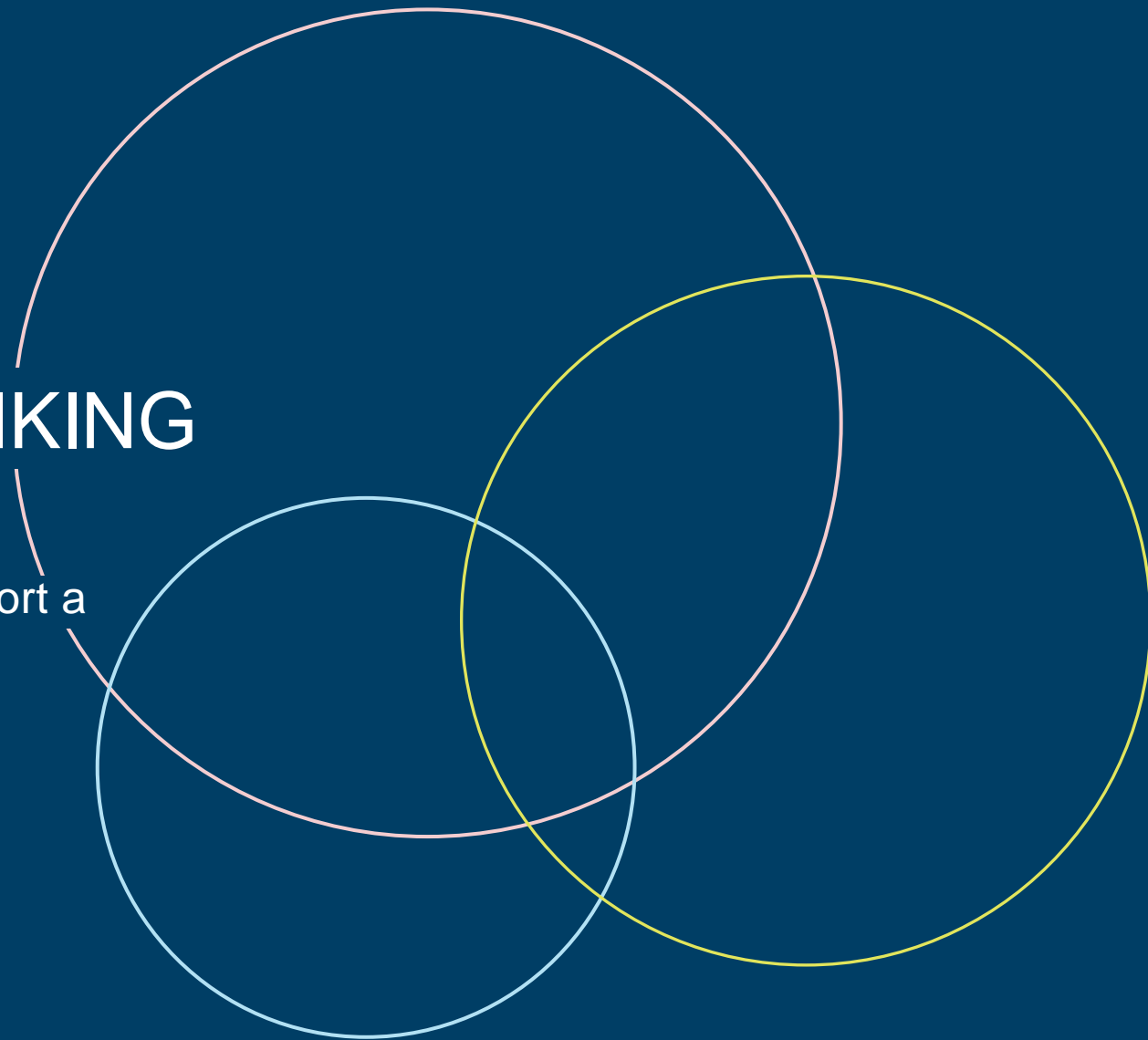


The logo for DIN (Deutscher Institut für Normung) is located in the top left corner. It consists of the letters 'DIN' in a bold, sans-serif font, centered within a white square. This square is set against a background of a grid of squares in various shades of blue and grey.

# CIRCULAR THINKING in Standards

How standardization can support a  
Circular Economy

Version 2 (11/2023)





# Circular Economy

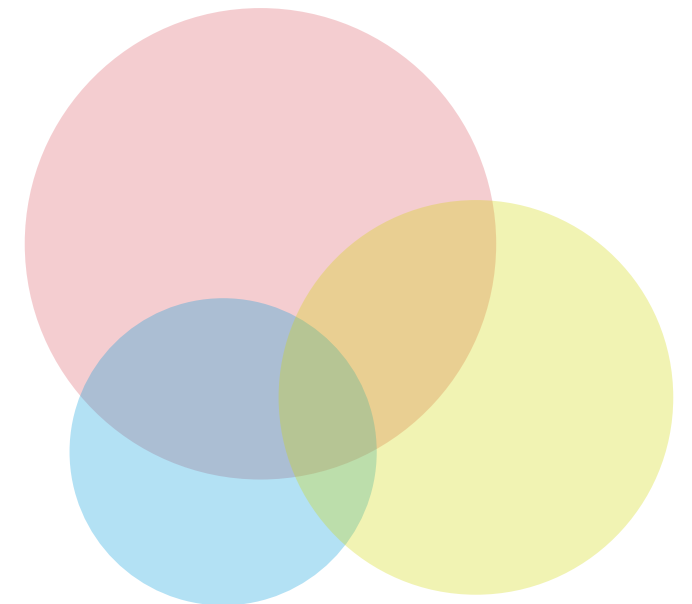
The Circular Economy is a concept for the transformation from a **linear to a circular value creation**. It is a holistic and systemic approach to sustainable development and pursues the goal of a circular transformation of our economy across production, consumption and disposal.

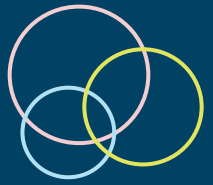
Circular strategies are intended to close material cycles and build a regenerative system in the long term, in which value creation, prosperity and security of supply are made possible within planetary boundaries.

The conservation of the value of raw materials and products and the reduction of resource consumption are the top priorities here. The existing and increasing shortage of resources makes it necessary to decouple economic development from the extent to which resources are used.

This is to be achieved through various measures such as increasing energy and resource efficiency, resource-conserving design, extending product lifetimes, recovering raw materials and much more.




For the implementation of a Circular Economy, the so-called **R-Framework** offers strategies for the circular handling of raw materials throughout the entire life cycle. The **R-Strategies** are structured hierarchically, complement each other and coexist. Standardization can support the individual strategies in their implementation. How exactly is explained on the following pages.

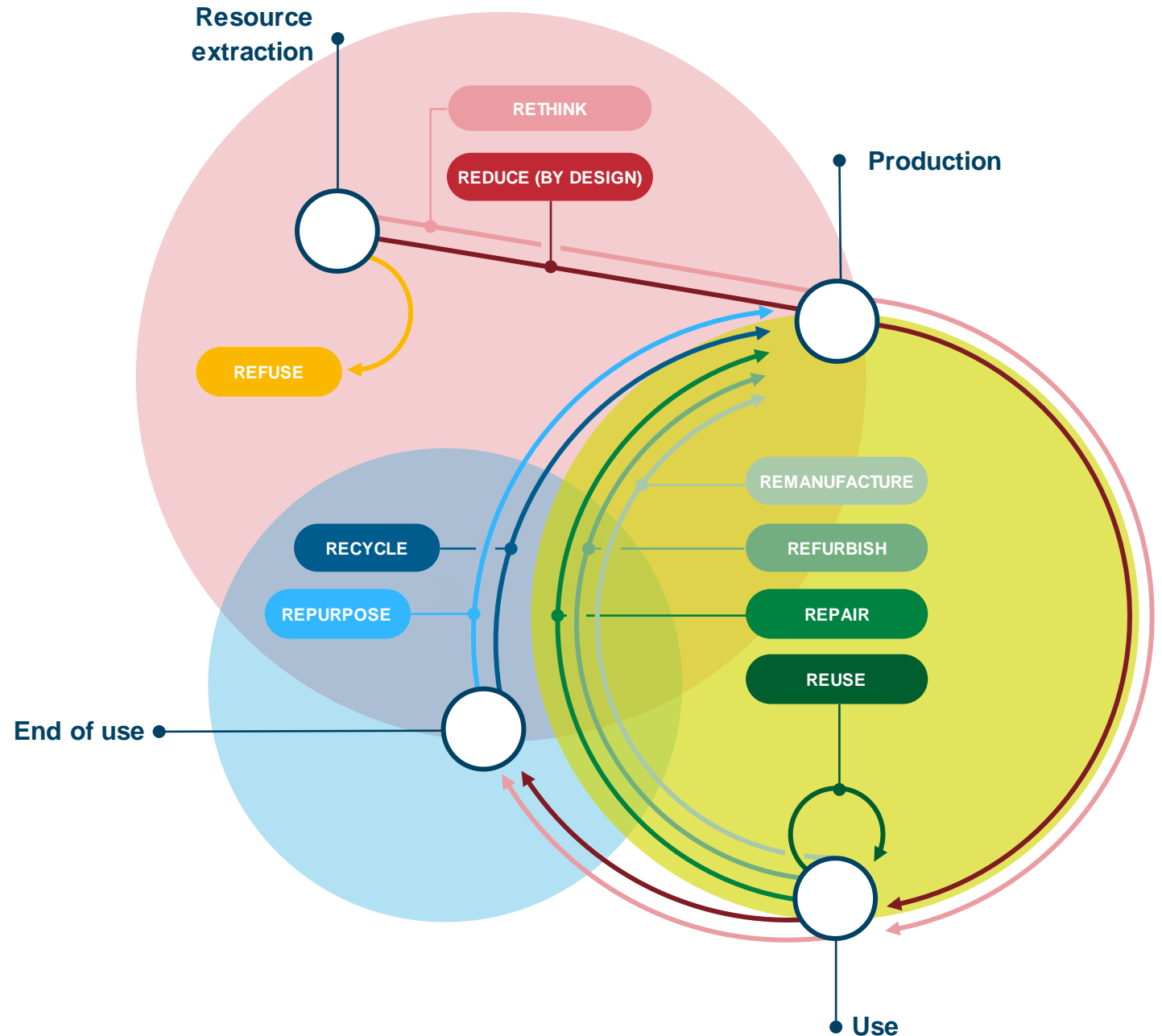




# R-Strategies as a framework

The **R-Strategies** cover the entire life of a raw material or product - starting with the extraction of resources, through the life of the product to the end of its life. All **R-strategies** aim to reduce the consumption of primary resources and promote the use of secondary raw materials. The various R-Strategies are divided into the following 3 phases:

-  **Narrow the Loop (Start of Design)**  
Reducing the consumption of resources, especially primary raw materials
-  **Slow the Loop (Product Life)**  
Extension and intensification of product use, value retention
-  **Close the Loop (End of Life)**  
Closing the cycle, reducing thermal recycling





# Standards support the Circular Economy

Standards play a key role in the transition to a **Circular Economy**: They create a common understanding of the concept and help to remove existing, mostly technical hurdles. They also help to standardize terminology and interfaces in order to ensure clear communication and an appropriate exchange of information between the various market players in the Circular Economy. In addition, standards help to achieve broad social acceptance of circular products and business models, which in turn is a prerequisite for circular products to become a successful economic model.

Requirements defined in **standards** can help to ensure that relevant R-Strategies are implemented in all phases of the product life cycle. On the following pages, the R-Strategies are explained and relevant standards are listed. These standards deal with the respective strategy and contain basic approaches for implementing it in your own process and product requirements. In addition to sector-specific Circular Economy standards, there are already some horizontal standards that describe overarching aspects of the Circular Economy (see figure on the right).

## HORIZONTAL CIRCULAR ECONOMY NORMS AND STANDARDS

The Circular Economy needs basic terminology, principles and common guidelines in order to be realized.

- [ISO/DIS 59004](#) | Circular Economy – Circular Economy - Terminology, Principles and Guidance for Implementation\*
- [DIN CLC/TR 45550](#) | Definitions related to material efficiency
- [DIN EN 4555x](#) | Series of standards on general methods for assessing the recyclability, the proportion of reused components and the proportion of recycled material content in energy-related products
- [prEN 45560](#) | Method to achieve circular designs of products

\* In addition, other important basic documents are currently being drafted in ISO TC 323 Circular Economy.



# Circular Thinking in Standards

## REFUSE

- Replacing with a product or replacing the function with a radically different (e.g. digital) product or service
- Avoiding or reducing the use of raw materials
- Avoiding waste through efficient/resource-conserving design of production processes

\*1, 2

↗ [DIN SPEC 59 / CEN GUIDE 4 / ISO Guide 64](#)  
Guide for addressing environmental issues in product standards

↗ [prEN 45560](#)  
Method to achieve circular designs of products

↗ [DIN EN IEC 62430](#)  
Environmentally conscious design (ECD) — Principles, requirements and guidance

## RETHINK

- Planning circular systems around the product, including reverse logistics
- Development of new business models, conscious choice of materials for cycles (replacement of substances of concern, material innovations)
- Intensification of product use (e.g. through product-as-a-service, reuse and sharing models or by offering multifunctional products on the market)

\*2, 3

↗ [DIN SPEC 59 / CEN GUIDE 4 / ISO Guide 64](#)  
Guide for addressing environmental issues in product standards

↗ [prEN 45560](#)  
Method to achieve circular designs of products

↗ [DIN EN IEC 62430](#)  
Environmentally conscious design (ECD) — Principles, requirements and guidance

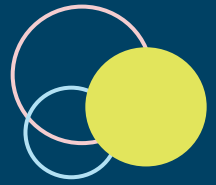
## REDUCE (BY DESIGN)

- Implementation of a product design that enables circularity (Design for Circularity)
- Increasing efficiency in the manufacture or use of products by using fewer natural (primary) resources and materials as well as energy
- Reduction of the ecological footprint

\*2, 3

↗ [prEN 45560](#)  
Method to achieve circular designs of products

↗ [ISO 14009](#)  
Environmental management systems – Guidelines for incorporating material circulation in design and development



# Circular Thinking in Standards

## REUSE

Reuse of a product or product part that still fulfills its function (and is not waste) for the same purpose for which it was designed, possibly after repair or refurbishment.

\*4



[E DIN/TS 35205](#)

Guide to re-use and preparing for re-use - Recommendations for setting up, implementing and optimizing corresponding business models



[DIN 31051](#)

Fundamentals of maintenance

## REPAIR

Repair of a defect product so that it can once again fulfill its intended use.

\*5



[DIN 31051](#)

Fundamentals of maintenance



[DIN EN 50614](#)

Requirements for the preparing for re-use of waste electrical and electronic equipment

## REFURBISH

Recovering materials from waste for reprocessing into new products, materials or substances for the original or another purpose.

\*6



[DIN EN 45553](#)

General method for the assessment of the ability to remanufacture energy-related products

## REMANUFACTURE

Creating a refurbished product with at least the functionality and performance of the original product from refurbished components of one or more used parts and new components.

\*7



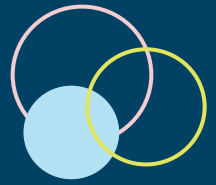
[DIN EN 45553](#)

General method for the assessment of the ability to remanufacture energy-related products



[DIN SPEC 91472](#)

Remanufacturing (Reman) - Quality classification for circular processes



# Circular Thinking in Standards

## REPURPOSE

Removing existing products and components from their context and creating new value, for example by giving them a new function

\*6



[ISO/DIS 59004](#)

Circular Economy –Terminology, Principles and Guidance for Implementation

## RECYCLE

Recovering materials from waste for reprocessing into new products, materials or substances for the original or another purpose.

Reprocessing of organic material, not energy recovery and reprocessing into materials for fuels or backfilling operations.

\*6, 8



[DIN SPEC 91446](#)

Classification of recycled plastics by Data Quality Levels for use and (digital) trading



[DIN EN 50625-1](#)

Collection, logistics & Treatment requirements for WEEE - Part 1: General treatment requirements



[DIN EN 45555](#), [45556](#) und [45557](#)

General methods for assessing the recyclability, the proportion of reused components and the proportion of recycled material content in energy-related products

# References

## Page 2

- 1 [Standardization Roadmap Circular Economy \(din.de\)](#)
- 2 Von Hauff, Michael: Basic knowledge of the circular economy - from the international sustainability concept to political implementation, 1st edition, Rübingen, Germany: UVK Editorial, 2023
- 3 Schmidt, Armando Garcia/Holzmann, Sara/Petersen, Thieß/Wortmann, Marcus: Sustainable Social Market Economy Focus Paper # 12 Circular Economy - A Key to a Sustainable Social Market Economy? 1st edition, Gütersloh, Germany: Bertelsmann Foundation, 2023

## Page 3

Source graphic: See Bocken et al., 2016, and UNEP 9R-Framework (based on Potting et al. (2017).

Source text: ISO/DIS 59004 Circular Economy - Terminology, Principles and Guidelines for Implementation

## Page 4

[Standardization Roadmap Circular Economy \(din.de\)](#)

## Page 5

- 1 Basel Convention, Revised glossary of terms
- 2 ISO/DIS 59004 Circular Economy - Terminology, Principles and Guidelines for Implementation
- 3 [Standardization Roadmap Circular Economy \(din.de\)](#)

## Page 6

- 4 Waste Framework Directive 2008/98/EG, Art.3 Nr.13
- 5 DIN **CLC**/TR 45550 Definitions related to material efficiency
- 6 Translation according to prEN 45560
- 7 DIN SPEC 91472 Remanufacturing (Reman)

## Page 7

- 6 Translation according to prEN 45560
- 8 Translation according to the Waste Framework Directive 2008/98/EG





## Circular Thinking in Standards

How standardization can support a Circular Economy

### CONTACT TO DIN

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The Circular Economy standardization roadmap is available at:



<https://www.din.de/en/innovation-and-research/circular-economy/standardization-roadmap-circular-economy>



Stay informed about standardization activities in the Circular Economy (German only)

[www.din.one](http://www.din.one)

Register and select "Circular Economy" as your area of interest