



SUNRISE

POLYVINYL BUTYRAL (PVB): A BOOST IN THE RECYCLING

An innovative approach of the Sunrise project

CEN Workshop Agreement on r-PVB
characterization

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Speaker presentation



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Outline

- 1) Standardization basics
- 2) Standardization organizations and deliverables
- 3) Draft CWA on r-PVB characterization
- 4) Summary and outlook



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Standardization

What is a standard?

A **consensus based document** that is approved by a recognized body (e.g. CEN)

- provides rules, guidelines or characteristics for activities or their results
- reflects the state-of-the art
- is based on the consolidated results of science, technology and experience

What is a standard good for?

Standardization promotes **knowledge and technology transfer** from research to markets

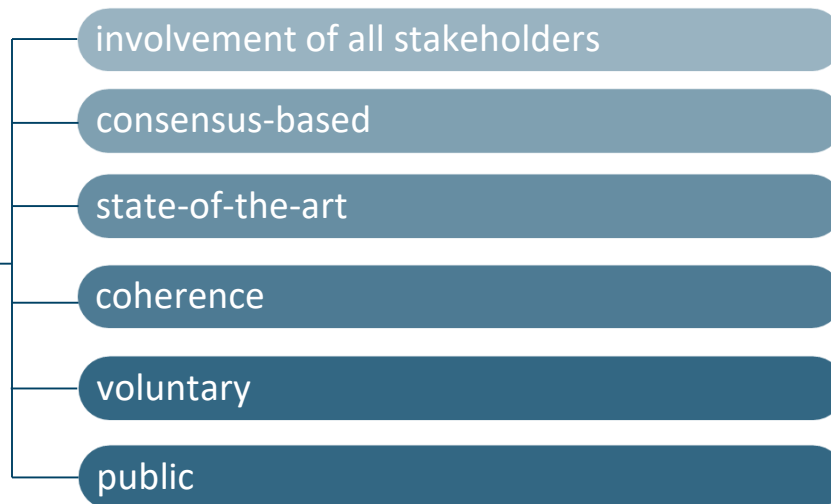
Standards make innovative know-how widely known and usable

Standardization **networks** relevant actors



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Principles governing standardization work



Unlike laws, standards are not legally binding. Their use only becomes binding when this is stipulated in legislation or in a contract.



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Benefits of standards

Standards and specifications

- enhance the safety of products
- promote the interoperability of products and services
- facilitate trade by diminishing trade barriers
- promote common understanding
- support environmental sustainability
- facilitate the uptake of innovation in the marketplace
- reflect the outcome of research and development



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Standardization organizations (national, European, international)

- ✓ Provide **platform for stakeholders** in a specific area to come together and reach a **consensus**
- ✓ Help to ensure that the system respects the WTO principles of **transparency, openness, coherence, consensus**
- ✓ Support established Technical Bodies in the development of their standardization/pre-standardization deliverables



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European Standardization Organizations (ESOs)



European Committee for Standardization



European Committee for Electrotechnical Standardization

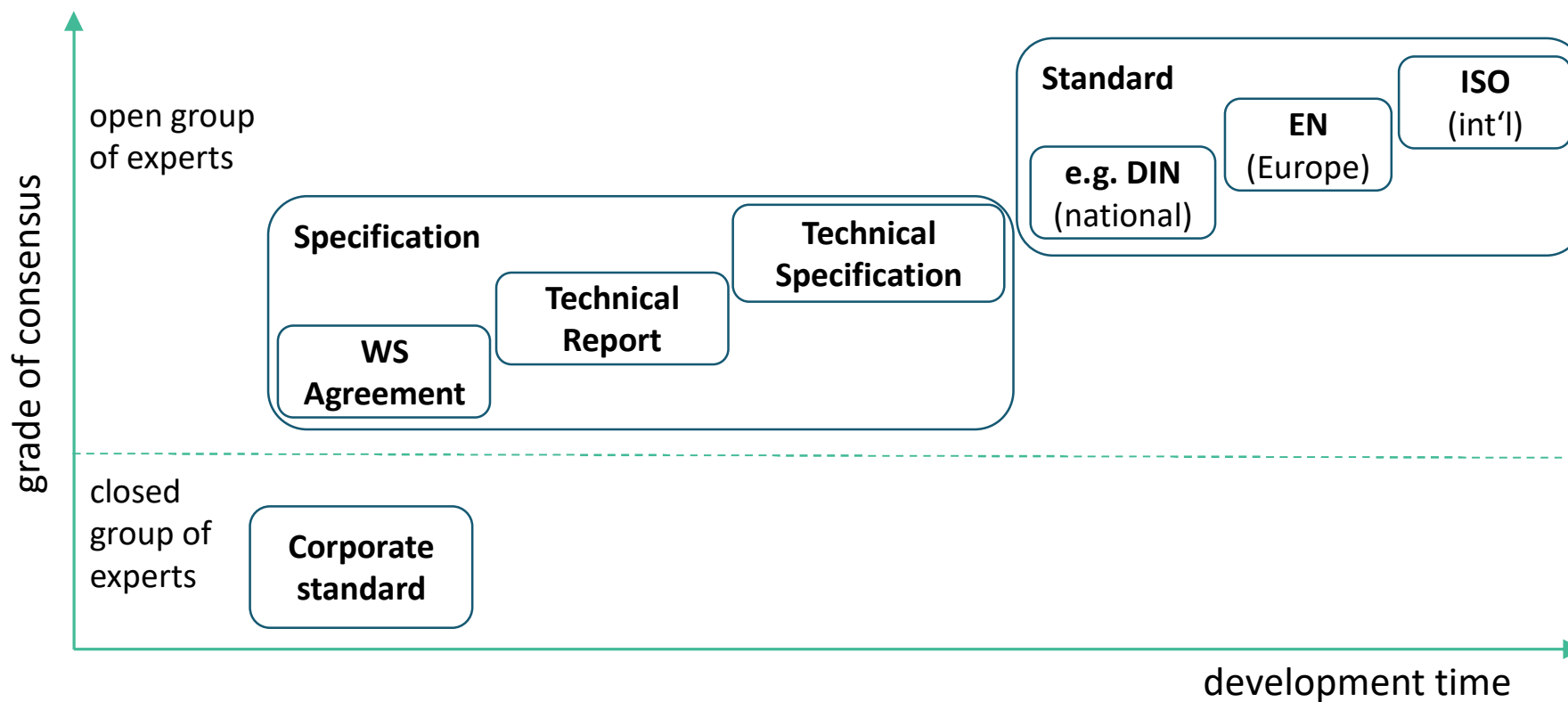


European Telecommunications Standards Institute



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Standardization deliverables



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CEN deliverables

Developed in **Technical Committees** by national delegates/experts:

- European Standards – **EN**
- Technical Specifications – **CEN/TS**
- Technical Reports – **CEN/TR**

Developed in **Workshops** with individual interested parties:

- CEN Workshop Agreements – **CWA**

→ Can be the basis for a European or international standard at a later stage



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CEN Workshop concept

- ✓ Flexible working platform:
 - Light procedures
 - Direct and voluntary participation of stakeholders**
 - Participants decide on the working arrangements

- ✓ Open to any company or organization:
 - Inside or outside Europe**
 - Public process

- ✓ Rapid elaboration of **documents** (10 – 12 months)
 - Few physical meetings
 - Work by electronic means encouraged



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Standardization activities in the SUNRISE project

AIM

Supporting market player to use r-PVB in various applications

Possible standardization activities for research projects:

Launching of a CEN Workshop to draft a CEN Workshop Agreement, CWA



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Investigated applications for r-PVB in the SUNRISE project

- Safety glass used in building, road vehicles and railway applications
- Photovoltaic applications
- Peelable coatings
- Carpet production
- Batteries

➤ r-PVB needs to meet the requirements of these applications



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New CEN Workshop „rPVB“ initiated by SUNRISE

Title: *Plastics – Recycled plastics – Characterization of polyvinyl butyral (PVB) recyclates*

Kick-off meeting: 12th April 2024 at DIN, Berlin (Germany) with hybrid option

Scope:

- defines a method of specifying delivery conditions for r-PVB
- gives most important characteristics and associated test methods for assessing r-PVB
- intended to support parties involved in the use of r-PVB to agree on specifications for specific and generic applications



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Core elements of draft CWA (1)

Characteristics of PVB recyclates are given in Table 1 and are divided into two types:

- a) mandatory characteristics (M) required to characterize PVB recyclates in general and required for all applications
- b) optional characteristics (O) needed to characterize PVB recyclates according to customer specifications and specific applications

Table 1 also includes the associated test methods

In addition, each batch shall be accompanied by an information stating:

- product name
- intended (suitable) application(s)



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Core elements of draft CWA (2)

Mandatory PVB characteristics to be reported

- Ash content [in accordance with EN ISO 3451-1:2019, Method A]
- Colour [visual inspection]
- Impurities [based on ISO 12418-2:2012, Annex A]
- Original application [Supplier to declare]
- Plasticizer content [in accordance with ISO 11358-1]
- Residual humidity [in accordance with EN 12099]
- Yellowness index [in accordance with ASTM E313 or ISO 17223]



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Core elements of draft CWA (3)

Optional PVB characteristics to be reported

- Adhesion to glass [to be agreed]
- **Colour [EN ISO/CIE 11664-4]**
- Elasticity modulus [EN ISO 178]
- Flexural modulus [EN ISO 178]
- Filtration level [mesh size]
- Flowability [qualitative assessment]
- **Glass transition point [EN ISO 11357-2]**
- **Haze [ASTM D1003 or ISO 14782]**
- **Light transmittance [ASTM D1003]**
- Melt mass-flow rate [EN ISO 1133-1]
- Refractive index [EN ISO 489]
- Tensile stress at yield and tensile strain at break [EN ISO 527-1 EN ISO 527-2 EN ISO 527-3]
- Thermal conductivity [to be agreed]

For laminated glass applications: optional characteristics in **bold** are mandatory



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Draft CWA on r-PVB characterization – Next steps

- 30 days public commenting period from 2024-10-01 to 2024-10-31
- resolution of comments at final CEN/Workshop meeting on 2024-11-26
- publication of CWA on r-PVB characterization beginning of 2025
- submission of CWA to CEN/TC 249/WG 11 „Plastics recycling“ for conversion in CEN/TS or EN



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CWA lifetime

- ✓ valid for 3 years; then participants of Workshop decide whether to:
 - confirm for 3 years
 - revise
 - withdraw
- ✓ maximum validity of a CWA: **6 years**; then either withdrawn or transformed into another deliverable
- ✓ At any point during the CWA lifecycle, a TC may decide to transform it into another deliverable, following the normal standard development process



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Interaction with existing standardization bodies

Liaison with CEN/TC 249 “Plastics”

and its working group WG 11 “Plastics recycling”

which published the standards series EN 1534x, *Plastics – Recycled plastics – Characterization of [plastic name] ([abbreviation of the plastic]) recyclates*

WG 11 to use CWA, *Plastics – Recycled plastics – Characterization of polyvinyl butyral (PVB) recyclates* as basis for new work item proposal for an EN (European standard) in the next years



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Summary and outlook

Aim of CWA: promote and facilitate use of PVB recyclates

Characteristics (mandatory and optional) of r-PVB defined including test methods

Use CWA as basis for agreement between interested parties on r-PVB specification

CWA on r-PVB characterization will be available for free download beginning of 2025 from the following website

<https://www.cencenelec.eu/get-involved/research-and-innovation/horizon-europe-projects/cwa-download-area/>

Conversion of CWA into European standard (EN) by CEN/TC 249 “Plastics” in the future (3 – 6 years)



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Thanks for your attention!

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Referenced standards (1)

EN 12099, *Plastics piping systems — Polyethylene piping materials and components — Determination of volatile content*

EN ISO 178, *Plastics — Determination of flexural properties*

EN ISO 489, *Plastics — Determination of refractive index*

EN ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

EN ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

EN ISO 527-3, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets*

EN ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*



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Referenced standards (2)

EN ISO 3451-1:2019, *Plastics — Determination of ash — Part 1: General methods (ISO 3451-1:2019)*

EN ISO 11357-2, *Plastics — Differential scanning calorimetry (DSC) — Part 2: Determination of glass transition temperature and step height*

EN ISO 11358-1, *Plastics — Thermogravimetry (TG) of polymers — Part 1: General principles*

EN ISO/CIE 11664-4, *Colorimetry — Part 4: CIE 1976 L*a*b* colour space*

ISO 12418-2:2012, *Plastics — Post-consumer poly(ethylene terephthalate) (PET) bottle recyclates — Part 2: Preparation of test specimens and determination of properties*

ISO 14782, *Plastics — Determination of haze for transparent materials*

ISO 17223, *Plastics — Determination of yellowness index and change in yellowness index*



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Referenced standards (3)

ASTM D1003, Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics

ASTM E313, Standard Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates



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