HELCOM Guidelines on monitoring of microlitter in the water column in the Baltic Sea

Baltic Marine Environment Protection Commission

Monitoring & assessment

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Contents

Pre-notes

In the context of the HELCOM BLUES project (DG Environment, MSFD, https://blues.helcom.fi/) a survey on existing and planned method approaches for the monitoring of microlitter in the Baltic Sea was conducted and compiled. This draft document on guidelines for sampling, sample treatment and analysis of microlitter within HELCOM BLUES project is based on the outcomes of the discussions during three workshops with national experts on microlitter held on 30 June 2021, 8 February 2022 and 6 September 2022.

1. Introduction

Marine Litter and Microlitter are defined according to Commission Decision 2017/848 (2017) and UNEP, 2022: "Marine litter is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment" (UNEP, 2022).

Marine microlitter is marine litter with a length of its maximum dimension below 5 mm.

The scope of microlitter monitoring within HELCOM is in accordance with MSFD Com Dec: D10C2: "micro-litter shall be monitored in the surface layer of the water column and in the seabed sediment and may additionally be monitored on the coastline. Micro-litter shall be monitored in a manner that can be related to point-sources for inputs (such as harbours, marinas, waste-water treatment plants, storm-water effluents), where feasible" (Commission Decision (EU) 2017/848, 2017).

2. Sampling of marine water column for microlitter monitoring

2.1 Sampling conditions

2.1.1 Number and location of monitoring stations

The number of monitoring stations surveyed by each country depends on the size of the area under responsibility of the respective country, as well as on how many sub-basins the country encompasses. For shared sub-basins, there is a shared monitoring responsibility. The distribution of monitoring stations should represent variation within HELCOM sub-basins (Figure 1) and should, where possible, integrate stations for target and measure monitoring[1] (i.e. near coast locations that are related to potential point-sources or locations of potential accumulation areas) as well as state monitoring[2] (i.e. open water or offshore-locations) according to the technical guidance on monitoring for the Marine Strategy Framework Directive (Zampoukas et al. 2014).

Where feasible, stations for monitoring of microlitter should correspond to existing monitoring stations from other monitoring programmes such as hydrochemical, hydrophysical and hydrobiological monitoring.

[1] "Target and measure monitoring (relating to Art. 10 and 13 MSFD) which compares to WFD operational monitoring: This requires additional monitoring (in terms of indicators/parameters, sampling frequency and stations) in those areas and for those ecosystem components for which GES has been failed and for those pressures, which are responsible for failing GES and for which environmental targets have been set. Monitoring should enable to assess progress towards GES and achieving targets and the efficiency of measures." (Zampoukas et al. 2014: 15).

[2] "State monitoring (relating to Art. 8, 9 MSFD) which compares to WFD surveillance monitoring: It aims at long-term monitoring and at surveillance monitoring for an overview of the state of the environment and is the backbone of MSFD monitoring. It is sufficient where GES is achieved for the individual ecosystem component. State monitoring includes the features, activities and pressures relevant for GES. It includes monitoring of additional parameters under Annex III MSFD to assess the extent and intensity of human activities and resulting pressures and their changes as well as changes in natural conditions." (Zampoukas et al. 2014: 15).

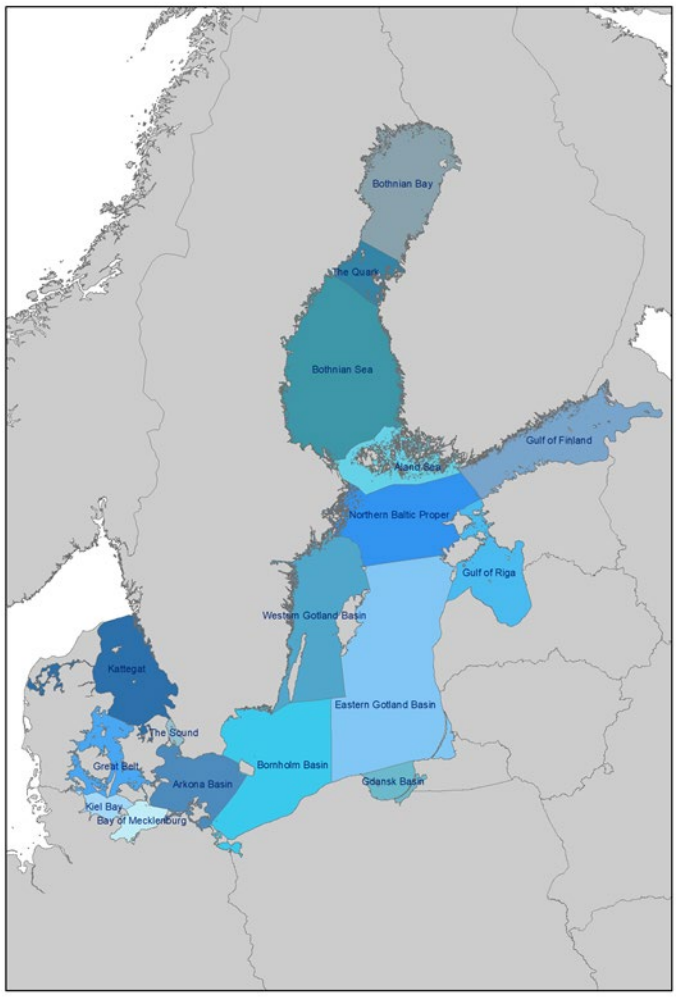

Figure 1: Map of the Baltic Sea presenting the HELCOM sub-division into 17 open sea sub-basins (HELCOM 2022).

2.1.2 Frequencies and time of sampling

The frequency of monitoring for microlitter in the surface layer of the water column is still under discussion. It is suggested that monitoring frequency should be determined on the basis of further analysis e.g. on sampling methods, variance in microlitter concentrations and local conditions. It is further proposed to consider different frequencies in the case of parallel investigations at target and measure monitoring versus state monitoring stations.

The sampling time depends on feasibility and whether the sampling is carried out in accordance with other monitoring programmes that require a specific season for sampling.

It should be taken into account that different weather events and hydrochemical, hydrobiological and hydrophysical peculiarities can influence microlitter distribution in the water column (e.g. downward mixing of microplastics from the sea surface due to a wind event or greater microplastic and algae concentrations because of a calm weather event). Seawater sampling during intense algal blooms or during the evening when zooplankton migrates to the surface should be avoided due to the fact that sample preparation in that case could become time and cost consuming.

2.2 Sampling techniques

2.2.1 Sampling device, sample volume, replicates, on-board sample processing

Sampling of microplastics from the water column can be done using nets (manta and plankton ones) and pumping systems with the mesh size of maximum 300 µm (optionally smaller mesh size can be used).

The depth of the sampled water column layer (surface of water column -up to 0. 25 m- or water column - > 0.25 m) should be registered. Sampling should not be impacted by the water mixing or particles created by the sampling vessel, therefore sampling devices should be positioned at the sides or stern of the vessel. For estimation of filtered water, the use of a volume flow meter is recommended, alternatively (only for nets) calculation of filtered water volume can be applied.

Filtered water volume is variable and dependent on water conditions (i.e. algae bloom) but should be at least 100 m^3 when using sampling devices with mesh size 300 µm, and at least 10 m^3 when using sampling devices with mesh size 100 µm. In cases when the requested sample volume cannot be conducted, sub-sampling for collection of needed sample volume is recommended. If a smaller mesh size or pumping system is used, it is acceptable for sample volume to be lower (due to potential mesh clogging or unrealistic pumping duration). It is supported to use manta trawl without replicates.

If manta net is to be used, it is to be noted that the speed of the vessel should not be higher than 2 knots in order to avoid clogging of the net.

After collection, samples should be concentrated using a sieve with a mesh size smaller than the sampling device mesh size, transferred to a pre-cleaned labelled glass tray and covered with a lid.

2.2.2 Recording of basic parameters, sampling protocol

Basic parameters during sampling shall be recorded and include:

- Mandatory: station name and sample ID (identification code), date, start and end (if applicable) coordinates, sampling device used, mesh size and opening (if applicable) of sampling device, depth of sampled water layer, filtered water volume, transect length and area (if applicable), water depth. Labelling the respective sample containers with (at least): station name and internal code for laboratory processing.
- Optional: weather and sea conditions (wind speed and direction, wave height and direction), station classification (coastal/offshore) and/or distance from the shore, amount of suspended solids (if applicable), CTD profile (if applicable).

Sample codes and parameters are documented in the sample documentation form.

2.2.3 Sample storage and preservation.

Samples should be stored in glass or metal containers, avoiding plastic ware as much as possible. It is recommended to store samples in low temperature (frozen or at maximum temperature of 2-6 °C) to stop biological processes. Alternatively, a conservation additive might be used.

2.3 Sampling QA/QC

To minimise background contamination, the following measures should be considered within the sampling campaigns, also when they are carried out in parallel to other monitoring campaigns:

- Use of glass and/or metal materials where possible, avoid the use of synthetic materials.
- Washing and rinsing of sampling devices before sampling to avoid cross-contamination.
- Pre-cleaning of sample containers and instruments with filtered water (mesh size smaller than lowest particle detection limit) and/or ethanol or isopropanol. Glassware can also be subjected to baking within a muffle oven at 500 °C.
- Operators to take care that potential contamination sources during sampling and sample processing are avoided (e.g. fleece sweaters hanging in the ship's laboratory). Wearing

brightly coloured work clothes for easy operator-generated contamination detection in samples. Operators to position facing the wind while retrieving the sample.

- Integration of blank samples: a representative number of blank samples should be integrated to account for contamination during sampling. The number of blank samples should be at least 3. The total number of blank samples should be representative for varying sampling conditions and thus, should reflect the specific contamination potential e.g. through varying weather conditions, varying operators wearing varying clothes.

  A proportion of 10 % blank samples of the total number of water microlitter samples is recommended for homogeneous conditions during the sampling campaign.

  For generation of blank samples, an empty sampling vessel is positioned next to the sample and opened while retrieving the sample. A field blank can also include a filtered distilled water rinse of a net. The resulting blank sample is subject to laboratory analyses in the same manner as water column microlitter samples.

  It is recommended to retrieve material from any device of synthetic polymer origin implemented during sampling. These comparative materials should be investigated for their polymer composition to enable exclusion of clearly identified contamination from sampling devices.

3. Sample treatment / laboratory analysis

Sample treatment and laboratory analysis can be done applying different methods when specific quality criteria are ensured. Any sample treatment needs to ensure not to harm synthetic polymers by applying strong chemicals and high temperatures. The treatment processes and methods applied need to be controlled via contamination control and recovery tests with reference samples.

3.1 Laboratory QA/QC

3.1.1 Contamination control

Appropriate measures to reduce air contamination, cross-contamination and contamination control must be taken during laboratory analysis. These include:

- Wearing of personal protection equipment made of natural materials (cotton laboratory coats, avoid plastic fibre face masks).
- Ensuring clean laboratory conditions (regular cleaning, regulated air circulation, minimized presence of staff, use of clean room and laminar flow chambers combined with fume hoods if possible).
- Avoidance of any plastic materials during samples processing (preferred use of glass and stainless-steel materials).
- Pre-filtration of water and chemical solutions with filter pore size significantly lower than minimal cut-off size of targeted particles in the samples.
- Pre-cleaning of filters, beakers and instruments by thoroughly rinsing with filtered (mesh size smaller than lowest particle detection limit) distilled water and/or ethanol or isopropanol or baking within a muffle oven at 500 °C.
- Covering samples and working solutions throughout the sample processing.
- Reduction of processing steps as far as possible.
- Inclusion of a relevant number of blank samples analysed in parallel with each sample series.
- Inclusion of a relevant number of reference samples analysed in parallel with each sample series to identify recovery rate is suggested.

3.1.2 Blank samples and recovery tests (mandatory)

- A relevant number of blank samples is to be analysed in parallel with each sample series (set of samples treated in parallel in one laboratory processing cycle). Combining field blank and laboratory blank samples is not recommended since the number of samples processed within one sample series may differ from the number of samples being representative for the respective field blank sample.
- Microlitter particles detected within both, field and laboratory blank samples, are used to calculate the limit of detection (LOD - mean + 3 x standard deviation of the particle concentration) according to McDougall et al. (1980). LOD thus reflects the efficiency of the precautionary methods during sampling and sample processing of the respective laboratory. LOD is reported within the data to EMODnet. Blank values are not subtracted from the results on water column microlitter samples.
- A relevant number of reference samples is to be analysed in parallel with each sample series. Reference samples reflect the efficiency of the respective laboratory protocol and are treated in the same manner and throughout all steps as the water microlitter samples.
- Reference samples should encompass samples that are spiked with a relevant number of synthetic polymer particles that are representative for dominating size categories, morphologies and polymer composition of the particles to be detected within the water samples. The number of reference particles will affect the resolution of the recovery rates, thus, a number of at least 50 reference particles for both fragments and fibres could be recommended leading to a resolution of 2 %.
- The recovery ratio (%) is calculated for re-detected added reference particles as mean value accounting for different size categories, morphologies and polymer composition. It is recommended to include reference material containing three types of polymer with different densities, three morphologies and a similar size to the targeted lower cut-off size (i.e. 100 µm) of particles according to Cui et al. (2022). The mean recovery ratios is reported together with the data to EMODnet. Results on water samples are not corrected for recovery rates.

3.2 Sample volume, sample preparation

Sample volume for laboratory analysis is dependent on the state of the sample, sampling conditions and further sample processing methods. In cases when the concentrated sample volume is high or the sample is rich on organic material, the splitting of the sample is supported, but it is recommended that sub-samples are treated proportionally, and that the total treated amount is not lower than the minimum recommended filtered water volume (see section 2.2.1.).

3.3 Sample digestion

In general, the order of digestion and application of density separation depends on the sample treatment protocol and particle analysis technique of the processing laboratory.

Optional digestion protocols cover oxidative, enzymatic, alkaline or mixed treatments. The implementation of acid digestion is not recommended since especially strong acids proved to affect synthetic polymers. The duration of the sample digestion depends on the selected digestion protocol and the complexity of the sample. It is recommended to use as little treatment steps as possible to avoid unintentional loss of particles.

The application of low temperature and stirring of the samples are an optional add-ons within sample digestion. The application of temperatures >40°C (>50°C if enzymatic digestion is applied) is to be avoided since it may damage synthetic polymers.

After digestion, the digestion solution is rinsed-off over a sieve or through a filter with a mesh size smaller than the minimum size of targeted particles.

If particle dimensions are not determined by single particle, a size separation step with a sieving cascade encompassing at least 300 and 1000 µm can be applied at this stage (smaller mesh sizes are optional). If pre-sieving at the beginning of the laboratory processing has not been applied, an additional sieve with a mesh size of 5000 µm can be integrated at this stage.

3.4 Density separation

Density separation might be applied in cases where inorganic material is present in the sample and may interfere with analysis.

The choice of the density solution and the device used for density separation depends on the respective protocol applied. Density solutions cover zinc chloride ($ZnCl_2$), sodium iodide (NaI) and sodium polytungstate ($NaWO_4$) with a mandatory minimum density of 1.5 g/cm³. The application of solutions with densities of >1.7 g/cm³ is recommended since this will distinctly improve the recovery rates of synthetic particles of higher material densities. The use of sodium chloride (NaCl) is not recommended since a relevant number of synthetic polymers will not be recovered due to low solution density.

In general, samples are introduced into the density separation solution, stirred for 10 minutes and left for settling for 24 h. The supernatant suspension is then transferred to filters, rinsed thoroughly with warm (<40 °C) filtered (mesh size smaller than lowest particle detection limit) water (additionally 50% ethanol can also be used) and saved for further particle treatment or identification. Filters are left to dry in pre-cleaned glass petri dishes.

3.5 Particle identification

The identification of synthetic particles depends on the availability of equipment and varies between optical microscopic identification, spectroscopic approaches like FTIR and Raman spectroscopy and staining approaches like Nile red staining in combination with fluorescence microscopy. Application of the hot needle test is not advised since it damages the particle and does not give information on chemical composition, although the application of the hot needle method is supported in cases where no other polymer identification method is available.

Particles are described by count, size classes, morphology, colours (optional) and polymer composition (on at least a subset). The minimum cut-off size for data to be reported is 300 µm (see section 4.3 for size classes).

3.6 Polymer identification

The determination of at least a subset of particles for their polymer composition via FTIR or Raman spectroscopy is mandatory.

Device settings and minimum library match (%) attributed is to be recorded within the metadata to EMODnet. Spectra libraries integrated for polymer composition determination should integrate spectra from synthetic and organic components. It is suggested to agree on one or several libraries that are used by all processing laboratories and/or to generate a combined FTIR and/or Raman spectra library for HELCOM microlitter monitoring.

It is recommended to analyse the polymer composition on a representative subset with a minimum of 10 % (preferably at least 20 particles) of synthetic particles identified within the size categories from 300 to 999 µm and from 1000 µm to 4999 µm. The subset size of particles identified in any smaller size category is to be discussed. The particles integrated in the subset are to be selected representatively according to size categories and morphologies.

4. Parameter and data recording

Parameters are to be recorded according to EMODnet requirements (see section 5). Data can also be reported to ICES DOME when parameters and attributes and e.g. harvesting of data from EMODnet will be harmonised (and the consent of the country is given). The reporting to or harvesting of data through ICES DOME is under discussion.

Parameters to be recorded encompass the following:

4.1 Numbers

The recording of the number of particles identified as synthetic polymers/microlitter is mandatory.

Data are calculated to the number of particles and optionally weighed in grams per volume of filtered water. At this stage, no recommendation on re-calculating number of particles into mass is given. The development of conversion algorithms based on polymer composition and particle size/volume is to be evaluated.

4.2 Morphology

The morphology of all identified particles is to be recorded according to the following morphology classes:

Table 1 Morphology classes to be used to report all identified particles.

EMODnet identifier "micro-litter morphology"	Name	Definition according to EMODnet	Definition according to GESAMP 2019 (Kershaw et al. 2019)
H0100004	Filaments	Slender thread-like micro-litter particles.	"Line" (Fibre, filament, strand): long fibrous material that has a length substantially longer than its width
H0100005	Films	Micro-litter particles derived from plastic sheets or thin plastic films.	"Film" (sheet): flat, flexible particle with smooth or angular edges
H0100006	Foams	Any kind of micro-litter particle made of plastic foam, including styrofoam.	"Foam" (EPS, PUR): near spherical or granular particle, which deforms readily under pressure and can be partly elastic, depending on weathering state
H0100002	Fragments	Irregularly-shaped plastic micro-litter particles with broken off edges that may be rounded or angular.	"Fragment" (granule, flake): irregular shaped hard particles having appearance of being broken down from a larger piece of litter
H0100003	Pellets	Micro-litter particles from industrial origin only. In comparison with granules, pellets are usually flat on one side, rough surface and irregular, round shapes.	"Pellet" (resin bead, Mermaids tears): hard particle with spherical, smooth or granular shape
H0100009	Granules	Micro-litter particles with smooth spherical shape. In comparison with pellets, they have a rounder shape	

It is under discussion whether microbeads are to be reported as a single class or identified from the data set as morphology: granules and the (smaller) dimension in size compared to pre-production resin pellets.

It is under discussion whether "pellets" and "granules" should be separate classes. In addition, it has to be considered that "film" and "foam" might not be identified due to restrictions of devices or protocols especially within smaller size fractions.

4.3 Particle dimensions

The dimensions of identified particles should be recorded according to the following size classes:

- 300 – 999 µm

- 1000 – 4999 µm

The reporting of size classes below 100 µm is optional according to the following size classes:

- 100 – 299 µm
- 50 – 99 µm
- 20 – 49 µm
- <20 µm

It is to be pointed out that results way be biased if particle dimensions are retrieved from mesh sizes from sieving and filtering or measuring actual length and width.

The reporting of absolute dimensions on particle length and/or particle width is optional. Sizes of particles are defined according to:

- Length (maximum Ferret diameter in longitudinal).
- Width (maximum Ferret diameter perpendicular to the identified length transect).

Fibres with a length >5000 µm are considered "mesolitter" and are therefore excluded from the data analysis.

4.4 Polymer composition

Polymer composition is to be reported according to polymer classes and is to be defined for at least a subset of identified synthetic particles.

It is suggested to align the polymer types according to the list provided and modified from AMAP 2021 (see Table 2) but to set up a short list with prioritised synthetic polymers that are predominantly found in environmental samples and that at least have to be reported when occurring.

Table 2: Polymer types for data reporting (modified from AMAP 2021).

Polymer type name	**Examples of materials included (detailed level)**	**Modifications compared to AMAP (2021)**
Acrylonitrile based	e.g. acrylonitrile butadiene styrene (ABS), polyacrylnitrile (PAN)	Modified to "Acrylonitrile based", PAN removed from polymer type and integrated here as an example
Cellulose based	e.g. cellulose acetate (CA), cellulose nitrate (CN)	Modified to "cellulose based", examples added
Polyamide based	e.g. all types of polyamide (PA) like various nylons	
Polycarbonate based	e.g. polycarbonate (PC)	Modified to "polycarbonate based"
Polychlorinated polymers	e.g. polyvinyl chloride (PVC), chlorinated PE, various chlorinated polymers	
Polyester based	e.g. polyethylene terephthalate (PET), all other types of polyesters	Modified to "polyester based"
Polyethylene based	e.g. high density polyethylene (HDPE), low density polyethylene (LDPE), and copolymers with a major PE fraction including ethylene-vinyl acetate copolymer (EVA)	EVA removed from polymer type and integrated into polyethylene based.
Polyfluorinated polymers	e.g. polytetrafluoroethylene (PTFE)	

Polymeth(ester)acrylate based	e.g. all types of polymeth(ester)acrylate (PM(ester)A)	
Polypropylene based	e.g. polypropylene (PP), and copolymers with a major PP fraction	
Polystyrene based	e.g. polystyrene (PS), and copolymers with a major PS fraction	
Polyurethane based	e.g. all types of polyurethane (PUR)	
Rubbers, automotive	e.g. styrene butadiene rubber (SBR), tire wear	SBR added as an example
Varnish/paint particles	If different from PM(ester)A	
Other plastics	e.g.polyether ether ketone (PEEK), polyoxymethylene (POM), polyvinyl acetate (PVA), polylactic acid (PLA), polyhydroxyalkanoate (PHA)	Examples added / moved from single polymer classes
Other rubbers	e.g. ethylene propylene diene monomer rubber (EPDM), nitrile rubbers, natural rubbers, silicone	Examples added / moved from single polymer classes / rubber types (refers to "rubbers sealing", "nitrile rubbers", "natural rubbers and derivates", "silicone rubbers and derivates"
Other microlitter materials	e.g. metal, glass	Examples added
Other semi-synthetic polymers	e.g. rayon	Polymer type added / introduced

4.5 Optional parameters

The recording of particle colours and/or transparency is optional. Colours and transparency are classified according to EMODnet:

Colour classes:

- black / grey
- blue / green
- brown / tan
- white / cream
- yellow
- orange / pink / red
- purple
- multicolour

It is suggested and discussed to include a class „colourless" in order to address particles derived from colourless and transparent foils or particles from e.g. (uncoloured) plastic bottles.

Transparency:

- Yes
- No

5. Data reporting

Data are to be reported to EMODnet according to current specification provided by EMODnet (i.e. Vinci et al. 2021).

The reporting to or harvesting of data through ICES DOME is under discussion.

The following lists comprise parameters (mandatory and optional), EMODnet codes and descriptions where available and suggestions for modifications or the integration of further parameters following the discussions and suggestions provided within these draft guidelines and first evaluations through EMODnet.

Parameters and related attributes are under continuous development. Therefore, it is recommended to consult the latest tables and vocabularies online at the NERC Vocabulary Server (NVS).

Table 3 Current list of default (green), mandatory (orange) and optional (light orange) parameters to be reported (modified from Vinci et al., 2021, p7)

Label/column header	Concept id	Use	Comments
Cruise		metadata/mandatory (ODV Default)	
Station		metadata/mandatory (ODV Default)	
Type		metadata/mandatory (ODV Default)	The suggestion is to use type "B". From manual: 'B' for bottle profile data. For time series and trajectories set to 'B' for small (<250) row groups
YYYY-MM-DDThh:mm:ss.sss		metadata/mandatory (ODV Default)	Start date/time. Format must be adapted to the date value (for example YYYY-MMDDThh:mm is second are not available)
Longitude [degrees_east]		metadata/mandatory (ODV Default)	start point coordinates
Latitude [degrees_north]		metadata/mandatory (ODV Default)	start point coordinates
LOCAL_CDI_ID		metadata/mandatory (ODV Default)	
EDMO_code		metadata/mandatory (ODV Default)	EDMO_CODE of the data centre distributing the data (the one connected to the CDI service)
MinimumObservation Depth [m]	MINWDIST	mandatory in ODV micro-litter	
MaximumObservation Depth [m]	MAXWDIST	mandatory in ODV micro-litter	
SampleID:INDEXED_TEXT	SAMPID01	mandatory in ODV micro-litter	
SamplingEffort [Km or L]	LENTRACK/ VOLWBSMP	mandatory in ODV micro-litter	The amount of effort expended during an event. It can be the survey distance from the beginning point in kilometres or a filtered volume in litres
Net_opening [cm]	MTHWDTH1	mandatory in ODV micro-litter	Net opening of the instruments used. This information is needed for the calculation of the covered surface in cm (e.g. diameter of the Ocean Pack RACE filtering “cakes” or bongo/manta net opening)
Mesh_size [micrometres]	MSHSIZE1	mandatory in ODV micro-litter	Mesh size of the filtering surface (e.g. manta or bongo net, filtering “cakes” of OceanPack RACE) in µm

Microlitter_Type:IND EXED_TEXT	SDN:H01	mandatory in ODV micro-litter	Type of the item (H01 SDN vocabulary); MLITYPS
Microlitter_Size:INDE XED_TEXT	SDN:H03	mandatory in ODV micro-litter	Size classes (H03 SDN vocabulary), MLITSZS
Microlitter_Count [Dimensionless]	MLITCNTW	mandatory in ODV micro-litter	Number of items collected. It's the official mandate from MSFD to provide the count of collected microplastics.
EventEndDateTime [YYYY-MMDDThh:mm:ss.sss]	ENDX8601	additional/optional	End date/time
EventEndLongitude [degrees_east]	ENDXXLON	additional/optional	End point coordinates. Either End Lat/Lon or SamplingEffort are mandatory
EventEndLatitude [degrees_north]	ENDXXLAT	additional/optional	End point coordinates. Either End Lat/Lon or distance are mandatory.
Microlitter length	NEW	additional/optional	
Microlitter width	NEW	additional/optional	
Microlitter_Weight [g]	MLDWWD01	additional/optional	Weight of the collected items, not mandatory Information in grams
Microlitter_Shape:INDEXED_TEXT	MLITSHPW	additional/optional	Shape of the item (H02 SDN vocabulary)
Microlitter_Color:IN DEXED_TEXT	MLITCOLW	additional/optional	Colour classes (H04 SDN vocabulary)
Microlitter_Transparency:INDEXED_TEXT	MLITROPW	additional/optional	Transparency classes (H06 SDN vocabulary)
Microlitter_Polymer_type:INDEXED_TEXT	MLITPOLW	additional/optional	Polymer type of the micro-litter (H05 SDN vocabulary)
WMO_Sea_State [Dimensionless]	WMOCSSXX	additional/optional	Sea conditions following the Douglas scale
Wind_direction [degT]	EWDAZZ01	additional/optional	Direction relative to true north from which the wind is blowing
Wind_speed [m/s]	WSBZZ01	additional/optional	Sustained speed of the wind (distance moved per unit time by a parcel of air) parallel to the ground at a given place and time.
Sampling_protocol	SAMPPROT	additional/optional	The name of, reference to, or description of the method or protocol used to produce the sample

6. References

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Annex

Figure A1 Proposed flow chart for the visual identification of microplastics. (AMAP, 2021, p223, reproduced from Lusher et al., 2020).