decrease step by step.

Taking into account the average catch per horse power per year, this value in 1986 was 1.06 ton/Hp and down to 0.46 ton/Hp in 1998. It means that the economic efficiency in fishing operations declines time by time.

Table 3. Size of fishing boat hull by engine capacity.

Horse power group (Hp)	Length of hull L (m)	Width of hul B (m)	Depth of hull D (m)
10-23	10.20-13.40	3.10-3.50	1.15-1.45
24-33	13.75-17.30	3.50-4.00	1.38-2.15
34-45	14.50-17.50	3.13-4.00	1.54-1.80
46-60	16.00-18.00	3.00-4.60	2.00-2.40
61-90	15.30-20.00	3.40-5.80	1.70-2.60
91-135	18.30-20.70	3.90-5.60	1.45-2.62
136-200	17.40-26.20	4.90-6.40	2.20-3.40
201-300	18.00-30.03	4.50-5.80	2.23-4.10
301-450	18.94-32.00	4.50-6.00	2.50-3.60

Table 4. The capture fisheries productions by years.

Year	Total
1986	570,481
1987	611,814
1988	630,561
1989	626,655
1990	641,465
1991	699,403
1992	699,403
1993	789,057
1994	889,998
1995	928,860
1996	962,500
1997	1,078,630
1998	1,151,400
1999	1,212,800

Because of the ratio of small scale fishing boats is very high, in comparison with the total of fishing boats, so the fishing grounds for these small boats are only in the coastal areas. Based on estimates of some experts, while total allowable catch in the areas of less than 50 m depth is about 580,000 tons, the total catch in fact practice is 1.5 times higher than the total allowable catch. Therefore, it is necessary to reduce the fishing pressure in coastal area.

The catch productions by fishing gears, **Table 5** shows the catch productions by fishing gears. From this Table, we can see some kinds of fishing gears having high catch productions such as: Trawl, purse seine, gill net, long line, lift net. The order of production given by gear types for each regions are listed as bellows:

- The North region: Trawl, gill net, purse seine, lift net, hook and line
- The Central region: Purse seine, gill net, lift net, trawl, long line
- The South region: Trawl, purse seine, gill net, long line

Table 5. The surveys on catch by type of fishing gears of 14 Provinces in 1997.

Fishing regions	Total catch (T)	Catch of trawl	Catch of purse seine	Catch of gill net	Catch of hook and line	Catch of lift net	Catch of fixed net	Catch of others
North region (6 Pro)	73,304 100%	27,182 37,1%	4,880 6.7%	18,728 25.4%	4,773 6.5%	14,110 19.3%	1,240 1.7%	2,391 3.2%
Central region (4 Pro.)	173,018 100 %	31,078 18%	41,614 24%	34,674 20%	23,793 13.8%	36,534 21.1%	841 0.5%	4,504 2.6%
South region (4 Pro.)	283,452 100%	169,958 60%	62,593 22.1%	18,729 6.6%	16,452 5.8%	-	13,371 4.7%	2,322 0.8%
Tatal (14 Pro.)	**529,767 100%**	**228,218 43,1%**	**109,087 20.6%**	**72,131 13.6%**	**45,018 8.5%**	**50,664 9.6%**	**15,452 2.9%**	**9, 217 1.7%**

6. Classification of Fishing Gears in Vietnam

There are many fishing gears are employed in catching of fisheries in Vietnam. They could divided into the following types:

6.1. Trawl	*Lưới kéo.*
6.1.1. Beam trawl	Lưới kéo sào.
6.1.2. Bottom otter trawl	Lưới kéo đơn tầng đáy.
6.1.3. Bottom otter trawl with booms	Lưới kéo đơn tầng đáy có tăng gông
6.1.4. Bottom pair trawl	Lưới kéo đôi tầng đáy.
6.2. Surrounding Net	*Lưới vây.*
6.2.1. Anchovy purse seine	Lưới vây cá cơm.
6.2.2. Luring purse seine	Lưới vây kết hợp ánh sáng, chà rạo.
6.2.3. Purse seine	Lưới vây thường (đảo ngời).
6.3. Seine Net	*Lưới rùng.*
6.3.1. Beach seine	Lưới rùng bãi biển.
6.3.2. Boat seine	Lưới rùng tàu.
6.4. Gill Net	*Lưới rê.*
6.4.1. Drift gill net	Lưới rê trôi.
6.4.2. Bottom gill net	Lưới rê tầng đáy.
6.4.3. Trammel net	Lưới rê ba lớp.
6.4.4. Drift gill net with bag	Lưới rê túi.
6.5. Hook and Line	*Nghề câu.*
6.5.1. Hand line	Câu tay.
6.5.2. Long line	Câu vàng.
6.6. Lift net	*Lưới vó.*
6.6.1. Portable lift net	Lưới vó xách tay.

6.6.2. Raft lift net	Lưới vó bè.
6.6.3. Lift net	Lưới vó, mành.
6.6.4. Stick-held dip net	Lưới pha xúc.
6.7. Trap	*Nghề bẫy.*
6.7.1. Set net	Lưới đăng
6.7.2. Bamboo stake trap	Sáo; lò; Đăng
6.7.3. Stow net	Lưới đáy
6.7.4. Trap	Lồng bẫy
6.8. Cast Net	*Lưới chụp.*
6.8.1. Cast net	Lưới chài
6.8.2. Stick-held falling net	Lưới chụp mực
6.9. Scoop Net	*Te đẩy.*
6.9.1. Man-push net	Te người đẩy
6.9.2. Powered-push net	Te tàu đẩy
6.10.Miscellaneous	*Các nghề khác.*
6.10.1. Dredge	Nghề cào sò
6.10.2. Spear	Lao, xiên
6.10.3. Tide net	Lưới vùi
6.10.4. Gaff hook	Móc cá

< Chapter 2 >

Explanatory Notes

This volume is a result of the surveys on marine fishing gear and methods in Vietnam from January 1997 to December 1999. The survey locations are selected from provinces where fisheries developed and are shown in **Figure 1**. The abbreviations and symbols used in illustrations and the surveys are in accordance with the use as in the first, second and third volumes (Thailand, Malaysia and Philippines). The number of surveyed fishing gear types is shown in **Table 6**. The data, which are introduced in this monograph, were based on the data contained in reports of Vietnamese Ministry of Fisheries and the data from practical surveys conducted by the Research Institute of Marine Products.

Illustrations :

1) Drawing of the horizontal length of surrounding nets, seine net and gill net depends on the length of the float line, and the vertical depth depends on the vertical hanging ratio of netting. In the case of gill nets with side lines, the depth of the side line is drawn same scale to float line. The width of netting panels, or sections of trawl are drawn as a half of the stretched netting width, and the depth or length according to the vertical hanging ratio of netting. Some

Table 6. Amount of fishing gear designs and technical papers collected from the surveys in Vietnam.

Group of Fishing gear	Amount of designs
Beam trawl	8
Bottom otter trawl	8
Bottom oter trawl with booms	8
Bottom pair trawl	19
Purse seine	22
Beach seine	2
Drif gill net	22
Bottom gill net	22
Trammel net	9
Hook and line	21
Lift net	12
Traps	14
Cast net	3
Scoop net	6
Dredge	1
Total	**177**

types of fishing gear are shown by schemata or overall sketches with the dimensions indicated applicably.

2) General outline drawings, such as of the rig of a complete gear, and detailed drawings of components, are not to scale, but the main dimensions are given.

3) Dimensions are given only in meters (m) and millimeters (mm). The units are not indicated but can be easily be recognized, as follows:

Meter : Length of footropes, headlines, floatlines, etc. used with decimals of hundredths (e.g., 5.25, 90.20).

Millimeter : Mesh size (stretched), diameter of ropes, floats, etc. used without decimal or with decimals of tenths (e.g., 15; 325 or 2.5 ; 15.8)

4) Mass and weight are indicated in the units of kilogram (kg) and gram (g). Buoyancies of floats and sink load of net yams or ropes are shown by kilogram-force (kgf) or gram-force (gf).

5) Materials are indicated by abbreviations listed in **Appendix 1.**

6) The size of net yarns is shown in the denier unit.

7) The mesh size given in millimeters (mm) is understood to be the distance between the centers of two opposite knots in the same mesh when fully stretched.

8) The number of meshes in a straight row along the edge shows the width and length or depth of net panels or sections.

9) The shape of netting section is indicated by the cutting rate at its edge. A tabulation of common cutting rates for a practical rang of taper ratios is shown in **Appendix 2.**

10) The term hanging ratio (E) designates the ratio between the length of a given portion of the mounting rope and the length of the stretched netting hung on this portion of the rope.

11) When there are two or more variants in the construction of gear or manner of use, there are indicated in the title and opposite the drawing by Roman numerals (I, II,...). Where these variants refer to only one component part of gear, other possible ways of making this part are shown with the abbreviation ALT.

12) Sequence in fishing operation is shown by sketches with circled Arabic numerals (1, 2,...) which indicate the sequence of operational stages.

13) Parts of gear drawn in detail are indicated by circled capital letters (A B...).

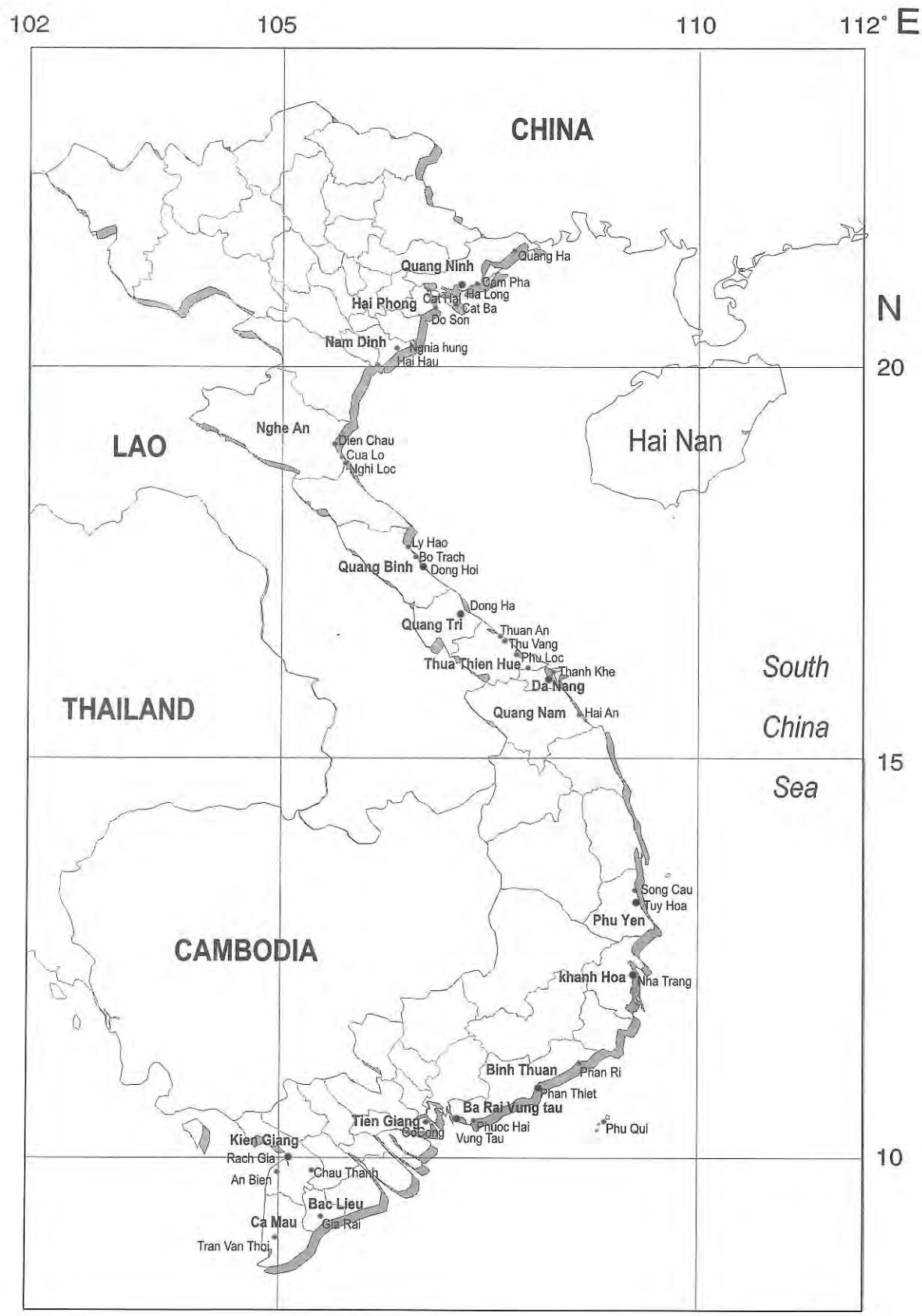


Figure 1. Location of fishing gear and method survey in the Vietnam.

Appendix 1. Abbrivations and symbols used in illustrations.

Loa	Length of over all fishing boat	RUB	Rubber
GT	Gross tonnage	S	S Twist
Hp	Horse power	SST	Stainless steel
EG	Electric generator	SW	Swivel
LL	Luring lamp	WD	Wood
BAM	Bamboo	WIRE	Steel wire rope
BR	Brass	Z	Z Twist
CEM	Cement	Ø	Diameter
CLAY	Baked clay		Upper panel
COMB	Combination rope		Lower panel
Fe	Iron		Side panel
Fp	Foam plastic		Purse ring
MAT	Material		Thichness
MONO	Monofilament		Approximately
PA	Polyamid		Circumference
Pb	Lead	XXXXX	Braided
PE	Polyethylene	ZZZZZZ	Twisted
PL	Plastic		Current
PP	Polypropylen		Wind

Appendix 2. Common cutting rates and taper ratios.
(Sự tăng giảm kích thước mắt lưới ở các chu kỳ cắt thông thường)

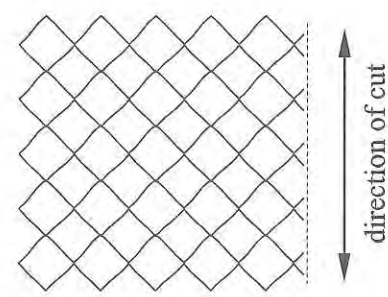
Number of meshes lost (or gained)
(Số mắt lưới tăng hoặc giảm)

Number of meshes in depth (Số mắt lưới theo chiều cao)

	1	2	3	4	5	6	7	8	9	10
1	AB	1T2B	1T1B	3T2B	2T1B	5T2B	3T1B	7T2B	4T1B	9T2B
2	1N2B	AB	1T4B	1T2B	3T4B	1T1B	5T4B	3T2B	7T4B	2T1B
3	1N1B	1N4B	AB	1T6B	1T3B	1T2B	2T3B	5T6B	1T1B	7T6B
4	3N2B	1N2B	1N6B	AB	1T8B	1T4B	3T8B	1T2B	5T8B	3T4B
5	2N1B	3N4B	1N3B	1N8B	AB	1T10B	1T5B	3T10B	2T5B	1T2B
6	5N2B	1N1B	1N2B	1N4B	1N10B	AB	1T14B	1T7B	1T4B	1T3B
7	3N1B	5N4B	2N3B	3N8B	1N5B	1N12B	AB	1T14B	1T7B	3T14B
8	1N2B	3N2B	5N6B	1N2B	3N10B	1N6B	1N14B	AB	1T16B	1T8B
9	4N1B	7N4B	1N1B	5N8B	2N5B	1N4B	1N7B	1N16B	AB	1T18B
10	9N2B	2N1B	7N6B	3N4B	1N2B	1N3B	3N14B	1N8B	1N18B	AB
11	5N1B	9N4B	4N3B	7N8B	3N5B	5N12B	2N7B	3N16B	1N9B	1N20B
12	11N2B	5N2B	3N2B	1N1B	7N10B	1N2B	5N14B	1N4B	1N6B	1N10B
13	6N1B	11N4B	5N3B	9N8B	4N5B	7N12B	3N7B	5N16B	2N9B	3N20B
14	13N2B	3N1B	11N6B	5N3B	9N10B	2N3B	1N2B	3N8B	5N18B	1N5B
15	7N1B	13N4B	2N1B	11N8B	1N1B	3N4B	4N7B	7N16B	1N3B	1N4B
16	15N2B	7N2B	13N6B	3N2B	11N10B	5N6B	9N14B	1N2B	7N18B	3N10B
17	8N1B	15N4B	7N3B	13N8B	6N5B	11N12B	5N7B	9N16B	4N9B	7N20B
18	17N2B	4N1B	5N2B	7N4B	13N10B	1N1B	11N14B	5N8B	1N2B	2N5B
19	9N1B	17N4B	8N3B	15N8B	7N5B	13N12B	6N7B	11N16B	5N9B	9N20B

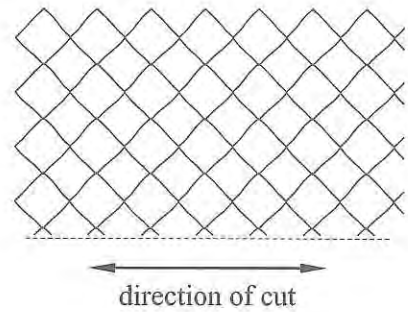
N(normal) cut. The cut is the perpendicular to the general course of the yarn in knotted netting

Cắt đứng (N). Kiểu cắt có hướng cắt vuông góc với hướng đan của tấm lưới



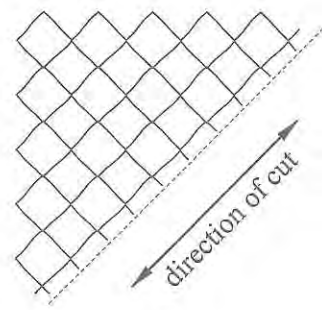
T(transversal) cut. The cut is the parallel to the general direction of the yarn in knotted netting

Cắt ngang(T). Kiểu cắt có hướng cắt song song với hướng đan của tấm lưới



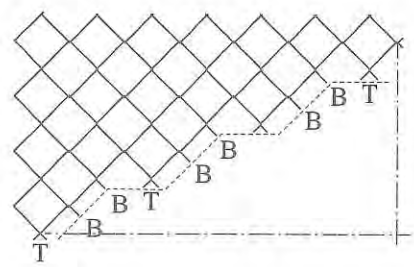
B(bar) cut. The cut is the parallel to a line of sequential mesh bars

Cắt xiên (B). Kiểu cắt có hướng cắt song song với cạnh của mắt lưới.



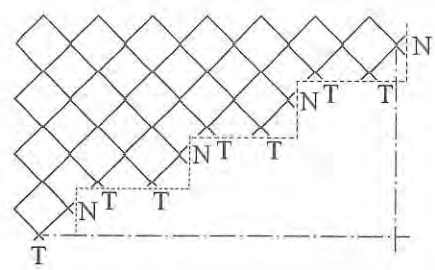
Cutting rate 1T2B

Chu kỳ cắt: 2 chân cắt xiên 1 mắt cắt ngang



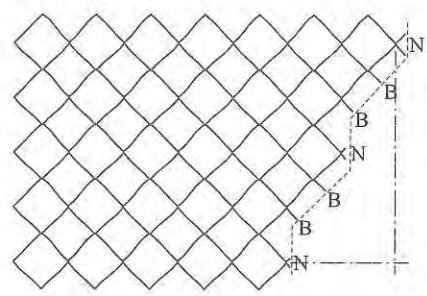
Cutting rate 1N2T

Chu kỳ: 1 mắt cắt đứng 2 mắt cắt ngang



Cutting rate 1N2B

Chu kỳ cắt: 2 chân cắt xiên 1 mắt cắt đứng



< Chapter 3 >

Trawl Fishing

Trawls are one of the most important types of fishing gear in Vietnam. The fishing production from trawling is about 40% of the total catch. Trawls have been used in Vietnam for a long time. In the early years, fishermen used two sailing boats to drag one trawl. The nets were made of cotton and the buoys were made of wood with a rectangular or hydrodynamic shape. The fishing grounds were mainly coastal areas with depths of less than 20 m.

Up to the year 1957, with the technical assistance of the Democratic Republic of Germany, four trawlers of 90 Hp were used with two-scam trawl nets in the Gulf of Tonkin.

During the year 1958, the People's Republic of China supplied Vietnam with 15 otter-board trawlers with an engine capacity of 250 Hp, each. These steel-hulled vessels were 28 m long and operated very successfully in Vietnamese waters. In 1976, Norway provided Vietnam with four steel-hulled otter-board trawlers of 600 Hp, each. The four-scam, high opening trawl nets were used in these vessels for fishing in the Gulf of Tonkin.

Up to the present, trawl fishery has developed to over 20,000 units. However, because of natural conditions in the fishing grounds, trawl fishery only developed in the Northern and Southern provinces of Vietnam.

At present, most trawls used in Vietnam are types of two-scam, only in recent years, fishermen in the Southern provinces have used some models of four-seam trawl net with a high opening.

Because of the smooth seabed, bottom sediment is sand-mud, so most of trawls use a "soft ground rope". This means that there is little use made of bobbins, iron discs or rubber discs, thus the ground rope directly contacts the bottom, and fish cannot escape because of the ground rope. Besides, the "soft ground rope" reduces the hydro-resistance of the trawl while towing. The otter boards have a rectangular, oval or V-letter shape.

Today, the trawl fisheries have some main groups as follows:

- Most of the trawlers often use the pair trawl method and are equipped with a large engine capacity of 135-500 Hp per boat. The towing speed is 3.5-4 miles per hour. However, this speed is slower than that needed for successful fishing.

- The shrimp trawlers often use the otter trawl. One boat can tow one, two or sometimes up to 18 trawls. For horizontal opening trawls, they can use two fishing methods: otter-board trawls and beam-trawls. The fishing grounds of the shrimp trawls are only in the coastal areas where the depth is less than 30 m.

From 1997 until the present, the big mesh size trawls have been imported from China. The characteristics of the sizes and meshes of these trawls are larger than those of ordinary trawls (see **Table 7**). The target species of the Chinese trawls are sardine, which are 80-90% of the total catch. Thus, although the total catch of the trawl is very high, the total income is low. On the other hand, this trawl only operates successfully in the coastal areas with a water depth of less than 30m, however it is not good for living resources in this area and causes conflict with small scale fisheries.

Table 7. The main parameters of Chinese and Vietnamese trawls for pair trawlers that have 300Hp/unit.

Parameters	Length of Head rope (m)	Length of trawl (m)	Mesh size of wing (m)	Mesh size of cod end (m)
Chinese trawl	46.0-84.00	68.00-120.00	1.00-4.00	0.03-0.04
Vietnamese trawl	26.00-40.00	52.00-90.00	0.08-0.30	0.03

Fishing Gear and Methods

Trawl fishing in Vietnam can be classified into four types:

- Beam trawl
- Bottom otter board trawl
- Bottom otter board trawl with booms
- Bottom pair trawl

1. Beam Trawl

The beam trawl is used mainly for catching shrimp, so the mesh size is usually small. The small-scale fisheries boats often use the beam trawl. Boats are of small size with engines ranging from 22 to 90 horsepower, rarely up to 250 Hp. Many small boats use 1 to 2 beam trawls, but if they use the Chinese trawling method, one big boat can pull up to 18 sets of trawls.

The mouth of net is horizontally propped open by bamboo or steel pipes. Sometimes the fishermen use two skis that are joined together with the ground rope and head rope for slipping along the seabed easily. The fishing grounds of the beam trawl are shallow waters with a sandy-muddy bottom. Target species are shrimp, crab and small demersal fish.

Net Setting:

If many nets are operated, the net farthest from the side of the vessel is set first, then setting the net nearer to the vessel sides. The towing wrap of the nets is secured at certain positions along the two booms because of the messenger rope.

If a vessel is operating with a beam trawl only, it's not necessary to have booms, in this case the towing warps are secured at the stem.

Net Hauling:

First, to be hauled is the towing warp of the net nearest to the vessel's sides, then the link between the towing warp and the messenger rope is untied, and the towing warps are gathered in until they are all laid on the deck of the vessel. Then the tie of the cod-end is opened and the shrimp and fish are emptied out.

2. Bottom Otter Board Trawl

According to the classification of the species caught, the bottom otter board trawls may be divided into two groups: Shrimp otter board trawl and Fish otter board trawl.

2.1. Fish Otter Board Trawl

The fish otter board trawl has developed mainly in large-scale fisheries. They are used on fishing vessels of 135-500 Hp. Most of the nets are two-seam types with a mesh size ranging from 80 to 240 mm for the wings and from 30 to 40 mm for the cod-end with polyethylene twine of 380D/5x3-380D/25x3 or polyethylene 700D/5x3-700D/15x3. The ground rope ranges from 21.8 to 40 m.

The otter boards are made of wood of a rectangular or oval shape. Depending upon boat size, the trawlers can operate on the fishing grounds continuously from 7-20 days.

Before 1985, the fish otter board trawls developed and expanded. Up to the present, because the numbers of living marine resources have declined and because the towing speed of otter board trawlers are slow, the catch obtained cannot cover the fishing cost. Therefore, the numbers of otter board trawlers have decreased year by year. Instead of fish otter board trawlers, nowadays, fishermen use pair trawlers with engines of 135-500 Hp per boat. Using pair trawls, the towing speed is increased and the production increases. Fishing operations can be carried out in offshore areas.

Net Setting:

The net is neatly prepared on the deck at the stern. When it is operated, the cod-end is deployed first, then the body, wings, ground rope, head rope, headline leg and towing leg and the sweep line follow. At that time, the otter board is tied to the sweep rope and unhooked from the gallows for gradual deployment into the waters and opened when the vessel goes ahead. When the net is stable, it is continuously set to the end of the warps.

Net Hauling:

The towing warp is recovered and the otter boards are hung on the gallows. The winch recovers the towing rope as far as the ground rope. The crane will then in turn lift each part of the

wings, body and cod-end. The cod-end is then pulled to the foredeck for discharging the fish.

2.2. Shrimp Otter Trawl

The fishing grounds of' the shrimp otter board trawls are the coastal areas, with a water depth of less than 30 m. In the North of Vietnam, small boats with engines of less than 60 Hp are always used. But in the South, fishermen use big fishing boats for catching shrimp. The boats have engines from 33 - 450 Hp. Though the big boats are used for exploitation of shrimp, they still operate in coastal areas. Therefore, the operation of these boats has a negative impact on the small-scale fisheries. Now, most of the otter board trawlers are used to catch shrimp, the fish otter board trawlers are very few in number.

Fishing operation of the shrimp otter board trawl is same as those of the fish otter board trawl.

The mesh size in the wings is 26-50 mm and made of polyethylene 380D/2x3 -380D/ 12x3. The mesh size at the cod-end is 12-24 mm and made of polyethylene 380D/3x3-380D/ 9x3. The size of net depends on the power of' the fishing boat. Fishermen use a "tickler" in front of' the ground rope and the head rope. The two ends of the tickler are kept in the same place with the ends of' ground rope. The length of the chain is 1.5 - 3.5 m shorter than the length of ground rope and moving in front of the ground rope. The tickler is used to round up the shrimp in the sand that jump up when contacted by the iron-chain, thus, the shrimp are easily caught by the net.

The otter boards are rectangular and flat, and are made of wood and iron, they are 0.40 - 0.75 m in width and 0.96 -1.80 m in length. The warps are 12-20 mm in diameter and are made of polyethylene or steel wire, their length depends upon the depth at the fishing ground. The parameters of' single trawls are given in **Table 8**.

3. Bottom Otter Board Trawl with Booms

Presently, in most provinces throughout the country there are many fishing boats catching shrimp, fish and other marine resources using the bottom otter board trawl with booms. To increase the horizontal opening of the trawl mouth, two booms are used on each side of' the boat. Thus, the fishing efficiency of the gear is increased.

The bottom otter board trawl with booms for catching shrimp is not very different in comparison to an ordinary otter board trawl. The mesh size of the net for catching shrimp is 35 - 50 mm in the wings and the mesh size of the cod-end is 20 - 25 mm. But to catch demersal fish and other species, the mesh size is bigger, with the mesh size of the wings ranging 80-240 mm with 30-40 mm at the cod-end.

The boom is used to increase the horizontal spreading of the otter boards because of the increased distance between the two towing warps.

Table 8. The parameters of single trawls in some provinces of Vietnam.

Provinces	Horse power of boat (Hp)	Length of trawl net (m)	Length of head rope (m)	Mesh size in cod end (mm)
Kien Giang	90-150	60.0-65.0	14.3	28.0
	250-400	62.0-95.0	19.0-22.2	28.0-30.0
	440-750	62.0-116.0	25.4-28.6	28.0-30.0
Ca Mau	90-150	41.0-45.0	26.0-35.0	25.0
	250-400	42.0-45.0	36.0-38.0	25.0
Vung Tau	250-400	60.0-70.0	30.0-35.0	20.0
	440-750	60.0-70.0	33.0-.8.0	20.0
Hai Phong	23-45	37.6	31.2	20.0
	250-400	76	39.6	40.0
	440-750	60.0-76.0	34.5-42.0	40.0

Net Setting:

The operation of an otter board trawl with booms is the same as for an ordinary otter board trawl. The setting of the towing warps reaches to the necessary length and links to the messenger ropes at the two ends of the booms.

Net Hauling:

The trawl winch hauls the messenger ropes. Following that, the board is hung on the gallows, and the net is collected by the common method of using an auxiliary vessel. The end of the sweep line is linked to the headline leg and tow leg of the wings. This requires the two vessels to work in synchronization to set the sweep lines, then the towing warp. The length of the towing warp depends on the fishing ground.

4. Bottom Pair Trawl

As mentioned above, bottom pair trawls are gradually replacing the otter board trawls for exploitation of fish. Now, bottom pair trawls are very popular in the Northern and Southern regions. Most pair trawlers have engines of 200-450 Hp per boat. There are two types of trawl used. The first one is an ordinary trawl and the second is the Chinese trawl with a very big mesh

size (see **Table 7**).

The nets have head ropes of 18-84 m in length. The length of trawl net fully stretched ranges from 40 m to 120 m.

The main parameters of the structure of the ordinary pair trawls are given in **Table 9**.

To operate the pair trawl, the two boats must have the same horsepower and size. This trawling method is applied throughout the whole country. However, only some provinces of the Southern region where the fisheries have developed use a big boat called a "Female boat" in cooperation with a small boat called the "male boat". During operations, the small boat is responsible for keeping only the end of a towing warp, the big boat not only keeps the end of other towing warp but also hauls the towing warps and the trawl and also stores the catch.

Net Setting:

The main boat (the setting boat) reduces its speed to the lowest possible level and the cod-end is deployed into the sea, the body of net, wings and headline leg and tow leg follow in turn.

Table 9. The parameters of ordinary bottom pair trawls in some provinces of Vietnam.

Provinces	Horse power of boat (Hp)	Length of trawl net (m)	Length of head rope (m)	Mesh size in cod end (mm)
Kien Giang	90-150	50-58	22.2-23.8	25.0-30.0
	250-400	62.0-100.0	23.8-28.6	25.0-30.0
Vung Tau	90-150	44.0-55.0	35.0-48.0	28.0-34.0
	155-225	44.0-48.0	50.0-52.0	30.0-34-0
	250-400	47.0-70.0	39.0-40.0	30.0-40.0
Khanh Hoa	23-45	48.0-48.5	19.2-21.0	30.0
	46-84	49.5-52.0	21.5-23.0	30.0
Da Nang	23-45	40.0-65.0	18.0-30.0	13.0-17.0
	46-84	440.0-68.0	20.0-41.0	16.0-18.0
Nghe An	<23	40.0-45.0	28.0-30.0	18.0
Hai Phong	250-400	60.0-82.0	32.0-42.0	40.0

The other boat reaches to the left side of the main one, a messenger line is thrown to the main vessel in order to haul one wing of the net.

Net Hauling:

Both boats reduce their speed to the minimum and turn their bows to the right until they are moving in the opposite direction to towing. The two boats then haul the towing warps synchronously, then the sweep line, the headline leg and the tow leg.

The auxiliary boat hauls the sweep line until the headline leg and the tow leg is very to close to the gallows then the headline leg and tow leg are linked together with the messenger line to transfer them to the main boat. The auxiliary then moves away from the main boat.

After receiving the wings from the auxiliary boat, the main boat continues using a crane to haul each part of the net from the wing to the cod-end. This operation is carried out on the right side (starboard) of the boat, at that time the boat is controlled carefully to keep the net from being to close to the vessel's side or drifting toward the propeller. Depending on the catch, one or two cranes may be used to haul the net.

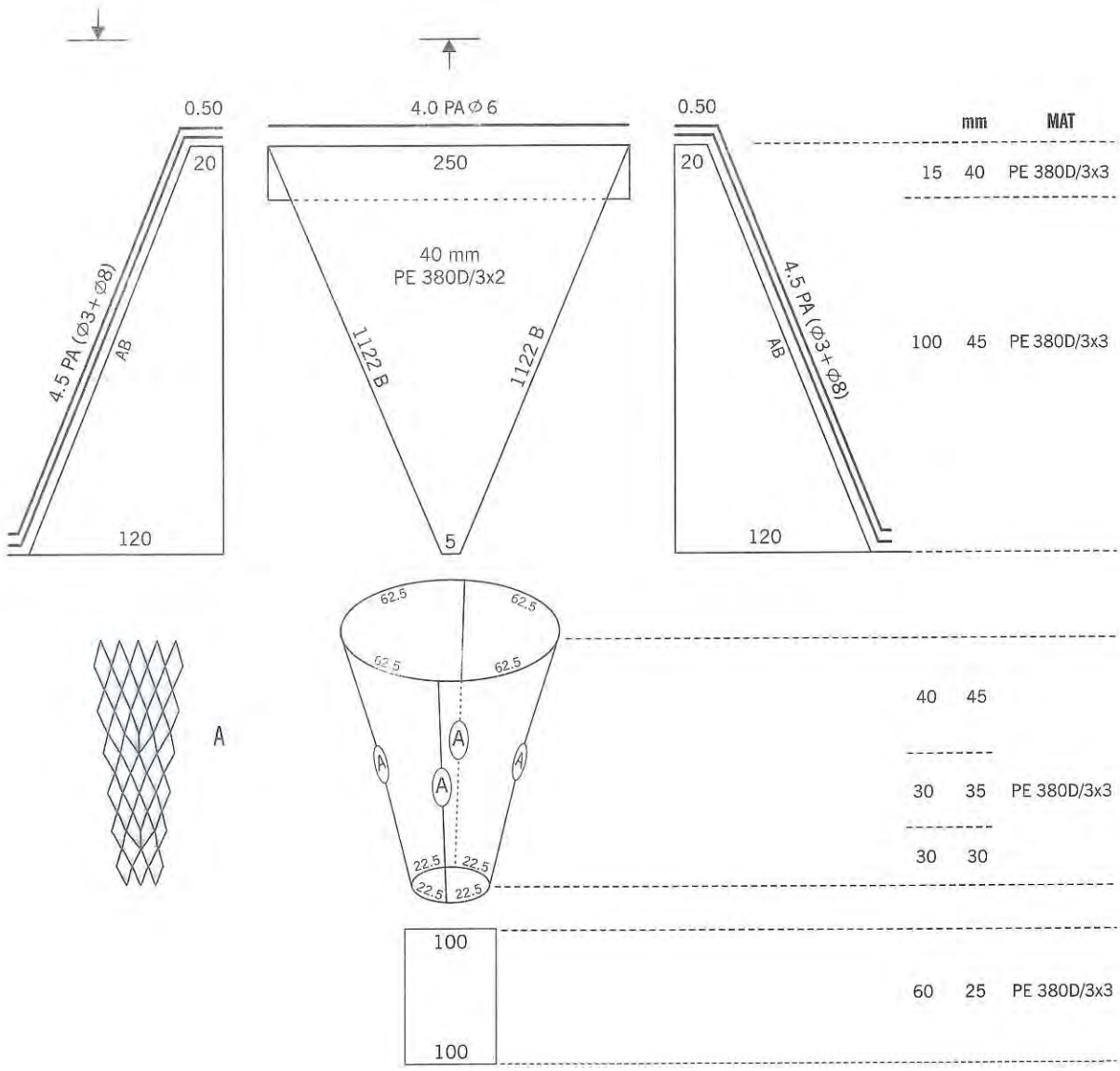
Apart from the above fishing method, some provinces use other methods to haul nets.

The duration of trawling in a haul is from 2-4 hours. The fishing trip lasts from 1 to 3 weeks. The main catches are bottom fishes, semi-pelagic fishes and trash fish. The average ratio of trash fish is usually 40-55% of the total catch.

TRAWL
Bottom, Double rig
Shrimp

VESSEL
Loa : 11.0
HP : 23

LOCATION
Cat Ba
Hai Phong

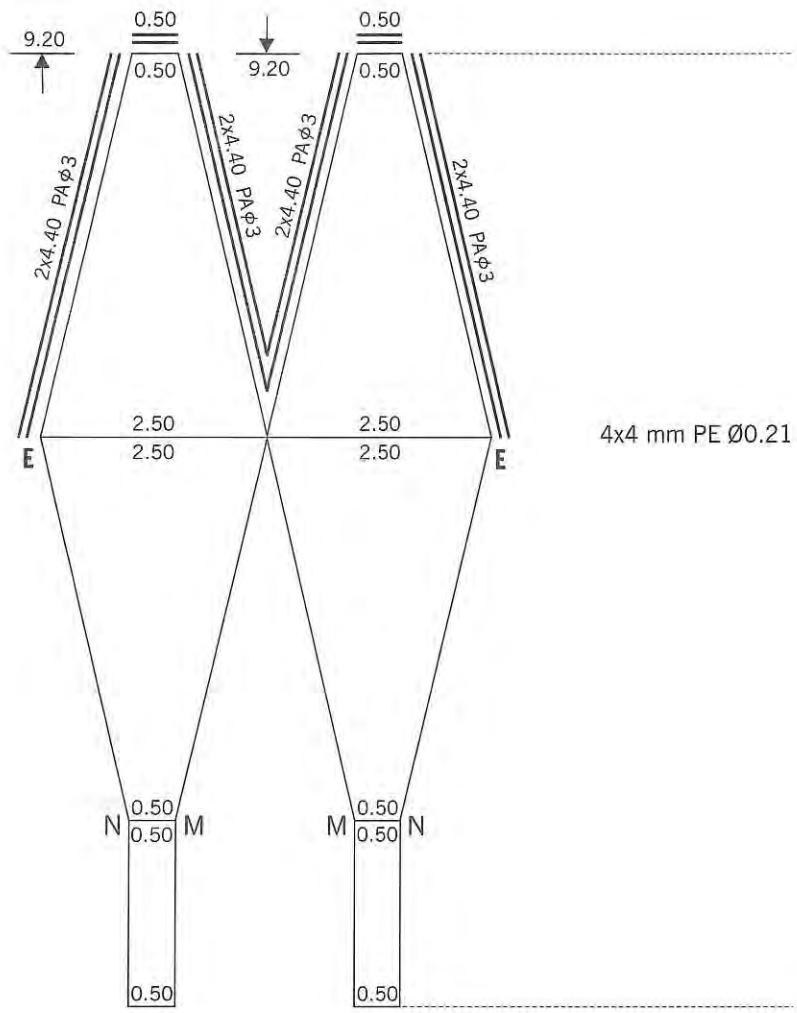


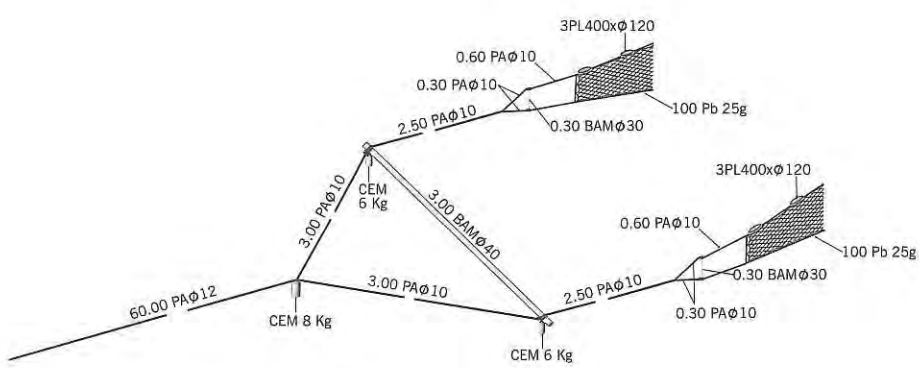
mm		MAT
15	40	PE 380D/3x3
100	45	PE 380D/3x3
40	45	
30	35	PE 380D/3x3
30	30	
60	25	PE 380D/3x3

TRAWL
Bottom, Beam
Shrimp

VESSEL
Loa : 13
GT : 11
Hp : 15

LOCATION
Dien Chau
Nghe An

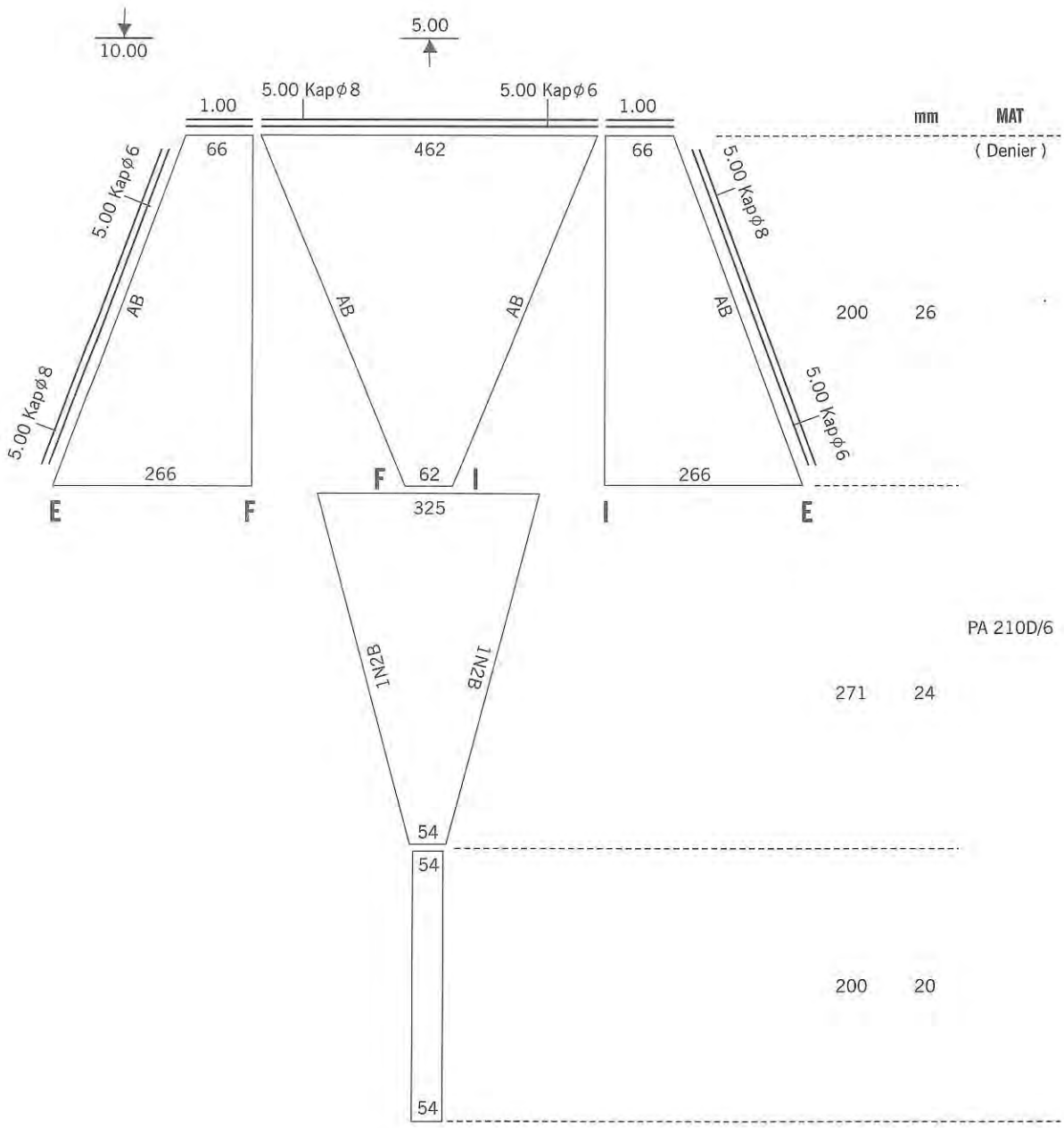


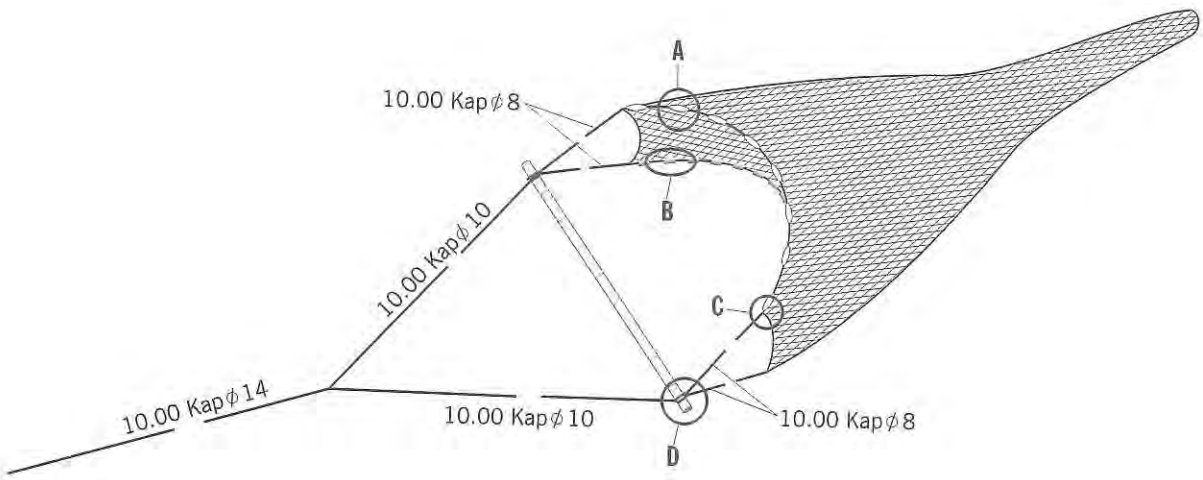


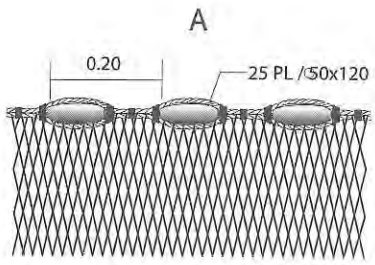
TRAWL
Bottom, Beam
Shrimp

VESSEL
Loa : 9
Hp : 15

LOCATION
Thuan An
T.T-Hue




A
10.00 Kapϕ8
B
10.00 Kapϕ10
C
10.00 Kapϕ14
10.00 Kapϕ10
10.00 Kapϕ8
D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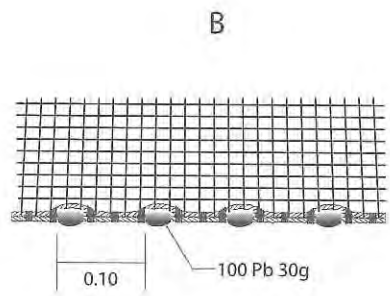
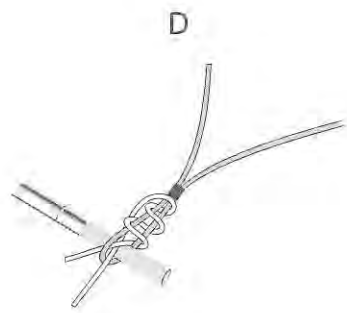
25 PL /50x120


B
0.10
100 Pb 30g

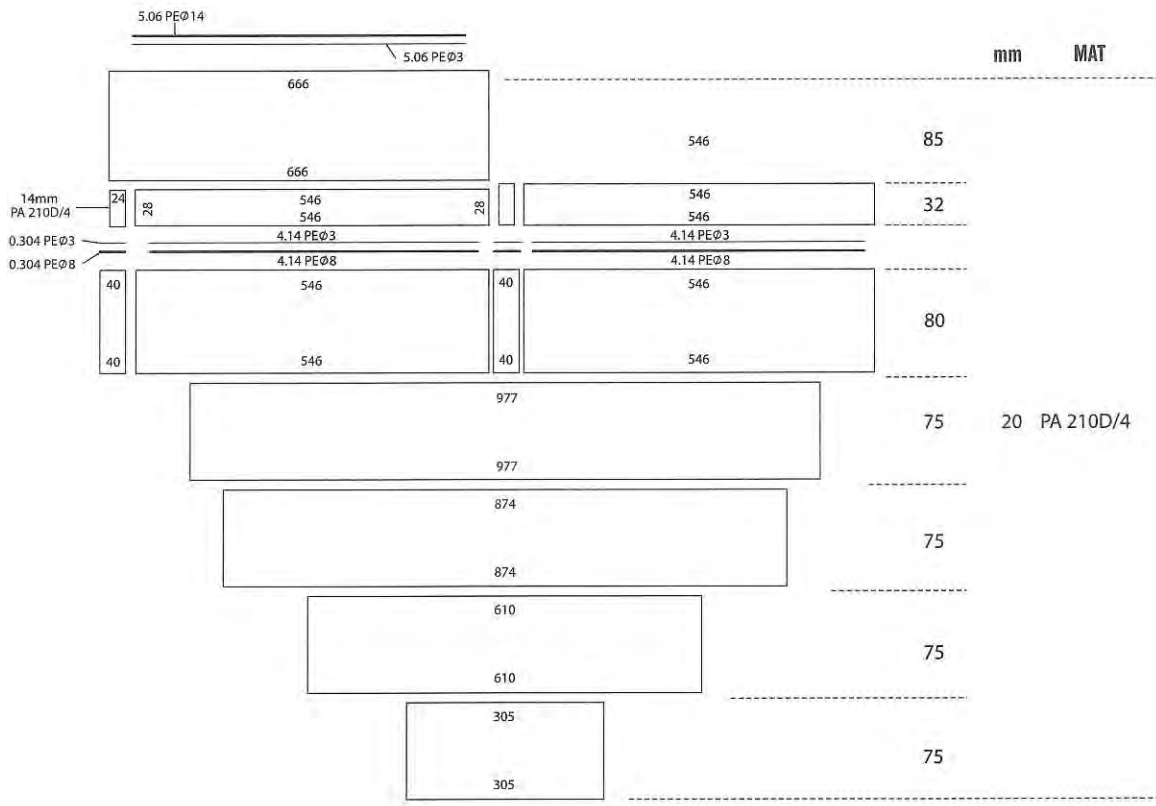

C

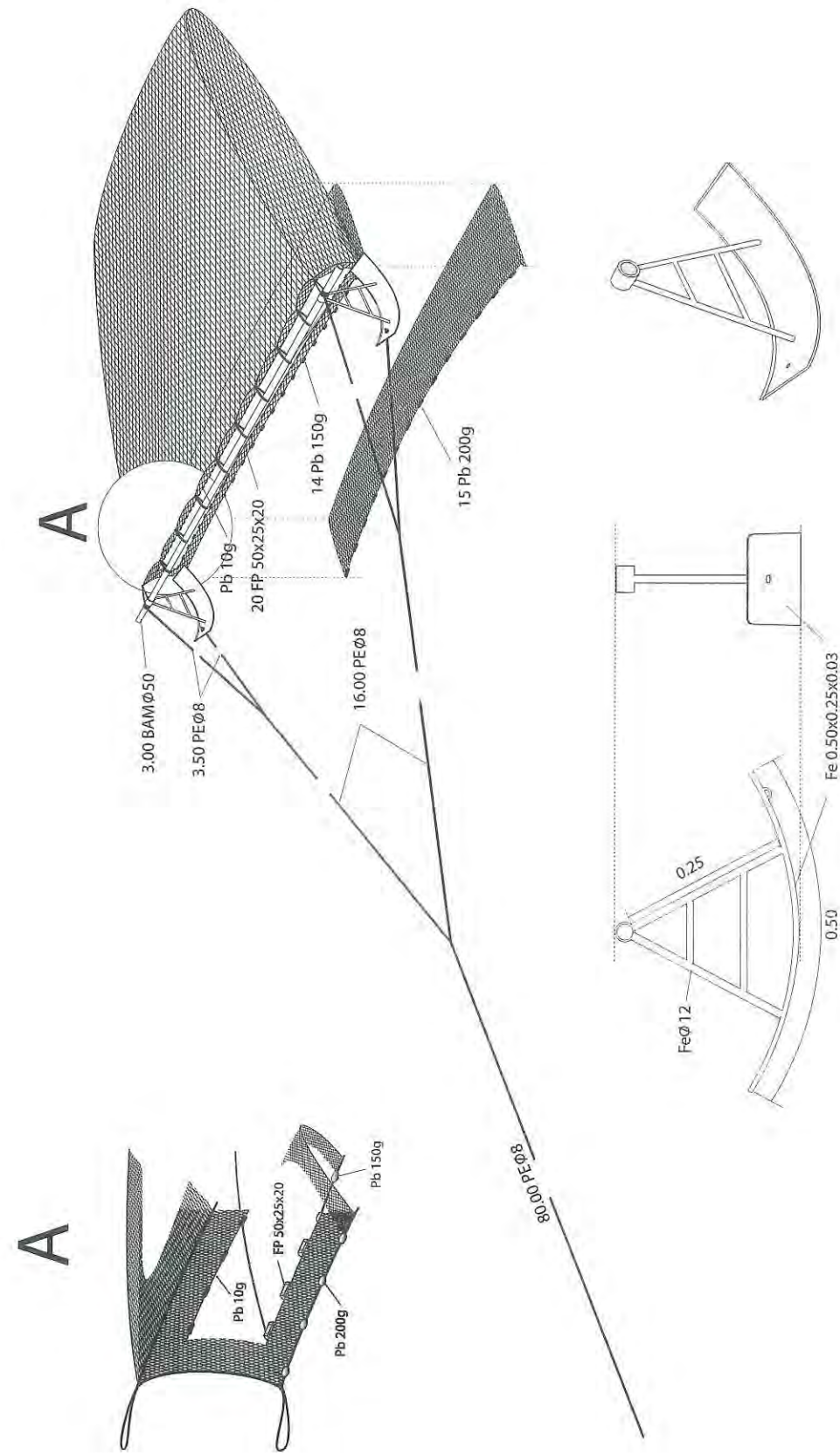

D

TRAWL
Bottom, Deam
Shrimp

VESSEL
Loa : 11.0
Hp : 22

LOCATION
Nghia Hung
Nam Dinh

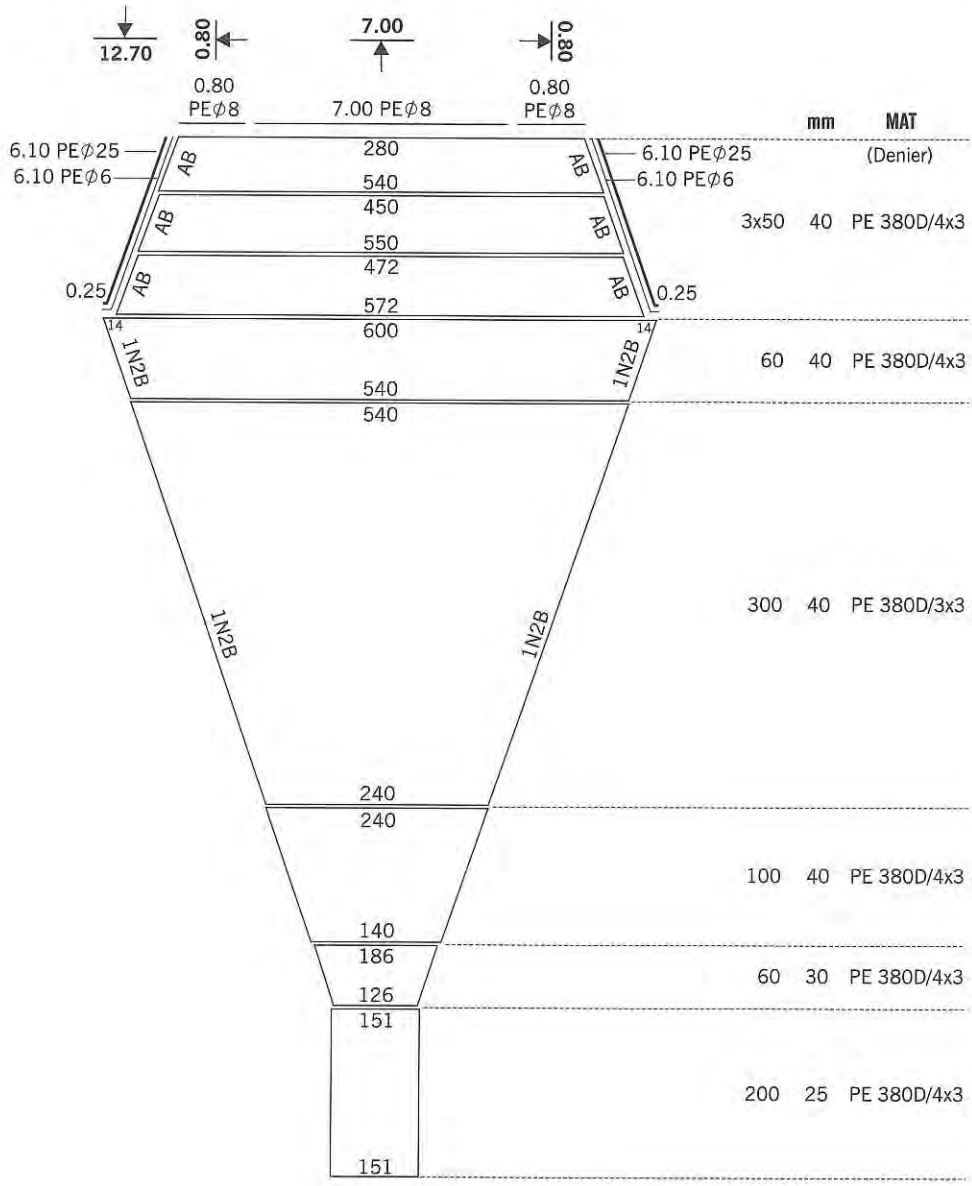


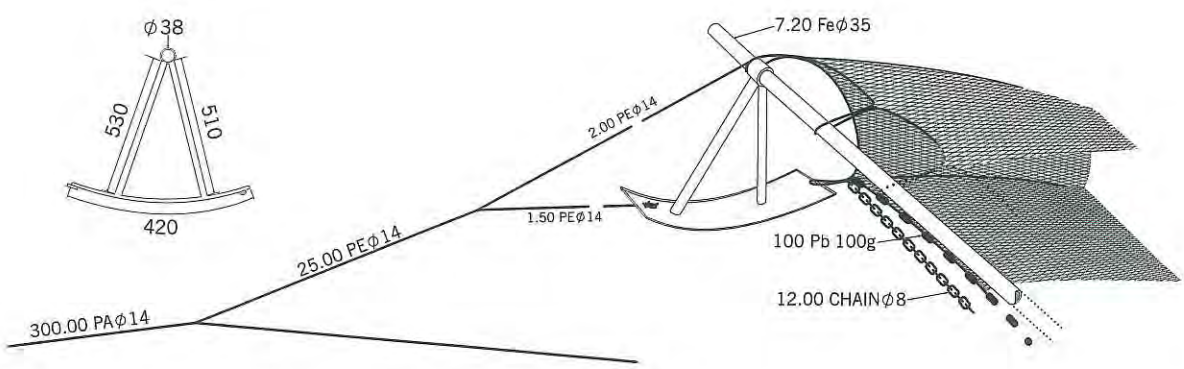

A
3.00 BAMØ50
3.50 PEØ8
Pb 10g
20 FP 50x25x20
14 Pb 150g
15 Pb 200g
16.00 PEØ8
80.00 PEØ8
Fe 0.50x0.25x0.03
0.25
0.50
FeØ 12
A
Pb 10g
FP 50x25x20
Pb 150g
Pb 200g

TRAWL
Bottom, Beam
Shrimp, Demersal fishes

VESSEL
Loa : 11.5
Hp : 22

LOCATION
Ly Hoa
Quang Binh

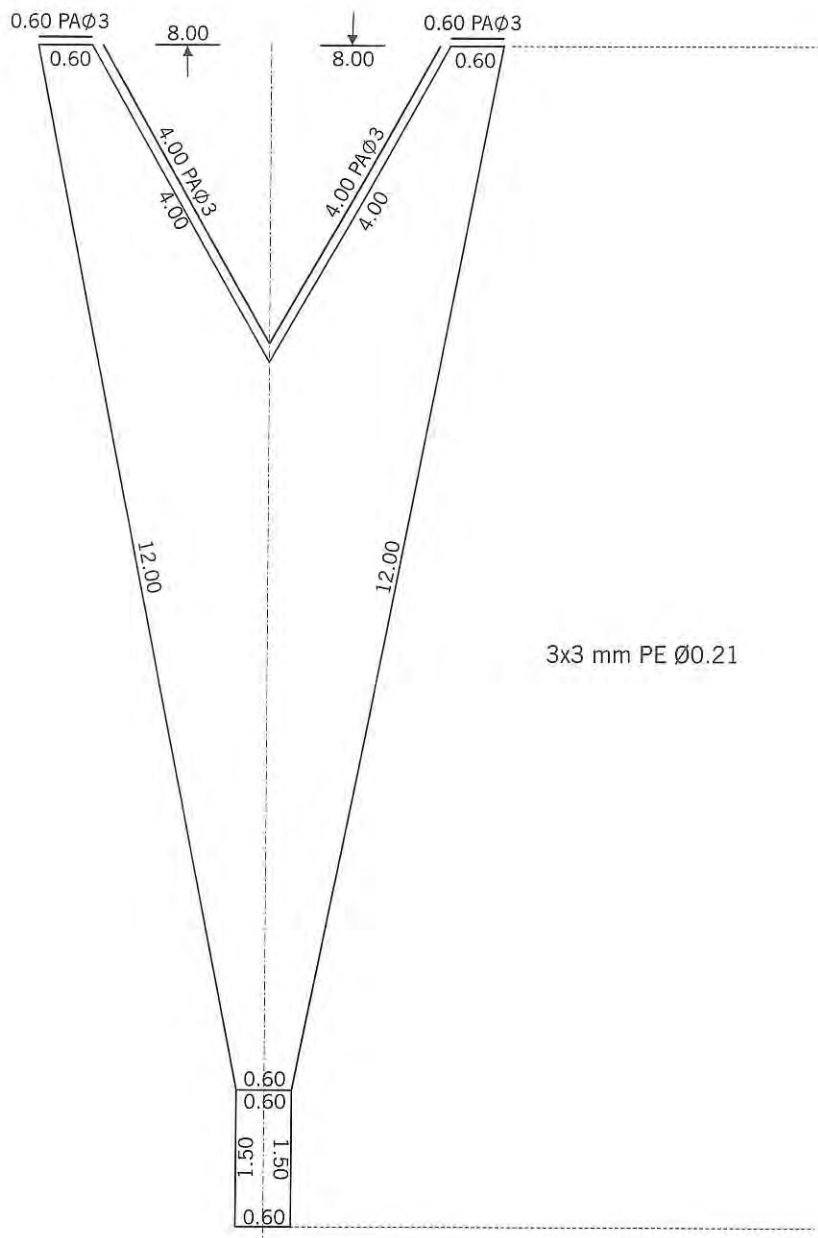


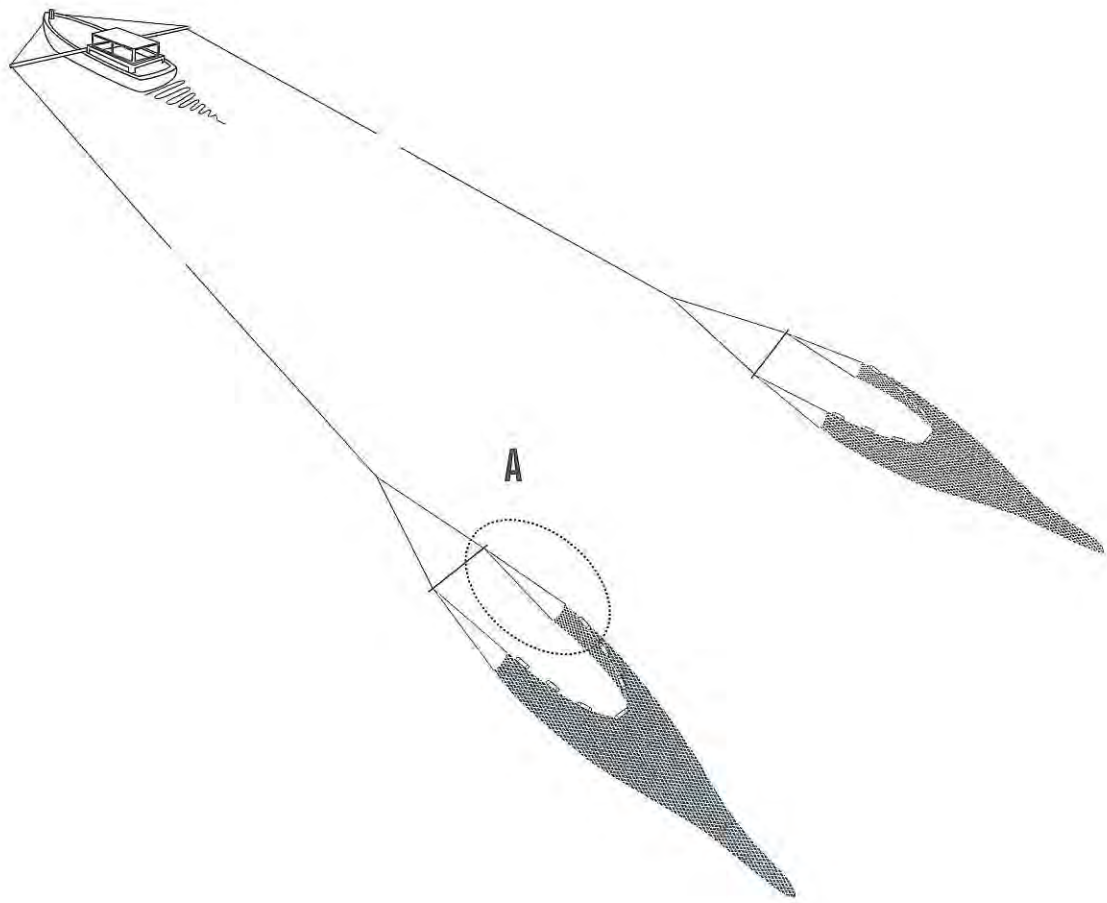


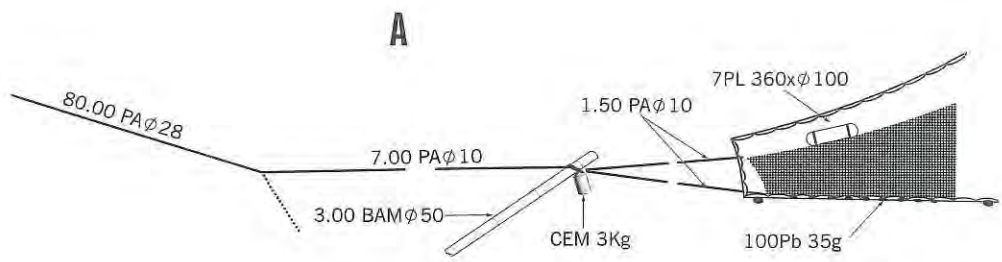
TRAWL
Bottom, Double rig
Shrimp, Demersal fishes

VESSEL
Loa : 12
Hp : 22

LOCATION
Phu Loc
Thua Thien Hue



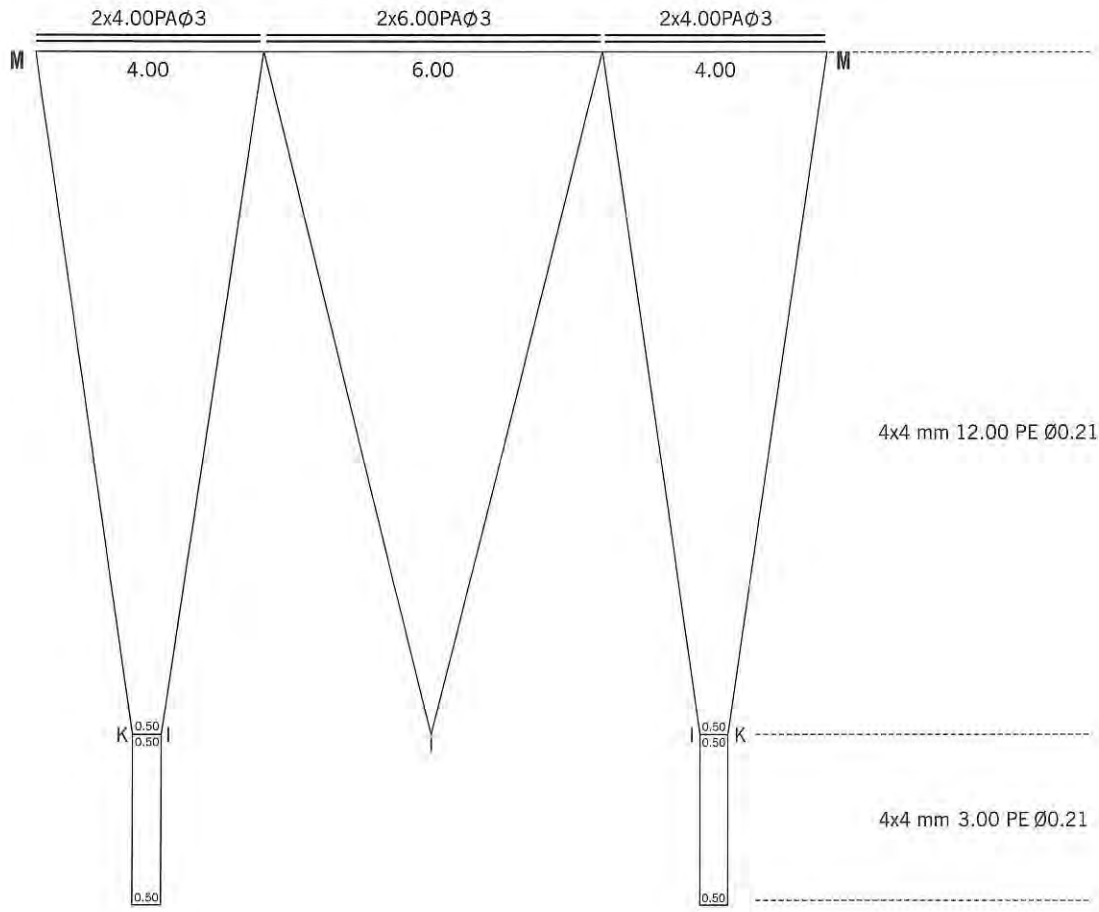

A

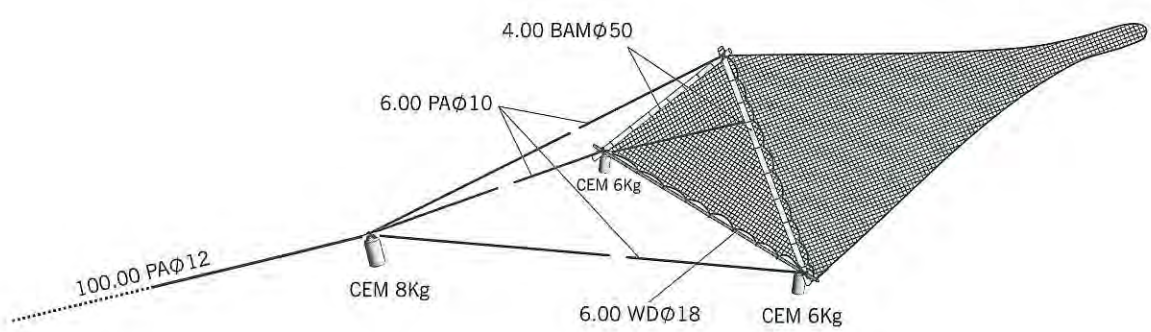

A
80.00 PAϕ28
7.00 PAϕ10
3.00 BAMϕ50
1.50 PAϕ10
7PL 360xϕ100
CEM 3Kg
100Pb 35g

TRAWL
Bottom, Beam
Shrimp

VESSEL
Loa : 13.5
Hp : 2x18

LOCATION
Dien Chau
Nghe An

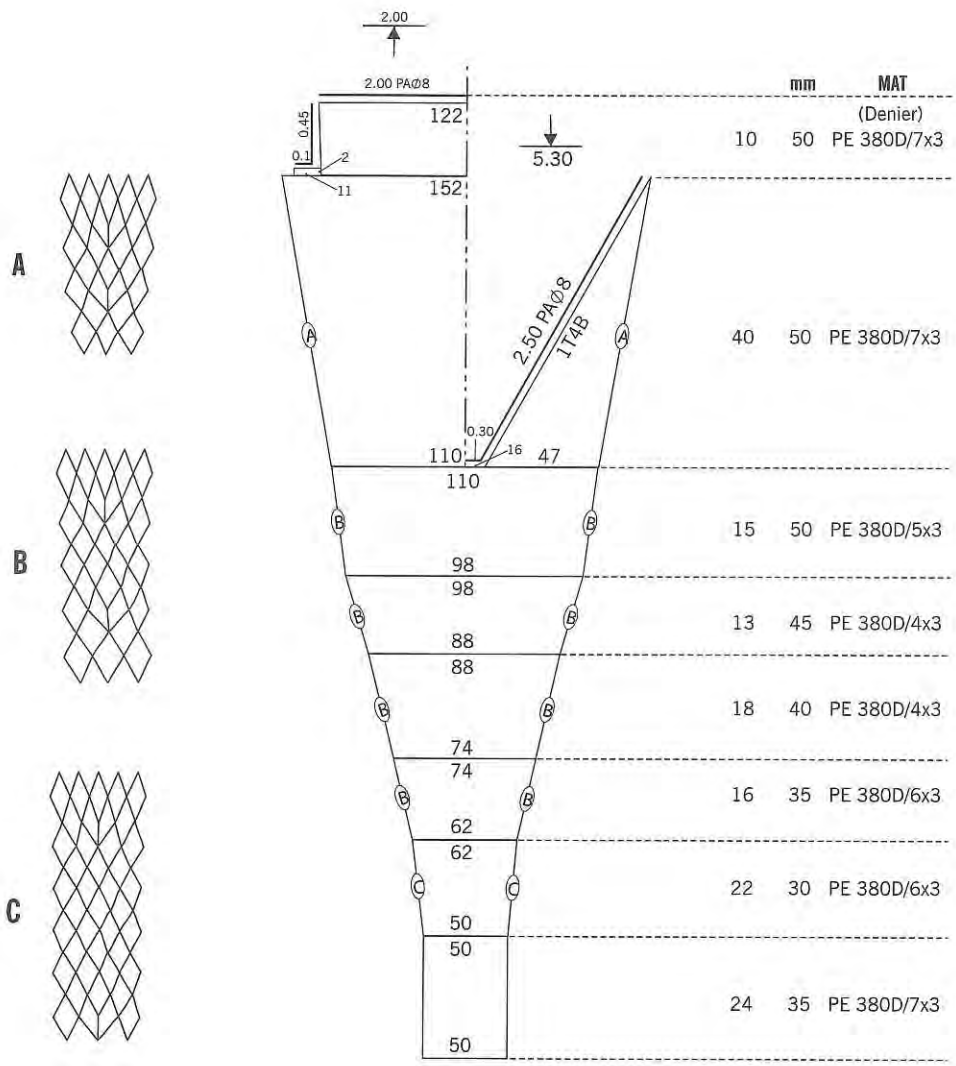


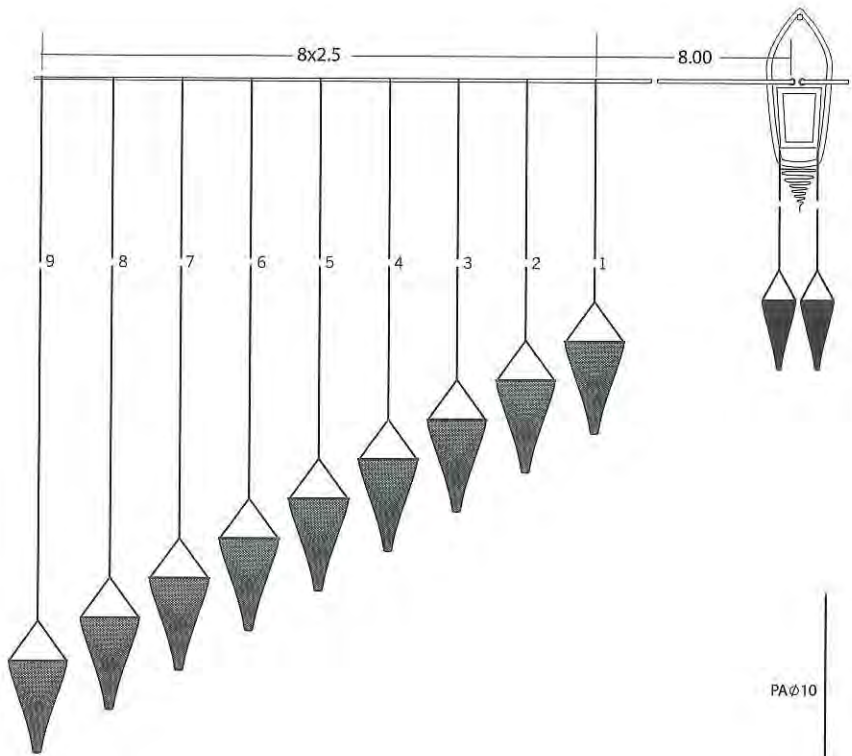


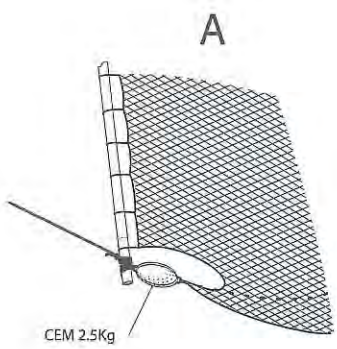
TRAWL
Multi-Rig Trawl
Shrimp

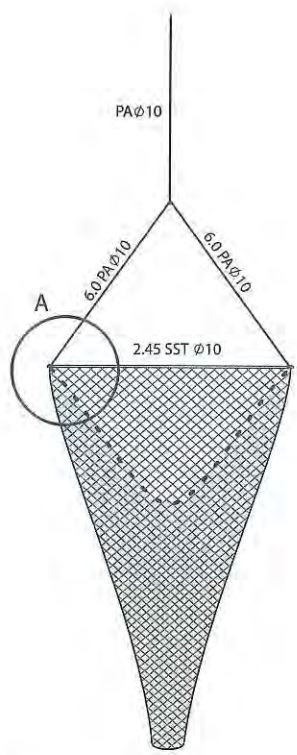
VESSEL
Loa : 20
GT : 92
Hp : 250

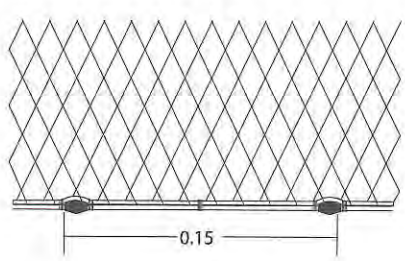
LOCATION
Cat Hai
Hai Phong




8x2.5
8.00
9
8
7
6
5
4
3
2
1


A
CEM 2.5Kg

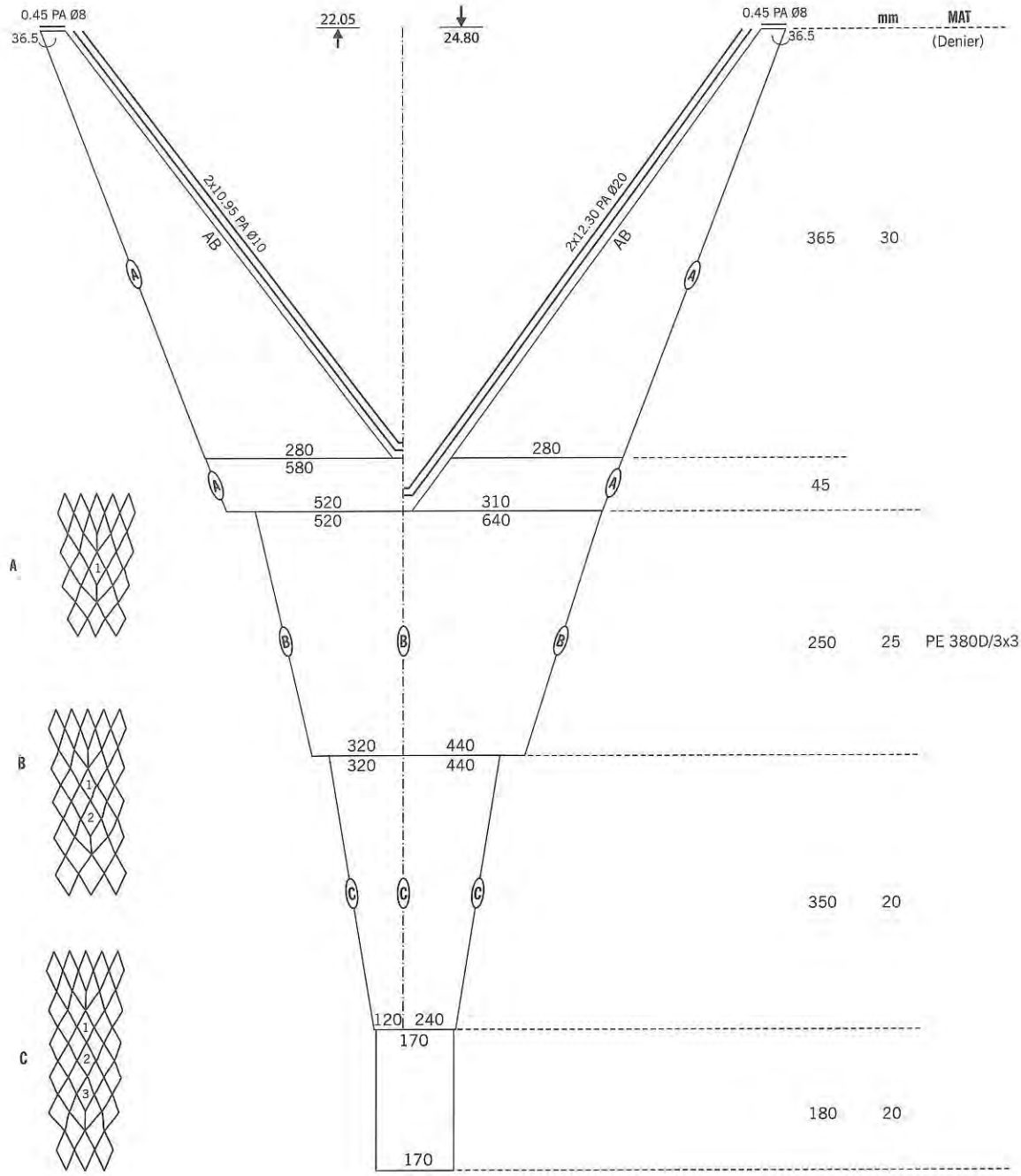

PAØ10
6.0 PAØ10
6.0 PAØ10
A
2.45 SST Ø10

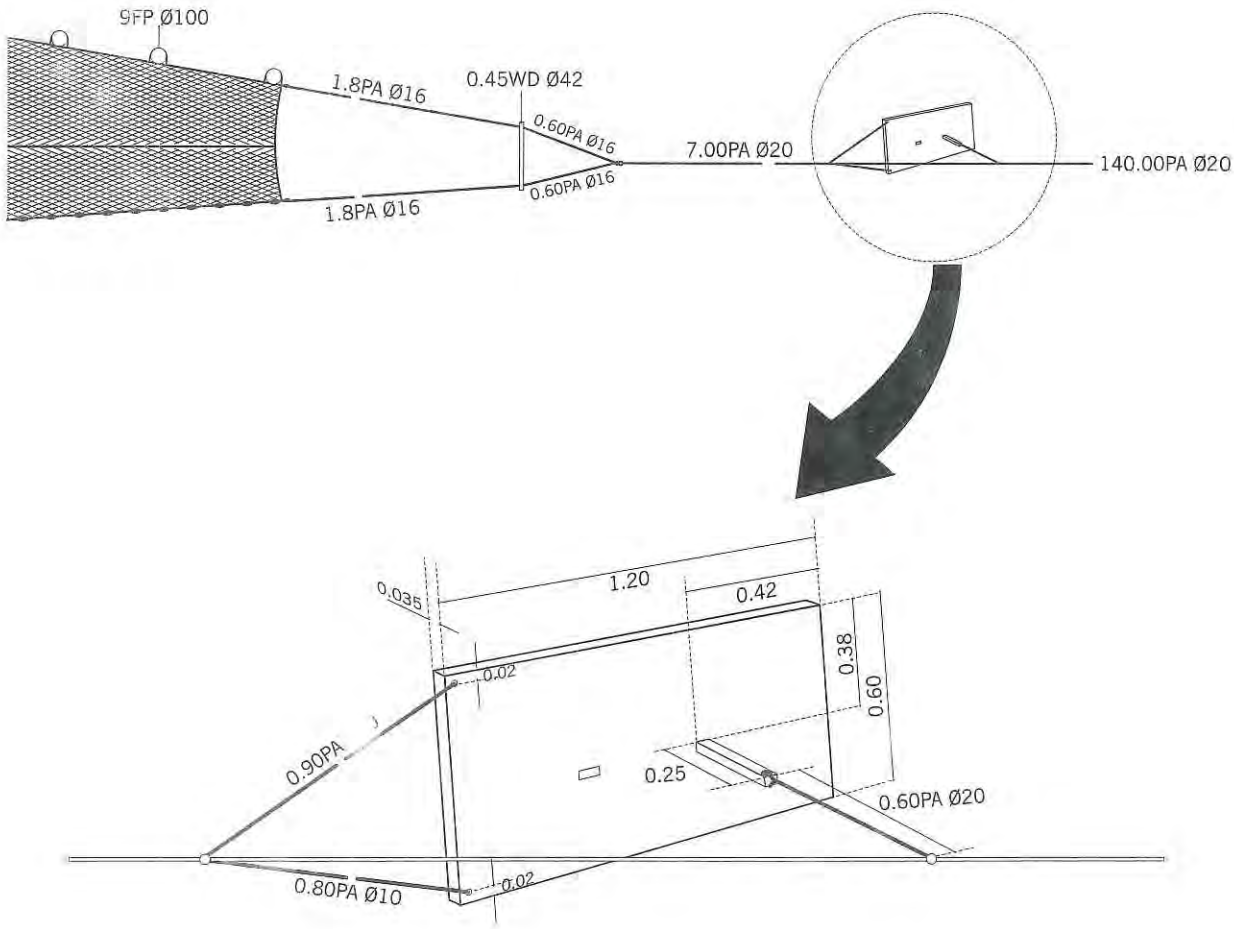

0.15

TRAWL
Bottom, Otter
Shrimp, Fishes

VESSEL
Loa : 13.6
GT : 15
Hp : 18

LOCATION
Dien Chau
Nghe An

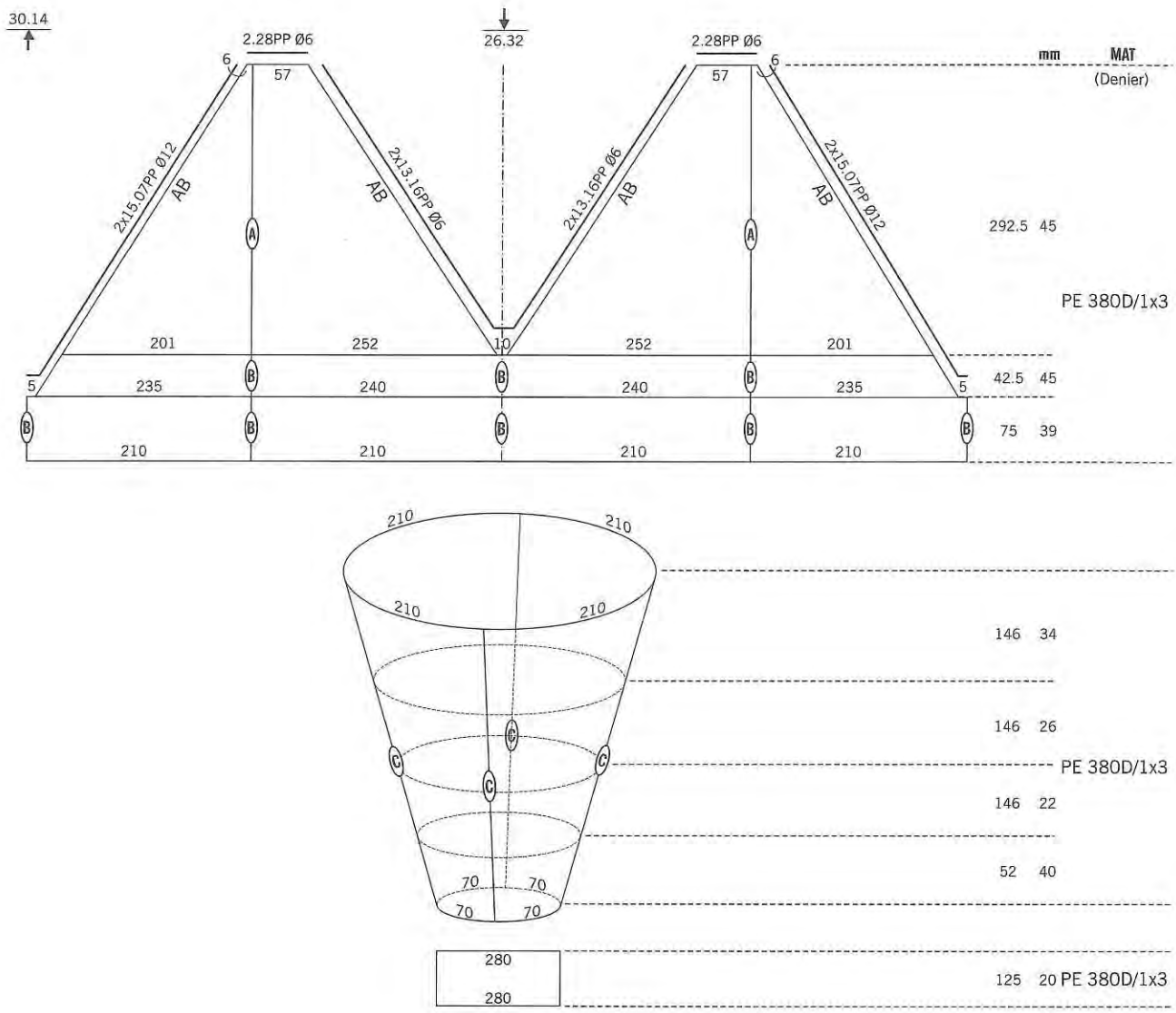


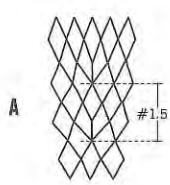

9FP Ø100
1.8PA Ø16
0.45WD Ø42
0.60PA Ø16
7.00PA Ø20
140.00PA Ø20
0.60PA Ø16
1.8PA Ø16
1.20
0.42
0.035
0.02
0.38
0.60
0.90PA
0.25
0.60PA Ø20
0.80PA Ø10
0.02

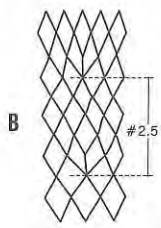
TRAWL
Bottom, Otter
Shrimp

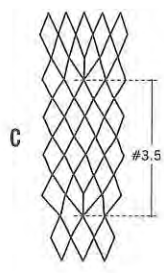
VESSEL
Loa : 13.9
Hp : 22

LOCATION
Diem Dien
Thai Binh





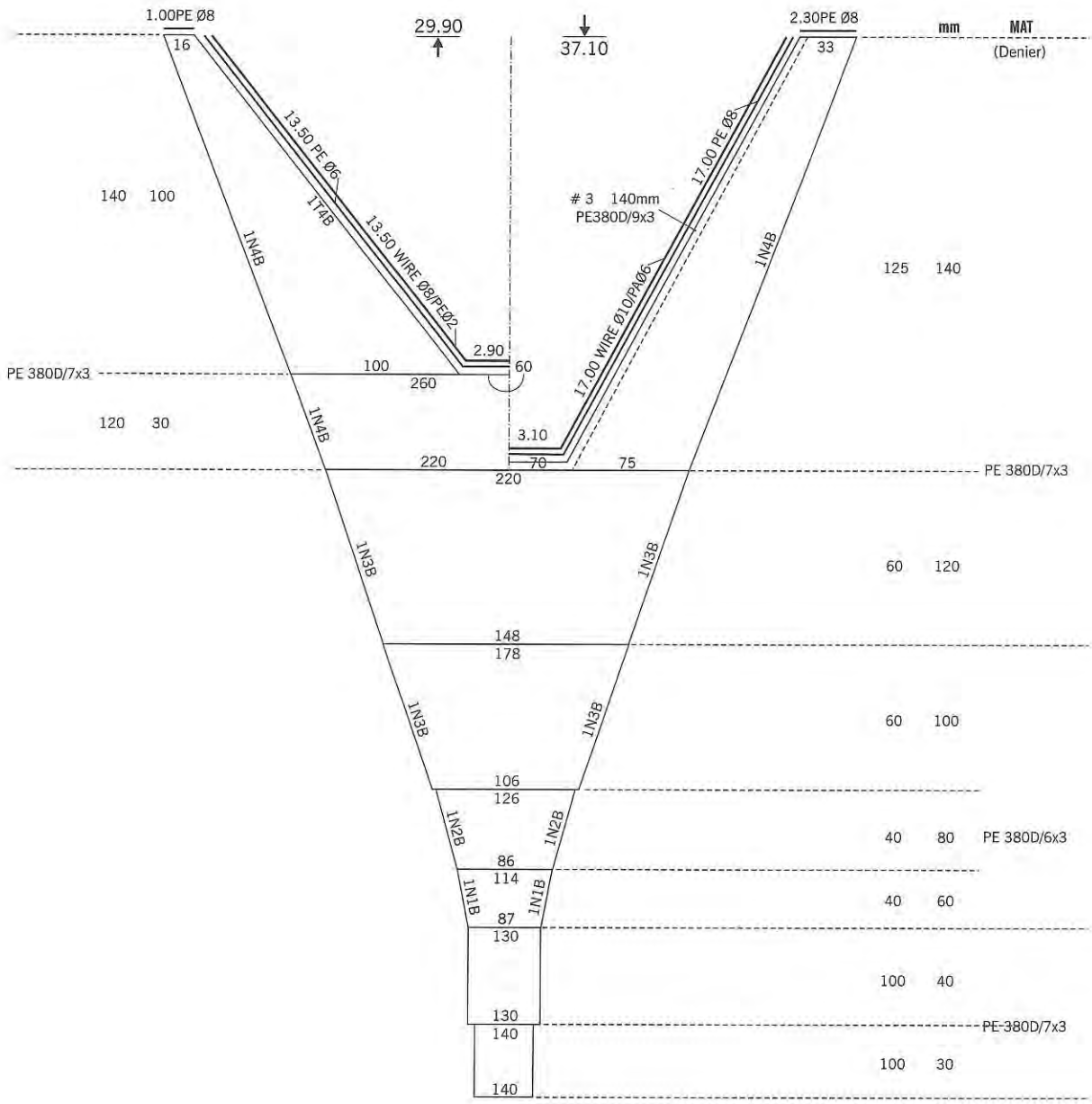


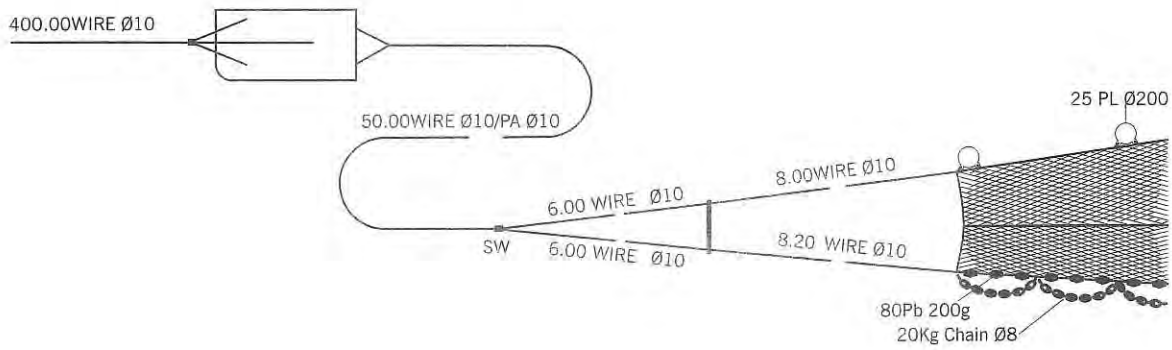


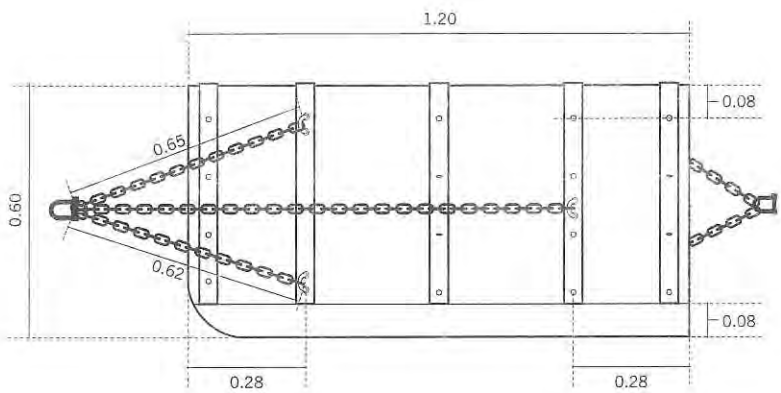
TRAWL
Bottom, Otter
Demersal Fishes, Squid,
Cuttlefish

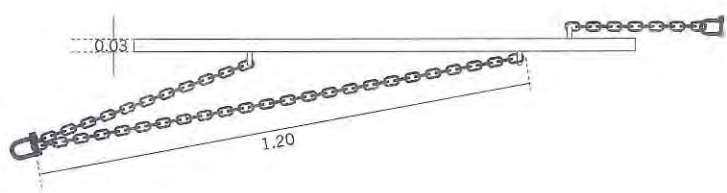
VESSEL
Loa :19.8
GT : 25
Hp : 135

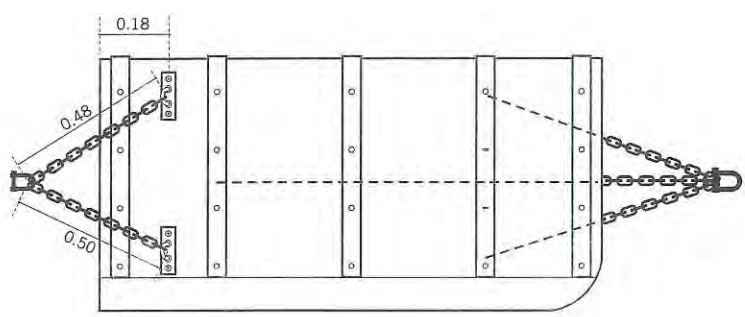
LOCATION
Ly Hoa
Quang Binh




400.00WIRE Ø10
50.00WIRE Ø10/PA Ø10
25 PL Ø200
8.00WIRE Ø10
6.00 WIRE Ø10
SW
6.00 WIRE Ø10
8.20 WIRE Ø10
80Pb 200g
20Kg Chain Ø8


1.20
0.08
0.65
0.60
0.62
0.08
0.28
0.28

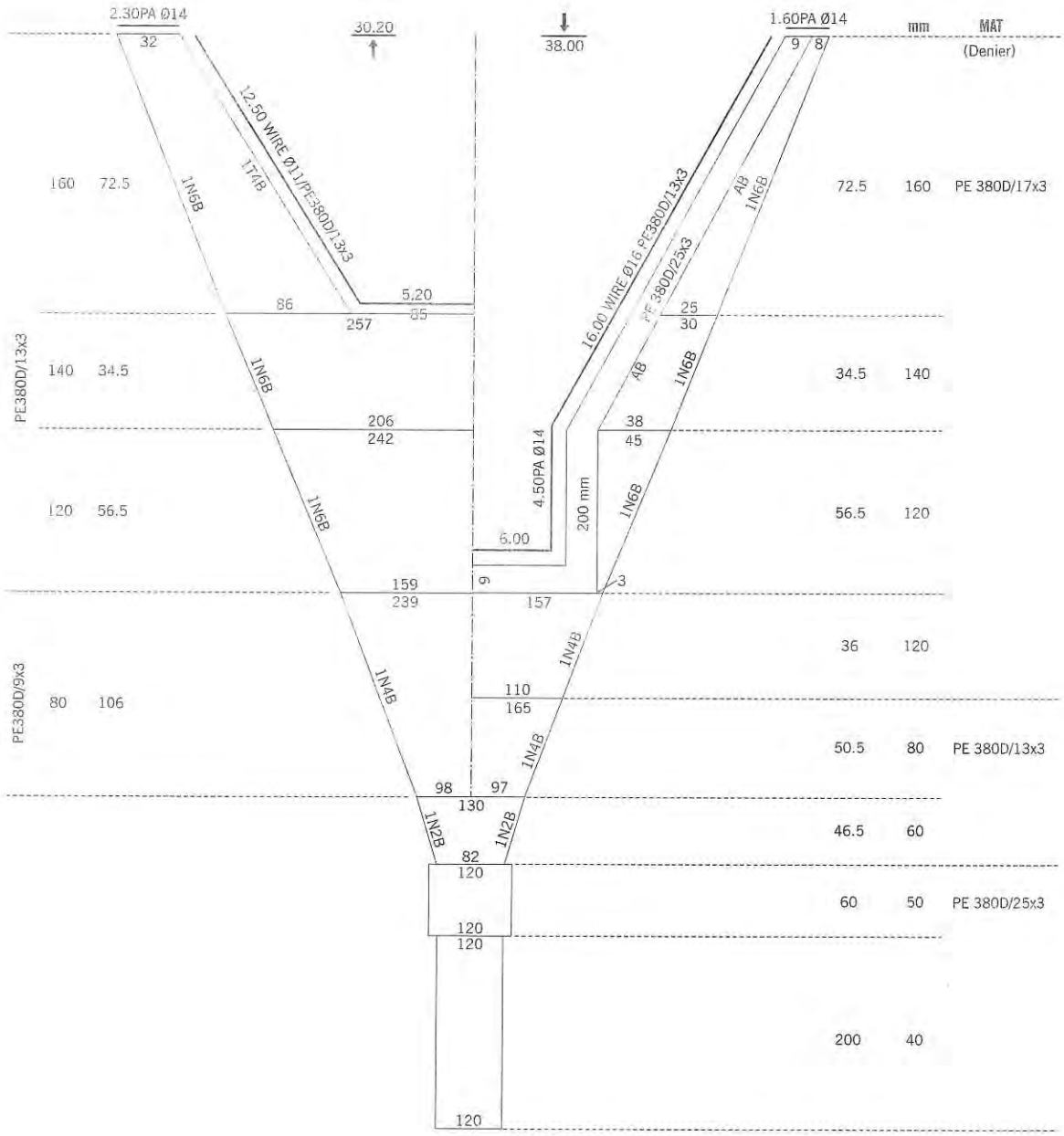

0.03
1.20

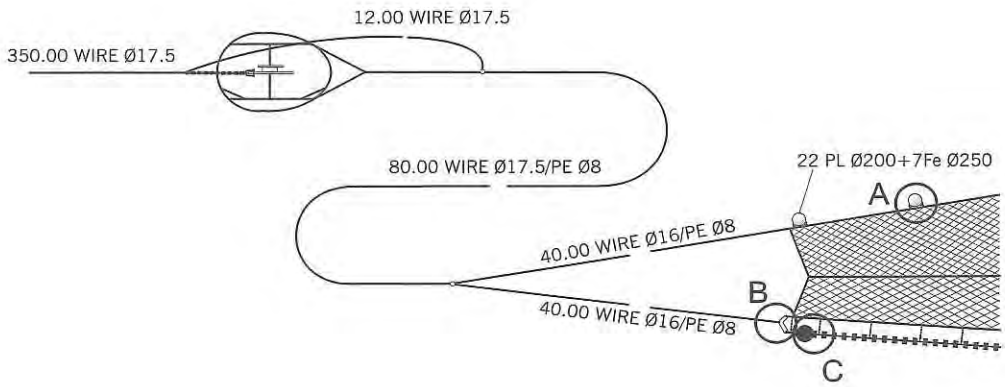

0.18
0.48
0.50

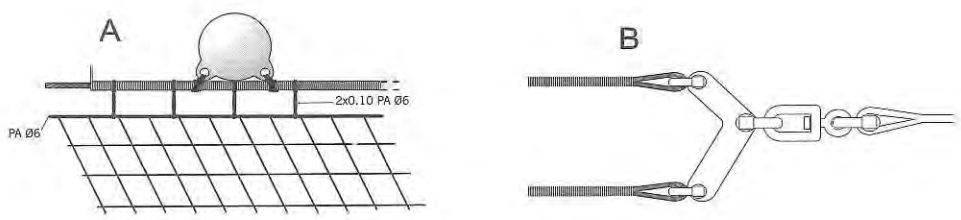
TRAWL
Bottom, Otter
Demersal Fishes, Squid, Cuttlefish

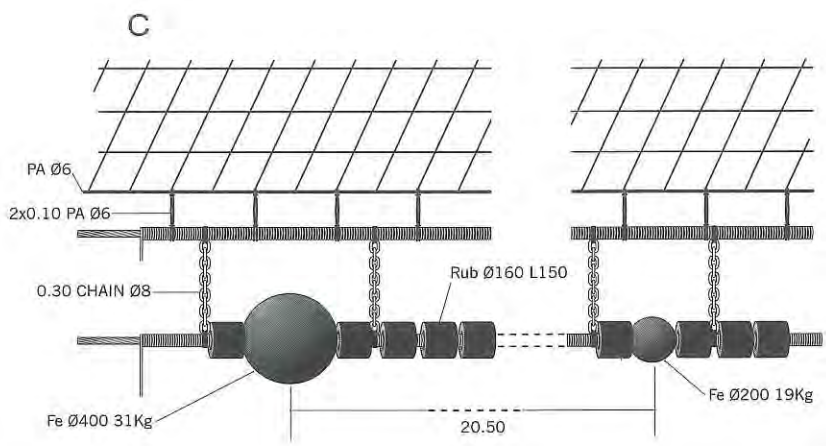
VESSEL
Loa : 30
GT : 80
Hp : 250

LOCATION
Cat Hai
Hai Phong




12.00 WIRE Ø17.5
350.00 WIRE Ø17.5
80.00 WIRE Ø17.5/PE Ø8
22 PL Ø200+7Fe Ø250
A
40.00 WIRE Ø16/PE Ø8
B
40.00 WIRE Ø16/PE Ø8
C


A
2x0.10 PA Ø6
PA Ø6
B


C
PA Ø6
2x0.10 PA Ø6
0.30 CHAIN Ø8
Rub Ø160 L150
Fe Ø400 31Kg
Fe Ø200 19Kg
20.50

TRAWL

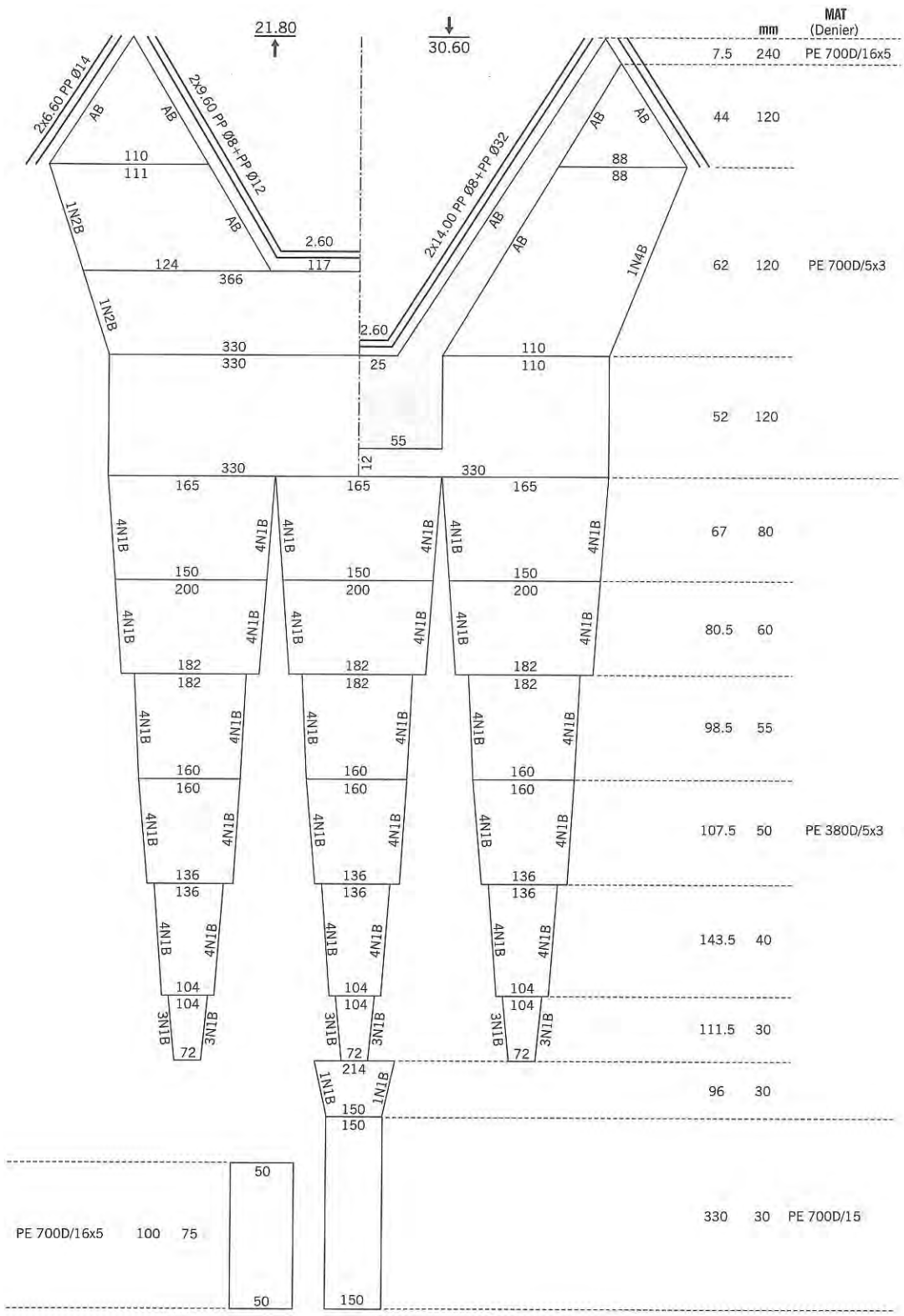
Bottom, Otter
Demersal Fishes, Squid,
Cuttlefish

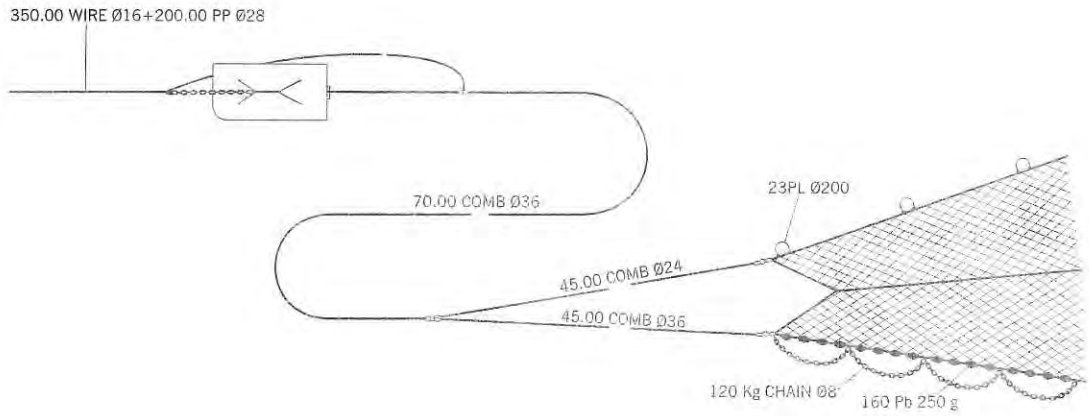
VESSEL

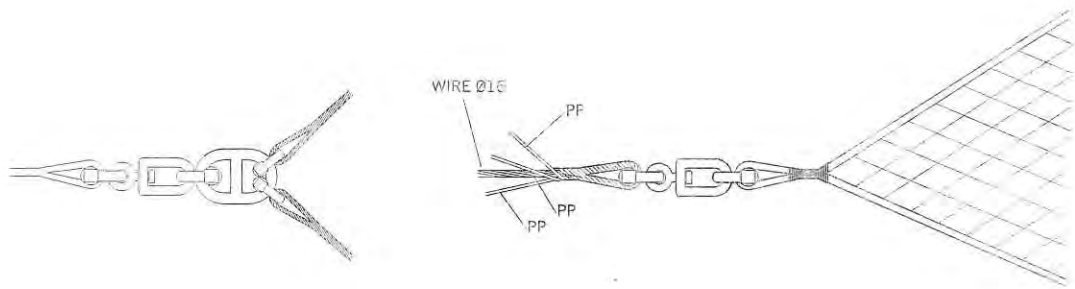
Loa : 20.30
Hp : 370

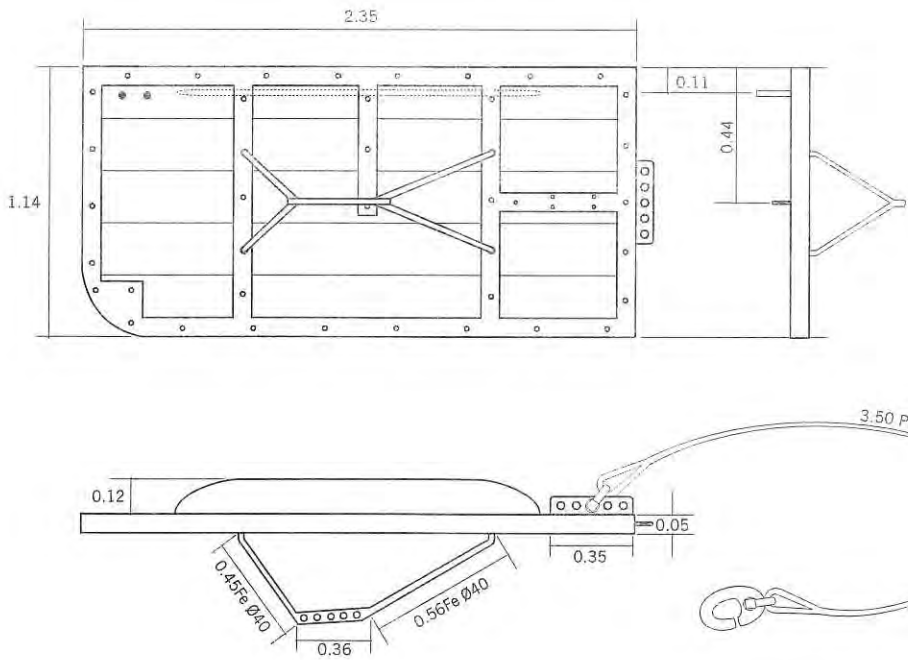
LOCATION

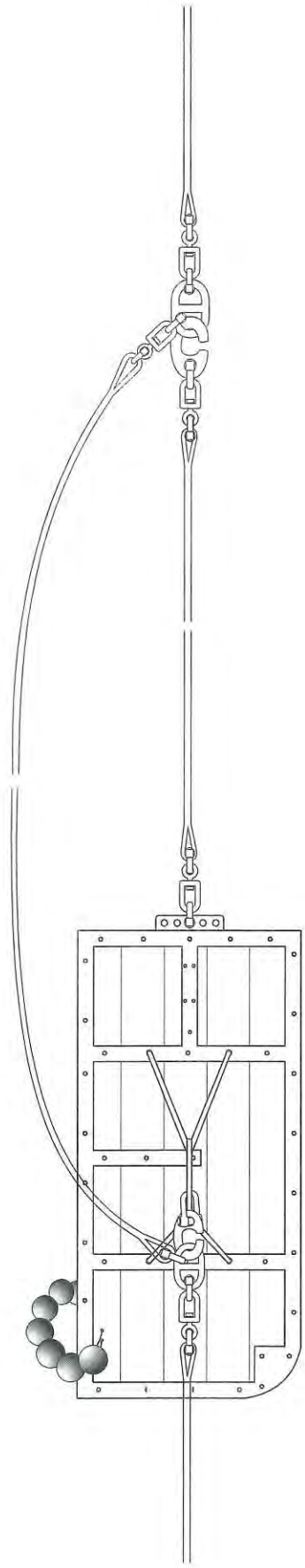
Rach Gia
Kien Giang




350.00 WIRE Ø16+200.00 PP Ø28
70.00 COMB Ø36
23PL Ø200
45.00 COMB Ø24
45.00 COMB Ø36
120 Kg CHAIN Ø8
160 Pb 250 g


WIRE Ø16
PP
PP
PP


2.35
1.14
0.11
0.44
3.50 PP Ø30
0.12
0.05
0.35
0.45Fe Ø40
0.56Fe Ø40
0.36



TRAWL

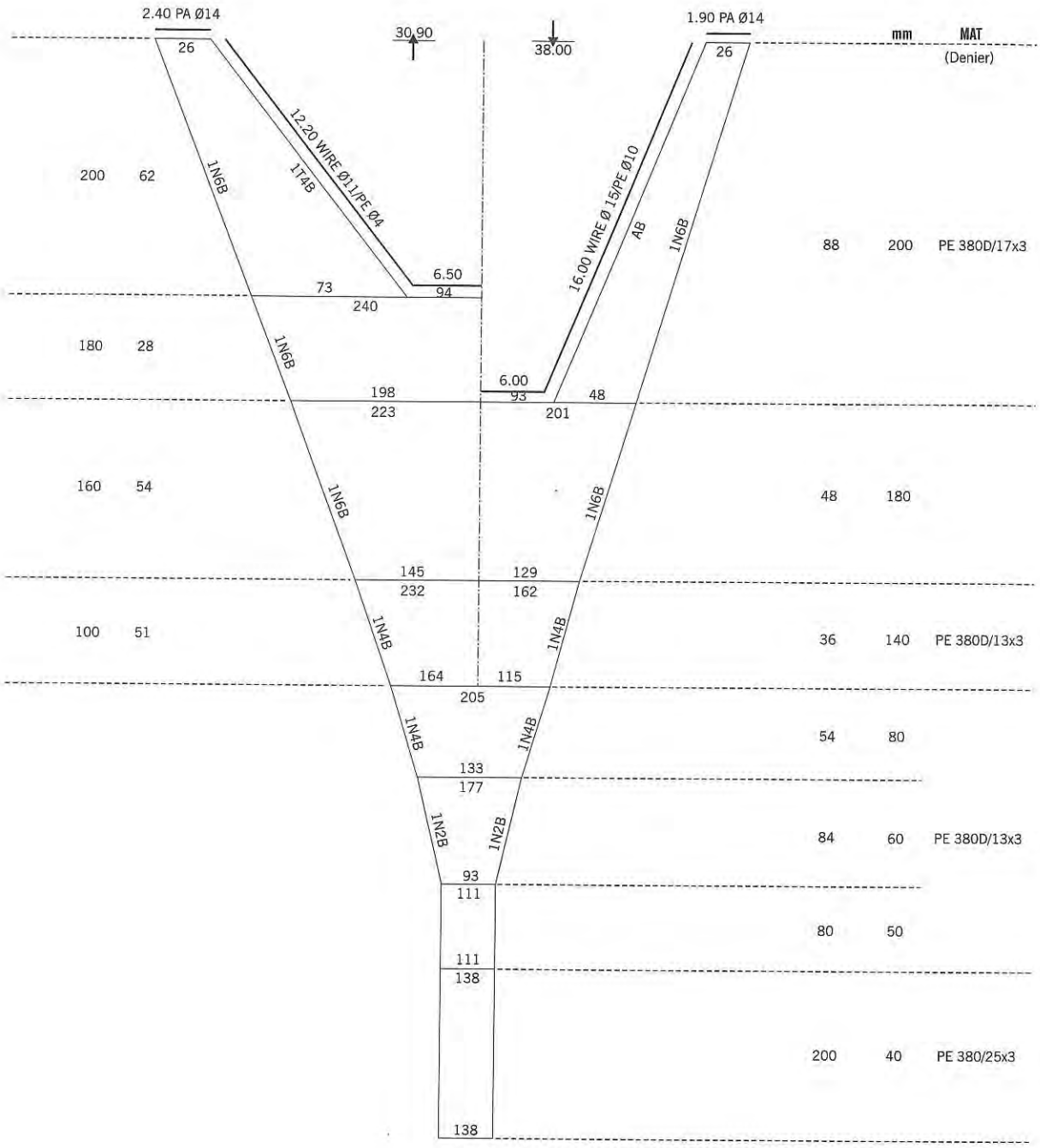
Bottom, Otter
Demersal Fishes, Squid,
Cuttlefish

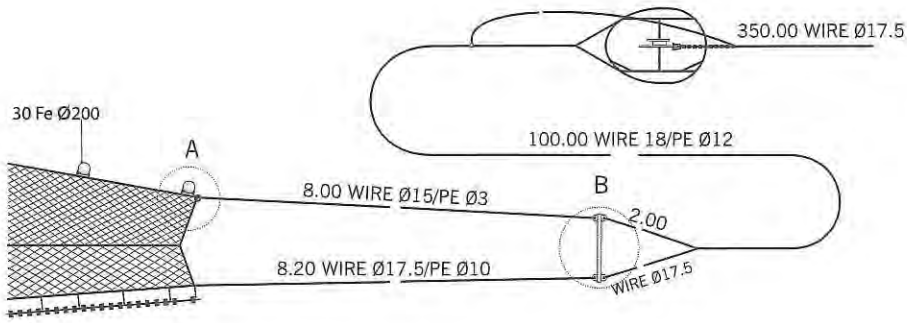
VESSEL

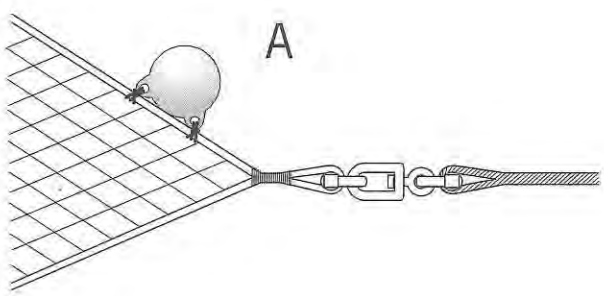
Loa : 31.4
GT : 101
Hp : 400

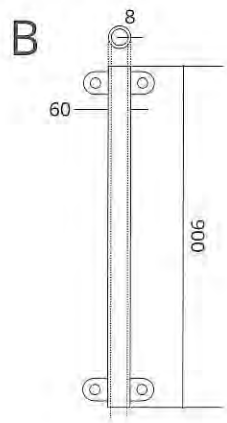
LOCATION

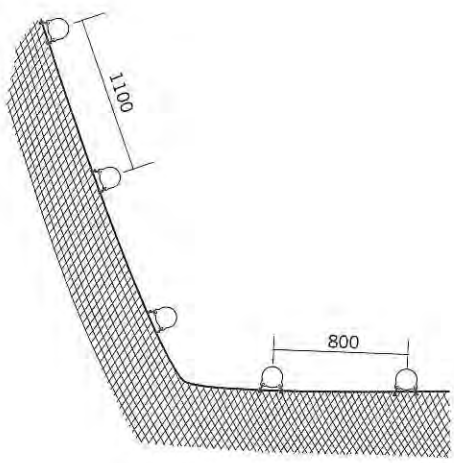
Cat Hai
Hai Phong

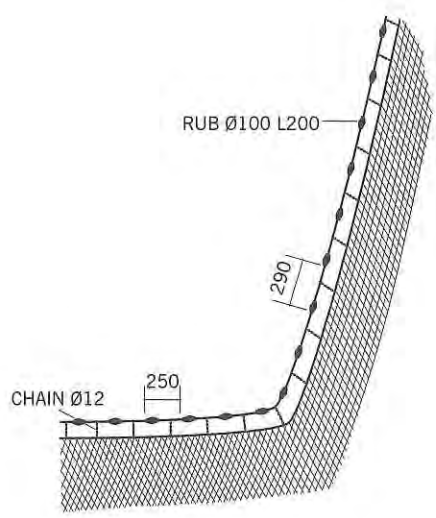



350.00 WIRE Ø17.5
30 Fe Ø200
A
100.00 WIRE 18/PE Ø12
B
8.00 WIRE Ø15/PE Ø3
2.00
8.20 WIRE Ø17.5/PE Ø10
WIRE Ø17.5


A


B
8
60
900

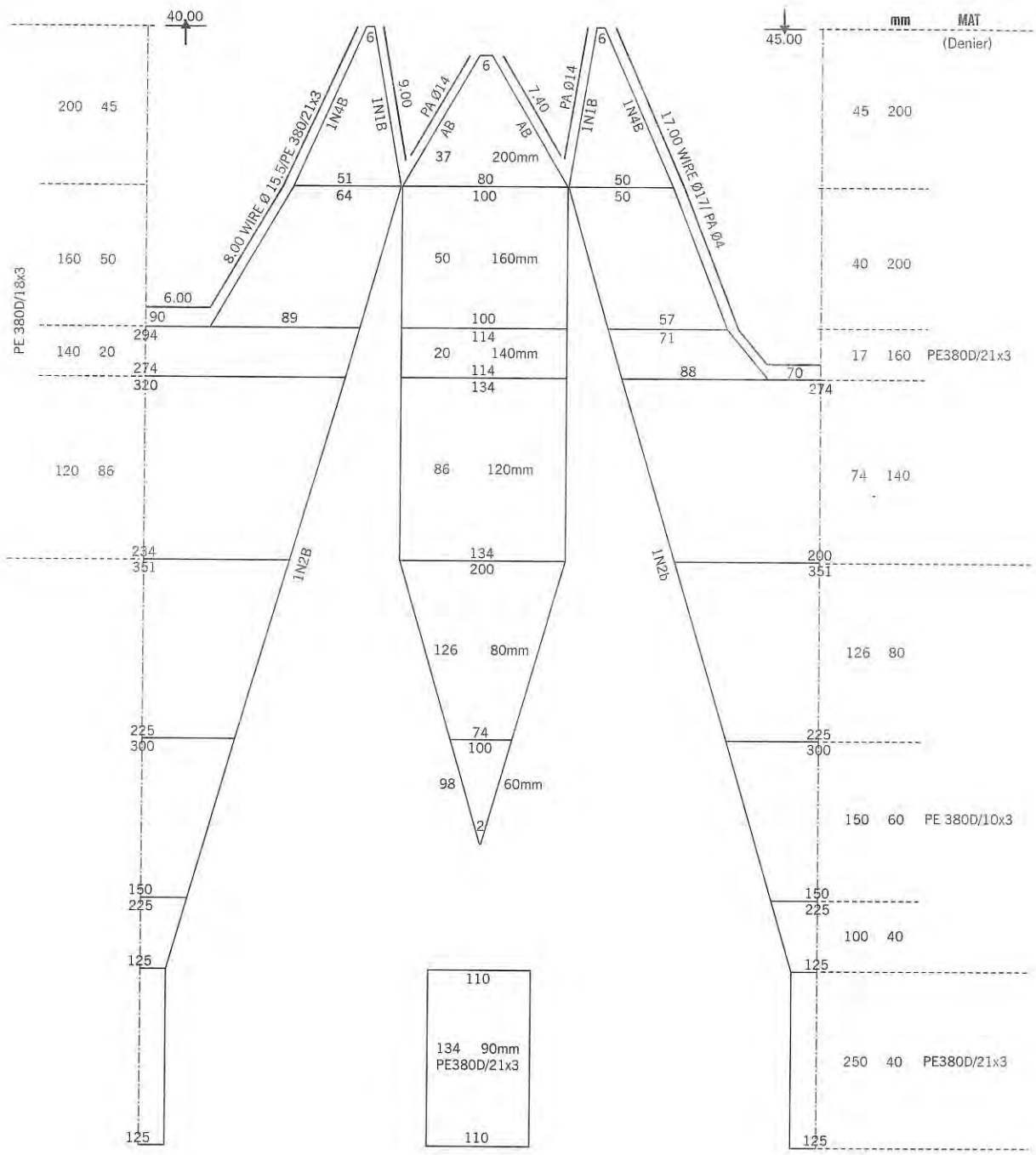

1100
800


RUB Ø100 L200
290
CHAIN Ø12
250

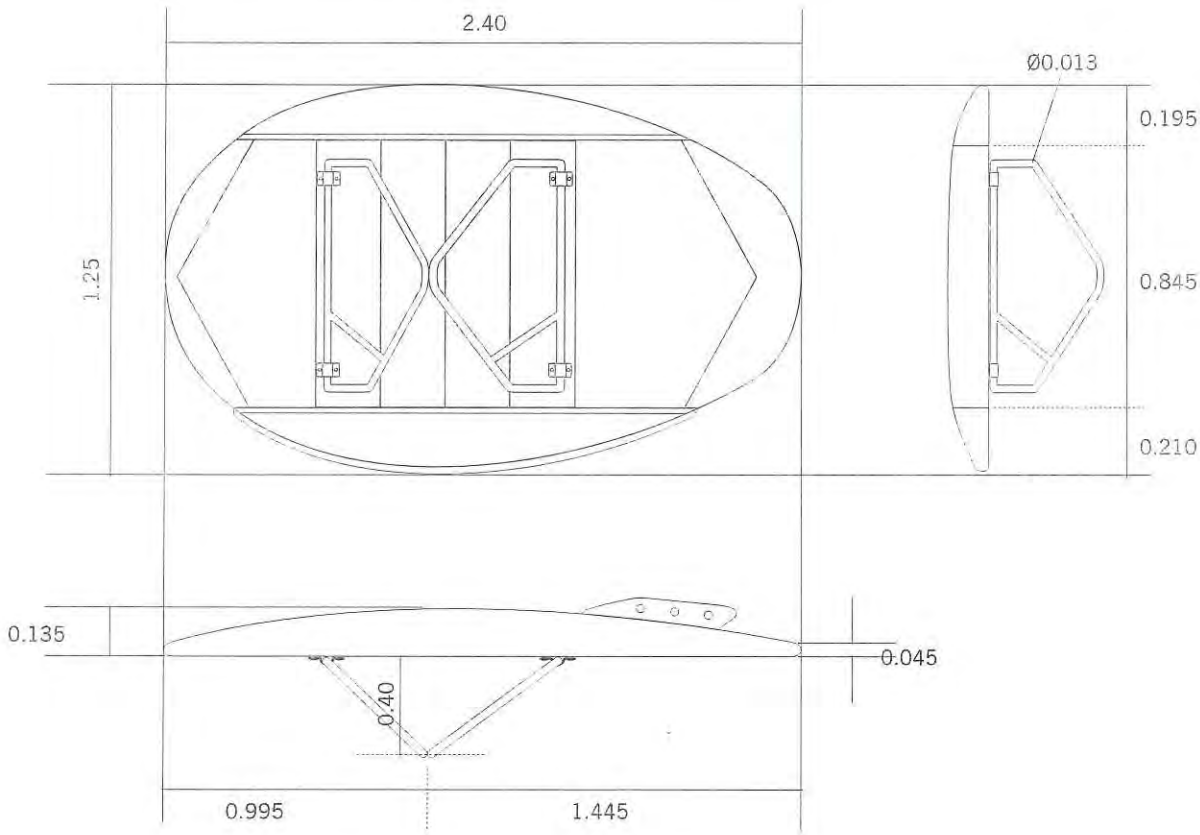
TRAWL
Bottom, Otter
Demersal Fishes, Squid, Cuttlefish

VESSEL
Loa : 23.8
GT : 93
Hp : 600

LOCATION
Cat Hai
Hai Phong



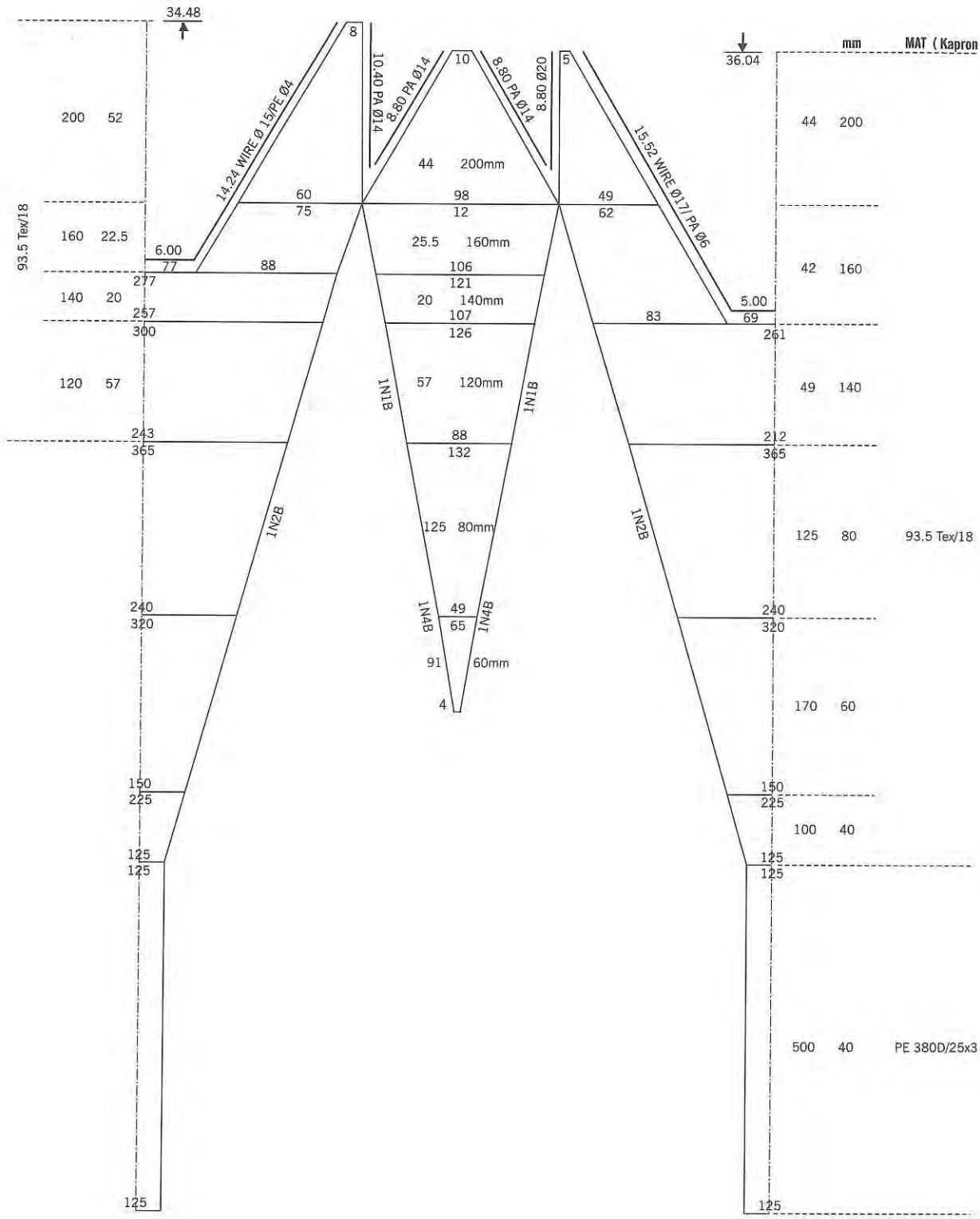

23 PL Ø200
400.00 WIRE Ø17
85.00 WIRE Ø18/PA Ø10
65.00 WIRE Ø15.5/PA Ø4
65.00 WIRE Ø18/PA Ø6

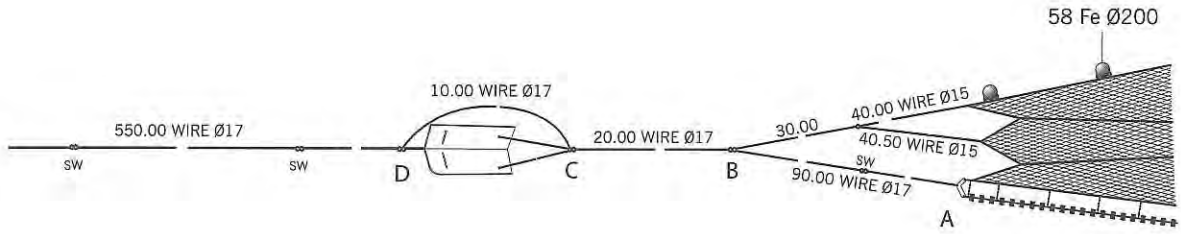

2.40
Ø0.013
0.195
0.845
0.210
1.25
0.135
0.045
0.40
0.995
1.445

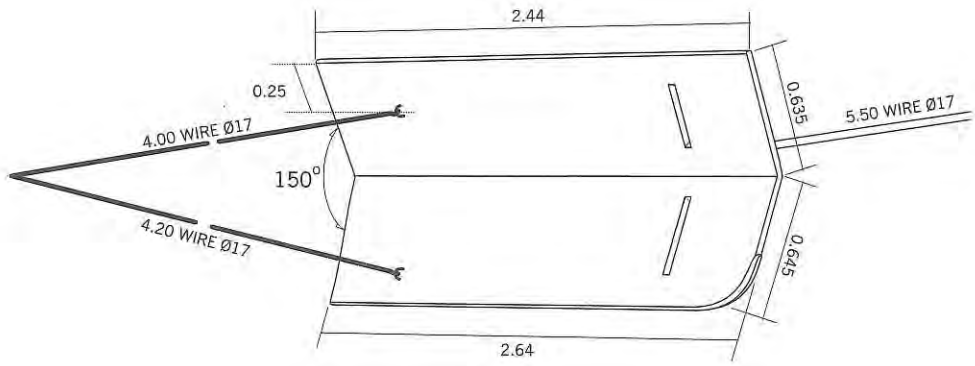
TRAWL
Bottom, Otter
Demersal Fishes

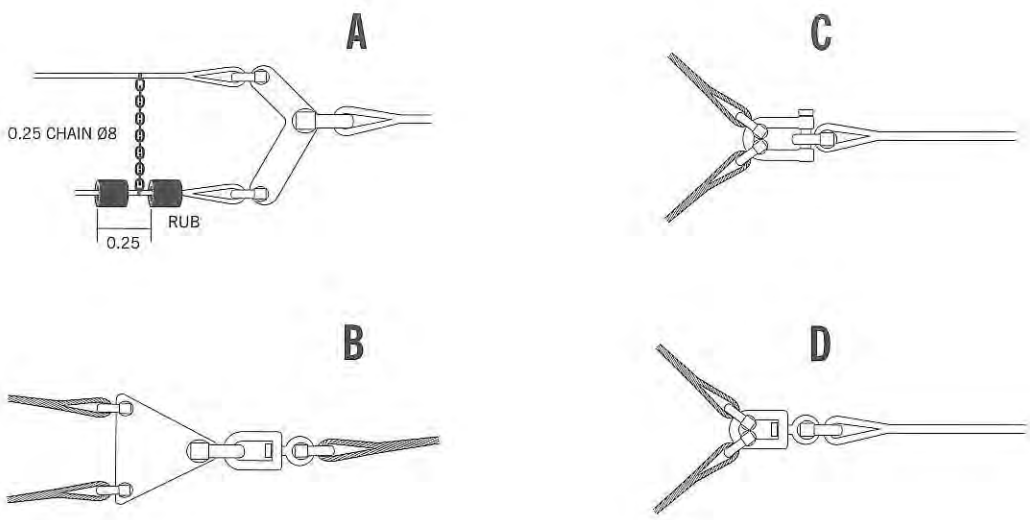
VESSEL
Loa : 32
GT : 70
Hp : 600

LOCATION
Cat Hai
Hai Phong




58 Fe Ø200
10.00 WIRE Ø17
550.00 WIRE Ø17
SW
SW
D
C
20.00 WIRE Ø17
B
30.00
40.00 WIRE Ø15
40.50 WIRE Ø15
SW
90.00 WIRE Ø17
A

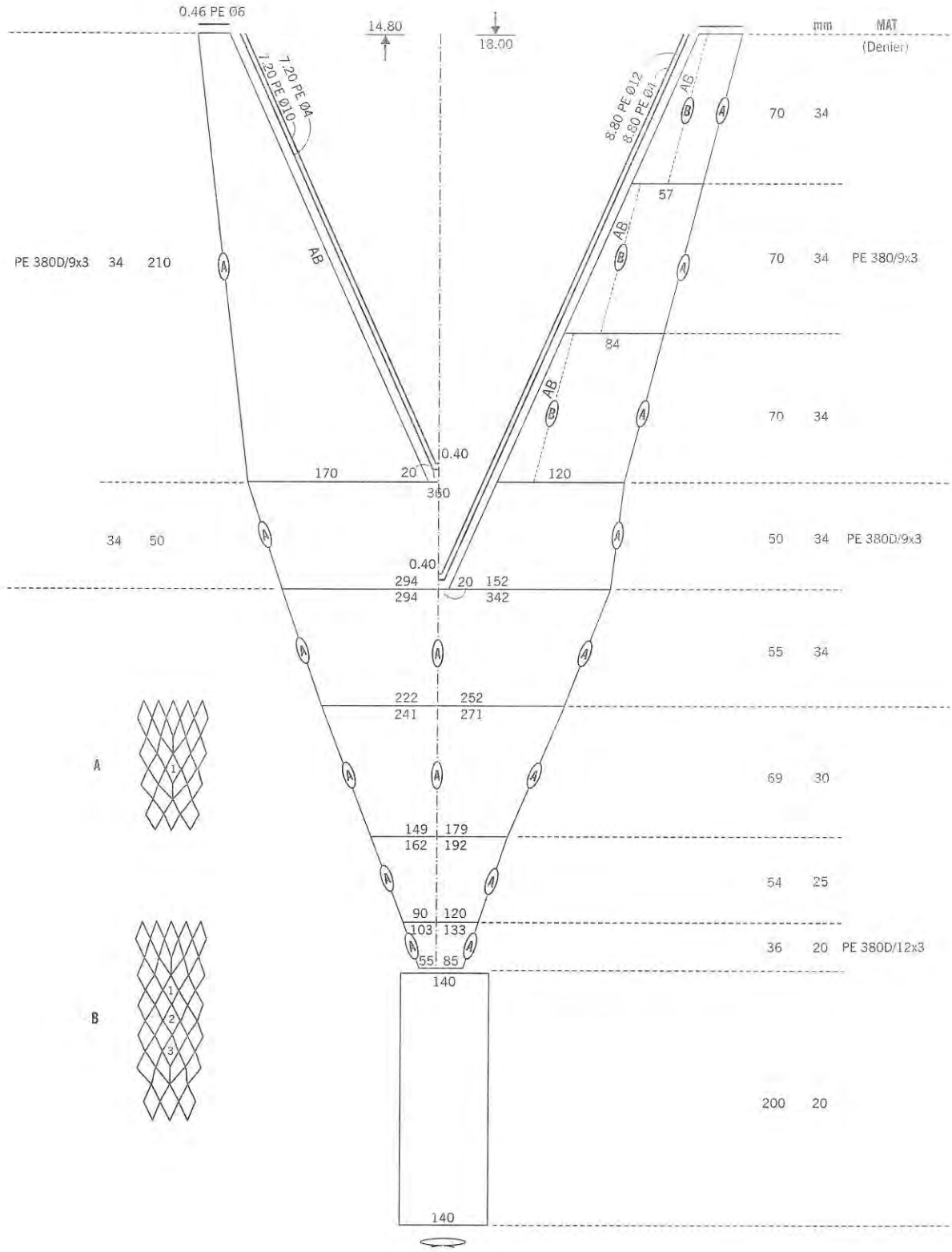

2.44
0.25
4.00 WIRE Ø17
150°
4.20 WIRE Ø17
0.635
5.50 WIRE Ø17
0.645
2.64

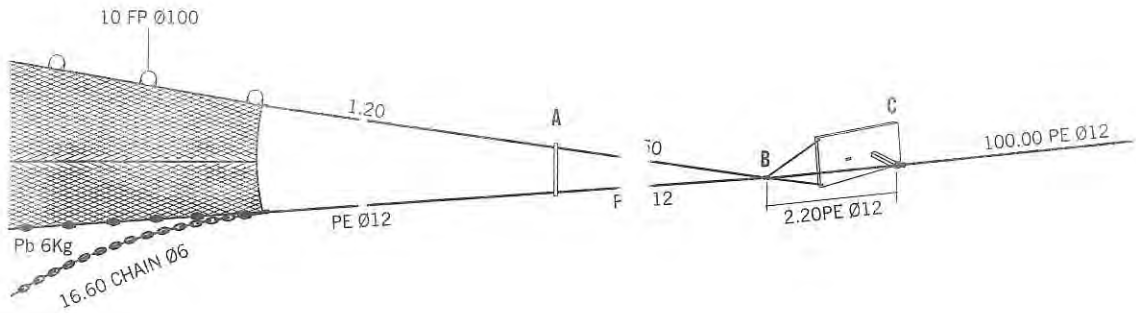

A
0.25 CHAIN Ø8
RUB
0.25
C
B
D

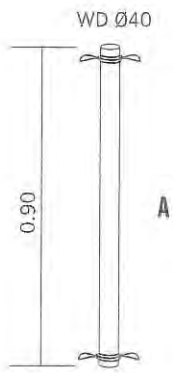
TRAWL
Bottom, Otter Trawl with Boom
Shrimp

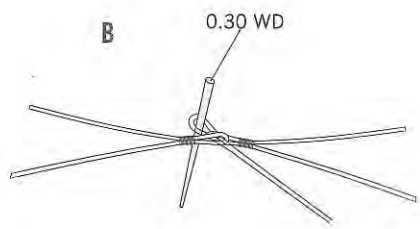
VESSEL
Loa : 14
Hp : 15

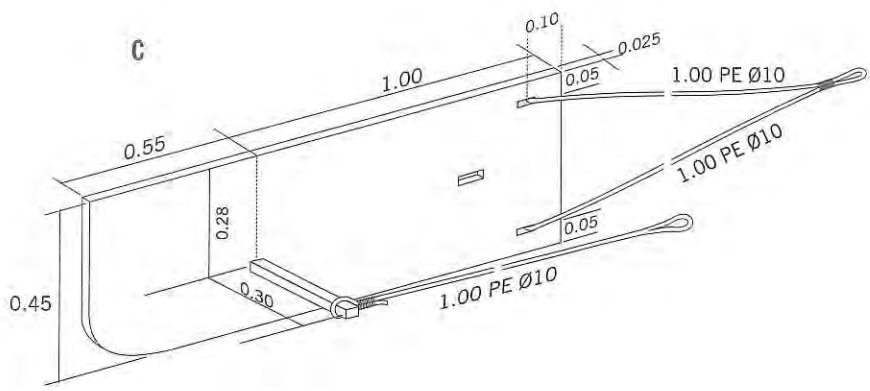
LOCATION
Nghia Hung
Nam Dinh




10 FP Ø100
1.20
A
B
C
100.00 PE Ø12
PE Ø12
2.20PE Ø12
Pb 6Kg
16.60 CHAIN Ø6


WD Ø40
0.90
A

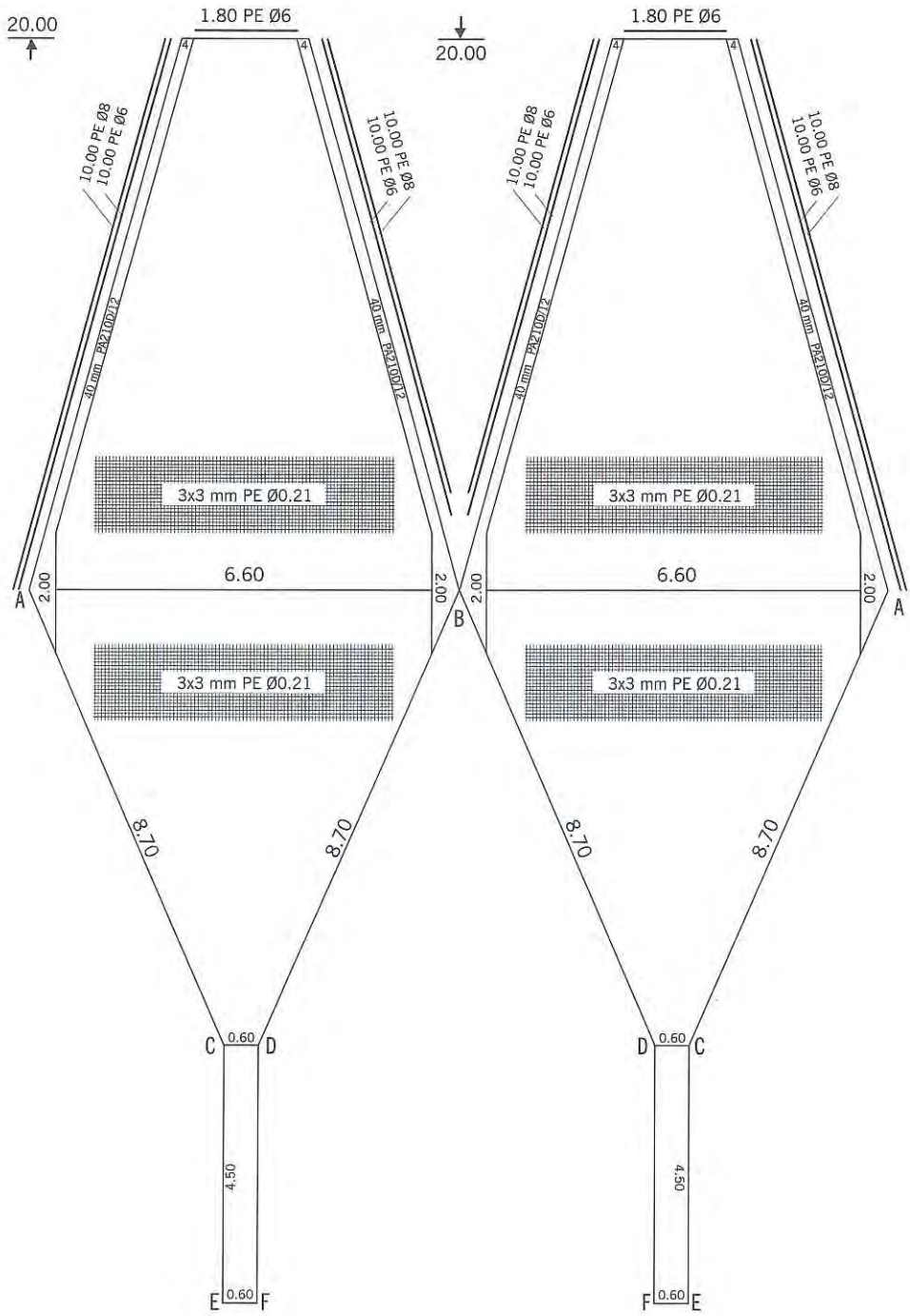

B
0.30 WD


C
0.10
0.025
1.00
0.05
1.00 PE Ø10
0.55
0.28
0.05
1.00 PE Ø10
0.45
0.30
1.00 PE Ø10

TRAWL
Bottom, Otter Trawl with Boom
Shrimp, Fishes

VESSEL
Loa : 14
Hp : 15

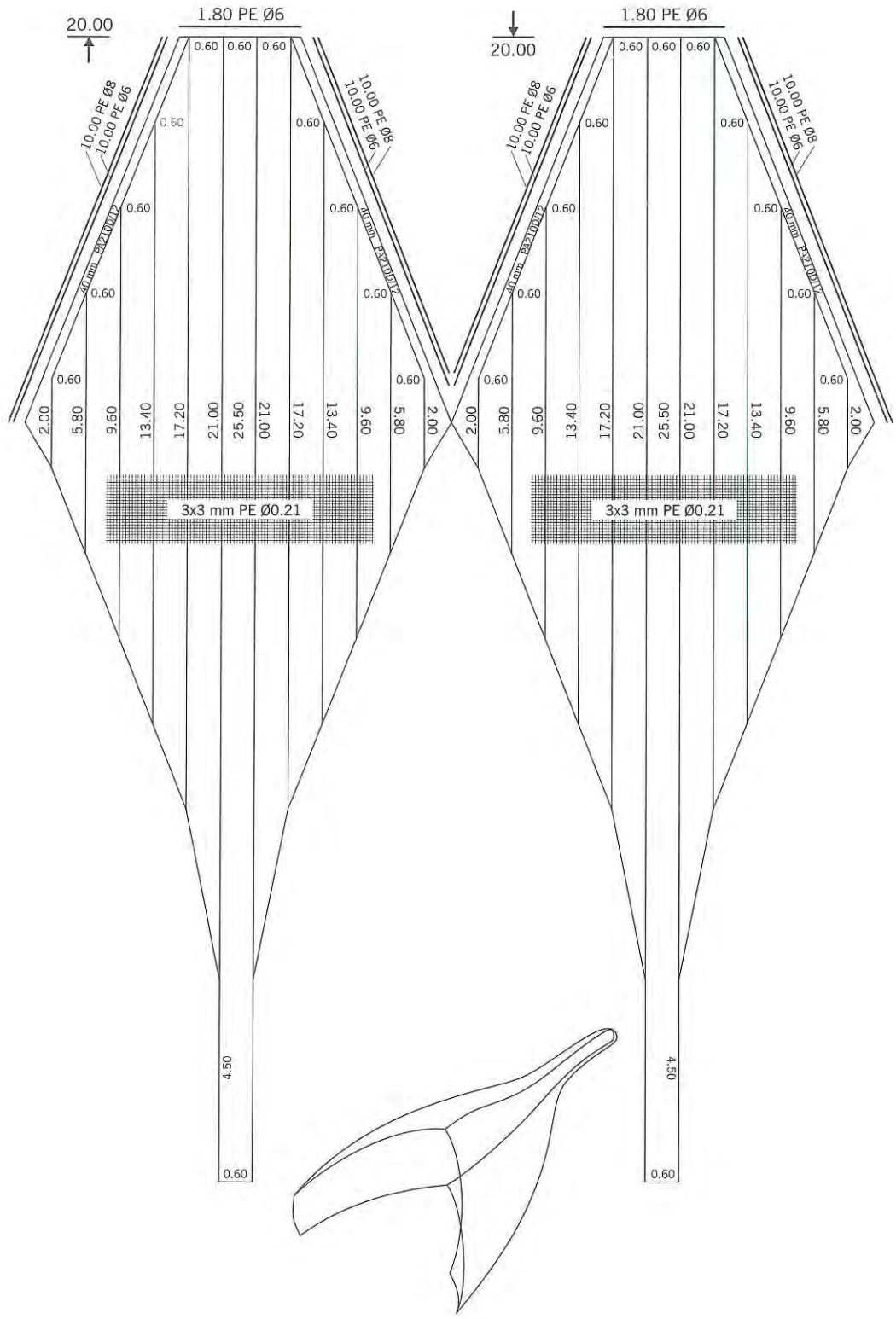
LOCATION
Nghia Hung
Nam Dinh

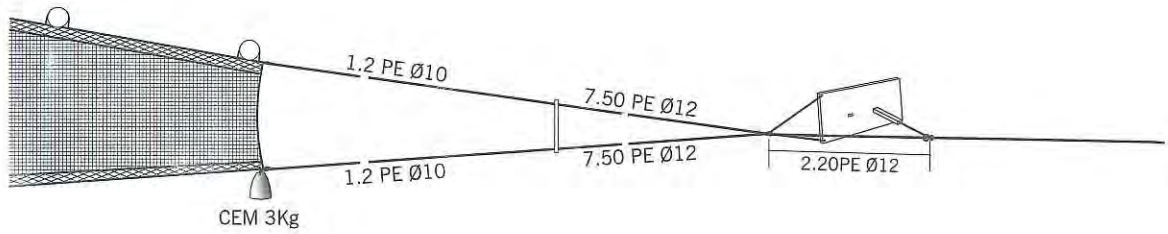


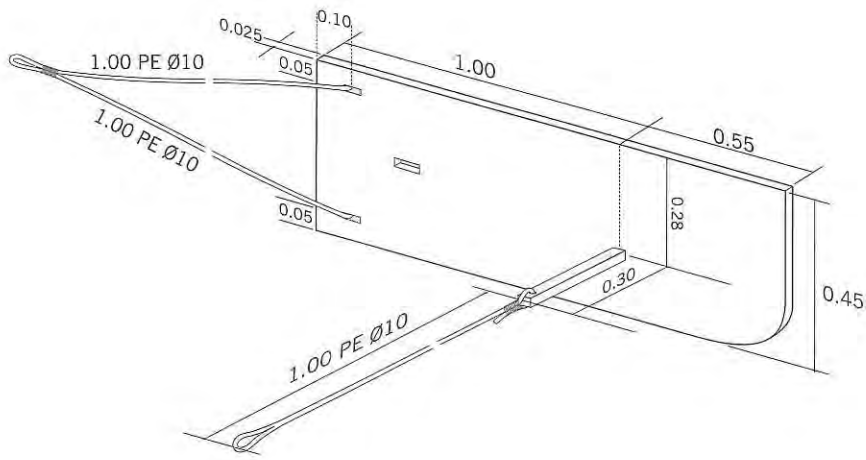
TRAWL
Bottom, Otter Trawl with Boom
Shrimp, Fishes

VESSEL
Loa : 14
Hp : 15

LOCATION
Nghia Hung
Nam Dinh



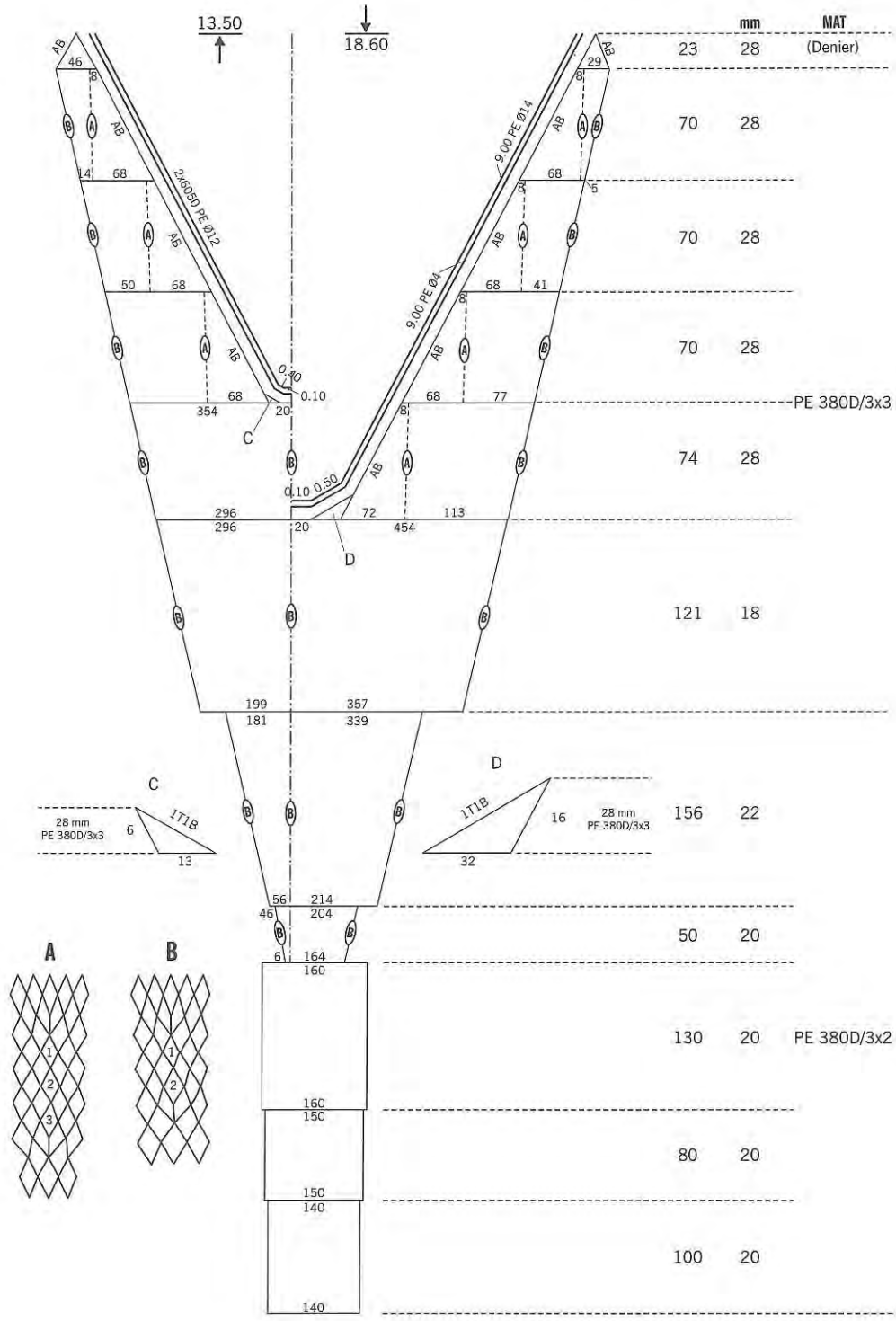

1.2 PE Ø10
7.50 PE Ø12
7.50 PE Ø12
1.2 PE Ø10
2.20PE Ø12
CEM 3Kg

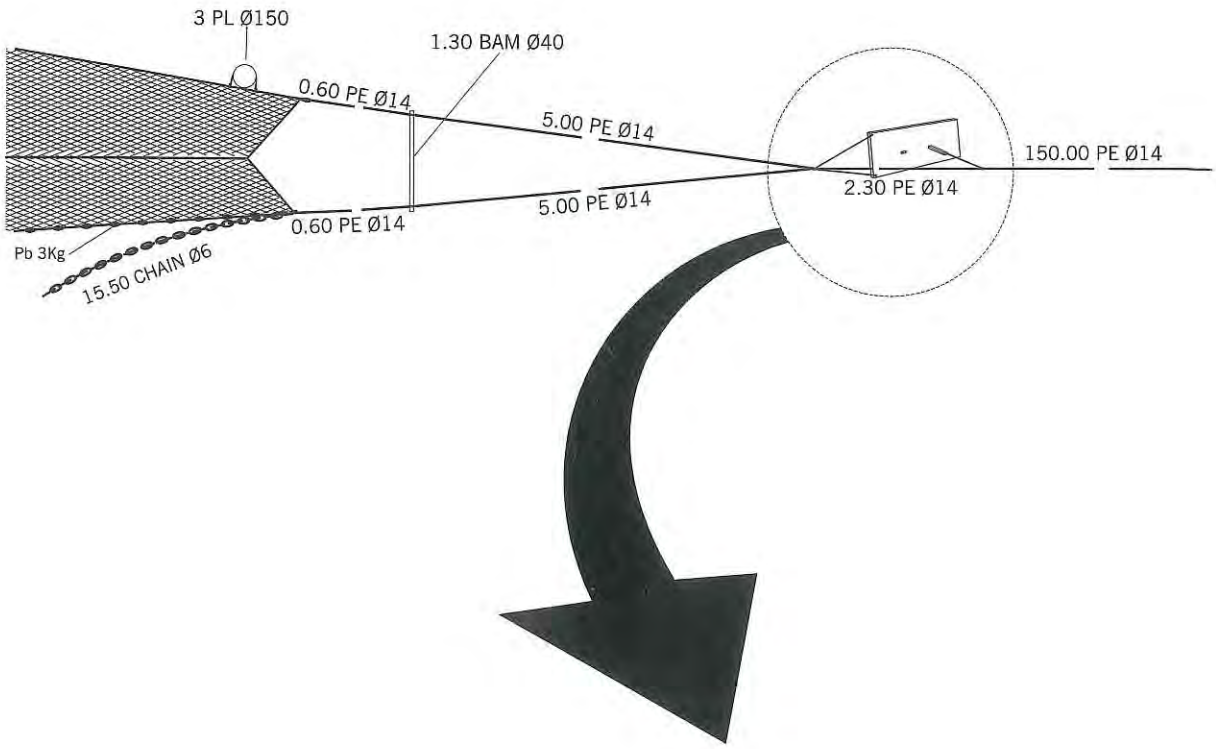

0.025
0.10
1.00 PE Ø10
0.05
1.00
0.55
1.00 PE Ø10
0.05
0.28
0.30
0.45
1.00 PE Ø10

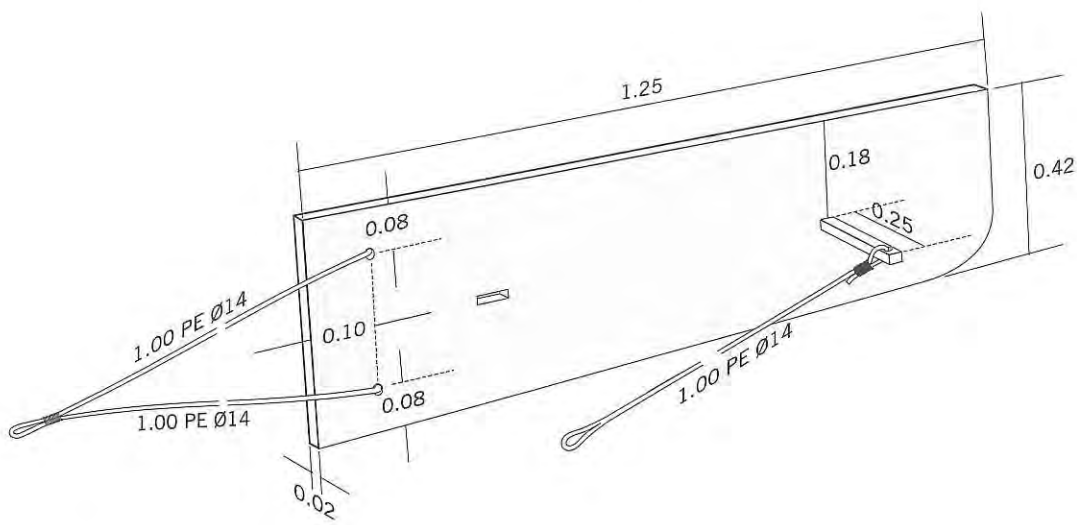
TRAWL
Bottom, Otter Trawl with Boom
Shrimp

VESSEL
Loa : 12
Hp : 22

LOCATION
Nghia Hung
Nam Dinh



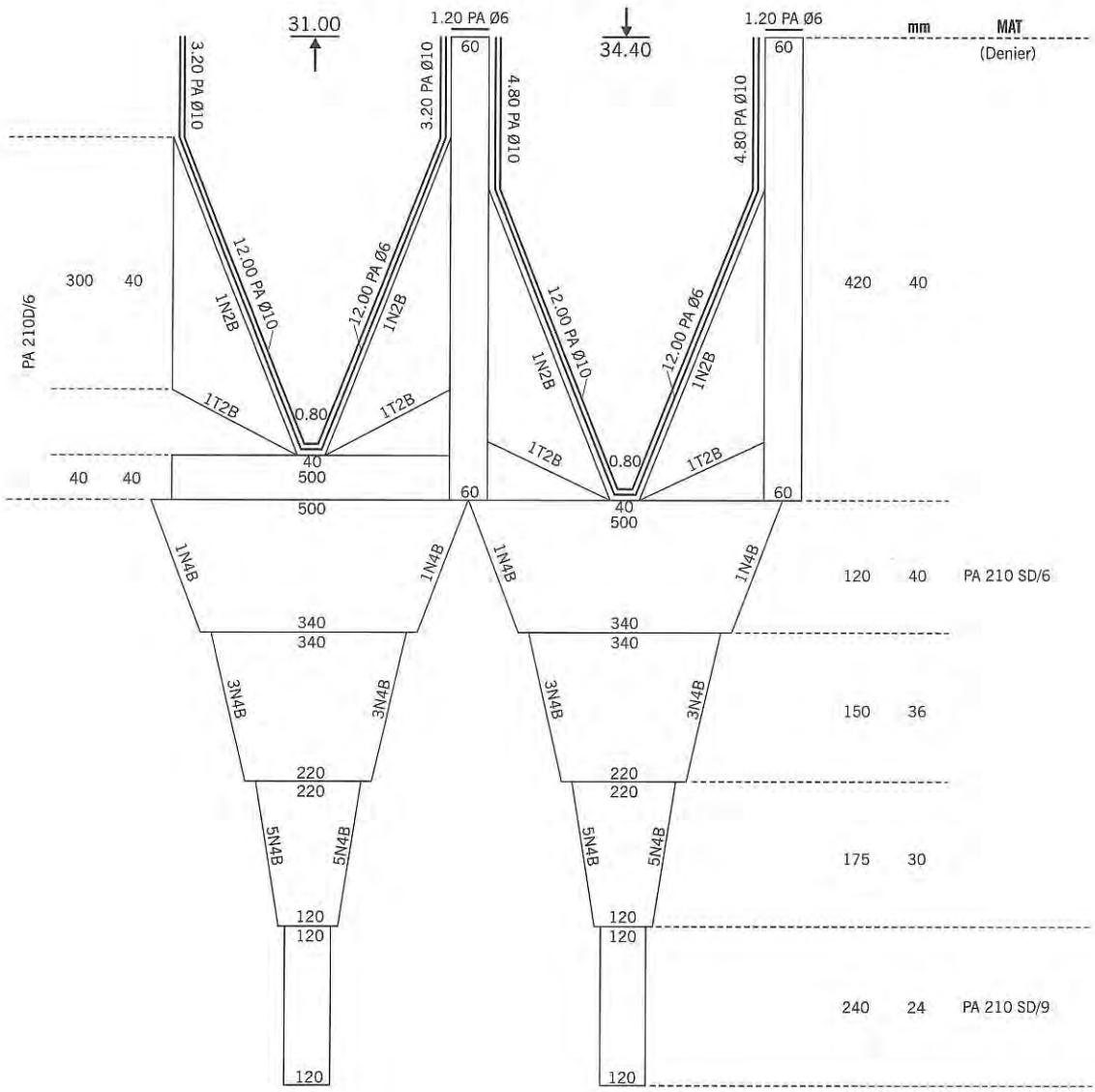

3 PL Ø150
1.30 BAM Ø40
0.60 PE Ø14
5.00 PE Ø14
150.00 PE Ø14
2.30 PE Ø14
5.00 PE Ø14
0.60 PE Ø14
Pb 3Kg
15.50 CHAIN Ø6

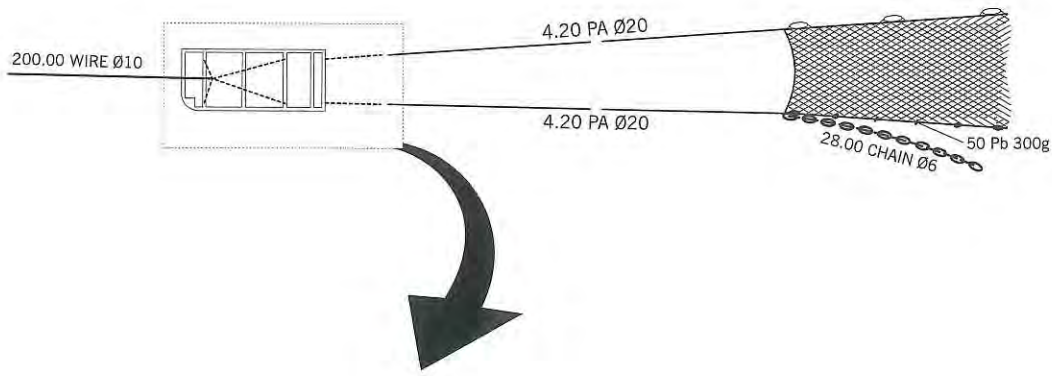

1.25
0.18
0.42
0.08
0.25
1.00 PE Ø14
0.10
0.08
1.00 PE Ø14
1.00 PE Ø14
0.02

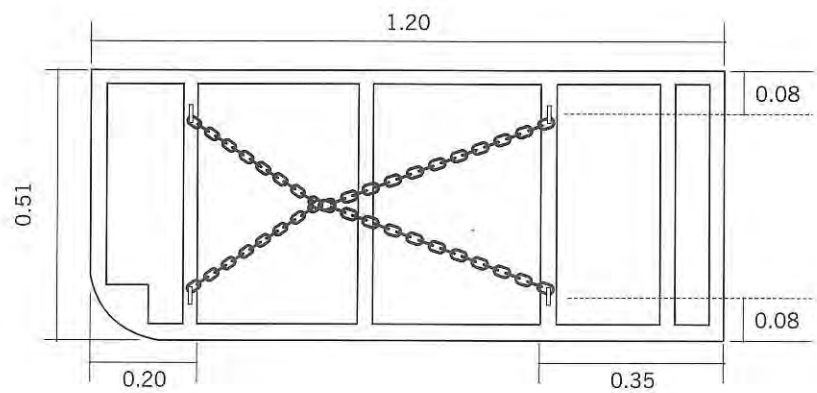
TRAWL
Bottom, Otter Trawl with Boom
Shrimp

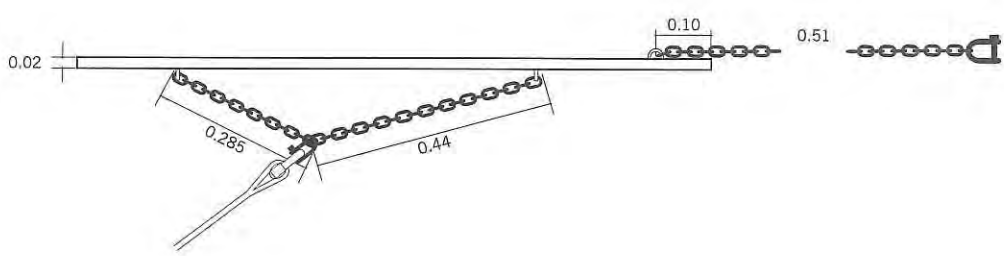
VESSEL
Loa : 11.5
GT : 6
Hp : 33

LOCATION
Ha Long
Quang Ninh




200.00 WIRE Ø10
4.20 PA Ø20
4.20 PA Ø20
28.00 CHAIN Ø6
50 Pb 300g

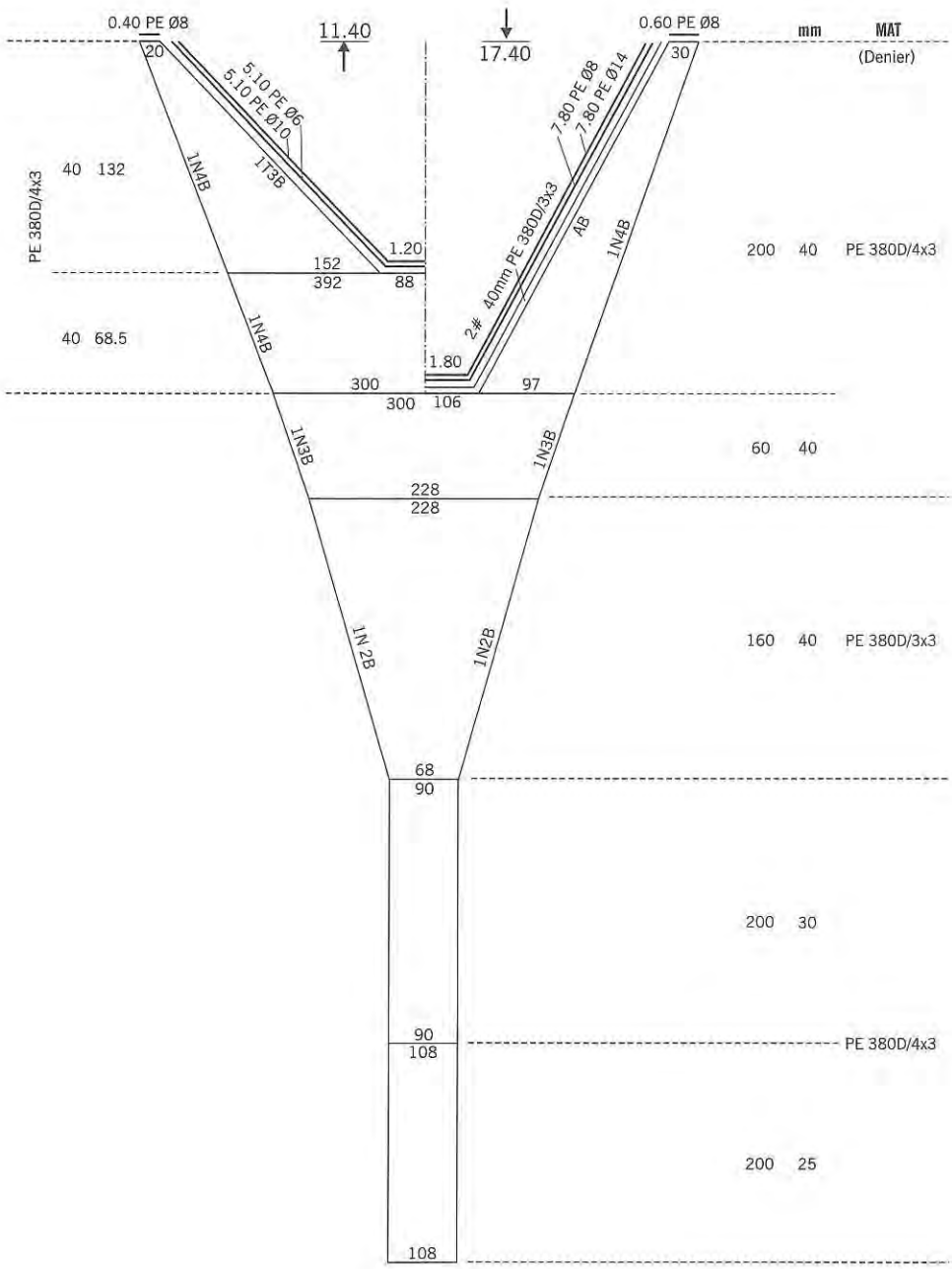

1.20
0.08
0.51
0.08
0.20
0.35

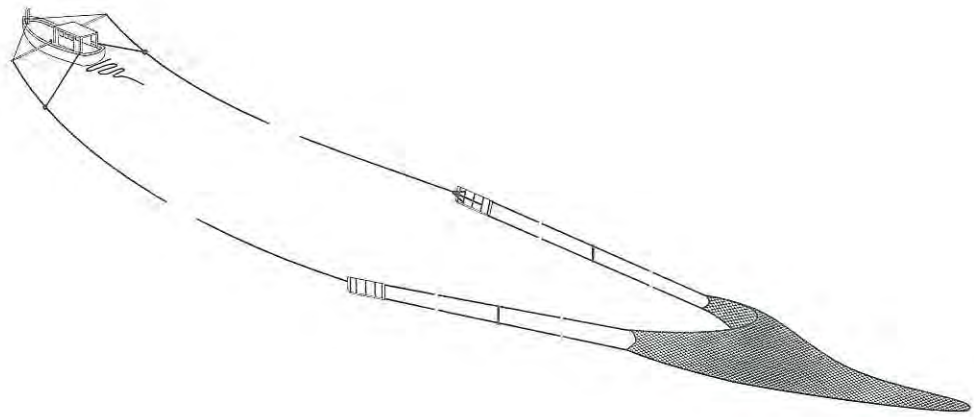

0.10
0.51
0.02
0.285
0.44

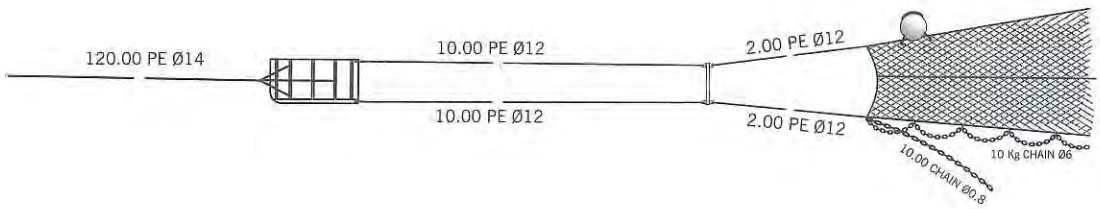
TRAWL
Bottom, Otter with Boom
Demersal fish,
Shrimp

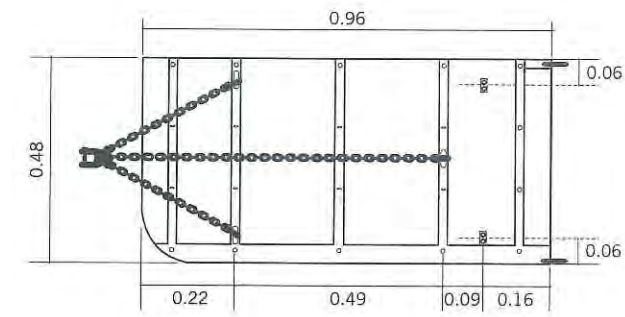
VESSEL
Loa : 13
GT : 10
Hp : 33

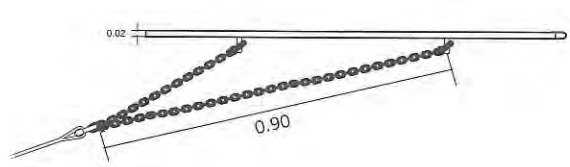
LOCATION
Ly Hoa
Quang Binh






120.00 PE Ø14
10.00 PE Ø12
10.00 PE Ø12
2.00 PE Ø12
2.00 PE Ø12
10 Kg CHAIN Ø6
10.00 CHAIN Ø0.8

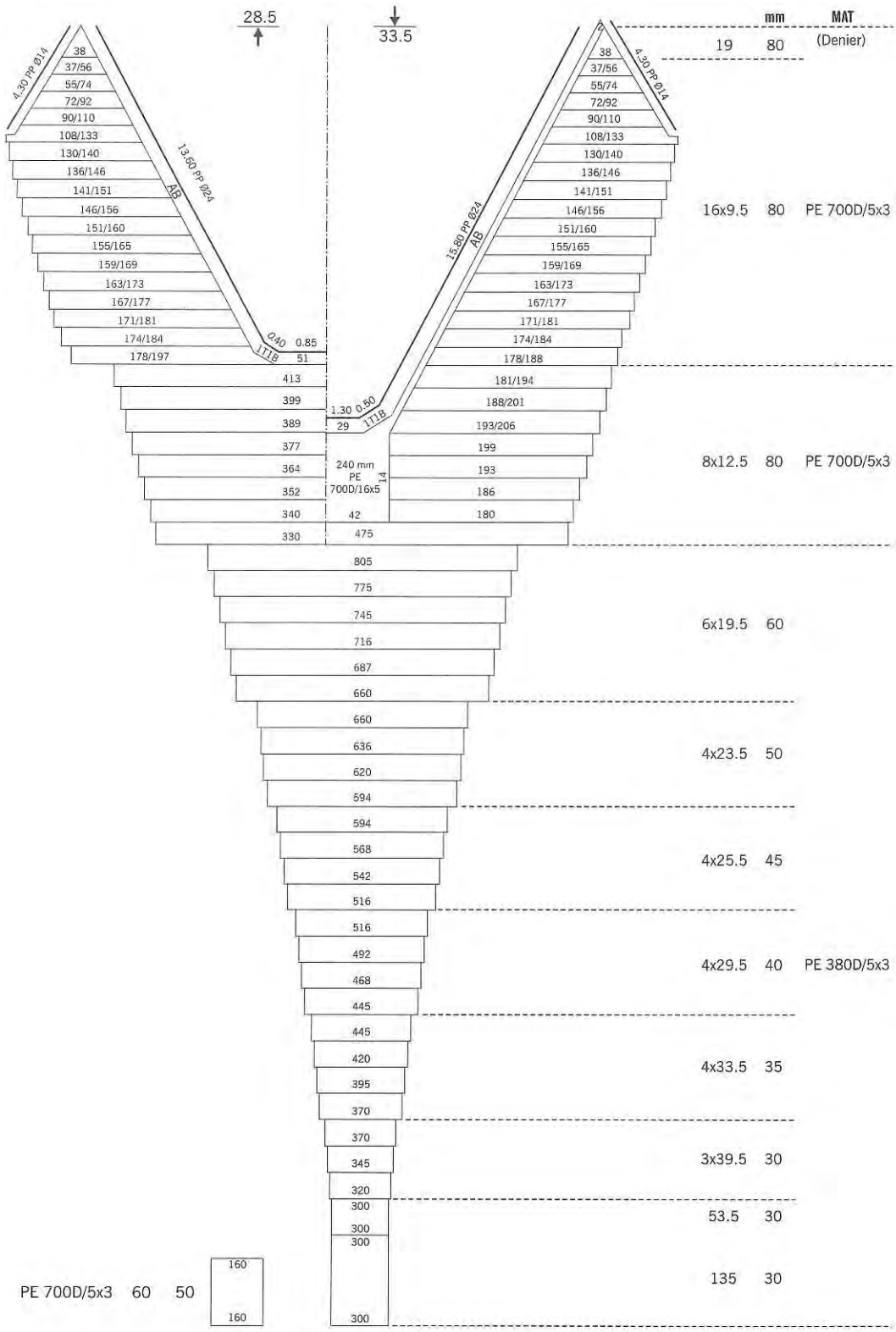

0.96
0.06
0.48
0.06
0.22
0.49
0.09
0.16

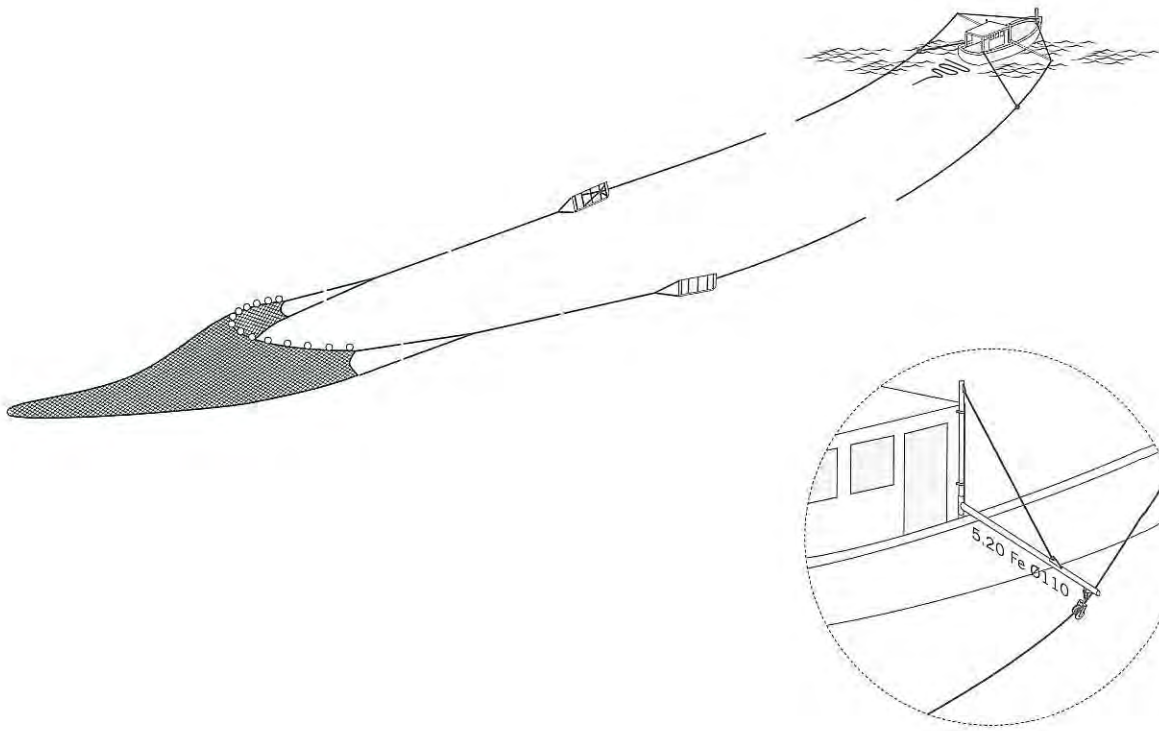

0.02
0.90

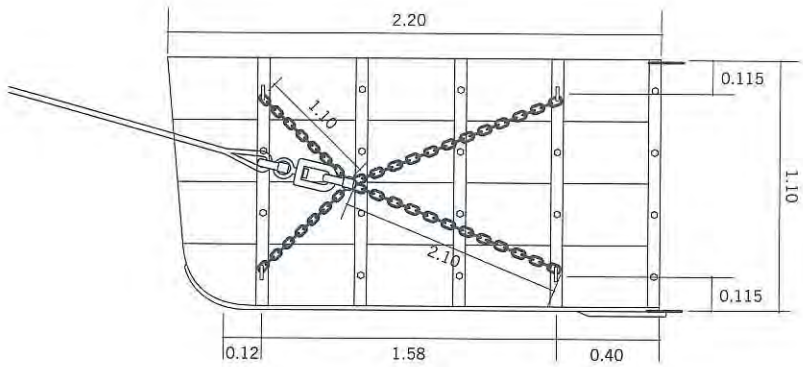
TRAWL
Bottom, Otter with Boom
Demersal fish,
Shrimp

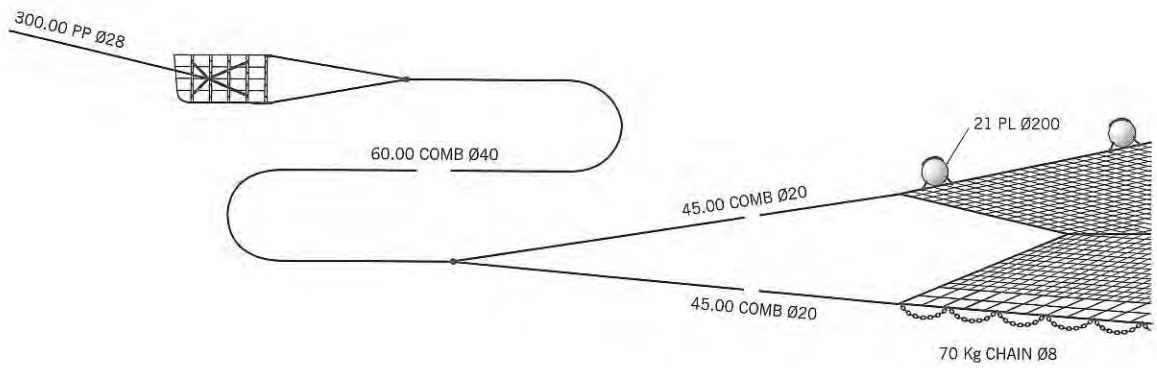
VESSEL
Loa : 13
GT : 10
Hp : 33

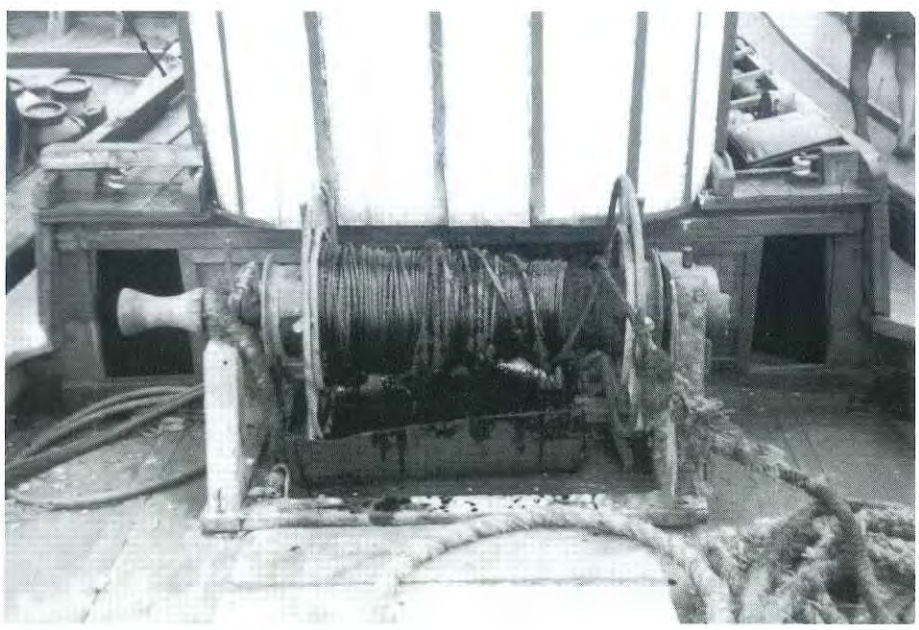
LOCATION
Ly Hoa
Quang Binh




5.20 Fe Ø110


2.20
0.115
1.10
1.10
2.10
0.115
0.12
1.58
0.40

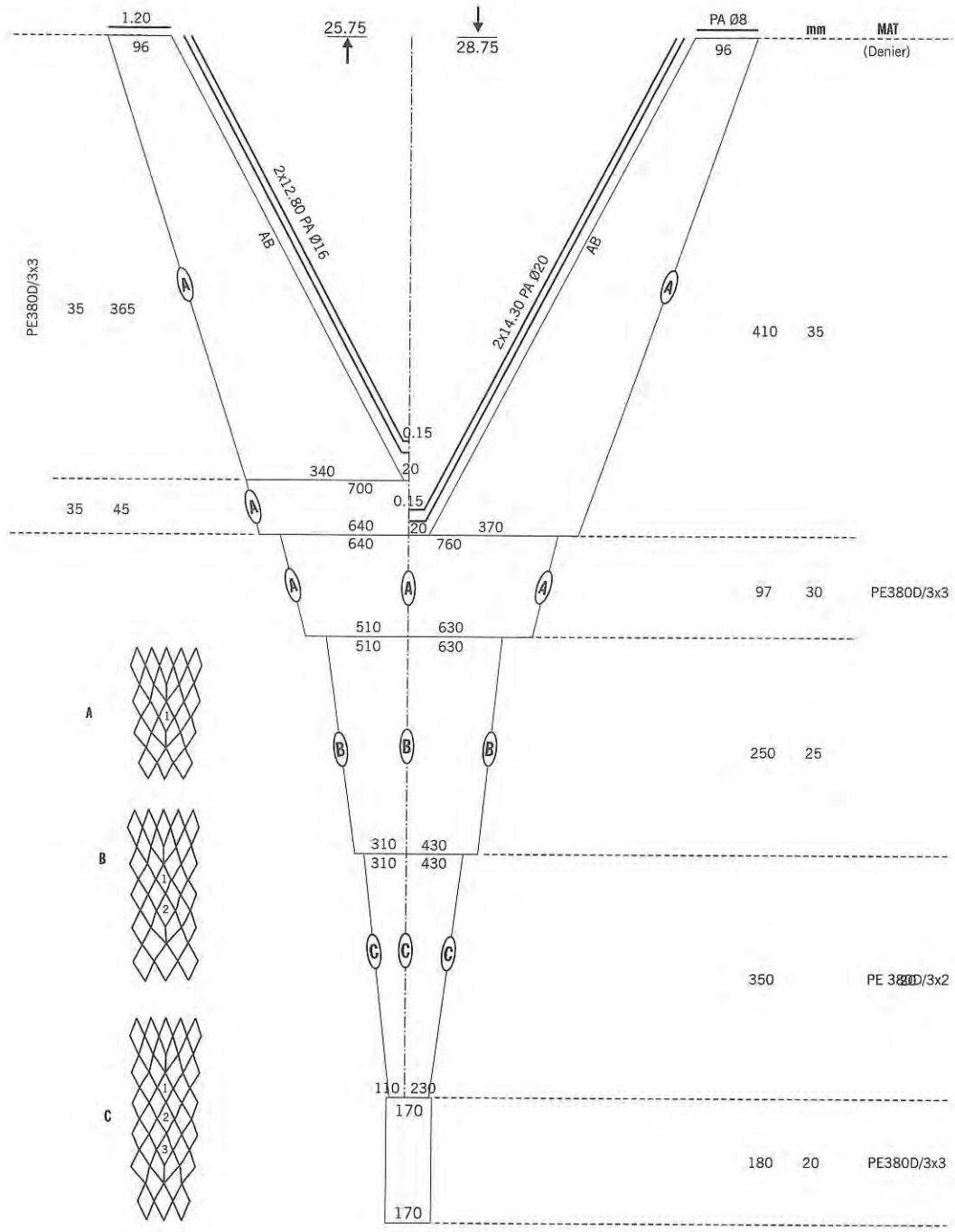

300.00 PP Ø28
60.00 COMB Ø40
21 PL Ø200
45.00 COMB Ø20
45.00 COMB Ø20
70 Kg CHAIN Ø8



TRAWL
Bottom Pair
Fishes, Squid, Cuttlefish

VESSEL
Hp : 18+20
Hp : 18+20

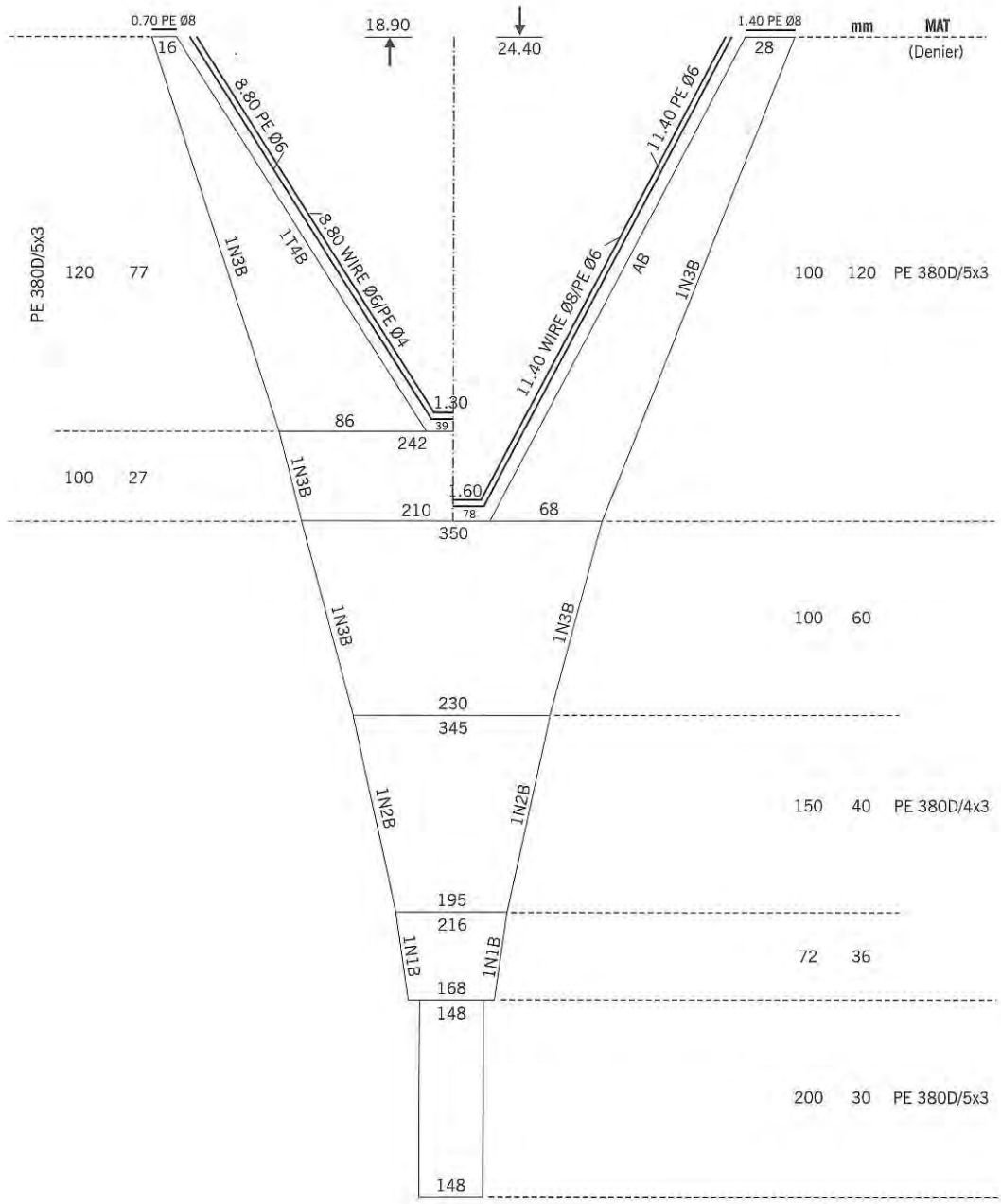
LOCATION
Dien Chau
Nghe An



TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Hp : 33
Hp : 33

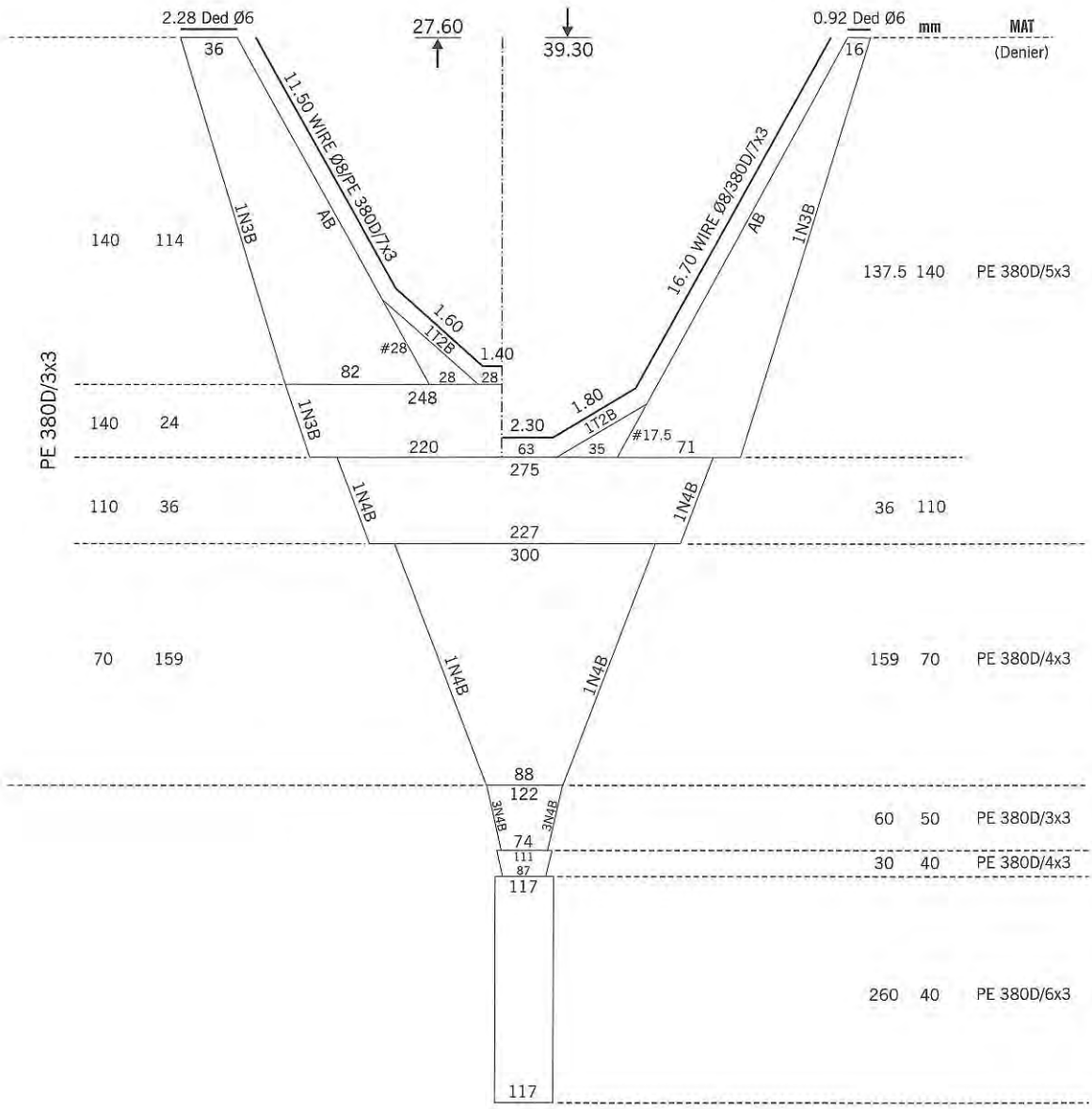
LOCATION
Dien Chau
Nghe An

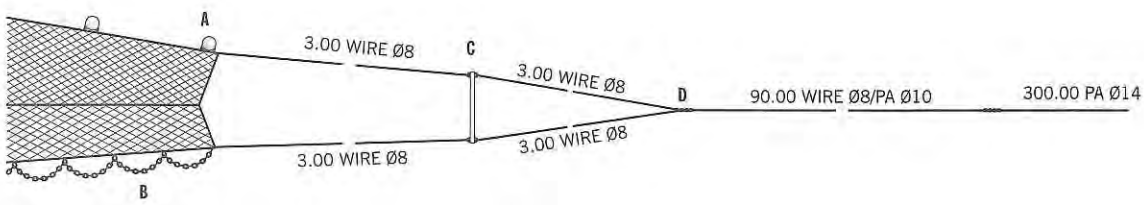


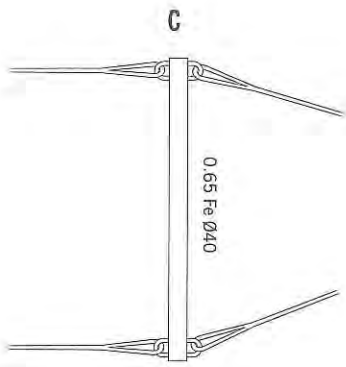
TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

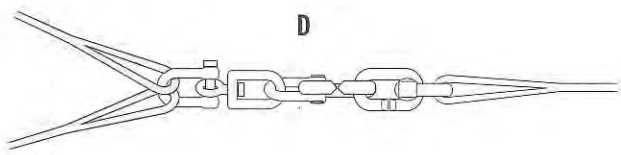
VESSEL
Hp : 33
Hp : 45

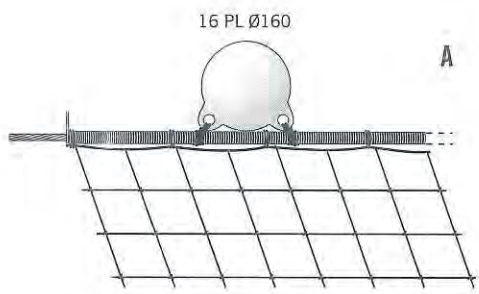
LOCATION
Cat Hai
Hai Phong

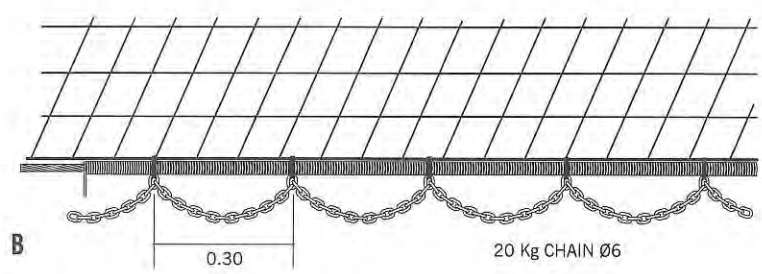



A
3.00 WIRE Ø8
C
3.00 WIRE Ø8
D
90.00 WIRE Ø8/PA Ø10
300.00 PA Ø14
3.00 WIRE Ø8
3.00 WIRE Ø8
B


C
0.65 Fe Ø40


D

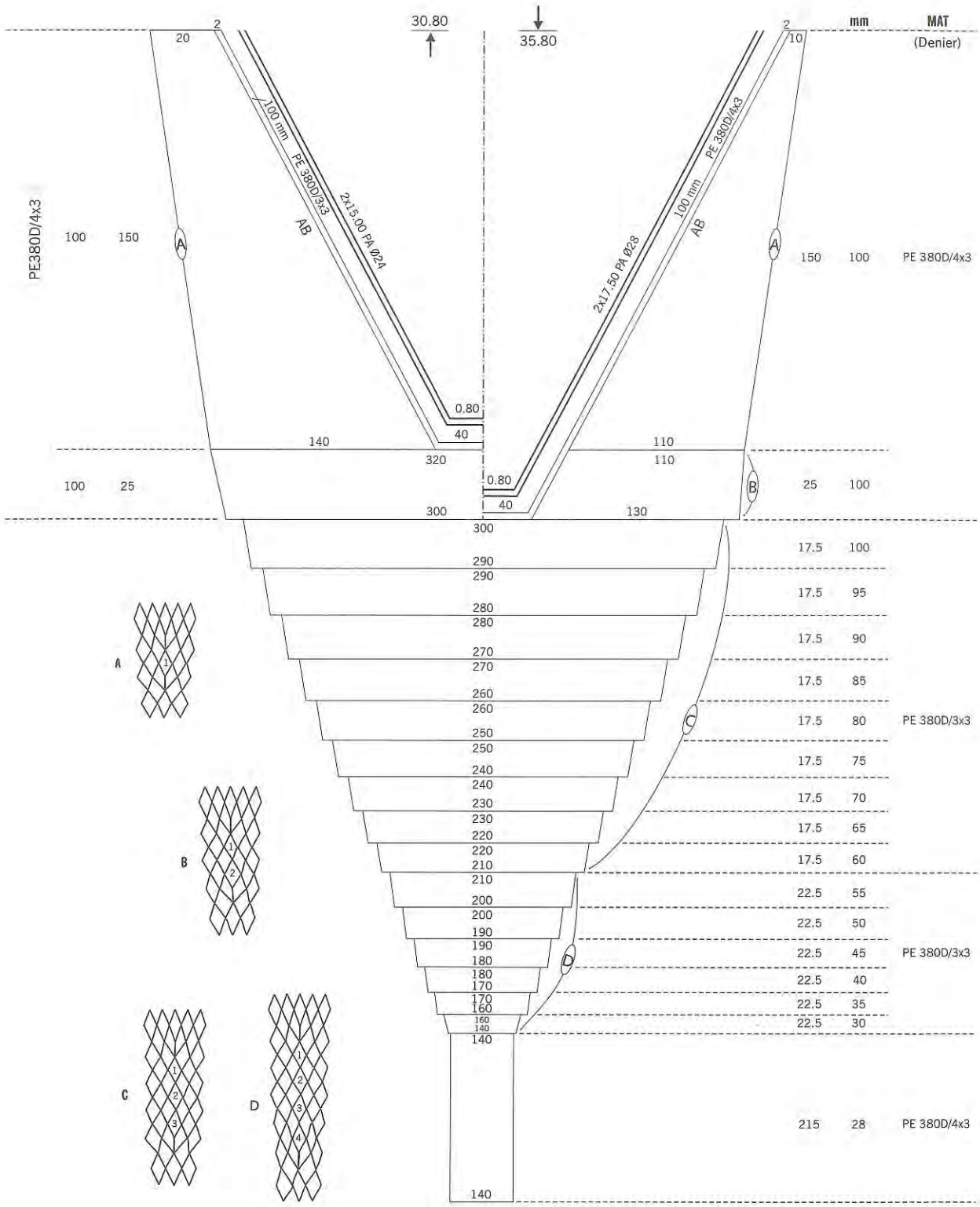

16 PL Ø160
A

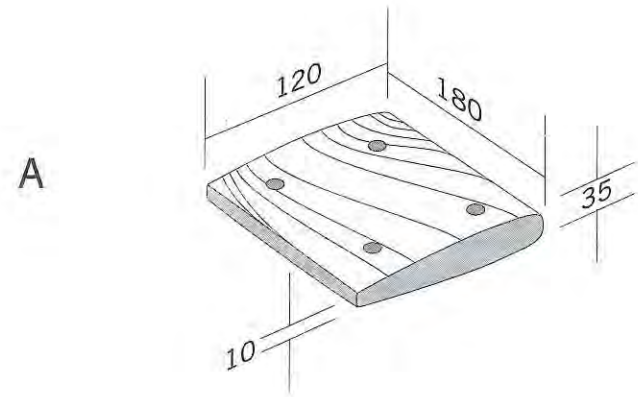

B
0.30
20 Kg CHAIN Ø6

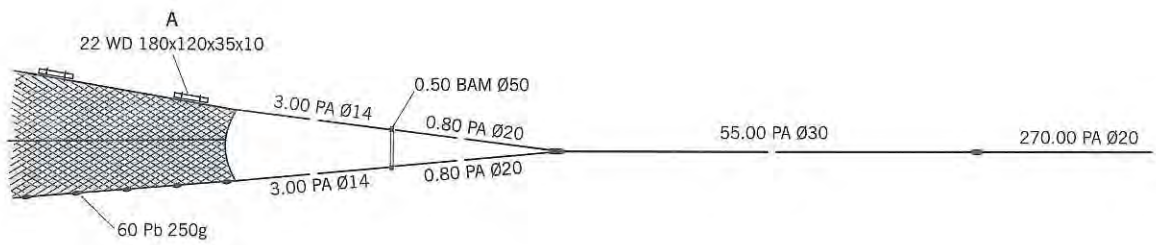
TRAWL
Bottom, Pair
Fishes, Squid, Cuttlefish

VESSEL
Hp : 33
Hp : 45

LOCATION
Cat Hai
Hai Phong



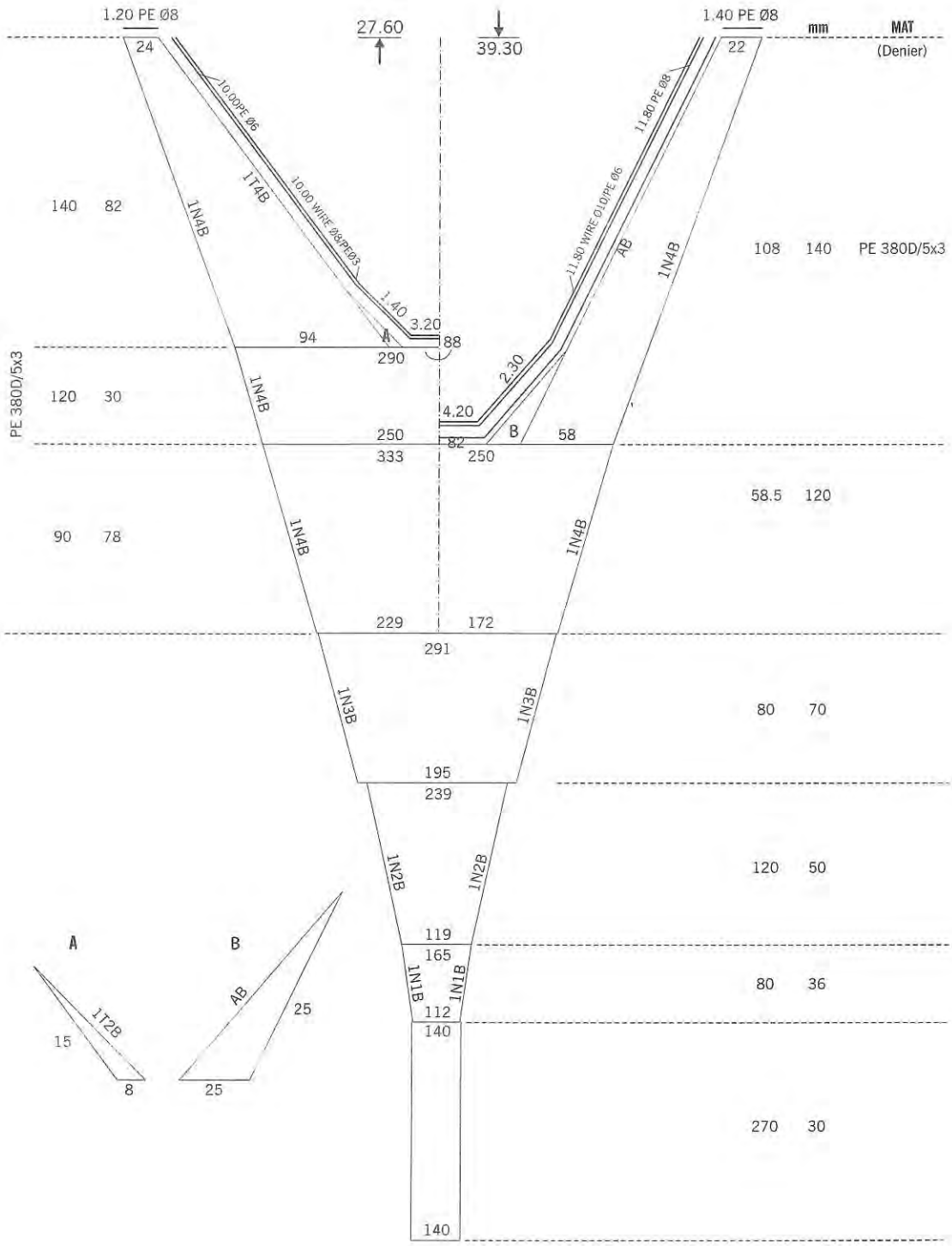

A
120
180
35
10

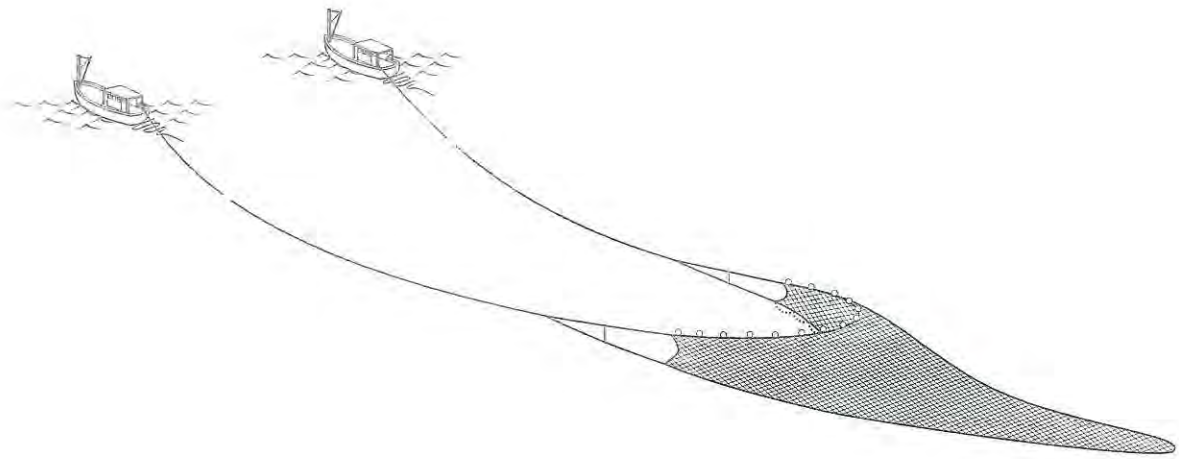

A
22 WD 180x120x35x10
3.00 PA Ø14
0.50 BAM Ø50
0.80 PA Ø20
55.00 PA Ø30
270.00 PA Ø20
3.00 PA Ø14
0.80 PA Ø20
60 Pb 250g

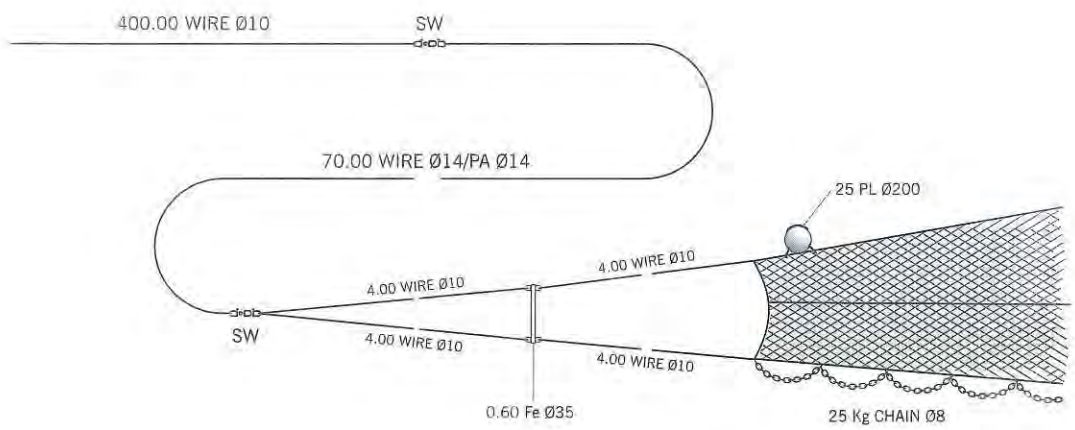
TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Hp : 90
Hp : 90

LOCATION
Ly Hoa
Quang Binh



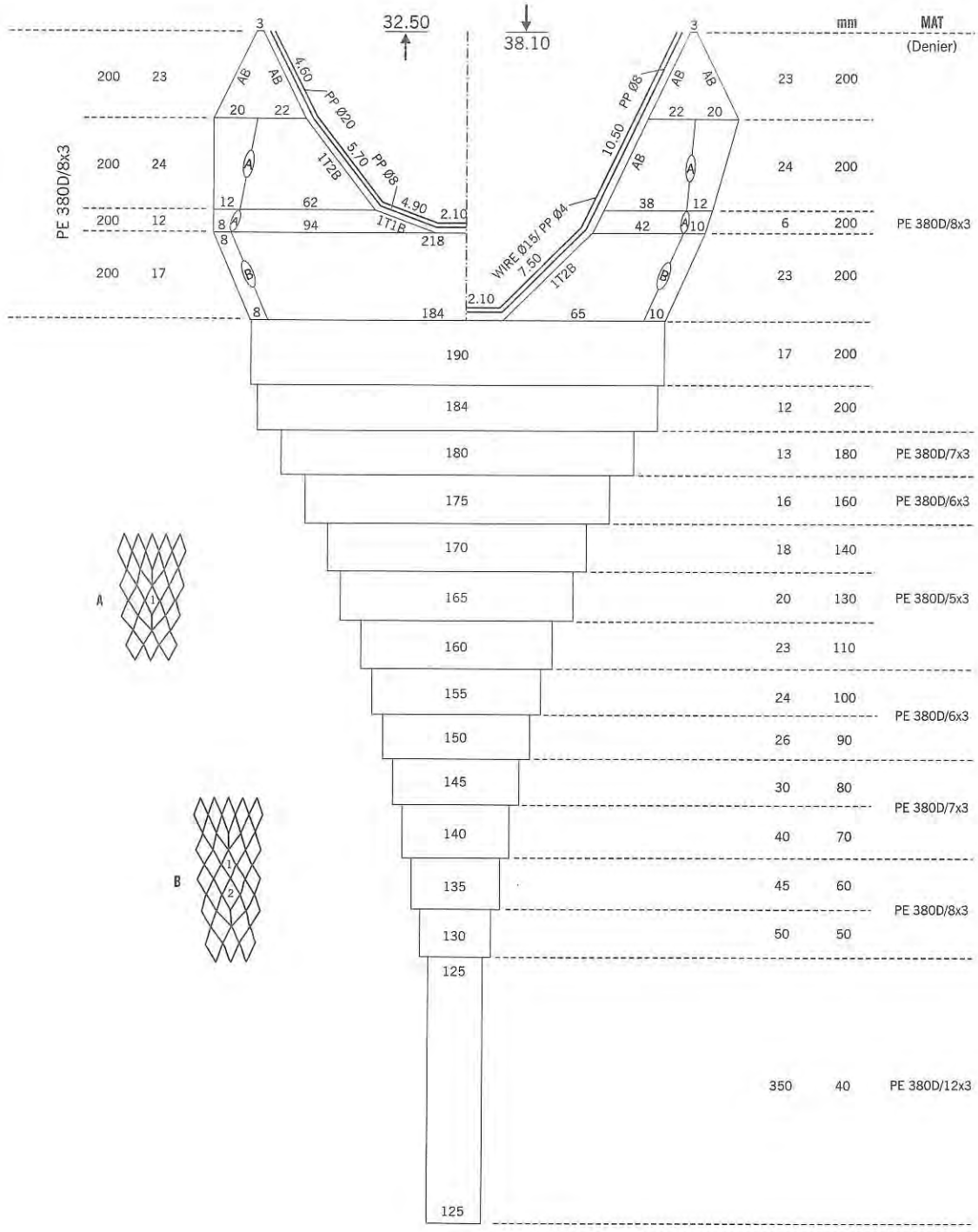


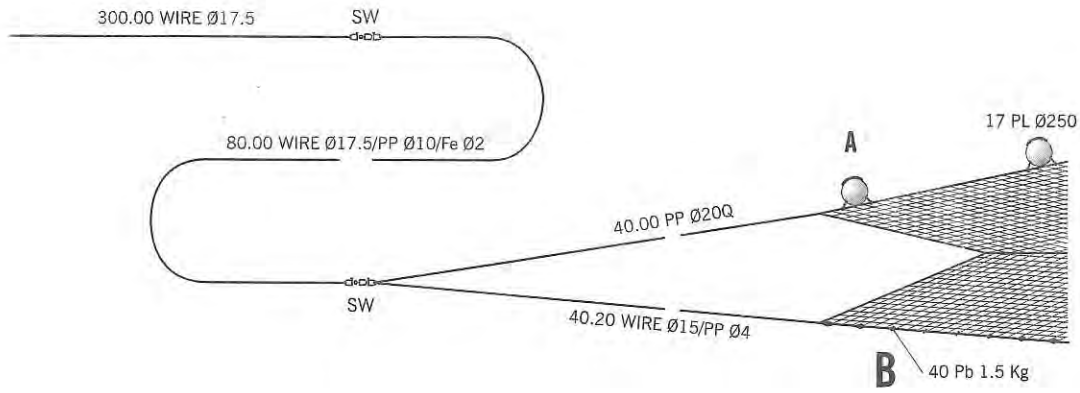

400.00 WIRE Ø10
SW
70.00 WIRE Ø14/PA Ø14
25 PL Ø200
4.00 WIRE Ø10
4.00 WIRE Ø10
SW
4.00 WIRE Ø10
4.00 WIRE Ø10
0.60 Fe Ø35
25 Kg CHAIN Ø8

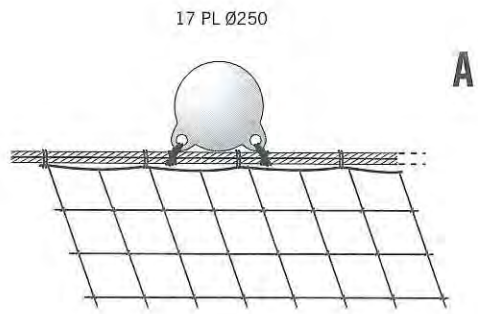
TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

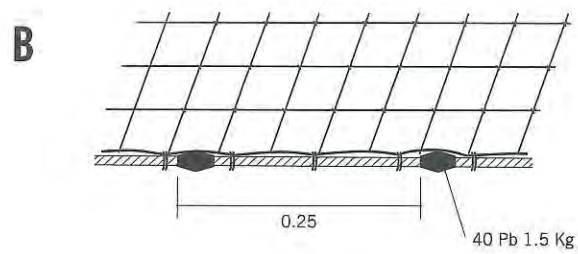
VESSEL
Hp : 135
Hp : 135

LOCATION
Hai Hau
Nam Dinh




300.00 WIRE Ø17.5
SW
80.00 WIRE Ø17.5/PP Ø10/Fe Ø2
17 PL Ø250
A
40.00 PP Ø20Q
SW
40.20 WIRE Ø15/PP Ø4
B
40 Pb 1.5 Kg

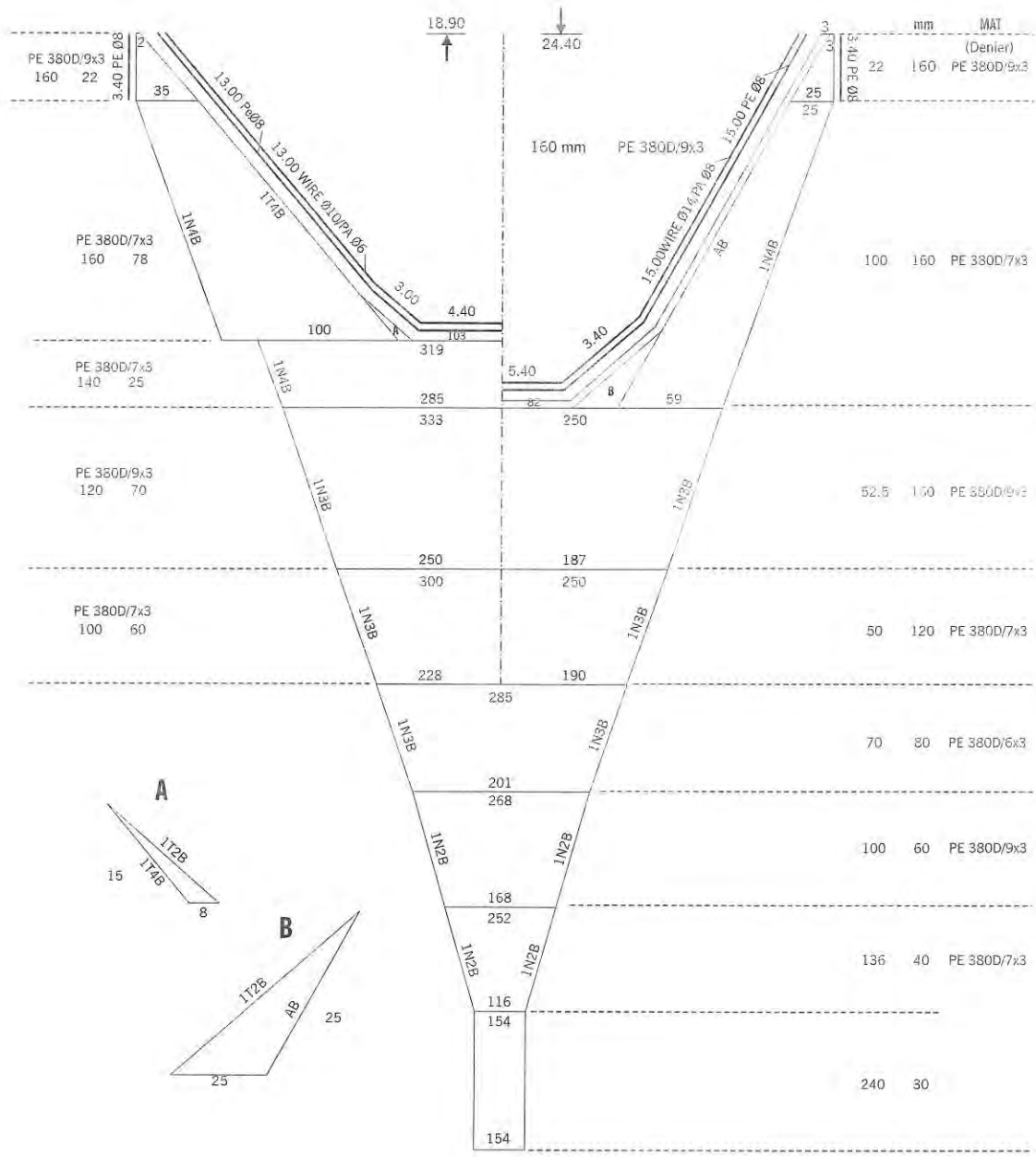

17 PL Ø250
A

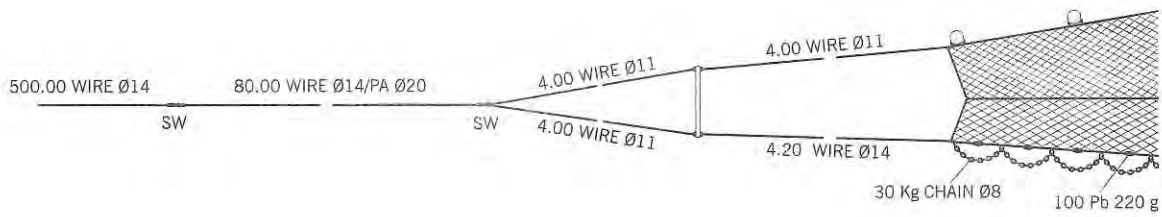

B
0.25
40 Pb 1.5 Kg

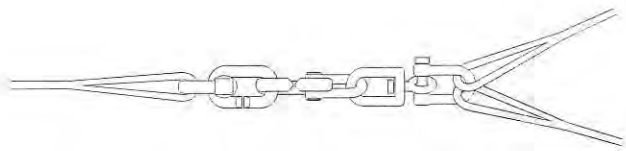
TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

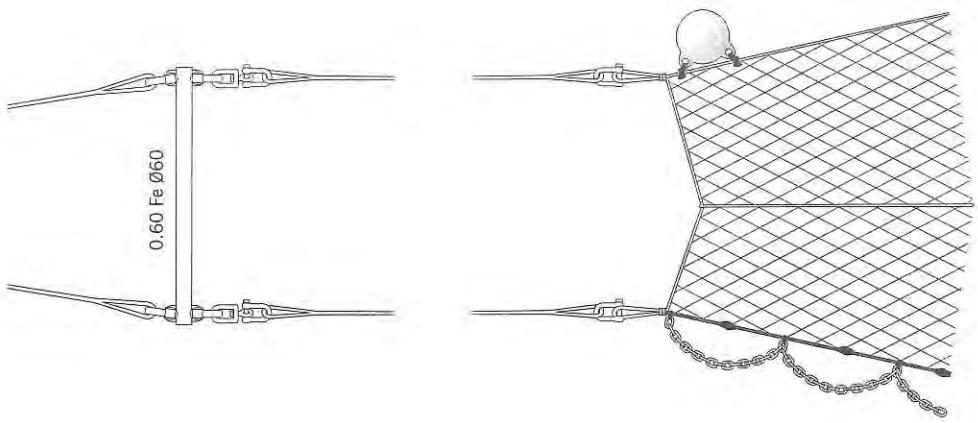
VESSEL
Hp : 135
Hp : 135

LOCATION
Ly Hoa
Quang Binh




500.00 WIRE Ø14
SW
80.00 WIRE Ø14/PA Ø20
SW
4.00 WIRE Ø11
4.00 WIRE Ø11
4.00 WIRE Ø11
4.20 WIRE Ø14
30 Kg CHAIN Ø8
100 Pb 220 g

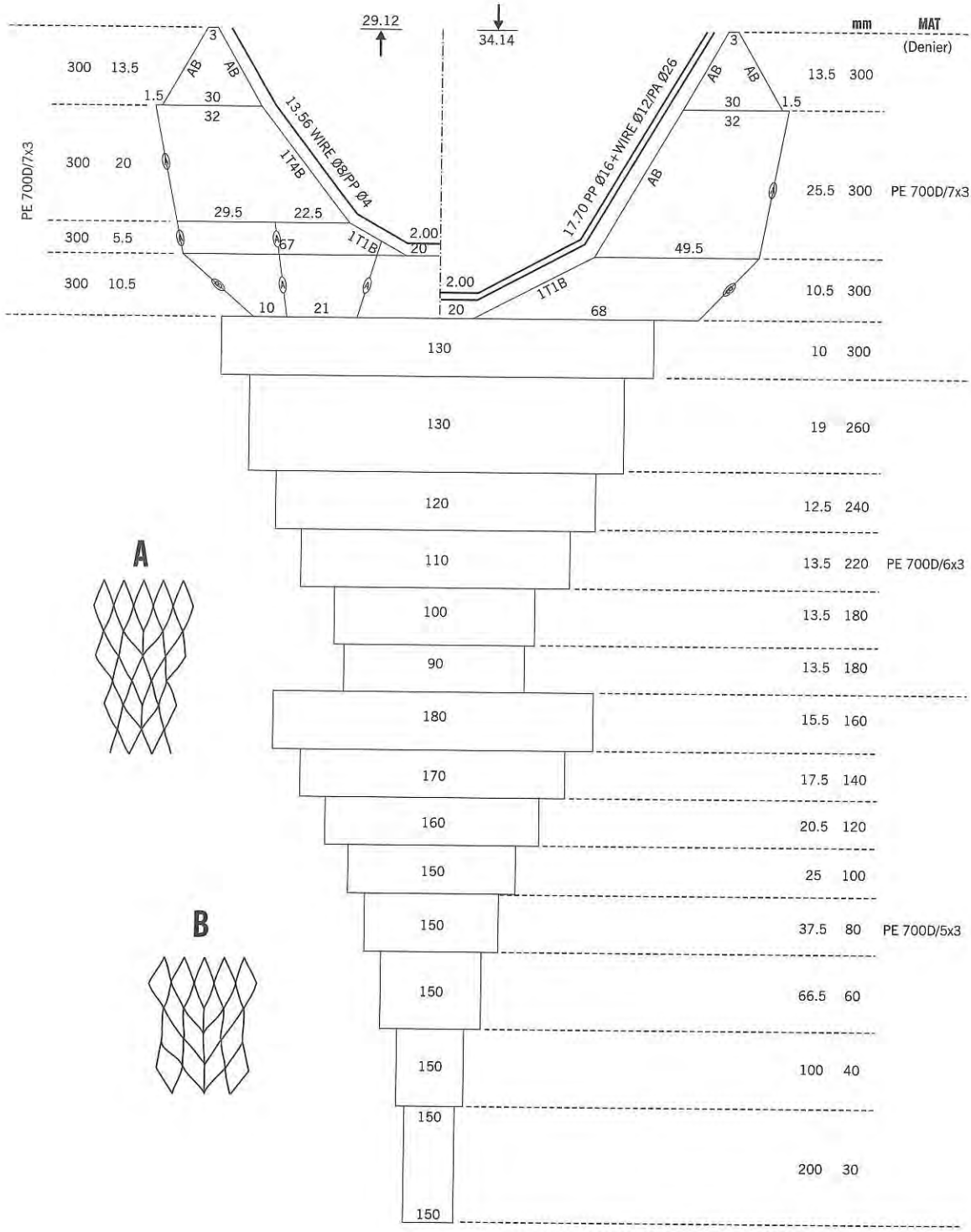



0.60 Fe Ø60

TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Hp : 220
Hp : 330

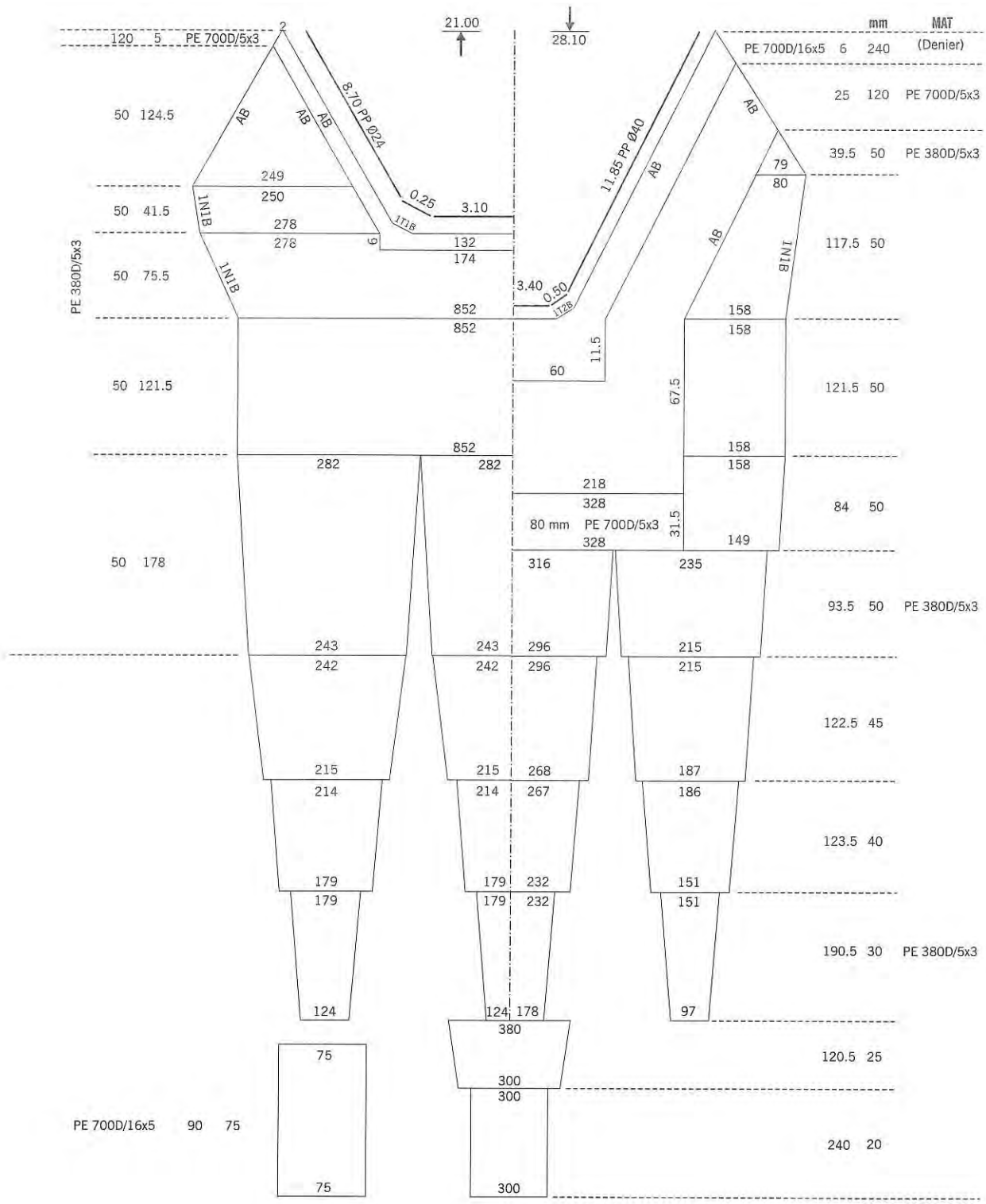
LOCATION
Vung Tau
Ba Ria-Vung Tau



TRAWL
Bottom, Pair
Demersal Fishes,
Cuttlefish

VESSEL
Hp : 180
Hp : 250

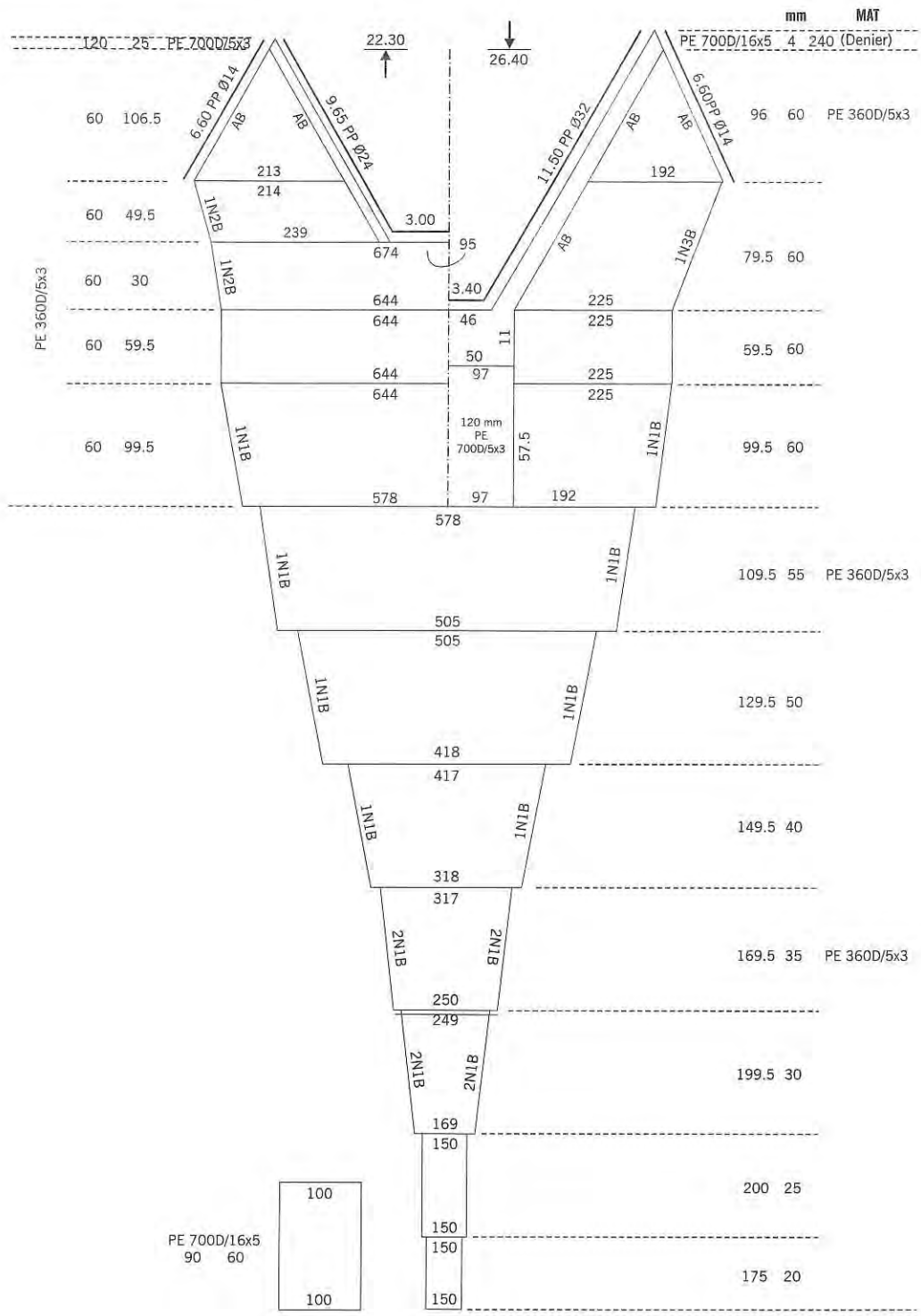
LOCATION
Tran Van Thoi
Ca Mau



TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Hp : 135
Hp : 135

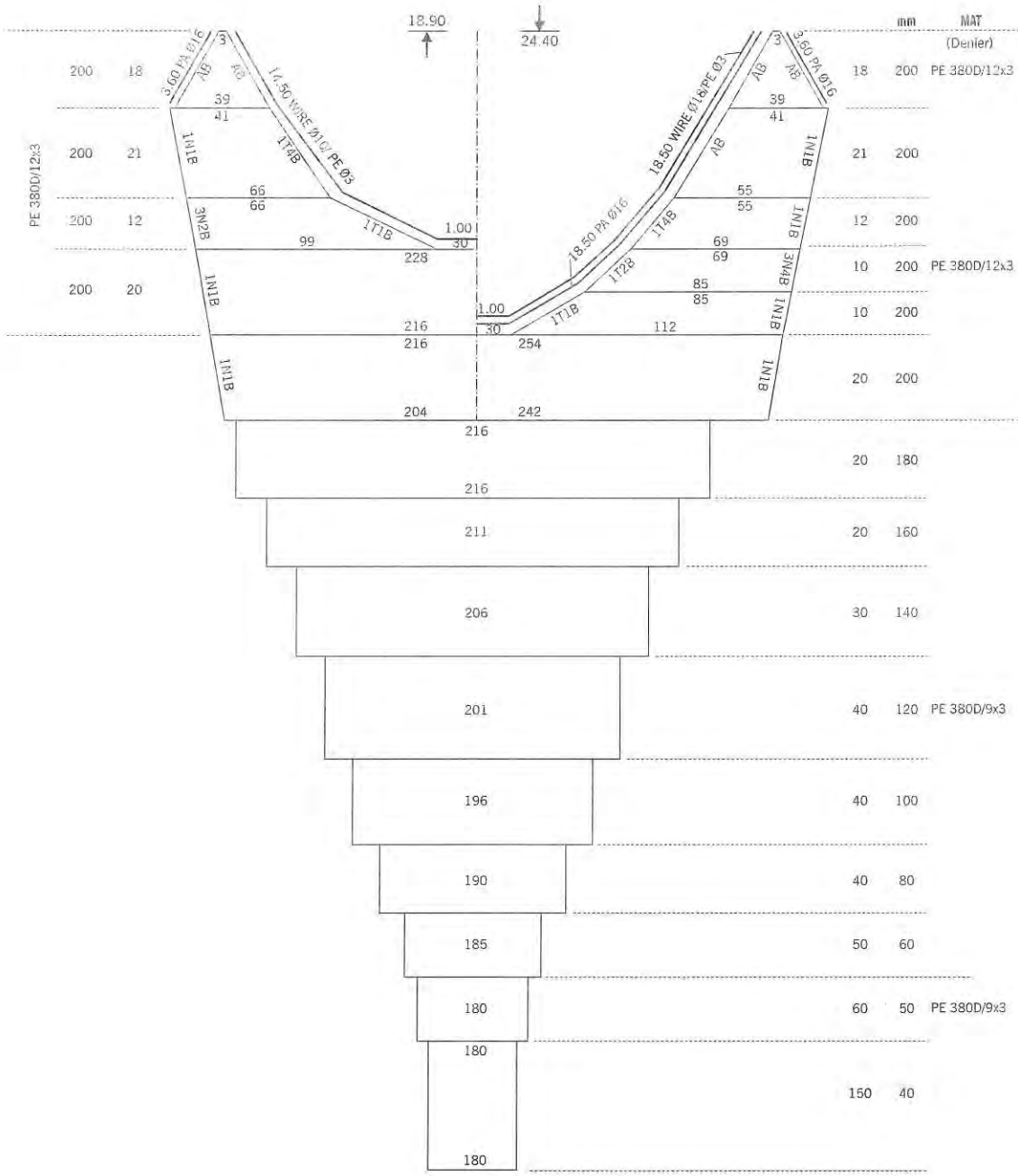
LOCATION
Ly Hoa
Quang Binh

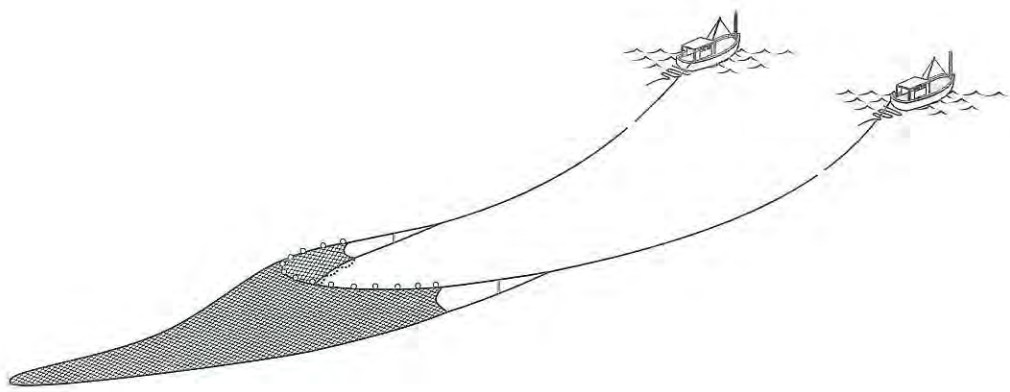


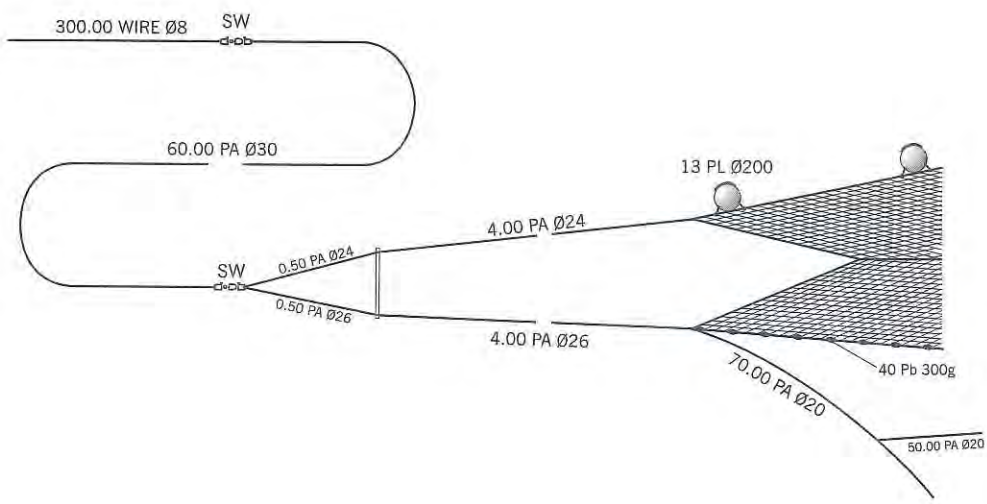
TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Hp : 200
Hp : 200

LOCATION
Cam Pha
Quang Ninh



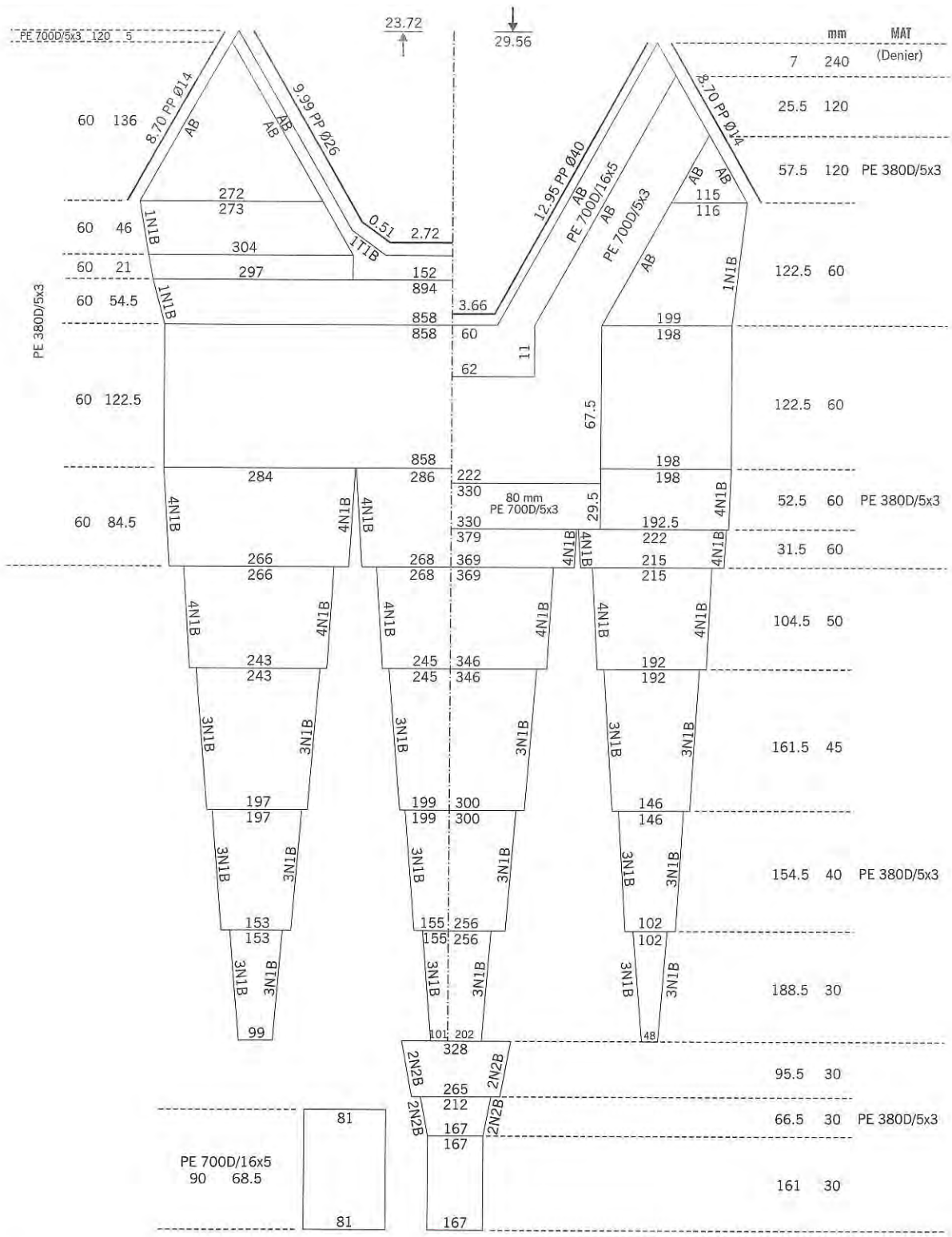



300.00 WIRE Ø8
SW
60.00 PA Ø30
13 PL Ø200
4.00 PA Ø24
SW
0.50 PA Ø24
0.50 PA Ø26
4.00 PA Ø26
40 Pb 300g
70.00 PA Ø20
50.00 PA Ø20

TRAWL
Bottom, Pair
Demersal Fishes,
Cuttlefish

VESSEL
Hp : 250
Hp : 250

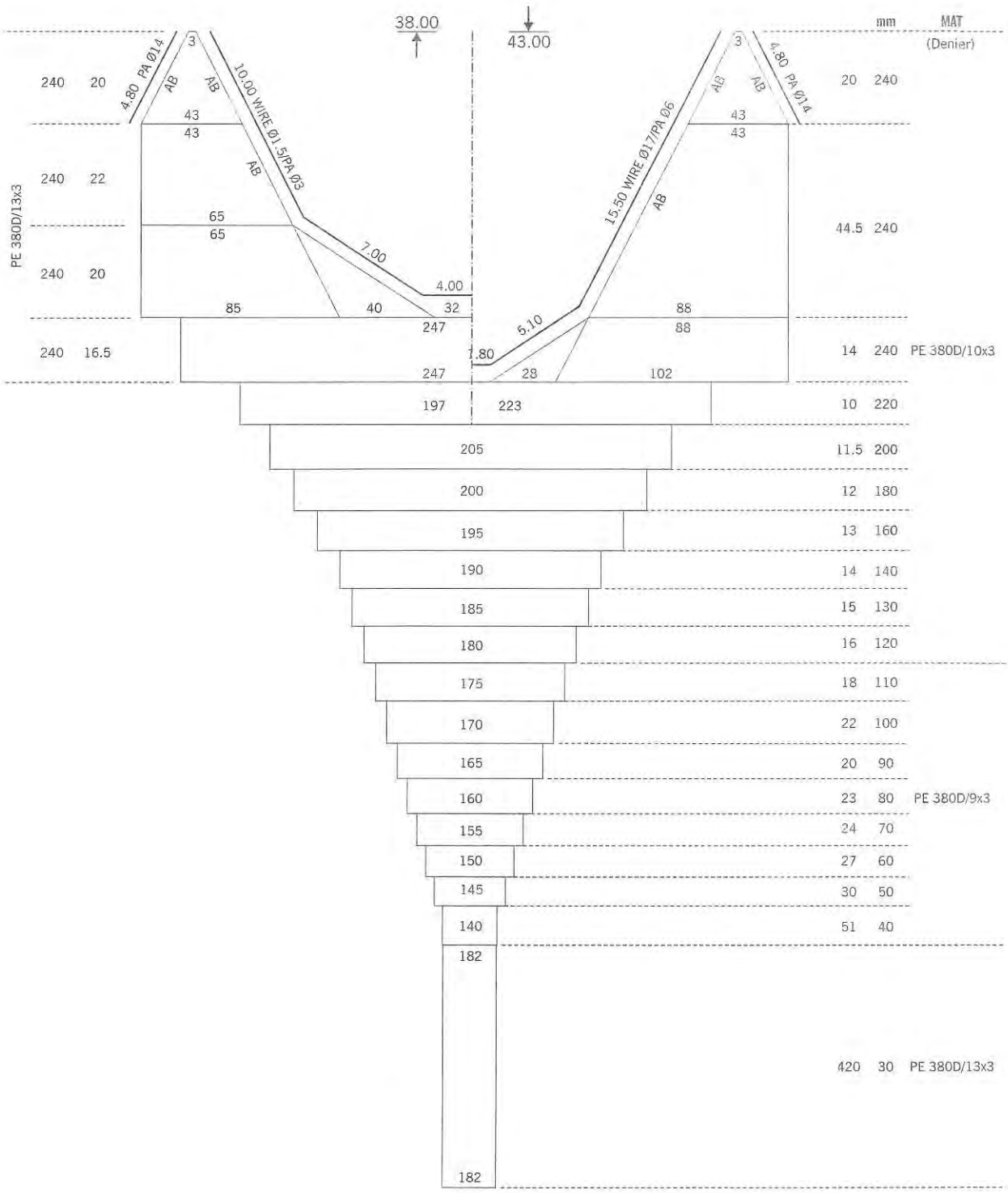
LOCATION
Tran Van Thoi
Ca Mau

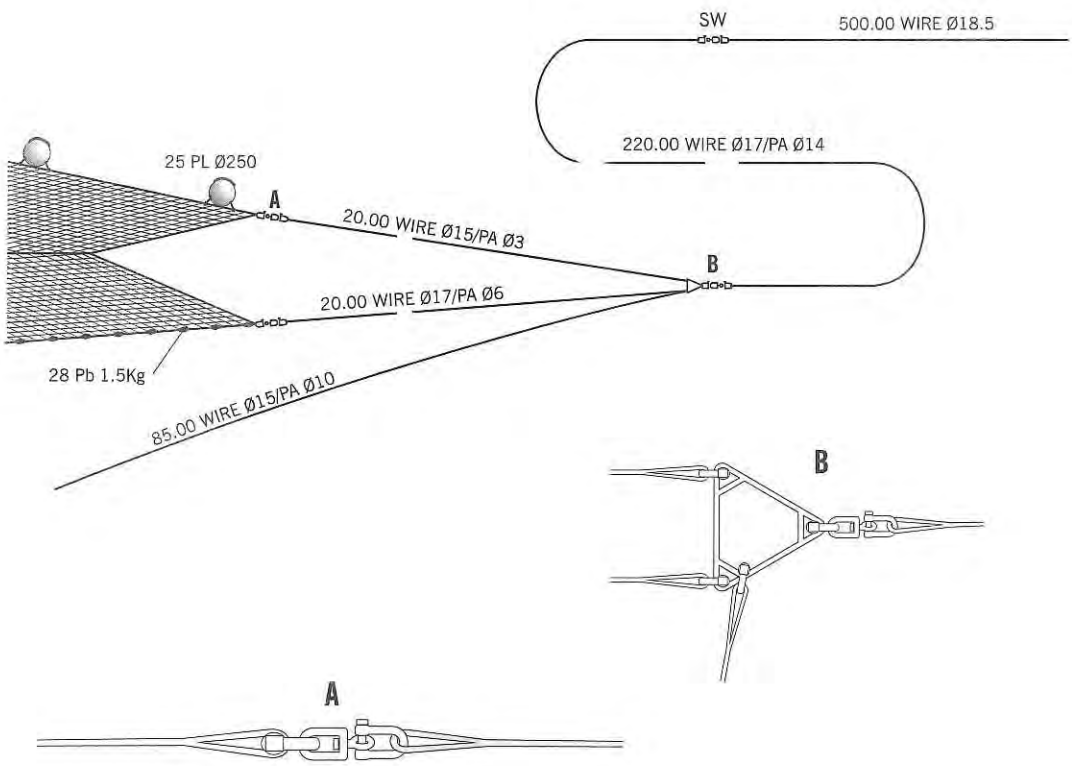


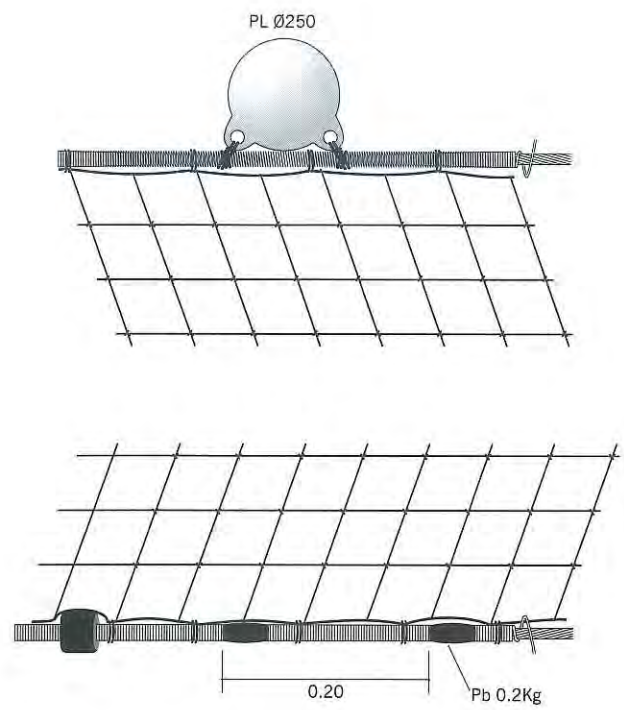
TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Hp : 135
Hp : 135

LOCATION
Ly Hoa
Quang Binh



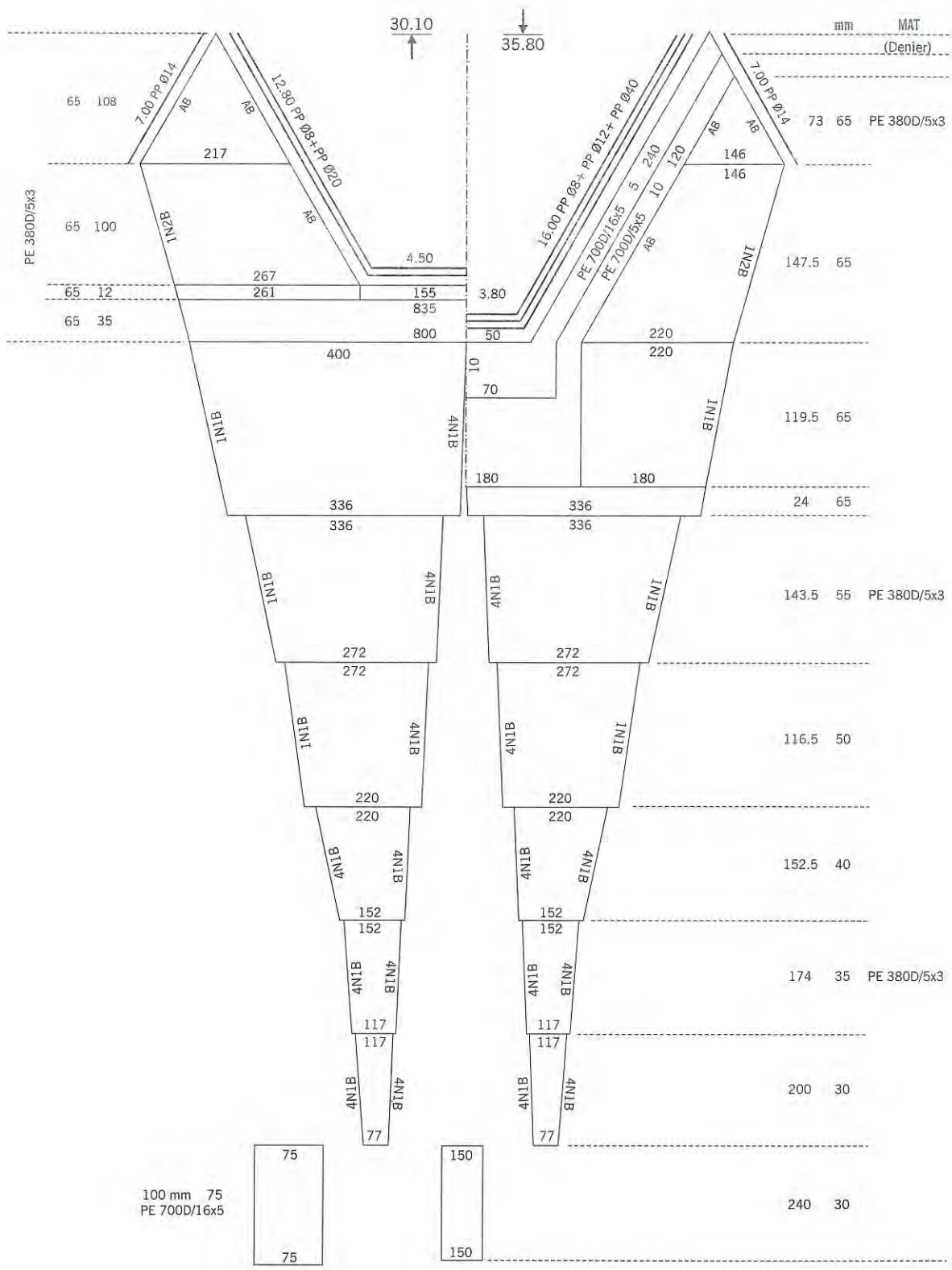

SW
500.00 WIRE Ø18.5
220.00 WIRE Ø17/PA Ø14
25 PL Ø250
A
20.00 WIRE Ø15/PA Ø3
B
20.00 WIRE Ø17/PA Ø6
28 Pb 1.5Kg
85.00 WIRE Ø15/PA Ø10
B
A


PL Ø250
0.20
Pb 0.2Kg

TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Loa : 17-20.5
Hp : 275-300

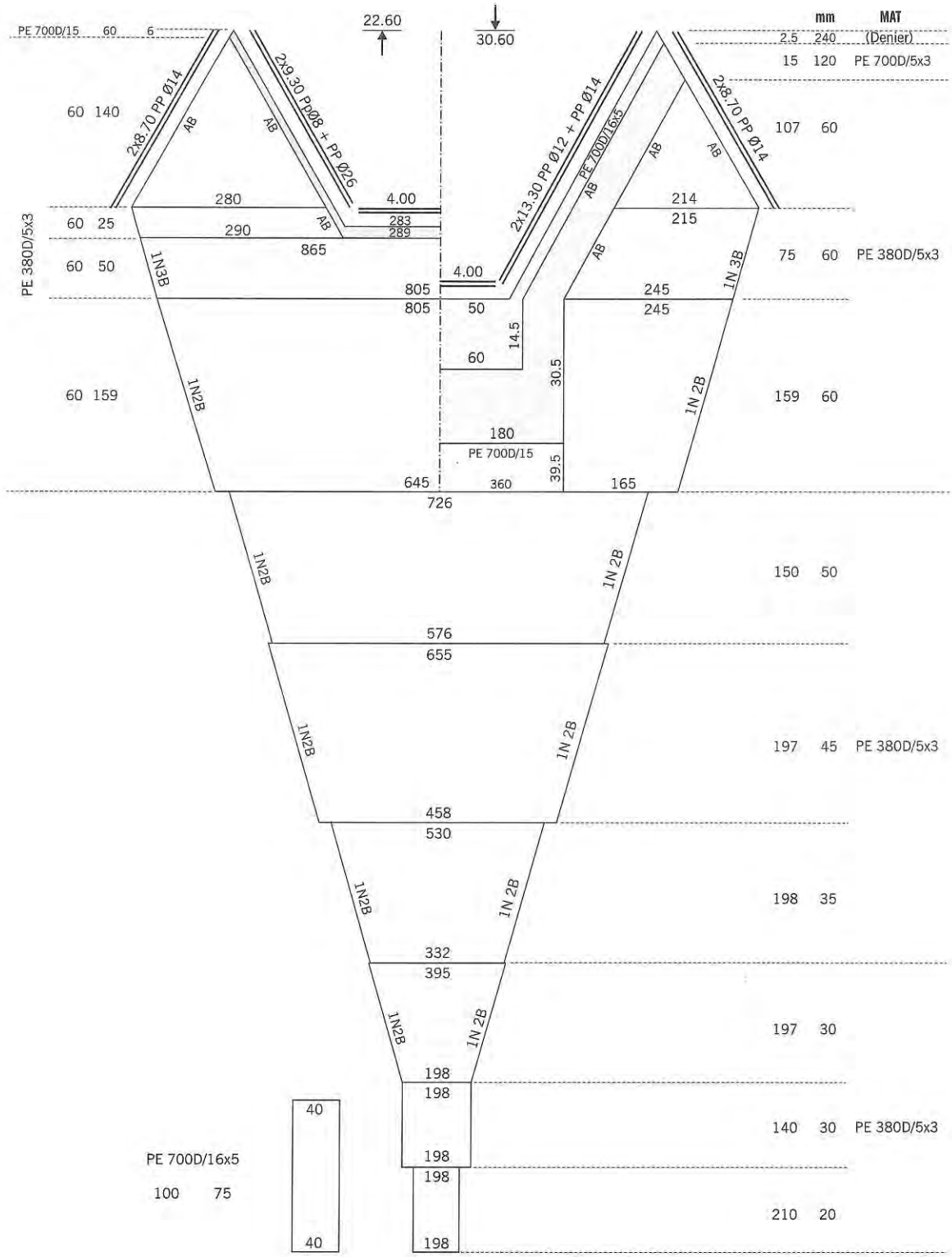
LOCATION
Rach Gia
Kien Giang

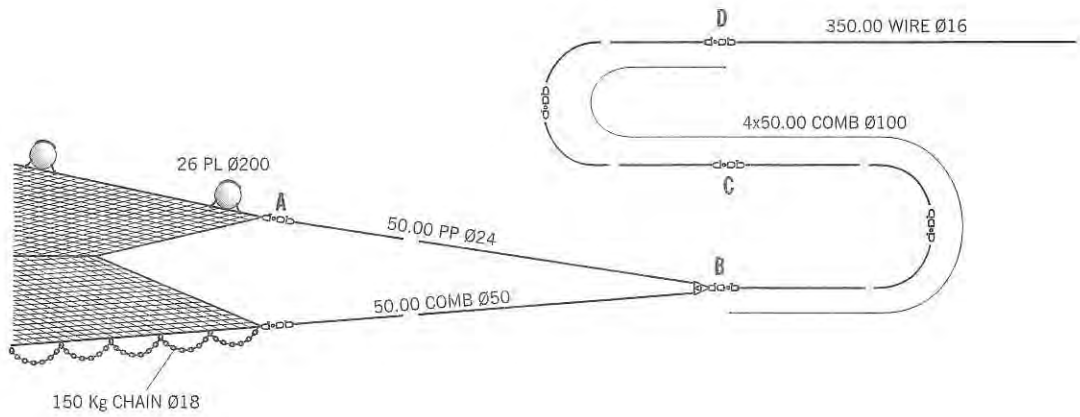


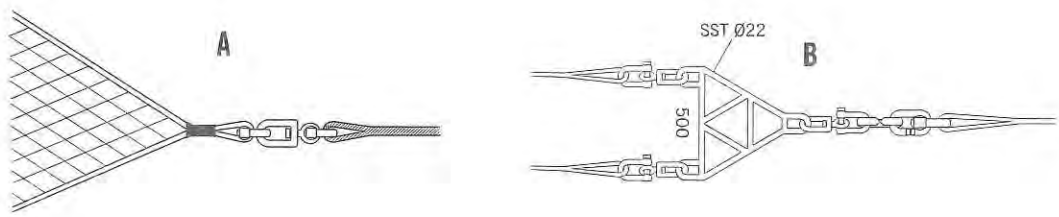
TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Hp : 275
Hp : 300

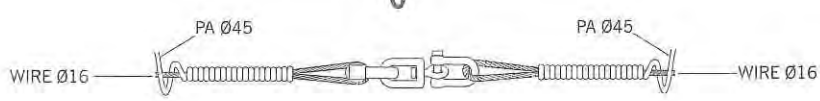
LOCATION
Rach Gia
Kien Giang

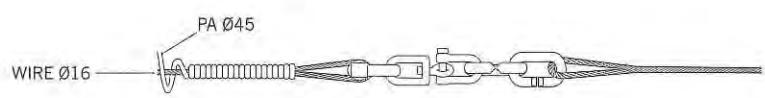



D
350.00 WIRE Ø16
4x50.00 COMB Ø100
C
26 PL Ø200
A
50.00 PP Ø24
B
50.00 COMB Ø50
150 Kg CHAIN Ø18

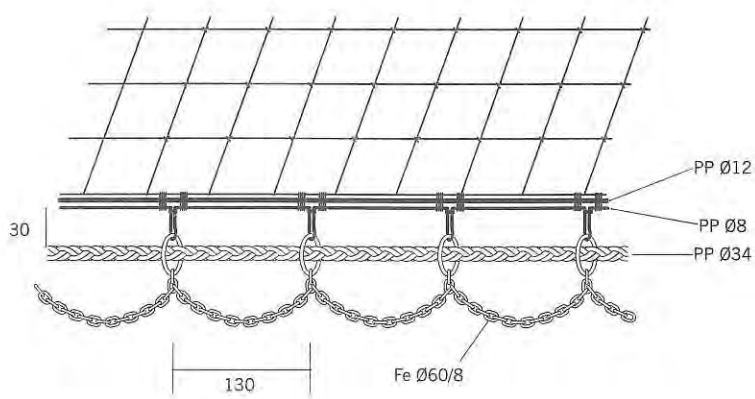

A
SST Ø22
B
500

C


PA Ø45
PA Ø45
WIRE Ø16
WIRE Ø16


PA Ø45
WIRE Ø16

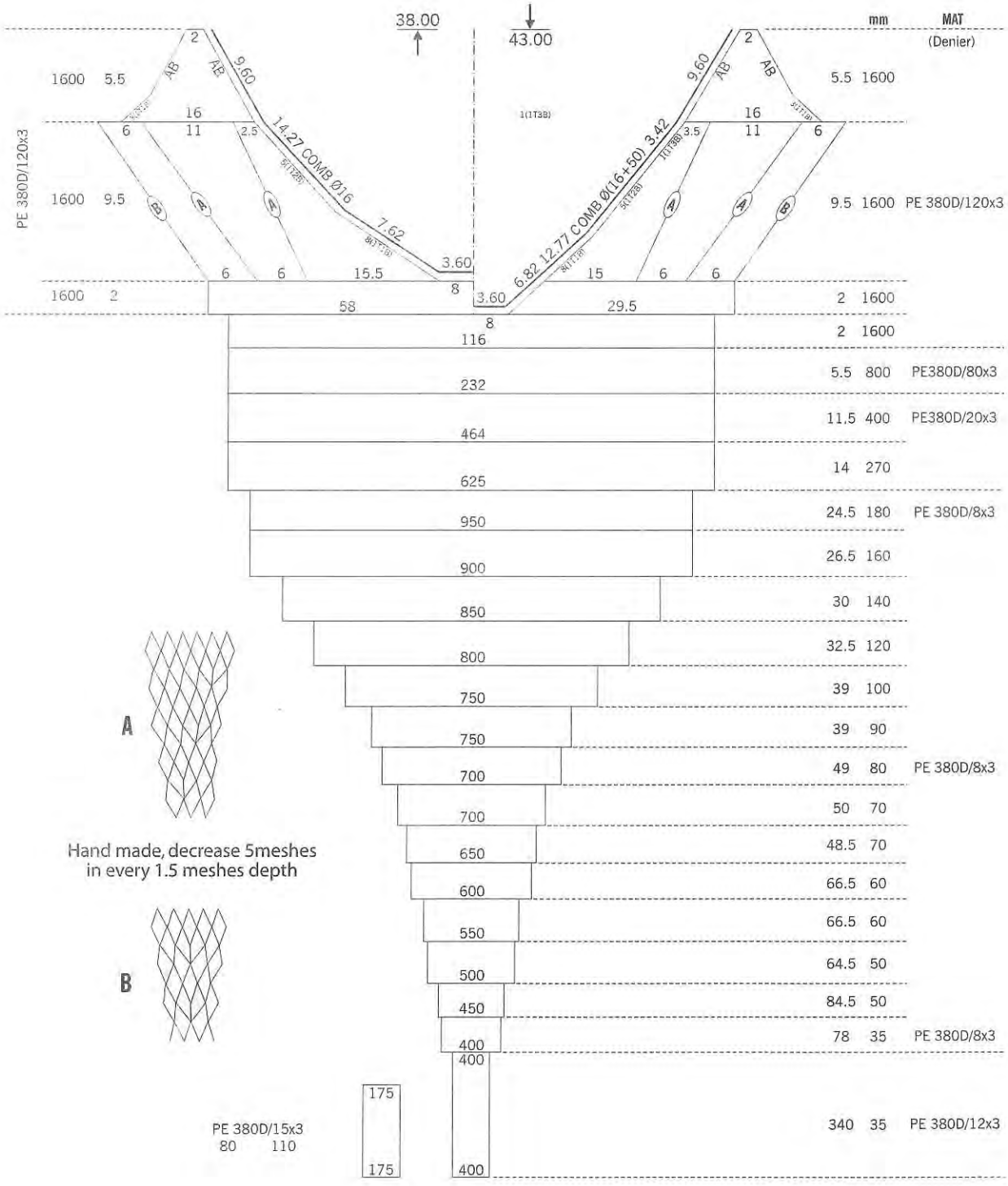
D

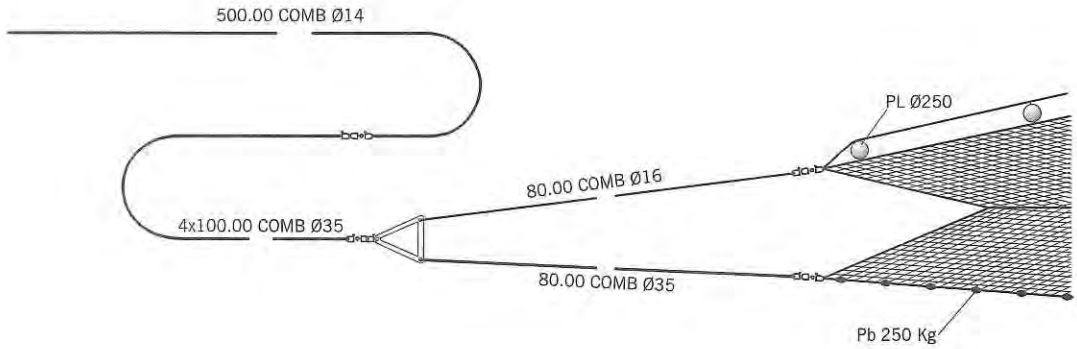

PP Ø12
PP Ø8
PP Ø34
30
130
Fe Ø60/8

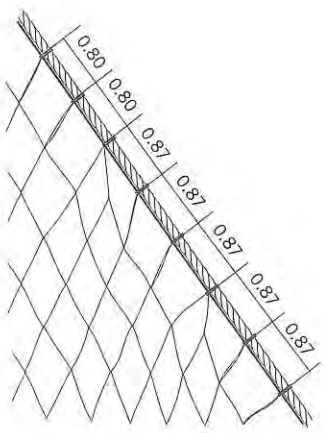
TRAWL
Bottom, Pair
Fishes, Cuttlefish

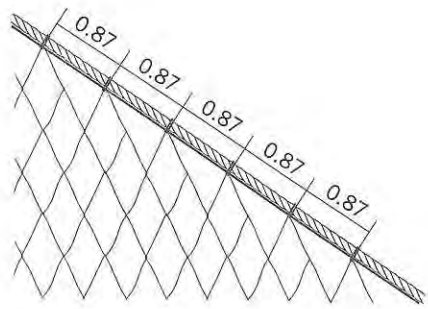
VESSEL
Loa : 27.00
Hp : 2x300

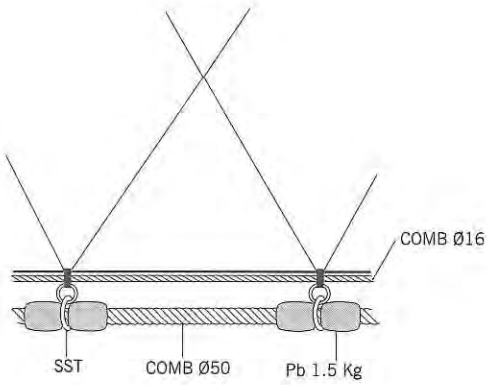
LOCATION
Hai Hau
Nam Dinh

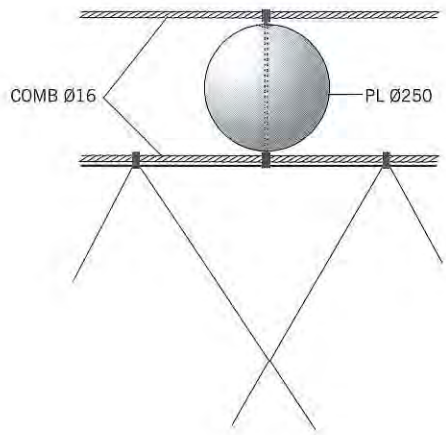



500.00 COMB Ø14
PL Ø250
80.00 COMB Ø16
4x100.00 COMB Ø35
80.00 COMB Ø35
Pb 250 Kg


0.80
0.80
0.87
0.87
0.87
0.87
0.87


0.87
0.87
0.87
0.87
0.87

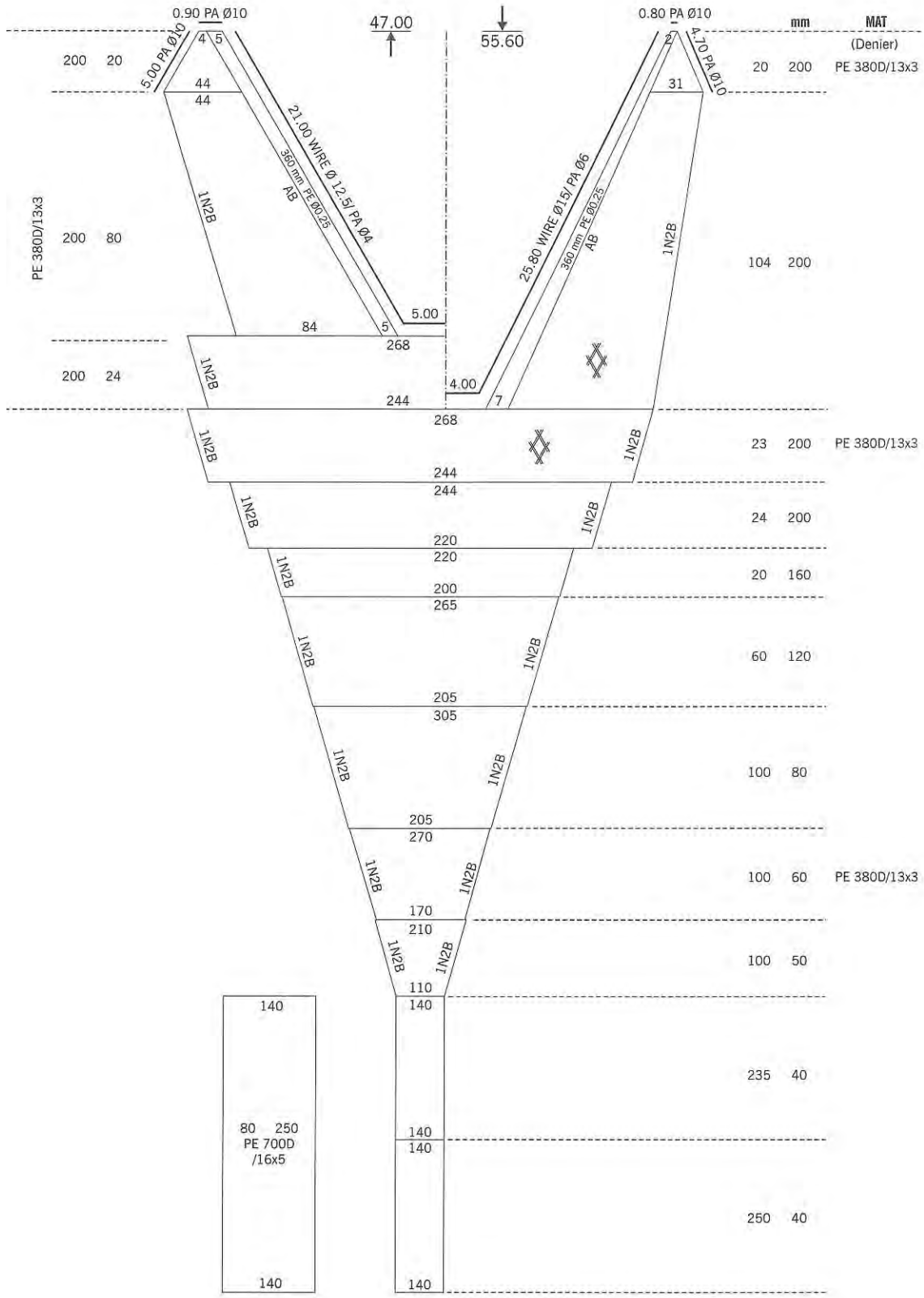

COMB Ø16
SST
COMB Ø50
Pb 1.5 Kg


COMB Ø16
PL Ø250

TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Hp : 350
Hp : 600

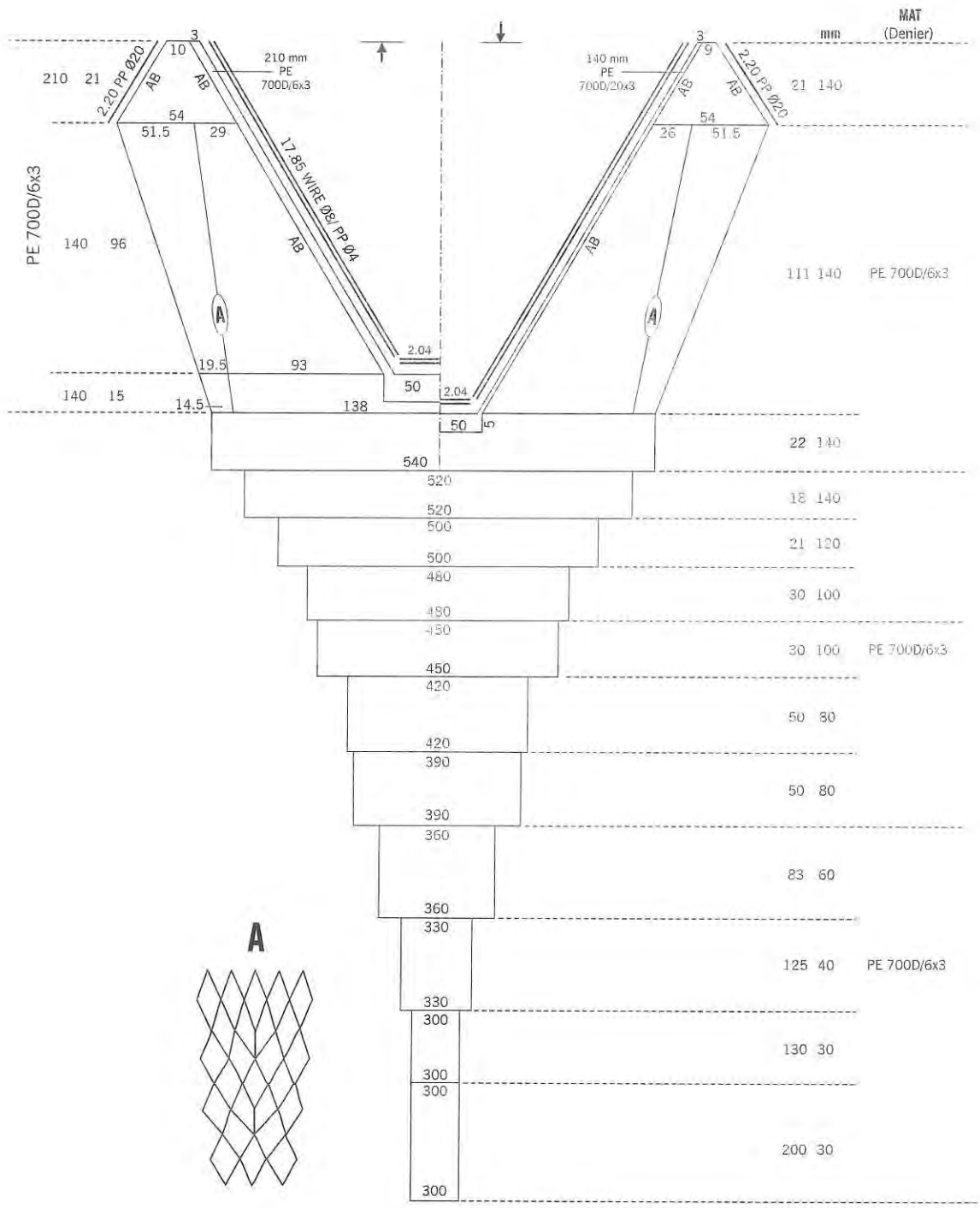
LOCATION
Ha Long
Hai Phong



TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Hp : 220
Hp : 330

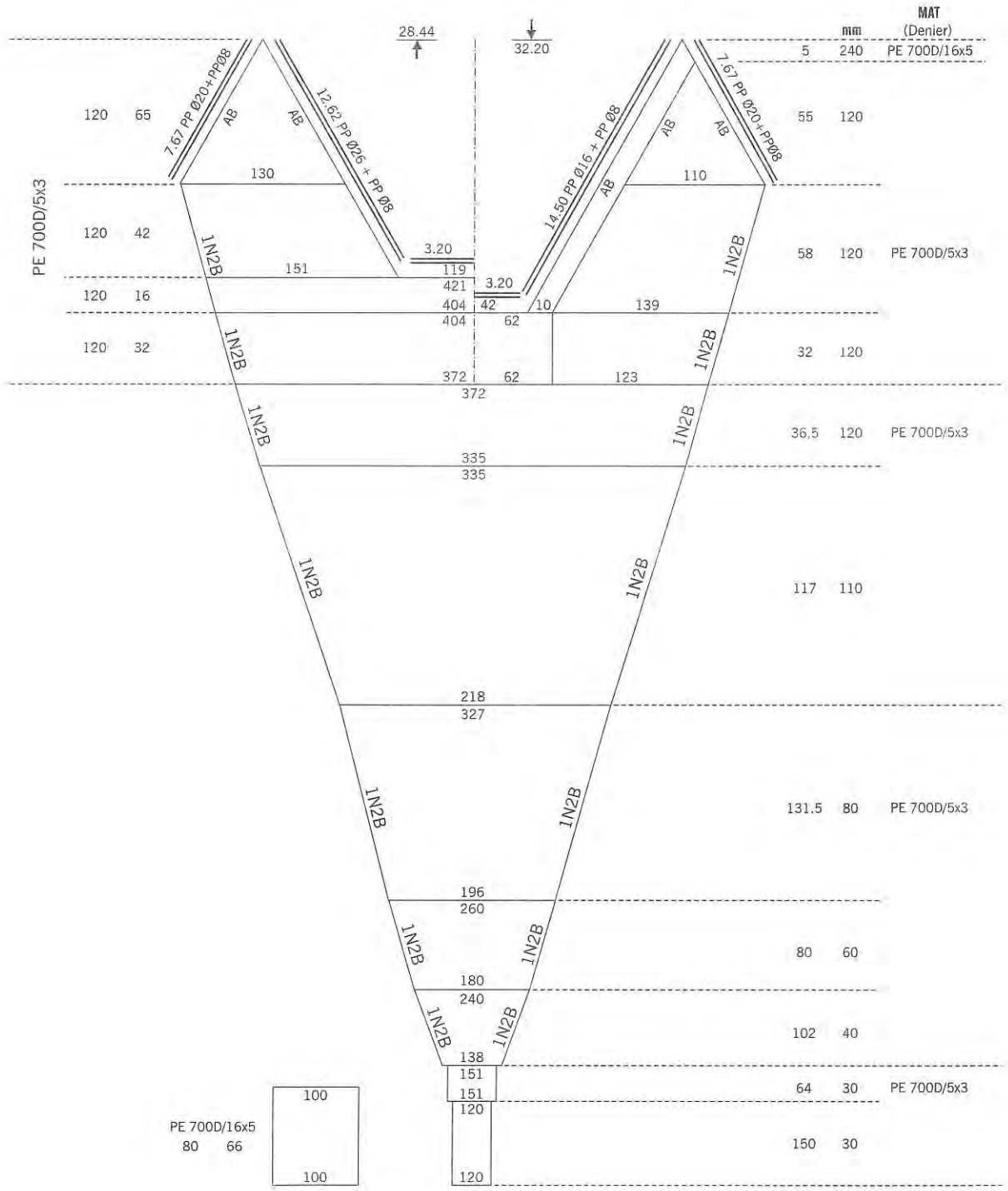
LOCATION
Vung Tau
Ba Ria - Vung Tau

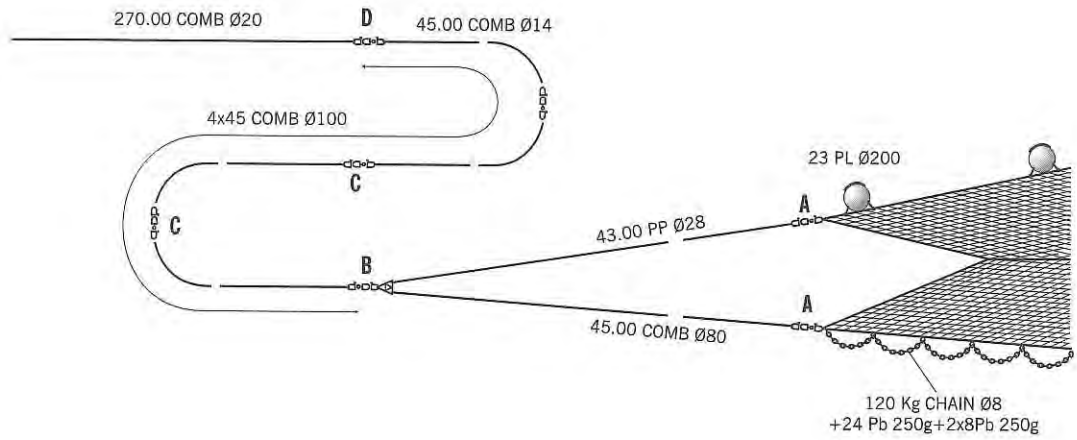


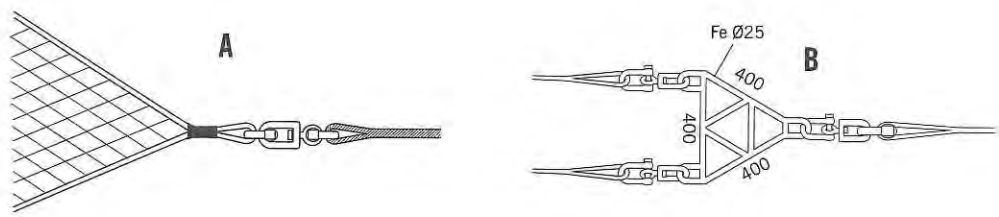
TRAWL
Bottom, Pair
Demersal Fishes,
Squid, Cuttlefish

VESSEL
Loa : 20-20
Hp : 330-330

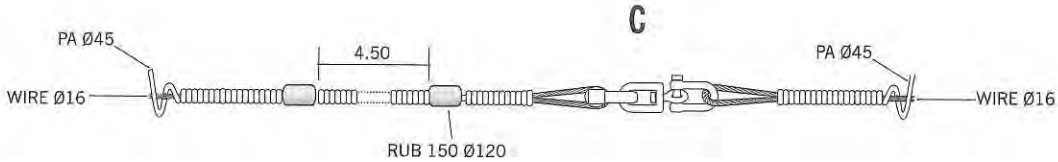
LOCATION
Chau Thanh
Kien Giang

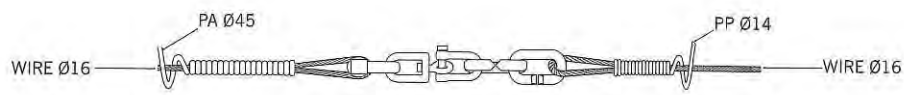



270.00 COMB Ø20
D
45.00 COMB Ø14
4x45 COMB Ø100
C
C
23 PL Ø200
A
43.00 PP Ø28
B
A
45.00 COMB Ø80
120 Kg CHAIN Ø8
+24 Pb 250g+2x8Pb 250g

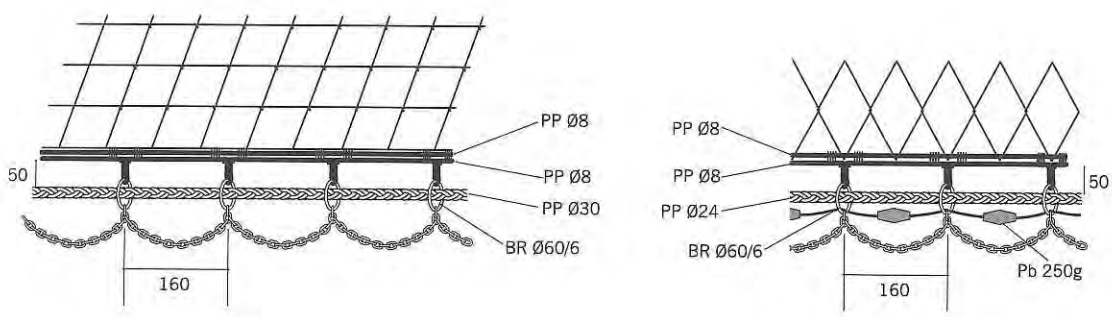

A
Fe Ø25
400
B
400
400

C


PA Ø45
4.50
PA Ø45
WIRE Ø16
WIRE Ø16
RUB 150 Ø120


PA Ø45
PP Ø14
WIRE Ø16
WIRE Ø16

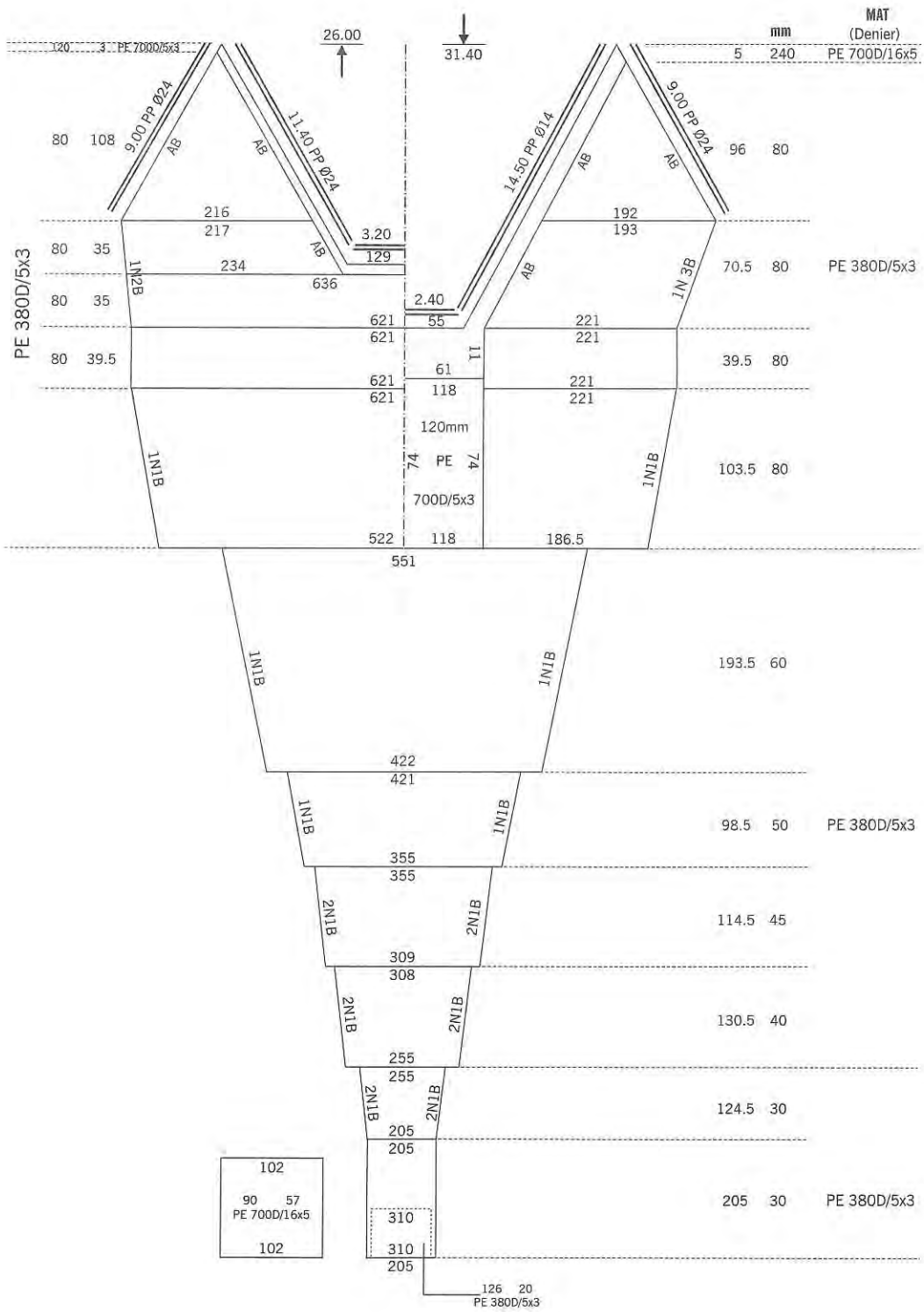
D


PP Ø8
50
PP Ø8
PP Ø30
BR Ø60/6
160
PP Ø8
PP Ø8
50
PP Ø24
BR Ø60/6
Pb 250g
160

TRAWL
Bottom, Pair
Demersal Fishes,
Cuttlefish

VESSEL
Hp : 350
Hp : 350

LOCATION
Tran Van Thoi
Ca Mau



< Chapter 4 >

Surrounding Net Fishing

Purse seine is one of the most important types of fishing gear in the marine fishing sector of Vietnam. It is the fishing gear having the potential for operation in offshore areas. The marine product from the purse seine is about 20.6% of the total catch.

With the appearance of' new techniques and Fish Aggregating Devices including: Using lights and fish shelters for luring fish; using nylon netting material, purse seine fishery developed very quickly. Most purse-seiners in the Northern and Central Provinces are of small size ranging 13-16 m in length with engines of less than 90 Hp. In the Southern provinces, the sizes of purse seiners are bigger and there is many of' 16-23 m in length with engines of 90-450 Hp.

The purse seines are large-scale fishing gear and are used on fishing boats of 33-450 Hp, they are concentrated mainly in the Central and Southern provinces. There are few purse seines in the northern provinces. Every year about 600 purse seiners of 33-74 Hp move from the Central region to the Gulf of Tonkin to operate.

Purse seine fishery in Vietnam uses two fishing methods. These are the luring method and searching method.

The luring method: This is very popular throughout the whole country. The length of the purse seine in the luring method is usually about 250-500 m and the depth of the net is about 45-70 m. The reason for this is that the fish schools often concentrate around fish shelters and under light sources. Therefore, it doesn't need a large size of net but big enough to surrounding fish school only.

The searching method: Pelagic fish often move at high speed, so the purse seiners must also have high speed of movement and of setting the net. The purse seines must be both long and deep. Commonly the nets are 500-1200 m long and 70-120 m deep.

At present, the surrounding nets are second in marine catches of' Vietnamese fisheries. Annual production of the surrounding net is about 30% of the total catch of the country. The main species of the local and commercial types of surrounding net are small pelagic fish and include: Sardine, mackerel, round scad, skipjack tuna, anchovy etc.

Fishing Gear and Methods

Based on the structure of nets and their operating methods, it is possible to divide the surrounding nets in Vietnam into the following types:

1. Anchovy Purse Seine

The net can operate in the deeper fishing grounds. The net is 200-450 m long and 40-60 m deep. Mesh sizes range from 6-10 mm, the materials used for the net are 210D/6-210D/ 12.

The Anchovy purse seiners are 11-21 m long with engines of 33 - 330 Hp and have generators with a capacity of 3-5 kW that are used for luring anchovy and other fish schools.

According to the experience of the fishermen in each area, anchovy fishing operations can be carried out either in the day or nighttime.

Using the search method the fishing operations take place in the daytime, usually in the early morning or at dusk; this type of fishing depends on the fishermen's experience of finding fish schools visually and encircling them.

Lure light fishing operations are done at night, lights are used to attract the fish.

The fishing operation of' anchovy purse seines is similar to the fishing operation of other seine nets'.

2. Luring Purse Seine

This fishing method is employed widely throughout the country. The luring purse seiners have engines of 20-350 Hp and generators with a capacity of 310 kW are used for the lure lights. Each boat has between 2-7 fish shelter groups. The net is of a rectangular-shape with a head-rope 300-500 m long and the net is 40-160 m deep. The mesh sizes are 18-15 mm in the bunt and 22 - 35 m in other parts. The luring purse seiners normally conduct fishing operations in waters of 20 - 80m deep.

Fishing operations are conducted at night. Using the lights on the vessel and on the light boats to lure the fish. Before setting the net, the lights on the vessel are gradually switched off to attract fish around the light boat.

Net Setting:

The vessel reaches a point near the light boat and the direction of water current and wind is determined before setting the net. First, the flag buoy is thrown into the sea and the net is deployed to encircle the whole fish school.

Net Hauling:

The flag buoy is towed and the purse line is picked up by the winch while the operation of' hauling the net is carried out by hand at the two sides of the vessel. Fish are driven to the bunt to concentrate there and are caught in conical nets. The main target species are scad (Carrangidae) and mackerel (Scombridae) etc.

When there is strong moonlight (from 12th to 19th in the lunar month), all the luring purse seiners remain in port and do not operate.

3. Searching Purse Seine

According to the structure and size of the net, the searching purse seines may be classified

into two groups: searching purse seine for catching small pelagic fish and for catching tuna.

The fishing method of' this gear is different from the luring purse seine. The difference is that this method does not need lights to attract fish, so it can be carried out both by day or night and relies on the fishermen's experience of visually finding the fish schools or using a fish finding sonar. Normally, the length and setting speed of' the searching purse seine are greater than those of the luring purse seine with a view to catching the whole school while they are swimming.

The fishing technology consists of both setting and hauling processes carried out similarly to those of the luring purse seine.

The target species are scad, mackerel and tuna, etc.

3.1. Small Fish Purse Seine Using the Searching Method

For the searching method, the purse seiners must have powerful engines, of a size suitable for operating in the offshore fishing grounds. The boats often use engines of more than 60 up to 450 Hp.

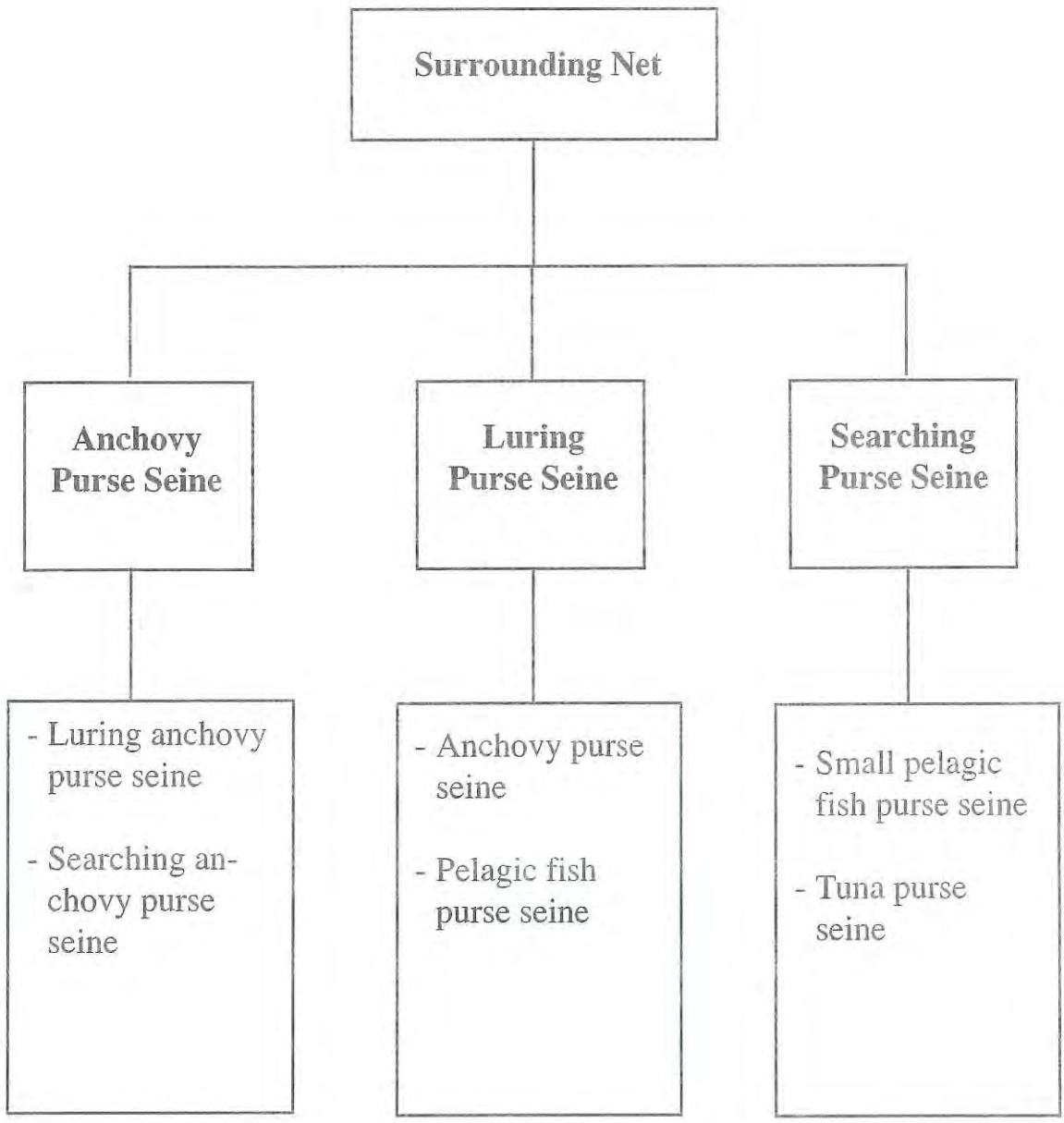
The sizes of the nets are 450-700 m long and 50-90 m deep. Mesh sizes are the same as for the luring method.

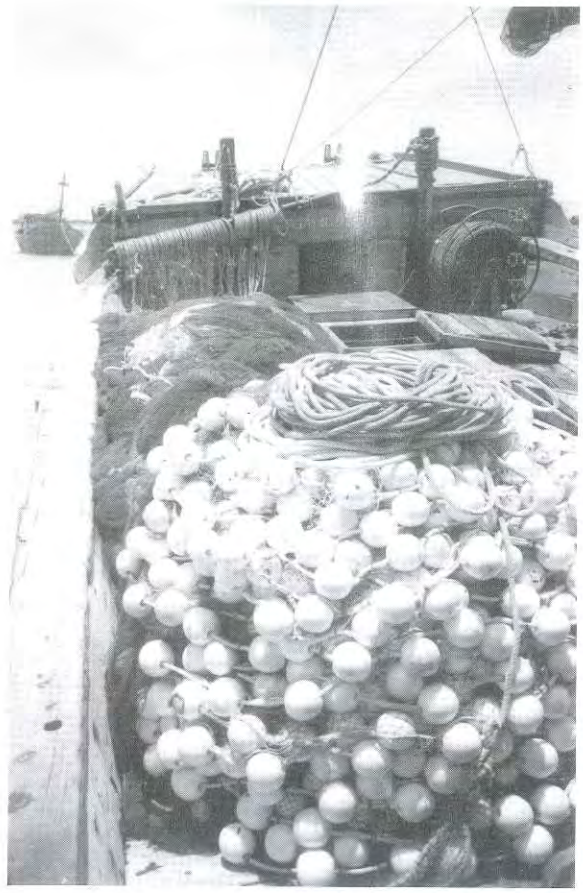
Fishing operations are conducted during the day or at nighttime. Fishermen seek the fish schools by a simple visual search.

3.2. Tuna Purse Seine

Tuna are one of the species that move at high speed so the purse seines for catching them often have a length of 500-1200 m and a depth of 70-120 m. The mesh size is about 30-35 mm in the bunt and 40-60 mm in other parts.

At present, there are many new types of equipment used including: radar, GPS, fish finders, winches and power-blocks that are useful during fishing operations.

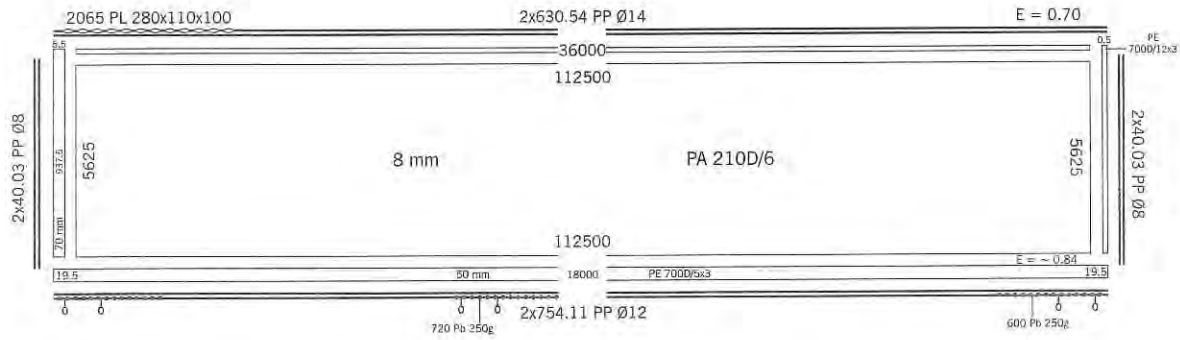

Surrounding Net
Anchovy Purse Seine
Luring Purse Seine
Searching Purse Seine
- Luring anchovy purse seine
- Searching anchovy purse seine
- Anchovy purse seine
- Pelagic fish purse seine
- Small pelagic fish purse seine
- Tuna purse seine

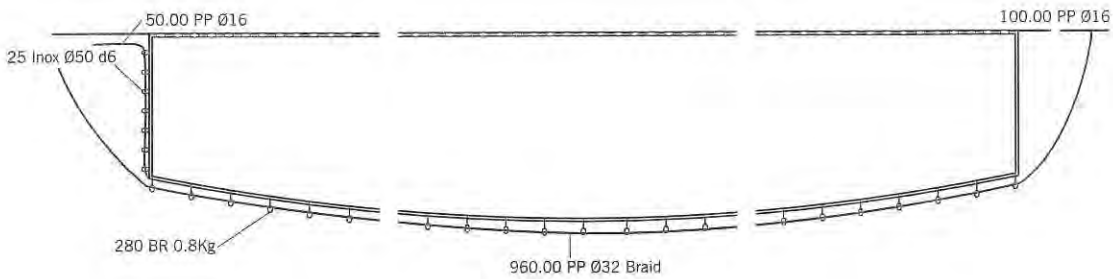


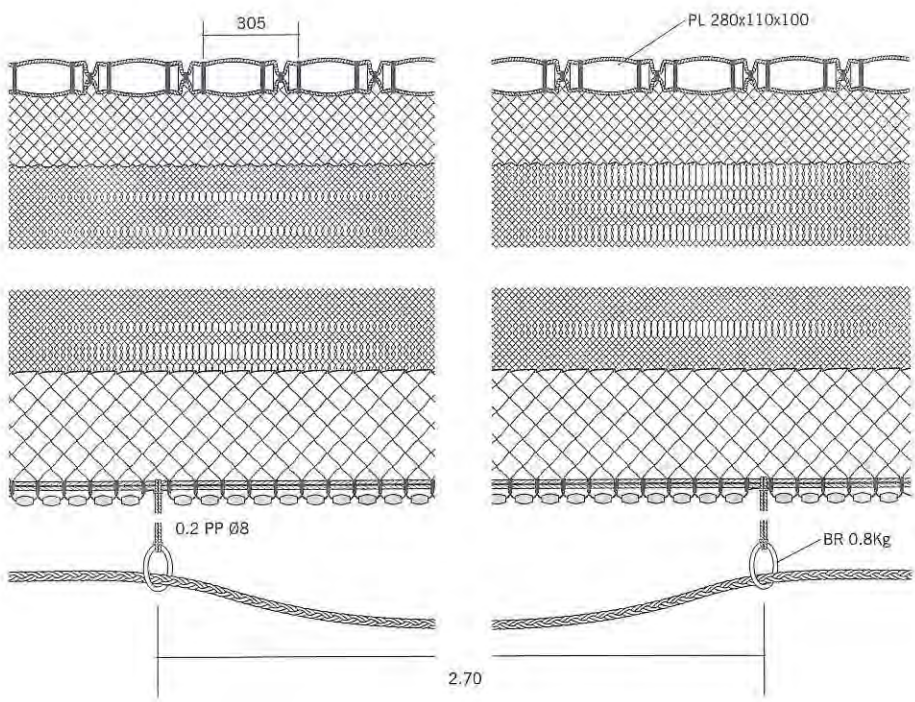
SURROUNDING NET
Luring Purse Seine
Anchovy

VESSEL
Loa : 20.00
Hp : 330

LOCATION
Phu Quoc
Kien Giang



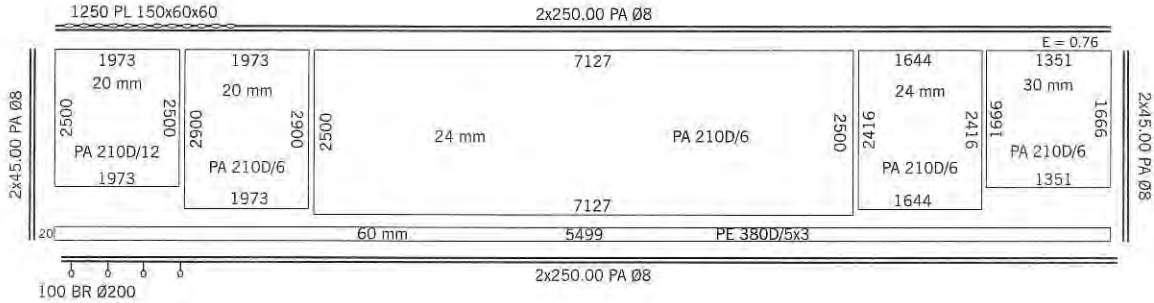


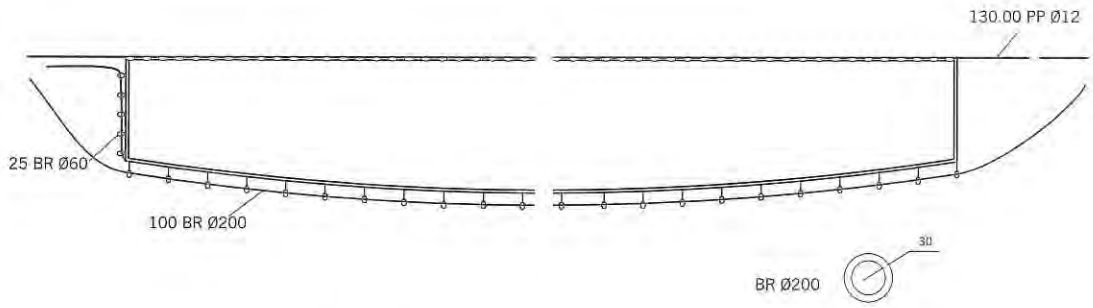


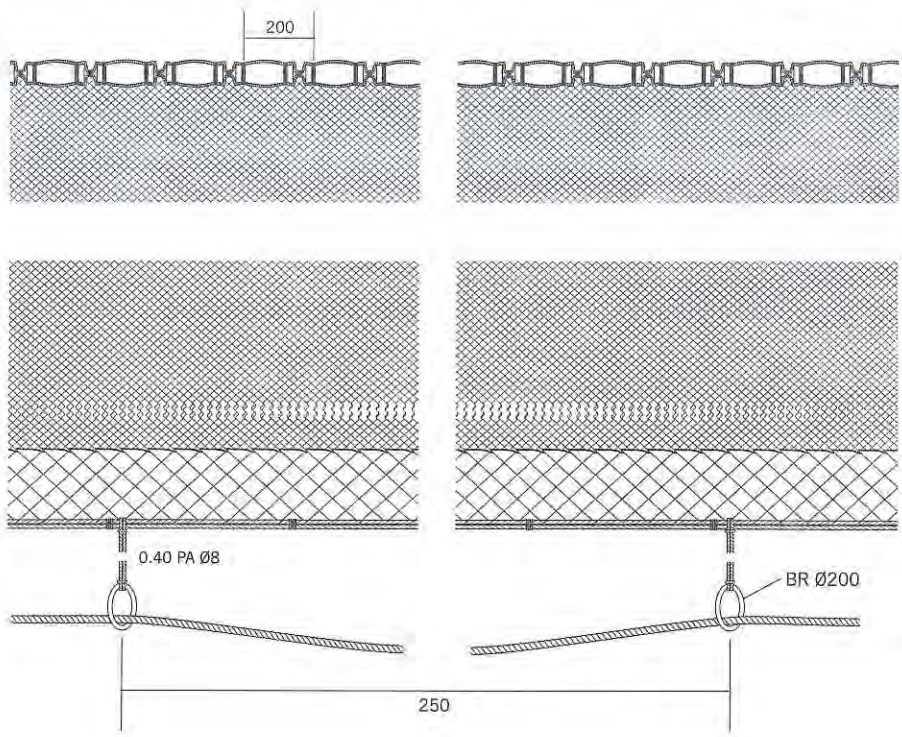
SURROUNDING NET
Luring Purse Seine
Sardine, Scad, Black Pomflet
Tuna, Squid

VESSEL
Loa : 15.50
Hp : 45
EG : 15 KVA
LL : 40x40 W

LOCATION
Cat Ba
Hai Phong



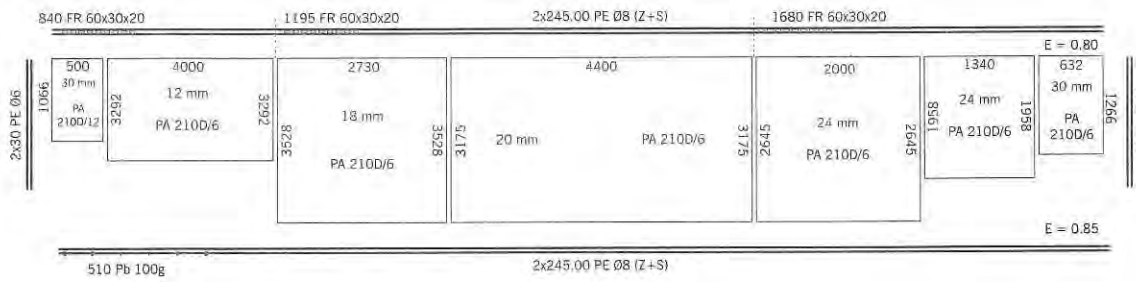


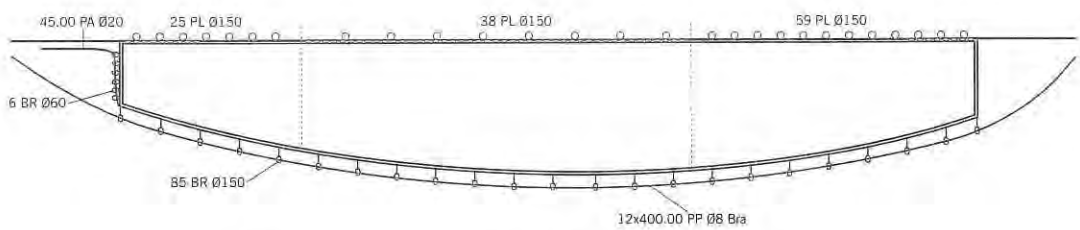


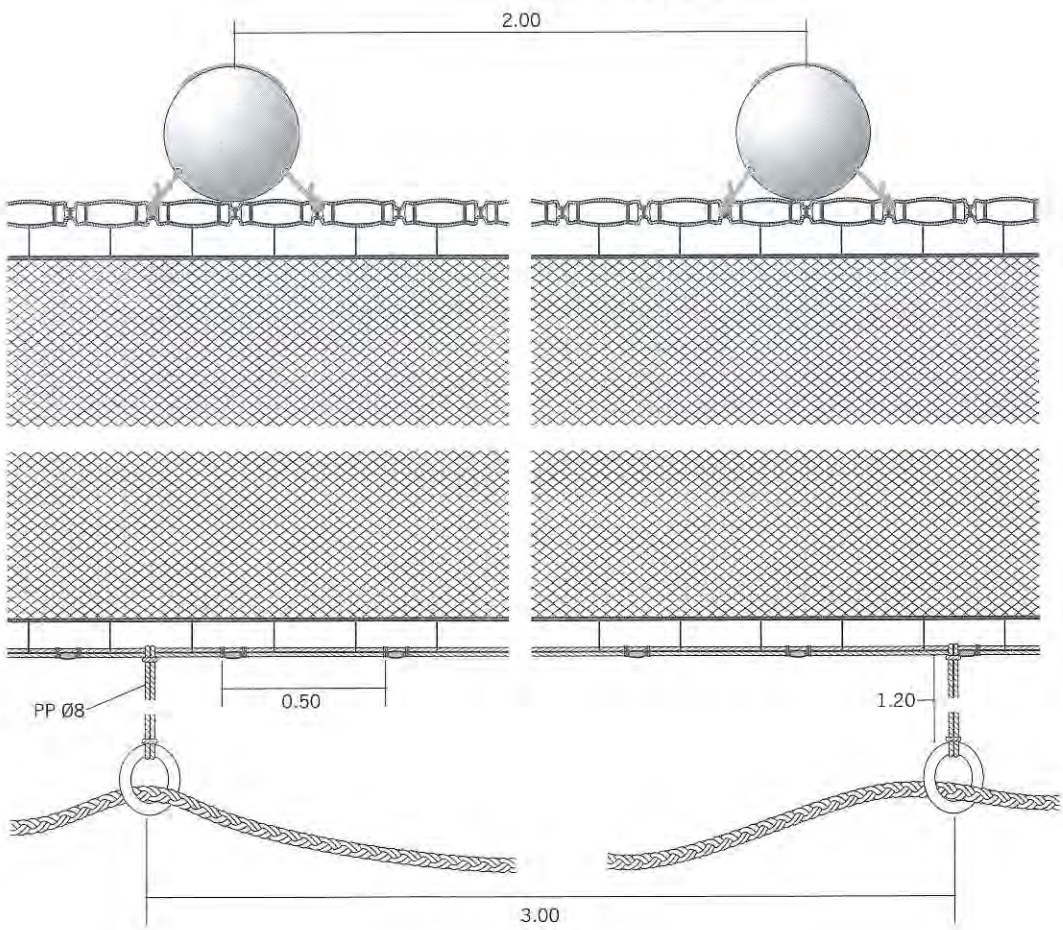
SURROUNDING NET
Luring Purse Seine
Scad, Sardine

VESSEL
Loa : 14
Hp : 60

LOCATION
Phu Thuan
Thua Thien Hue



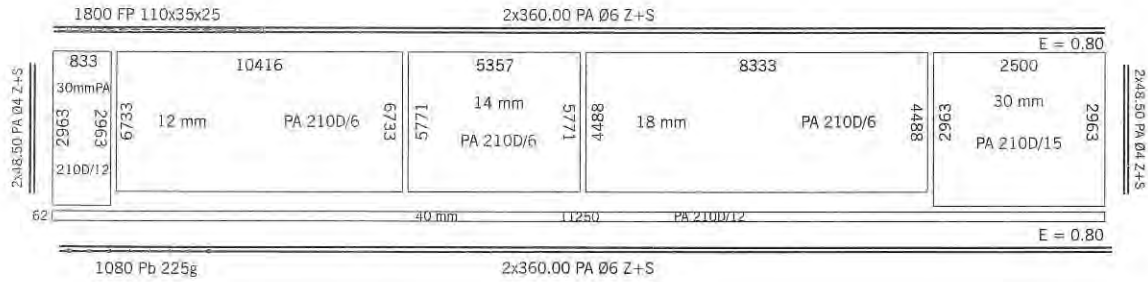


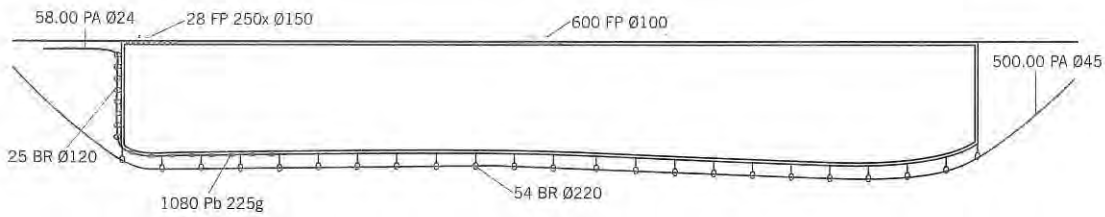


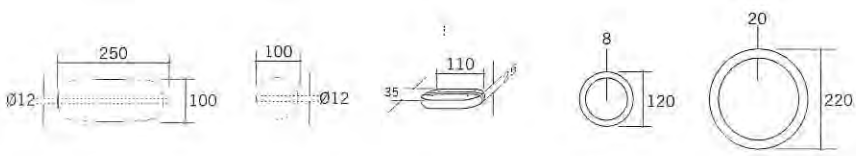
SURROUNDING NET
Luring Purse Seine
Pelagic Fish

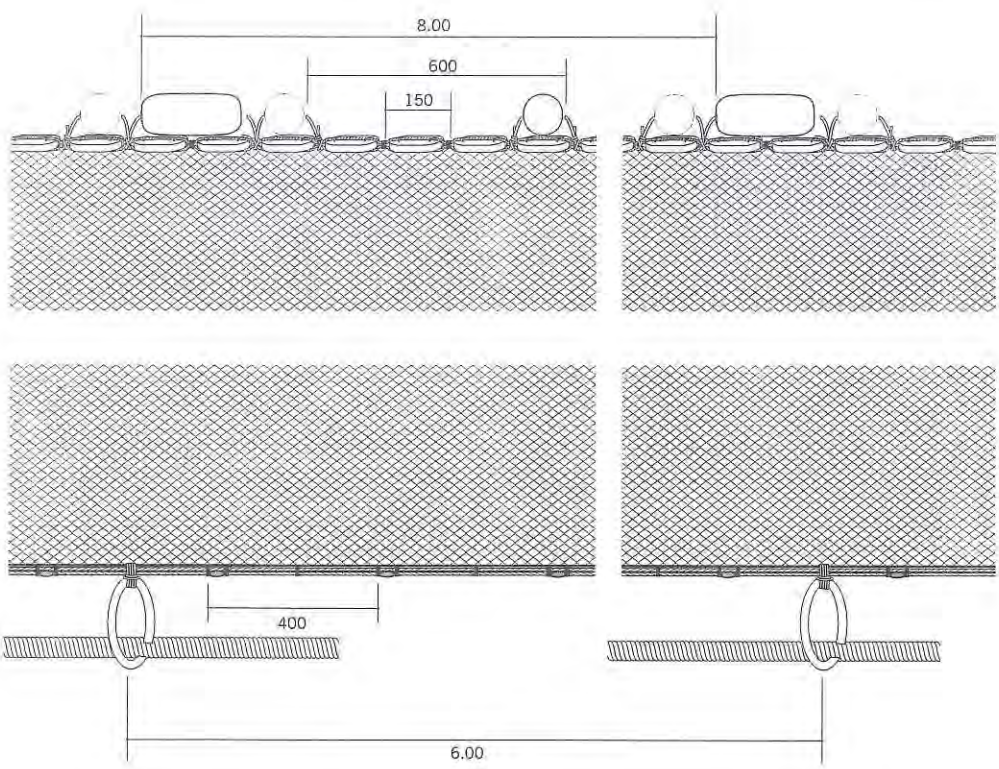
VESSEL
Loa : 16.30
GT : 27
Hp : 70

LOCATION
Cat Ba
Hai Phong





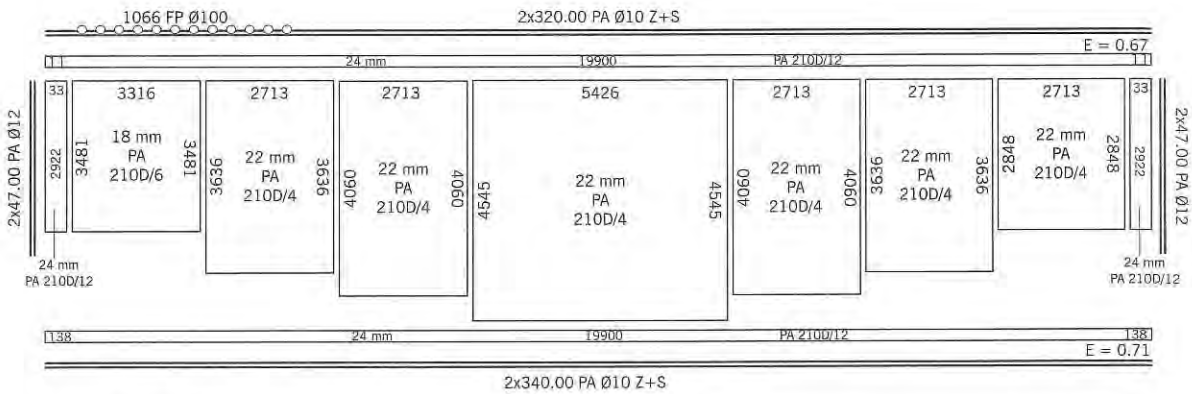


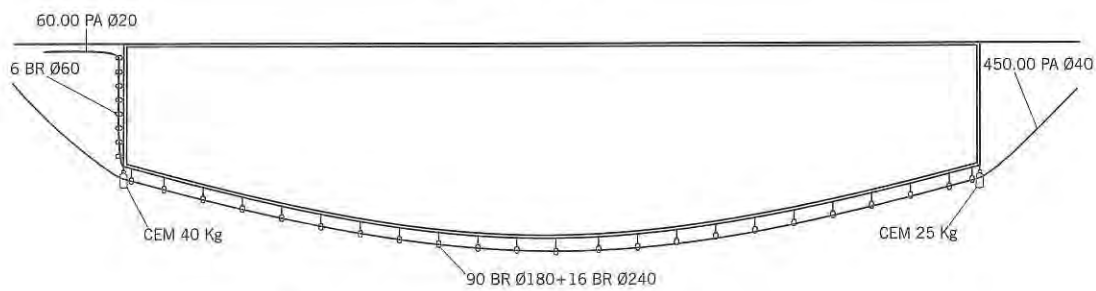


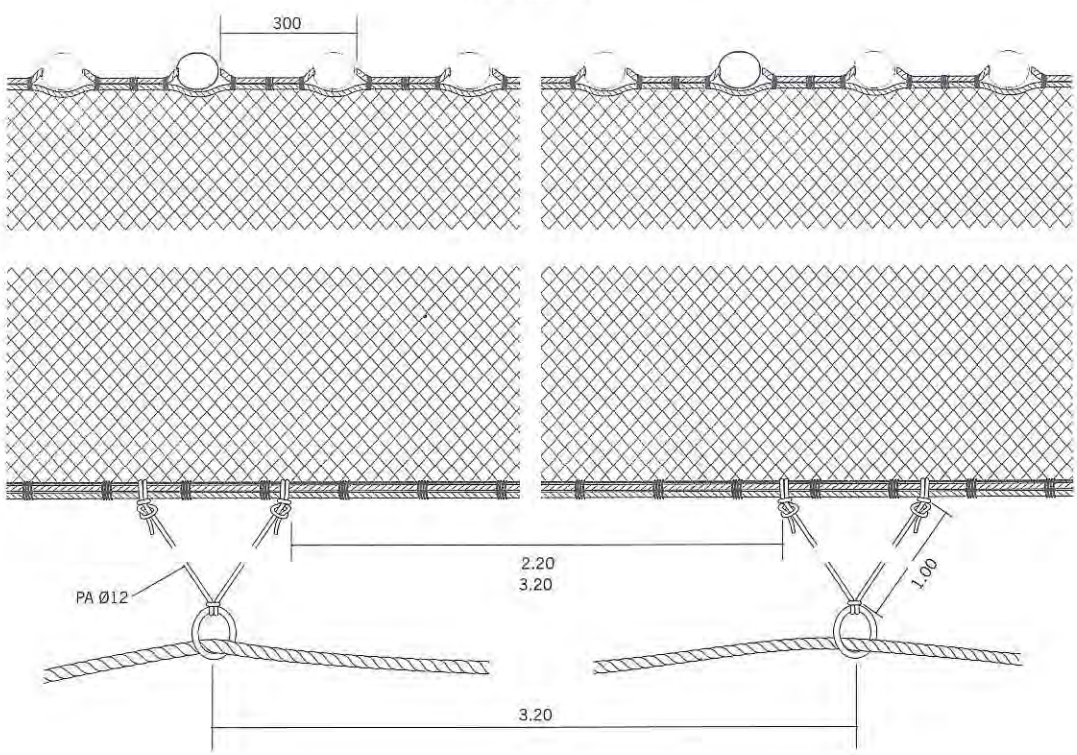
SURROUNDING NET
Luring Purse Seine
Pelagic Fish

VESSEL
Loa : 18.4
GT : 37.7
Hp : 74

LOCATION
Ha Long
Quang Ninh



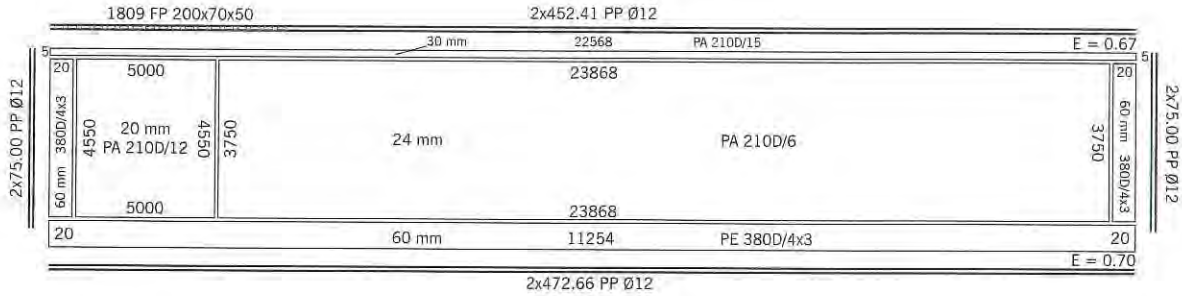


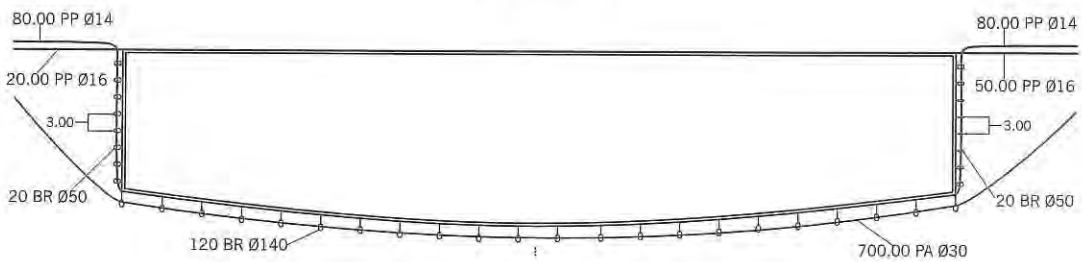


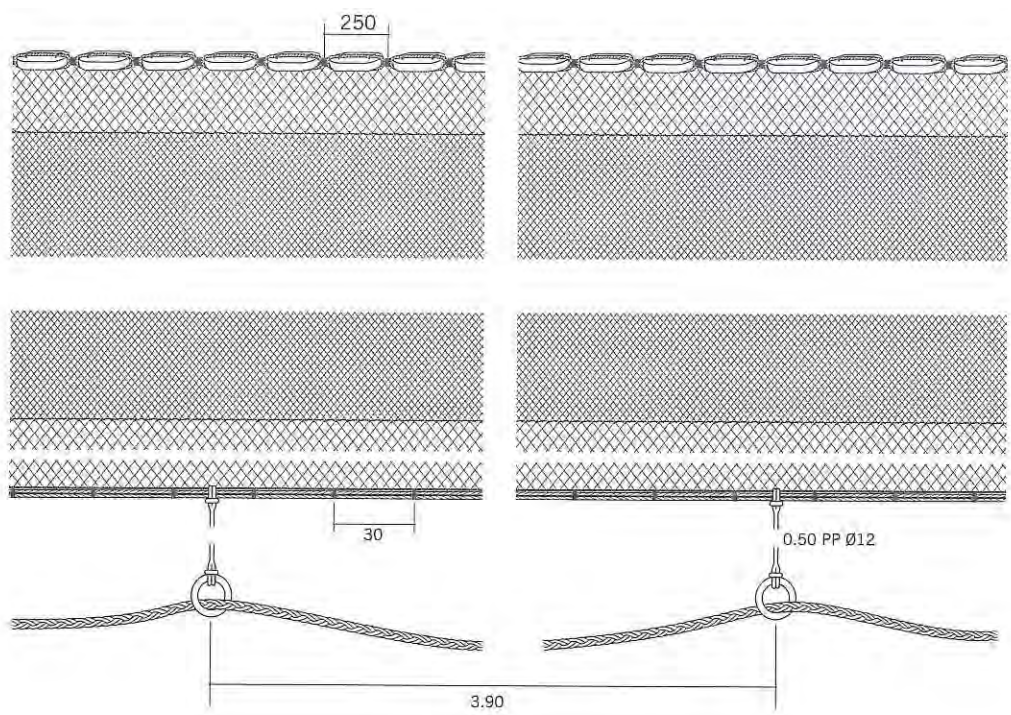
SURROUNDING NET
Luring Purse Seine
Scad

VESSEL
Loa : 16
Hp : 88

LOCATION
Dong Hoi
Quang Binh



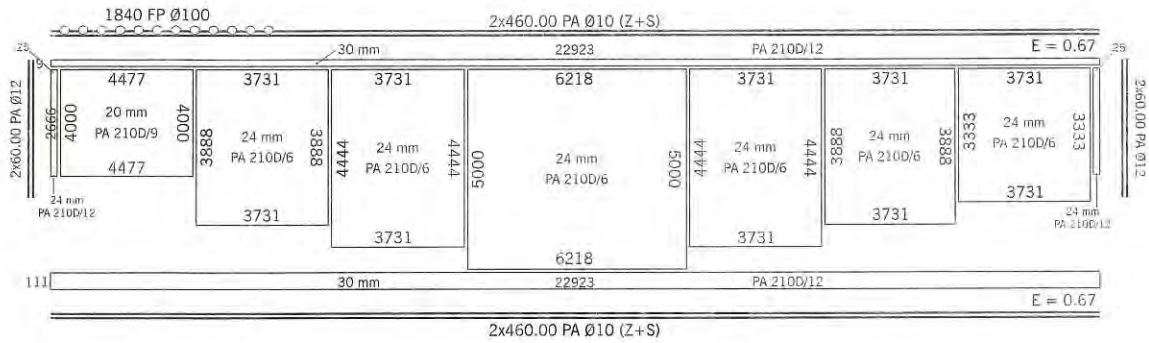


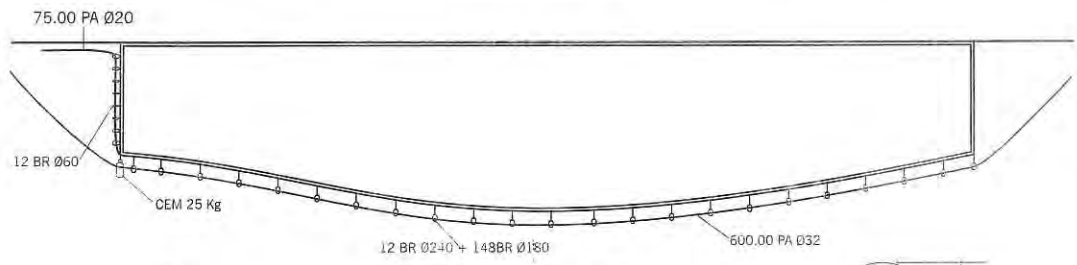


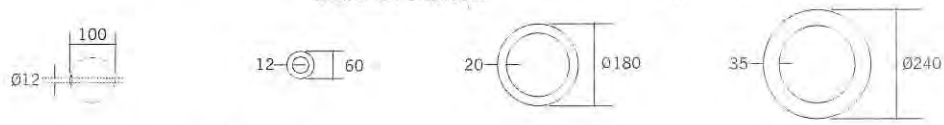
SURROUNDING NET
Luring Purse Seine
Scad, Tuna

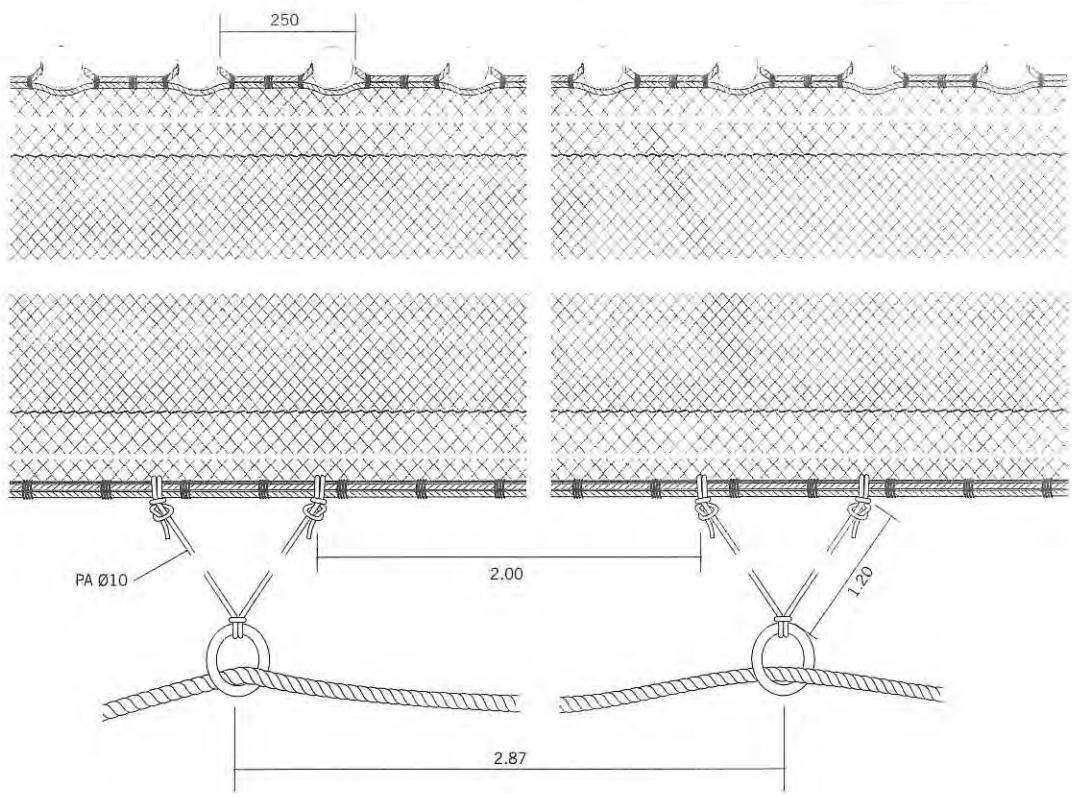
VESSEL
Loa : 18.4
GT : 37.7
Hp : 110

LOCATION
Ha Long
Quang Ninh





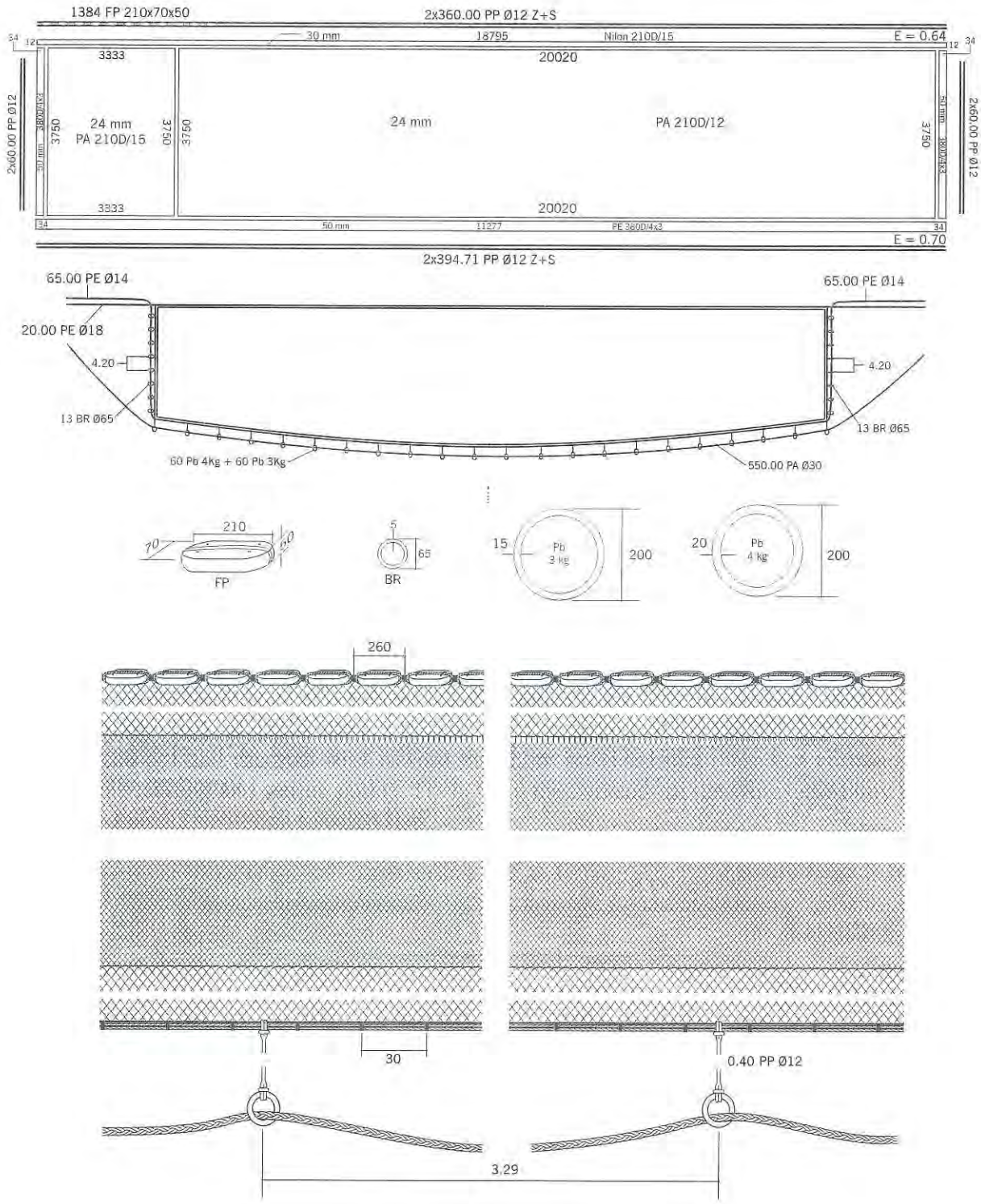




SURROUNDING NET
Luring Purse Seine
Scad

VESSEL
Loa : 17,2
Hp : 115

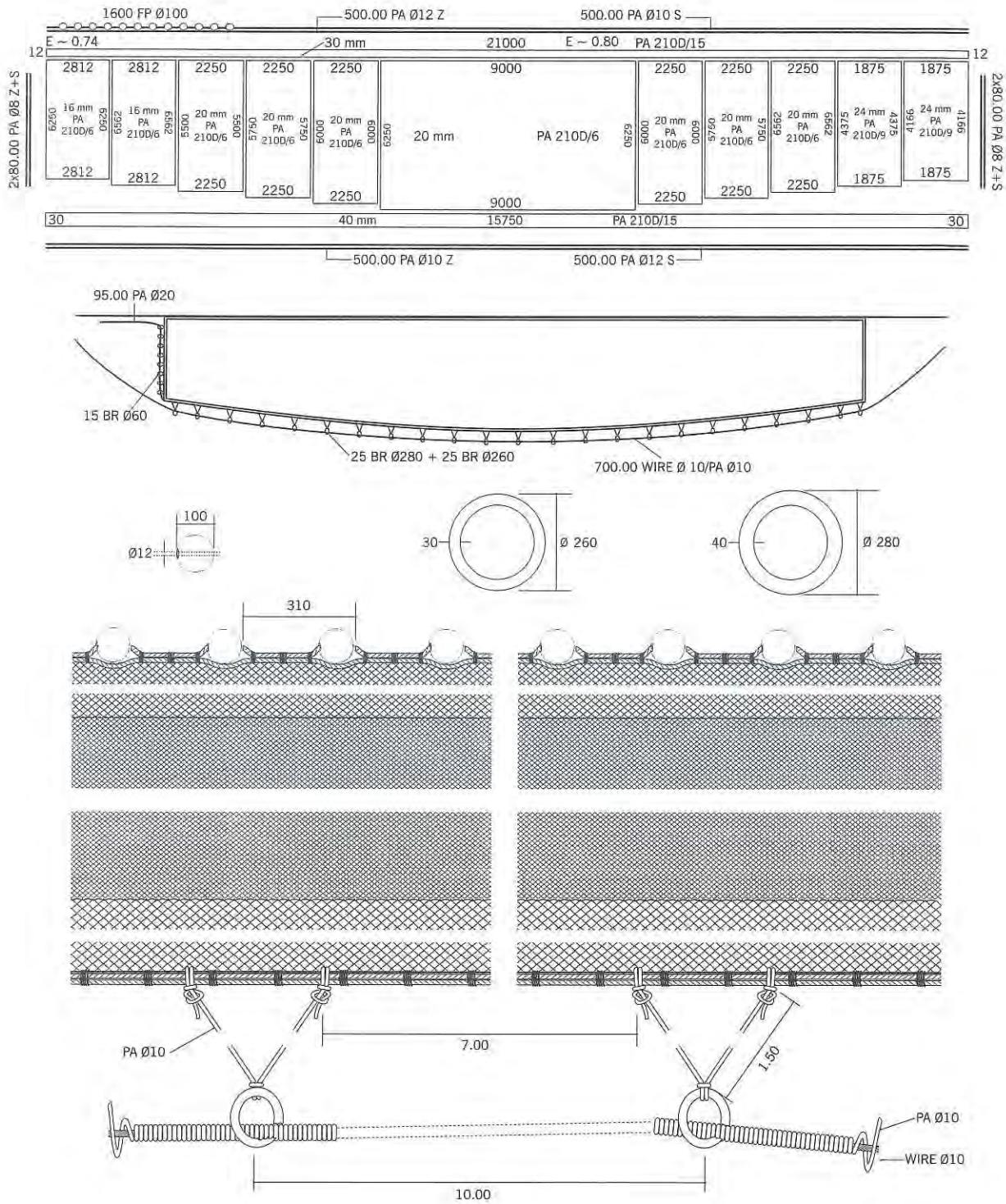
LOCATION
Dong Hoi
Quang Binh



SURROUNDING NET
Luring Purse Seine
Pelagic Fish

VESSEL
Loa : 19.50
GT : 55
Hp : 155

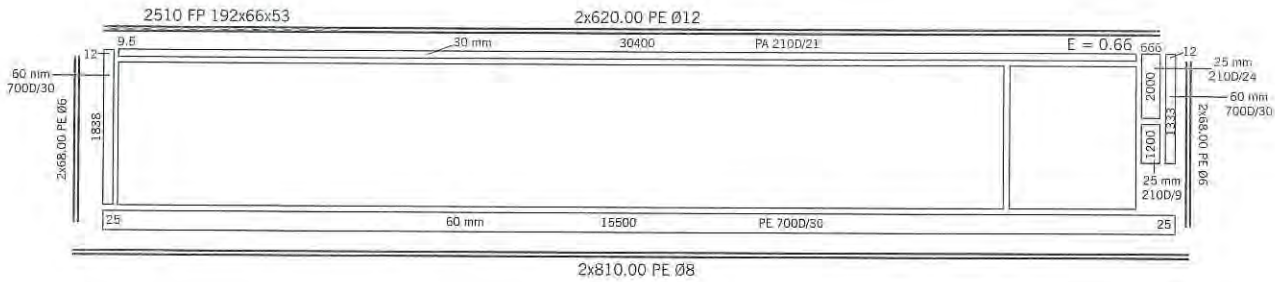
LOCATION
Nghi Loe
Nghe An

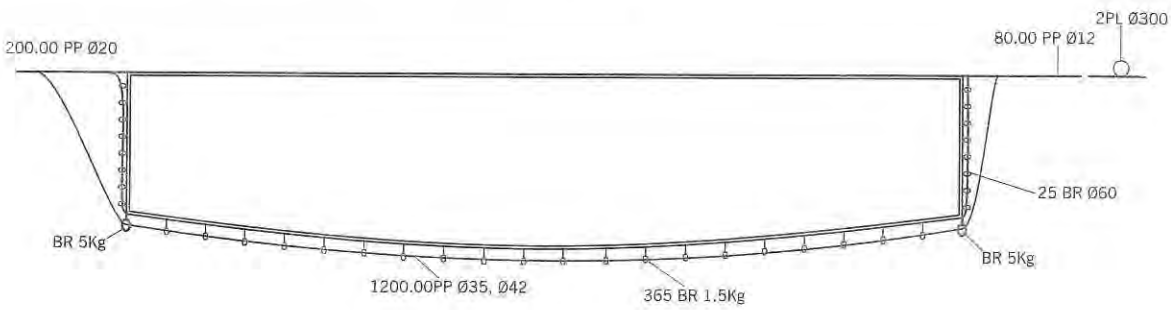


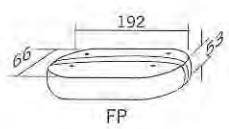
SURROUNDING NET
Luring Purse Seine
Short-Bodied Mackerel

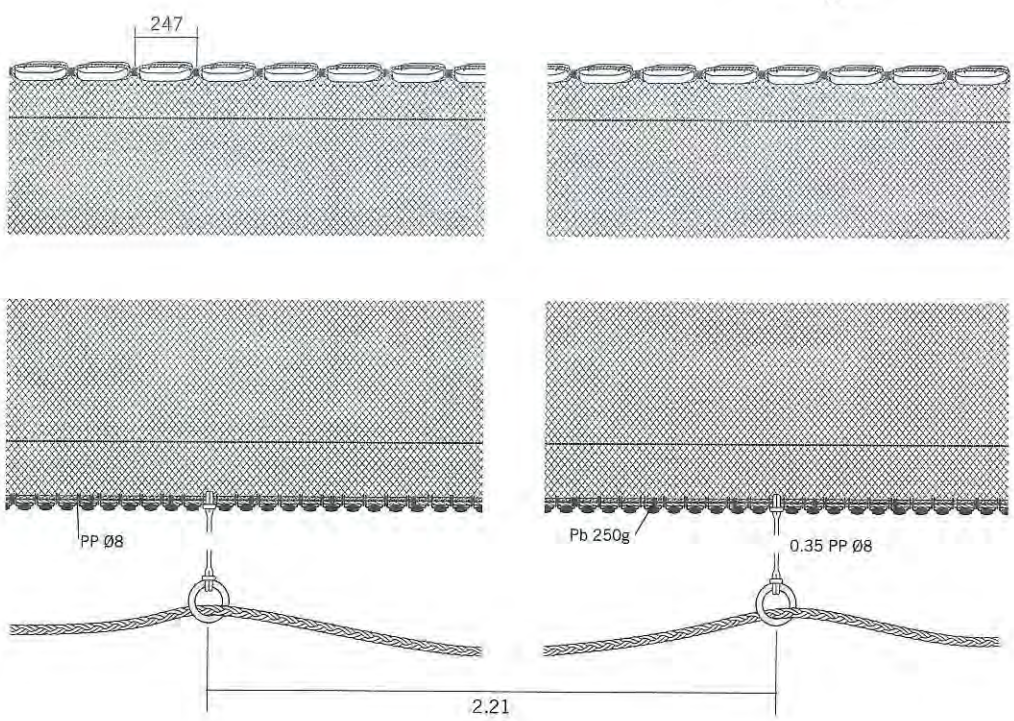
VESSEL
Loa : 21.00
Hp : 305

LOCATION
Tran Van Thoi
Ca Mau





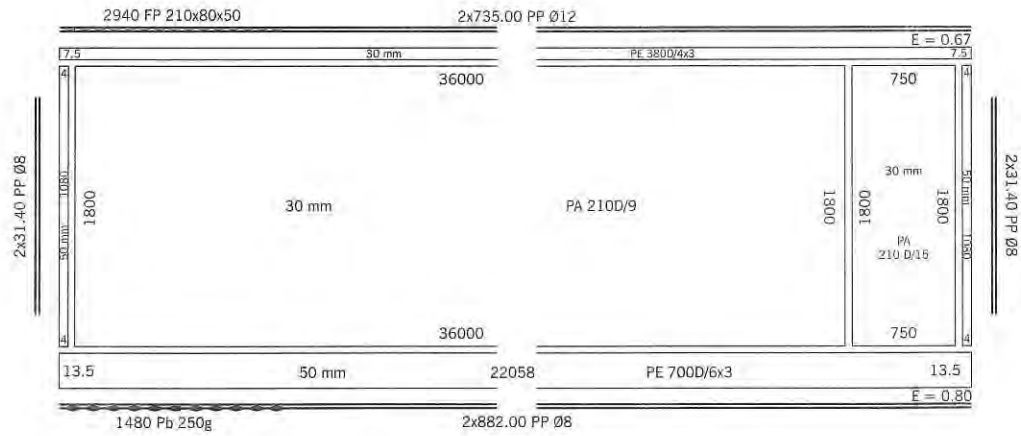


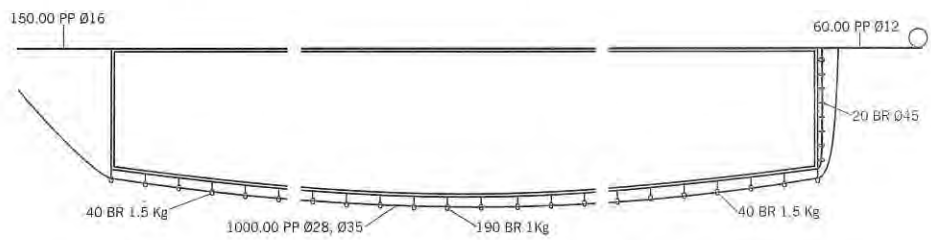


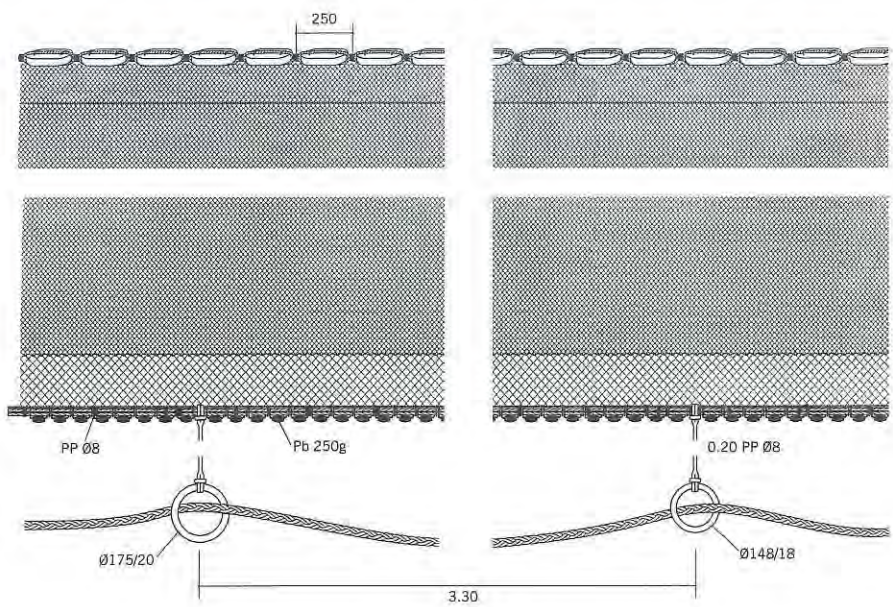
SURROUNDING NET
Purse Seine
Tuna, Short-Bodied Mackerel

VESSEL
Loa : 17.00
Hp : 45

LOCATION
Tran Van Thoi
Ca Mau



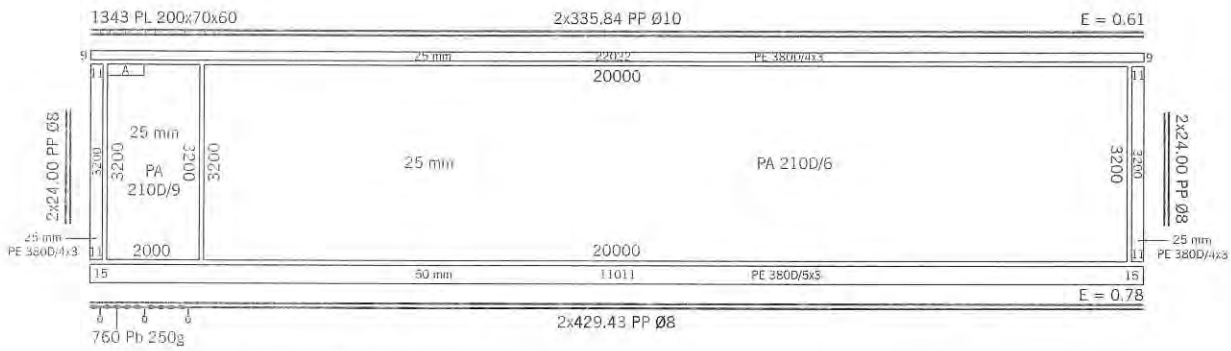


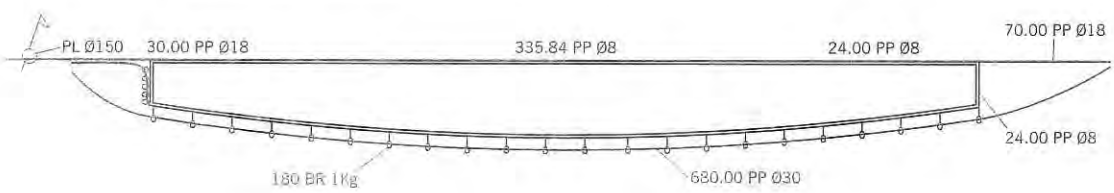


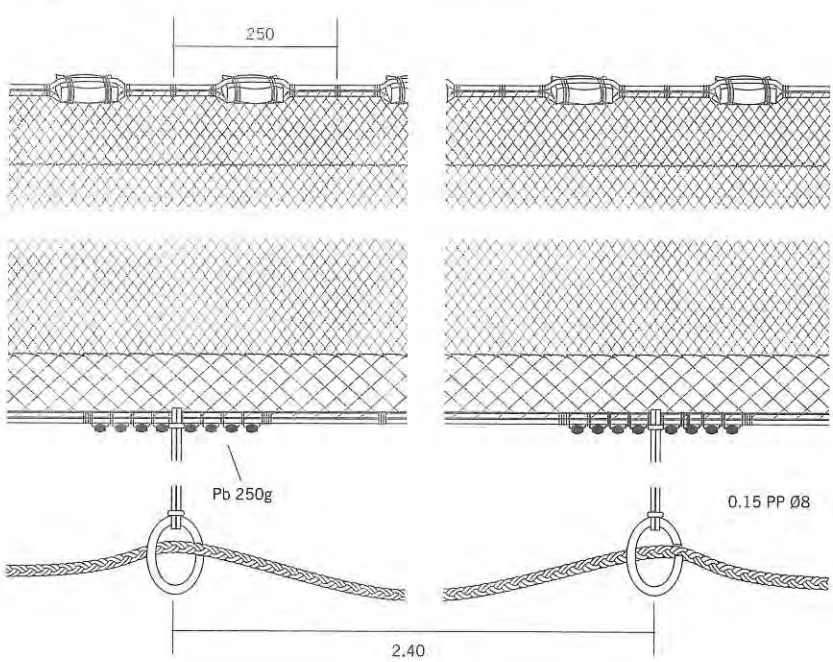
SURROUNDING NET
Luring Purse Seine
Sardine, Yellowtail Scads,
Short Bodied Mackerel

VESSEL
Loa : 14
Hp : 45

LOCATION
Phu Quoc
Kien Giang



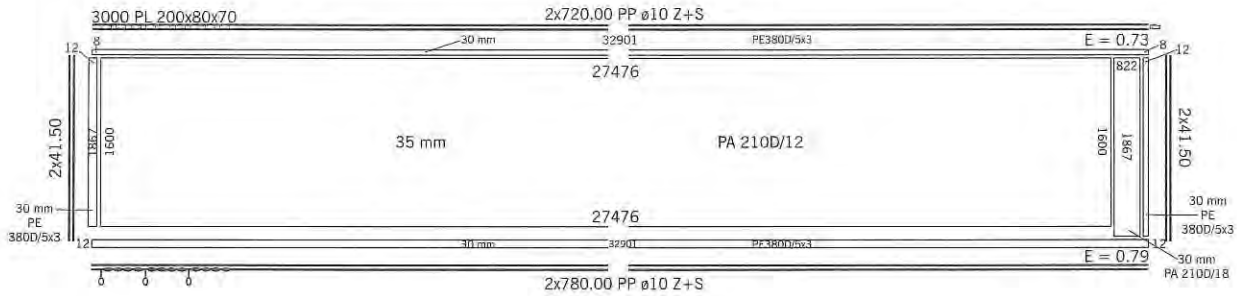


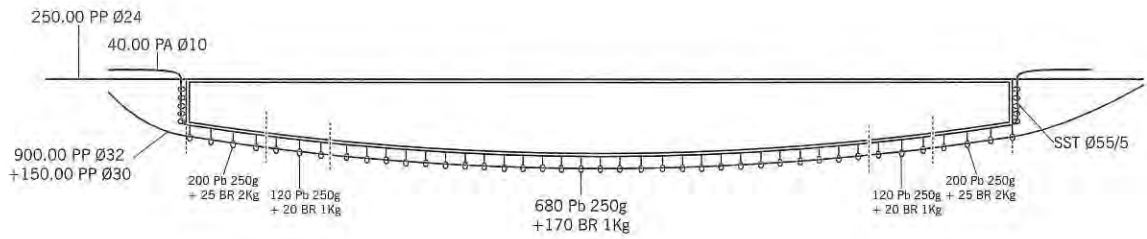


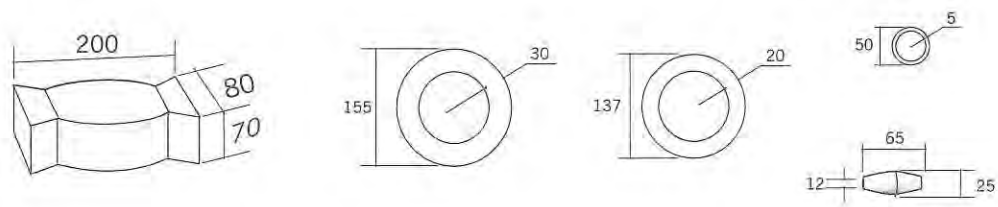
SURROUNDING NET
Purse Seine
Short Bodied Mackerel

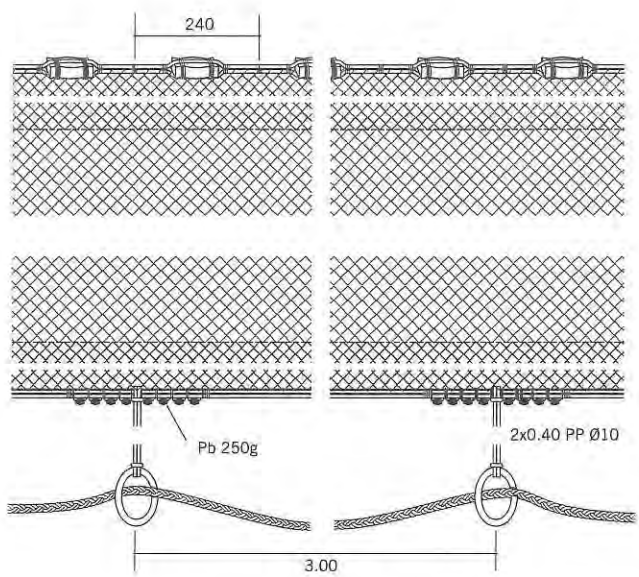
VESSEL
Loa : 19.6
Hp : 45

LOCATION
Rach Gia
Kien Giang





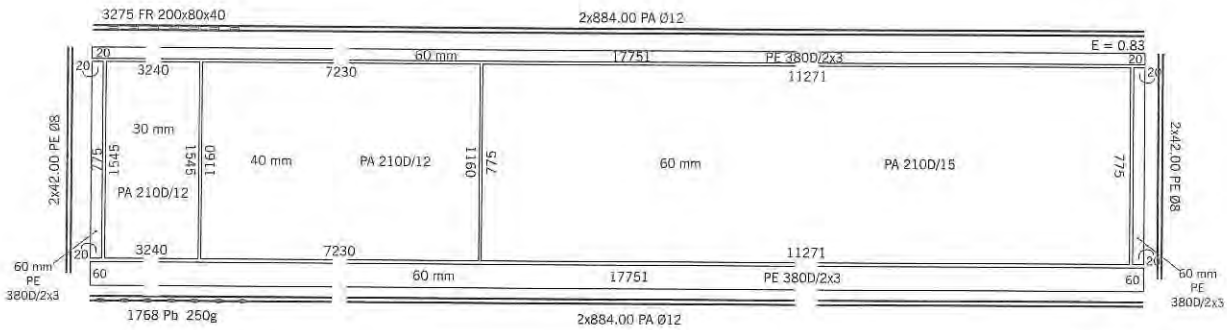


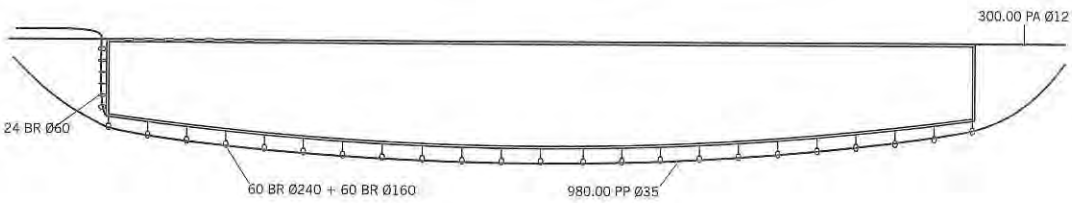


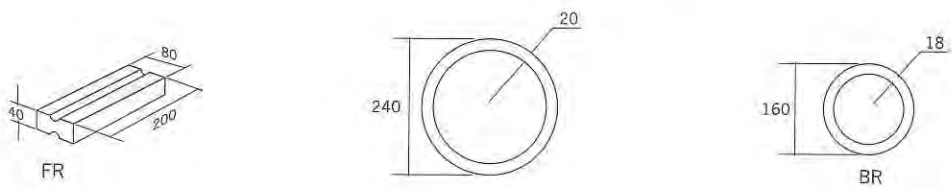
SURROUNDING NET
Purse Seine
Mackerel, Tuna

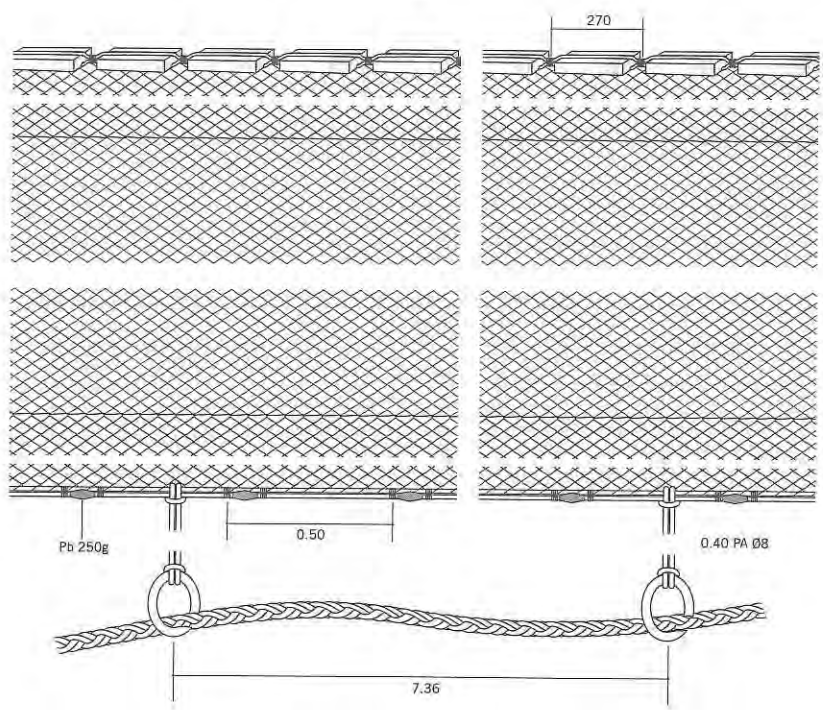
VESSEL
Loa : 15.00
GT : 21
Hp : 56

LOCATION
Cat Ba
Hai Phong





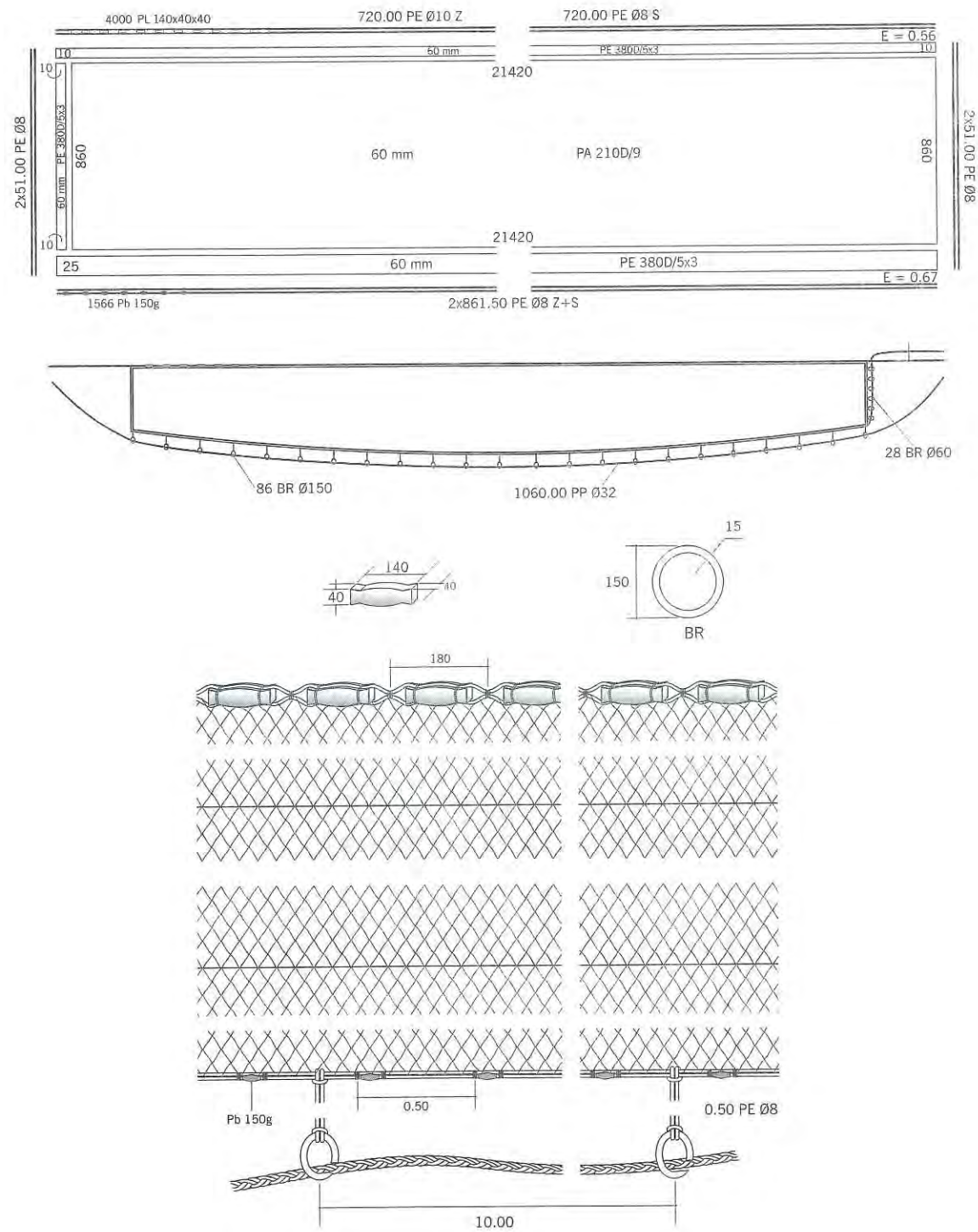




SURROUNDING NET
Purse Seine
Tuna, Hardtail Scad

VESSEL
Loa : 14.50
Hp : 60

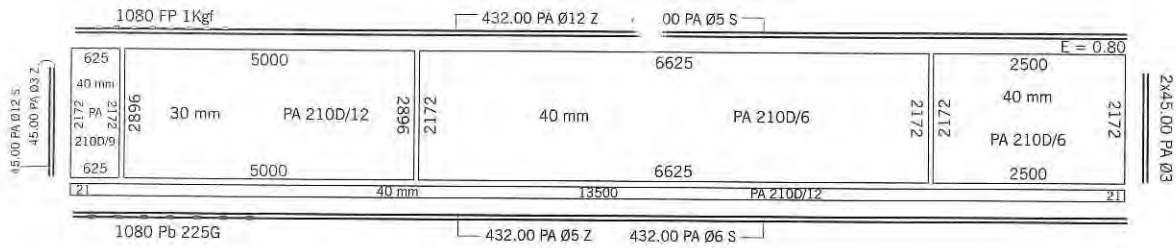
LOCATION
Thuan An
Thua Thien Hue

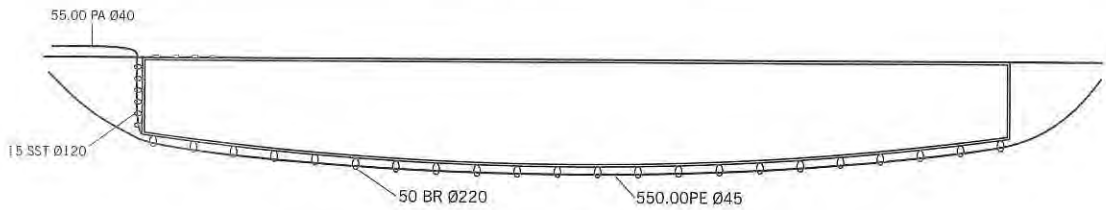


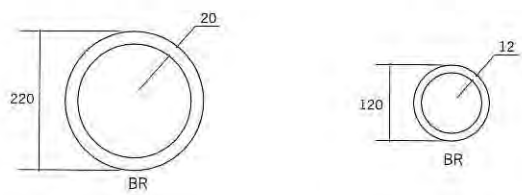
SURROUNDING NET
Purse Seine
Scads, Tuna

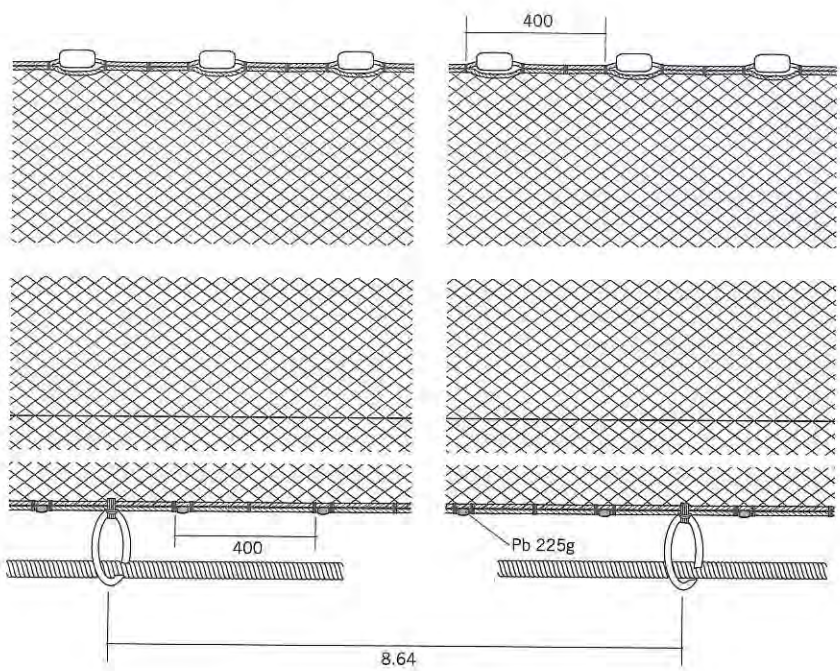
VESSEL
Loa : 17.5
Hp : 80

LOCATION
Cat Hai
Hai Phong





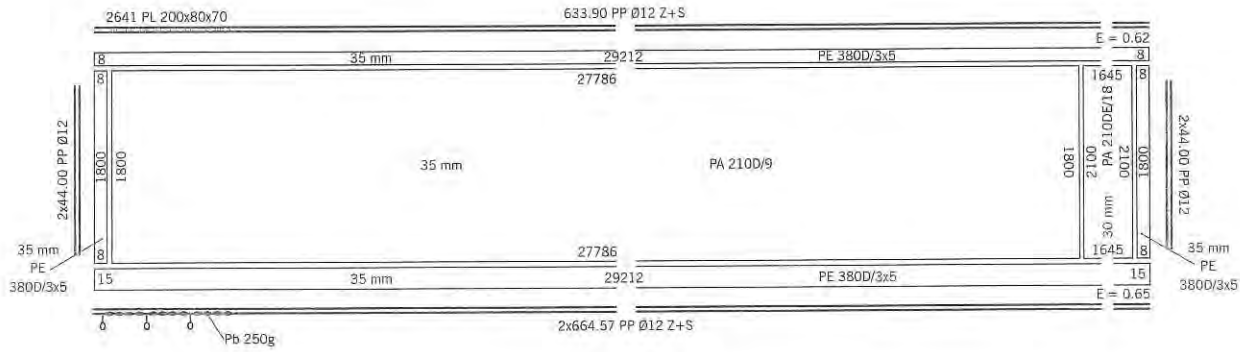


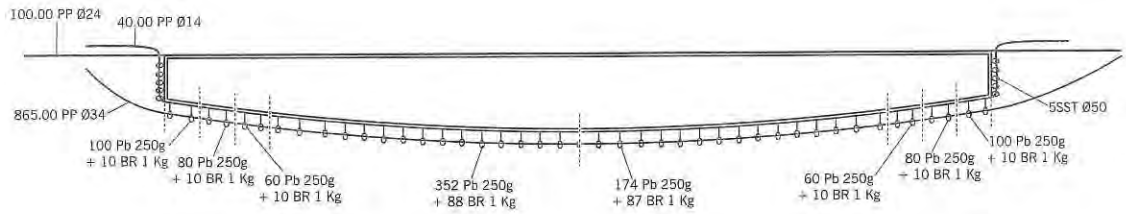


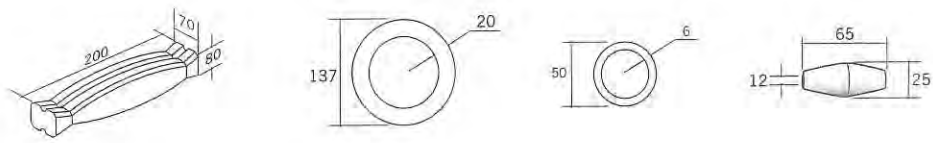
SURROUNDING NET
Purse Seine
Short Bodied Mackerel

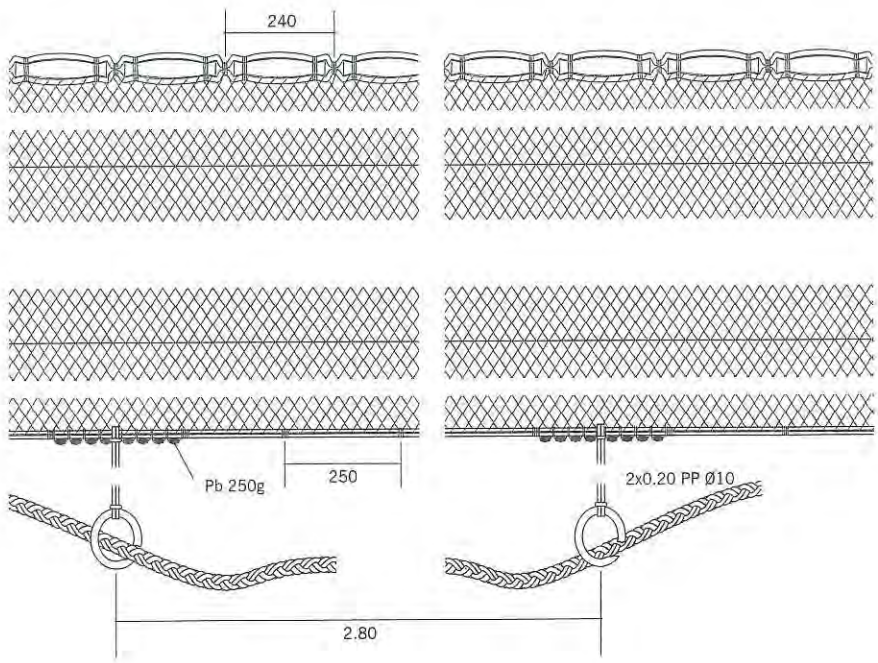
VESSEL
Loa : 18
Hp : 105

LOCATION
Rach Gia
Kien Giang





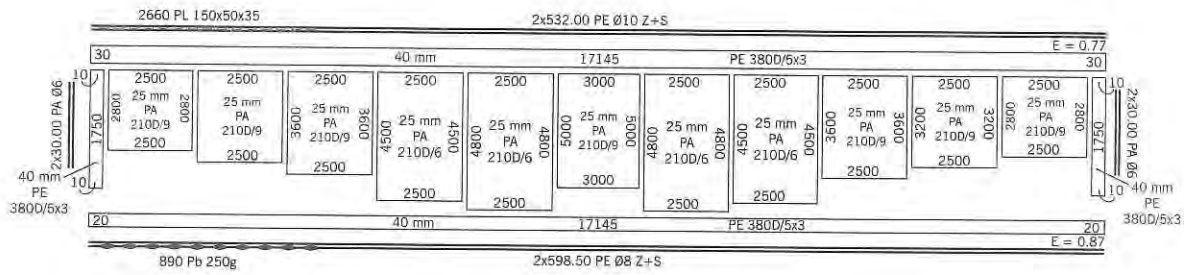


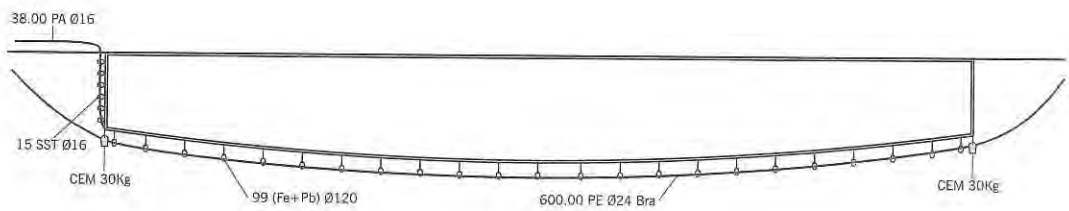


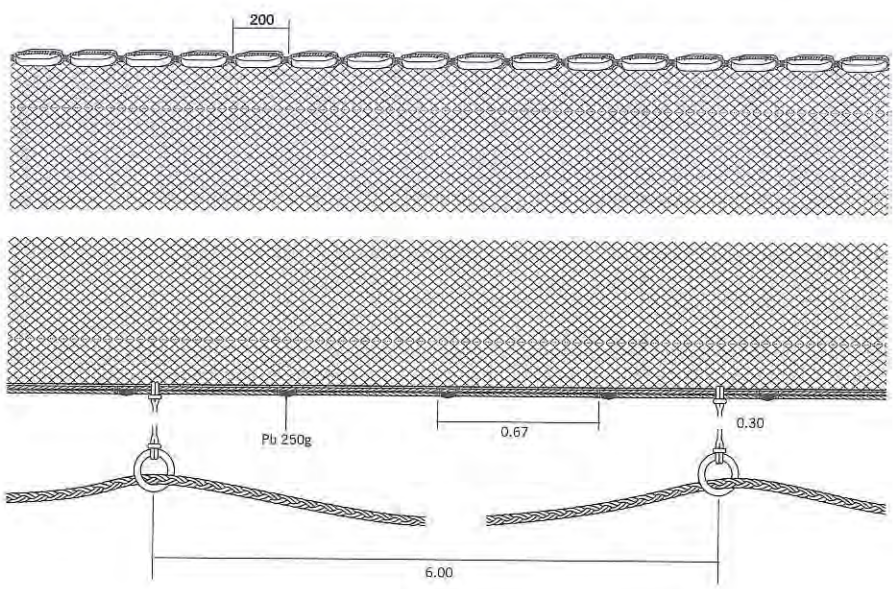
SURROUNDING NET
Purse Seine
Tuna, Hardtail Scad

VESSEL
Loa : 19
GT : 38
Hp : 135

LOCATION
Ly Hoa
Quang Binh



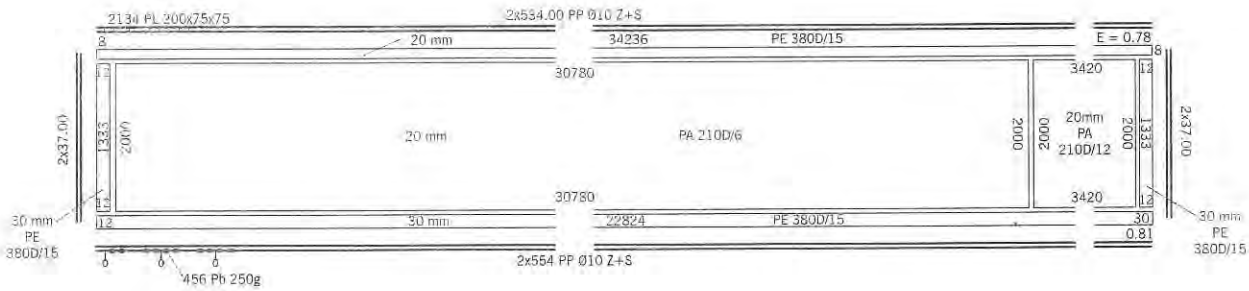


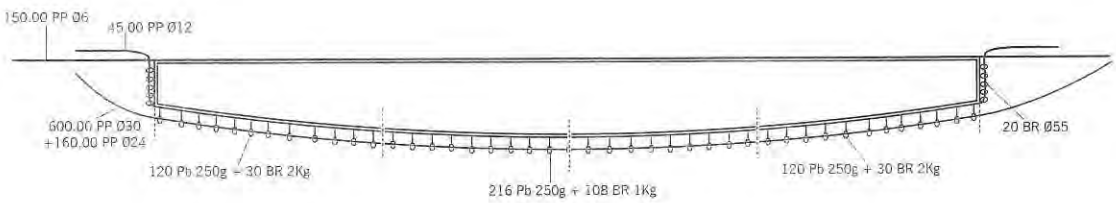


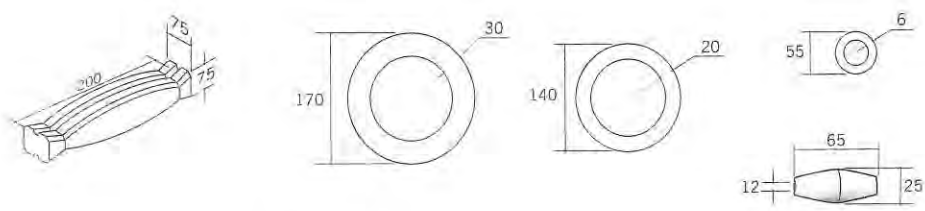
SURROUNDING NET
Purse Seine
Short Bodied Mackerel

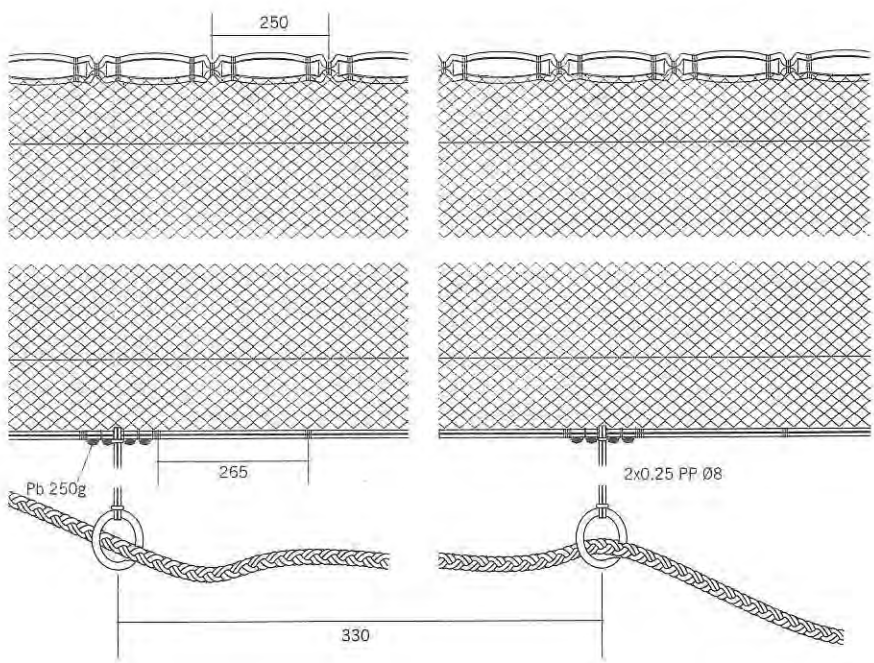
VESSEL
Loa : 19.4
Hp : 285

LOCATION
Rach Gia
Kien Giang





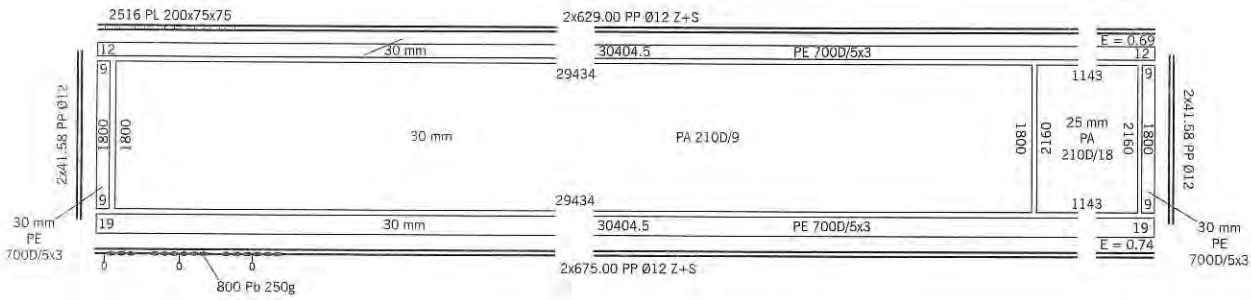


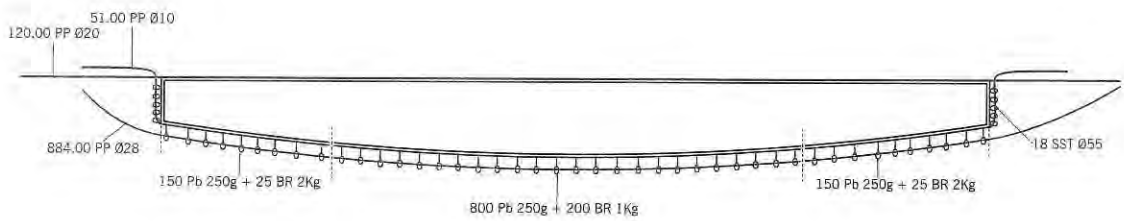


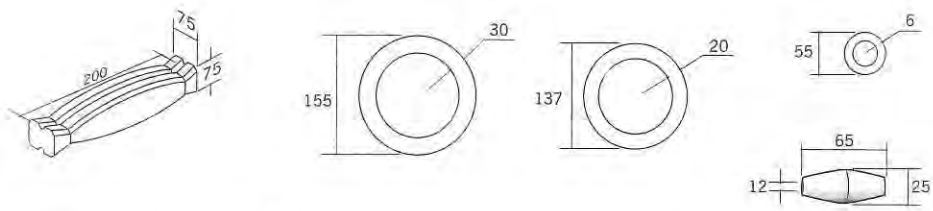
SURROUNDING NET
Purse Seine
Short Bodied Mackerel

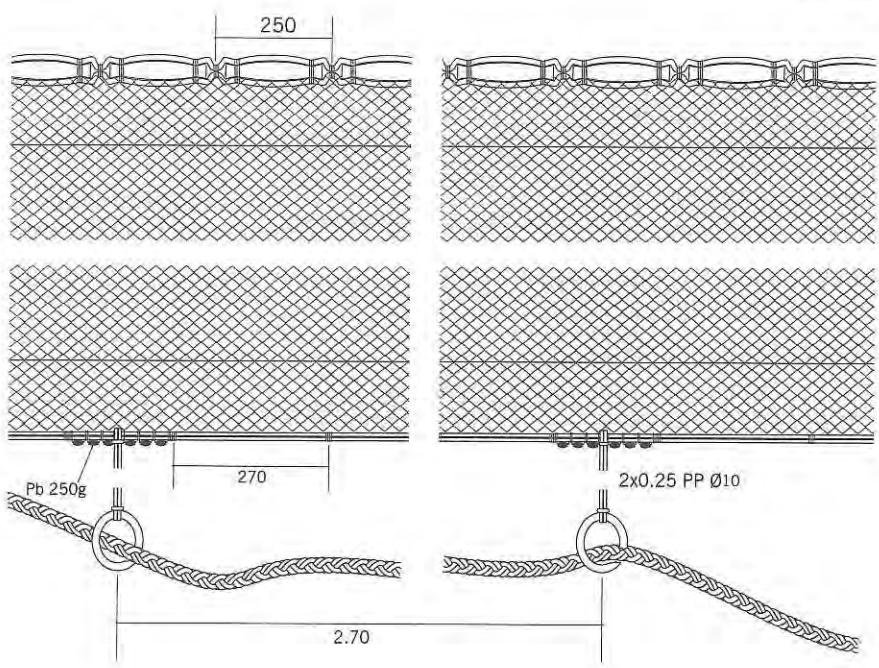
VESSEL
Loa : 19.7
Hp : 330

LOCATION
Rach Gia
Kien Giang





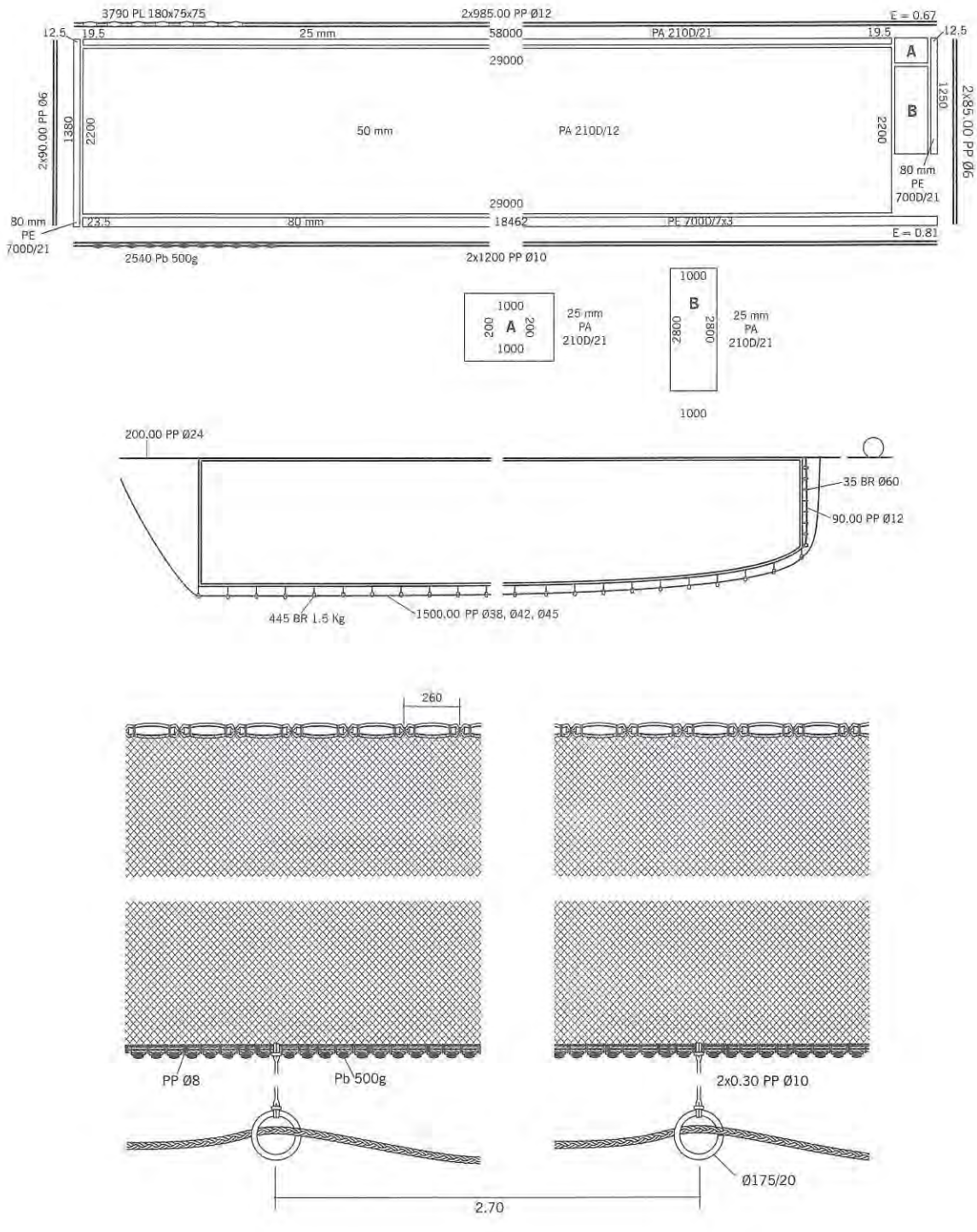




SURROUNDING NET
Purse Seine
Tuna, Short-Bodied Mackerel

VESSEL
Loa : 21.00
Hp : 350

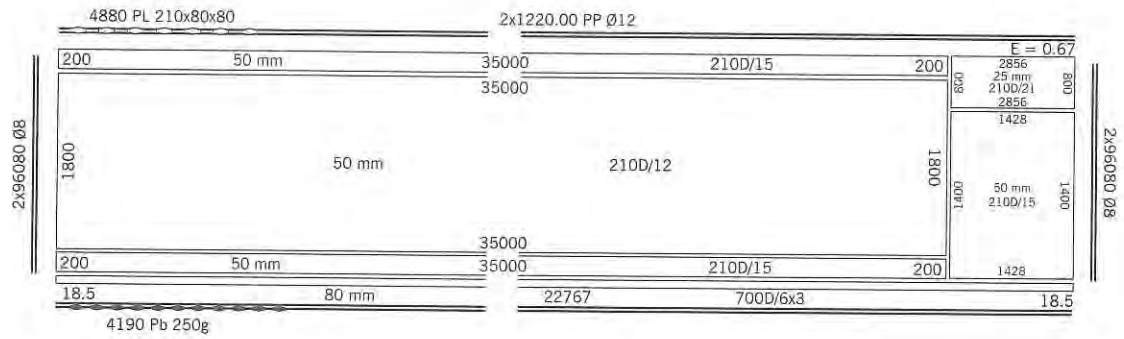
LOCATION
Tran Van Thoi
Ca Mau

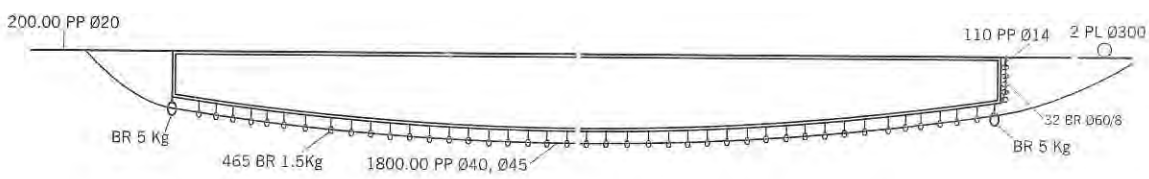


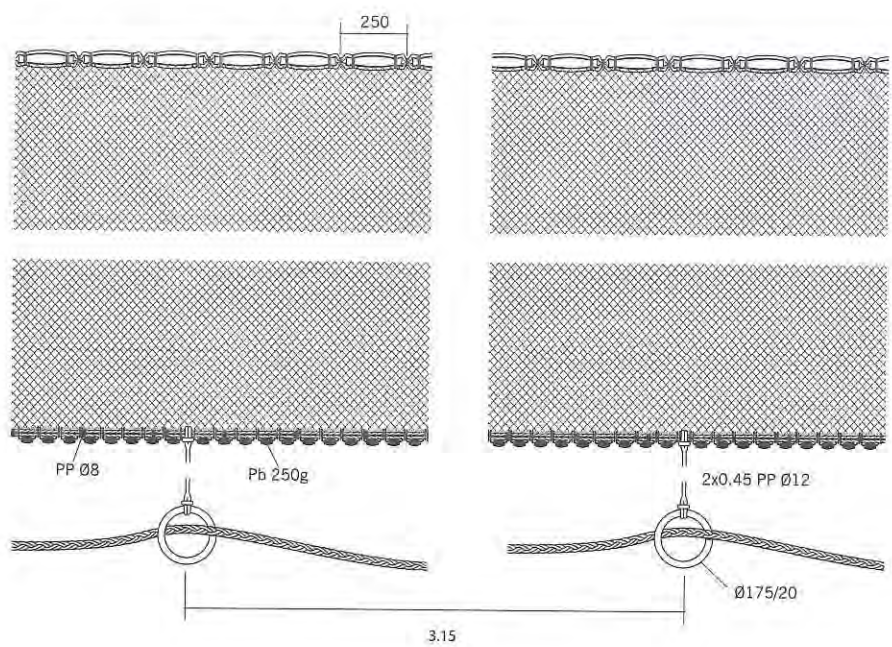
SURROUNDING NET
Purse Seine
Tuna, Short-Bodied Mackerel

VESSEL
Loa : 21.00
Hp : 350

LOCATION
Tran Van Thoi
Ca Mau







< Chapter 5 >

Seine Net Fishing

In Vietnam, seine net fishery is a long-standing traditional fishing method. There are two types of seine net used in marine fisheries they are the boat seine and the beach seine net. With the development of fishing techniques and the improvement from low fishing efficiency, the boat seine net is rare now. In some Northern provinces, the seine net is used on the beaches but this method is not frequent.

Fishing Gear and Methods

Commonly, the length of the beach seine is 220-450 m and the depth ranges from 6-12 m. Minnow net is the main material for making the beach seines. The minnow net has a mesh of 4x4mm to 6x6mm polyethylene or polyamide monofilament. The main target species are anchovy, thryssa and others.

Fishing operations of the beach seine are commonly carried out during daylight hours. However, the best fishing time is around sunrise and sunset. The boat used for the beach seines are artisanal or outboard-powered boats with engines of 6-12 Hp.

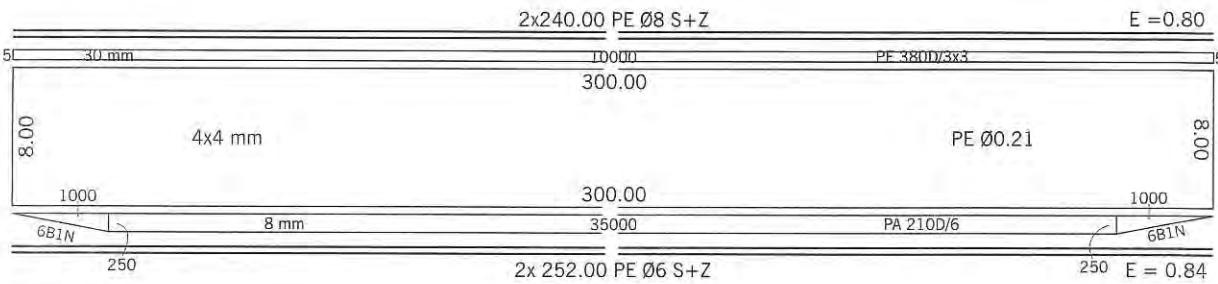
Beach Seineing

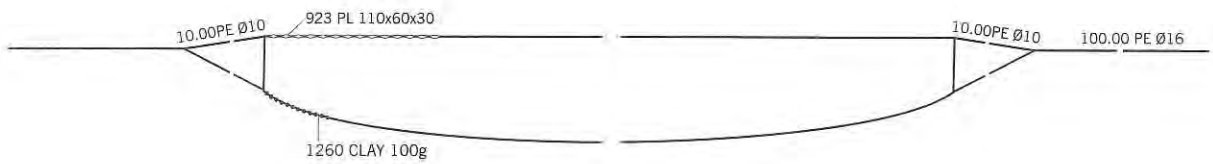
Beach seining is a simple fishing method. One end of the wing is held by a group of fishermen on the shore, the net is first set at right angles to the seashore and then the direction of the net setting turns gradually toward the shore. After setting all the net, the towing line of the wing is paid out and the boat runs toward the shore provided that there is a certain distance between the landing and setting points. Then, from the two ends of the wings, the buoy line and the sinker line are hauled in to catch fish.

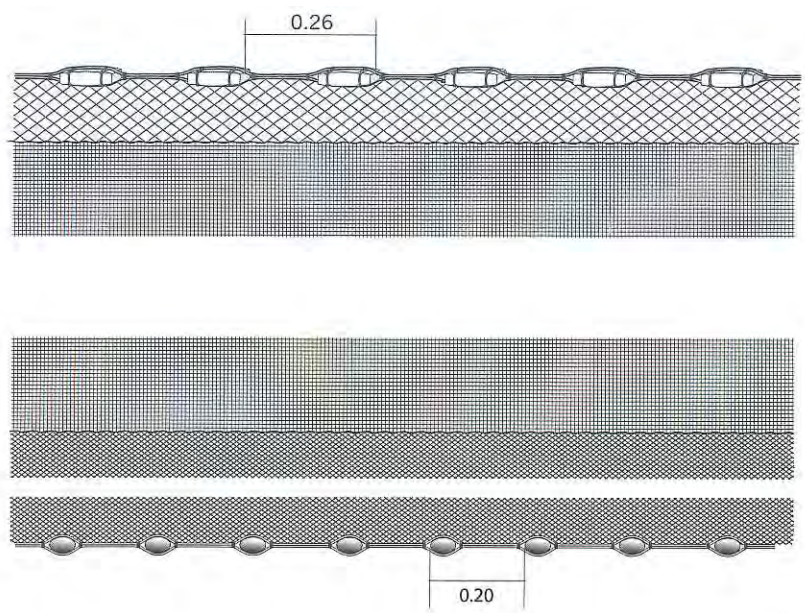
SEINE NET
Beach Seine
Thryssa, Anchovy

VESSEL
Loa : 11.8
Hp · 12

LOCATION
Ly Hoa
Quang Binh



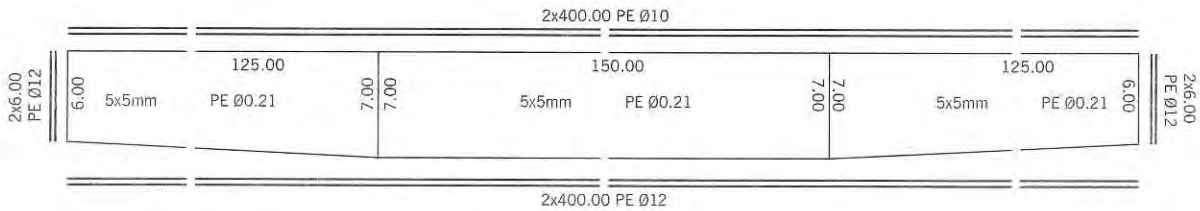


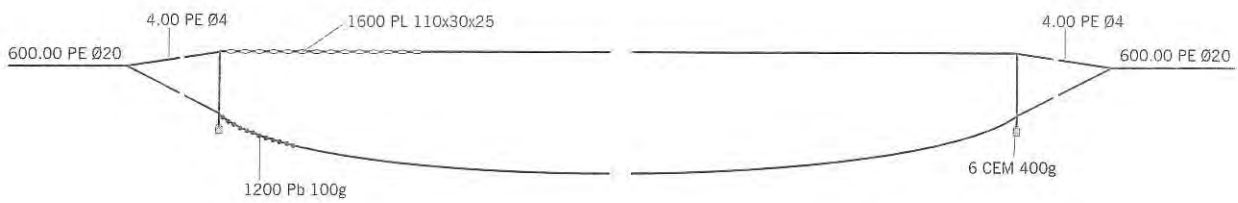


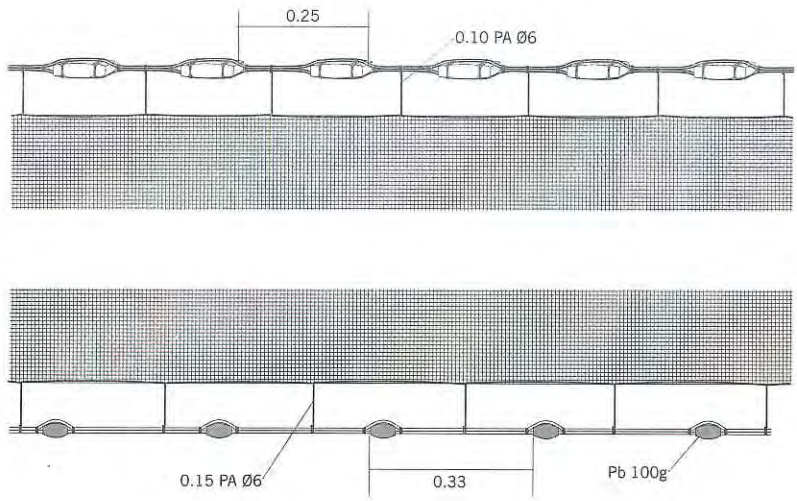
SEINE NET
Beach Seine
Thryssa, Mixedfish

VESSEL
Loa : 12
Hp : 15

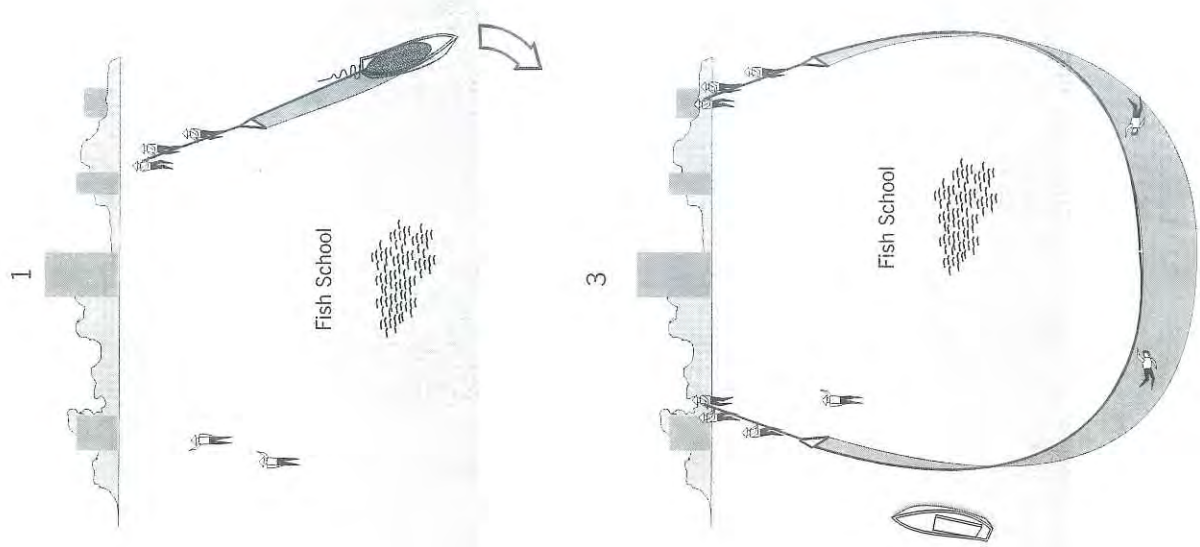
LOCATION
Thuan An
Thua Thien Hue








2
Fish School
4


1
Fish School
3
Fish School

< Chapter 6 >

Gill Net Fishing

Gill-net is an age-old traditional fishing gear in Vietnam. In 1997, it contributed 13.6% to the total fisheries production of 72,131 tons (from the statistics of 14 key provinces).

The gill net became very popular in the small-scale fisheries because its construction is very simple and the capital investment is low.

There are many types of gill net operating in Vietnamese waters. These are drift gill nets, surface gill nets, bottom gill nets, fixed gill nets, shrimp trammel nets and cuttlefish trammel nets. Depending on the target species and its behaviour, the design of gill nets varies.

The fishing boats used in gill net fishery are small. There are about 18,000 small fishing boats with engines of less than 45 Hp or are not powered at all, these are 94% of the total gill-netters in the whole country. Therefore, the fishing grounds for these operations are in coastal waters.

Fishing Gear and Methods

1. Drift Gill Net

There are many types of drift gill net used for different target species. Generally, their construction is a wall of net that is set across the water current and can be allowed to drift according to the current direction. The head rope is on the surface of the water or at the depth of 2 - 6 m. The lower part of the net is without sinkers or with a sinker line depending on the target species and the characteristics of the fishing ground.

The length of gill-net depends on the size of boat, financial ability of fishermen and the target species. The average length of the gill-net is from 1 to 15 km and the nets that are used for catching small pelagic fishes such as sardine, flying fish etc are shorter than the drift gill-nets used for catching mackerel and tuna. The height of the gill net also depends on the target species and ranges from 2 to 20 meters. The mesh size used for catching small pelagic fishes like the sardine, flying fish etc. are from 30 to 50 mm. The main material for making the net is nylon monofilament with a diameter of 0.2 - 0.4 mm. For mackerel and tuna, the mesh size is larger ranging from 70 to 105 mm and the nets are mainly made of nylon multifilament of PA210D/12 -PA210D/18 and a few are made of PE380D/3x3 - PE380D/3x5.

The Drift gill net is used mainly to catch pelagic fish, so that gill-netters usually are operated at night without moonlight (18" of this lunar month - 12 h of the next lunar one). The net is set at 3 - 5 pm and hauled the next morning.

When the vessel is on the fishing ground, the skipper identifies the direction of water and wind, and decides a suitable direction for setting the net. Normally, the gill net is set or drifted making a certain angle between the water direction and the net. When setting, the vessel runs at a speed of 3 - 4 nm/h. After setting, one end of the net can be linked to the vessel or be allowed to drift freely according to the conditions of wave and wind in the fishing grounds.

Net Hauling:

The part of the net drifting down wind is hauled first. In the hauling operation, the vessel can move in the direction of the net with a speed of 2 -3 kts according to the amount of fish trapped in the net. The hung fish are picked while hauling. The net is kept in the net hold after operation.

2. Drift Bottom Gill Net

This gear is used to catch demersal fish or swimming crab. Depending on the target species, the net has different specifications that include mesh size, yam size, hanging ratio and the length and height of the net.

This type is the most commonly used for catching bottom fishes such as grouper, croaker, bream etc., with a mesh size of 48 - 400 mm, the yam size of 0. 17 - 0.70 mm diameters, the head rope length is up to 7000 m and the height is up to 5m.

The bottom gill net is used in two fishing methods: where the net is drifted close to the bottom; or the net is set fixed with two anchors at the ends.

According to the target species, the bottom gill net can be operated during both day and night.

Net Setting:

In the fishing grounds with a flat bottom, the net is set across the current. By this method, because of the current, the net is set drifting freely on the bottom. During the setting operation, which is done at the vessel side, the vessel runs with a speed of 1 -2 kts . The bottom gill net is also set to be stationary around reefs because of the two anchors.

Net Hauling:

The vessel runs to the flag buoy and the hauling operation is carried out at the vessel's a speed of 1.5 - 2.5 kts according to the wave conditions and the quantity of fish caught in the net.

3. Trammel Nets

Trammel nets are used on small boats with engines of less than 25 Hp or on non-powered boats. The trammel net is operated in small-scale activities, in shallow waters of less than 20 m in depth.

There are two types of trammel net. They are the shrimp trammel net and the cuttlefish

trammel net. The construction is almost the same, they are only different in mesh size and yam diameters of the inner and outer net. The length of the head rope is less than 1.500 m and the height is less than 4.5 m.

For the shrimp trammel net, the netting is made of nylon multifilament or monofilament. The yam size of the inner net is 110D/2, 210D/6 or PA Mono 0.3mm diameter, whereas that of the outer nets is 210D/4 - 210D/6 or 0.8 mm. The mesh size of the inner net is 44 - 100 mm and that of the outer nets is 300 - 800 mm.

For the cuttlefish trammel nets, the netting is made of nylon monofilament or multifilament, the yam size of inner net is 0.1 - 0.25 mm in diameter with a mesh size of 75 -100 mm. For outer nets, the yam size is 0.2 - 0.4 mm diameter and the mesh size ranges from 400 to 480 mm.

Net Setting:

The setting operation of the trammel net is like the bottom gill net, but the trammel net is set in line across the current. According to the target species and the clarity of the water in fishing ground, this work can be done in daytime or at night.

Net Hauling:

The vessel tows the net at a speed of 1 - 2 kts. Normally, fish are picked out after the net is hauled and put on the deck, then the net is prepared carefully for the next setting.

4. Bag Gill Net

Net Setting:

The net is set drifting on the current in the condition that the mouth of the bags face the water current.

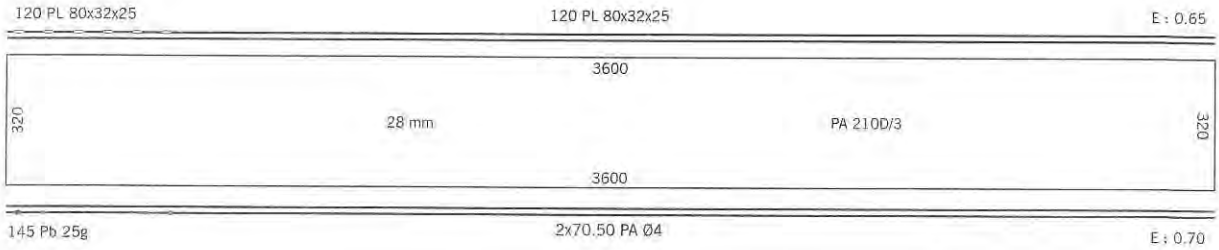
Net Hauling:

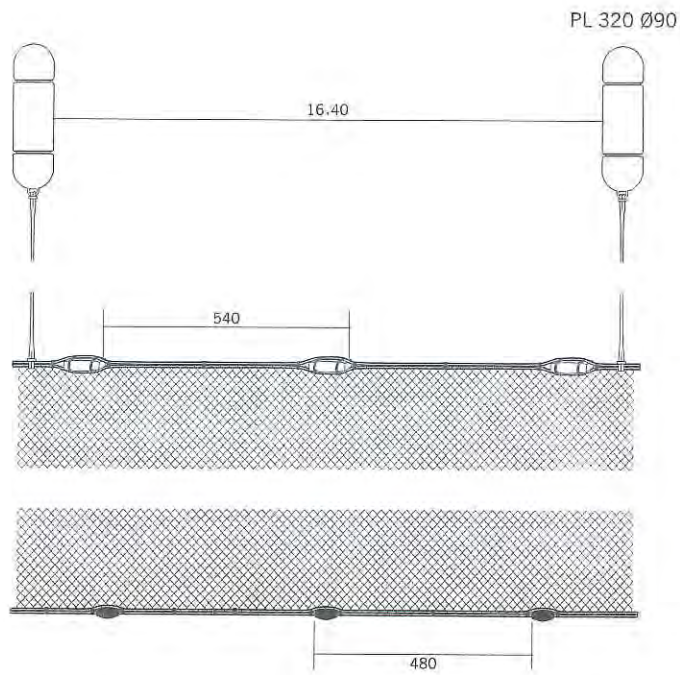
During the net recovery, the vessel moves at 1 - 2 kts and tows the buoy line.

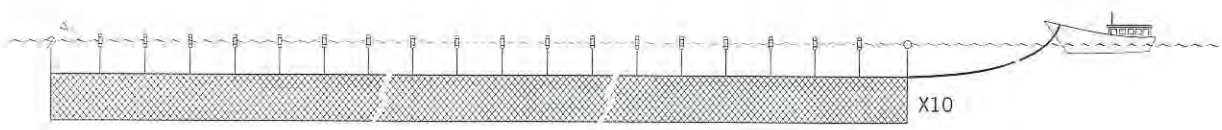
GILL NET
Drift-Net
Sardine

VESSEL
Loa : 10
GT : 7
Hp : 12

LOCATION
Song Cau
Phu Yen



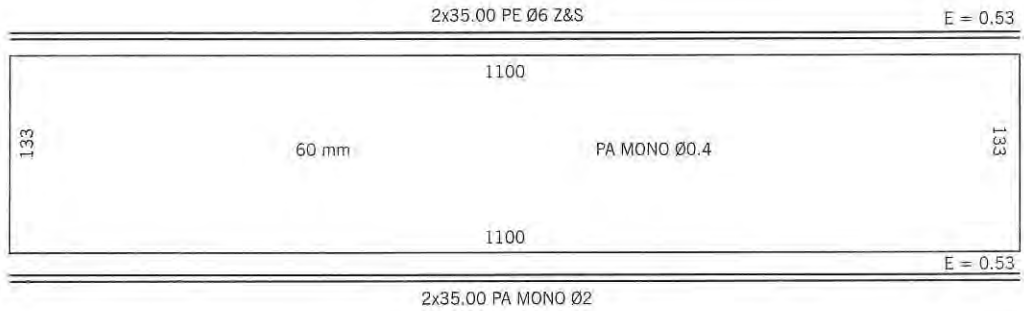


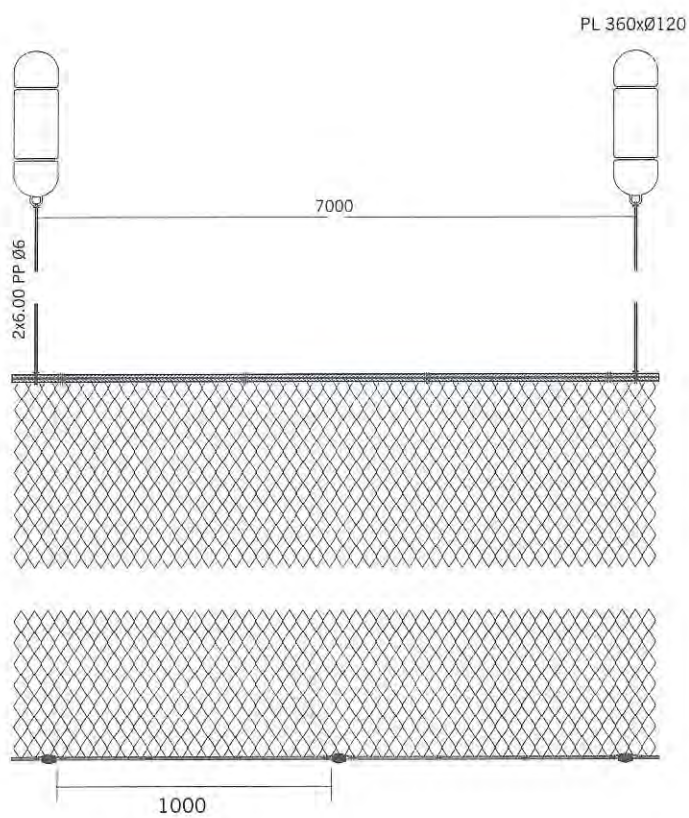


GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 9
Hp : 12

LOCATION
Quang Ha
Quang Ninh

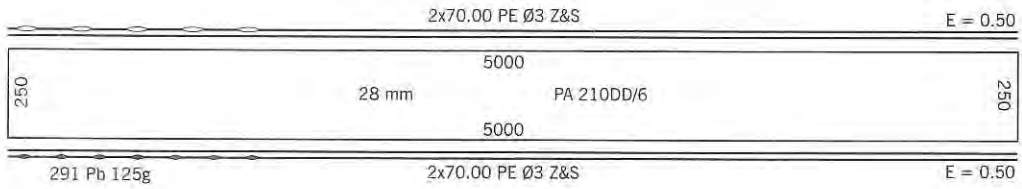


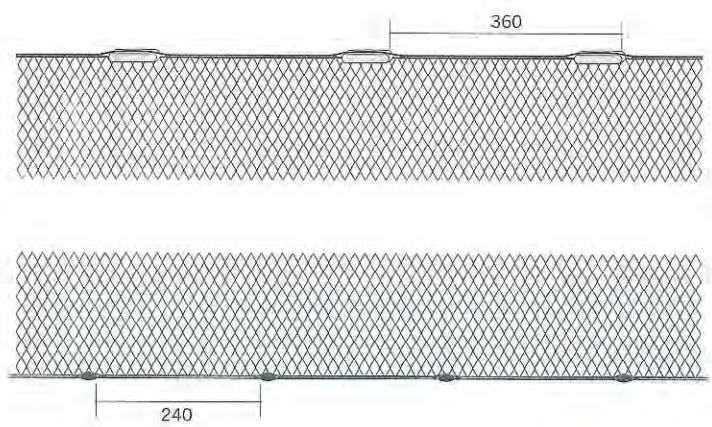


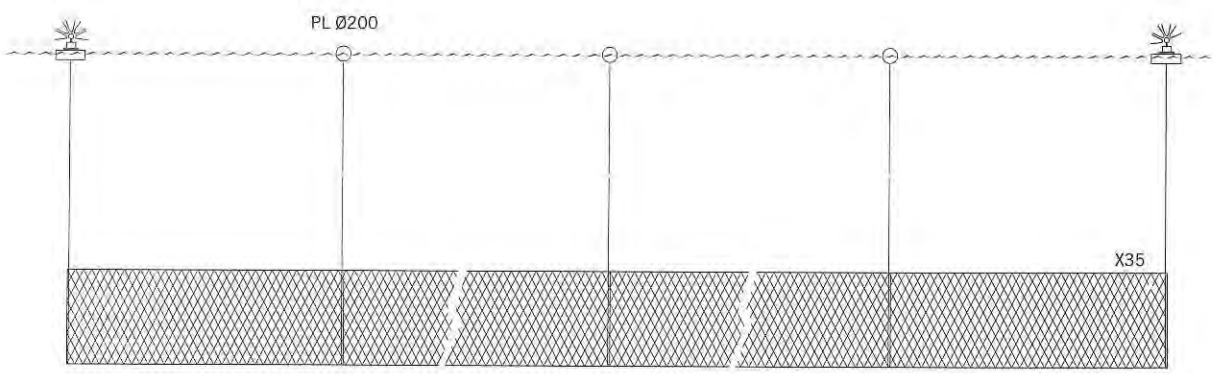
GILL NET
Drift-Net
Sardine

VESSEL
Loa : 8.7
Hp : 15

LOCATION
Ly Hoa
Quang Binh



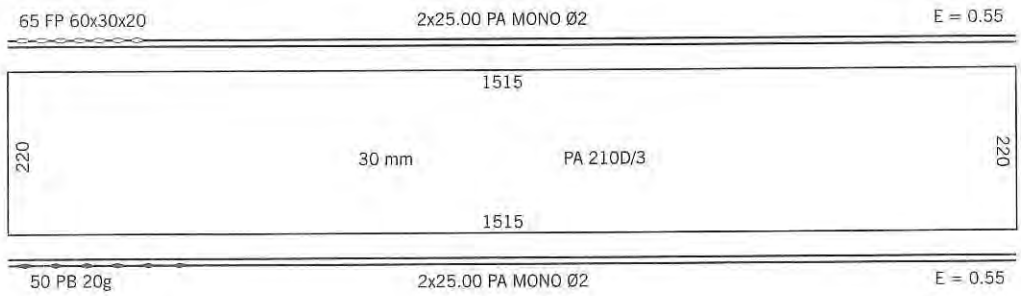


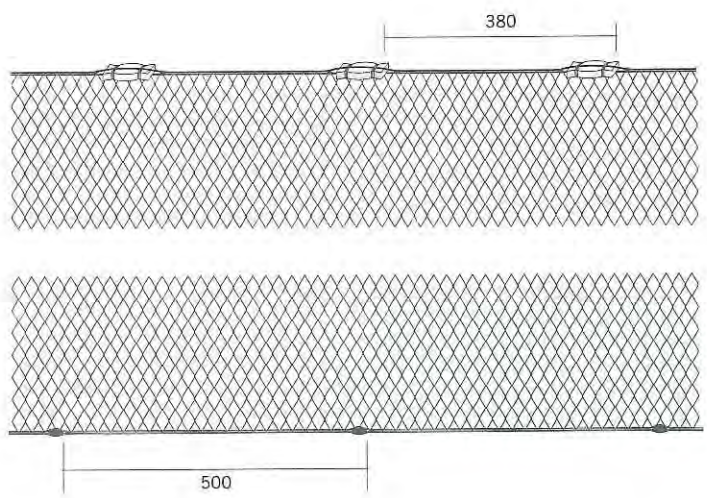


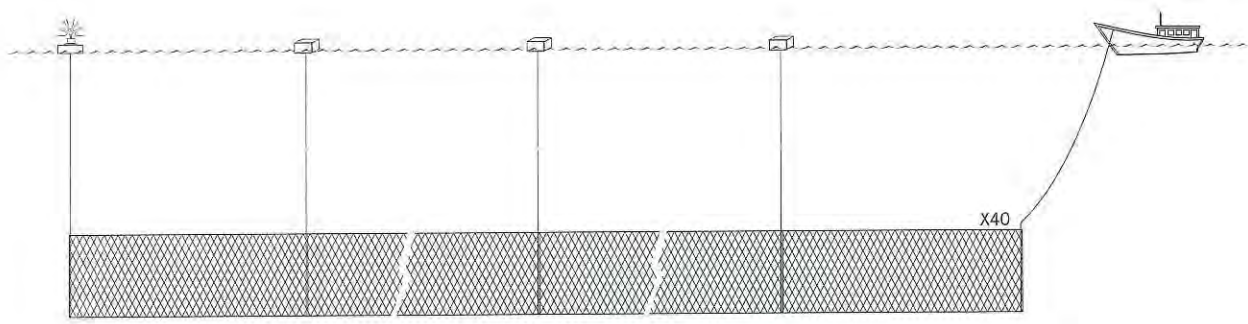
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 14
Hp : 33

LOCATION
Cua Lo
Nghe An



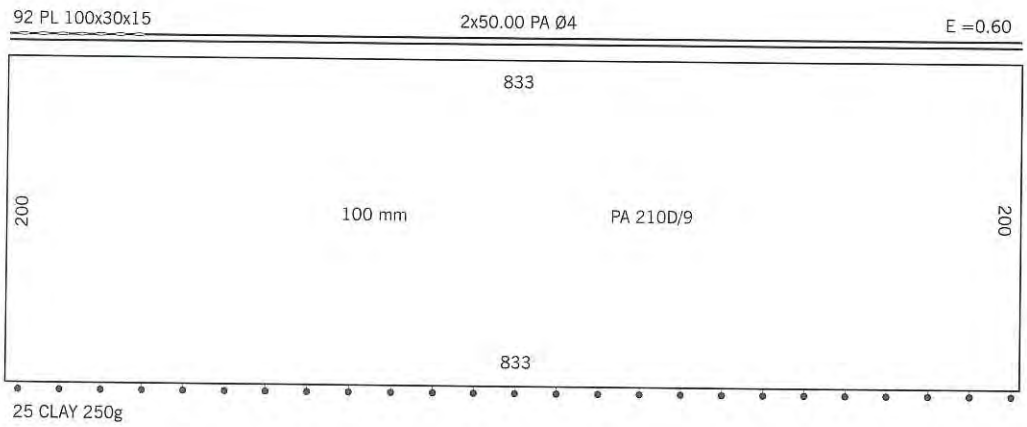


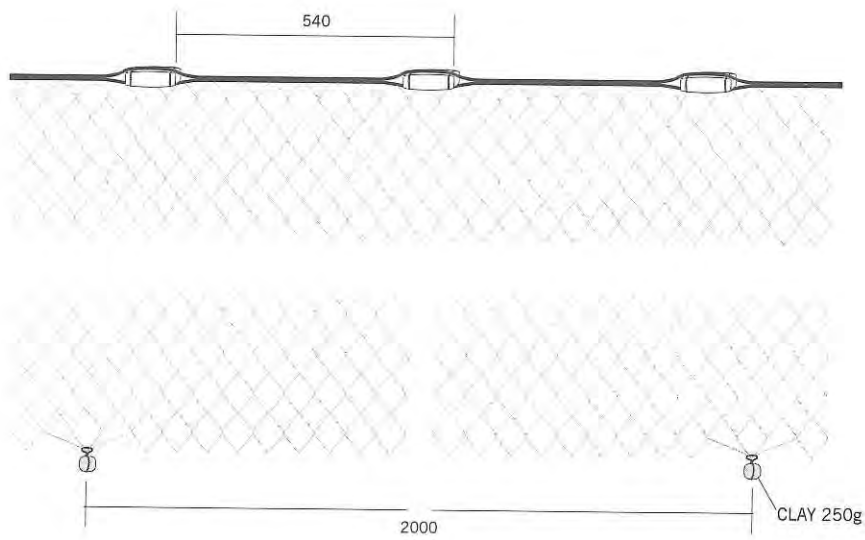


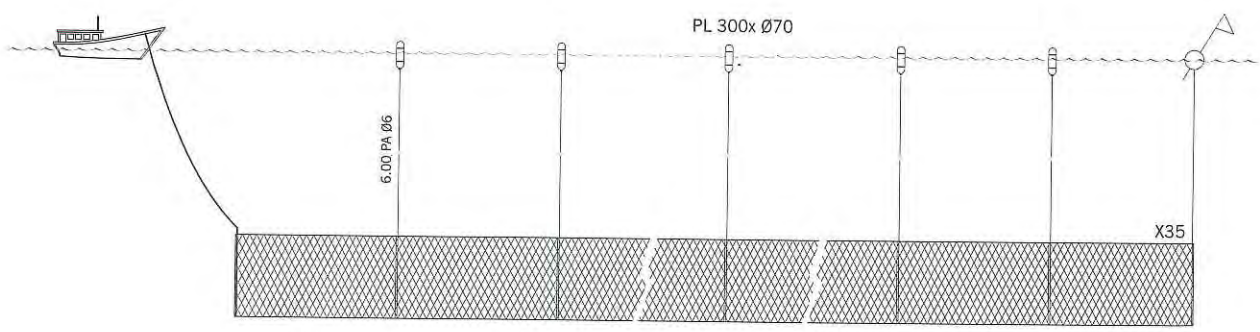
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 14
Hp : 33

LOCATION
Cua Lo
Nghe An



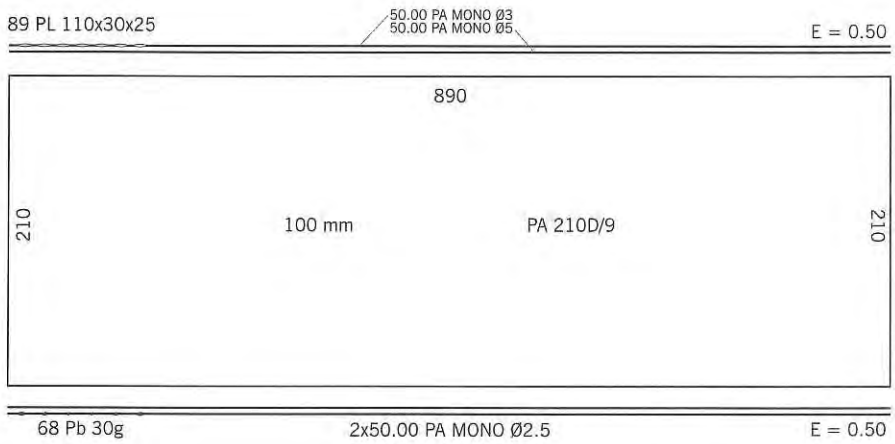


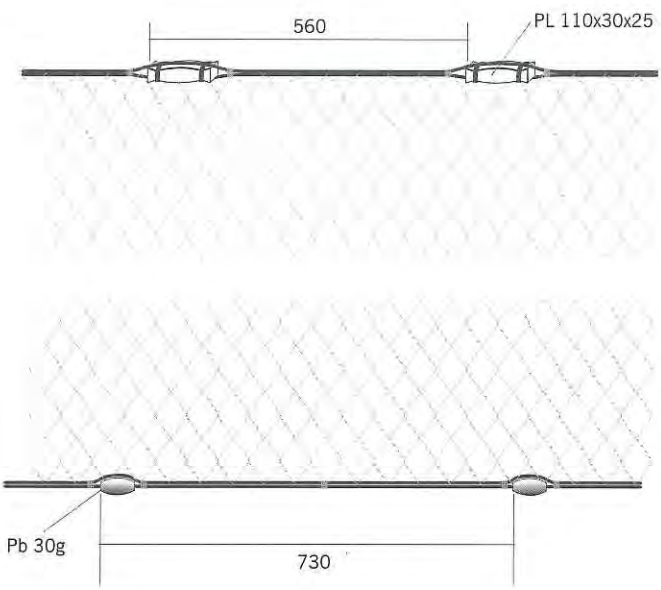


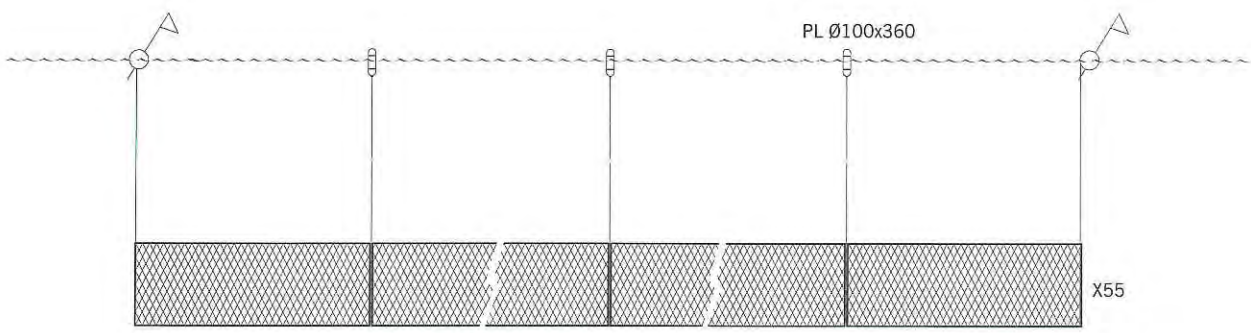
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 12.5
Hp : 33

LOCATION
Thuan An
Thua Thien Hue



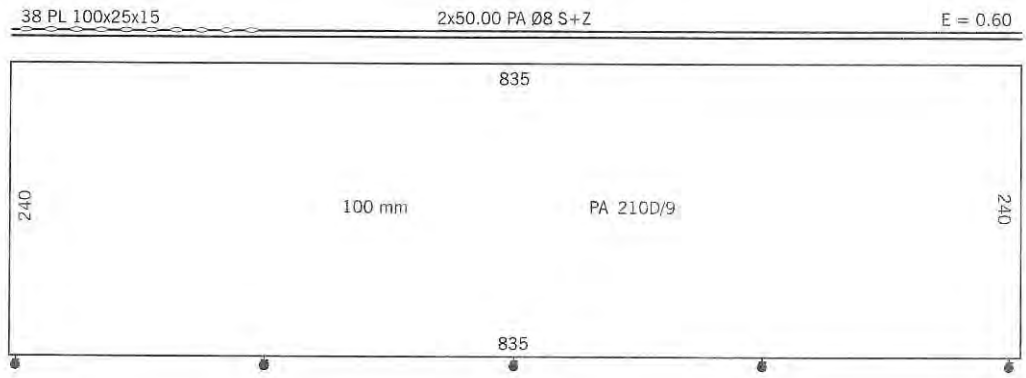


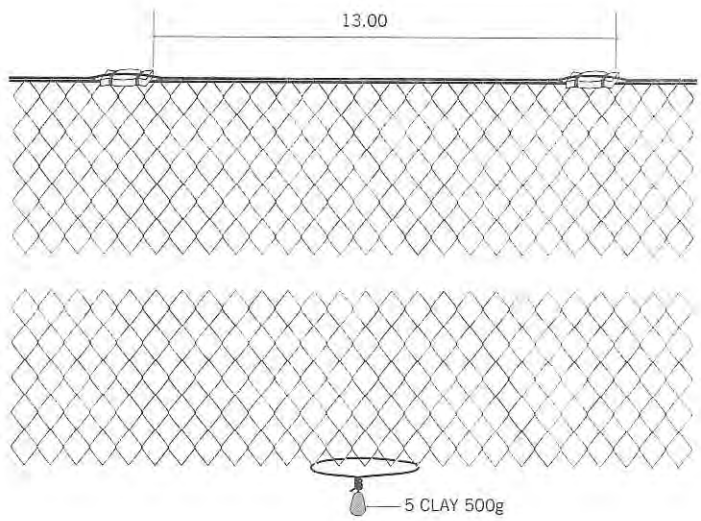


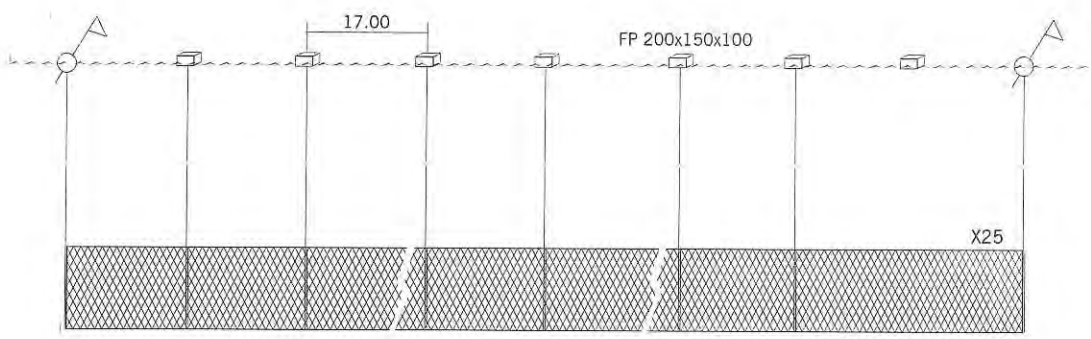
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 15
Hp : 15+22

LOCATION
Hai Hau
Nam Dinh



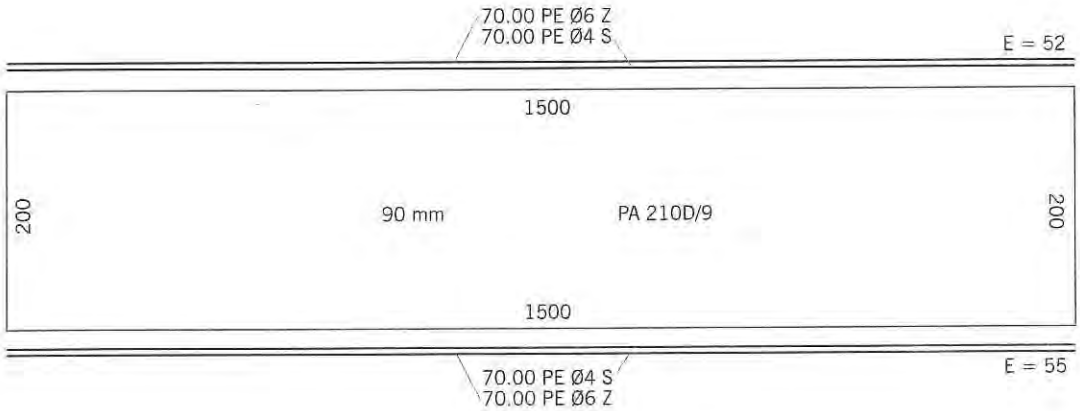


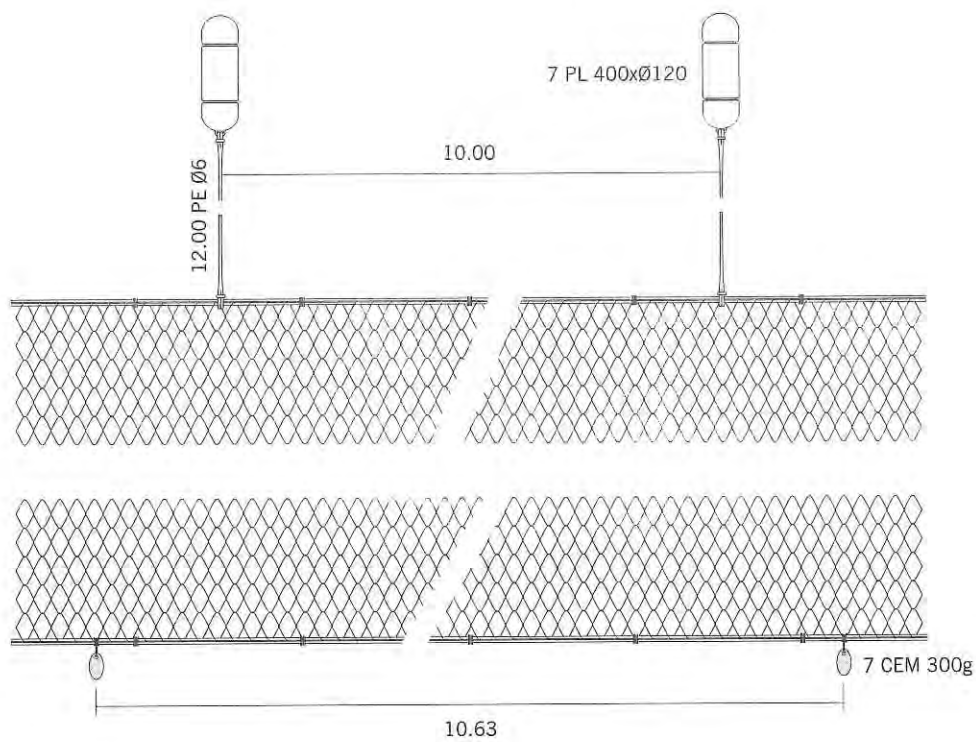


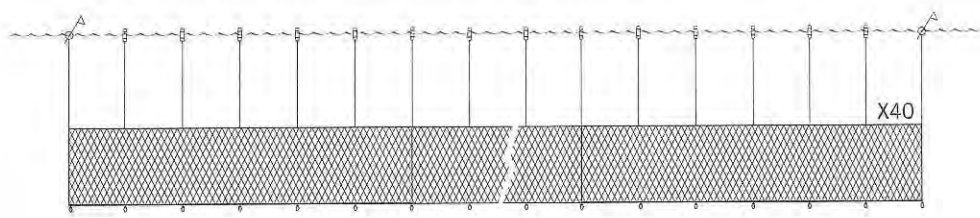
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 14
Hp : 45

LOCATION
Ly Hoa
Quang Binh



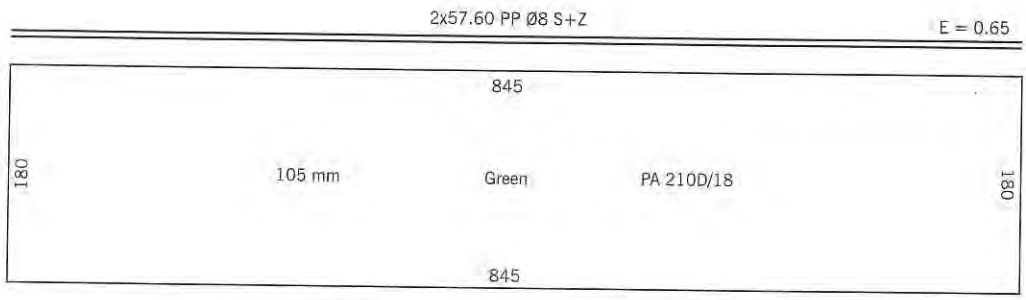


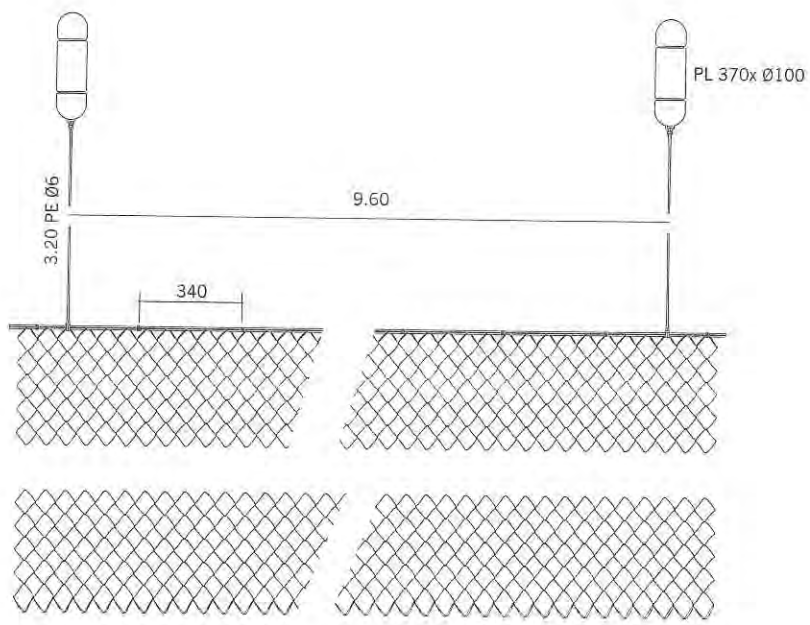


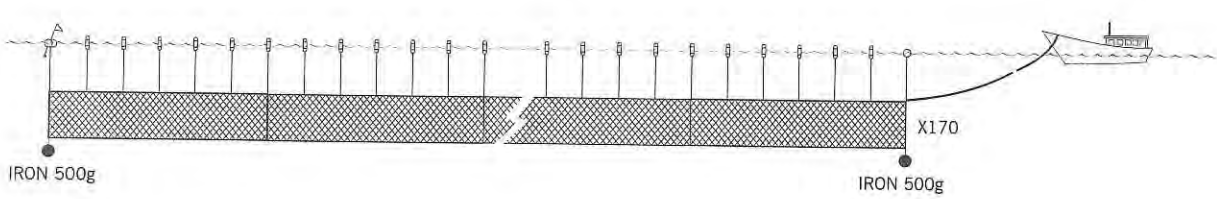
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 18.5
Hp : 45

LOCATION
Rach Gia
Kien Giang



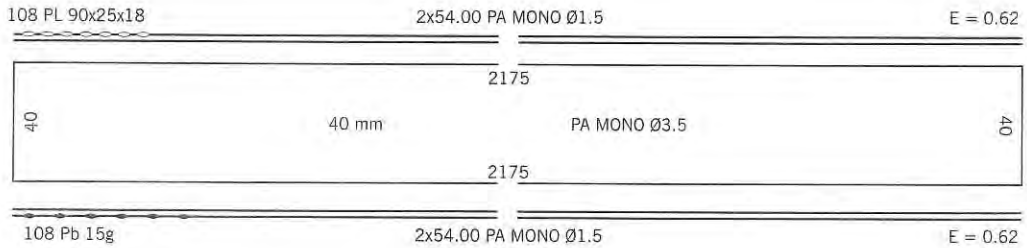


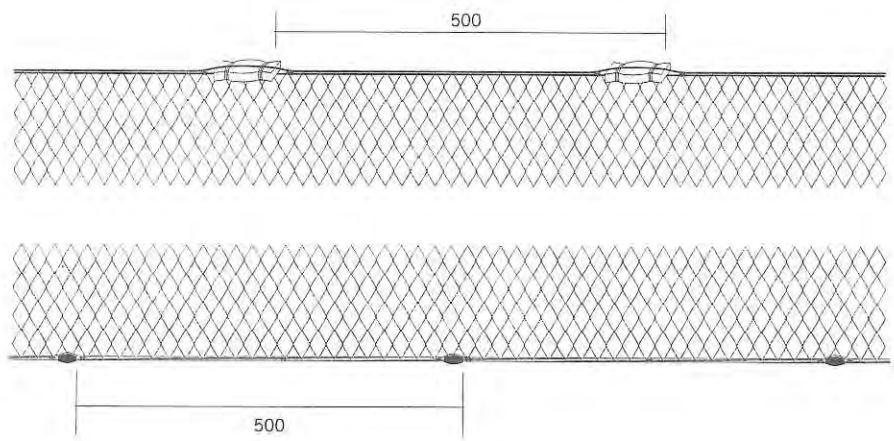


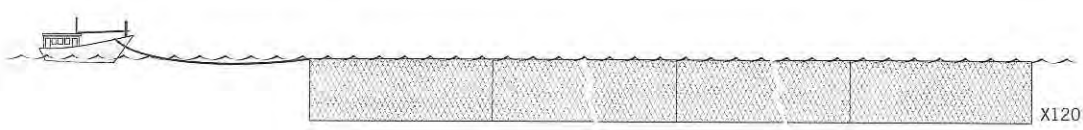
GILL NET
Drift-Net
Flying Fish

VESSEL
Loa : 15.2
GT : 26
Hp : 45

LOCATION
Hoi An
Quang Nam



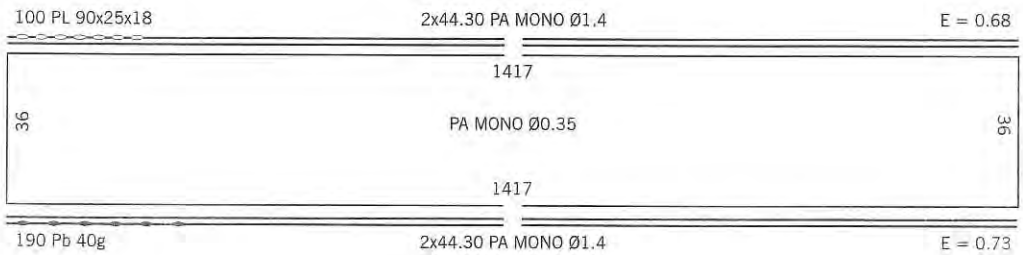


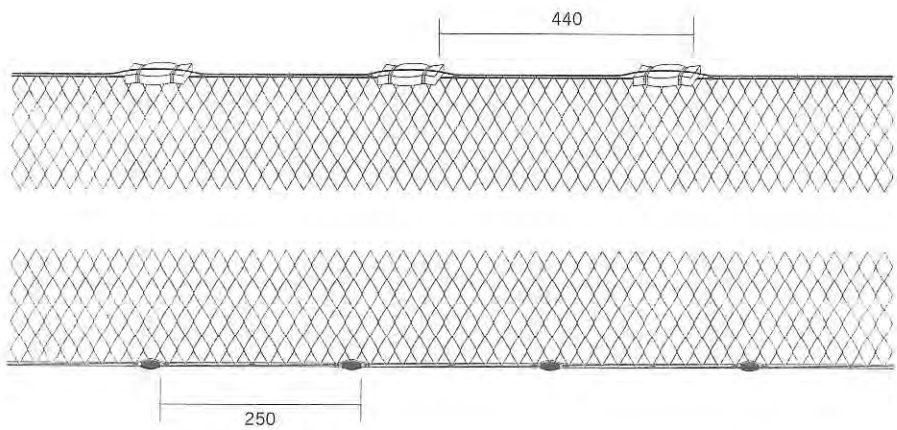


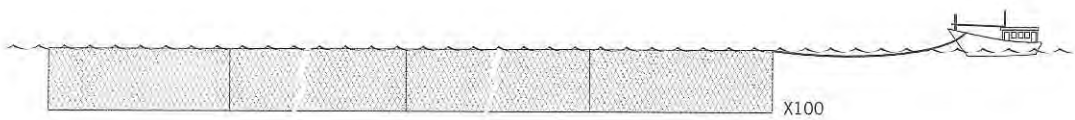
GILL NET
Drift-Net
Flying Fish

VESSEL
Loa : 15.2
GT : 26
Hp : 45

LOCATION
Nha Trang
Khanh Hoa



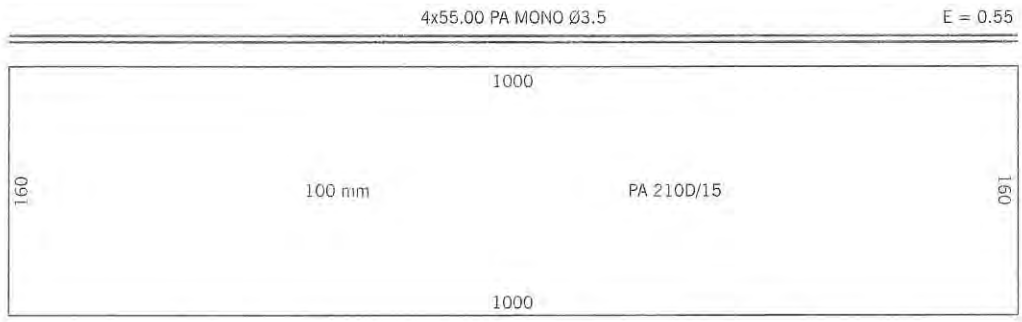


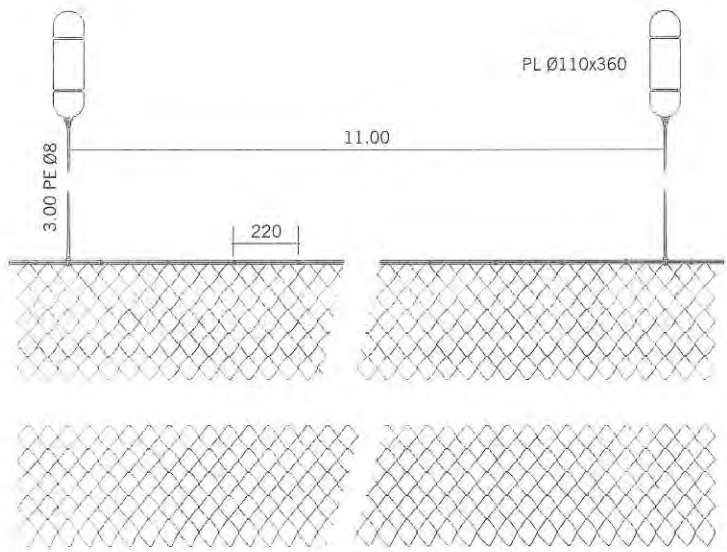


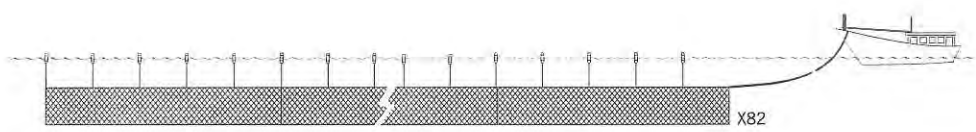
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 15
Hp : 45

LOCATION
Dong Hoi
Quang Binh



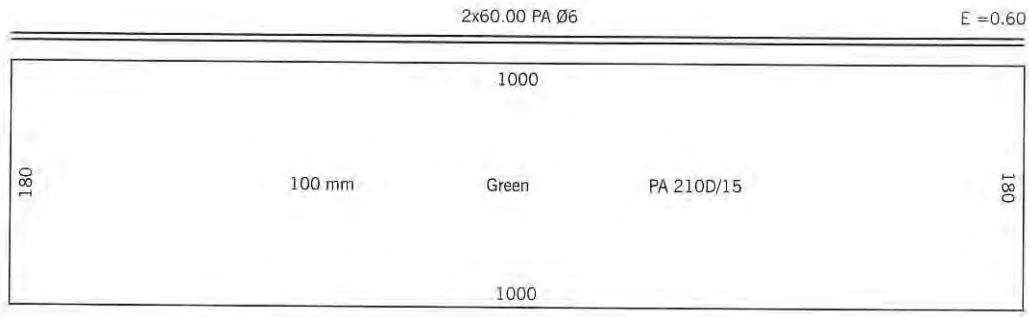


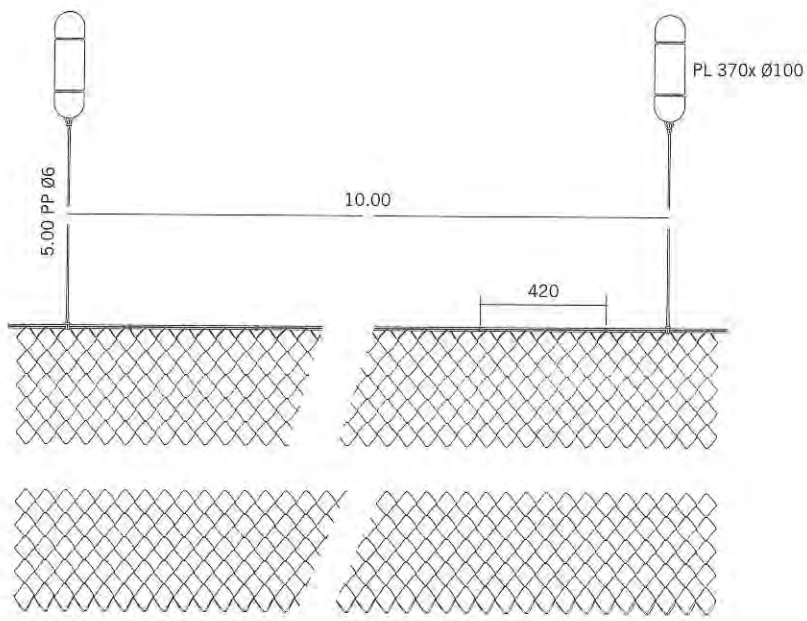


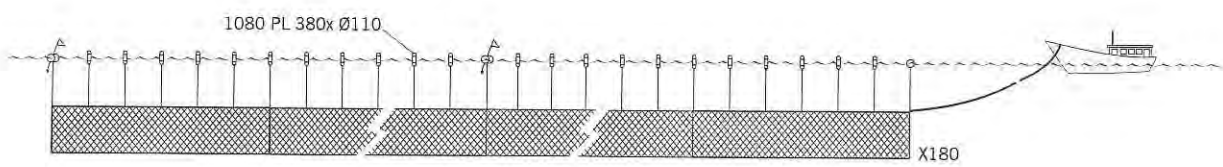
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 14.5
Hp : 60

LOCATION
Vung Tau
Ba Ria-Vung Tau



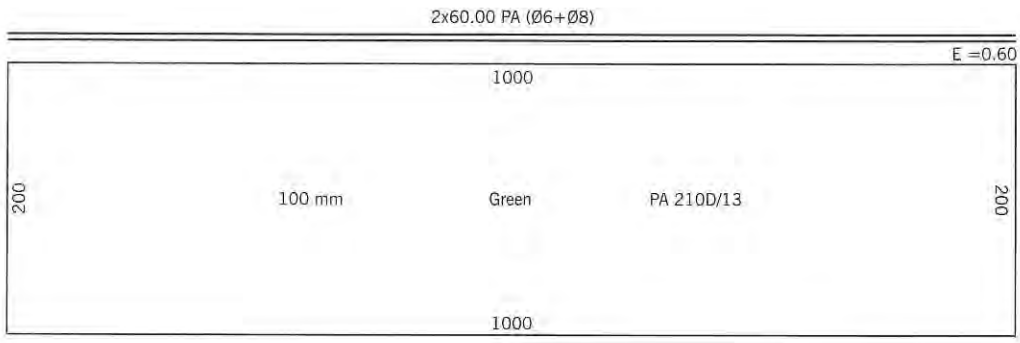


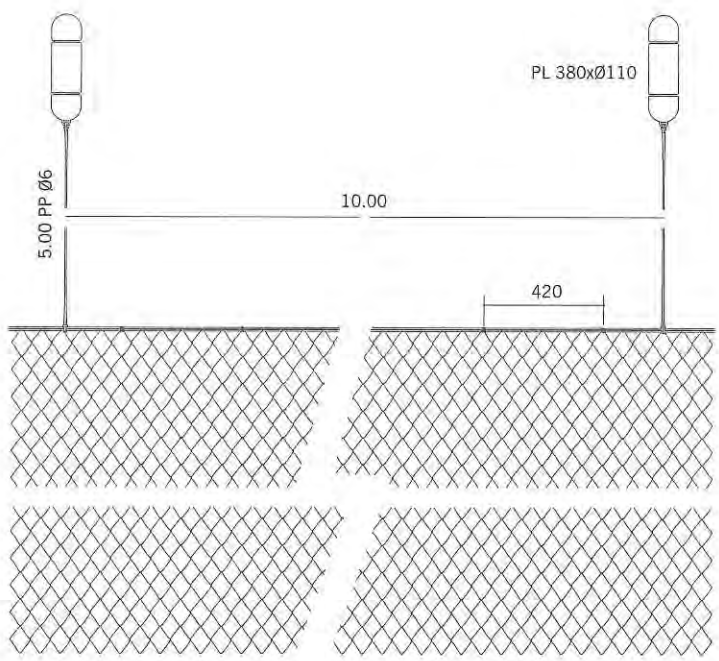


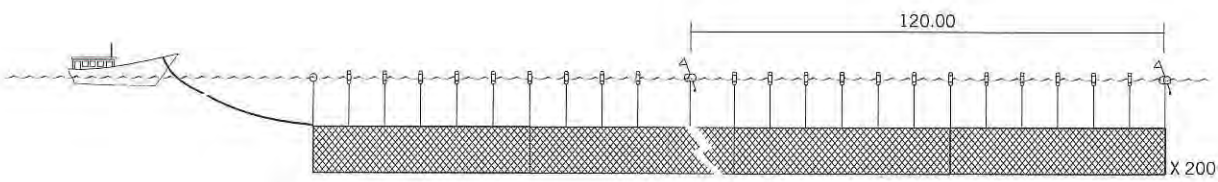
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 14.5
Hp : 60

LOCATION
Vung Tau
Ba Ria-Vung Tau



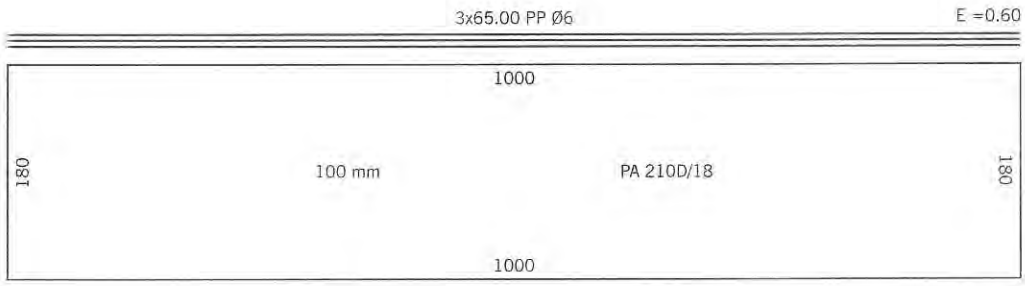


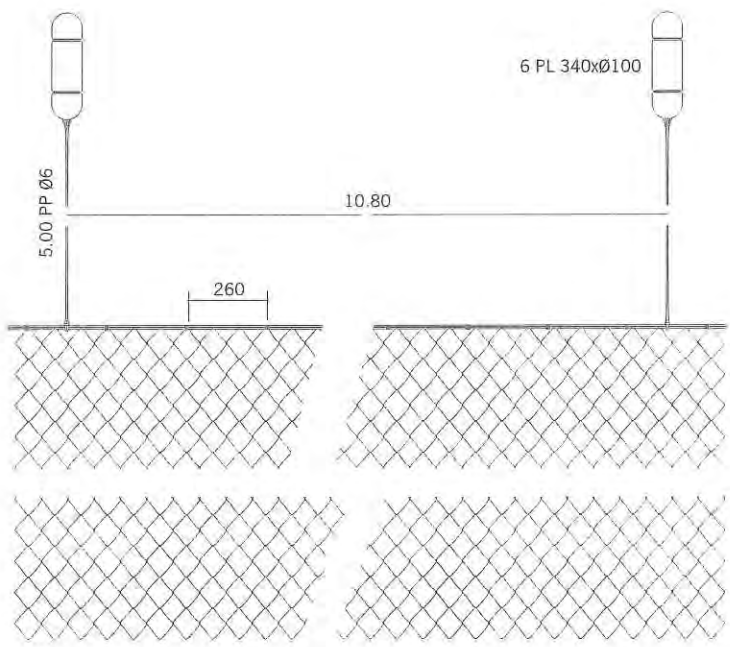


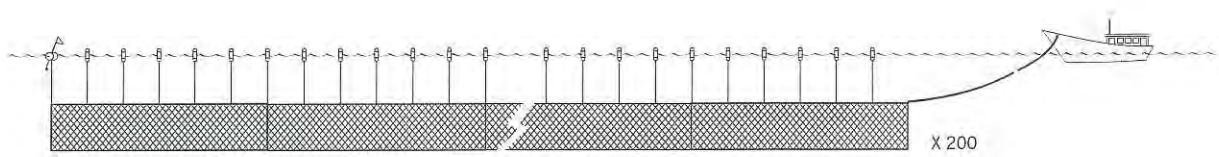
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 15.8
Hp : 60

LOCATION
Nha Trang
Khanh Hoa



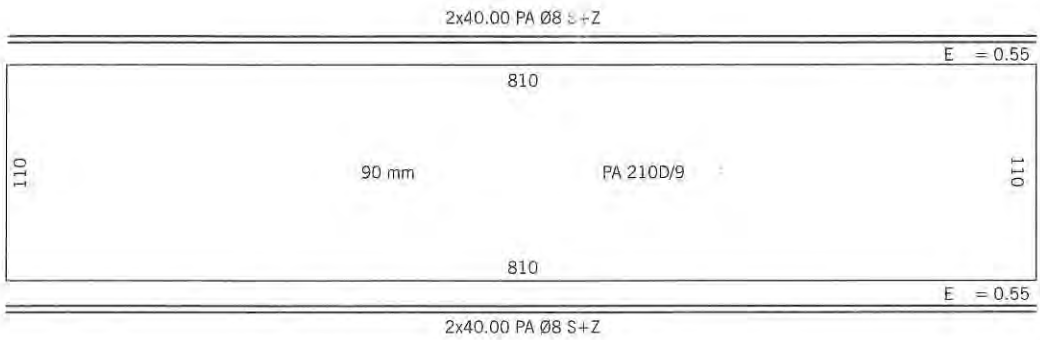


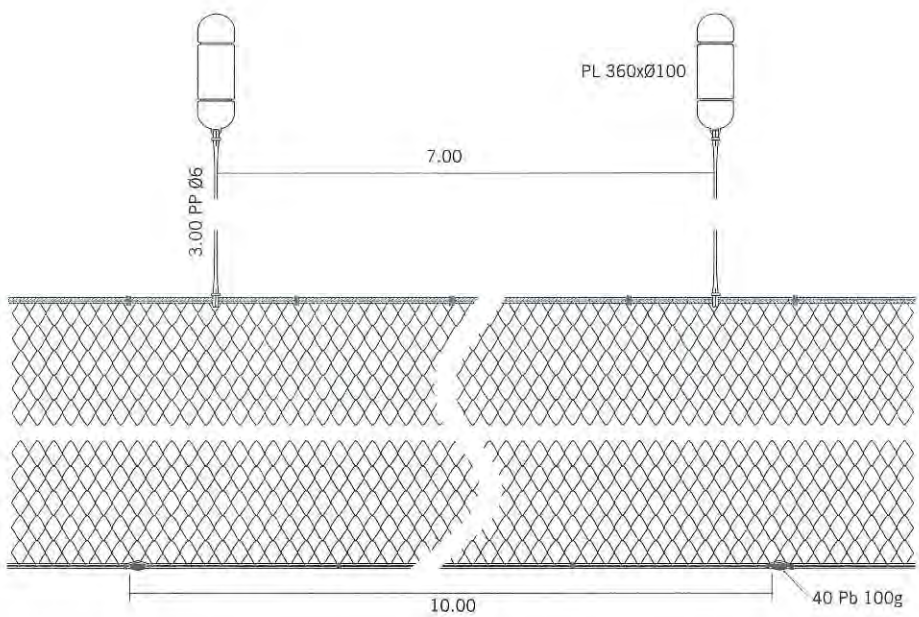


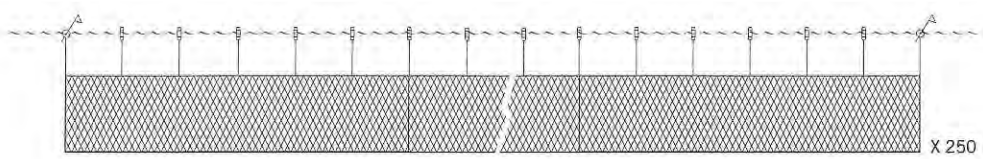
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 14.50
Hp : 74

LOCATION
Cat Ba
Hai Phong



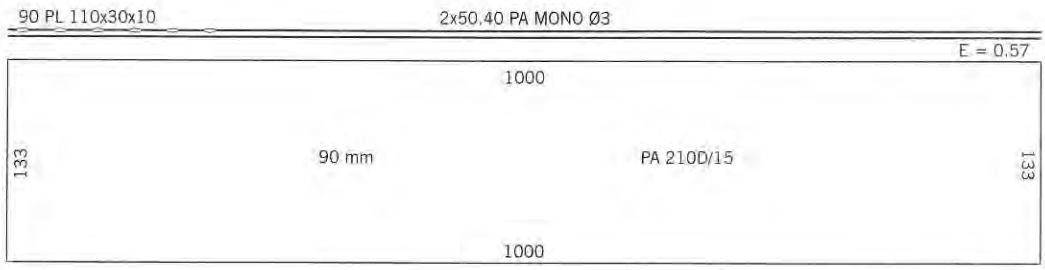


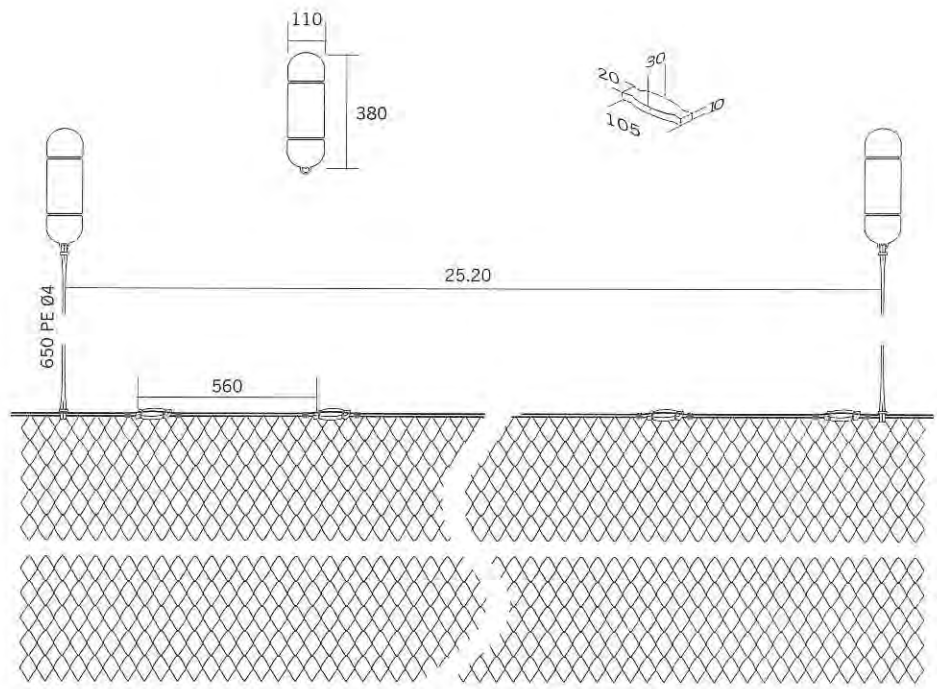


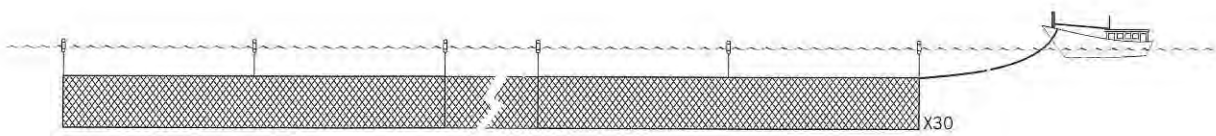
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 15.80
Hp : 74

LOCATION
Phu Vang
Thuab Thien Hue



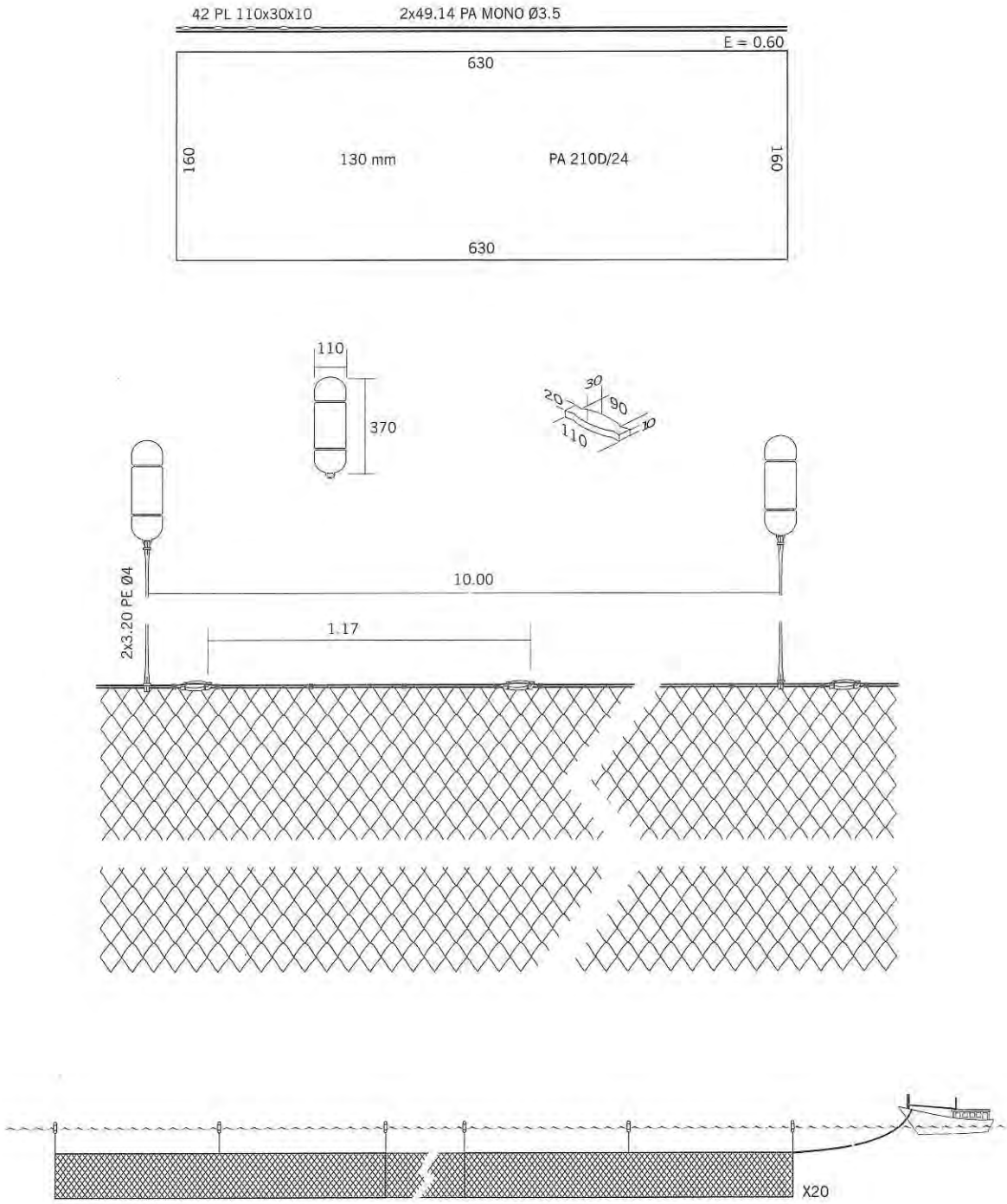




GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 16.4
Hp : 105

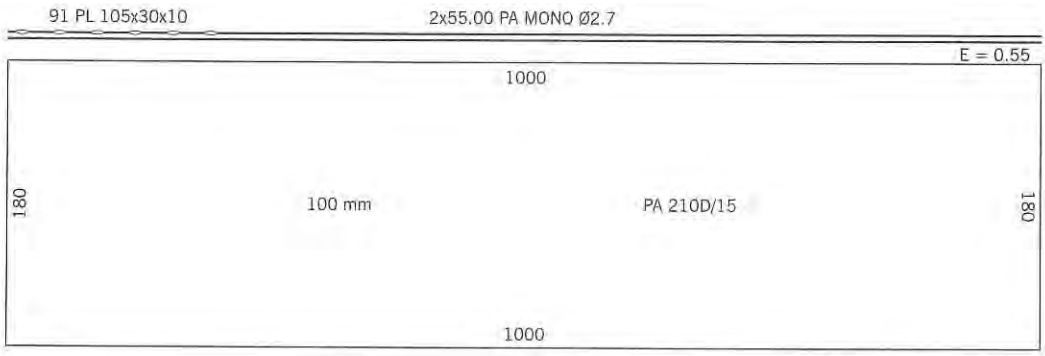
LOCATION
Phu Vang
Thuab Thien Hue

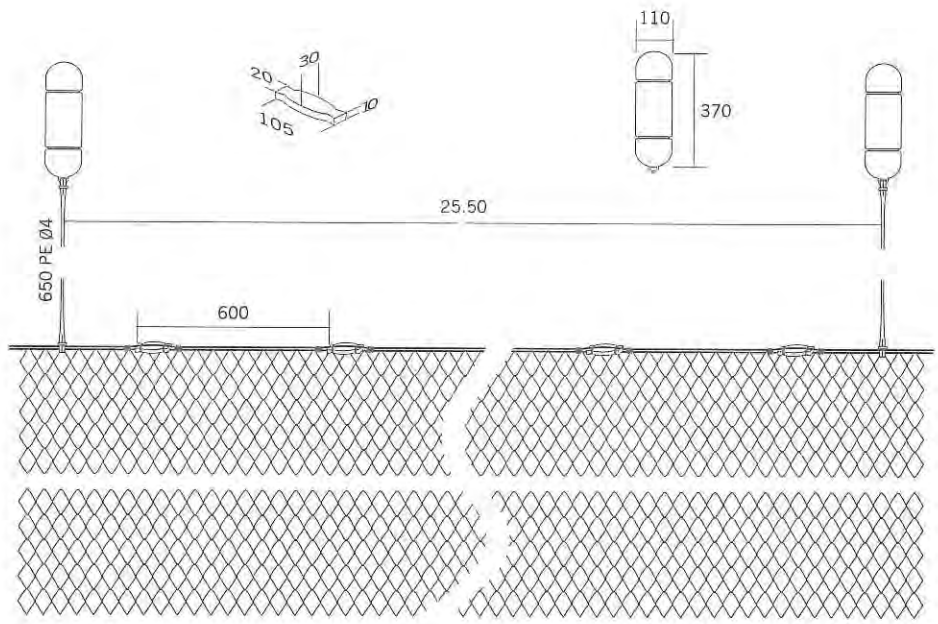


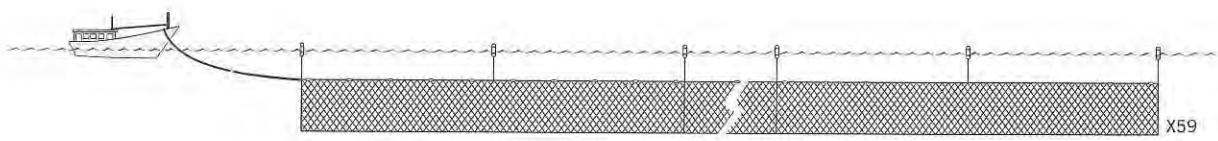
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 17.50
Hp : 120

LOCATION
Phu Vang
Thuab Thien Hue



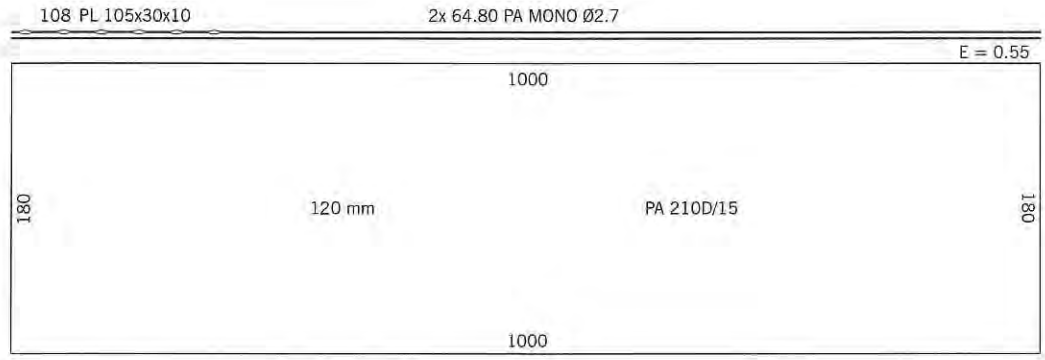


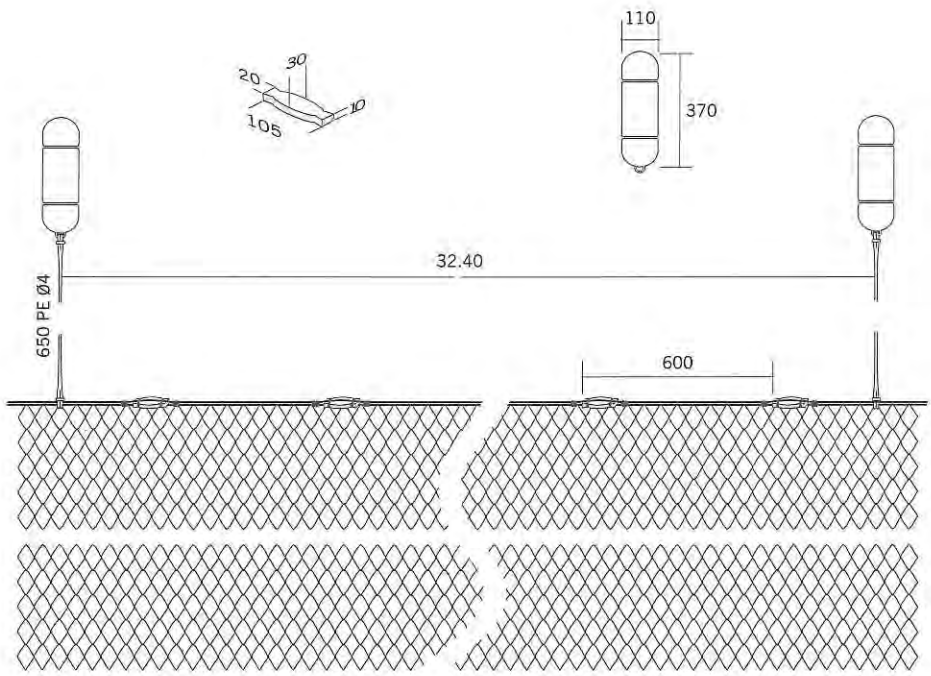


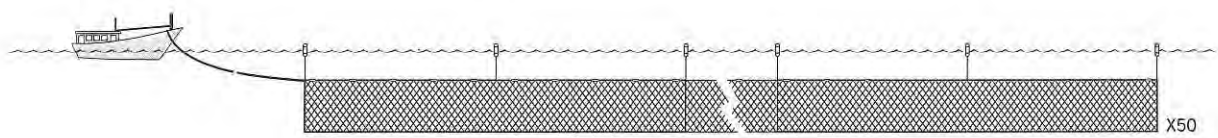
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 17.50
Hp : 120

LOCATION
Phu Vang
Thuab Thien Hue



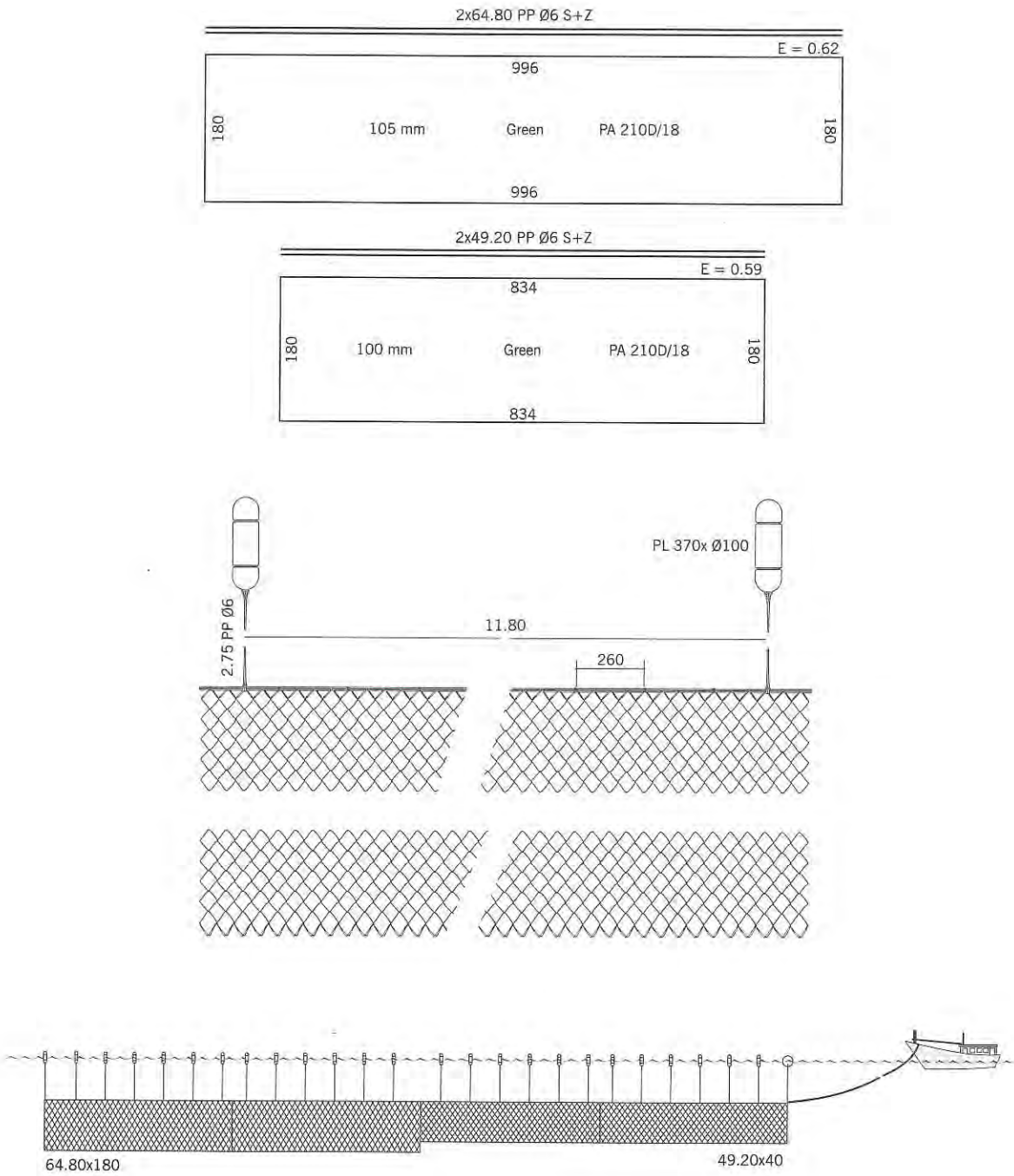




GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 17.3
Hp : 150

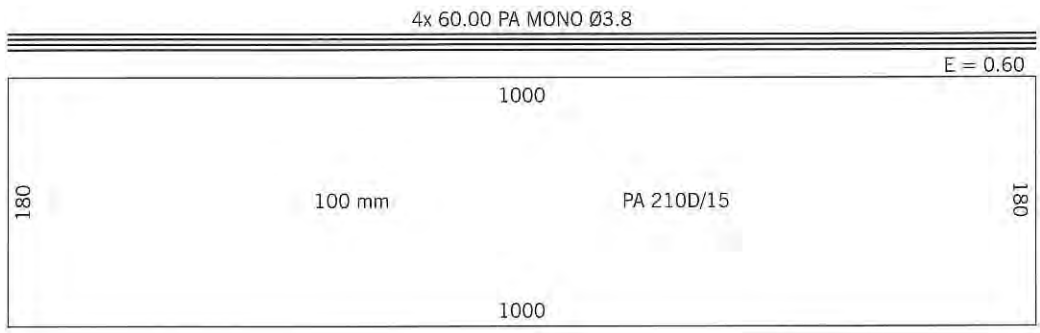
LOCATION
Rach Gia
Kien Giang

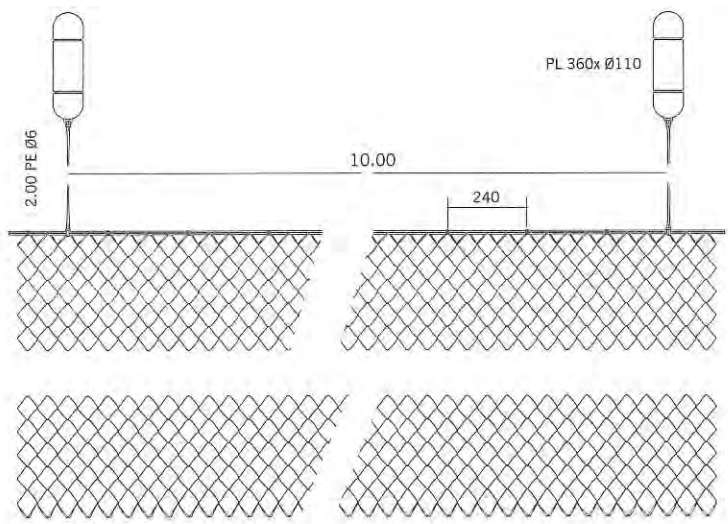


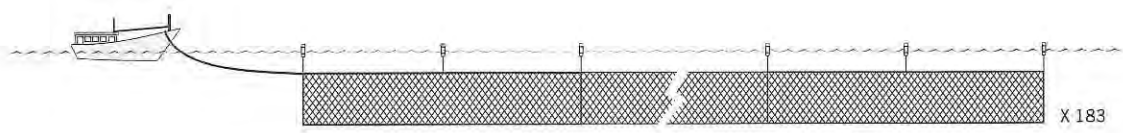
GILL NET
Drift-Net
Mackerel, Tuna

VESSEL
Loa : 19.90
Hp : 155

LOCATION
Cua Lo
Nghe An



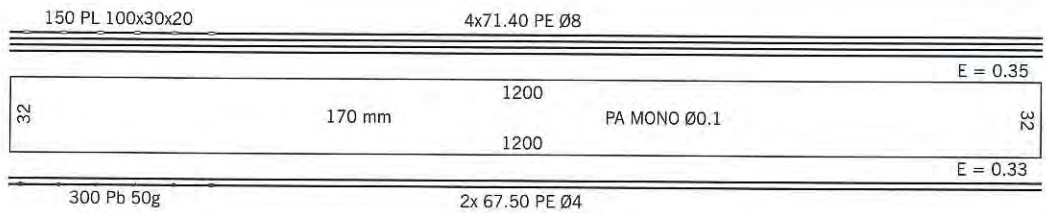


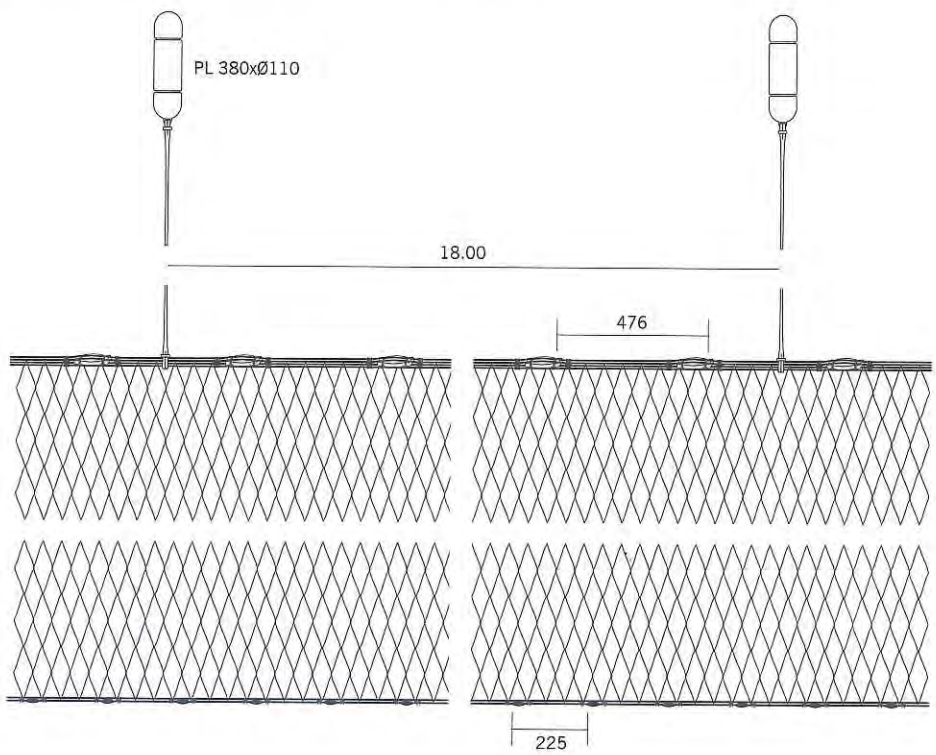


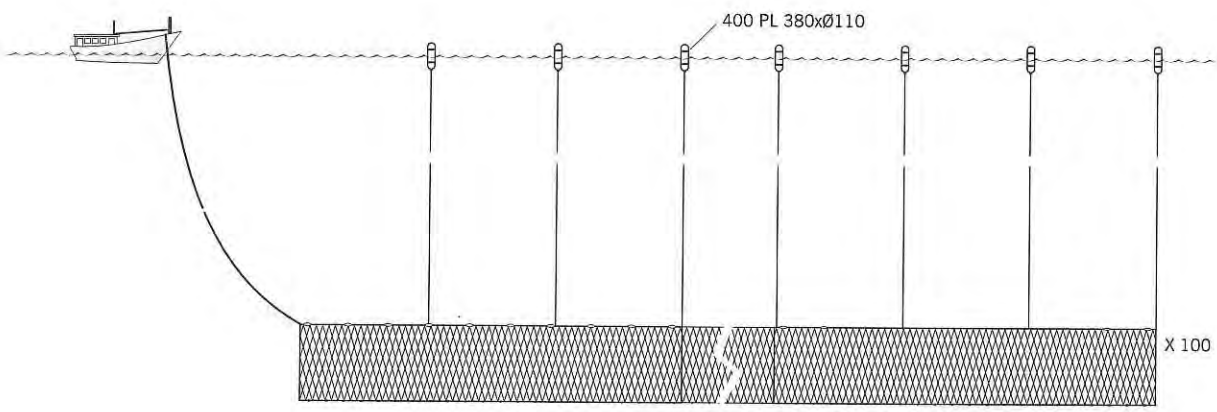
GILL NET
Bottom Set
Snapper, Giant Catfish
Painted Sweetlip

VESSEL
Loa : 18.00
Hp : 250

LOCATION
Long Phu
Soc Trang



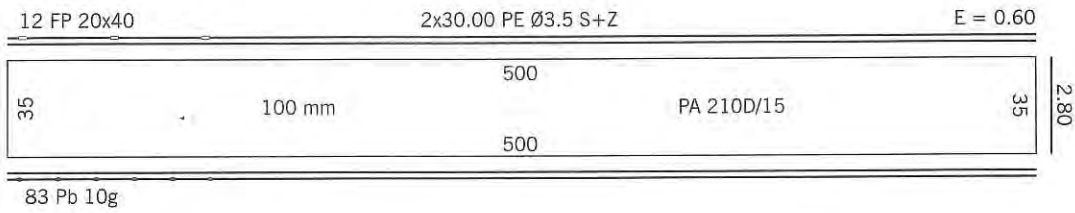


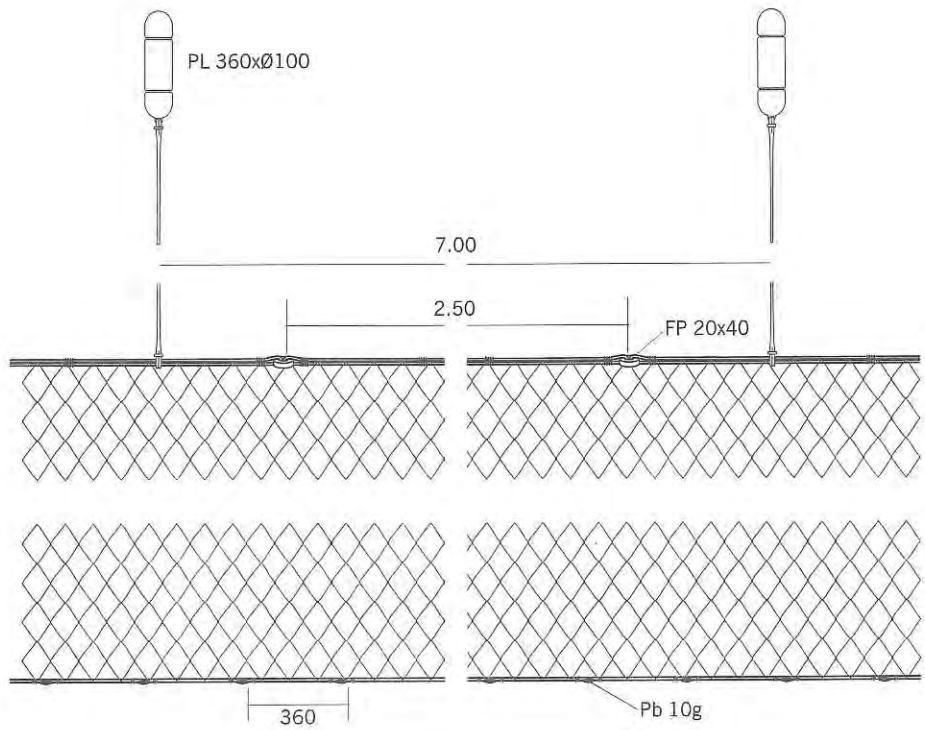


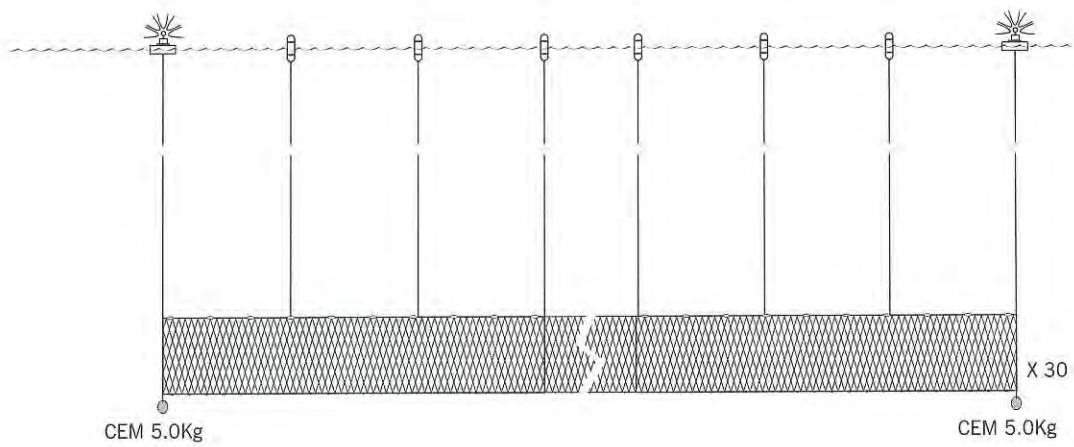
GILL NET
Bottom Set
Demersal Fishes

VESSEL
Loa : 9
Hp : 12

LOCATION
Thuy Nguyen
Hai Phong



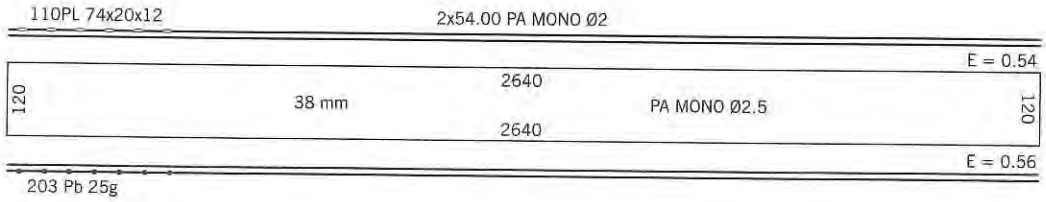


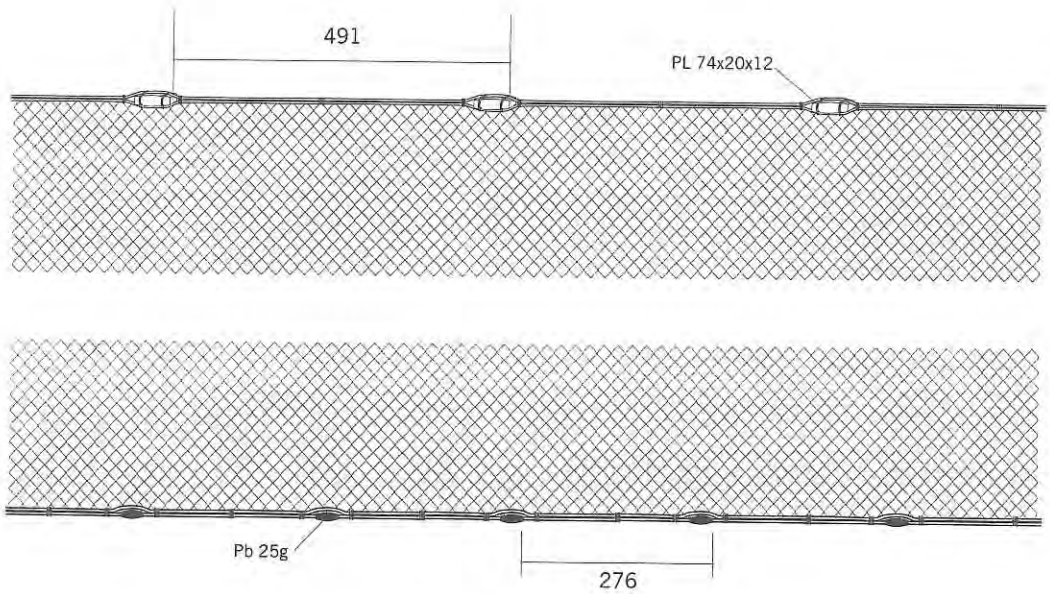


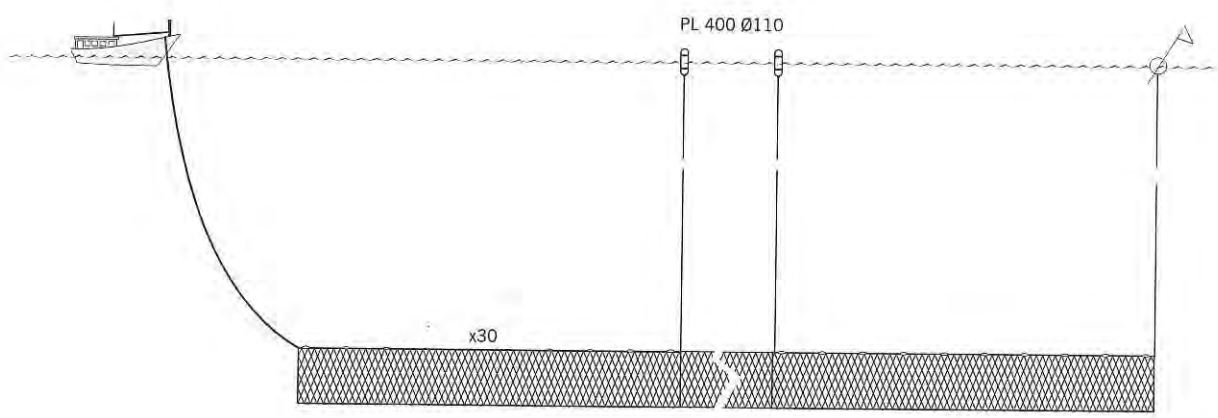
GILL NET
Bottom Set
Threadfin Breams

VESSEL
Loa : 8.5
Gt : 6
Hp : 12

LOCATION
Trieu Phong
Quang Tri



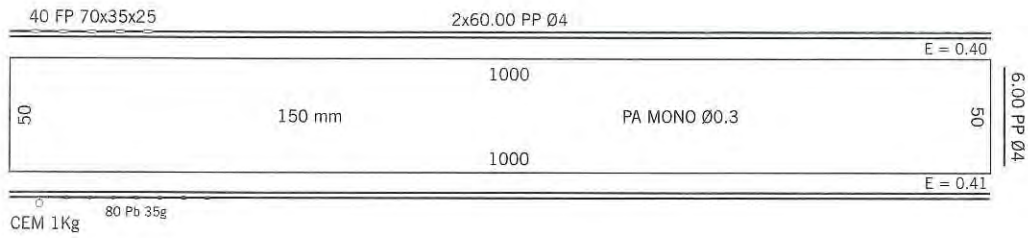


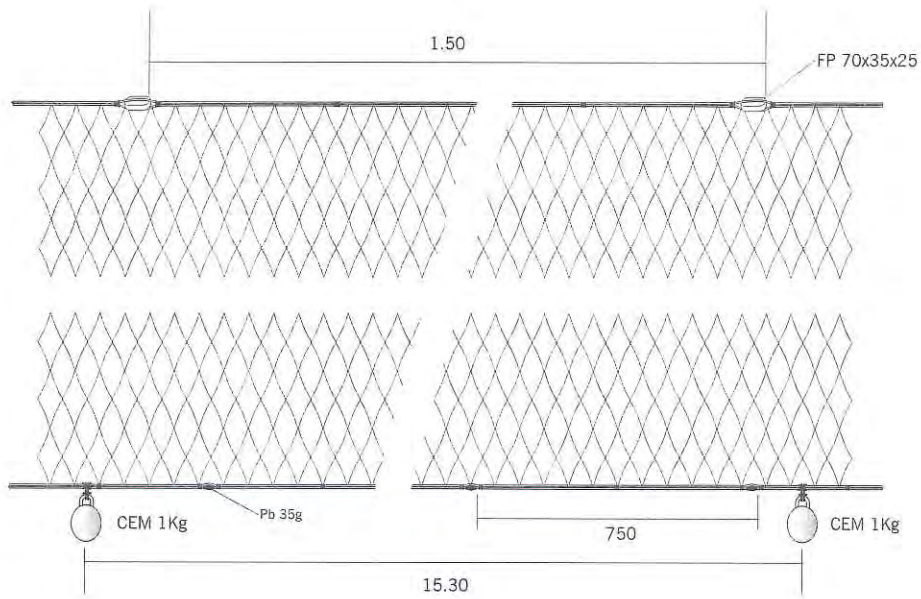


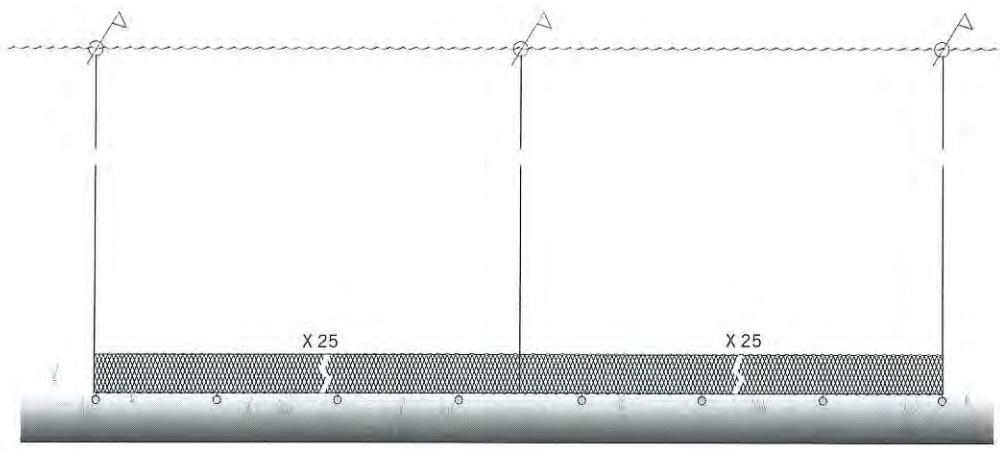
GILL NET
Bottom Set
Pomfret

VESSEL
Loa : 9.80
Hp : 15

LOCATION
Cat Ba
Hai Phong



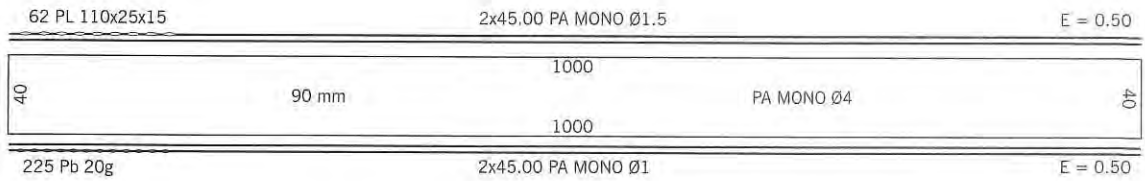


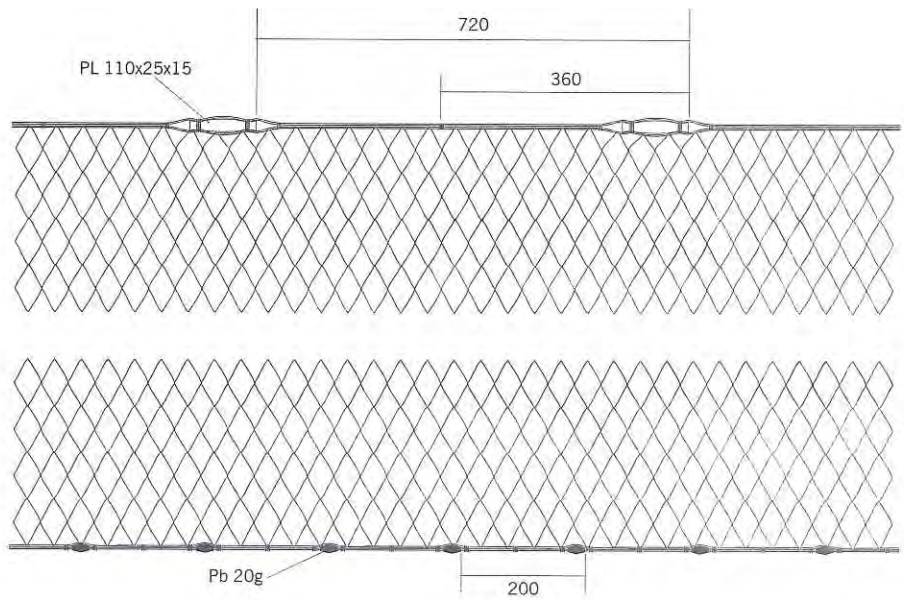


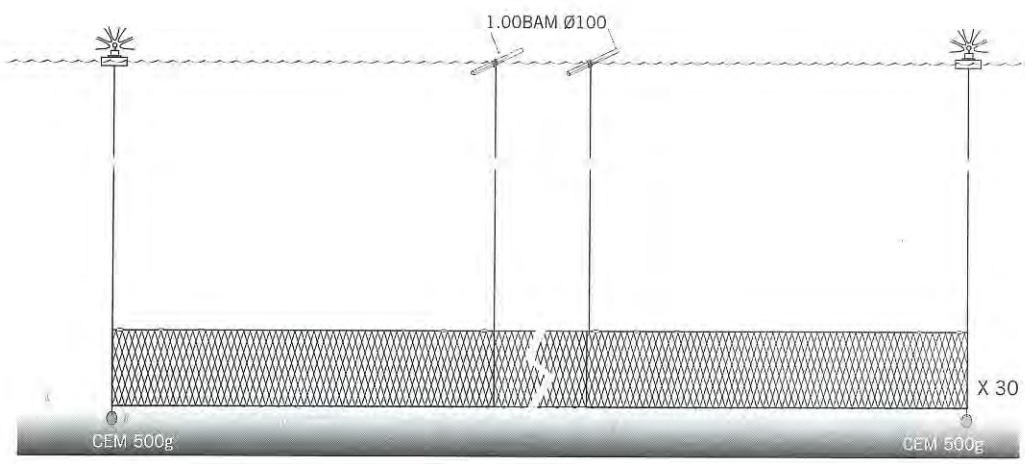
GILL NET
Bottom Set
Conger Pike, Rays

VESSEL
Loa : 12.5
Hp : 15

LOCATION
Ly Hoa
Quang Binh



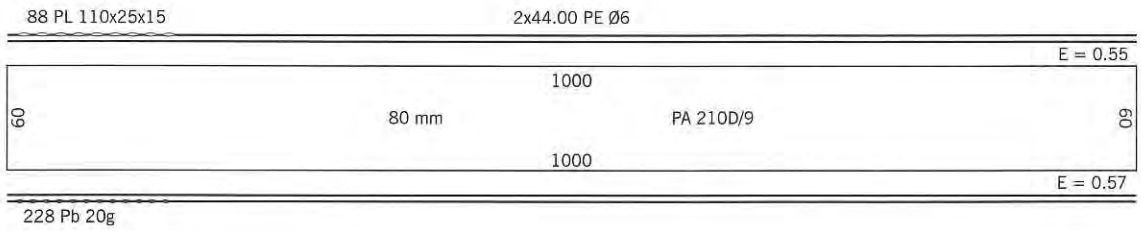


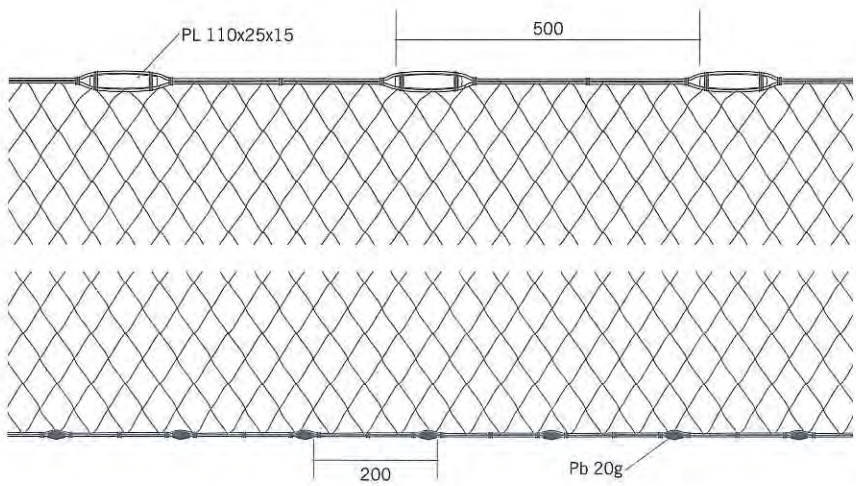


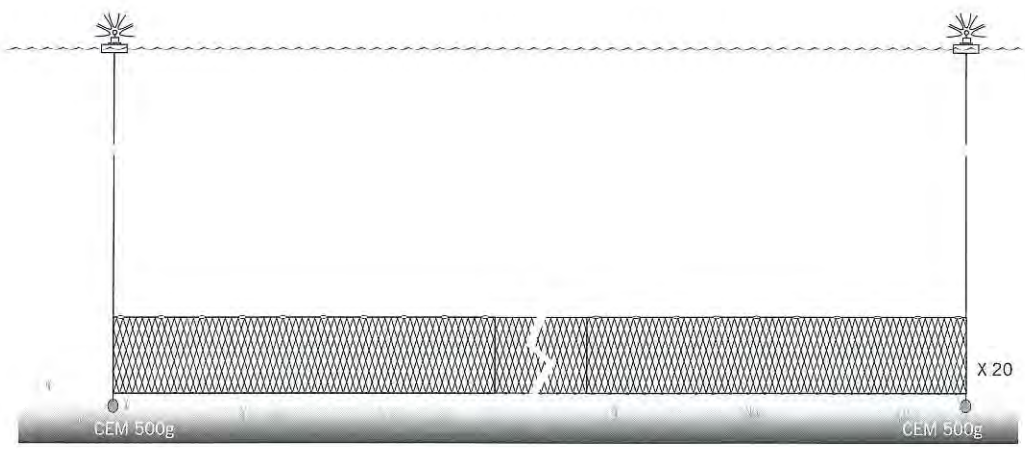
GILL NET
Bottom Set
Lobster

VESSEL
Loa : 13.5
Hp :15

LOCATION
Ly Hoa
Quang Binh



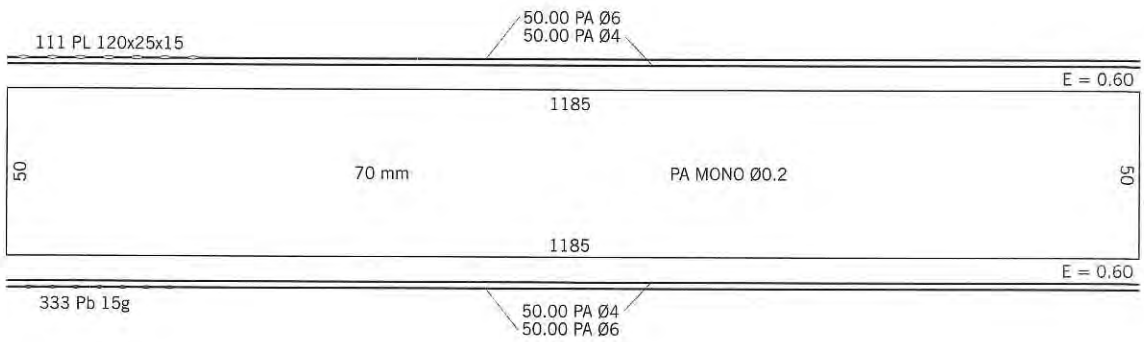


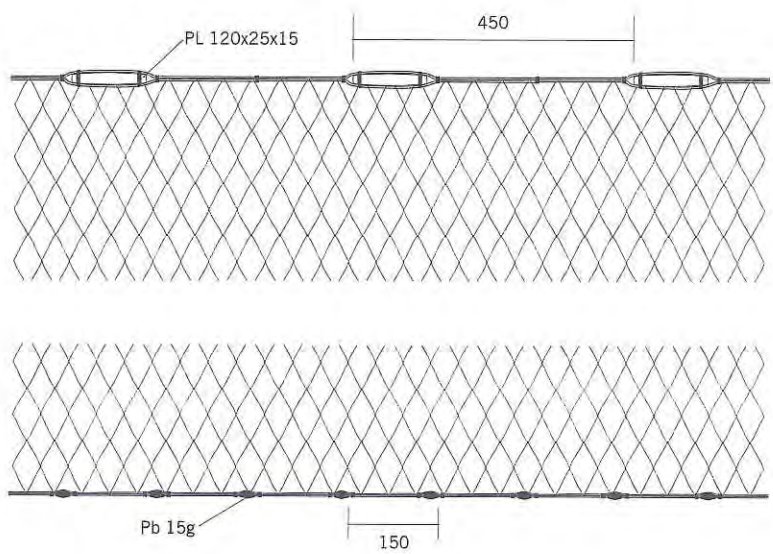


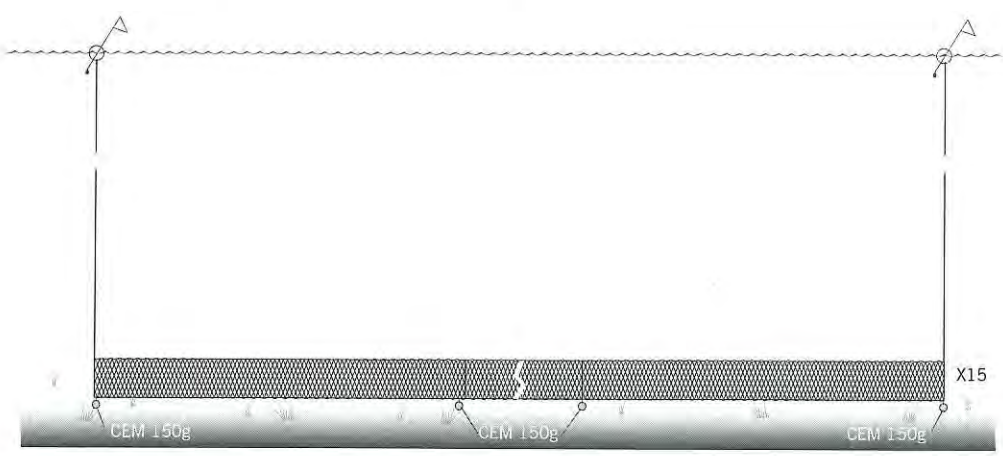
GILL NET
Bottom Set
Demersal Fishes

VESSEL
Loa : 13.5
Hp : 18

LOCATION
Cua Lo
Nghe An



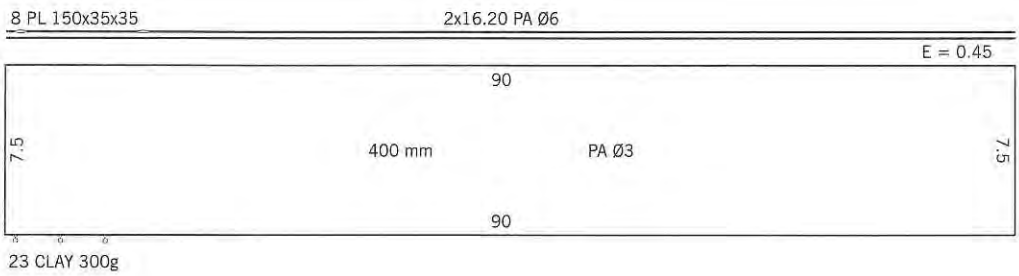


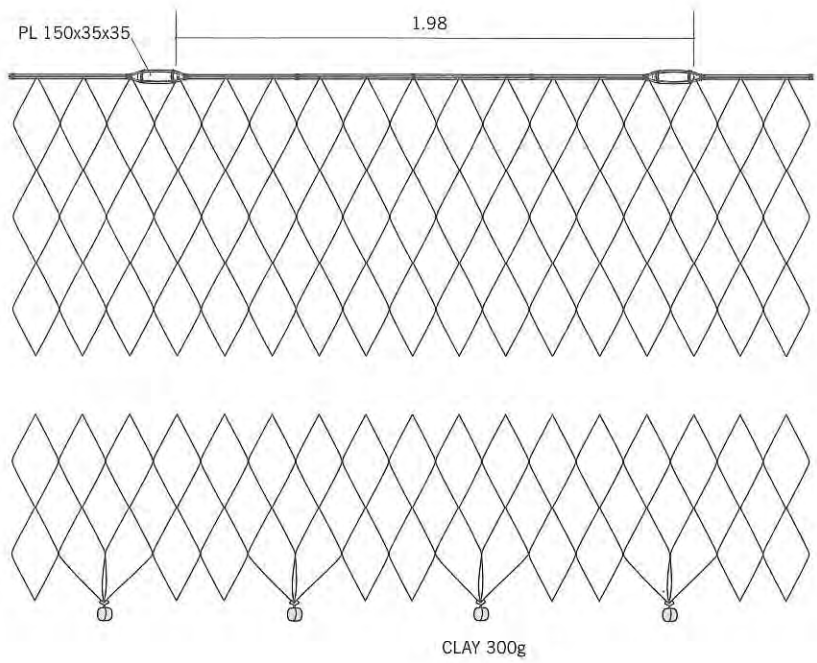


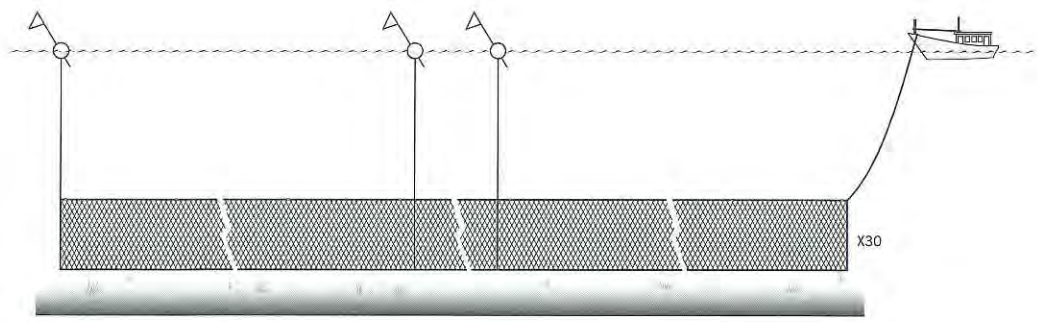
GILL NET
Trammel, Bottom Set
Tigertoothed Croaker

VESSEL
Loa : 13
Hp : 22

LOCATION
Nghia Hung
Nam Dinh



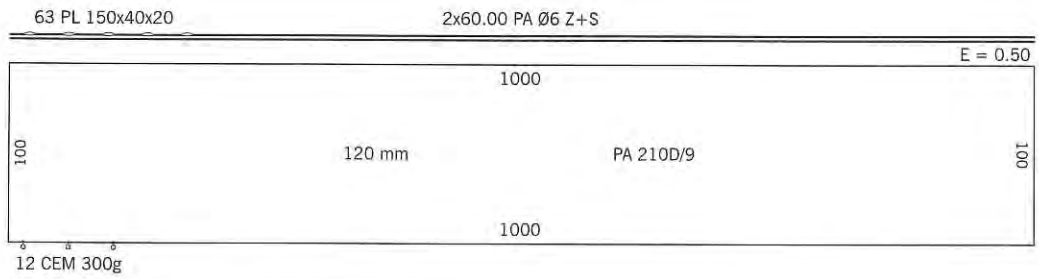


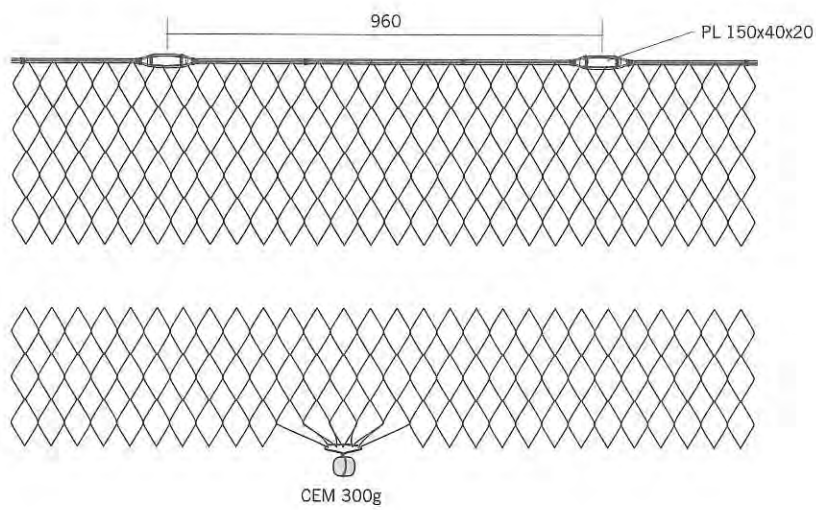


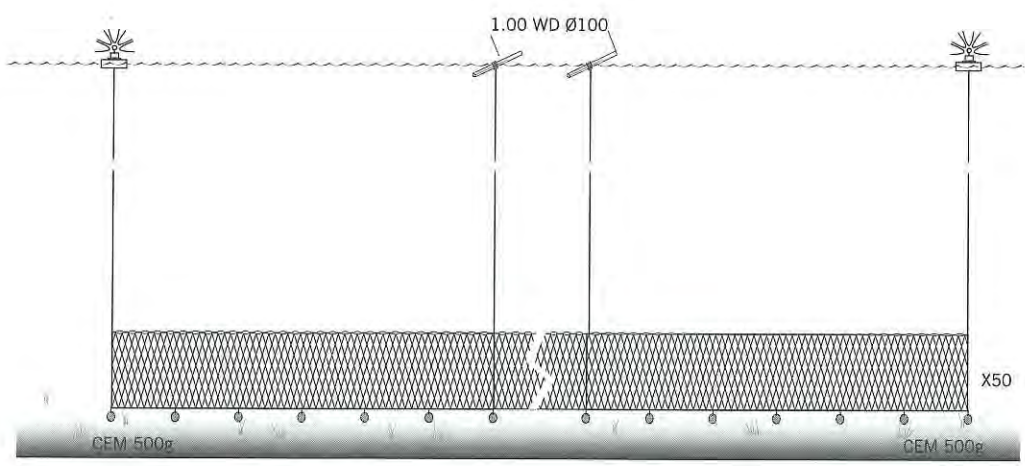
GILL NET
Bottom Set
Demersal Fishes

VESSEL
Loa : 14
Hp : 22

LOCATION
Ly Hoa
Quang Binh



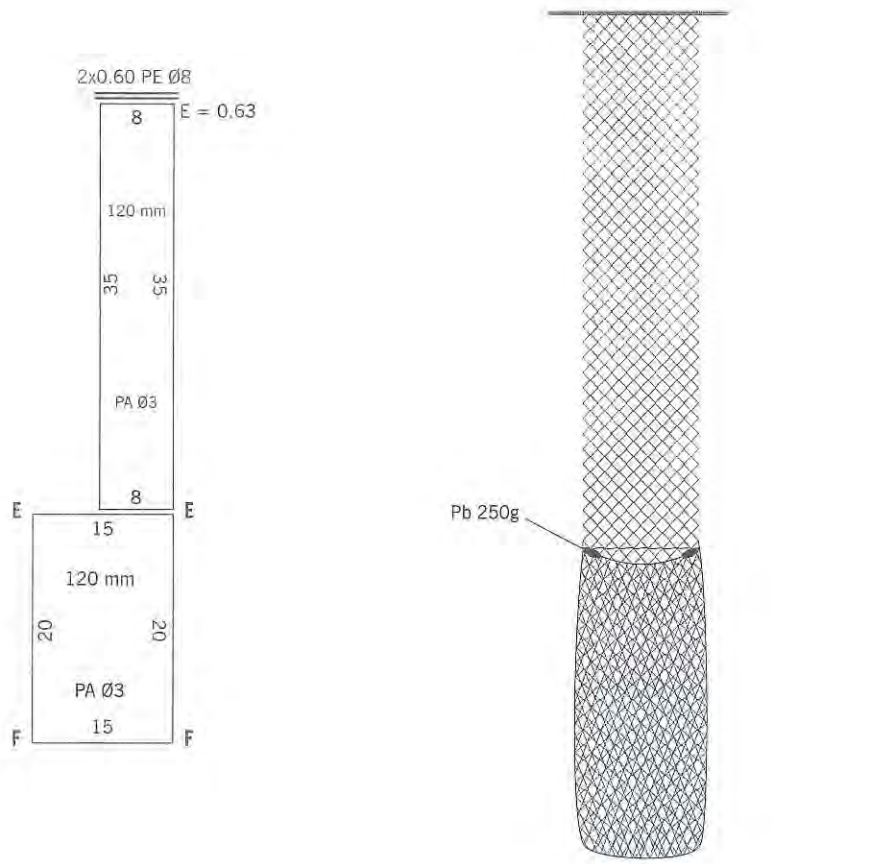


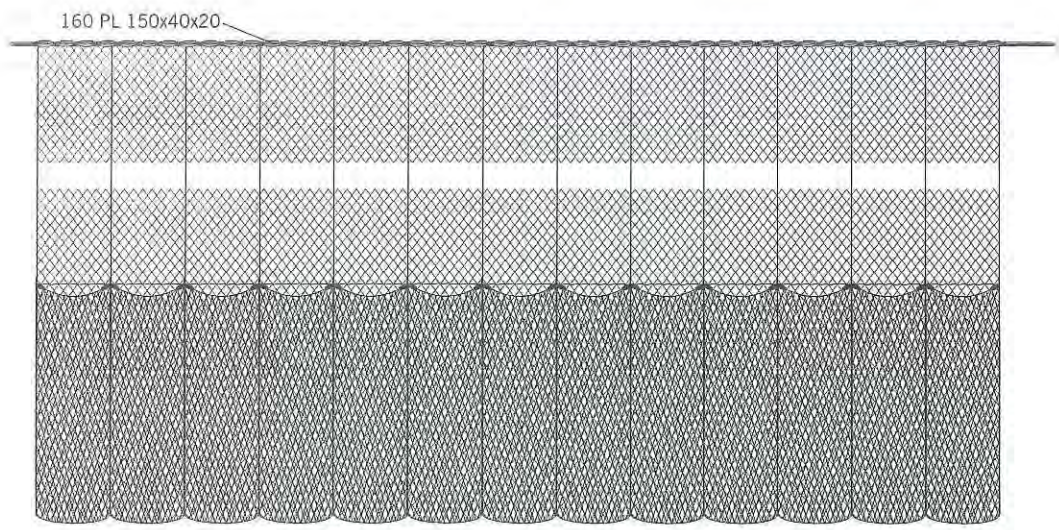


GILL NET
Bottom Set, with Bag
Tigertoothed Croaker

VESSEL
Loa : 13.5
Hp : 33

LOCATION
Nghia Hung
Nam Dinh

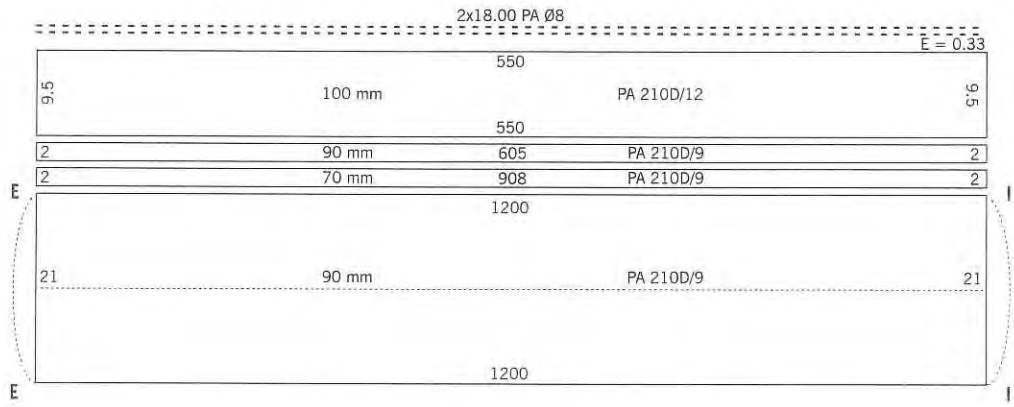


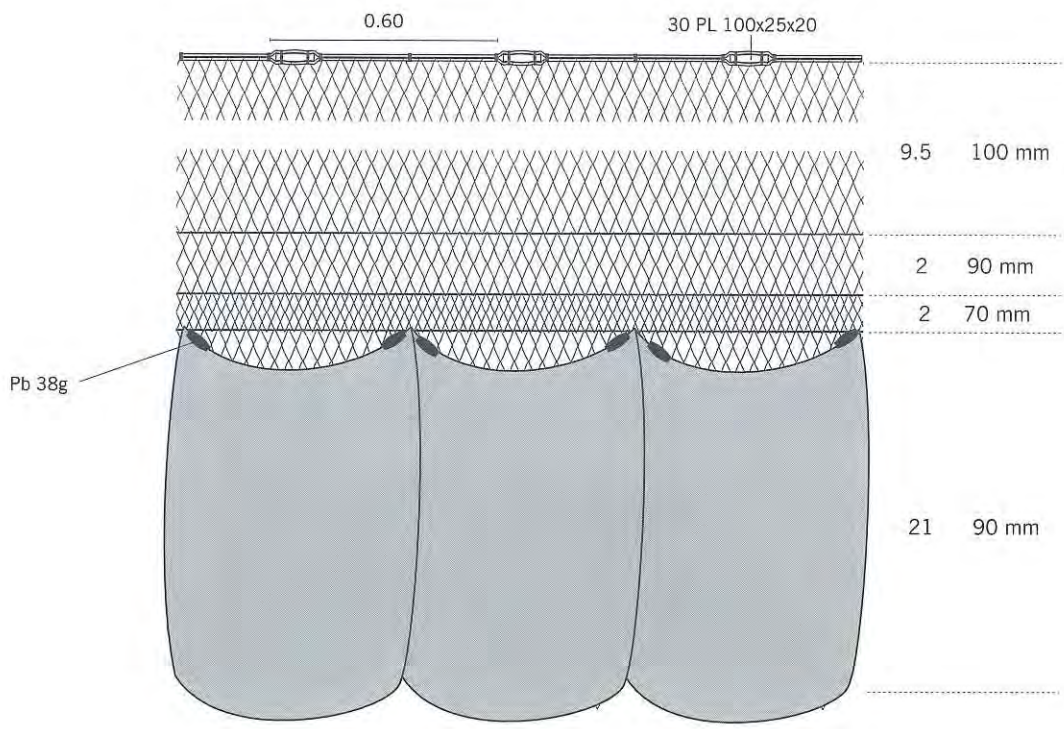


GILL NET
Set Net
Crabs, Blue Swimming Crab

VESSEL
Loa : 12
Hp : 12

LOCATION
Nghia Hung
Nam Dinh

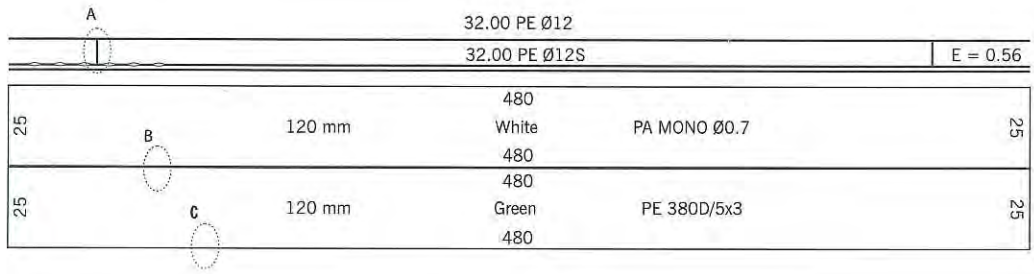


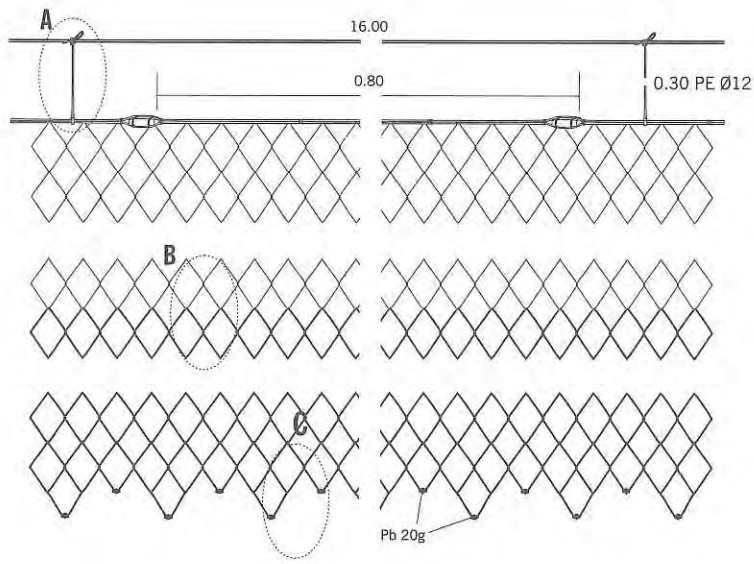


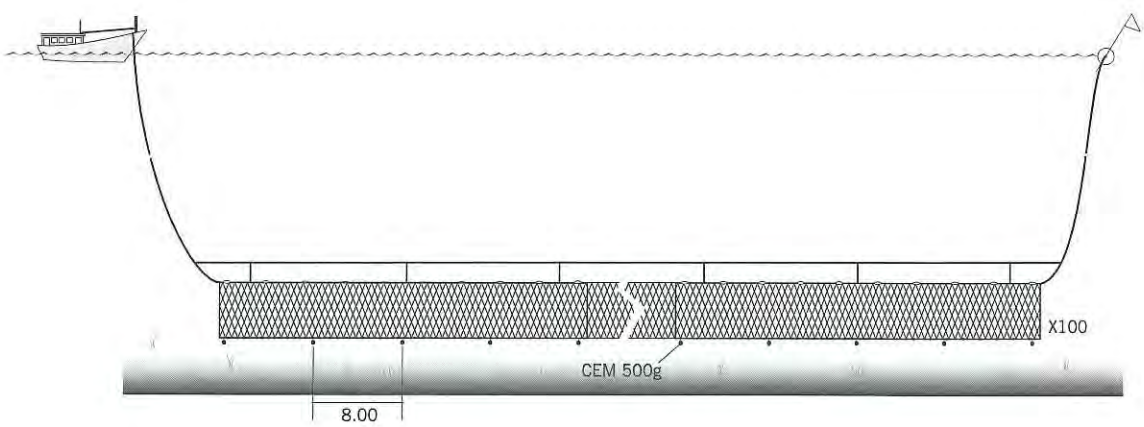
GILL NET
Bottom Set
Conger Pike,
Mackerel

VESSEL
Loa : 14.5
Hp : 15+22

LOCATION
Hai Hau
Nam Dinh



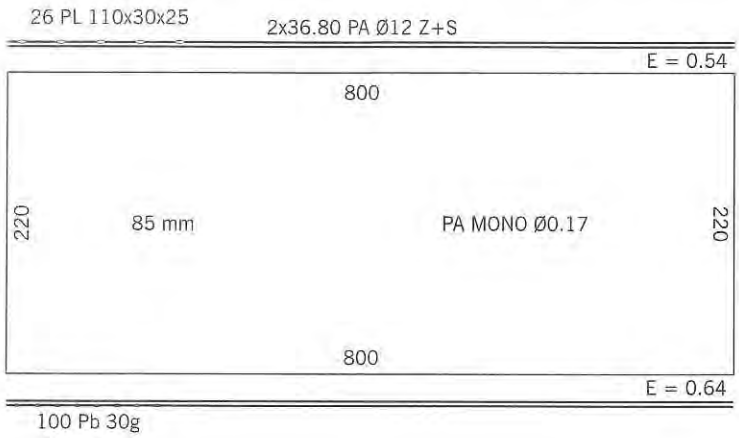


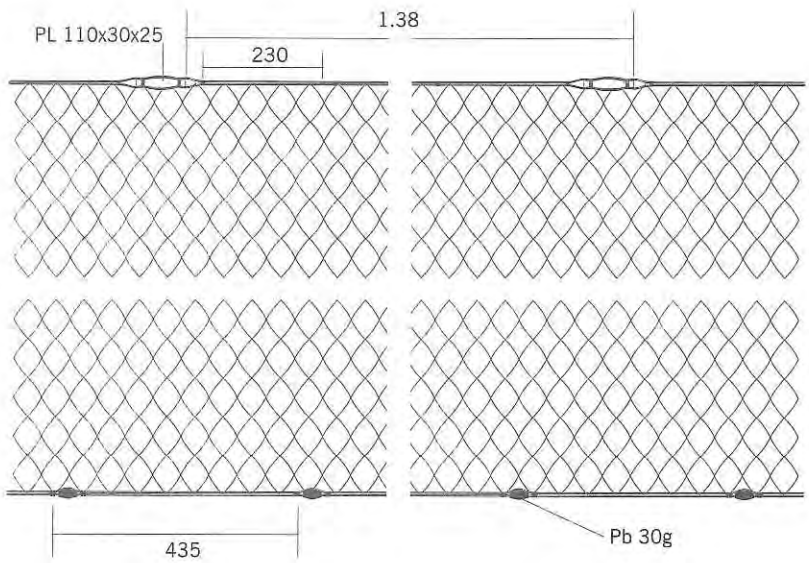


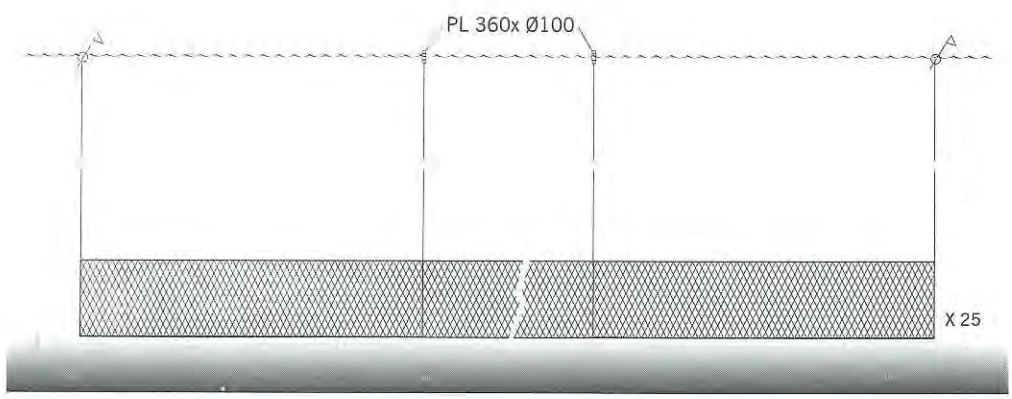
GILL NET
Bottom Set
Demersal Fishes

VESSEL
Loa : 14
Hp : 15+22

LOCATION
Thuan An
Thua Thien Hue



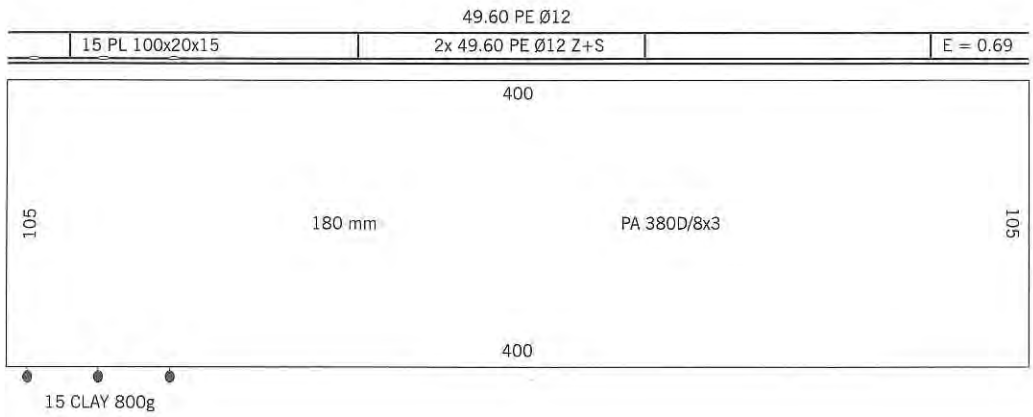


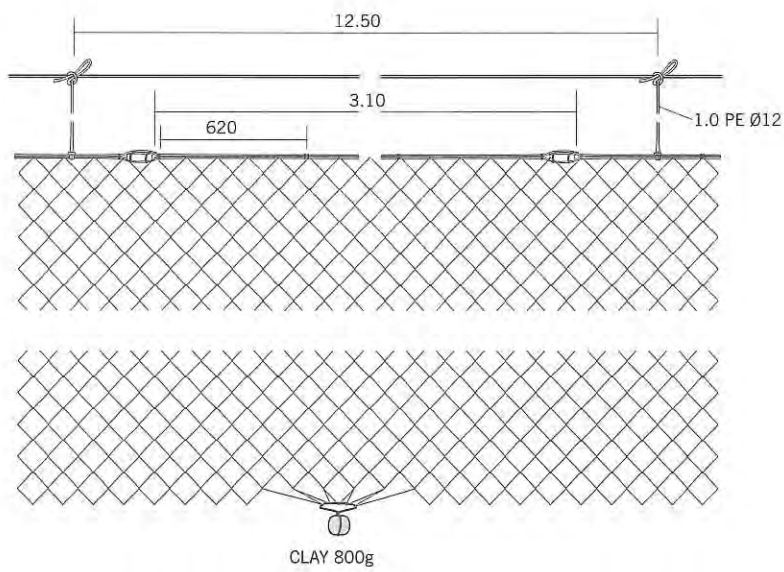


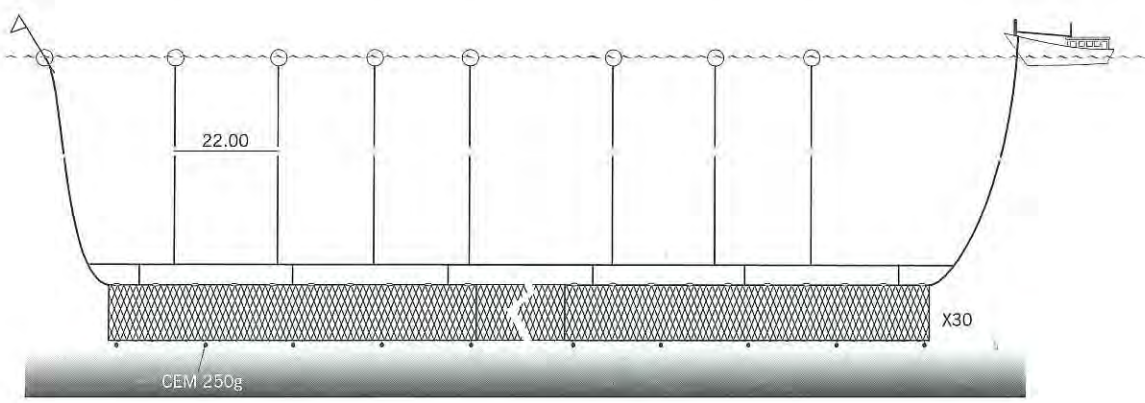
GILL NET
Bottom Set
Tigertoothed Croaker

VESSEL
Loa : 15
Hp : 45

LOCATION
Hai Hau
Nam Dinh



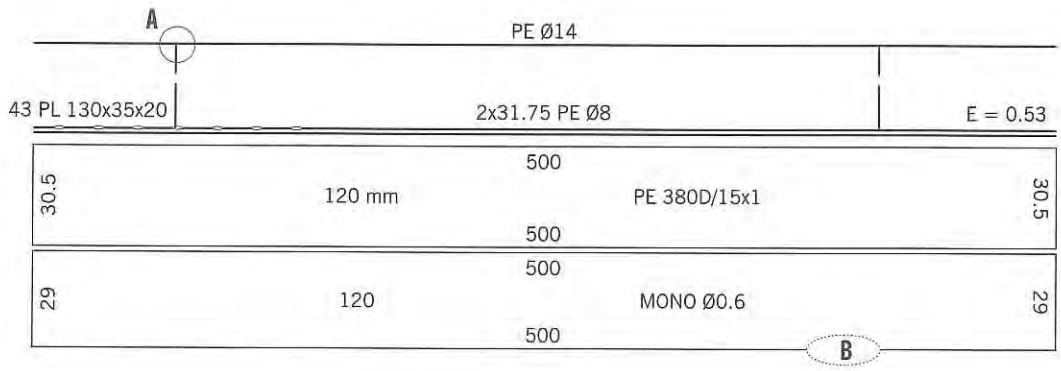


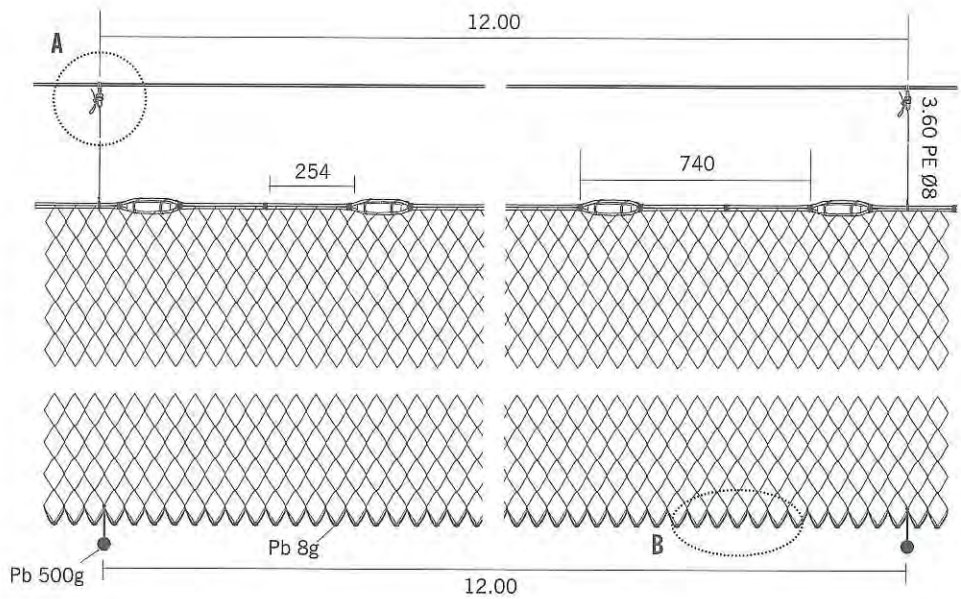


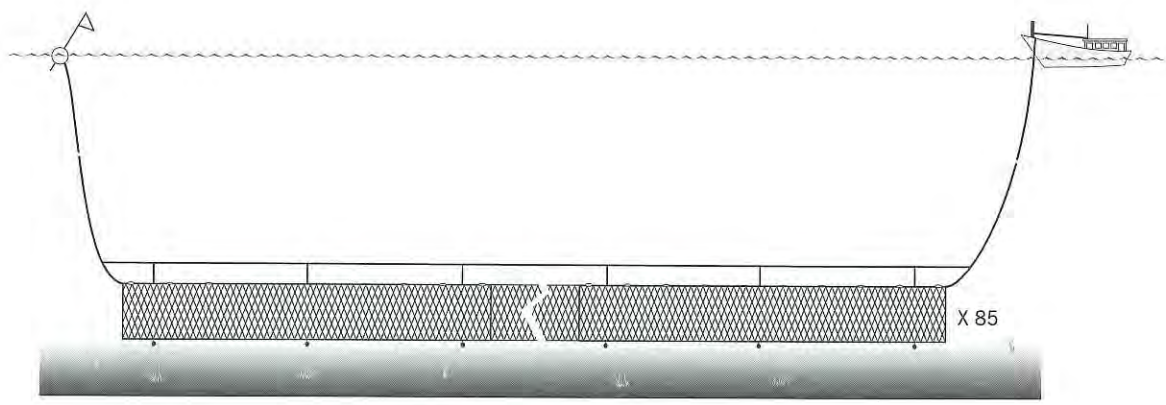
GILL NET
Bottom Set
Demersal Fishes

VESSEL
Loa : 12.50
Hp : 51

LOCATION
Dong Hoi
Quang Binh



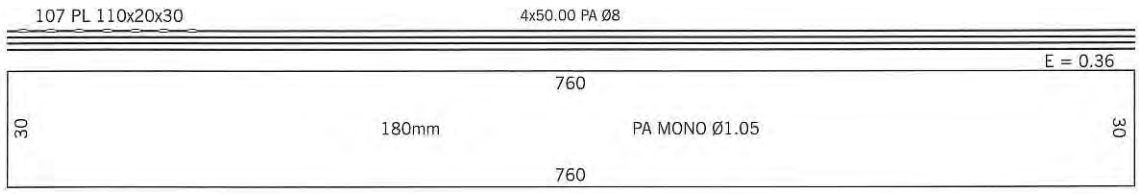


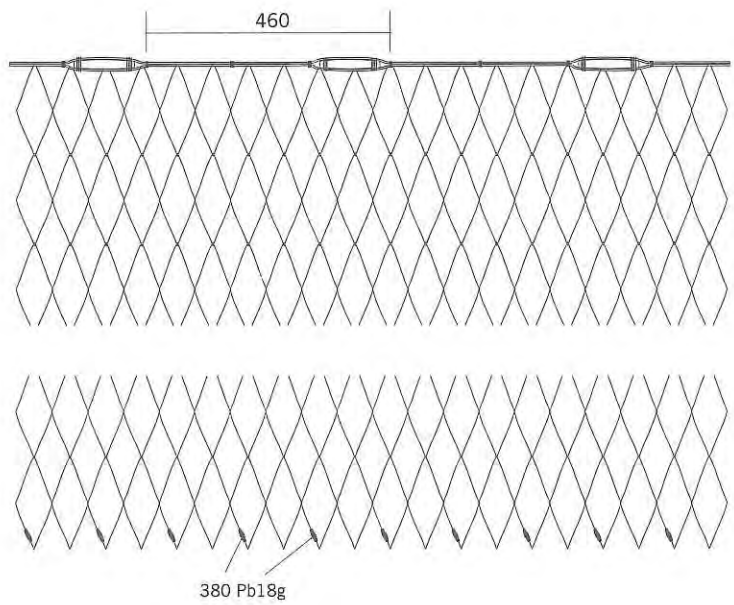


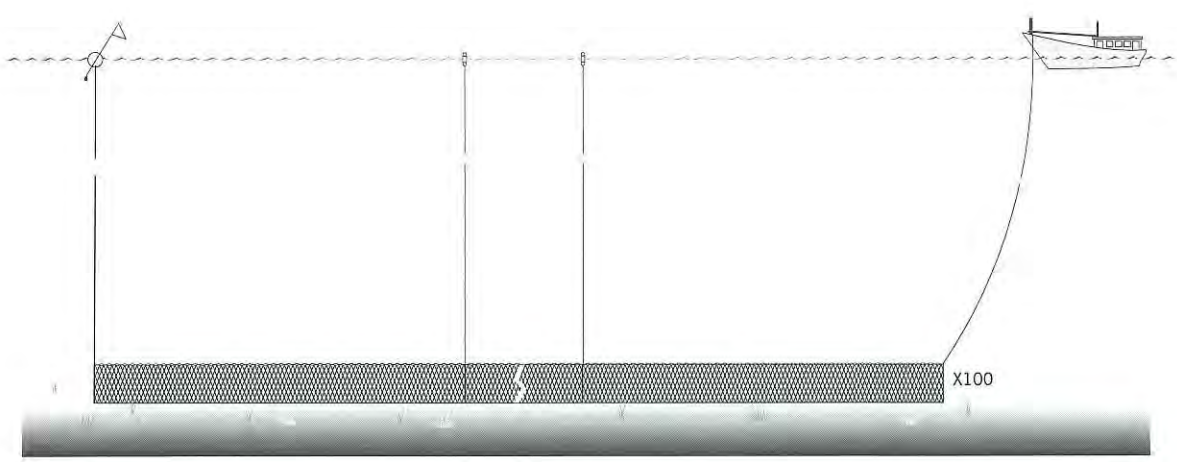
GILL NET
Bottom Set
Snapper

VESSEL
Loa : 17.4
Hp : 60

LOCATION
Go Cong Dong
Tien Giang



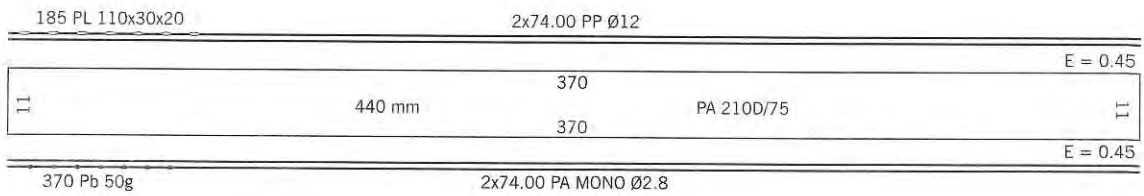


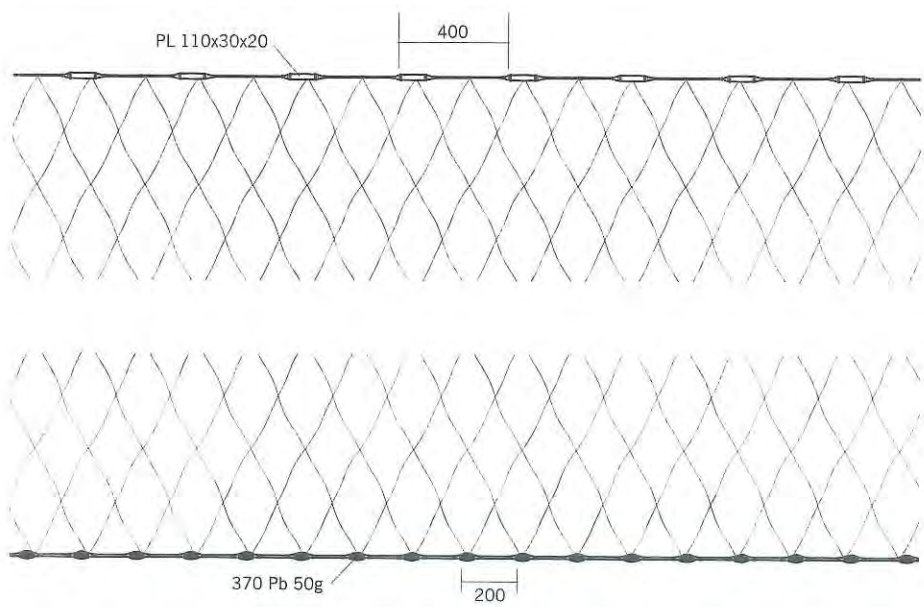


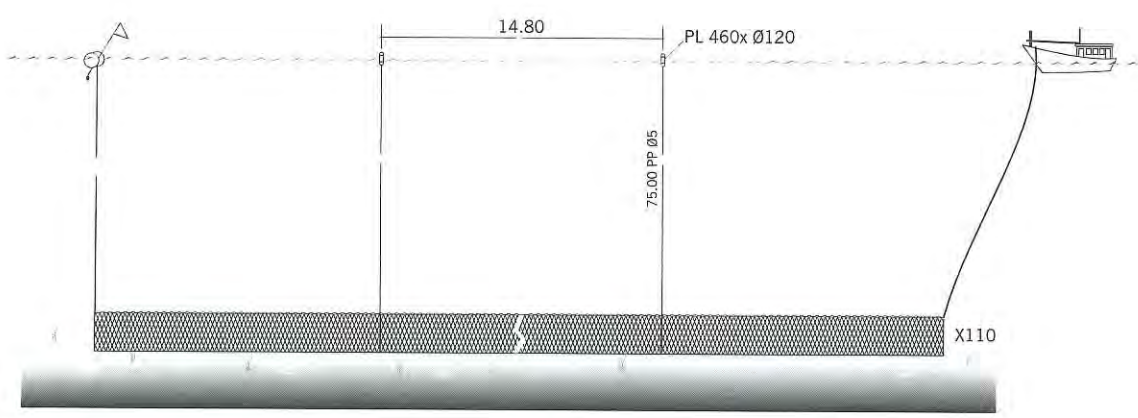
GILL NET
Bottom Set
White-Spotted
Shovelnose Ray, Ray

VESSEL
Loa : 17
Hp : 90

LOCATION
Go Cong Dong
Tien Giang



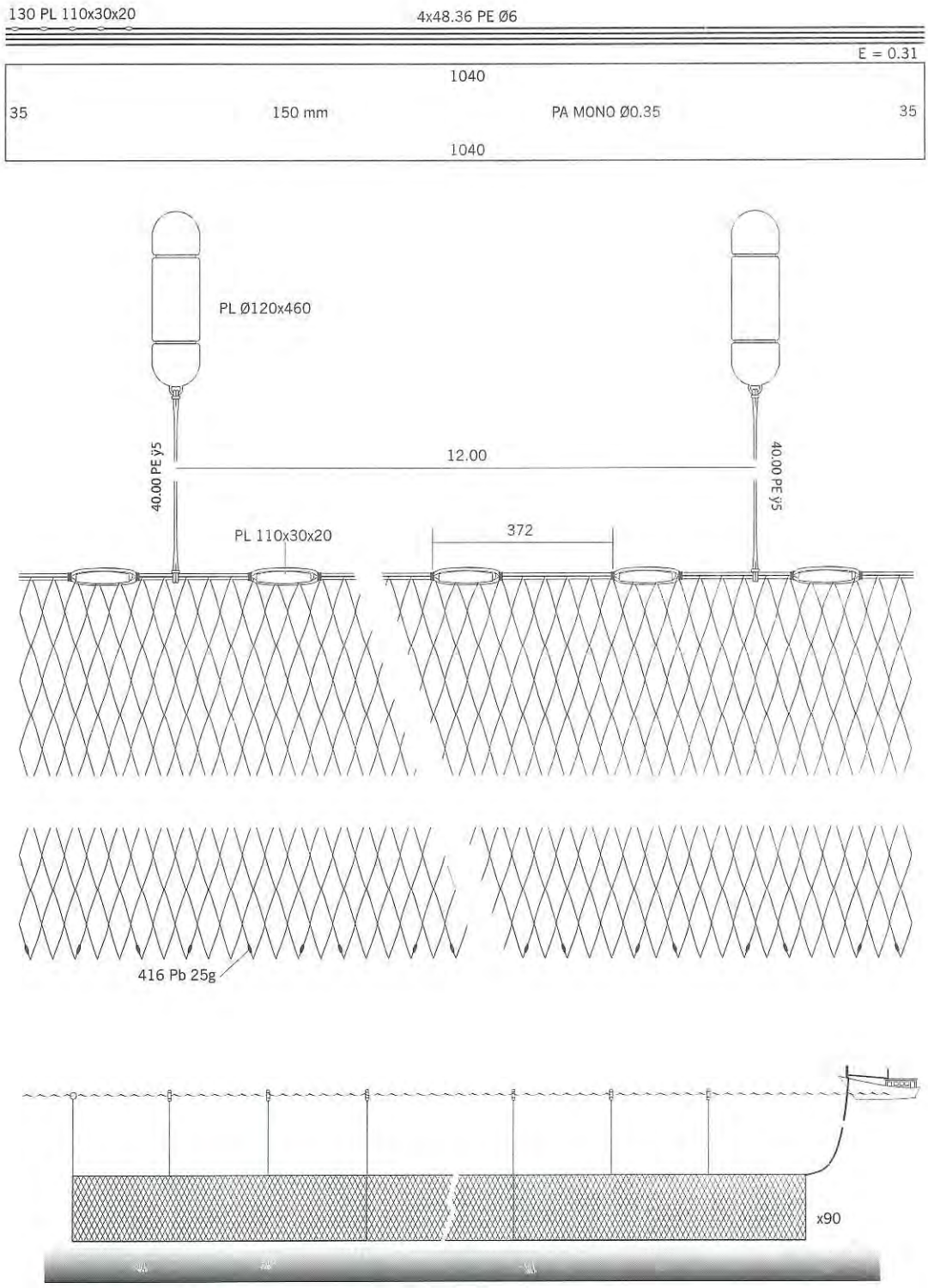




GILL NET
Bottom Set
Snapper

VESSEL
Loa : 18.4
Hp : 90

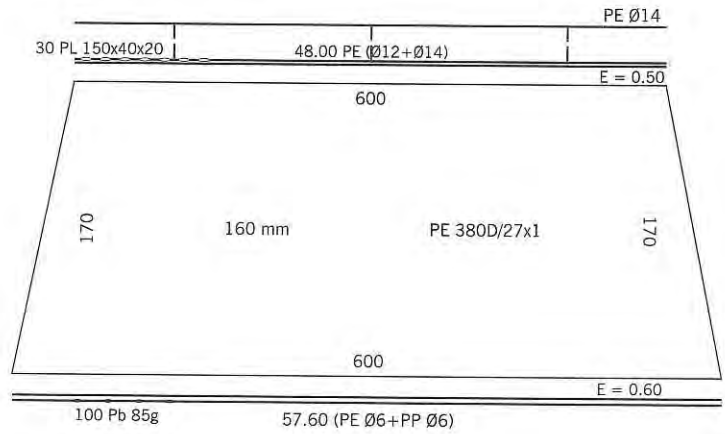
LOCATION
Go Cong Dong
Tien Giang

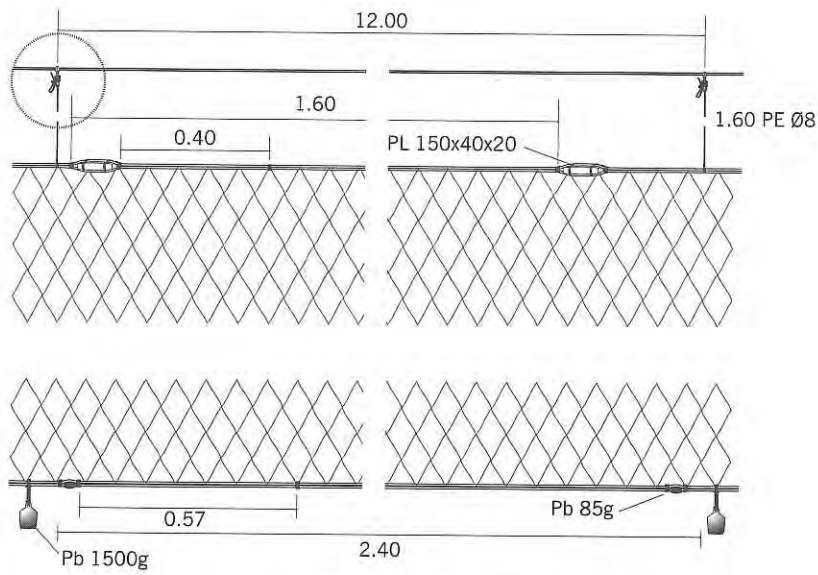


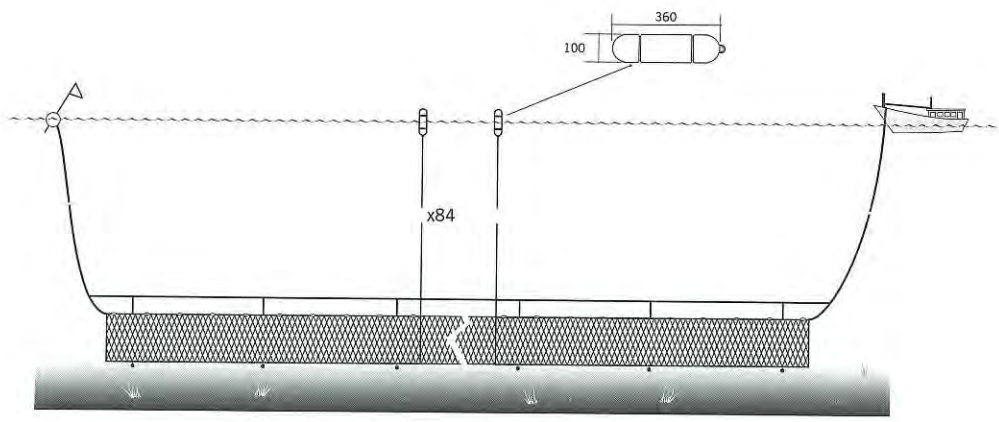
GILL NET
Trammel, Bottom Set
Tigertoothed Croaker

VESSEL
Loa : 17.00
Hp : 105

LOCATION
Huong Tra
Thua Thien Hue



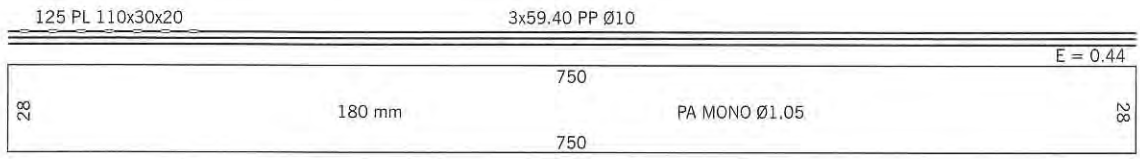


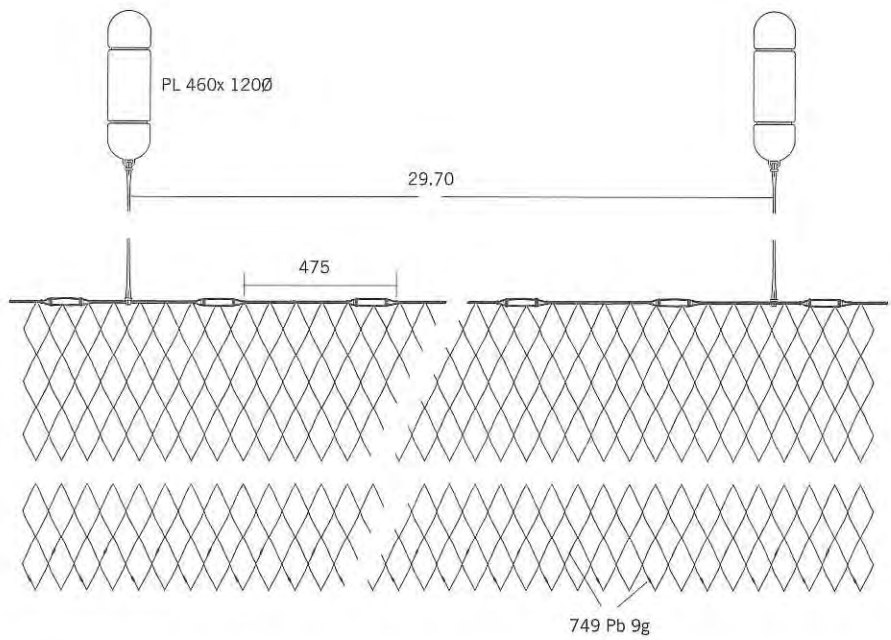


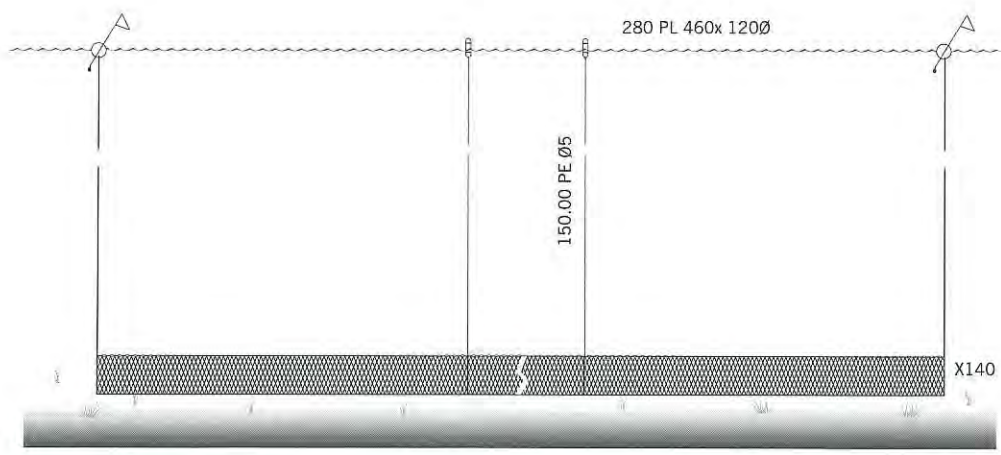
GILL NET
Bottom Set
Snapper

VESSEL
Loa : 19
Hp : 170

LOCATION
Go Cong Dong
Tien Giang



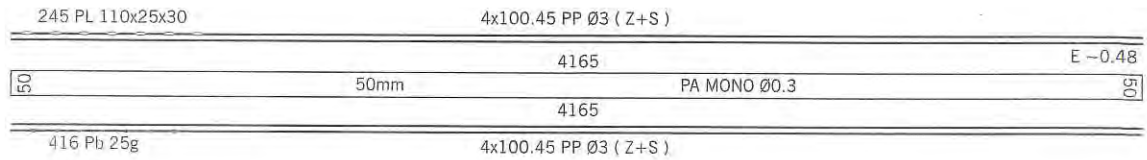


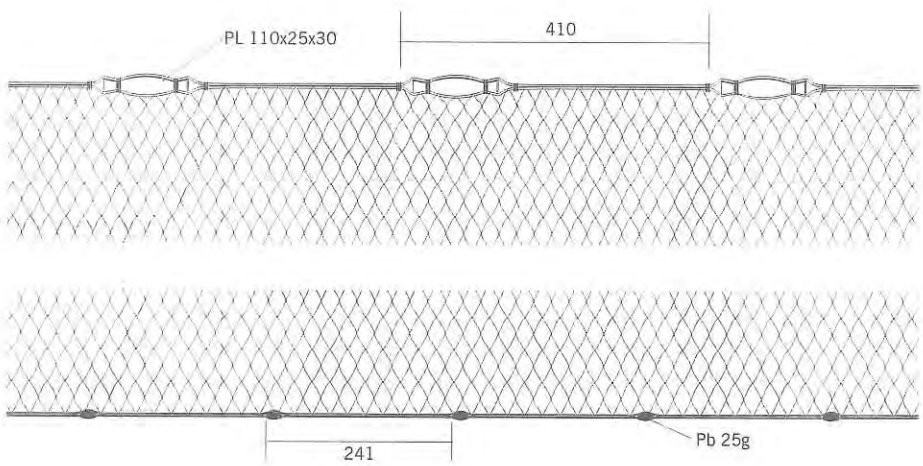


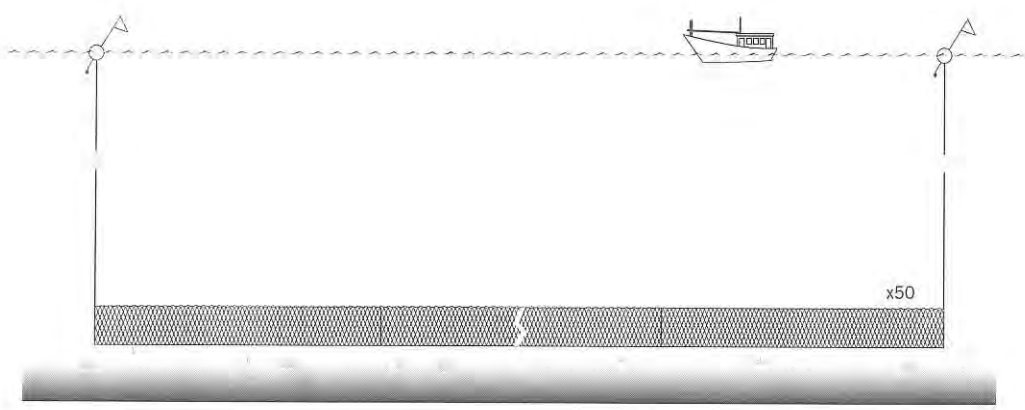
GILL NET
Bottom Set
Short-Bodied Makerel

VESSEL
Loa : 17
Hp : 250

LOCATION
Tran Van Thoi
Ca Mau



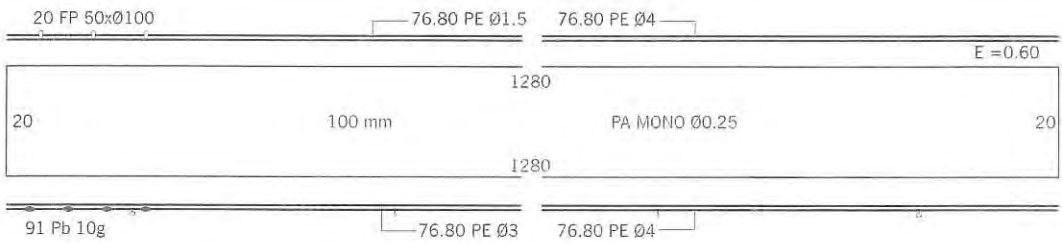


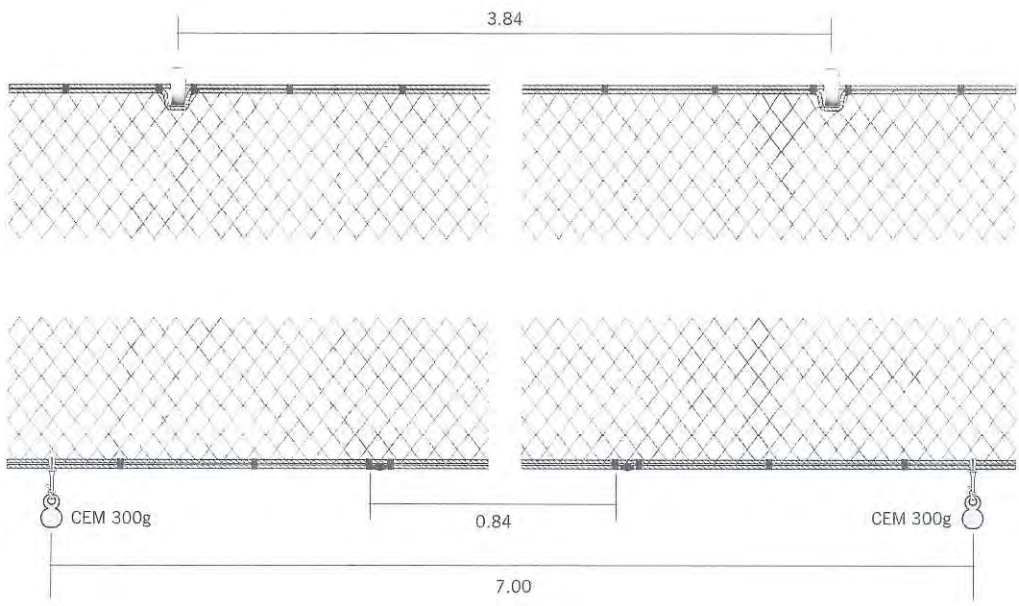


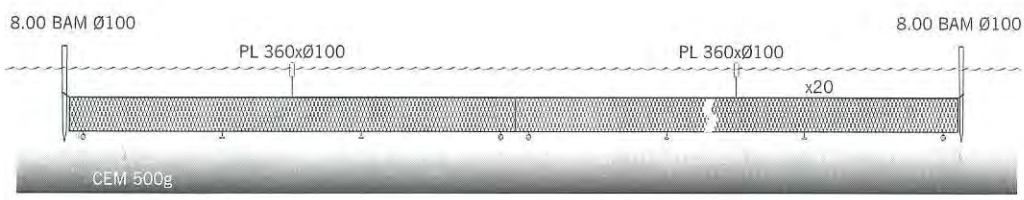
GILL NET
Set Net
Demersal Fishes

VESSEL
Loa : 7
Hp : 6

LOCATION
Do Son
Hai Phong



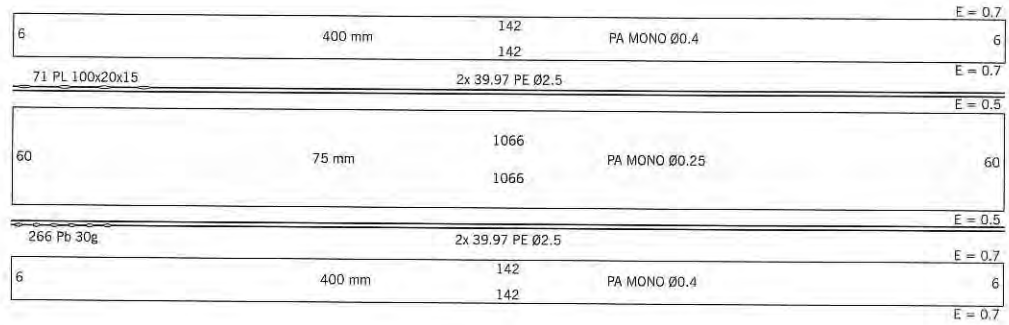


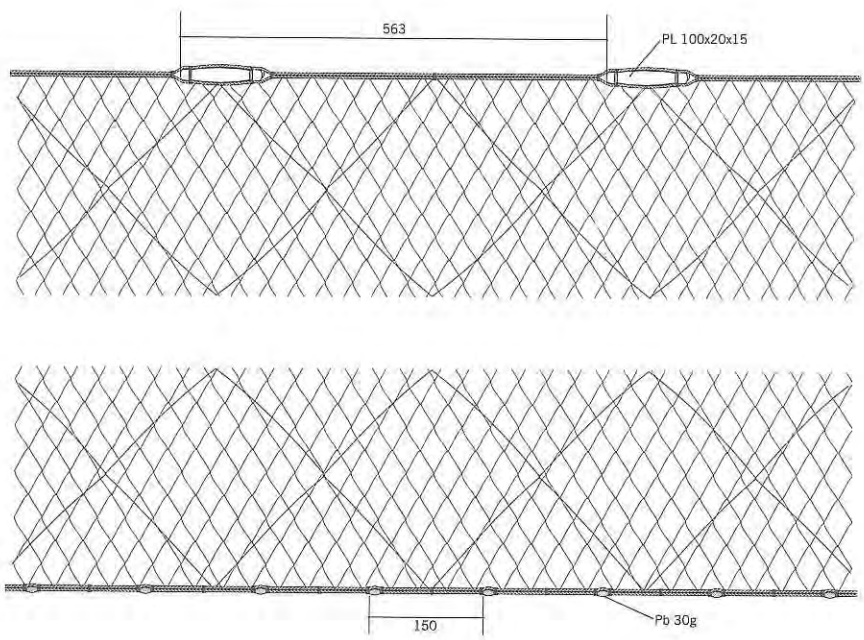


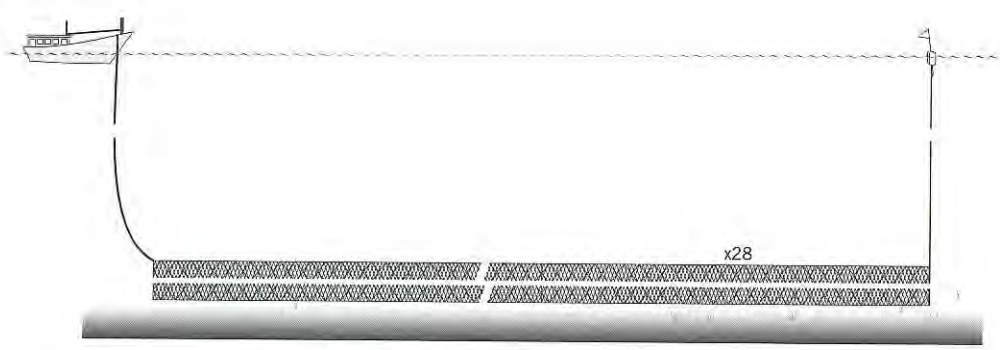
GILL NET
Trammel, Bottom Set
Cuttlefish

VESSEL
Loa : 8
Hp : 12

LOCATION
Quang Ha
Quang Ninh



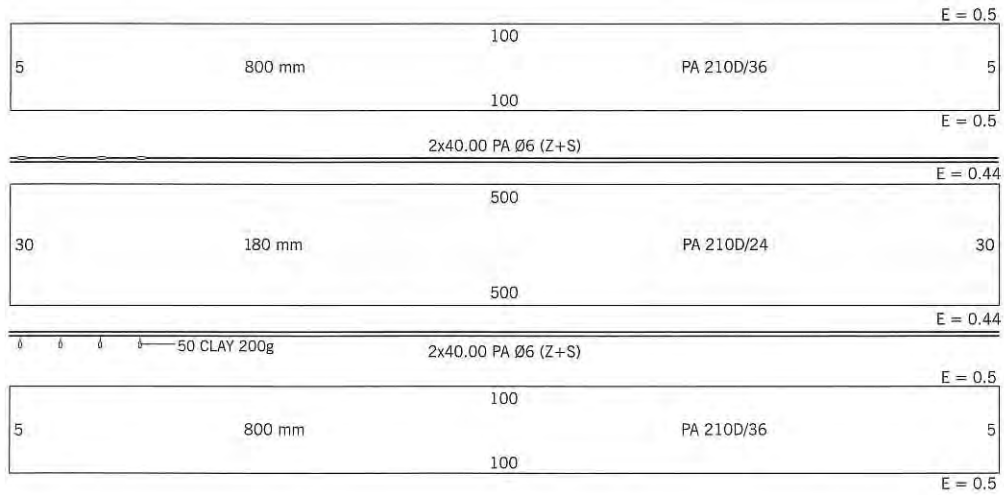


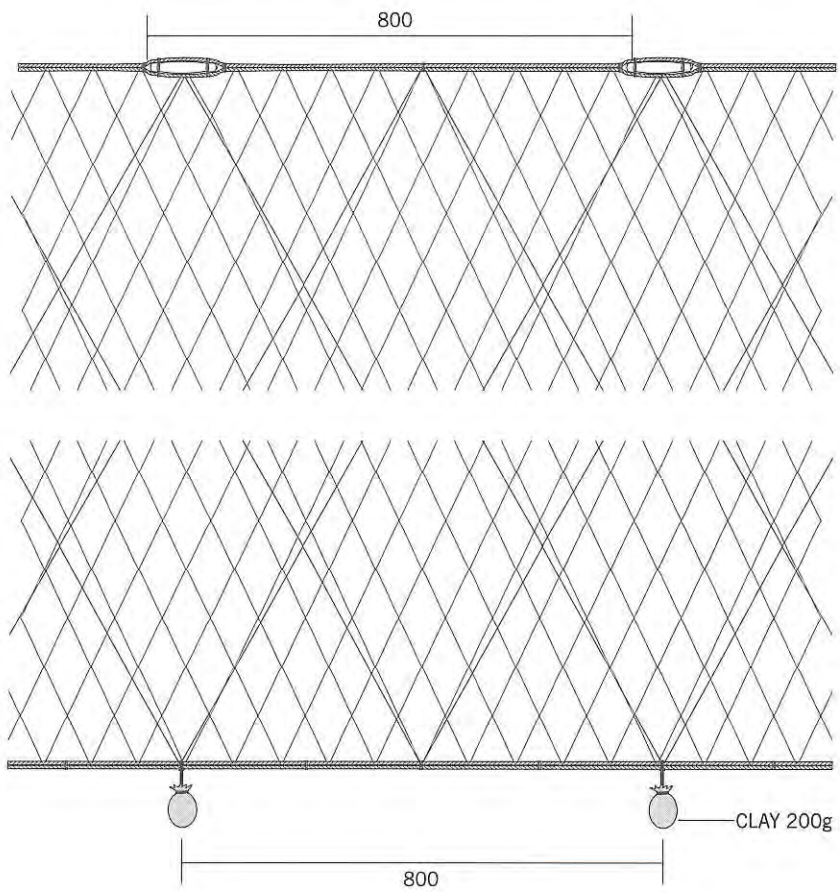


GILL NET
Trammel, Bottom Set
Tigertoothed Croaker

VESSEL
Loa : 8.5
Hp : 12

LOCATION
Do Son
Hai Phong

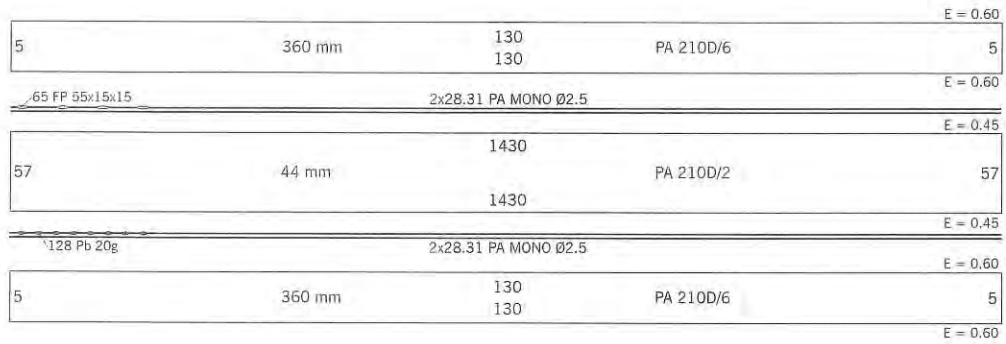


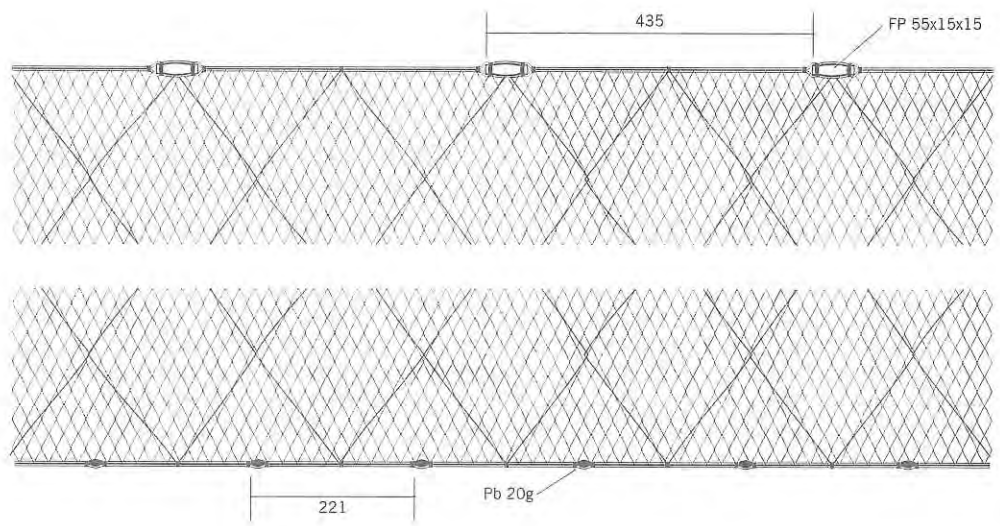


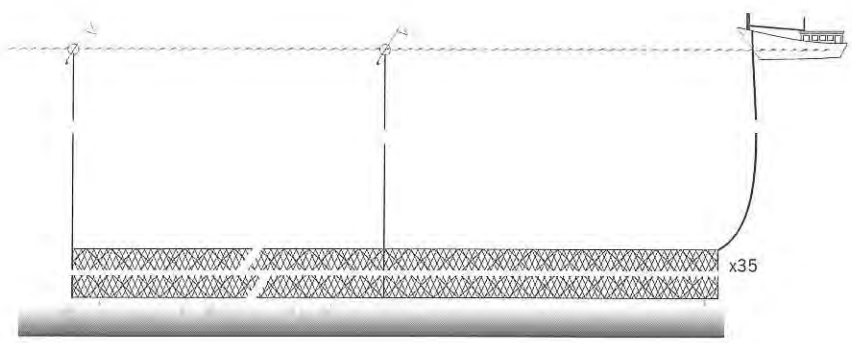
GILL NET
Trammel, Bottom Set
Lobsters

VESSEL
Loa : 11
Hp : 12

LOCATION
Phu Thuan
Thua Thien Hue



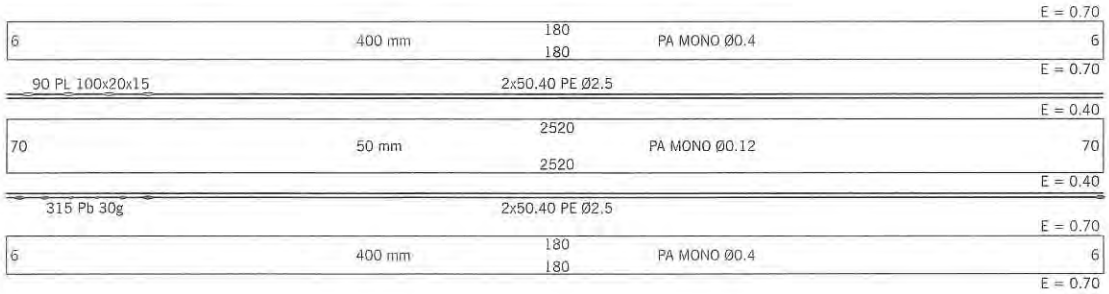


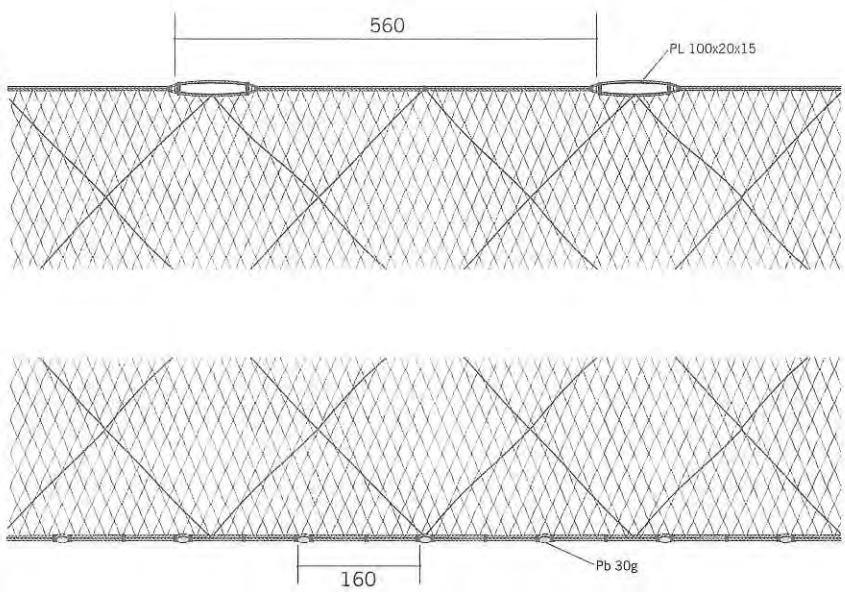


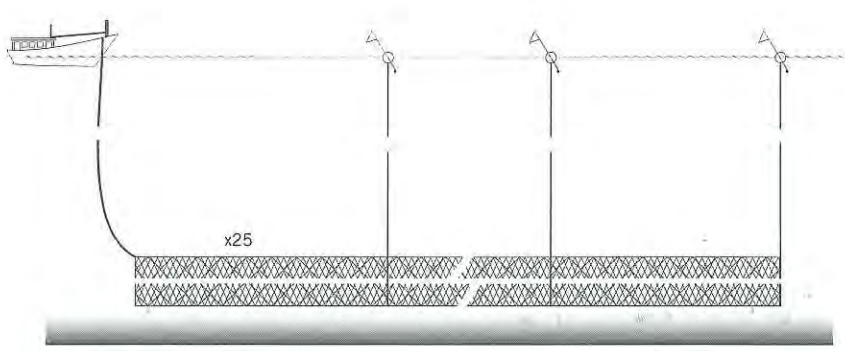
GILL NET
Trammel, Bottom Set
Shrimps

VESSEL
Loa : 9.2
Hp : 15

LOCATION
Quang Ha
Quang Ninh



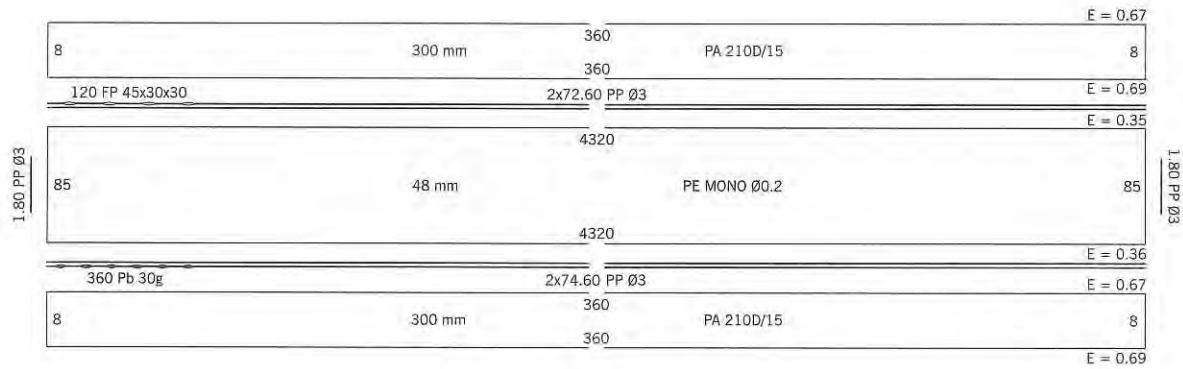


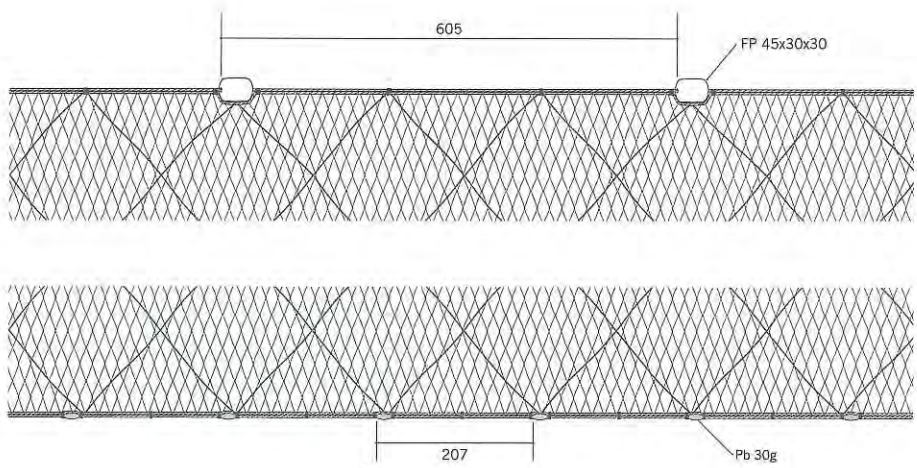


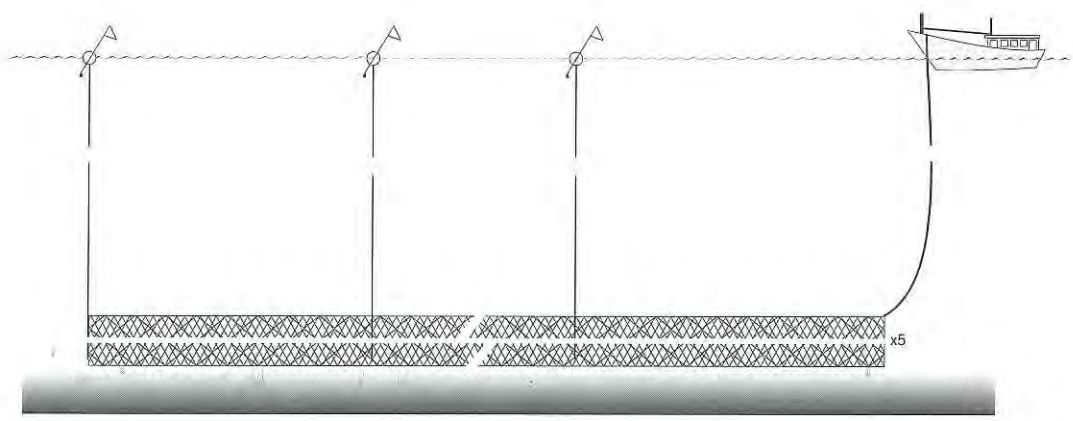
GILL NET
Trammel, Bottom Set
Shrimps

VESSEL
Loa : 10
Hp : 15

LOCATION
Cat Ba
Hai Phong



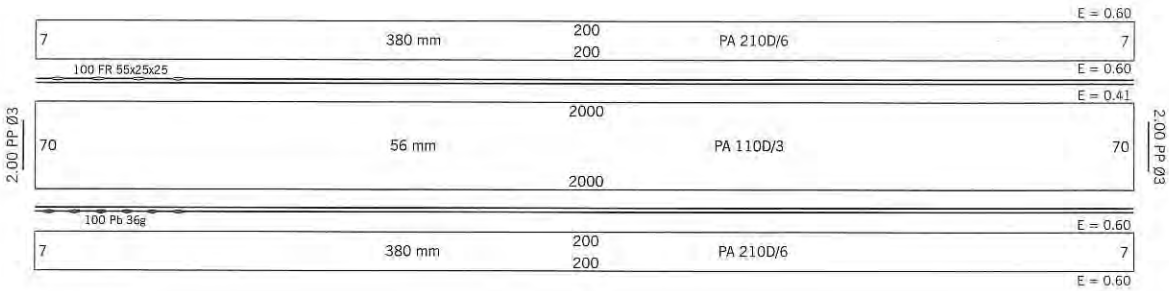


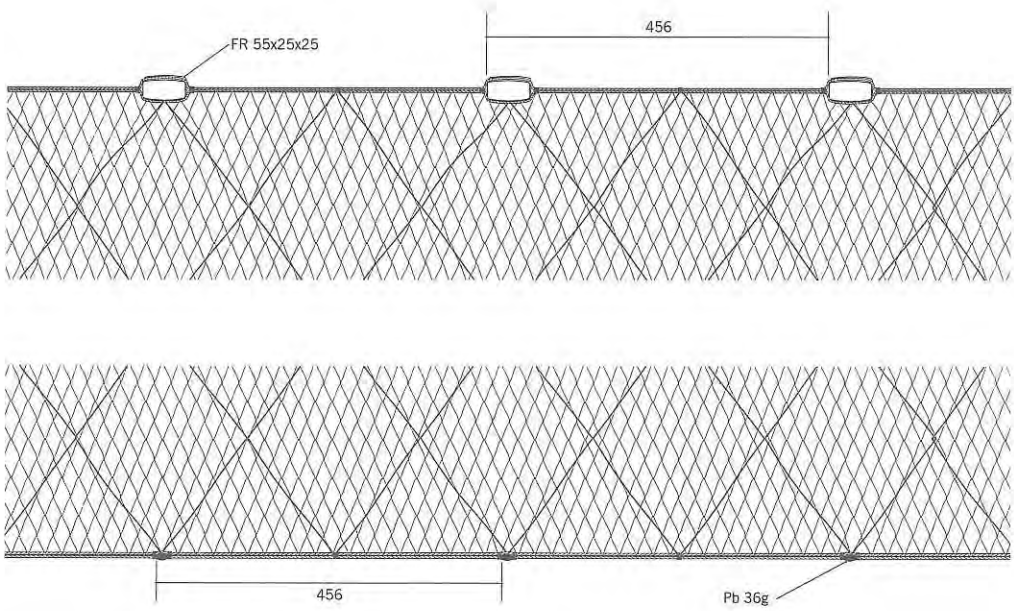


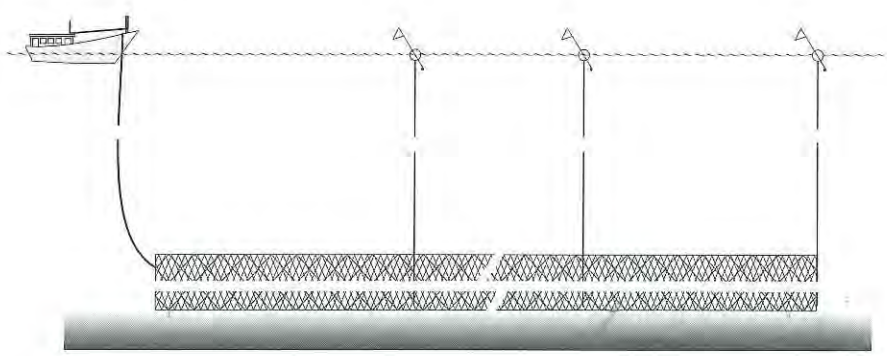
GILL NET
Trammel, Bottom Set
Shrimps

VESSEL
Loa : 11.3
Hp : 15

LOCATION
Do Son
Hai Phong



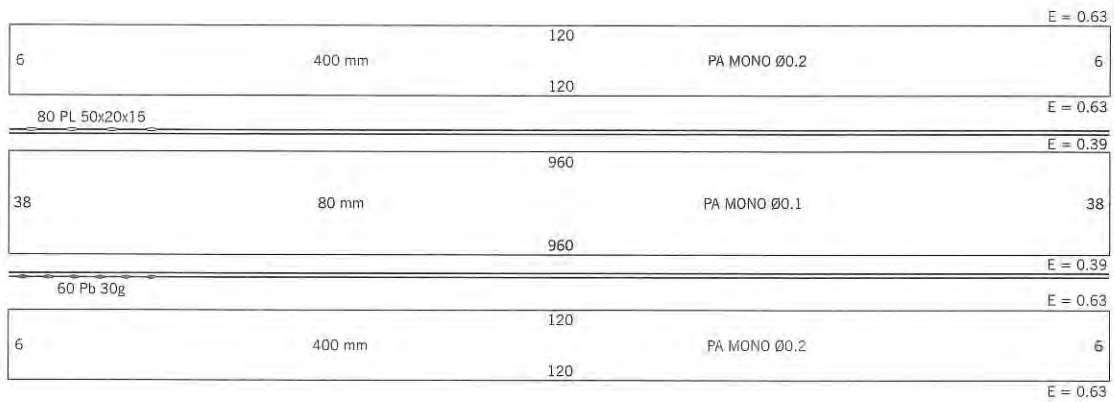


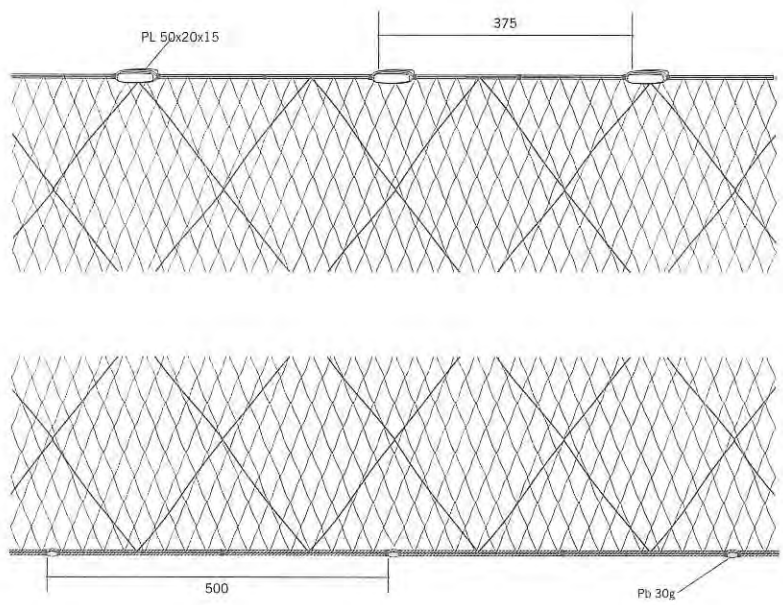


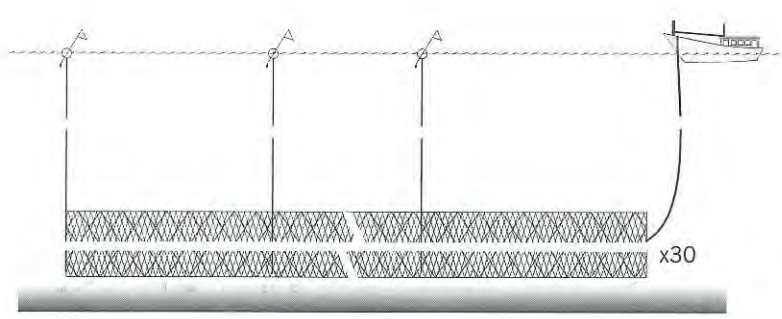
GILL NET
Trammel, Bottom Set
Cuttlefish

VESSEL
Loa : 11.3
Hp : 15

LOCATION
Thuan An
Thua Thien Hue



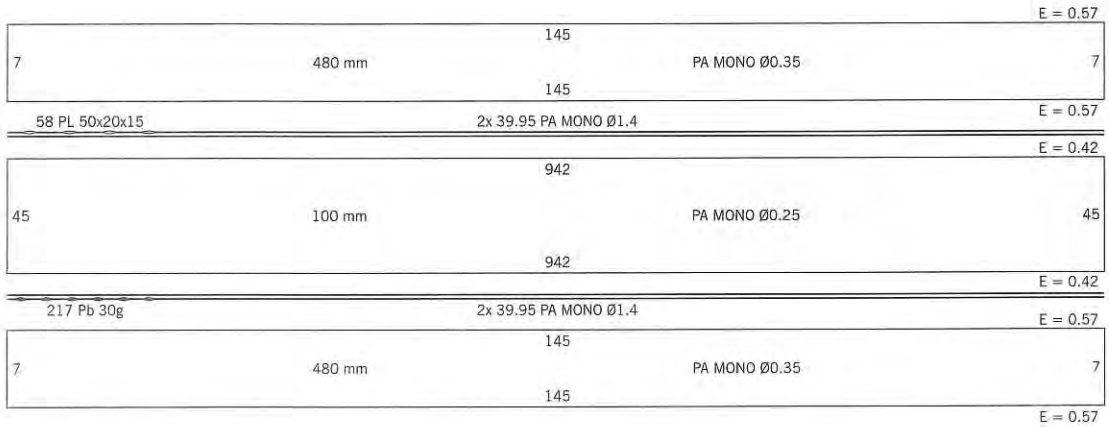


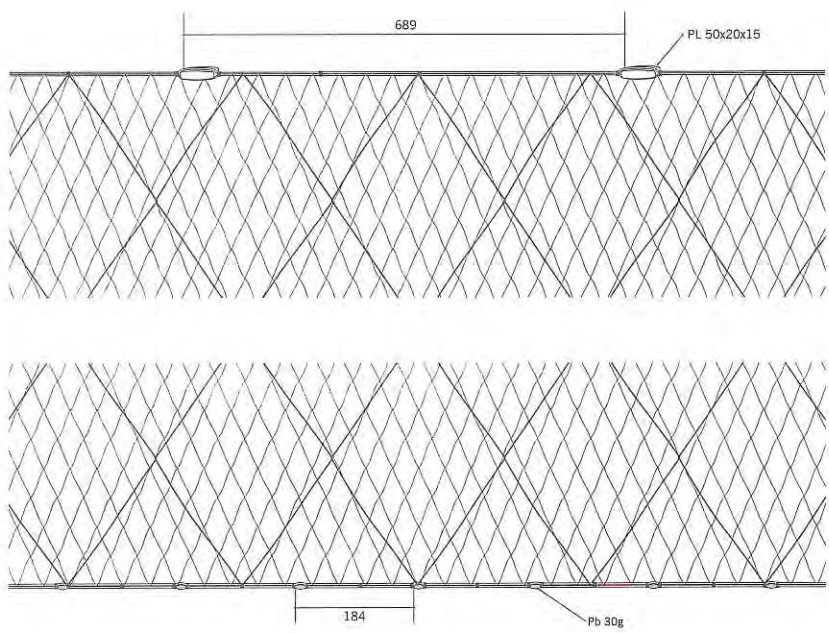


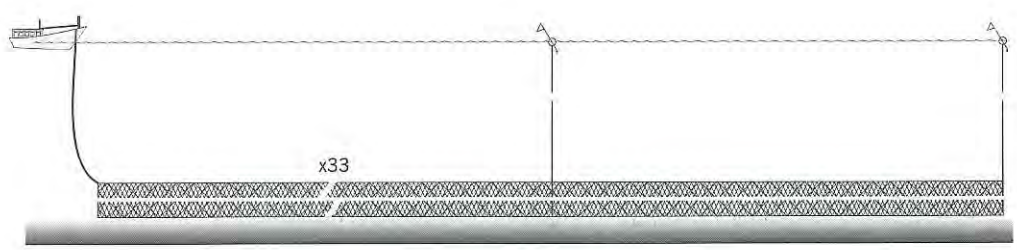
GILL NET
Trammel, Bottom Set
Cuttlefish

VESSEL
Loa : 12
Hp : 22

LOCATION
Thuan An
Thua Thien Hue



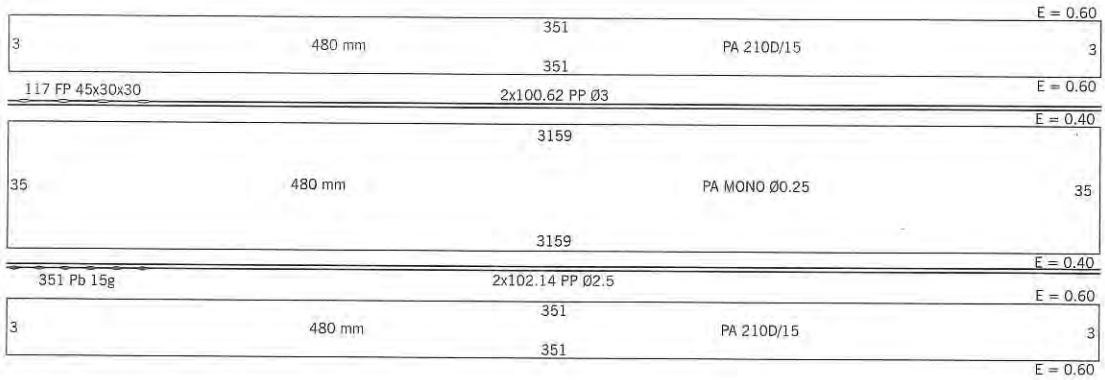


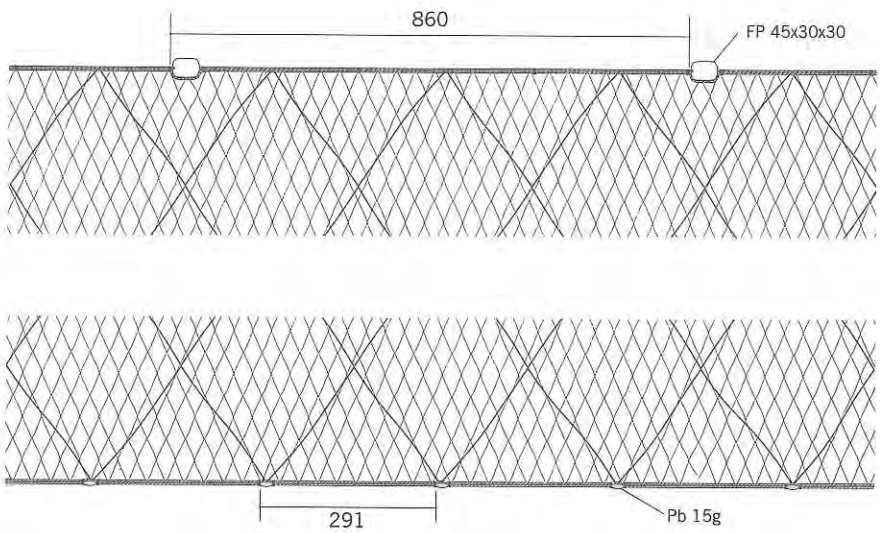


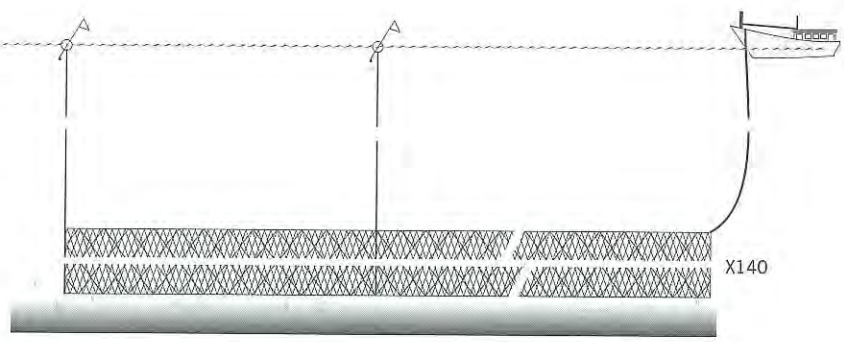
GILL NET
Trammel, Bottom Set
Cuttlefish

VESSEL
Loa : 10
Hp : 2x30

LOCATION
Cat Ba
Hai Phong







< Chapter 7 >

Hook and Line Fishing

In Vietnam, the development of hook and line fisheries has great potential in the future and can be operated in the offshore areas, hook and line fisheries contributed 45,028 tons or 8.5% of the total catch in 1997.

The development of hook and line fishery is different among the regions of Vietnam. The normal squid (*Loligo sp.*) jigger is becoming very popular throughout the whole country and is used on small fishing boats with a common engine of 33-90 Hp (sometimes up to 350 Hp) are used for jigging squid. Most of these boats operate in the coastal areas.

In recent years, jigging for flying squid in offshore waters of Central Provinces has been developing strongly and quickly. Fishermen carry out jigging on artisanal boats at night using a flickering light on the water-surface driven by a battery.

Long line fishery is developing in the Central and Southern regions. In the Central region, tuna (yellowfin, bigeye tuna) longline is developing strongly and is used on boats of 33-350 Hp, the tuna longline of Central Provinces contributed 52.8% of the total catch of the whole country. In the Southern region, the main target species of the bottom longline are congers, fishermen use boats with engines of 45-275 Hp, and the length of the longline is 24km to 30km. The catch of longline in this region is 36.5% of the total catch of the country.

Based on the statistics of 1997, the amount of line boats in the country was 11,492 units (data from 20 provinces). Small boats with engines of less than 90 Hp account for 98.4% of the total number of line boats.

Fishing Gear and Methods

1. Hand Lines

The structure of the hand line is very simple. In general, a hand line consists of a mainline; Some branch lines with hooks; a stainless wire is used to protect against losing the hook because of fish bites; A swivel is used to prevent the line from twisting and tangling with the sinkers.

The hand line can be used for catching mackerel scad, grouper, snappers and especially for catching squid. Natural bait and artificial baits are used for fishing.

Nowadays, most of the hand lines in Vietnam are squid hand lines. The boat size used in squid jigging varies. Engines are often 33 - 74 Hp.

1.1. Fish Hand Line

Fish hand lines are very commonly used in the early morning in the areas with rocky bottoms or around the islands. Operation of the squid hand line is done in the evenings. Electric lamps are used for attracting the squid.

1.2. Flying Squid Jigging

This fishery has strongly developed in the Central areas. Each mother vessel has 13 - 18 individual fishermen. Each is on his own non-powered bamboo boat (small boat). The fishing gear includes one big jigging hook of 20 -30 cm long and one jigging line made of monofilament of 0.8 - 1.0mm diameter. Each bamboo boat is equipped with a sail system of 2 - 4 m2 to increase its speed and they also use a system of winkers. After sunset, boats put to sea at a distance of 300 - 500 m from each other making at right angles to the wind direction. Jigging duration of each night is 6 - 9 hours, the average catch of each small boat is 45 -70 kg.

2. Longlines

The major types of long line are bottom set longlines and drift-longlines. According to the target species the construction of the longline is different, such differences are the length of the mainline, branch lines, hook sizes, numbers of hooks, etc. Some of the major longlines are as follows:

2.1. Tuna Longline

The tuna longline is operated in offshore areas and it is the most common gear for fishermen in the Central Provinces of Vietnam. Fishing boats of 33 to 350 Hp use the tuna longline. The length of the longline varies between 18 to 25 km. The main species are bigeye tuna and yellowfin tuna. Flying fish, mackerel are used as bait. Bait are caught or are bought from fish markets or other fishing boats. Flying fish gill nets are part of the equipment in all longline boats.

Line Setting:

When on the fishing grounds, the skipper identifies the current and wind directions and chooses the most suitable direction for setting (the setting direction is usually at right angles to the current). The hooks are baited while the branch lines are tied to the mainline and the mainline is set. Normally, during the setting, the vessel runs at a speed of 4 - 6 kts allowing the line to drift on the current flow.

Line Hauling:

When hauling the mainline, the vessel runs along the mainline at a speed of 2.5 - 3.5 kts, the branch lines are collected separately after the ties between them are undone.

The average catch on a fishing trip, which takes 15-30 days, is 1.2-4.3 tons of big eye tune and yellow fin tuna.

2.2. Shark Longline

The development of the shark longline has developed in the provinces of the Central

region. At present, the level of catch is low and the number of shark longline boats small. The shark longline is operated by fishing boats of 60 to 90 Hp and in offshore waters. The length of mainline can be as much as 24-32 km with 620 to 1,300 hooks.

The method of setting is similar to that of the yellow fin tuna longline. However, the ties between the branch line and the mainline are fixed.

The shark long-liner runs in the direction of the line with a speed suitable to the conditions of the waves, wind and fishing ground. The hooks, branch lines and mainline are put stored in the hook-buckets or on hangers.

The catch of the average trip (lasting from 20 to 30 days) can be 4 to 4.2 tons.

2.3. Bottom Longline

The bottom longline is used to catch demersal species like grouper, snapper, conger, etc. Conger is one of the most important species for bottom longlining in the Southern region. The catch of conger is about 90% of the total catch of bottom longline in this region. The components of a longline consist mainly of float lines, mainline, branch lines, sinkers and hooks. The longline is made of Nylon monofilament. The hook size depends on the target species. Boats used for bottom longlines have engines of 20-350 Hp and operate in fishing grounds having a depth of less than 100 m. The length of the bottom longline is 2-30 km with 900-2000 hooks.

The bottom long-liner runs at a speed of 3 - 5 kts at right angles in the direction of the current or according to characteristics of the sea bottom. Hooks are removed from the hangers and are baited one hook after another before being set.

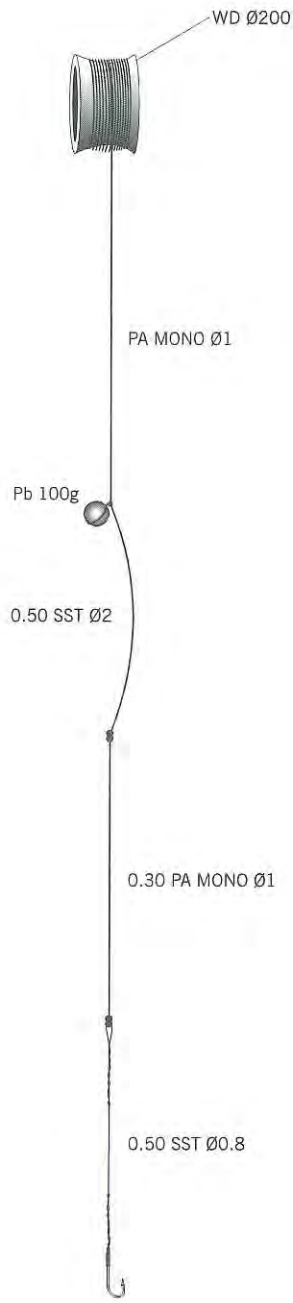
The vessel can move along the longline following the floating flagpoles, with the recovery speed is 2 - 4 kts according to the wave and wind conditions and the quantity of hooked fish.

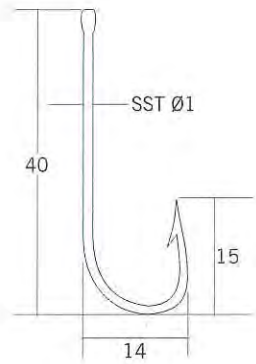
An average catch of a 30 km longline per fishing trip (8 days) is from 2 to 5 tons.

HOOK AND LINE
Hand
Grouper, Snaper

VESSEL
Loa : 8
Hp : 6

LOCATION
Ha Long
Quang Ninh

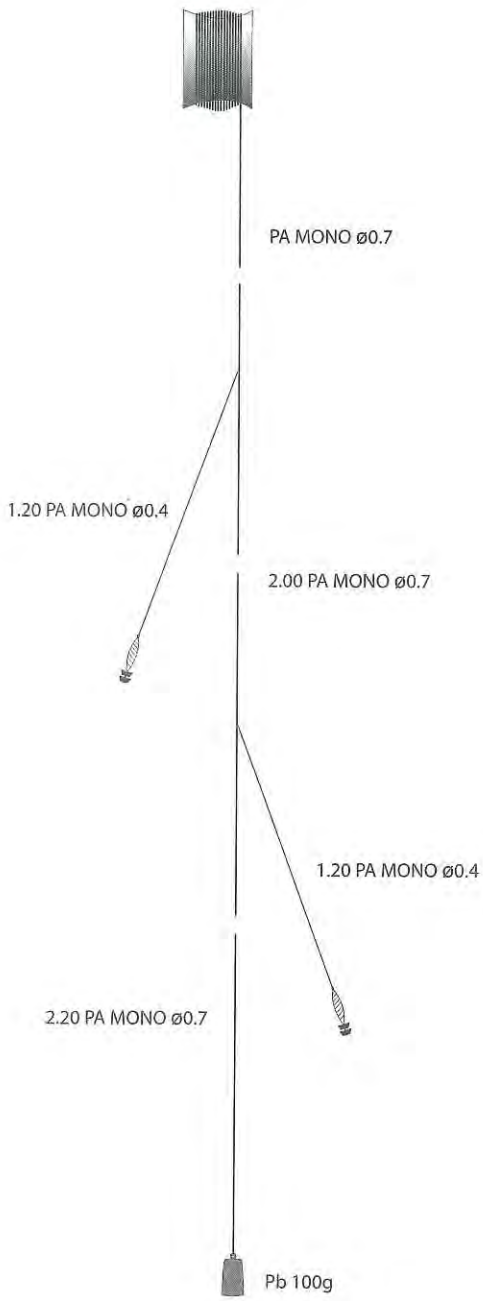


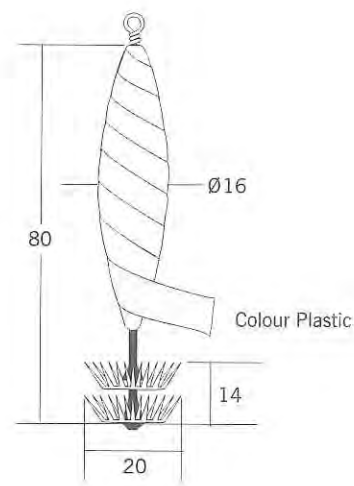


HOOK AND LINE
Hand, Night Time
Squid

VESSEL
Loa : 12
Hp : 22

LOCATION
Ha Long
Quang Ninh

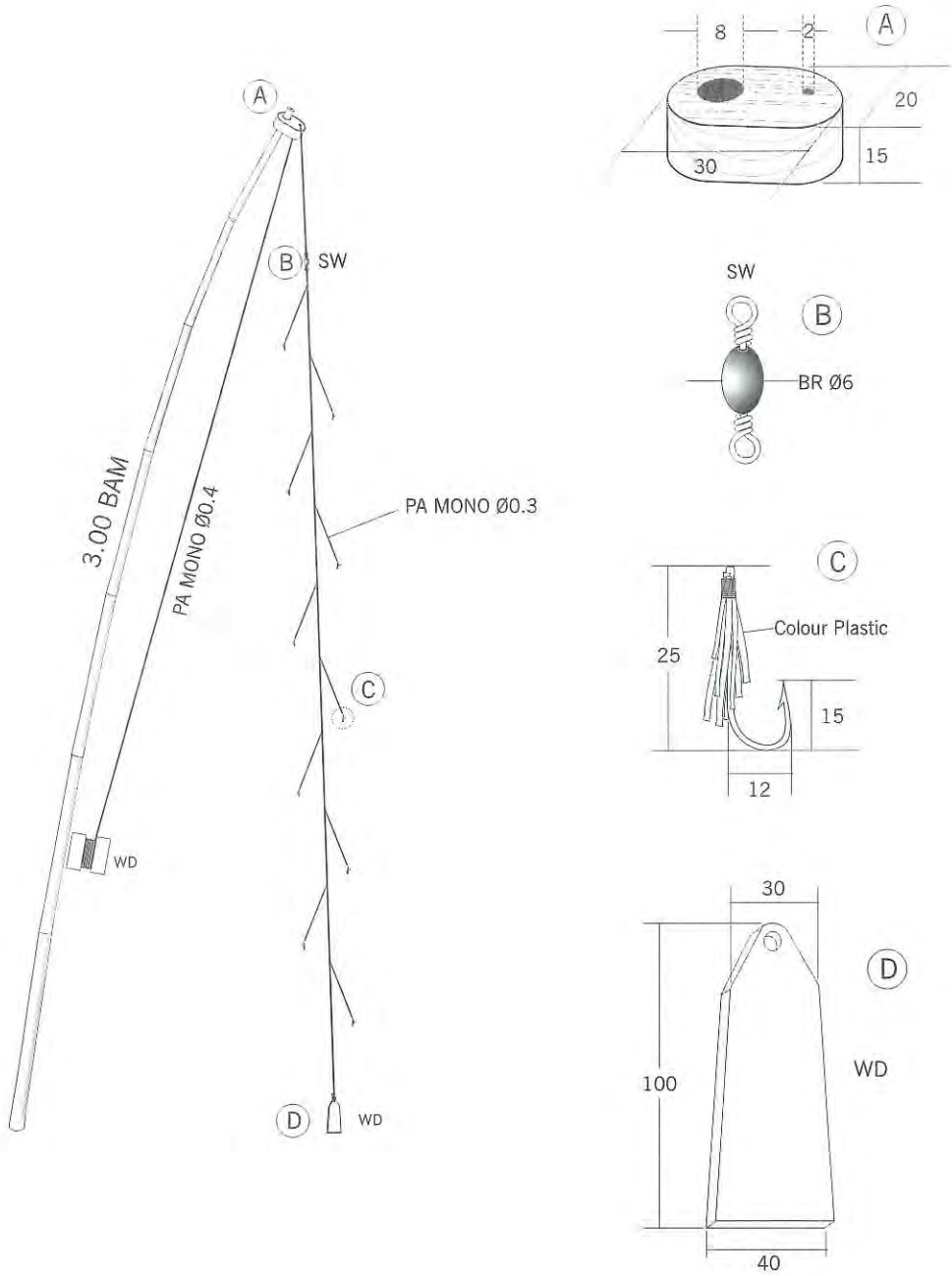




HOOK AND LINE
Pole And Line
Scads, Tuna

VESSEL
Loa : 13
Hp : 22

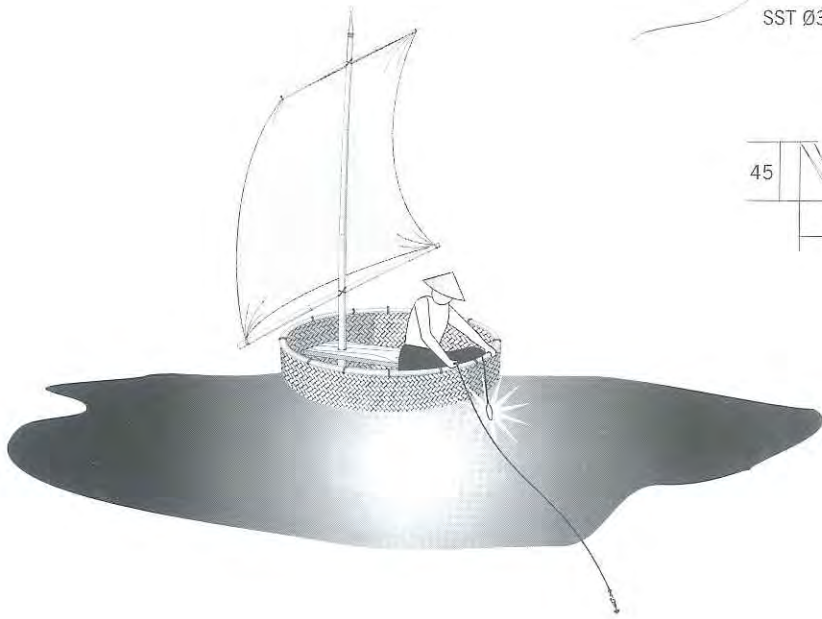
LOCATION
Ly Hao
Quang Binh

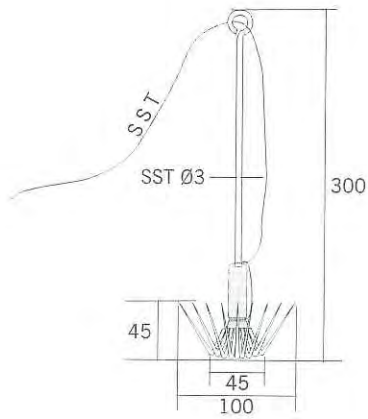


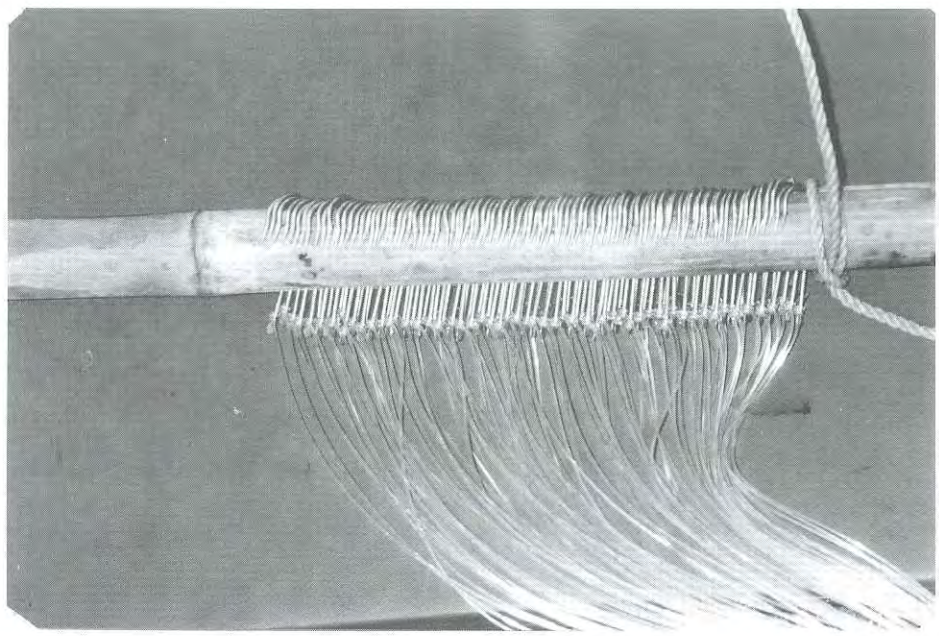
HOOK AND LINE
Hand
Flying Squid (*Ommastrephes Sp.*)

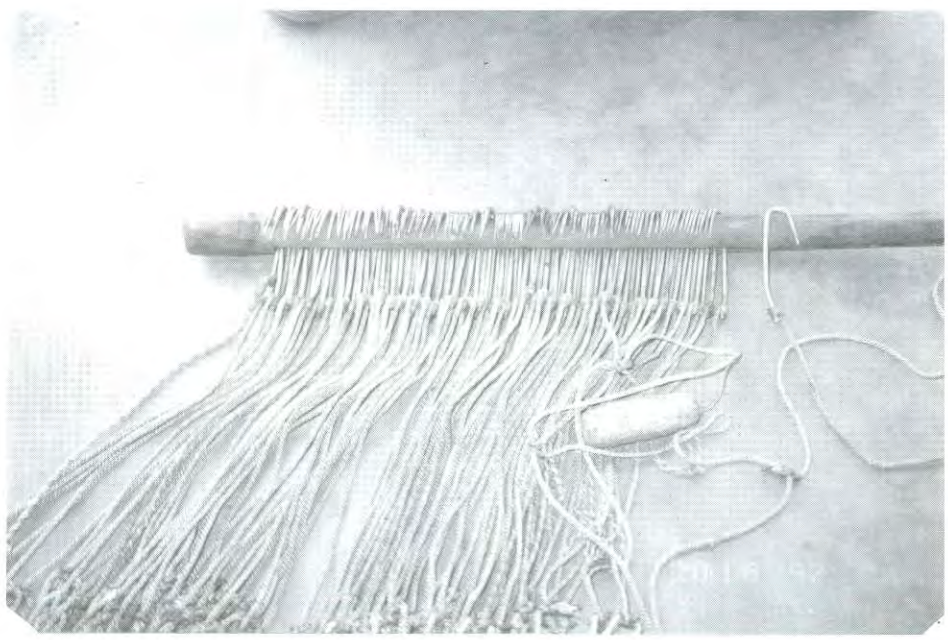
VESSEL
Loa : 19.70
Hp : 165

LOCATION
Thanh Khe
Da Nang





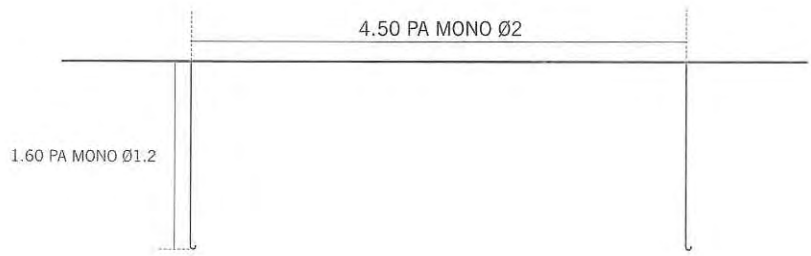


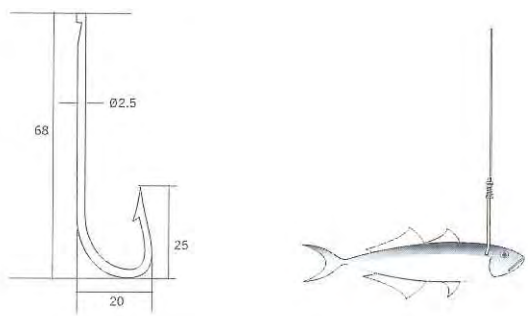


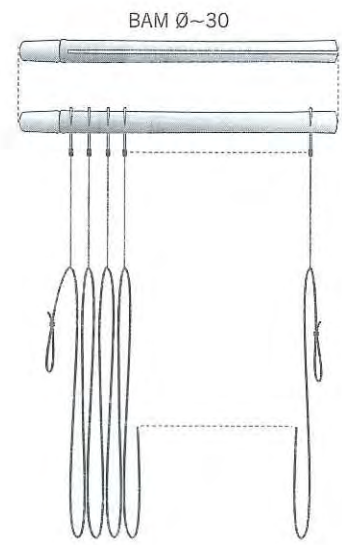
HOOK AND LINE
Bottom Longline
Group

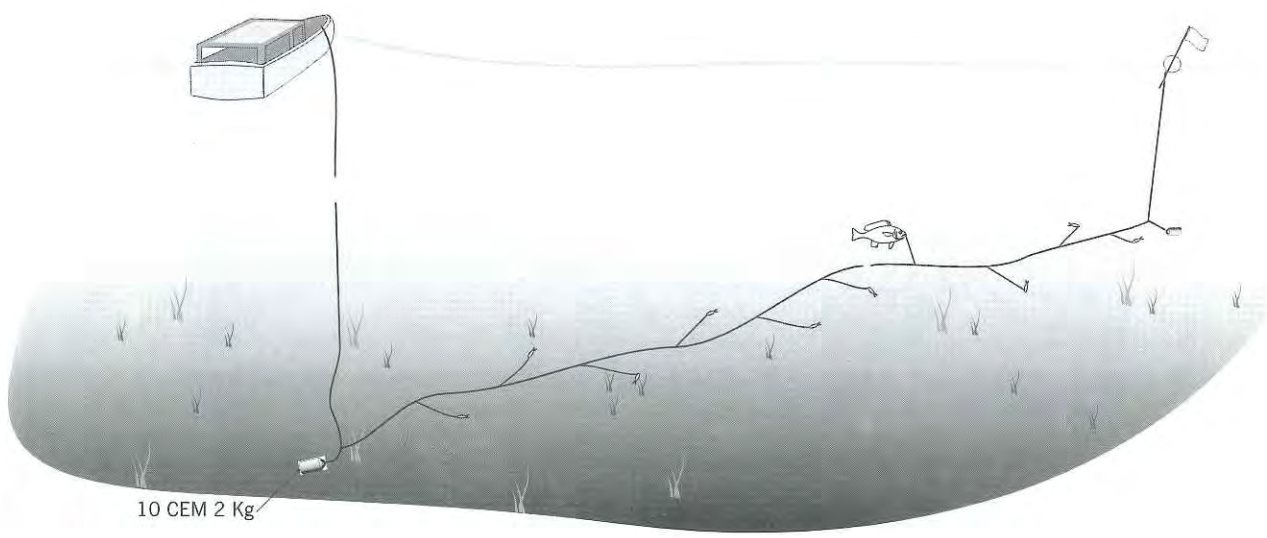
VESSEL
Loa : 8.5
Hp : 12

LOCATION
Ha Long
Quang Ninh





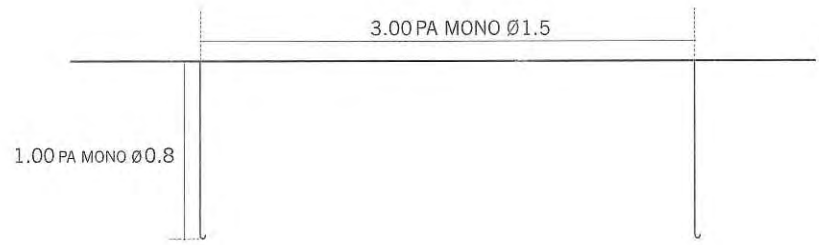


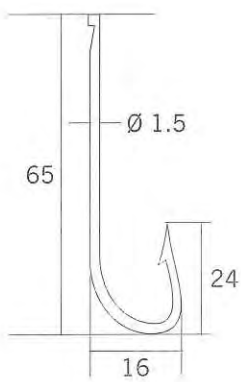


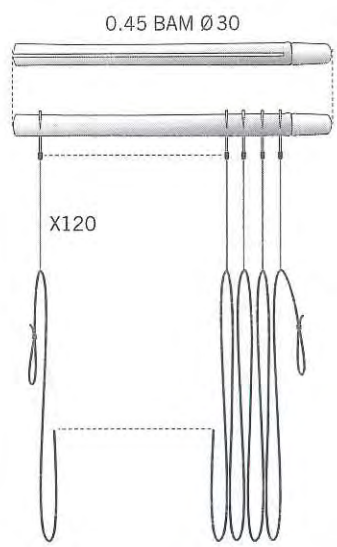
HOOK AND LINE
Bottom Longline
Grouper

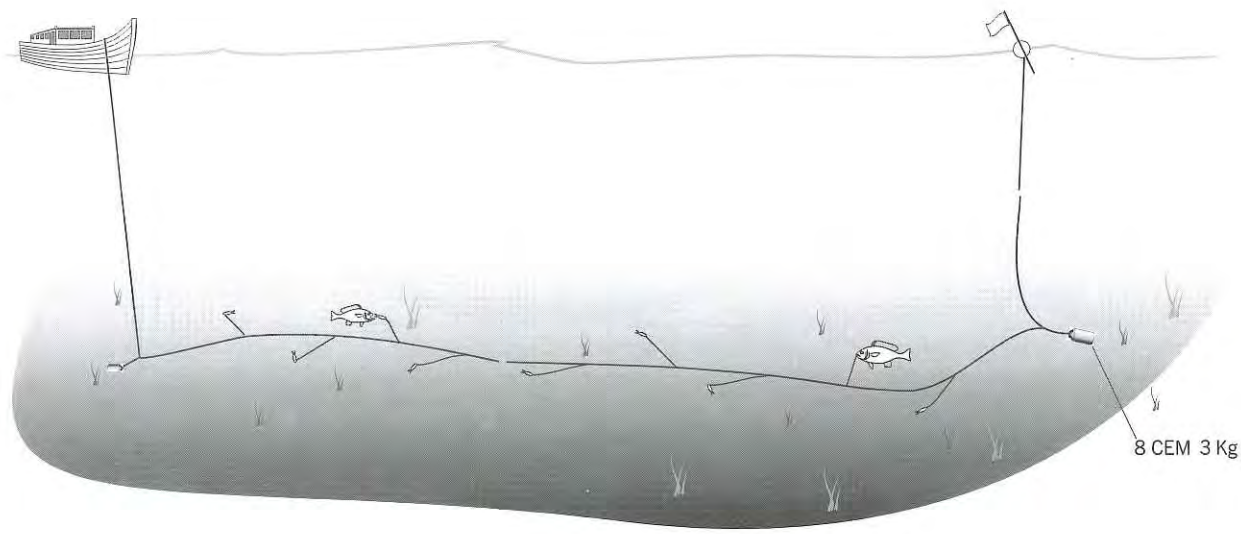
VESSEL
Loa : 8
Hp : 12

LOCATION
Ha Long
Quang Ninh





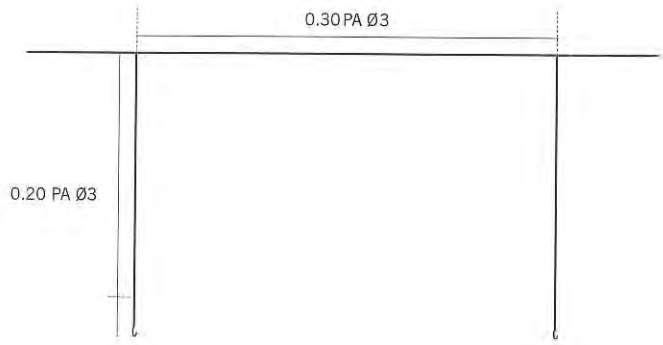


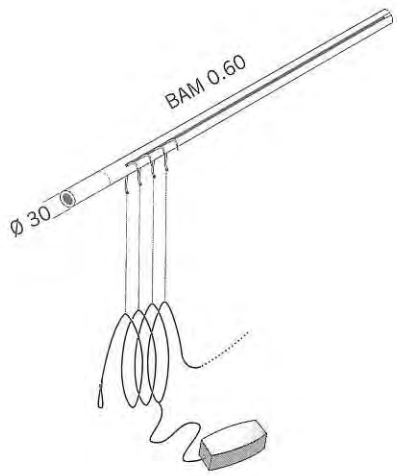


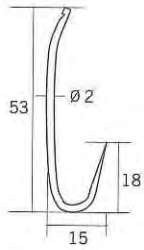
HOOK AND LINE
Bottom Longline
Catfish, Ray

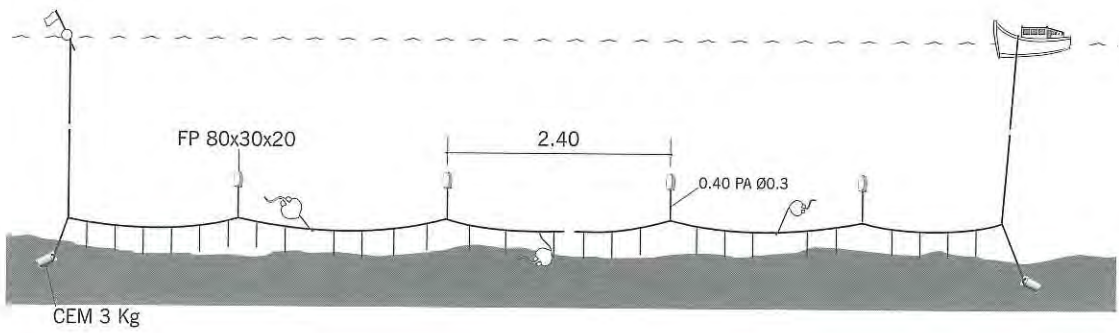
VESSEL
Loa :12.7
Hp :15

LOCATION
Nghia Hung
Nam Dinh





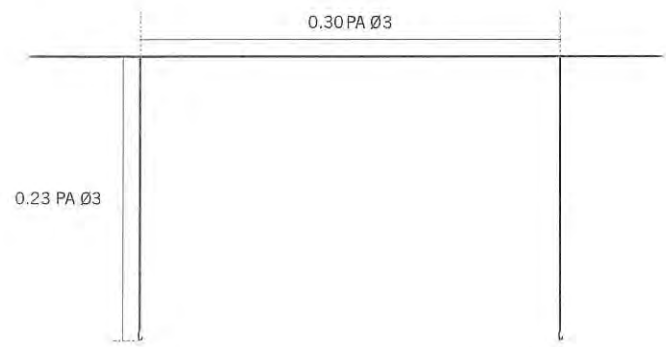


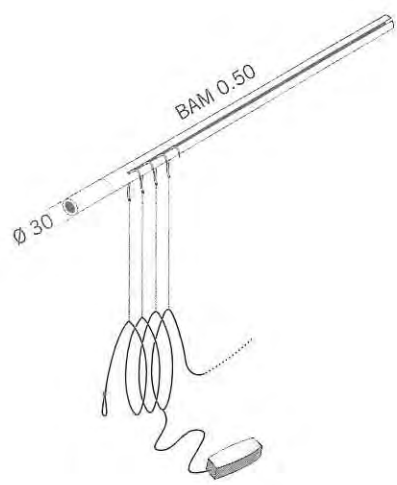


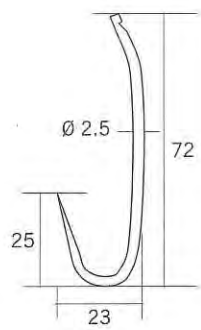
HOOK AND LINE
Bottom Longline
Tigertoothed Croaker

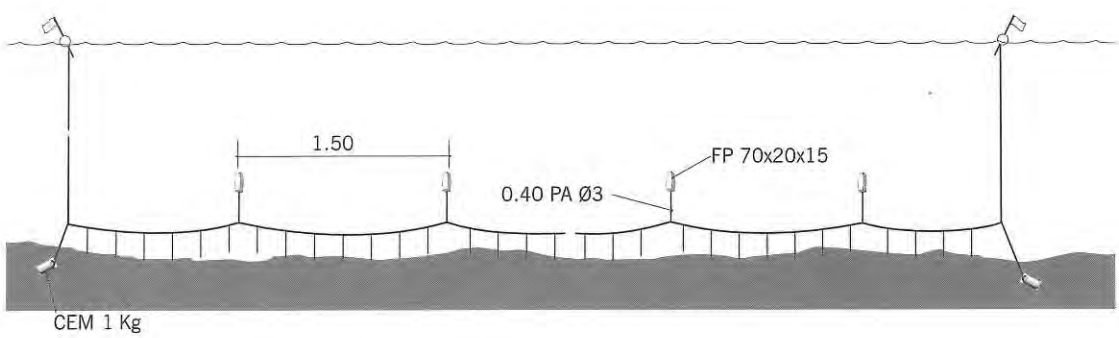
VESSEL
Loa : 13
Hp : 22

LOCATION
Nghia Hung
Nam Dinh





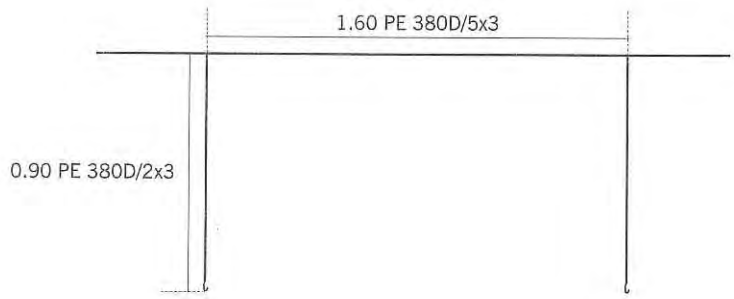


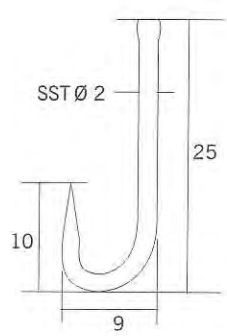


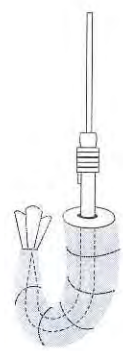
HOOK AND LINE
Bottom Longline
Tigertoothed Croaker

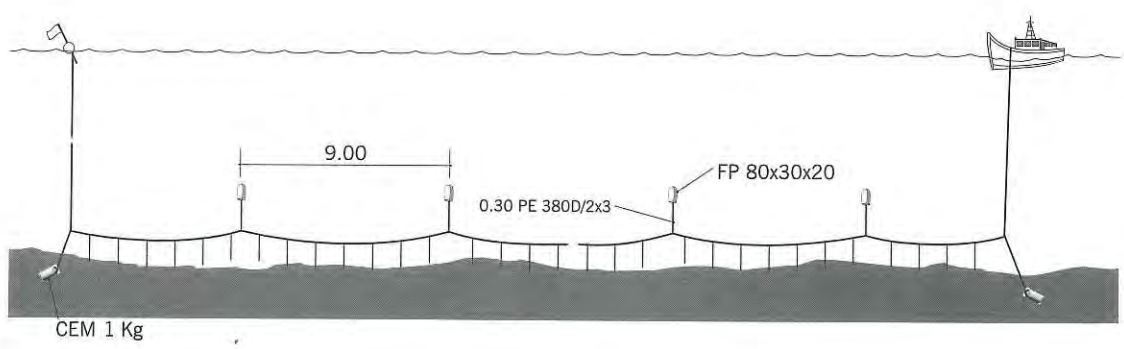
VESSEL
Loa : 13
Hp : 22

LOCATION
Nghia Hung
Nam Dinh





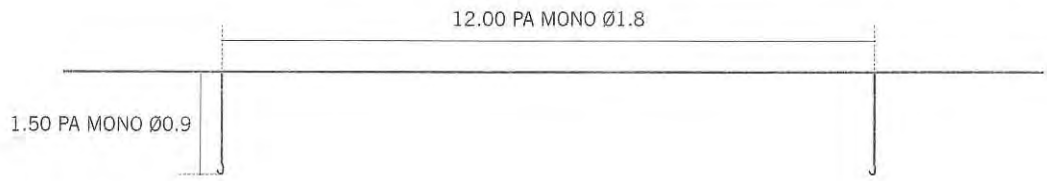


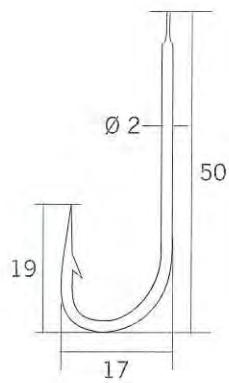


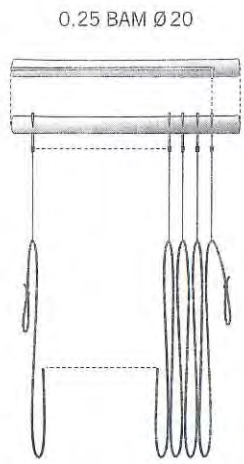
HOOK AND LINE
Bottom Longline
Grouper

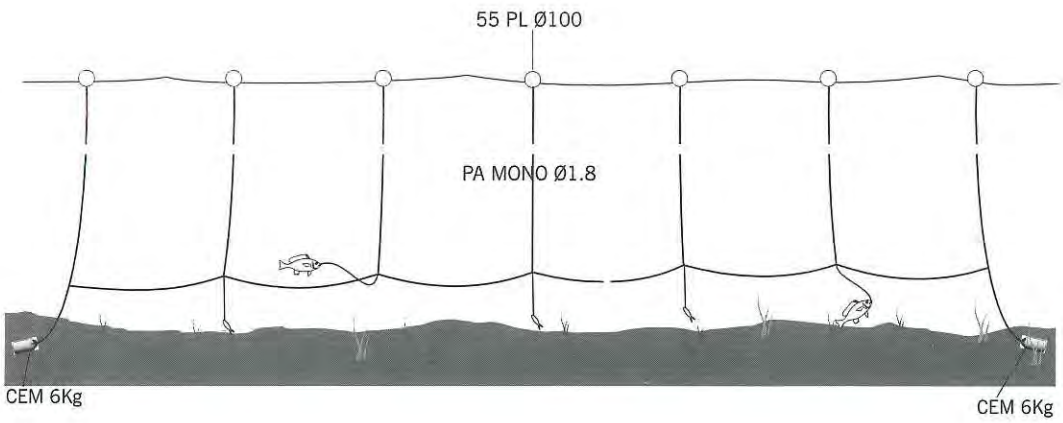
VESSEL
Loa : 12
Hp : 22

LOCATION
Phu Qui
Binh Thuan





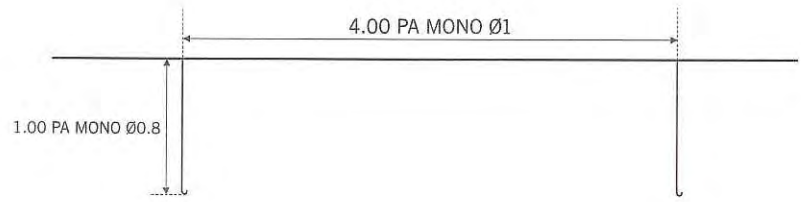


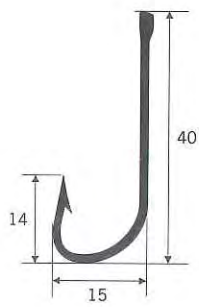


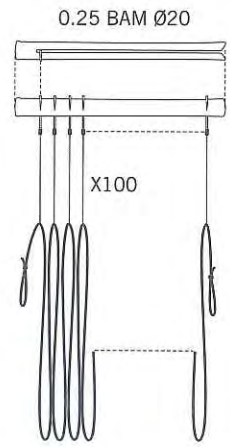
HOOK AND LINE
Bottom Longline
Group

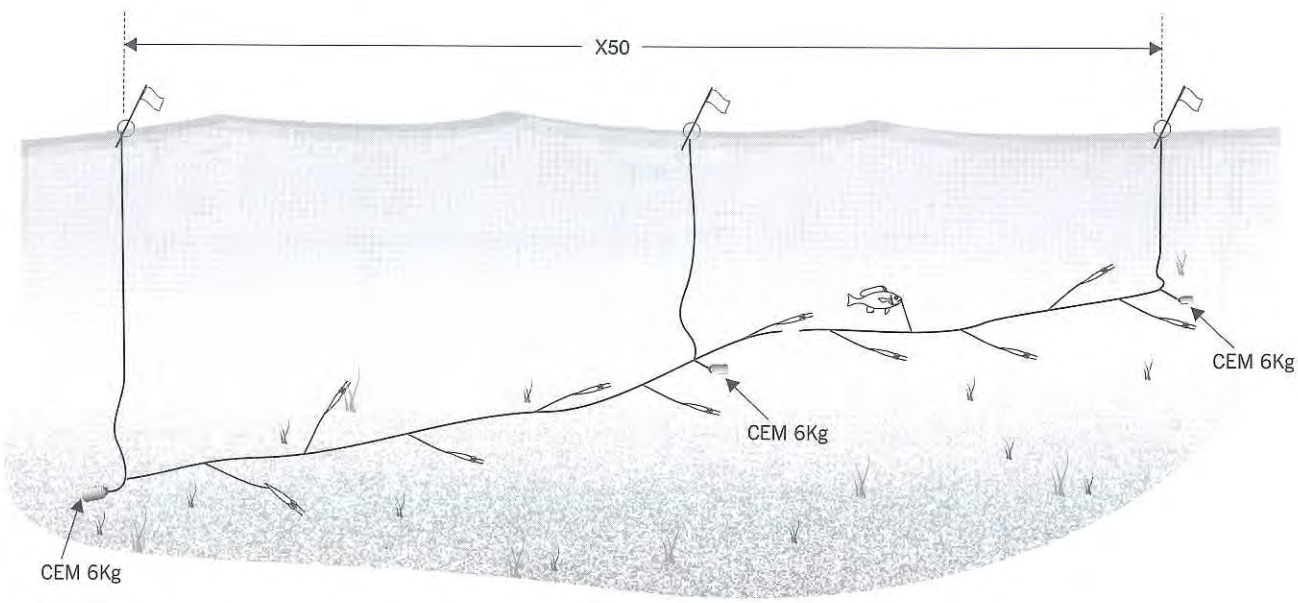
VESSEL
Loa : 8.5
Hp : 12

LOCATION
Ha Long
Quang Ninh





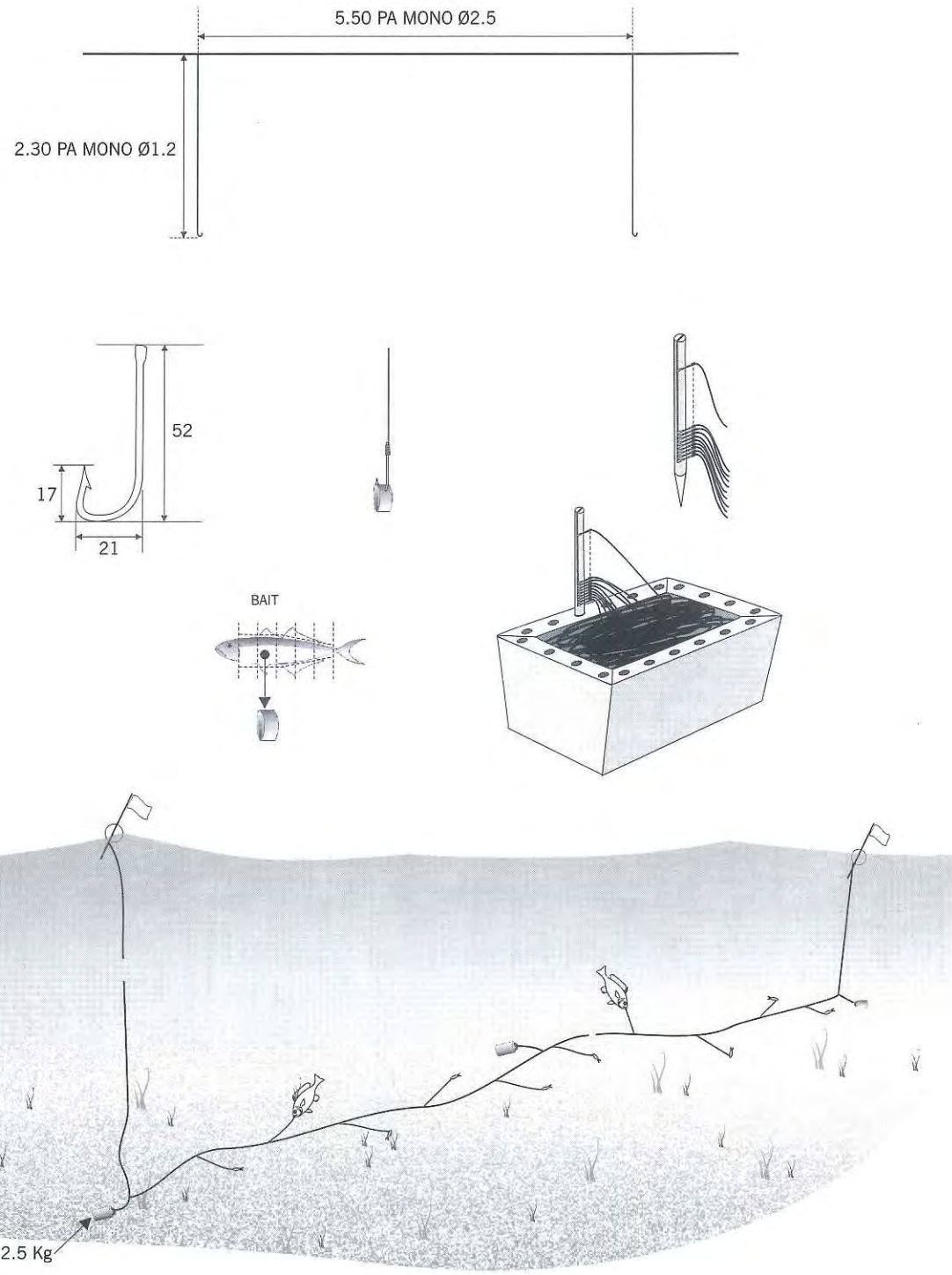




HOOK AND LINE
Bottom Longline
Grouper,

VESSEL
Loa : 8.5
Hp : 2x15

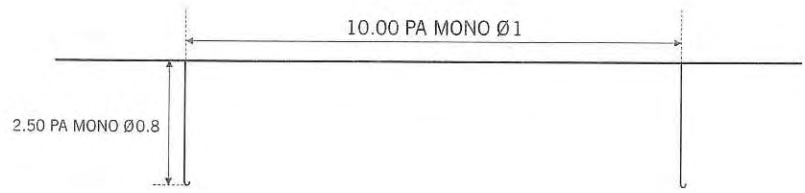
LOCATION
Cat Ba
Haiphong

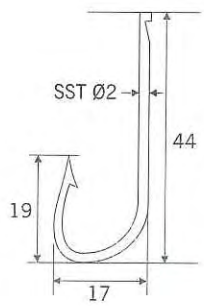


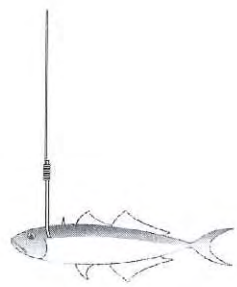
HOOK AND LINE
Bottom Longline
Bottom Fishes

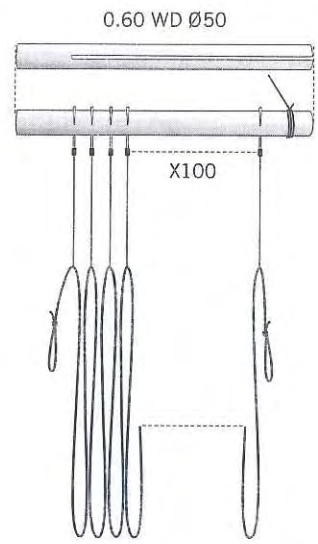
VESSEL
Loa : 13
Hp : 2x15

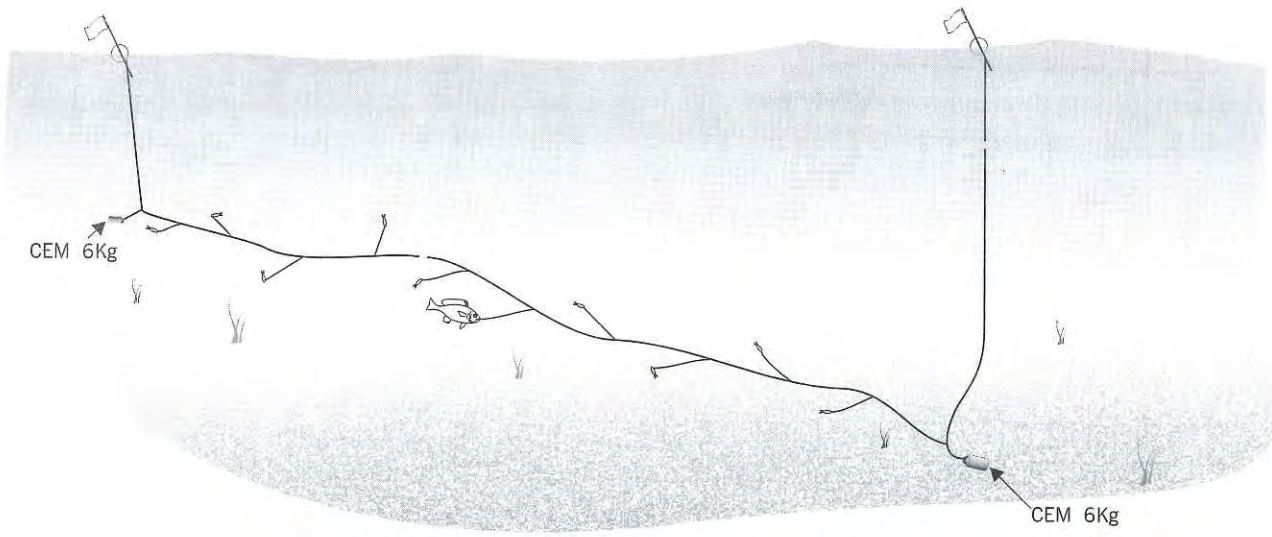
LOCATION
Cua Lo
Nghe An







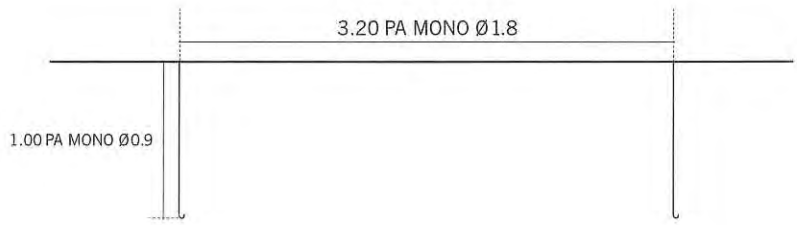


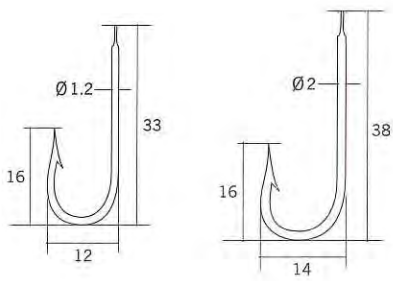


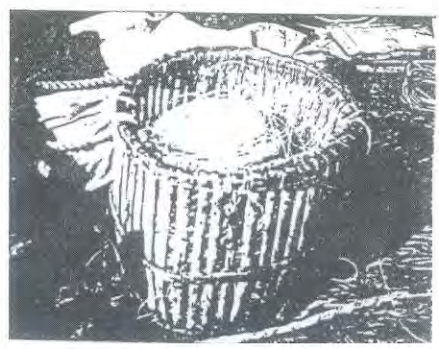
HOOK AND LINE
Bottom Longline
Threadfin Breams
Snapper, Grouper

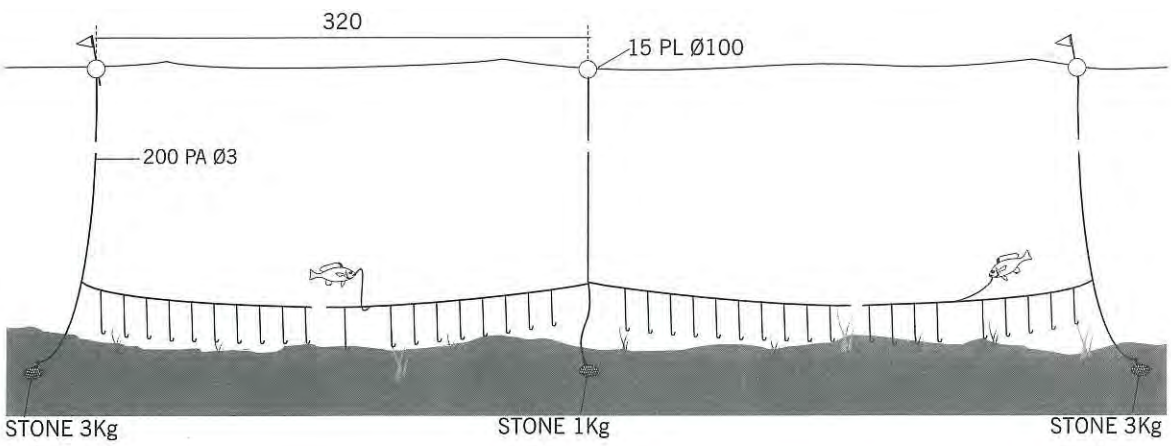
VESSEL
Loa : 16
Hp : 56

LOCATION
Phu Qui
Binh Thuan





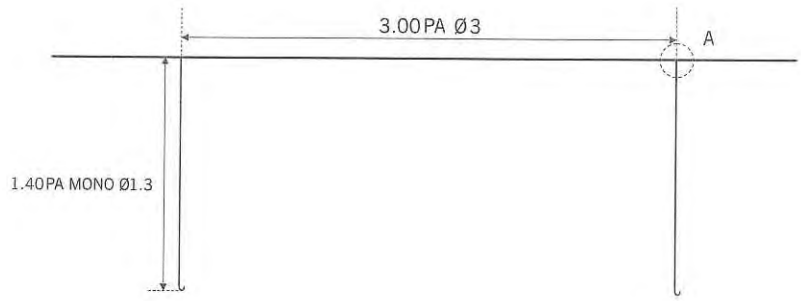


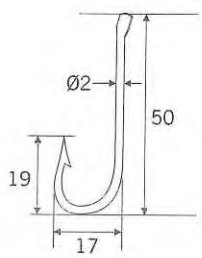


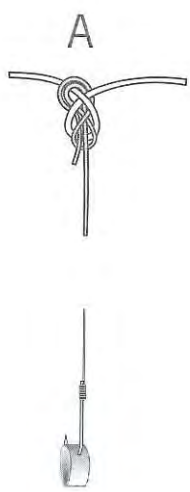
HOOK AND LINE
Bottom Longline
Conger Pike

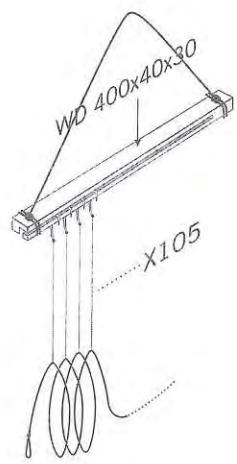
VESSEL
Loa : 17
Hp : 45

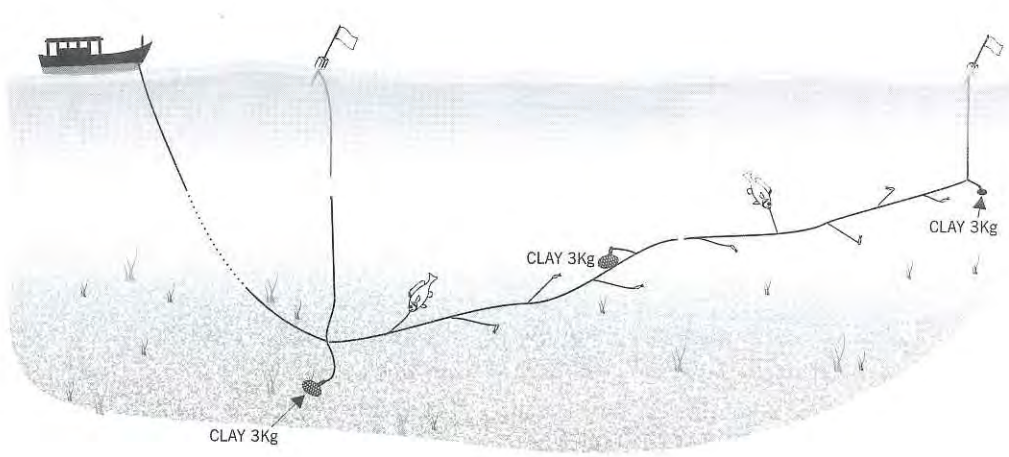
LOCATION
Rach Gia
Kien Giang







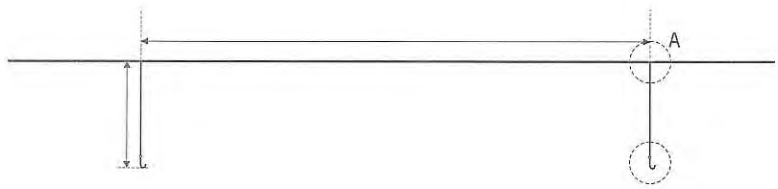


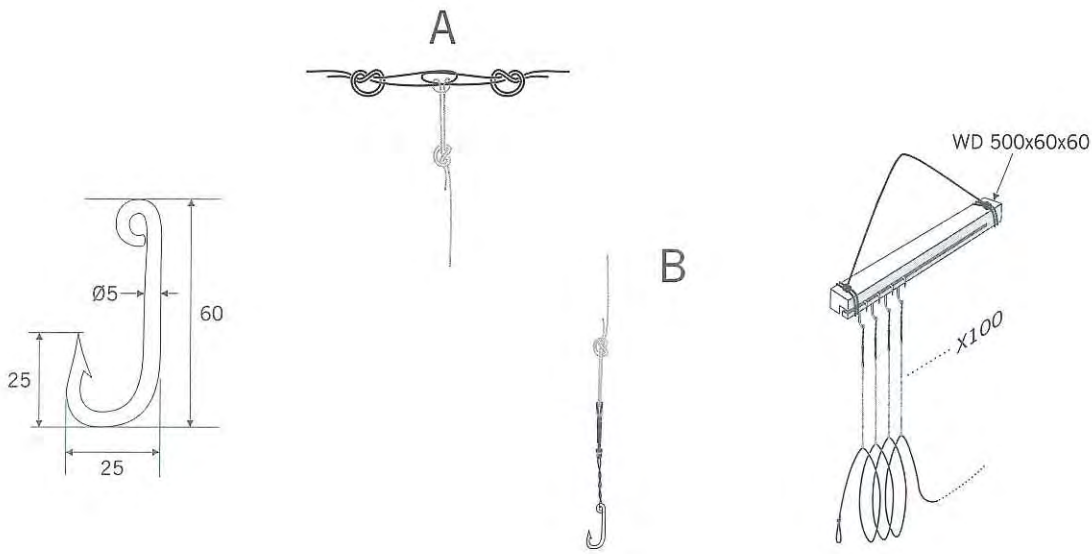


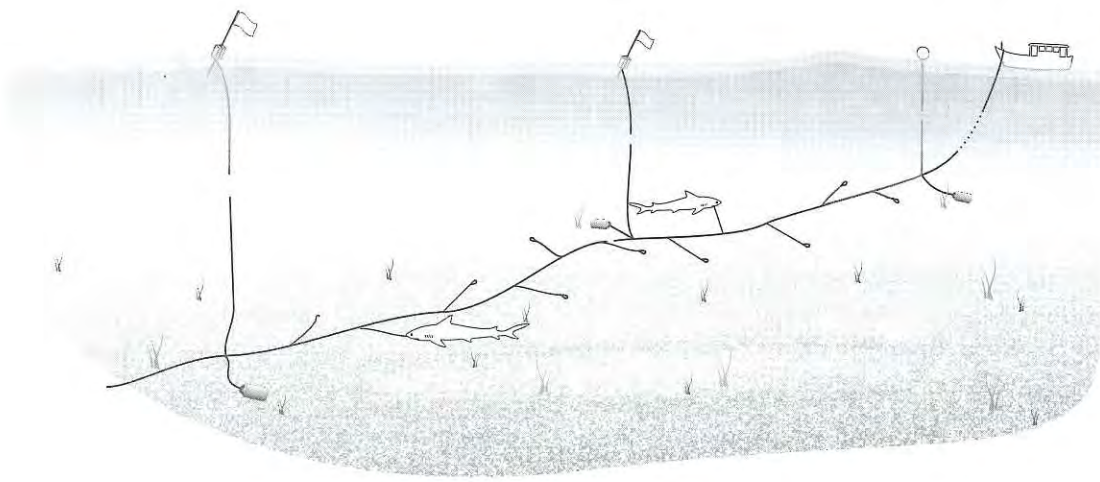
HOOK AND LINE
Bottom Longline
Shark

VESSEL
Loa : 18
Hp : 60

LOCATION
Rach Gia
Kien Giang



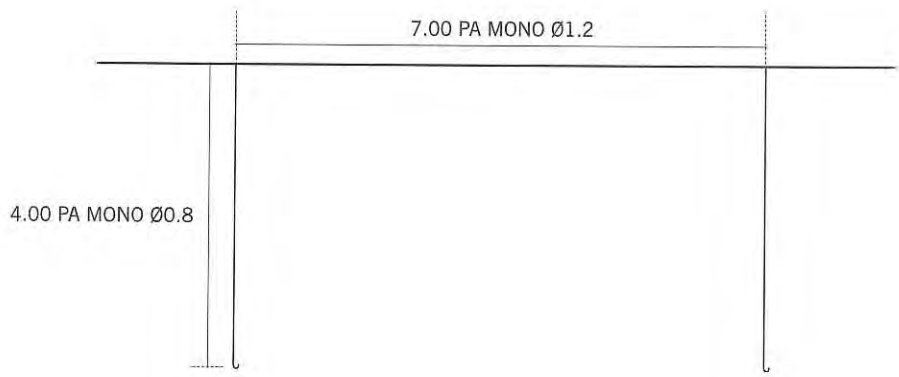


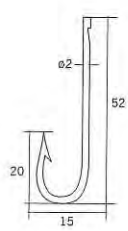


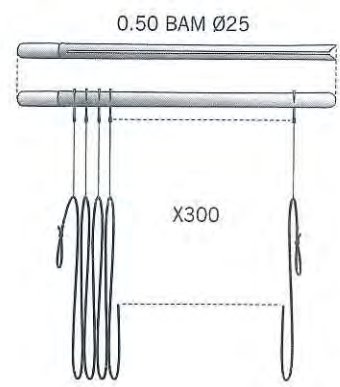
HOOK AND LINE
Drift- Longline
Queenfish

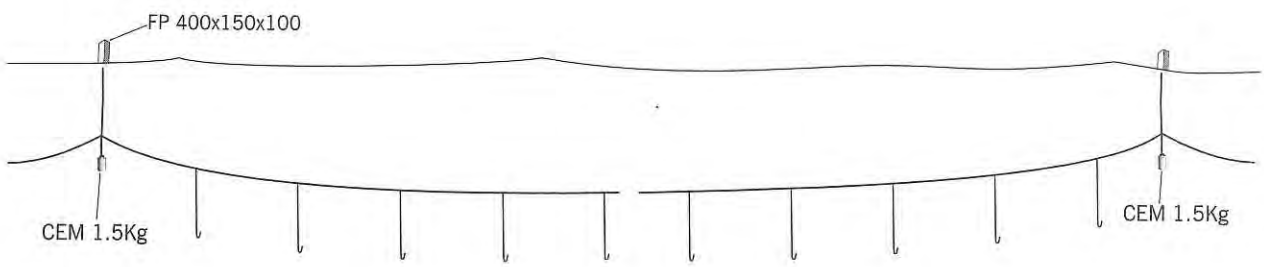
VESSEL
Loa : 7.5
Hp : 12

LOCATION
Ha Long
Quang Ninh





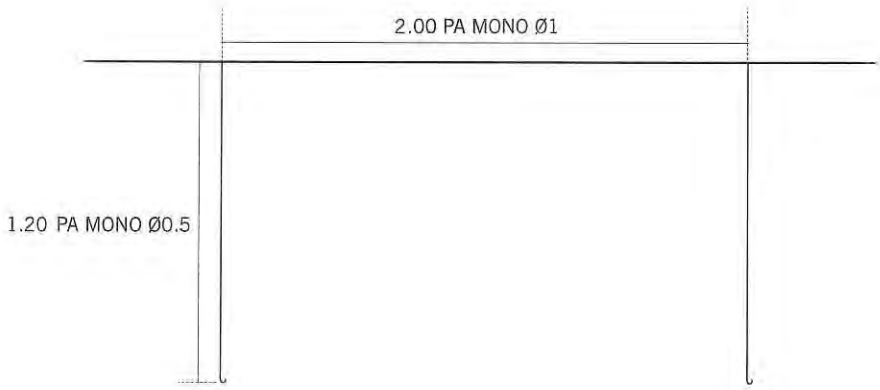


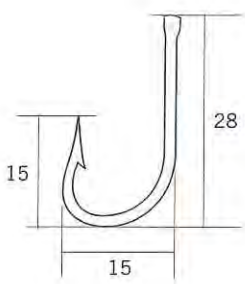


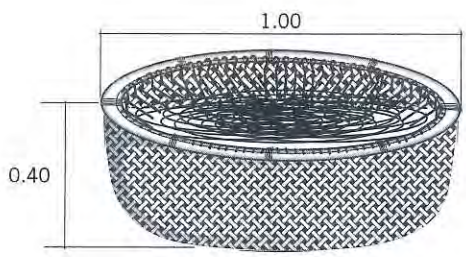
HOOK AND LINE
Drift- Longline
Tuna, Spanish Mackerel

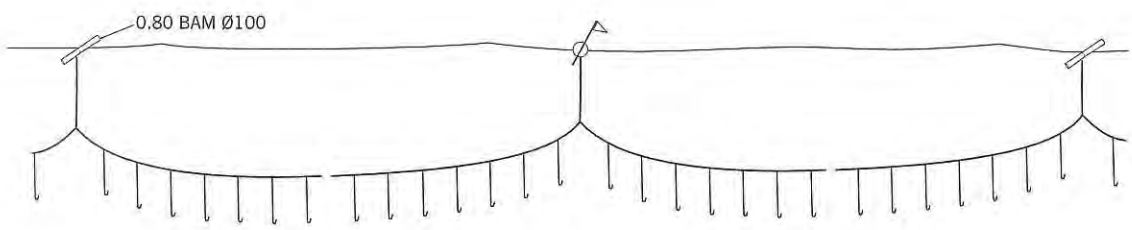
VESSEL
Loa : 13.5
Hp : 33

LOCATION
Ly Hoa
Quang Binh





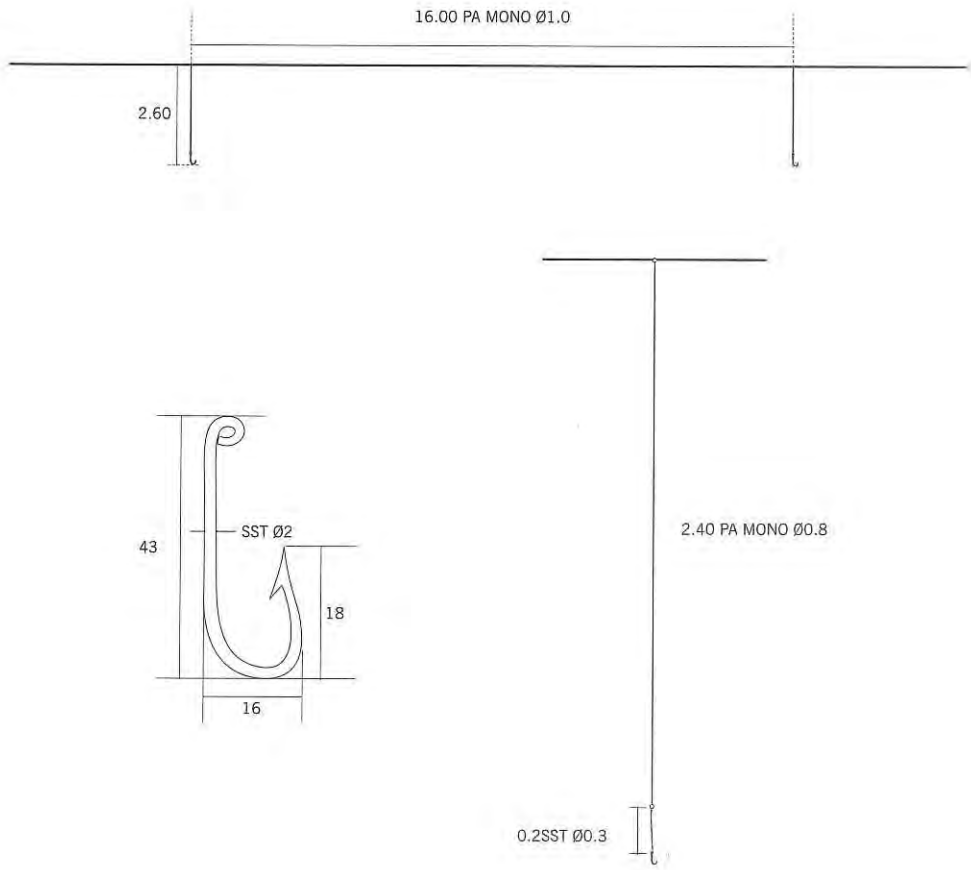


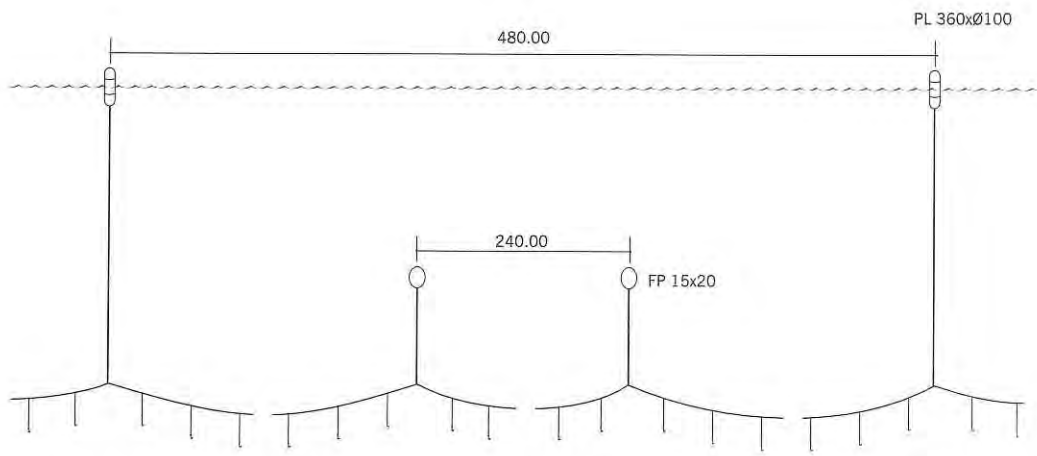


HOOK AND LINE
Drift-Longline
Wahoo *(Acanthocybium Solandri)*

VESSEL
Loa : 13.3
Hp : 2x18

LOCATION
Cua Lo
Nghe An

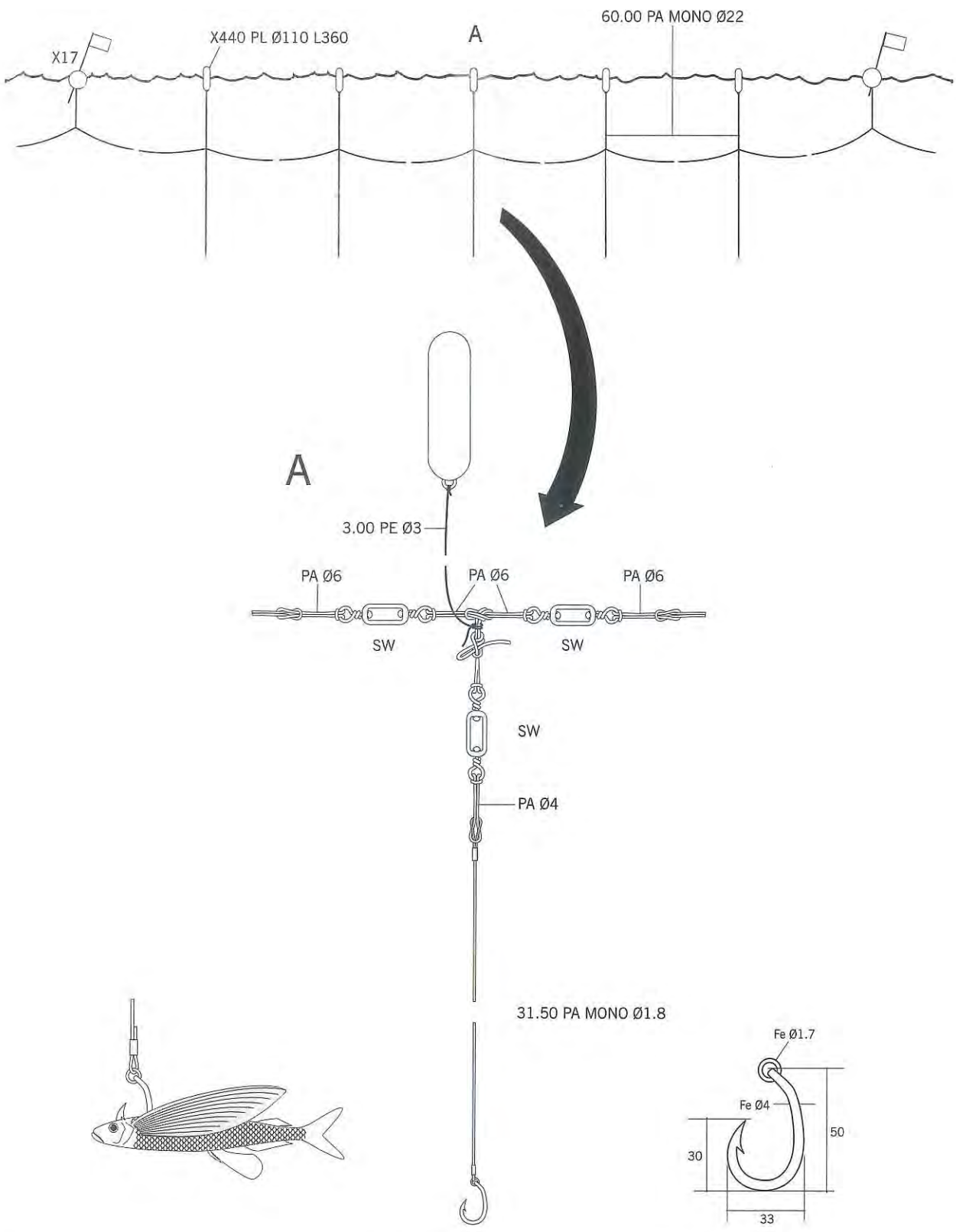




HOOK AND LINE
Drift- Longline
Yellowfin Tuna, Marlin

VESSEL
Loa : 14
Hp : 33

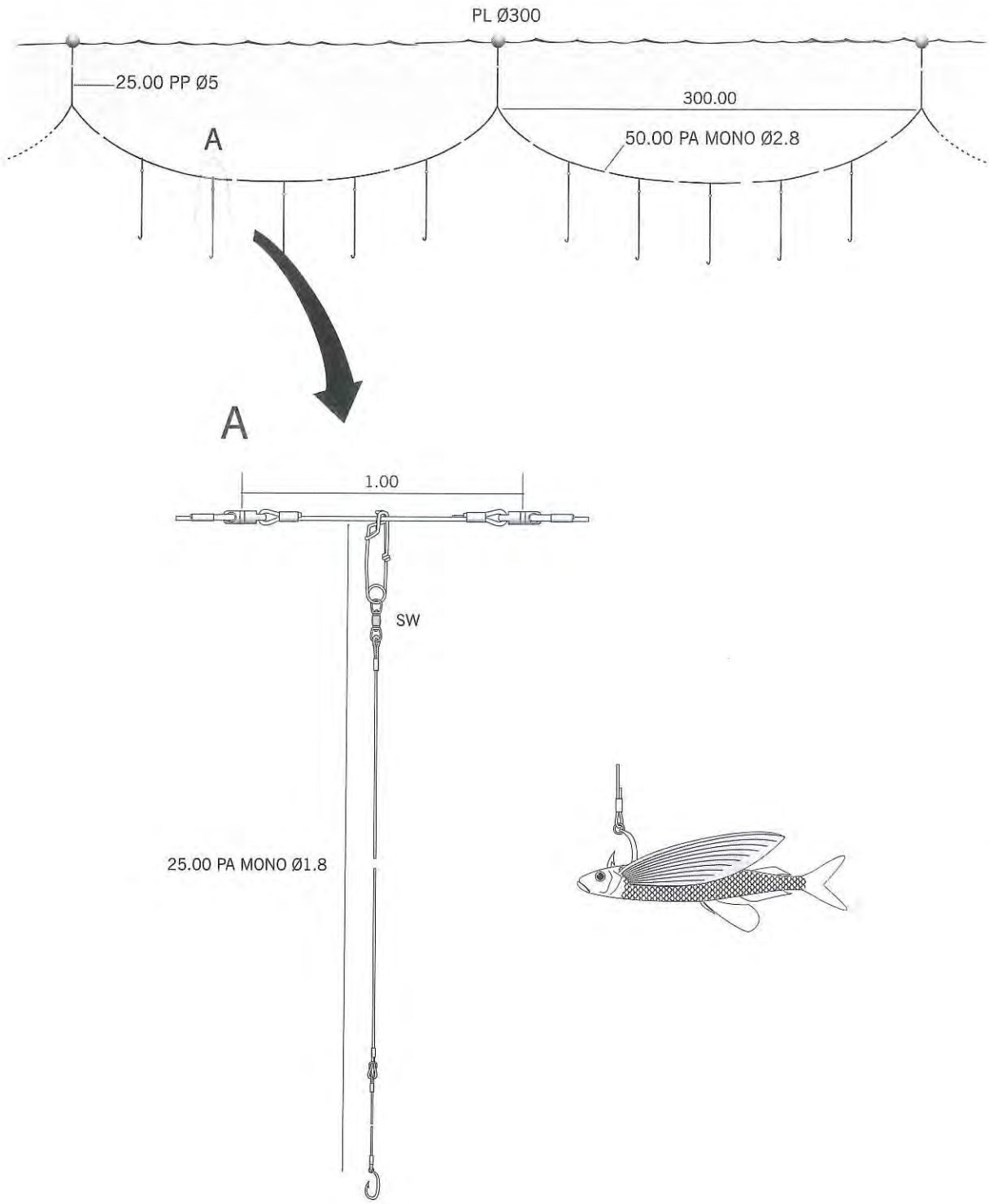
LOCATION
Tuy Hoa
Phu Yen



HOOK AND LINE
Drift- Longline
Yellowfin Tuna, Marlin

VESSEL
Loa : 21
Hp : 330

LOCATION
Phan Thiet
Binh Thuan



< Chapter 8 >

Lift Net Fishing

There are many types of lift net used in Vietnam. They operate in the coastal waters, estuaries and lagoons, and the target species are small pelagic fishes living near the shore like thryssa, anchovy, sardine etc. Nowadays, there are many lift-netters using lights and fish shelters so they can operate in the deeper waters and capture species having higher valuable like the black pomfret, scad, mackerel etc. However, in general, lift net fishery is a small-scale fishery with short duration fishing trips. Based upon the structure of the fishing gear and operations, lift nets can be divided into the following types:

- **Portable lift net**
- **Raft lift net**
- **Lift net**
- **Stick-held dip net**

Fishing Gear and Methods

1. Portable Lift Net

The structure of this is simple, neat and easy to make. The gear is used with non-powered boats or outboard powered boats with engines of 6 - 12 Hp and the fishing grounds are mainly in the near-shore waters catching high value species like babylonia, crab, swimming crab, lobster etc. The structure of the gear consists of one steel frame with a diameter of 40 - 60 cm and there are 3 or 4 lines attached to the frame to facilitate the setting and hauling of the gear. A netting of nylon monofilament or multifilament with mesh size of 40 - 80 mm is hung on the frame on which there is a component of setting baits.

Such a lift net can be set independently or linked to form a line with intervals of 8 - 12 m.

2. Raft Lift Net

This gear is mainly used in the estuaries and lagoons throughout the country. The construction of the gear consists of one square or rectangular netting made of nylon multifilament or minnow net with a mesh size of 4 - 8 mm. The netting has four comers tied to a bamboo or wooden frame, which is cross-shaped. The net is lifted or set down through the lifting and setting structure of the frame. The target species of this fishery are shrimp, thryssa and other trash fish.

The Raft lift net can be set in position without movement, or may be put on a floating raft, which is movable. The lift net is lifted and dropped over a certain period of time depending

on the number of fish caught in the net.

3. Lift Net

In general, the dip-net numbers are the greatest among the lift-net groups. They are employed on boats with engines of 33 - 74 Hp and operate in the deeper fishing grounds up to 50 m in depth. The main target species are black pomfret, scad, mackerel etc. Most of operate in conjunction with fish aggregating devices including luring lights and fish shelters. During the fishing operation, fishermen use a main boat with engines of 33 - 74 Hp and some (from 4 to 8) small boats for lighting and setting or hauling the nets. The main structure of the gear is a rectangular net or a bag-shaped net made of nylon or polyethylene with a mesh size of 20 - 40 mm.

Net Setting:

One type of liftnet uses 4 or 8 boats: The net is held on the main vessel. The 4 comers of the net are set in a stationary condition because of 4 anchors. At those comers there are ropes linking to the boat, and one rope in the middle of each edge of the liftnet links to the other auxiliary boats. After setting, the light boat (luring boat) is directed toward the middle of the area of the set net.

Another type of liftnet uses 1 or 2 boats: The net is set and fixed by two anchors. After that, fishermen can use lights or fish shelters to concentrate fish in the net mouth.

Hauling Net:

The type uses 4 or 8 boats: The boats at the 4 comers pull the linking pins between the liftnet comers and anchors, then the 4 net comers are lifted together. In the case of an 8-boat liftnet, other boats lift the edges of the net.

The type using 1 or 2 boats: After the linking pin between the net mouth and the anchor is removed, the mouth of net is lifted by the floats and the hauling of the purse rope.

4. Stick -Held Dip Net

The stick - held dip - net is used in the provinces of the central region for catching anchovies and other species like squid and mackerel.

Fishing is carried out onboard small - boats (12 - 15m) with electric luring lights, the net is nylon 210D/6, 10mm mesh size or minnow net with a mesh size of 6mm. The net is hung on two bamboo poles and the gear is operated by “pushing" and "lifting".

This gear is operated at night. During the operation, the boat is moving and searching for fish schools with the aid of a strong light. Using the light to concentrate the fish near the side of

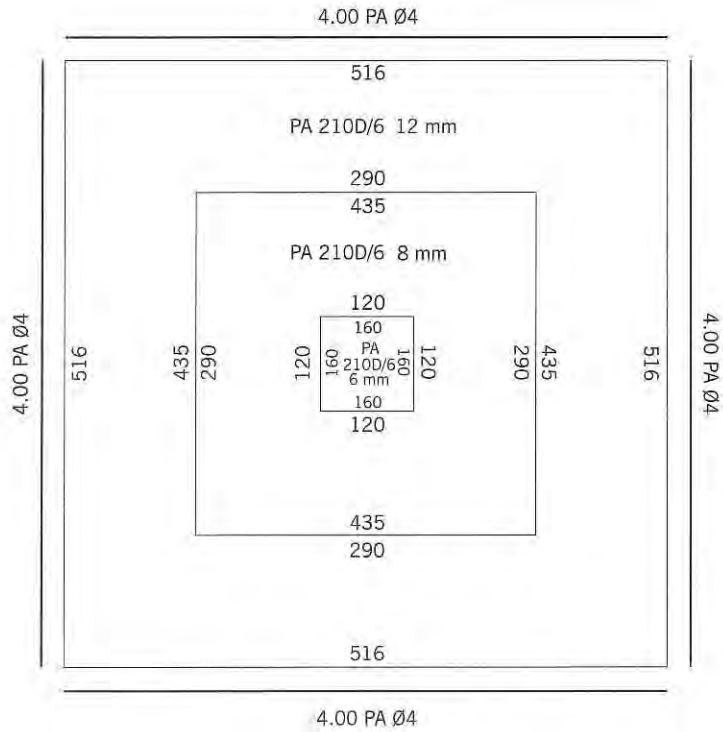
boat, where the net is set already, then the net is lifted to entrap the fish.

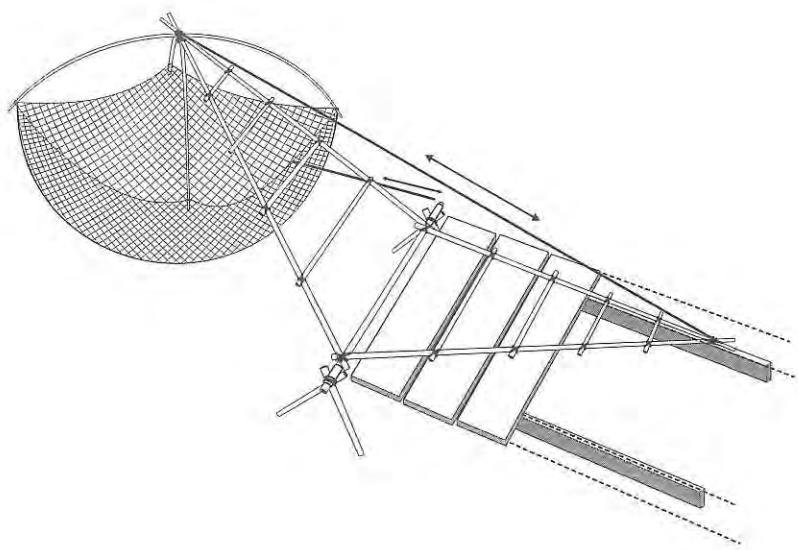
When a fish school concentrates under the light area, the amount of light is suddenly increased (10%), then suddenly decreased. This technique gives good results and a high volume catch. The operation is carried out many times during a night.

LIFT NET
Raft Lift Net
Mullet Thryssa

VESSEL
Non-Power

LOCATION
Thuan An
Thua Thien Hue

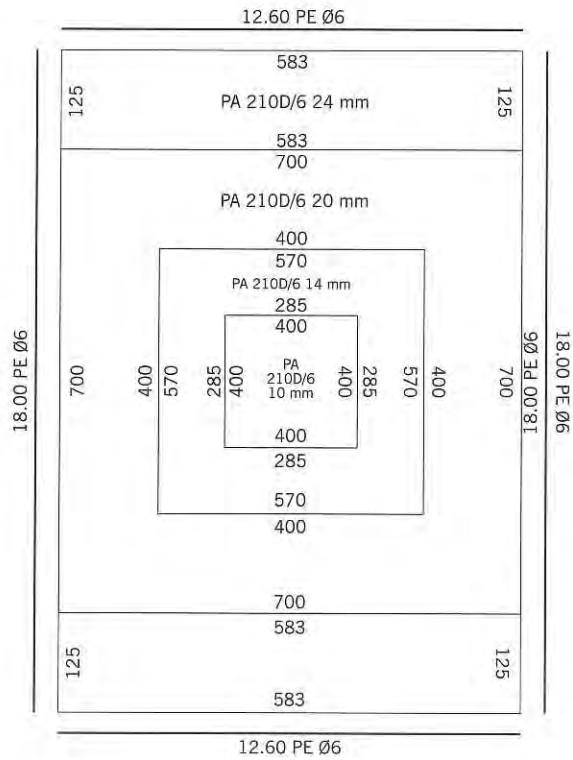


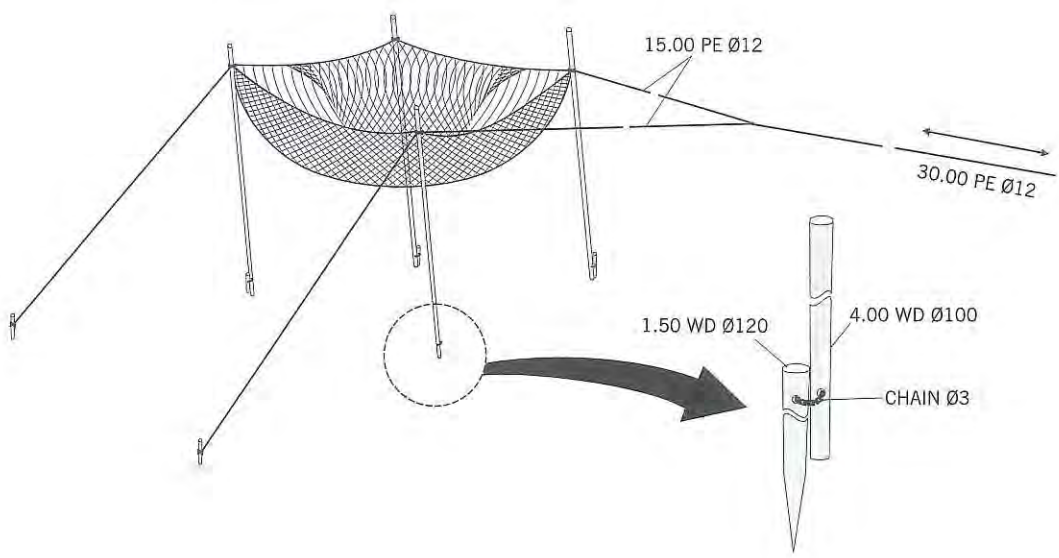


LIFT NET
Stationary Lift Net
Mullet, Thryssa

VESSEL
Loa : 9
Hp : 6

LOCATION
Phu Vang
Thua Thien Hue

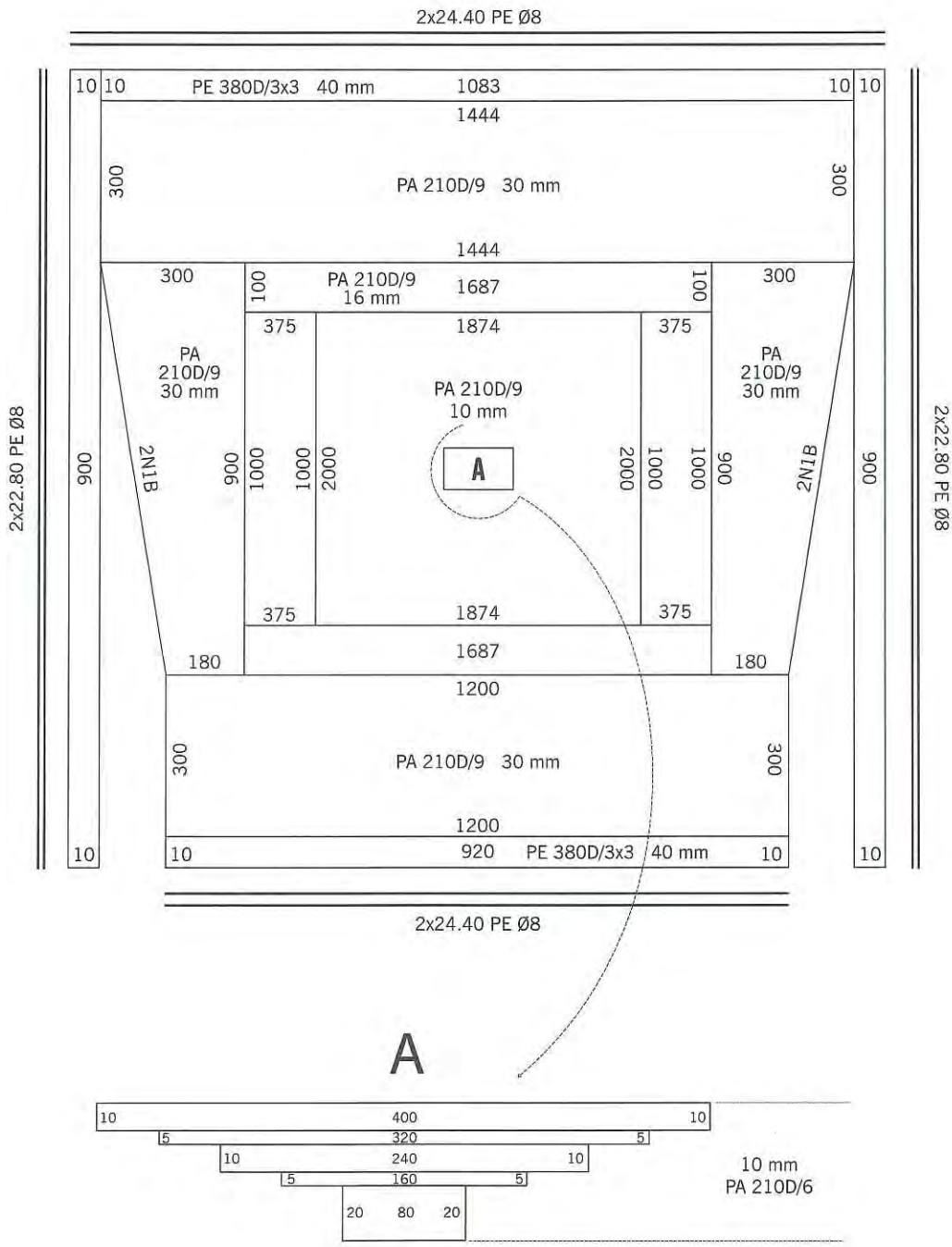


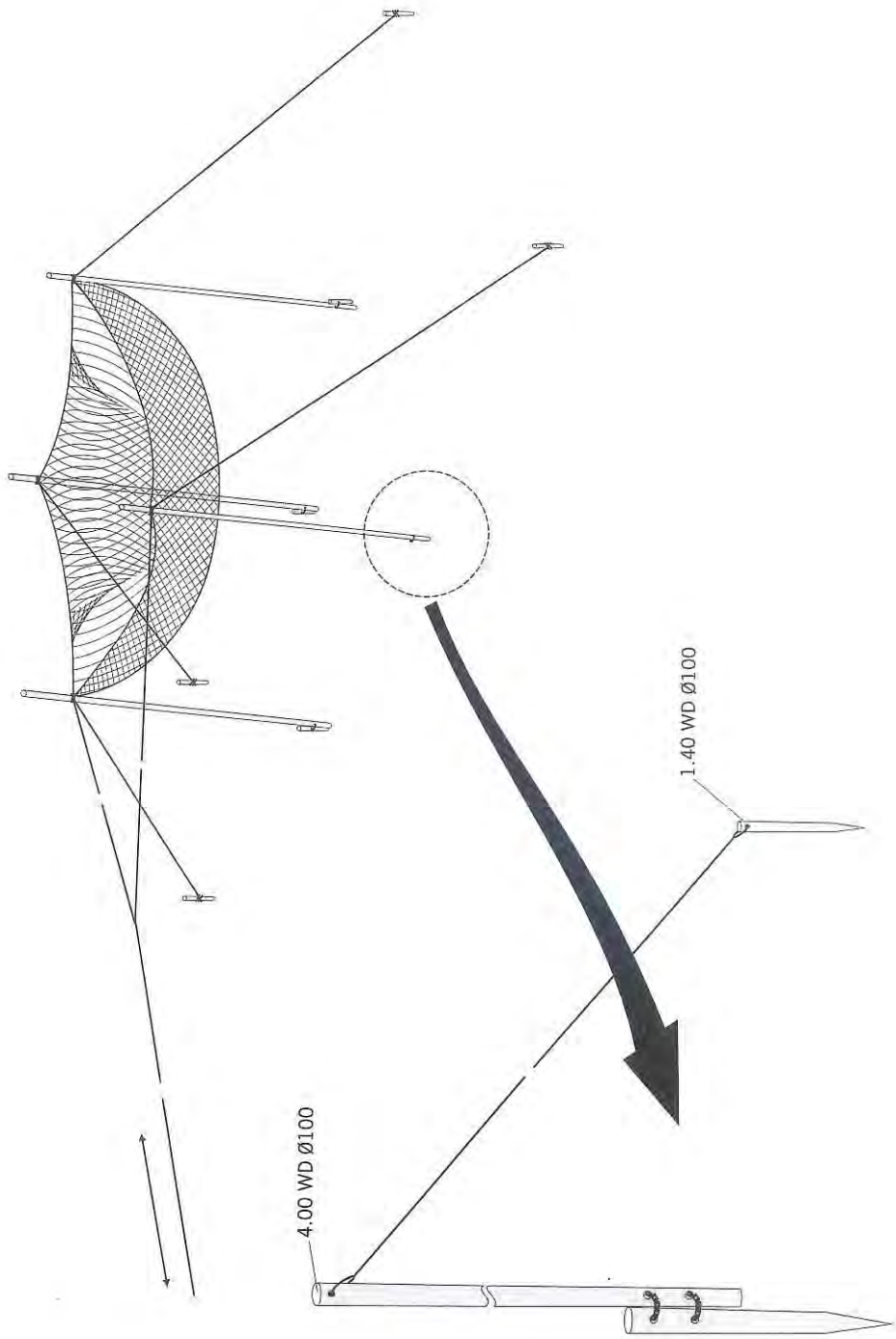


LIFT NET
Stationary Lift Net
Mullet, Thryssa

VESSEL
Loa : 8
Hp : 6

LOCATION
Ly Hoa
Quang Binh

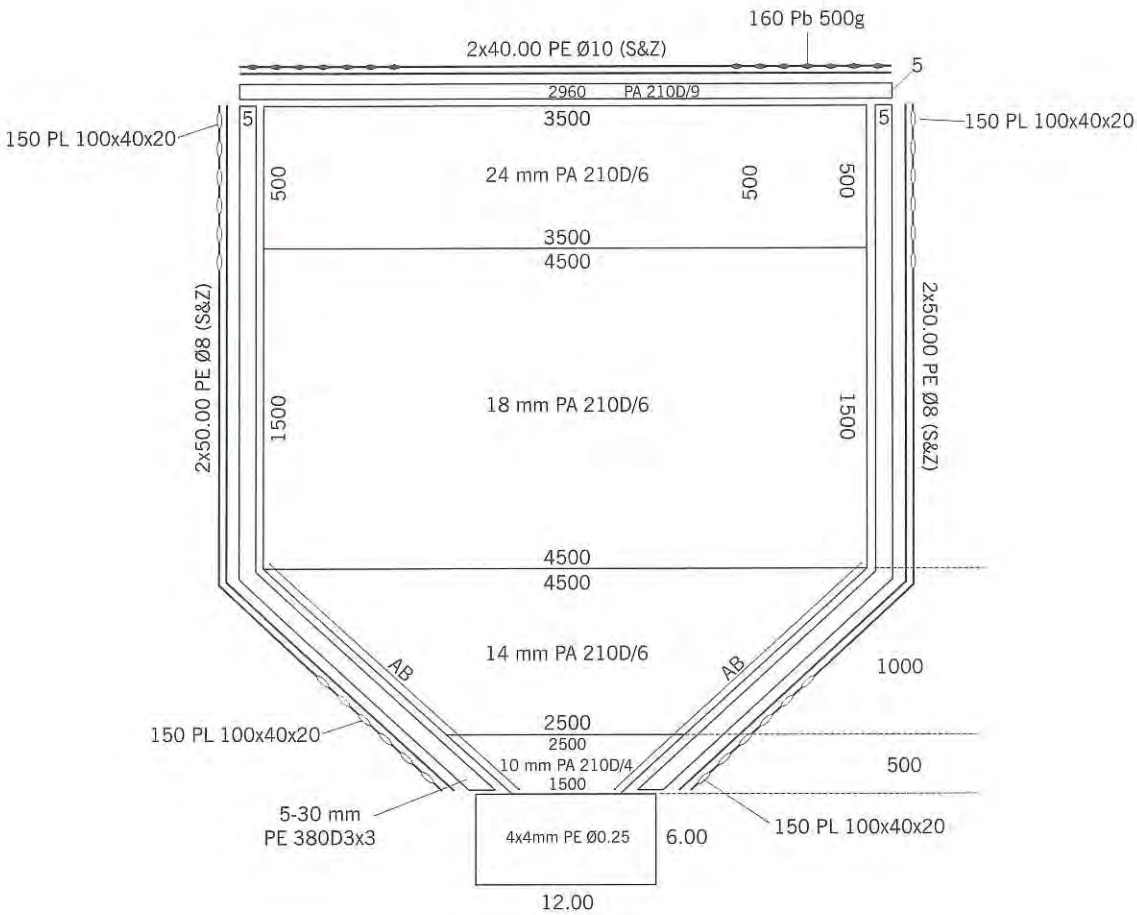


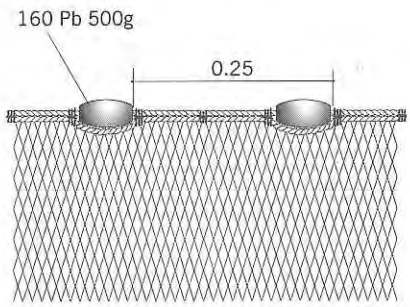

1.40 WD Ø100
4.00 WD Ø100

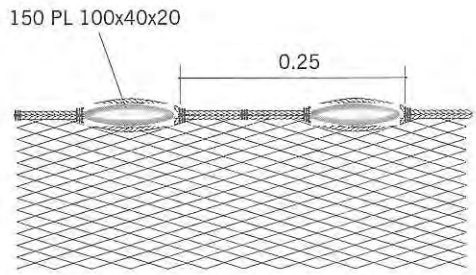
LIFT NET
Luring Lift Net, One Boat
Sardine, Scad

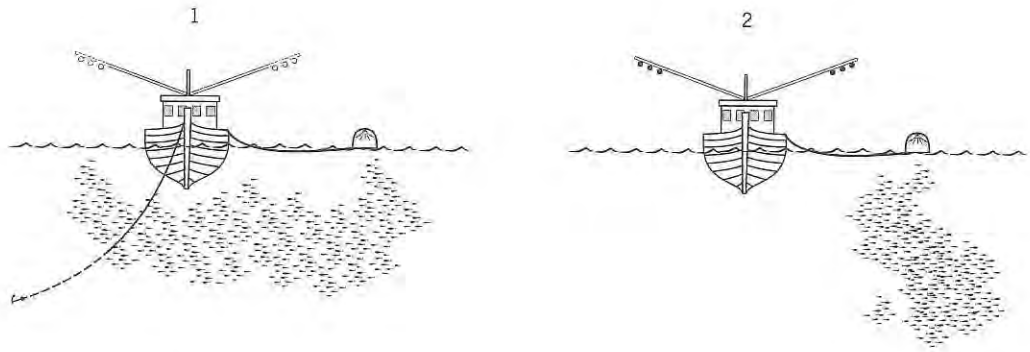
VESSEL
Loa : 12
Hp : 15

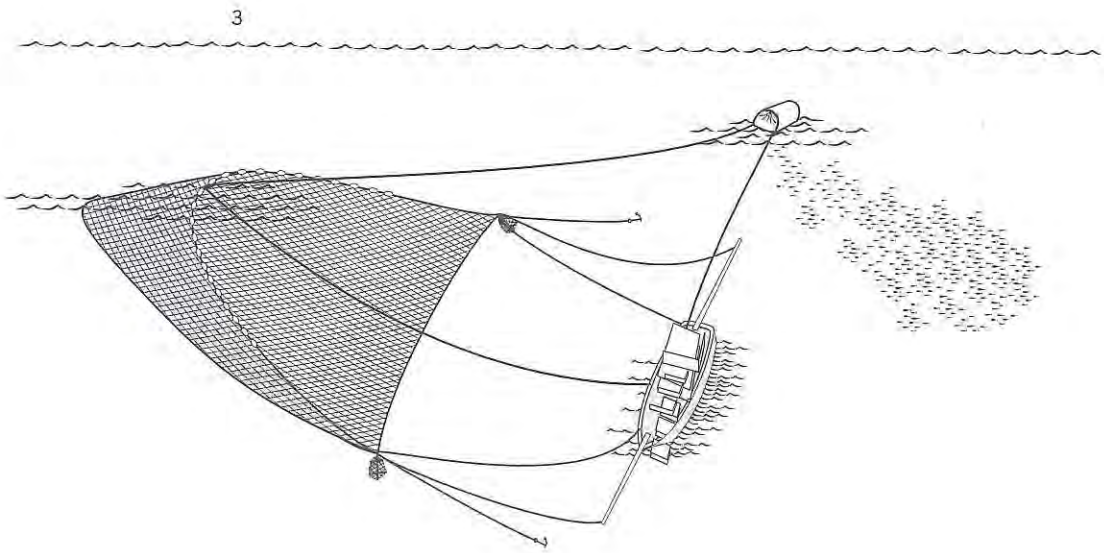
LOCATION
Bo Trach
Quang Binh








1
2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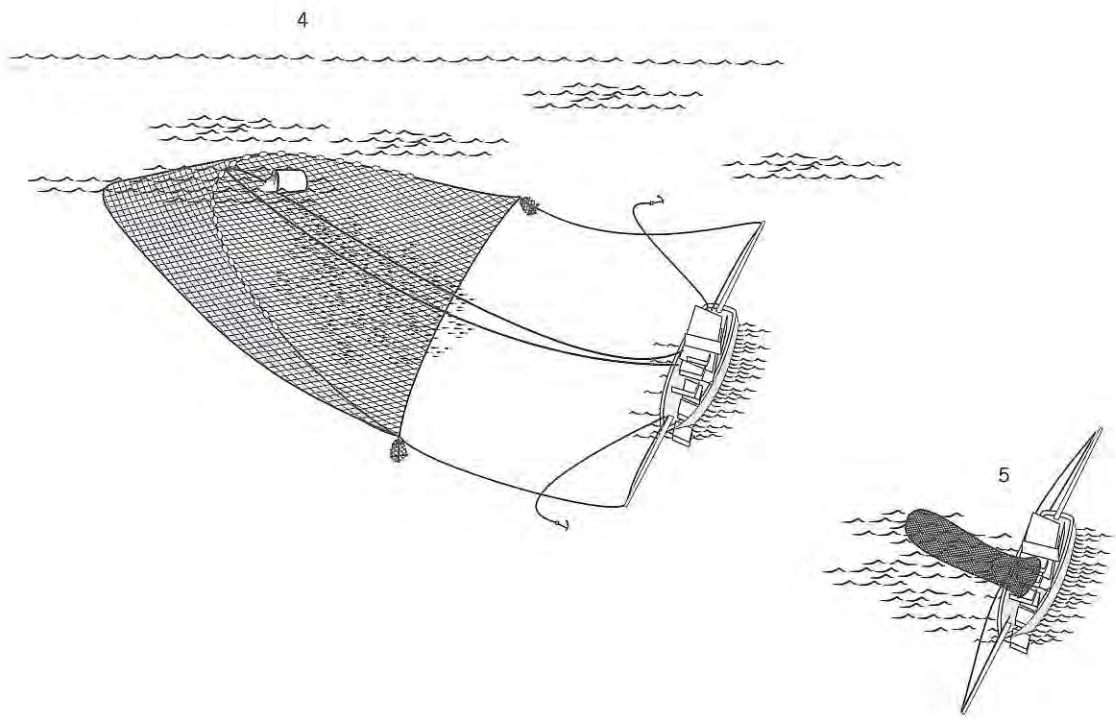
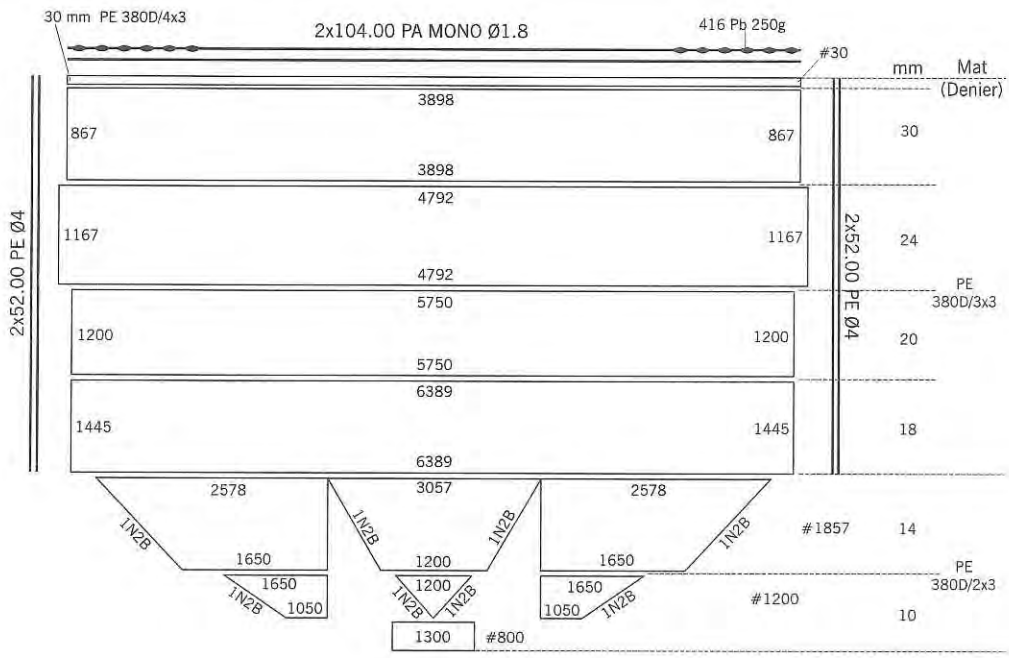
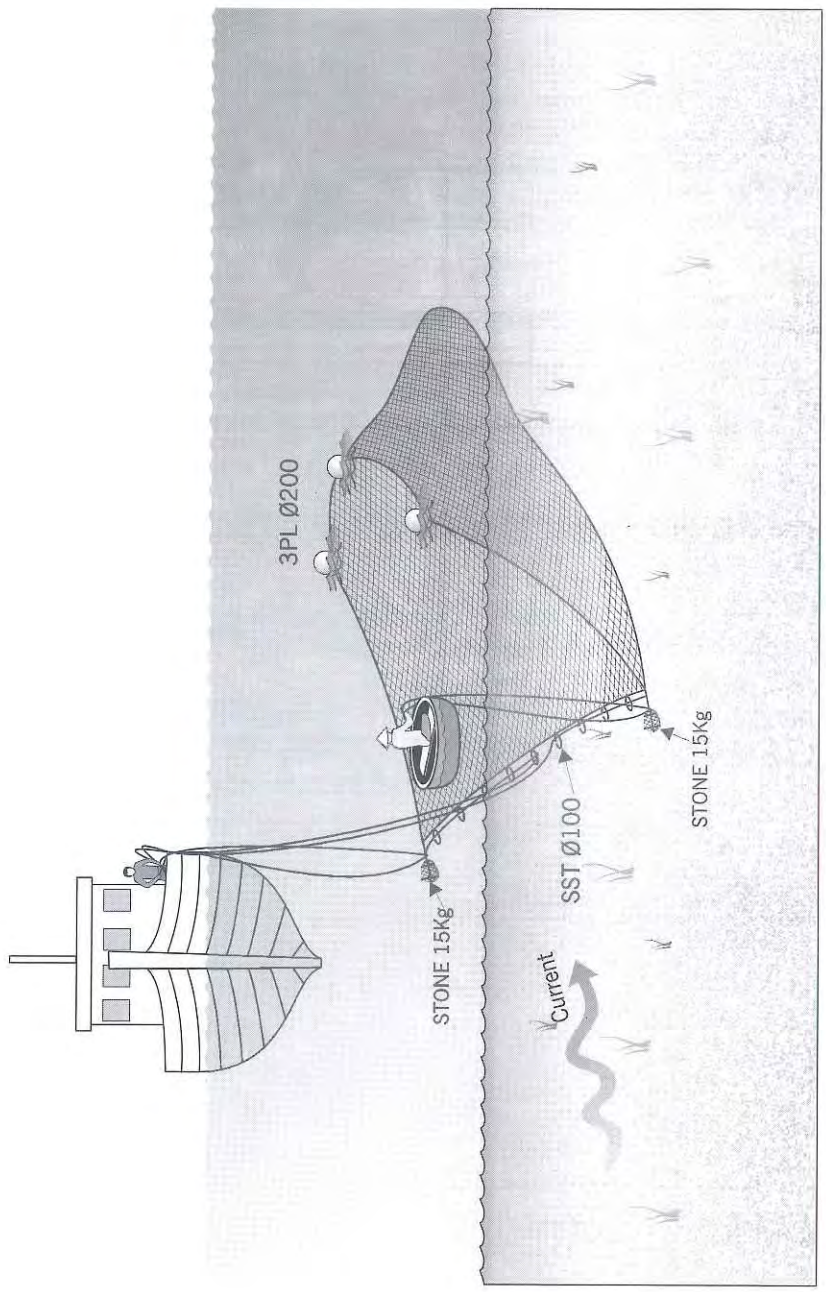

4
5

LIFT NET
Luring Lift Net, One Boat
Sardine, Scad

VESSEL
Loa : 12.5
Hp : 22

LOCATION
Phu Vang
Thua Thien Hue

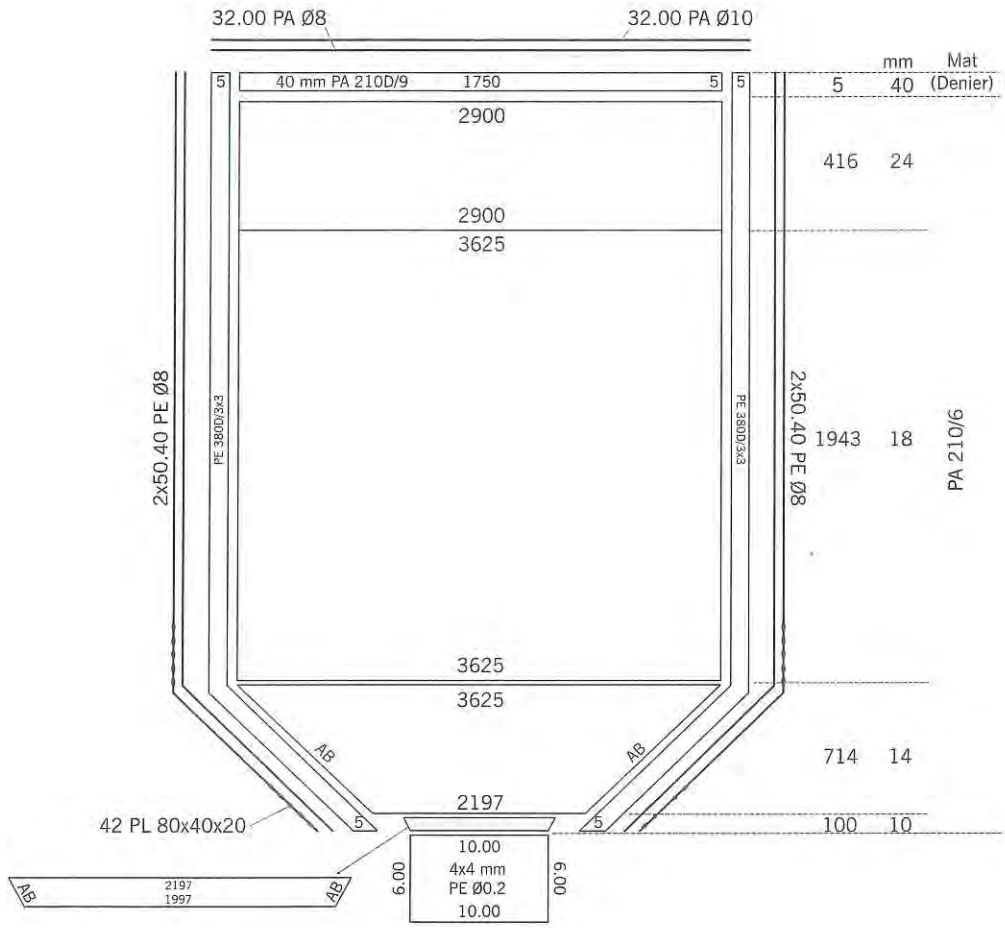


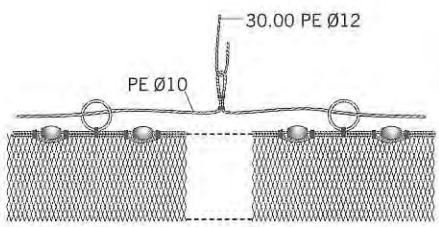

3PL Ø200
STONE 15Kg
SST Ø100
STONE 15Kg
Current

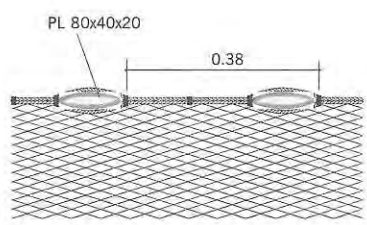
LIFT NET
One Boat Lift Net
Sardine, Scad

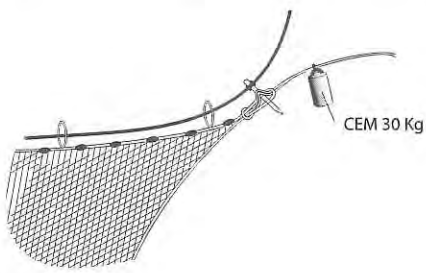
VESSEL
Loa : 14
Hp : 22

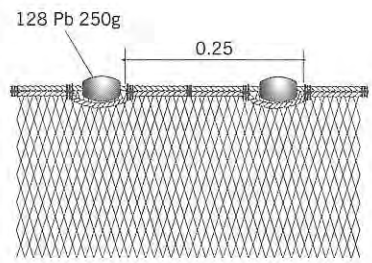
LOCATION
Ly Hoa
Quang Binh

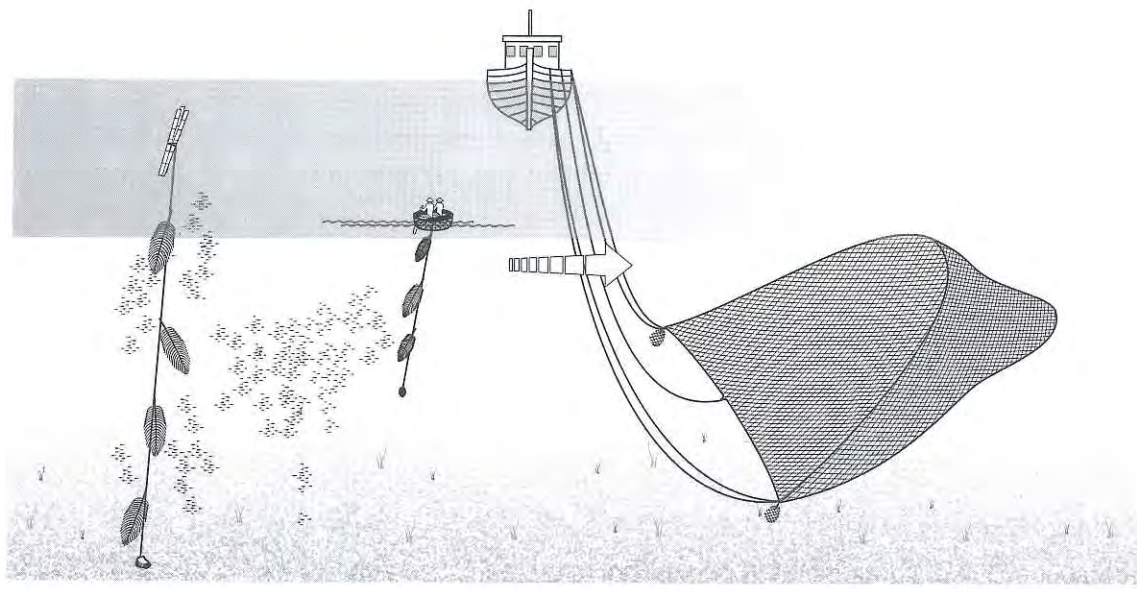


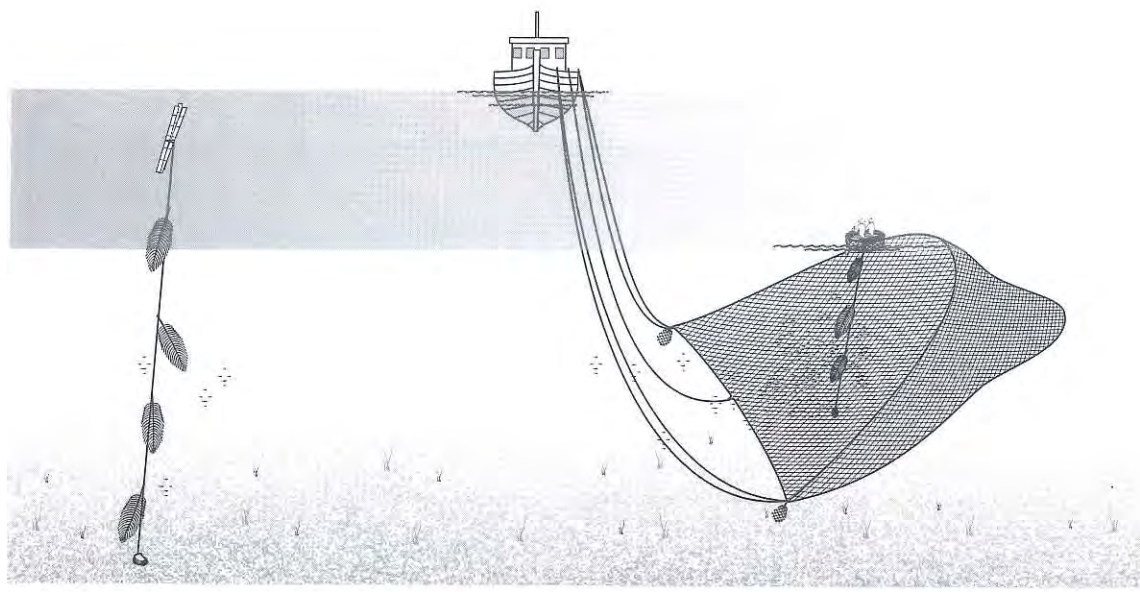


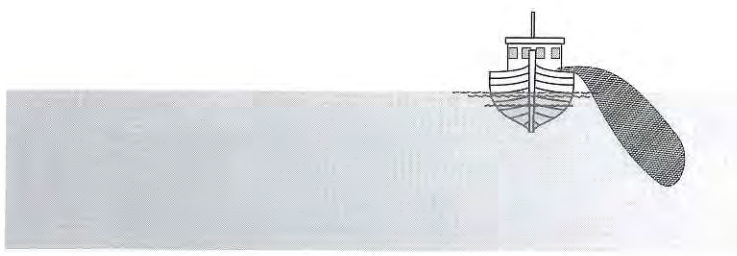








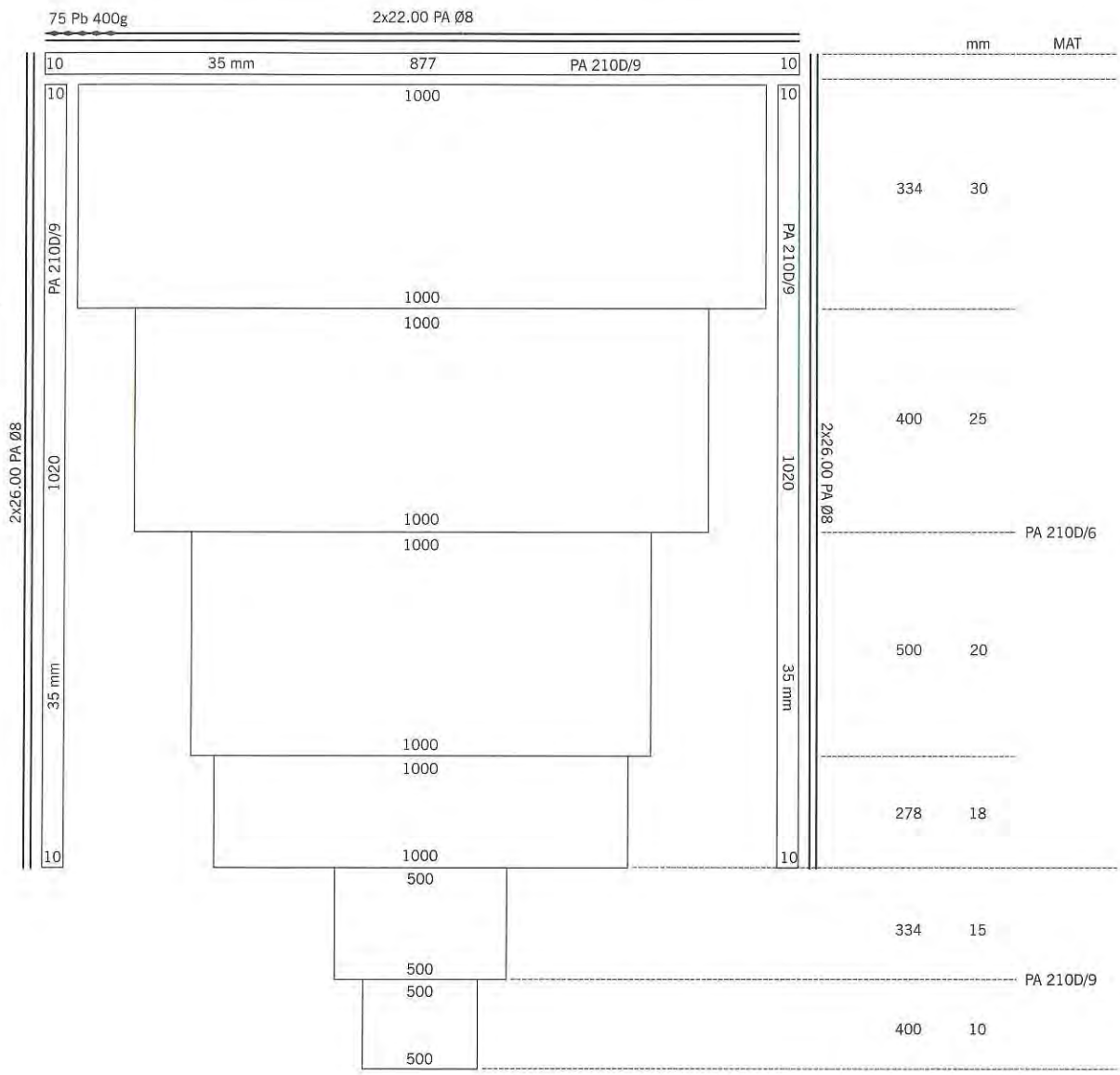


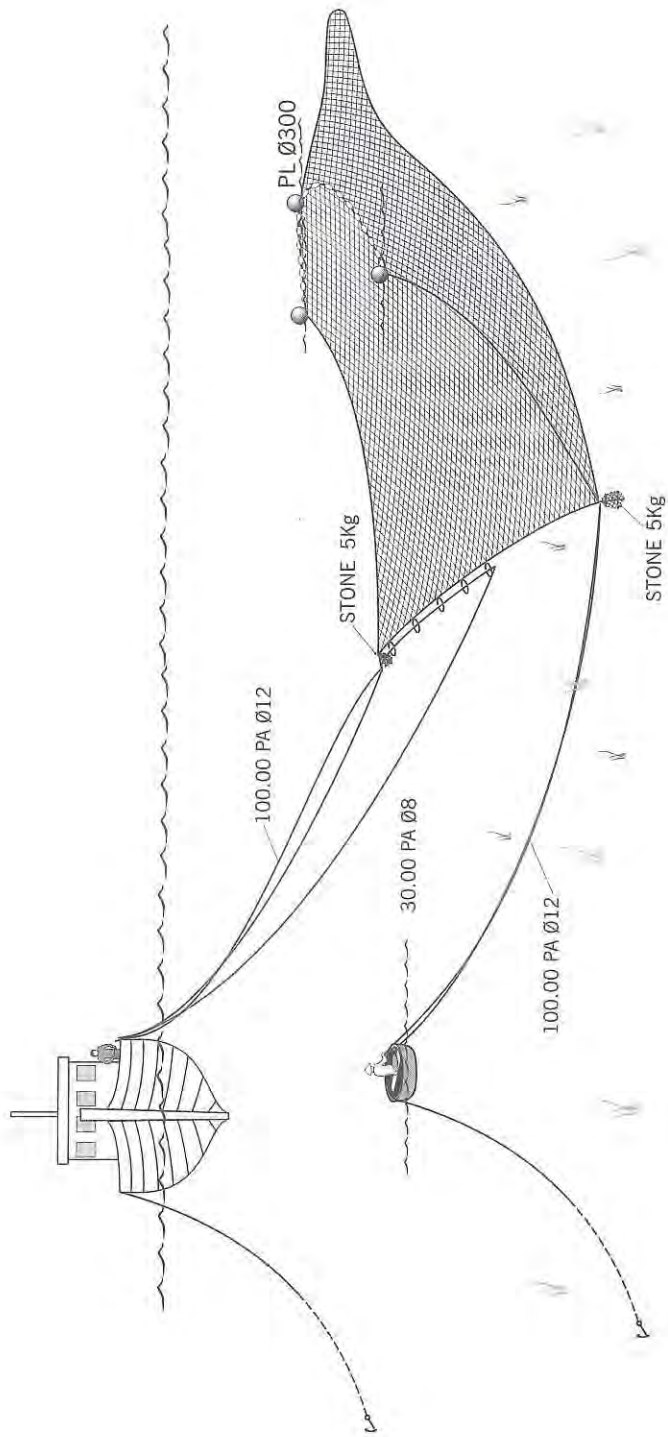


LIFT NET
One Boat Lift Net
Sardine, Scad, Squid
Mackerel, Tuna

VESSEL
Loa : 14.1
GT : 24
Hp : 33

LOCATION
Phan Ri
Binh Thuan

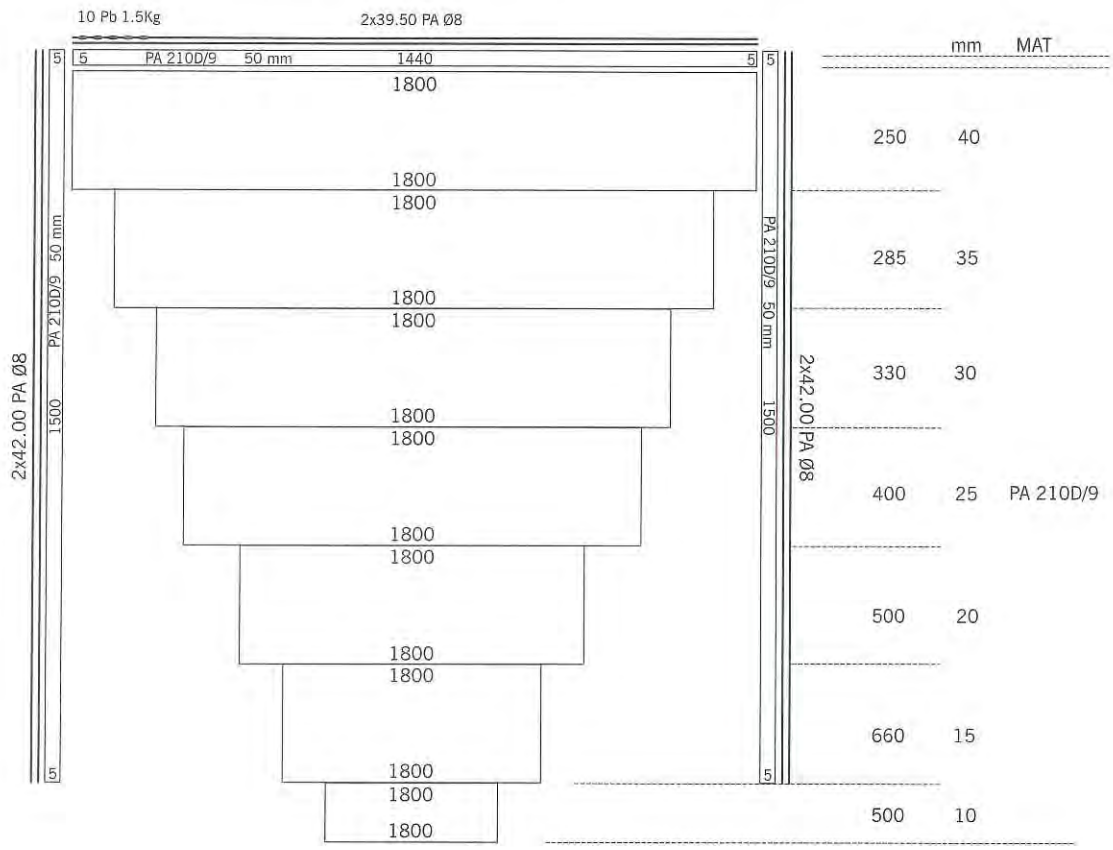


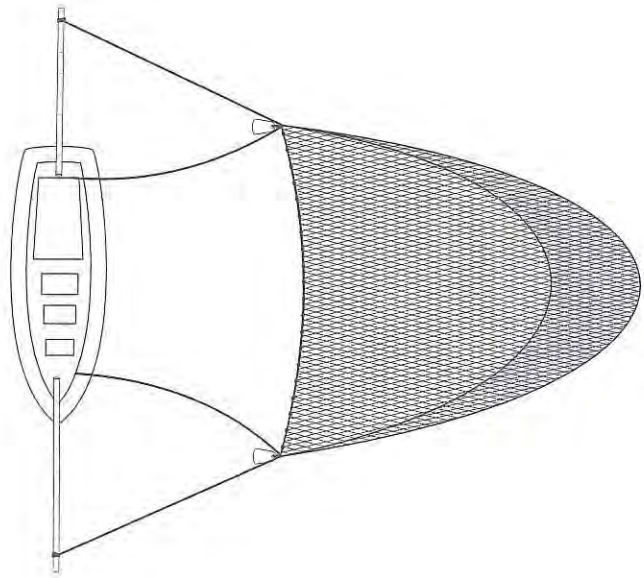

PL Ø300
STONE 5Kg
STONE 5Kg
100.00 PA Ø12
30.00 PA Ø8
100.00 PA Ø12

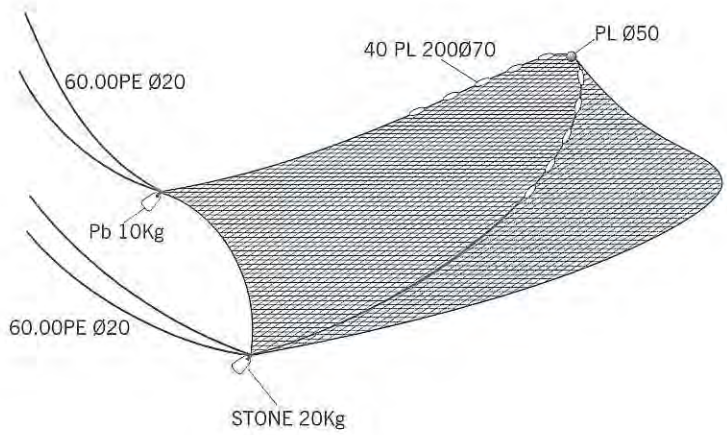
LIFT NET
One Boat Lift Net
Fishes, Squid

VESSEL
Loa : 14.3
Hp : 45

LOCATION
Ham Tan
Binh, Thuan



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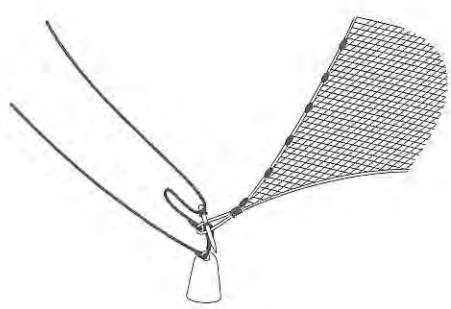
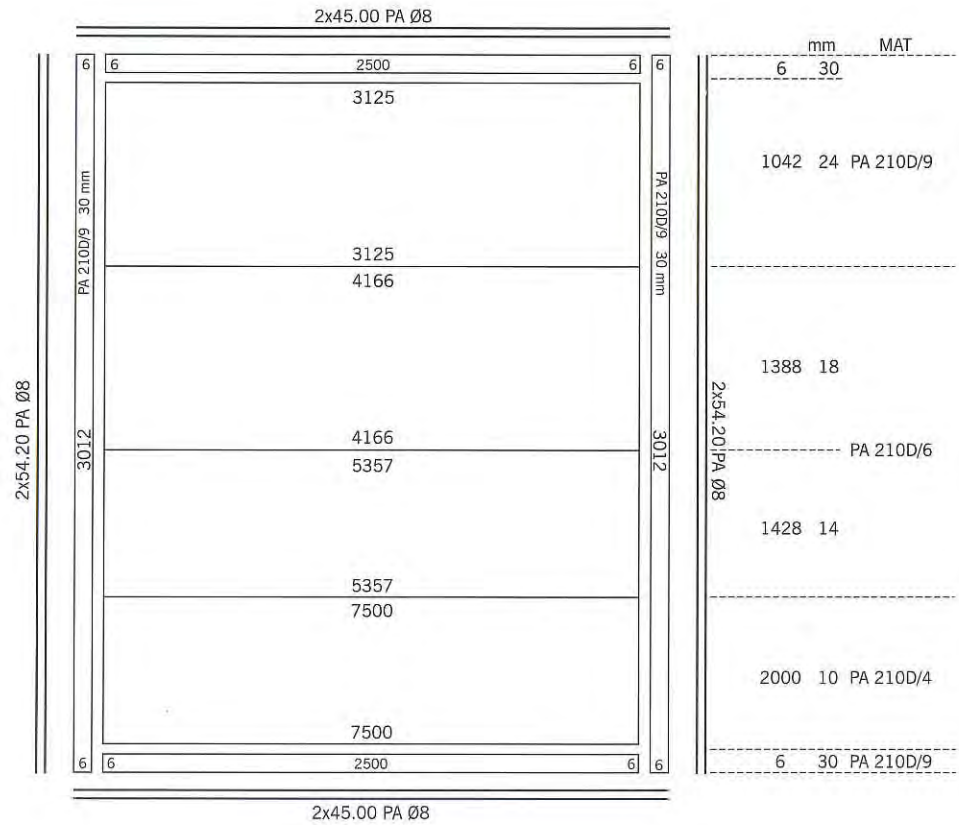
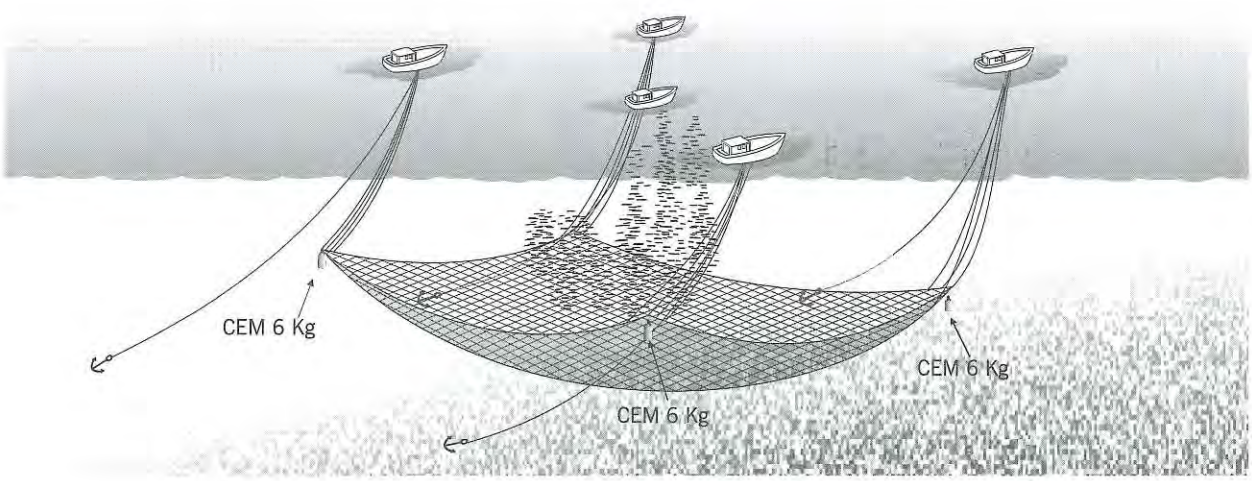


LIFT NET
Luring Lift Net, Four Boats
Pelagic Fish

VESSEL
Loa : 14
Hp : 33

LOCATION
Cua Lo
Nghe An

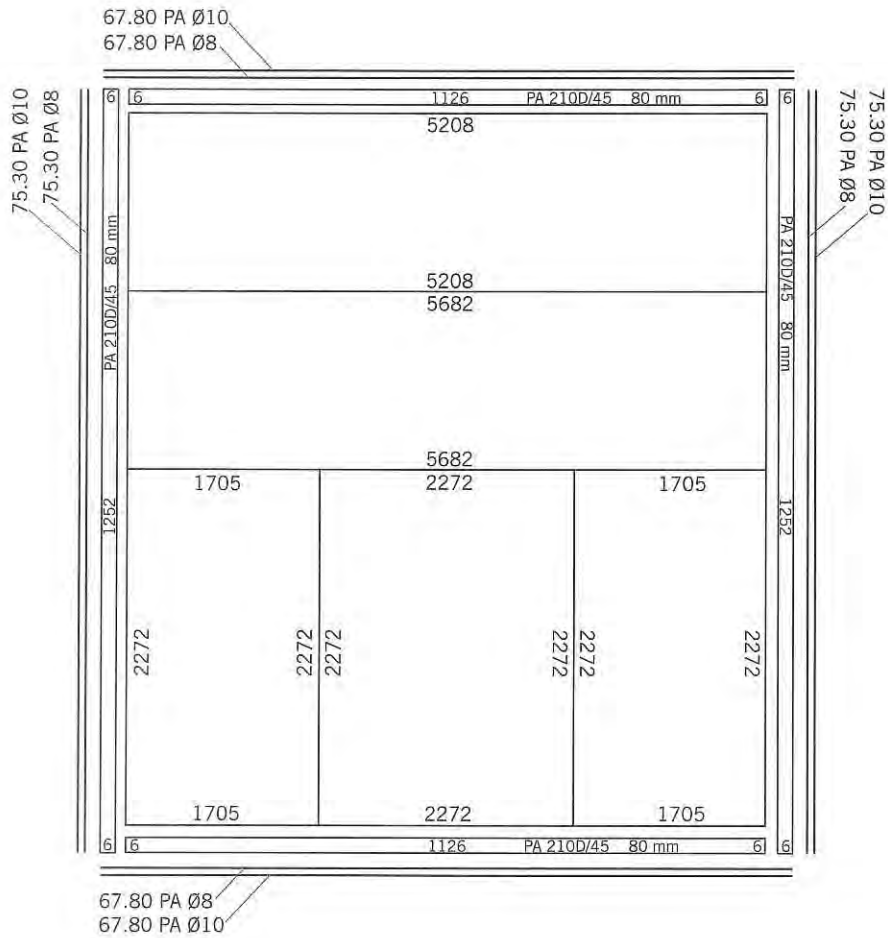


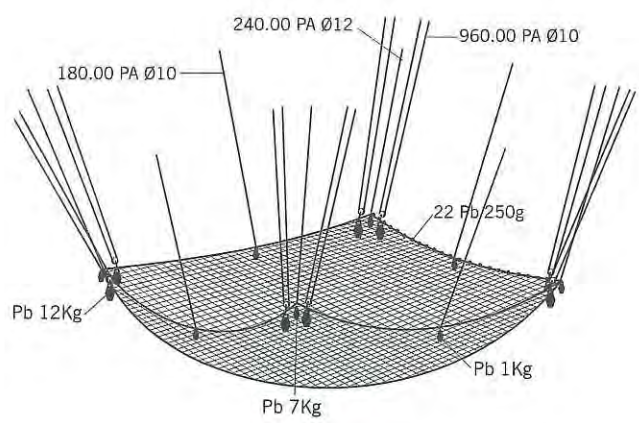


LIFT NET
Luring Lift Net, Four Boats
Pelagic Fish

VESSEL
Loa : 14
Hp : 15+22

LOCATION
Quang Ha
Quang Ninh

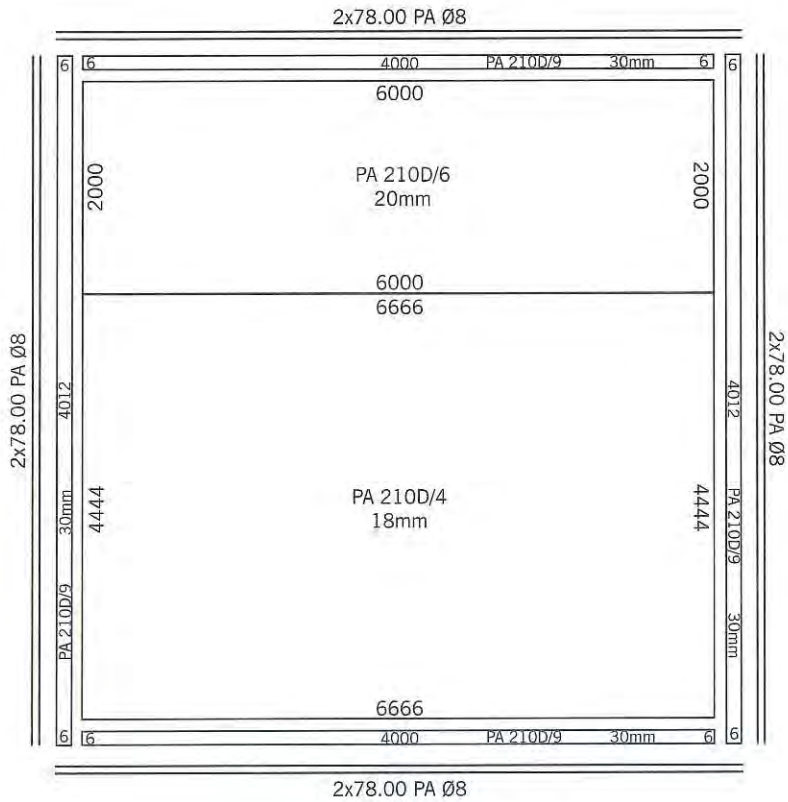


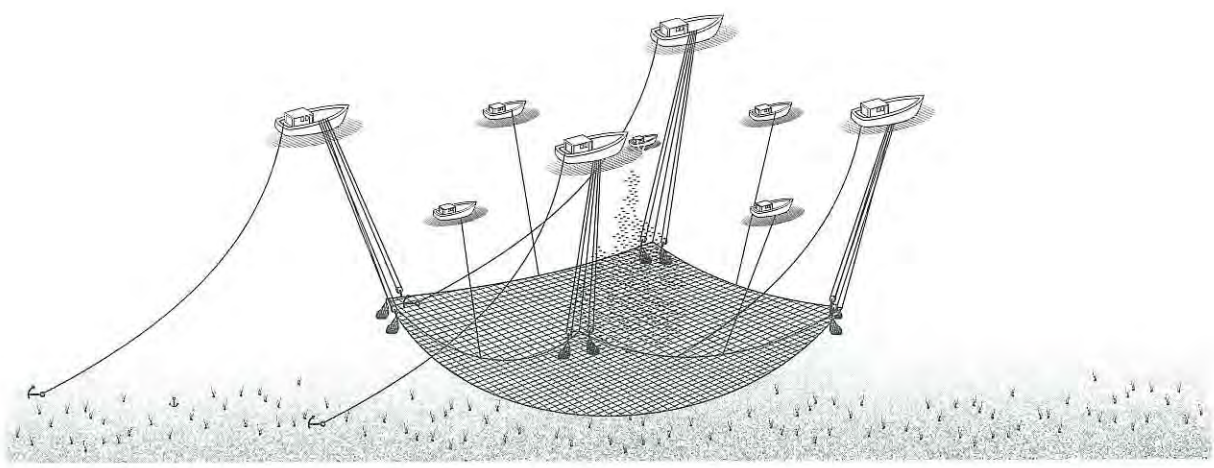


LIFT NET
Luring Lift Net, Eight Boats
Pelagic Fish

VESSEL
Loa : 16.2
Hp : 45

LOCATION
Cua Lo
Nghe An

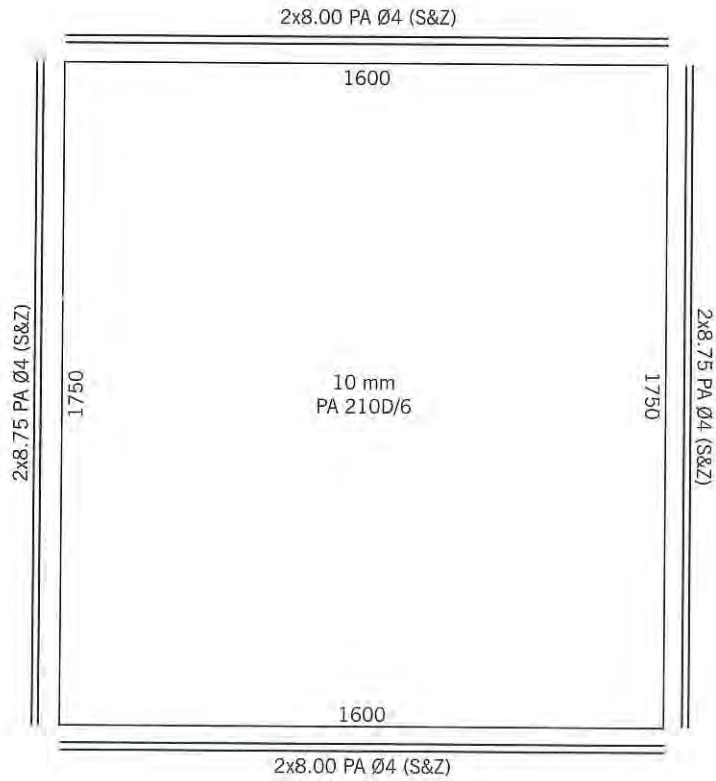


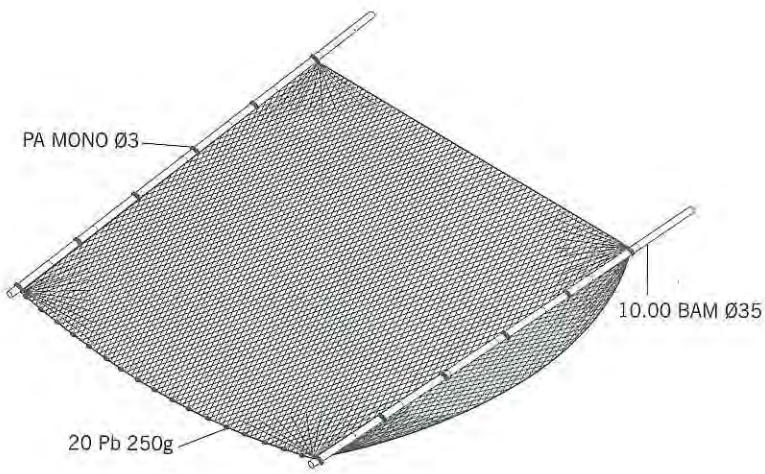


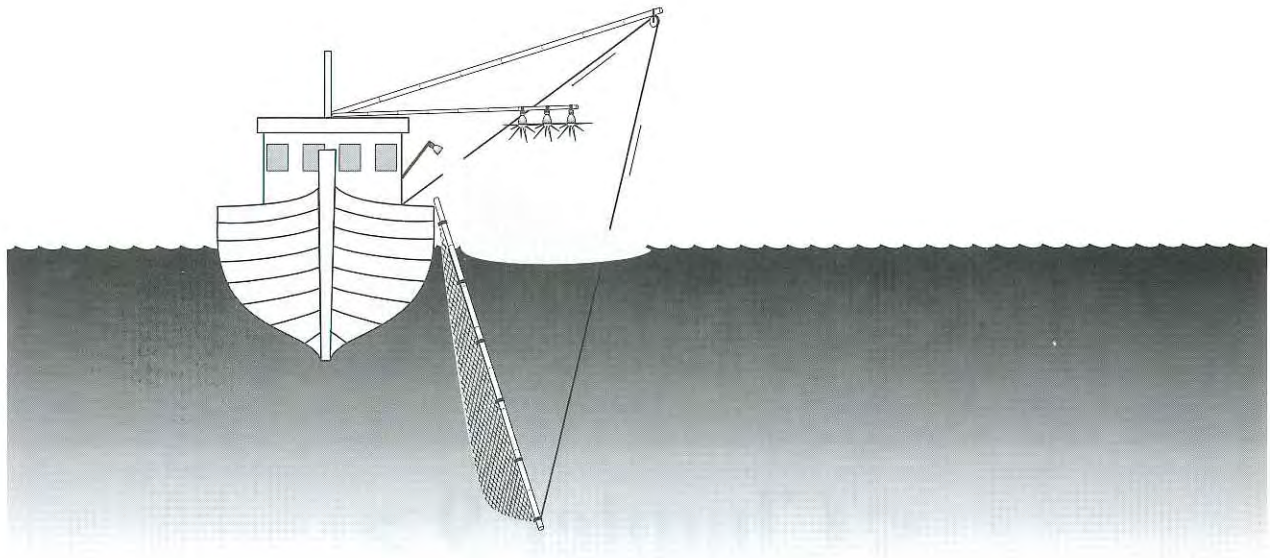
LIFT NET
Stick Held Dip Net
Anchovy

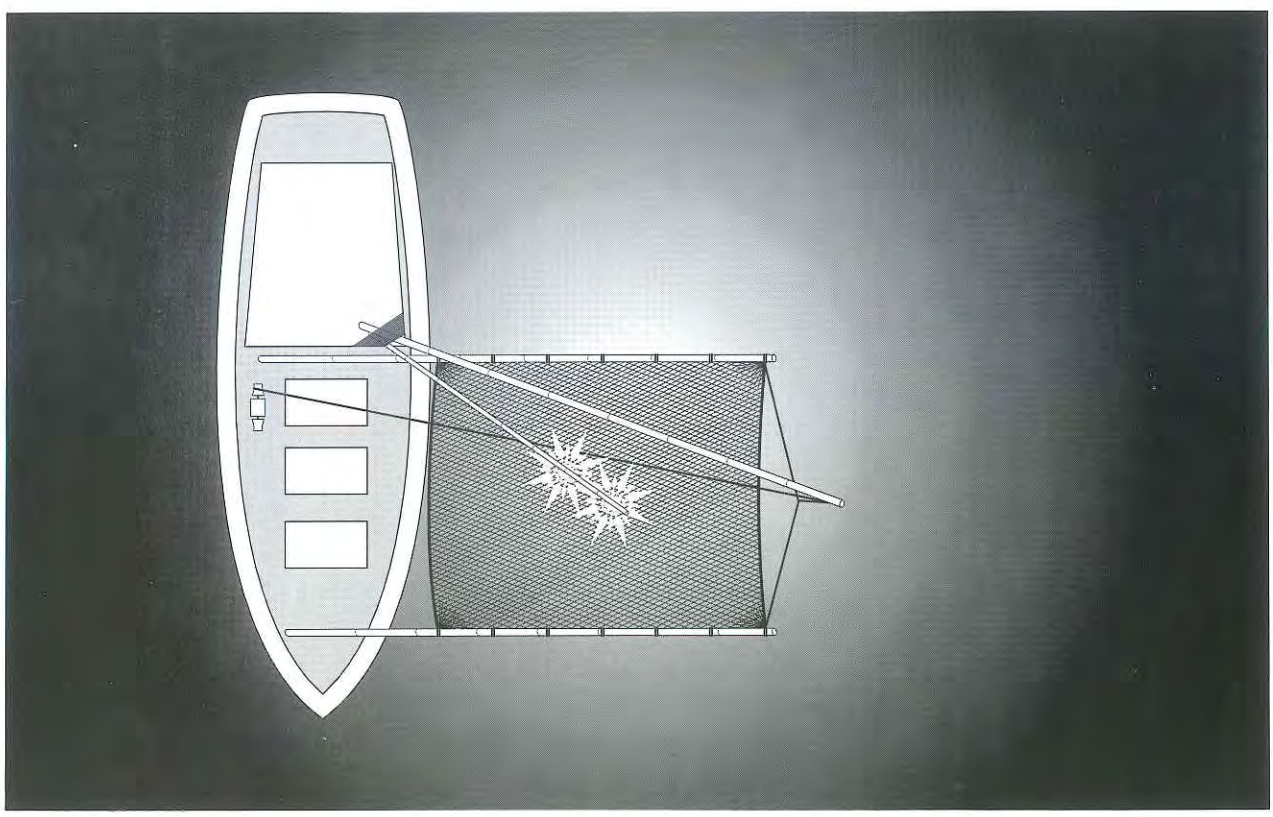
VESSEL
Loa : 15.5
Hp : 33
EG : 2x5KVA
LL : 5KW

LOCATION
Nha Trang
Khanh Hoa









< Chapter 9 >

Trap Fishing

Trap fishing includes fishing gear set and stationary in a given position. In Vietnam, this fishing is usually conducted in estuaries or coastal areas.

This is a traditional fishing throughout the country. The majorities are set nets and bottom net fishing shrimp and juvenile fish. There is a small number of traps and big set nets catching species of high economic value, like: mackerel, tuna, squid and crab ect.

Fishing Gear and Methods

1. Set Net

The set net has the main structure consisting of two parts: Leaders, play ground and bag net. The leader net is usually 200 - 500 m long and has the height equal to the depth of the fishing ground. The net made of nylon multifilament of 210D/80 - 210D/90 with mesh size of 200 -250 mm. The leader net is set cross the movement direction of fish schools, whereas the playground net has one or two entries. Its structure is complicated to reduce the escape of fish from the playground. There is a lift net or dip net in the playground to collect fish. The mesh size of the playground net is 90 - 120 mm and smaller than that of the leader net. The mesh size of the net for collecting fish is much smaller and depends on the target species. The material of manufacture is nylon multifilament of 210D/9 - 210D/21.

This is a stationary fishing gear. The net is set once during the fishing season. Its setting technique is very complicated. A system of anchors is used to keep the entrance net and the box net in a fixed position. When fish go into the box net, fishermen use purse nets (scoop net, lift net) to catch fish in the box net.

The main target species of this fishing gear are mackerel, tuna and other pelagic fishes.

2. Bamboo Stake Trap

This fishing gear and method has a main structure similar to set net, but the material of making the net is bamboo, wood and minnow net. The fishing grounds are estuaries and the main target species are juvenile shrimp and small fishes.

3. Fyke Net (Stow Net)

The Fyke net has bag-shaped structure with or without wings depending on the regional tradition and experience. The net is made of polyethylene yarn of 380D/2x3 -380D/4x3 or nylon yams of 210D/6 - 210D/12 and the mesh size is 10 - 20 mm. The mouth of net is fastened to two fixed poles against the current. When the current carrying the fish goes through the net, fish and

shrimp are kept in the cod-end.

4. Traps

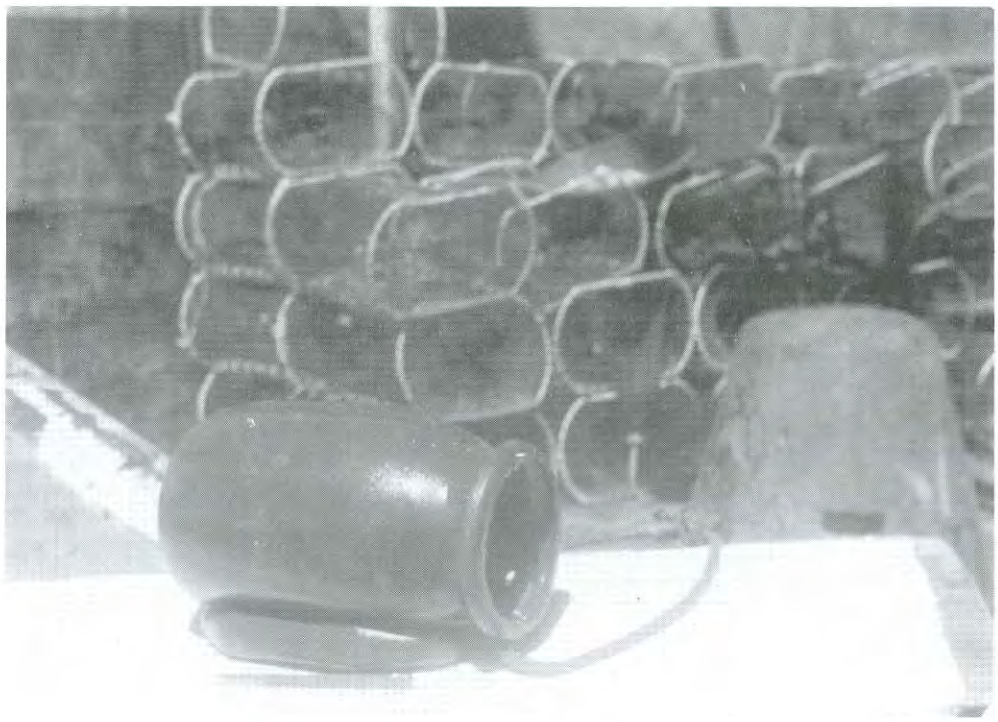
Basing on target species of this fishing, traps can be divided into: cuttlefish traps, crab traps, fish traps, etc. This has developed little in Vietnam and is focused mainly in the coastal areas, it is not operated in the offshore areas and seawaters having a rough or complex bottom.

The fishing gear has the structure of parallelepiped or cylindrically shape with one or two entries and one entry for collecting catch. Bait is set in the traps to attract the target species. Traps may be made of bamboo, rattan or wire net; or with hard frames and net covering the traps. They can be set independently because of the float or set in one line on the main rope. Target species are of high economic values. However, this fishing has not been developed widely and has not attracted enough research yet, it should be applied using advanced techniques to operate in the waters having species of higher economic value (and only it can exploit).

Depending on the target species, the methods of setting, keeping and collecting traps are different.

Lobster traps and grouper traps must be set separately and placed against the entrances to caves. These traps are fixed for months in the waters. The collecting operation is carried out daily or weekly.

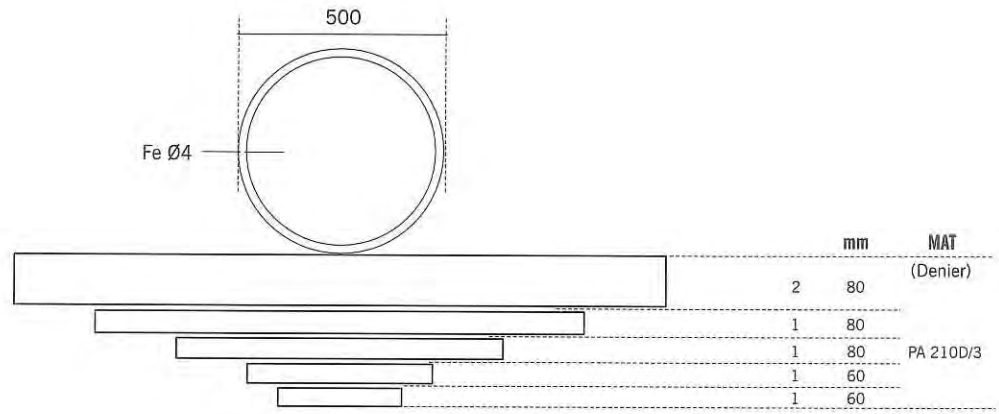
Crab traps are set in one line of hundreds, one by one. They are placed and collected daily.

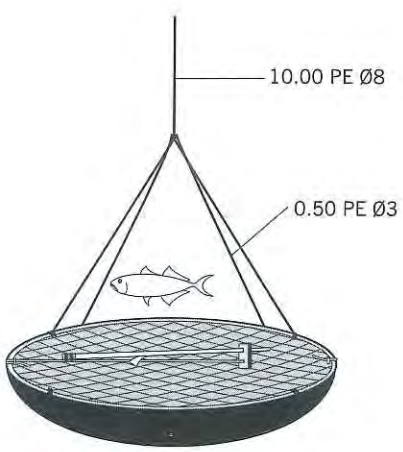


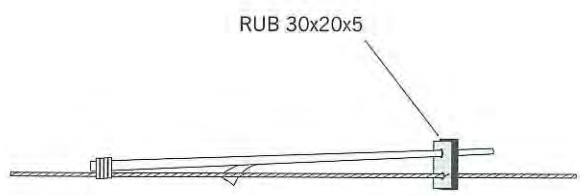
TRAP
Crab Liftnet, Portable
Crab, Blue Swimming Crab

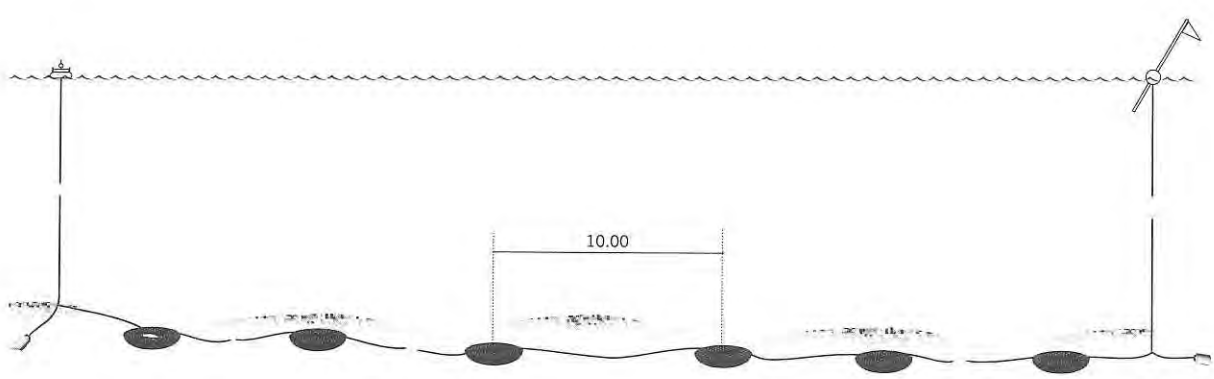
VESSEL
Loa : 12.5
Hp : 12

LOCATION
Ly Hoa
Quang Binh





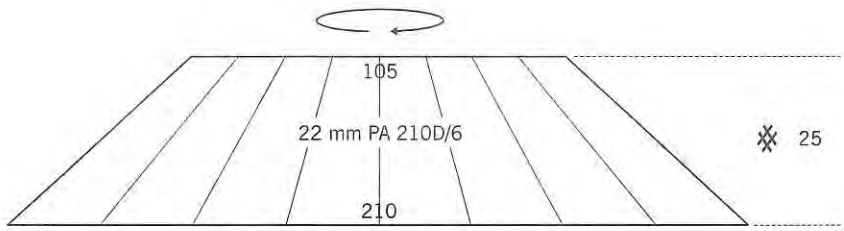


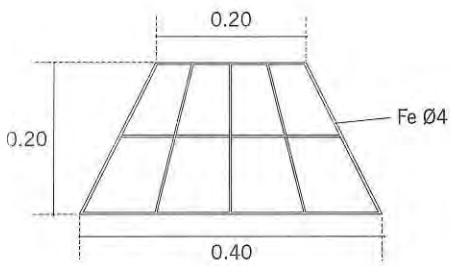


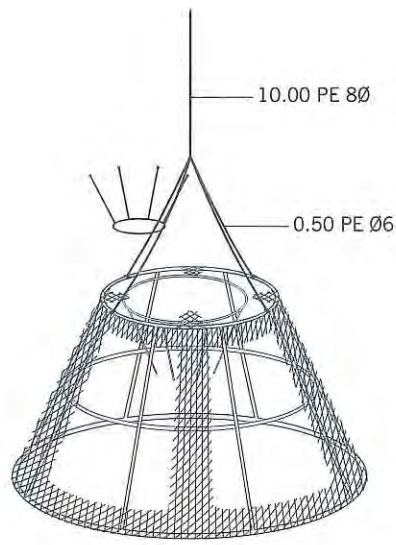
TRAP
Snail Liftnet, Portable
Babylonia

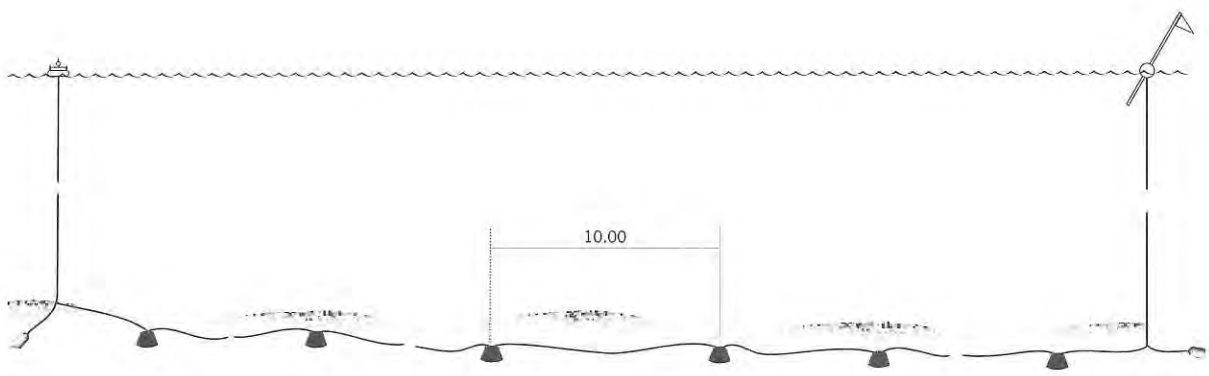
VESSEL
Loa : 11
Hp : 12

LOCATION
Ly Hoa
Quang Binh





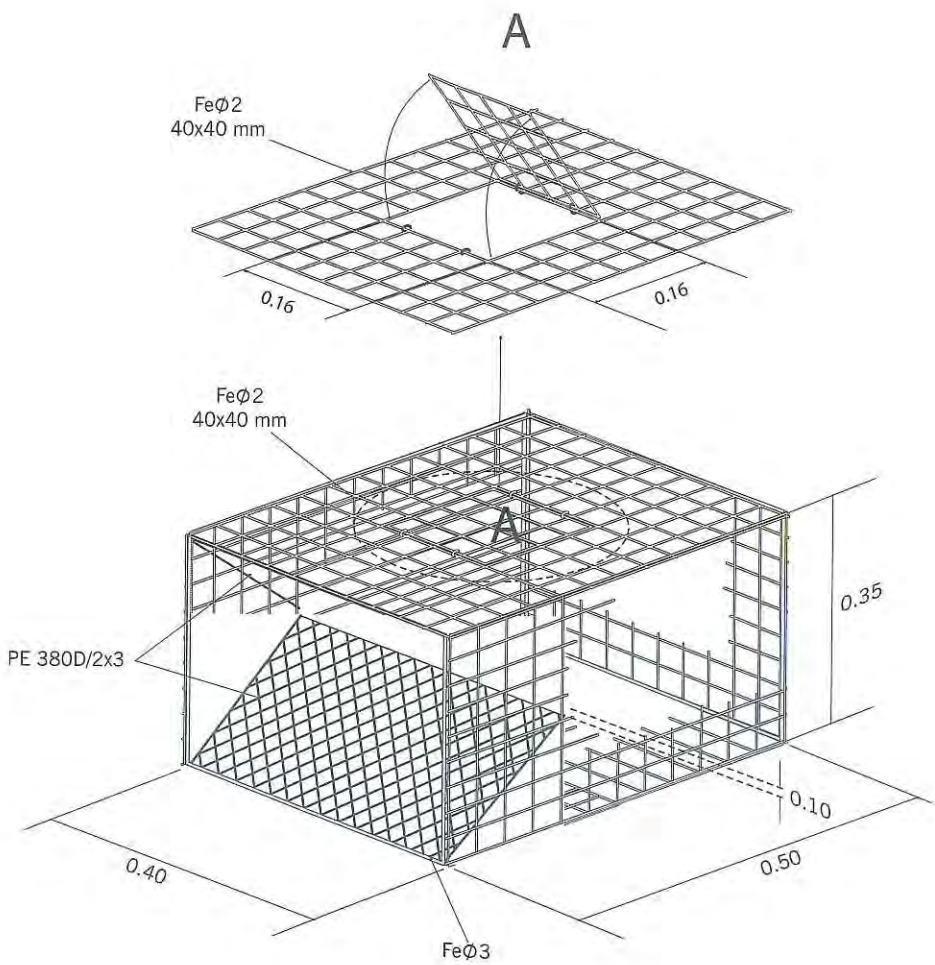


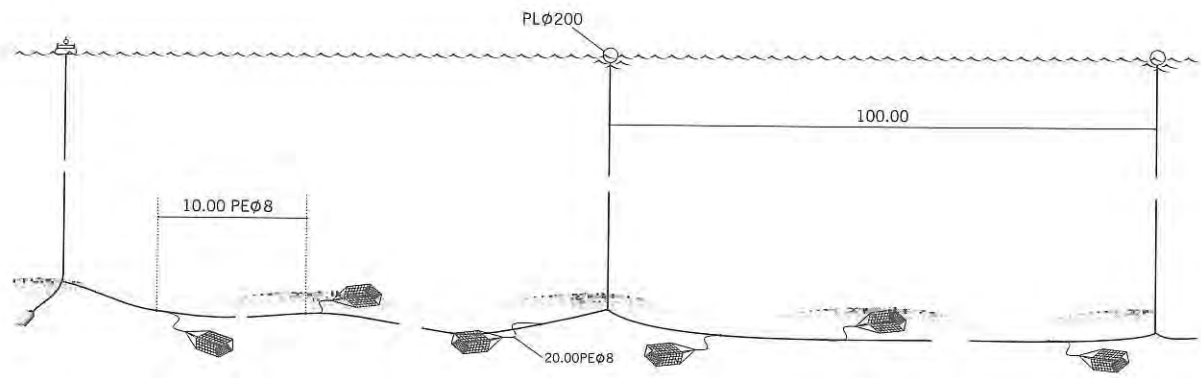


TRAP
Crab Trap
Crab, Swimming Crab

VESSEL
Loa : 12.8
Hp : 12

LOCATION
Ly Hoa
Quang Binh

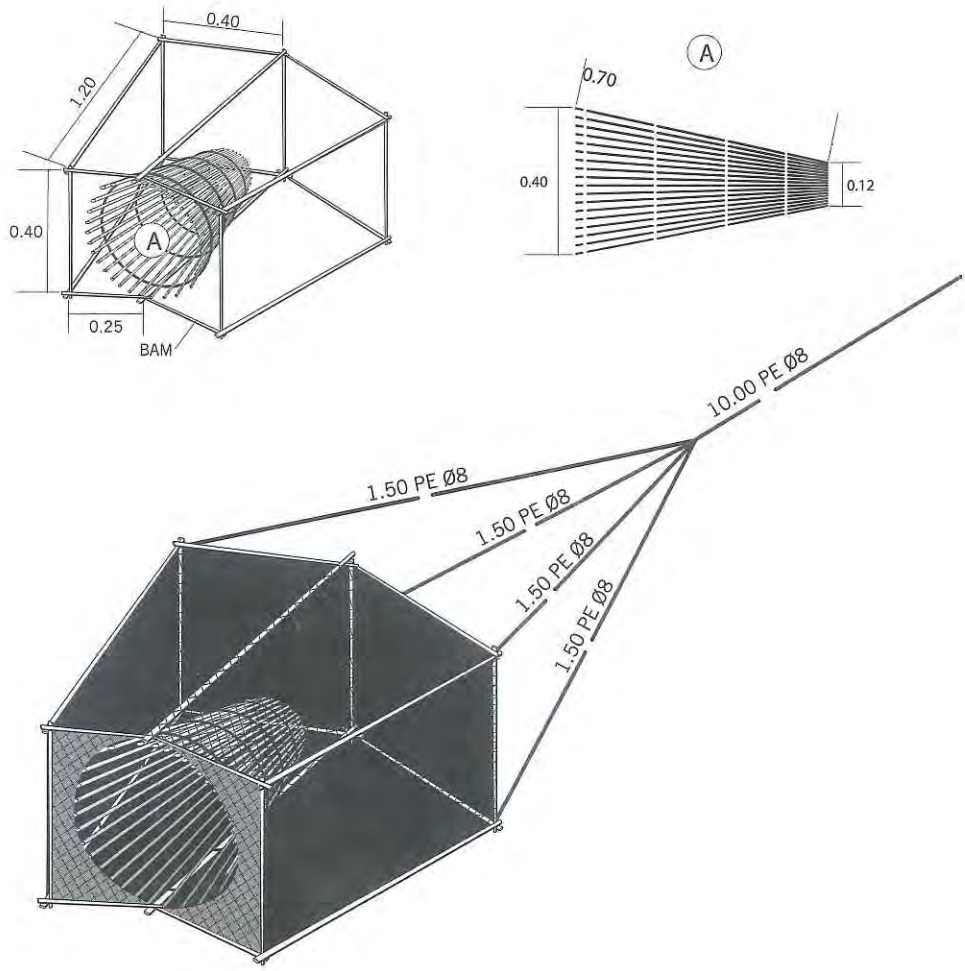


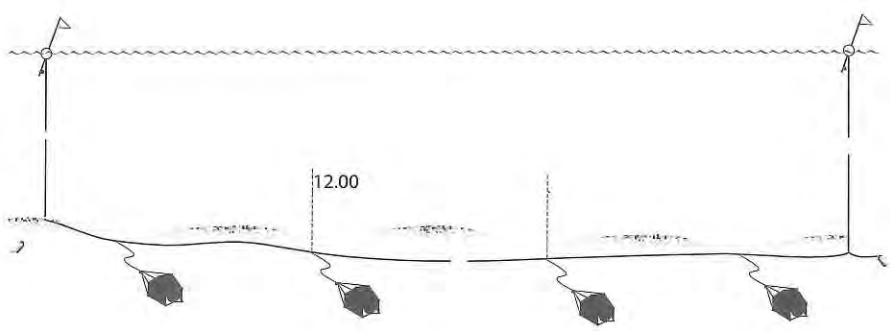


TRAP
Cuttlefish Trap
Cuttlefish

VESSEL
Loa : 12
Hp : 15

LOCATION
Ly Hoa
Quang Binh

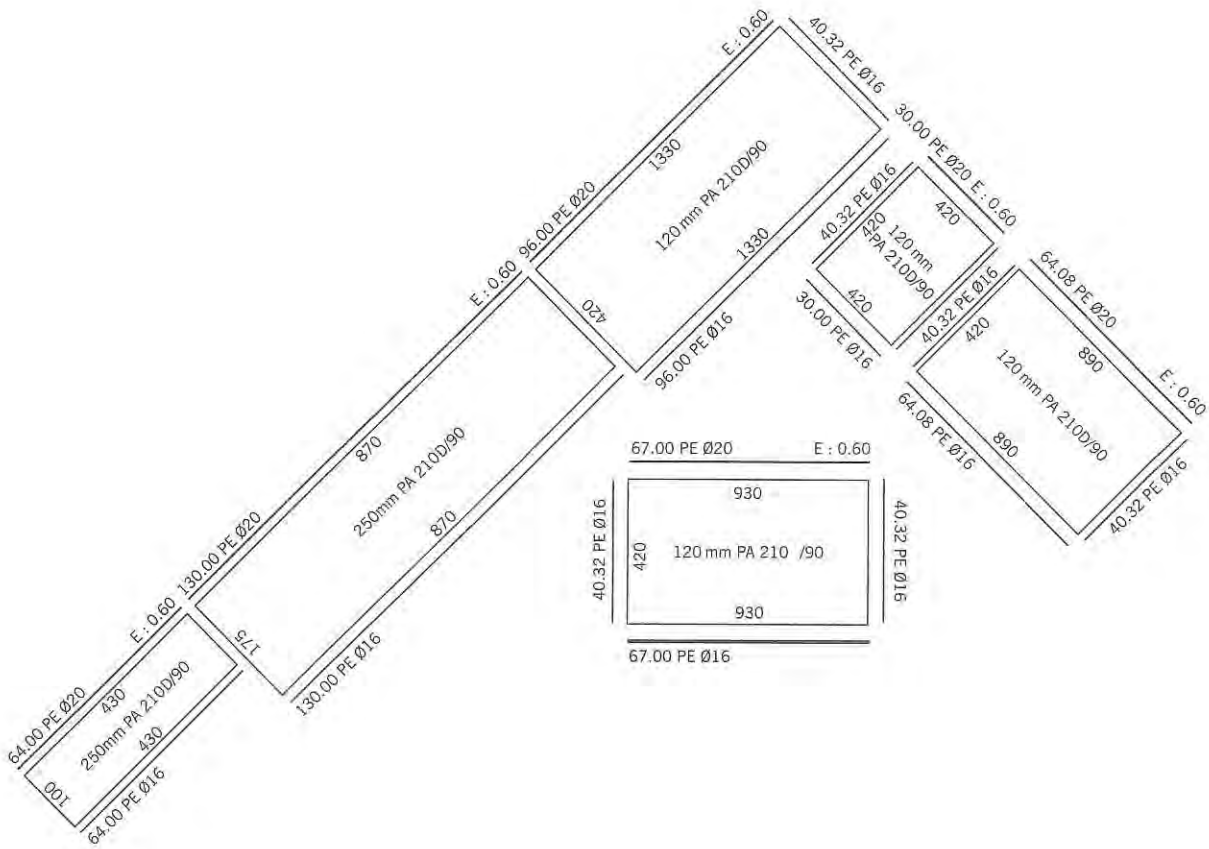


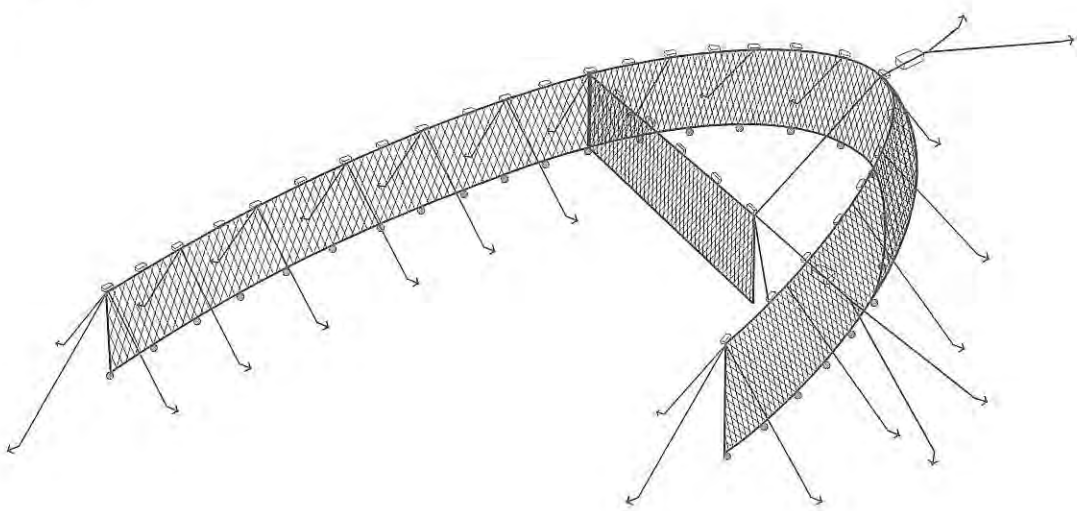


STRAP
Set Net
Tuna, Mackerel

VESSEL
Loa : 13.5
Hp : 45

LOCATION
Nha Trang
Khanh Hoa

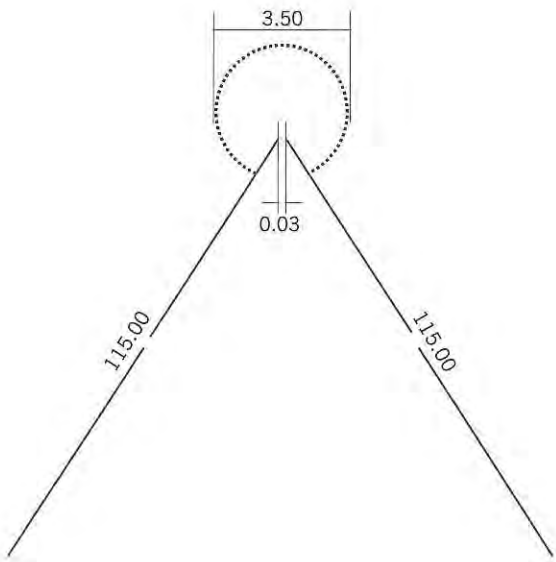


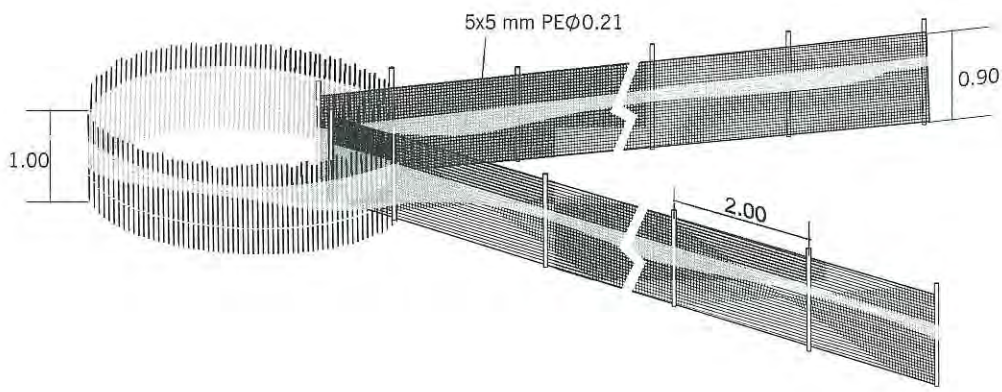


TRAP
Shallow Bamboo Stake Trap
Juvennile Fishes, Shrimp

VESSEL
Loa : 8
Hp : 6

LOCATION
Phu Loc
Thua Thien-Hue

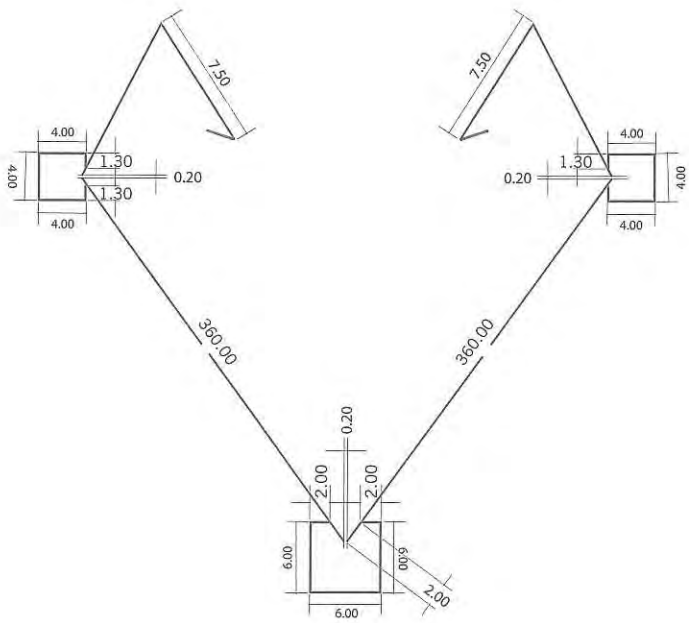


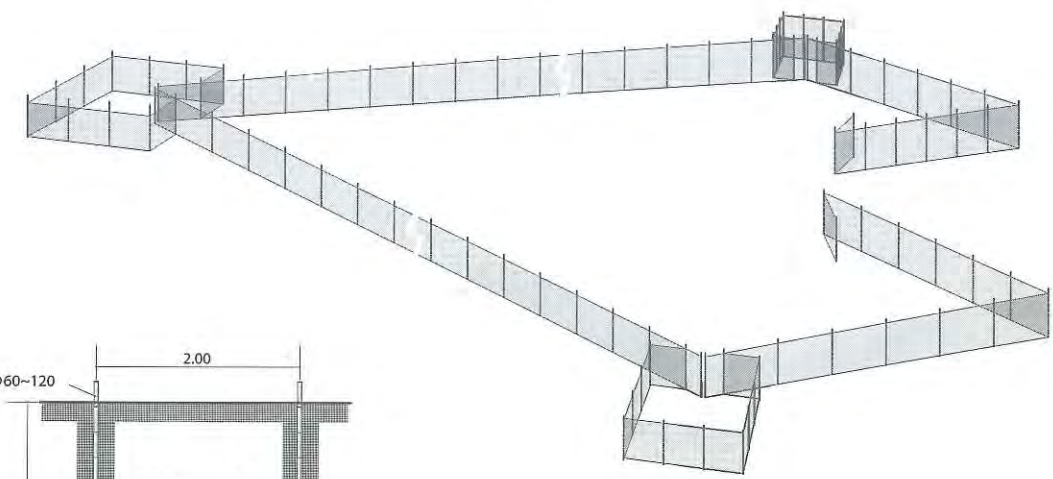


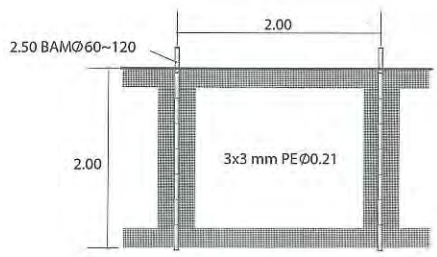
TRAP
Shallow Stake Trap
Juvenile Fishes, Shrimp

VESSEL
Loa : 14
Hp : 22

LOCATION
Nghia Hung
Nam Dinh



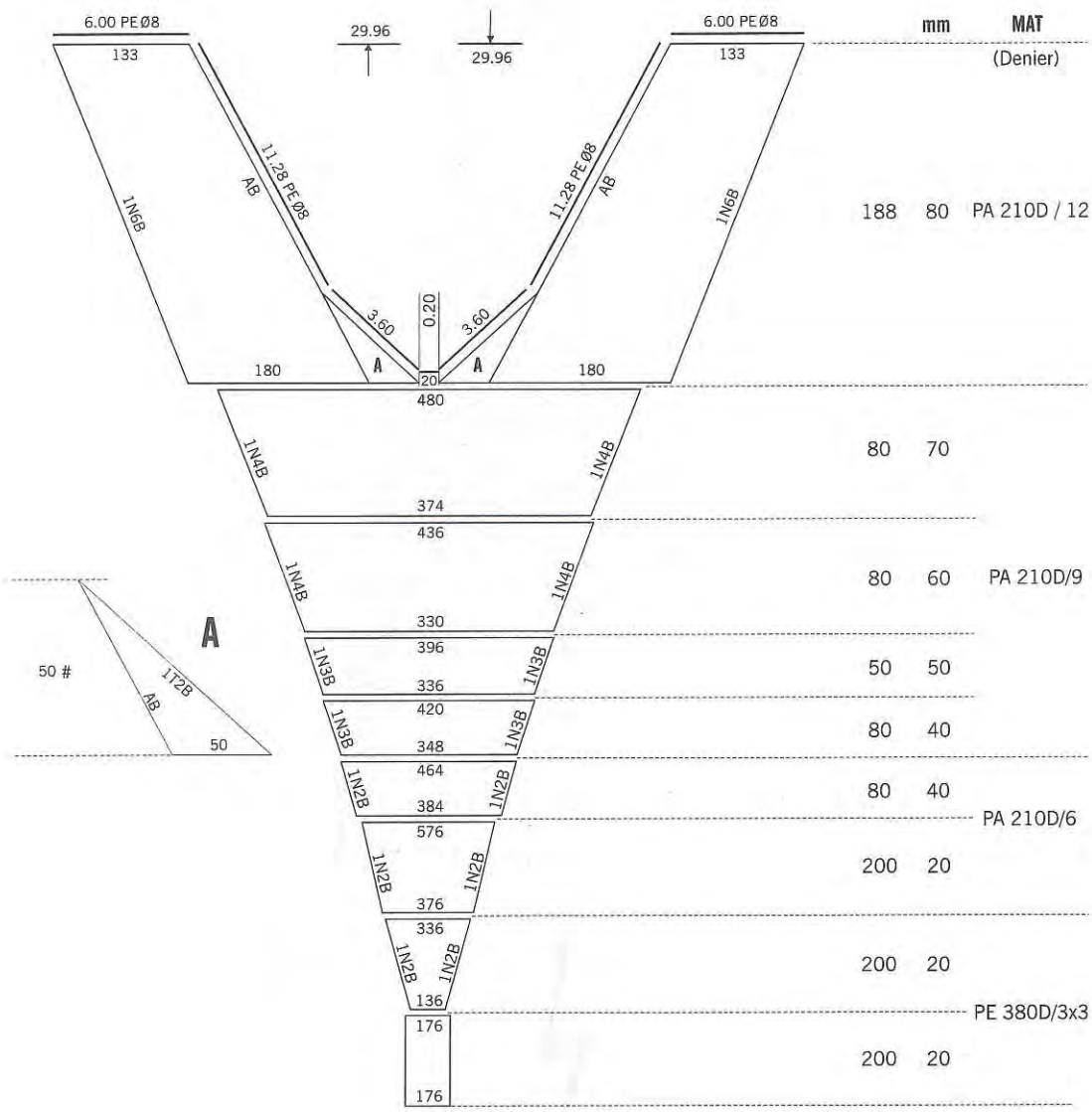


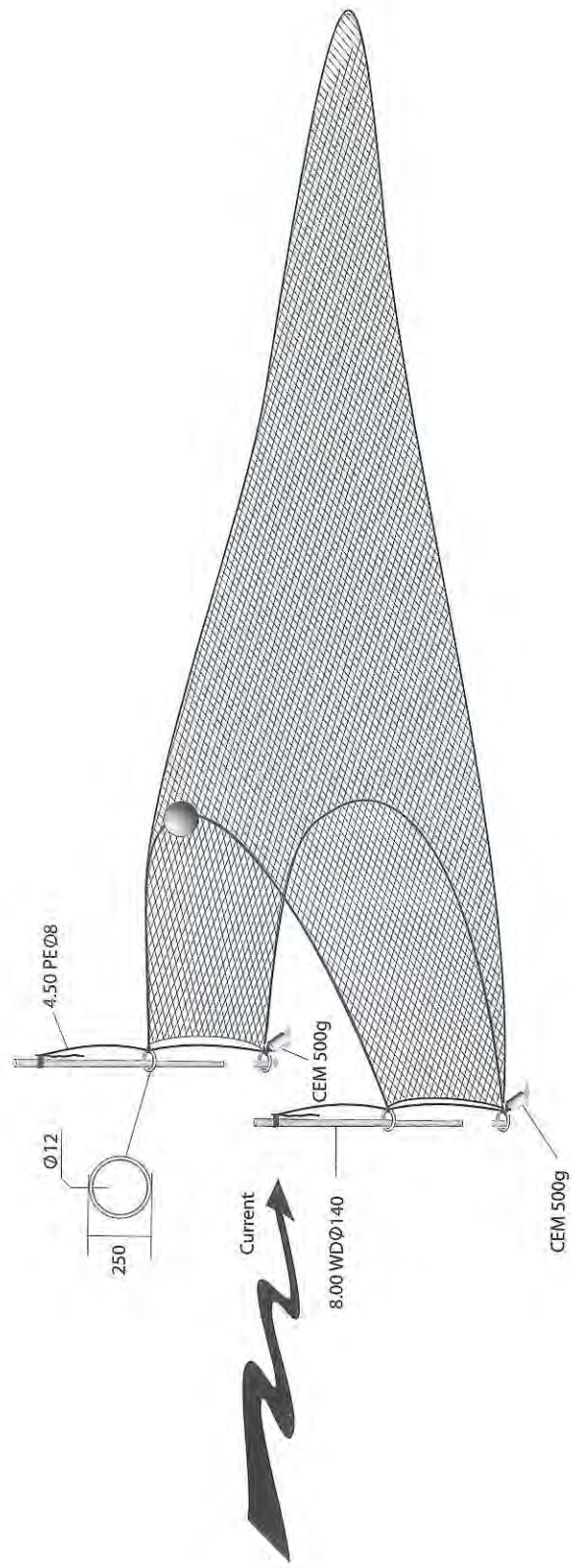


TRAP
Fike Net
Shrimp, Fishes

VESSEL
Loa : 8.00
Hp : 6

LOCATION
Ly Hoa
Quang Binh

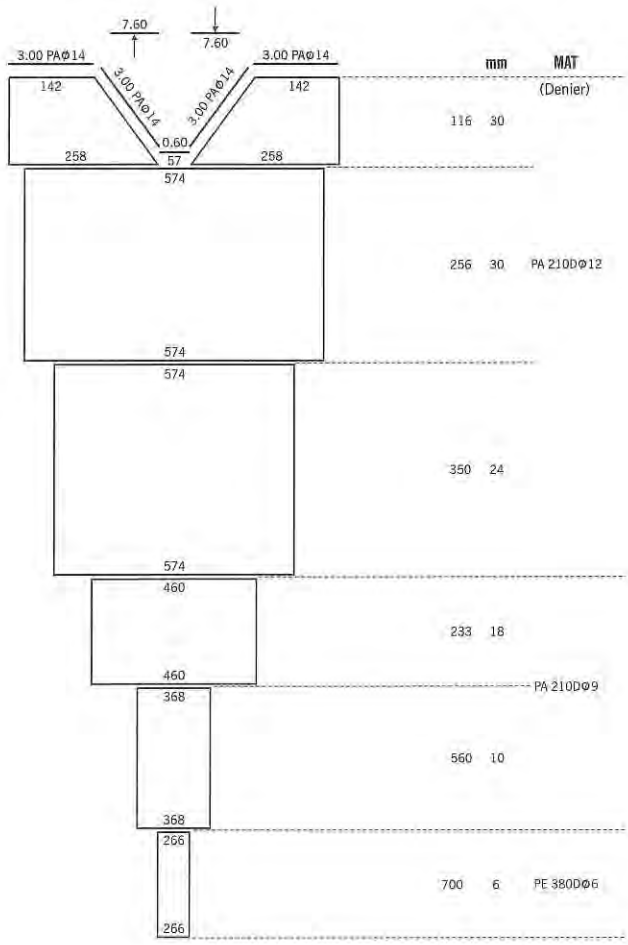


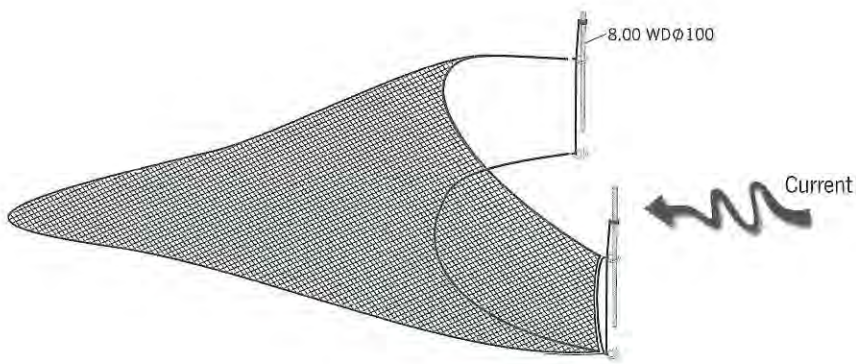

4.50 PEØ8
CEM 500g
Ø12
250
Current
8.00 WDØ140
CEM 500g

TRAP
Fike Net
Shrimp, Fishes

VESSEL
Loa : 8.7
Hp : 12

LOCATION
Thuan An
Thua Thien-Hue

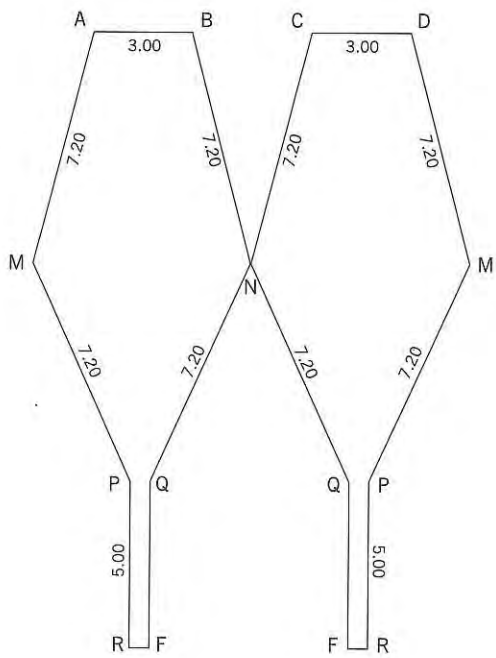


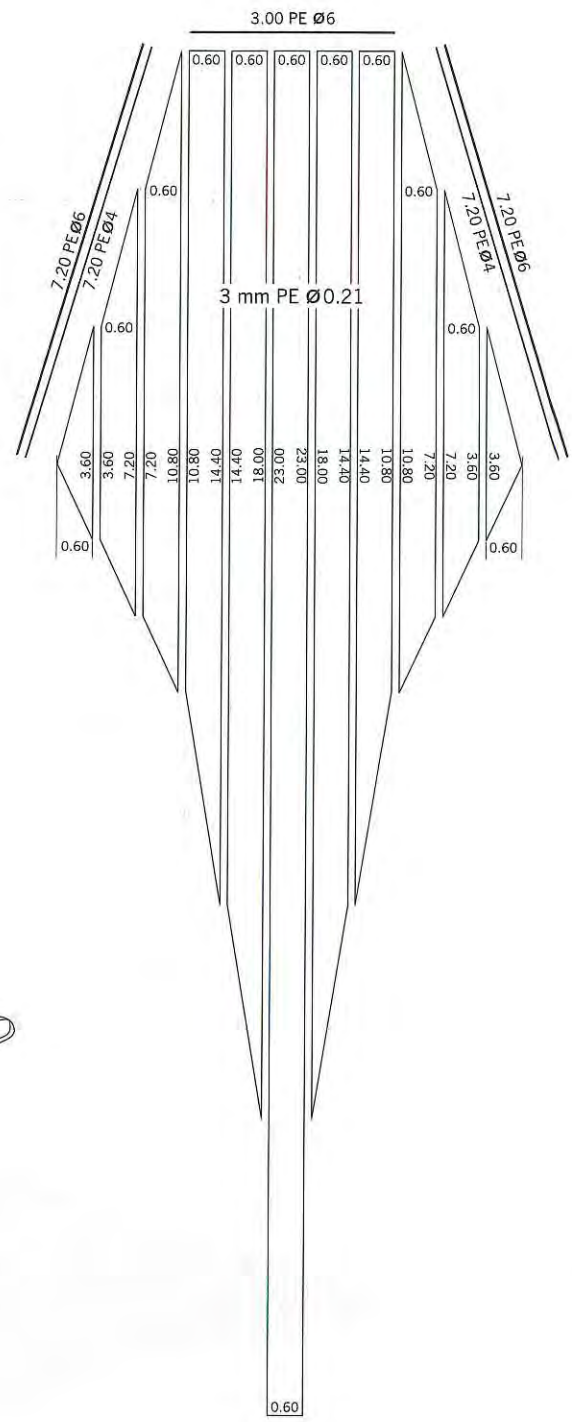


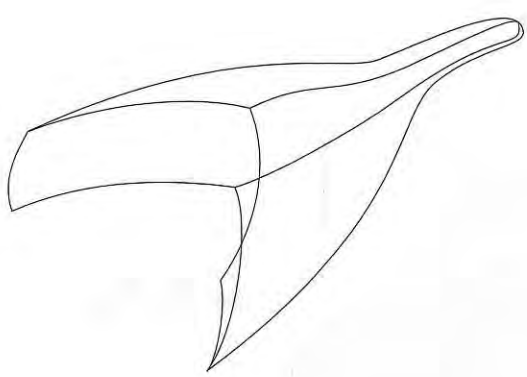
TRAP
Fike Net
Shrimp, Fishes

VESSEL
Loa : 8
Hp : 6

LOCATION
Nghia Hung
Nam Dinh



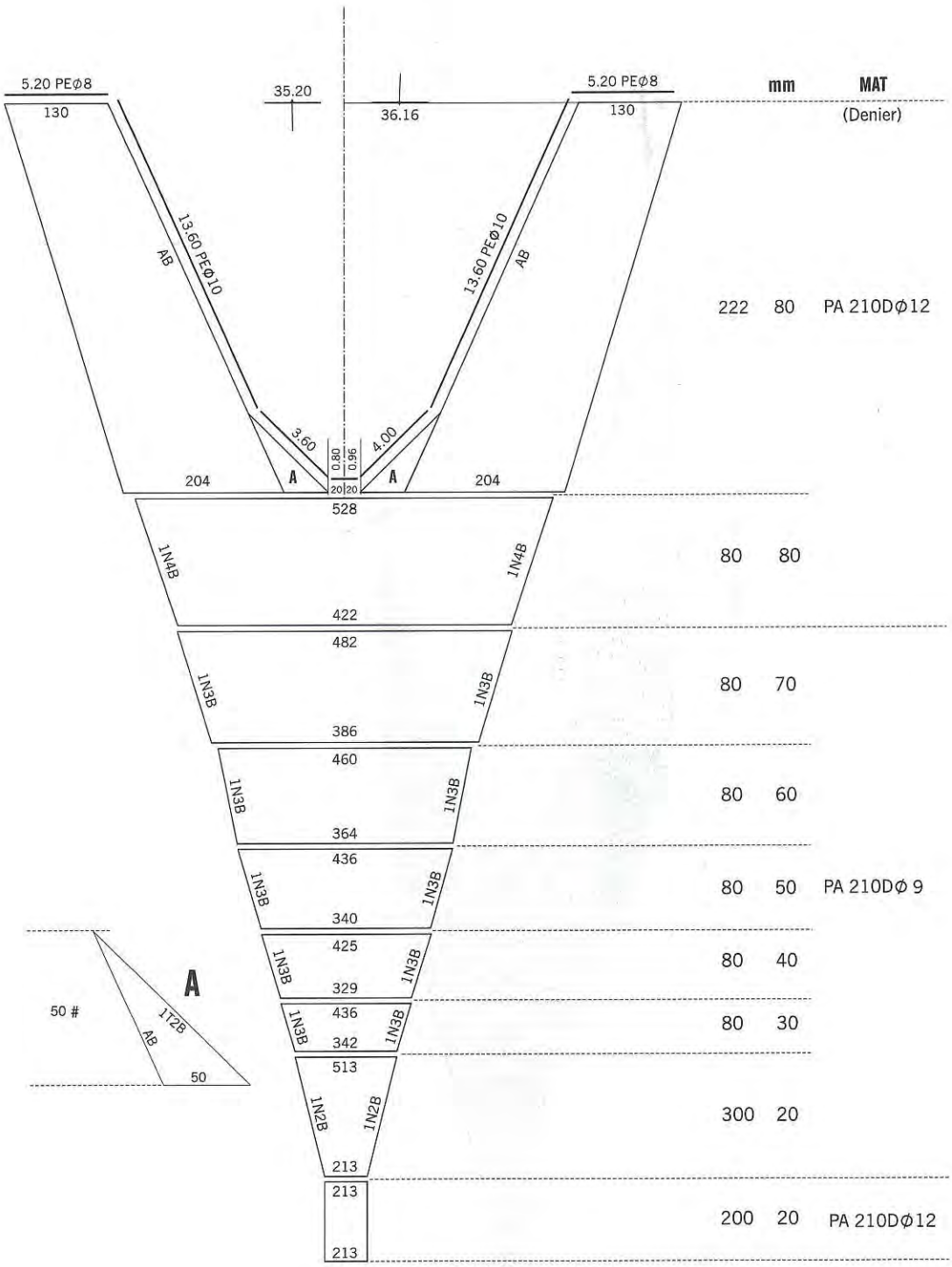


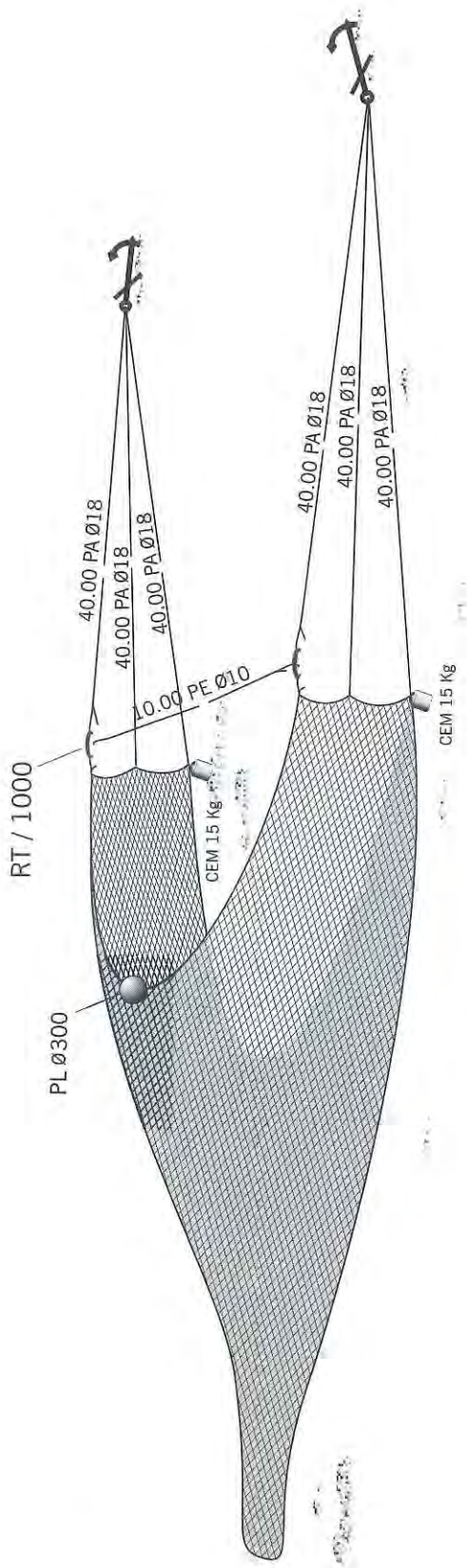


TRAP
Fike Net
Shrimp, Fishes

VESSEL
Loa : 6.5
Hp : 12

LOCATION
Ly Hoa
Quang Binh




40.00 PA Ø18
40.00 PA Ø18
40.00 PA Ø18
10.00 PE Ø10
RT / 1000
CEM 15 Kg
PL Ø300
40.00 PA Ø18
40.00 PA Ø18
40.00 PA Ø18
CEM 15 Kg

TRAP

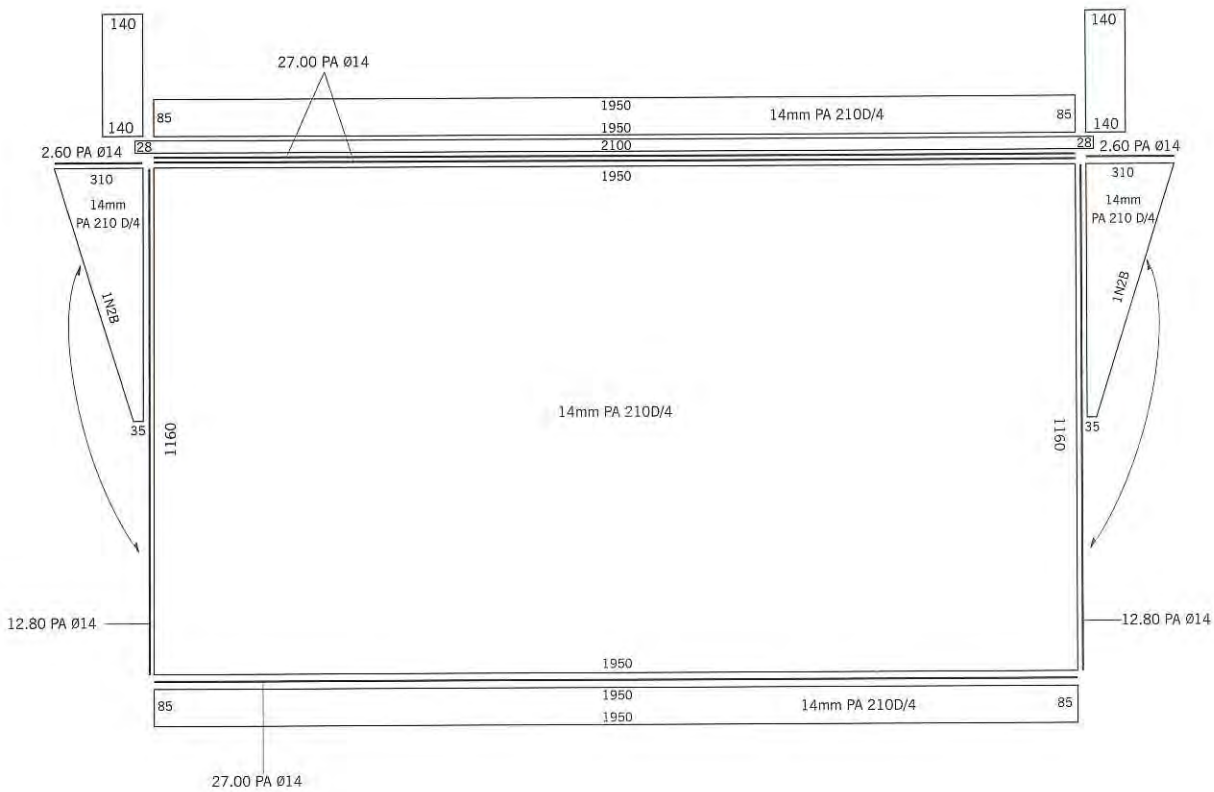
Stow Net with bag
Fishes, Shrimp

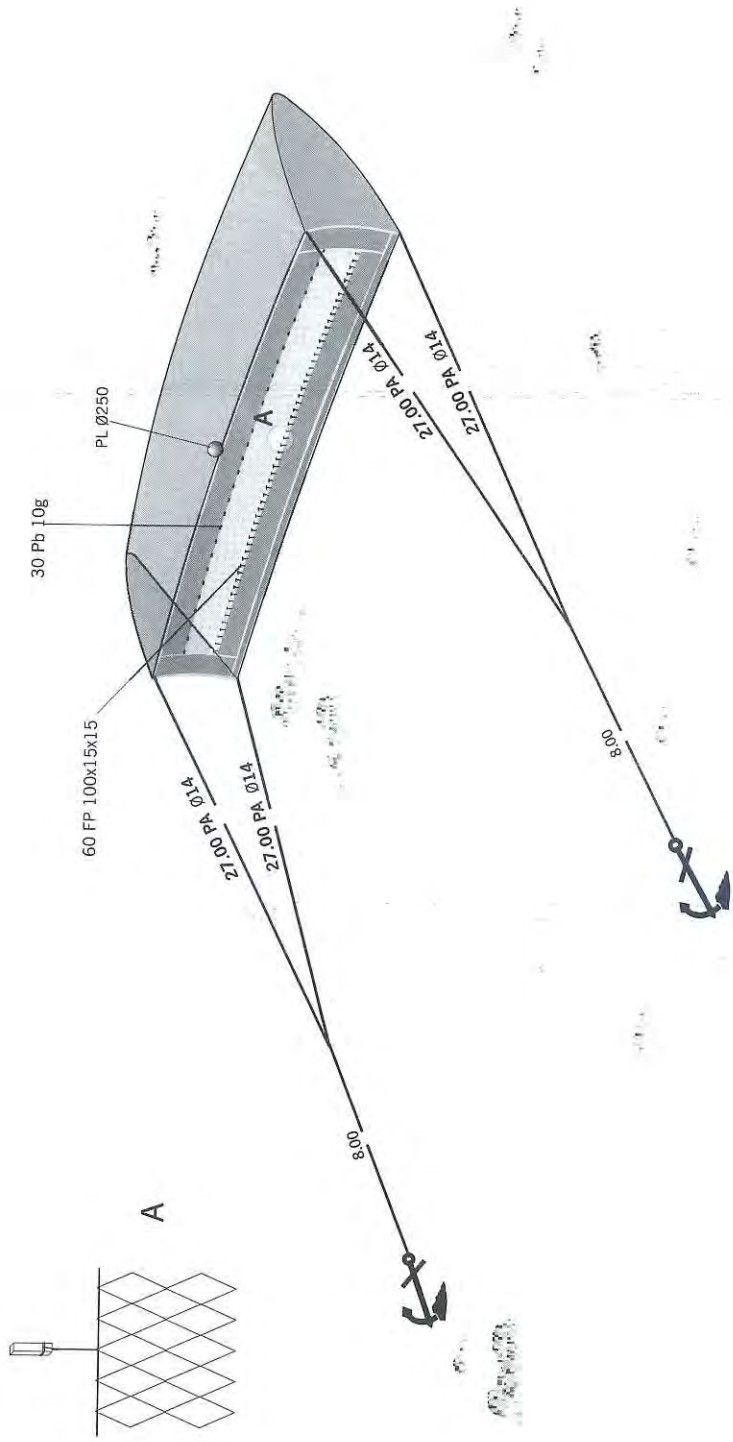
VESSEL

Loa : 8
Hp : 6

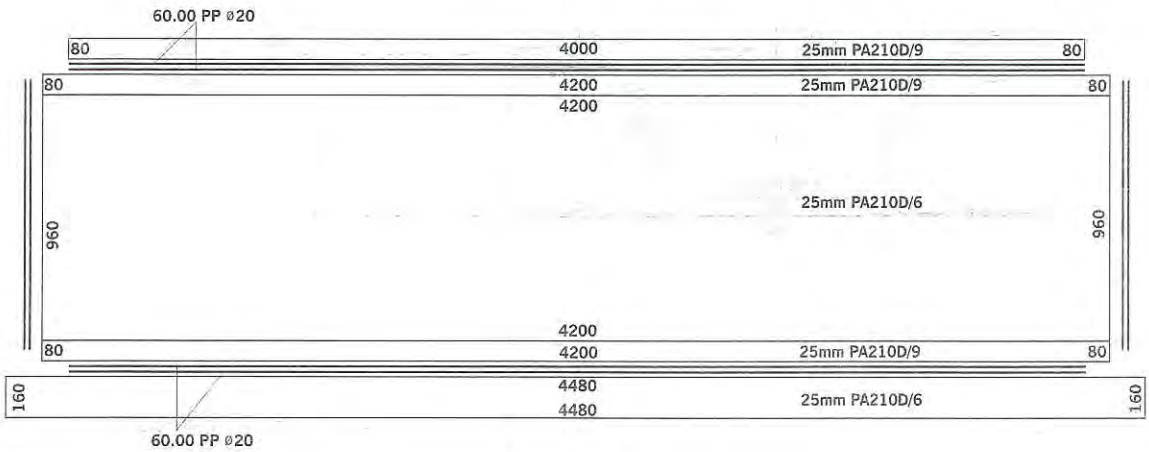
LOCATION

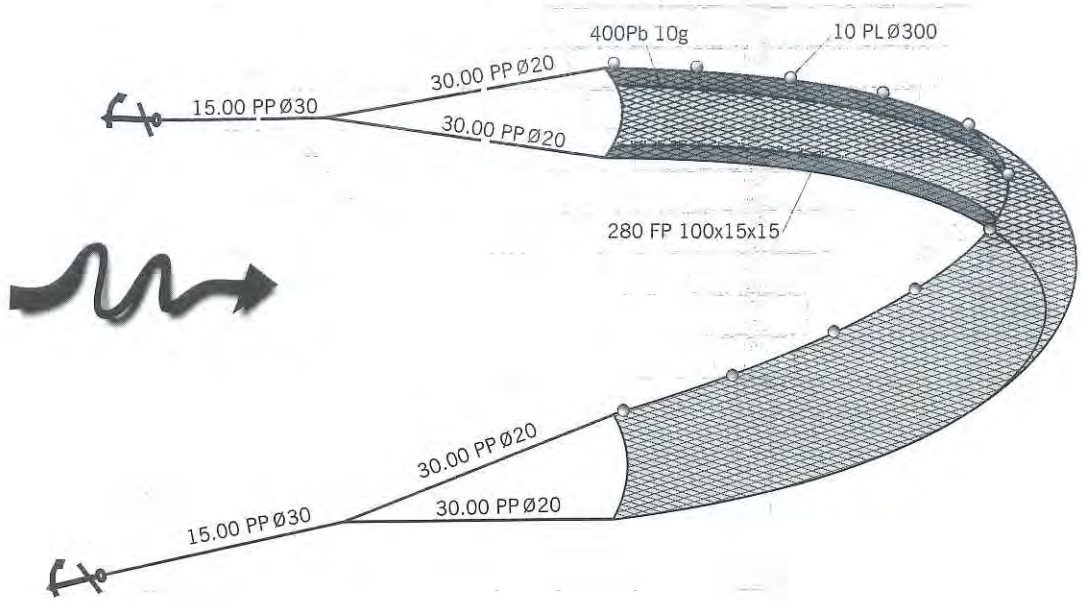
Nghia Hung
Nam Dinh




PL Ø250
30 Pb 10g
60 FP 100x15x15
A
27.00 PA Ø14
27.00 PA Ø14
27.00 PA Ø14
27.00 PA Ø14
8.00
8.00
A

TRAP	VESSEL	LOCATION
Stow Net with bag Fishes, Shrimp	Loa : 9.4 Hp : 12	Do Son Hai Phong

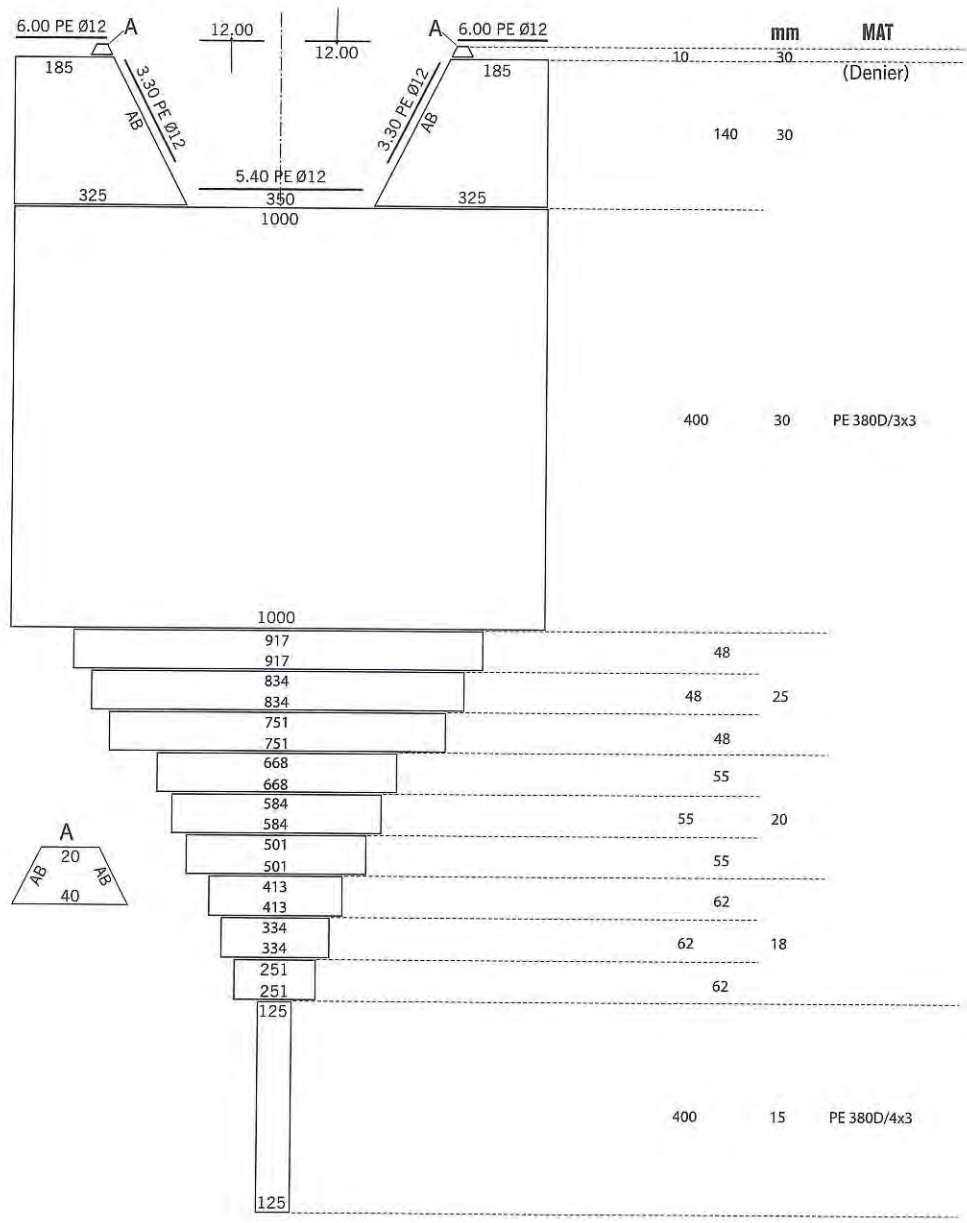


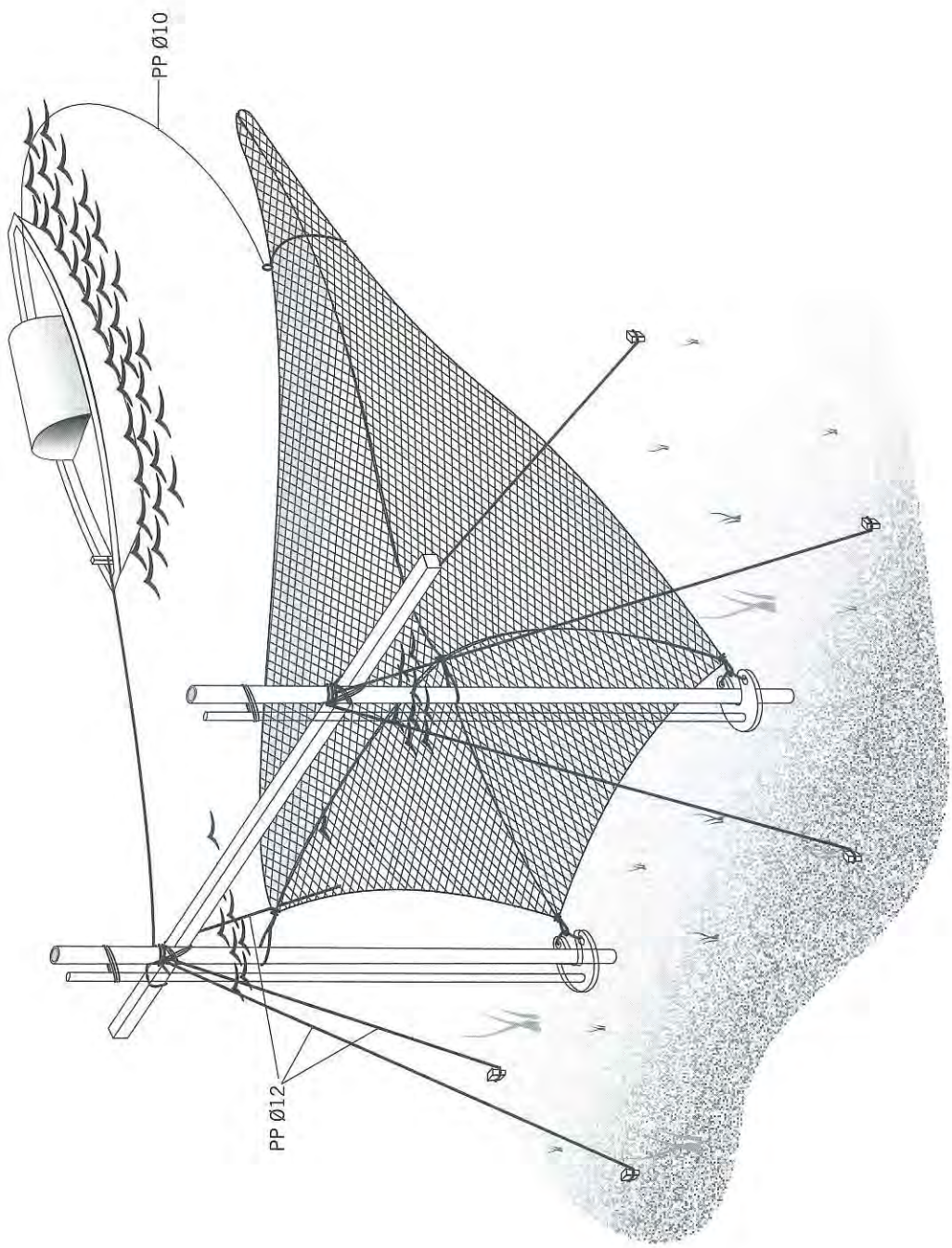


TRAP
Stow Net
Shrimp, Fishes

VESSEL
Loa : 10.4
GT : 7
Hp : 15

LOCATION
Gia Lai
Bac Lieu




PP Ø10
PP Ø12

< Chapter 10 >

Cast Net Fishing

Cast net fishing has been used for a long time and includes small cast nets operated in ponds, lakes, and rivers or in the coastal areas. Early in the 1990s, the stick-held falling net was introduced in Vietnam from China and Thailand. The number of fishing boats engaged in this fishery is small in comparison with other fisheries, but it is one of the most important types of fishing gear in Vietnam for catching squid. The products caught are dried in the sun and are valuable export commodities.

Fishing Gear and Methods

1. Cast Net

Cast net fishery is considered as a small-scale fishery. The Cast-net structure is bag-shaped. At the mouth of the net, there are small bags where the catch is kept. The bottom of the net has a line so that casting and hauling net more easily. The main target species are shrimp and small fishes.

2. Stick-Held Falling Net

This fishery is the biggest among cast net groups. They are used on powered boats with engines of 33 - 200 Hp. The main target species are squid, which are dried in the sun and are valuable export commodities. The main structure of the gear is bag-shaped with a mouth circumference of 40 - 70 m, at the mouth, the net is equipped with a sinker of 150 - 250 kg. The mouth of the net is closed through a system of purse-line and rings on the head rope.

Normally, the net is made of PA monofilament of 0.2 - 0.3 mm in diameter or Nylon multifilament of 210D/4 - 210D/6 and the mesh size is 20 - 30 mm.

The fishing operation is done at night. After a period using lure lights to gather the fish, the light intensity is gradually reduced to attract the fish to the water-surface to the place where the gear is dropped. The gear is already hung on the sticks attached on one side or both sides of the boat, then the link-pins are pulled out and the gear falls down covering the school of fish. The mouth of the net is closed by hauling on the purse-line. Many operations can be done during a night.

Net Setting:

The fishing operation is as follows:

- Spreading the net

- Gradually reducing the lighting on each group

- Controlling the light intensity to gather squid on the surface, under the spread net

- Pulling the pins to let the net down and catch the whole school of squid

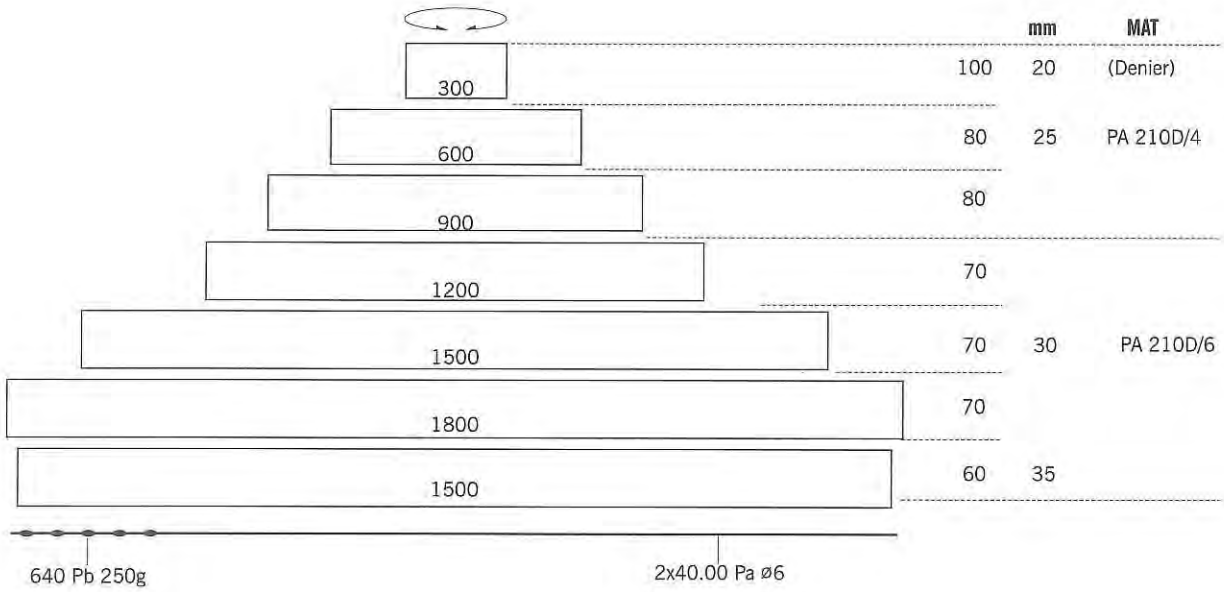
Net Hauling:

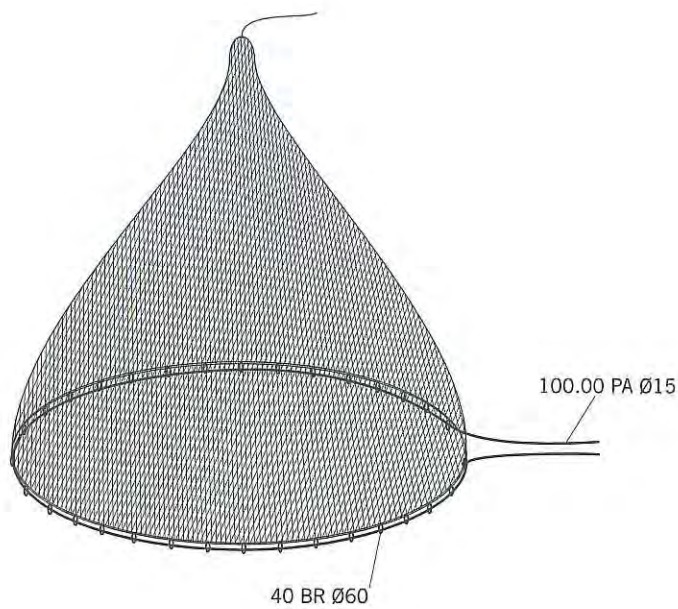
When the net sinks to 15 - 20 m deep, it can catch the squids. The purse line is hauled to close the net mouth, then hauled up on board by winch.

Cast Net
Stick-Held-Falling Net
Squid

VESSEL
Loa : 14.5
GT :15
Hp : 45

LOCATION
Phan Thiet
Binh Thuan

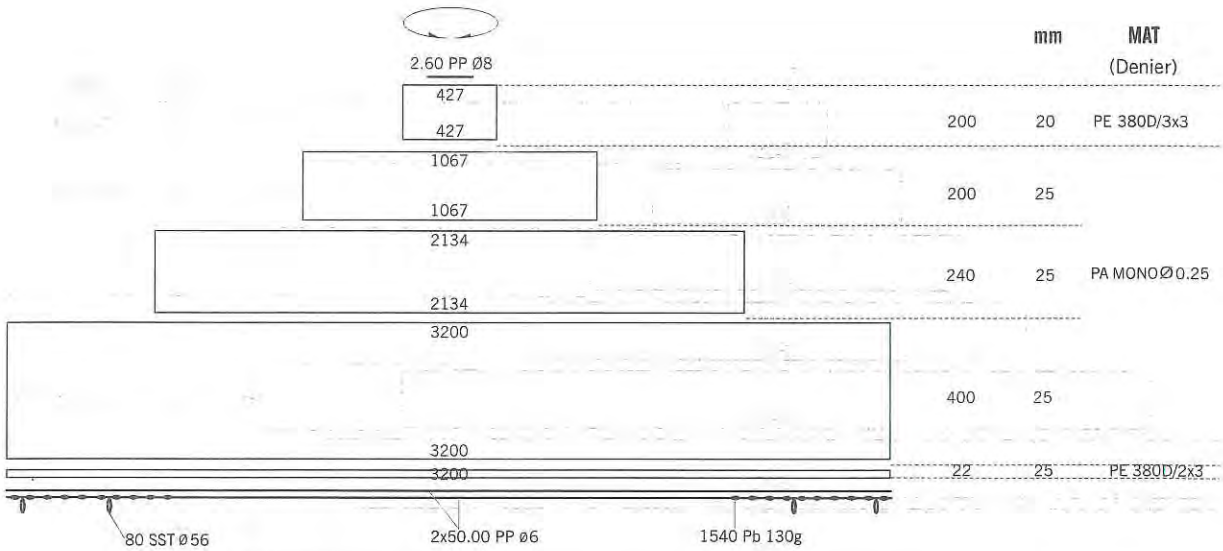


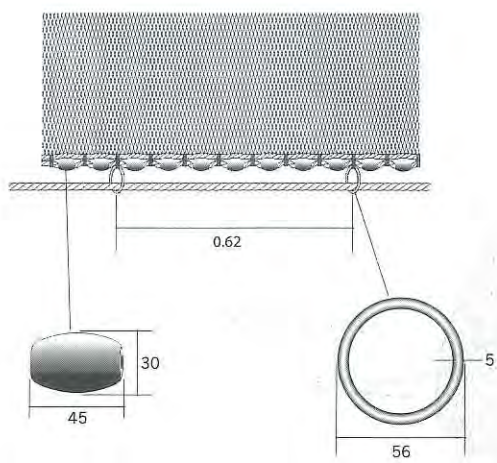


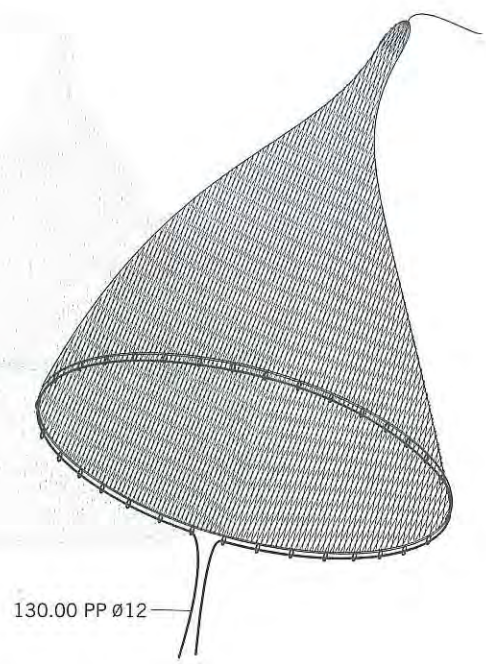
Cast Net
Stick-Held-Falling Net
Squid

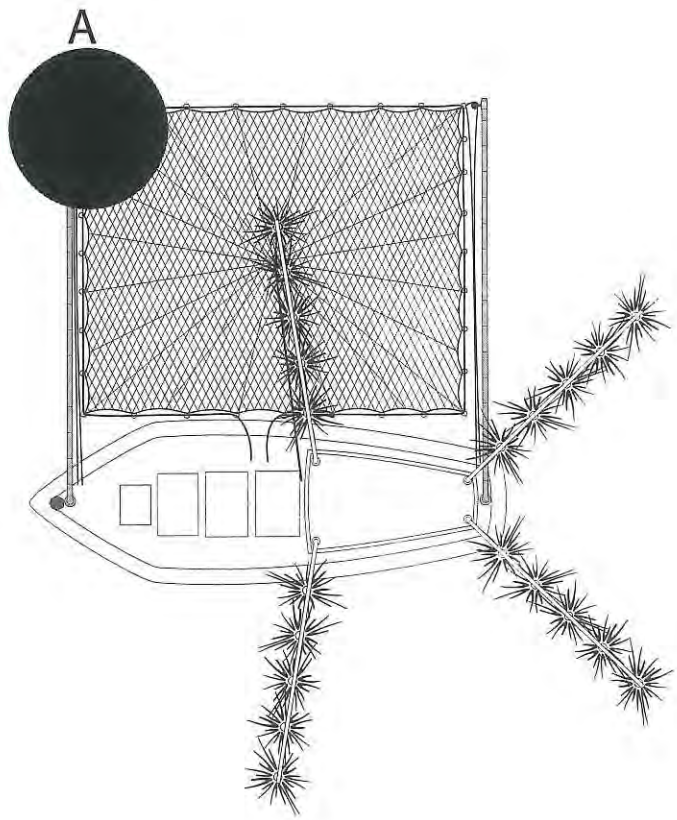
VESSEL
Loa : 14.5
GT : 15
Hp : 45

LOCATION
Phan Thiet
Binh Thuan





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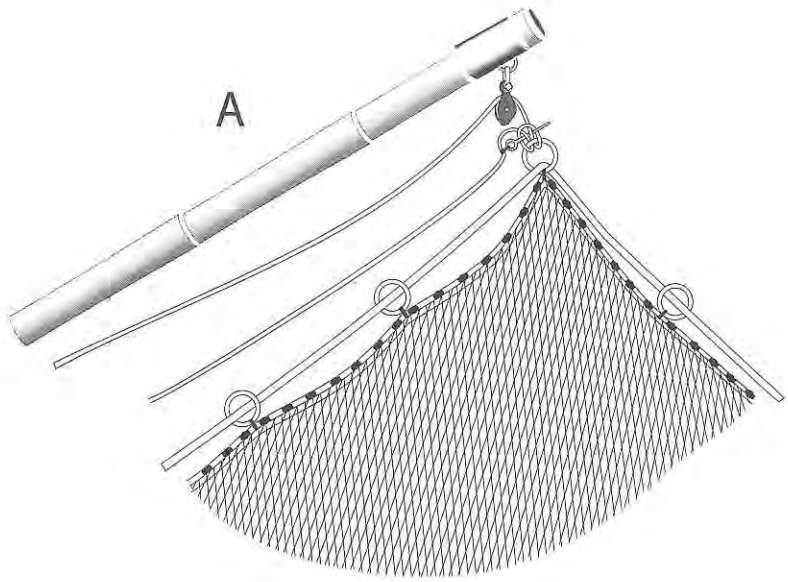
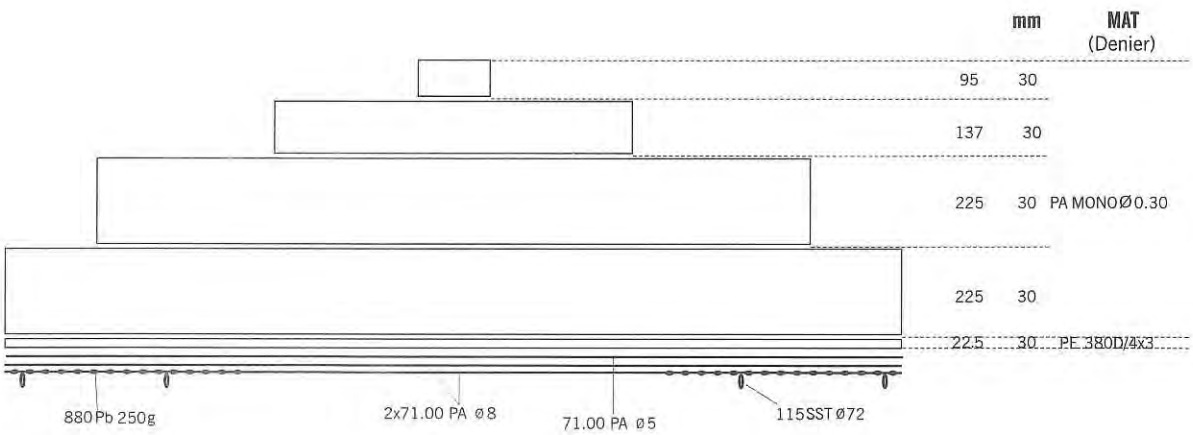
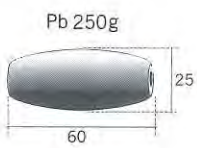

A

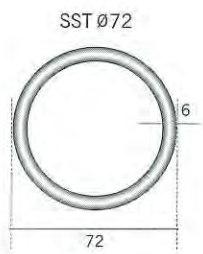
Cast Net
Stick-Held-Falling Net
Squid

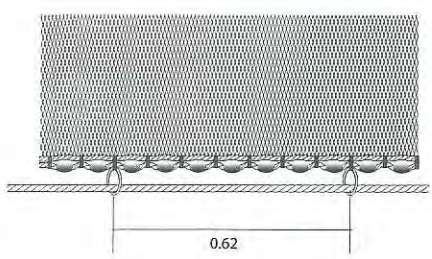
VESSEL
Loa : 10.5
Hp : 52
EG : 15 KVA
LL : 18x500

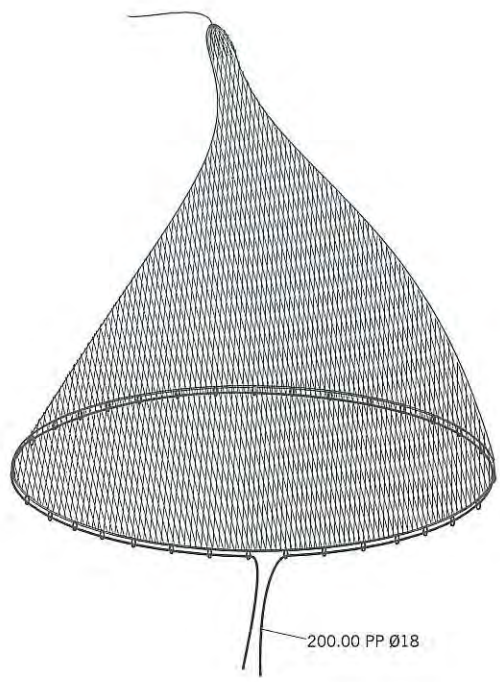
LOCATION
Cat Ba
Hai Phong

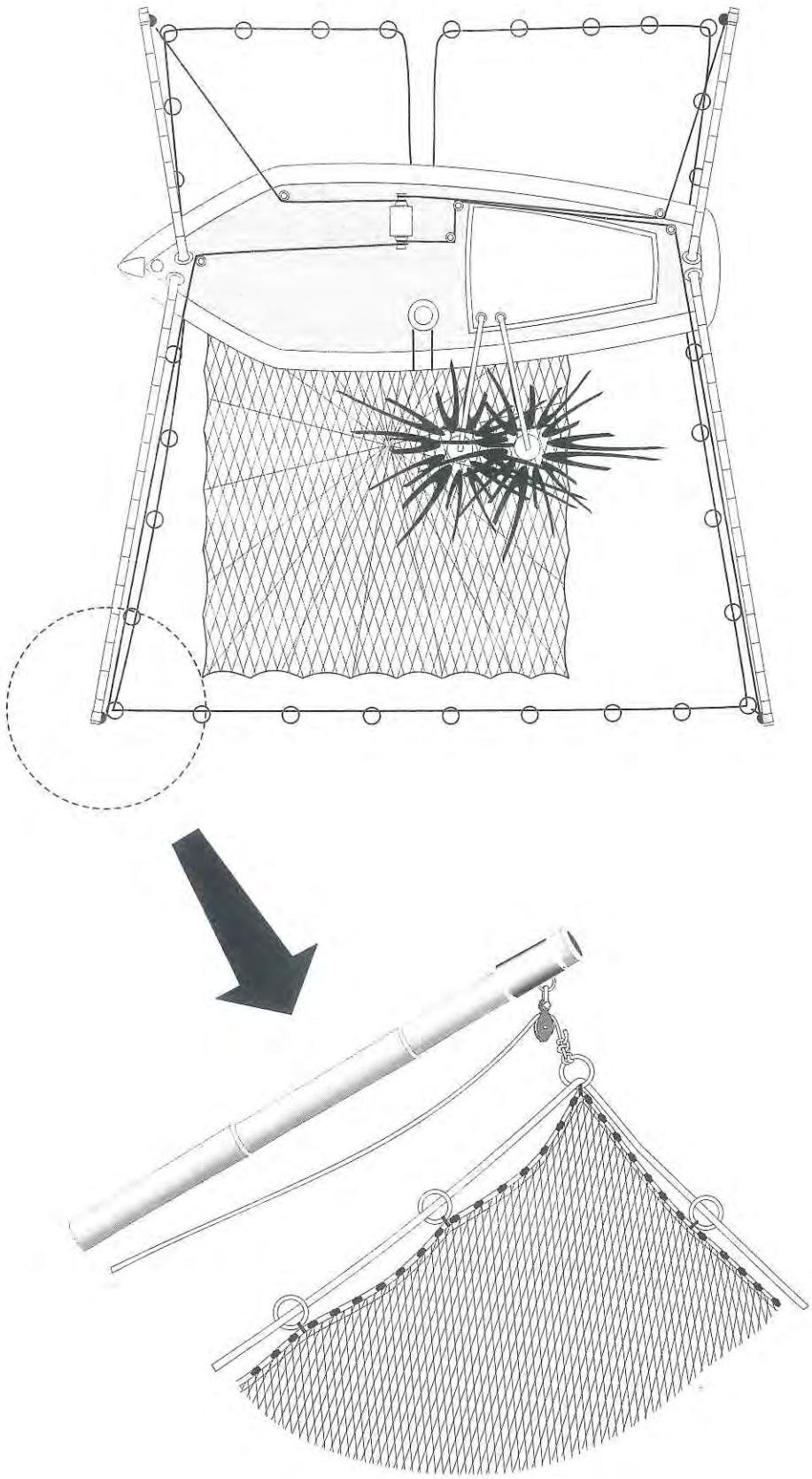












< Chapter 11 >

Scoop Net Fishing

This is a traditional fishing gear used from generation to generation in Vietnam. The scoop net is operated in rivers, estuaries and the coastal areas. The main target species are shrimp and fish, in which the proportion of juveniles is very high. Based on the fishing method, it can be divided into two types: One pushed by manpower is called a scoop net, the other pushed by a powered boat is called a push net. Because the invested capital for each unit is suited to the financial capacity of fishermen, the number of boats in push net fishery has increased quickly. This has caused a lot of serious damage to the resource reproduction. The regular reduction of catch leads to the fact that fishermen use explosives or electric charges together with push nets in most provinces of Vietnam.

Fishing Gear and Methods

The structure of the fishing gear consists of two main components that are a bag-net and a scissors-shaped wood or bamboo frame. The purse-shaped net is made of nylon monofilament of 0.2 - 0.3 mm in diameter or multifilament of 380D/3x3 -380D/3x4.

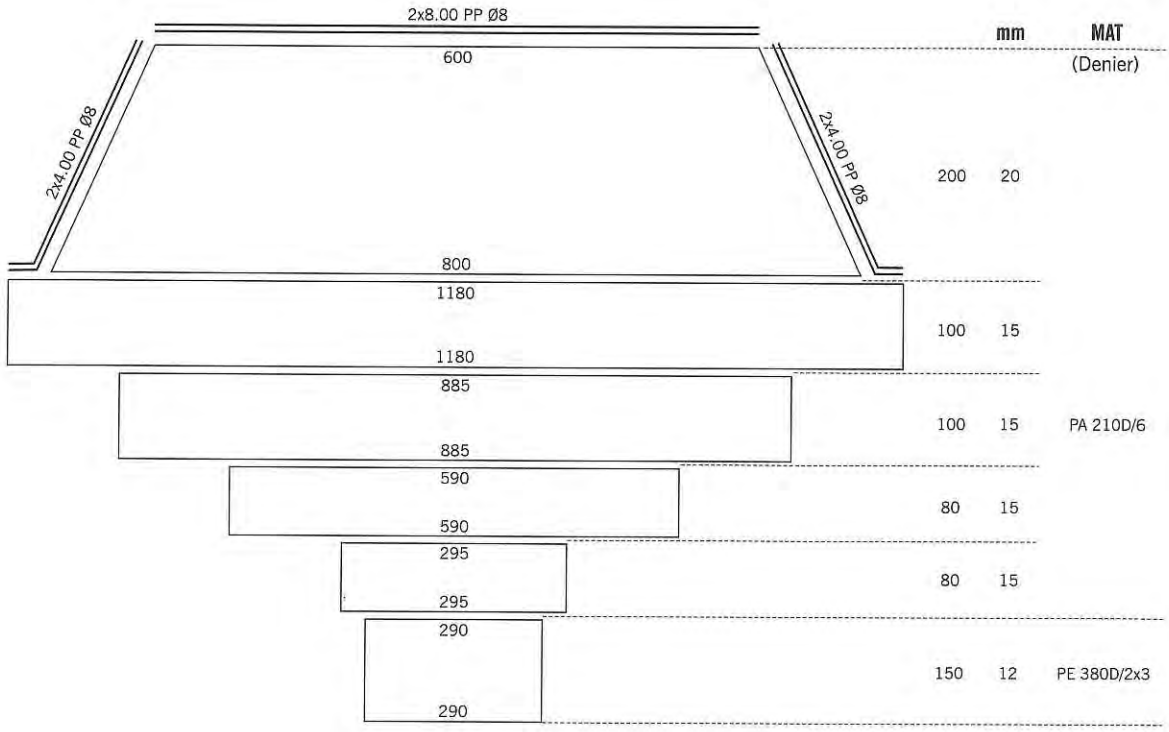
The mouth of net is linked to the scissors-shaped frame the mouth of which scrapes the seabed and is equipped with lead or chain to ensure that the mouth of push net is always on the sea bottom. The scissors-shaped frame consists of two poles, each is 16 - 22 m long. On the end of each pole is a ski for the purpose of easily skidding the frame on the seabed.

A powered boat of up to 140 Hp pushes the push net. The operational time can be either daytime or nighttime, but the best is at night. The duration of each haul is 1 - 2 hours, and each boat has 2 - 3 fishermen.

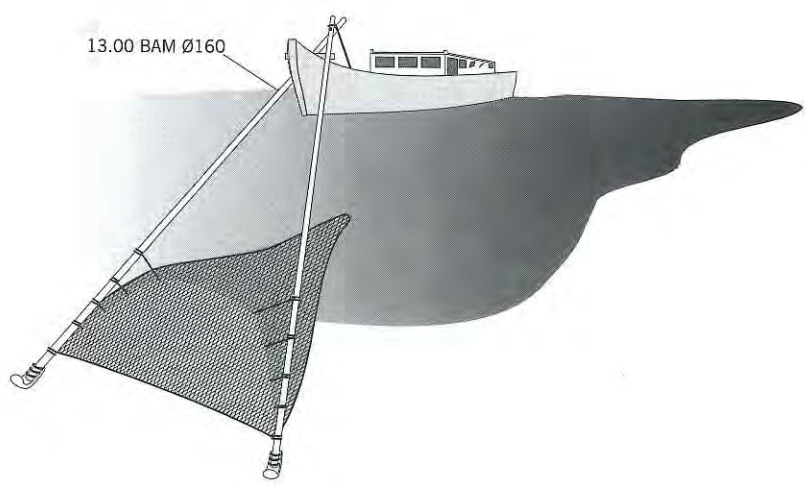
SCOOP NET
Push Net
Sardine, Anchovy

VESSEL
Loa : 11.00
Hp : 15

LOCATION
Cat Ba
Hai Phong



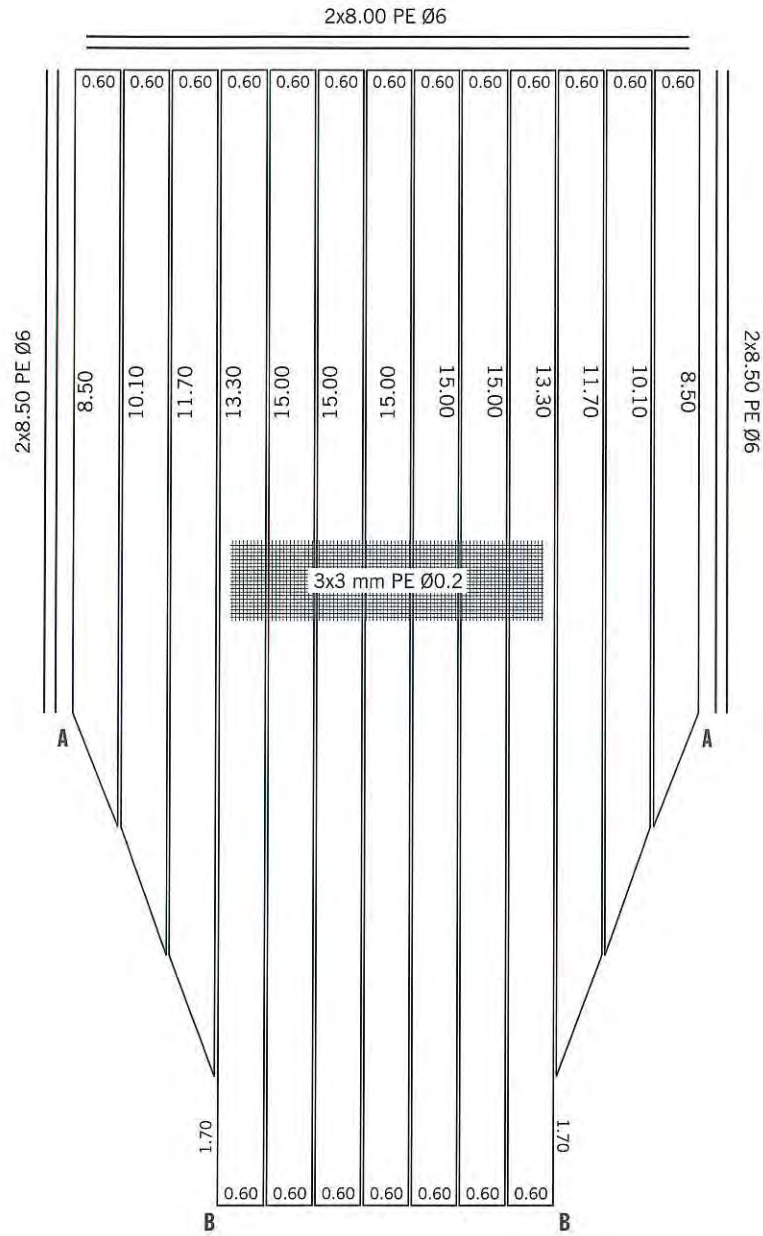
	mm	MAT (Denier)
2x4.00 PP Ø8	200	20
1180	100	15
885	100	15
590	80	15
295	80	15
290	150	12



Scoop Net
Push Net
Shrimp

VESSEL
Loa : 11.00
Hp : 15

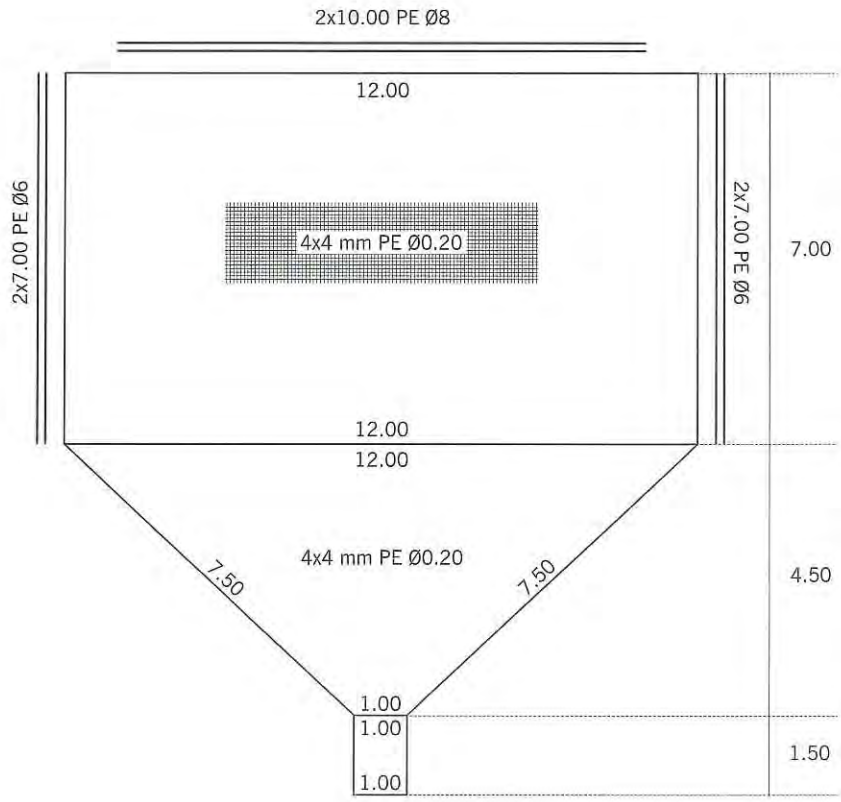
LOCATION
Nghia Hung
Nam Dinh

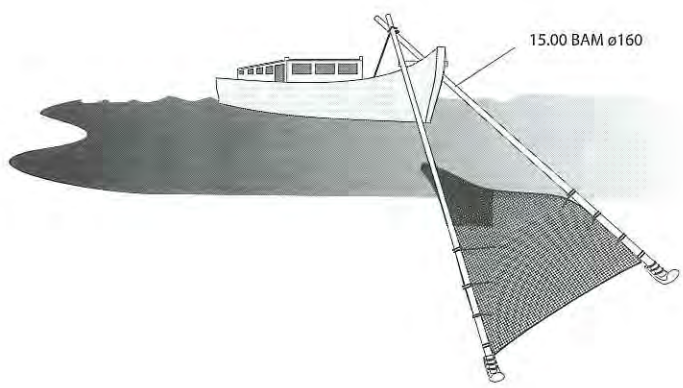


SCOOP NET
Push Net
Shrimp, Demersal Fishes

VESSEL
Loa : 11.00
Hp : 15

LOCATION
Nghi Loc
Nghe An

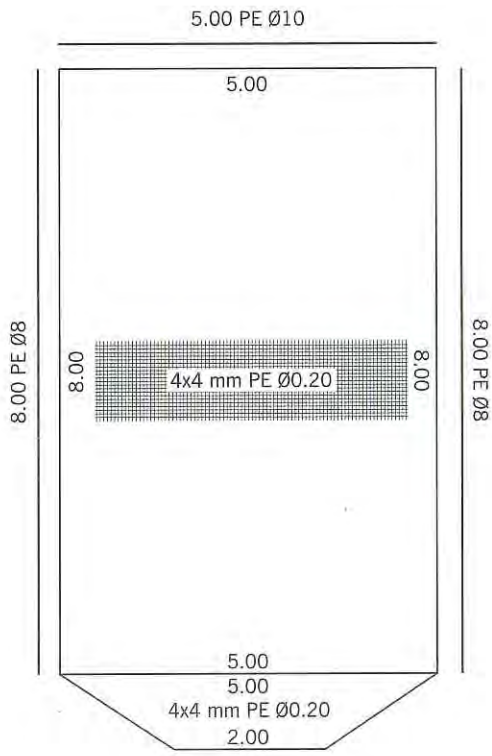


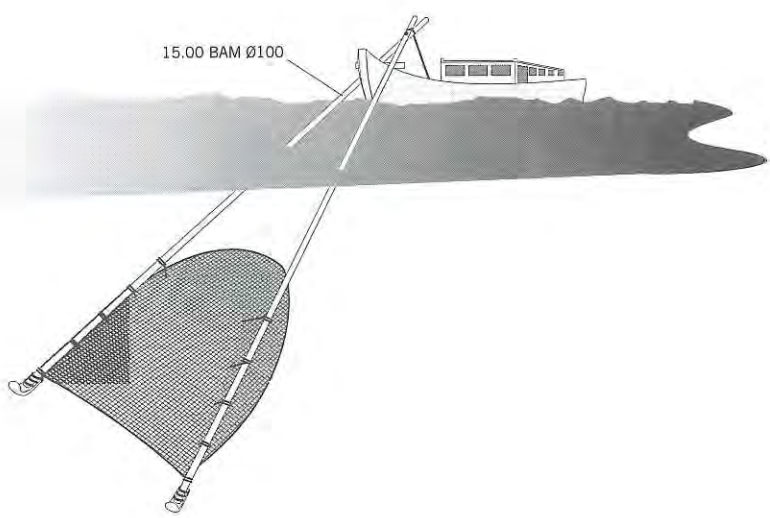


SCOOP NET
Push Net
Shrimp, Demersal Fishes

VESSEL
Loa : 11.00
Hp : 15

LOCATION
Nghi Loc
Nghe An

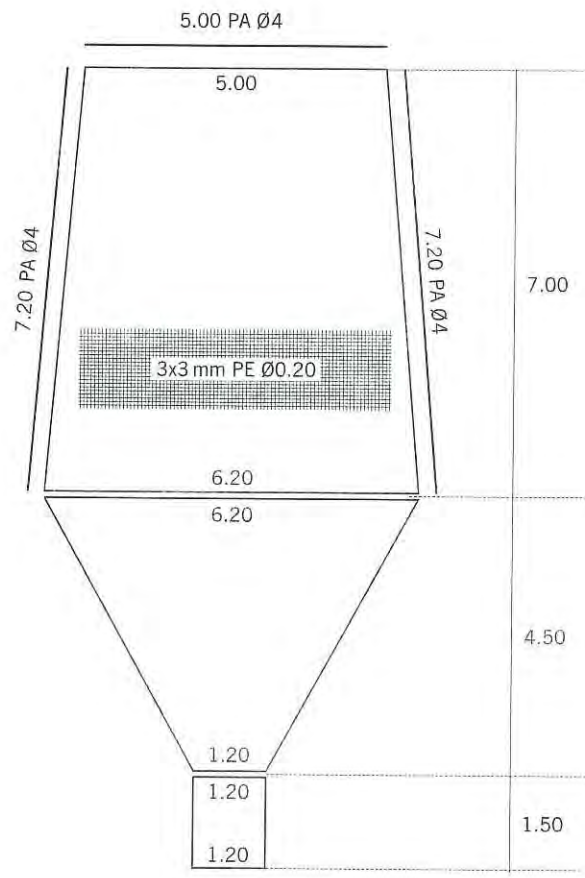


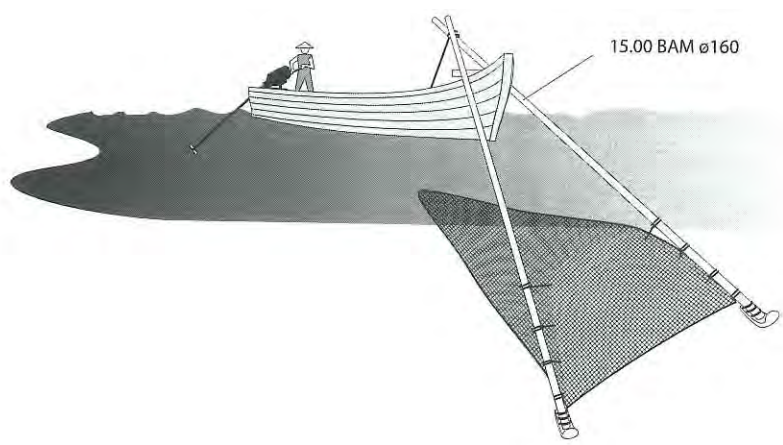


SCOOP NET
Push Net
Shrimp

VESSEL
Loa : 11.00
Hp : 15

LOCATION
Thuan An
T-T-Hue

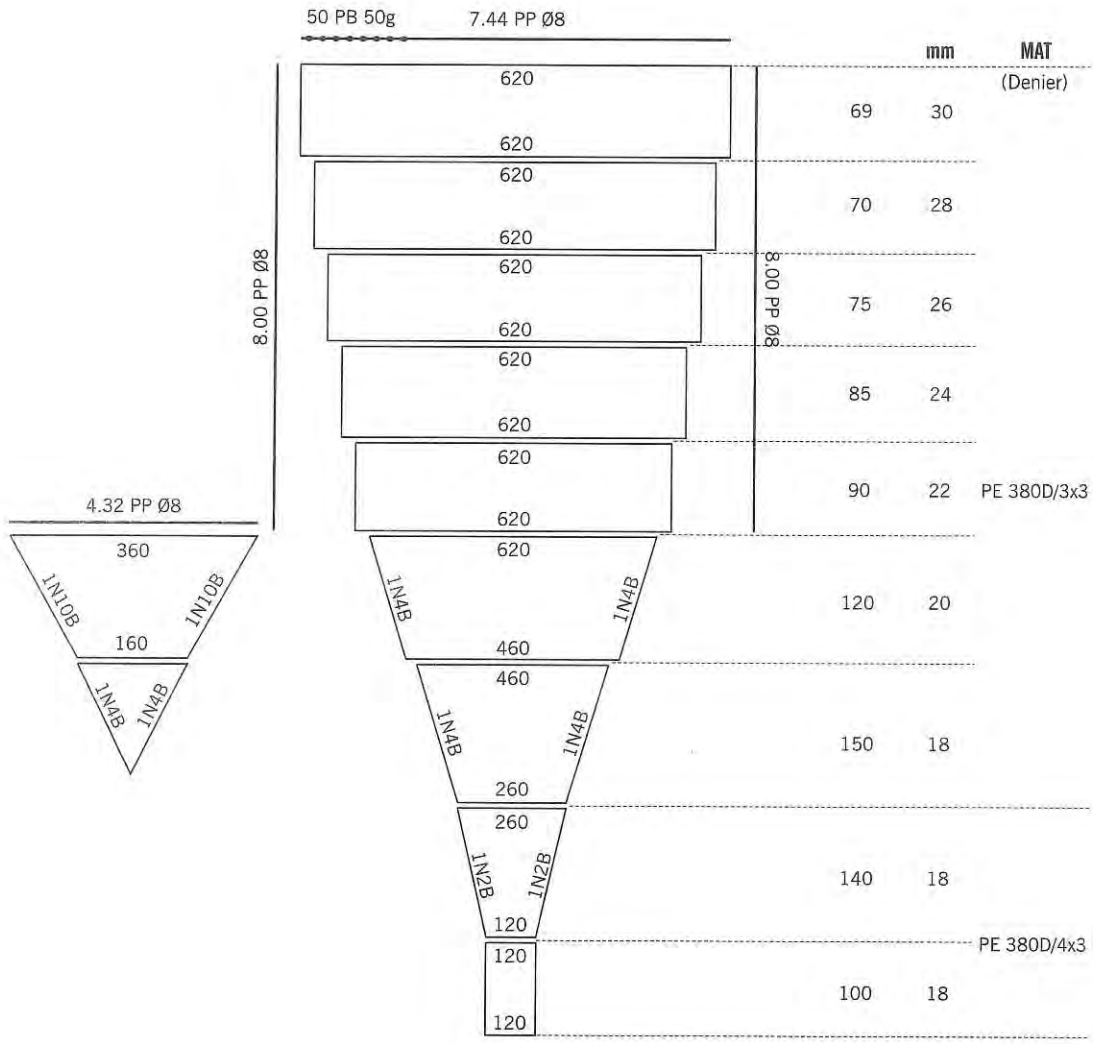


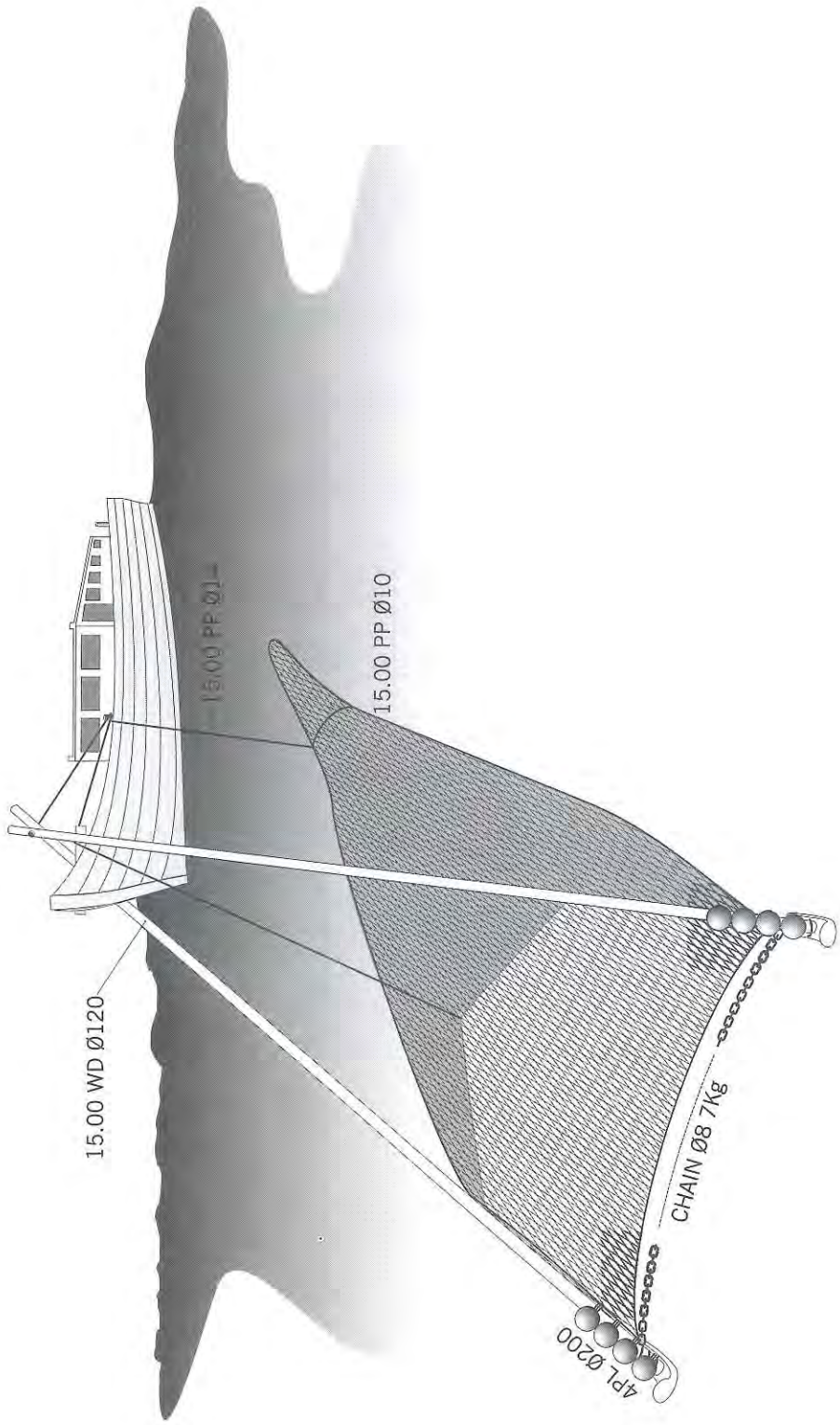


SCOOP NET
Push Net
Shrimp

VESSEL
Loa : 13.5
Hp : 22

LOCATION
Rach Gia
Kien Giang




15.00 PP Ø10
15.00 WD Ø120
CHAIN Ø8 7Kg
4PL Ø200

< Chapter 12 >

Miscellaneous Gear Fishing

Beside the above-mentioned fishing gear, Vietnam also has many other fisheries. These fishing gear are used to capture some typical species, like clam dredge and fish harpoon.

These fisheries are implemented in some areas only that have their target species, for example: clam dredge in the South, fish harpoon around the islands.

Fishing Gear and Methods

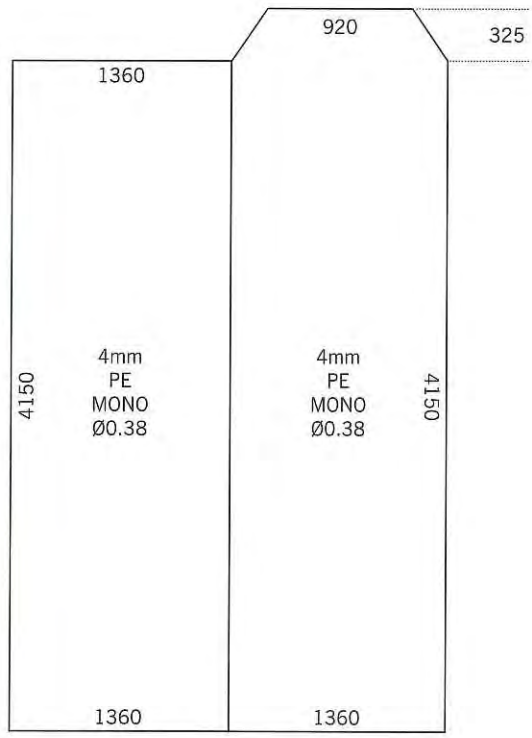
1. Clam Dredge

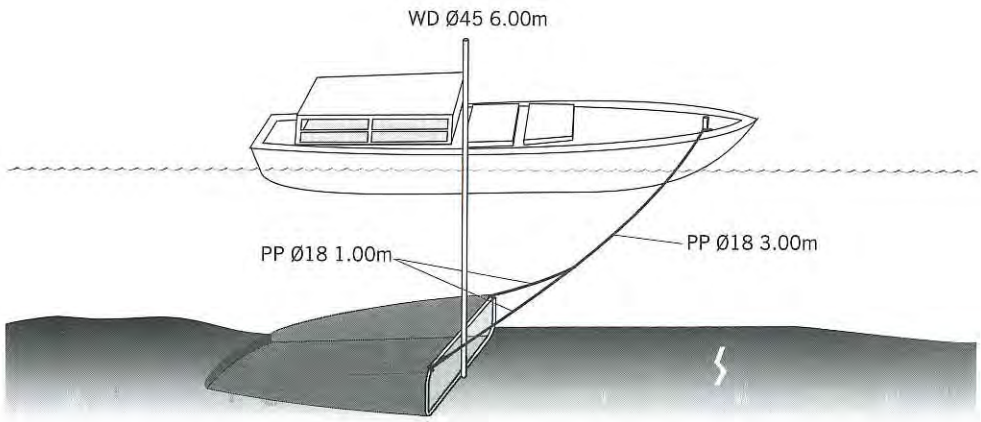
The Clam dredge is used in large vessels with engines of 350 Hp. The fishing gear has a parallelepiped shape. It is made of steel netting with a size of 4 -10 mm, and the size of the net mouth is 330 x 1360 mm. One vessel hauls 1 - 3 units according to its engine capacity.

DREDGE
Bottom
Ark Shell

VESSEL
Loa : 11.00
GT : 5
Hp : 15

LOCATION
An Bien
Kien Giang





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