

ADDENDUM: WGBIFS MANUAL 2007

**MANUAL FOR THE BALTIC INTERNATIONAL
TRAWL SURVEYS**

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ROSTOCK GERMANY



ICES
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International Council for
the Exploration of the Sea

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1 Introduction

First young fish trawl surveys in the Baltic Sea were carried out by Poland in 1962 (Netzel 1974). Most of the Baltic countries also developed national trawl surveys during subsequent years. However, it was difficult to combine the results of these national surveys because the fishing gears, the realization of fishing hauls and the survey periods varied.

The first attempts to co-ordinate national surveys of the Baltic young fishes were made in 1985 (ICES 1985), and they were continued with varying intensity in subsequent years and, several attempts were made to determine the conversion factors among different fishing gears (Schulz and Grygiel 1984; 1987, ICES 1987; Oeberst and Frieß 1994, Oeberst and Grygiel 2004). A robust method for compiling trawl survey data used in the assessment of cod inhabiting in the central Baltic Sea was developed by Sparholt and Tomkiewicz (2000). Authors applied generalized linear models to calculate the “fishing power” of national bottom trawls. The “fishing power” factors are used to transform the national catch per unit effort into CPUE-values of the former standard GOV trawl.

A further to establish internationally co-ordinated trawl surveys in the Baltic Sea was made in 1995 (ICES 1995). The first meeting of the ICES Working Group on Baltic International Fish Survey (WGBIFS) (ICES 1996) considered the design of trawl surveys for cod assessment and started the development of bottom trawl manual. The EU Study Project No. 98/099 (Anon. 2001a) provided funding for the development of new standard fishing gears (type TV3#520 and TV3#930). Since autumn 1999, a number of fish laboratories of the Baltic countries have been conducting inter-calibration experiments between national and new standard gear (ICES 2001a, 2003) and conversion factors between the new standard and the national gears were estimated (Anon. 2001a, ICES 2002, Oeberst & Grygiel 2002, 2004, Lewy et al. 2004).

New co-ordinated survey design was established in 2001. Stratified random trawl surveys use the ICES subdivisions and their depth layers as strata to reflect the variability of the distribution pattern of target species. Besides the traditional survey in spring (15 February – 31 March) additional coordinated survey has been conducted in November since 2001. Different step for improving the survey design were realized between the different meetings of the WG BIFS. Because it was necessary that vessels work in areas where own experiences did not exist Tow Database was established in 2001 and was improved based on the feedbacks from the realized surveys. This Tow Database contains all positions where demersal trawls can be realized with the standard gears in the Baltic Sea. The different steps for planning and realizing the surveys and for estimating stock indices were documented in the reports and in the manual of the Baltic International Trawl Survey (BITS).

2 The fishing method

2.1 Main target species

The international coordinated trawl surveys are directed to the demersal species i.e. cod and flounder and other flatfishes in the Baltic Sea. Baltic Sea with the ICES Sub-divisions and rectangle codes are given in **Annex 1**. Annex 2.presents the assignment of quarter of rectangles to the ICES Sub-divisions. Besides target species as mentioned above all other fishes are analysed with lower intensity of recorded data to support ecosystem analyses.

2.2 Survey periods

National parts of the international coordinated fish surveys should be carried out in the first quarter between 15 February and 31 March (spring survey) and in the fourth quarter between 1 and 30 November (autumn survey).

2.3 Survey area and stratification of the Baltic Sea

Total distribution area of cod should be covered by the BITS trawl survey. It was agreed by the responsible ICES WGBIFS that the ICES Sub divisions 22 – 28 should be covered with fishing hauls during the trawl surveys because the stock size of the eastern Baltic cod is low and is currently concentrated in the ICES Sub-division 25 to 28. Expansion of the area under investigation in northern areas of the Baltic Sea (ICES Sub-division 29 - 32) is possible dependent on the development of the eastern Baltic cod stock size and its spatial distribution pattern.

The international trawl surveys are carried out in form of a stratified random survey. The ICES Sub-divisions and depth layers within an ICES Sub-division are used as strata. Only depth layers from 10 to 120 m depending on the ICES Sub-division are covered by the surveys. The areas aggregated on 10-m depth layers per the ICES rectangle are given in **Annex 3**. Following strata are used:

ICES Sub-division	Strata
22	10 – 40m
23	10 – 40 m
24	10 – 40m, 41 – 60m
25	20 – 40m, 41 – 60m, 61 – 80m, 81 – 100m
26	20 – 40m, 41 – 60m, 61 – 80m, 81 – 100m, 101 – 120m
27	20 – 40m, 41 – 60m, 61 – 80m, 81 – 100m, 101 – 120m
28	20 – 40m, 41 – 60m, 61 – 80m, 81 – 100m

2.4 Fishing gears

The TV-3 bottom trawl is strongly recommended as standard fishing gear during the BITS surveys in the Baltic Sea. Two types of the TV-3 trawl were developed for different sizes of research vessels, one small of 520 meshes in circumference and one large of 930 meshes. The description and use of the trawls are given in **Annexes 4 and 5**, respectively. These trawls have been used since 2001. The small standard trawl type TV-3#520 should be used for vessels up to around 800 HP and the larger standard trawl type TV-3#930 for vessels with higher towing power.

Small adaptation of large TV3 was carried out by Denmark which added a stone panel to reduce the danger of trawl damage by large stones.

It was agreed by WGBIFS that the Denmark and Germany realize all hauls in the ICES Sub-divisions 22 – 24 to reduce the effects of the conversion factors between the small and large version of the new standard trawls. Vessels of both countries (RV “Hafisken” and RV “Solea”) use the small version of the standard trawl. The large version of the standard trawl is used by Denmark (RV “Dana”), Poland, Russia and Sweden in the ICES Sub-divisions 22 to 28. Only eastern parts of the ICES Sub-division 28 and small part of the ICES Sub-division 26 are covered by Estonia, Latvia, and Lithuania which also use the small version of TV-3.

Quality control

During use, the trawls shall be checked at regular intervals by taking a number of check measurements on the geometry of the trawl. The intervals and a list of check measurements are given in the detailed trawl specifications in the **Annexes 4 and 5**.

2.5 Fishing operation

The haul shall be performed using a standard towing speed of 3 knots. The speed should be measured as the speed over the ground.

The duration of the standard haul is 30 minutes (**for the DATRAS Database each single catch should be recalculated in catch per 1 hour**). Start time is defined as the moment when the vertical net opening is stable at the stated towing speed. Stop is defined as the starts of hauling back the trawl.

Trawling shall only take place during daylight, defined in the checking program as the time between 15 minutes before sunrise until 15 minutes after sunset.

Quality control

The horizontal distance between the upper wing-ends should be monitored if possible during the whole tow. The following table gives the limits of the wing-end distance and the corresponding height of the trawl at the centre of the headline.

Trawl measurements at 3 knots in metres	Distance between upper wing-ends	Approximate corresponding height at centre of headline
TV-3, #520 meshes	13.5 - 14.5	2.2 - 2.5
TV-3, #930 meshes	26 – 27	5.5 – 6.5

2.6 Allocation of trawl stations

The aim of the trawl surveys is to cover the main distribution area of the target species - cod and flounder. For allocating the planned stations to the different strata the size and spatial distribution pattern of cod are used. Besides the size of both Baltic cod stocks, the actual hydrographical conditions may influence the spatial distribution of the target species. These aspects should be considered during the process of allocation of hauls to the different strata. However, the relationship between the hydrographical parameters and the cod distribution cannot be accurately described at this date. Furthermore, the hydrographical conditions during the surveys cannot be predicted. Therefore, it was agreed that the number of planned stations should be distributed dependent on the size of the areas of the ICES Sub-divisions and using depth range from 10 to 120 m. The significant decrease of the eastern Baltic cod stock in the last years suggests that the trawl stations should be also allocated according to the distribution and density pattern of the cod stocks. It was agreed during the WGBIFS meeting in February 2001 that a running 5 years mean of the CPUE derived from the BITS survey in spring should be used for describing the distribution of cod.

The factors - area of the ICES Sub-division, and distribution pattern of cod - are used with different weights. A weighting factor of 0.6 was defined for area, and a weighting factor of 0.4 was defined for mean distribution of cod (running 5 years mean). The running mean of the cod (age group 1+) CPUE should be adapted every year based on the results of the spring surveys. The same weights were used for the parameters - area and running mean of the distribution pattern - for allocating the number of stations in all the depth layers for the different ICES Sub-divisions. The areas by rectangle, in nm² of 10 m depth layers are given in **Annex 3**.

In the first step the numbers of planned stations of all participating countries are summarized for the western Baltic region (ICES Sub-division 22 – 24) and for the eastern region (ICES Sub-division 25 to 28). Then the total number of planned trawl stations is allocated to subdivisions according to the area and the 5 years running mean as mentioned above for each region. The number of planned stations of each the ICES Sub-division is then allocated to the depth layers.

2.7 Fishing positions

The new survey design which was introduced in 2001 requires that vessels work in areas where they have not experience with the bottom types and possible dangers for the trawls like rocky bottom, wrecks etc. Furthermore, large areas are closed for fishing activities in the Baltic Sea due to munitions, electrical cables, gas pipelines, dense traffic etc. Therefore, the Tow Database was established. This database contains all positions where demersal trawls can be successfully realized with the different versions of the standard gear. The feedbacks from the surveys of the last years were used to update and improve the quality of the Tow Database. Unfortunately, the available haul positions are heterogeneously distributed in many depth layers. Therefore, it is not possible to use a generator of equally distributed random numbers to select hauls from the Tow Database for a planned survey since such algorithm produces a biased selection due to different probability of areas to come into the selected pool of hauls (ICES 2002, 2003). Method for selecting hauls from the Tow Database was proposed in 2003 (Oeberst 2003). The working group WGBIFS stated in 2004 (ICES 2004) that the proposed method is suitable to solve the problem of heterogeneity of hauls which are available in the Tow Database. The analyses have shown that the use of a unit size of 10'N x 20'E is the best compromise for the trawl surveys in the Baltic Sea if it is taken into account that the same unit size should be used for selecting hauls in depth layers of all ICES Sub-divisions. The first step of selection haul position from the Tow Database for a given depth layer of a ICES Sub-division is a random selection of a unit within the same depth layers where a generator of equally distributed random numbers is used. Then one of the haul positions within the selected unit is randomly selected.

The selected hauls are assigned to the participating countries in such a way that the distance between the planned hauls is minimal as possible and that the national zones are covered if possible. When the selected stations can not be realized due to wrecks, gill nets, navy military training or other reasons the hauls should be realized in the same depth layer as close as possible to the selected station.

Selected hauls should be omitted in the case when the results of at least two stations in the same depth layers have shown that fish not appeared in the zone which was covered by the net opening and when hydrographical observations have shown that oxygen content is less than 1.5 ml/l in the layer of vertical net opening. However, it is necessary that data sets must be added to the DATRAS database with the haul position and the validity code "N" to avoid biased estimated of the stock indices in the depth layer.

2.8 Tow Database

The use and the reworking of the Tow Database have shown that changes of the structure can improve the handling of the database and can make the structure more understandable. Therefore, the structure of the Tow Databases was partly changed until 2005. The structure is given in the subsequent table.

The first column contains the notation of the survey where the station was used the last time. The haul number (HrHaul) summarizes two parts. The first two digits present the number of the ICES sub-division. The following three digits present the number of haul in the ICES subdivisions. The two next columns contain the notation of the rectangles and of the ICES

subdivision. Then follows the latitude of the first position is stored in two columns (degree and minutes separately) followed by the longitude of the first position (degree and minutes separately). This structure is used for all possible ten positions of the hauls. Then the depth data are given. The first value presets the mean depth of the haul in metre. This value is used for the assignment of the haul to the depth stratum. Then up to ten depth data in metre can be stored. The column “source” informs wherefrom the data were made available. The column “TV3” is used to store the countries which have already realized the stations. This data are used for assigning the selected stations to one of the participating countries. The next column informs whether a standard ground rope can be used (1) or the rock hopper equipment (2) must be used. Then the main direction of the haul (zero – main direction from west to east) and the distance between the first and last position of the haul in nm follow.

Column	Structure of Tow Database - valid since autumn 2004			
A	Last realization			Q404
B		NrHaul		28002
C		Rectangle		4265
D		ICES SD		28
E	1. position	Latitude	Degree	56
F			Minutes	36.5
G		Longitude	Degree	20
H			Minutes	41.3
I	2. position	Latitude	Degree	56
J			Minutes	36.9
K		Longitude	Degree	20
L			Minutes	41.9
M	3. position	Latitude	Degree	56
N			Minutes	37.2
O		Longitude	Degree	20
P			Minutes	42.6
Q	4. position	Latitude	Degree	56
R			Minutes	37.6
S		Longitude	Degree	20
T			Minutes	43.2
U	5. position	Latitude	Degree	0
V			Minutes	0
W		Longitude	Degree	0
X			Minutes	0
Y	6. position	Latitude	Degree	0
Z			Minutes	0
AA		Longitude	Degree	0
AB			Minutes	0
AC	7. position	Latitude	Degree	0
AD			Minutes	0
AE		Longitude	Degree	0
AF			Minutes	0
AH	8. position	Latitude	Degree	0
AI			Minutes	0
AJ		Longitude	Degree	0
AK			Minutes	0
AL	9. position	Latitude	Degree	0
AM			Minutes	0
AN		Longitude	Degree	0
AO			Minutes	0
AP	10. position	Latitude	Degree	0
AQ			Minutes	0
AR		Longitude	Degree	0

AS			Minutes	0
AT				
AU		Mean depth	Metre	38
AV	1. position	Depth	Metre	0
AW	2. position	Depth	Metre	0
AX				0
AY				0
AZ				0
BA				0
BB				0
BC				0
BD				0
BE	10. position		Metre	0
BF		Source	Latvia	
BG		TV3		L
BH		Ground	rope	1
BI		Direction		0

3 Sampling of trawl catches

The following guidelines are to be used for each haul during the survey. All forms should be filled in using a pencil in order to allow correcting and stay waterproof. The working up of the catch can be seen as a number of processes succeeding each other.

3.1 Estimating the total mass (weight) of the catch

Purpose

Measurement or estimation of the total mass of the fish and “other” caught in the given haul.

Methods

The total catch mass (weight) of haul can be estimated by one of the following methods.

1. Weighting the total catch by use of a marine balance.
2. Counting the number of standard filled baskets/boxes. The average weight of the baskets/boxes is estimated by weighting five random selected baskets/boxes.
3. By adding up the total estimated mass or weighted mass of each species (will often be achieved during an estimation of the species composition).

The results are recorded in kilograms.

3.2 Estimating of the catch by species

Purpose

Measurement or estimation of the total mass (weight) and number of specimens of given species in catch.

Methods

Total catch should be sorted out by species, storing different species separately in boxes or baskets for further analyses. In order to simplify further working up of the catch, only boxes or baskets of same size and material should be used.

Certain species that are hard to distinguish from each another may be grouped by genus or higher taxonomic units.

In cases of exceptionally large catches (e.g. over 500 kg) or other circumstances which do not allow the sorting of total catch, the species composition should be estimated using sub-sampling.

The procedure for sub-sampling is one of the following depending on the circumstances:

1. If all species appear fairly frequently in the catch, simultaneous sub-sampling of all species in the whole catch should be used:
 - A. Three sub-samples each weighting app. 100 kg's, depending of the impression of the species included in the catch are sorted by species. The samples must be taken from the first, middle and last sections of the trawl cod-end. Be aware of, that the three sub-samples together should represent the whole catch.
 - B. Each species from the three sub-samples are pooled and each species are weighted separately. The weights are recorded.
 - C. The total mass (weight) of all species (c) in the three sub-samples is estimated by adding the weight of the three samples.
 - D. The total catch mass (weight) of each species is estimated by raising the sub-sample mass for a given species with the ratio between the total catch weight and the summed mass of all sub-samples.
 - E. All total and sub-sample masses (weights) are recorded.
2. If some species appears in very low numbers in the catch, while other species appears in high numbers, sub-sampling of only the frequent species in the catch may be applied.
 - A. The species appearing with low frequency are sorted out of the whole catch by species and weighted.
 - B. The rest of the catch is treated as specified in method 1.
 - C. All total and sub-sample masses (weights) are recorded on the species-form.

Non-fish species should be recorded as well. This group might be grouped and recorded as invertebrates, botanicals or just "Other1". Non-organic material (stones, barrels etc.) should be recorded as "Other2".

The sorted and weighed fish are then used for the following **length, age and maturity sampling**.

3.3 Length composition

Purpose

Measurement or estimation of the absolute or relative length frequency by species

Methods

Length distribution should be recorded for all main fish species caught, at least for cod, flounder herring, sprat and flatfishes.

If the number of a given species does not significantly exceed the number recommended in the table below all individuals are measured.

If the number of individuals of a given species significantly exceed the number recommended in the table below the following procedure must be adapted:

1. All individuals of a given species in the catch are subdivided into a number of sub-samples. Each sub-sample should approximately have the size which is recommended in the table below.
2. One of the sub-samples is randomly selected for length measurements.

Always measure the whole sub-sample. Never stop in the middle because you have realised that your sub-sample is too large. In most cases, a biased length distribution will be the result.

If you realise that your sub-sample is too small then randomly select another of the sub-samples and continue obtaining the length frequency measuring all of it. If you must, divide this sub-sample into a number of sub-sub-samples and continue the measuring procedure by measuring one or more randomly selected sub-sub-samples).

Length of the fish is defined as total length (measured from the tip of the nose to the tip of caudal fin).

Length is measured to 0.5 cm below for herring and sprat (e.g., lengths in the range of 10.0-10.4 cm are equal to 10.0-cm class and lengths 10.5-10.9 cm are equal to 10.5-cm class). For all other species the length is measured to 1-cm below, (e.g., lengths in the range of 20.0-20.9 cm are equal to 20.0-cm class).

If a certain species is caught in two clearly distinct size categories, both of these size categories should be sampled separately. The number of fish from each sample should follow the sample sizes given below.

Minimum number of individuals to be length measured (in sample or sub-sample):

Number of length-classes	Number of individuals
1 - 10	100
11 - 20	200
more then 20	300

The relation between number of length-classes of the total length range and the number of individuals to be measured is illustrated in Figure 1 (Müller 1996). During the length measurements, the above-specified number of fish of each species per length group are collected and stored separately by the length-groups for **age, sex, individual mass and maturity** estimations.

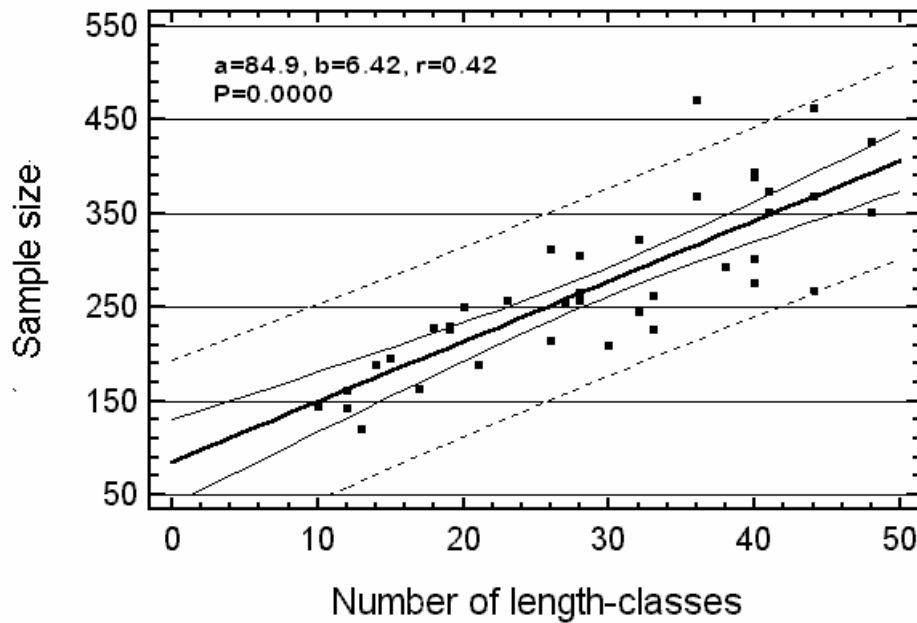


Figure 1. Relationship between the number to be measured and the number of length groups of the total length range in the sample of the catch (after Müller, 1996).

3.4 Age, sex, individual mass (weight) and maturity sampling procedure

Purpose:

Estimation of the fractions of age groups, sex ration, mass and fractions of the different maturity stages by length-class and species.

Age, sex, mass and maturity estimates are at least required for the main target species:

- cod,
- flounder.

However, same data should be sampled for herring, sprat and flatfishes when capacities are available.

The complete number of age determinations is used to establish age-length-keys (ALK) by the ICES Sub-division and quarter. ALKs are used for converting the length distribution of given aggregation level into an age distribution. The determination of sex and maturity stage is done to produce maturity ogives for estimating the Spawning Stock Biomass (SSB). The individual mass is used for calculating the mean mass per length class, to convert catch in weight into catch in numbers and the mean mass of age groups for calculating the SSB and total biomass. Apart from the mentioned purposes, there might be additional purposes (identifying stock components etc.).

Methods

The samples are collected on the basis of country, quarter and the ICES Sub-division.

It is recommended that each country collects otoliths by each haul to make safe that sampled otoliths come from all parts of the ICES Sub-division.

The procedure of re-measuring the fish, weighting, estimating of sex, maturity stage and the cutting of otoliths might be made most efficient in one work-procedure for each individual in the above-mentioned sequence.

Consequently, the number of fish selected for estimating of sex, maturity stage and cutting of otoliths are equal.

Estimating individual/mean mass (weight)

After length measuring the individual mass of each fish is weighted and recorded. If it is impossible to achieve the individual weight, the number and total mass of group of individuals with the same length are recorded to calculate the mean mass of the individuals in the length class. The mass (weight) is estimated by use of an electronic balance. The mass (weight) is measured in grams. A minimum of five specimens must be weighted even though less is used for cutting of otoliths.

Estimation of sex and maturity stage

The abdomen of each individual is cut open and the gonads are examined in order to estimate the sex. If the individual is mature, the sexes can easily be distinguished, but for immature individuals the task is difficult and special literature about the subject have to consult.

In the same process, the maturity stage is determined according to the classification description of the different stages given in **Annex 6** or according to the code practiced on the national level. If a national code is used the national coding must be converted into the BITS 5 stage code according to **Annex 7** before the data are submitted to ICES Data Centre.

Cutting of otoliths.

The technique for cutting otoliths depends on the species. For descriptions of these techniques, please consult the literature about the subject.

The optimum number of otoliths per length class and the ICES Sub-division cannot be given in a universal form. A description of the optimum sample size of age readings and length measurements dependent on a universal cost function is given paper prepared in Oeberst (2000).

The analyses showed that the necessary number age readings in a length class is dependent on:

- the portion of the length class within the length frequency,
- the maximum variance of the portions of the age groups within the length class.

The table below gives the minimum number of otoliths by length class, which must be cut per country, survey, the ICES Sub-division and species based on the length distribution.

Length-class	Minimum number of age readings
With probably only one age group (age group 0, 1)	2 to 5
With probably more than on age group	
Portion of the length class less than 5%	10
Portion of the length class more than 5%	20

Since the collection of the otoliths should be distributed over the whole survey time in the ICES Sub-division, the actual length frequency of the survey can be used to choose the number of otoliths per length-class.

The otoliths may be:

1. read during the survey, if proper facilities and experienced age readers are available on board; store the otoliths in ice-boxes, envelopes or other suitable containers,
2. stored for later age determining.

In both cases, the containers must be labelled with indication of: species, cruise number, date, ICES subdivision, length class.

4 Environmental data

Purpose

Measurements of environmental parameters which might influence the temporal and spatial distribution of the different species

Methods

As minimum following hydrographical data should be collected at each station:

- seawater temperature and salinity in the surface layer,
- seawater temperature, salinity and oxygen content in the bottom layer.

The sampling procedure of the hydrographical data should be implemented according to the standard specified by the ICES. If possible the CTD profiles from the surface to the bottom should be sampled.

5 Estimation of stock indices

5.1 Stock indices

Following notations are used for describing the algorithms.

$c_{l,h,s,t}$ denotes the catch per hour of species with length l , in haul h of strata s captured with trawl type t . The number of trawl stations in strata s is denoted by n_s , and A_s denotes the area of strata s .

To combine the CPUE values of both the new standard gears conversion factors were estimated based on inter-calibration experiments (literature). The conversion factors ($conf_t$) are used to transform the CPUE values of trawl type t in standard CPUE's which are expressed in units of the larger TV3.

$$C_{l,h,s} = c_{l,h,s,t} * conf_t$$

Different ways are possible to aggregate the data of the hauls in stock indices by age group and the ICES Sub-division. One option is that $C_{l,h,s}$ are transformed in CPUE by age group for each haul $C_{a,h,s}$, where a denotes age group. Then the means by depth layers and the ICES Sub-division are estimated. Second way which is described here estimates the means by depth layer and the ICES Sub-division by length classes. The mean length frequency of the stock in the subdivision is then transformed in stock indices by age groups. Both ways estimates the same stock indices.

Using the $C_{l,h,s}$ the mean standardized CPUE of species with length l in strata based on n_s hauls by depth layers is estimated.

$$\bar{C}_{l,s} = \frac{1}{n_s} \sum_{k=1}^{n_s} C_{l,k,s}$$

The stratified mean of the ICES Sub-division by length class ($\hat{C}_{st,l}$) uses the areas of the strata (depth layer) as weighting factors and can be calculated by

$$\hat{C}_{st,l} = \frac{1}{\sum_s A_s} \sum_s A_s \bar{C}_{l,s}$$

$\hat{C}_{st,l}$ presents the length distribution of the stock in the ICES Sub-division.

The variance (V) of $\hat{C}_{st,l}$ can be estimated by

$$V(\hat{C}_{st,l}) = \frac{1}{(\sum_s A_s)^2} \sum_s A_s^2 V(\bar{C}_{l,s}) / n_s$$

where $V(\bar{C}_{l,s})$ presents the variance of the CPUE values by length interval in strata s.

The mean length frequency in the ICES Sub-division can then be transformed in CPUE vales by age group using the data of ALK key.

X_{la} may be the number of aged individuals with length l and age a and

$$X_l = \sum_a X_{ja} \quad \text{denotes the total number of individuals aged in length class l.}$$

Proportion of age group a in the stock can be estimated by

$$p_a = \frac{\sum_l \hat{C}_{st,l} X_{la}}{\sum_l \hat{C}_{st,l} \sum_j X_{ja}}$$

Stock index of age group a, C_a , is estimated by

$$C_a = p_a \sum_l \hat{C}_{st,l}$$

5.2 Weight at age

Weight of individuals which is stored in CA data is used to estimate mean weight at age where weight samples are stratified by length class. Mean weights per length class must be used for converting the length distribution of the CPUE on a given aggregation level, X, (as depth layer or ICES Sub-division) into mean weight at age (ICES 2002).

$\bar{W}_{l,a}$ donates the mean weight of individuals in length class l with age a based on CA data of the used aggregation level. Missing mean weights of length class where $\bar{C}_{X,l}$ exist are substituted by the length-weight relationship of the corresponding data.

$$W = kL^b$$

where k and b denote the parameter of the length-weight relationship.

Mean weight at age, \bar{W}_a , of the aggregation level is calculated by

$$\bar{W}_a = \frac{\sum_l \bar{W}_{a,l} * \bar{C}_{X,l}}{\sum_l \bar{C}_{X,l}}$$

Criteria for calculating mean weight at age:

- ☐ No missing age values
- ☐ No missing weight values
- ☐ Both valid and invalid data

Selections:

- ☐ Year
- ☐ Survey
- ☐ Aggregation level (depth layer or subdivision)
- ☐ Species

5.3 Maturity at age

The maturity ogive is calculated as the fraction of mature fish (cod and flounder) at age group a chosen aggregation level, X, (depth layer or ICES Sub-division). Mean fraction of matured fish per length class must be used for converting the length distribution of the CPUE on a given aggregation level, X, (as depth layer or subdivision) into mean fraction of matured individuals at age (ICES 2002).

In the DATRAS system the maturity has the codes from 1 to 5 where 1 is immature and 2 is resting. Therefore, stages 3-5 are different stages of mature fish. To create maturity ogive the code 1 to 5 is transferred into a two code system – mature (M) and immature (I).

$N_{M,l,a,s}$ denotes the number of matured individuals in length class l with age a and sex s and $N_{I,l,a,s}$ denotes the number of immature individuals in the same length class and age group with the same sex.

The fraction of matured individuals by length class, age group and sex can be estimated by

$$p_{M,l,a,s} = \frac{N_{M,l,a,s}}{N_{M,l,a,s} + N_{I,l,a,s}}$$

Missing $p_{M,l,a,s}$ of length class l is substituted by

$$p_{M,l,a,s} = (p_{M,l-1,a,s} + p_{M,l+1,a,s}) / 2$$

with

$p_{M,a,l,s} = 0.0$ for total length smaller than 20 cm and

$p_{M,a,l,s} = 0.95$ for individuals larger than 60 cm or

$p_{M,a,l,s}$ of the nearest neighbour when more than one length-class are missing.

The fraction of matured age group a for a given aggregation level X, $p_{M,X,a,s}$ can be calculated by

$$p_{M,X,a,s} = \text{Ogive}_{M,X,a,s} = \frac{\sum_l p_{M,X,l,a,s} \bar{C}_{X,l}}{\sum_l C_{X,l}}$$

Criteria for creating of maturity ogive:

- ☐ No missing age values
- ☐ No missing maturity values
- ☐ Both valid and invalid data

Selections:

- ☐ Year
- ☐ Survey
- ☐ Aggregation level (depth layer or subdivision)
- ☐ Species

6 Exchange specifications for the Baltic International Trawl Survey data

Data of BITS are used for estimating different stock indices and stock parameters for Baltic cod and flounder. For this purpose DATRAS system was developed which stores the sampled

data, checks the data quality by screening tools and estimates different stock parameters. It was agreed by WG BIFS that participating countries submit all data in DATRAS exchange format to the ICES Secretariat in Copenhagen.

6.1 Deadlines of reporting

It was agreed that data should be submitted to the following deadlines:

Data	Deadlines
Preliminary data 1q (HL and CA records only for cod and flounder)	Before WGBFAS in April
Final data 1q	1st June
Final data 4q	1st April

The option of submitting preliminary data of the first quarter survey was made available to support the assessment working group with newest data. In some cases it is not possible to prepare final version of the data because the surveys finished late in March and the ICES assessment working group (WGBFAS) starts on the beginning of April. However, it is pointed out that final data should be available until the agreed deadline.

When sending the data to the ICES Secretariat the form in section 6.5 has to be filled in and send together with the records. This will provide an overview of the data for later use and help the entering of the data to the database.

6.2 Screening of data

Before the data (in ASCII coding) are submitted to the ICES Secretariat, they should be checked by the screening program available from the ICES Secretariat. It can be found in the website (www.ices.dk/datacentre/datsu/selrep.asp). Checks which are realized during the data screening are given on the same website of the ICES. Furthermore, the CA data should be screened based on ICES and additional agreed tools which are defined by WG BIFS.

6.3 Format of data

Three distinct types of computer records have been defined for standard storage of the DATRAS data:

HH : Record with detailed haul information

HL : Length frequency data

CA : Sex-maturity-age-length keys (SMALK's) for the ICES Sub-division.

The detailed formats of these three record types are given section 6.4.1 - 6.4.3 of the present manual. For the reference, codes please check ICES website

<http://www.ices.dk/datacentre/reco/>.

Details of environmental data should be submitted to the Hydrographic Service of ICES according to established procedures. The national hydrographical station number should be reported in record type HH to enable the link to be made between haul data and environmental data.

6.4 File structure and name

When delivering the data to the ICES Secretariat one file should only contain data from one year and one survey. The name of the file should be contains month (the first day of the survey), country (ICES country code) and year, e.g., 03EST98.csv. In addition, all the fish species the country intends to report have to be included in the file when sending it to the ICES Secretariat. Later corrections and updates are possible.

The records must be ordered in such a way that each record of TYPE HH be followed by all records of TYPE HL of the same haul, ordered by species. The number and kind of species recorded must agree with the species recording code as specified in record TYPE HH. For examples of the various codes, see **Annex V**.

Records of TYPE CA should follow at the end of the file after the last species record of TYPE HL for the last haul.

6.4.1 Record type HH

Baltic International Trawl Survey - from 2004

Mandatory Record

HH

Haul Information, fields are separated by comma

Field	Start	Width	Mandatory	Key	Range	Comments <u>ICES website</u>
RecordType	1	2	✓	char	HH	Fixed value: HH
Quarter	2	1	✓	int	1.0 to 4.0	
Country	3	3	✓	char	See Annex 8	<u>TS_Country</u>
Ship	4	4	✓	char	See Annex 8	<u>TS_Ship</u>
Gear	5	6	✓	char	See Annex 9	<u>Gear</u>
SweepLgt	6	3		int	0.0 to 999.0	
GearExp	7	2		char		<u>TS_GearExp</u>
DoorType	8	2		char		<u>TS_DoorType</u>
StNo	9	6	✓	char		Coding system of the Tow Database
HaulNo	10	3	✓	int	1.0 to 999.0	Sequential numbering by cruise
Year	11	4	✓	char	1900.0 to 2099.0	
Month	12	2	✓	int	1.0 to 12.0	
Day	13	2	✓	int	1 to 28/29/30/31	
TimeShot	14	4	✓✓	char	1 to 2400	In UTC
Stratum	15	4		char		<u>TS_DepthStratum</u>
HaulDur	16	3	✓	int	0, 5.0 to 90.0	In minutes, Haul duration of 0 is possible for hauls with validity code N
DayNight	17	2	✓	char	D, N	<u>TS_DayNight</u>
ShootLat	18	8	✓	decimal4	53.0 to 66.0	Shooting position: Degree Lat.
ShootLong	19	9	✓	decimal4	0.0 to 59.99	Shooting position: Minute Lat.
HaulLat	20	8	✓	decimal4	9.0 to 30.0	Shooting position: Degree Lon.
HaulLong	21	9	✓	decimal4	0.0 to 59.99	Shooting position: Minute Lon.
StatRec	22	4		char		
Depth	23	4	✓	int	10 to 300, space	Depth from surface in metres, space filled=not known
HaulVal	24	1	✓	char	I, V, N, C	Invalid =I, Valid =V or no oxygen = N, C = calibrated <u>TS_HaulVal</u>
HydroStNo	25	8	✓	char		Station No as reported to the ICES hydrographer
StdSpecRecCode	26	1	✓	char	See Annex 10	Use position 65 for standard and 66 for bycatch codes <u>TS_StdSpecRecCode</u>
BycSpecRecCode	27	1	✓	char		<u>TS_BycSpecRecCode</u>
DataType	28	2	✓	char		<u>TS_DataType</u>

Netopening	29	4		decimal1	1.5 to 10.0	in metre
Rigging	30	2		char		<i>Not used in this format</i>
Tickler	31	2		int		<i>Not used in this format</i>
Distance	32	4		int	1850.0 to 9999.0	Distance towed over ground (m)
Warplngt	33	4		int	100.0 to 999.0	in metre
Warpdia	34	2		int	10.0 to 60.0	in millimetre
WarpDen	35	2		int		
DoorSurface	36	4		decimal1	1.0 to 10.0	in square metre
DoorWgt	37	4		int	50.0 to 2000.0	in kilogram
DoorSpread	38	3		int	48.0 to 180.0	in metre
WingSpread	39	2		int	12.0 to 30.0	
Buoyancy	40	4		int	50.0 to 200.0	in kilogram
KiteDim	41	3		decimal1	0.5 to 2.0	in square metre
WgtGroundRope	42	4		int	0.0 to 800.0	in kilogram
TowDir	43	3		int	1.0 to 360.0	
GroundSpeed	44	3		decimal1	2.0 to 6.0	ground speed of trawl in knots
SpeedWater	45	3		decimal1	1.0 to 9.9	rawl speed through in knots
SurCurDir	46	3		int	0.0 to 360.0	Ssack water =0
SurCurSpeed	47	4		decimal1	0.0 to 10.0	metres per sec
BotCurDir	48	3		int	0.0 to 360.0	slack water =0
BotCurSpeed	49	4		decimal1	0.0 to 10.0	metres per sec
WindDir	50	3		int	0.0 to 360.0	0 = calm
WindSpeed	51	3		int	0.0 to 100.0	metres per sec
SwellDir	52	3		int	0.0 to 360.	
SwellHeight	53	4		decimal1	0.0 to 25.0	in metre
SurTemp	54	4	✓	decimal1	-1.0 to 30.0	in °C
BotTemp	55	4	✓	decimal1	1.0 to 20.0	in °C
SurSal	56	5	✓	decimal2	10.0 to 38.0	in PSU
BotSal	57	5	✓	decimal2	20.0 to 38.0	in PSU
ThermoCline	58	2		char		<u>TS_ThermoCline</u>
ThClineDepth	59	4		int	5.0 to 100.0	in metre

6.4.2 Record Type HL

Mandatory Record HL Length frequency distribution, fields are separated by comma

Field	Start	Width	Mandatory	Key	Range	Comments <u>ICES website</u>
RecordType	1	2	✓	char	HL	Fixed value: HL
Quarter	2	1	✓	int	1.0 to 4.0	
Country	3	3	✓	char	See Annex 8	<u>TS_Country</u>
Ship	4	4	✓	char	See Annex 8	<u>TS_Ship</u>
Gear	5	6	✓	char	See Annex 9	<u>Gear</u>
SweepLngt	6	3		int	0.0 to 999.0	
GearExp	7	2		char		<u>TS_GearExp</u>
DoorType	8	2		char		<u>TS_DoorType</u>
StNo	9	6	✓	char		
HaulNo	10	3	✓	int	1.0 to 999.0	
Year	11	4	✓	char	1900.0 to 2099.0	
SpecCodeType	12	1	✓	char	N, T	N - NOCD, T – TSN code <u>TS_SpecCodeType</u>
SpecCode	13	10	✓	char	See Annex 12	Official TSN code
SpecVal	14	2	✓	char	See Annex 11	<u>TS_SpecVal</u>
Sex	15	2		char	F, M, U	Male = M, Female =F, Unsexed = U, <u>TS_Sex</u>
TotalNo	16	9		decimal2	1.0 to 9999999.0	No specimen caught per hour
CatIdentifier	17	2	✓	int	1.0 to 5.0	
NoMeas	18	3	✓	int	1.0 to 999.0	
SubFactor	19	9	✓	decimal4	1.0 to 1000.0	
SubWgt	20	6		int	0.0 to 40000.0	
CatCatchWgt	21	8	✓	int	0.0 to 10000000.0	
LngtCode	22	2	✓	char	., 0, 1, 9	-9 – missing value, . 1mm, 0 – 0.5 cm, 1 – 1cm <u>TS_LngtCode</u>
LngtClass	23	4	✓	int	1 to 999	Identifier of lower bound of length distribution, eg. 65-70 cm=65 For classes less than 1 cm there will be an implied decimal point after the 2 nd digit, eg. 30.5-31.0 cm=305
HLNoAtLngt	24	6	✓	decimal1	1.0 to 999999.0	Length classes with zero catch should be excluded from the record (no/hour equals the sum of no at length).

6.4.3 Record Type CA

Optional Record CA SMALK, fields are separated by comma

Field	Start	Width	Mandatory	Key	Range	Comments <u>ICES website</u>
RecordType	1	2	✓	char	CA	Fixed value: CA
Quarter	2	1	✓	int	1.0 to 4.0	
Country	3	3	✓	char	See Annex 8	<u>TS_Country</u>
Ship	4	4	✓	char	See Annex 8	<u>TS_Ship</u>
Gear	5	6	✓	char	See Annex 9	<u>Gear</u>
SweepLgt	6	3		int	0.0 to 999.0	
GearExp	7	2		char		<u>TS_GearExp</u>
DoorType	8	2		char		<u>TS_DoorType</u>
StNo	9	6	✓	char		
HaulNo	10	3	✓	int	1.0 to 999.0	
Year	11	4	✓	char	1900.0 to 2099.0	
SpecCodeType	12	1	✓✓	char		<u>TS_SpecCodeType</u>
SpecCode	13	10	✓	char	See Annex 12	Official TSN code
AreaType	14	2	✓	char	-9, 0, 4	-9 – not provided, 0 – ICES statistical rectangle, 4 – Baltic ICES Sub-division, <u>TS_AreaType</u>
AreaCode	15	4	✓	char		
LgtCode	16	2	✓	char	-9, ., 0, 1	-9 – missing value, . 1mm, 0 – 0.5 cm, 1 – 1cm <u>TS_LngthCode</u>
LgtClass	17	4	✓	int	1.0 to 999.0	Identifier of lower bound of length distribution, eg. 65-70 cm=65 For classes less than 1 cm there will be an implied decimal point after the 2 nd digit, eg. 30.5-31.0 cm=305
Sex	18	2	✓	char	-9, M, F, U	-9 – unknown, M – Male, F – Female, U – Unsexed <u>TS_Sex</u>
Maturity	19	2	✓	char	-9, 1 to 5	-9 – missing value and Annex 1, <u>TS_Maturity</u>
PlusGr	20	2		char	+, -9	Plus group = +, else -9 <u>TS_PlusGR</u>
AgeRings	21	2	✓	int	0. to 99.0, spaces	Unknown age =spaces
CANoAtLgt	22	3	✓	int	1 to 999	
IndWgt	23	5		Decimal1	1.0 to 99999.0	The mean weight of the number of fish in the record (in gram).

6.5 Overview tables of BITS

Checklist with detailed information per survey compiled by:date:

Year:

Quarter:

Country:

Vessel:

Fishing gear:

Mesh bar length in the codend (in mm):

Comments on gear:

Hydrography (y/n):

Stations no.:

CTD-probe (y/n):

Surface temperature (y/n):

Bottom temperature (y/n):

Surface salinity (y/n):

Bottom salinity (y/n):

Bottom oxygen (y/n):

Haul duration:

Day/night (trawling):

Other comments:

ICES SUBDIVISION:	22	23	24	25	26	27	28	29	30	31	32
Number of hauls:											

STANDARD SPECIES:	MEASURED (Y/N)	AGED (N - NO, O - OTOLITHS, S - SCALE)	AGED PLUS GROUP USED	GROUPED BY WHAT STRATIFICATION? (DEPTH OR ICES-REC.)	SEX Y/N	MATURITY (Y/N)	FISH HEALTH CONDITION (Y/N)	STOMACH FULLNESS (Y/N)
Herring:								
Sprat:								
Cod:								
Flounder:								

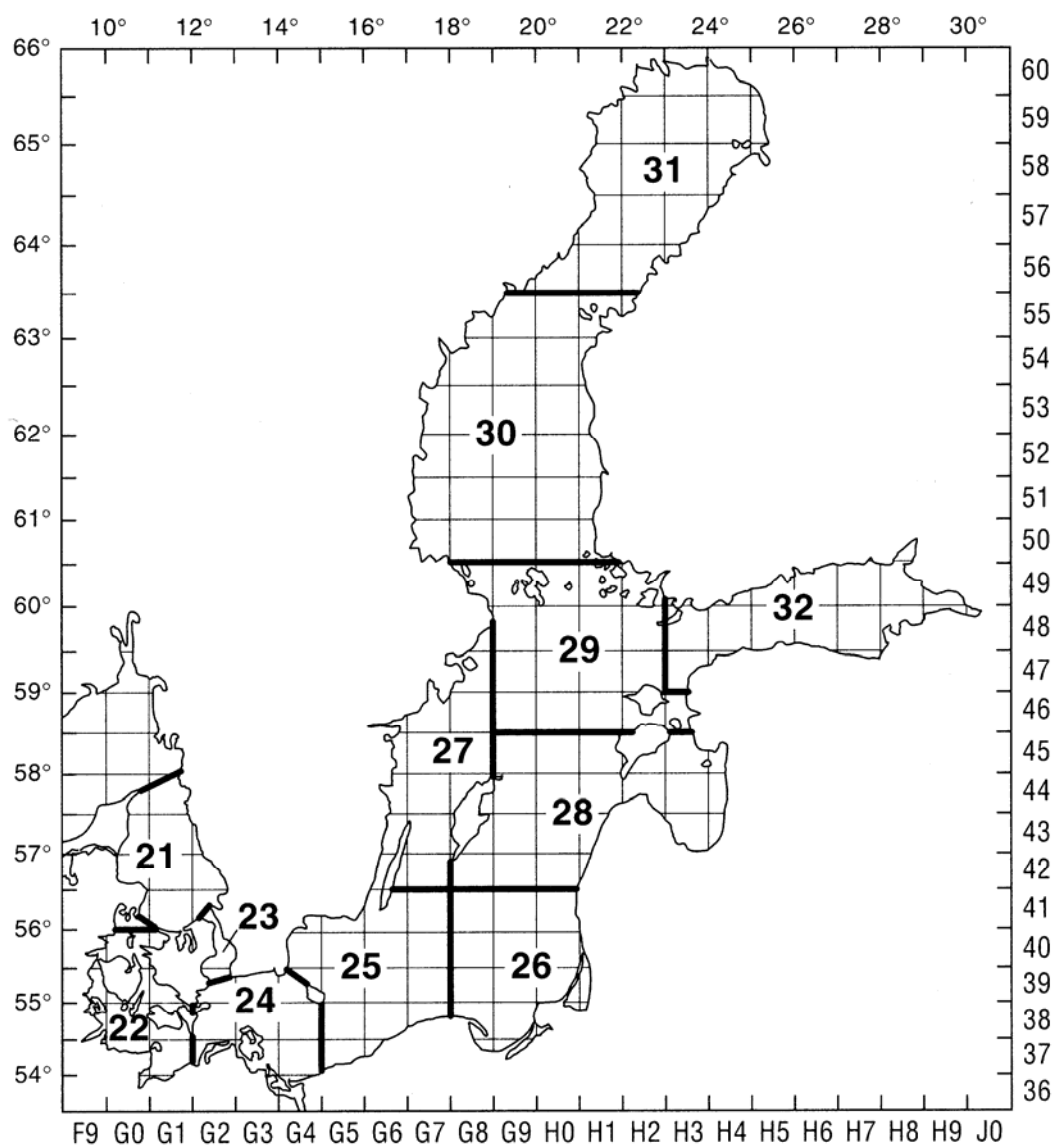
BYCATCH	MEASURED (Y/N)	COUNTED (Y/N)	AGED (Y/N)
Plaice:			
Dab:			
Turbot:			
Brill:			
Sole:			
All other bycatch:			

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Annex 1: Baltic Sea with the ICES Subdivisions and rectangle codes



Annex 2: Assignment of quarters of rectangles to the ICES Subdivisions

		10°00		12°00		14°00		16°00		18°00		20°00			
		F F	G G	G G	G G	G G	G G	G G	G G	G G	G G	H H	H H	H H	H H
		9 9	0 0	1 1	2 2	3 3	4 4	5 5	6 6	7 7	8 8	9 9	0 0	1 1	2 2
60°30	50														
	50														
60°00	49														
	49										29 29	29 29	29 29	29 29	29 29
59°30	48											29 29	29 29	29 29	29 29
	48										29	29 29	29 29	29 29	29 29
59°00	47										27 27	29 29	29 29	29 29	29 29
	47										27 27	29 29	29 29	29 29	29 29
58°30	46									27 27	27 27	29 29	29 29	29 29	29 29
	46								27 27	27 27	27 27	29 29	29 29	29 29	29 29
58°00	45								27 27	27 27	27 27	28 28	28 28	28 28	
	45								27	27 27	27 27	28 28	28 28	28 28	
57°30	44			21 21					27 27	27 27	27 27	28 28	28 28	28 28	
	44		21	21 21					27	27 27	27 27	28	28 28	28 28	
57°00	43		21	21 21	21				27 27	27 27	27 28	28 28	28 28	28 28	
	43		21 21	21 21	21				27 27	27 27	27 28	28 28	28 28	28	
56°30	42		21 21	21 21	21 21				27 27	27 27	28 28	28 28	28 28	28	
	42		21 21	21 21	21 21				27 27	27 27	28 28	28 28	28 28	28	
56°00	41		21	21 21	21 21				25 25	25 25	26 26	26 26	26 26		
	41		22 22	21 21	23 23		25 25	25 25	25 25	25 25	26 26	26 26	26 26	26	
55°30	40		22 22	22 22	23 23		25 25	25 25	25 25	25 25	26 26	26 26	26 26	26	
	40	22	22 22	22	23 23		25 25	25 25	25 25	25 25	26 26	26 26	26 26	26	
55°00	39	22	22	22	23 23	24 24	24 25	25 25	25 25	25 25	26 26	26 26	26 26	26	
	39	22	22 22	22 22	24 24	24 24	24 24	25 25	25 25	25 25	26 26	26 26	26 26		
54°30	38	22	22 22	22 22	24 24	24 24	24 24	25 25	25 25	25 25	26 26	26 26	26		
	38	22	22 22	22 22	24 24	24 24	24 24	25 25	25 25	25	26 26	26 26	26 26		
54°00	37		22 22	22 22	24 24	24 24	24 24	25 25	25		26	26 26			
	37		22	22 22	24	24 24	24 24	25 25							
36	36		22												
	36														
		F F	G G	G G	G G	G G	G G	G G	G G	G G	G G	G G	H H	H H	H H
		9 9	0 0	1 1	2 2	3 3	4 4	5 5	6 6	7 7	8 8	9 9	0 0	1 1	2 2

[illegible][illegible]

[illegible]

[illegible][illegible]

strata	SD 27	42G6	42G7	43G6	43G7	43G8	44G6	44G7	44G8	45G6	45G7	45G8	46G6	46G7	46G8	47G8
Depth interval																
total	8826.6	427.7	986.9	389.5	945.6	189.3	331.9	960.5	435.4	194.7	947.2	947.2	78.2	598.1	915.9	478.6
0 - 9	1014.8	150.2	0.0	108.2	26.0	66.0	121.7	0.0	8.5	117.9	28.4	0.0	36.5	121.9	28.1	201.4
10 - 19	700.5	111.8	0.0	60.6	45.4	53.0	61.9	1.1	10.7	42.1	36.8	0.0	28.1	102.1	28.1	118.6
20 - 29	525.3	31.8	3.3	114.7	41.1	30.3	44.8	1.1	11.7	20.0	46.3	0.0	8.3	91.7	20.8	59.3
30 - 39	415.7	23.0	14.3	70.3	47.6	38.9	27.7	3.2	8.5	10.5	33.7	1.1	4.2	74.0	20.8	37.8
40 - 49	538.2	23.0	24.1	32.5	92.0	1.1	55.5	24.5	18.1	4.2	92.6	13.7	1.0	75.0	54.2	26.6
50 - 59	562.5	25.2	205.1	3.2	76.8	0.0	17.1	45.9	9.6	0.0	52.6	13.7	0.0	51.1	45.8	16.4
60 - 69	463.9	23.0	168.9	0.0	66.0	0.0	3.2	39.5	10.7	0.0	52.6	11.6	0.0	26.1	57.3	5.1
70 - 79	532.3	38.4	190.8	0.0	100.6	0.0	0.0	50.2	23.5	0.0	57.9	23.2	0.0	14.6	26.1	7.2
80 - 89	634.0	1.1	201.8	0.0	110.4	0.0	0.0	64.0	54.4	0.0	91.6	42.1	0.0	19.8	43.8	5.1
90 - 99	961.6	0.0	154.6	0.0	145.0	0.0	0.0	233.7	124.9	0.0	90.5	144.2	0.0	15.6	53.1	0.0
100 - 150	1782.0	0.0	24.1	0.0	194.7	0.0	0.0	399.1	154.7	0.0	280.0	521.0	0.0	6.3	201.1	1.0
> 150	695.8	0.0	0.0	0.0	0.0	0.0	0.0	98.2	0.0	0.0	84.2	176.8	0.0	0.0	336.6	0.0

strata	SD 28	42G8	42G9	42H0	42H1	43G8	43G9	43H0	43H1	44G8	44G9	44H0	44H1	45G9	45H0	45H1
Depth interval																
total	11398.4	963.9	986.9	982.5	75.7	347.3	973.7	973.7	434.9	100.3	923.1	960.5	887.9	937.7	947.2	903.0
0 - 9	353.5	9.9	0.0	18.6	28.5	41.1	1.1	0.0	38.9	13.9	34.2	0.0	72.6	16.8	0.0	77.9
10 - 19	733.7	62.5	0.0	66.9	30.7	56.3	2.2	5.4	117.9	22.4	44.8	4.3	180.4	28.4	0.0	111.6
20 - 29	974.3	239.0	0.0	84.4	16.4	59.5	10.8	40.0	114.7	39.5	30.9	4.3	151.5	25.3	0.0	157.9
30 - 39	881.0	227.0	0.0	102.0	0.0	56.3	18.4	64.9	49.8	24.5	63.0	2.1	112.1	31.6	14.7	114.7
40 - 49	772.7	117.3	0.0	89.9	0.0	35.7	19.5	97.4	26.0	0.0	60.8	25.6	112.1	62.1	23.2	103.1
50 - 59	825.2	68.0	0.0	112.9	0.0	33.5	30.3	94.1	28.1	0.0	65.1	37.4	149.4	46.3	25.3	134.7
60 - 69	621.4	23.0	0.0	73.5	0.0	17.3	40.0	51.9	54.1	0.0	57.6	55.5	76.8	51.6	41.0	78.9
70 - 79	479.7	48.2	0.0	65.8	0.0	11.9	44.4	49.8	5.4	0.0	53.4	52.3	14.9	53.7	42.1	37.9
80 - 89	614.3	36.2	0.0	38.4	0.0	8.7	59.5	82.2	0.0	0.0	73.6	60.8	13.9	58.9	147.3	34.7
90 - 99	774.5	37.3	0.0	37.3	0.0	8.7	71.4	73.6	0.0	0.0	105.7	122.7	4.3	89.5	175.8	48.4
100 - 150	2935.0	95.4	540.6	219.3	0.0	18.4	440.3	135.2	0.0	0.0	265.7	470.6	0.0	301.0	445.2	3.2
> 150	1433.1	0.0	446.3	73.5	0.0	0.0	235.9	279.1	0.0	0.0	68.3	124.9	0.0	172.6	32.6	0.0

Annex 4: Manual of the construction and use of the International Standard Trawl for the Baltic Demersal Surveys, TV3 520

TV3 520 meshes

References

Anonymous 1998. Report of the Baltic International Fish Survey Working Group. Karlskrona, 8 – 13 June 1998. ICES CM 1998/H:4.

Contents

Two trawls are specified as International Standard Trawls for Baltic Demersal Surveys:

- TV3 520 meshes in the circumference for vessels less than 600 KW (This manual)
- TV3 930 meshes in the circumference for vessels of more than 600 KW (Separate manual)

This manual includes:

- Parts list
- A plot of the specifications of the net
- Three pages of detailed drawings of selected items
- Check lists
- Check guide

Notes to the construction

The nets should be made from good quality polyethylene netting, except the codend, which is made from polyamide. It will however not be possible for the net manufacturer always to obtain sheet netting of exactly the same length as specified in this manual. Thorough care must be taken to obtain materials with properties as close as possible to the ones specified here. The denomination of the sheet netting differs from manufacturer to manufacturer, but the following table should give the most common ‘translations’.

	CHEMICAL COMPOSITION	CONSTRUCTION	DIAMETER	INTERNATIONAL DENOMINATION	TRADE ‘NAME’
Front part and font belly	PE	Twisted	2.17	500/36	3/12
Rear belly	PE	Twisted	1.71	500/24	3/8
Codend	PA	Twisted	1.32	210/30	no. 10

IMPORTANT: It is very important to maintain the original relationship (hanging ratio, difference in length) between the netting lengths and the framing ropes along the headline and footrope. So if the headline in a section shall be 10% longer than the net according to this manual, it must be so, also if the dimensions of the net differ from the present specification.

Operation of the standard trawls

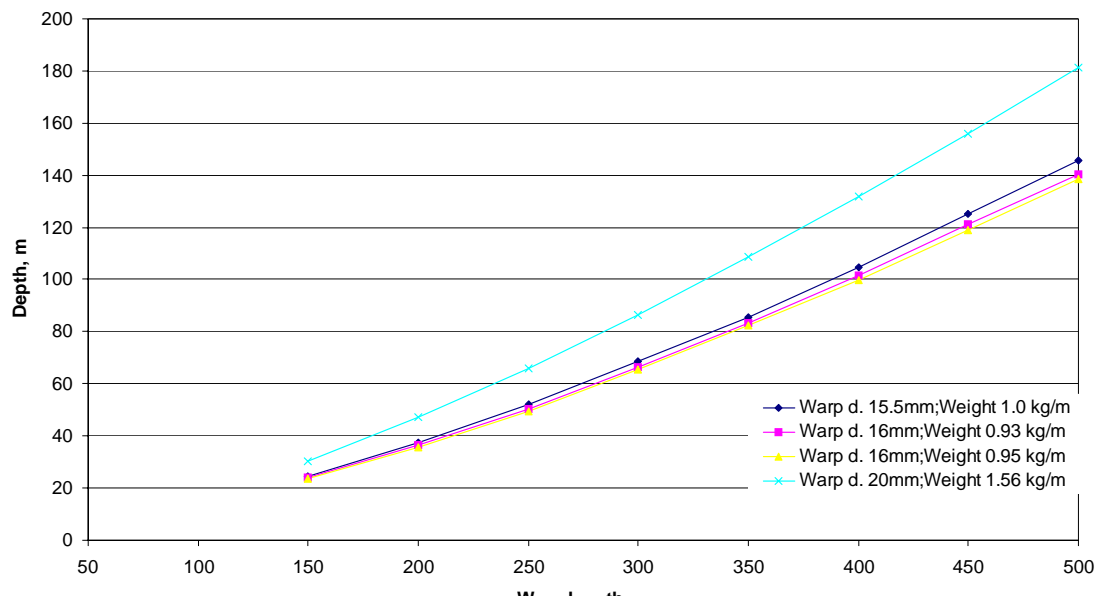
Towing speed

The towing speed should be 3.0 knots.

Warp length

It is recommended to use the following table for finding the correct warp length to be used at various fishing depths. The table gives different warp lengths for a range of warp constructions given by diameter and weight per metre.

It is recommended according to practical experience that the warps length should not less than 125 metre as it will decrease the door spread too much.



(The figures have been obtained using software developed at Kaliningrad State Technical University, by Professor Rosenstein).

The recommended warp length in the upper figure for warp diameter 15/16 mm should be taken as maximum. When using warps 15/16 mm their length could be less the results from the figure, but not less than the results from the curve of 20 mm.

Trawl geometry

The shape of the trawl is depending on many parameters of which some are being standardized here by using the same procedures. Nevertheless, when working on different depths and using different lengths of towing warp the door spread will change, and therefore also the height of the net. Table 2 below shows the relationship between the basic geometric parameters for the standard trawl using the specified 97.2 m distance between trawl door and the net (8 + 75 + 2.1 + 9.1 + 3 m). They are based on model measurements and full scale measurements at sea using acoustic measuring devices.

DOOR SPREAD, M	50	55	60	65
Trawl vertical opening, m	2,3	2,1	1,8	1,7
Headline spread, m	13	14,5	16	17,5
Angle of sweeps, degrees	11	12	13	14

If trawl monitoring instruments (like SCANMAR) are used on the trawl the table can be used to check if the trawl is working properly. Care should be taken that the instruments are neutrally buoyant in water.

Maintenance

The net should be regularly checked for wear and tear and all damages shall be repaired upon discovery.

The net will eventually stretch under normal fishing conditions. It is important for its fishing performance and for maintaining a constant fishing efficiency at regular intervals to check the length of the bridles, sweeps, extensions, netting sections etc.

The overall status for the net should be checked at the beginning of every cruise. Every year a detailed check should be made of all net and rope dimensions. (The interval between checks is depending on the time the net is in use. An annual check is regarded sufficient if the net is used for one or two normal surveys a year). The special check guide attached to this manual can be used.

IMPORTANT: Special attention should be given to ensure that the relationship (difference) between the length of the netting sections in the top and bottom panels are maintained. Lower sections are a half mesh or a full mesh longer than the corresponding top section. These differences have to be maintained by monitoring the net at regular intervals.

In the case that the difference is larger than 1 mesh size the bottom section must be shortened to the proper size.

Also the relationship between the length of the framing ropes and the nets in the wings and arms must be retained. The percentage the net is stretched on the headline and footrope is given in the specification. When the netting after a period of use loose its stretch, the headline and footrope must be cut off, the net in the wings and arms shortened and remounted on the ropes again.

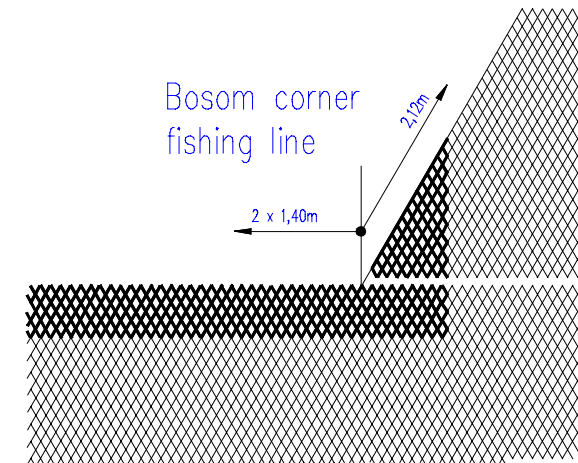
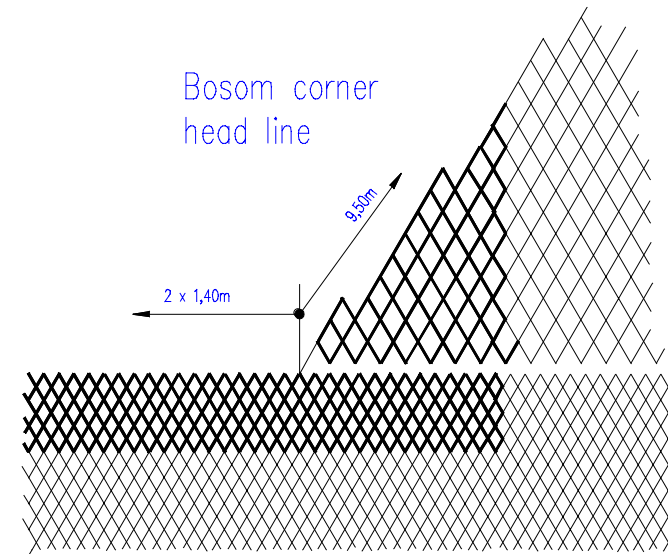
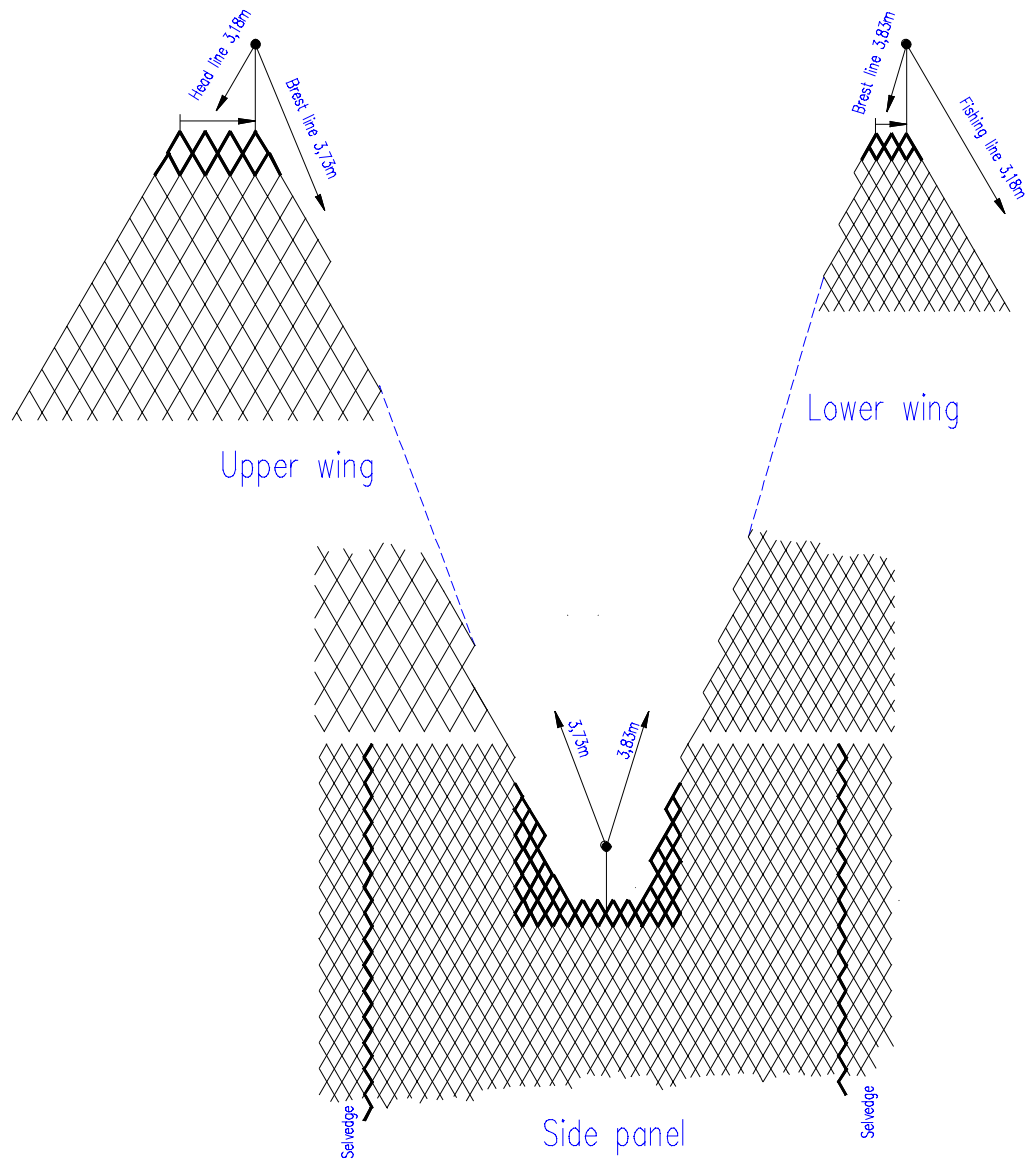
TV3 520#**Parts List****International Standard Trawl for Baltic Demersal Surveys**

Note: In this list the term weight is used for mass and the unit is kg.

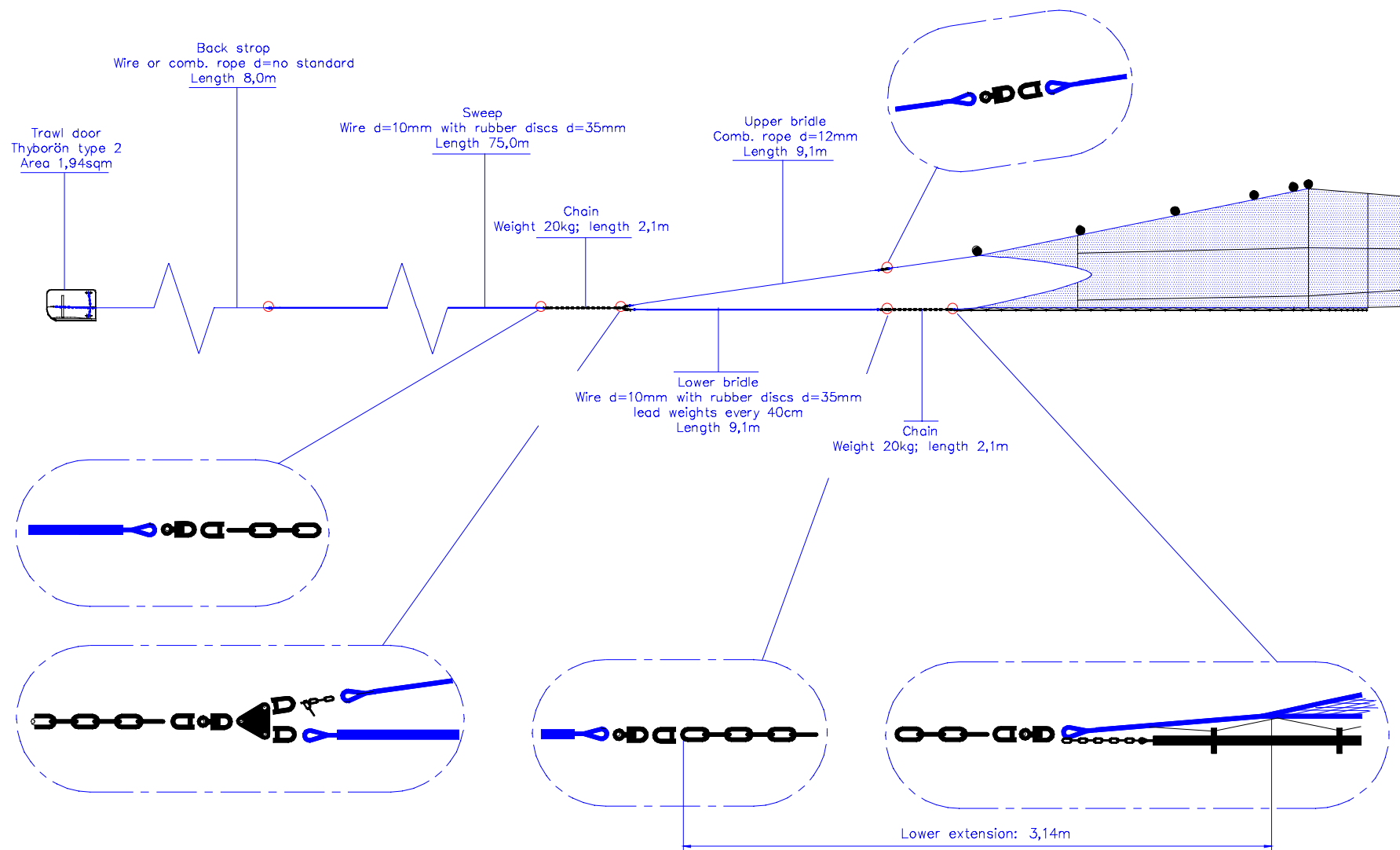
	No	ITEM	DESCRIPTION	SIZE
Trawl doors				
	2	Doors	Cambered V-doors, Type: Thyborøn Trawl Doors Type 2	1.78 m ² (63 inch) Weight 235 kg
		Front Chain	Recommended setting: 18 links using link 3 for warp attachment	Inside length of link 80 mm
		Back Chain	Recommended setting Top chain: 7 links Horizontal chain: 18 links Bottom chain: 5 links	Inside length of link: 63 mm
	2	Back strop	Combination rope	Ø = no standard Length 8 m
Sweeps				
	2	Sweep	Wire Rubber disks	Ø = 10 mm Length 75 metre Weight per metre 0.36 kg Ø = 35 mm
Chain between sweeps and bridles				
	2	Chain	Iron	Length 2.1 m Weight: 20 kg
Bridles				
	4	Upper bridle	Combination rope	Ø = 12 mm Length: 9.1 m Weight per metre 0.2 kg
	2	Lower bridle	Wire Rubber discs Lead weights with centre hole distributed evenly, every 40 cm	Ø = 10 mm Length 9.1 m Weight per metre 0.36 Ø = 35 mm 22 pieces of 250 g each on each lower bridle
Floats				
	(11)	Floats	(4 litre (same as 200 mm, 8 inch) plastic floats)	Total lifting force: 38.5 kg (equivalent to 11 pcs. of 200 mm plastic floats)

Headline and Fishing line				
	1	Headline	Combination rope, stainless	Ø = 12 mm Length 34.16 m incl. extension Weight per metre 0.2 kg
	1	Fishing line	Combination rope, stainless Chain weight	Ø = 12 mm Length 37.66 m incl. extension and weight Weight per metre 0.2 kg Length 2.1 m Weight 20 kg
Footrope				
		Centre Wire	Stainless steel wire	Ø = 9.5 mm Weight per metre 0.34 kg
	108	Rubber discs	Rubber discs with side hole	100 mm
		Filling the space between rubber discs	Plastic or rubber tube Rubber discs on each side of rubber disc 28 pcs. of lead, (1 every 3 rd space)	Ø = 12 mm/14 mm Ø = 35 mm 250 g each piece
		Rope to mount the gear	Danline mounted in bights on the fishing line and through the rubber discs.	Ø = 12 mm The size of the bights makes the footrope disc periphery hang 4 cm below the fishing line
Attachments				
		Lazy deckie	No standard	
		Tackle strop	No standard	



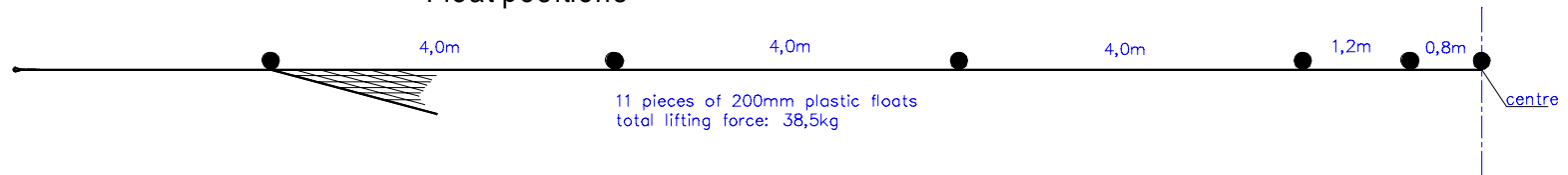


Details for trawl TV3-520x80



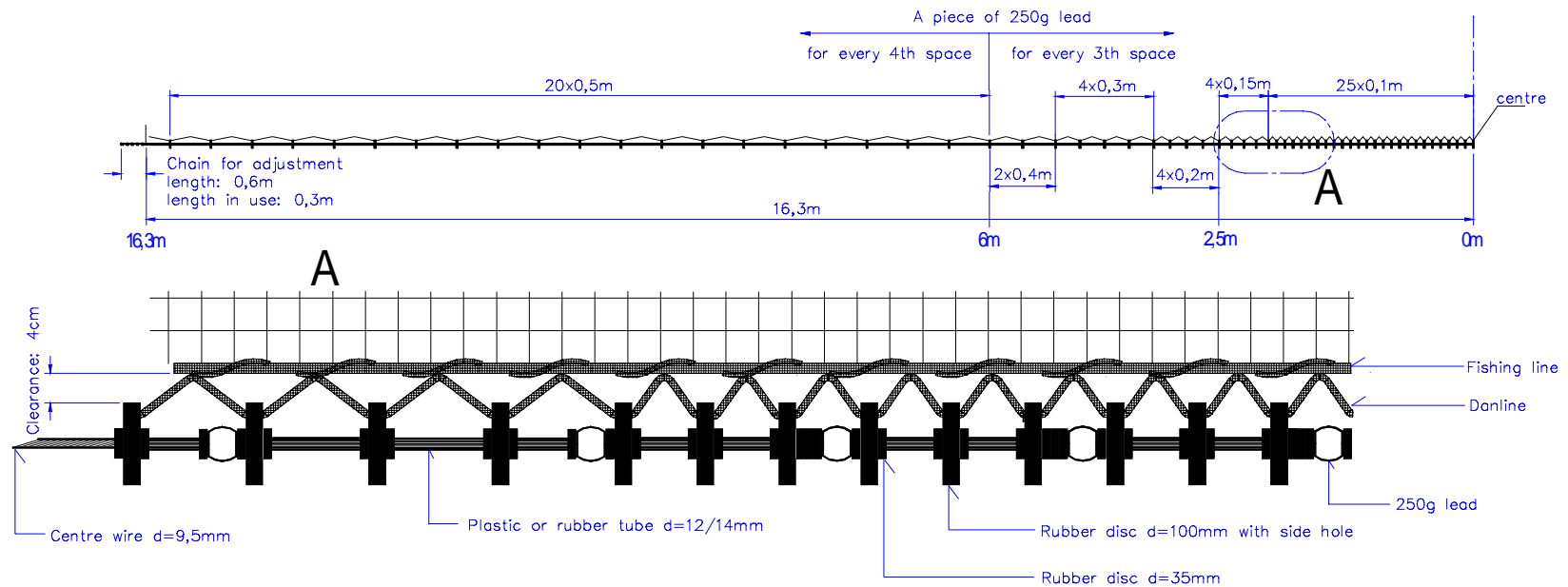
Rigg details (1) for trawl TV3- 520x80

Float positions

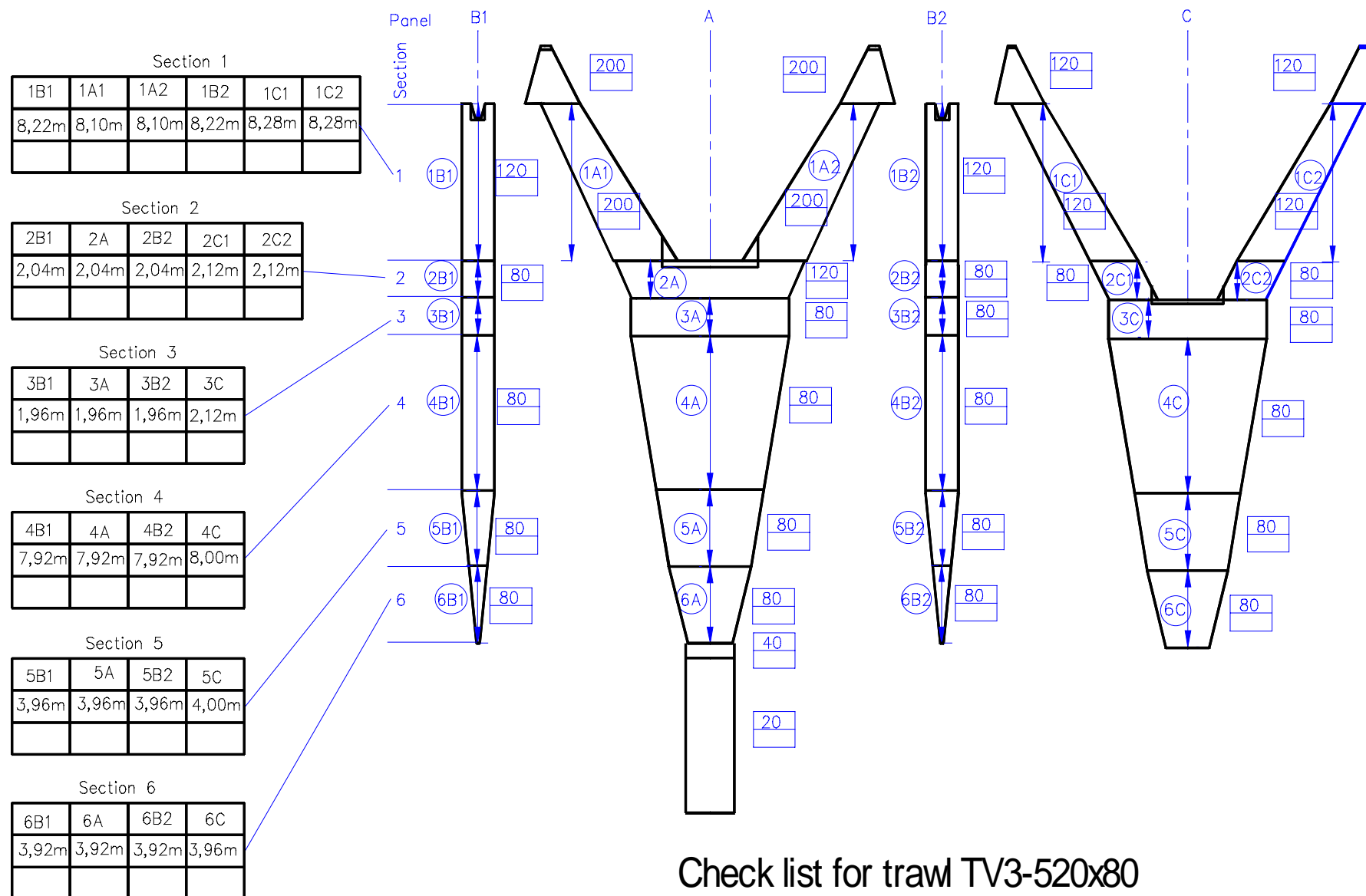


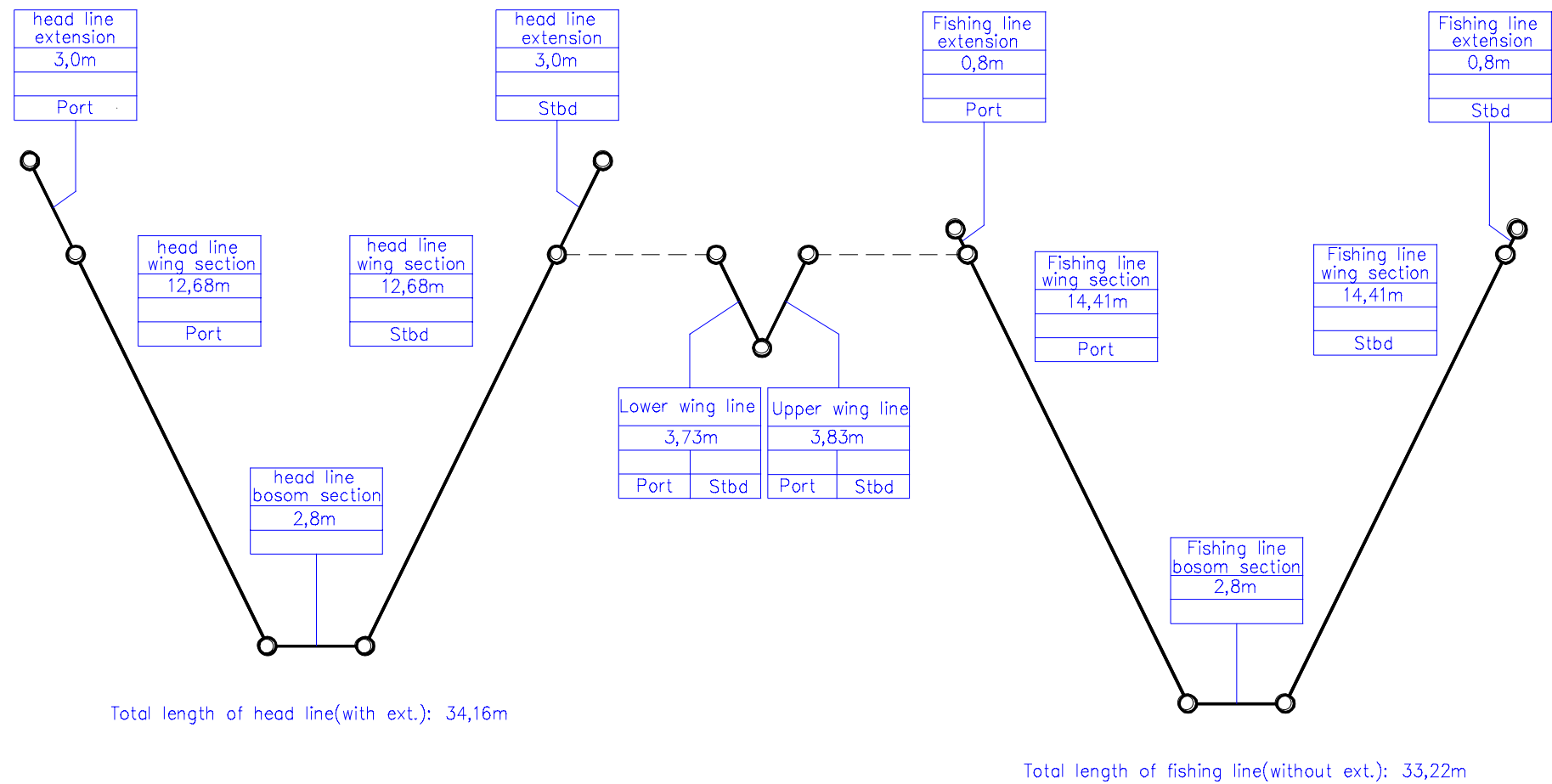
Footrope

0 – 2,5m:	100mm rubber discs with side hole, 100mm distance
2,5 – 6m:	100mm rubber discs with side hole, distance increasing from 100 to 500mm
6 – 16,3m:	100mm rubber discs with side hole, 500mm distance
0 – 16,3:	12/14mm rubber or plastic tube and 45mm rubber discs filling all the space between the large discs

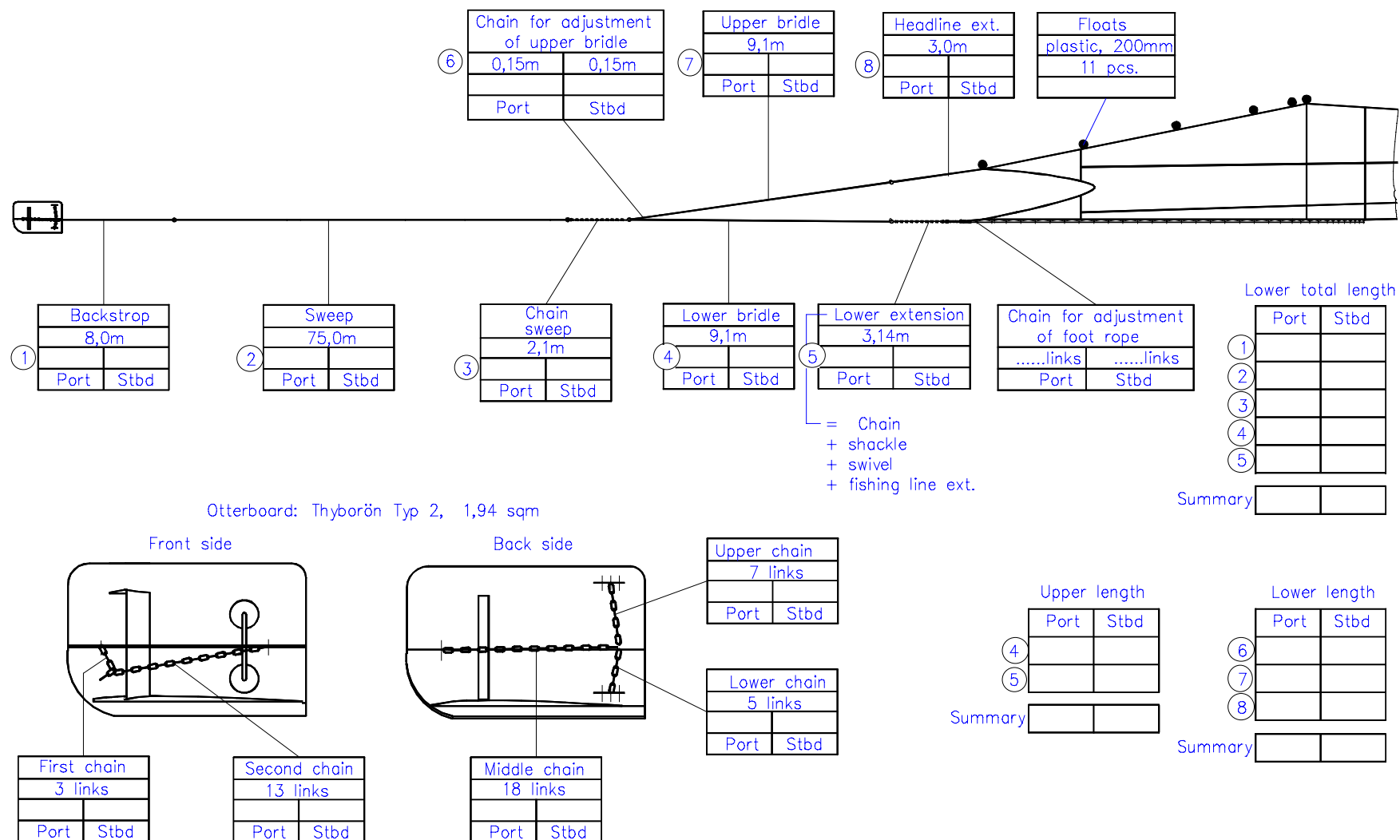


Rigg details (2) for trawl TV3- 520x80





Check list for frame ropes of trawl TV3-520x80



Check list for rig of trawl TV3-520x80

TV3 520#

Check Guide

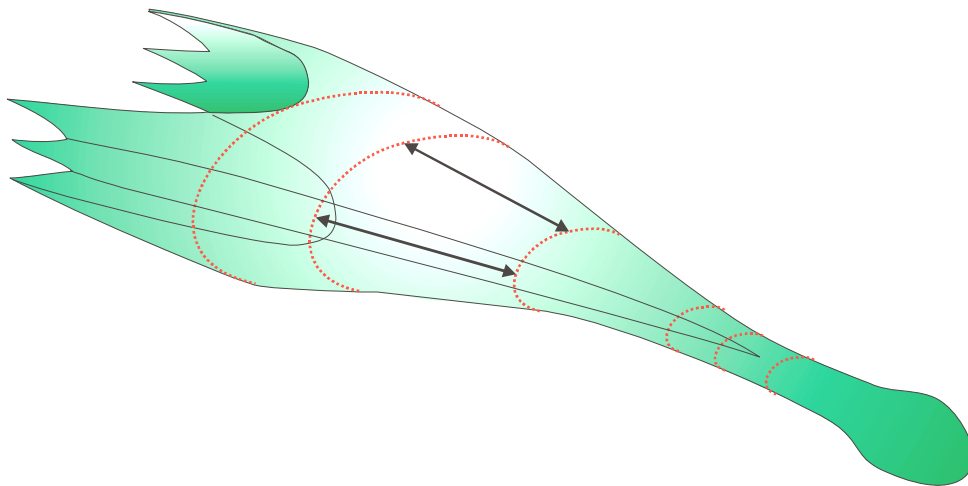
International Standard Trawl for Baltic Demersal Surveys

In order to maintain the properties and performance of the net it must be checked at regular intervals.

Before every cruise

Length of net sections

The trawl consists of four panels: top, bottom and side panels. Each panel has several sections. It is necessary to check the relative length of each netting section. They are all compared with the corresponding sections in the other panels in the way that the top and bottom panel sections are checked against the side panel sections.



Comparison of the lengths of two sections from the top and side panels – indicated by arrows: Approx 10 meshes from around the centre line of the top panel is hold against approx. 10 meshes from around the centre line of the side panel.

The best method to compare two sections is to let two persons – one in each end of the section – take around 10 meshes from the centre line of one section in one hand and hold it against 10 meshes from the centre line of the other section in the other hand. The sections must then be stretched and the difference in length observed.

- Length of side and top panel sections must be equal;
- Length of bottom panel sections must be about 1 mesh longer than corresponding side panel sections.

The procedure is repeated for each section. In case the difference differs more than 4 cm (or half a mesh) from the specified difference, a skilled netmaker should be consulted to evaluate a possible shortening

Length of wings

The specified shortening of the side wing shall be measured from the joining round between the wing and arms to the eye at the end of the headline, footrope and breastline extensions respectively.

- The length of side wing must be 0.65 meter shorter than the top wing and bottom wing.

Length of ground rope

The length of the ground rope and fishing line must be compared by holding the two together. The length is adjusted by means of the adjustment chain on the ground rope.

- The ground rope must be two links shorter than the fishing line (equal to shortening the groundrope one link in each side).

Annex 5: Manual for the construction and use of the International Standard Trawls for Baltic Demersal Surveys, TV3 930

TV3 930 meshes

References

Anonymous 1998: Report of the Baltic International Fish Survey Working Group. Karlskrona, 8 – 13 June 1998. ICES CM 1998/H:4.

Contents

Two trawls are specified as International Standard Trawls for Baltic Demersal Surveys:

- TV3 930 meshes in the circumference for vessels more than 600 KW (This manual)
- TV3 520 meshes in the circumference for vessels of less than 600 KW (Separate manual)

This manual includes:

- Parts list
- A plot of the specifications of the net
- Detailed drawings of selected items
- Check lists
- Check guide
- Optional stone excluding panel for lower panel

Notes to the construction

The nets should be made from good quality polyethylene netting, except the codend that is made from polyamide. It will however not be possible for the net manufacturer always to obtain sheet netting of exactly the same length as specified in this manual. Thorough care must be taken to obtain materials with properties as close as possible to the ones specified here. The denomination of the sheet netting differs from manufacturer to manufacturer, but the following table should give the most common ‘translations’.

	Chemical composition	Construction	Diameter	International denomination	Trade ‘name’
Front part and front belly	PE	Braided	3.0	500/36	3/12
Central belly	PE	Twisted	1.71	500/24	3/8
Rear belly and codend	PA	Twisted	1.32	210/30	no. 10

IMPORTANT: It is very important to maintain the original relationship (hanging ratio, difference) between the netting lengths and the framing ropes along the headline and footrope. So if the headline in a section shall be 10% longer than the net according to this manual, it must be so, also if the dimensions of the net differ from the present specification.

Operation of the standard trawls

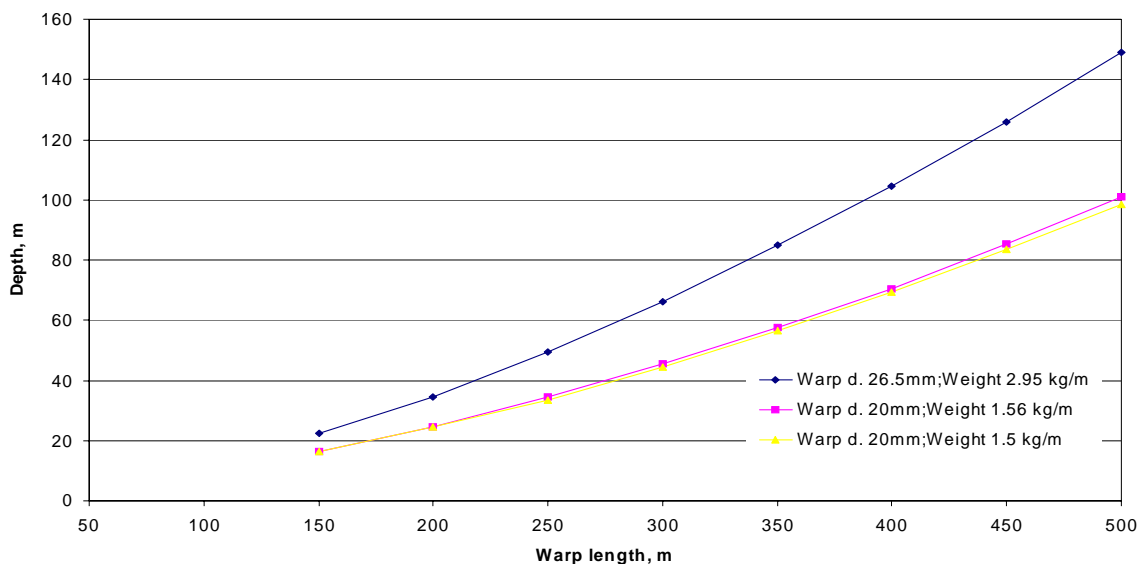
Towing speed

The towing speed should be 3.0 knots.

Warp length

It is recommended to use the following table for finding the correct warp length to be used at various fishing depths. The table gives different warp lengths for a range of warp constructions given by diameter and weight per metre.

The tables are calculated based on the specifications of the net and doors. They should be taken as a starting point. Preliminary tests during the year 2000 suggest that the warp length should be 50 metres more than the table specifies. Also it is recommended that the warps length should not less than 200 metres as it will decrease the door spread too much.



(The figures have been obtained using software developed at Kaliningrad State Technical University, by Professor Rosenstein).

Trawl geometry

The shape of the trawl is depending on many parameters of which some are being standardized here by using the same procedures. Nevertheless, when working on different depths and using different lengths of towing warp the door spread will change, and therefore also the height of the net. Below Table 2 shows the relationship between the basic geometric parameters for the standard trawl using the specified 118,1 m distance between trawl door and the net (8 + 75 + 3.6 + 27.5 + 4 m). They are based on model measurements and full-scale measurements at sea using acoustic measuring devices.

Door spread, m	60	70	80	90
Trawl vertical opening, m	7.3	6.7	6.1	5.6
Headline spread, m	no data	22.5	26	no data
Angle of sweeps, degrees	11	12	14	16

If trawl monitoring instruments (like SCANMAR) are used on the trawl the table can be used to check if the trawl is working properly. Care should be taken that the instruments are neutrally buoyant in water.

Maintenance

The net should be regularly checked for wear and tear and all damages shall be repaired upon discovery.

The net will eventually stretch under normal fishing conditions. It is important for its fishing performance and for maintaining a constant fishing efficiency at regularly intervals to check the length of the bridles, sweeps, extensions, netting sections etc.

The overall status for the net should be checked at the beginning of every cruise. Every year a detailed check should be made of all net and rope dimensions. (The interval between checks is depending on the time the net is in use. An annual check is regarded sufficient if the net is used for one or two normal surveys a year). The special checklists attached to this manual can be used.

IMPORTANT: Special attention should be given to ensure that the relationship (difference) between the length of the netting sections in the top and bottom panels are maintained. Lower sections are a half mesh or a full mesh longer than the corresponding top section. These differences have to be maintained by monitoring the net at regular intervals. In the case that the difference is found to be too small the particular bottom section must be shortened by cutting up the joining round and cut away half a mesh or a full mesh from the length.

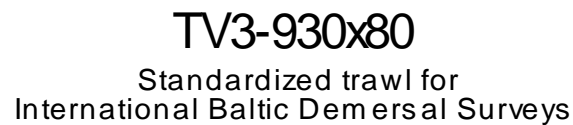
Also the relationship between the length of the framing ropes and the nets in the wings and arms must be retained. The percentage the net is stretched on the headline and footrope is given in the specification. When the netting after a period of use loses its stretch, the headline and footrope must be cut off, the net in the wings and arms shortened and remounted on the ropes again.

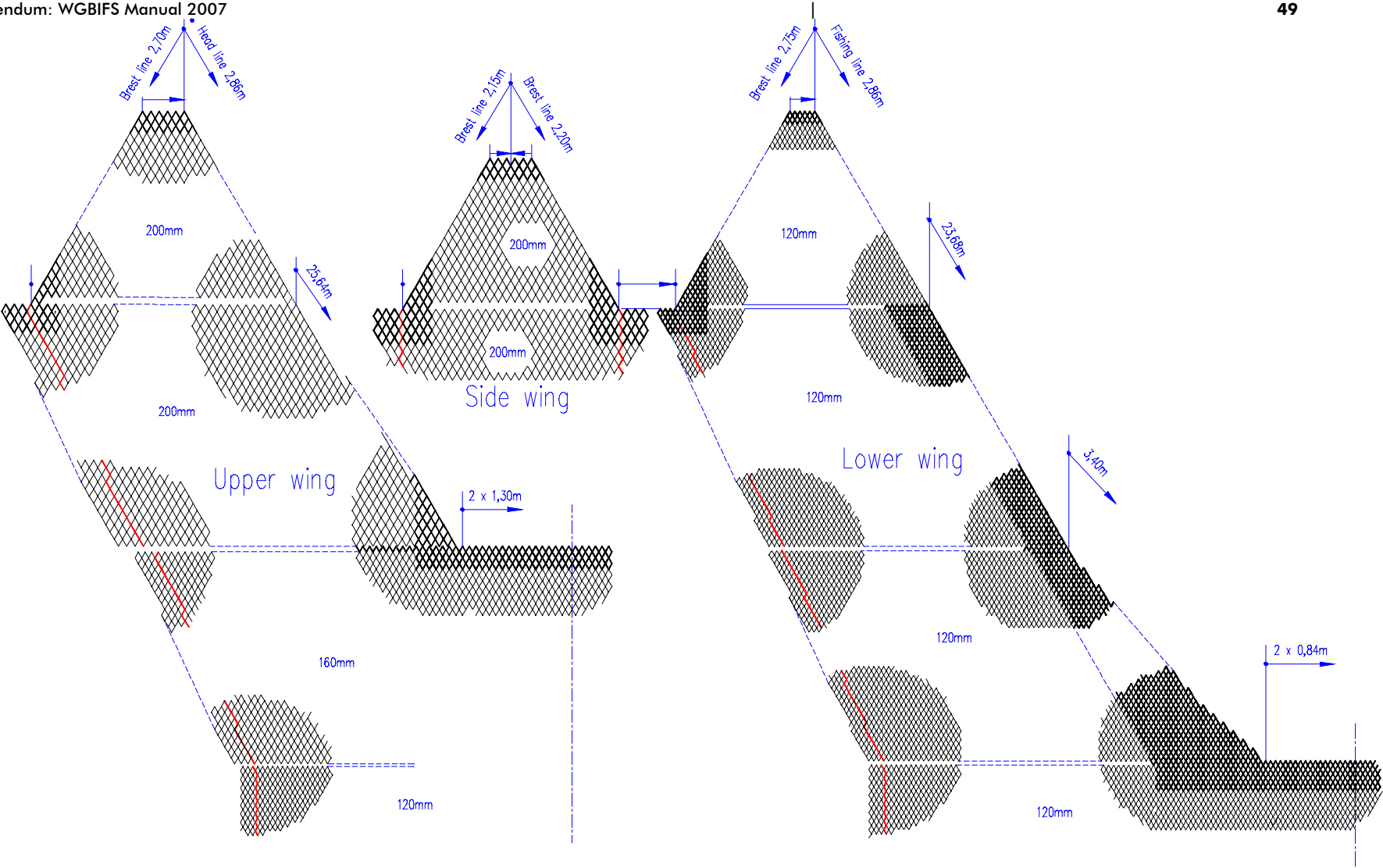
TV3 930#**Parts List****International Standard Trawl for Baltic Demersal Surveys**

Note: In this list the term weight is used for mass and the unit is kg.

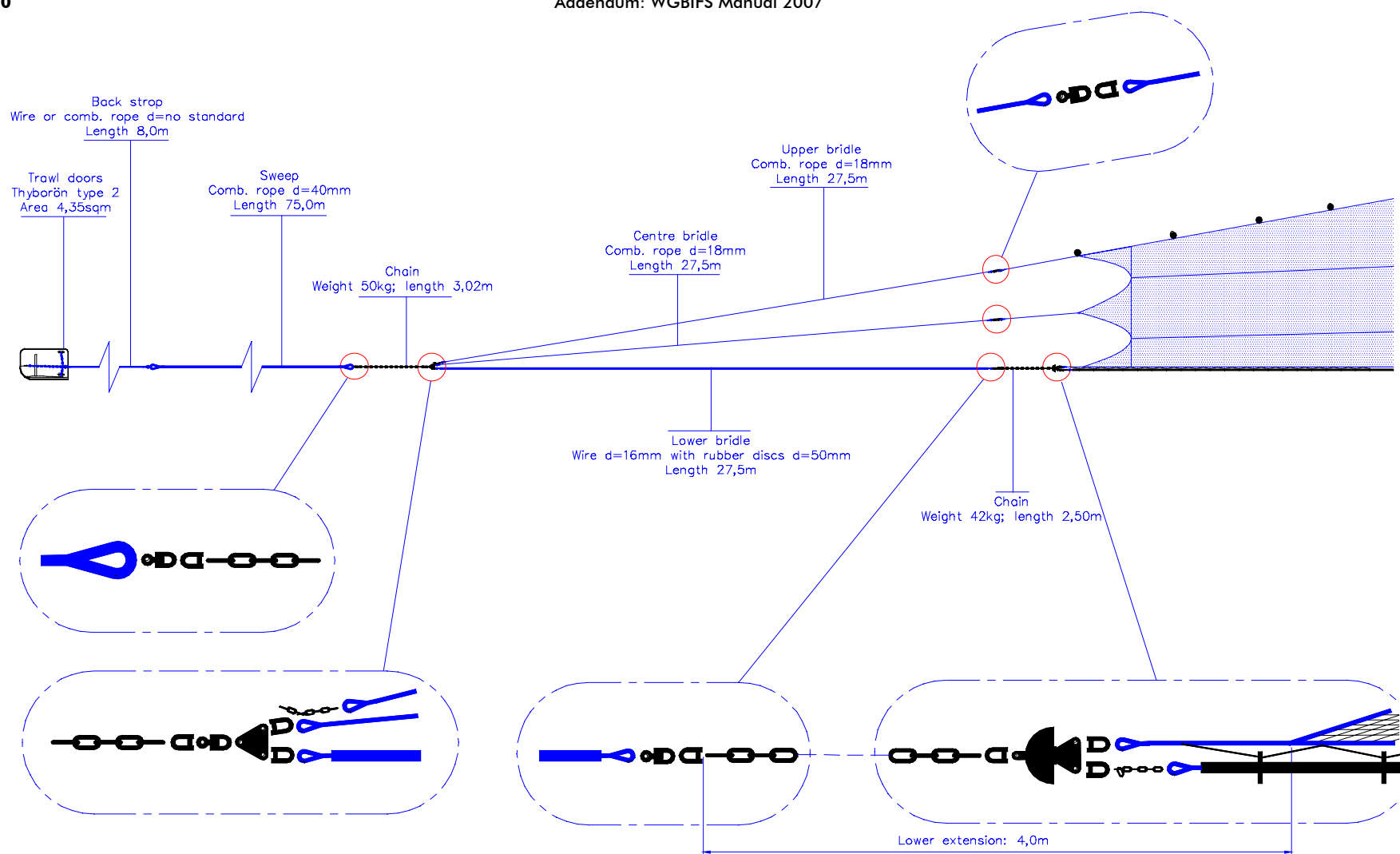
	No	Item	Description	Size
Trawl doors				
	2	Doors	Cambered V-doors, Type: Thyborøn Trawl Doors Type 2	4.35 m ² Weight 520 kg
		Front Chain	Recommended setting: 23 links using link 6 for warp attachment	Inside length of link 100 mm
		Back Chain	Top chain: 10 links Horizontal chain: 24 links Bottom chain: 9 links	Inside length of link: 80 mm
	2	Back strop	Wire or combination rope	Ø = no standard Length 8 m
Sweeps				
	2	Sweep	Combination rope (light)	Ø = 40 mm Length 75 metre Weight per metre 1.60 kg
Chain between sweeps and bridles				
	2	Chain	Iron	Length 3.02 m Weight: 50 kg
Bridles				
	4	Upper and centre bridles	Combination rope	Ø = 18 mm Length: 27.5 m Weight per metre 0.46 kg
	2	Lower bridle	Wire Rubber discs	Ø = 16 mm Length 27,5 m Weight per metre 0.95 kg Ø = 50 mm
Floats				
	(25)	Floats	(11 litre (same as 280 mm, 11 inch) plastic floats)	Total lifting force: 212.5 kg equivalent to 25 pcs. of 280 mm plastic floats)
Headline and Fishing line				
	1	Headline	Combination rope, stainless	Ø = 16 mm Length 67.60 m incl. extension Weight per metre 0.39 kg
	1	Fishing line	Combination rope, stainless	Ø = 16 mm Length 69.64 m incl extension and weight Weight per metre 0.39 kg
	2		Chain weight at bosom corner	14 kg each side
	2		Chain weight at mid-arm	14 kg each arm
	2		Chain weight at wingend	Length 3.02 m Weight: 50 kg each wingend
	2		Semi-spherical rubber bunt bobbins	Ø = 230 mm
Footrope				
		Centre Wire	Wire, stainless steel	Ø = 13 mm Weight per metre 0.66 kg
		Large rubber discs		Ø = 200 mm
		Small rubber discs		Ø = 150 mm

	No	Item	Description	Size
		Filling	rubber discs	Ø = 45 mm
		Rope to mount the gear	Combination rope mounted in bights on the fishing line and through the rubber discs	Ø = 12 mm Weight per metre 0.20 kg The length of the bights shall make the disc periphery hang 4 cm from the fishing line
		Wire lockers	To mount the wire to the fishing line	
Attachments				
		Lazy deckie	No standard	
		Tackle strop	No standard	



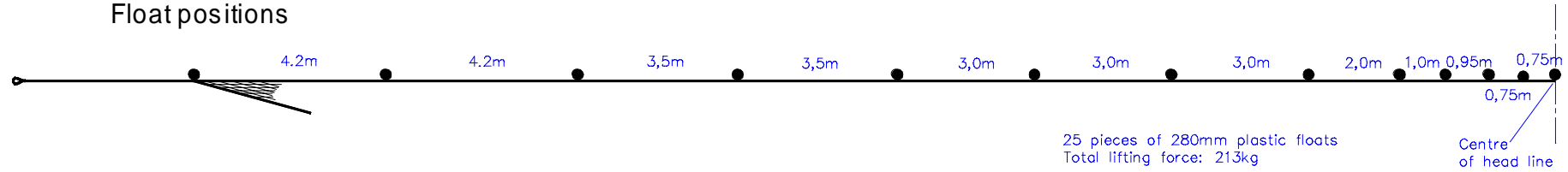


Details for trawl TV3-930x80



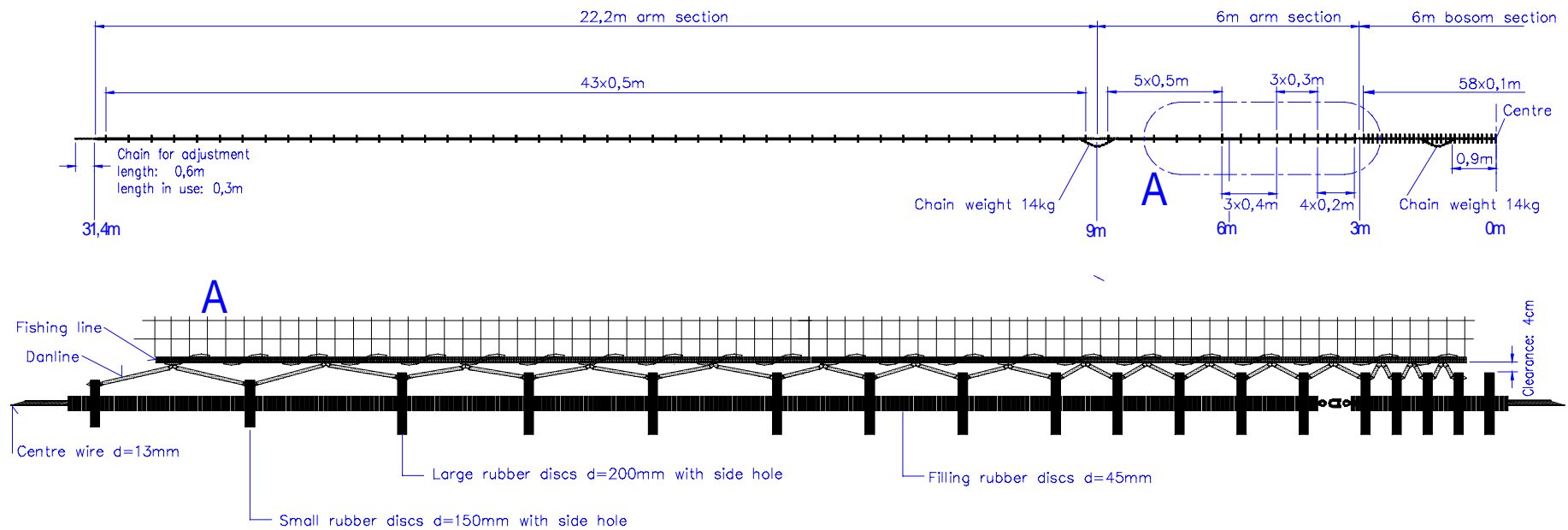
Rigg details (1) for trawl TV3- 930x80

Float positions

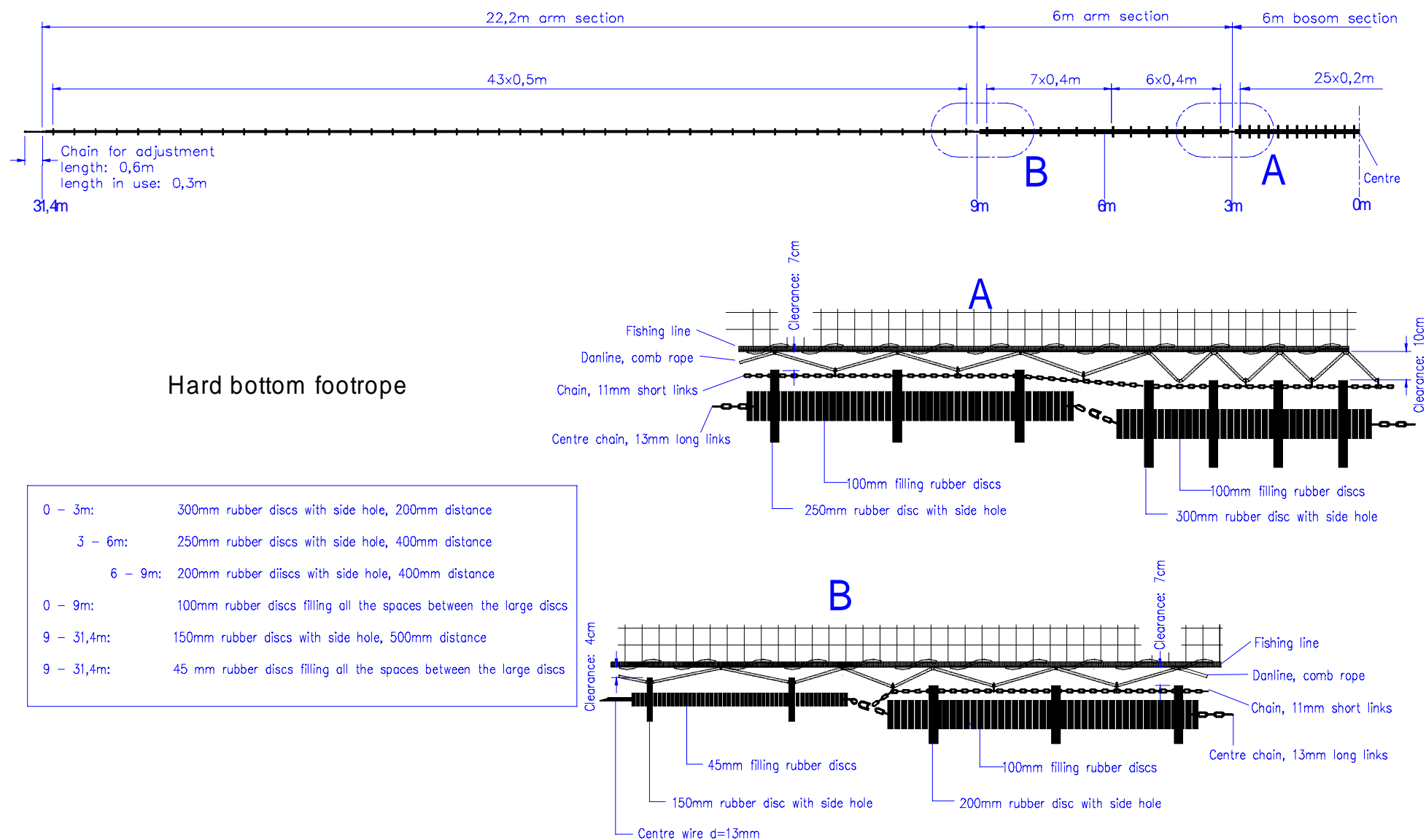


Normal standard footrope

0 – 3m:	200mm rubber discs with side hole, 100mm distance
3 – 6m:	200mm rubber discs with side hole, distance increasing from 100mm to 500mm
6 – 31,4m:	150mm rubber discs with side hole, 500mm distance
0 – 31,4m:	45mm rubber discs filling all the space between the large discs

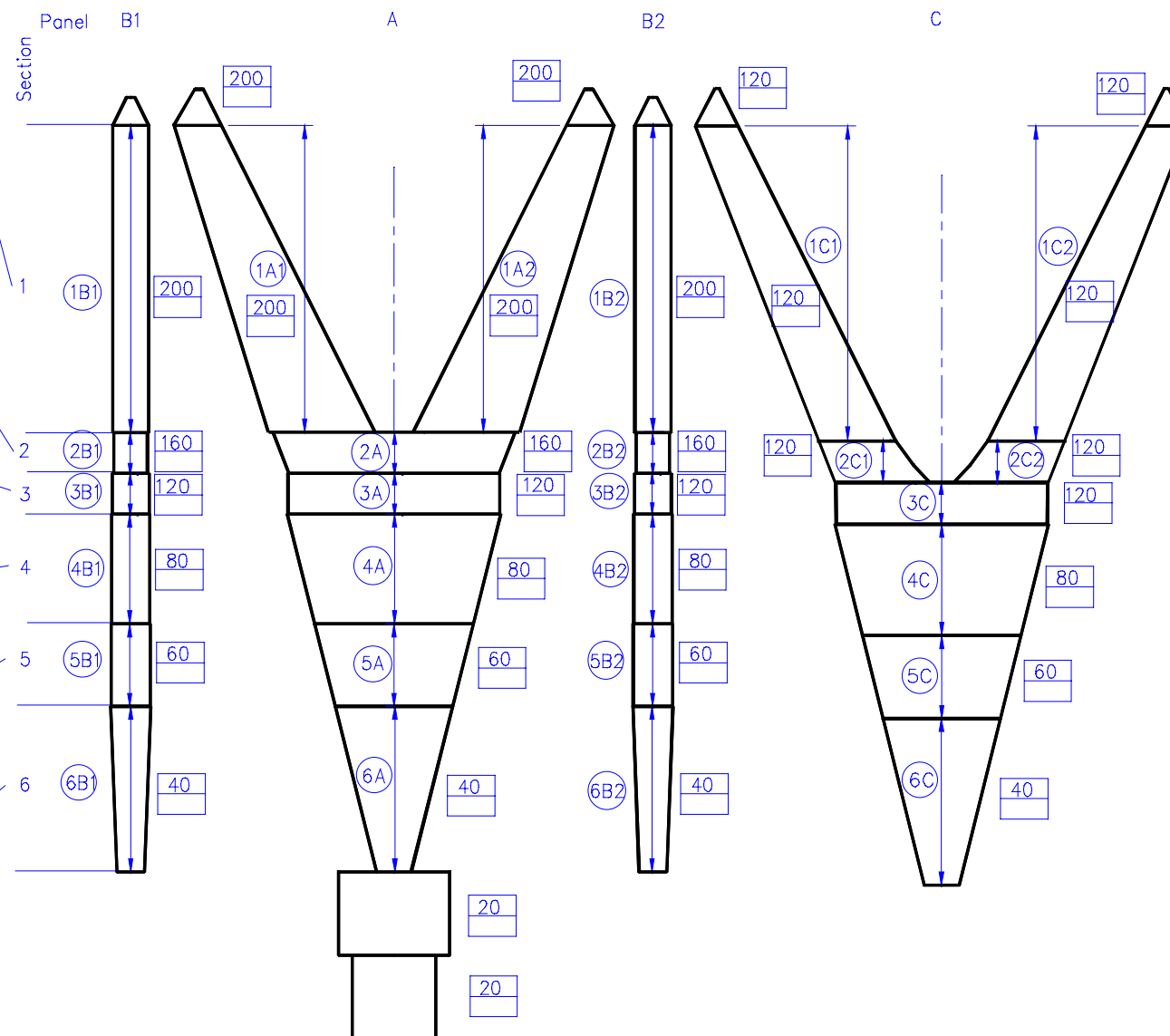


Rigg details (2) for trawl TV3- 930x80

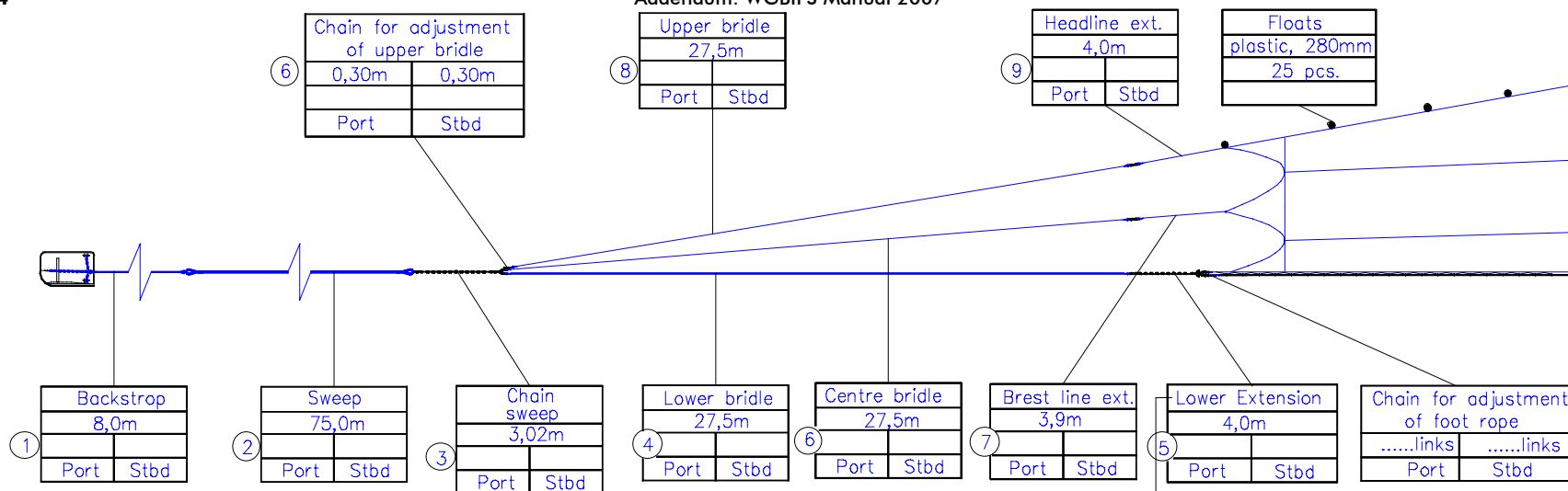


Rigg details (3) for trawl TV3- 930x80

Section 6			
6B1	6A	6B2	6C
11,92m	11,92m	11,92m	12,00m



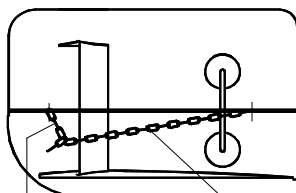
Check list for trawl TV3-930x80



= Chain
+ Bunt bobbin
+ Fishing line ext.

Otterboard: Thyborön Typ 2; 4,35sqm

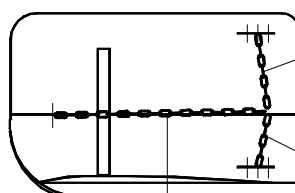
Front side



First chain	
6 links	
Port	Stbd

Second chain	
17 links	
Port	Stbd

Back side



Horiz. chain	
24 links	
Port	Stbd

Top chain	
10 links	
Port	Stbd

Bottom chain	
9 links	
Port	Stbd

Lower total length	
Port	Stbd
①	
②	
③	
④	
⑤	
Summary	

Upper length	
Port	Stbd
⑥	
⑧	
⑨	

Summary	
---------	--

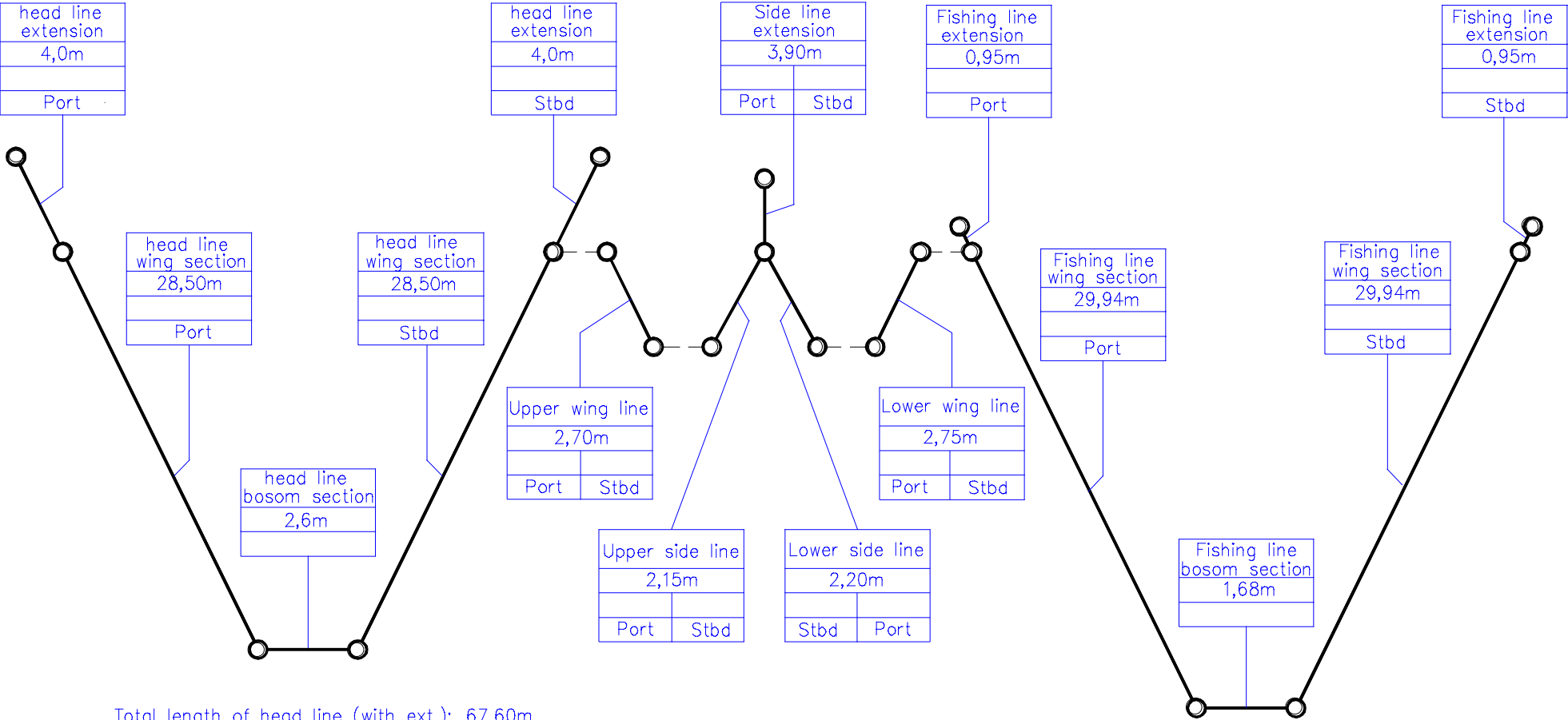
Centre length	
Port	Stbd
⑥	
⑦	

Summary	
---------	--

Lower length	
Port	Stbd
④	
⑤	

Summary	
---------	--

Check list for rigg of trawl TV3-930x80



Total length of head line (with ext.): 67,60m

Total length of fishing line(without ext.): 63,46m

Check list for frame ropes of trawl TV3-930x80

TV3 930#

Check Guide

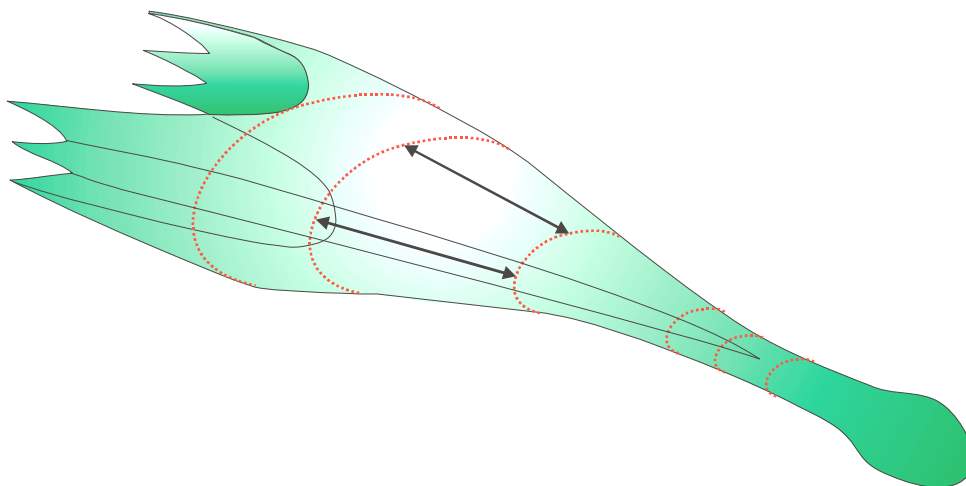
International Standard Trawl for Baltic Demersal Surveys

In order to maintain the properties and performance of the net it must be checked at regular intervals.

Before every cruise

Length of net sections

The trawl consists of four panels: top, bottom and side panels. Each panel has several sections. It is necessary to check the relative length of each netting section. They are all compared with the corresponding sections in the other panels in the way that the top and bottom panel sections are checked against the side panel sections.



Comparison of the lengths of two sections from the top and side panels – indicated by arrows: Approx 10 meshes from around the centre line of the top panel is hold against approx. 10 meshes from around the centre line of the side panel.

The best method to compare two sections is to let two persons – one in each end of the section – take around 10 meshes from the centre line of one section in one hand and hold it against 10 meshes from the centre line of the other section in the other hand. The sections must then be stretched and the difference in length observed.

- Length of side and top panel sections must be equal;
- Length of bottom panel sections must be about 1 mesh longer than corresponding side panel sections.

The procedure is repeated for each section. In case the difference differs more than 4 cm (or half a mesh) from the specified difference, a skilled netmaker should be consulted to evaluate a possible shortening.

Length of wings

The specified shortening of the side wing shall be measured from the joining round between the wing and arms to the eye at the end of the headline, footrope and breastline extensions respectively.

- The length of side wing must be 0.65 meter shorter than the top wing and bottom wing.

Length of ground rope

The length of the ground rope and fishing line must be compared by holding the two together. The length is adjusted by means of the adjustment chain on the ground rope.

- The ground rope must be two links shorter than the fishing line (equal to shortening the groundrope one link in each side).

Annex 6: Maturity key

Key	MATRITY STAGE	Male	Female
1	Virgin	Testes very thin translucent ribbon lying along an unbranched blood vessel. No sign of development.	Ovaries small, elongated, whitish, translucent. No sign of development.
2	Maturing	Development has obviously started, colour is progressing towards creamy white and the testes are filling more and more of the body cavity but sperm cannot be extruded with only moderate pressure.	Development has obviously started, eggs are becoming larger and the ovaries are filling more and more of the body cavity but eggs cannot be extruded with only moderate pressure.
3	Spawning	Will extrude sperm under moderate pressure to advanced stage of extruding sperm freely with some sperm still in the gonad.	Will extrude eggs under moderate pressure to advanced stage of extruding eggs freely with some eggs still in the gonad.
4	Spent	Testes shrunken with little sperm in the gonads but often some in the gonoducts which can be extruded under light pressure.	Ovaries shrunken with few residual eggs and much slime.
5	Resting	Testes firm, not translucent, showing no development.	Ovaries firm, not translucent, showing no development.

Resting (see remarks in ICES CM 1997/J:4, Section 2.5)

Possibilities to classify the maturity stages of the BITS key:

MATURITY STAGE	PURPOSE OF CLASSIFICATION	
(BITS CODE)	ESTIMATION OF	
	SPAWNING STOCK SIZE	SEXUAL MATURITY
1. VIRGIN	Immature (non-spawner)	immature
2. MATURING	mature (spawner)	mature
3. SPAWNING	mature (spawner)	mature
4. SPENT	mature (spawner)	mature
5. RESTING	'immature' (non-spawner)	mature

Annex 7: Conversion tables for maturity keys

The table converts the codes of the national maturity keys into the codes of the BITS key for cod.

COUNTRY	BITS	DENMARK	ESTONIA	FINLAND	GERMANY	LATVIA	POLAND	RUSSIA	SWEDEN
Species	All	Cod	All		Cod	Cod	Cod	Cod	Cod
Source	ICES (1997)	Modif. from	Kiselevich (1923),		Modif. from	Kiselevich (1923),	Maier (1908),	Sorokin (1957, 1960)	Modif. from
		Maier (1908)	Pravdin (1966)	not available	Maier (1908).	Pravdin (1966)	Chrzan (1951)	Mod.by Alekseev, Allekseeva (1996)	Maier (1908)
		Berner (1960)			Berner (1960)				
<u>Maturity stage</u> (¹)	<u>Code</u>								
VIRGIN (immature)	1	I,II	I		I	Juvenis, II	I	Juv., II	I
MATURING (mature)	2	III–V	II–IV		III–V	III, IV	III–V	III, IV	III–V
SPAWNING (mature)	3	VI,VII	V		VI,VII	V	VI,VII	V, VI (V), VI (IV)	VI
SPENT (mature)	4	VIII	VI		VIII	VI	VIII	VI	VII,VIII
RESTING (mature/ immature ²)	5	IX,X	II		II	II	II	VI – II	II

¹sexual maturity for estimating the proportion of spawners.

²should be used when the investigation was during the prespawning and early spawning time (still no spent individuals).

Individuals will not contribute to the spawning stock in the present year.

COUNTRY	BITS	DENMARK	ESTONIA	FINLAND	GERMANY	LATVIA	POLAND	RUSSIA	SWEDEN
Species	All		All		Herring	Herring	Herring	Herring	Herring
Source	ICES (1997)		Kiselevich (1923),		Modif. from	Kiselevich (1923)	modified from Maier scale.	Kiselevich (1923)	ICES (1962)
			Pravdin (1966)	not available	Heincke (1998)		Popiel (1955)		
							Strzyzewska(1969)		
<u>Maturity stage</u> (¹)	<u>Code</u>								
VIRGIN (immature)	1		I		I	I	I,II	Juv., II	I,II
MATURING (mature)	2		II–IV		III,IV	III, IV	III–V	III, IV	III–V
SPAWNING (mature)	3		V		V,VI	V	VI,VII	V	VI
SPENT (mature)	4		VI		VII,VIII	VI	VIII	VI	VII
RESTING (mature/ immature ²)	5		II		II, IX	II (VI)	-	VI (II)	VIII

¹sexual maturity for estimating the proportion of spawners.

²should be used when the investigation was during the prespawning and early spawning time (still no spent individuals).

Individuals will not contribute to the spawning stock in the present year.

The table convert the codes of the national maturity key into the codes of the BITS key for flatfishes

COUNTRY	BITS	DENMARK	ESTONIA	FINLAND	GERMANY	LATVIA	POLAND	RUSSIA	SWEDEN
Species	All		All		Flatfish		Flatfish	Alekseev,	
Source	ICES (1997)	not available	Kiselevich (1923),	not available	Maier (1908)	Kiselevich (1923),	Maier (1908)	Alekseeva (1996)	not available
			Pravdin (1966)			Pravdin (1966)			
<u>Maturity stage</u>	<u>Code</u>								
(¹)									
VIRGIN	1		I		I	Juvenis, II	I	Juv., II	
(immature)									
MATURING	2		II–IV		III–V	III, VI	III–V	III, IV	
(mature)									
SPAWNING	3		V		VI,VII	V	VI,VII	V, VI (V),	
(mature)								VI (IV)	
SPENT	4		VI		VIII	VI	VIII	VI	
(mature)									
RESTING	5		II		II	II	II	VI (II)	
(mature/ immature ²)									

¹ sexual maturity for estimating the proportion of spawners (mature individuals).

² should be used when the investigation was during the prespawning and early spawning time (still no spent individuals).

Individuals will not contribute to the spawning stock in the present year.

Annex 8: Alpha codes for countries and ships

COUNTRY	ICES CODE 1)	SHIP'S NAME	BITS CODE
Denmark	DEN	Dana (old)	DAN
		Dana (new)	DAN2
		J.C. Svabo	JCS
		Havfisken	HAF
		Havkatten	HAK
Germany	GFR	Anton Dohrn (old)	AND
		Anton Dohrn (new)	AND2
		Solea	SOL
		Walther Herwig	WAH
		Clupea	CLP
		Eisbär	EIS
Sweden	SWE	Thesis	THE
		Skagerrak	SKA
		Argos	ARG
		Ancylus	ACY
Estonia	EST	Koha	KOH
		Solveig Charter	SLG CEV
Finland	FIN		
Latvia	LAT 1)	Baltijas Petnieks	BPE
		Zvezda Baltiki	ZBA
		Monokristal	MON
		Commercial Latvia Vessel	CLV
Poland	POL	Baltica	BAL
Russia	RUS	Monokristal	MON
		Atlantida	ATLD
		AtlantNIRO	ATL
		Voskhod	VOS
Lithuania	LTU 1)	Darius	DAR

Note 1). Country code for Latvia and Lithuania codes refer to the FAO, ISO Alpha 3 code system.

Annex 9: Alphanumeric codes for demersal trawl gears

TRAWL SPECIFICATION	TRAWL POPULAR NAME	RESEARCH VESSEL
DT	Russian bottom trawl	Monokristal
LPT	Latvian Pelagic Trawl	Baltijas Petnieks, Zvezda Baltiki
LBT	Latvian Bottom trawl	Baltijas Petnieks
GOV	Grand Overture Verticale	Argos, Dana
DBT	Danish bottom trawl	Dana
EXP	Danish winged bottom trawl	Dana
SON	Sonderborg trawl	Clupea, Solea
H20	Herring ground trawl (H20/25)	Solea, Eisbär
P20	Herring bottom trawl (P20/25)	Commercial Vessel, Baltica
TV1	Large TV trawl	Havfisker
TV2	Small TV trawl	Havkatten
FOT	Fotö bottom trawl	Argos
LCT	Lithuanian cod trawl	Darius
ESB	Estonian small bottom trawl	Koha
HAK	Hake-4M	AtlantNIRO, Atlántida
CHP	Cod Hopper	Solea
MWT	Mid water trawl 664	Solea
TV3	TV trawl	All vessels
TVL	TV3 930 meshes	All vessels participating in the BITS besides vessels using TV3
TVS	TV3 520 meshes	Havfisker, Solea, Solveig, CEV(Estonian Commercial Vessel), LAT?

Within the gear field the following positions have been reserved for recording various types of rigging:

Position 14–16: Sweep length in m. (Numeric, right justified, zero filled. Spaces for unknown. Code 000 indicates the semi-pelagic rigging; this specification is associated with the GOV.)

Position 17: Exceptions (B=Bobbins used, D=Double sweeps, space=standard or not known).

Position 18: Door type (P=Polyvalent, V=Vee F=Flat, K=Karm Waco, space=others or not known).

Further quantitative numeric information on rigging of gear is defined in positions 74–95, in Record Type HH.

NB: This code must still be considered as a preliminary one. More detailed information on the gears used in the past is required before a completely comprehensive coding system can be developed.

Annex 10: Recorded species codes used in Record Type HH

Standard species for Baltic International Trawl Surveys are listed in **Annex 12** together with NODC and TSN species codes.

NB: Zero catches of a particular species in a haul may be included in or excluded from the file. However, any species deliberately excluded from a subset, or an invalid species for a particular haul, should be included for each haul with a species validity code 0.

RECORDED STANDARD SPECIES LIST CODES (POSITION 65)

0 = No standard species recorded		
1 = All (4) standard species recorded		
2 = Pelagic (2) standard species recorded	Note	1)
3 = Bottom (2) standard species recorded		1)
4 = Individual (1) standard species recorded		2)

RECORDED BYCATCH SPECIES LIST CODES (POSITION 66)

0 = No bycatch species recorded		
1 = Open ended bycatch list - All species recorded		
4 = Closed bycatch list - Only flatfish (4) species recorded		1)

- 1) For definition see **Annex 11**.
- 2) If this code is applied, zero catches of the species recorded must be recorded in Record Type 2 format.

Annex 11: Species validity code

0 =	INVALID INFORMATION	Information lost. A note should be given with the cause for the classification as invalid.
1 =	VALID INFORMATION	No per hour and total length composition recorded; applies also when No per hour is zero.
4 =	TOTAL NO PER HOUR ONLY	Catch sampled for No per hour only; no length measurements.
9 =	VALID INFORMATION AVAILABLE BUT NOT RECORDED ON THE FILE	Data not processed on the file

Annex 12: Species names, NOCD and TSN codes and max. Length of fish species which is used in the datras checking program

TSN code	NOCD code	Latin name	English name	Max length (cm)
161694	8745	Clupeiformes		120
161722	8747010201	<i>Clupea harengus</i>	Herring	040
161789	8747011701	<i>Sprattus sprattus</i>	Sprat	018
161717	8747010100	<i>Alosa fallax</i>	Twaite shad	050
161831	8747020104	<i>Engraulis encrasicolus</i>	European anchovy	020
161997	8755010306	<i>Salmo trutta</i>	Sea trout	095
161989	8755010302	<i>Salmo gairdneri</i>	Rainbow trout	050
161950	8755010115	<i>Coregonus lavaretus</i>	Whitefish	065
162039	8755030301	<i>Osmerus eperlanus</i>	Smelt	029
162139	8758010101	<i>Esox lucius</i>	Pike	120
164665	8791030000	Gadiformes		120
164712	8791030402	<i>Gadus morrhua</i>	Cod	135
164748	8791031801	<i>Enchelyopus cimbrius</i>	Fourbeard rockling	035
164758	8791031801	<i>Merlangius merlangus</i>	Whiting	060
172702	8857040000	Pleuronectiformes		060
172894	8857041402	<i>Platichthys flesus</i>	Flounder	052
172902	8857041502	<i>Pleuronectes platessa</i>	Plaice	057
172881	8857040904	<i>Limanda limanda</i>	Common dab	040
172748	8857030402	<i>Psetta maxima</i>	Turbot	060
167640	8834	Perciformes		085
168510	8835200403	<i>Stizostedion lucioperca</i>	Pikeperch/Zander	085
168470	8835200202	<i>Perca fluviatilis</i>	Perch	040
168520	8835200601	<i>Gymnocephalus cernua</i>	Ruff	015
171645	8842130209	<i>Pholis gunnellus</i>	Butterfish	020
171581	8842120905	<i>Lumpenus</i>	Serpent blenny	035
165325	8793012001	<i>Zoarces viviparus</i>	Eelpout	040
171676	8845010105	<i>Ammodytes tobianus</i>	Lesser sand eel	020
171682	8845010301	<i>Hyperoplus lanceolatus</i>	Greater sand eel	035
172414	8850030302	<i>Scomber scombrus</i>	Mackerel	065
168588	8835280103	<i>Trachurus trachurus</i>	Horse mackerel	045
171746	8847010000	<i>Gobiidae</i>	Gobies	007
172072	8847017505	<i>Neogobius melanostomus</i>	Round goby	025
167318	8831022207	<i>Myoxocephalus scorpius</i>	Sea scorpion/Shorthorn sculpin	035
167454	8831080803	<i>Agonus cataphractus</i>	Pogge	020
167612	8831091501	<i>Cyclopterus lumpus</i>	Lumpfish	045
167578	8831090828	<i>Liparis liparis</i>	Sea snail	010
166361	8818010000	Gasterosteiformes		007
166365	8818010101	<i>Gasterosteus aculeatus</i>	Stickleback	007
162846	8776010000	Cypriniformes		060
163666	8776014901	<i>Abramis brama</i>	Bream	060
	8776010601	<i>Vimba vimba</i>	Vimba	040
163761	8776017401	<i>Rutilus rutilus</i>	Roach	030
161123	8741010000	Anguilliformes		180
161128	8741010102	<i>Anguilla anguilla</i>	Eel	180
	8603010000	Petromyzoniformes		090
159721	8603010300	<i>Petromyzon sp.</i>	Lampreys	090