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Circular design of fishing gear and aquaculture equipment - Part 3: Technical requirements

Kreislaufwirtschaft von Fischfanggeräten und Aquakulturausrüstungen - Teil 3: Technische Anforderungen

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Circular design of fishing gear and aquaculture equipment - Part 3: Technical requirements

Technische Anforderungen an kreislauforientiertes Design von Fischfanggeräten

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European Foreword

This document (prEN 17988-3:2023) has been prepared by Technical Committee CEN/TC 466 “Circularity and recyclability of fishing gear and aquaculture equipment”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This document is part of a series of standards.

EN 17988 consists of the following parts, under the general title *Circular design of fishing gear and aquaculture equipment*:

— Part 1: General requirements and guidance

— Part 2: User manual and labelling

— Part 3: Technical requirements

— Part 4: Environmental and circularity requirements and guidelines

— Part 5: Circular business model

— Part 6: Digitalization of gear and components

This document has been prepared under a mandate given to CEN by the European Commission (Standardization request M/574), and supports EU Directive(s).

Introduction

Plastics are synthetic organic polymers that can be easily moulded into different shapes and products for a large variety of uses. Invented only 110 years ago, plastics are now the most widely used man-made material and have become omnipresent in every aspect of our lives. From medical supplies and water bottles to food packaging, clothing, and construction materials, every person now disposes an average of 52 kg of plastic waste every year (Jambeck et al. 2015). Geologists are now considering a plastic horizon in the world's soils and sediments as one of the key indicators marking the current geological epoch, the Anthropocene (Waters et al. 2016).

Concerns about plastic release into the environment were at first non-existent. The material was seen as benign, due to its inertness and perceived lack of toxicity. As a result, an estimated sum total of 5 billion tonnes of plastic has been discarded into landfills and the environment since 1950 (Geyer et al. 2017). This led to increasing concerns about pollution, particularly in the oceans, with some actions by governments to stem the growing tide of plastic debris. The International Convention for the Prevention of Pollution from Ships (MARPOL) was signed in 1973, although a complete ban on the disposal of plastics at sea was not enacted until the end of 1988 (IMO, 1988). At the same time, waste disposal practices and recycling capacities improved, particularly in highly industrialized countries, leading to better waste management and lower release of plastic waste into the environment.

Plastic pollution has now become widely recognized as a major global environmental burden (GESAMP, 2016; Rochman et al. 2013) particularly in the oceans where the biophysical breakdown of plastics is prolonged (Derraik 2002; Wilcox et al. 2015), effects on wildlife are severe (Kaiser 2010, GESAMP, 2016) and options for removal are very limited (Thompson et al. 2004; Jambeck et al. 2015).

There has been a shift in strategy within the EU regarding plastics, with the development of initiatives, associated with further development of circular economy initiatives within the EU, with a 'plastics circular economy'. This is a sustainable model where plastics remain in circulation longer, and are reused and recycled at the end of their life span. In support of this, the European Parliament and Council adopted two Directives in 2019 that aimed to make a significant contribution to the reduction of marine litter from sea-based sources.

One such directive is the revised Port Reception Facilities (PRF) Directive (PRF, 2022). Up until now, ports have been able to charge fishers for bringing retrieved abandoned, lost or otherwise discarded fishing gear (ALDFG) ashore over and above their normal fee. The revised PFR Directive introduces indirect fee and consequently removes this disincentive.

Second is the Single Use Plastics (SUP) Directive, which addresses 10 most common single use plastic items found on European beaches as well as end-of-life fishing gear and ALDFG. Within this Directive producers of fishing gear containing plastic will have to take on the responsibility (and costs) for separate collection, transport, treatment and awareness raising measures of fishing gear. This has been brought in to reduce port costs for fishers, particularly in small fishing ports, and potentially accelerate the development of a dedicated waste stream for fishing gear waste.

In support of the PRF and SUP Directives, there are several challenges that need to be examined. The majority of ropes and netting producers for the fishing industry are dominated by Small and Medium-sized Enterprises (SMEs), with few large producers of fishing gear. In addition, there are substantial logistic issues across the entire value chain of fishing gear; from collection and retrieval at sea by fishers (or other groups), to bringing and unloading in ports, collecting in ports,

transporting to recycling facilities, performing mechanical and chemical recycling, and producing new products from recycled fishing gear. To date, all of the available work that has examined the issues surrounding logistics have focused solely on end-of -life fishing gears - there are no successful efforts globally to recycle ALDFG, with the vast majority of material incinerated or dumped in landfills (Gilman et al., 2016). Lastly, there are substantial problems with the current design of fishing gear in terms of environmental impact at end-of-life.

At present, six raw polymer types are utilized to manufacture the majority of nets within Europe: Polyamide (PA), Polyester (PES), Polyethylene (PE), Polypropylene (PP), Aramid, and High-density polyethylene (HDPE). However, within the current design of fishing nets within Europe, there is up to 700 different combinations of these polymers and other materials. Such mixing of different raw materials, although potentially important for the use of the fishing gear, makes it nearly impossible to recycle as a single unit. Furthermore, there is a range of other factors that reduce the likelihood of fishing gear being recycled, including the use of materials within nets that are toxic or unrecyclable (i.e. lead shot in sink lines), the likelihood that collected gear may have been contaminated (i.e. sand, salt) or other man-made material mixed. Additionally, the small number of recyclers within Europe and the need to provide to these recyclers cleaned and sorted gears, as well as the lack of agreed standards for circular design of fishing gear further weaken the prospects for gear recycling.

The development of this document with technical requirements forms part of a wider array of work undertaken by the EU in the development of the Circular Economy, and supports the recent EU Strategy for Plastics in a Circular Economy. This is the first EU -wide policy framework adopting a material-specific lifecycle approach to integrate circular design, use, re-use and recycling activities into plastics value chains. The strategy sets out a clear vision with quantified objectives at EU level, so that amongst other things, by 2030 all plastic packaging placed on the EU market is reusable or recyclable.

The general requirements and guidance for utilizing these set of standards is provided in Part 1.

The description and requirements for designing a user manual, and well as requirements for labelling of gear and components is provided in Part 2.

The technical requirements, specific to the product, are provided in Part 3. This standard covers aspects of durability, material strength inherent in redesign, the utility of gear and maintenance in sustaining utility following redesign, as well as innovation in preventative maintenance, repair, remanufacturing, ability to refurbish, recycling at ‘end-of-life’ and upgrading.

The environmental and circularity requirements for the components of fishing gear and aquaculture equipment which contain plastics is provided in Part 4.

Development of circular business models to support the circular design of fishing gear and aquaculture equipment is provided in Part 5.

Traceability of fishing gear components throughout their life cycle is covered in part 6.

1 Scope

This document specifies the technical requirements for the components of fishing gear and aquaculture equipment (hereafter termed 'gear') which contain plastics. It will establish the material principles and processes that enhance the circularity and recycling of the plastic components of gear and the materials comprising the components of the gear, taking into account the impact of such requirements on gear utility. The technical requirements for the design of gear focuses on:

— Development and selection of materials and components;

— Reduction in the use of virgin plastics;

— Manufacture/assembly/disassembly;

— Use, maintenance, repair, re-manufacturing and refurbishing;

— Storage, transport; and

— End-of-life including recycling and upcycling.

Excluded from this document are design aspects related to enhancement of the capture of fisheries. This is unless such design reduces the utility of the gear for capture fishing or aquaculture techniques or management.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Gear performance

When designing gear, a life cycle perspective should be taken, and the performance concept of the gear/equipment should include circularity issues.

Prevention:

— Design of gear shall enhance durability and performance of new gears placed on the market.

— Durability and performance shall encompass both gear 'components' as well as the total gears.

— Gears comprised of materials that are not durable but should not be lost to the environment (i.e. will not biodegrade) shall be further developed to enhance durability and longevity, as well as designed to reduce risk of loss (and/or phased out).

— Design of gear shall not compromise the capacity of the product to be used, as well as to reach the goals of the European common fisheries policy.

Preparing for re-use:

— The different options pursued following the waste hierarchy, laid down e.g. in the European Waste Framework Directive 2008/98:

  o The gear or equipment shall be prepared for high-quality reuse by disassembling and separating its components.

  o A following evaluation of the performance of the components is the basis for assessing options for possible further uses.

  o If possible and economically reasonable, the value of the gear or equipment shall be retained by refurbishment, i.e. dismantling, only replacing irreparably damaged parts, and re-assembling the product.

  o Any parts that cannot be reused shall be introduced into the appropriate recycling processes.

Recycling:

— Where existing non-recyclable materials can be substituted for recyclable alternatives, this should be undertaken.

— The use of circular, recyclable, recycled and/ or renewable materials to replace/reduce virgin materials should be increased.

— All (raw) materials used in the production of gear and components shall be deemed reusable and recyclable by industrially and commercially viable means.

— The considerations here shall also be extended to the packaging.

Disposal

— The use of suitable biodegradable materials for gear and gear components where loss cannot be eliminated completely should be considered.

— Where material is at a high risk of being lost at sea, materials that can biodegrade in marine environments should be utilized where available.

— The use of hazardous materials that are toxic and/or non-recyclable shall be minimized.

— Any materials or components within fishing gear shall not contain (e.g. through plating or coating), or have as a manufacturing requirement, hazardous chemicals that pose a significant risk to human health or to the environment (EC, 2006).

NOTE Materials are also in line with the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulation.

5 Innovation

When designing gear in a circular economy, innovation in the technical requirements of the underlying design of gear and gear components should be enhanced.

— Further the use of combinations of materials, as well as manufacturing and assembly techniques which allow easy disassembly and dismantling of components

— Enhance modular design by using standardized parts matched to the other parts in the product, while ensuring that the parts are available.

— Ensure easy disassembly and dismantling of components, using connections that allow easy disassembly and dismantling, while also retaining utility.

— Innovation in operation and efficiency of material and gear manufacture and development, including manufacture of single materials and articulation of materials to form gear and all end-of-life uses (i.e. full life cycle, including recycling of cut offs).

— Optimize manufacture to reduce material loss and reduce energy use, reduce emissions, reduce water use (scope 1 and 2 - energy use in the manufacturing of the raw material (internally and externally), scope 3 - influence of the raw material (manufacturing)).

— New materials (and the use of such materials within gear) should enable preventative maintenance, modification, cleaning and repair, remanufacturing, refurbishment, recycling at end-of-life and upgrading.

— Design shall take into account weight, volume, shape of material, elongation, tensile strength, abrasion resistance, UV resistance, and other specific characteristics/properties.

— Enhance ease of collection and sorting of materials to enhance accessibility and processing to recycle materials, gear components and total gear.

— Reduce where possible multi-material products (one product comprised of different plastic polymers and any other materials which make the product unsuitable for recycling), and where possible mixing of materials e.g. gear made up of different materials that have the same job.

— Improve capability to disassemble, including simplifying the separation of mixed materials

— Coatings shall have an ability to be recycled or should not interfere with recycling of the product, with anti-fouling coatings and other toxic additives shall be avoided.

— Improve traceability and ability to detect material type on land to enhance recycling.

— Components shall be designed where possible to be attached without adaptation.

— Innovations shall focus on improvements but may in some cases involve the need for trade-offs with other important characteristics. For example, prolonging the lifetime of gear by